

# **THE CITY OF CAMBRIDGE BIKEWAY NETWORK MASTER PLAN**

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## **ABSTRACT**

The City of Cambridge is one of the fastest growing and strongest economic areas in Canada with a population of over 125,000 people. It is strategically located within Waterloo Region on both sides of Highway 401 in southwestern Ontario.

With a view to promoting sustainable transportation, City of Cambridge Council approved a 20-year Bikeway Network Master Plan in the spring of 2008. It recommended that an additional 112 km of cycling facilities be added to the existing 48 km of on-road cycling facilities. The network focuses on integration with Waterloo Region's Cycling Network and the City's off-road trails, to provide a viable alternative to motor vehicle usage for commuters, in addition to supporting recreational cycling. The Master Plan also recommended a wide range of policy and land use planning initiatives to ensure that future growth will facilitate improved transportation demand management. Implementation of the plan began in the fall of 2008.

The paper will focus on the development of the 20-year Bikeway Network Master Plan, the challenges encountered, and the strategies within the plan for the design, funding, implementation, maintenance, and promotion of cycling routes and facilities in the City of Cambridge.

## **INTRODUCTION**

The City of Cambridge Bikeway Network Master Plan was prepared in 2008 to update the City's 1999 Bikeway Network Study. It is a comprehensive document that outlines a recommended bikeway network for the entire City, in conjunction with strategies for the design, funding, implementation, maintenance and promotion of cycling routes and facilities. The document will guide decision making for the next 20 years and establish a viable bikeway network in the City of Cambridge.

## **Background**

The City of Cambridge is comprised of roadways under the jurisdiction of both the Regional Municipality of Waterloo and the City. In 1999, a City-wide Bikeway Network study was prepared in-house. The study identified 94 km of cycling routes on City roads and 72 km on Regional roads, along with policies and strategies for the implementation, design, education and maintenance of the Bikeway Network. Of the routes identified in this plan, 48 km of on-road cycling facilities were implemented throughout the City over a seven year period from 2000 to 2006.

Since the development of the 1999 bikeway network, there have been dramatic increases in the level of interest in cycling, due in part to an increased interest in improved health and physical activity, awareness of environmental issues related to high auto reliance and financial benefits. However, the increasing number of motor vehicles on roads, combined with poor driver behaviour in some cases, has discouraged cyclists from using a bicycle as a mode of transportation. Others have decided to use their bicycle, but ride illegally on sidewalks. The demand to widen roads and include cycling facilities in existing neighbourhoods has presented many challenges.

In order to change travel behaviour, changes to transportation infrastructure are required to address the perception of cycling safety and comfort. Recognizing this, the City of Cambridge identified the need for an effective cycling network within the City that accommodates cycling as both a mode of transportation and a recreational activity. The need to update of the 1999 Bikeway Network Study to create a Bikeway Network Master Plan was also recognized.

The objectives of the Bikeway Network Master Plan were to:

- Update existing cycling routes and identify new cycling routes or improvements in the City;
- Confirm or update the City's policies for the design, funding, implementation, maintenance and promotion of cycling routes.

In June 2007, the City retained a consultant, Stantec Consulting Limited, to assist with updating the City of Cambridge Bikeway Network Study.

## **BIKEWAY NETWORK MASTER PLAN**

Providing a bikeway network is fundamental to encouraging more people to cycle. At a conceptual level, the City of Cambridge bikeway network consists of a City-wide system and a Neighbourhood system that are integrated to form an overall network. The network is hierarchical and includes a range of bikeway types from signed routes to designated bike lanes. With this type of network, less experienced cyclists are able to ride on quieter routes to gain the skill and confidence needed to enable them to use bike lanes on busier roads, ultimately becoming comfortable riding on any road. Policies and practices are required to supplement the bikeway network, to support and encourage more cycling and a bicycle-friendly City.

Based on a vision for a bicycle-friendly City, the City of Cambridge Bikeway Network Master Plan was developed.

## **Study Process**

A three-phase approach, as outlined below, was undertaken to develop the Bikeway Network Master Plan for the City of Cambridge.

### Phase 1: Project Initiation and Consolidation

This Phase identified the environmental value and benefits of a bikeway network.

### Phase 2: Network and Policy Development

A review of the existing on-road cycling network was conducted during this phase taking into account the types of cyclists and cycling trips in the City, the Regional Cycling Master Plan, the City's trail network, existing road conditions, planned land use, and the future rapid transit system and potential station locations. This phase also included recommendations for updated objectives, policies, and principles.

### Phase 3: Recommended Network and Implementation Plan

During this phase of the study, an updated and improved bikeway network was developed, the future budget requirements to implement and maintain the network were identified along with funding opportunities, and lastly, a recommended multi-year plan for implementation with funding sources was identified.

## **Bikeway Network Development**

The benefits of cycling are significant to individuals, our society and the environment. Cycling promotes improved health and well-being, it is energy-efficient, non-polluting, and affordable. A bikeway network also provides economic sustainability to urban centres, businesses, and tourism.

Considerations for plan development included network guiding principles that were established at the outset of the project, existing and planned bikeways, destinations, barriers and opportunities, Waterloo Region's Cycling Master Plan, off-road trails, and candidate routes suggested through stakeholder and public consultation.

The initial step in the network development process was to evaluate various routes using the guiding principles to select a set of candidate routes. The purpose of the principles is to guide and support the network development, including future changes, while maintaining the objectives and intent of individual routes and the overall bikeway network. The guiding principles, described below, were established by the project team and endorsed by the public:

- Connected – the network provides a connected series of bikeways within the City and connects to bikeways in adjacent municipalities.
- Destination-oriented – the network serves community, education, employment, commercial, recreational, and tourist destinations within or near the City.
- Physically integrated – the network is integrated with other modes of transportation, particularly transit.
- Expandable and flexible – the network is flexible and can be expanded as the City grows to accommodate future opportunities.
- Responsive – all community planning, site design, and road projects respond in a consistent and connected manner to the needs of different types of cyclists with varying skill levels. The need to accommodate cyclists influences community and land use planning, in order to create bicycle-friendly communities.
- Direct and efficient – the network provides direct and efficient connections to destination to make cycling a viable transportation choice.
- Consistent and visible – the design of the bikeway along a route is consistent and appropriate for the type of cyclists encouraged to use it. The route is easy to follow, logical, and progresses smoothly from one route or facility to another.
- Doable - the routes within the network are physically, politically, socially, environmentally, and financially acceptable.
- Importance and overall priority – if all other principles are met except “doable”, the route is maintained in the network to demonstrate the need for it should future redevelopment make it possible.

The routes selected in the initial step were then compared against existing and planned routes, Waterloo Region’s Cycling Network, off-road trails, destinations, barriers, and opportunities to develop a draft bikeway network. Where necessary, field assessments of the routes were also conducted. On-road routes and facilities are endorsed by the City and were continued to be supported through the development of the network. These routes and facilities consist of 4 types as follows:

- Reserved Bike Lane - A reserved bicycle lane is a dedicated portion of the roadway that is designated by lane markings to separate the portion of road used by motor vehicles from the portion of the road used by bicycles.
- Wide Shared Use - A shared use lane typically consists of a wider than normal travel lane intended for motor vehicles and bicycles to share. The portion used

by vehicles is not separated from the portion used by bicycles; vehicles and bicycles are expected to operate side by side.

- Signed Route - Signed routes have no designated space for cyclists. Signs are used only to indicate the presence of a route and for way finding.
- Paved Shoulders - On roads with gravel shoulders, the shoulders may be paved and marked to provide space for cyclists.

The routes identified in the draft bikeway network were further evaluated to determine whether they should be included in the final bikeway network. Each route carried forward to the final network was also assigned a facility type. The evaluation consisted of an in-office review based on aerial photography, additional field assessment, consideration of the network guiding principles and individual route assessment based on specific factors. These factors included safety, existing roadway condition, parking, cost, connectivity, convenience and integration with other modes of transportation such as transit. The end result was a viable city-wide bikeway network (see figure E.2 – Bikeway Network and Facility Types).

## **Challenges**

A number of challenges were encountered while developing the bikeway network. In particular, on-street parking, retrofitting existing roadways, integrating the plan with Waterloo Region's Cycling Network and the City's off-road trails, and physical barriers such as rivers and highways were the primary challenges.

On-street parking is a valued commodity in residential neighbourhoods. Many residents are not willing to sacrifice on-street parking to accommodate cycling facilities. This is partly due to a lack of knowledge about the benefits of a bikeway network and lack of desire to change travel behaviour. Taking this into consideration, all facilities were reviewed for conflicts with on-street parking to determine a resolution that would satisfy both area residents and the intent of the bikeway network.

Existing roadways also presented a challenge when developing the bikeway network as many are not wide enough to retrofit for cycling facilities. Prior to identifying facility types for these roadways various options were explored to overcome this challenge. Options considered included implementing a signed route as an interim solution until the roadway is reconstructed, scheduling facility implementation where existing pavement width is inadequate with road resurfacing projects, and where practical and feasible, acquiring land. In addition, implementing signs and markings was another option identified.

Throughout the development of the Bikeway Network Master Plan, integration of the plan with Waterloo Region's Cycling Network and the City's off-road trails was a priority

to all stakeholders. However, ensuring that the goals and objectives of each stakeholder were met was a challenge. In order to resolve the issues, some compromises were made by each of the stakeholders. Changes to Waterloo Region's Cycling Network were recommended, joint City-regional projects were proposed and partnerships were formed to ensure future integration is less challenging.

Lastly, the City of Cambridge has several physical barriers that limit the opportunity to provide a connected bikeway network. These barriers include two rivers, namely, the Grand River and the Speed River, Highway 401 and several railway lines. To address these barriers, more sophisticated facilities were incorporated into the Master Plan such as a future structure over Highway 401 for cyclists and pedestrians.

## **Policies and Strategies**

In order to supplement the bikeway network and support the vision for a bicycle-friendly City, policies and strategies are required to address the specific objectives of transportation demand management (TDM), and the design, maintenance and promotion of cycling routes and facilities. Within the Master Plan, the recommended policies and strategies for these objectives were categorized into four main groups:

- Bicycle-friendly community;
- Bikeway Network;
- Cycling-related practices; and
- Cycling-supportive programs.

The following is a brief description of each group and the policies and strategies identified for each. The objective of each policy and strategy is shown in brackets.

### Bicycle-friendly Community

Integrating transportation demand management and design standards into new and existing communities is essential to the success of a viable bikeway network and creating bicycle-friendly communities. With this in mind, the following policies and strategies were incorporated into the Bikeway Network Master Plan:

- Create a Cycling Advisory Committee of Council (TDM)
- Integrate cycling with transit (TDM)
- Land use policy changes to require developers to provide bicycle end of trip facilities for new developments and to create sites that are bicycle-friendly (TDM/Design)
- Develop guidelines for bicycle end of trip facilities (TDM/Design)
- Provide end-of trip facilities, where possible, at all city owned buildings (TDM/Design)
- Integrate bike facilities into new subdivisions (Design)

## Bikeway Network

With a view to sustainable transportation, the Bikeway Network Master Plan includes specific policies and strategies to ensure cycling becomes a practical transportation alternative for commuters, while at the same time supporting recreational cycling. Some of the policies and strategies to achieve this include:

- Commit to the implementation of the bikeway network (TDM)
- Consider needs of cyclists in all transportation projects (TDM/design)
- Develop and implement a bikeways signage strategy (promotion)

## Cycling-Related Practices

Cycling-related practices including proper maintenance and promotion of the bikeway network are key to a successful network. Proper maintenance, both preventative and proactive (i.e. pothole repair, street sweeping), is vital to providing cyclists with a quality experience that will ensure continued use. Likewise, promotion of the network including specific routes and facilities will ensure the success of the network as people become more familiar with it and use alternative modes of travel. Some of the policies and strategies for this category consist of:

- Bikeway maps – web based and hardcopy (promotion)
- Consider needs of cyclists in transportation services and practices (maintenance)
- Cycling-specific road repair reporting strategy (maintenance)
- Strategies to maintain bikeway infrastructure (maintenance)

## Cycling -Supportive Programs

Leading by example is an effective way to educate and engage the public. As such, the Bikeway Network Master Plan incorporates policies and strategies that support and promote cycling in conjunction with educating the public. Some examples include:

- Commuter option initiatives (TDM)
- Information link about cycling in Cambridge on the City website (promotion)
- Support community events that encourage more cycling (promotion)
- Campaigns and programs that focus on safety, education, enforcement, skills training and collision prevention (promotion)



## Implementation Plan

The implementation plan for the Bikeway Master Plan is intended to guide decision making for the next 20 years. The plan consists of three phases namely, Short Term (2008 – 2012), Medium Term (2013 – 2017) and Long Term (2018 – 2028). Implementation priorities for each phase were established based on:

- The City's 10-year capital forecast;
- Public consultation;
- New development areas;
- Gaps in the existing network;
- Connectivity between the City's three Core Areas;
- Anticipated cycling demand and volume;
- Connectivity to multi-use trails and Regional facilities considered fundamental to the overall network; and
- Equitable distribution of routes throughout the City.

Table 1.0 below outlines the length of bikeways to be implemented and estimated cost for each phase.

**Table 1.0 Implementation Plan**

<b>Phase</b>	<b>Length (km)</b>	<b>Estimated Cost (\$)</b>
Short Term (2008 – 2012)	55	1.35M
Medium Term (2013 – 2017)	43	0.48M
Long Term (2018 – 2028)	14	0.66M
Total	112	2.49M

A schedule of unit costs was created to calculate the implementation costs noted in Table 1.0. These costs are in 2007/08 dollars and do not include the cost of property acquisition, utility relocations, or major roadside work such as drainage. The costs are based on average costs for the construction of bikeways in Waterloo Region and other municipalities across Ontario.

## Funding

Funding sources for the Bikeway Network Master Plan include capital roadway reconstruction projects, the annual capital bikeway program budget and new development.

More specifically, on-road facilities in established areas of the City will be funded through the annual capital bikeway program or the capital roadway reconstruction projects. Facilities within new subdivisions will be funded by the development through subdivision agreements. Development charges will also fund the growth component of the cost of installation of new facilities on existing arterial and collector roadway.

The City's Capital budget includes funding for an annual bikeway program. In order to meet the objectives of the Bikeway Network Master Plan and implement the length of bikeways for each phase noted in Table 1.0, the Capital budget was increased significantly for the years 2009 through 2013.

## **ENVIRONMENTAL IMPACT**

While it is the City's intent to reduce its carbon footprint by promoting sustainable transportation, the implementation of the Bikeway Network Master Plan is still in its early stages. The impact of the plan on the City's carbon footprint cannot be quantified until an appropriate amount of data collection and research has been conducted. As such the next step in the process is to develop a method that can be used to measure the environmental benefits of the plan. The methodology will include:

- An annual review of cycling facilities;
- Incorporating cyclists into turning movement counts;
- Adding turning movement counts at strategic locations within the bikeway network to the City's data collection program; and
- Research and use of statistically sound data to calculate Greenhouse Gas emissions for all typical vehicle types on an annual basis.

By the end of 2028, it is estimated that the City of Cambridge will have 175 km of on-road cycling facilities. As the bikeways are implemented, it is expected that the City's carbon footprint will decrease accordingly.

## **CONCLUSION**

The City of Cambridge Bikeway Network Master Plan will require regular review and revisions over time to ensure that it meets the needs of the users and is providing the optimal environmental benefits for the City. It is anticipated that updates will be completed approximately every five years.