# AN ACTIVE TRANSPORTATION STRATEGY FOR QUEEN'S UNIVERSITY

DECEMBER 2013

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# ABOUT THE TEAM

This project was completed by a group of six graduate students from the School of Urban and Regional Planning at Queen's University This report was produced for the Housing and Human Services Project Course (SURP 823) and submitted in partial fulfillment of the requirements for the degree of Master of Urban and Regional Planning for all team members.

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From left to right: Ivy, Heather, James, Keith, Sarah, Nancy

# ACKNOWLEDGEMENTS

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Queen's University

School of Urban and Regional Planning

KFL&A Public Health

## ABOUT KFL&A PUBLIC HEALTH

Kingston Frontenac and Lennox & Addington Public Health provides a number of public health services and programs to residents of Kingston and the surrounding region, and works with these communities to protect and promote the health of the more than 180,000 residents who live in this region. It is an accredited public health agency with over 200 staff and 150 volunteers. As a part of its mandate KFL&A Public Health actively promotes active transportation as a key aspect of personal and community health and wellness, and is also involved with the Kingston Coalition for Active Transportation. To help promote active transportation, KFL&A Public Health funds and promotes valuable research, including this project.

KFL&A PublicHealth

# EXECUTIVE SUMMARY

## Introduction

### *Project Background*

The intent of this report is to provide Kingston, Frontenac and Lennox & Addington (KFL&A) Public Health with **An Active Transportation Strategy for Queen's University.** The recommendations in the report are designed to inform decision-making and planning efforts to increase physical activity levels through improved use of active transportation (AT) to, from, and on campus, which will ultimately increase physical activity levels of students, staff, and faculty at Queen's University. This may also offer insights for other employers to increase AT among their employees.

For this study, two separate study boundaries were delineated. The greater boundary included the area of Kingston serviced by Kingston Transit, and is addressed in general strategies and recommendations for students, staff and faculty. A more thorough examination of preferred routes was done for the areas within a two-kilometre distance from the centre of Queen's University.

Information was collected from a variety of sources, which allowed for the development of a comprehensive AT strategy to improve the conditions for walking, cycling, and multimodal commuting trips to, from, and on campus.

### *What is Active Transportation?*

AT is any form of human-powered transportation such as walking or cycling.

### *What is an Active and Preferred Route?*

An active and preferred route is one that offers a convenient, attractive, efficient, safe, connected, accessible, and pleasant route for commuting.

### *What is an Active Transportation Strategy?*

An Active Transportation Strategy is a plan that provides a vision for AT infrastructure, programs, and policies. The guiding questions addressed in the strategy are:

- Where are we now?
- Where do we want to go?
- How do we get there?

# WHERE ARE WE NOW?

## Background Research

### *Benefits, Costs, and Determinants of AT*

AT is a topic at the forefront of the planning profession due to its potential to improve both public and environmental health. AT can provide significant benefits to population health and community well-being by increasing levels of physical activity, and simultaneously reducing greenhouse gas emissions by reducing the number of motor vehicle trips. Costs associated with AT are largely related to initial installation investments, which allow for sustained, long-term benefits to be realized.

Identifying the determinants of AT is a valuable exercise for improving and encouraging active commuting. Built environment determinants of AT include safety, aesthetics, density, connectivity, and land-use mix. Logistical influences include

proximity to frequent destinations and integration of public transportation. Socio-demographic and personal determinants include age, physical activity, income and employment. A final determinant of AT is political will of government at every level.

**Space required to fit 60 people on a bus, 60 people on bicycles, and 60 people in cars**

*Source: ecooptimism.com*

### *Kingston Context*

Kingston is a medium sized Canadian city with a population of 123,363. Typical of most Canadian cities, the private automobile remains the dominant mode of travel to work. However, Kingston has a notably high proportion of permanent residents who walk or cycle to work, with rates that are approximately double the national average. As well, the Kingston Census Metropolitan Area (CMA) boasts the second highest rate of AT commuting in Canada. There are significant concentrations of students, faculty and staff who live in the area surrounding Queen's University that would benefit from improvements to all modes of AT.

Kingston has many plans that address AT through infrastructure, policies, and programs. Notable plans and policies include: Cycling and Pathways Study, Transportation Master Plan, Sustainable Kingston Plan, Parks and Recreation Master Plan, Traffic Calming Policy, and relevant by-law amendments. These plans can serve as a springboard and guide for AT initiatives and efforts at the University.

## WHERE DO WE WANT TO GO?

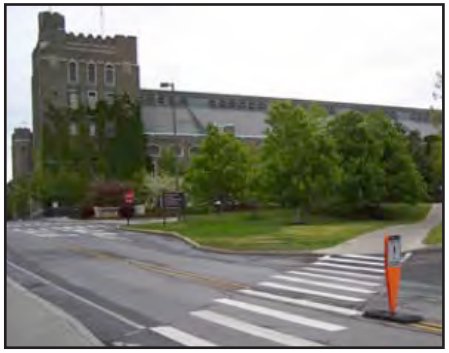
### Best Practice Precedents

A review of best practices informed the recommendation of appropriate strategies for AT within and around the Queen's University Campuses. The precedent case studies chosen include five Canadian locations and five international ones. They were selected because they exhibit campus and citywide AT strategies, and have similarities to Queen's University and Kingston.

**Common Elements and Viable Solutions for Queen's University and Kingston:**

**WALKING - Lessons Learned**

- Pedestrian priority areas on campus
- Pedestrian-scale streets and car-free zones
- Walking route maps with distances and times
- Pedestrian activated crossings
- Walking route networks



**Marked Mid-block Crosswalk**
*Source: Cornell University*

## CYCLING – Lessons Learned

- Comprehensive cycling supports, including ample end-of-trip facilities
- Extensive cycling infrastructure
- Enhanced lane markings and signage
- Bike rental program on campus
- Campus bike centre for repair, maintenance, education, and loans
- Cycle-friendly routes and facilities
- Bike registration system
- Bike share system
- Secure bike storage
- Bicycle regulation and enforcement
- Bicycle advisory committee
- Cycling route networks

**Bike Box,**
Source: Western University

## MULTI-MODAL – Lessons Learned

- Flexible parking program
- Use of existing City resources
- Discounted bus pass for students and employees
- Commuter Challenge Event for employees
- Public transit system with year-round bike racks and storage
- Guaranteed Ride Home Program
- Interactive mapping tools
- Park and Ride / Park and Bike / Park and Walk infrastructure
- Real-time transit information
- Employee AT incentive programs

**Indoor Bike Storage at a Bus Station**
*Source: University of Wisconsin*

## Primary Research Findings

The findings are based on several information sources, including preliminary research, precedent analyses, interviews and a workshop.

The precedents we reviewed served as a springboard for ideas, from which we were able to better define and identify details of what might comprise an AT strategy for Queen's University and how it could be implemented. The precedents highlighted

that an AT strategy must be a practical and well-planned course of action that involves an arsenal of policies, programs, and infrastructure implemented over time through the collaboration of numerous key stakeholders and public engagement.

Key informant interviews provided valuable information about AT challenges and successes at Queen's and in Kingston. Our interviewees clarified that, given the distribution of student and employee residences (students are concentrated closer to the university, where employees are more spread out across the city), the AT strategy would need to address the complex two-pronged issue of how to both increase and improve conditions for active commuting to the University.

The workshop corroborated many of the findings identified in the background research, precedents, and interviews. Notably, participants showed the greatest interest in two categories of AT promotion: cycling initiatives and infrastructure improvements. They saw the improvement of cycling infrastructure as the biggest challenge and gap in the current AT context.

Discussion also revolved around the need to remove barriers and threats to AT, and to approach the promotion of AT in a way that recognizes the differing needs of cyclists, pedestrians, and multi-modal users, as well as those who live farther or closer to the University. All groups identified partnerships and increased communication as means to ensure successful implementation.

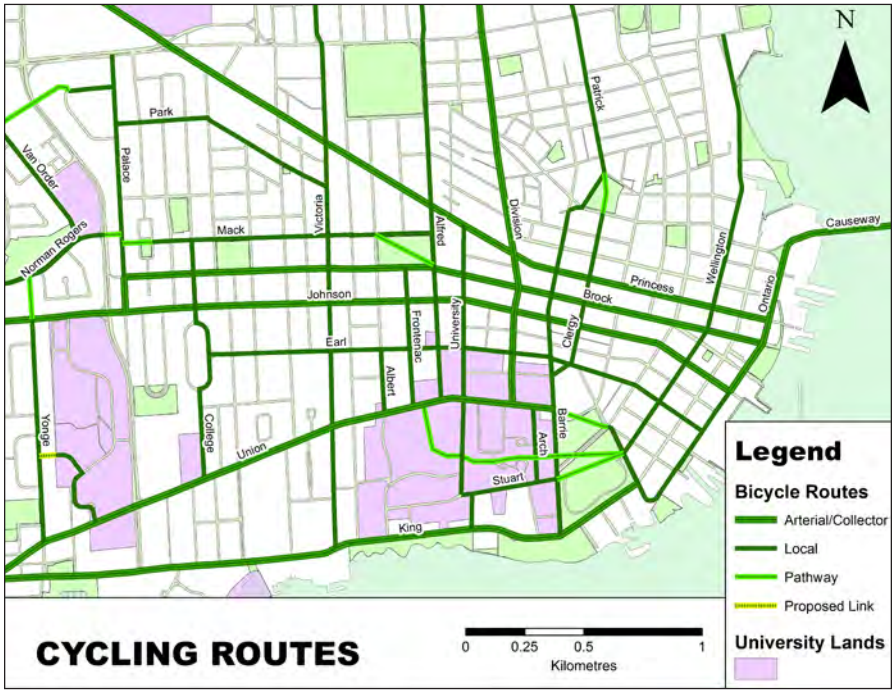
## HOW DO WE GET THERE?

### Recommendations

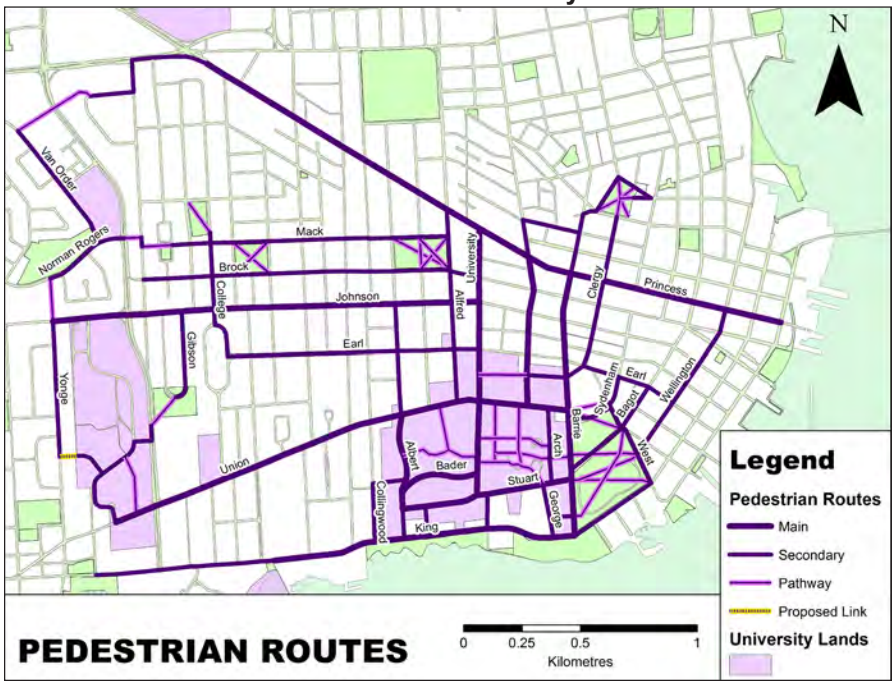
A total of 38 recommendations are outlined in four chapters in this report, which respectives are priority routes, walking, cyling, and multimodal recocommendations. Every recommendation addresses one or more facets of encouraging and facilitating AT, and is an important component of the comprehensive strategy. From this list, ten recommendations have been selected as key recommendations. While all of the recommendations are imperative to a comprehensive AT strategy, these ten highlighted recommendations, which cover a range of programs, policies, and infrastructural improvements, could have the most impact for Queen's University.

- Improve Pedestrian Crossings
- Implement Traffic Calming Measures
- Encourage Participation in Walk to Work Programs
- Lobby for Changes to the Ontario Highway Traffic Act
- Improve Bicycle Parking on Queen's Campuses (Bicycle Lockers and Covered Parking)
- Promote Cycling Awareness
- Improve Maintenance of Designated Bike Lanes
- Create Transit Stop Linkages
- Facilitate the Provision of Discounted Employee Public Transit Passes
- Do Not Subsidize Motor Vehicle Parking

Identified Cycling Priority Routes




Identified Pedestrian Priority Routes




## Implementation and Partnerships

Various stakeholders are required to implement the recommendations presented in this report, over both the short- and long-term time frames. Particularly, KFL&A Public Health, Queen's University, and the City of Kingston will be responsible for specific areas of improvement in which they have the experience, knowledge, jurisdiction, and capacity to implement. Many of the recommendations will require the formation of partnerships between key stakeholders for successful implementation.

## Conclusion

This report presents findings from preliminary research on the subject and develops a series of planning and design guidelines for promoting AT amongst the Queen's community. The ultimate goal of this report is to increase the number of active commuting trips to and from campus by encouraging more faculty, students and staff to incorporate AT into their daily routine. This can be achieved through policies, programs, and improvements to the current infrastructure for walking, cycling, and multi-modal transportation. Through appropriate partnerships and implementation, KFL&A Public Health can use the recommendations in this report in continuing to foster a healthy and more sustainable campus and city. Although directed for implementation at Queen's University, the recommendations are designed to be adaptable for the use and benefit of other employers.

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# 1

# INTRODUCTION

Physical activity is an important component of a healthy lifestyle. It has been found that active people are more productive and more likely to avoid illness and injury (Herman et al., 2007; Public Health Agency of Canada, 2010). The Canadian Society for Exercise Physiology (2013) recommends adults aged 18-64 years old should perform at least 150 minutes of moderate- to vigorous-intensity aerobic physical activity per week. One way to increase physical activity levels is by using active transportation (AT) as a means of commuting. This involves opting to walk, or bike, whenever possible, instead of using a car.

## 1.1. Project Background

The intent of this report is to provide Kingston Frontenac Lennox & Addington (KFL&A) Public Health with an “Active Transportation Strategy” for Queen’s University. The strategy is designed to increase physical activity levels of faculty, staff and students through improved use of AT to, from, and on campus. Queen’s University is one of many large institutional employers in Kingston with over 7,000 faculty and staff and over 20,000 students. Other large institutional employers in the city include Canadian Forces Base Kingston, Correctional Services of Canada, City of Kingston, Providence Care, Kingston General Hospital, Hotel Dieu Hospital, and Saint Lawrence College. As such, this study could also offer actionable items that are transferrable to other institutional employers in Kingston.

For the purpose of this study, two separate study boundaries have been delineated. The greater boundary included the area of Kingston serviced by Kingston Transit, and is addressed in general strategies and recommendations for students, staff and

faculty (Figure 1.1). A more thorough examination of preferred routes was done for the areas within a two-kilometre distance from the University, radiating from the intersection of University Avenue and Union Street (Figure 1.2).

**Figure 1.1: Greater Study Area Boundary**

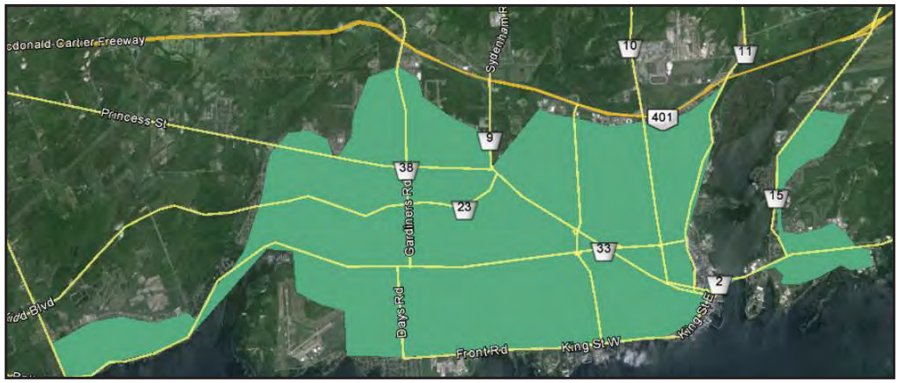



**Figure 1.2: Two Kilometre Study Area Boundary**


Information was collected from a variety of sources to develop a comprehensive AT strategy. These included reviews of academic literature, reports and documents from various organizations, policies and legislation, and examples of AT best practices from similar universities. The team also ran an AT workshop, and conducted ten key informant interviews.

The specific objectives of this report are as follows:

- To review AT best practices, promotion, and education programs at other campuses in Canada and internationally;
- To identify proposed active and preferred transportation routes to and from Queen's campus; and
- To provide recommendations and an implementation strategy to improve AT use at Queen's University.

**Given these objectives, the strategy outlined in this report aims to contribute to increasing the number of active commuting trips to, from and on campus and to enhance the existing conditions for walking, cycling and other modes of AT.**

## 1.2. What is Active Transportation?

Active transportation (AT) is any form of human-powered transportation such as walking or cycling (Public Health Agency of Canada, 2010). Incorporating AT into daily routines provides an opportunity for increased routine physical activity (Public Health Agency of Canada, 2010).

Communities are more likely to engage in AT when they have amenities such as sidewalks, pleasant scenery, street lights, and an enjoyable environment in which to walk or cycle (Canadian Medical Association, 2009). Since the 1950s, too much emphasis has been placed on accommodating automobiles, making it difficult or undesirable for community members to commute by walking or cycling.

By designing and creating routes that are well connected, accessible, safe and enjoyable, the goal is to encourage more people to choose an active mode of travel more often. In turn, this will simultaneously reduce dependence on the private automobile and make it easier to achieve the recommended 150 minutes of moderate to vigorous activity per week (Public Health Agency of Canada, 2010).

### 1.3. What is an Active and Preferred Route?

To encourage children to commute actively to school, an emphasis has been placed on creating "active and safe" routes to school. While safety remains important for any user of AT, regardless of age, other elements surface as contributing factors for route selection amongst adults. It is these elements that contribute to our definition of a preferred route. As such, an active and preferred route is one that offers a convenient, attractive, efficient, safe, connected, accessible, and pleasant route for commuting (Transport Canada, 2011).

### 1.4. What is an Active Transportation Strategy?

An Active Transportation Strategy is a plan that provides a vision for AT, programs and policies. According to Transport Canada (2011), an AT strategy seeks to understand:

- Where are we now?
- Where do we want to go?
- How can we get there?

The first step, "where are we now?" describes the current situation of AT in the community. In this phase, key issues are identified as well as strengths and weaknesses within the internal environment and opportunities and threats in the external environment. The next component "Where do we want to go?" focuses on developing a vision. Additionally, best practices are identified that could be implemented in the community. The third step "How can we get there?" focuses on recommendations and implementation. These are essential to helping achieve the vision that has been developed.

**An AT Strategy is not about restricting the use of motor vehicles, but about improving the environment and opportunities for travel that incorporates physical activity (Bergeron & Cragg, 2009). Moreover, the goal of an AT Strategy is to transform an automobile reliant community into a community where all interested parties including motorists, public transit users, pedestrians, cyclists and others share a common vision for the development of future transportation networks (Bergeron & Cragg, 2009).**

Some possible outcomes of an AT Strategy include: identifying links and extensions of existing bikeways, trails, sidewalks and roads, identifying missing connections, prioritizing network projects, reviewing current standards, by-laws and identifying opportunities for public promotion and education (Bergeron & Cragg, 2009).

### 1.5. Project Scope

This report seeks to present a comprehensive AT strategy for Queen's University. Given the time frame and focus of the project, it has not been possible to address all aspects of AT. This report acknowledges that accessibility is a factor in promoting AT, however, it has not been addressed within this report. Similarly, the report does not provide detailed examinations of the explicit environmental benefits of AT, and does not conduct a street network study. Lastly, monitoring of the implementation of this strategy was beyond the scope of this project due to time constraints. It is therefore recommended that further research and work take place to explore these topics and areas of improvement.

### 1.6. Report Overview

This report is divided into ten chapters. Following this introduction, the report begins by seeking to understand "Where Are We Now?" Chapter Two delves into general background information surrounding active transportation. Environmental, social, economic and health benefits are identified, as well as determinants of active transportation use. Additionally, the chapter examines active transportation through the lens of the City of Kingston. Insight is provided into the current context of active commuting at Queen's, including the existing policy context and the current social demographics.

The report then shifts to answering the question "Where Do We Want To Go?" Chapter Three identifies both international and Canadian campus initiatives that have been effectively implemented at comparable institutions. These examples help inform a better understanding of best practices. Chapter Four discusses primary research findings from both interviews and the workshop to better understand what direction key stakeholders believe the University should move.

From here, the report moves to provide insight on "How Do We Get There?" Chapter Five provides the first set of recommendations, walking and cycling route maps based on an analysis of gathered information. Chapter Six focuses on walking recommendations, followed by cycling recommendations in Chapter Seven. The final group of recommendations is covered in Chapter Eight regarding Multimodal travel. Within Chapter Nine, implementation and partnerships are discussed. This chapter considers how the recommendations will require the formation of partnerships between key stakeholders for successful implementation. Lastly, Chapter Ten contains the final thoughts and conclusions offered on an active transportation strategy for Queen's University.

# WHERE ARE WE NOW?

# 2

# BACKGROUND

## 2.1. Benefits of Active Transportation

Over the past decade, active transportation (AT) has received increased academic and media attention. It is a topic at the forefront of the planning profession due to its potential to improve both public and environmental health (Public Health Agency of Canada, 2013; Canadian Institute of Planners, 2011; Weyman et al., 2013). Conditions and diseases such as diabetes, obesity, coronary artery disease, osteoporosis, depression and cancer are increasingly affecting the quality of human health, all of which are linked to physical inactivity (Herman et al., 2007; Janssen, 2004).

### 2.1.1. *Health & Social Benefits*

AT is a form of transportation that incorporates healthy, purposeful activity into daily travel and routines, and has extensive benefits for users. Individuals who use AT have better physical fitness, and a reduced risk of cardiovascular disease compared to those who travel primarily by car (Miles, 2007; Warburton et al., 2006). The health benefits of AT outweigh the risk of injury, and the reduced reliance on private automobiles contributes to lower levels of air pollution (Hillman, 1992 ; Reynolds et al., 2010). People who cycle are more fit, less overweight or obese, and have a lower risk of all-cause mortality, disease specific mortality, and cardiovascular disease (National Collaborating Centre for Environmental Health, UBC, 2010).

The shift from car dependency to AT has many social benefits as well, which include reduced traffic noise and pollution, lower crime rates, increased outdoor community presence, and increased eyes on the street, resulting in safer communities (Reynolds

et al., 2010). More specifically, AT has been associated with fostering greater civic involvement, and increasing community pride and well-being (Bergeron & Cragg, 2009; Devlin, Frank, & VanLoon, 2009). For short distances, commuting via AT offers an efficient alternative to automobile travel. The door-to-door travel time for distances less than five kilometres is usually fastest when commuting by bicycle, whereas walking is an efficient alternative for distances of up to two kilometres (Booth, et al., 2012; Canadian Medical Association, 2009).

### 2.1.2. *Environmental Benefits*

Transportation is one of the main sources of air pollution in Canada, and there is a large and growing body of evidence linking the detrimental effects of automobiles to the deterioration of the natural environment (Transport Canada, 2011). Promoting AT can help reduce reliance on automobiles and therefore reduce impacts and irrevocable environmental damage (Transport Canada, 2011). Reducing reliance on private automobiles will lessen the pressure and need for parking lots. These spaces can be transformed into parks, open spaces, or mixed-use development, which can lessen or eliminate negative consequences of parking lots, including heat island effects. AT modes contribute minimally, if at all, to smog or air pollution, thus reducing Canada's greenhouse gas production (Public Health Agency of Canada, 2013). Finally, encouraging AT is supportive of municipal greenhouse gas reduction strategies and air quality plans, such as the Kingston Climate Action Plan (Transportation Canada, 2011; City of Kingston, 2013a).

### 2.1.3. *Economic Benefits*

There are many economic benefits associated with AT. Politicians and business owners are increasingly choosing to invest in, and support, AT initiatives and programs (Transport Canada, 2011). As well, reports reveal that those who partake in AT, including bicyclists, will spend less money on commuting costs than individuals who use automobiles as their main mode of transportation (City of Toronto, 1999). Research shows that retail revenue increases, commercial and retail vacancies decline, and sales and tourism increase in areas that see increased pedestrian and cyclist flows due to more comfortable and safe infrastructure and amenities (Arancibia, 2013).

As AT promotes physical activity, it can indirectly decrease the national financial burden of physical inactivity, which is roughly $6.8 billion a year (Janssen, 2011; Katzmarzyk and Janssen, 2004). In Kingston, the estimated annual total medical cost of physical inactivity is $31.3 million per year. However, if there was a 10% decrease in physical inactivity in Kingston, the Province could potentially save $2.8 million per year in total medical costs (Janssen, 2011). AT can provide significant benefits to population health and well-being, as well as environmental and economic sustainability.

On average, Canadians commute 20-60 minutes each day depending on the size of the community (Statistics Canada, 2010). By reducing automobile travel, individuals will typically save around $10,000 per year, which is the approximate operating cost of a car including expenditures on gas, maintenance, and parking (Public Health Agency of Canada, 2013).

Benefits of AT also extend to employers, employees, and workplaces. By supporting AT, employers demonstrate corporate environmental and social responsibility. AT has been associated with increased productivity, reduced absence or sick-days, and increased job satisfaction (Kaye, 2012). The benefits to employers can amount to roughly $513 per worker every year (Campbell, 2004). AT also requires much less expensive commuting infrastructure and space for institutional employees. Pedestrians require no parking and relatively inexpensive pathways and amenities. Installation of bicycle parking is approximately $75-150 per bicycle. The cost of installing a surface vehicular parking space, however, is approximately $2200. In addition, the space required for one motor vehicle parking spot can accommodate approximately 10-12 bicycles (Pedestrian and Bicycle Information Center, 2013).

## 2.2. Costs And Resources Associated With Active Transportation

AT infrastructure investments have significant long-term returns, but the initial installation costs can act as a deterrent for potential projects. However, it is not the aim of this project to determine the level of expenditure required to attract and improve conditions for AT users. It should be noted that there will be initial short-term costs for Queen's University and the City of Kingston when investing in AT (Campbell, 2004). Queen's University may need to make initial investments for items such as expenditures on additional staff and resources, workshops, posters, events, pedestrian and cycling end-of-trip facilities, and policy development. Some potential initial investments funded by the City of Kingston might be paths for cyclists on collector streets, sidewalk improvements, equipment for bicycles on transit vehicles, signage, and pedestrian and cycling access to transit stops and stations. Thus, short-term investments in AT can appear costly, but the comprehensive long-term benefits outweigh the initial costs (Campbell, 2004).

**Figure 2.1: Space required to fit 60 people on a bus, 60 people on bicycles, and 60 people in cars**

*Source: ecooptimism.com*

## 2.3. Determinants Of Active Transportation

Identifying the individual determinants of AT is a valuable exercise for improving and encouraging active commuting, but these factors are not isolated variables. The presence or absence of any of these variables can be influenced by or can influence the presence of the others.

### 2.3.1. *Built Environment Determinants*

*Safety*

The prevalence and patterns of AT are significantly influenced by the safety of the environment in which people are riding their bicycles and walking. Lee and Moudon (2004) argue that safety is the central component that moderates and is moderated

by other influences in the decision to use AT, as a feeling of safety and the absence of potentially harmful elements are major deciding factors for those considering using AT (Bopp et al., 2012; North and Agarwal, 2012; Transport Canada, 2011). In several studies in the United States, concerns about traffic safety appeared to have a greater influence on the use of AT than concerns about theft or personal assault (Bopp et al., 2012). The presence of AT infrastructure, such as safe crosswalks, separated bike lanes, pedestrian and cyclist-friendly signs, and proper lighting can encourage AT and influence route choice (Transportation Canada, 2011; Ottawa Cycling Strategy, 2013; Coalitions Linking Action and Science for Prevention, 2012).

*Aesthetics*

Pleasant scenery has been associated with a greater potential for AT, as it makes the commute for AT users more enjoyable than if they had commuted by car (Paez and Whalen, 2010; Transportation Canada, 2012). Thus, AT can be encouraged by designing routes to include elements that enhance the beauty and peacefulness of the commute. A study in Hamilton, Ontario found that compared to those who travel by car or transit, AT users were the least dissatisfied with their commute (Paez and Whalen, 2010). An enjoyable commute can have numerous benefits for both communities and individuals, such as improved productivity and performance at work, improved mental health, and reduced stress-related symptoms (Transport Canada, 2011). Similarly, a study conducted by Statistics Canada showed that 19% of cyclists noted the most enjoyable part of their day as the journey to work, but only 2% indicated their commutes as the most enjoyable (Statistics Canada, 2008).

*Density, Connectivity, and Land Use*

Greater neighbourhood density, connectivity and mixed land uses have been associated with higher rates of AT, all providing ease of travel for active commutes (Frank et al., 2004; Frank and Kavage, 2009). These factors play a pivotal role in how the built environment affects decisions and potential for active commuting. Mixed land uses result in closer proximity of possible destinations, and therefore, minimize the travel distance (Frumkin et al., 2004; Kerr, 2012). Greater density makes AT more convenient, while areas that are vehicle-centric, low-density, and single-use can increase the travel time and distance for cyclists and pedestrians, and make AT more impractical and improbable (Transportation Canada, 2011, p. 31). Similarly, low connectivity can also discourage people from using AT, as trips take more effort and time on an indirect route (Kerr et al., 2012; Transport Canada, 2011).

### 2.3.2. *Logistical Influences*

*Proximity*

A location within a reasonable distance from either the destination or access to public transportation has been widely cited as one of the most important factors that contributes to the potential for AT (Kerr et al., 2012; Lee and Moudon, 2004; Morency et al., 2011; Transport Canada, 2011). For all or part of a commute, being located too far away from the end destination is a critical barrier in the decision to use AT (Kerr et al., 2012). Numerous other factors weigh into this component of the decision to use AT, and even perception of a large distance between travel points can debase other efforts to encourage active commuting (Bopp et al., 2012; Lee and Moudon, 2004). Proximity to other

locations or destinations travelled to following work also appear to influence the choice to use AT. Those who commute with no, or fewer, stops between destinations are more likely to use AT (Boop et al., 2012). However, for those with longer distances between start and end locations, incorporating some form of public transit will often still allow for some AT (Morency et al., 2011).

*Integration of Public Transportation*

Mode-sharing in commuting (e.g., walking to access public transit) has been increasingly recognized and used as a means of incorporating physical activity into daily travel (Transport Canada, 2011). Numerous studies have shown that people who use active means to get to public transportation contribute significantly to their recommended daily physical activity on their commute (Besser et al., 2005; Institute of Engineers, 2013; Morency et al., 2011). Especially for those living farther away, or those who face other transportation barriers, multi-modal travel that includes physical activity provides a viable alternative to automobile travel (Transport Canada, 2011). Transport Canada (2011) indicates that providing amenities like end-of-trip facilities, bike racks on public transportation buses, and more secure parking for bicycles can facilitate and encourage mode-sharing with elements of physical activity.

### 2.3.3. *Socio-demographic and Personal Influences*

*Age, Gender, and Physical Activity*

Age has been identified as a key determinant for AT. Younger people, primarily youth and adolescents, have been shown to use AT more often than middle-aged and older adults (Yang et al., 2011; Butler et al., 2007; North and Agarwal, 2012). These results are particularly pronounced for cycling, in which young people who are enrolled in university are found to be the most likely to cycle purposefully (North and Agarwal, 2012). Studies also indicate that younger people are more likely to be physically active, and accordingly, people who are more physically active, both for travel and leisure, are also more likely to engage in AT than those leading more sedentary lifestyles (Butler et al., 2007; Bruijn et al., 2009). Those who use one mode of AT (for example, walking) often over the course of a week show a greater propensity to use a second type (for example, bicycling) more during that same week (Butler et al., 2007).

Gender has also been observed as a determinant of and influence on AT use. Studies have found that women who cycle will take strategic routes to avoid hazardous areas (North and Agarwal, 2012). Similarly, studies show that in North American cities, women tend to walk more often than men, but men are more likely to cycle than women (Dill and Voros, 2007; Plaut, 2005).

*Income and Employment*

Income has also been identified as an influencing factor for AT. Reports show that people with lower household incomes are more likely to walk, and that, “where opportunities exist to walk and cycle…findings suggest that low-income Canadians are more likely to make use of them” (Butler et al., 2007, p. 263). Mode-sharing is particularly common in lower-income neighbourhoods, either due to proximity to transit options in more urban areas, or because of limited access to cars (Besser

et al., 2005). Similarly, access to facilities and AT-friendly policies at the workplace have also been identified as significant factors in determining whether people choose to use AT (Bopp et al., 2012).

### 2.3.4. *Political Influences*

"In a 2004 nation-wide survey, 84% of respondents agreed that they would like to walk more often and 64% agreed they would like to cycle more often. In addition, 84% of those surveyed also supported spending to create dedicated bike lanes and paths."

(Transport Canada, 2011, p. 22)

This quote outlines the extensive and growing support for AT in Canada, and the fact that municipal, provincial, and the federal governments are recognizing the extensive benefits of AT (Transport Canada, 2011; Share the Road 2010). Fuelled by a growing awareness of the environmental and economic costs of single-user motorized transport, and, conversely, the benefits of active travel, public approval in support of AT has surged since the 1980's. This has put significant pressure on governments to provide the resources and funding for infrastructure, programs, and large- or small-scale projects. This has further propelled the issue of AT into the spotlight in municipalities across the country.

## 2.4. Census Profile

Kingston is a medium-sized Canadian city with 123,363 permanent residents (Statistics Canada, 2012). The median age of Kingston's permanent residents is 40.3 years, slightly below the Canadian average of 40.6. Typical of most Canadian cities, the private automobile remains the dominant mode of travel to work. According to the 2011 National Household Survey as shown in Figure 2.2, 79.6% of residents commute to work by car. This percentage is on par with the national average of 79.7% (Statistics Canada, 2011). Kingston has a low proportion of transit use, approximately half the national average. In contrast, a notably high proportion of permanent residents who walk or cycle to work, with rates that are approximately double the national average (Statistics Canada, 2011). The Kingston Census Metropolitan Area boasts the second highest rate of AT commuting in Canada (Figure 2.3). Additionally, since Canadian censuses are undertaken during the summer, these figures do not include the thousands of students who live and commute in Kingston for eight months out of the year.

**Figure 2.2: Transportation Mode Share, 2011**

| | Kingston | Canada |
|---|---|---|
| **Private Automobile** | 79.6% | 79.7% |
| Driver | 71.5% | 74.0% |
| Passenger | 8.1% | 5.6% |
| **Public Transit** | 6.2% | 12.0% |
| **Active Transportation** | 13.2% | 7.0% |
| Walk | 10.5% | 5.7% |
| Bicycle | 2.7% | 1.3% |
| **Other** | 1.1% | 1.2% |

*Source: Statistics Canada, 2011 National Household Survey*

**Figure 2.3: Active Transportation by CMA, 2011**

| Rank | Census Metropolitan Area | Walk & Cycle |
|---|---|---|
| 1 | Victoria | 17.6% |
| **2** | **Kingston** | **14.9%** |
| 3 | Halifax | 12.7% |
| 4 | Ottawa - Gatineau | 12.3% |
| 5 | Québec | 10.5% |
| 6 | Vancouver | 10.3% |
| 7 | Saskatoon | 9.8% |
| 8 | Montréal | 9.7% |
| 9 | Peterborough | 9.2% |
| 10 | Guelph | 8.6% |

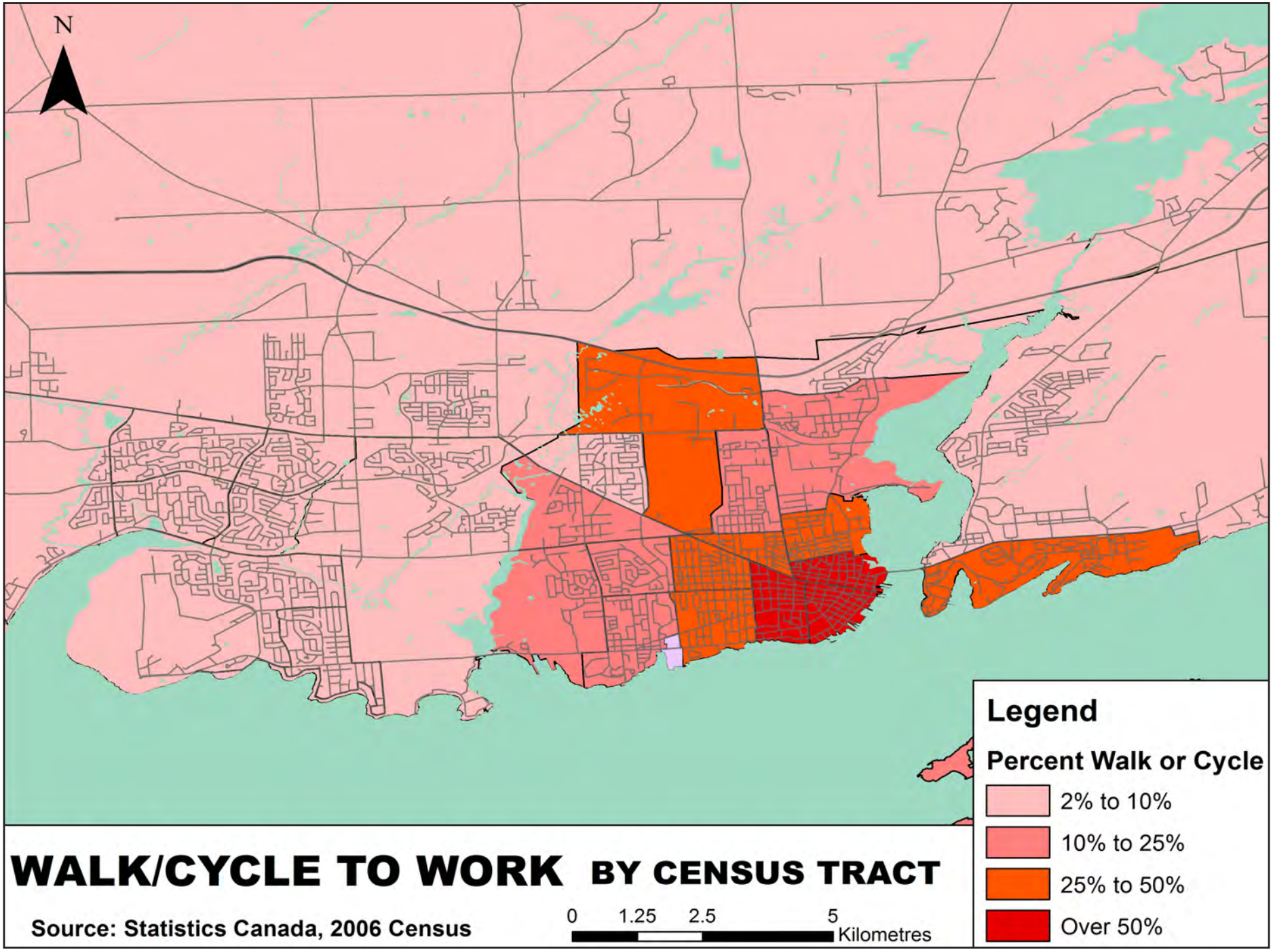
*Source: Statistics Canada, 2011 National Household Survey*

## 2.5. Travel Characteristics of Kingston Residents

Rates of commuting by AT in Kingston vary geographically. Data from the 2006 Census revealed that areas closer to downtown and Queen's University have very high rates of AT (Figure 2.4). Within our Small Study Area, 43% of permanent residents commute by walking or cycling. When public transit commuters are included, this figure rises to 49%. Within census tracts covering downtown and the university area, the majority of people walk or cycle to work, with rates ranging from 54.0% to 69.9% (Statistics Canada, 2006). The census tracts surrounding this core, which approximately cover the Small Study Area, have rates ranging from 33.1% to 41.5%. **In reality, all of these census figures are conservative since they do not include the non-permanent student population.**

Journey to work statistics only tell part of the story. When all travel is considered, including non-work trips, the number of people who report engaging in AT increases dramatically. Kingston's 2008 Household Travel Survey found that while 8% of work trips were made by walking, the rate of non-work walking trips was double at 16%. When combined, walking trips made up 13% of total trips (City of Kingston, 2009). Non-work cycling was less popular, at only 1%, as compared with 2% of work trips. A recent household travel survey of Kingston residents found that 72% of respondents used a form of AT at least once per week (Collins and Mayer, forthcoming). Contrary to the notion that AT projects would only benefit a small minority of people, this data suggests that many Kingston residents engage in some form of AT at least some of the time and would therefore benefit form improvements, especially a majority of the population within the small study area.

**Figure 2.4: Population Commute to Work By Walking or Cycling, Kingston, 2006**



## 2.6. Geographic Distribution of Queen's Students and Employees

The Main Campus of Queen's University is embedded within Kingston's inner city. There are significant concentrations of students, faculty and staff who live in the area surrounding the campus. However, compared to staff and faculty, students generally live closest to campus. Student location data from 2008 show that a large majority of undergraduate students, 82.4%, live within a 1.5 km radius of the intersection of Union Street and University Avenue (Chong, 2008). Graduate students are more dispersed, with 64.8% living within a 1.5 km radius (Chong, 2008). By comparison, data from 2010 showed that only 12.8 % of staff and faculty lived within two kilometres of the campus, and 50% live within ten kilometres (Timmerman, Miller, Collins & Lester, 2011). Figure 2.5 to 2.8 show the distribution of Queen's academics, staff, undergraduate students, and graduate students in relation to Queen's campuses based on their home address.

## 2.7. Travel Characteristics of Queen's Students and Employees

Although dispersion patterns differ significantly between students and employees, research suggests that both groups would benefit from improvements to all modes of AT. The large proportions of students who live within walking distance to campus would benefit greatly from pedestrian improvements. However, students would also benefit from improvements to the cycling network. A recent survey of Queen's University students has found that a majority would be encouraged to cycle more often given certain improvements, including more clearly demarcated cycling lanes, physically separated lanes, enforcement of illegal parking in cycling lanes and better winter maintenance (North and Agarwal, 2012). Furthermore, redevelopment along upper Princess Street is expected to bring more students to the Williamsville neighbourhood. Located further from Main Campus than the University District, student housing development in this neighbourhood should be expected to increase the number of students cycling to campus.

Faculty and staff use a wide variety of modes to commute to Queen's. Preliminary findings from a survey indicate that 28% to 34% of Queen's employees walk, cycle or take transit, depending on the season. However an additional 12% of employees park their cars off campus and walk in. The total number of employees who use AT for at least part of their journey to work is approximately 40% to 45% (Collins and Agarwal, forthcoming). Therefore a variety of improvements that promote cycling, transit, and mode-sharing will be of great benefit for this group as well.

**Figure 2.5: Queen's University Employees Distribution (Academics)**

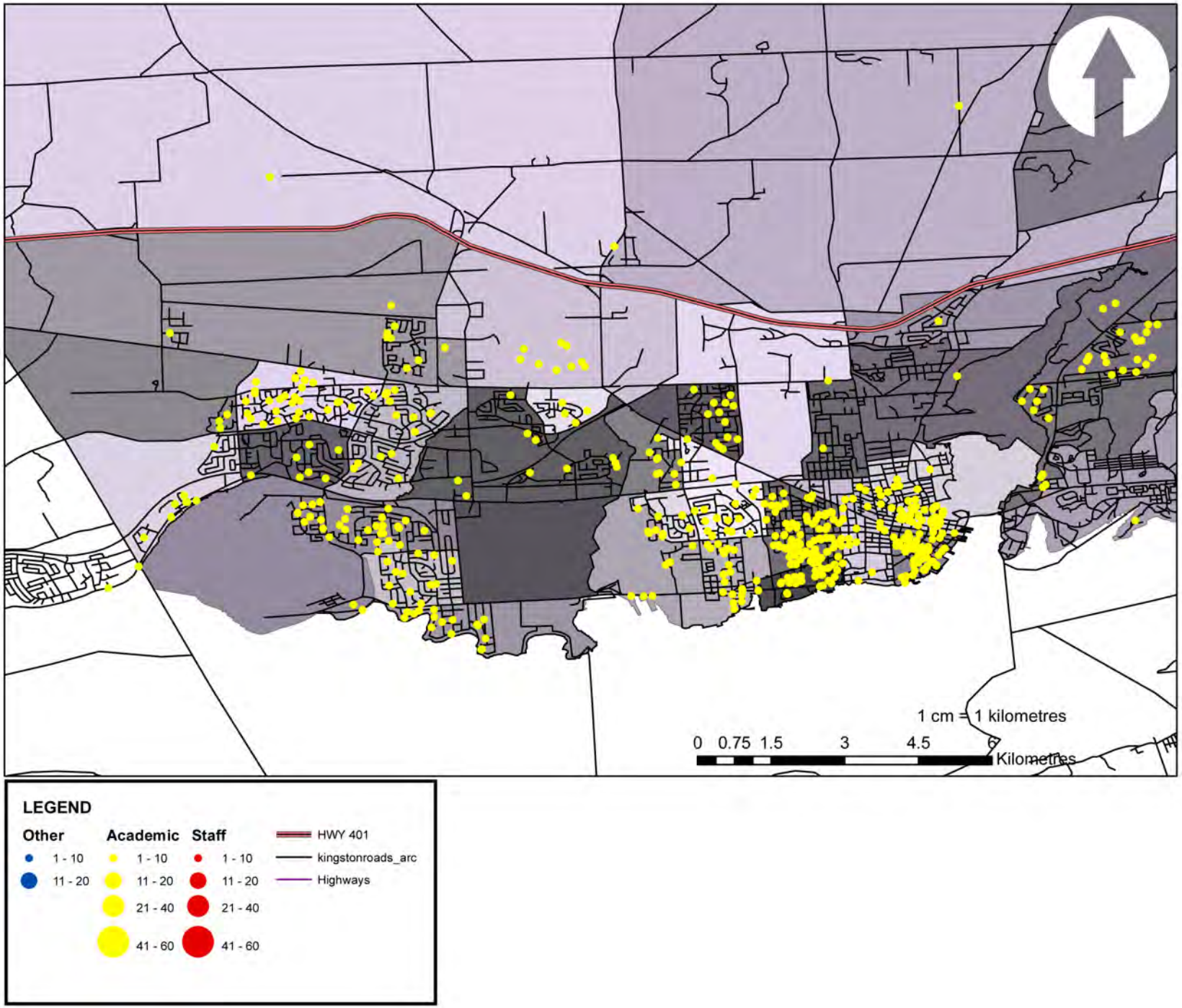


**Figure 2.6: Queen's University Employees Distribution (Staff)**

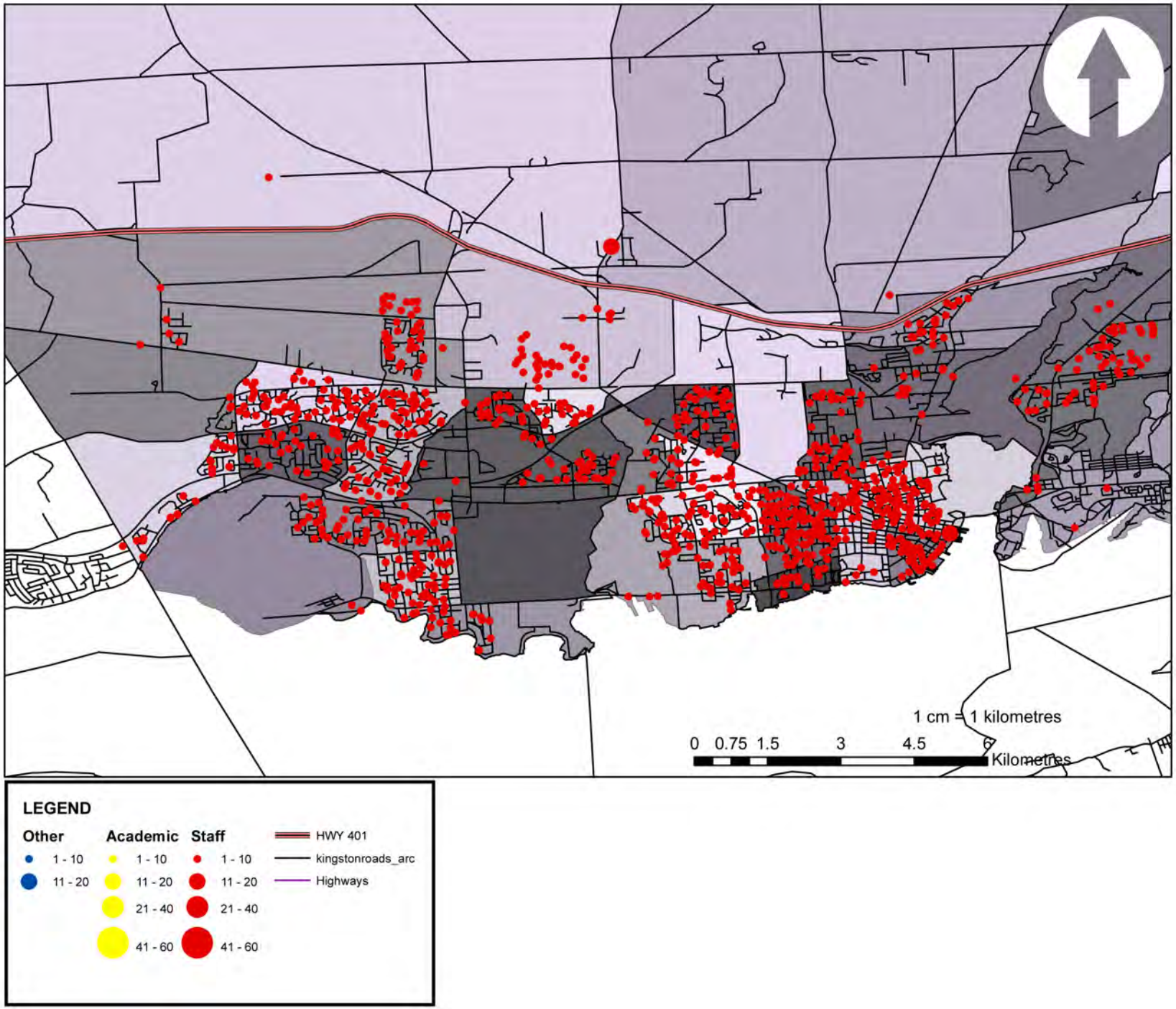


**Figure 2.7: Queen's University Students Distribution (Undergraduate)**

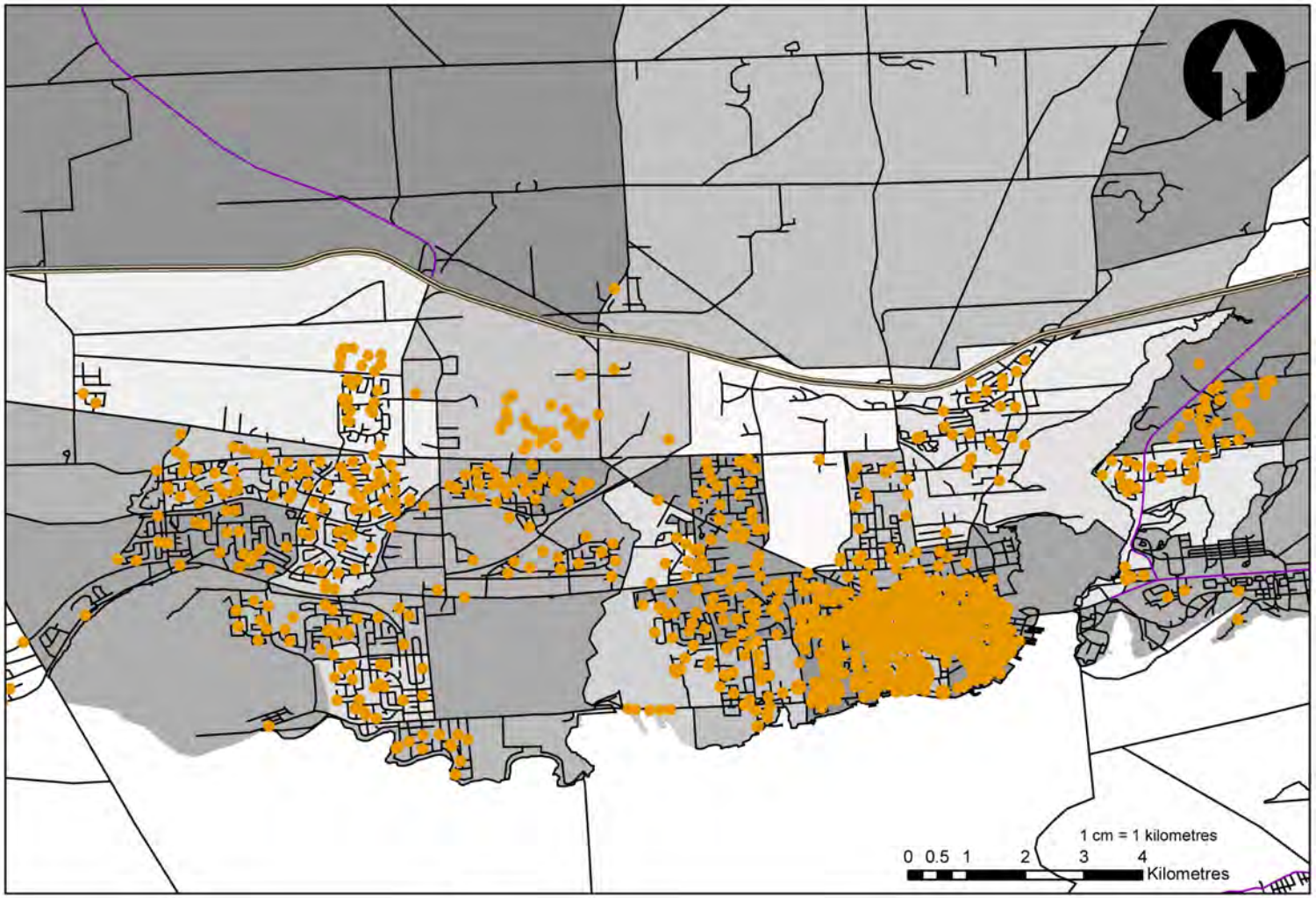
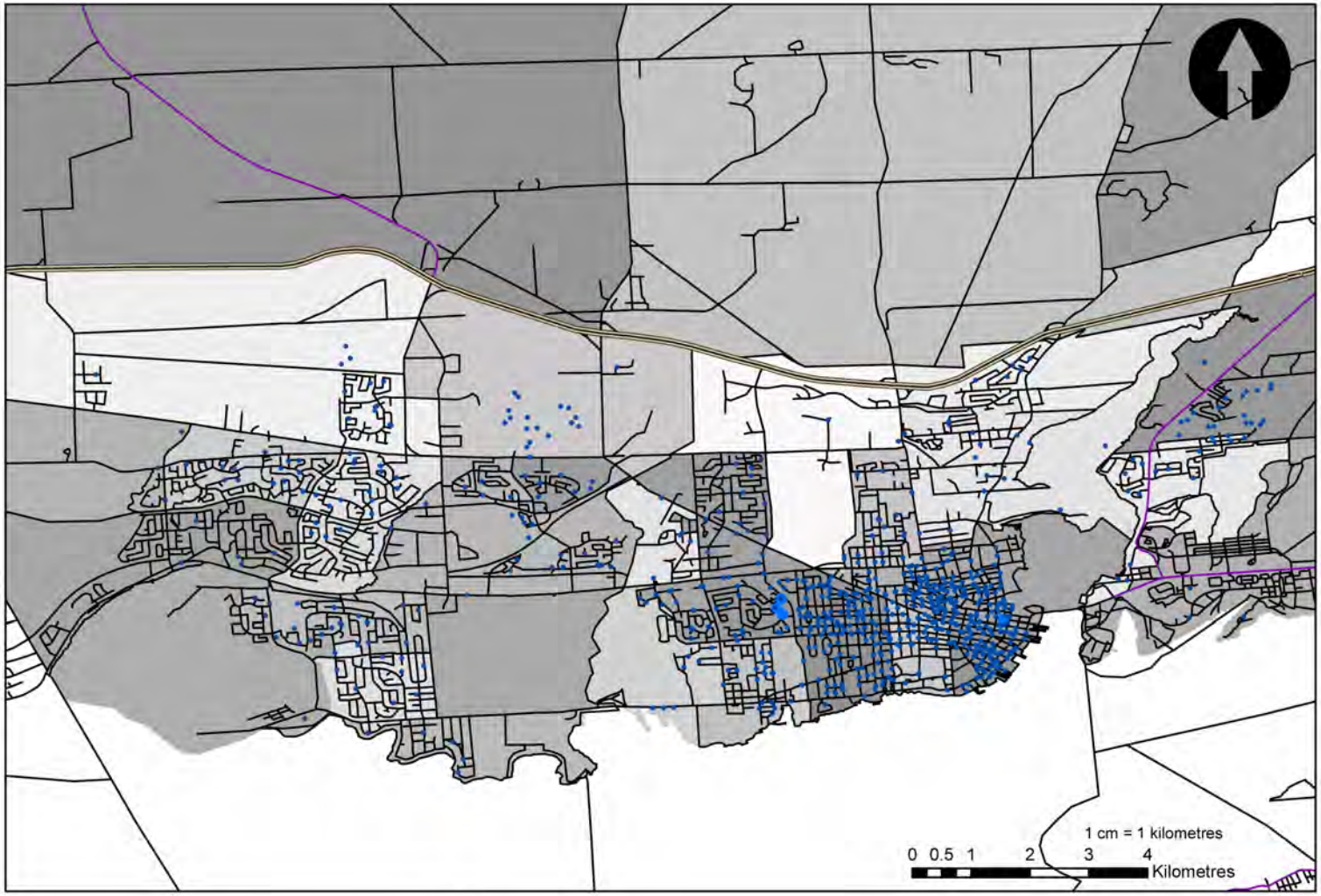


**Figure 2.8: Queen's University Students Distribution (Graduate)**



## 2.8. City of Kingston Plans, Studies and Bylaws

### 2.8.1. *Cycling and Pathways Study, 2003*

The City's Cycling and Pathways Study (Kingston, 2003) has been influential in guiding the planning and development of pedestrian and cycling infrastructure for the past decade. It has established high-level policy, set facility design standards and mapped priority pedestrian and cycling improvement projects. It has also proposed a progressive prioritization of road users starting with persons with physical disabilities at the top, then pedestrians, cyclists, public transit users, and finally motorists. The study suggested a number of facility standards and guidelines for existing and new roadways, and provides design criteria for a variety of facility types.

The study proposed three network plans: 1) The Pedestrian Focus Master Plan, 2) The Recreational Focus Master Plan, and 3) The Utilitarian Cycling Focus Master Plan. The Pedestrian Focus Master Plan mapped priority pedestrian routes, proposing a number of improvements to the sidewalk and pathway networks. The Recreational Focus Master Plan and the Utilitarian Cycling Focus Master Plan are distinct from one another, but are complimentary in their goals and objectives. These network plans were adopted into the City's Transportation Master Plan, and later into the City of Kingston's Official Plan (2010b), and therefore have been primary guiding documents in the implementation of facility improvements in recent years.

Notably, the study did not identify or propose specific types of facilities on individual routes. Higher-order cycling facilities, such as physically separated bicycle lanes, are given little consideration. In fact, the study specifically discourages one type of facility, boulevard pathways (pathways that parallel arterials within the right-of-way), because of safety concerns regarding how they interface with intersections.

Most cyclists would feel more than comfortable using a physically separated facilities of which a boulevard pathway is one type. Recommending this particular type of facility would require revisiting city policy. Careful attention would need to be given regarding how these pathways interact with intersecting streets.

**Figure 2.9: Example of a boulevard pathway. Interface with intersecting streets requires careful design.**
*Source: bikecalgary.org*

### 2.8.2. *Transportation Master Plan, 2004*

The Transportation Master Plan introduced the City's strategic direction for its transportation system which is meant to make efficient use of existing infrastructure and encourage walking, cycling and transit as priority modes before expanding road

infrastructure (City of Kingston, 2004a). This new strategic direction introduced the concept of "Transportation Demand Management", or TDM. The Transportation Master Plan adopted the pedestrian and cycling network plans from the Cycling and Pathways Study as formal City of Kingston policy.

### 2.8.3. *Zoning By-law amendments, 2005*

Provision of bicycle parking is an integral part of a successful cycling strategy. In 2005, the City introduced amendments to two of the five zoning by-laws, which added bicycle parking requirements to the existing parking regulations and applies to certain zones (City of Kingston, 2005a; City of Kingston, 2005b). New multi-family residential development is required to provide a minimum of one bicycle parking space per unit under the City of Kingston Zoning By-Law (City of Kingston, 1975) and the Downtown and Harbour Zoning By-Law (City of Kingston, 1996). In addition, the Downtown and Harbour Zoning By-Law requires bicycle parking for various commercial land uses, but currently there are no by-law requirements for institutional zones, including the University. The City is presently in the process of updating all five by-laws to include multi-family bicycle parking requirements (Personal Communication, 2013).

### 2.8.4. *Sustainable Kingston Plan, 2010*

The City has envisioned becoming Canada's most sustainable city. The Sustainable Kingston Plan (City of Kingston, 2010a) identifies a number of goals under the four pillars of sustainability: Cultural Vitality, Economic Health, Environmental Responsibility and Social Equity.The goals in the plan that speak directly to AT include:

- Invest strategically in municipal infrastructure and services to ensure that it meets the goals of all pillars, in a balanced manner (EC4).
- Plan, construct and maintain safe, secure, convenient, efficient, and attractive transportation infrastructure to encourage pedestrian, cycling and public transit modes of transportation (EC4).
- Reduce single occupancy and short distance motor vehicle use (EC4).
- Plan residential developments to encourage walking, cycling and public transit and connectivity (EN5).

Interestingly, the goals of Theme SO2: Health and Wellness, do not explicitly mention the role of AT in promoting health. However, several community partners including Kingston Coalition for Active Transportation (KCAT), Yellow Bike Action, Kingston by Bike, Kingston Frontenac Public Library, KFL&A Public Health, and Empire Life Insurance Company have all identified specific AT initiatives under the SO2 Theme.

### 2.8.5. *Parks and Recreation Master Plan, 2010*

The Parks and Recreation Master Plan (City of Kingston, 2010c) supports the implementation of the recreational trail network identified in the Cycling and Pathways Study (2003). The plan acknowledges the role that an interconnected pathways and trail network plays in promoting AT.

### 2.8.6. *Traffic Calming Policy, 2013*

Traffic calming can play an integral role in promoting AT by making streets safer and more comfortable for pedestrians and cyclists.

Earlier this year, the City's engineering department published the Traffic Calming Policy (City of Kingston, 2013d). In the past, traffic calming measures have typically been confined to the use of speed humps and all-way stops. However, this policy offers a variety of more creative solutions which would more likely support AT, such as roundabouts and curb extensions. This document highlights that opportunities to combine traffic calming measures with bicycle facility improvements should be considered. A ranking system for prioritizing projects has also been established, and evaluates proposed projects by considering the following criteria: traffic speeds, traffic volumes, collisions, presence of schools, presence of sidewalks, presence of pedestrian generators, and presence of existing cycling route or cycling traffic volumes.

## 2.9. Ontario Highway Traffic Act Constraints

The provincial Highway Traffic Act (RSO 1990 C.H.8) defines the rights and responsibilities of all road users including pedestrians. At crossings, pedestrians are not afforded substantial right-of-way priority, as is the case in other provinces. At uncontrolled crossings, pedestrians are required to wait for a safe gap in traffic before proceeding. The Ontario Traffic Manual: Book 15 (2010) identifies 6 types of controlled crossings where pedestrians are granted the right-of-way:

- Traffic Control Signals,
- Intersection Pedestrian Signals,
- Pedestrian Crossovers,
- Stop Signs,
- Yield Signs, and
- Designated School Crossings with a Crossing Guard.

The Pedestrian Crossover is the only form in this list that does not involve a stop (or yield) sign or signal. Even in this case, pedestrians are only granted the right of way once they are in the roadway; Section 140 of the Traffic Act does not require drivers to stop for approaching pedestrians (RSO 1990 c.H.8)

**Figure 2.10: School Crossing**
School children are given priority only when a crossing guard is present.
*Photo by James Taylor*


**Figure 2.11: Courtesy Crossing**
Accompanying sign advises pedestrians that they do not have the right of way.
*Photo by James Taylor*

## 2.10. Queen's Policy Context

### 2.10.1. *Campus Master Plan, 2002 and Update (ongoing)*

The 2002 Campus Plan included a number of policy directives for walking and cycling infrastructure on campus. It called for a balance of pedestrian and vehicle needs, and one of the most prominent components of the plan was the redesign of University Avenue south of Union Street. The roadway was narrowed, the sidewalks widened, and pedestrian-paving character was installed, as directed in the Plan (Queen's University, 2002, p. 71). The pedestrian and cycling policies from the 2002 Campus Plan focused almost exclusively on the geographic extent of the Main Campus.

The goal of the current Campus Master Plan update is to "establish a vision and framework to guide how the University will physically change over the next 10 to 15 years to accommodate Queen's evolving programs and activities" (Queen's CMP, n.d.). In regards to transportation, the Plan is looking to expand the scope by studying the connections between the University's various land holdings, including West Campus, Innovation Park, and the Isabel Bader Centre. To date, the process has specifically identified four important routes: Union Street, King Street, University Avenue and Sir John A MacDonald Boulevard (Queen's University, May 23, 2013).

### 2.10.2. *SURP Great Streets for Kingston Report, 2012*

The 2012 Great Streets for Kingston Report from the Queen's School of Urban and Regional Planning provided a number of design guidelines based on street typology in Kingston. It combined the concepts of Complete Streets and Green Streets to create a "toolkit for policy makers" (Queen's University, 2012, p. vi) in designing streets for all road users in an environmentally sustainable manner. Related to this, the City has proceeded with hiring a consulting firm to develop right-of-way cross sections based on the principles of Complete Streets (City of Kingston, December 2012).

## 2.11. Current Projects And Recent Achievements

As part of its 2011-2014 multi-year capital budget, the City allocated $8.01 million for AT (primarily bike lanes and sidewalks) and related improvements (traffic calming, bus shelters, bike parking and recreational pathways and trails). This represents approximately 6% of the total four-year capital budget (City of Kingston, 2011). Twenty-one bikeway projects were approved in this budget, which are being built between 2011 and 2014 (City of Kingston, 2013b). Some of these projects have been completed; a recent and notable example is the stretch of University Avenue between Union Street and Brock Street. In total, the bikeway projects cover approximately 33 kilometres of roadway.

A number of new and reconstructed sidewalks, and street furniture installations were also approved under this budget. The recent reconstruction of a section of Princess Street made significant pedestrian infrastructure improvements, including street furniture and high quality surfacing. This project is a perfect local example of how to build streets prioritizing pedestrians - a concept that should be replicated on other streets with heavy pedestrian traffic around the university campus.

The bikeway projects presently being constructed are relatively basic, consisting primarily of painted bike lanes, and there are no plans to construct physically separated bikeways or bike boulevards. Network plans from the Cycling and Pathways Study (City of Kingston, 2003), are now a decade old and require updating. A number of high-quality pedestrian improvements have demonstrated what progress can be made in Kingston, and these designs need to be replicated throughout the network. Recent local policy documents such the Traffic Calming Policy (City of Kingston, 2013d) and studies such as the Great Streets project have laid the groundwork for a new round of more advanced AT projects in the coming years that can deliver high quality, safe and preferred routes to Queen's.

# WHERE DO WE WANT TO GO?

# 3

# BEST PRACTICE PRECEDENTS

A review of applicable best practices informed the recommendation of appropriate strategies for active transportation (AT) at Queen's University. The precedent case studies chosen include five Canadian locations and five international ones. They were selected because they exhibit campus and citywide AT strategies and are comparable to Queen's University and Kingston. Specifically, all cases focus on a university with relatively similar enrolment numbers to Queen's University, which had 20,264 full-time and 1,421 part-time students in 2012 (Queen's University, 2012). In addition, each campus is situated within the urban fabric in medium-sized cities that are comparable to Kingston (population 123,363 [Statistics Canada, 2012]). This review of relevant precedents and best practices will draw out common elements and viable solutions that can be used to provide recommendations for applications at Queen's University and the broader Kingston setting.

Canadian Precedents:

1. Dalhousie University – Halifax, Nova Scotia
2. University of Guelph - Guelph, Ontario
3. McMaster University – Hamilton, Ontario
4. University of Waterloo – Waterloo, Ontario
5. Western University – London, Ontario

International Precedents:

1. Boise State University – Boise, Idaho
2. University of Cambridge – Cambridge, England
3. Colorado State University – Fort Collins, Colorado
4. Cornell University – Ithaca, New York
5. University of Wisconsin – Madison, Wisconsin

## 3.1. Best Practice Summary

Highlights of best practices for promoting walking, cycling, and multi-modal transportation that were gained form a review of applicable precedents are summarized below.

### 3.1.1. *Walking*

To promote walking as a mean of commuting, many universities used walking route maps. These indicate distances and travel times to major destinations around a campus, and are used to orient pedestrians and provide them with essential commuting information. Moreover, several universities also established pedestrian priority areas on campus, such as designated pedestrian streets or car free zones, to encourage walking by enhancing pedestrian safety. Pedestrian activated crossings are also used to make it easier and safer for pedestrians to get from one place to another.

**Lessons for Queen's University and Kingston**

- **Pedestrian priority areas on campus**
- **Pedestrian-scale streets and car-free zones**
- **Walking route maps with distances and times**
- **Pedestrian activated crossings**
- **Walking route networks**

**Figure 3.1:**
**Marked Mid-block Crosswalk, Cornell University**

### 3.1.2. *Cycling*

Most of the precedents have incorporated a bike centre on campus to provide repair stations, maintenance services, and tools to the university community. Many campuses also have well connected bicycle routes and extensive cycling infrastructure, such as bike boxes, clearly marked symbols, and separated lanes. In addition, comprehensive end-of-trip facilities are also present, such as bike racks, lockers, cages, and shower facilities. Similarly, the ten precedents all have various types of bike rental or bike share programs. A few universities have adopted a bike registration system for more systematic bicycle regulation and enforcement on campus. These registration programs are either voluntary or mandatory for AT users. Some universities also have a bicycle advisory committee to provide recommendations pertaining to the development of bikeways and their associated facilities.

**Lessons for Queen's University and Kingston**

- **Comprehensive cycling supports, including ample end-of-trip facilities**
- **Extensive cycling infrastructure**
- **Enhanced lane markings and signage**
- **Bike rental program on campus**
- **Campus bike centre for repair, maintenance, education, and loans**
- **Cycle-friendly routes and facilities**
- **Bike registration system**
- **Bike share system**
- **Secure bike storage**
- **Bicycle regulation and enforcement**

- **Bicycle advisory committee**
- **Cycling route networks**

**Figure 3.2: Bike Box, Western University**

### 3.1.3. *Multi-modal*

Many of the case studies have introduced discounted student transit passes, or included the cost of a transit pass in tuition. A few have collaborated with their local government for discounted employee bus passes. Many of our precedents have also adopted some sort of flexible parking permit system to provide employees with financial incentives to take alternative modes of transportation. These include a monthly parking pass that only charges for the days that employees actually drive to campus, and programs that offer employees partially- or fully-subsidized public transit passes if they are willing to relinquish their parking permits. In addition, Park and Ride/Bike/Walk use is encouraged through the installation of bike racks on public transit buses, the allocation of free vehicle parking lots near bus stops, and secure bike storage that allows employees to drive for a certain distance and then take public transit, shuttle buses, bike, or walk to work.

**Lessons for Queen's University and Kingston**

- **Flexible parking program**
- **Use of existing City resources**
- **Discounted bus pass for students and employees**
- **Commuter Challenge Event for employees**
- **Public transit system with year-round bike racks and storage**
- **Guaranteed Ride Home Program**
- **Interactive mapping tools**
- **Park and Ride / Park and Bike / Park and Walk infrastructure**
- **Real-time transit information**
- **Employee AT incentive programs**

**Figure 3.3:**
**Indoor Bike Storage at a Bus Station, University of Wisconsin**

## 3.2. Precedent Examples

### 3.2.1. *Dalhousie University*

**Enrolment (2011):** 18,220
**Location:** Halifax, Nova Scotia
**Population (2011):** 390,096

#### Context

Halifax is the capital city of Nova Scotia. Dalhousie operates three campuses in Halifax, with the primary and secondary campuses located southwest of downtown Halifax, largely surrounded by residential neighbourhoods, and a third campus situated within the downtown core.

#### Cycling Best Practices

There are three major programs at Dalhousie that help to increase the number of cyclists on campus, including the Campus Bike Centre, the Bike Rack Program, and the Bike Loan Program. Similar to the bike shops on other university campuses, the Campus Bike Centre offers opportunities for students and employees to learn about, maintain, and fix their bicycles. Under the Bike Rack Program, there are over 900 bike parking spots located throughout Dalhousie campuses. They can be identified on the campus map and in the Bike Rack Report. In addition, all new buildings will include end-of-trip facilities, such as indoor/outdoor bike racks and showers. Furthermore, Dalhousie offers bike loans to students and employees on all campuses, which allows students and employees affiliated with the University to borrow a bike and helmet easily with a university identification card.

#### Multi-modal Best Practices

Dalhousie has partnered with the Halifax Regional Municipality (HRM) SmartTrip to launch Epass/Linkpass, a reduced-cost pilot Metro Transit bus pass program, to all permanent full-time, part-time, and associate employees at Dalhousie. During the academic year, Dalhousie also offers a free shuttle bus service to students, faculty and staff.

*Guaranteed Ride Home Program*

Dalhousie has a Guaranteed Ride Home program, which offers employees who commute to work at least three times a week by foot, bike, transit, carpool, or vanpool up to five free taxi rides per year in the event of a personal emergency.

**LESSONS FOR QUEEN'S AND KINGSTON**

- **Campus Bike Centre (education and maintenance)**
- **Bike Rack Program**
- **Bike Loan Program**
- **End-of-trip facilities in new buildings**
- **Employee bus passes**
- **Guaranteed Ride Home Program**


**Figure 3.4: Bicycle Facility Map, Dalhousie University**

### 3.2.2 *University of Guelph*

**Enrolment (2011):** 20,461
**Location:** Guelph, Ontario
**Population (2011):** 121,668

#### Context

Guelph is located in southwestern Ontario, 100 kilometres from downtown Toronto. As shown on the map to the right, the main campus of the University of Guelph is situated in the southeast part of the city, adjacent to the downtown.

#### Walking Best Practices

A series of trail maps produced by the City of Guelph allows one to identify preferred walking routes to campus and make for a more enjoyable walk-to-work experience.

#### Cycling Best Practices

The main bike learning resource at the University of Guelph is the Central Student Association (CSA) Bike Centre, which provides workshops, training, tools, and equipment for cycling and repairs. There are also four bicycle repair stations on campus, which are designed to allow cyclists to suspend their bicycles in the air and make small repairs, such as changing a flat tire, adjusting gears and brakes, or greasing a chain. Moreover, the University has been promoting programs and local resources pertaining to cycling, including the City of Guelph's ReCycle Bike Reuse Program, which encourages Guelph residents to drop off their unwanted but usable bikes for others to use free of charge. In addition, the City of Guelph has produced bicycle lane maps, which are available to cyclists to plan for their trips to and from campus.

#### Multi-modal Best Practices

The CSA subsidizes bus passes for all undergraduate students, which provide unlimited access to Guelph Transit services and are included in the tuition fees. The University and the City also partner in offering a discounted monthly pass to all University employees.

The Annual Commuter Challenge Event is held at the University of Guelph during June to encourage University employees to walk, bike, bus, or carpool to work in an effort to reduce the number of single occupant vehicles driven to campus.

**LESSONS FOR QUEEN'S AND KINGSTON**

- **Use existing City resources**
- **Central Student Association Bike Centre**
- **Discounted bus pass for students and employees**
- **Commuter Challenge Event for employees**


**Figure 3.5: CSA Bike Centre, Guelph University**

### *3.2.3. McMaster University*

**Enrolment:** 25,456 (full-time)
**Location:** Hamilton, ON
**Population (2011):** 519,949

**Context**

McMaster University is located in Hamilton Ontario, which is an industrial city at the west end of Lake Ontario. The campus is situated within an urban context. It is flanked by established residential neighbourhoods and also borders a large natural marshland.

**Walking Best Practices**

To encourage walking, a custom map with routes, walking times and distances to the areas in and around campus is provided. As well, most of the campus is car-free, with a large central spine road specifically designated as a pedestrian priority area. This mode is further supported by the Student Walk Home Attendant Team, which volunteers to walk students home from campus in the evenings.

**Cycling Best Practices**

University students and employees take advantage of the network of bike routes and paths in the city, including the multi-use Waterfront Trail and maintained bike lanes, which provide convenient access to campus destinations. The city provides detailed maps of the cycling routes and facilities, which indicate where there are trails, paved paths, bike lanes, and signed on-street bike routes. On campus, there is a non-profit cycle repair shop, which provides repairs and advice, and allows students to do their own repairs with used parts. The university has also recently increased the number of secure bike racks available, which totals over 1900 parking spaces, and the placement of these has been aligned with campus bikeways and sites where demand is high for bicycle parking. Bike lockers and secure storage facilities are also available, and a map of bike rack locations is provided to indicate bicycle-parking options. Lockers and showers are located on campus to enhance the commuting experience for cyclists.

**Multi-modal Best Practices**

The University has developed a monthly flex pass for car parking, which only charges drivers for the days of the month that they drive, and thus, provides a financial incentive for them to take public transit or other modes of AT.

**LESSONS FOR QUEEN'S AND KINGSTON**

- **Pedestrian Priority Areas on Campus**
- **Walking route map with distances and times**
- **Comprehensive cycling supports including bike repair shop and ample end-of-trip facilities**
- **Flexible car parking pass to encourage A.T.**


**Figure 3.6: Flex Pass Program, McMaster University**

### 3.2.4. *University of Waterloo*

**Enrolment:** 31,600 (full-time)
**Location:** Waterloo, Ontario
**Population (2011):** 98,780

#### Context

The University of Waterloo is located in Waterloo, Ontario. The campus is embedded within the urban area and is surrounded by residential neighbourhoods on three sides. The campus also borders the Laurel Creek Conservation Area.

#### Walking Best Practices

There are several paved, multi-use trails that run throughout the city and provide a pleasant and direct route for travelling to campus. Walking maps are provided as well for pedestrians to navigate the city, and there are also plans for an increase in pedestrian refuge islands at crossings throughout the city.

#### Cycling Best Practices

The City of Waterloo provides a bicycle map that highlights an extensive network of bicycle routes and facilities. These include on-street routes, trails, and winter-maintained routes. The City also has a 'Blue W' program, which allows those using AT modes to fill up their water bottles at sites where the Blue W is present. A map of these sites is provided online. A recent Active Transportation Program will see an increase in bike racks and lockers within the city, and an increase and enhancement of major cycling routes to destinations such as the University's campus.

The University of Waterloo is also supportive of cycling. A Bike Centre is situated on campus, and for a small fee, students and employees can use the tools and supplies that are provided to carry out maintenance on their bicycles. The University also has a Yellow Bike Program to encourage bicycling as a mode of commuting around the city. After paying their fee each term, students can borrow a bicycle from the campus, provided that the bicycle is returned to campus every 24 hours.

#### Multi-modal Best Practices

To encourage the use of the Grand River Transit bus system, the tuition fees for full-time students at the University of Waterloo include a bus pass that allows for an unlimited number of trips. The buses are equipped with bike racks, and specific stations have bike lockers that can be rented for a three-month term.

**LESSONS FOR QUEEN'S AND KINGSTON**

- **Designated walking trails and route maps**
- **Cycle-friendly routes and facilities**
- **Campus Bike Centre for repair, maintenance and loans**
- **Student bus pass provided with tuition**
- **Public transit system with bike racks and storage**

**Figure 3.7: Public Transit Buses with Bike Racks, University of Waterloo**

### 3.2.5. *Western University*

**Enrolment:** 27,525 (full-time)
**Location:** London, ON
**Population (2011):** 366,151

#### Context

Western University is located in London, Ontario. The campus is surrounded by residential areas, and is not far from central London. The Thames River runs along the majority of the campus and bisects a portion of it.

#### Walking Best Practices

To complement the pedestrian network that contains pedestrian crossings and maintained walkways, the City of London provides a walking route map that can be used to assist individuals walking to and from campus. On campus, there is a pedestrian pathway system that provides safe and convenient access between all destinations. This includes the use of pedestrian-activated flashing lights at busy intersections.

#### Cycling Best Practices

Cycling in London is accommodated through the use of shared on-road signed bicycle routes, multi-use pathways, in-boulevard bicycle paths, and pedestrian and bicycle-only routes, which extend into the university campus. The city has also recently implemented bike boxes, which are brightly painted at controlled intersections. These provide a space for cyclists to ride up in front of cars that are stopped at a red light and assist the cyclists in making a left turn. They also increase the visibility of cyclists and prevent motorists from making right turns in front of approaching cyclists. Western University is home to the non-profit Purple Bikes program, which offers workshops and bikes that can be rented for a day, week, or month. This acts as an affordable means for individuals cycling to and from campus. In addition to this, the campus provides bike racks and a number of bike lockers that can be rented for the semester, eight months or the entire year.

#### Multi-modal Best Practices

The London bus system provides routes to take students and employees to campus. The buses are equipped with bike racks to support intermodal trips. Full-time students are part of the universal bus pass program that provides unlimited bus transportation.

**LESSONS FOR QUEEN'S AND KINGSTON**

- **Pedestrian-activated crossings on campus**
- **Extensive cycling infrastructure including bike boxes**
- **Bike rental program on campus**
- **Student transit pass for unlimited trips**


**Figure 3.8: Bike Rental Program, Western University**

### 3.2.6. *Boise State University*

**Enrolment:** 13,590 (full-time)
**Location:** Boise, Idaho - USA
**Population (2013):** 212,303

#### Context

Boise State University is located in the mid-sized city of Boise, Idaho, which is the state's capital and largest city. The university campus is embedded within the city's urban fabric and is just south of the downtown. The campus has generally flat terrain and is bordered by the Boise River.

#### Walking Best Practices

Walkers can take advantage of the extensive trail systems that connect to campus, as well as the wide, well-maintained sidewalks and pathways that extend through campus. The City of Boise has an alternative transportation program for municipal employees, which includes 40 dollars per year towards walking shoes for individuals who walk to and from work more than 60 percent of the time between April and October.

#### Cycling Best Practices

The city has a large urban network of cycling paths that connect to the university and are utilized heavily by students and employees. Part of this network includes the long, paved, grade-separated Boise River Greenbelt trail that runs on both sides of the river and along the campus. A map of cycling routes indicates trails, dedicated cycling lanes, and bicycle friendly roads that students and employees can use to commute to and from campus. In addition to this, several routes for reaching campus are provided, through maps and narratives, which are designed and tested by university employees who frequently commute by bicycle. These include departure points, suggested departure times and estimated times to specific points along the routes. The campus also provides repair facilities, parts and accessories, bike rentals, free compressed air, education, showers, and ample bicycle parking. Over 1000 bike rack spaces, as well as caged bike lock areas, are detailed on the bicycle-parking map.

#### Multi-modal Best Practices

There are several public transit bus routes that connect to the university campus. These routes include park-and-ride facilities to reduce reliance on the private automobile. All buses are equipped with bike racks to facilitate cycling as a viable option for more individuals to commute to campus. In addition, Boise also has a Guaranteed Ride Home Program that allows registered individuals to reimburse taxi costs for valid emergency rides.

**LESSONS FOR QUEEN'S AND KINGSTON**

- **Networks for walking and cycling**
- **Comprehensive cycling supports, including education and end-of-trip facilities**
- **Guaranteed Ride Home Program**


**Figure 3.9:**
**Emergency Ride Home in a Taxi, Boise State University**

### 3.2.7. *University of Cambridge*

**Enrolment:** 18,187 (full-time)
**Location:** Cambridge, England
**Population (2011):** 123,867

#### Context

The University of Cambridge is located in the city of Cambridge, England. It is composed of several colleges, which occupy multiple sites throughout the city's compact urban fabric. Many of the older colleges are situated nearby the city centre, residential neighbourhoods and the River Cam.

#### Walking Best Practices

Cambridge has a resource called Walkit that provides maps with walking directions and the most efficient routes for getting to destinations around town and the university campus. Additional information regarding calories burned and carbon emissions saved is provided for the routes. The pedestrian scale of the historic urban fabric in Cambridge supports walking, as do the many car-free areas in the central city.

#### Cycling Best Practices

Cambridge provides a number of maps that detail designated and recommended cycling routes for the quickest and most pleasant commuting through Cambridge. These routes contain signed on-road routes, on-road cycling lanes, and pathways. The University has a Cycle to Work Scheme that supports bicycle and safety equipment leases to University employees. This is achieved through a 'salary sacrifice' so that the employees receive income tax savings on the retail price of the specific bicycle and equipment package that they choose. Local bike shops that are participating in the scheme supply the equipment that the faculty and staff members choose from. Safety and bicycle training programs are also provided on campus to encourage the use of cycling as a mode of commuting. To further this goal, the University has a Park and Cycle facility for employees that allows them to park a car at the designated site, pick up their bike and other equipment from a designated locker, and use their bike to commute around the city centre. There is a minimal one-time fee associated with this program.

#### Multi-modal Best Practices

A Park and Ride service is available for individuals who park outside of the central city and take the bus into the core where there is limited parking. Commuters can also access real-time information on bus departure and arrival times. Furthermore, there is a subsidized shuttle service for University members to reach various campus destinations.

**LESSONS FOR QUEEN'S AND KINGSTON**

- **Pedestrian-scale streets and car-free zones**
- **Cycle to Work income tax savings scheme**
- **Park and Cycle facility**
- **Park and Ride and real-time bus information**

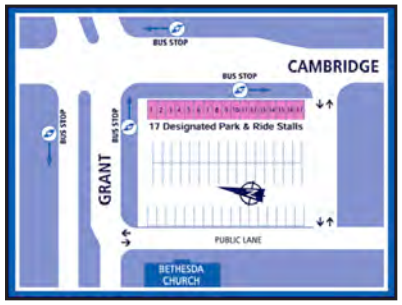



**Figure 3.10:**
**Designated Park and Rides Stalls University of Cambridge**

### 3.2.8. *Colorado State University*

**Enrolment (2012):** 30,650
**Location:** Fort Collins, Colorado - USA
**Population (2012):** 148,612

#### Context

Fort Collins is located in northern Colorado at the western edge of the Great Plains and at the base of the Rocky Mountains. The main campus of Colorado State University is situated in central Fort Collins, within walking distance to the downtown area.

#### Walking Best Practices

Many scenic trails accessible throughout Fort Collins lead to the University's campus from most locations in town. The trails are maintained year round by the City and snow is removed from the trails during winter months. A trail map is available from the City of Fort Collins. In addition, the campus SafeWalk program offers walk-home support to destinations on or near campus to address the safety concerns of pedestrians.

#### Cycling Best Practices

Colorado State University has received a Silver Award in the League of American Bicyclists' Bicycle Friendly University program. Studies show that there are more than 15,000 bikes on campus at Colorado State University per day. Since cycling is one of the most popular modes of transportation on campus, the University has a comprehensive management system for bicycles. All bicycles ridden or parked on the campus must be registered with the campus police department. Individuals who ride a bicycle on campus must also abide by the Safe Cycling Bicycle Regulations, which are enforced by the campus police. In addition, the Campus Community Bicycle Advisory Committee was established in 2008 to offer support and guidance, as well as technical and planning assistance to enhance the bicycling experience for the Colorado State University community.

#### Multi-modal Best Practices

Fort Collins' local "Transfort" bus service offers a multitude of stops close to student living areas and keeps schedules that complement Colorado State University's class schedules. The bus service is free for all full-time students with a valid student card.

**LESSONS FOR QUEEN'S AND KINGSTON**

- **Trail maps from the City of Fort Collins**
- **Bike registration system**
- **Bicycle regulation and enforcement**
- **Bicycle Advisory Committee**

**Figure 3.11: Numerous Bike Racks, Colorado State University**

### 3.2.9. *Cornell University*

**Enrolment (2011):** 22,400
**Location:** Ithaca, New York - USA
**Population (2012):** 101, 564 (Metro)

#### Context

Ithaca is located in southern New York State and is considered one of the best college towns in the United States. As shown on the map to the right, Cornell University, the Ivy League Institution, has a strong presence in the small city, with an active downtown and historic districts nearby.

#### Walking Best Practices

A Wellness Walking Map is available, which identifies the five best loops for walking or jogging around campus.

#### Cycling Best Practices

Transportation Services of Cornell University has implemented several programs to promote cycling as a preferred mode of transportation. All Cornell community members riding a bicycle on campus must register the bicycle with Commuter and Parking Services in order to track the number of bikes on campus and justify the improvements to roadways and bicycle facilities. To make the campus safer, Cornell has also implemented a system of marked bike lanes (white), pedestrian-shared paths (yellow), and dismount zones (red), which are indicated on the Campus Bike Map. Furthermore, Big Red Bike is a student-run, non-profit organization that provides a bike share service to the Cornell community. Students and University employees can easily borrow a bike with their Cornell ID. In addition, the Cornell Outdoor Education Program offers workshops and educational courses for cyclists.

#### Multi-modal Best Practices

Cornell employees and students can access their bus riding privileges with their photo ID card on all Tompkins Consolidated Area Transit (TCAT) buses. In addition, Cornell has been able to offer the OmniRide Commute Option to employees who are willing to relinquish their parking permits. The OmniRide Commute Option allows Cornell employees unlimited access to the TCAT buses along with three free books of ten one-day parking permits per year, in case they occasionally need to bring a car to campus.

**LESSONS FOR QUEEN'S AND KINGSTON**

- **Wellness Walking Map of campus area**
- **Bike registration system**
- **A marking system for lanes with different purposes**
- **A student run bike share system**
- **OmniRide Commute Option**
- **Guaranteed Ride Home Program**

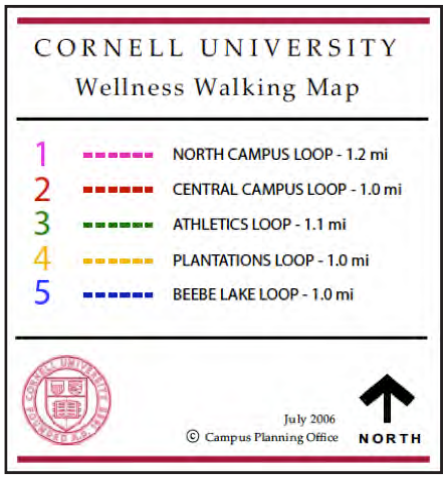



**Figure 3.12:**
**Wellness Walking Map**
**Cornell University**

### 3.2.10. *University of Wisconsin*

**Enrolment:** 42,820
**Location:** Madison, Wisconsin -USA
**Population (2012):** 240,323

#### Context

Madison is located in south central Wisconsin. As shown on the map to the right, the University of Wisconsin spreads out along Lake Mendota to the north of the city, encompassing wooded hills, an attractive shoreline, and lively city streets.

#### Walking Best Practices

The University of Wisconsin offers a strong network of pedestrian routes, and is continuously adding new connections. It provides an interactive campus-mapping tool that allows pedestrians to identify routes and measure distances. In addition, the SAFEwalk program provides walking escorts throughout the campus by students in teams of two. They are also responsible for watching for suspicious situations around campus and answering transportation/safety-related questions.

#### Cycling Best Practices

Situated in one of America's most bicycle-friendly cities, the University of Wisconsin has many programs dedicated to improving the environment for cyclists on campus. The University Bicycle Resource Center provides free tool use and supplies for bicycle repairs, and holds monthly events for cyclists on campus to meet. The University of Wisconsin employees and students are eligible to rent a bike locker or cage to protect their bikes from weather, theft, and vandalism. They can join the City's Madison B-cycle Bicycle Sharing program for $20 per year, which includes an unlimited number of trips of 30 minutes or less. In addition, the University of Wisconsin Transportation Services provides a limited number of recycled bicycles for use by various departments.

#### Multi-modal Best Practices

The University of Wisconsin encourages Park and Ride/Park and Bike/ Park and Walk by allocating free vehicle parking lots and secure indoor bike storages to allow employees to drive and then take public transit, shuttle buses, bike or walk to campus.

The University of Wisconsin has a Bicycle/Pedestrian Subcommittee to advise the Campus Transportation Committee on policies pertaining to the development of pedestrian- and bicycle-ways and their associated facilities.

**LESSONS FOR QUEEN'S AND KINGSTON**

- **Interactive campus mapping tool**
- **University Bicycle Resource Center**
- **Bike lockers/cages**
- **Well-connected pedestrian and bicycle routes on campus**
- **Park and Ride/ Park and Bike/ Park and Walk**

**Figure 3.13:**
**Bike Lockers**
**University of Wisconsin**

# 4

# PRIMARY RESEARCH FINDINGS

## 4.1. Interviews

In order to better understand existing conditions and to obtain expert opinions on opportunities for action, ten interviews were conducted with key stakeholders familiar with AT at Queen's University. The key stakeholders included: three City of Kingston employees from departments such as Transportation, Engineering, and Planning; five Queen's University employees from departments including planning, parking, administration, and student services; and two Alma Mater Society (AMS) student groups. Each interviewee was asked questions pertaining to their area of expertise, as well as general questions regarding opportunities and challenges for AT around Queen's University. **Some common themes identified in the interviews included a shortage of bicycle parking, a lack of dedicated bicycle lanes, inadequate snow removal, issues with vehicle parking, lack of subsidized bus passes for employees, and desired changes to provincial policies.**

This interview data produced valuable information about AT challenges and successes at Queen's and in Kingston. Interviews clarified that, given the distribution of student and employee residences, the AT strategy would need to address a complex two-pronged issue. As seen on the maps produced from our background research (Figures 2.4), university employees tend to live farther distances from the university, and thus, have a longer commute. Research also shows that they are more likely to have regular access to a private vehicle, and can afford the necessary expenses of driving. For this portion of the population, AT is a less likely option, and interviewees emphasized that the strategy must address how to increase the

number of people who choose to actively commute. In contrast, our interviewees indicated that students are more likely to live closer to the University and are less likely to have access to or the ability to afford a private vehicle or related amenities. Thus, students are more likely to use some form of AT on their commute to the University. The strategy must therefore also address how to make the active commute for those existing AT users safer, more convenient, and more enjoyable.

## 4.2. Workshop

A workshop, 23 participants which included AT experts, AT users, and University and City employees, provided input and feedback for the project. The workshop was divided into two sessions: an Analysis Round and an Action Round. The Analysis Round involved a rotation of participant groups through three stations. Following the Analysis Round was the Action Round. Participants were given the chance to discuss what might be the most appropriate strategies for AT at Queen's University, and how to implement them.

### 4.2.1. *Analysis Round Findings*

The SWOT (Strengths, Weaknesses, Opportunities, and Threats) Analysis exercise asked workshop participants to identify the strengths, weaknesses, opportunities, and threats (or challenges) that can be associated with active commuting to and from Queen's University. Several strong themes emerged from the discussions, based on how the groups categorized various aspects of the AT context at Queen's University and in Kingston.

***Strengths***

- Critical mass of commuters living around the University
- University's location and connectivity of surrounding area
- Recent improvements to AT infrastructure in the area

***Weaknesses***

- Unsafe traffic conditions
- Winter conditions
- Condition and lack of infrastructure
- Lack of end-of-trip facilities

***Opportunities***

- Chance to build on existing strengths
- Expansion of partnerships and collaborations
- Chance to influence growth and change

***Threats***

- Entrenched car-oriented mindset of some commuters
- Inflexibility of existing regulations and policies

Participants were also asked to review our selection of best practices from other universities in Canada and abroad. These approaches, which can be separated into nine categories, were presented at a workshop for discussion and analysis. Participants were asked about examples of specific approaches, contextual suitability, and efficacy of best practices within each category. Participants identified a number of practices that would be ideal for the context of Queen's University and would greatly improve AT. These included:

- improved pedestrian pathway design,
- walking and cycling maps,
- more park and ride facilities,
- implementation of a bike share or bike rental program,
- improved cycling pathway design,
- more and better end-of-trip facilities,
- a bicycle registration program,
- flexible parking and transit pass systems, and
- a guaranteed ride home program.

At the final station, participants were asked to fill out individual map sheets where they could identify their own preferred routes and areas of concern. The maps sheets also provided participants with space to add commentary. The majority of participants are regular commuters to Queen's, or are experts in the field of transportation and knowledgeable about Kingston AT issues; therefore these maps provide an indication of users' personal experiences of the small study area road network. Participants' individual maps were combined to create four maps, highlighting preferred routes and hazards for cycling and walking. Greater line thickness and dot size represent routes and intersections that were more commonly marked by participants. There maps are shown in Figures 4.1 to 4.4.

#### 4.2.2. *Action Round Findings*

The second round of discussions at the workshop, the Action Round, was aimed at facilitating discussions on how to implement the most appropriate strategies for AT at Queen's University. Participants touched on many of the topics and concerns identified at previous workshop stations, and began to formulate ways in which the University could move forward with AT initiatives. Much of the discussion revolved around the need to remove barriers and threats to AT, and to approach the promotion of AT in a way that recognizes the differing needs of cyclists, pedestrians, and multi-modal users, as well as those who live farther or closer to the University. All groups identified partnerships and increased internal and external communication as a means to ensure successful implementation.

The workshop corroborated many of the findings identified in the precedents, interviews, and background research. Findings showed interesting smaller-scale trends, but also elucidated some broader, overarching themes. **Notably, participants showed the greatest interest in two categories of AT promotion, which were cycling initiatives and infrastructure improvements, and were most interested in cycling infrastructure. Participants saw these categories, and particularly the improvement of cycling infrastructure, as the biggest challenge and gap in the current AT context.**

**Figure 4.1: Cycling Routes Composite Map**

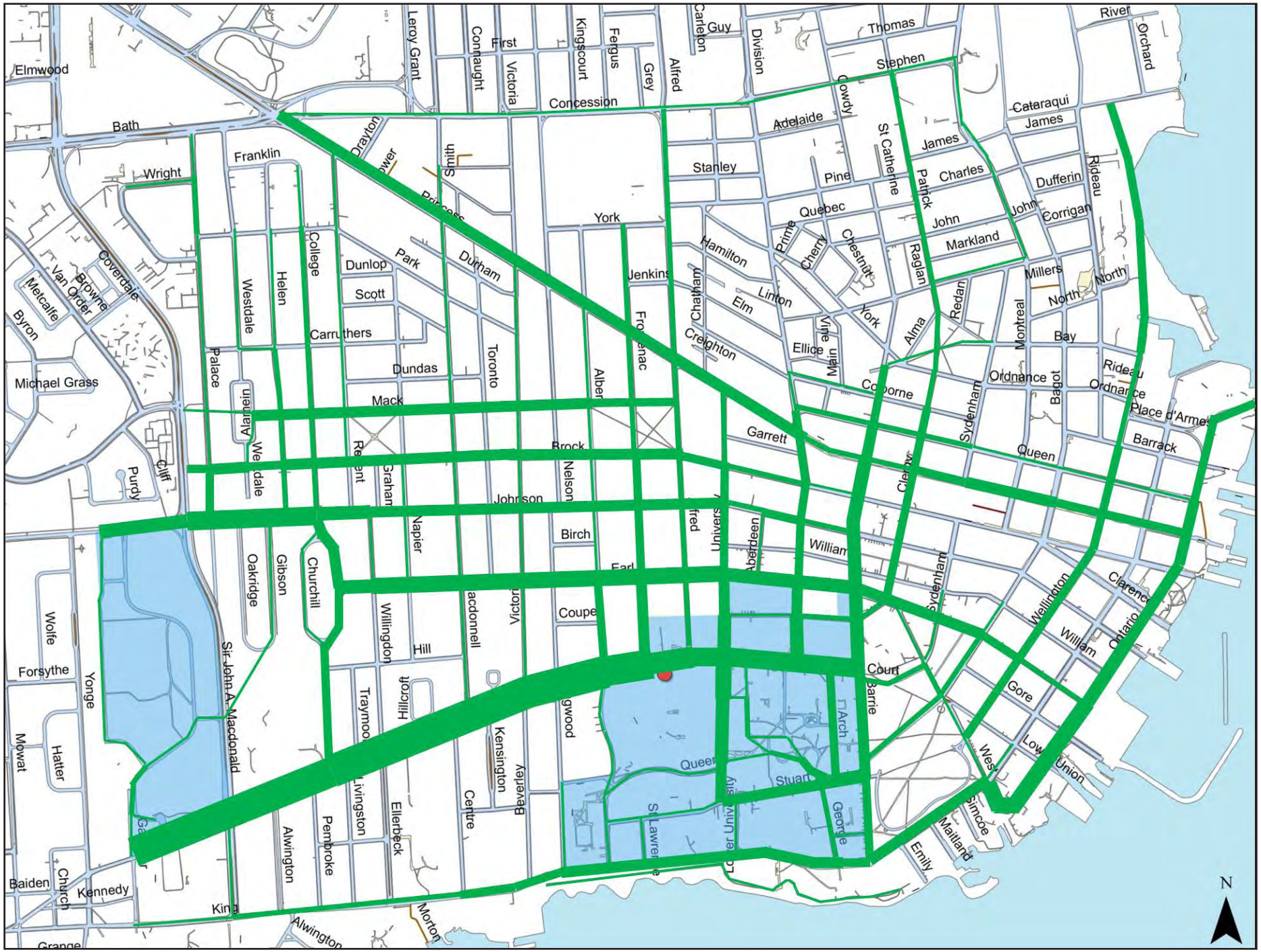


**Figure 4.2: Pedestrian Routes Composite Map**

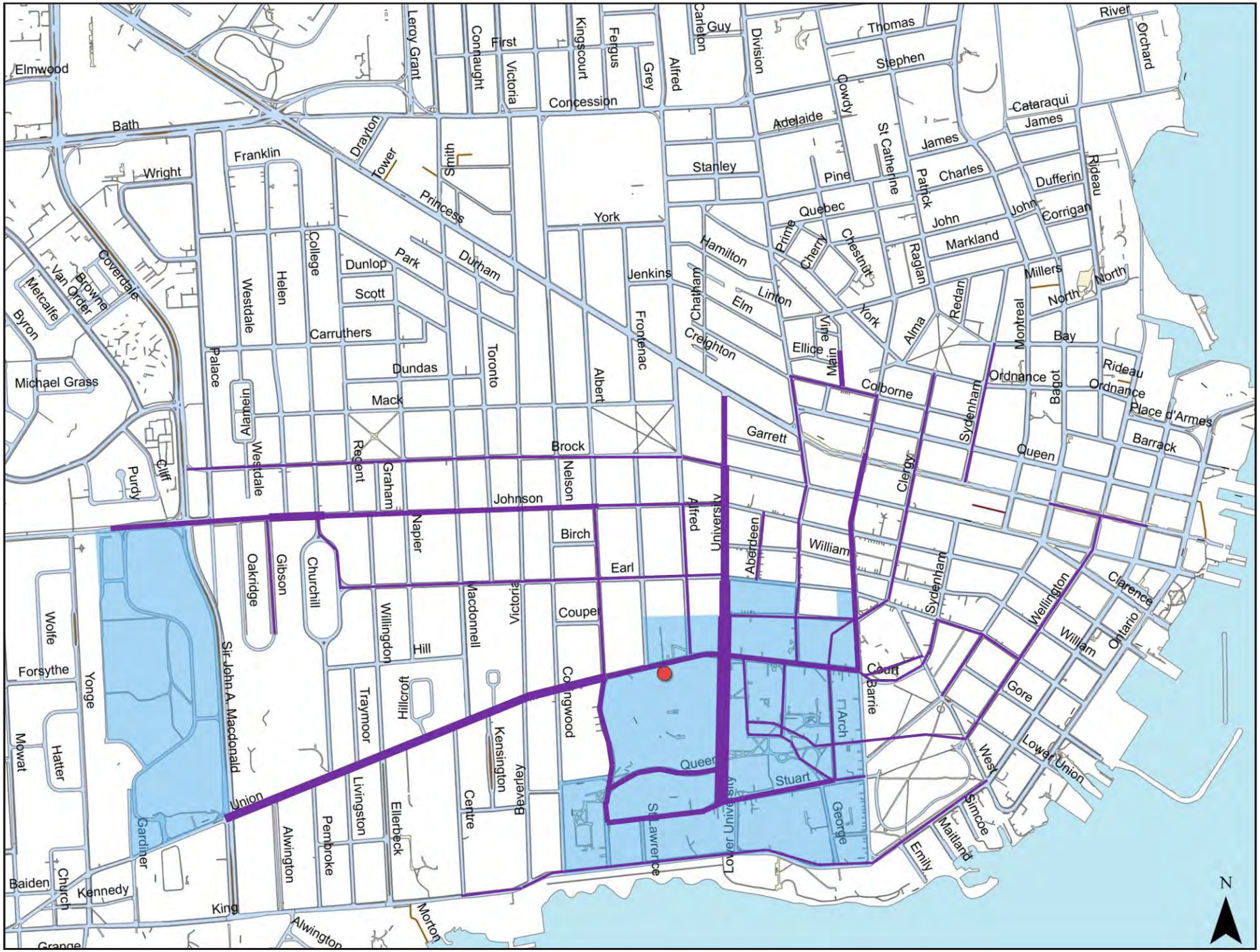


**Figure 4.3: Hazardous Routes Composite Map**

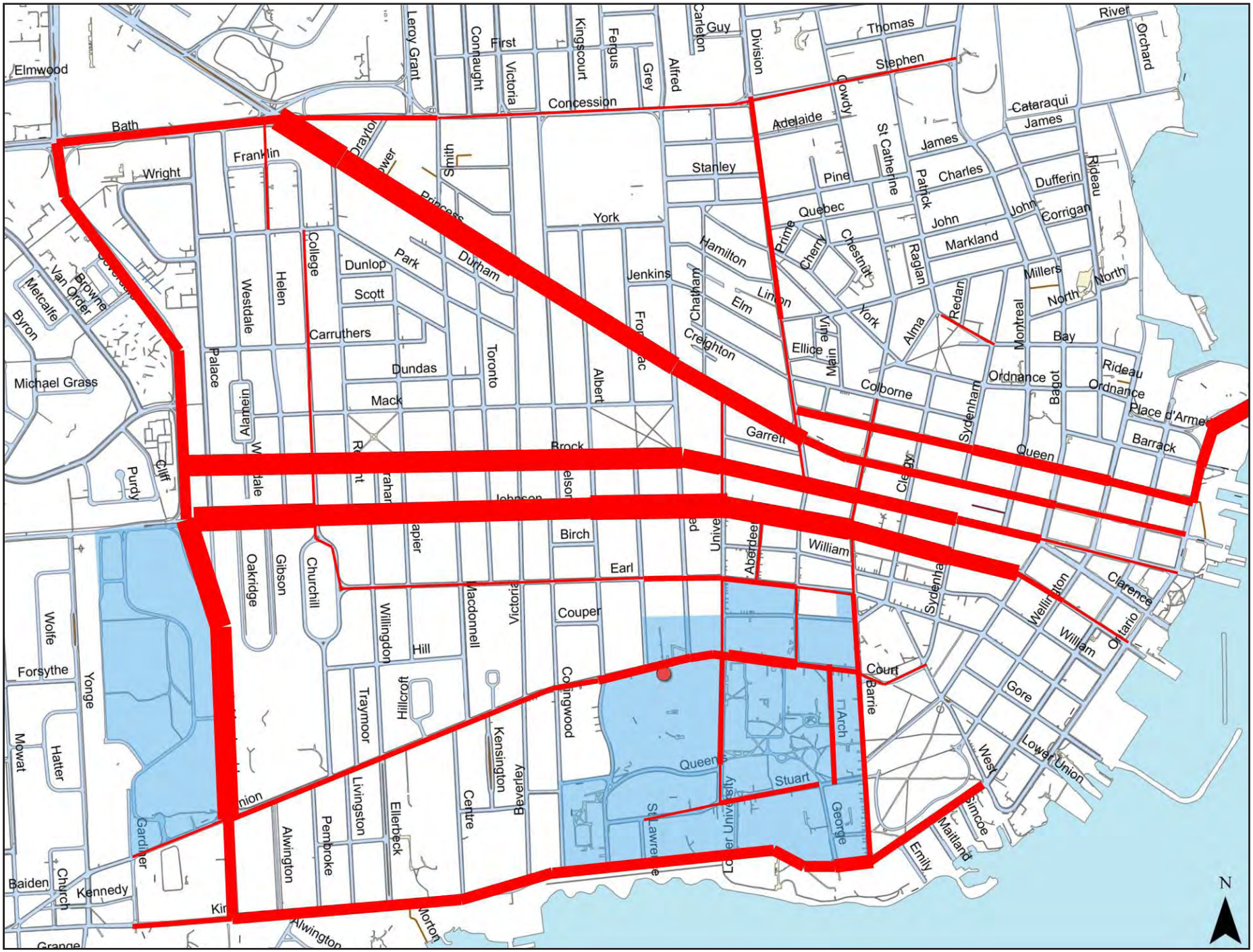
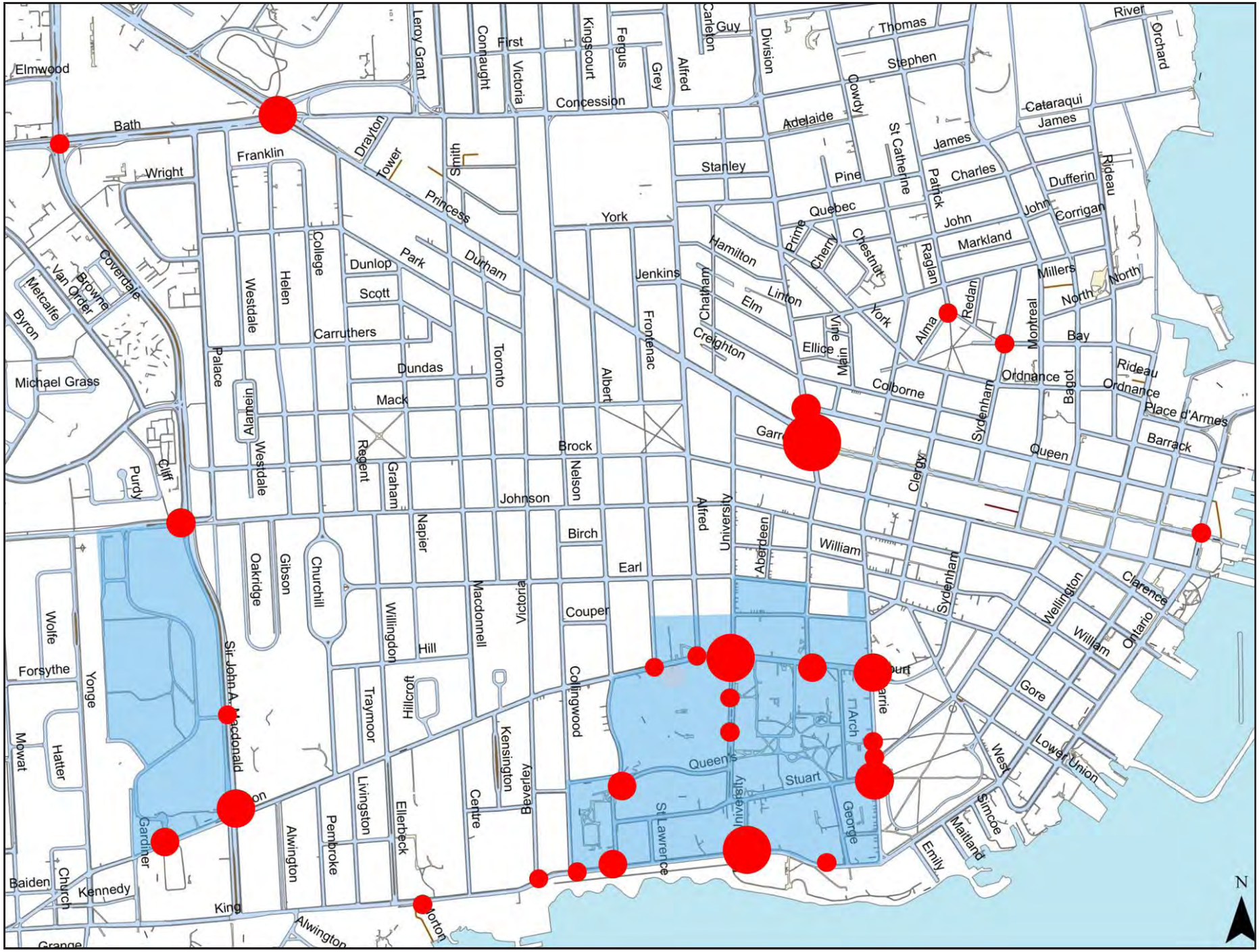


**Figure 4.4: Hazardous Intersections Composite Map**



# HOW DO WE GET THERE?

# 5

# PRIORITY ROUTES RECOMMENDATIONS

The cycling and walking maps shown as Figure 5.1 and 5.2 represent priority routes to Queen's University. These are routes where recommendations outlined in later sections of this chapter should be concentrated. Route analysis was based on a variety of sources, including:

- Feedback from workshop participants. Routes that were repeatedly identified became the starting point for both the walking and cycling maps;
- Analysis of major routes and corridors identified in the Cycling and Pathways Study (City of Kingston, 2003) and the ongoing Campus Master Plan update;
- Consideration of student and employee residence location patterns;
- Consideration of connectivity between the campuses and other major University properties;
- Consideration of connectivity beyond the Small Study Area to the rest of Kingston;
- Consideration of key transit hubs including the new express route stops, particularly for the walking route map, and;
- Consideration for the role that parks and pathways play in the AT network.

The resulting maps should not be considered as comprehensive pedestrian and cycling networks for Kingston's inner city. For other Kingston destinations, different routes may also be important. As these maps represent many of the needs and priorities of the students and employees of Queen's University, one of Kingston's largest employers and trip generators, they can contribute to future AT network planning in the City of Kingston.

## 5.1. Cycling Priority Routes

The cycling map identifies two categories of on-street routes based on street classification: Arterial/Collector and Local/Collector. **The Arterial/Collectors generally have higher levels of vehicular traffic and are therefore more hazardous to cyclists.** These routes will require higher-order improvements. At minimum, painted bike lanes should be planned for on Arterial and Collector routes and physically separated cycle tracks should be considered in the highest conflict areas.

Most of the network is comprised of Local (and some minor Collector) streets. These routes generally require less intervention. Shared-use markings (sharrows) and signage are appropriate for most areas on these routes; however bike lanes may be required in higher conflict areas, such as along Union Street. Traffic calming measures, as outlined in the City's Traffic Calming Policy (City of Kingston, 2013d), could be combined with bike route designation to create bike boulevards.

The cycling map also identifies off-road pathways. Most pathways represent existing formal or informal paths located on either City or Queen's property. Generally, these pathways are designed primarily for pedestrian traffic and most require upgrading for safer and more effective use by cyclists as well. Special attention should be paid to the way pathways intersect with streets, with consideration given to the safe and efficient movement of bicycles at these intersections.

The cycling map identifies one proposed connection, which is located on the western edge of West Campus. The western edge of West Campus property currently forms a solid barrier in the street and pathway network that is nearly a kilometre long, running north to south. The proposed connection is located on City-owned property, which currently sits vacant and aligns well with the inner street network on West Campus. Presently, a fence bars the way for would-be cyclists and all but the most acrobatic pedestrians. **Opening this connection to cyclists and pedestrians would provide a convenient route to West Campus from neighbourhoods to the north and west.** With increased development of the lands at West Campus expected in the coming years, it is important to ensure that a well-connected network of streets and pathways serves this area.

## 5.2. Pedestrian Priority Routes

The pedestrian map identifies two on-road categories of routes as well as off-road pathways. The on-road routes are prioritized as Primary and Secondary. Although all streets should accommodate pedestrian traffic, the prioritization of certain key routes will help focus higher-order interventions where they may benefit the most number of Queen's students and employees. As such, the network is highly concentrated around Main Campus. The highest concern for streets in and around campus is the need for more frequent safe crossings. The City should also consider capacity upgrades along streets with the highest pedestrian traffic such as Union Street, University Avenue, and Division Street.

City and University-owned parks and pathways create vital network connections for walking as they do for cycling. Many of the pathways identified on the map represent informal paths.

Informal paths offer compelling insight into the demand for pathway connections as years of pedestrian traffic physically leaves its mark on the landscape. These paths should be formalized, where feasible, with the installation of a proper multi-use path. For all pathways, special attention should be given to areas in which pedestrians interact with vehicular traffic to ensure the safety of pedestrians, cyclists, and motorists.

The pedestrian map identifies one proposed connection. This is the same connection as identified in the cycling map. See the Cycling Map section above for details.

**Figure 5.1: Cycling Priority Routes**

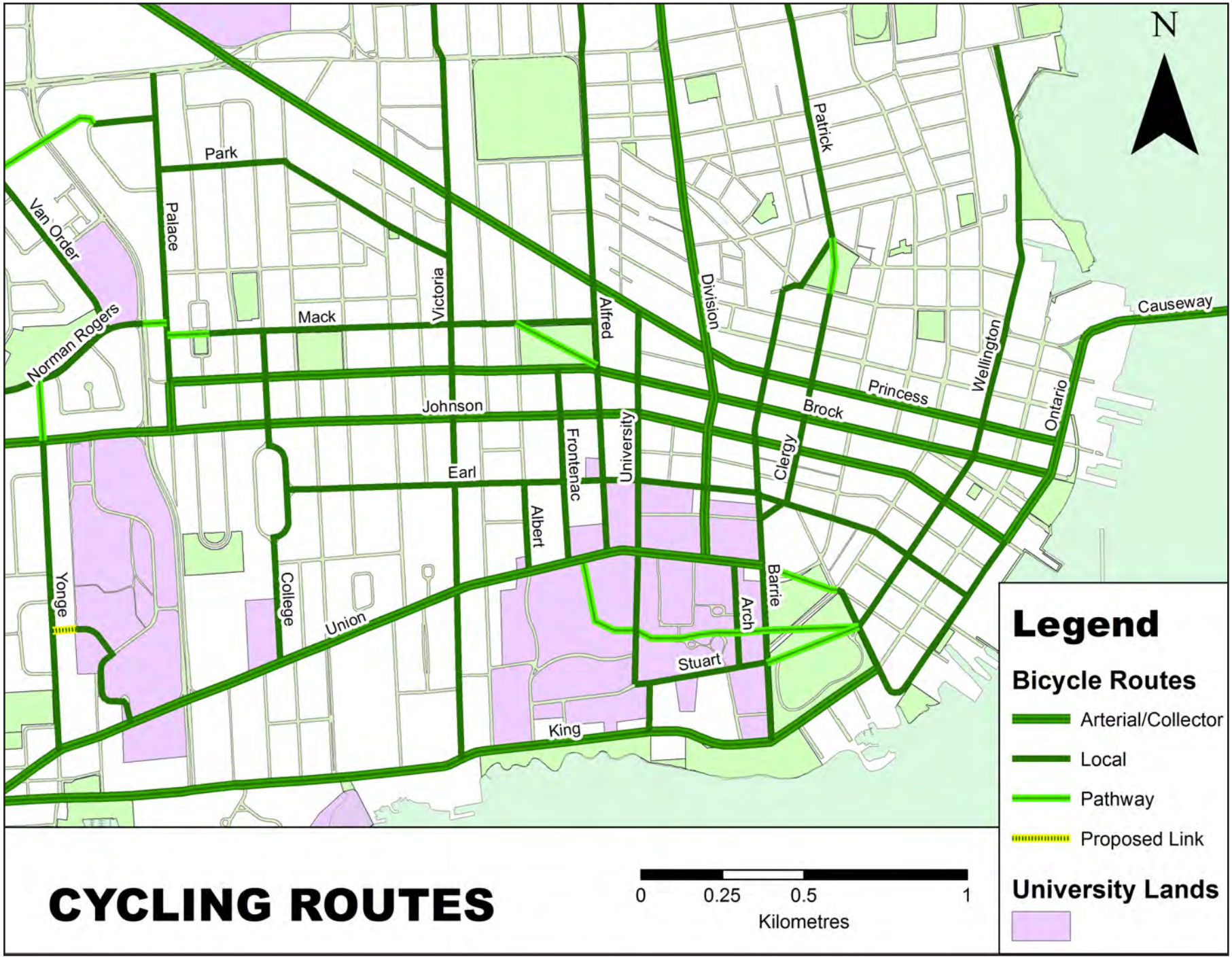
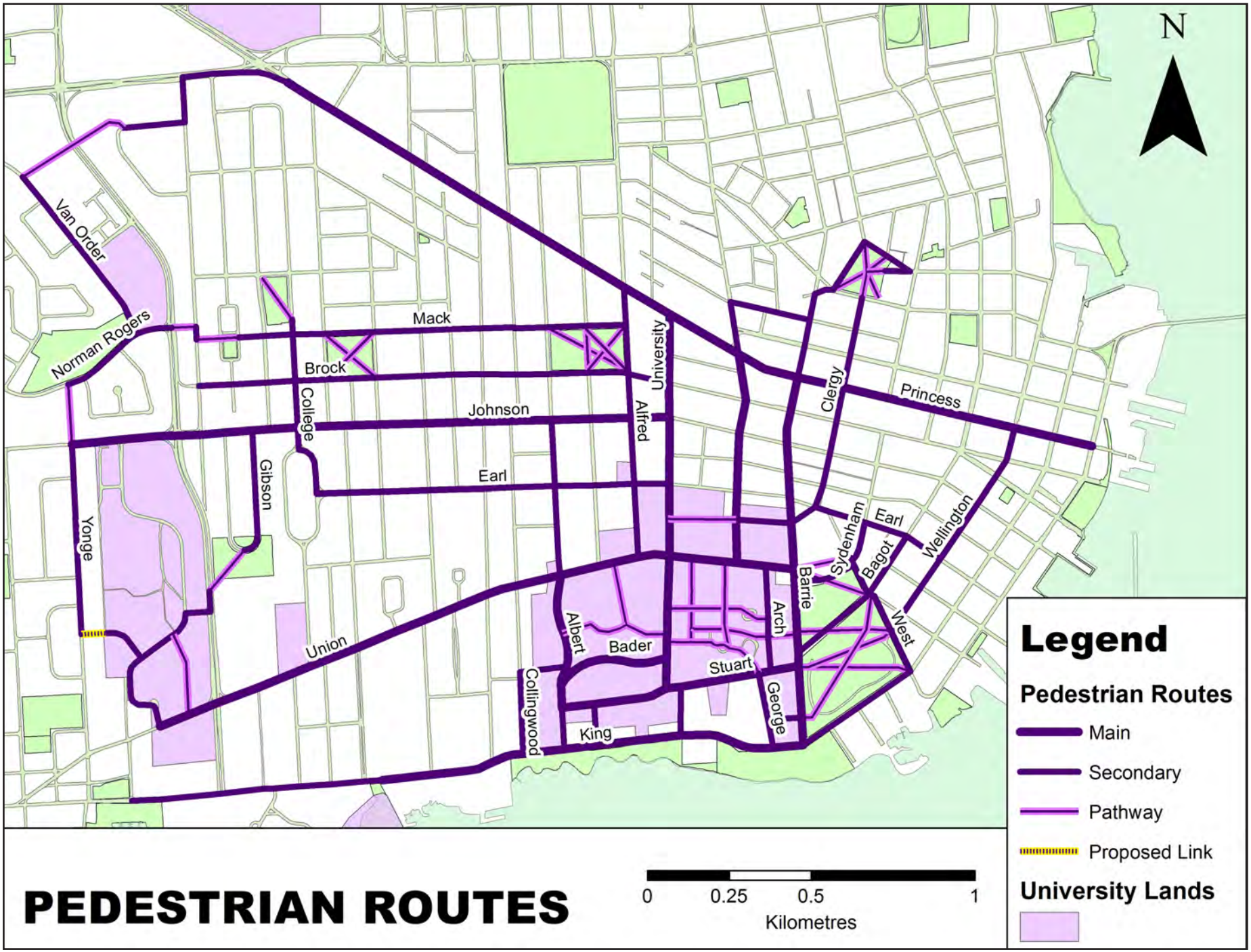


**Figure 5.2: Pedestrian Priority Routes**



# 6

# WALKING RECOMMENDATIONS

Improving conditions for walking is an essential part of an effective AT strategy. In Kingston, walking is the City's number one transportation priority, according to policy statements in the TMP (City of Kingston, 2004). Walking is a viable choice for many community members, and an important component of an active and healthy lifestyle. By improving the safety and quality of current walking conditions, walking becomes a more feasible option for a greater number of users. Walking can help commuters save money, get active, and improve the local environment. The following walking recommendations target infrastructure improvements, policy changes, and programming suggestions to increase the viability and ease of walking to work or school for the students and employees of Queen's University.

## Walking Recommendations Summary

***Infrastructure***

- Improve sidewalks around Queen's University campus
- Provide more pedestrian crossings
- Enhance pedestrian infrastructure
- Increase and maintain streetlights
- Apply traffic calming measures

***Programs***

- Install way-finding maps and pedestrian signage
- Maintain a clean environment for campus commuting
- Educate pedestrians about their rights and responsibilities
- Establish a weekly 'Walk To Work Day'

***Policies***

- Lobby for changes to the Ontario Highway Traffic Act
- Prioritize snow clearing of sidewalks
- Maintain sidewalks and walkways to a high standard
- Encourage mixed land uses and pedestrian-oriented design

## 6.1. Infrastructure

### *Improve Sidewalks around Queen's University Campus*

Sidewalk width has significant implications for streetscape design and the quality of the pedestrian environment. A wide sidewalk offers pedestrians enough space to walk, stand, sit, socialize, or simply enjoy their surroundings. Allocating greater amounts of road space for pedestrians could allow for wider sidewalks as well as landscaping and amenities, making the streetscape more functional and attractive. Continuous sidewalks are also an important component in enabling pedestrians to move safely and easily.

Interview and workshop participants indicated that some sidewalks around the campus area are too narrow, with places where the sidewalks are disconnected. This decreases the walkability to and from the campus. **Since street improvement is the City's responsibility, it is recommended that the City of Kingston conduct regular and comprehensive pedestrian counts, and survey sidewalk conditions on major pedestrian routes around the Main Campus area to identify where infrastructure changes can be implemented to increase width and improve connectivity.**

**Figure 6.1:**
**An Example of wide and continuous sidewalk, Cornell University**
*Source: fm.fs.cornell.edu/*

### *Provide More Pedestrian Crossings*

Pedestrian crossings improve accessibility and connectivity of destinations on opposite sides of a street, and they are major components of pedestrian safety and convenience. **Based on our interview and workshop findings, many participants pointed out that a lack of designated pedestrian crossings on major streets near Main Campus, specifically along Brock Street, Johnson Street, Barrie Street, Union Street, and King Street, deters people from walking to, from, and around the campus area.** This is due in part to the volume and speed of the vehicular flows on those streets that make crossing difficult and unsafe.

**Therefore, the installation of more pedestrian crossings at strategic mid-block points is strongly recommended along major campus-area streets in the form of courtesy crosswalks or signalized pedestrian crossovers.** Since motorists in Ontario are not required by law to stop at courtesy crosswalks, the signalized pedestrian crossover is preferred for increased effectiveness. However, given budget constraints, courtesy crosswalks should be another option. Statistics show that the rate of cars stopping for pedestrians rose from 4% to 44% after a courtesy crosswalk was installed on King Street in front of Kingston General Hospital (Schliesmann, 2012). **In addition, a pedestrian scramble is recommended for the University Avenue and Union Street intersection given the high pedestrian volume crossing the intersection daily.**


**Figure 6.2: Courtesy Crosswalks**
Marked with oversized yellow fluorescent signs and white ladder-type crosswalk pavement markings. Signs are posted on the side stating “Caution Vehicles Not Required to Stop” to remind pedestrians to stay alert when crossing.
*Source: City of Kingston*

**Figure 6.3: Pedestrian Crossovers**
Pedestrians may push a button to make the overhead yellow lights flash that warn drivers that they will be crossing. Drivers and cyclists must yield the right-of-way to pedestrians in the crossover zone.
*Source: Ontario Ministry and Transportation*

**Figure 6.4: Pedestrian Scrambles**
All-way pedestrian crossings that stop all vehicular traffic and allow pedestrians to cross an intersection in every direction, including diagonally, at the same time.
*Source: spacing.ca*

## *Enhance Pedestrian Infrastructure*

Sidewalks and intersections must be designed to safely accommodate pedestrians of all ages, abilities, and with varying needs. Considerations include agility, mobility, balance, cognition, coordination, endurance, flexibility, hearing, problem solving, strength, vision, and walking speed. A number of recommendations come from these considerations. **Curb ramps to sidewalks at all crosswalks and intersections around the campus area should be installed to remove barriers for accessibility. Secondly, it is recommended that the City of Kingston integrate Accessible Pedestrian Signals, such as speakers and vibrating surfaces, into the pedestrian activated signal system at intersections.** This will provide non-visual crossing indications for those who are

**Figure 6.5: An example of a good curb ramp**
*Source: charmeck.org*


**Figure 6.6: Examples of Accessible Pedestrian Signals**
*Source: apsguide.org*

## *Increase and Maintain Streetlights*

During the daytime, natural light facilitates a safe, comfortable, and enjoyable walking experience. At night, however, street lighting becomes particularly important to maintain that standard of walking experience by increasing visibility and sightlines for pedestrians. Several interview participants identified that insufficient street lighting and broken streetlights are issues around Queen's University, particularly in City Park, Victoria Park and along Court Street. It was also noted that individuals have experienced difficulties reporting broken streetlights to the City for repair. Based on our workshop findings, it appears as though pathways cutting through those parks are popular routes among pedestrians, but lack proper lighting. **On these heavily used routes, it is critical for the City of Kingston to ensure pedestrian safety by implementing sufficient and fully functioning lighting in the parks,** similar to the new fixtures on one City Park pathway (Figure 6.7). It is recommended that the City survey the conditions of the streetlights in parks around campus and have contact information and a functioning system to coordinate repairs available for reporting a broken light. The Customer Service phone number and email address should be better advertised so that residents can easily contact the City with concerns.

**Figure 6.7: New LED lighting in City Park, Kingston**
*Source: starlightcascade.ca*

### *Apply Traffic Calming Measures*

Traffic calming measures will improve the safety of non-motorized street users, including pedestrians. Interview and workshop participants expressed concerns regarding excessive speed and aggressive motorist behaviour on streets surrounding campus. **The City of Kingston's Traffic Calming Policy should be used to prioritize the implementation of traffic calming measures around campus, as the level of pedestrian activity is high in these areas.** Potential traffic calming measures that can be implemented around the campus include speed bumps, textured crosswalks, mini roundabouts, raised intersections, and curb extensions.


**Figure 6.8: Speed Bump**
*Source: thestar.com*

**Figure 6.9: Curb Extension**
*Source: surrey.ca*

## 6.2. Programs

### *Install Way-Finding Maps and Pedestrian Signage*

Way-finding maps and signage are valuable tools for informing individuals about route options and facilities along commuting routes. Walking maps and signs are particularly useful for guiding pedestrians by providing information on commute times and distances to major destinations, as well as visually identifying recommended routes and facilities. **It is recommended that Queen's University develop a campus map and install way-finding signage at strategic locations along major pedestrian routes leading to the campuses.** Possible locations for installing the way-finding signage might include King Street, Union Street, Division Street, University Avenue, and Sir John A. Macdonald Boulevard.

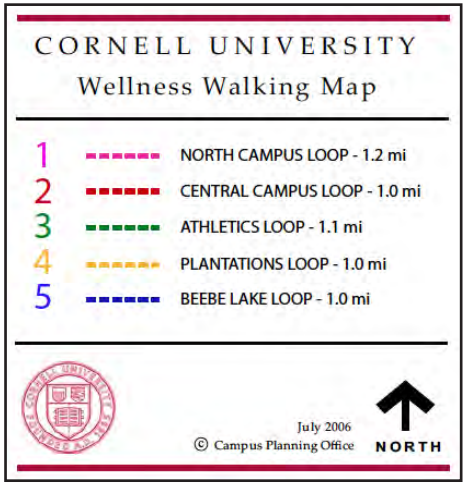


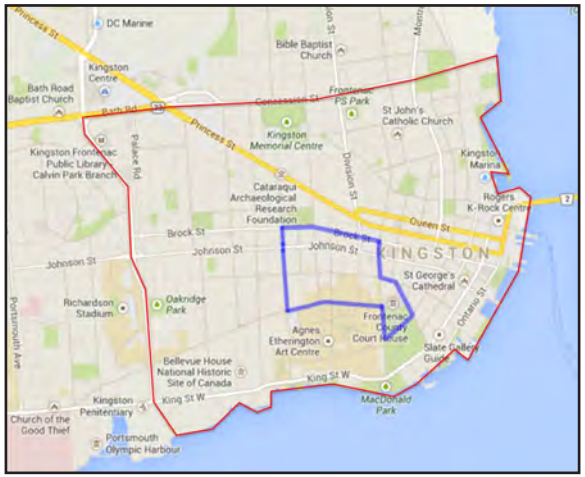

**Figure 6.10: An example of a campus walking map**
*Source: Cornell University*


**Figure 6.11: An example of way-finding signage**
*Source: City of San Francisco*

## *Maintain a Clean Environment for Campus Commuting*

Cleanliness of the pedestrian environment is one of the determining factors for the selection of a route. A Community Clean-Up program that encourages groups or individuals to participate in organized clean-ups would facilitate more aesthetic routes, and enhance the walking experience for AT users. The Student Maintenance and Resource Team (SMART) run by the Alma Mater Society at Queen's University has been offering community clean-up services within the University District for the past year. **Strengthening the SMART program by expanding the service area and encouraging more participation should be a priority for all parties with interests in improving and encouraging AT use.** The service area could be expanded to include all areas within the two-kilometre radius established for this project and shown below.

**Figure 6.12: Clean-up Service Boundary**




Current SMART Clean-up Service Boundary
Potential Expansion of SMART Clean-up Service Boundary

*Source: SMART website, smartkingston.ca*

## *Educate Pedestrians about their Rights and Responsibilities*

Education can be a powerful tool for changing behaviour and enhancing safety of all users on the road, and particularly pedestrians as they interact with cyclists, motorists, and other road users. Pedestrians can benefit from educational tools and messages that provide information not only about their own rights and responsibilities, but also about the rules that regulate all types of transportation users. This may facilitate the establishment of a mutual understanding and respect between pedestrians, drivers and other AT users. **Therefore, it is recommended that Queen's University create and promote pedestrian education programs for the University and broader communities.** Various departments could help spearhead this effort, including the Sustainability Office and AMS. Given that there are major differences in walking abilities, behavioural patterns, and learning capacities of different groups who use the roads around the University (i.e. the walking behaviour of undergraduate students might differ from that of older employees), these educational programs need to be tailored to specific audiences.


**Figure 6.13:**
**Pedestrian Signage Education**
*Source: farm3.staticflickr.com*

### *Establish a Weekly 'Walk To Work Day'*

Regular physical activity, which could include daily walking, can have significant benefits for overall individual health, and can foster healthier and more productive employees. **To help faculty, staff, and students at Queen's University incorporate regular walking into their daily routine, the University could coordinate departmental participation in a Walk to Work program and establish a weekly Walk to Work Day, such as "Walk to Work Wednesday".** On the Walk to Work Day, the University community would be encouraged to incorporate and encourage walking as much as possible in their activities on that day. This could include:

- Commute to Queen's campus and home by walking if possible.
- If the commute is too long, recommend the use of public transit and exiting the bus a few stops earlier to walk the rest of the way to work and home.
- If an employee needs to drive, encourage leaving the car at least one kilometre from the destination and walk the remainder of the distance.
- Take a half-hour walk at lunchtime.
- Use the stairs rather than escalators and elevators where possible.
- Get up and walk around at work at least once every hour.

Other ways to increase walking among university employees includes encouraging university faculty and staff to follow the Workplace or Individual Commuter Guide produced by the Kingston Coalition for Active Transportation (KCAT) and to participate in Kingston's Annual Commuter Challenge in June.


**Figure 6.14: Walk to Work Day Logo**
*Source: elephantjournal.com*

## 6.3. Policies

### *Lobby for Changes to the Ontario Highway Traffic Act*

Legislatively, pedestrians are not awarded the same right-of-way at crossings in Ontario as they are in other provinces. Under the current statutes, pedestrians are required to wait for safe gaps in traffic before crossing unless they are crossing at intersections controlled by traffic signals, stop/yield signs, or pedestrian crossovers with flashing lights. The negative consequences of these out-dated statutes are particularly acute on streets within and immediately surrounding the Queen's University campuses, where pedestrian traffic is heavy and pedestrian travel patterns are highly variable. Currently, no way exists to give pedestrians greater right-of-way priority without installing a number of traffic signals or all-way stops, which are expensive and/or controversial.

It is beyond the jurisdiction of Queen's University or the City of Kingston to amend or circumvent provincial statutes. **However, both organizations should partner, and with community organizations, actively lobby the Ontario Ministry of Transportation to amend the Highway Traffic Act accordingly.**

### *Prioritize Snow Clearing of Sidewalks*

Kingston's climate is moderate, which typically permits walking year-round. This, however, is conditional on clear sidewalks that are free of ice and snow. Snow removal from sidewalks should be done in a timely and consistent manner, and road ploughing should never create barriers on sidewalks or bike lanes. Workshop participants commented that, while roadways are cleared relatively quickly for vehicles, sidewalk clearing is often left for several days, especially on side streets. Unattended snow-covered sidewalks become a significant safety hazard for pedestrians when compacted snow turns to ice. Snow piles from driveway clearing and sidewalks in front of businesses are often left piled on a sidewalk, which also poses safety hazards for pedestrians. The City's Streets by-law forbids the depositing of snow on roadways but not the depositing of snow of sidewalks.

The City of Kingston should give priority to sidewalk clearing after major snowfall events. **The priority routes identified in the Pedestrian Map should be used to help identify sidewalks that serve the majority of Queen's students and employees, and should be considered among the first to be cleared.** It is also recommended that the City adopt a comprehensive approach to counting pedestrian traffic volumes. The City should also amend its Streets By-Law (City of Kingston, 2004b) to forbid the depositing of snow or ice on a sidewalk or walkway.

### *Maintain Sidewalks and Walkways to a High Standard*

Poorly maintained sidewalks can become a significant hazard, especially for persons with mobility challenges. Maintaining high quality pedestrian facilities requires adequate financial and staff resources to properly monitor and prioritize problem areas.

**Queen's University should monitor the quality of pedestrian facilities on city streets within and surrounding the campuses to regularly provide the City with recommended repair and reconstruction projects.** The City of Kingston should also allocate adequate funds for sidewalk and walkway maintenance in its annual budget. The City is encouraged to continue with the development of its Planned Maintenance Program based on up-to-date problem identification and prioritization techniques (City of Kingston, 2013e).

**Figure 6.15: Poorly maintained sidewalk in Kingston**
*Photo by: James Taylor*

### *Encourage Mixed Land Uses and Pedestrian-Oriented Design*

Achieving a good mix of land uses with buildings that are scaled and designed for pedestrians is a major factor in promoting AT. The City of Kingston Official Plan recognizes the strong link between land uses, urban design, and walkability. Due, in part, to proximity to the downtown core, many areas surrounding Main Campus already achieve a high degree of land use mix. However, the design of some commercial and residential buildings in these neighbourhoods creates conflict between pedestrians and motorists. The Official Plan and Site Plan Control By-Law (City of Kingston, 2010b; 2010d) require consideration for the impact on pedestrians and other road users of new development, which should be heeded for any future developments.

The City of Kingston should continue to evaluate new developments for their impact on pedestrian traffic. The evaluation criteria should be paramount and non-negotiable for development projects located along high-pedestrian traffic routes, including routes to Queen's University.

**The University itself should actively support land-use projects that will positively affect walking conditions and encourage increased pedestrian activity in the neighbourhoods surrounding each campus. While Main Campus is mostly built to capacity, West Campus has significant development potential that is expected to be realized in the future.** West Campus was originally built as an auto-oriented suburban-style campus. Future development

should be pedestrian-oriented and offer a range of uses to create a more complete community. The University can look to the UniverCity development at Simon Fraser University in Burnaby, British Columbia as an example of transforming a suburban campus into a complete community.

**Unlike a truly secluded suburban campus, such as SFU, West Campus does have the advantage of an existing community nearby with Portsmouth Village. Queen's should look for ways to improve connections with this community.**


**Figure 6.16: UniverCity Development, Simon Fraser University**
*Source: bmra.ca*

# 7

# CYCLING RECOMMENDATIONS

Cycling is an important component of any AT strategy as it appeals to people of all ages and backgrounds. Cycling is the City's second transportation priority behind walking (City of Kingston, 2004). By encouraging more people to cycle more frequently, Queen's University can help foster healthier and happier employees, and students, and become a champion for cycling in the City of Kingston. The following cycling recommendations are intended to encourage more people to take up cycling and to improve the safety, enjoyment, and convenience of trips for those that currently cycle. The recommendations address infrastructure improvements, policy changes, and program recommendations.

### Cycling Recommendations Summary

***Infrastructure***

- Improve bicycle parking on Queen's campus
- Provide bike lanes on arterial and collector streets
- Create a network of bike boulevards
- Install bike boxes at select and appropriate signalized intersections
- Install bicycle signals at traffic intersections
- Locate bike repair stands in high traffic areas
- Provide convenient end-of-trip facilities for staff, faculty and students

***Programs***

- Promote cycling awareness
- Host cycling workshops on campus
- Start a bicycle registration program on campus
- Start a bike share  program on campus

***Policies***

- Province-wide support from the Ontario Highway Traffic Act
- Uphold commitment to regular maintenance of on-street marked bicycle lanes
- Maintenance of snow-free bike lanes and bicycle parking areas
- Align goals with Ontario's Cycling Strategy

## 7.1. Infrastructure

### *Improve Bicycle Parking on Queen's Campus*

Improving the availability of bike racks and providing options for secure bicycle parking can greatly enhance a cyclists' commuting experience. Cycling literature, interviews, and a workshop demonstrate a need for Queen's University to provide more bicycle parking as well as options for secure bicycle storage. There are two principal reasons for this recommendation. **First, inadequate bike parking is associated with illegally parked bikes on campus. Second, providing proper bicycle parking as well as secure bicycle parking can help to minimize bicycle theft around campus.**

A 'quick win' for bicycle parking at Queen's is to install bicycle-locking hoops. These small devices can be added to lampposts, parking meters, or signposts. Longer-term strategies could include providing narrow inverted 'U' stands around campus.

**Figure 7.1:**
**Bicycle parking directly outside of university facilities**
*Source: The City of Chicago*

In terms of offering secure bike parking, bicycle lockers are fully enclosed containers that are equipped to fit a standard bicycle. These lockers provide a high level of security as well as protect bicycles from damage due to harsh weather (Transport Canada, 2010). To access the locker, an individual is provided

with an access key, or combination code. Individuals would pay a monthyl fee for use of the lockers which would help recover the costs. These facilities come in two general forms, which are a mass storage unit or individual lockers as shown in the pictures below.

**Figure 7.2:**
**Central Bicycle Locker**
*Source: Cyclehoop*


**Figure 7.3:**
**Individual Bicycle Locker**
*Source: Cyclehoop*

It is recommended that Queen's University also adopt a policy to require bicycle racks designated for every building on campus. It is also suggested that a study be conducted to assess under- and over-utilized bicycle parking, and the number of bicycle racks required for each building. Bicycle parking requirements are usually set in municipal by-laws, and can also be developed by local associations. Some examples of requirements specifically for educational institutions are in Appendix C.

Additional bicycle racks should be installed at all major buildings and large central gathering areas on the University campus, such as around or underneath the Athletics and Recreation Centre, all libraries, the John Deutsch University Centre, student residences, under-utilized underground parking spots, and sports fields. An effective way to select additional locations is to note where bikes are illegally parked, and to install them appropriately. Bicycle parking facilities are at their highest capacity in the summer and fall and lowest during the winter months, so implementing movable or seasonal bicycle parking would be an important investment on campus. **It is advised that Queen's University invest in flexible bicycle parking facilities. A demand study should be conducted to identify which areas on campus are in need of more bicycle parking. These bike structures would be secure, easy to assemble, lightweight, and easy to store during the winter months.**

For secure bicycle parking, such as bike lockers, a central area should be designated, such as the Athletics' and Recreation Centre. These lockers would be available for individuals that spend long durations on campus and therefore could leave their bikes in a central location. Other locations should be identified around campus for smaller covered bicycle facilities, such as around the libraries, student residences, sports fields, under-utilized underground parking spaces, or under the law building. This recommendation is specifically directed at the Campus Master Plan and Queen's University, and could be transferable to other employers in Kingston. These stakeholders should ensure that the number of bicycle racks and bicycle parking spaces available is calculated based on the number of people working, visiting, or living in each building. It is also recommended that high quality lighting be provided for major bicycle parking facilities to increase security and safety for all users.Locations selected for bicycle racks should be well-lit, accessible, and easily identifible by pedestrians and motorists. A poorly lit and hidden bike parking location is a significant deterrent to bicycle useage.

### *Provide Bike Lanes on Arterial and Collector Streets*

As the Kingston Transportation Master Plan (2004) places priority on cycling as a preferred mode of transportation, emphasis should now be placed on the installation of bicycle lanes around Queen's University and the City of Kingston. Bike lanes can provide a safe space for cyclists, enhance safety for all road users, and increase ease and movement along the street. Bicycle lanes should be 1.5 – 2m wide (City of Toronto, 2013), and be clearly marked with a white stripe adjacent to traffic and a bicycle or diamond symbol on the pavement. Where there is on-street parking, bike lanes should be provided along the left or right side of parked vehicles. When no on-street vehicle parking is provided, lanes should appear next to the curb (City of Toronto, 2013). Styles of bicycle lanes that could be implemented include coloured bike lanes, buffered bike lanes, left-side bike lanes, cycle tracks, and marked shared lanes (sharrows) as identified in the Great Streets report by the Queen's School of Urban and Regional Planning (2012).

The City of Kingston, in conjunction with local cycling groups, should identify roads that are in need of bicycle facilities and priorities. Once identification has been completed, prompt bicycle lane installation should commence. Installation should be focused on Queen's campus and the surrounding community to ensure appropriate routes for cyclists. Bike lanes need to be consistent with the Ontario Traffic Council OTM Book 18: Bicycle Facilities, 2013 and the Transportation Association of Canada's guidelines.

**Streets around Queen's University that have been identified by AT users as a priority for bicycle lanes include Union Street, University Avenue, and Barrie Street. These roads were chosen due to high automobile and bicycle traffic around main campus.**

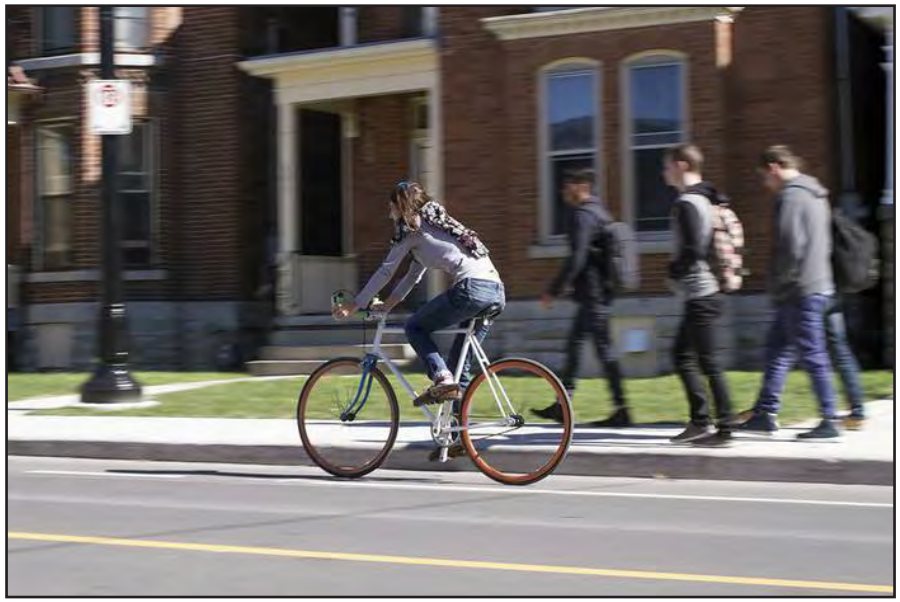


**Figure 7.4: Bicycle Lane on a Collector Street**
*Source: Queen's University The Journal*

### *Create a Network of Bike Boulevards*

Sharing the road with cars travelling at high speeds is unsafe and intimidating for cyclists, particularly for inexperienced cyclists and children. Bicycle boulevards can be used to create streets that are much safer and more enjoyable for cyclists of all abilities. Bicycle boulevards are intended to be shared roadways designed to be inconvenient as through routes for cars, thereby creating a low-volume street that is safer for cyclists (Pedestrian and Bicycle Information Centre, 2013). Bike boulevards use traffic calming and diversion, signage and pavement markings, and intersection crossing treatments to create a traffic calming effect on residential roadways (Pedestrian and Bicycle Information Centre, 2013).

The City of Kingston should implement a network of bicycle boulevards across the city to make it safer and easier to commute to various destinations throughout Kingston. Streets should be selected that are already low volume residential streets and that parallel main arterial roads. Once routes have been selected, traffic calming measures should be implemented to reduce vehicle speeds and to prioritize cyclists. Pavement markings and signage should be installed to notify cyclists and motorists of the bike boulevards.

**Two examples of streets that could easily be turned into bicycle boulevards are Earl Street and Alfred Street, as they already have low-vehicular-volume.**


**Figure 7.5: Sample Bike Boulevard**
*Source: City of Minneapolis*

### *Install Bike Boxes at Select and Appropriate Signalized Intersections*

Bike boxes are on-street markings that help cyclists and motorists share the road, and in particular, the space around street intersections. These boxes act as a space in front of motorists for cyclists waiting at a controlled intersection or to make a left turn (Figure 6.6). These boxes improve the safety of intersections by providing a visible and defined space for cyclists while waiting for a light to change (City of Toronto , 2013).

Bike boxes are already planned for the following intersections on Princess Street in Williamsville: Bath Road/Concession Street, Victoria Street, and Division Street. It is recommended that the City of Kingston continue to identify intersections where bike boxes can be installed.

**Major intersections around Queen's University and the surrounding neighbourhoods should be prioritized, including the intersection of Union Street and University Avenue (north & south) or Union Street and Albert Street (north & south), due to their high levels of motorist and cyclist traffic.**

**Figure 7.6: A Bike Box**
*Source: Canadian Broadcasting Corporation (CBC)*

### *Install Bicycle Signals at Traffic Intersections*

Bicycle signals, including cyclist-activated signals, allow for cyclists to cross intersections safely. Cyclists may have difficulty crossing intersections with high volumes of traffic, and this difficulty increases with the number of traffic lanes. Bicycle signals can improve cyclist movement and provide priority to cyclists without creating significant delay for motorists (National Association of City Transportation Officials, 2012; City of Toronto, 2013). Detectors can be placed in the traffic lane, or push buttons can be located on the side of the street for cyclists to activate manually.

It is recommended that the City of Kingston implement automatic bicycle signals or activated signals be placed on routes with existing bike routes, and that a policy be adopted to sustain this practice. Implementation of these signals should commence at all major intersections, beginning with multi-lane roads. The signals should be placed where cyclists are intended to travel on the road, for example in the bike lane or boulevard. If cyclists are not provided with an automatic signal, a push button should be provided on the right-hand side of the street. **The City of Kingston should focus on installing bicycle activated signals on streets with cycle routes that intersect with traffic signals such as Union Street and University Avenue due to their high levels of bicycle and vehicular traffic, and proximity to Queen's campus.**


**Figure 7.7: Signal Detection Configuration**
*Source: National Association of City Transportation Officials*

### *Locate Bike Repair Stands in High Traffic Areas*

If proper supports are not available, maintaining and operating a bike can be inconvenient and costly, and can discourage potential cyclists from using AT. Bike repair stands help reduce the costs associated with bike repair and make accessing maintenance equipment convenient and easy. A bike repair stand, as pictured above at Dalhousie University, consists of a place to suspend a bike off the ground to conduct repairs, a universal pump to inflate tires, and various tools that a cyclist may need to make simple repairs. A QR code on the top of the stand can be scanned to provide users with step-by-step instructions for common repairs (e.g. changing a tire). Additionally, due to its unique appearance, the stand acts as an effective marketing tool for raising awareness about cycling.

This recommendation is directed at the Alma Mater Society (AMS), the Queen's University Undergraduate Student Government, and could also involve various departments of the University's administration. This type of project provides an opportunity for students to get involved, work with the administration, and take action to promote AT on campus.

It is recommended that the University begin implementation on a smaller scale, and consider installing one or two stands on campus in areas that are considered safe and that support high bike traffic, for examples areas that are well lit and visible to pedestrians . Funding from sources within AMS that support sustainable initiatives, and from the larger University network, should be identified and pursued. As seen at Dalhousie

University, the Dalhousie Student Union sought extra funding from the municipality to expand a project to include five new bike repair stands. Queen's University AMS could seek external funding from the City of Kingston, Sustainable Kingston, Awesome Kingston (if under $1000), or the Kingston Community Foundation.

**Possible Locations for bike repair stands on Queen's campus could include nearby Stauffer Library, outside the ARC, in front of the JDUC, or at West Campus.**

**Figure 7.8: Bike Repair Station**
*Source: Dalhousie University*

### *Provide Convenient End-of-Trip Facilities for Staff, Faculty and Students*

Ambient weather, including cold, wet, or snowy days, as well as natural features, such as hills and windy stretches, can make walking and cycling unpleasant and inconvenient, and have been cited as a major deterrent to cycling (North and Agarwal, 2012). To aid in overcoming this barrier, the University should support AT users by providing internal end-of-trip facilities such as change rooms, showers, areas to hang clothes to dry, and lockers for stowing helmets, bicycle clothing, and other personal belongings. These provisions are instrumental in encouraging people to cycle year-round, including in the rain and other weather conditions, as they offer cyclists a place to freshen up, conveniently store and dry their gear, and facilitate an easier transition to the work environment.

Queen's University can take a series of steps to provide better access to end of trip facilities as McMaster University in Hamilton has successfully done. The first step to providing better end-of-trip facilities is making a comprehensive list of existing facilities available on the Queen's University website. Information should include location on campus, hours of accessibility, and facilities offered (i.e. lockers, showers, sink, etc.). At present, access to showers and lockers on campus is limited, as was identified in key informant interviews. To rectify this, Queen's University can begin by evaluating which buildings or areas on campus are lacking end-of-trip facilities. Once identified, the University can look at planning for new end-of-trip facilities in appropriate locations.

**In addition, access to the showers, lockers and change room facilities in the Athletics & Recreation Centre (ARC) could be offered free-of-charge, or at a reduced rate to AT users**. The locker rooms at the ARC contain over 3,600 lockers, and shower and bathroom facilities that are complete with hair dryers, and benches. Peak use for use of the facilities by AT users would be early mornings and summer months, when the ARC is generally quiet. Cyclists should be able to inform the ARC staff that they have cycled to the University and would like access to the showers, which, at minimum, should be available at a significantly reduced rate for those commuting actively.

**Figure 7.9: Examples of End of Trip Facilities**
*Source: Bicycling Western Australia*

## 7.2. Programs

### *Promote Cycling Awareness*

All partners with an interest in AT should promote awareness of cycling to, from, and on campus. Promotion and leadership can generate attention to AT, which may increase interest in cycling and serve as an example for broader initiatives. In particular, leadership from Queen's University's in addressing AT issues and cycling promotion can encourage the City of Kingston and other large employers in the city to take a similarly strong stance. Strong leadership can also attract financial support from both the public and private sector. For example, the Federation of Canadian Municipalities offers financial support for municipalities to engage in projects related to sustainable transportation. This fund, the Green Municipal Fund, can provide financial and knowledge-based support to help municipalities develop into more sustainable communities. Other potential investors might include IBM Smarter Cities, or local organizations interested in forwarding AT and cycling issues. Finally, awareness campaigns can also be used to encourage individuals to use AT and to address feelings of animosity or distrust between cyclists and drivers.

**Taking a leading role in AT promotion, the University should support a range of cycling programs that might, for example, encourage people to bicycle to work on a set day of the week, ("Cycle Thursdays"), or facilitate departmental competitions to encourage staff, faculty, and students to bike to Queen's.** To encourage participation, incentive programs

or prizes should be awarded to individuals and departments. A final way to increase cycling includes using Kingston Coalition for Active Transportation's (KCAT) Workplace or Individual Commuter Guide and by participating in the Kingston Annual Commuter Challenge.

Queen's University is strongly encouraged to become a leader in promoting the use of AT and cycling. To do so, the University should adopt an institution-wide strategy to encourage the involvement of a mix of stakeholders, including faculty, staff, students, and local employers.


**Figure 7.10: Cycling Awareness Campaign**
*Source: Bike Pittsburgh*

### *Host Cycling Workshops on Campus*

On-campus initiatives, such as workshops and day-events, can increase awareness and facilitation of cycling at Queen's University, and at a larger scale throughout the city. A sustained awareness and education campaign from the University can leverage existing support and encourage more investment in the future. Workshop topics that have direct implications for potential and existing users, like proper cycling etiquette and road-awareness, would be beneficial for all types of cyclists and serve practical purposes as well. Indeed, participants from the interviews and workshop noted that proper cycling etiquette, such as how to signal at intersections and lane-awareness, is an area that needs improvement. These types of workshops can be partnered with larger cycling movements or local AT events such as a bicycle summit or province wide campaign. With the University as a leader in AT and cycling awareness, there would be opportunities to shift perceptions of cycling and increase ridership.

**It is recommended that Queen's University partner with Cycle Kingston to promote workshops that improve and promote cycling. These workshops should also encourage partnerships with the AMS, local bike shops, University departments, student associations, local employers, and the City.**

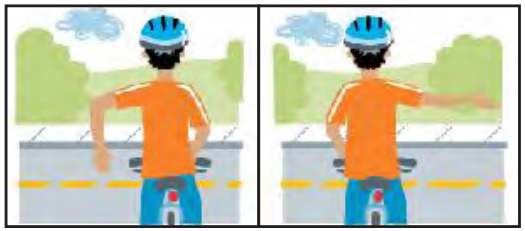


**Figure 7.11: Cycling workshop graphic**
*Source: Ministry of Transportation*

### *Start a Bicycle Registration Program on Campus*

**The University should provide a system that encourages any bicycles ridden or parked on campus to be easily registered with Queen's University to address bike theft and better meet cyclist's needs.**

Fear of bicycle theft has been shown to negatively influence university students cycling to campus (Titze et al. 2007; Agarwal and North, 2013). A bike registration program is intended to help address the issue of bicycle theft. In the event of a bicycle theft, necessary information, such as serial numbers and detailed descriptions of the bike, are available for Campus Security and Kingston Police to use in identifying stolen bicycles. This data aids in the recovery of the bike and can be added to a Canada-wide computer network that identifies stolen property, including bicycles. Frequently bicycles are recovered by Police and cannot be returned to their rightful owner because they are not able to provide the bicycle serial number.

Additionally, the bike registration system provides the University with an up to date count of bicycles on campus so that sufficient end-of-trip facilities are provided (i.e. bicycle parking spaces, secure storage facilities, etc.), and to justify roadway and bicycle facility improvements. Bike Registration programs have proven successful at many universities including Carleton University, University of Windsor, Cornell and Colorado State University.

The program could be operated by Campus Security, as is the case at many universities within Canada, including Carleton University and the University of Windsor.

The program should be offered as a free service to the campus community, and registration should be offered both online and in person during the fall (September), and again in the spring (April/May). The program should be promoted among all members of the Queen's community including students, faculty and staff. Similarly, upon implementation, the program should be directed at incoming new students, and advertised in acceptance packages and welcome brochures. **Campus Security should consider partnering with local bike shops, bike organizations, and Kingston Police to maximize awareness of the program and to encourage the University community to participate in the program.**


**Figure 7.12: Sample Bike Registration Sticker**
*Source: www.myassettag.com*

### *Start a Bike Share Program on Campus*

The provision of bicycles for temporary periods of use can encourage their use for daily commuting activities. Campuses are ideal for bike sharing systems as they save students the hassle of bringing, storing, and maintaining their bikes on campus. Bike share programs vary in their complexity and size but at the basic level, the concept of a bike share program is relatively user-friendly and easy to grasp. Bikes are made available for loan to members of the University community free-of-charge or for a small fee. A user registers to become a member and can then borrow a bike. Borrowing a bike may involve picking up a key from an office on campus, or a more advanced system may have an automated process. For example, at Cornell University, a Red Bike can be signed out from the library like a book.

**This recommendation is directed at Queen's University and specifically the AMS, but could be expanded to include a partnership with the City of Kingston.**

A Bike Share program on campus could begin at a very small scale, as the University of Ottawa did in starting its bike share program in May 2013. The program has 6 bikes available for sharing seven days a week from 7am -10pm, which are available for pick-up and drop-off at an office on campus. As awareness and use of the program grows, bicycles may be added and the system modified to a more automated process. Bike share programs at several universities in the United States have been very successful, adding many bikes and locations from which to pick up and drop off the bikes. A Bike Share at Queen's has great potential to improve connectivity between Main Campus and West Campus.

There is opportunity for this to be a student run initiative operated by volunteers through the Queen's Bike and Board Shop, which is an organization of the AMS. If the program proves successful on campus, there may be an opportunity to expand the concept to a more complex system in partnership with the City of Kingston, which would offer the service to those outside the University community and campus.

**Figure 7.13: Bike Sharing in Action, Cornell University**
*Source: www.blogs.cornell.edu*

## 7.3. Policies

### *Province-Wide Support from the Ontario Highway Traffic Act*

In Ontario, the primary purpose of the Ontario Highway Traffic Act (HTA) is to enforce the rules of the roads and increase safety. Under the HTA, bicycles are considered to be vehicles. This piece of legislation is a critical component of encouraging and supporting cycling initiatives, as it can legislatively hinder or improve AT in Ontario. Updates to this act occur regularly, and the legislation "could be updated to respond to new cycling safety issues" (Province of Ontario, 2013, p. 24). Addressing this piece of legislation is paramount, as several barriers to AT are embedded in the HTA, which, relative to similar types of legislation in other provinces in Canada, is not as supportive of AT. For example, we recognize that cyclists and vehicles travel at drastically different speeds, and that cyclists are intrinsically more alert and aware of what is around them, therefore recommend that cyclists should be allowed to perform a "rolling stop" at stop signs. The same level of priority for pedestrians and cyclists should be mandated similar to that in other provinces.

This policy initiative can benefit from, and will indeed require, the coordination and joint efforts of several major stakeholders. Involvement should be sought from the Campus Master Plan, KFL&A Public Health, the City of Kingston, local politicians, Queen's University, and large employers within the city of Kingston, as well as AT organizations and local interested parties.

It is recommended that the City of Kingston, KFL&A Public Health, local politicians, local school boards, Queen's University, and large employers continue to support the use of AT in Kingston, and across Ontario. It is critical that these larger organizations and institutions foster and use support from grass-roots organizations in providing AT-supportive policies, programs, and infrastructure. All players are encouraged to continue to expand the body of knowledge on AT, including evidence based information, in order to support the growth of AT. With this information and the organized collective efforts of AT-proponents, supporters and politicians can work together with the Province to update the Ontario HTA.

### *Uphold Commitment to Regular Maintenance of on-Street Marked Bicycle Lanes*

As was observed by the project team, common problems with bicycle lanes in Kingston include sunken grates, potholes and cracked pavement. When cyclists encounter these while riding, they are forced to ride outside of the bike lanes or swerve to avoid them, thereby endangering themselves and aggravating drivers. If cyclists are expected to use on-street marked bicycle lanes, the lanes must be well maintained and free of obstructions. Maintenance should include measures such as keeping road surface conditions smooth, ensuring that lines and pavement markings are visible, and that routes are well signed and identified.

This recommendation is directed at the City of Kingston, which is the stakeholder responsible for road maintenance. **The City of Kingston should commit to keeping on-road cycling facilities in a State of Good Repair, as per its by-law.** Interview and workshop participants identified poor pavement conditions and faded lines along Union Street. First steps could involve continuing and enhancing the ongoing inventory of the state of existing cycling conditions. Problems should be categorized by road surface condition (i.e. potholes, cracks, broken glass etc.), pavement markings (i.e. faded or non-existent lines and symbols, etc.), and missing signage (i.e. identifying bike routes, traffic signs, etc.). These issues should be further categorized into different priority classes (i.e. emergency repairs, urgent repairs, etc.), and acted on accordingly. Repairs should be coordinated and conducted in a timely manner to ensure that cycling facilities are kept in a State of Good Repair. **The Customer Service phone number and email address should be promoted to inform cyclists about how to contact the City about unsafe cycling conditions.**

**Figure 7.14: Bike Lane in a State of Disrepair**
*Source: www.letsgorideabike.com*

### *Maintenance of Snow-Free Bike Lanes and Bicycle Parking Areas*

Typically, Kingston has snow on the ground for a few weeks between November and April. In order to make cycling a feasible mode of AT year-round, bicycle lanes must be kept clear of snow and ice in the winter months. Snow and ice on the road can make conditions slippery and dangerous for cyclists who choose to ride. To enhance the safety of cyclists, the whole width of the bike lane should be kept clear and no part of the lane should be used for snow storage. Keeping marked bike lanes clear means cyclists will continue to have a defined place in traffic during winter commutes. In addition to keeping bicycle lanes clear, bicycle racks used for bicycle parking should also be kept free of snow and ice, if covered bicycle parking is not provided. The racks and surrounding areas should be kept clear so that cyclists can transition from the road to the bicycle parking area smoothly without difficulty.

This recommendation is directed to both the City of Kingston and Queen's University. **The City of Kingston should place priority on clearing bicycle lanes and sidewalks effectively and in a timely manner to enable people to actively commute. Queen's University should work with the City of Kingston to ensure that snow removal on campus does not impede AT users. Both the City and Queen's University should strive to keep bicycle racks clear of snow and ice so that they are easily accessible in the winter months.**

The City of Kingston should prioritize the clearing of on-street marked bicycle lanes. This would ensure that snow is removed within 24 hours and that lanes are kept free of snow and ice. On campus, Queen's University should work with the City to identify areas that need to be kept clear for bicycle storage access. Physical Plant Services should be tasked with keeping priority bicycle racks clear of snow and ice.

**Figure 7.15:**
**Snow Filled Bike Lane**
*Source: James Taylor*

### *Align Goals with Ontario's Cycling Strategy*

The Ontario Cycling Strategy is designed to encourage the growth of cycling and improve the safety of people who cycle in the province (Ontario Cycling Strategy, 2013). Achieving the Strategy's vision requires a commitment from all partners for integrated action to design healthy, active, and prosperous communities, improve cycling infrastructure, make highways and streets safer, promote cycling awareness and behavioural shifts, and increase cycling tourism in Ontario (Ontario Cycling Strategy, 2013). In order to realize this vision, different levels of government, cycling and transportation associations, safety organizations, businesses, and health units all need to work together to facilitate change.

**It is recommended that the City of Kingston refer to Ontario's Cycling Strategy in transportation and land use decision-making, just as they are required to refer to the Provincial Policy Statement and the Official Plan. For information and guidance on street design to safely accommodate cyclists, transportation practitioners are encouraged to continue to refer to the Ontario Traffic Council's OTM Book 18: Bicycle Facilities (2013).**


**Figure 7.16: Ontario's Cycling Strategy**
*Source: Government of Ontario*

# 8

# MULTIMODAL RECOMMENDATIONS

Multi-modal transportation involves combining modes such as walking or cycling with public transportation. Multi-modal transportation systems can reduce the number of vehicles on the road and lower greenhouse gas emissions. By focusing on and improving sustainable transportation systems, the University and the City can facilitate different travel choices and reduce the need for road space and parking for cars. To encourage more people to utilize multi-modal transportation, it is necessary for employers to offer incentives and support changes to the transportation system that makes AT safer and more appealing. The following multimodal recommendations aim to improve infrastructure, policies, and programs that can make it easier for AT to be incorporated into lifestyles.

### Multimodal Recommendations Summary

***Infrastructure***

- Create transit stop linkages for pedestrians and cyclists
- Expand and increase the number of park and ride facilities
- Provide adequate shelters and secure storage at transit stops
- Provide clear, adequate, and up-to-date information at each transit stop
- Leave bicycle racks on transit buses year-round

***Programs***

- Facilitate a discounted transit pass for Queen's University employees
- Develop opportunities for flexible parking
- Offer a Guaranteed Ride Home Program

***Policies***

- Do not subsidize motor vehicle parking
- Increase marketing of Park and Ride/Bike/Walk

## 8.1. Infrastructure

### *Create Transit Stop Linkages for Pedestrians and Cyclists*

Safe, clearly defined, and effective linkages around bus stops for cyclists and pedestrians is a central component of ensuring that multimodal travel feels comfortable and easy for AT and transit users. Without the linkages, AT users may not feel safe reaching a transit stop, regardless of the distance from their route.

Many individuals, organizations, businesses, and departments can be involved in realizing this recommendation. Transit stops are located in various types of location throughout the city, and depending on the surrounding uses, different stakeholders may have a role to play in the implementation. It may benefit surrounding uses, for example a nearby business, to have these types of linkages near transit stops to facilitate a greater amount of pedestrian and/or cycling traffic. Ultimately, however, the City of Kingston will be responsible for the implementation of this sort of pedestrian and cycling infrastructure.

Ensuring that pedestrians and cyclists have direct and safe access to transit stops will involve coordination between AT infrastructure and transit infrastructure. This may involve the implementation of pedestrian crosswalks, pedestrian crossovers, sidewalk extensions, bicycle path extensions, or multi-use paths to connect the transit stops with existing infrastructure. It may also involve placement of transit stops closer to traffic lights or intersections with pedestrian crossings

(United States Department of Transportation, 2013). Creating these linkages is critical to encouraging AT and multimodal travel, as AT and multimodal users may otherwise face substantial physical barriers. Without these types of linkages pedestrians and cyclists may be forced to take dangerous or inconvenient paths to safely and efficiently travel between the transit stop and other route infrastructure.

**Wherever transit stops are located, an assessment of the surrounding infrastructure and amenities should be done to determine if improved linkages are needed. Priority should be given to those locations in which pedestrians and cyclists may be forced into unsafe situations while attempting to access a transit stop.** An example of this would be the transit stop on the south side of Union Street across from Queen's University's West Campus. Attempting to cross Union Street to access the transit stop puts pedestrians and cyclists at considerable risk. This makes it less likely that people will engage in AT or multimodal travel, for fear of safety, when required to access that stop.

**Figure 8.1: Bus shelter with clearly marked pedestrian walkway**
*Source:*
*Cynthia Parkhill Blogspot (2012), cynthiaparkhill.blogspot.ca*

### *Expand and Increase the Number of Park and Ride Facilities*

All additional Park and Ride facilities should provide designated secure bicycle and gear storage spaces, as well as linkages to public transit, pedestrian, and bicycle infrastructure for commuting to work and other key destinations. This would allow individuals who live longer distances from campus to take a car or bicycle for the first portion of their trip, park at a designated facility, and use a different active mode of transportation for the remainder of their journey, such as public transit. These facilities would make AT use available and more feasible for a wider segment of commuters who live too far to rely on only one mode of AT.

**Park and Ride facilities could be implemented by Queen's University at their outer campuses or by the City of Kingston at strategic locations, such as Express Bus stops, surrounding the city centre.**

These facilities could be developed on underused parking lots or on spaces shared with other land uses that do not have their parking spaces utilized during regular office hours. Designated parking spaces and storage lockers could be provided for Queen's employees at these locations.

Currently, Kingston Transit provides a few free Park and Ride lots for vehicle parking on a first come, first served basis. These are located at Montreal Street and Highway 401, the INVISTA Centre, at 1350 Gardiners Road, Centre 70 on the corner of Days Road & Front Road, and the Kingston Gospel Temple

at 2295 Princess Street. Improvements to these facilities and the installation of more Park and Ride spaces and facilities on routes that lead directly to Queen's, including Express Bus routes, is recommended.

**Figure 8.2: Park and Ride facility with car and bike parking, Cambridge, UK**

*Source: upload.wikimedia.org*

### *Provide Adequate Shelters and Secure Storage at All Transit Stops*

Shelters should be provided at as many stops as possible along public transit routes for the benefit of AT users. These shelters should be covered and walled units with integrated benches, and should be located on a concrete pad that connects to adjacent sidewalks. Specific design components should be based on the highest specifications found in Kingston Transit's (2012) Accessible Transit Services Handbook, so as to ensure accessibility. These bus stop improvements will also allow individuals to wait for buses in comfort and with protection from inclement weather. The added amenity will make the commuting experience more pleasant and will encourage individuals to wait for public transit at the stops instead of choosing non-AT options.

The City of Kingston or third party companies similar to those with whom the City currently has contractual agreements could implement the installation of these shelters.

Locations in need of improved shelters should be identified and catalogued. This process would then lead to the placement of shelters at all public transit stops that do not provide adequate shelter, with high-use locations prioritized.

Secure, well-lit storage facilities should also be provided at transition points along AT commuting routes, including transit stops. This can involve the provision of bicycle and pedestrian gear storage lockers, bike racks, or caged storage areas at public transit stops, near Park and Ride facilities, or anywhere where

there could be a transition in the mode of transportation. An increase in these amenities at transition points allows for more convenient mixing of transportation modes and encourages AT use for complete journeys to and from work.

These installations could be implemented by the City of Kingston at sites where shelters are also installed, or at transit stops that are lacking an adequate amount of secure storage.

**Figure 8.3: An Example of Bus Shelter, Waterloo**
*Source: i576.photobucket.com*

### *Provide Clear, Adequate, and up-To-Date Information at Each Transit Stop*

Having accurate and relevant information available to those using public transit is paramount in generating and maintaining ridership. While current information is standardized and comprehensive for the routes available, more detailed information could assist riders, and especially riders using multimodal travel, in ensuring the ease, comfort, and safety of their commute.

This recommendation is specifically tailored to Kingston Transit, as they are responsible for the information provided at bus shelters. Kingston Transit might consider working with and seeking advice from organizations, institutions, and neighbourhood groups, who would be knowledgeable about and interested in the surrounding amenities, facilities, and infrastructure, and willing to gather and update information.

The information provided should cover not only transit information, but should also include maps of the immediate areas showing where the nearest bike racks, secure storage, pedestrian facilities, and parking lots are. Wherever possible, real-time bus tracking and scheduling should be made available to transit riders, either from bus shelters, wherever possible, or in the form of a mobile device application. The availability of commuting information is especially important for those using more than one mode of travel combined with transit, as they may have more intricate travel patterns and routes.

This information should be standardized at all bus stops, with a particular urgency for implementation at those stops that see high volumes of riders. Additionally, particular attention should be given to those stops within a two-kilometre radius of campus, those at Park and Bike/Ride/Walk facilities, and major transfer points for the transit system.


**Figure 8.4: Transit Information**
*Source: Google Maps Mania (2009) googlemapsmania.blogspot.ca*

### *Leave Bicycle Racks on Transit Buses Year-Round*

Having the option of combining bicycling and public transit can be a feasible and convenient means of transportation, and can accommodate people living both closer to and farther away from the University campus. Keeping bicycle racks on for the full year, as opposed to removing them during the winter months, ensures greater flexibility and convenience for those riding their bicycle year-round.

Kingston Transit is the operator of the transit buses on which this infrastructure is provided, and therefore, this recommendation is designed for their consideration.

**The bus bicycle racks that are available in the spring, summer, and fall, should be available to cyclists on all buses in the winter as well. While the new Express Buses will have bicycle racks all year, buses running on the regular service schedules should also provide the same amenities to transit passengers.** A user-friendly system that allows people to easily and quickly attach their bicycles to a bus is ideal to minimize service schedule delays and the required skills of the riders or the driver to operate the infrastructure. However, if the passenger requires assistance, drivers should be willing and able to provide help. Similarly, as practiced in by the Grand River Transit “Bus ‘n’ Bike” program, people should be allowed (space permitting) to bring bikes onto the bus if the racks are full (Region of Waterloo, 2013).

## 8.2. Programs

### *Facilitate a Discounted Transit Pass For Queen's University Employees*

A discounted public transit pass for university employees would encourage the use of public transit in conjunction with other modes of AT. There are a number of forms that this program could take. The University could provide a discounted monthly bus pass for employees, which is the approach taken by the University of Guelph. Another option is for the University to partner with the City to offer a discounted bus pass, similar to the pass provided at Dalhousie University. A third approach, which is used at Cornell University, is to provide employees with a bus pass and a small number of single-use parking passes if they agree to relinquish their car parking permits.

This type of program would be implemented by the employer, Queen's University, and available to all of its employees.

**The provision of public transit passes to Queen's employees would be a logical extension of the discounted passes that are provided to Queen's students as part of their tuition. This would also resemble programs currently offered by other large employers, like Kingston General Hospital, and demonstrate leadership in sustainable transportation.**

### *Develop Opportunities for Flexible Parking*

**Flexible parking would entail a parking pass or parking system that does not lock employees into a contract through which financial losses are incurred if parking is not used. Two options could replace the current system. The first would be a continuation of the parking pass system, but with the introduction of greater flexibility in the amount of parking required. This program would provide an alternative from the standard flat rate parking pass by only charging drivers for days that they make use of a parking space**. Key informants throughout the research process indicated that for those who have a parking pass, using other modes of transportation makes them feel as though they are wasting the money spent on the pass. Creating a system that allows people to decide how many days a week they would like to drive would eliminate some of this frustration and remove a potential perceived financial barrier to AT. In fact, such a pass would provide commuters with a financial incentive to park fewer days of the month and make more use of AT options.

**Alternatively, a more systematic change could involve a switch to a fee-for-parking system in which passes become limited for special circumstances, are phased out, or are discontinued altogether.** This type of system, while very different from the current system, would have several benefits. It could provide the greatest amount of flexibility for both occasional and regular drivers and make the parking system more efficient. If coupled with technology like real-time signs showing the availability and location of parking spaces

and efficient, user-friendly parking tariff machines, this parking system could improve the ease with which drivers on campus are able to park (Teodorovic and Lucic, 2006; Scheidt & Bachmann, 2013). This system would also allow the rates for parking to be more easily controlled and adapted based on variables such a peak usage times, special events, or seasonal variation. Again, with the aim of introducing greater systematic flexibility, other benefits could include improved efficiency of space-finding, and even increased use of AT and multimodal options.

Having either of these types of flexibility in the parking system may encourage some employees and students to consider and use AT or transit options at various times over the course of a week, month or year.

**Queen's University Parking Services should implement a more flexible parking program, using either of the above options. The implementation of such a program would apply to the parking spaces currently available on campus, and would not involve substantial infrastructure alterations.** Physical changes that may be necessary include new signage and booths for purchasing passes.

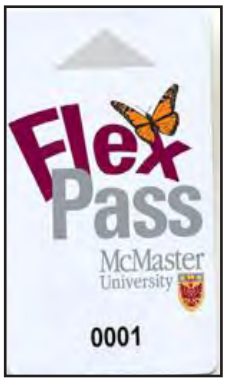



**Figure 8.5:**
**Flexible parking permit, McMaster University**
*Source: mcmaster.ca/sustainability/*

### *Offer a Guaranteed Ride Home Program*

**A Guaranteed Ride Home Program is intended for individuals using an active mode of transportation, including transit, for their commute.** Once registered with the Guaranteed Ride Home Program, individuals can take a taxi in the case of a valid emergency while at the workplace, such as a sick child that need to be taken home from school. Following the emergency ride, receipts are submitted to the program for full reimbursement. This program is intended to encourage the use of an active mode of transportation for those individuals who are reluctant to leave their car at home.

This recommendation is directed at Queen's University, which could develop its own program to allow employees to utilize the benefits and reduce the number of cars brought to campus.

The program has been successfully implemented at a number of similar sized and situated universities, including Boise State University and Dalhousie University (see Precedents section), and at local workplaces including the City of Kingston. **Queen's should follow this established model and should also consider providing a limited number of single-use bus passes to registered users.** This will provide a more sustainable and active alternative to taking a taxi, and may suit the need of some users.


**Figure 8.6: Guaranteed ride home program, Dalhousie University**
*Source: dal.ca/content/dam/dalhousie/pdf/sustainability/smart-trip/*

## 8.3. Policies

### *Do Not Subsidize Motor Vehicle Parking*

One of the most effective and direct ways to create a disincentive for the use of private automobiles is to make driving more expensive. While drivers incur many costs, such as car maintenance, fuel costs, and the purchase price of the car itself, these costs are more difficult to control and not simple to change. The cost of parking, however, is more easily adaptable and an increase in the cost of parking can have a substantial effect on the number of people who choose to drive private automobiles. The marginal cost of providing new parking spaces on the main campus is expensive due to the cost of land and construction. The current rate charged by the University does not cover this expense. Parking fees should be raised and new parking demand should be strongly discouraged. The University's budget should not subsidize the cost of parking.

Tying the cost of parking to transit by ensuring that it is more expensive to drive and park than it is for other modes of travel will eliminate the financial incentive to drive, and correct the perception that taking transit is actually more expensive.

Both Queen's Parking Services and Kingston Parking Operations can play a role in increasing the direct financial burden of parking in relation to transit and active travel. Queen's Parking Services can address parking costs directly on campus, while Kingston Parking can determine appropriate parking fees for the University's surrounding areas. The two departments can coordinate efforts to ensure that a reasonable and effective system can be implemented.

**Based on the cost of a monthly transit pass, Queen's Parking Services and Kingston Parking Operations can jointly or separately set monthly rates for parking that are adequately higher than the cost of a monthly transit pass.** Should the cost of a regular monthly transit pass fluctuate, the price for a monthly parking pass can be adjusted appropriately.

This policy is logical for Kingston because the transit system has high service levels that cover many parts of the city, and has recently expanded this with the implementation of the Express Bus Routes. It is particularly feasible for the University, which is one of the most serviced areas in the city.

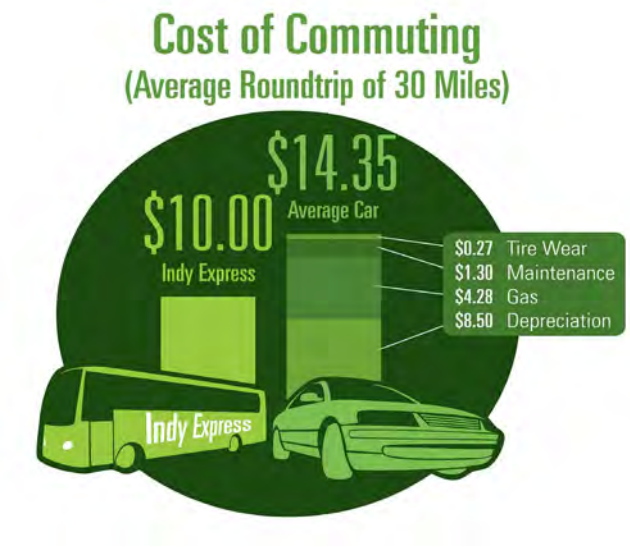



**Figure 8.7: Cost of Commuting**
*Source: Central Indiana Transportation Authority (2011), cirtaconnects.blogspot.ca*

### *Increase Marketing of Park and Ride/Bike/Walk*

The Park and Ride/Bike/Walk program can be marketed as a viable alternative to driving and parking on campus. A marketing campaign could increase awareness about AT and multimodal travel options, encouraging more people to engage in travel that involves a greater level of physical activity.

As parking availability on the University campus declines due to construction of new buildings, and as the University continues to grow, a lack of parking space and options may reduce the number of people that are able to commute directly to campus by car. Marketing Park and Ride/Bike/Walk as a convenient, secure, and appealing option for drivers can encourage people to consider other viable travel options, and relieve some of the demand for parking.

**Queen's University Parking Services, Kingston Transit, and Kingston Parking Operations can all be key players in marketing the existing programs and travel options, as well as newly opened and planned expansions. Coordination between departments is ideal, as this will allow greater flexibility for users, increase utilization, and may improve efficiency for the programs overall.**

Highlighting the combination of financial and logistical incentives available to users, and raising awareness about the numerous health and financial benefits of active commuting can change general perceptions of AT and multimodal options. Providing information about how the Park and Ride/Bike/Walk program works and outlining why it is ideal for people commuting to campus can generate buy-in from both students and employees. Branding might also give the program more traction, as widespread recognition of the program could be a large part of attracting and retaining users.

The Park and Ride/Bike/Walk program is beneficial for those commuting to many parts of the city, and marketing can emphasize the efficiency, safety, and convenience of the program for users in numerous neighbourhoods. Marketing can target the University's population, including students and employees, with a particular emphasis on employees, given that a greater number of employees reside in areas that require multimodal travel options. Similarly, marketing that highlights the program's facilities that are closer to campus could be critical in initially gaining support.


**Figure 8.8: Park and Ride Sign**
*Source: Manual of Traffic Signs (2010), trafficsign.us*


**Figure 8.9: Park and Ride Parking Lot**
*Source: Commute Connection (2009) commuteconnection.com*

# 9

# IMPLEMENTATION & PARTNERSHIPS

## 9.1. Implementation

A range of stakeholders are required to carry out the recommendations presented in this report. Queen's University and the City of Kingston bear primary responsibility for most areas of improvement, as they have the experience, knowledge, jurisdiction, and capacity to implement. Many of the recommendations will require the formation of partnerships between these, and additional, stakeholders.

Figure 9.1 provides a summary of all walking, cycling, and multimodal recommendations. These have been organized by mode, and then by policies, programs, and infrastructure within each mode type.

All recommendations have also been categorized on the basis of the implementation period, which includes short-term and long-term initiatives. These are based on the level of resources required and the level of delay inherent in the specific implementation process. Short-term initiatives are those that likely require fewer resources and level of delay. Long-term initiatives are those that will take more time to implement, due to a higher level of funding and other resources required, a lengthy installation period, procedural or political delays, or the necessity for a phased approach to implementation.

**Figure 9.1: Implementation Table**

| RECOMMENDATIONS | SHORT-TERM | LONG-TERM |
|---|---|---|
| **WALKING** | | |
| Infrastructure | Wayfinding, Maps, and Signage; Street Lighting Improvements; Traffic Calming Measures | Pedestrian Crossing Improvements; Wider Sidewalks; Pedestrian Accessibility Enhancements |
| Programs | Walk-to-Work Programs; Pedestrian Education Programs | Community Clean-Up Programs |
| Policies | Sidewalk Maintenance; Sidewalk Snow Removal | Lobby Ontario Highway Traffic Act; Mixed Land-Use and Urban Design |
| **CYCLING** | | |
| Infrastructure | Improved Bicycle Parking (Secure and Covered); Bike Lanes; Do-It-Yourself Bike Repair Stand | Bike Boxes; End-of-Trip Facilities; Bicycle Signals; Bike Boulevard Network |
| Programs | Cycling Promotion Campaigns; Cycling Workshops | On-Campus Bike Share Program; Bike Registration Program |
| Policies | Bike Lane Maintenance Policy; Snow Removal from Bike Lanes and Parking Areas | Ontario Cycling Strategy; Lobby to Promote Cycling in Ontario Highway Traffic Act |
| **MULTIMODAL** | | |
| Infrastructure | Transit Stop Linkages for Pedestrian and Cyclists Using Transit; Transit Shelter Information | Transit Stop Design and Storage; Increase Number of Park and Ride/Bike/Walk Facilities; Year-Round Rack n' Roll |
| Programs | Employee Public Transit Pass; Guaranteed Ride Home Program | Flexible Vehicle Parking Program |
| Policies | Market Park and Ride/Bike/Walk | Eliminate Subsidization of Vehicle Parking on Campus |

### 9.1.1. *Ten Key Recommendations*

A comprehensive catalogue of 38 recommendations including policy, program and infrastructure items was compiled. Every recommendation addresses one or more facets of encouraging and facilitating AT, and is an important component of the comprehensive strategy. From this list, ten recommendations have been selected as Key Recommendations that we believe could have the most impact at Queen's University. Of these ten, some can be implemented relatively quickly (in fact, for a few, significant progress has already been made), while others will require phasing and longer-term time frames. Many will require on-going collaboration between a variety of organizations including Queen's University, various City of Kingston departments, KCAT, KFL&A Public Health, and others. The 10 Key Recommendations are listed as they appeared in the chapter and are not arranged by priority.

- **Make Pedestrian Crossing Improvements**
- **Implement Traffic Calming Measures**
- **Encourage Participation in Walk to Work Programs**
- **Lobby for Changes to the Ontario Highway Traffic Act**
- **Improve Bicycle Parking on Queen's Campuses**
- **Promote Cycling Awareness**
- **Improve Maintenance of Designated Bike Lanes**
- **Create Transit Stop Linkages**
- **Facilitate the Provision of Discounted Employee Public Transit Passes**
- **Eliminate the Subsidization of Motor Vehicle Parking**

For those key recommendations that focus on infrastructural changes, which include pedestrian crossings, traffic calming measures, bicycle parking and transit stop linkages, various proposed locations have been identified for implementation as shown in Figure 9.2. These locations are intended to provide examples of possible locations and are not intended to be an exhaustive list.

**Figure 9.2: Possible Implementation Locations**


Transit Stop Linkages

Improved Bicycle Parking

Pedestrian Crossing Improvement

Traffic Calming Measures

*Pedestrian Crossing Improvements*

Five potential pedestrian crossing improvement sites have been identified. At present, there is a pedestrian courtesy crossing at King Street and Collingwood Street. Although the courtesy crossing has significantly improved the safety at this crossing, a pedestrian activated signal at this location would have a much greater impact. The intersection at Union Street and University Street has been identified as a good location for a pedestrian scramble. The pedestrian scramble prioritizes the flow of pedestrians over the flow of cars, by halting all traffic in intervals to allow pedestrians to cross. Given the high foot traffic at this intersection, a scramble crossing would be preferable. New pedestrian crossings are suggested for Union Street at Division Street, Barrie Street at Court Street, and Barrie Street at Bagot Street. All of these intersections see very high levels of pedestrian traffic and are difficult to cross at and as such, would benefit from pedestrian crossing signage.

*Transit Stop Linkages*

Three transit stops on Queen's University campus could benefit from improved linkages. Most notably, the transit stop situated on the south side of Union Street at West Campus is very dangerous for pedestrians to access. As the majority of users are located on the north side of the street, transit users are required to cross mid-block. This becomes especially dangerous when students are running to catch the bus. Second, the transit stop located on main campus on Union Street outside of Goodes Hall is also hazardous for pedestrians. Again, students are travelling from the south side of the street to get to the bus stop and there is no designated crossing area on Union Street between Albert Street and University Avenue. Lastly, the bus stop on the north side of Stuart Street that serves both Queen's University and Kingston General Hospital is also very dangerous for pedestrians to access. To reach the stop from the west side, pedestrians must cross on the road, in front of the parking garage entrance. There is no sidewalk and it is difficult to see whether or not cars are exiting the parking garage. Improved access to all of the above mentioned transit stops are required.

*Traffic Calming Measures*

Traffic calming measures are recommended for Union Street between Albert Street and Barrie Street. As this section of Union Street crosses through main campus, it is an area of high pedestrian foot traffic, particularly as students travel to and from class across campus. Motor vehicles travel too fast through this area, making it dangerous for pedestrians crossing, as well as cyclists. Another area identified for traffic calming measures is King Street between Collingwood Street and West Street. Although considered an arterial in the Official Plan, the speed at which cars travel along this road detracts from activity at the waterfront and inhibits connectivity from Queen's campus to the waterfront.

*Improved Bicycle Parking*

Several sites on campus have been identified as possible locations for more bicycle parking. One possible location would be around Leonard Field, to serve the numerous first year residences in this area. Goodes Hall could also benefit from more bike parking as the bike racks are often full and bicycles are regularly parked illegally along the fence. Opportunities for

sheltered bicycle parking may also exist outside of Stauffer Library, along the east side of the building, or outside the Athletics and Recreation Centre (ARC), and the Biosciences Complex.

All of these examples are intended to help readers envision changes that could take place to greatly enhance the active transportation environment at Queen's University. These do not comprise an exhaustive list of all implementation locations or initiatives.

### 9.1.2. *Advice On Implementation From Engineering*

To better understand how the recommendations contained within this Report are attuned with the City of Kingston's plans for AT infrastructure development, we interviewed an Engineer at the City of Kingston. This opportunity, although heavily focused on cycling, provided insight into the feasibility of various recommendations and a better understanding of the direction the City is headed. The following is a description of the conclusions from this interview.

One of the greatest challenges with implementing cycling facilities and infrastructure is the limited space in the Right–of-Way (ROW). Often, there is not enough space to accommodate sidewalks, on-street parking, and bicycle lanes together. Buffered or segregated bike lanes require even more space, and are therefore even more challenging to implement. For example, implementing bike lanes and wider sidewalks along University Avenue north of Union required the removal of on-street parking. One solution to this problem is to acquire more land, however this is an expensive and potentially unrealistic option. If more land is acquired to enable a widening of the ROW, existing infrastructure such as curbs, gutters and utilities must be relocated, which is also an expensive process.

Segregated bike lanes pose numerous additional challenges, as they have a specific set of operational requirements. Many concerns revolve around how the municipality will maintain these facilities. Snow removal and street sweeping require additional personnel and equipment- a different level of service in order to ensure they are safe for cyclists to use.

Kingston's approach to implementing cycling infrastructure has so far focused on "quick win" projects, or rather, implementing projects that can be put in quickly and in sizeable quantities. For example, one project has been the establishment of designated bike lanes from Cataraqui Woods along Centennial Drive to Bath Road, creating a linkage from the west end to the downtown core. As such, Kingston has reached a point where the remaining project options are on a smaller scale and more expensive. Many of these smaller projects are necessary to build out connectivity, but will require significant investment. For these types of projects, the City looks for multi-wins where opportunities exist to improve AT facilities as well as other City infrastructure such as water, sewer, transit etc.

Interestingly, Kingston is looking at a pilot project to implement bike boulevards along Frontenac Street. Frontenac Street has been selected because it connects green spaces, Memorial Park and Victoria Park, highlighting that cycling facilities are not

necessarily just for utilitarian users, but also recreational users too. Earl Street has also been examined as an option for bike boulevards, but this street poses more challenges, with its high number of four-way stops and considerable cross-street traffic.

A new form of infrastructure that will benefit cyclists will soon be appearing in Kingston at signalized intersections. At the present time, signalized intersections operate on a sensor loop system; cyclists do not have enough metallic mass to activate the sensor and therefore go undetected. These sensor-loop intersections will gradually be switched over to camera-activated systems. The cost of this technology has declined significantly in recent years, and is now a feasible option for the City. The benefit of cameras at signalized intersections is that they will be able to detect cyclists. However, it should be noted that there are over 175 signalized intersections in Kingston, so the transition to this technology will take time.

The City acknowledged that for AT policy at a provincial level, Ontario is 'behind the times'. The City of Kingston is part of a working group at the Provincial level, which is actively trying to lobby for changes to the Highway Traffic Act. Changing the Highway Traffic Act is in the best interest of municipalities for building infrastructure and lowering costs. If the Highway Traffic Act is changed to require cars to stop for pedestrians, the existing courtesy crossing infrastructure would remain useful, and only a sign change would be necessary to conform. This is a much less costly alternative for pedestrian crossings than installing signalized pedestrian activated signals or pedestrian crossovers, which can cost upwards of $200,000 per crossing.

The City's engineer suggested that the lack of AT program and policy development in Kingston as a larger problem than missing infrastructure. The City can continue to build AT infrastructure, but only to a point, and more needs to be done to change behaviours. Kingstonians need to be convinced that there are other means of commuting than solely by car. Opportunities exist for multi-modal trips as well as AT trips, and repetitive messaging is required to engage the community in these types of alternatives. In his view, only when members of the community see AT as a common choice for other Kingston residents, will they themselves engage.

Moving forward, the City of Kingston is looking at ways to move from bronze recognition to silver recognition for Bike Friendly Communities. The City consulted with the mayor of Madison, Wisconsin, who offered some advice on how this can be done in Kingston. Although it was recognized that a number of infrastructural improvements must still be made, public education and communication should also play a role. The Mayor of Madison emphasized that dialogue with community partners is necessary, and one suggestion was that this might take the form of a committee composed of members from different backgrounds. As such, the City is considering creating a working group that is focused on Transportation Demand Management, which would include AT.

Lastly, with municipal elections to be held next year, the City will be looking at presenting the new council with a four-year infrastructure plan. Although the City does take an asset management approach for infrastructure renewal, there is still

opportunity for new infrastructure. As such, this report on an AT strategy will be able to play a role in informing the four-year infrastructure plan.

### 9.1.3. *Quick Wins*

Given the complexity and high cost to some of the recommendations provided, a few quick wins have also been identified. A "quick win" is an improvement that is visible, bears little cost, has immediate benefit, and can be delivered quickly after the project begins. Quick wins provide project momentum in the early stages of strategy implementation. The following have been identified as opportunities for "quick wins" at Queen's University:

- Create a webpage on the Queen's website that celebrates and promotes AT. The site can feature current initiatives and promotions, identify end of trip facilities on campus, and provide way-finding maps, among other things.

- Install more bike parking on campus. Bike loops provide one low cost option while locating bike racks under overhangs provides a low cost option for covered bicycle parking.

- Install a pilot bike repair stand on campus. This is a low cost bike resource that not only benefits cyclists but also acts as a marketing tool to raise awareness about cycling on campus.

- Start a small bike share program. At the most basic level, a bike share program can operate using just a few donated bicycles. As interest grows, the program can be expanded.

- Install small signs along bike routes and walking routes that advertise the City's customer service number, which community members can use to call in road and sidewalk maintenance issues. The City doesn't necessarily know of issues immediately unless members of the public report them.

- Install way-finding signage on campus with walking times and distances to key destinations (i.e. west campus, downtown, etc.).

- Advertise and promote student participation in the Student Maintenance and Resource Team (SMART) to help keep the university district clean for all users.

- Put up posters around campus to remind pedestrians of their responsibilities and the rules of the road.

- Offer employees that commute to Queen's University campus by active transportation a "Guaranteed Ride Home" in the event of unexpected circumstances or emergencies.

These are just a few possible initiatives that could be implemented by Queen's University and the City of Kingston to kick start improvements to active transportation use at Queen's.

## 9.2. Key Stakeholders and Partnerships for an Active Transportation Strategy


In order to implement recommendations that promote AT, it is critical for Queen's University to establish responsibilities for relevant University departments, including the Sustainability Office, AMS, and Queen's Parking Services, as well as develop strategies for effective coordination. It is equally important for Queen's University to collaborate through partnerships with other key stakeholders, such as, Sustainable Kingston, and various departments of the City of Kingston, including Public Works and Kingston Transit. The following points illustrate major partnership opportunities for Queen's University:

- Develop partnerships with the City of Kingston to create AT-supportive infrastructure in and around campus, such as pedestrian crosswalks, bike lanes, streetlights, etc.

- Develop partnerships with Kingston Transit to optimize and increase local transit services, and develop joint transit and service plans for the Queen's community. This could include a discounted bus pass program for University employees.

- Develop partnerships with Sustainable Kingston and KFL&A Public Health to implement AT programs in and around Queen's University.

# 10

# CONCLUSION

In this report, we have outlined the benefits and key determinants of AT, reviewed the context of AT at Queen's University and in the City of Kingston, examined best practices from other Canadian and international universities, and developed a series of planning and design guidelines for promoting AT amongst the Queen's community. The ultimate goal of this report is to increase the number of active commuting trips to, from, and on campus by encouraging more faculty, students and staff to incorporate AT into their daily routine. This can be achieved through policies, programs, and improvements to the current infrastructure for walking, cycling, and multi-modal transportation.

The recommendations of this report were based on a number of sources, including background research, a review of best practice examples from other universities, interviews with key stakeholders, and findings from the mid-term workshop. This combination of data collection methods reinforced our understanding of active and preferred routes and provided valuable insight into effective AT strategies for Queen's University. The recommendations are intended to provide Queen's University with a comprehensive AT strategy that covers improvements to infrastructure, programs, and policy that can aid in improving existing conditions to make them safer for AT users and to increase AT use by faculty, staff and students. Although directed at Queen's University, the recommendations are designed to be adaptable for other large employers in the Kingston area and surrounding region.

Moving forward, the Kingston community beyond Queen's University must recognize the connection between the built

environment and human health. To improve AT across the city, planning should be integrated with existing planning and development activities across all municipal departments, including Public Health, Transportation, Public Works, and Engineering Departments. In addition, collaboration and partnership with other key community groups and local organizations are also critical for effective implementation of the AT strategies. Ultimately, supporting AT development in the City meets multiple planning objectives, improves community health and well-being, is both economically and environmentally sustainable, and is a prominent issue for many community groups, local organizations, and government departments. If used appropriately, the recommendations of this report can help create a healthy, sustainable campus and city.

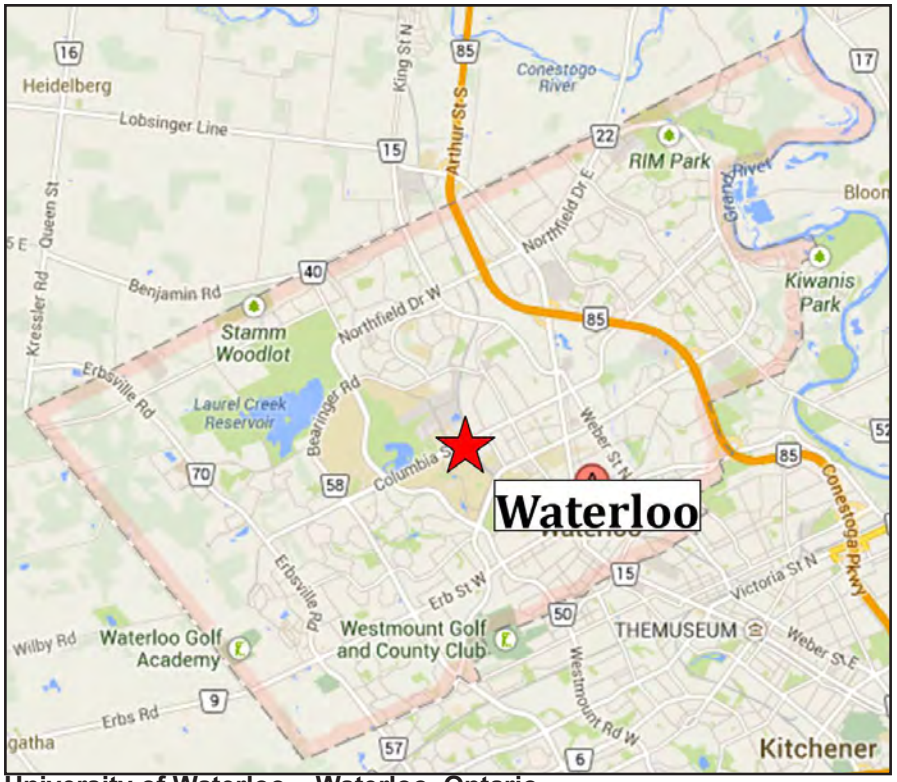
# APPENDICES

# APPENDIX A:
# CONTEXT MAPS OF BEST PRACTICE PREDEDENTS

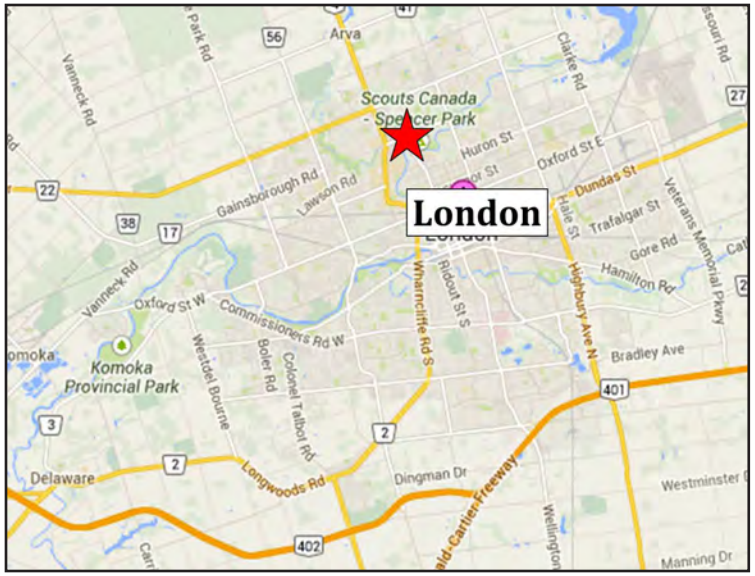

**Dalhousie University – Halifax, Nova Scotia**


**McMaster University – Hamilton, Ontario**


**University of Guelph - Guelph, Ontario**




**University of Waterloo – Waterloo, Ontario**



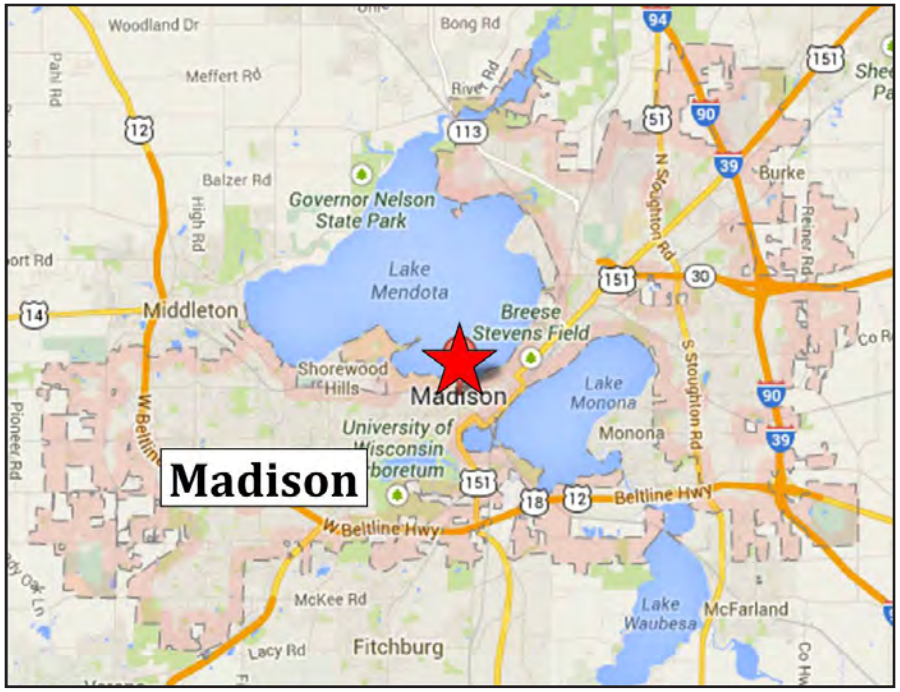

**Western University – London, Ontario**


**University of Cambridge – Cambridge, England**


**Boise State University – Boise, Idaho**


**Colorado State University – Fort Collins, Colorado**


**Cornell University – Ithaca, New York**




**University of Wisconsin – Madison, Wisconsin**

# APPENDIX B:
# DETAILED SUMMARY OF PRIMARY RESEARCH FINDINGS

## Workshop SWOT Analysis (October 23rd, 2013)

The SWOT (Strengths, Weaknesses, Opportunities, and Threats) Analysis exercise asked workshop participants to identify the strengths, weaknesses, opportunities, and threats (or challenges) that can be associated with active commuting to and from Queen's University. The participants were given a brief explanation of what a SWOT analysis is designed to cover, and examples for each category. Three rounds of analysis were conducted with different group members for each. Throughout the rounds, significant reoccurring themes emerged, and many participants also identified elements that were relevant to or associated with their professions or positions.

### *Strengths*

*Critical Mass of People*

One of the most commonly identified strengths, in the AT context of Queen's University, was the number of people already walk and bicycle to the University. Many participants indicated that they believed this to be one of the most important strengths for AT at Queen's, and noted several benefits associated with this trend. The crowds that travel on streets around the campus, comprised primarily of students, were thought to foster a sense of safety in creating a clear pedestrian presence. Participants noted that this presence forces vehicular traffic to be aware of others using the roads, and even makes drivers more cautious and less willing to travel through or around the campus at high speeds. A number of participants cited University Avenue as an example of this phenomenon, with an exceptionally high number of people travelling by foot or bicycle along or crossing the street at peak hours. Participants thought that this situation creates a critical mass in which the pedestrian becomes a paramount player in traffic dynamics, and fosters a culture of active travel on the campus and in the surrounding areas.

*Location and Connectivity of Campus and Surrounding Areas*

The location of Queen's University within the city and the ease of travel between the campus and surrounding neighbourhoods or destinations was also cited as a major strength for AT. The campus' location within Kingston and proximity to the downtown core and other amenities was thought to shorten trips and make AT more feasible. Similarly, within the neighbourhoods surrounding the campus, the variety of land uses was thought to create more destinations in close proximity to the University, making active commuting a more convenient and viable option. Participants also noted that elements of neighbourhood and street design encouraged AT, highlighting that the grid system of the older neighbourhoods around campus creates numerous route options for AT users traveling to and from the Queen's. The compact design of Main Campus was also seen as a strength for AT, as travelling within the campus can often be done more easily on foot or bicycle.

*Recent Improvements to Cycling and Transit*

In all three rounds of the SWOT analysis, workshop participants agreed that walking on campus and to or from the university is common for students and University employees who live in close proximity to Queen's. Participants indicated that the recent progress and improvements in cycling infrastructure and transit show a growing recognition of and willingness to address the

needs of those who live outside a reasonable walking distance. Individuals referenced the existing and recently implemented bike lanes on Union Street and University Avenue as prime examples of this. Likewise, the increased frequency and number of route options for transit service that runs through or around the campus (which was noted to be the highest in the city), was seen as a significant benefit for AT users who need to travel longer distances.

***Weaknesses***

*Traffic Safety*

Safety of pedestrians and cyclists, while interacting with vehicular traffic on campus, was one of the most emphasized concerns that participants identified as a barrier to AT. The groups noted that the congestion and nature of traffic on campus at peak hours during the day poses a risk for all travel modes. This traffic, coupled with the large volume of people that walk or bicycle around, to, and from campus at the same times, creates a major traffic safety hazard in which AT users were seen by participants as the most vulnerable. Additionally, traffic on the surrounding roads, and specifically Brock Street, Johnson Street, Sir John A. Macdonald Boulevard, and Princess Street, was cited by participants as a weakness that prevents people from using AT. Participants stressed that having to travel on or cross those major roadways by foot or bicycle is a deterrent to using AT, and decreases both the perceived and actual safety of AT users.

*Winter Conditions*

Participants felt that due to an anticipated decrease in the number of people who would use AT, the maintenance and priority given to the existing AT infrastructure decreases in the winter. Snow removal for bike lanes and sidewalks both on campus and in surrounding areas was a major seasonal barrier conveyed by the participants. Some participants noted having seen snow ploughed into bike lanes or sidewalks around campus, forcing pedestrians and cyclists into the road and putting them at greater risk of a collision with vehicular traffic.

*Condition and Lack of Infrastructure*

The state and lack of infrastructure were common themes throughout the analysis of weaknesses. Many participants noted the poor condition of various roads and sidewalks on and around campus, citing potholes, cracks, bumps on the roads, chipped edges, uneven terrain, and garbage or broken glass on sidewalks as major barriers to AT. The absence of sidewalks in some locations and the condition, discontinuity, and lack of cycling infrastructure (for example, the bike lanes along Union Street that end at Sir John A. Macdonald Boulevard) were also identified as crucial weaknesses in the AT context at Queen's, and as areas in which greatly needed improvements could have significant benefits.

*Lack of End-of-Trip Facilities*

One of the most underscored weaknesses that were brought forward in the analysis rounds was the lack of end-of-trip facilities for AT users, and particularly for cyclists. While amenities such as showers and change facilities are available in the Athletics

and Recreation Centre, participants suggested that many other amenities that would likely facilitate AT are not present in enough locations or numbers to affect the majority of users. Participants expressed interest in seeing improvements in end-of-trip facilities that would address the most pressing concerns of AT users. One such suggestion was the implementation of not only more bicycle racks and bicycle parking structures, but the construction of secure facilities that would address the issue of bicycle theft on campus. Participants indicated that neither bicycle parking nor bicycle theft issues are currently being addressed, and that this is a major deterrent for current and potential AT users.

***Opportunities***

*Building on Existing Strengths*

Some of the first opportunities identified by the participants involved using the existing assets of the university, neighbourhoods, and city to invoke change and benefits for the state of AT. Several participants noted that the large and growing concentration of students in the neighbourhoods around the Main Campus could improve the potential for AT and, according to one participant, could even spur increased attention and infrastructure upgrades in the area. On a broader scale, participants thought that the culture of AT found on and around Main Campus could serve as an example, spreading from the campus to the entire city. Participants indicated that the City could invest in making Main Campus AT-friendly, using it as a springboard for other projects in the rest of Kingston, as well as a platform for increasing its reputation and prominence as a cycle-friendly city.

*Growing Partnerships*

Participants also identified opportunities in partnering with departments and services at the City of Kingston and Queen's University. One such partnership, which was identified in all three rounds, could be with Kingston Transit in creating opportunities for mode-sharing between public transportation and AT. Participants noted that Kingston Transit already offers some benefits to AT users, but stressed that a financial incentive, such as a bus pass program, would likely be the most helpful. Similarly, many participants also stressed the importance of also partnering with the Queen's University Parking Department to ensure that mode-share and active modes of travel remain the cheapest, and are economically incentivized. Some participants also saw any improvements to the AT context as potential for organizations and City departments to promote awareness and education about the health and environmental benefits of using AT.

*Influence Growth and Change*

Several timely opportunities were brought forward by the workshop participants that involved capitalizing on current and future plans for change, both within and outside the campus. Many participants saw any current work and action around AT as a chance to connect with the Campus Master Plan, which is being prepared by a private consulting firm. Participants identified this as an opportunity to ensure that concerns of AT users and advocates are identified and explained to those who will be planning for the future of the Queen's University campuses. Likewise, participants noted that opportunities to influence plans of the City of Kingston and private developers (for example, the

Williamsville project) would be beneficial in creating efficient and timely change. AT advocates and organizations could work with the City to identify where and when infrastructure upgrades will be taking place, and strategically use these opportunities to minimize the costs of AT infrastructure alterations.

***Threats***

Several threats to AT improvements, at a variety of political and geographic scales, were voiced throughout the course of the SWOT analysis rounds. Participants identified a range of challenges, from political pushback due to changes in the electoral districts, to business opposition against possible initiatives for less parking. However, two main themes emerged in the discussions: 1) issues with the parking system on campus and 2) a car-oriented mindset of many employees. Most participants agreed that the majority of students use some form of AT or mode-share to commute to and from Queen's University, but that many employees, especially those living in neighbourhoods farther from campus, remain car-oriented in their commute. Participants noted a "car culture" and the perceived ease, comfort, and convenience of commuting by car, especially for those travelling longer distances from within or outside the city. Participants said that people feel more comfortable driving a car, especially if they have limited or no exposure to using AT, live far away from the campus, or would be required to use multiple modes of transportation in their commute.

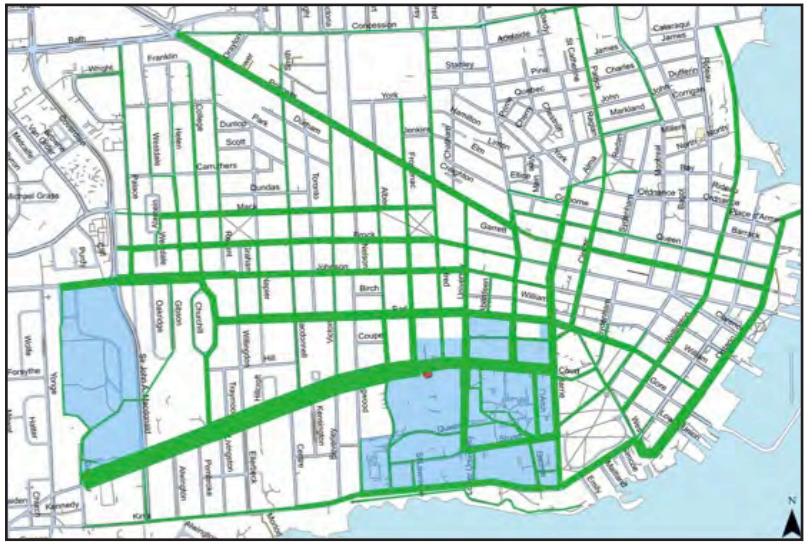
Participants explained that compounding this perceived, and sometimes actual, ease of commuting by car, are the perceived and actual costs and benefits associated with car commutes. The participants thought that commutes for University employees living within the city would rarely take over 20 minutes, and that one of the only major determining expenses calculated by drivers would be the cost of parking. Many participants agreed that the current rates for parking passes are too low, given the enduring popularity of the parking pass system, exemplified by the long waiting list. They also noted a growing trend of people keeping their parking passes even when not using them, for fear of not being able to obtain one again at a later date if necessary. In addition to this inflexibility, participants observed that there are limited options for parking passes, which poses problems for many potential AT users. The current options do not account for the fluctuating needs of commuters, such as seasonal variability or even weekly commuting variability. For example, if an employee wanted to cycle to work two days per week in the summer and fall, there is no pass system that provides incentive for this, or compensates the employee for lost value.

## Workshop Mapping Exercise

During the mapping exercise, participants were asked to discuss their priorities for cycling and walking routes in the study area, and to identify hazardous areas and routes. Group discussions covered a variety of topics regarding route priorities and concerns. Participants were also asked to fill out individual map sheets where they could identify their own preferred routes and areas of concern. The maps sheets also provided participants with space to add commentary. The majority of participants are regular commuter to Queen's, or are experts in the field of transportation and knowledgeable about Kingston AT issues; therefore these maps provide an indication of users personal experiences of the Small Study Area road network. Participants' individual maps were combined to create four cycling, walking and hazards composite maps.

### *Cycling Mapping*

**Cycling Route Composite Map**



*Union Street*

As is clearly visible from the Cycling Routes Composite Map, Union Street was the most popular route among participants, and particularly the segment between West Campus and Main Campus. This is not surprising given the information collected regarding route selection. Discussion on route selection was dominated by the following themes: presence of existing facilities, personal comfort and safety, speed and directness of the route, and network connectivity. While Union Street was identified as an important route for those commuting to the University, the segment of Union Street east of Albert Street was identified in commentary and group discussion as a hazardous area, though still a priority route. This is visible from the slight decrease in prevalence on the Cycling Routes map and slight increase on the Hazardous Routes map.

*Influence of the Street Grid Network on Route Alternatives*

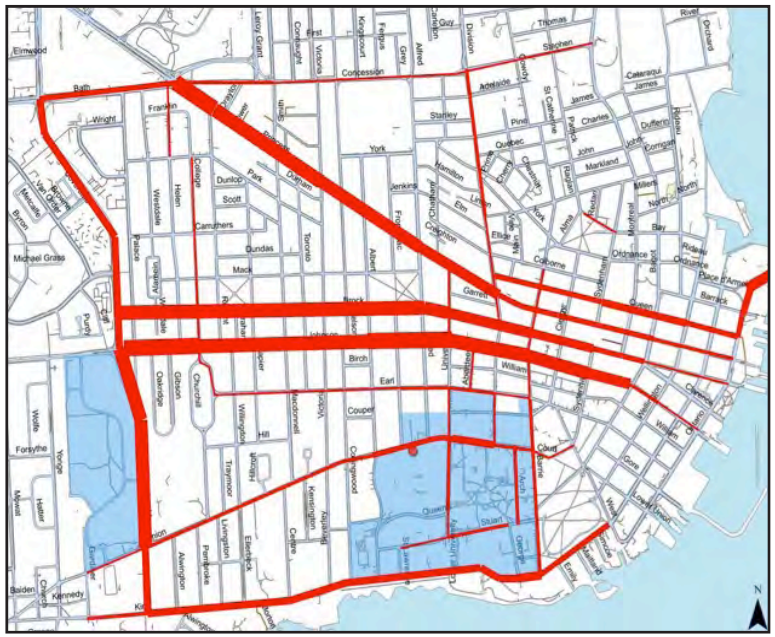
The Cycling Routes map shows a thick web of preferred routes. The interconnected street grid in Kingston's central area allows cyclists greater choice in route selection. This leads to several notable route-selection trends.

*Brock/Johnson Corridor*

The general popularity of the Brock Street and Johnson Street east-west corridors appears to be underrepresented on the map, as route selection was dispersed among these main streets and their flanking local streets, Mack Street and Earl Street. This pattern shows that, given the option, many people prefer to use quieter parallel side streets. The Johnson Street line is thickest closest to the intersection with Sir John

A Macdonald Boulevard, where alternative routes disappear and cyclists are funnelled back to Johnson Street in order to continue travelling westward. This pattern coincides with the substantial identification of Brock Street and Johnson Street as hazardous cycling streets. The Hazardous Routes Composite Map shows that Brock Street and Johnson Street were in fact the most consistently identified streets. Numerous comments speak to dangers, such as poor maintenance, sunken storm grates and heavy, high-speed traffic with limited room.

**Hazardous Routes Composite Map**



*King Street / Ontario Street Corridor*

The King Street / Ontario Street corridor also appears to be influenced by parallel streets. King Street, south and west of Main Campus, was moderately identified as both a hazardous and a preferred cycling route, and to a lesser extent as a preferred walking route. Absolutely no attention was given to King Street eastward beyond West Street at the east end of City Park, where Ontario Street begins. Participants showed a marked preference for moving onto Ontario Street wherever possible. Wellington Street was also identified as a parallel alternative to King Street. In this instance however, it is unclear whether Ontario Street and Wellington Street are more popular because they are safer and more pleasant, because they offer greater connectivity north and east of the downtown, or due to an unidentified reason.

*No Stand-out North-South Routes*

The composite maps do not reveal any clear North-South preferred routes or hazards. This is, at least in part, attributable to the high variety of North-South streets extending from Main Campus, with little variability among the quality of those streets as cycling or walking routes.

*Princess Corridor*

The Princess Street corridor is characterized by both the presence and lack of alternate routes. As a cycling route, Princess Street was not the most identified route among participants, however, relative to surroundings streets, the section of Princess Street in Williamsville was identified as a route with greater use. This may be due to the lack of obvious alternative local streets that would allow a cyclist to travel in the same northwest-southeast direction. The importance of Princess Street to participants diminishes towards the downtown as cyclists choose their preferred north-south route. Interestingly, the Hazardous Routes Composite Map shows the same diminishing trend on Princess

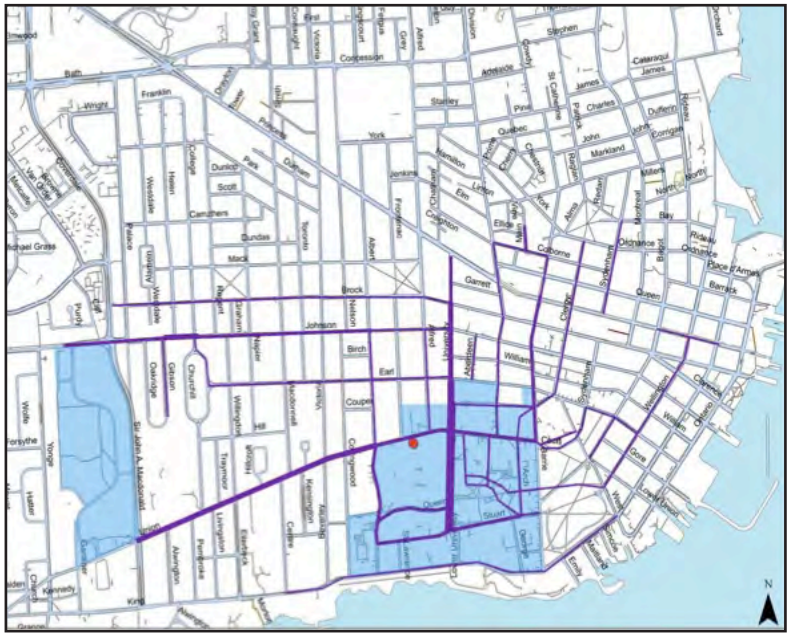
Street towards the downtown, with the most problems closest to the Bath Road and Concession Street intersection.

*Other Corridors*

Sir John A Macdonald Boulevard was heavily identified as a hazardous route, but was not identified by participants as a priority cycling or walking route. The Causeway was heavily identified as a hazard and, to a lesser extent, as a cycling route.

## *Pedestrian Mapping*

**Pedestrian Route Composite Map**



The Walking Routes Composite Map revealed few notable patterns, except for the convergence along the north-south axis of University Avenue. It appeared that people were not as selective in commuting from north to south, likely because of the options afforded by the grid street network. One participant commented that “every street is [a potential route]”, which aptly summarizes this point.

**Hazardous Intersections Composite Map**

Route identification notes, along with group discussion, revealed that feelings of personal safety and comfort could influence preferred walking routes. Some participants expressed a preference for avoiding high concentrations of students in the core of the University area and the associated debris (broken glass, litter, etc.). A good AT strategy for Queen’s should take into account the distinctive nature of the needs and preferences of staff and faculty, as well as those of students. Two major patterns emerged from the Hazardous Intersections Map. The first is the identification of high-traffic, high-conflict intersections, notably Princess Street at Division Street, Princess Street at

Bath Road and Concession Street, Union Street at University Avenue, and Union Street at Sir John A Macdonald Boulevard. These intersections are signalized and all have pedestrian crossing facilities, but participants felt that their high-conflict potential warrants further attention.

The second pattern highlights the current lack of adequate pedestrian crossings connecting both West and Main Campuses and their surroundings. With the exception of Union Street at University Avenue, all of the mapped hazard points around Main Campus indicated areas whether facilities were either entirely missing, ambiguous, or unsafe. One of the major themes in the group discussions was the inadequacy of courtesy crossings. In contrast, two major intersections in the radius surrounding Main Campus are notable omissions: Union Street at Albert Street, and King Street at Barrie Street. These two intersections are the only other signalized intersection with proper pedestrian crossings in the immediate area.

***Other Comments***

Among the variety in commentary and discussion topics, additional recurring themes include:

- maintenance and snow removal
- personal safety concerns such as poor lighting
- the need for higher-quality facilities on busy arterials
- legal issues regarding pedestrian crossings

## Workshop Analysis of Best Practices

A review of case studies and relevant literature has revealed a wide variety of best practices for supporting AT. These approaches, which can be separated into nine categories, were presented at a workshop for discussion and analysis. Participants were asked about examples of specific approaches, contextual suitability, and efficacy of best practices within each category. The results of this process are presented below.

### *1. Pedestrian Pathway Design*

Appropriately designed and maintained pedestrian pathways will encourage their use as routes for commuting purposes. Pedestrian-oriented enhancements can include traffic calming measures, marked and signed pedestrian crossings, pedestrian-activated crossing lights, and continuous, wide walkways with aesthetic enhancements.

A discussion of this best practice category revealed that there is a need for wider sidewalks, and an increase in the number of marked crossing is necessary. Clear demarcation of pedestrian routes and better clarity on the uses of specific campus paths would also assist pedestrians. Car-free zones on the university campus may further improve the pedestrian environment. This could begin with the closure of several internal roads so that they are only accessible for pedestrians, service vehicles and transit buses.

### *2. Walking & Cycling Maps*

Walking and cycling maps are particularly useful for guiding pedestrians and cyclists travelling to campus by identifying recommended routes, commute times, and travel distances to specific destinations. In addition, location maps of bike facilities and services along the routes and on campus are also helpful to cyclists and pedestrians.

Maps were seen as a valuable tool to educate individuals about their route options and facilities along the way. While maps were thought to convey the efficiency of AT, displaying longer commute distances and wait times could deter the use of an active mode. In formulating efficient route options, the quality of the routes must also be taken into account for user benefits to be realized.

### *3. Park & Ride / Park & Bike / Park & Walk*

Park and Rides are a good way to reduce reliance on private automobiles. Installing bike racks on public transit buses can encourage Park and Ride or Park and Bike. Free vehicle parking lots and secure bike storage can allow employees to drive for a certain distance and then take public transit, shuttle buses, bike, or walk to campus.

While a number of individuals utilize the Park and Ride or Park and Bike at West Campus, due to cheaper parking fees, there was an expressed demand for more Park and Ride facilities around the city. Many individuals articulated that it would be beneficial to incorporate secure bike and gear storage at the Park and Ride facilities to better incorporate multiple modes of

transportation. Safety was put forward as a barrier to Park and Ride use, but it was suggested that improvements to lighting and visibility could remedy this.

***4. Bike Share / Bike Rental***

The provision of bicycles for temporary periods of use can encourage their utilization for daily commuting activities. Bikes can be made available on campus for sharing, such that they can be taken from point A, and left at point B. They can also be loaned for commuting around town, or they can be rented on a monthly, semester, or yearly basis.

Our analysis revealed that a bike share or large-scale bike rental is desired at the university campus. This could help students and employees with their commute and movements between various campus destinations. However, appropriate infrastructure and security is needed to support these rental programs. Abandoned bikes were mentioned as a source of rental bikes for such programs.

***5. Cycling Pathway Design***

Appropriately designed and maintained cycling pathways will encourage their use as routes for commuting purposes. Road markings, signage, on-street cycling lanes, separated cycling lanes, bike boxes, bicycle-only paths and multi-use trails can be used to enhance a route and make it more suitable for cyclists.

Clear markings and signage were seen as important features of a cycling pathway. Networks should also be continuous with clear transition points. As well, the level of infrastructure provided must be consistent on all routes throughout the networks. Moreover, there was a desire for an increase in the number of segregated bike boulevard lanes.

***6. End-of-Trip Facilities***

End-of-trip facilities encourage the use of active modes of transportation, such as bicycling, by making them more convenient and attractive. These facilities consist of parking and storage, as well as complementary infrastructure. This can include bike racks, bike lockers, secure caged bike areas, showers, and clothing and gear storage spaces.

A need was expressed for large employers to provide easy and affordable access to shower facilities for AT users. The security of bicycle parking was also found to be of concern for cyclists. Therefore, an increase in the number of secure bike storage areas at convenient locations around campus would be beneficial.

***7. Bicycle Registration System***

All bicycles ridden or parked on campus could be registered with the university, in order to track the number bikes on campus, justify roadway and bicycle facility improvements, deter bike thefts, recover stolen bikes, and help to identify injured cyclists.

Discussion revealed that a bike registration could act a means of monitoring the number of bicycles on campus so that appropriate infrastructure could be provided. The system was also seen as a means of identifying stolen bicycles. However, for the system to be well-utilized benefits must be clearly conveyed to users

and the registration process must not burden those registering. Otherwise, the perceived benefits will be outweighed by the costs of participation.

***8. Flexible Parking & Transit Passes***

A flexible parking system provides employees with a financial incentive to take alternative modes of transportation. This can be done through a flexible parking pass that only charges for the days that employees actually drive to campus, allowing the freedom for them to take public transit or other modes of AT. Partially- or fully-subsidized public transit passes can also be offered if employees are willing to relinquish their parking permits. Limited numbers of one-day parking permits are granted in case employees need to bring a car to campus occasionally.

Discussions surrounding passes revealed that there is a need for more flexibility and options. A flexible automobile-parking pass was seen as a viable solution. Given that other large employers provide discounted transit passes to their employees, and that the University provides students with passes as part of tuition at an annual fee that is less than the cost of a regular monthly bus pass, a discounted University employee transit pass was seen as an option. Furthermore, an increase in the cost of parking was discussed as an alternative to deter frequent automobile commuting.

***9. Guaranteed Ride Home Programs***

A Guaranteed Ride Home programs is indented to encourage individuals to use an active mode of transportation and to leave their car at home. This program is for those who walk, as well as those who carpool, ride the bus, or bike, and are registered with the program. If there is a valid emergency, these individuals can call a taxi and submit their receipts to the program for full reimbursement.

This type of program was well received by the group as a way to mitigate some concerns of potential AT users related to the possibility of an emergency while at work.

## Workshop Action Round Summary

Awareness of AT has increased the demand for improved AT strategies in Kingston, including infrastructure, policies, and programming. The second round of discussions at the workshop, the Action Round, was aimed at facilitating discussions on how to best respond to this demand and implement the most appropriate strategies for AT at Queen's University. This section will outline key findings from the session.

### *Infrastructure*

In this section, infrastructure refers to the physical structures within an area that influence travel behaviour of community members. Workshop participants assessed existing infrastructure, and discussed several types of infrastructure improvements that could increase the amount of AT use, improve safety, and provide an enjoyable commute.

#### *Cycling Infrastructure*

Cycling infrastructure was one of the main themes addressed in the workshop. Enhancement of cycling infrastructure was identified as a major strategy that could help to improve cycling conditions, and could encourage more individuals to commute by bicycle. A key component addressed by participants was bicycle parking. All groups emphasized the importance of providing proper bike racks and lockers, which could reduce bike theft and illegal bike parking, and enhance public space. It was evident from discussions that any cycling infrastructure initiatives would be most effective if championed by Queen's University. Many participants indicated that the best way to address AT infrastructure on the campus might be to increase automobile parking fees. This would remove financial incentives to drive, while also generating funds that could be directed at AT expenses.

Two initiatives were outlined in the Action Round that specifically address cycling infrastructure. The first was to identify a road around campus that has a higher volume of bicycle traffic. Right-of-Way (ROW) would be given to cyclists for a defined length of time, and the road could serve as a pilot test for a type of Bicycle Boulevard. On this road, cars would be permitted, however, ROW would be given to cyclists, and cars would only be permitted to travel 10 kilometres per hour. The second initiative, which involves direct collaboration with the University, was to host a competition with Queen's engineering students to develop innovative bicycle racks or storage facilities.

Finally, the concerns addressed in this section centred on fluctuating rates of AT use during different times of the year. The most frequent point addressed was the varied use of bicycle racks, which are typically at capacity during the spring, summer, and fall seasons, and are often unused or underused in the winter months. A few participants stated that if bicycle facilities were covered during the winter months, they would be more inclined to use them.

#### *End Of Trip Facilities for Employers*

End-of-trip facilities, which encompass bicycle parking, stands, racks, shelters, lockers, changing rooms, and showers, were discussed frequently. The provision of showers, lockers, and

changing facilities at the University was a central suggestion from all groups. The first option was to install these facilities in all major buildings around campus. An alternative option was to provide University employees with a discounted rate to use the facilities at the Athletics & Recreation Centre (ARC). Participants also spoke to the possibility of an underground bicycle parking facility at the ARC, where individuals could park their bicycles and use showers at the same facility.

*Walking Infrastructure*

The workshop results indicated that community members living in walkable, mixed-use neighbourhoods would be more likely to walk to certain, proximal destinations. These individuals were also more likely to be socially engaged and know their neighbours. The first proposal was to provide more bus shelters. It was suggested that providing shelters would encourage more people to use AT in unfavourable weather, such as rain or colder temperatures. The second proposal was to increase sidewalk widths and provide a variety of crosswalks, which would increase walkability. This also encompasses accessible facilities for all individuals, and strong connections between neighbourhoods, parks, and schools.

The third proposal was to provide proper and frequent wayfinding. Adequate wayfinding and signage will improve navigation and reduce travel delays related to navigational difficulties. Way-finding signage could also provide an approximate estimate of time or distance it would take to travel to particular destinations around Queen's University.

*Road Maintenance*

The importance of infrastructure maintenance and snow removal was a continuous point of discussion at the workshop. All three groups in the Action Round emphasized concerns about road maintenance and poor winter conditions as being significant barriers to AT. The first main concern addressed was to improve the pavement in the bicycle lanes by fixing potholes and sunken grates. The second concern was prompt and sufficient ploughing of bicycle lanes in the winter. Some participants also noted that snow is often ploughed into the bicycle lanes for storage, which is a major safety concern for cyclists, and after a snowfall, the bicycle lanes are reduced the most.

***Programs***

The facilitation of AT-friendly programs was a prominent topic at the workshop. Participants expressed a desire to see the implementation of many of the suggestions generated in the Action Round.

*Activities*

Most recommended programs were directed at Queen's University. It was recommended that Queen's University develop a programmatic approach to encourage all faculty, staff and students to get involved with AT. Some of these activities included an "Active Transportation to Work Wednesdays", or a "Walk to Work Wednesday". Another recommendation was to have priority street sweeping on cycling routes.

Participants noted that cleanliness was a strong determinant of AT route selection, and that a community clean-up program

could promote greater levels of AT. The Alma Mater Society has an existing program similar to this, which could be strengthened and expanded to encourage more participation.

A final program in this category was one to help families with children use AT, and particularly the bus, which can be difficult. One solution was to have a locator system at each of the bus stops. This system, like a GPS, would show how far away the bus was from the stop. This could be in the form of a real-time estimated time of arrival, or displayed on a map. However, it was noted that this would be very expensive, and that an alternative would be to develop a comprehensive Kingston Transit application for cellphones.

*Employee Incentive Programs*

As participants in the workshop were either an employee of the City, Queen's University, or an external organization, employee incentive programs were easily approached. One incentive program addressed the need for flexibility in automobile parking. This encompassed flexible parking passes, incentives to encourage employees not to drive on certain days of the week, and the provision of employee transit passes or subsidized employee transit passes. For example KFL&A Public Health provides employees with a bus pass if they choose to forfeit their free parking privileges. This program is also coupled with proper end of trip facilities. Finally, a friendly departmental competition could be launched to encourage employees to use the stairs over the elevator, or to use AT on their commute to work.

*Education*

Education was central to many discussions at the workshop, and there were two key points brought forward. The first was to change the perception that engaging in AT means using only one form of AT. It was suggested that promoting multimodal forms of travel could reshape views of AT as an absolute commitment to one mode. An employee or student could drive their automobile to a Park and Ride/ Bike/ Walk lot, and then take the bus, bike, or walk to Main Campus. The second point was to promote proper walking and cycling etiquette and safety techniques, such as signalling and sharing the road. In order to establish and maintain a mutual respect between drivers and AT users, people using all modes of travel need to respect and share the road with proper techniques.

*Funding & Partnerships*

Actively searching for funding and grants is the key to facilitate the improvement of AT. Participants saw great benefit in encouraging the University and other organizations to look for funding from Sustainable Kingston and the Kingston Community Foundation. It was also recommended to look to Kingston's Member of Parliament, Member of Provincial Parliament, and Attorney General for support in acquiring higher levels of funding. If Queen's University takes initiative in improving AT, it could encourage major funders to participate in these efforts. This initiative could begin with the designation of the entire campus as a School Zone, which could also coincide with a smoke free zone. This progressive approach could draw attention, and subsequently support, from potential funding bodies and corporate associates, and help to establish partnerships.

***Policy***

The discussion around policy and AT during the workshop reflected a desired shift to encourage healthier and more active lifestyle options for University employees and students. Participants agreed that policy is an important component of a health community and lifestyle, as it can leverage and support AT-supporting infrastructure and programs. Provincial-level policy was addressed in all groups. The Ontario Highway Traffic Act (OHTA) was explicitly addressed for two reasons. In the OHTA, pedestrians do not have the right-of-way unless there is a formal pedestrian crossover with a signal. Ontario is the only province in Canada that does not give pedestrians a substantial legal level of right-of-way.

Municipal level plans and policies were also prominent points of discussion. Participants spoke positively about a new Kingston policy that places pedestrians, cyclists, transit, and emergency vehicles above automobiles. Other discussions primarily revolved around Kingston's Official Plan, and how City staff interprets the OHTA. Some participants spoke to the City of Kingston's conservative interpretation of the OHTA, which differs from other cities in Ontario that interpret greater rights for pedestrians.

Municipal level plans and policies were also prominent points of discussion. Discussion revolved primarily around Kingston's Official Plan, and how City staff interprets the OHTA. Some participants spoke to the City of Kingston's conservative interpretation of the OHTA, which differs from other cities in Ontario that interpret the pedestrian right-of-way more loosely. Other participants, however, spoke positively about a new Kingston policy that placed pedestrians, cyclists, transit, and emergency vehicles above automobiles.

The City of Kingston does have numerous AT-friendly policies and bylaws, such as Zoning By-Law #8499 for multi-family residential, which requires covered bike parking. Still, it was noted that Queen's University is exempt from this. The main recommendation from these discussions was for the University to adopt a policy for bike parking and/or refer to the City of Kingston's policies and by-laws when investing in new infrastructure or establishing new policies.

Finally, participants agreed that the City of Kingston should support mixed-use development wherever possible. It was suggested that mixed-use areas support AT by reducing distance to a variety of amenities and destinations, creating safer neighbourhoods, and making routes more convenient and enjoyable. One participant noted that there are many convenience stores mixed in with single-family residential areas and that there should be an option similar to this for coffee shops and other indoor third-spaces.

## The Car-Free Campus Debate

The historic campus of Queen's University is located directly adjacent to Kingston's downtown and embedded in the grid street network of one of Kingston's oldest neighbourhoods. The roads around the campus area have high levels of vehicular and pedestrian traffic during school year, from September to May. As the Queen's campus continues to evolve over the years, continual intensification will increase the number of students and faculty travelling between Main Campus and West Campus. Workshop participants discussed the implementation of a car-free campus in the context of safety concerns, future plans for the University, and the push to make campus more sustainable.

### *The Debate*

The car-free campus debate is a contentious issue in Kingston and presents two key and often polarized arguments. The first position argues in favour of a car-free zone on campus and claims that the city needs to plan for the largest user group on campus: pedestrians. They argue that pedestrians and cyclists fill the Queen's campus from September to May, and that roads in these areas should be for pedestrians due to safety concerns. The second position, against the car-free campus pedestrian-zone, argues that cars are an essential component to transportation and that residents in a mid-size city, such as Kingston, will continue to use their vehicles and greatly oppose barriers to their current habits. In addition, this position argues that roads surrounding Queen's are main routes to Queen's University and to the downtown, and that these roads are vital links that enhance connectivity in the city.

### *Ontario Examples*

The University of Guelph is an enclosed, superblock-style, campus. Most of the main buildings on campus are situated within one major block, with two major pedestrian arteries running North/South and East/West. These arteries are wide enough to fit over 4 lanes of traffic, however they only support local service vehicles.

The University of Toronto, although it is a much larger university and situated in a much larger city than Kingston, focuses on a Pedestrian Priority Zone (PPZ). On the St. George campus the PPZ "builds upon policies contained in the St. George Campus Master Plan, the City's Part II Plan and the University's recent Raising Our Sights document, and represents an appropriate adjustment to the city network that reflects the high level of pedestrian activity on the St. George Campus" (City of Toronto , 2013). For the PPZ, the aim is to establish priority for pedestrians and cyclists first, then to automobiles, when designing campus infrastructure. As such, the University of Toronto will also be closing streets between St. George and Huron Street, but keeping St. George, Huron, and Harbord Streets open. As well, streets between Ryerson University and the University of Toronto have been turned into pedestrian-only zones. At Ryerson, they have closed off Gould Street from O'Keefe Lane to Bond Street, and Victoria Street from Gould Street to just North of Dundas Street (Balkissoon, 2010). McMaster University, has a similar pedestrian zone, and charges $75.00 for motorists who use of the pedestrian zone (McMaster University, 2013).

A final, and most recent example is the University of Windsor's new master plan launch. On November 27th, 2013, the University of Windsor's board of governors approved a new master plan, which is pedestrian focused, including a pedestrian bridge, enhanced lighting, gathering places, and more seating. Most notably the university will be closing Sunset Avenue (after California Avenue, one block east) to vehicular traffic, and will be transformed into a public space. They hope that their new plan will increase the University's competitiveness and enhance the pedestrian experience (University of Windsor , 2013).

Walking and cycling are the primary means of movement on those campuses, and continue to be encouraged by upgrades to pedestrian routes and reduced points of conflicts with vehicular traffic. When presented with precedents of universities that have implemented measures towards a car-free campus, workshop participants saw great benefits and expressed their desire to create a green, pedestrian-friendly campus, with the minimum number of vehicles.

***Partnerships***

Several partners will need to come together to discuss and realistically consider this option and the associated logistics. The administration of Queen's University, the City of Kingston (including collaboration of several departments), the Campus Master Plan, Kingston General Hospital, local employers, and student government, organizations, and interest groups will all have critical roles in assessing the viability, costs, and benefits of a car-free campus.

***Where to Start***

It is evident from over three months of extensive research, and findings from workshop and interviews, that this type of initiative will take time to come to fruition. We recognize that this will need to be a phased development in order to accommodate pedestrians, cyclists, and motorists. First, a local example of a potential road to convert to a pedestrian-zone is Bader Lane, which is a street that Queen's University owns. Second, the University should critically think about areas on campus that can be transformed into a car-free zone, while implementing traffic calming measures on streets such as Union Street, University Avenue, and Division Street. Traffic calming measures, such as bike lanes, and boulevard tree treatments can help reduce traffic speeds and increase safety and enhance the pedestrian space for the more than 20,000 pedestrians/students that travel to campus daily during the school year.

Third, Arch Street, on the East side of campus, is another street with high pedestrian and vehicular use, which could be considered as a pedestrian zone. This one-way street is a unique and enclosed area on campus that has the potential to be a host to local community and University-wide events. Fourth, we acknowledge that collector streets such as Union Street and University Avenue are vital connections to the downtown for vehicular traffic. However, this intersection draws high pedestrian traffic and should be improved to enhance pedestrian safety. Therefore, the installation of a pedestrian scramble at University Avenue and Union Street is a prime example of a way in which the pedestrian and vehicle interface can be made safer.

**The following may be recommended if a decision is made to pursue a Pedestrian-Zone campus:**

a) The University should begin to identify roads and areas on campus to be designated a pedestrian-only zone (with restricted vehicular access and parking around the edges) from September to May. Options for re-opening the campus to vehicular traffic during the summer months can be considered if parties see benefit in doing so.

b) The University should replace underutilized spaces, including grey spaces, with pedestrian areas, such as greenspaces or places for public gathering. For example, Queen's could transform closed street networks into a pedestrian- and cyclist-friendly environment with benches, planter boxes, gardens, street art, and bicycle infrastructure.

c) Access to service, emergency, and transit vehicles should be permitted at all times to maintain standards of emergency and logistical access and avoid disruption to necessary daily functions.

d) An implementation plan should be adopted and followed to facilitate a smoother transition to a pedestrian zone on campus. It is recommended that street closures be done in phases over the course of many years, and that each closing be launched in conjunction with an AT event to draw awareness to AT and newly implemented infrastructure.

## Interviews with Key Informants

In order to better understand existing conditions and to obtain expert opinions on opportunities for action, interviews were conducted with key stakeholders familiar with AT at Queen's University. The key stakeholders interviewed included, City of Kingston employees, Queen's University faculty and employees, Alma Mater Society (AMS) student groups, as well as users of AT affiliated with the University. Each interviewee was asked questions pertaining to their area of expertise, as well as general questions regarding opportunities and challenges for AT around Queen's University.

The findings of the interviews have been organized into common themes and are presented below. To begin, key issues identified by participants are outlined, which include bicycle parking, dedicated bike lanes, snow removal, parking considerations, subsidized bus passes, and Provincial regulations. Following the key issues, recommendations for making the greater campus area more conducive to AT are summarized. Lastly, opportunities for action that were suggested by the participants are outlined.

### *Key Issues*

*Bicycle Parking Shortage*

Informants stated that there is a shortage of bicycle parking available on campus. It was emphasized that this negatively affects AT use because people will not ride their bikes if they do not have somewhere to park. The shortage of bike racks has also led to issues with cyclists illegally parking bikes on campus. Unfortunately, there are no funds allocated for bike racks within the budget and racks are only installed during capital projects. Additionally, it was mentioned that there is not enough space to put bike racks on campus because they are not planned into the overall building design. However, efforts are being made to relocate underutilized racks to areas experiencing over crowding and illegal bicycle parking.

Moreover, concerns were raised about the lack of covered bike parking, as well as secure bike parking. Covered bike parking is important for facilitating winter riding, while secure storage is important to prevent bike theft, which is often cited as a deterrent to using AT. The Queen's community has shown interest in secure bike storage facilities. As such, plans are currently underway to implement a bike rack pilot project at three locations on main campus that would provide sheltered and secure bicycle parking.

Lastly, one of the challenges identified by informants regarding bicycle parking on campus is that availability fluctuates tremendously with the seasons, and semesters. In the fall, there is a shortage of available bike parking, as it is the most conducive time for riding. However, bicycle use tapers off in winter and there is more parking available, although not covered parking as would be preferred. In the spring, bicycle use increases again, but as the winter semester ends, the campus clears out as students leave Kingston. As such, bicycle parking is a much bigger issue in the fall semester.

*Lack of Dedicated Bike Lanes*

A shortage of dedicated bike lanes was identified as a deterrent for using cycling as a mode of AT amongst interviewees. The issue was raised that riders feel it is dangerous to share the road with cars on busy streets where cars travel at high speeds. Areas of concern identified by interview participants were Princess Street, Brock Street and Johnson Street.

However, according to City staff, there are some major projects in the works that will see dedicated bike lanes implemented; in the coming year, the portion of Princess Street that runs through Williamsville will receive bike lanes with a wider buffer, while parking will be removed along Brock and Johnson Streets to accommodate new bicycle lanes. Additionally, the City has a policy to put in bike lanes if a road is being repaved so that they can continue to expand the cycle lane network across Kingston.

*Snow Removal*

Several interview participants expressed concern over the impacts of inadequate snow removal on AT. It was emphasized that sidewalks and bike lanes must be kept clear of snow in the winter months to keep pedestrians and cyclists safe and engaged in AT. Sidewalks and bike lanes should not be used as snow storage facilities in the winter months. On campus, in terms of snow removal, the priority is to keep sidewalks cleared for the Queen's community, whereas the City places priority on keeping the roads clear. As such, sidewalks are of secondary concern. This makes commuting to Queen's difficult in the winter months when snow and ice are present.

*Parking*

Interviewees identified parking as a key issue for two reasons. At present, there is not enough parking available to meet the needs of drivers, and parking will only continue to disappear. Accordingly, the University must look at promoting alternative means of travelling to campus, such as promoting use of the Park and Ride available at West Campus or the use of AT modes. Ideally, for those who must commute by car, it would be beneficial to encourage use of the West Campus lot as a transition point to walk or shuttle to Main Campus.

The issue of parking was also raised because some interview participants believe the only way to influence automobile use is through parking rates. Raising parking fees was identified as an incentive for users to participate in AT. Similarly, tying parking rates to transit rates helps to encourage the use of public transit, which usually involves AT for walking to or from a bus stop. According to interviewees, monthly parking passes should be at least 10% more expensive than transit passes to provide incentive to save money by using public transit.

*Subsidized Bus Pass*

Several interview participants suggested subsidized bus passes, or free bus passes, as a means of increasing AT. However, as per one interviewee, a subsidized employee bus pass was brought to the table five or six years ago, but failed. On one hand, the City of Kingston was unwilling offer a significant discount to Queen's employees at the time (about 5% discount; user based). On the other hand, a survey done by Queen's Parking Office indicated that there was very little interest in public transit among the employees. However, as the

City has become more keen on sustainability, it is now willing to offer a minimum of 10% discount to Queen's employees if there is a sufficient number of users.

*Provincial Policy Changes*

One interview participant highlighted the constraints to improving conditions for pedestrians, due to Provincial policy. The City of Kingston interprets the statutes to mean that motorists are not required to stop for pedestrians at crosswalks or at any corner that is not regulated by a traffic signal. This is problematic and dangerous for AT users. One interview participant iterated that unfortunately the status quo likely will not change until a politician takes a stand for pedestrians or enough people are injured.

***Suggestions: Making Streets More Conducive to AT Users***

The following suggestions were made by key informants as ways to improve existing conditions on and around campus for AT users:

- Improve and maintain lighting on and off campus to make it safer at night for pedestrians, particularly along pedestrian routes through the parks surrounding Queen's campus.

- Implement dedicated bike lanes, bike trails and cycle tracks to improve riding conditions for cyclists.

- Enhance pedestrian conditions by investing in wider sidewalks, better pedestrian crossings, and more pedestrian activated crossings (i.e. flashing green lights). As the majority of students are walking to school, improvements around the campus should be pedestrian oriented.

- Maintain bike lanes, with regards to potholes, sunken grates, and broken glass, so they are safe for cyclists.

- Make routes to Queen's campus more attractive - ensure streets are clean and vacant lots or parking lots are hidden from view.

***Opportunities: Ideas for Taking Action***

The following ideas were provided by key informants to promote and support AT at Queen's:

- Study the feasibility of a Flexible Parking Permit System, which gives commuters the freedom to use AT, as well as the option to drive to campus when needed.

- Market AT as a cost-efficient alternative to commuting by car. Highlighting the cost savings (i.e. saving money on gas, maintenance, parking, etc.) and use these as incentives for increased AT use.

- Start a grassroots bike rental program or bike share program on campus, which could become expanded to the city scale (i.e. Washington State University or University of Toronto). Currently, the Queen's School of Business is working on writing a business case for a bike share program.

- Buy bikes from police auctions and sell them to students at reduced rates to make cycling an easy, simple, and affordable part of Queen's culture.

- Educate cyclists on bicycle safety so cyclists can be confident sharing the road with cars, with or without the presence of cycling infrastructure. Those identified as potential target audiences were exchange students, international students, and first year students.

- Work with campus enforcement officers and Kingston Police to develop a stolen bike database for Queen's students.

- Leverage and involve key players such as engineers, faculty heads, donors & funders, politicians, AMS, drivers and local businesses to improve AT at Queen's.

- Promote Queen's and Kingston as walkable to incoming students.

Queen's has one of the largest cycling communities in Kingston. There is opportunity for Queen's to become a leader and play a more active role in promoting AT in Kingston.

# APPENDIX C:
# BICYCLE PARKING QUANTITY RECOMMENDATIONS

## Recommended Quantities of Bicycle Parking

| Location/Source | Minimum Short Term Spaces (Class II/B) | Minimum Long Term Spaces (Class I/A) |
|---|---|---|
| Victoria Transport Policy Institute [1]<br>→ **University** | 1 per 5 students (full time; max attendance) | Not Specified |
| VTA Bicycle Technical Guidelines [2]<br>→ **College residences**<br><br>→ **Academic buildings and other university facilities** | Minimum 2 spaces<br><br>1 spot per 9 student seats (75% Class II) | 1 Class I per 4.5 beds + 1 Class I per 30 employees<br>1 Class I per 30 employees + 1 spot per 9 student seats (25% Class I) |
| City of Portland By-Laws [3]<br>→ **Dormitory**<br>→ **Colleges** | None<br>2, or 1 per 10,000 SF of net building area | 1 per 8 residents<br>2, or 1 per 20,000 SF of net building area |
| City of Vancouver By-Laws [4]<br>→ **School-Elementary or Secondary;**<br>**School - University or College** | A minimum of 0.6 spaces for every 10 students on a maximum attendance period except that elementary schools shall provide a minimum of 1 space for every 20 students. | A minimum of 1 space for every 17 employees and for secondary schools, universities or colleges, 0.4 space for every 10 students on a maximum attendance period. |

*Source:*
*McMaster University Short Term Bicycle Parking Utilization Study by Dr. Antonio Paez & Dr. Brian Baetz*

# ADDENDUM

To provide key stakeholders and interested parties with an overview of the work done by the project team, a final presentation was held in Robert Sutherland Hall on December 10th. The session consisted of a presentation from the team, a brief round of questions from the audience, and an open question period in which students answered questions one-on-one and the audience was given a chance to view the team's presentation panels.

After the final presentation a survey was given to attendees, which asked them to prioritize our 10 Key Recommendations identified in the presentation. The were given a chart of the ten recommendations and the following two questions:

1. **How important do you consider the following recommendations in influencing active transportation at queen's university?**

2. **Please indicate the priority that should be given to each of the recommendations listed below.**

Of the roughly 40 attendees, 26 returned the survey. As these were not ranking questions, one point was awarded for each time a participant categorized each recommendation. The answers to both questions showed strong themes.

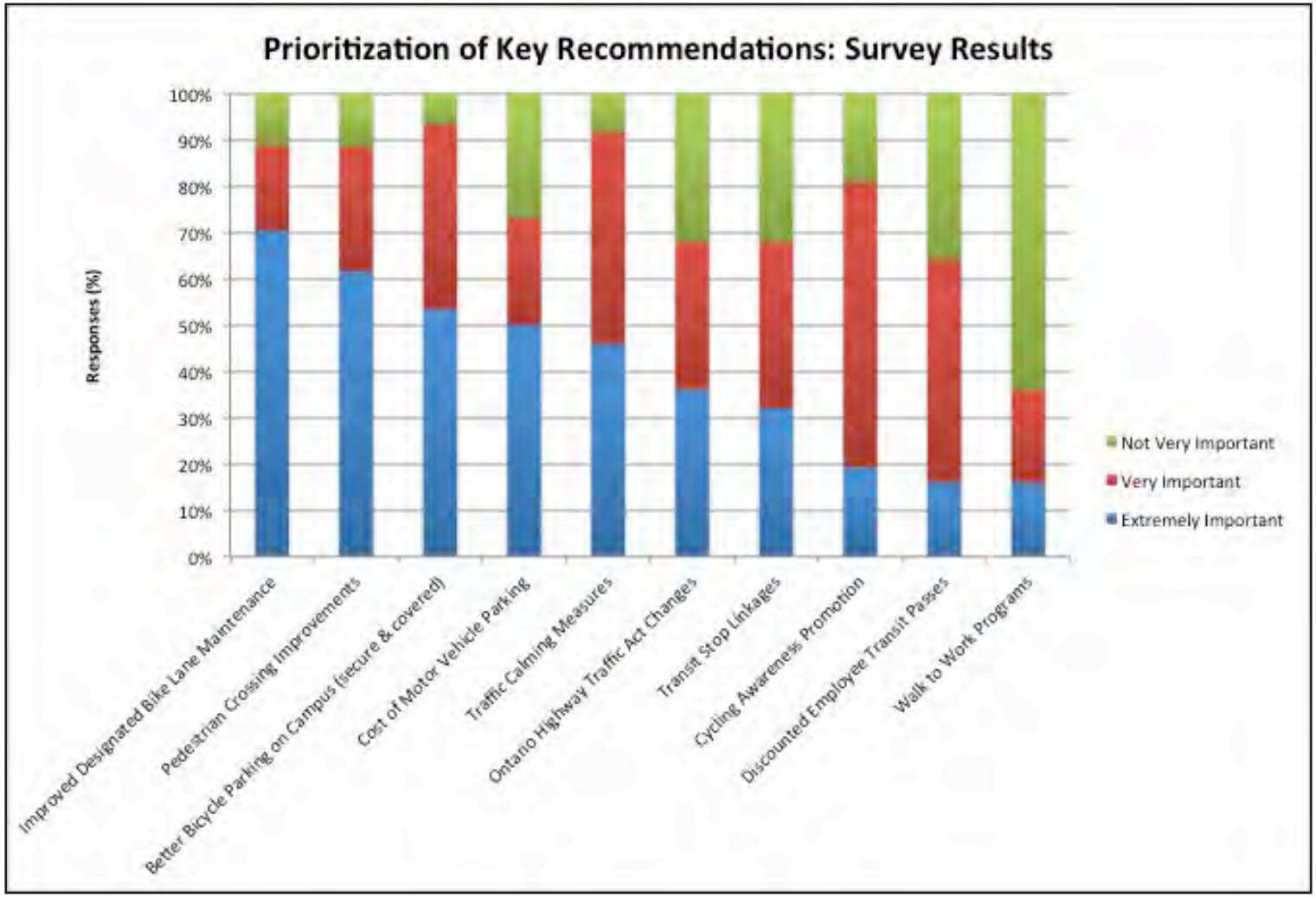
In the first question 19 respondents marked improved maintenance of designated bike lanes as 'extremely important'. This was the highest number of points marked in the 'extremely important' category. This was followed closely by better bicycle parking on campus and pedestrian crossing improvements, which both had 16 points in the 'extremely important category.' The cost of motor vehicle parking received 13 points for 'extremely important.'

From these results, maintenance of bike lanes was identified as the most influential factor contributing to AT at Queen's University. It should be noted that respondents might have been influenced by a heavy snowfall just prior to the presentation, which affected cycling infrastructure. However, over half the respondents indicated that both pedestrian crossing improvements and better bicycle parking were also extremely important in influencing AT to the University. Half of the respondents also thought that the cost of motor vehicle parking was extremely important for influencing this as well. Interestingly, these results were corroborated by the results from the second question.

In the second question 20 participants identified improved designated bike lane maintenance as a recommendation that should be given high priority. This was the highest number of points marked in the 'high priority' category. However, improvements to pedestrian crossings received only one less point, with 19 points, as a recommendation that should be a high priority. Better bicycle parking on campus received 16 points in the 'high priority' category.

The consistency through these results shows an interesting trend in the identification of influences on AT and prioritization of recommendations. Improved designated bike lane maintenance was a highlighted by respondents as the most influential recommendation for AT to the University, and the

recommendation that was most consistently marked as a high priority. Still, the recommendation for pedestrian crossing improvements received similarly high priority from respondents and was also thought to be extremely influential on AT.



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