MISSISSAUGA CYCLING MASTER PLAN

shifting gears for a healthier city

DRAFT - MARCH 2010

iTRANS Consulting Inc.
VICTOR FORD AND ASSOCIATES INC

MISSISSAUGA
Leading today for tomorrow

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City of Mississauga

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March 2010 - Draft Report

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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 skillful leadership, insight and commitment to this project.

He will be missed.

City Project Team

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EXECUTIVE SUMMARY

1 Introduction

The Cycling Master Plan was developed with the input of over 1,000 Mississauga citizens and stakeholders and led by a team of active transportation planning specialists, iTRANS Consulting Inc and Victor Ford & Associates Inc. Area municipalities, approval agencies and transit authorities were consulted in the development of this plan.

The Mississauga Cycling Master Plan gives focus to the ongoing effort to incorporate cycling into our City's way of life

Mississauga Cycling 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.

Adoption of this Master Plan will provide a strategy to connect the City to its many communities, provide healthy recreational opportunities and support a significant transportation mode. Cycling should be a part of life for citizens and stimulate tourism and economic growth. The Cycling Master Plan is informed by successful international precedents and inspired by the leadership Mississauga can show to the World.

The Cycling Master Plan is a document with initiatives which has been developed based on a collaborative and comprehensive approach. Having regard for national and international best practices as well as relevant legislation and guidelines, the plan recommends appropriate standards for the design, construction, and operation of a safe, comprehensive and cost-effective cycling network in the City of Mississauga. These standards, supported by a sustainable financial, promotional and educational program will assist the City in achieving its vision for cycling.

The plan establishes a long-term strategy for a 20-year planning horizon. An Implementation strategy will be developed based on the recommendations of the Cycling Master Plan. To ensure that the Cycling Master Plan remains valid, a review and update of the plan will occur approximately every five years.

Goals and Recommendations

Three Goals have been established with the following recommendations which address each of the three Goals.

GOAL 1
Foster a Culture where Cycling is an Everyday Activity

1. Establish a "cycling office";
2. Increase the transportation modal split for cycling to 10 % of all weekday trips;
3. Promote cycling to schools;
4. Increase awareness of cycling as an active transportation mode;
5. Increase awareness of cycling network and facilities;
6. Foster community cycling events;
7. Develop partnerships to implement the education and awareness program;
8. Establish a tourism campaign focused on cycling;
9. Establish a regulatory framework to ensure the provision of bicycle destination amenities on private lands;

GOAL 2
Build an Integrated On-Road and Off-Road Cycling Network as Part of a Multi-Modal Transportation System

10. Add an average of 30 kilometres of bicycle lanes and multi-use trail per year over 20 years;
11. Seek partnership opportunities to complete the cycling network;
12. Give priority to completing network links to existing higher order transit terminals;
13. Develop and implement a comprehensive signage and way-finding system;
14. Provide cycling routes within 500 metres of all residents and publicly funded schools;
15. Ensure that 95% of the population are within 1 kilometre of a primary cycling route;
16. Ensure that all nodes are connected by cycling routes;
17. Promote bicycle parking at all major transit facilities within 5 years;
18. Incorporate connecting bicycle links into future higher order transit plans;
19. Incorporate destination amenities within libraries and community centres within 5 years;
20. Connect all major natural and cultural destinations by cycling routes;

GOAL 3
Adopt a "Safety First" Approach for Cycling in Mississauga

21. Continually reduce cyclist incident rates;
22. Develop an asset management plan for all cycling facilities;
23. Establish an educational plan for motorists and cyclists;
24. Establish cross-sections within the City's road rights-of-way for safe cycling facilities;
25. Work with partners to develop standard designs for safe intersection crossings.

Implementation Strategy

Implementation is projected over a 20 year planning horizon and will include timing, anticipated costing, life-cycle opportunities of existing road infrastructure and experience of other jurisdictions. This is consistent with the rate of implementation of other progressive cycling cities in Canada, such as Montreal and Vancouver. It is recognized that the rate of implementation of the cycling network will be dependant upon the degree and rate of funding allocated through the City capital programs and external funding sources.

Short, medium and long-range targets for implementation of bicycle routes will be established in the Implementation strategy. Priorities for implementing the cycling network will be assessed based on the vision of the Master Plan, principles identified by MCAC and through the public engagement sessions.

The first priorities will include routes that meet one or more of the following criteria:

- Develop a core grid network of major north / south / east / west routes.
- Recognize the City Centre as the primary activity centre and destination.
- Connect to other key City destinations.
- Provide cycling route connectivity in cycling routes.
- Achieve feasible low cost "early wins" to demonstrate successes.

2 Policy

The Cycling Master Plan provides an opportunity to consolidate policy for achieving the vision for cycling in the City of Mississauga. The City recently completed its Strategic Plan and is in the process of developing a new Official Plan, Transportation Master Plan and other strategic planning documents. These planning initiatives are developed with guidance from Provincial and Regional policies, including the *Places to Grow Act (2006)* and the Metrolinx Regional Transportation Master Plan.

The Cycling Master Plan has been prepared in response to policy directions contained in the Provincial Policy Statement (2005)[1] and Places to Grow Growth Plan for the Greater Golden Horseshoe (2006)[2] that promote healthy communities, an efficient land use pattern, density and mix of uses that seek to minimize the length and number of vehicular trips in favour of more active and sustainable modes of transportation. The plan also embraces the Metrolinx Regional Transportation Plan objectives for pedestrian, transit and cycling friendly communities and connected destinations that support the regional and municipal urban structure.

[1] Municipal Affairs and Housing (2005)
[2] Ministry of Energy and Infrastructure (2006)

The plan supports Mississauga's Strategic Plan with direct links to the following Pillars for Change: Developing a Transit-Oriented City, Completing Our Neighbourhoods and Living Green. The plan creates a comprehensive and integrated cycling network of on-road and off-road routes to connect communities and destinations.

3 Cycling Demand

According to the 2006 Transportation Tomorrow Survey (TTS)[3] 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. The TTS also indicates the following:

- 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 home based discretionary trips (leisure), and work trips; and
- Cycling demand along major corridors is highest in the vicinity of destinations such as City Centre, neighbourhood centres, Clarkson, Port Credit and the Waterfront Trail and GO stations.

Surveys have indicated that there is latent demand for cycling in Mississauga. Smart Commute Mississauga conducted a survey of employees within Mississauga in 2008. The survey indicated that 13.4% of respondents would be willing to try cycling on a more regular basis if secure bicycle parking, and shower and change room facilities were available at places of employment.

The Master Plan's public engagement survey results indicate that the public's main reason for not riding a bicycle is the lack of safe cycling routes.

4 Staffing/Partnerships

The planning, design, implementation, operation, and promotion of the cycling network will require dedicated City of Mississauga staff resources to provide day-to-day direction and management. Current and new tasks will include capital works planning and programming for cycling infrastructure including trip end facility design, construction and maintenance. Also required will be off and on-road trail design, construction management, field inspection and rehabilitation, asset management and seasonal maintenance. Staff will also be responsible for establishing cycling policies and by-laws and conducting community consultation; bicycle demand monitoring and cycling demand count programs; business planning and programming for cycling infrastructure; maintenance of website content related to cycling; manage issues of

[3] www.transportationtomorrow.on.ca

risk and liability related to cycling; and formal reporting to council. There is tremendous opportunity for partnership building on the existing work with the Mississauga Cycling Advisory Committee and the potential for new partnerships, promotion and coordination of community events, and the establishment and management of training programs.

Mississauga will establish a dedicated "cycling office" to oversee and coordinate all cycling activities in the City.

5 Network Development

The development of a city-wide cycling network includes the establishment of primary and secondary bicycle route networks and supportive infrastructure, such as bicycle parking and other trip-end facilities. Table 1-1 illustrates the proposed increases in the cycling network system from 202 kilometres today to 891 kilometres proposed.

In developing primary routes, the City will balance the competing needs between the feasibility and configuration of primary cycling routes and other corporate objectives or operational needs. On-going and anticipated studies will investigate the feasibility and appropriateness of cycling routes on corridors (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 from Existing	% of Total Network
Primary Routes (Bicycle Lanes, Shared Use Lanes, Multi-Use Trails)	48 km	202 km	**250 km**	520%	28%
Secondary Routes (Bicycle Lanes, Shared Use Lanes - sharrows, signed route / edge lines)	100 km	250 km	**350 km**	350%	39%
Off-Road Multi-Use Trails	202 km	89 km	**291 km**	144%	33%
Total	**350 km**	**541 km**	**891 km**	**255%**	**100%**

6 CYCLING ROUTE DESIGN

Cyclists must co-exist with other modes of travel including vehicles on-road, pedestrians and other users within the boulevard and on the off-road multi-use trail system. Design standards for the City of Mississauga will accommodate the range of cyclist skill categories and facility types and keep safety as a key consideration.

7 DESIGN STANDARDS

The design standards for cycling infrastructure will be based on best practices from other jurisdictions within Canada, the U.S and Europe. Mississauga will design bicycle routes using a range of facility types including bicycle lanes, multi-use trails, "sharrows", multi-use park pathways in order to provide a safe environment for cyclists of all ages, abilities and preferences.

The primary challenge for Mississauga is in retrofitting the existing road network to accommodate cycling, given that the City is substantially built out and there is a need to balance the requirement for safe facilities with fixed standards that may not be able to be accommodated.

Design Issues Under Review

Crossrides
The ability to ride through an intersection outside the travelled portion of the road (i.e. across a multi-use trail) without dismounting at both signalized and un-signalized intersections is being researched and developed for consideration by the Ministry of Transportation (MTO). 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. The pilot project has been implemented within two un-signalized 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 using a "sharrow" lane must share the road with motor vehicles in the curb lane, (i.e. there is no separate bicycle lane). Sharrows are implemented if there is adequate pavement width in the curb lane (4 metre minimum) to safely accommodate both cyclists and vehicles.

Edge Lines
Edge lines are a solid white pavement marking, typically offset from 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 the use of edge lines.

8 NETWORK OPERATION

One of the primary reasons the City of Mississauga has been successful in providing quality recreational trails, has been its commitment to the construction and maintenance of high quality facilities. 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.

9 Signage and Way-Finding

The principle of the three D's is recommended to organize the way-finding information on cycling signage. The three D's include:

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 located 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 by providing confirmation that cyclists are where they expect to be.

10 Bicycle Parking and Amenities

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

Cyclists' needs for bicycle parking may vary depending on the nature of the trip and destination. Facilities should be designed to accommodate showers/change areas for destinations drawing longer trips, security to address risk of vandalism depending on location and length of visit and sheltered parking for adverse weather conditions.

The plan seeks to incorporate bicycle parking at major City destinations and transit terminals and establish a regulatory framework to ensure the provision of bicycle parking on private lands.

11 Education and Promotion

Mississauga will work with existing programs and partners and seek new partnerships, to develop opportunities to advance the education of cycling safety in the City using the premise that 'safety is everyone's responsibility'.

The following is a list of existing programs and partners:

- CAN-BIKE courses
- Education Campaign (e.g. "share the road" and "share the trail")
- City transit driver education
- Commercial vehicle operator education
- Stakeholder Involvement - Traffic Safety Council, Road Safety Mississauga
- Peel Region Police and Mississauga Fire and Emergency Services Outreach
- Bicycle Theft Prevention (proper bicycle parking)
- Education on proper attire (e.g. reflectivity, cycling in inclement weather)
- Institutionalizing Bicycle Safety Education (e.g. inclusion of cycling skills within physical education programs and studying role of active transportation within environmental studies curriculum)

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

- incorporating bicycle parking in prominent locations in new development;
- increasing visibility of bicycle infrastructure such as bicycle lanes and signage; and
- proactive marketing campaigns, coordinated with cycling partners that highlight the benefits of cycling for specific user groups and target audiences.

1.0 INTRODUCTION

1.1 Mississauga's Vision for Cycling

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 Goals of the Mississauga Cycling Master Plan are:

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

The applicable recommendations to achieve each of these Goals are included at the beginning of each section of the document as well as listed in section 12.

1.2 Benefits of Cycling

The benefits of cycling as an activity and mode of travel are well documented. The development of a comprehensive cycling strategy provides focus and direction in increasing bicycle use and realizing benefits that include:

- integrating healthy, physical activity into everyday travel, fostering active lifestyles;
- reducing transportation costs;
- reducing traffic congestion and carbon dioxide emissions;
- conserving energy resources; and
- contributing to a more connected community.

The physical exercise gained from cycling is generally linked with increased health and well-being. According to the World Health Organization (WHO), physical inactivity is the second highest health risk in developed countries and is associated with many tens of billions of dollars of healthcare costs. Cycling can minimize the risk of coronary heart disease, strokes, diabetes and cancer. Cycling helps manage blood pressure and stress, is efficient at boosting metabolism levels, and contributes to reduced obesity. Cycling can contribute to lower health care costs in the order of $100 to $400 per person (Source: National Cooperative Highway Research Program (NCHRP) Report 552 - Guidelines for Analysis of Investments in Bicycle Facilities).

Cycling is a cost effective mode of travel. The cost and maintenance of bicycle ownership is substantially less than a motor vehicle. The annual cost of operating a motor vehicle, including fuel, insurance, maintenance and parking, is between approximately $8,000 and $15,000 (Source: Canadian Automobile Association Driving Costs, 2008).

Cycling can be developed and promoted as a viable means of transportation in Mississauga, helping to address traffic congestion. Opportunities exist through the development of a commuter cycling grid, allowing bicycling to compete with other modes for longer distance commuter travel.

It is broadly recognized that changes in world climate due to Greenhouse Gases (GHG) would influence the functioning of many ecosystems and their member species. Travel accomplished by biking and other active modes that do not generate GHG emissions can be encouraged through the establishment, design, and maintenance of parks, trails and bicycle lanes.

Cycling friendly neighbourhoods can improve the liveability of streets, increasing public presence for safety and security and contributing to the sense of place and belonging.

2.0 POLICY

RECOMMENDATIONS:

9. Establish a regulatory framework to ensure the provision of bicycle destination amenities on private lands;
17. Promote bicycle parking at all major transit facilities within 5 years;

"Mississauga is on its way to becoming a complete community. A "complete" community is one within which individuals can live, learn, work and play. It's a community where you can achieve your daily needs through easy access to active transportation, such as walking, cycling or taking the bus." – 2009 Strategic Plan: Our Future Mississauga

2.1 Strategic Planning Initiatives

The Cycling Master Plan provides an opportunity to consolidate policy for achieving the vision for cycling in the City of Mississauga. The City of Mississauga recently completed its Strategic Plan and is in the process of developing a new Official Plan, Transportation Master Plan and other strategic planning documents. These planning initiatives are developed with guidance from Provincial and Regional policies, including the *Places to Grow Act* and the Metrolinx Regional Transportation Master Plan.

The following Provincial, Regional and City policy documents were reviewed to develop "harmonized" bicycle policies to provide direction for the planning, design, implementation and operation of cycling initiatives in Mississauga:

- 2005 Provincial Policy Statement Ontario Ministry of Municipal Affairs and Housing.
- 2006 Places to Grow, Ontario Ministry of Infrastructure Renewal.
- 2006 Ontario's Action Plan for Healthy Eating and Active Transportation, Ontario Ministry of Health.
- 2002 Long Range Transportation Master Plan, Region of Peel.
- 2004 Transportation Demand Management Study Report, Region of Peel.
- 2005 Region of Peel Official Plan, Region of Peel, Office Consolidated.
- 2008 Regional Transportation Master Plan, Metrolinx.
- 2009 Strategic Plan: Our Future Mississauga, City of Mississauga.

Table 2-1 describes the directions and actions from the 2009 Strategic Plan: Our Future Mississauga and are relevant to the establishment of a cycling city.

Table 2-1: Strategic Plan Directions and Actions

Strategic Pillar for Change - Developing a Transit-Oriented City
Action 1: Provide "complete streets" that balance land uses and forms. *We will pursue "road diets" and give priority to "complete streets" that accommodate cycling and/or transit.*
Action 6: Shorten the travel time to a transit stop. *We will complete the pedestrian and cycling network in nodes and corridors within 500 metres (a 10 minute walk) of all transit stops.*
Action 7: Create mobility hubs. *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.*
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
No specific actions
Strategic Pillar for Change - Living Green
Recommendations in the Cycling Master Plan are consistent with Goal 1, "Lead and Encourage Environmentally Responsible Approaches" and Goal 3, "Promote a Green Culture".

2.2 Existing City Policies

The City of Mississauga through its existing Official Plan, Mississauga Plan, articulates the current policy for the planning of cycling and walking infrastructure in the City. The policies in the Official Plan place emphasis on the development of the trail system, however the list of policies includes more broad accommodation of cycling as noted below:

- "Design standards 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.

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

- To plan and manage a balance of transportation choices to reduce the reliance upon any single mode and promote transit, cycling and walking.
- To develop a multi-modal transportation network.
- Mississauga will ensure that pedestrian and cycling facilities are integrated into the transportation network to provide safe, comfortable travel for pedestrians and cyclists within existing communities and new development and to provide linkages between intensification areas, adjacent neighbourhoods, and transit stations, including facilities for cyclists on the major road network as determined through future studies.

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, cross rides at unsignalled 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.

2.3 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 needs to 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. The City's current Parks By-law and the Traffic By-law will be reviewed in order to meet this objective.

3.0 CYCLING DEMAND

RECOMMENDATIONS:

2. **Increase the transportation modal split for cycling to10% of all weekday trips;**

Cycling demand in Mississauga can be expressed as:

1) actual observed cycling activity, measured through observed or reported trips, and;
2) potential cycling activity, reflecting latent cycling demand.

Observed cycling demand can be collected through counts and surveys of travel behaviour. Potential cycling demand can be estimated through attitudinal surveys and through measurements of the effects of new cycling infrastructure on the level of cycling activity.

The City of Mississauga, like most other jurisdictions, does not have a formal monitoring program for measuring cycling activity. However, the following sources provide insight into current cycling demand 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.
- Documented research on cycling demand before and after infrastructure investment.

3.1 Current Cycling Activity

Mississauga is the sixth largest city in Canada, and currently home to over 730,000 residents and the destination of 400,000 employees. There are approximately 3,500 daily weekday cycling trips (0.3% of all trips) in Mississauga (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. Mississauga has made significant strides in the development of cycling routes since the completion of the *"Mississauga Multi-Use Recreational Trail Study: 2001 Review of the Bicycle and Pedestrian Route Study"*. Successes have included:

- Completion of 200 kilometres of off-road multi-use trails
- Completion of 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) is a survey of travel behaviour of residents within the Greater Golden Horseshoe Area (GGHA). The TTS is undertaken every 5 years (most recently in Fall 2006) to collect information on the travel behaviour on a typical weekday. The survey questions focus on travel by members of the household who are over 11 years of age for all trips from one location to another by any form of transport.

Key findings of the 2006 survey include the following:

- 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 home based discretionary trips (leisure), and work trips.

Often, comparisons are made between European and Canadian cities regarding cycling characteristics. According to the 2006 CROW Design Manual for Bicycle Traffic, 72% of all cycling trips in Holland are 5 kilometres or less. In addition, approximately 46% of all cycling trips are education related trips. These statistics are comparable to those found in Mississauga as indicated above.

Cycling activity within the City of Mississauga is also comparable to the level of demand in other Greater Toronto Area (GTA) jurisdictions. **Table 3-1** illustrates the level of cycling activity in Mississauga relative to other municipalities in the GTA, based on 2006 TTS data. It should be noted 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 in Mississauga. The 2006 Census, Statistics Canada indicates 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. This is a 0.2% increase relative to the 2001 census. The TTS indicates an increase in cycling activity from 0.26% to 0.27% between 2001 and 2006. This modest increase may be in part attributable to the investment in walking and cycling trails since the *"Mississauga Multi-Use Recreational Trail Study: 2001 Review of the Bicycle and Pedestrian Route Study.*

3.1.3 Distribution of Cycling Demand

The Cordon Count Program, conducted by the Region of Peel, provides counts of 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). Site specific counts have been undertaken by the City of Mississauga, to assess cycling demand on high activity corridors.

Figure 3-1 illustrates a snapshot of the most recent demand in Mississauga for a typical weekday.

Figure 3-1: Weekday 15-Hour Two-Way Cycling Demand

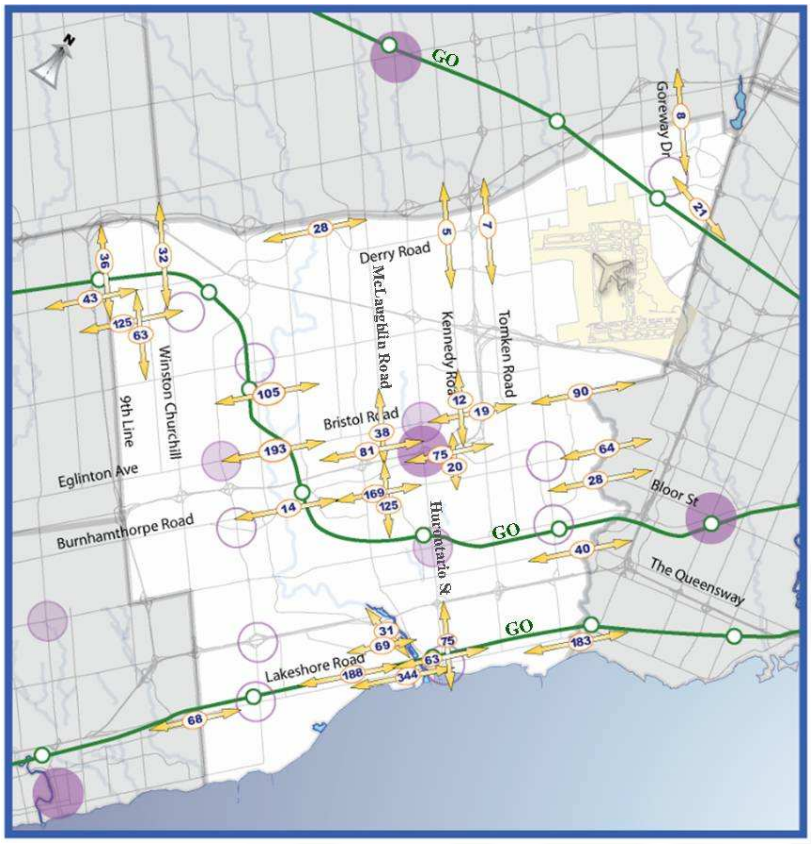


Figure 3-1 illustrates that the cycling volumes along major corridors are modest, 1% or less of travel by all modes (automobiles, transit, walking). The highest demand for cycling has been measured along Burnhamthorpe Road, the Waterfront Trail, Lakeshore Road, Eglinton Avenue West, Aquitaine Drive,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

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

Cycling count information is not available on community streets, however given that school trips represent approximately half of cycling trips in Mississauga, it is anticipated that cycling volumes on trails and roads in proximity to schools are a significant percentage of travel.

The implementation of "Bicycle Sensitive Inductive Loop Traffic Counters" could be installed to improve the data available for bicycles without incurring the high costs of performing manual counts. Regular counts can be used to develop short-term and long-term trend information, usage estimates for new bikeways, and evaluations of new facilities. Inductive loops should be installed in locations where cars or other vehicles cannot be mistakenly counted, either on multi-use trails or locations on bicycle lanes where motor vehicles do not cross over it. **Image 3-1** illustrates what loop traffic counters could be located within an on- and off-road cycling route in Mississauga.

Re-use and re-calibration of older counters can perform counts every month for a one-week period or on a continuous basis, 24 hours a day, year round for newer counters. The loops must be installed on asphalt multi-use trails or on bicycle lanes where vehicles are unable or unlikely to trigger the counter. Use of other technology such as pneumatic tubes and pyroelectronic sensors can also be used to collect cyclist count data.

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

Example Future Locations

Eglinton Avenue Multi-Use Trail

Tenth Line Bicycle Lane

3.2 Potential Cycling Activity – Latent Demand

3.2.1 Measures of Latent Demand

Smart Commute Mississauga conducted a survey of employees within Mississauga, in 2008, to identify existing cycling levels and factors affecting demand. The results indicate that there is a high potential for increased demand for cycling in the City. The survey indicated that 13.4% of respondents would be willing to try cycling on a more regular basis. The factors most likely to encourage cycling are the construction of cycling routes and the provision of "trip-end" facilities including secure parking and the availability of shower and change room facilities. **Table 3-2** provides a summary of 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 indicated that 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 identified that they 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 that would encourage an individual to bike to work more often: 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 the online and Public Engagement Session Survey conducted as part of the Cycling Master Plan. There were over 600 respondents to the surveys. Approximately 90% of respondents indicated that they would ride their bicycle to parks, community centres, schools, commercial centres and places of employment if there were secure bicycle racks or lockers. Over 50% of respondents 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.

3.2.2 Priority Initiatives

The highest cycling demand in the City of Mississauga is for short distance and school oriented trips. Hence the promotion of cycling to school and cycling to shop represent key opportunities for increasing cycling demand and activity.

The provision of secure bicycle parking at schools and coordinated programs in addition to the development of the community cycling network can contribute to this opportunity. Other priorities include: cycling demand along major corridors is highest in the vicinity of key destinations such as City Centre, Port Credit and the Waterfront Trail, neighbourhood centres and GO stations; a 'Primary Grid' spine should be a priority initiative to allow for continuous

north-south and east-west routes to the City Centre and a continuous route along the lake shore; and cycling connections to GO stations should also be a priority initiative.

3.3 Effects of Cycling Investment on Demand

Investment in cycling infrastructure, through the provision of bicycle lanes, trails and trip end facilities will improve cyclist safety and sense of security. Investment will also help to reduce barriers to cycling, which is expected to contribute to increased demand.

The ability to predict cycling demand on individual corridors in Mississauga requires existing cycling ridership data and established relationships between cycling demand and route characteristics. The availability of this information in Mississauga is limited.

Future cycling demand can be estimated using traditional travel demand methods as outlined below.

Comparison Method – Based on comparison to the demand in similar environments adjusted to reflect different population and land use characteristics. Other municipalities have seen increased cycling activity with investment in cycling. The Cities of Portland and San Francisco are generally considered among the top cycling jurisdictions in the United States. These two cities have had success with the *"build it and they will come"* approach to cycling investment.

- **City of Portland**: Eight selected corridors showed a consistent increase in cycling after bicycle lanes were installed resulting in a 137% average increase in ridership.

- **City of San Francisco**: Increase in ridership witnessed at 8 locations in the City ranging from 23% to 83%.

These results suggest that a significant increase in cycling demand (as much as double) is feasible, in the shorter term, through improved cycling infrastructure. The findings were assessed based on interim development of the cycling network. Projected increases in cycling demand upon the completion of the cycling system ranged from 250% to 300%. Investment in cycling related infrastructure and programs such as bicycle parking, promotion, grade separation projects and upgrades to existing facilities have resulted in ridership increases documented through European examples. **Table 3-3** compares European cities that have experienced significant mode share increases directly related to investment in cycling. For these jurisdictions, cycling represents a significant proportion of travel.

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%
Frailburg	16	10%	+4.4%
Munster	11	29%	+3.6%
Berlin	13	10%	+3.2%
Zurich	20	7%	+2.3%
Delft	6	40%	+1.2%

The travel characteristics within Mississauga can contribute to high cycling demand and much higher levels of cycling activity than currently exist. The high percent of short distance trips in Mississauga is conducive to cycling travel. However, given the low urban density, suburban street patterns and the City's urban form, the modal share for cycling may not meet levels of more successful European Cities.

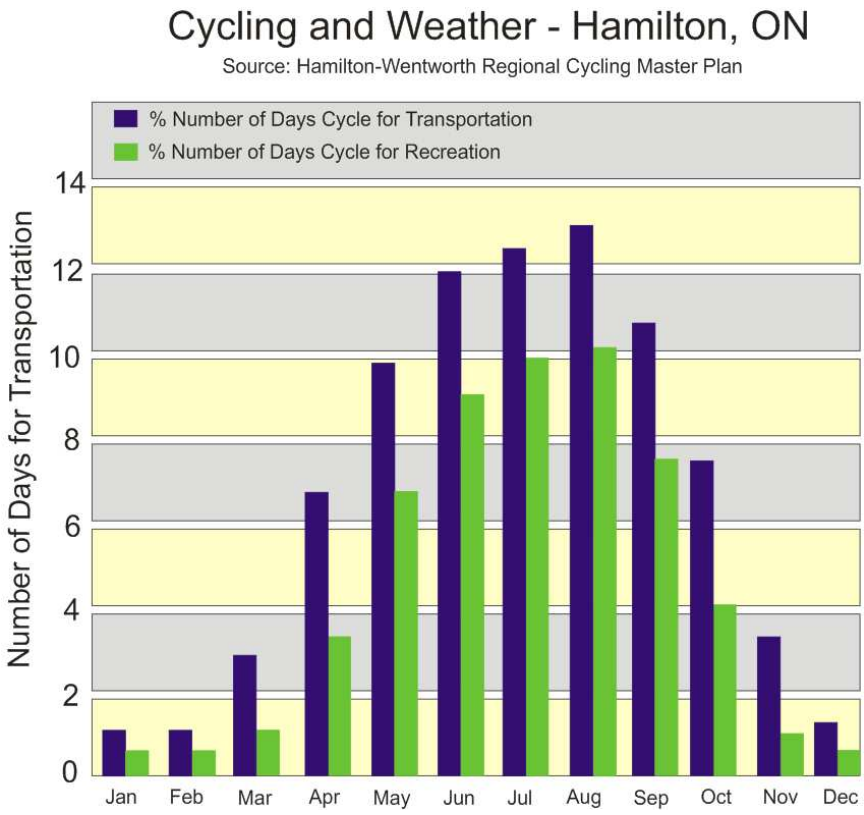
3.4 Barriers Affecting Cycling Demand

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, through the surveys, as a top reason for not cycling, we know that weather (temperature and seasonal conditions) affects cycling demand. The online and Public Engagement Session survey indicated that 14% cycle in winter compared 90% in spring, 99% in summer and 86% in fall. **Figure 3-3** illustrates the relationship between the season, average temperature and cycling demand in the City of Hamilton (former Region of Hamilton-Wentworth).

Figure 3-3: Effects of Weather on Cycling Demand



4.0 STAFFING / PARTNERSHIPS

RECOMMENDATIONS:

1. Establish a "Cycling Office";
6. Foster Community Cycling Events;
7. Develop Partnerships to implement the education and awareness program;
11. Seek partnership opportunities to complete the cycling network;
19. Incorporate destination amenities within libraries and community centres within 5 years;
24. Establish cross-sections within the City's road rights-of-way for safe cycling facilities;
25. Work with partners to develop standard designs for safe intersection crossings;

The City of Mississauga has been proactive in establishing and strengthening partnerships in order to promote and fund opportunities to increase cycling activity in the City. Partnerships help to improve safety awareness, route development, and monitoring effectiveness of cycling programs. Implementation of the Master Plan will rely on successful partnerships, developed with internal and external City stakeholders, to attain common goals and objectives.

4.1 Staffing and Administration

The planning, design, implementation, operation, and promotion of the cycling network will require dedicated City of Mississauga staff resources to provide day-to-day direction and management. Current and new tasks should include:

- Capital works planning and programming for cycling infrastructure.
- Off-road trail design and construction management.
- 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.
- Establish new partnerships and provide MCAC consultation.
- Promotion and coordination of community events.
- Establishment and management of training programs.
- Maintenance of website content related to cycling.
- Establish 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.
- Manage issues of risk and liability related to cycling.
- Formal reporting to Council.

Mississauga should establish a corporate Cycling Coordinator who would promote the goals, objectives and strategies of the Cycling Master Plan and maintain a cross departmental team approach to ensure that the implementation of the Master Plan progresses.

4.2 Role of Stakeholders

City/stakeholder partnerships will play an important role for advancing cycling in Mississauga. These include corporate partnerships, which can foster community relationships and help offset some costs associated with the construction and operation of the bicycle route network. Partnerships with school boards and individual schools to encourage cycling are considered vital to sustaining and increasing cycling ridership in the City.

City Council: Approve 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 bicycle supportive initiatives with on-going City projects (Community Services, Transportation and Works, and Planning and Building staff).

Mississauga Cycling Advisory Committee: Work with City staff on various 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 provide support for development of 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, cycling advocacy groups and many more.

4.3 Partnership Opportunities

The City will seek opportunities to partner with other public, private, and not-for-profit agencies such as the following agencies:

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.
Active and Safe Routes to School (ASRTS)	Partner to promote the existing Walk-or-Wheel to school (WoW) Wednesday's program and work to expand the ASRTS programs, to encourage riding a bicycle to school as a viable active transportation alternative.
Bicycle Clubs – The Healing Cycle Foundation (Bike Club), Mississauga Bicycle Racing Club	Support and promotion of various existing Clubs and Foundations in enhancing the cycling profile and different ways to get involved in cycling in the City. These groups advocate cycling activity and benefit from increased memberships and fundraising initiatives.
School Boards and Individual Schools	Involve of individual schools and the School Boards within Peel to encourage and educate students and parents about cycling through the curriculum in either physical education, social and environmental science classes, and participation in available programs, such as 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 to educate motorists and cyclists. Peel Region 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 in partnership with local school boards and advocacy groups (similar to the Vancouver Police Department). http://vancouver.ca/ctyclerk/cclerk/documents/cs1_004.pdf
University of Toronto – Mississauga Campus (UTM)	Partner with UTM by encouraging 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 the City. This would be cost-effective and help to provide students with experience and skills.
Bicycle Shops	Businesses have their finger on the pulse of the cycling community. A partnership with businesses that sell bicycles and bicycle related accessories would provide a win-win situation to increase ridership.

Partner(s)	Opportunities
City Bicycle Fleet	Lead by example by sharing a City of Mississauga fleet of bicycles at the Civic Centre to attend meetings, 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 by promoting bicycle-friendly businesses and commercial districts with the development of bicycle-friendly business awards.
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 helping employers and commuters explore commuter choices: carpooling, teleworking, transit, and cycling. Smart Commute Mississauga works directly with employers in Mississauga to promote cycling and other sustainable commute modes.
Other Public / Private / Not-for-Profit Agencies	There are several agencies that could play a supportive role in cycling in Mississauga, through funding or service opportunities with the following partners including:

5.0 NETWORK DEVELOPMENT

RECOMMENDATIONS:

10. Add an average of 30 kilometres (18.6 miles) of bicycle lanes and multi-use trail per year over the next 20 years;
11. Seek partnership opportunities to complete the cycling network;
12. Give priority to completing network links to existing higher order transit terminals;
14. Provide cycling routes within 500 metres (0.3 miles) of all residents and publicly funded schools;
15. Ensure that 95% of the population are within 1 kilometre of a primary cycling route;
16. Ensure that all nodes are connected by cycling routes;
18. Incorporate connecting bicycle links into future higher order transit plans;
19. Incorporate destination amenities within libraries and community centres within 5 years;
20. Connect all major natural and cultural destinations by cycling routes;

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 (to the end of 2009) cycling network as illustrated in **Map 5-1**. Error! Reference source not found.

Table 5-1: Existing Cycling Facilities

Facility Type	Existing Kilometres (2009)	% of Existing Network
Primary Routes *(Bicycle Lanes, Shared Use Lanes, Multi-Use Trails)*	48km	14%
Secondary Routes *(Bicycle Lanes, Shared Use Lanes - sharrows, signed route / edge lines)*	100 km	29%
Off-Road Multi-Use Trails	202 km	57%
Total	**350 km**	**100%**

5.2 Proposed Cycling Network

To meet the City's network objective and provide greater balance between on and off-road cycling routes, new planned routes are proposed. These include additional dedicated on-road bicycle lanes. The development of the planned bicycle network was a public process developed from input from an online survey, public engagement sessions to identify preferred cycling routes, workshops with the Mississauga Cycling Advisory Committee, and input from City staff on strategic initiatives and desired service to important City destinations.

The development of the cycling network was guided by principles based upon a combination of strategic City policies and best practices used in other jurisdictions.

These principles are:

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

The development of the network took into consideration, cyclist preference in route selection, and ease and cost of implementation. A matrix of route characteristics such as vehicle volume, speed, truck traffic, pavement width, boulevard width, route directness, access to transit, connections to community and City-wide destinations and other factors were used as a basis for assessing alternative routes. The assessment matrix is documented in **Appendix C**.

The network was assessed and developed at the City-wide scale to serve short and long distance travel. The proposed cycling network of approximately 540 additional kilometers of cycling routes is summarized below 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 from Existing	% of Total Network
Primary Routes (Bicycle Lanes, Shared Use Lanes, Multi-Use Trails)	48 km	202 km	**250 km**	520%	28%
Secondary Routes (Bicycle Lanes, Shared Use Lanes - sharrows, signed route / edge lines)	100 km	250 km	**350 km**	350%	39%
Off-Road Multi-Use Trails	202 km	89 km	**291 km**	144%	33%
Total	**350 km**	**541 km**	**891 km**	**255%**	**100%**

The proposed comprehensive cycling network is a combination of the primary on and off-road route connections and secondary route connections. To support the cycling routes identified in the network, there is a need to provide safe route connections, and amenities such as bicycle parking. Error! Reference source not found. illustrates the proposed complete cycling network. When completed, all Mississauga residents will be within 500-metres from accessing the cycling network.

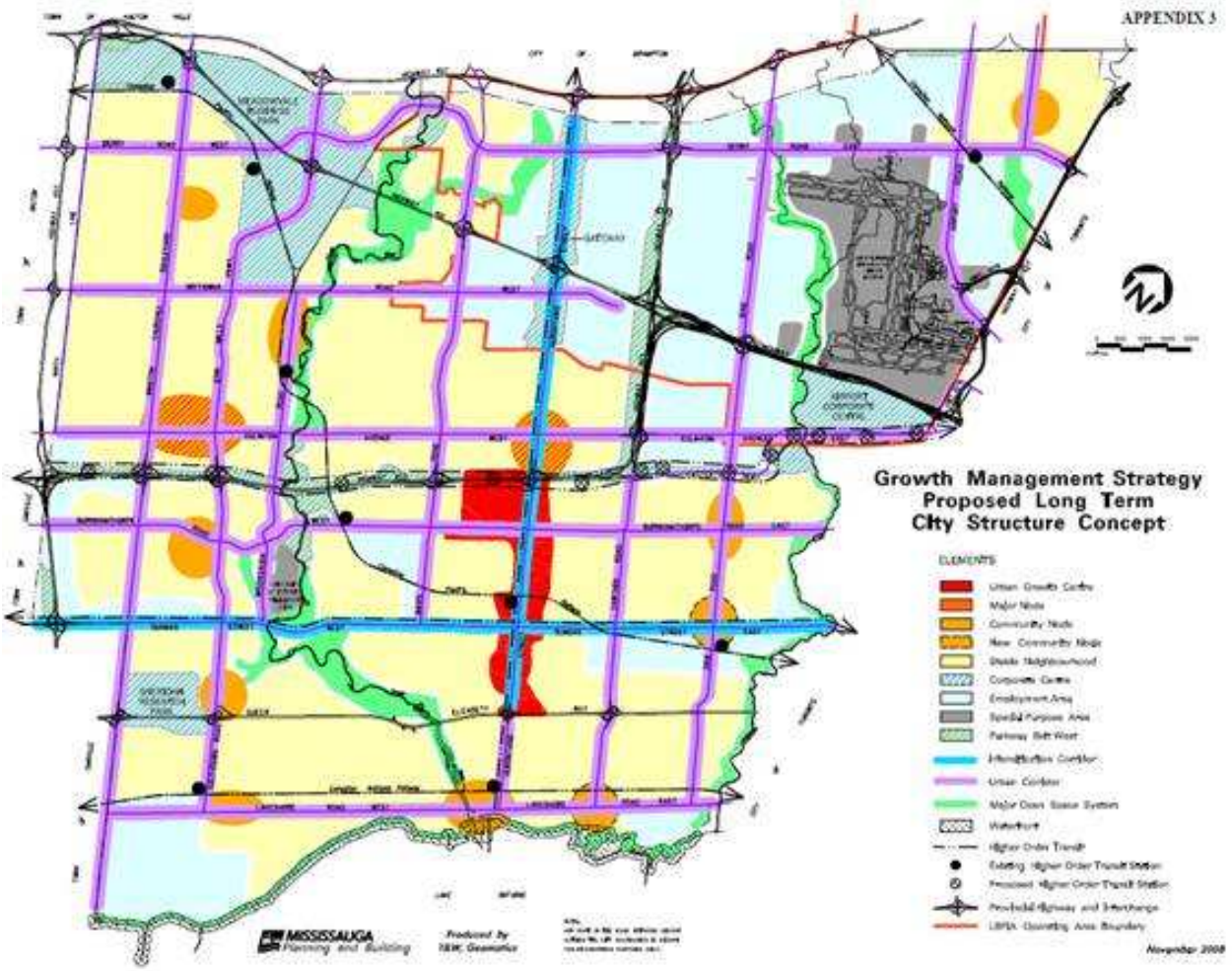
5.2.1 Primary Cycling Network

It is a goal of the City of Mississauga to develop cycling as a viable transportation option to the City over the next 20 years. Thus far, the City has focused its existing cycling network mainly on providing recreational cycling routes rather than cycling routes for commuting purposes.

The public has indicated that a primary factor affecting their decision to consider cycling to work is the need for safe and direct routes. In order to support cycling as a competitive mode of travel, there is a need to develop continuous and direct routes to cycling destinations within the City and to neighbouring municipalities.

Based upon the City's Growth Management Strategy's Long Term City Structure Concept illustrated in **Map 5-3** and public consultation, a number of key Mississauga cycling destinations were identified. These destinations incorporate many commercial and employment centres along corridors that are attractive to both recreational and commuter cyclists such as 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 was established to support the City Structure Concept. All residential areas within the City are within a 4 to 5 kilometre bicycle ride to a major node or community node as identified in the City Structure Concept. 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 are identified below:

- City Centre
- Port Credit
- Streetsville
- Clarkson Village
- Cooksville
- City Centre Transit Terminal
- GO Stations
- Mobility Hubs (e.g. BRT 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 and Community Centres
- Employment Centres
- Lake Ontario Waterfront
- Central Library and Branch Libraries

In developing primary routes, the City will need to balance competing needs between the feasibility and configuration of primary cycling routes and other corporate objectives or operational needs. 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 high order transit initiatives. Plans for the development of these corridors **(Table 5-3)** will address cycling issues and provide information on how each corridor will contribute to the advancement of cycling in the City through safe network connections and supportive amenities.

Table 5-3: On-Going and Future Corridor Planning Studies

Corridor Name	Study Scope
Hurontario Street	The Hurontario-Main Street Corridor Transit Environmental Study is examining the feasibility of rapid transit along Hurontario Street from Port Credit to Downtown Brampton. The study, scheduled to be completed in 2010, will also assess bicycle route feasibility.
Lakeshore Road	The Lakeshore Road Corridor Study is currently assessing the need and feasibility of high order transit and bicycle routes. The study, scheduled to be completed in 2010, will also assess bicycle route feasibility.
City Centre	The Downtown 21 Study, to be completed in 2010, will provide direction on the configuration of the road patterns and cycling route opportunities.
Dundas Street	The Dundas Street Corridor Study will assess the need and feasibility of high order transit and bicycle routes. The study is scheduled to be initiated in 2011.

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)

Primary routes have been selected based on the characteristics of the corridor and the opportunities and constraints that affect their suitability such as compatible traffic conditions and available space to provide a cycling route. Recommendations for primary cycling routes include:

- Safe connections to major destinations and connections with other cycling routes.
- Integration with existing cycling network.
- Meet the travel patterns of the public identified through public engagement sessions.
- Minimize exposure of cyclists to high truck volumes, traffic volumes, or traffic speed by planning routes within desirable traffic operating conditions.
- Access to high order transit stations including future transit stations.
- Available on-road and / or boulevard space.
- Links to community origins and destinations.
- Connect to mobility hubs.
- Support eco-tourism.

5.2.2 Secondary Cycling Network

As identified in **Chapter 3**, the majority of cycling trips in Mississauga are short distance trips. Approximately 80% of existing cycling trips are less than 5 kilometres in length and 50% are less than 1 kilometre. Hence, the majority of existing cycling trips are to destinations or for leisure purposes within the neighbourhood. Increasing the frequency of shorter community based trips can be encouraged through the provision of new cycling routes within neighbourhoods. This component of the network represents a high potential for increasing cycling activity for all ages and contributes to creating a culture of cycling for future generations.

Recommendations for secondary cycling routes include:

- **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 of the public identified through public engagement sessions.**
- **Promote healthy and active living within communities by providing cycling opportunities.**
- **Improve access to safe, pleasant recreational cycling opportunities.**

Secondary connections can help to reduce traffic congestion and improve traffic safety around school zones and promote active, healthy living. **Map 5-5** illustrates the proposed secondary routes within the cycling network. Implementation of these routes is subject to further detailed assessment of feasibility and to the determination of any local safety issues or impacts to operations such as street parking.

5.2.3 Off-Road Multi-Use Cycling Network

Mississauga has been highly successful in developing an extensive off-road multi-use trail network through work completed in the *"Mississauga Multi-Use Recreational Trail Study: 2001 Review of the Bicycle and Pedestrian Route Study"*. Building upon these successes, expansion of 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. The off-road multi-use trail network provides an alternative for both less experienced cyclists and avid cyclists who seek a leisure experience.

In addition to the work completed in the City's 2001 Multi-Use Recreational Trail Study, which is represented in the Bikeways and Trails Map 4th Edition, an assessment of "missing links" was undertaken. Opportunities to provide connections utilizing City lands and other opportunities such as hydro and rail corridors were identified. These opportunities were then identified as candidate (or potential) off-road multi-use trail connections.

Recommendations for off-road cycling routes include:

- **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. Although not explicitly assessed as part of the Master Plan and cycling network map, short multi-use trail connections through neighbourhood parks provide key opportunities for the City to provide connections or "short cut" opportunities between cycling routes within the road right-of-way. Therefore, if such a trail meets the minimum standards, the short trail connection should be included within the network.

5.3 Integration with Public Transit

The City will integrate commuter cycling route links to transit stations with "trip-end" infrastructure such as bicycle parking and bicycle lockers. This will facilitate longer cycling commutes and integrate initiatives identified by Metrolinx to create mobility hubs within the GTA, promote a reduction of automobile trips and increase the cycling and transit modal share.

Mississauga Transit has recently equipped its fleet with bicycle racks to increase ridership by integrating cycling into transit operations. This was made possible through funding from Metrolinx. This commitment to sustainable transportation provides opportunities to residents to incorporate cycling into longer trips or to assist cyclists who may get caught in inclement weather and in need of alternative mode of travel. In June 2009, bus bicycle racks became available on all Mississauga Transit buses. As illustrated in **Image 5-2**, each rack can hold two conventional bicycles and no additional fare is required to use them.

Image 5-2: Bicycle and Transit Integration

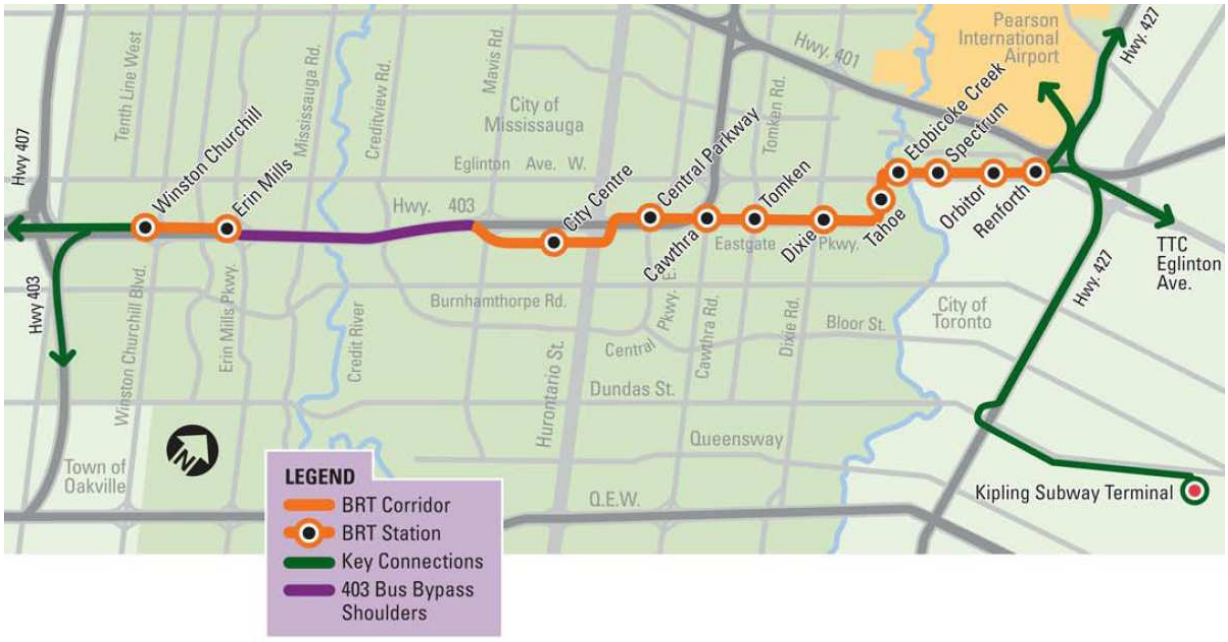
Approach	Example
Bicycle Racks on Buses GO-by-Bike: (Source: McMaster University)	
Bicycle Racks on Trains (left) Irish Rail (Source: iTRANS) (right) France TER (Source: FUBicy.org)	  Currently GO Trains allow bicycles on-board during non-peak times and have a pilot program allowing folding-bicycles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

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

Approach	Example
Sheltered Bicycle Parking at Transit Stations Clarkson GO Station: (Source: iTRANS) *Note: Bicycle Parking is discussed in more detail in Chapter 9.*	
Bicycle Rack on Mississauga Transit Bus (Source: Smart Commute Mississauga)	

As part of the cycling network development, attention was given to provide route connections to Bus Rapid Transit (BRT) terminals to facilitate the integration of a seamless transportation system that accommodates multiple transportation modes. There is also an opportunity to use remaining funding available to the City, from Metrolinx, to provide secure bicycle parking at mobility hubs such as BRT stations within the City. **Figure 5-1** shows the proposed BRT station locations in Mississauga.

Figure 5-1: Proposed Mississauga BRT Station Locations (Source: City of Mississauga)



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" (Source: Places to Grow) including 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 the highest form of bicycle parking: sheltered bicycle parking to protect against poor weather and / or secure bicycle lockers to facilitate longer cycling 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.

6.0 CYCLING ROUTE DESIGN

RECOMMENDATIONS:

21. Continually reduce cyclist incident rates
24. Establish cross-sections within the City's road rights-of-way for safe cycling facilities

Cyclists must co-exist with other modes of travel including vehicles on-road, pedestrians and other users within the boulevard and on the off-road multi-use trail system. Design standards for the City of Mississauga will accommodate the range of cyclist skill categories and facility types and keep safety as a key consideration.

6.1 Cyclist Types

The design of cycling routes in Mississauga considers both the user skill level and trip purpose (recreation or active transportation) in order to provide 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. In addition to this publication, several other best practices in the development of a range of cycling route network have been identified in this Master Plan.

The cycling route types are intended to meet the needs of existing cyclists and encourage non-cyclists to participate. **Image 6-1** summarizes the ranges of cyclist skill level.

Image 6-1: Cyclist Ability Type

Cyclist Type	Example
Experienced On-Road Cyclists – Have a high skill level and are comfortable interacting with traffic. The primary interest in cycling routes relates to directness of route and minimizing travel time. On-road routes on major roadways are often the preference.	

Competent Cyclists – Have sufficient confidence and skills to ride on neighbourhood streets, off-road trails and in the boulevard. The primary interest in cycling routes is safety. Competent cyclists may feel comfortable riding on major streets with a separate bicycle lane where the speed is moderate.	
Novice Cyclists – Typically include children and beginner adults who have a low level of confidence cycling on-road. The primary interest is safety and / or recreation. Novice cyclists feel comfortable riding on off-road trails and in the boulevard.	

6.2 Safety Considerations

Cyclist safety is a primary objective of Mississauga's cycling strategy. Cyclist level of safety is a measure of anticipated frequency and severity of incidents. The frequency and severity of cycling incidents is related to:

- The skill level required for cyclists to manoeuvre amongst 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 exposure to potential conflicts given visibility and illumination.
- Vehicle speed and the exposure to heavy vehicle traffic.
- The level of cyclist and driver understanding of rules of the road where there is interaction.
- 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 through the design of roadway and cycling infrastructure.

Cycling route designs and use of traffic control measures can help maximize awareness of cyclist-vehicle interaction, minimize distractions and obstructions, and improve understanding of which road user has the right of way. Increased comfort levels may be achieved through enhanced pavement markings on roadways, maintaining speed limits at 60 kilometres per hour or less, and enforcing speed limits.

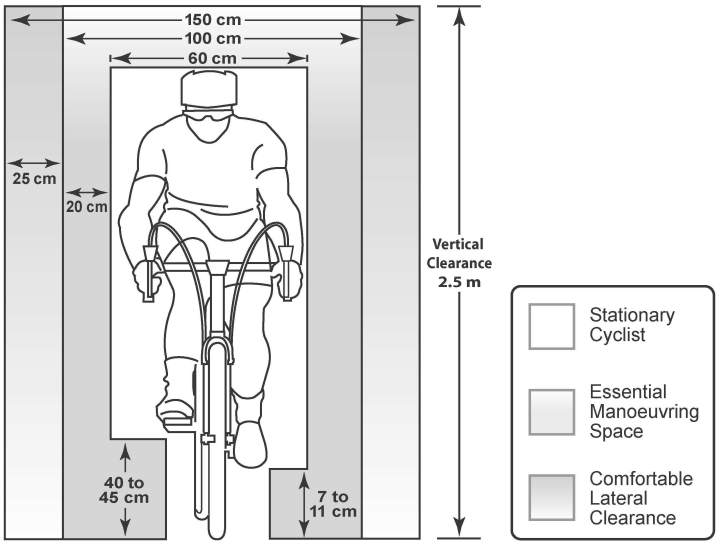
The development of cycling route design guidelines based on best practices will improve the comfort level of cyclists and encourage a high level of safety by:

- 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 kilometres per hour and where the number of vehicles per 1 hour is less than 15, 000.
- Improving consistency in design approach in order to contribute to driver and cyclist expectation that is appropriate for the road environment and potential hazards.

On-road cycling routes in Mississauga will be designed, recognizing that bicycles are vehicles and cyclists have the same rights and responsibilities as other users of City roadways. The design of on-road cycling routes will reflect the cyclist 'dynamic envelope' (**Figure 6-1**), the minimum profile required for the safe movement of the cyclist on all route types. This envelope reflects the operating zone of a typical adult cyclist including 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 the natural side-to-side movement of a cyclist 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). Three-wheeled bicycles, although wider than typical bicycles, are more stable and have less side-to-side movement. Therefore, the envelope provided is appropriate for both types of bicycles.

Figure 6-1: Dynamic Envelope



Within multi-use trails, cyclists may encounter a range of other users. Interaction may occur with pedestrians, inline skaters and disabled travellers. 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). The operating space of a cyclist interacting with a less able bodied user will be accommodated by this width.

6.3 Cycling Route Types

The cycling route types identified in **Images 6-2, 6-3, 6-4, 6-5, and 6-6** will be implemented to develop the Cycling Network to accommodate a wide range of cycling ability, cyclist needs and site-specific constraints. Chapter 7 of this report provides details on cycling design guidelines based on existing City practices and best practices from other jurisdictions.

Image 6-2: Visually Separated Bicycle Lanes

Example	
Bicycle Lane (visually separated) A painted linear line with bicycle and reserved lane (diamond) stencils visually separate dedicated space for bicycles away from vehicles. The delineation separation of traffic increases the sense of security and safety by a cyclist. Visually separated lanes require additional spring street sweeping maintenance that would automatically occur in general purpose travel lanes from the movement of vehicles.	 Confederation Parkway - Mississauga (Source: iTRANS)  Erin Centre Boulevard – Mississauga (Source: City of Mississauga)

Image 6-3: Physically Separated Bicycle Lanes

Example	
Bicycle Lane (physically separated) A physical barrier such as a dedicated median that can be physical or painted with vertical delineators, provide a high level of control between cyclists and vehicles. This type of bicycle lane can be implemented on one-way or two-way streets and integrated with on-street parking. This type of route facility requires a high degree of cyclist and driver awareness at cross-streets. Turn prohibitions and dedicated bicycle signals assist in increasing the level of safety associated with physically separated bicycle lanes.	 Belfast, N. Ireland (Source: iTRANS)  Amsterdam, Holland (Source: iTRANS)  Montreal, P.Q. (Source: City of Mississauga)

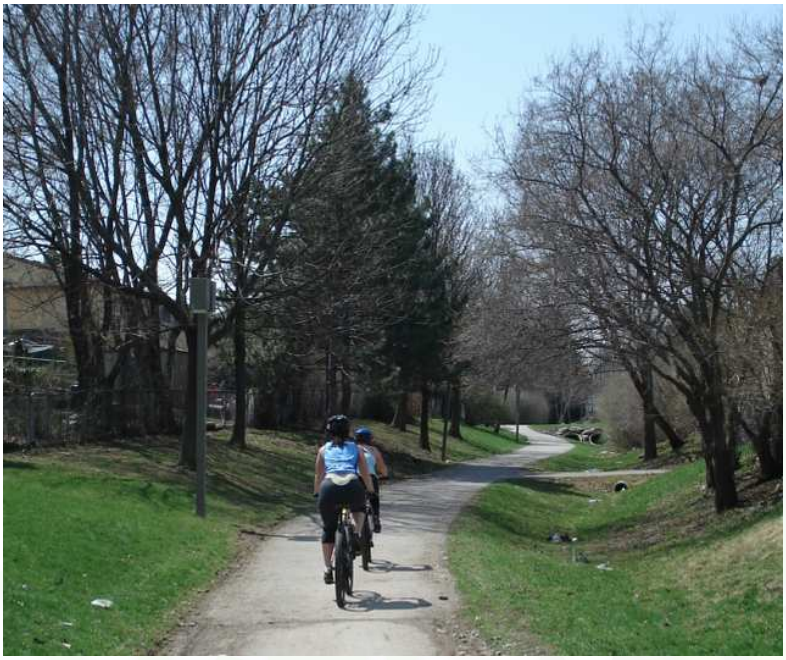
Image 6-4: Shared Use Lanes

Example	
Shared Use Lane ("sharrow") 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, and is accompanied by signs. These types of routes are typically applied to roadways with a wide pavement width. Cyclists and motorists are expected to share the road.	 Indian Road - Mississauga (Source: iTRANS)
Shared Road ("signed route") Signed routes are delineated by a bicycle route sign (bicycle stencil without chevrons are optional). Cyclists and motorists are expected to share the road. These types of routes are typically applied to residential streets with low traffic volumes.	 Avalon Drive - Mississauga (Source: iTRANS)

Image 6-5: Multi-Use Trail

Example	
Multi-Use Trail A trail that is within the road right-of-way that can accommodate bicycle-only traffic or both pedestrians and cyclists as a multi-use trail. Similar to physically separated bicycle lanes - this type of route is ideally suited for corridors with a limited number of driveway accesses and intersections. Turn prohibitions, crossrides and dedicated bicycle signals can assist in increasing the level of safety.	 Lakeshore Road - Mississauga (Source: iTRANS)

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

Example	
Off-road Multi-Use Trail Trails within open space or utility corridors (i.e. outside of road rights-of-way) provide continuous routes with few conflict zones. This type of route is well suited for recreational cycling, but may also contribute to primary cycling routes.	 Lake Wabukayne Trail - Mississauga (Source: iTRANS)

The selection of the most appropriate cycling route type for each corridor is dependant upon:

- 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

Design guidelines from municipalities in Ontario, across North America and overseas were reviewed to establish state of the practice for cycling route design.

Design practices of the following jurisdictions were considered:

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

The results indicated that there is considerable consistency with design practices between jurisdictions. The best practices review included innovative cycling treatments based on published references from the Institute of Transportation Engineers, and Transportation Association of Canada.

The appropriateness of design practices from other jurisdictions was assessed relative to: the City vision for cycling, the existing design practices and operating requirements in Mississauga, and traffic legislation in Ontario. The comparison summary of best practices is provided in **Appendix B.**

7.0 DESIGN STANDARDS

RECOMMENDATIONS:

21 Continually reduce cyclist incident rates
24. Establish cross-sections within the City's road rights-of-way for safe cycling facilities
25. Work with partners to develop standard designs for safe intersection crossings

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 City strategic planning objectives to establish cycling route design standards best suited for the City of Mississauga.

7.1 Best Practices: Off-Road Routes

7.1.1 Off-Road Trail Widths

Based on Public Engagement Session 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, city 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.

Multi-use trails and off-road routes in Mississauga 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 D.**

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	3.5 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*

The width of bicycle and multi-use trails should reflect the level of demand and potential for interaction. Corridors with high cycling activity should provide a wider travel area. One-way bicycle trails and one-way multi-use trails are not recommended except under special conditions such as linkages and connections where necessary for continuity of a facility.

It is recognized that cyclists and pedestrians frequently use these facilities in either direction regardless of one-way designations. When trails are not designed of two-way activity, conflicts may arise when they are used for travel in both directions.

7.1.2 Trail Pavement Markings

The separation of pedestrians and cyclists on multi-use trails in Mississauga will depend on the usage and trail width. Generally 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 in width will be reviewed on a case by case basis for potential pavement markings.

All trails should be accompanied by supporting signage that promote "share the path / trail" and other regulatory and warning signs as appropriate. **Image 7-1** illustrates examples of separation treatments in Montreal and New York City.

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

Municipality	Example
Montreal, PQ (Source: City of Mississauga)	 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.

Municipality	Example

Montreal, PQ (Source: City of Mississauga)	 Pavement markings that visually separate cyclists and pedestrians are used along primary routes, where high cyclist and pedestrian traffic volumes are anticipated.

7.2 Best Practices: On-Road Routes

7.2.1 On-Road Lane Widths

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

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	3.75 metres	3.35 metres
→ Local Road Vehicle Lane	3.5 metres	3.35 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 in certain situations
** 2.1 when low speed, low traffic
→ Under Review

7.2.2 On-Road Pavement Markings

Pavement markings delineate cyclist space on-road or the need for vehicles and bicycles to share space. They provide designation of regulatory controls such as exclusive bicycle lanes and warning information such as the presence of shared use lanes. Application of on-road markings are governed by the Ontario Highway Traffic Act and the Ontario Traffic Manual Book 11 and TAC Guidelines. Standard applications are illustrated in **Figure 7-1** and **Figure 7-2**.

Figure 7-1: On-Road Bicycle Symbols

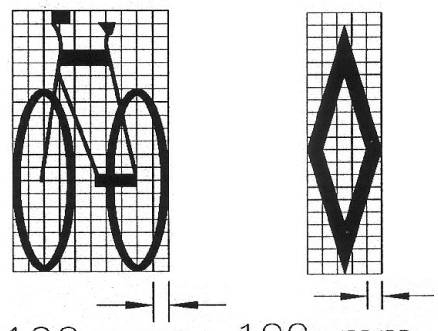
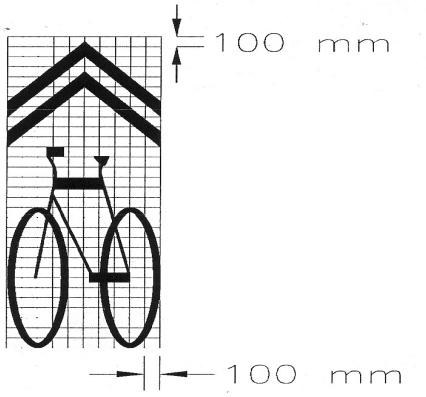
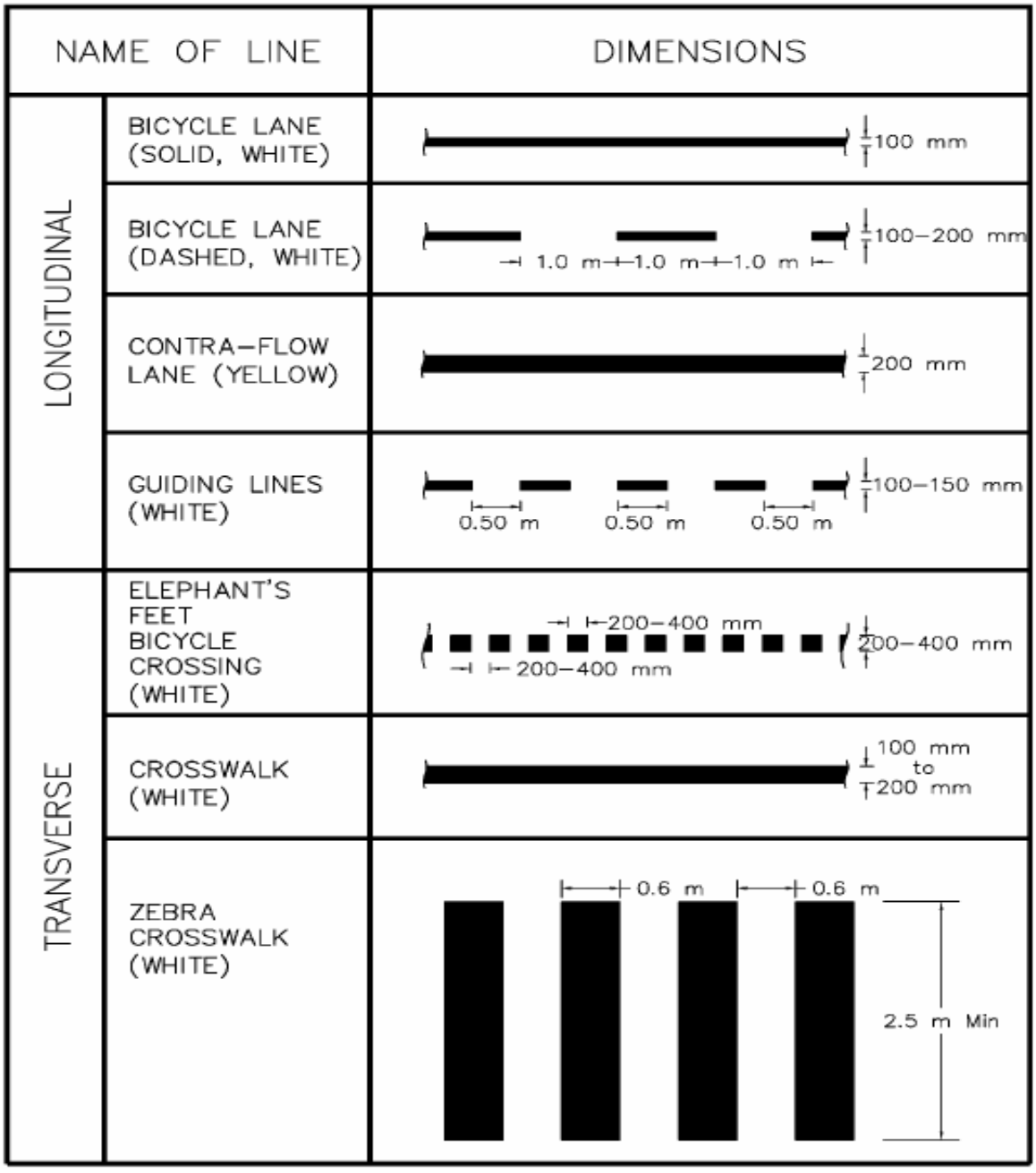
Symbols	Example
Bicycle Lane Symbols 200-250m intervals and at the beginning of intersections (Blocks)	 Diamond Symbol Width = 0.5 metres Height = 2.1 metres Bicycle Symbol Width = 1.0 metres Height = 2.0 metres
Shared Used Lane ("Sharrow") Symbol 75m intervals and at the beginning of intersections (Blocks)	 Diamond Symbol Width = 1.0 metres Height = 3.0 metres
Standard Application	Refer to the TAC Guidelines for the Design and Application of Bikeway Pavement Markings

Figure 7-2: Pavement Marking Dimensions



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 the use of edge lines.

Historically, the City of Mississauga implemented edge lines on local roadways as a traffic calming measure. A painted edge line is typically located 1.2 to 1.5 metres from the edge of curb on roadways. They are intended to narrow the travelled lane width, in an effort to reduce vehicle operating speeds. On-street parking is typically permitted on roadways with edge lines.

Over the years, edge lines have evolved and appear to be similar to a designated bicycle lane. When an edge line is used in conjunction with "bicycle route" signs, edge lines may provide cyclists with a false sense of security. Parked vehicles could create a potential conflict for cyclists. If an edge line is used, it is recommended to be placed no more than 300 millimetres from the edge of pavement to indicate that the space is not wide enough to be considered a bicycle lane (Source: CROW, Chapter 5: Road Sections, pg. 123, 2006)

It is recommended that bicycle lanes or shared use lanes with sharrows be implemented when considering on-road cycling facilities. On-street parking may be removed in order to accommodate the required lane widths for bicycle lanes or shared use lanes with sharrows.

"Bicycle Route" signage could be implemented on local roadways with lower volumes and, lower speeds to encourage cycling, but are not recommended in conjunction with edge lines.

7.3 Intersection Treatments

In 2007, Transportation Association of Canada (TAC) *Guidelines for the Design and Application of Bicycle Pavement Markings* were developed to address various treatments to apply on-road, at intersections and other unique applications. This document supersedes the 1999 TAC *Bicycle Control Guidelines*. Good engineering judgement should be exercised when considering applying alternative treatments at individual intersection locations.

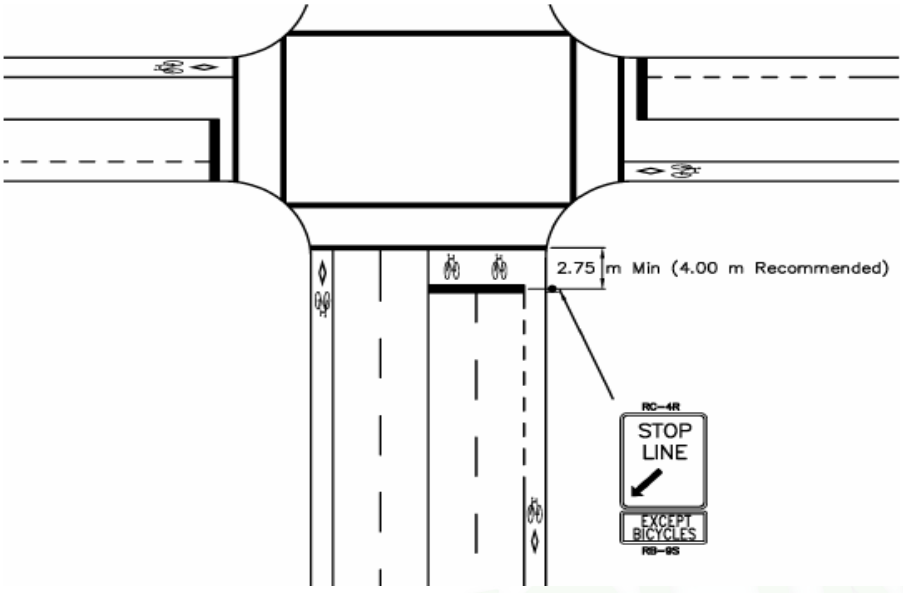
7.3.1 Advanced Stop Bars / Bicycle Box

In Europe and parts of North America, provision of advanced stop bars, also referred to as "bike boxes", giving cyclists advance priority, have proven to be very successful. **Image 7-2** and **Figure** 7-**3** illustrate advance stop bars used in Amsterdam and Toronto and the TAC 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



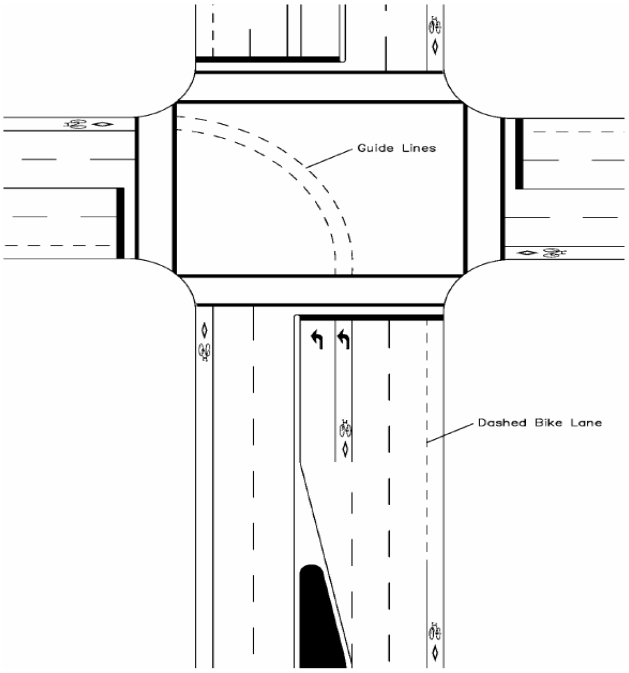
The TAC guideline recommends that bicycle lane markings through intersections should be applied at intersections where cyclist guidance is a concern and where there is a standard bicycle lane, on both entering and leaving opposite sides of the intersection.

Instances where guide markings may be applied include:

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

Figure 7-4 illustrates the TAC 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 Guidelines through Intersections



7.3.2 Crossrides

In addition to on-road bicycle route treatments, 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. Both cyclists and pedestrians were considered in this treatment. Cyclist movement is delineated through the use of elephant feet, while pedestrian movements are delineated by zebra markings.

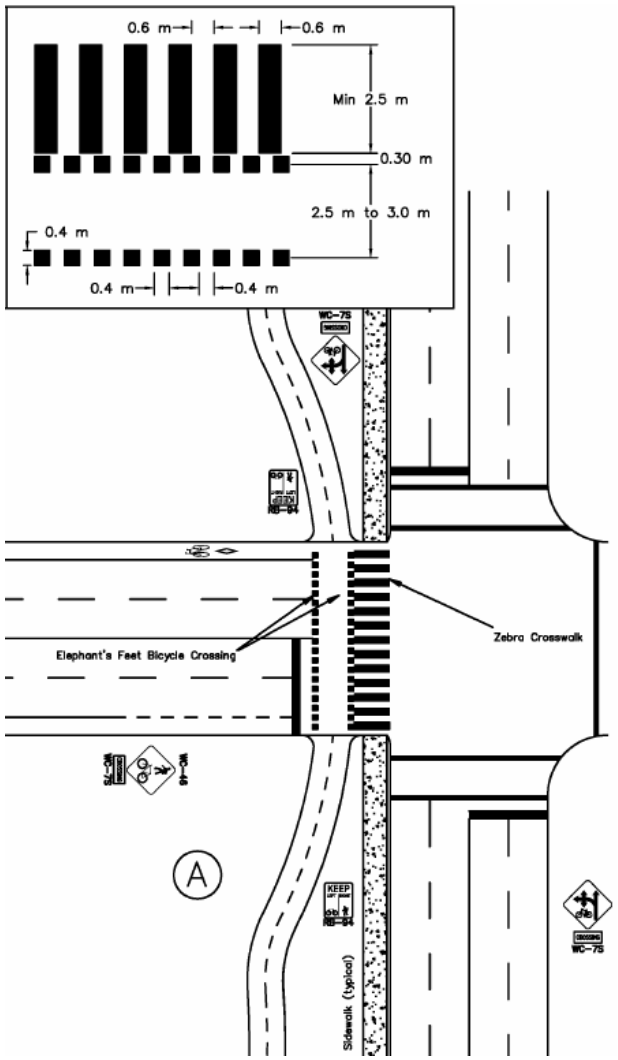
MTO is considering the merits of crossrides. However, permission has been granted by the Minister of Transportation's Office, in 2008, for the City to conduct a pilot project on a crossride treatment in Mississauga. The City will implement a pilot project for crossrides at unsignalized intersections. Crossrides at signalized intersections are to be researched and developed further in conjunction with other municipalities and the MTO. The City is piloting crossrides at unsignalized intersections. Crossrides at signalized intersections are being researched and

developed and are subject to approval from MTO. **Image 7-3** depicts existing examples of crossride treatments. **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	 Sheridan Park Drive & Homelands Drive pilot project (Source: City of Mississauga)
New York City, NY	 Crossride Treatment on 12th Avenue (Source: iTRANS)

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



7.3.3 Speed Limits

Vehicle speed typically dictates the severity of all collisions, particularly for vulnerable (pedestrian and cyclist) road users. Higher speeds result in higher force at impact. Furthermore, a faster speed increases vehicle stopping distance, reduces the ability of a driver to see a pedestrian or cyclist, and therefore increases the probability of pedestrian or cyclist being hit (Source: Zegeer et al. 2002a). Studies have shown that the higher the vehicular speed at the time of impact, the higher potential for a pedestrian to experience a severe collision. Accordingly, on-road cycling routes are considered on roadways where the posted speed limit is 60 kilometres per hour or less.

7.5 Bicycle Signals

Bicycle signals have not been adopted within the Highway Traffic Act in Ontario, however, the design practice for bicycle signals are provided within the TAC *Guideline for Bicycle Signal Design, 2005*.

Bicycle 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 cyclist speeds rather than vehicle speeds.

The City of Mississauga will consider the application of the TAC Bicycle Signal guidelines upon adoption into the Ontario Highway Traffic Act, based on TAC guidelines. **Image 7-4** and **Image 7-5** present examples of bicycle signals devices.

Image 7-4: Bicycle Traffic Signal Devices

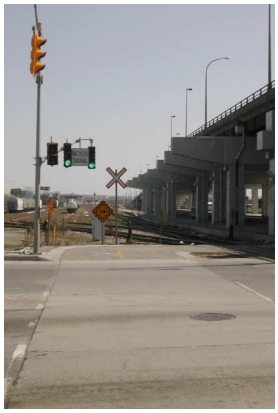
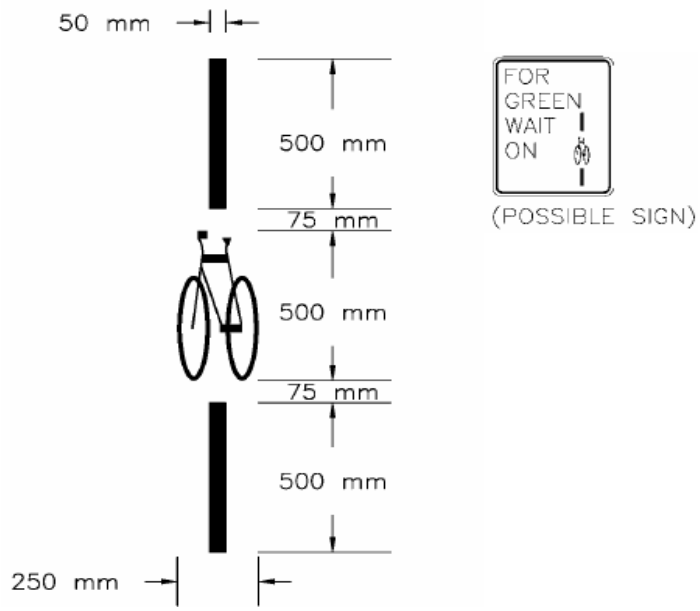
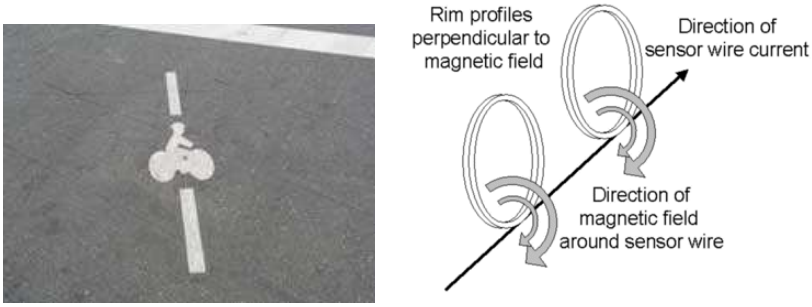
Examples	
 *TAC Recommended Signal Head* (Source: Transportation Association of Canada)	 Bicycle Countdown Signal, Amsterdam, Holland (Source: iTRANS)
 Toronto Bicycle Signal Pilot Project (Source: iTRANS)	 Ottawa Bicycle Signal Pilot Project (Source: City of Ottawa)

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)

7.6 Mid-Block Crossings

Mississauga will consider mid-block crossing features, when warranted, where cycling routes cross major roadways or long distances between signalized intersections or other protected crossing points.

The assessment of the appropriateness of mid-block crossings will be based on engineering judgement and based on consideration of operational conditions such as: roadway width/crossing distance, traffic volume, traffic speed and type, magnitude and preferred routes for cyclist movement, and sight distance. The design of mid-block crossings will have 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 will be considered as part of a mid-block crossing when:

- the posted speed limit is 60 kilometres per hour or less.
- the number of lanes is 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.
- bus stops are located on the far side of the crossing.

Where cycling routes intersect major roads, in close proximity 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*. **Image 7-6** is an example of mid-block crossings treatments in Mississauga.

Image 7-6: Example Mid-Block Crossing

Municipality	Example
Mississauga, ON	 Ninth Line and Sun Canadian Pipeline

7.7 Grade Separation

Grade separation crossings such as bridges and underpasses provide critical links for cycling. It is therefore important that the structures are well-designed with safe and adequate accommodation of cycling facilities. Designated cycling facilities such as bicycle lanes or multi-use boulevard trails should be accommodated wherever possible, especially on the cycling routes identified in the cycling network.

There are various ways of accommodating cycling facilities within a structure other than widening the structure, such as re-striping travel lanes with narrower lane widths, removing a lane, or removing or narrowing the centre median. **Image 7-7** illustrates alternative grade separated structures.

Image 7-7: Grade Separation Examples

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

8.0 NETWORK OPERATION

RECOMMENDATIONS:

21. Continually reduce cyclist incident rates
22. Develop an asset management plan for all cycling facilities

One of the primary reasons the City of Mississauga has been successful in providing quality recreational trails, has been its commitment to the construction and maintenance of high quality facilities. 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

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

8.2 Accessibility

Multi-use trails should be accessible to and useable by the broadest possible spectrum of potential trail users. The provision of trails and related amenities should conform to accessibility requirements. Minimum accessibility requirements that apply to the entire province of Ontario development through 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

Cyclist ability to control their bicycle and their level of safety is affected by the degree of maintenance provided on the route, which includes: spring debris clearing, snow clearing, regular inspections, replacing worn pavement markings and bicycle symbols, replacing damaged signs, repairing streets including bicycle facilities, and repairing potholes. The level of maintenance needs to be consistent with public expectation, such that the public cycling behaviour matches the level of safety, and must also be fiscally sustainable.

The maintenance level of service will be assessed relative to costs and potential liabilities for the City. The level of investment in maintenance may vary from year to year, based on the City Operating Budget process. However, the following maintenance principles will be applied:

- all multi-use trails within the boulevard will be cleared according to the spring maintenance schedule.
- primary on-road cycling routes will be considered for high priority in snow removal and debris clearing.
- all multi-use trails within the boulevard will be considered for snow removal as part of the sidewalk clearing program.
- the current practice of posting signs on off-road trails that do not receive winter maintenance will continue.
- regular grass cutting, tree trimming and vegetation clearing will be provided as part of the parks and roadway maintenance programs.

In order to maintain a higher level of service, the City will administer an Asset Management Program for cycling routes. Cycling incidents and City liability can be reduced through regular inspections of route conditions and their amenities. **Table 8-1** is a list of the maintenance activities that will be addressed through the Asset Management Program.

Table 8-1: Cycling Asset Management Program

Category	Type of Maintenance
Signage / pavement markings	▪ Signs ▪ Pavement markings
Snow removal	▪ On-Road routes ▪ Off-Road routes ▪ Seasonal routes ▪ City operated bicycle parking areas
Debris removal	▪ Litter removal ▪ Roadway debris clearing (sand, gravel, glass, auto parts, leaves, etc.) ▪ Spring trail debris clearing
Vegetation maintenance	▪ Encroaching vegetation ▪ Grasses adjacent to trail edges ▪ Private property
Surface maintenance	▪ Surface distress ▪ Chip seal gravel ▪ Ridges or cracks
Other Maintenance Issues	▪ Illumination ▪ Inspection of structures

9.0 SIGNAGE AND WAY FINDING

RECOMMENDATIONS:

5. Increase awareness of cycling network and facilities;
13. Develop and implement a comprehensive signage and way finding system;

Signs and pavement markings play an important role in promoting and supporting cycling activity. A complete signage system provides regulatory messages to road users and way finding to educate users and to help users navigate the system. Signs will be applied in a manner to provide a clear and consistent message to cyclists, pedestrians and motorists.

9.1 Cycling Network Signing and Naming

The intent of signing and pavement markings is to address the need to provide guidance for cyclists, pedestrians and motorists. They communicate important route information or warnings and provide way finding information to cyclists and pedestrians in a clear and consistent manner. Signs can also play an integral role in establishing an identifiable 'brand' for the bicycle route network. Signs can provide additional information including interpretive information relating to points of interest on or near the bicycle route facilities.

The types of signage and markings to be used can be categorized as: **Regulatory; Warning; and Way Finding**. Examples of bicycle-related 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: Example Signage

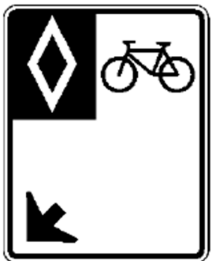
Sign Type	Example	Sign Type	Example
Regulatory (On-Road)		Regulatory (Off-Road Multi-Use Trail)	
Information		Warning	

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

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

Front Street (Source: iTRANS)

The appropriate naming of a route is an important component for way finding within the cycling system. The naming of trails will be consistent with the Trail Route Identifier (General Committee Recommendation #0298-98) approved by Council in May 1998. The naming of cycling routes should be consistent with the road, corridor or park facility. The name of the route should be as continuous as possible. Where there is a desire to recognize an individual within the cycling system, the use of a "dedication" vs. "naming" should be used in order to meet the above noted objectives. A "dedication" does not formally change the name of the route, however a plaque is erected recognizing the individual and signs regarding the dedication can be included within the route.

9.2 Establish Way Finding

There are three general objectives in a way finding signage system. In determining sign locations and messages, achieving these objectives should guide the way finding plan.

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 that there may be cyclists on the roadway** – Use cautionary and safety messages to increase motorists' awareness of cyclists. Cycling is an important component of the transportation system and should 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, visually 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.

The three D's include:

1. **Destination** (nearest or intermediate destinations, or less commonly, the end-of-the-line destination)
2. **Direction** (directional arrows, ahead, left and right)
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. These signs will aid cyclists by providing information at decision points, and by providing confirmation that cyclists are where they expect to be. 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)
- 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 promote cycling in the City and assist in making navigation of the cycling network more user-friendly. Way finding signs can also be used as a technique to "brand" cycling within the City. Signs that are designed to be identified with cycling throughout the City can be a valuable promotional device in raising awareness.

Numbered routes are useful, but do not provide additional context to destinations and directions. Alternatively, the "Naming" of cycling routes relates them to users and other geographical features, which is useful for many trail users to orient themselves. Since a "naming" convention has been successfully established on some existing routes within the City, it is recommended that this practice is continued. 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.

There are four general characteristics that should be considered in implementing a way finding program for a cycling network: 1) Design, 2) Location; 3) Frequency; and 4) Placement.

Descriptions of practices, on these sign characteristics, are provided in Error! Reference source not found.**1**. However, as with most signing programs, 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.

Table 9-1: Sign Implementation Practice

Characteristic	Practice
General Sign Design and Placement Guidelines	The Ontario Traffic Manual (OTM) books are recognized as 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 listed below: ▪ Way finding signs are placed before and after intersections so as not to interfere with cyclists, yet still be visible. ▪ On multi-use trails, the lateral sign clearance must be not less than 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	▪ Signs should be placed where they will be clearly visible. Placement is dependent on the sight lines (relative to user speed) of each trail. ▪ Signs should be placed 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	Way finding signs at regular, predictable intervals between 200 and 250 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. Intervals no greater than one kilometre for destination, direction, and kilometre marking signs are recommended.

The City of Mississauga currently has an official sign logo, adopted by Council, for use on the Mississauga Trail Network. Use of this logo or other variation may be used to "brand" cycling in the City as part of the way finding system. **Image 9-3** illustrates examples of 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 found along cycling routes, more elaborate signs may be desirable at certain key locations along the routes.

These signs typically include information such as:

- a route network map
- "You are here" marking on all maps
- key destinations marked on all maps
- warnings / advisories / route etiquette / other interpretive information

Trailheads (also known as identifier signboards) are important in indicating entrance (gateways) to the cycling network and in directing users to select destinations. The development of trailheads at strategic locations within the cycling network is 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 as well as coordination with the Region of Peel's active transportation signing campaign.

Since these types of signs present much more detailed information than a typical way finding sign, they are located in areas where there is sufficient space to allow cyclists 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 interpretative sign panels within the Mississauga Trail Network. The current design includes the City of Mississauga's logo, name of the trail, an easy-to read

map of the trail and text about the trail including its history, or nearby points of interest. In addition, information on trail etiquette, a map legend, and contact information is provided. Room is also made available, when appropriate, for names and logos of any sponsoring organizations that can help to reduce the cost of providing these types of signs as illustrated below.

Figure 9-1: Current City Interpretative Sign Layout (Typical)

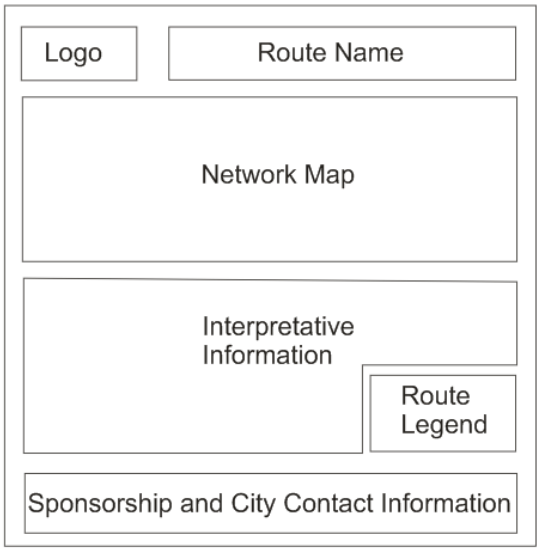


Image 9-4: Interpretive Sign Example

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:

5. Increase awareness of cycling network and facilities;
17. Promote bicycle parking at all major transit facilities within 5 years;
19. Incorporate destination amenities within libraries and community centres within 5 years;

The provision of bicycle parking and amenities is essential to support the development of cycling as a practical active transportation choice. According to the online survey and Public Engagement Session survey, the fear of bicycle vandalism and theft was the second most common reason given for not riding a bicycle. Bicycle parking, storage and shower/changing rooms and rest areas with benches (collectively called *trip-end facilities*) are important ways to provide convenience and security for cyclists at cycling destinations.

Currently, there are a range of bicycle parking types used throughout Mississauga that are provided by the City, other government agencies, schools and private landowners. Typically bicycle racks should be located along street frontages within Business Improvement Areas and at transit hubs, city destinations such as libraries, community centres, parks and city administrative offices. The amount of bicycle parking at office and commercial developments varies from site to site.

As part of the monitoring of the Cycling Master Plan, it is recommended that a bicycle parking inventory be undertaken at City-owned facilities. An initial bicycle parking demand count can also be undertaken to provide a baseline of bicycle usage statistics with updates to occur when the resources permit. In addition, the inclusion of bicycle parking counts as part of development related traffic and parking impact study submissions to the City will assist with obtaining bicycle usage statistics and identifying supply and demand issues.

Cyclists' needs for bicycle parking may vary depending on the nature of the trip and destination. Trip-end facilities should be designed to accommodate:

- **Trip Length**: Destinations drawing longer trips benefit from showers/change rooms.
- **Risk of Vandalism**: Lockers or a secured-access enclosed area are desirable at locations sheltered from public view.
- **Duration of Stay**: Lockers or a secured-access enclosed area offer higher security and shelter in locations where bicycles will be parked over several hours or overnight.
- **Weather Conditions:** Sheltered parking is beneficial where year round cycling is anticipated.

Short-term **(Class II)** parking is needed where bicycles will be left for short stops. It requires a high degree of convenience (as close to destinations as possible). At least some short-term bicycle parking is recommended to provide protection from the weather (a portion can be unprotected, since demand tends to increase during dry weather).

Long-term **(Class I)** parking is needed where bicycles will be left for hours at a time. It requires a high degree of security and weather protection, with well-designed racks in covered areas, lockers, storage rooms, or fenced areas with restricted access.

The provision of shower facilities, change rooms and lockers are also important amenities for making cycling a viable transportation choice. Such facilities are particularly important for cyclists who travel long distances, or through inclement or hot weather as well as those who need to dress in professional attire. Over 50% of respondents to the City's online cycling survey indicated that the addition of shower and change room facilities at places of work would encourage them to use a bicycle as their primary mode of transportation.

10.1 Parking Demand at Key Destinations

A number of key cycling destinations have been identified in this Cycling Master Plan through public input at the Public Engagement Sessions. The City's Growth Management Strategy Proposed Long-term City Structure Concept. **Map 5-1,** identifies major destinations such as schools, transit hubs, City Hall, employment centres, parks, community centres and libraries, and urban growth 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 there were secure bicycle racks or lockers available. This indicates that providing bicycle parking at these destinations will encourage cycling as a mode of travel.

Mississauga should provide a bicycle parking supply that meets anticipated demand at major City destinations such as the City Centre, Lake Ontario and shopping centres and neighbourhood destinations such as a local park, schools and convenience stores. Bicycle parking demand should be estimated by:

- applying modal split targets to estimates of trip generation
- referencing surveys of cycling parking demands at comparable sites
- referencing available industry standards as they are developed
- best practices from other municipalities

Bicycle parking at transit stops and terminals and bus bicycle racks significantly increase the transit catchment area and provide cyclists with increased mobility options for longer trips. Bicycle parking at transit terminals and bus bicycle racks have proven successful in attracting new riders. Transit agencies find that a significant portion of bicycle locker and rack users consist of new transit riders. This infrastructure enhances the transit catchment area and provides cyclists with increased mobility options for longer trips. 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).

Bicycle parking at transit terminals should reflect the significance of the station, anticipated cycling demand and level of security warranted. Bicycle parking at mobility hubs should

reflect the highest form of bicycle parking: Class I sheltered bicycle parking to protect against poor weather and/or secure bicycle lockers.

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 and no additional fare is required to use them.

Image 10-1: Bike Racks on Mississauga Transit buses

(Source: City of Mississauga, 2009)

10.1.1 Public Bicycle Systems

Public Bicycle Systems (PBS), also called *Bicycle Sharing* and *Community Bike Programs*, provide convenient rental bicycles intended for short commuter trips (less than 5 kilometres). A typical PBS consists of a fleet of bicycles, a network of automated stations where bicycles are stored, and bicycle redistribution and maintenance programs. The intent of this type of system is to increase the mode share of bicycles for inner city neighbourhood trips, and not necessarily intended for tourist use. Since 2004 in Mississauga, the University of Toronto-Mississauga Campus (UTM) has operated a volunteer bike-share program for students and the local community http://www.utm.utoronto.ca/bikeshare/about.html. It is recommended that Mississauga 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 / Bicycles	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

Image 10-2: Example Bicycle Sharing System

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

10.1.2 Bikestation / Cycle Centre

Bikestation® is a not-for-profit organization that offers secure bicycle parking with features as identified in **Table 10-2**. Some Bikestation® locations offer bicycle repairs, bicycle and commute sales and accessories, rental bicycles for local and tourist needs, restrooms and changing rooms. It is recommended that Mississauga investigate opportunities for partnership with Bikestation®/Cycle Centre.

Bikestation® Locations:

- Berkeley, CA
- Long Beach, CA
- Palo Alto, CA
- Washington, D.C.
- Embarcadero, CA
- Santa Barbara, CA
- Seattle, WA
- Various locations within LA County, CA

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 (24 hrs)
Retail Sales	10% discount for members.
Bike-Sharing	Check out conventional and electric bicycles and electric scooters: $3 per hour or $15 per day for regular and electric bicycle rentals $5 per hour or $25 per 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 recently launched a Bicycle Station in May, 2009. The inaugural bicycle station is located downtown at Union Station, the City's primary transportation hub. The City of Toronto also plans to expand to other locations throughout the City. Currently, the second planned location is Nathan Philip Square, by Toronto City Hall.

User Costs:

- One-time membership fee: $25
- Discounts at local participating bike shops
- Four Month Parking Plan: $60
- One Month Parking Plan: $20
- Daily Parking Plan: $2/day

Image 10-3: City of Toronto Bicycle Station Brochure

Source: City of Toronto

10.2 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, municipalities are developing standards for bicycle parking, or allow bicycle parking to substitute for a portion of automobile parking. The support of active transportation through the development approval process can ensure the provision of bicycle parking infrastructure. Development of bicycle parking zoning requirements needs to consider a variety of characteristics. Some of these considerations are identified in **Table 10-3.**

Table 10-3: Bicycle Parking Zoning Considerations

Zoning Considerations
▪ Compare zoning by-laws from other municipalities
▪ Perform literature review from industry documents to identify best practices (e.g. Victoria Transportation Policy Institute, AASHTO, MTO)
▪ Align with current City of Mississauga policies to achieve City goals and objectives
▪ Identify applicability of bicycle parking guidelines (e.g. City-wide versus planning district basis)
▪ Define applicability of bicycle parking guidelines to specific or general land uses
▪ Refer to cycling data to assist with identifying ratios (e.g. census data, Transportation Tomorrow Survey)
▪ Identify requirements for residential and non-residential land uses
▪ Identify requirements for employee / tenant / owner parking versus customer / visitor parking requirements and associated Class I and Class 2 bicycle parking facilities
▪ Reference to bicycle parking guidelines for specific location and design criteria

Examples of municipalities that have integrated bicycle parking within their respective zoning by-laws are identified in **Appendix E: Comparison of Bicycle Parking Zoning Standards**. For Mississauga, given the long-term vision of the City "to make cycling a way of life", it would

be appropriate to accommodate cycling within all land uses, using the bicycle parking requirements from the City of Vancouver and the City of Calgary models. It is recommended that the City of Mississauga incorporate provisions for bicycle parking within the Zoning By-law.

Bicycle parking definitions should also provide guidance on what is not considered as acceptable to qualify as bicycle parking (e.g. storage for an apartment shall not be within a dwelling unit, on a balcony or in a storage locker). In addition to quantity, minimum space dimensions, definitions of long term and short term parking and the requirement for shower/change facilities should be included within the Zoning By-law.

The following minimum parking space dimensions are recommended to be included in the City's zoning by-law:

- **Horizontal Parking:** 1.9 metres high, by 0.6 metres wide and 1.8 metres deep.
- **Vertical Parking:** 1.9 metres high, by 0.6 metres wide and 1.2 metres deep. (Not to exceed a maximum of 50% of bicycle parking spaces provided as vertical parking).

The following definitions of long term and short term parking are recommended to be included in the City's zoning by-law.

- **Long term parking** must be provided in the form of racks in an enclosed, secured area such as a room or cage with controlled-access or in the form of bike lockers.
- **Short term parking** must be provided in the form of racks at-grade in highly visible locations close to major building entrances, sheltered wherever possible.

10.3 Design and Location of Bicycle Parking and Amenities

A range of bicycle rack designs exist within the city offering 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 10-4** and **Table 10-5**. Along with zoning standards, the City should develop design guidelines for bicycle parking facilities that build upon the zoning standards by further detailing considerations for rack design, anchoring, aisle spacing and layout configurations, signage and access.

Table 10-4: Bicycle Parking Design Considerations

Bicycle Rack Design Criteria	Characteristics
Security	▪ Theft resistant material and anchoring ▪ Materials are smooth as not to scratch bicycles ▪ Supportive of wheel and frame locking devices (i.e. two points of contact) ▪ Prevents bicycle tipping over ▪ Provide sufficient lighting levels ▪ Short-term parking locations that are busy and highly visible ▪ Long-term parking locations are ideally in secured-access enclosed areas. ▪ Vertical bicycle space racks need to support the bicycle without the bicycle being suspended on its wheels. ▪ Monitoring by close-circuit or regular security patrols
Usability	▪ Convenient to access and use ▪ Do not pose a barrier to those with disabilities ▪ Not located within walkway clear zones ▪ Sufficient spacing from walls, stationary objects, parked vehicles, and other racks to allow manoeuvre-ability of bicycle into and out of rack area, thus not reducing bicycle parking capacity. ▪ Provide short-term parking near building entrances and provide shelter where possible ▪ Provide long-term parking that is sheltered from weather elements ▪ Shower and change facilities available for commuters ▪ Directional signs to direct cyclists to designated bicycle parking areas ▪ Warning signs for motorists and cyclists within parking garages ▪ Provide sufficient grades on parking ramps

Table 10-5: Preferred Short and Long Term Bicycle Parking Facilities

Bicycle Parking Term	Type
Short-Term	▪ Inverted U-Shape Rack ▪ Post and Ring ▪ Multiple-space Bicycle Rack
Long-Term	▪ Bicycle Locker ▪ Bicycle Storage Rooms with secure access and monitoring

Image 10-4: Bicycle Parking Options

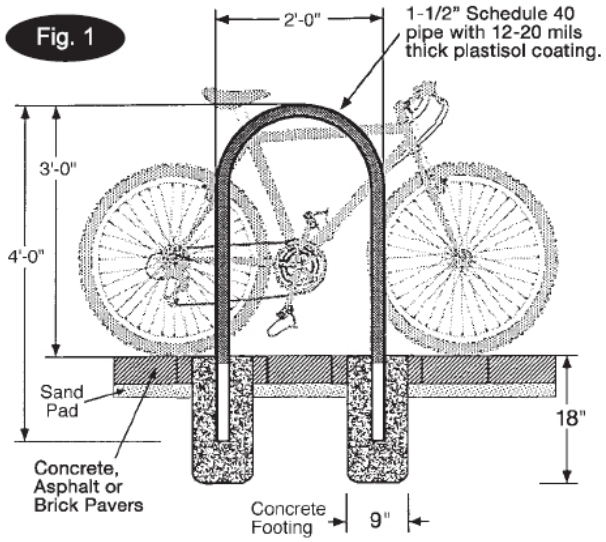
Bicycle Rack Type	Example
Bicycle Rack – Inverted "U" (Wisconsin– Source: Wisconsin Department of Transportation - WDOT)	
Bicycle Rack Type	**Examples**
Post and Ring Bicycle Rack (Mississauga - Source: iTRANS) Multiple-space Bicycle Rack (Mississauga - Source: iTRANS)	 
Sheltered Bicycle Parking (Clarkson GO Station - Source: iTRANS)	

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

Bicycle Rack Type	Example
Stacked Indoor Bicycle Parking at Transit Station (Chicago - Source: iTRANS)	
Bicycle Locker (Toronto - Source: iTRANS)	
Secure Bicycle Parking Room (Toronto - Source: bikerack.ca)	

11.0 PROMOTION AND EDUCATION

RECOMMENDATIONS:

3. Promote cycling to schools;
4. Increase awareness of cycling as an active transportation mode;
5. Increase awareness of cycling network and facilities;
6. Foster community cycling events;
8. Establish a tourism campaign focused on cycling;
17. Promote bicycle parking at all major transit facilities within 5 years;
23. Establish an educational plan for motorists and cyclists;

The Mississauga Cycling Master Plan identifies two themes that encourage more people to ride their bicycle.

1. **Awareness –** Exposure to cycling as a transportation alternative helps to reintroduce or reinforce the bicycle to individuals. Given that cycling has low use as an active transportation mode and viewed by many as an activity for the very young, the public may not have sufficient appreciation of the opportunities cycling provides. Education will reinforce the health, economic, and environmental benefits of cycling. It will also help to improve traffic safety.

2. **Accessibility –** Bicycle training, bicycle routes, and bicycle parking are all important requirements for those who chose to ride their bicycle. Safety and security has been identified as 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. These include:

- Incorporating bicycle parking in prominent locations in new development.
- Increasing visibility of bicycle infrastructure such as bicycle lanes and signage.
- Proactive marketing campaigns, coordinated with cycling partners that 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 with a full range of ages. The concept of recreational cycling will represent different messages for the various skills and interests of cyclists 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, which involves touring and exploration or sightseeing by bicycle for leisure

In October 2008, 30 cyclists participated in the City's first Tour de Mississauga. At the second annual Tour de Mississauga in 2009, over 400 cyclists of all ages and fitness levels participated in the event.

11.1.2 Active Transportation

It is the goal of Mississauga 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 can serve as the marketing themes.

The greatest opportunity for a cultural change toward cycling in Mississauga is through efforts focused on school age children, since the proposed cycling network will connect to over 90% of all schools in the City. Coordination and partnership between the City and School Boards to encourage cycling can be marketed to students providing the following opportunities: educating and influencing a generation of potential cyclists before they are committed to the auto mode of travel; providing a consistent message across Mississauga, and into most households, of the personal and community benefits of cycling; offering bike to school programs that can help address a common traffic operational issue of parking and traffic circulation at schools and the resultant vehicle idling and emissions; learning from other successful community awareness campaigns 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. The Region's Official Plan states that "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." The development of a Peel Region Active Transportation Plan, and subsequent improvements to make the Region more conducive to alternative modes of transportation, will be one means of achieving the Region's objectives for long term growth and for a more healthy, liveable community. The Region, working with

the area municipalities, launched a comprehensive Peel Region Active Transportation Initiative. The Initiative is comprised of two phases:

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

Phase 2: Development of an integrated, comprehensive Peel Region Active Transportation Master Plan. Anticipated completion date is 2011.

11.2 Marketing Messages and Events

The City of Mississauga can develop its own marketing messages coordinated with other on-going marketing initiatives. However, opportunities for a cultural change toward cycling could benefit municipalities across the GTA and coordinated initiatives could support mass media campaigns with leadership from the provincial government and Metrolinx.

The following 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 ride a bicycle through, with 350 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 much easier to stay fit when you work exercise into your daily routine.
- **Walk + Roll Peel –** Region of Peel initiative to promote walking and cycling for everyday transportation.

The campaigns themselves can be focused on the range of bicycle trip purposes. **Table 11-1** summarizes proposed campaign themes.

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 become a success, as they would form the nucleus of providing a guaranteed ride home, which may be considered a drawback to individuals choosing active transportation as a means to commute. 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 Active and Safe Routes to School Program. Integrate campaign into the curriculum and / or school events (e.g., Walk and / or Wheel Wednesday's - WoW) through discussions with the Peel Region school boards and individual schools.
"Share the Road / Share the Trail" Campaign	Promote safe cycling and motorist and cyclist behaviour in the City 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 of the City and bicycle rentals.

11.2.1 City Initiated Communication

Building upon the current communication methods used by the City, additional approaches and programs can assist with promoting cycling within the City as summarized in **Table 11-2**.

Table 11-2: City Cycling Programs

Method	Recommendations
Information Briefs	A series of information briefs on various cycling topics, such as riding in inclement weather, benefits of bicycle commuting and how to create a bicycle use group (BUG) in the workplace. Information briefs are aimed at increasing awareness of cycling and associated benefits.
Annual Survey	To assist in soliciting feedback on cycling in the City and ways to continually improve the cycling network, design, and maintenance of facilities; as well as amenities and programs. This can play an integral role in continually improving the state of cycling infrastructure in the City.
Bulletins / Magazine Articles	Distribution of quarterly bulletins by the City to update the community on upcoming events and progress in the cycling in Mississauga. In addition, feature articles in magazines on cycling in Mississauga can help to increase the profile of cycling in the City.
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 publicise 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 in the City. A highly visible way finding system can help to "brand" cycling in the City. In addition to the operational benefits of bicycle lanes and trails, the mere presence of bicycle routes represents a component of public recognition of cycling as an accessible mode.

11.2.2 Cycling Events

There are a number of existing bicycle events that currently take place within Mississauga and the Greater Toronto Area (GTA). These events present opportunities for the City to provide cost-effective promotion, as well as partnering with other agencies to expand these events and create new events. As part of any cycling event, the inclusion of incentives such as prizes (e.g. bicycle accessories) and / or free services (e.g. bicycle tune-ups) should be included. 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	▪ Become part of Bike Week in Toronto, or partner with Toronto and other municipalities to create Bike Month within the GTA. ▪ Initiate an on-going summer festival with several events throughout the summer months. 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 events could include walking and cycling activities, as the number one action to help the environment on the official Earth Day website. www.earthday.net
Bike Fridays	Further promote Mississauga Bike Fridays event across the City and to City employees, major employers, small businesses, and schools.
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. The Bike Tour began in 1989, proceeds from the event have gone to fund research in the search for a cure and vital services for people currently living with MS.
Healing Cycle Foundation	The Foundation has raised $480,000 towards a $1 million commitment to the palliative care unit at Credit Valley Hospital. 100% of donations go directly to its palliative care unit.
Other City Events	Bicycle Safety Demonstrations at various City events and festivals to provide a high cycling profile.
Car Free Day	Encourage families to engage in physical activity Sunday mornings and early afternoons. A

Event	Recommendations
	ride linking Mississauga's City centre with the lakefront is recommended as an introductory route. Closures of cross streets are unnecessary since participants, with the help of volunteer marshals, will stop at signalized intersections. Enhance street closures with fitness and health events in parks and other locations along the route. Gradually expand to other streets connecting the City centre to various locations throughout the City such as industrial areas on weekends.
Bicycle-Friendly Awards	As a means to promote business partnerships within the community and also a tool to help attract new employees, the bicycle-friendly awards program has been used in several communities. The link below provides guidelines used by Niagara Region http://www.niagararegion.ca/living/health_wellness/physicalactivity/pdf/BFA-Guidelines.pdf
Tour de Mississauga	In October 2008, 30 cyclists participated in the City's first Tour de Mississauga. For the second annual Tour de Mississauga in 2009, over 400 cyclists of all ages and fitness levels participated in the event.
Phil Green Recognition Award	Since 2003, the City of Mississauga has presented the Phil Green Recognition Award to the person(s) who demonstrate an exemplary effort to the cause of promoting and furthering cycling or other forms of sustainable transportation in the City.

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 educational programs to help educate cyclists, pedestrians and motorists on safety and road and trail etiquette.

Through existing and new partnerships, the City has the opportunity to further advance the education of cycling safety through the following:

- CAN-BIKE courses
- Education Campaign (e.g. "share the road" and "share the trail")
- City transit driver education
- Commercial vehicle operator education
- Bicycle Ambassadors (on-road and trails)
- Stakeholder Involvement - Traffic Safety Council, Safe Driving Committee, Mississauga Cycling Advisory Committee
- Peel Region Police and Mississauga Fire and Emergency Services Outreach
- Bicycle Theft Prevention (proper bicycle parking)
- Education on proper attire (e.g. reflectivity, cycling in inclement weather)
- Institutionalizing Bicycle Safety Education (e.g. inclusion of cycling skills within physical education program and studying role of active transportation within environmental studies curriculum)
- Health benefits through Peel Public Health and Trillium and Credit Valley hospitals
- Environmental and economic benefits through local environmental agencies such as the Clean Air Partnership

12.0 RECOMMENDATIONS

STRATEGIC DIRECTION 1
Foster a Culture where Cycling is an Everyday Activity

1. Establish a "cycling office";
2. Increase the transportation modal split for cycling to 10% of all weekday trips;
3. Promote cycling to schools;
4. Increase awareness of cycling as an active transportation mode;
5. Increase awareness of cycling network and facilities;
6. Foster community cycling events;
7. Develop partnerships to implement the education and awareness program;
8. Establish a tourism campaign focused on cycling;
9. Establish a regulatory framework to ensure the provision of bicycle destination amenities on private lands;

STRATEGIC DIRECTION 2
Build an Integrated On-Road and Off-Road Cycling Network as Part of a Multi-Modal Transportation System

10. Add an average of 30 kilometres (18.6 miles) of bicycle lanes and multi-use trail per year over 20 years;
11. Seek partnership opportunities to complete the cycling network;
12. Give priority to completing network links to existing higher order transit terminals;
13. Develop and implement a comprehensive signage and way-finding system;
14. Provide cycling routes within 500 metres (0.3 miles) of all residents and publicly funded schools;
15. Ensure that 95% of the population are within 1 kilometre (0.6 miles) of a primary cycling route;
16. Ensure all nodes are connected by cycling routes;
17. Connect all major natural and cultural destinations by the cycling network;
18. Give priority to completing network links to existing high order transit terminals;
19. Incorporate connecting bicycle links into future higher order transit plans;
20. Connect all major natural and cultural destinations by cycling routes;

STRATEGIC DIRECTION 3
Adopt a "Safety First" Approach for Cycling in Mississauga

21. Continually reduce cyclist incident rates;
22. Develop an asset management plan for all cycling facilities;
23. Establish an educational plan for motorists and cyclists;
24. Establish cross-sections within the City's road rights-of-way for safe cycling facilities;
25. Work with partners to develop standard designs for safe intersection crossings;

13.0 IMPLEMENTATION STRATEGY

An Implementation strategy will be developed based on the recommendations of the Cycling Master Plan. To ensure that the Cycling Master Plan remains valid, a review and update of the plan will occur approximately every five years.

Implementation is projected over a 20 year planning horizon and will include timing, anticipated costing, life-cycle opportunities of existing road infrastructure and experience of other jurisdictions. This is consistent with the rate of implementation of other progressive cycling cities in Canada, such as Montreal and Vancouver. It is recognized that the rate of implementation of the cycling network will be dependant upon the degree and rate of funding allocated through the City capital programs and external funding sources.

Short, medium and long-range targets for implementation of bicycle routes will be established in the Implementation strategy. Priorities for implementing the cycling network will be assessed based on the vision of the Master Plan, principles identified by MCAC and through the public engagement sessions.

The first priorities will include routes that meet one or more of the following criteria:

- Develop a core grid network of major north / south / east / west routes.
- Recognize the City Centre as the primary activity centre and destination.
- Connect to other key City destinations.
- Provide cycling route connectivity in cycling routes.
- Achieve feasible low cost “early wins” to demonstrate successes.