4.0 Cycling Master Plan Development

4.1 Guiding Principles

In designing a city-wide cycling network, guiding principles were established to direct decisions regarding core aspects of the network structure (the network philosophy) and route design elements for specific links.

4.1.1 Network Philosophy

Cyclists include a broad spectrum of society and the activity of cycling is influenced by some key external factors. The following principals summarize the core aspects considered in developing a network structure:

- Cycling Audience – age and skill level
- Cycling Purpose – commuter/utilitarian or recreational
- Cycling Network Density
- All-season Considerations
- Health and Safety

Cycling Audience and Purpose

Cyclists range from children in elementary school through teens, to adults and seniors - and within this spectrum of people there is a wide variety of cycling skills from novice to expert. Such a variety of cyclists prefer different cycling facilities. The purpose of cycling trips further influences the preference for various cycling facilities. A young novice cyclist learning to cycle or a middle-aged, highly skilled cyclist planning a leisurely bike ride would prefer a multi-use trail; however a commuter cyclist or an elderly recreational cyclist wanting to ride 50 km in one day may prefer on-road bike lanes to avoid mixing with slow pedestrian traffic. Thus different cyclists or situations create different choices regarding the preferred type of cycling facility.

Cycling Network Density

In order to provide users with easy access to cycling facilities, planning studies have indicated that those facilities should be spaced no further than 2 km apart in urban areas (Metrolinx, The Big Move 2008). As a result, a 2 km cycling grid within the City of Hamilton's urban area was adopted as a design guideline. In rural areas the network spacing is typically greater than 2 km for functional and financial reasons. Major cycling routes were defined and examined on this basis. While such a network cannot be built immediately, it will develop through annual improvements.

The *MEA Class EA (October 2000, as amended in 2007)* document dictates that various alternative solutions be identified and assessed and that an ultimate preferred alternative be selected. Thus, for this study, the following cycling network alternatives were considered by the Project Team:

- Alternative 1: Do Nothing;
- Alternative 2: Primary Corridors Network; and
- Alternative 3: Provide Bike Facilities on All Major Streets.

A description and evaluation of the network alternatives is presented in **Section 4.2.1**.

All-season Considerations

While most people cycle from approximately April to October due to the City's climate, some people are all-season cyclists. During many winters there are periods when road conditions are very dry, making cycling possible. All-season cyclists regard the condition of the asphalt to be the primary issue for winter riding, rather than the temperature.

Health and Safety

Two important aspects of the personal health of cyclists are recognized: the benefits of increased physical activity and the negative impacts of exposure to poor air quality. A decreased reliance on cars and an increased participation in active transportation modes (eg. walking and biking) can increase physical activity levels resulting in lower rates of obesity and other health conditions, such as Type 2 diabetes and heart disease (Frank, Kavage, Litman, *Smart Growth BC*, 2006).

Comprehensive research has been conducted in the Hamilton area by Dennis Corr regarding exposure to poor air quality in the vicinity of motor vehicles. The research raises the concern of very poor air quality along major streets and in the immediate vicinity of idling vehicles, particularly at intersections (Health Impacting Air Pollutants - A mobile monitoring study to identify & rank sources in Hamilton Ontario, Corr, 2006). This problem is being addressed through newer technologies within the auto industry, such as cleaner engines, emission controls, cleaner fuels and hybrid technologies (anti-idling), thus in the future this situation will be less critical. Although air quality and the personal health of cyclists is a concern at present, this Cycling Master Plan study recognizes that cyclists have the option to choose their routes; whether they be direct routes that expose them to higher levels of vehicle exhaust or less direct routes on lower volume streets that are removed from vehicle emissions. The irregular street alignments in some areas of the city require that many of the direct routes occur on higher volume streets.

Collisions are another aspect of health and safety. The analysis of police motor vehicle collision data has been incorporated into decisions regarding the location of new cycling facilities and implementation priorities by aligning proposed routes with locations showing high incidence of collisions. These locations ultimately reflect locations with high cycling demand, at least at some time of the day or week, and would clearly benefit from facilities which would either fully separate cyclists and motor vehicles or at least provide upgraded facilities. The number of collisions in the rural areas of Hamilton was observed to be low. Police collision data for the City of Hamilton was analyzed for the 10 year period between August 1998 to August 2008. Approximately 155 bike/auto collisions occurred annually during that time. Although this type of collision only forms 20% of all vehicle crashes (**Figure 4.1.1-1**). 12 fatalities occurred during the 10 year period data was analyzed.

Figure 4.1.1-1 presents the types and percentage occurrence of all cycling injuries in Ontario in 2002/03. **Figure 4.1.1-2** displays the police reported collision locations for the August 1998 to August 2008 period for much of the Hamilton urban area, with collision incidents marked with blue dots.

Figure 4.1.1-1: Cycling Crashes as Reported by Ontario Hospitals, 2002/03

Source: Ontario InjuryCompass, 2002/03)

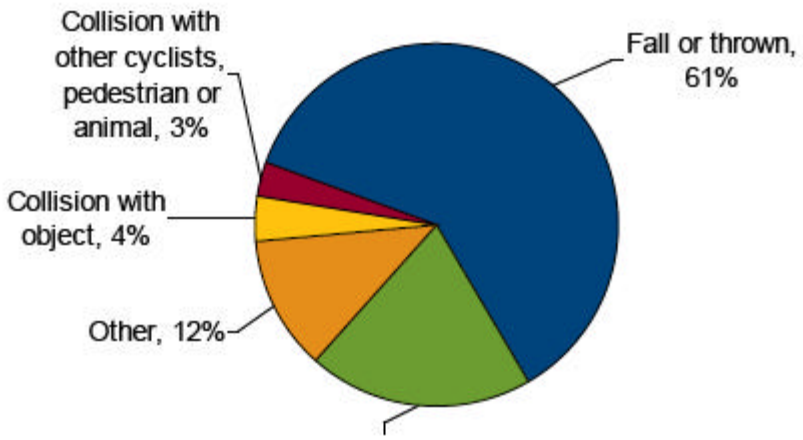
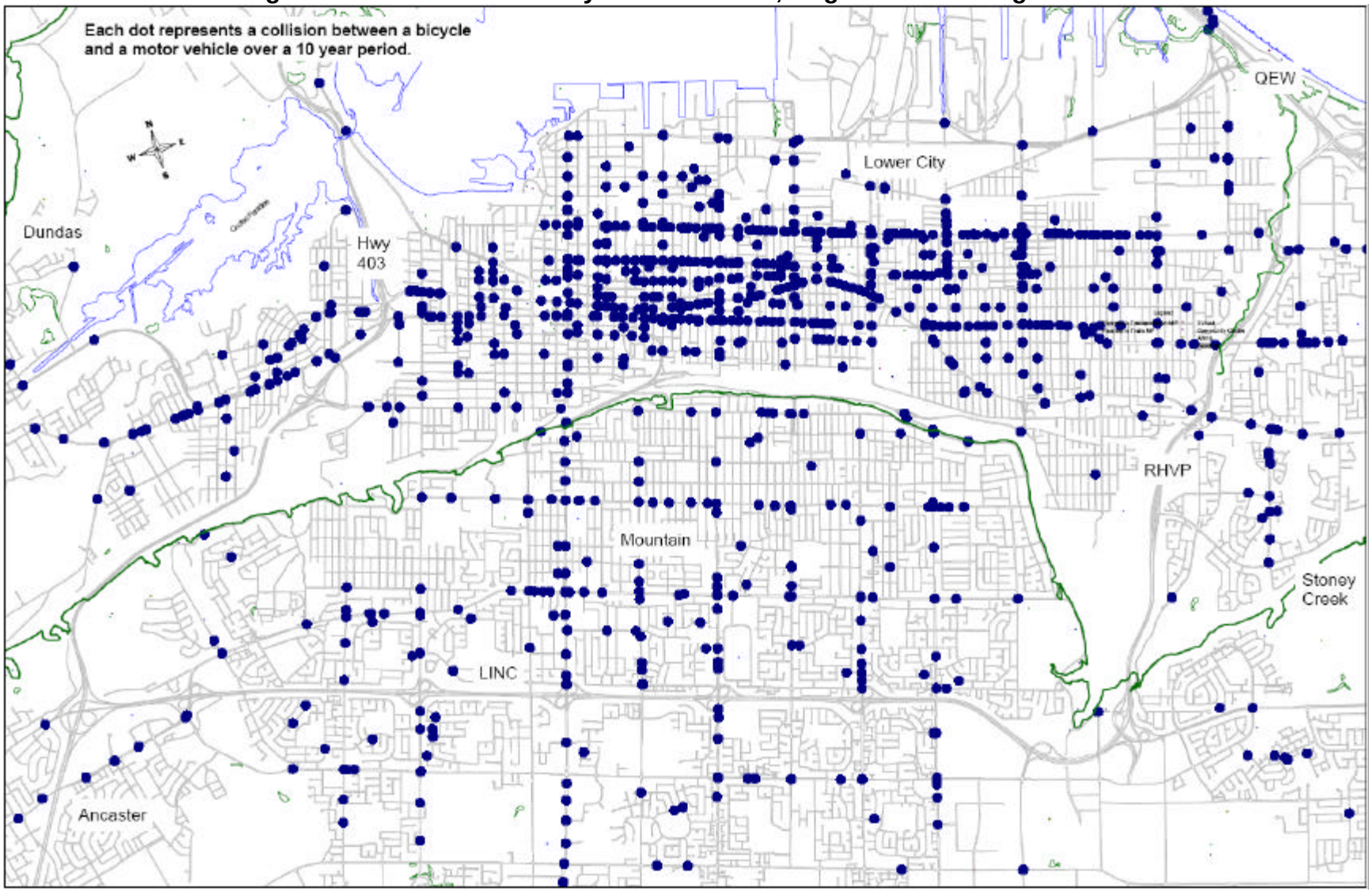


Figure 4.1.1-2: Location of Cyclist Collisions, August 1998 to August 2008



4.1.2 Cycling Facility Design Types for Individual Links

This section provides further background information regarding the design details that were considered in the development of the preferred network. This study recognizes that separate cycling facilities are a key tool in creating an environment which will foster increased rates of cycling. Surveys completed in both Canadian and American cities clearly indicate that an increase in separate cycling facilities, such as bike paths and lanes, would do the most to encourage more people to cycle (Dill and Carr, 2003). Thus, it is imperative that Canadian cities greatly expand their investment in such separate cycling facilities if they really want to increase cycling (Pucher and Buehler, 2005).

There are four well established cycling facility designs that the City of Hamilton utilizes, which are as follows:

1. Multi-use Recreational Trails (off-street, rural & urban)

A multi-use trail is a paved or packed loose-material trail that is physically separated from motorized traffic by an open space or barrier. Multi-use trails are typically shared by pedestrians and other non-motorized uses and an asphalt surface is desirable. Operational rules are often designated by signage and may also incorporate pavement markings. In Chapter 4 of the *Hamilton Recreational Trails Master Plan (2007)*, the City conducted an extensive review of trail designs in other municipalities and in published Design Guides in order to formalize design details for various trail classifications. The preferred minimum width is 4.0 m, but on heavy traffic trails, 6.0 m should be considered.

There are three multi-use trail designs that the City generally considers, each having a minimum trail corridor design width:

A) Accessway – Short connector trails typically shorter than 50 m. Given a 4 m trail surface width, a desirable trail corridor width (property width) is 10 m (6 m absolute minimum) to permit a setback from private property. These trails are also referred to as causeways.

B) Stable-edge Trails – Trails that are typically longer than 50 m constructed in locations where the edge of the trail corridor will not deteriorate or shift over time. Given a 4 m trail surface width, a desirable trail corridor width (property width) is 15 m (12 m absolute minimum) to permit a setback from private property.

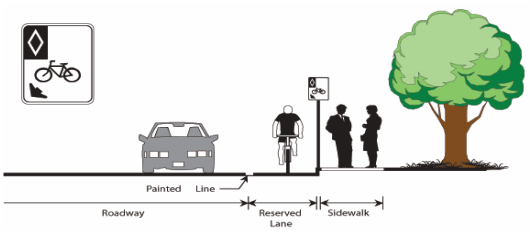
C) Dynamic-edge Trail – Trails that are constructed in locations where the edge of the trail corridor may deteriorate, shift or erode over time such as along the edge of escarpments or waterways. Given a 4 m trail surface width, a desirable trail corridor width (property width) is 20 m or more (15 m absolute minimum) to permit a setback from private property and edges of land that are prone to erosion. This setback provides safety for trail users as well.

Where multi-use trails intersect roadways, they should be positioned a suitable distance from other intersections and the roadway should have a gap in any raised curbs for trails to ramp to street level for the convenience of cyclists and wheelchairs, etc. At intersections of trails/roadways, when there is no traffic control on the roadway that carries motor traffic, the following details are to be implemented:

- all multi-use trails shall have a standard stop sign (60 cm x 60 cm) at the approach to roadway crossings;
- all multi-use trails shall have a standard sign (RB-89) prohibiting autos and motorcycles near access or crossing points with public roadways;
- all multi-use trails shall have bollards where they intersect roadways (or other device to ensure cyclists stop). These bollards will be designed to prohibit motor vehicle access (maximum gap of 2.0 m), and special provision will be made for authorized vehicles only (eg. one drop-down bollard);
- on all roadways with a posted speed limit of 70 km/hr or higher, and on the approaches to all freeway and controlled-access highway ramps, signing shall be erected to notify drivers of a multi-use trail crossing ahead; and
- on roadways with a posted speed limit of less than 70 km/hr, signage to notify drivers of the multi-use trail crossing will only be installed if sightline requirements are not met or if the roadway is a truck route.

There shall be no painting of the roadway to mark trail crossings when trail users do not have the right of way.

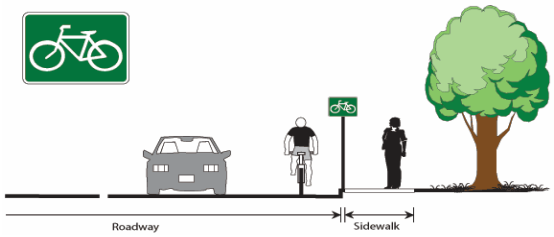
2. Reserved Bike Lanes (on-street, urban)



Reserved Bike Lanes designate a portion of the roadway to the exclusive

use of cyclists through signing and pavement markings. Signage and pavement markings are typically implemented as per Transportation Association of Canada (TAC) Guidelines (1998) and TAC is currently working on substantial expansion and revisions as an updated resource. The city will generally continue to follow the TAC guidelines in the future. Additional wayfinding signage may be considered, including various distance markers to significant destinations (eg. “Battlefield Park, 7 km”). The width of a bike lane is ideally 1.5 m to 1.8 m, with an absolute minimum of 1.2 m. Note that this dimension is measured from the edge of pavement, and in the case of no gutter pan, can be to the face of the curb. The design and condition of sewer grates and the pavement surrounding them should be considered when determining the effective bike lane width.

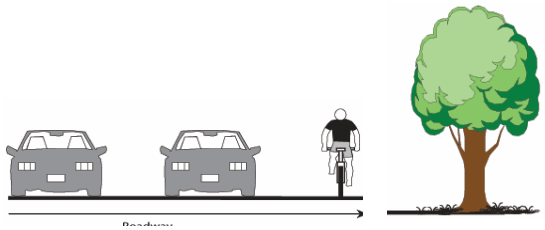
3. Signed Bike Routes (on-street, urban)



Signed Bike Routes are roadways that are to be shared-use (eg. mixed traffic) for cyclists and motorists that are normally designated by signage only. The term bicycle boulevard is also becoming commonly used to identify these facilities, especially when the design incorporates a few extra elements (e.g. pavement markings) to benefit cyclists. Sharrows, a combination of a bicycle icon and a chevron (see TAC Guidelines, 1998 and **Figure 4.1.2-1**), may be applied to the roadway at a few critical locations where issues of cyclist safety or organization dictate. If the travel lane is narrower than 4.25 m, the sharrow should be positioned in the centre of the travel lane, with appropriate “single file” signage. Situations such as this are usually accompanied by warning signing, either for the road narrowing or the organization of traffic. If the travel lane is narrower than 4.5 m but wider than 4.25 m, then the sharrow can be positioned along the curb beside motor traffic, with appropriate “side-by-side” signage. If the travel lane is wider than 4.5 m, a separate bike lane should be implemented.

Figure 4.1.2-1: Sharrow Symbol

4. Paved Shoulders (on-road, rural)



Paved shoulders are part of the continuous paved area of a roadway, but are separated from the motor vehicle lane by a solid painted edgeline. Typically there are no other pavement markings and only guide signing. This is similar in operation to a designated bike lane, but is usually in an area with open ditch drainage. Occasional cycling wayfinding signage may be considered. Pedestrians may also use this facility. An ideal standard for all rural road reconstruction (or at least those with an Average Annual Daily Traffic value greater than 2000 vehicles per day) would include at least a modest paved shoulder of 1.5 m. Such a feature will not only provide a refuge for cyclists on all rural roads (which typically have 60 – 80 km/hr speed limits) but would also increase the lifespan of the road since keeping heavier motor traffic away from the edge of the asphalt will reduce the deterioration of the pavement. A rumble strip embedded in the painted edge line can also be considered but it may not be appropriate if the width of asphalt is insufficient. Note that residents in rural areas do not have local street alternatives for cycling as the street network is much less frequent in rural areas.

In addition to the four established elements described above, other facility designs that were considered are as follows:

Alleyways

Alleyways were considered as a possible option for resolving “pinch points” in the cycling network, but no such routes were identified. Alleyways were not regarded as ideal links in the network since they typically have very poor sightlines at street intersections, making for serious safety concerns.

Bike Lanes Beside the Sidewalk (Behind the Curb)

The City considers the design where a bike lane is positioned behind the curb (or beside the sidewalk) as the least preferred option. This design may cause conflicts at intersections and driveways due to poor visibility, is very difficult to manage at signalized or stop-controlled intersections and thus will be avoided unless conditions are ideal for its use (A situation with

no intersecting roadways or driveways for an extended distance is preferred).

Bike Lanes "Stepped" by the Curb

Positioning bike lanes adjacent to motor vehicle lanes, but raised approximately 7 cm from the surface of the street, are being experimented with in several jurisdictions, and is in use in European cities, but the City of Hamilton will do further investigation before such a design is considered in the City. Advantages include increased perceived safety and reduced maintenance (sweeping and stencil painting) due to separation from motor traffic. Disadvantages include increased construction costs, poor connectivity for cyclists needing to make left turns, inexperienced cyclists falling from the curb, drainage issues, accommodation of on-street parking, improperly designed intersections and snow clearing.

Barrier Separated Bike Lanes

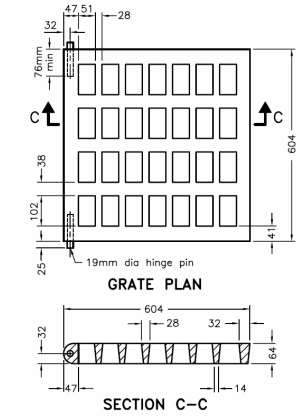
The City will consider bike lanes with a barrier (typically a raised median) separating cycling traffic from motor traffic only in specific situations where other techniques (i.e. knockdown bollards) are either not providing required safety or are a maintenance concern. Barrier separated facilities create maintenance issues for snow clearing, drainage and street sweeping.

In addition to the linear route design elements described above, other specific design elements are noted herein:

Sewer Grates

A standard sewer grate design that is cyclist friendly has recently been approved by the City. **Figure 4.1.2-2** shows this standard sewer grate design.

Figure 4.1.2-2: Standard Sewer Grate Design



The City continues to explore a standard design for sewer grate collars that better prevents asphalt settling around sewer grates.

Stop Control Intersections

Whenever possible, the design of cycling routes will avoid all-way stop controlled intersections or attempt to revise existing traffic control, such as stop signs, which are a deterrent for cyclists perhaps even more than they are for auto drivers due to the loss of momentum.

Signals

The City's goal shall be to incorporate sensors for cyclists to activate or incorporate sensors that detect bicycles whenever an approach requires detection. There are a number of alternatives to employ, and this preference of design shall evolve as technologies develop. Video sensors may serve as an ultimate technology as one sensor might serve both bike and auto requirements, but sensitivity and cost are yet to be assessed. Other technologies include loops embedded in asphalt and activation poles at approaches (problematic for through cyclists if the curb lane is a dedicated right-turn lane). TAC is in the process of developing standard pavement markings and signage to assist cyclists in positioning themselves to activate signals using embedded loops. Bike boxes, a demarcated area at a signalized intersection that allows cyclists to make left turns more easily in front of motor traffic, will be considered at critical locations. See **Figure 4.1.2-3** for an example of a bike box.

The City is awaiting an approved "signal head", a signal device illuminated at a signalized intersection, made specifically for cyclists and used within the Province of Ontario.

Roundabouts

At single-lane roundabouts, cyclists are expected to merge with vehicular traffic. At multi-lane roundabouts, the TAC philosophy is for bikes to form a separate route outside the roundabout or ride through merged with motor traffic.

Stairs with Bike Trough

The City has a practice to construct stairs which are part of multi-use trails or bike routes with a trough for bicycles. Such stairs work best for cyclists when the stairs have less steep slopes and troughs on both sides of the stairs. A rough surface (grit) in the trough is necessary to maintain braking control of a bicycle traveling down such stairs. See **Figure 4.1.2-4** for an example.

Figure 4.1.2-3: Bike Box

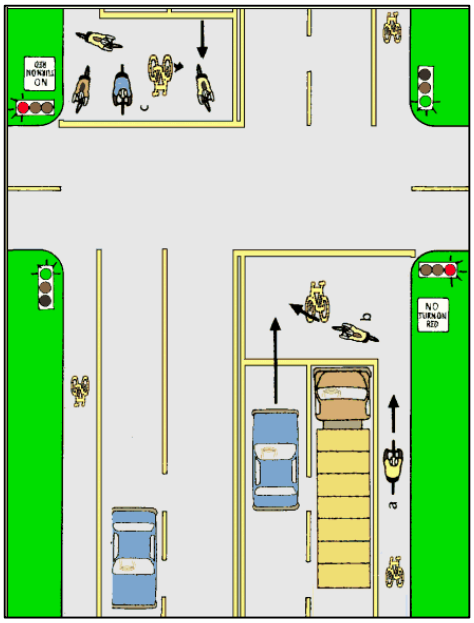


Figure 4.1.2-4: Stairs with Bike Trough

4.2 Alternative Solutions

There were two distinct tasks required in the development of the preferred cycling network. The first task was to determine the philosophy of the network that will comprise the ultimate network, eg. the density of cycling routes in the network. Next, a determination of the specific links which will constitute the ultimate network was required.

4.2.1 Cycling Network Philosophy Alternatives

As mentioned previously in **Sections 1.2 and 1.3**, this study is following the *MEA Class EA (October 2000, as amended in 2007)* process. As a result, the following cycling facility network alternatives were considered by the Project Team:

- Alternative 1: Do Nothing;
- Alternative 2: Primary Corridors Network
    - Identify a network of select routes to target for cycling facilities to ensure a well-connected, convenient and safer network for cyclists throughout the city; and
- Alternative 3: Provide Bike Facilities on All Major Streets
    - A broader approach, constructing cycling facilities everywhere across the city, without a system of prioritization.

The alternatives developed reflect the study's Problem and Opportunity Statement (see **Section 2.2**) which is to improve the commuter cycling network and link with the recreational cycling network developed in the *Recreational Trails MP (2007)*.

Table 4.2.1-1 presents how each of the alternatives were evaluated. Given the feedback from the first round of Public Information Centres (PICs), the study applied three evaluation criteria towards selecting a preferred network structure. The criteria were network continuity, safety and cost. Network continuity as a criterion ensures that cycling facilities are continuous across the city instead of having a disjointed collection of cycling facilities that do not connect to each other. Safety as a criterion incorporates health and safety issues as well as serving to make cycling more appealing to more potential cyclists due to a proven increase in safety. Cost recognizes that there are limited resources to construct cycling infrastructure given that there are other municipal responsibilities.

As will be discussed further in **Section 4.3**, feedback from PIC #1 indicated approximately equal support for Alternative 2: Primary Corridors Network vs. Alternative 3: Provide Bike Facilities on all Major Streets options. There was no support for Alternative 1: Do Nothing. The primary priority for PIC attendees was for the Project Team to ensure connectivity and implement a core cycling network as an immediate first step.

Table 4.2.1-1: Cycling Facility Network Type Evaluation

Evaluation Criteria	Cycling Facility Network Type		
	Alternative 1: Do Nothing	**Alternative 2: Primary Corridors Network**	**Alternative 3: Bike Facilities on all Streets**
Network Continuity	- No changes to the existing cycling network – continuity does not improve	- Improves network continuity on primary corridors	- Improves network continuity, although achieved at an uneven pace
Safety	- No improvements to the safety of the existing cycling network - No change in current situation of some cyclists using sidewalks	- Improves safety by providing improved cycling network within short distance of all users and destinations - Safer practice of keeping cyclists off sidewalks, where bike facilities exist	- Improves safety by providing improved cycling network everywhere - Safest practice of keeping cyclists off sidewalks
Cost	- Lower cost, maintain existing network only	- Higher cost to implement	- Highest cost to implement
Conclusions	Least Preferred - Does not address Study Objectives	**Most Preferred** **- Addresses Study Objectives at lower cost**	Less Preferred - High cost and lack of network structure reduces effective implementation

Upon evaluation, the Primary Corridors Network alternative was determined to be the preferred alternative. The Do Nothing alternative did not address the objectives of the study therefore it was not carried forward. By pursing a Primary Corridors Network, comprehensive urban and rural cycling connectivity throughout the City could be achieved at an earlier point in time and at a lower cost than the All Major Streets alternative. Although a Primary Corridors Network would have high implementation costs, user safety would be optimized. By prioritizing the creation of on-street and off-street Primary Cycling Corridors, cycling would be encouraged throughout the City. The optimum city-wide cycling network is to be made up of a combination of Multi-use Trails, Reserved Bike Lanes, Signed Bike Routes and Paved Shoulders, depending on site specific conditions. Fostering cycling would address four pressing concerns facing society that are often mentioned in the media – air quality, global warming, obesity rates and projected traffic congestion. A continuous network would also help ensure that all residents of Hamilton would have a viable, healthy and economical means of transportation.

One final justification for expanding the cycling network is the increased frequency of complaints by pedestrians regarding cyclists riding on sidewalks. Riding a bicycle on a sidewalk is illegal in the City of Hamilton and is often dangerous because of inadequate sight distances for motorists and cyclists as well as unexpected cyclists behaviour. Nevertheless, cyclists are resorting to this practice because they are not comfortable sharing the roads with motor vehicles without their own designated facilities/lanes.
Even though the Primary Corridors Network cannot be built immediately, it will develop through annual improvements. Cycling infrastructure is implemented in four ways:

- Specific cycling projects (typically retrofits on existing streets);
- Recreational or multi-use trail construction;
- Integrated with roadway reconstruction and/or rehabilitation; and
- Integrated with roadway projects which are part of new development.

In addition to the routes that were identified in the Primary Corridors Network (outlined in **Section 4.2.3.1**), it is recognized that a larger network of cycling facilities is desirable. Opportunities to perform low cost cycling upgrades may be found in conjunction with road construction, redevelopment and new development projects, and should be considered. Priority will always be given to primary routes so that a continuous network can be completed.

4.2.2 Cycling Network Link Alternatives

The methodology employed to develop the Primary Corridors Network was as follows:

- **Step 1:** Compile a list of identified streets/trails for consideration;
- **Step 2:** Identify criteria for the assessment;
- **Step 3:** Data collection to describe each of the identified streets/trails;
- **Step 4:** Determine a preliminary design concept that best suits each segment;
- **Step 5:** Calculate a weighting value for each identified street/trail based on its preliminary design concept; and
- **Step 6:** Map the identified streets/trails that rank highest in the assessment, together with existing cycling infrastructure. The full network was built around these streets/trails. Note that some of these segments were parallel streets very close to each other, so a preferred street was identified in such scenarios to recognize the 2 km distance principle.

  The methodology used is further explained in **Sections 4.2.2.1 – 4.2.2.6**.

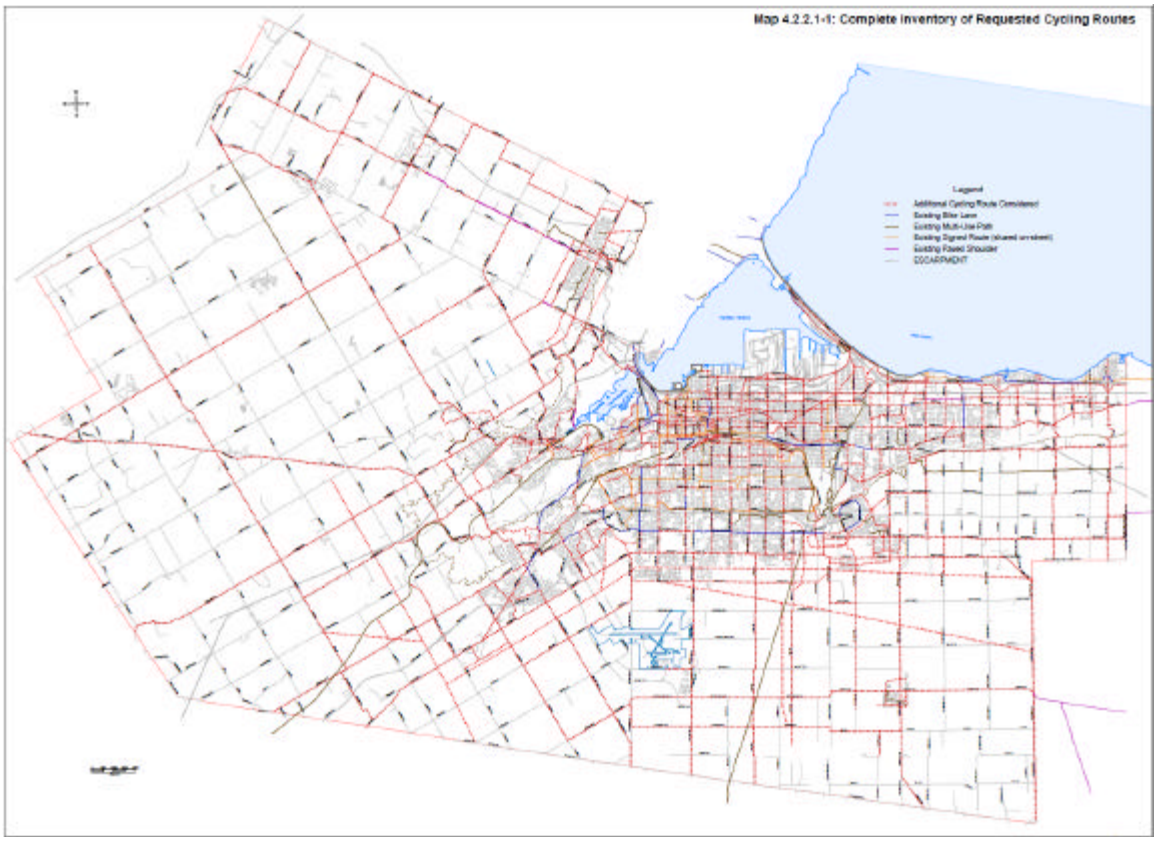
4.2.2.1 Step 1: Identification of Links for Consideration

The City continually receives submissions from the community regarding the need for specific cycling infrastructure. In conjunction with existing City documentation (described in **Section 3.0**), these community submissions were integrated into the consideration of link alternatives. Maps that combined existing and planned cycling facilities were then created, as documented in the *Transportation MP (2007)* and the *RTMP (2007)* (see **Maps 3.6-1** and **3.6-2**). Attendees at the first set of Public Information Centres (PIC) suggested many additional streets, rural roads and potential trails for consideration as cycling routes.

In total, over 500 segments of roadways and trails were identified. The initially identified network included most arterial streets and collector streets within the urban envelope of the City of Hamilton, as well as many of the rural roads and some off-street trail ideas. **Map 4.2.2.1-1** depicts the complete inventory of cycling routes requested through this process.

Major streets such as Main Street/Queenston Road and King Street in the lower city were suggested, but due to the concurrent timing of this study with the Hamilton Rapid Transit Feasibility Study, facilities on many potential rapid transit corridors were omitted. These streets will instead be addressed after the routing of rapid transit is determined. Discussions with City staff responsible for the Hamilton Rapid Transit Feasibility Study have noted that they will further investigate bicycle routing issues as they progress to the detailed design phase.

Insert Map 4.2.2.1-1



4.2.2.2 Step 2: Identification of Evaluation Criteria for the Link Alternatives

In order to develop a priority list for cycling infrastructure investment, criteria were developed to determine the Primary Corridors Network. These criteria incorporate the "pro" factors for the various links, or justification, as well as the "con" factors, or constraints. The justification criteria identified were: network continuity, safety and demand. Each of the factors was weighted based on significance and are discussed further below.

1. ***Network Continuity*** addresses "missing link" segments within the existing network. Each of the segments in the network projects were rated as having a high or low degree of continuity. This factor was weighted as 30% of the justification and the value was assigned based on its ability to connect existing and proposed cycling facilities.

2. ***Safety*** was incorporated into the criteria through collision history data. Statistics describing cyclist/motorist collisions (as described in **Section 4.1.1**) were analyzed for each of the segments. Collision data was calculated as collisions/km, aggregated for a full 10 year period. Safety data was weighted as 30% of the justification. Perceived safety issues were recognized as a public concern, but there was no means identified to collect and utilize such data in an objective fashion.

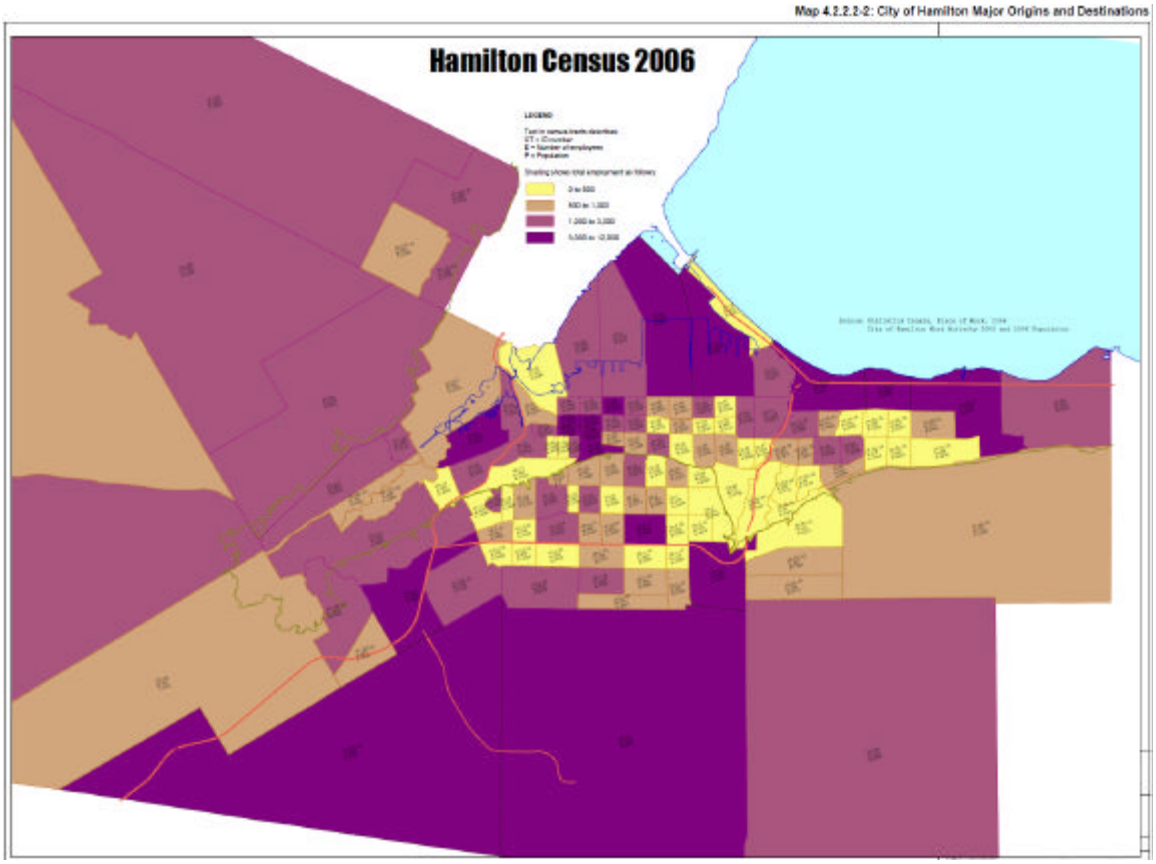
3. ***Demand*** for cycling routes comprised 40% of the weighting to calculate the justification for various segments. Demand was assessed based on two data sources:

    1. Proximity to major origins and destinations; and
    2. Community desire based on input from Public Information Centre (PIC) #1 and existing City cycling plans.

    Proximity to major origins and destinations recognizes that higher demand is well established in certain areas of the City, such as near McMaster University; other major employment areas including downtown Hamilton, Mohawk College, the Harbour, the Centennial/Fruitland employment lands and the Ancaster Commercial Areas; and higher density residential neighbourhoods such as downtown Hamilton, select neighbourhoods on the Mountain and the neighbourhood east of Eastgate Square. **Map 4.2.2.2-2** displays these areas.

Insert Map 4.2.2.2-2

Map 4.2.2.2-2: City of Hamilton Major Origins and Destinations



Community preference was measured from PIC #1 submissions whereby a value was assigned based on the frequency that a route was identified as desired. If a route was flagged by the Hamilton Cycling Committee (HCyC) it was assigned a value equivalent to the most popular of requests from the PIC input, given that the HCyC members represent cycling interests across the entire city. In addition to this measure of frequency, if a route was already flagged in either the *RTMP (2007)* or the *Transportation MP (2007)*, it was given the highest ranking in this category.

Although existing cycling traffic volume data is collected by the City, it is not collected consistently enough across the city to be considered a reliable data source; therefore, it was not used in this analysis. It is also recognized that the lack of cycling facilities (bike lanes, bike parking, workplace shower facilities, etc.) in many areas of the City deter cyclists, further making existing volume data an unreliable data source to assess demand. Note that collision data can suggest corridors with larger volumes of cyclists, but this cannot be applied with great confidence.

Constraints Criteria identified in this analysis are cost of construction and property limitations.

4. ***Cost*** estimates were developed for each segment once a design concept was identified. These costs are based on unit costs per metre where appropriate and easily calculated given the approximate length of each segment. The specific costs associated with each segment varied, dependent on the type of facility required, and the existing conditions of the specific area. The unit costs used in the calculations are:

    - Painting and signing of bike lanes: $15/m
    - Sandblasting of existing pavement markings: $10/m
    - Paving a 1.5m shoulder on both sides of a roadway: $100/m
    - Constructing a 1.5m gravel shoulder on 1 side of a roadway: $25/m
    - Shifting a curb 1.5m: $180/m

    Other costs were identified, where required, such as special concrete work, the installation of signals, etc. The costing for most of the off-road (multi-use trail) facilities was sourced in the *RTMP (2007)*.

    Road widenings can have various potential environmental impacts: natural, heritage, archaeological, social and economic. Consequently, their construction should be sensitive to established vegetation (eg. by minimizing impacts on healthy, established trees that are of significant

size and by relocating saplings), encountered heritage and archaeological features, and to local social and economic issues. For projects identified in this Master Plan that are determined to have such impacts, separate Schedule B or C Municipal Class EAs would be required.

5. ***Property Limitations*** for specific projects were assigned if property is anticipated to be acquired. Not only the dollar value of the land was incorporated but also the social impacts related to community inconvenience and the extra time needed to arrange property acquisition.

4.2.2.3 Step 3: Data Collection for the Link Alternatives

To assist in the assessment of the segments identified, the following list of data was collected. This data served to identify a preliminary design concept for each segment (shared on-street, bike lane, paved shoulder, multi-use trail where applicable; or no facility):

- Length of route (m)*;
- Existing asphalt width (m)*;
- Number of travel lanes**;
- Curb vs. Shoulder Configuration**;
- 24 hr traffic volume*;
- HSR service (% of segment length)***;
- Truck route (% of segment length)***;
- On-street parking status***;
- Road construction schedule***; and
- 10 yr collision data***.

* from City GIS data
** from City GIS data and augmented with field investigations
*** from other City data sources

Select data sources have been further explained below.

Existing Asphalt Width

Some streets were found to have sufficient width, thus in some cases bike lanes could be added by simply revising the pavement markings on existing asphalt. To assess initial applicability of bike lanes, a dimension of 3.3 m was used as the minimum width required for a motor vehicle lane and the minimum width required for a bike lane was 1.5 m. These dimensions permit a combination of 3.5 m plus 1.2 m as well. It is recognized that dimensions

are influenced by sound engineering assessment during Detailed Design, prior to construction.

24 hr Traffic Volume

Traffic volumes were assessed in two manners:

1. If 24 hr traffic volumes were in the range of 1600 to 2000 vehicles/day or lower on a two-lane street, then bike lanes were typically deemed not to be required. However, if the street was determined to be a critical connection to ensure continuity in the network, the roadway was flagged as requiring signage to provide wayfinding for cyclists unfamiliar with the route.
2. In locations with three or more travel lanes, “road diets” were considered as a possible means to introduce bike lanes. A road diet is defined as, “the removal of a motor vehicle lane in order to create space for a bike lane (or other facility such as a dedicated transit lane)”. This study applied a less aggressive 24 hr two-way traffic volume of approximately 14,000 vehicles/day as a determination value, but it is recognized that roads with volumes as large as 20,000 vehicles/day are potential candidates for road diets, dependent on the portion of traffic in the peak hour periods. The per-lane capacity of 700 vehicles to 1000 vehicles during the peak hour translates into 1400 to 2000 vehicles/hr for a two-way, two-lane roadway. Ten percent of the 24 hr traffic volume typically constitutes the peak hour traffic, so the typical maximum 24 hr volume (capacity) for a two-way, two-lane roadway is 14,000 to 20,000 vehicles.

HSR Service

The presence of transit service along potential cycling links was identified, although the presence of HSR non-express (local) service does not typically pose a significant concern. In the future, proposed rapid transit services may require special design consideration.

Truck Route

Truck routes were noted, but it was recognized that the designation of a through truck route does not preclude bike lanes. Should there be limited options for cycling facilities, a roadway designated as a truck route would support the need to establish a bike lane on the road to ensure a defined place for cyclists separate from larger vehicles. Trucks are permitted on all streets for local deliveries, but where truck routes exist, a greater volume and frequency of truck traffic is usually present.

On-Street Parking

A preliminary review of on-street parking on all potential links was undertaken. If it was found that there exists excess width and there is no on-street parking, then a bike lane could be easily introduced. Alternatively, if on-street parking exists, a decision will have to be made to prioritize bike lanes or parking. More detailed analysis will be undertaken as projects are scheduled for implementation. If the parking is observed and found to be underutilized, it could be consolidated onto one side of the street. Such a scenario would provide a possible means to introduce bike lanes. In general, links for which this review would be conducted in detail later, were initially identified as potential bike lane candidate locations.

10 yr Collision Data

Auto/bicycle collision data was summarized for each link and calculated as number of collisions per km. This value determined the collision factor for each segment.

4.2.2.4 Step 4: Determination of the Preliminary Design Concept for Individual Links

A review of the various cycling facility design types as described in **Section 4.1.2** was undertaken and each was evaluated against the criteria identified in this project. **Table 4.2.2.4-1** outlines the results of the evaluation. Based on this review a preferred preliminary design concept was developed for each segment.

Table 4.2.2.4-1: Evaluation of Cycling Facility Types

Evaluation Criteria	Cycling Facility Types				
	Alternative 1: Do Nothing*	**Alternative 2: Multi-use Trails**	**Alternative 3: Reserved Bike Lanes**	**Alternative 4: Signed Bike Routes**	**Alternative 5: Paved Shoulders**
Network Continuity	- No major changes to the existing cycling network – continuity does not improve	- Can improve network continuity	- Can improve network continuity	- Can improve network continuity	- Can improve network continuity
Safety / Collision History	- No improvements to the safety of the existing cycling network	- Improves safety by providing dedicated facility away from road traffic	- Improves safety by separating motorists and cyclists using pavement markings	- Appropriate for lower traffic volume streets	- Improves safety by separating motorists and cyclists using pavement markings
Demand for Cycling	- Does not address demand for cycling routes	- Addresses moderate demand for cycling off-street (primarily recreational)	- Addresses high demand for cycling within urban area (commuter, recreational)	- Addresses high demand for cycling within urban area	- Addresses moderate demand for cycling within rural areas
Cost	- Lower cost, maintain existing network only	- Highest cost to implement dedicated facility on separate right-of-way	- Lower cost to implement although dependent on available right-of-way width	- Low cost to implement (eg. signage)	- Higher cost to implement
Property Limitations	- No property impacts	- Higher potential for property impacts unless ownership is already City of Hamilton limited opportunities exist	- Variable impacts, depending on available property within right-of-way; parking and other uses	- No property impacts as pavement width not affected	- Variable impacts although usually lower, depending on available property within right-of-way
Road Reconstruction Schedules	- No impact to road reconstruction schedules	- Not applicable	- Increases priority and lowers project cost if project can be combined with road reconstruction	- Road reconstruction has less impact on project priority and project cost since signage is low cost to implement	- Increases priority and lowers project cost if project can be combined with road reconstruction

*Alternative 1: Do Nothing includes all currently approved cycling policy and infrastructure commitments made in the *Transportation MP (2007)*, *RTMP (2007)*, the Urban Hamilton Area Official Plan, *Rural Hamilton Official Plan (September 2006)* and, at the time of writing this report, the seven official plans.

4.2.2.5 Step 5: Numerically Ranking the Link Alternatives

The previously described analysis generated numerical values for both the justification factors and the constraint factors. All of these values were aggregated and a value was thus determined for each link alternative. These values were then used to list the link alternatives in a priority ranking.

4.2.2.6 Step 6: Selection of the Links that form Primary Corridors Network

The above analysis generated a numerical ranking for each of the segments. This listing served to identify the projects within the whole of all projects being considered that would be the most beneficial to implement. Within this list, the top 90 segments constituted approximately $2.5 million worth of projects which would represent approximately 5 years of cycling projects if the allocation of funds to the Annual Bicycle Routes Improvement Program were increased from the current $300,000 to $500,000 per year. This network of segments was mapped and it served as the first draft of what the Preferred Cycling Network should include. In this network there were a few segments that paralleled one another very closely (much closer than the 2 km spacing), such as Cannon Street and Barton Street in the Harbour Shores area of the City. In such situations, a decision was made to favour one of these streets as the preferred route in the network based on feasibility, road construction schedules, etc. A network was then developed for the entire City based upon this “top of the list” ranking and other segments that would complement this network.

A Preferred Cycling Network was thus created. The actual schedule of implementation of this network, based solely on the numerical analysis, is presented in **Appendix A**. The actual implementation order will be adjusted dependent on road reconstruction schedules, trail network development and consideration of recreational demand/tourism. Issues that arise during detailed design such as ability to adjust parking, utility impacts and unforeseen property issues could impact the implementation schedule as well as further EA requirements.

4.2.3 Preferred Cycling Network

It was determined that a Primary Corridors Network should be implemented to ensure a well-connected, clearly defined, convenient and safe network of cycling facilities. The final Preferred Cycling Network developed is a combination of existing and planned cycling facilities, comprising on-street bike lanes, paved shoulders, signed routes, and multi-use trails that do not permit motorized vehicles.

4.2.3.1 Preferred Cycling Network – City-wide

Map 4.2.3.1-1 displays the Preferred Cycling Network and **Appendix A** includes a priorized list of the proposed streets and trails within this network. **Appendix A** also includes details for each of the segments of this network including length, the preliminary design concept and the estimated cost. A larger, fold-out version of Map 4.2.3.1-1 is available in **Appendix B**. The Preferred Cycling Network will be augmented by new facilities on new roadways, typically arterials and collectors (residential, commercial and industrial), as new developments are constructed. This element of the network may also include reconstruction of existing roadways to accommodate new development. The costs associated with these facilities will be financed by development charges or by the development projects.

The Preferred Cycling Network reflects cycling facilities that were identified in the *Transportation MP (2007)*, but includes many additional segments that were not identified in that plan. **A few streets that were identified in the Transportation Master Plan for cycling infrastructure were not incorporated into the Cycling Master Plan.** These streets were not included either because nearby streets were identified that offered more direct routing, alternate streets were identified as being easier to implement, or network density criteria did not support the inclusion of a street. Details of the Preferred Cycling Network are described by ward in **Section 5**.

The preliminary schedule of implementation for the Preferred Cycling Network is based on the combined assessment of justification criteria and constraints criteria. This process serves to list projects in a priority ranking that incorporates the best investment for money spent. A timeline is not rigidly applied to this list. Instead, timing will be based on available funding. The schedule of implementation is therefore flexible based on how much money is available annually both directly for cycling projects and for road reconstruction on links identified for cycling upgrades.

The proposed cycling routes/links identified in this Cycling Master Plan Update include:

Table 4.2.3.1-1: Proposed Cycling Routes/Links Identified

	Proposed Length (km)	Existing Length (km)	Total Length (km)	Description
City of Hamilton Jurisdiction				
Multi-use trails	63.5*	132.5	191.5*	Centreline length
Bike Lanes	462	104	566	One-way lane
Paved Shoulders	417	17	434	One-way lane
Shared On-Street (Signed)	31	173	204	One-way lane
Ministry of Transportation Jurisdiction				
Multi-use trails	18.5	0	18.5	Centreline length
Paved Shoulders	6	0	6	One-way lane
Total	**998**	**426.5**	**1395.5***	-

* 4.5 km of proposed Multi-use Trails includes paving existing Multi-use Trails

The plan represents 998 km of new proposed cycling facilities, of which approximately 480 km can also be utilized by pedestrians (multi-use trails and paved shoulders).

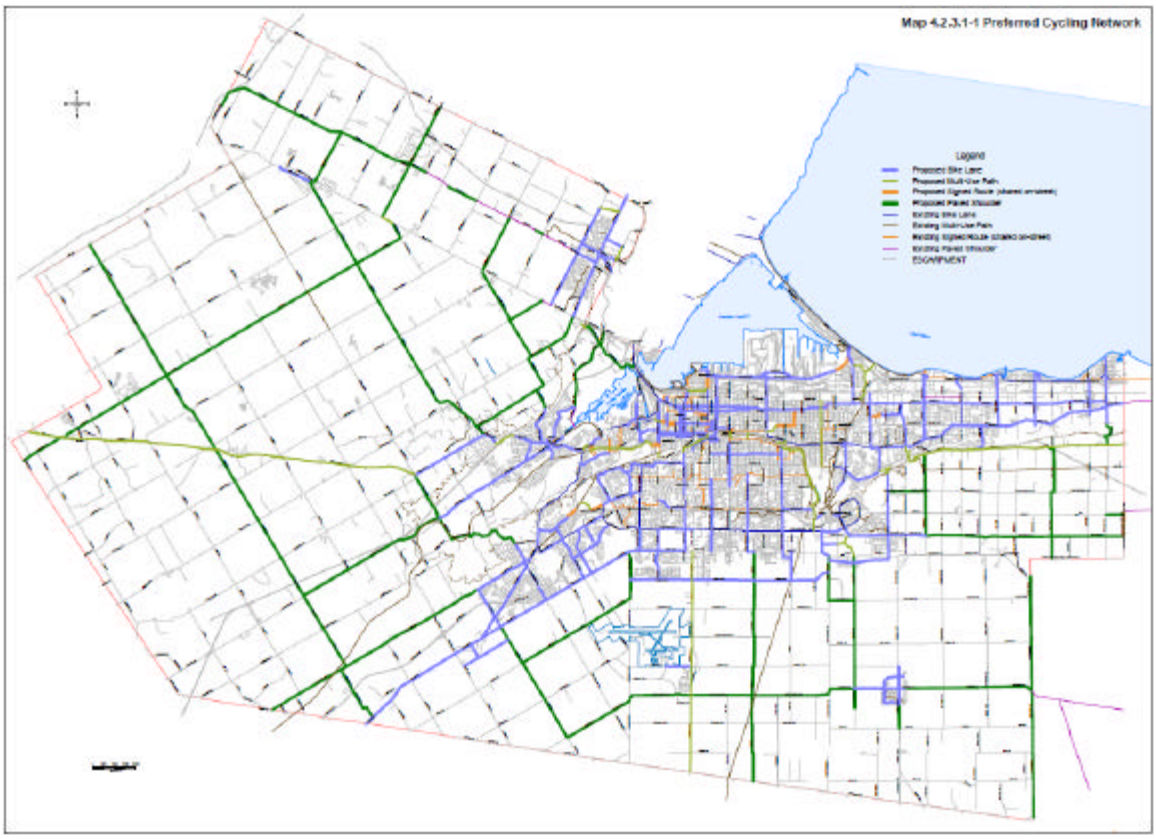
The total cost of the Preferred Cycling Network is approximately $51.5 million. Only a very few listed projects have already been allocated funding previously. Included in the network are three significant trail projects that already have arranged funding. These three projects are the Red Hill Valley Trail extension northerly over the Queen Elizabeth Way (QEW) to the Lake Ontario Waterfront Trail ($14 million), a new trail over the Lincoln M. Alexander Parkway (LINC) in the vicinity of Dartnall Road using the Arbour Road alignment ($1.3 million) and the CP Rail Trail project extending the rail trail in Dundas Valley easterly over Highway 403 to Dundurn Street ($2 million).
Also in the network are three projects within the Ontario Ministry of Transportation (MTO) jurisdiction relating to Highway 5, Highway 6 and Highway 8. Further discussion with the MTO Sustainable Transportation Office will be carried out to facilitate these projects.

Numerous projects in the Master Plan are within the Niagara Escarpment Commission (NEC) lands as referenced in the tables describing proposed cycling routes by ward, in **Section 5.0**.

See **Section 6.0** for further financial analysis of the entire network.

Insert Map 4.2.3.1-1

For a larger-scale map - see the first link on webpage:
www.hamilton.ca/ShiftingGears



4.2.3.2 Escarpment Crossings

One of the significant challenges to providing cycling facilities in the City of Hamilton is the Niagara Escarpment which acts as a significant barrier for cyclists. Crossings of this 100 m limestone cliff need to be provided in reasonable frequency in order to provide cyclists with connectivity between the upper and lower sections of the City. Some of these crossings are already well established, but it was strongly recognized that more were needed. In addition to these physical routes, it is recognized that the connectivity provided by the bike racks on the front of every bus in the Hamilton Street Railway (HSR) fleet provides a great option for cyclists to scale the Escarpment. The option to provide this service either free or with a reduced fare was explored with the HSR, but was determined to not be feasible due to enforcement issues and financial concerns.

Previous studies including the *City of Stoney Creek Multi-Use Pathway, Pedestrian and Cycling Route Master Plan Study (1995*), the *Hamilton–Wentworth Transportation Review (1996)* and the *Transportation Master Plan (2007)* outline options for cyclists to scale the Escarpment and contain proposals ranging from on-street and trail improvements to measures that require cyclists to dismount and walk; the latter includes incline railways, bicycle lifts and bicycle-friendly stairs.

4.2.3.2.1 Proposed Escarpment Crossings

The Escarpment crossings proposed in this Cycling Master Plan Update are summarized in **Table 4.2.3.2.1-1** by the wards in which they are located. Mapping of these Escarpment routes is shown by ward in **Section 5**. The number that identifies each of these planned routes in **Table 4.2.3.2.1-1** represents a "priority ranking" assigned to each cycling route. It is recognized that any future rapid transit plans may influence these proposed facilities.

Bike Lanes on Existing Roadways

The following crossings are planned to utilize existing roadways, with some possible widenings to include bike lanes:

- Mill Street/Waterdown Road #177,
- Main Street/Thomson Drive/Snake Road #204,
- Sydenham Road #86,
- Middletown Road #28R (rural),
- Governor’s Road #39R (rural),
- Sulphur Springs Road #161,
- the Jolley Cut #16,

- the Claremont Access #24 downbound and #108 upbound,
- Dewitt Road #107 and
- Fifty Road #35R (rural).

Table 4.2.3.2.1-1: Escarpment Crossings

Ward(s)	Priority Ranking (as on map)	Street	from	to	Length (m)	Design Concept **	EA Status	Previous Plans ***	NEC ****
15	177	**Mill St/ Waterdown Rd**	Hwy 5	Burlington border	875	BL w widening	A+	-	Y
15	44	**Mountain Brow Rd**	Mill	Arterial A	1200	MurT w development	*EA2	-	Y
15	204	**Thomson/ Snake Rd**	Main	Burlington border	100	BL w widening	A+	-	Y
13 & 15	220	**Innovation stairs**	Innovation Dr	Old Guelph Rd		Stairs w bike trough	*Reg	-	Y
13 & 15	86	**Sydenham bridge**	Crowley	Romar	1000	BL on existing - narrow dnbound	A+	-	Y
13 & 14	176	**Hwy 8**	Bond	Hillcrest	1100	MurT on south side	*EA1	-	Y
14	28r	**Middletown/Binkley**	Hwy 8	Mineral Springs	3500	PS and paved road in section	A+	-	Y
14	39r	**Governor's**	Woodhill	Binkley	7100	PS widen asphalt	A+	-	Y
14	161	**Sulphur Springs**	Mineral Springs	Lovers Lane	1450	PS widen asphalt	A+	Y	Y
1	203	**Chedoke MurT**	Scenic	Dundurn	3000	MurT pave existing 3.0m gravel	*Reg	Y	Y
1	221	**Dundurn stairs**				stairs exist - develop retrofrit for bikes	*Reg	-	Y
2 & 7	16	**Jolley Cut**	St Josephs	Concession	1410	BL on existing (upbound priority)	A+	-	Y
2 & 7	24	**Claremont Access**	Inverness	Main	1600	BL on existing	A+	-	Y
2	108	**Claremont Access**	Hunter	James stairs	1600	BL w spot widening	A+	-	Y
2 & 8	182	**Claremont to W5th**	James stairs	Gateview	620	MurT w road diet - shift concrete & widen MurT	A+	-	Y
2	207	**John St MurT**	James stairs	John & Ferguson	420	MurT 4.0m pave	A+	-	Y
3	222	**Wentworth stairs**				Stairs exist - develop retrofrit for bikes	*Reg	-	Y
3	223	**Henderson lift**	at Sherman			Incline lift - separate EA required	TBD	Y	Y
3	214	**MurT Ottawa St to Escarpment Rail Trail**			390	MurT 4.0m pave	*Reg	-	Y
5 & 9	206	**First Rd W MurT**	Greenhill to Glover Mtn Rd		750	MurT 4.0m pave	A+	-	Y
9	209	**Mtn Ave MurT**	Mtn Ave/Lake	Ridge Rd/ Devil's Punch Bowl	420	MurT 4.0m pave	A+	-	Y
10	107	**Dewitt**	Dundee	Ridge	500	BL on existing - narrow lane - 2-way for bikes	A+	-	Y
11	35r	**Fifty**	Cokers	Ridge	1750	PS widen asphalt	A+	-	Y

red text indicates link overlaps another ward
** BL = Bike Lane, MurT = Multi-Use Recreational Trail, PS = Paved Shoulder, osp = on-street parking
** w = with, NB = northbound, SB = southbound, EB = eastbound, WB = westbound, osp = on-street parking, TWLTL = two-way left-turn lar
*** previously planned in other City documents including the Transportation Master Plan and the Recreational Trails Master Plan
**** within Niagara Escarpment Commission (NEC) jurisdiction
*Reg - exempt under Regulation 334
*EA1 - Highway 8 Class EA Study (Park Ave to Bond St) in progress
*EA2 - Waterdown North-South Road Class EA in progress

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Multi-use Recreational Trails Shared by Cyclists and Pedestrians

In some locations, crossings for cyclists can more easily be accommodated with trails. Such trails are proposed to be 4.0 m wide and paved. In some locations these facilities will serve as a route utilized by the Bruce Trail Conservancy. The crossings in the Preferred Cycling Network utilizing such a trail connection include:

- Mountain Brow Road in Waterdown #44 (partially included in the *RTMP (2007)*);
- Highway 8 connecting Greensville and Dundas #176. This route is along a former provincial highway with minimal shoulders and a long, relatively steep grade. Widening to accommodate a multi-use trail could require the construction of a retaining wall. The narrow clearance under the CN railway bridge will require further analysis as well;
- Paving the existing Chedoke Trail by the Chedoke Golf Course #203 (included in *Shifting Gears 1999*);
- Along the brow from the Psychiatric Hospital grounds easterly along the Claremont Access to the James Street stairs #182, continuing to the base of the escarpment at the southern terminus of John Street and further to the southern terminus of Ferguson Street #207 (partially included in the *RTMP (2007)*);
- A trail connecting the southern terminus of Ottawa Street to the Escarpment Rail Trail #214 (included in the *RTMP (2007)*);
- A trail connecting Greenhill Avenue to the northern terminus of First Road West on the brow via Glover's Mountain Road #206 (partially included in the *RTMP (2007)*); and
- A trail connecting Mountain Avenue South in Stoney Creek to Ridge Road by the Devil's Punch Bowl #209.

Incline Railways

The *Transportation MP (2007)* and the *RTMP (2007)* recommend the consideration of an incline railway near Wentworth and Concession Streets. The use of an incline railway was considered in the Ford & Associates 1992 study when surplus equipment was available from the Niagara Parks Commission. As the 1992 study indicates (p.82), this was rejected because it would be too costly to install and operate. Any consideration of an incline railway should be based on sound economic, tourism and transportation considerations. A separate environmental assessment would be required for such a project, including consultation with the Niagara Escarpment Commission. While this type of facility would have significant capital and operating cost implications, it could generate significant additional interest in cycling in the City of Hamilton. A Sherman Avenue alignment (Priority ranking #223) should also be

considered as an alternative to provide excellent commuter connections between the Henderson Hospital complex on the Escarpment brow and the significant residential area below, including a connection to any possible rapid transit station in the lower city at or near Sherman Avenue.

Bicycle-friendly Stairs

Bicycle-friendly stairs in Hamilton can be found at nine locations, however not all of them are Escarpment crossings. These designed-and-made-in-Hamilton stairs were introduced in 1993 at the Chedoke stairs. These stairs are 2.5 m wide and have a trough on either side, each being 350 mm wide, resulting in 1.8 m clear width for two people to pass. Wider level platforms are at regular intervals, specifically at bends in the stairs. On short stairs, only one trough may be required, particularly if there is a set of stairs on either side of the road, such as at Main Street West near Osler Drive. There are three existing sets of stairs, all Escarpment crossings, which lack the bike trough feature. These three stairs are at Dundurn Street #221, James Street and Wentworth Street #222. Further investigation of these locations is recommended to provide assistance to cyclists using these escarpment crossings. Engineering students at McMaster University or elsewhere may be able to propose viable solutions. Since the James Street stairs are very close to the proposed multi-use trail proposed at John Street, these stairs are not a priority for a bike trough. One new set of stairs is planned #220 connecting Innovation Drive to Old Guelph Road.

4.2.3.2.2 Escarpment Crossings Not Currently Planned for Cycling Facilities

The following Escarpment crossings were investigated through this Cycling Master Plan Update, but have not been recommended to be included in the Preferred Cycling Network:

New Mountain Road

New Mountain Road in Stoney Creek is a steep and fairly narrow escarpment crossing with one narrow underpass at the rail line. Even if a partial widening was feasible, casual cyclists would not use this long winding steep and narrow road, therefore no cycling infrastructure is proposed. The proposed multi-use trail immediately west of the Devil's Punch Bowl would be a convenient option in this area.

The Escarpment Brow at the Red Hill Valley Parkway

The Red Hill Valley Parkway (RHVP), opened in Fall 2007, has disconnected the two sections of Mud Street between Paramount Drive and Mountain Brow Road. The *RHVP Landscape Management Plan (2003)* considered a bridge crossing the mainline and several ramps of the freeway, some of which are at grade at this location. Such a bridge would be long and high. Instead, two east-west bikeway routes have been established in the area; one, a multi-use trail along the Escarpment brow and routing through the valley briefly to pass under the freeway, and second, bike lanes along Stone Church Road / Paramount Drive. This second route is planned to connect to the Escarpment brow in the vicinity of Albion Falls using an Environmental Assessment approved multi-use bridge *(Arbour Road Multi-use Crossing EA, 2009)* to cross the LINC/RHVP in the alignment of Arbour Road, replacing the existing and undesirable route using Pritchard Road. This Arbour Road crossing is planned to be completed in 2010 or 2011. Given these two connections, a bridge spanning over the freeway along the brow is not required at this time.

Sherman Access / Sherman Cut

The Victor Ford and Associates (1992) study identified a possible central crossing using portions of the Sherman and Claremont Access roadways as bicycle routes. The 1992 study rejected this concept because it could not be used by pedestrians and would not fit within a long range plan. Furthermore, the existing platform width of the Sherman Cut and the Sherman Access roadway is insufficient to provide wider curb lanes or bicycle lanes, so no dedicated cycling facility could be pursued at this time.

Beckett Drive to West 5th Street

The *RTMP (2007)* shows a possible trail from the south end of John Street up to the Hamilton Psychiatric Hospital following sections of the Claremont Access and then down to Beckett Drive (Queen Street). Portions of this route currently exist as a part of the Bruce Trail. The section from John Street to the Claremont Access is recommended as part of the proposed network (Priority ranking #207), but not the section connecting the Claremont Access to Beckett Drive and further to Hillcrest Avenue. An escarpment crossing connecting the Claremont Access by the Hamilton Psychiatric Hospital and Beckett Drive/Hillcrest Avenue was also rejected in the Victor Ford and Associates (1992) study because it would cross Beckett Drive and use the Bruce Trail.

Bicycle Lift

A bicycle lift is an electrically operated underground cableway in a housing which forms a paved curb up a hill. Anchored footplates are attached to the cable at approximately 25 m intervals, pushing cyclists up short steep hills (maximum 200 m and grades up to 20%). The manufacturer quotes the installation cost at approximately $2000 per metre.

One such lift has been in use in Trondheim, Norway since 1993, but no others have been constructed. Various concerns with the bike lift relate to the significant installation and operational costs, the potential liability/risks, and comments that it can be uncomfortable to use.

4.2.3.3 Other Municipalities and Regional Linkages

The Preferred Cycling Network was reviewed and refined to ensure connectivity at municipal boundaries when the network is completed.

Niagara Region: Continuous routes cross the border on Baseline Road/Winston Road, Highway 8/Main Street, Highland Road/Mud Street, and Binbrook Road/Silver Road. Note that the proposed multi-use trail beside Ridge Road in Hamilton connects to a shared on-street roadway in Niagara Region and the Eighth Road paved shoulders connect to a shared on-street roadway in Niagara Region, but these are acceptable.

Haldimand County: Connections into Haldimand County should be further resolved as there are few existing facilities for cycling to the south. Most notable is the Chippawa Rail Trail, part of the Trans Canada Trail, which is a well established route in Hamilton but looses definition south of Haldibrook Road. Note that the proposed paved shoulders on Westbrook Road do connect to a cycling route identified in a Haldimand County publication. Further discussions are recommended for the routes identified along Highway 6 (proposed to eventually become a local road with the construction of the new alignment) and along Miles Road.

Brant County: Connections to Brant County include the heavily-used Hamilton-Brantford Rail Trail, part of the Trans Canada Trail, and two roadways, Jerseyville Road and Wilson Street/Colborne Street (former Highway 2). The generous width of asphalt on the former provincial highway will be well suited to accommodate bike lanes. Another route could be considered connecting Carluke Road and Brant County Road 22 (McBain Road).

Waterloo Region: Highway 8 and Concession 7 West/Maple Manor Road are the planned connections to the Cambridge area. Note that the Highway 8

route requires further negotiations with the Province as it is a Provincial highway. As a cycling route it offers a very direct connection between the urban area of Hamilton and Cambridge, and through to Kitchener/Waterloo; as well as connectivity for the communities of Sheffield and Rockton.

Wellington County: Three connections towards the City of Guelph are identified including Foreman Road/Sideroad 20, the Lafarge Trail and Centre Road/Victoria Road. The northerly routing of the Lafarge Trail is undetermined as it crosses the Hamilton boundary and Highway 6. The Centre Road/Victoria Road alignment was further resolved through this Master Plan exercise to be the new route for the Ontario Bicycle Route (OBR) connecting the City of Hamilton to the City of Guelph.

Halton Region: Connections to the Greater Toronto Area (GTA) include Carlisle Road/Kilbride Street, Dundas Street (former Highway 5), Waterdown Road, Thomson Drive/Snake Road, York Road/Old York Road (via the new Highway 6 interchange), York Boulevard/Plains Road, Valley Inn Road/Spring Gardens Road and the lake Ontario Waterfront Trail (via the Canal Lift Bridge). The City of Hamilton and the City of Burlington and their cycling committees continue to pursue an improved crossing of the canal where the trail would be continuous on the lake side of the lift bridge rather than requiring trail users to cross under the bridge and use the sidewalk on the harbour side of the bridge. Cyclists are forced to dismount to negotiate this crossing.

In light of the Federal Government's announcement that it will undertake work on the bridge in 2009 and 2010, the City of Hamilton will continue to pursue discussions with Transport Canada regarding opportunities to resolve the canal crossing problem for cyclists as part of the proposed bridge rehabilitation work.

4.3 Public and Agency Consultation

4.3.1 Public Consultation

Public Information Centres (PICs) are informal meetings where the public is provided the opportunity to review planning and project information. PICs are a key part of public consultation programs and are designed to involve stakeholders early and throughout the environmental assessment (EA) process in order to identify concerns and provide opportunities for input.

Two sets of PICs were held as a part of the public consultation for this Master Plan. The public were notified of the project and PICs via notices published in local newspapers and on the project website (www.hamilton.ca/ShiftingGears). Notice of PIC #2 was also distributed via mail or email (depending on preference) to those on the study contact list (developed from PIC #1 comment submissions).

4.3.1.1 Public Information Centre #1 (November 2008)

PIC #1 was held in an open house format and provided an opportunity for attendees to review display boards on existing conditions and offered the opportunity for preliminary input on priority routes and the proposed evaluation criteria. PIC #1 was an optional consultation requirement under the *MEA Class EA (October 2000, as amended in 2007)*.

PIC #1 was held over a two week period in November 2008 at 4 locations within the City: Downtown Hamilton, Stoney Creek, Ancaster and West Hamilton. Approximately 75 people attended PIC #1 and 84 public comments were received.

The comment sheets provided at PIC #1 asked specific questions pertaining to the information presented on the display panels. The comment sheets and display panels were also made available on the project website. **Table 4.3.1.1-1** presents a summary of the overall comments submitted. For Questions 1, 2, 4, 6 and 9, the data results reflect the amount of responses received for each question. Comments from PIC #1 were incorporated into *Shifting Gears 2009* where possible. Commenter's who provided contact information were added to the study contact list in order to receive study updates and to track actions resulting from their comments.

The PIC #1 Summary Report provides further details on the results of PIC #1 and contains all of the comments received verbatim. The report is enclosed in **Appendix C**.

Table 4.3.1.1-1: Summary of PIC #1 Public and Interest Group Comments

QUESTION 1: What type of cyclist would you consider yourself?

- Recreational 47
- Commuters 33
- Utilitarian 28

Total Number of Responses = 108

QUESTION 2: Where do you ride?

- Downtown Area 24%
- Recreational Trails 22%
- Harbourfront Trail 16%
- Mountain Area 14%
- Dundas 8%
- Rural Roads 6%
- Ancaster 6%
- Stoney Creek 4%

Total Number of Responses = 136

QUESTION 3: What areas of the network are a priority to implement for you? And why?

- Route between downtown Hamilton and McMaster/Westdale neighbourhood
- Connections (trails and/or bridges) over/under 403, QEW, Red Hill Valley Parkway and LINC
- Connections into Burlington
- Jolley Cut
- System through the city centre
- More north-south connections through city
- More east-west connections, particularly in the lower city
- Rail trail in CNR east-west right of way
- Trail along old pipeline right-of-way
- Innovation Park trail
- Connection between Gage Park and the waterfront
- Increased amount of off-road trails
- Increased amount of escarpment crossings, eg. Free bus rides for cyclists going up the escarpment between designated stops, incline railways, etc.
- The following streets:
  - King St.
  - Barton St.
  - Wilson St.
  - York St.
  - Herkimer St.
  - Brock Rd.
  - Main St.
  - Dundurn St.
  - Gage Ave.
  - Chatham St.
  - Garner Rd.
  - Highway 6
  - Mohawk St.
  - Bay St.
  - Carlisle Rd.
  - Queenston St.
  - Waterdown Rd.
  - Golf Links Rd.
  - Upper Wellington St.
  - Upper Ottawa St.
  - Charlton Ave.
  - Gray Rd.
  - Nash Rd.
  - Nebo Rd.

Table 4.3.1.1-1: Summary of PIC #1 Public and Interest Group Comments			
- Highway 8			
QUESTION 4: Which of these cycling facilities do you feel safest using?			
- Reserved Bike Lane 42% - Multi Use Trails 28% - Paved Shoulders 19% - Signed Route 11% *Total Number of Responses = 99*			
QUESTION 5: Why *did you choose the previous cycling facilities as the safest*?			
Multi Use Trails: - Avoid conflicts with cars - Those that are paved are preferred	Reserved Bike Lanes: - Provide a defined division between cycling and road traffic - Separation makes you feel safer - The only thing motorists respect - Provide room to manoeuvre - Those with barriers are preferred	Paved Shoulders: - Safely away from high speed traffic - Wide shoulders are preferred - Provide room to manoeuvre	Signed Route: - Works well if signs are visible and both cyclists and motorists obey rules
QUESTION 6: Which of these strategies do you prefer?			
- Option A: Bike lanes/facilities on all major streets 26 - Option B: Bike lanes/facilities on a select network of streets 25 *Total Number of Responses = 55*			
QUESTION 7: Why *did you choose the previous strategy*?			
Option A - bike lanes/facilities on all major streets: - Encourages more people to cycle - Provides more options and access, particularly for commuter cyclists - Equalizes cars and cyclists - This option is ideal however seems unlikely and costly		Option B - bike lanes/facilities on a select network of streets: - Prefer quality over quantity approach - Routes would need to be thoughtfully determined with logical connections to transit modes and different sections of the city - This option seems more feasible and cost-friendly	

Table 4.3.1.1-1: Summary of PIC #1 Public and Interest Group Comments
QUESTION 8: Are there other strategies?
- Use a strategy that combines A and B, where bike lanes/facilities are made available on all major streets in the city center and a select network is provided in the periphery - Require bike lanes on all new streets, then retrofit existing streets - Add bike lanes during any road reconstruction/upgrading - Expansion of the off-road trail system - Create pedestrian/cyclist only streets - Create pedestrian/cyclist/bus only lanes
QUESTION 9: Do you agree with the criteria listed?
- Yes 78% - No 4% - Other 17% *Total number of responses = 43*
QUESTION 10: Are there other factors to consider?
- Research the cycling networks in other cities, particularly those that are physically similar, such as Montreal, Victoria and Quebec City - The number of users who will utilize the route if implemented - Directness of route - Safe for young children - Population density - Likelihood to encourage a modal shift from car to bike - Ease of implementation - Continuous route? - Ease of maintenance
QUESTION 11: Please note any other promotional and/or educational ideas that you feel the City should invest more effort in.
- Driver and cyclist education - Increased signage, particularly signs that remind cars to “Share the Road” - Increased bike parking, particularly in commercial areas, at recreation centers, hospitals, clinics and parks - Encourage more bike garages, lockers and showers for commuters at existing and new workplaces/institutions - Close major streets to car traffic on Sundays and holidays. Allow pedestrian and cyclist traffic only - More cyclist education in schools - Cycling network maps more readily available, eg. In bus shelters and placed downtown for reference - Bikes for rent along the waterfront - Sponsor advertisements that promote safe cycling and sharing the road - Hold annual cycling races, such as “Tour du Hamilton”

Table 4.3.1.1-1: Summary of PIC #1 Public and Interest Group Comments
- Hold more cycling events geared towards families and casual riders, such as “Bike to Work Day” - Increased enforcement of cycling rules - Give away free bike lights, helmets or merchandise that encourages cycling, particularly in low income areas - Create a reporting mechanism for cyclists to detail accidents, close calls and road issues - Offer cyclist courses that teach safe cycling - Create incentives for cycling - Increase the amount of questions on cyclist rights and rules on drivers license tests
OTHER COMMENTS
- Ensure bike lanes/facilities are maintained and kept free of debris all year round - Consider changing downtown streets to two-way streets - Review the projects work in conjunction with the work completed by the S.C.U.B.E taskforce to ensure that they are aligned - All infrastructure should be cyclist friendly, i.e. grates, lighting, paving with finer grade gravel, etc. - Action is needed now - Traffic signals should detect cyclists. This would minimize wait times at traffic lights and decrease the amount of red light running by cyclists - All trails should be designed to avoid barriers, such as stairs - Should encourage the creation of cycling facilities, particularly for those who can’t afford a car or don’t drive - Increase the amount of buses with bike racks

4.3.1.2 Public Information Centre #2 (April 2009)

PIC #2 was held in an open house format and provided an opportunity for attendees to review display boards presenting the findings of the study and the preferred alternatives.

PIC #2 was held over a one week period in April 2009 at 2 locations within the City: Downtown Hamilton and the Central Mountain. General feedback on the information presented was requested. The results of the comments were then posted on the project website. Approximately 43 people attended PIC #2 at the two locations and 35 public comments were received.

Table 4.3.1.2-1 presents a summary of the PIC #2 comments received.

Table 4.3.1.2-1: Summary of PIC #2 Public and Interest Group Comments

- The plan is comprehensive and impressive
- There are no routes through Downtown Hamilton
- Bike lanes are favoured over signed routes
- More bike lanes are needed in Downtown Hamilton
- More north-south connections are needed
- Create a dedicated east-west cycling corridor
- More bike parking/secure storage is needed, particularly in commercial areas
- Maintain curb lanes and paved shoulders so they are free of potholes and debris
- Bike lanes should be physically separated from traffic, particularly along high speed/high volume roads
- Implement traffic calming and other safety measures for cyclists, such as reduced speed limits for cars, traffic lights which detect the presence of cyclists, bike boxes at traffic lights and cyclist crossings
- Prioritize routes for snow clearing
- Provide protected bike parking at public events and festivals
- Improve escarpment accesses. They are in poor condition.
- Route and community connectivity are important
- Multi-use trails aren't practical for commuter cyclists
- Produce more destination/distance signage aimed at cyclists
- Implement the plan as soon as possible
- Include kids cycling skills training in Parks and Recreation Summer Day Camp programs
- Target cycling promotion at students and other likely cyclists
- Promote active living and active transportation
- Research/visit other national and internationally renowned bike cities, such as Ottawa, Portland, Vancouver, Seattle and New York
- Plan more multi-use trails
- Paint directional arrows in bike lanes
- Clarification was needed on how the priority listing was devised, what the construction schedule for projects will be and what routes will be implemented
- Analyze safety issues along all routes
- Incorporate cyclists and their needs into rapid transit corridors, stops and stations
- Consider implementing a community bike share program
- All escarpment stairs should have bike troughs
- Include bike lanes on all new roads
- Paved shoulders on all rural roads
- General requests for more information, eg. cycling maps, promotion materials, PIC 2

materials, etc.
- Requests for bike lanes on Rymal Rd., West 5th, Queen St., James St. N, Kennilworth Ave., Evans Rd., Locke St., Kerns Rd., Main St. and King St.
- Requests for maintenance (repaving, pothole filling, debris cleanup, improved signage, safety improvements, etc.) on John St. S, Sherman Access, Stonechurch Rd., Longwood Hill, Claremont Access, Golf Links Rd., Jerseyville Rd (west of Shaver Rd), York Blvd Bridge, Upper Wentworth St (opposite from East 24th St), and Jolley Cut
- Requests for paved shoulders along Lyden Rd., Jerseyville Rd., Fiddlers Green Rd. and Book Rd.
- The following routes should be given higher priority: Highway 403 and QEW crossings at Woodward Ave, Connecting the Bayfront Trail to the Lake Ontario Trail, Pritchard Rd, Queensdale Ave, all escarpment crossings (particularly the Jolley Cut and Claremont Access improvements)
- The following routes should be given lower priority: King (between Sterling St and Longwood Rd) and Highland Rd (between Winterberry Dr and First Rd E)
- Barton St. would be a better route then Cannon St.
- Improve the connection between the Ancaster Senior Achievement Centre and the Jerseyville Rail Trail

Comments from PIC #2 were incorporated into *Shifting Gears 2009* where possible. Commenter's who provided contact information were added to the study contact list in order to receive study updates and to track actions resulting from their comments.

The PIC #2 Summary Report provides further details on the results of PIC #2 and contains all of the comments received verbatim. The report is enclosed in **Appendix C**.

4.3.2 Stakeholder and Agency Consultation

Local stakeholders and agencies were identified and these organizations were added to the standard stakeholder and agency contact list. This group included Hamilton area bike shops, educational institutions, cycling organizations – both local and provincial, the Canadian Automobile Association, the HSR, Hamilton Police, local environmental organizations, among others.

A project initiation letter, notice of study commencement and PIC #1, Stakeholder Advisory Committee (SAC) invitation and stakeholder meeting notification were distributed via mail and email to those on the contact list during the first round of PICs. **Appendix D** includes copies of this notification.

A separate stakeholder meeting was held in November 2008 and allowed attendees to dialogue with others present and provide initial comments on existing conditions. The meeting was attended by 11 people representing a variety of organizations and interests, including:

- Hamilton Cycling Committee
- Scattalon Cycling Club
- Ontario Bicycling Route
- Central Cycle Bike Shop

- Ancaster Cycle
- Environment Hamilton
- McMaster University
- City of Hamilton Public Health Services
- Great Canadian Bicycle Tours
- Hamilton Health Sciences
- Mohawk College

14 stakeholder and agency representatives attended PIC #1 and 25 written comments were provided.

Table 4.3.2-1 presents a summary of the agency comments received during PIC #1.

Table 4.3.2-1: Summary of PIC #1 Stakeholder / Agency Comments

QUESTION 1: What type of cyclist would you consider yourself?

- Recreational 27
- Commuters 14
- Utilitarian 9

Total Number of Responses = 50

QUESTION 2: Where do you ride?

- Downtown Area 25%
- Recreational Trails 21%
- Harbourfront Trail 21%
- Mountain Area 9%
- Dundas 12%
- Rural Roads 3%
- Ancaster 3%
- Stoney Creek 6%

Total Number of Responses = 34

QUESTION 3: What areas of the network are a priority to implement for you? And why?

- Routes around Mohawk College and McMaster University
- Connections over the LINC
- Central and lower city routes
- Cross boundary trails into/out of Hamilton to promote cycle tourism
- Routes to hospitals
- Rural road routes
- Trail parallel to the downtown CN Rail line
- Connection to the beach strip
- Increased amount of escarpment and mountain crossings, eg. Free bus rides for cyclists going up the escarpment between designated stops, incline railways, etc.
- GO Service locations, such as Hamilton GO Centre, McMaster University bus terminal, Stoney Creek Park and Ride lot, former Liuna Station
- Continuous north-south route through the downtown
- Connections to/around Hamilton International Airport
- Increased cross-boundary crossings to municipalities outside of Hamilton
- Increased cycling infrastructure in Stoney Creek
- East-west corridor through the downtown that links with the Red Hill Valley
- The following streets:
  - King St.
  - Main St.
  - James St.
  - Dundurn St.
  - Gage Ave.
  - Woodward Ave.
  - John St.
  - Binbrook Rd.
  - Barton St.
  - Lawrence Rd.
  - Mohawk St.
  - Arvin Ave.

Table 4.3.2-1: Summary of PIC #1 Stakeholder / Agency Comments

- Cannon St.	- Hunter St.	- Bay St.	- Scenic Dr.
- Rymal Rd.	- Ridge Rd.	- York Blvd.	- Upper Paradise Dr.
- Fennell Ave.	- Jolley Cut	- Sydenham Rd.	- Sulphur Springs Rd.

QUESTION 4: Which of these cycling facilities do you feel safest using?

- Reserved Bike Lane	39%
- Multi Use Trails	39%
- Paved Shoulders	13%
- Signed Route	9%

Total Number of Responses = 23

QUESTION 5: Why *did you choose the previous cycling facilities as the safest*?

Multi Use Trails:	Reserved Bike Lanes:	Paved Shoulders:	Signed Route:
- Little/no interaction with cars - Easy to ride on	- Physically separated from cars - Allow room to swerve around holes, grates, etc. - Are able to travel quickly, with a low risk of collision - Make cars more aware of cyclists - Are better on arterial and collector roads - Those with barriers are preferred, eg. Medians, raised surface paint, bollards, curbs	n/a	n/a

QUESTION 6: Which of these strategies do you prefer?

- Option A: Bike lanes/facilities on all major streets	13
- Option B: Bike lanes/facilities on a select network of streets	6

Total Number of Responses = 19

QUESTION 7: Why *did you choose the previous strategy*?

Option A - bike lanes/facilities on all major streets:	Option B - bike lanes/facilities on a select network of streets:
- Provides the most travel options - Provides equal opportunities for cyclists and cars - Provides the most direct routes - Encourages cycling	- More economical - Omits those areas that aren't practical for bike lanes/facilities, eg. Narrow streets - Provides facilities to only those roads that need them, ie.

Table 4.3.2-1: Summary of PIC #1 Stakeholder / Agency Comments	
- Would offer a complete and connected cycling network	With higher traffic volumes
QUESTION 8: Are there other strategies?	
- Two-way dedicated bike only lanes on main commuter routes, such as those used in Holland - Combination of Options A and B - Paved shoulders along all rural routes, which can be installed during road reconstruction/upgrading - Option B, along with a review of all major streets as they come up for reconstruction - Bike facilities placed on all new streets and on older streets as they undergo construction/repaving - Bike facilities through parks and the escarpment - Incorporate paved shoulders into all rural road construction/reconstruction projects - Trails throughout the city - Speed reduction strategies implemented for vehicles, eg. Speed bumps - Utilize the approach used in the Niagara Cycling Map, which identifies bicycle friendly routes	
QUESTION 9: Do you agree with the criteria listed?	
- Yes 62% - No 38% - Other 0% *Total number of responses = 13*	
QUESTION 10: Are there other factors to consider?	
- Connectivity - Directness of route - Common destinations - The number of people who would use the proposed trails/routes - Promotion of cycling tourism - Connections with public transit	
QUESTION 11: Please note any other promotional and/or educational ideas that you feel the City should invest more effort in.	
- Promote cycling courses, particularly in elementary schools eg. CAN-BIKE - “Share the Road” campaign - Driver, cyclist and pedestrian education - Signage, eg. “Watch for cyclists merging” - Advertising (TV, radio, print, billboards, bus ads) that promote safe cycling and a ride to work day - Promote cycling events - Increased education on cycling in schools, particularly programs for Grade 4 and 5 students - Increased bike parking facilities in every area of the City, such as racks, lockers and/or or cages. Look into compound design. - Give away free bike lights, helmets or merchandise that encourages cycling, particularly in low income areas - Create a bike share program for low income families, particularly children	

Table 4.3.2-1: Summary of PIC #1 Stakeholder / Agency Comments
- Tax credits to those who commute to work via cycling - Indoor all-weather cycling facility, such as a velodrome - Cyclovia event every week with city support - Increased driver awareness/visibility of pedestrians and cyclists at expressway crossings
OTHER COMMENTS
- Review cycling policies - All infrastructure should be cyclist friendly, i.e. grates, lighting, etc. - Ensure bike lanes/facilities are maintained and kept free of debris all year round - Repaint and sweep bike lanes more frequently - Measures should be taken to limit the interacation of bikes and other vehicles on major roads in the City - Low income areas have a low amount of cycling infrastructure, although they have the most cyclists - Look at the Montreal cycling network as an example - Hold meeting for students, staff and faculty at McMaster to discuss the project - Contact the Regional Niagara Cycling Committee for input

A notification letter inviting stakeholder and agency representatives to attend PIC #2 was distributed in March 2009. Six stakeholder and agency representatives attended PIC #2 and six sets of written comments were received. **Appendix D** includes a copy of the letter sent to stakeholders as well as the Notice of PIC #2, which was also included with the letter.

Table 4.3.2-2 presents a summary of the agency comments received during PIC #2.

Table 4.3.2-2: Summary of PIC #2 Stakeholder / Agency Comments
- The plan is comprehensive and impressive - Limited accessibility to trails and paths for those with disabilities. Escarpment crossings should be more accessible - Wish to coordinate with City efforts - Requests for more information on cycling infrastructure (on- and off-street) proposed for Provincial roads and in areas within the Niagara Escarpment Plan - Suggested revisions to the evaluation criteria - Clarification on the EA process being followed - General comments on maintenance issues and preferred route improvements - Ontario Regulation 150/06 permits may be required for certain works - Development permits may be required for works within the NEP - Cycling infrastructure should not be placed on King Road in Burlington

Internal consultation also took place with City staff at two technical team meetings, each prior to the PICs. Representatives from Public Health, Planning and Economic Development (Business Development, Development and Real Estate, Community Planning and Design), Public Works (Open Space, Asset Management, Design, Strategic Planning, Operations and Maintenance, HSR) and Tourism Hamilton attended these meetings.

Following the second PIC, additional communication was received from both MTO and the NEC staff as documented in **Appendix D**. In response to this communication, a meeting was held with NEC staff on June 10, 2009 to discuss in more detail the content of the proposed Master Plan. The minutes of this meeting are included in **Appendix D**.

Early correspondence from the Ministry of the Environment and Indian and Northern Affairs Canada is enclosed in **Appendix D**. Copies of all of the other comments received from stakeholders and agencies can be found in **Appendix C**.