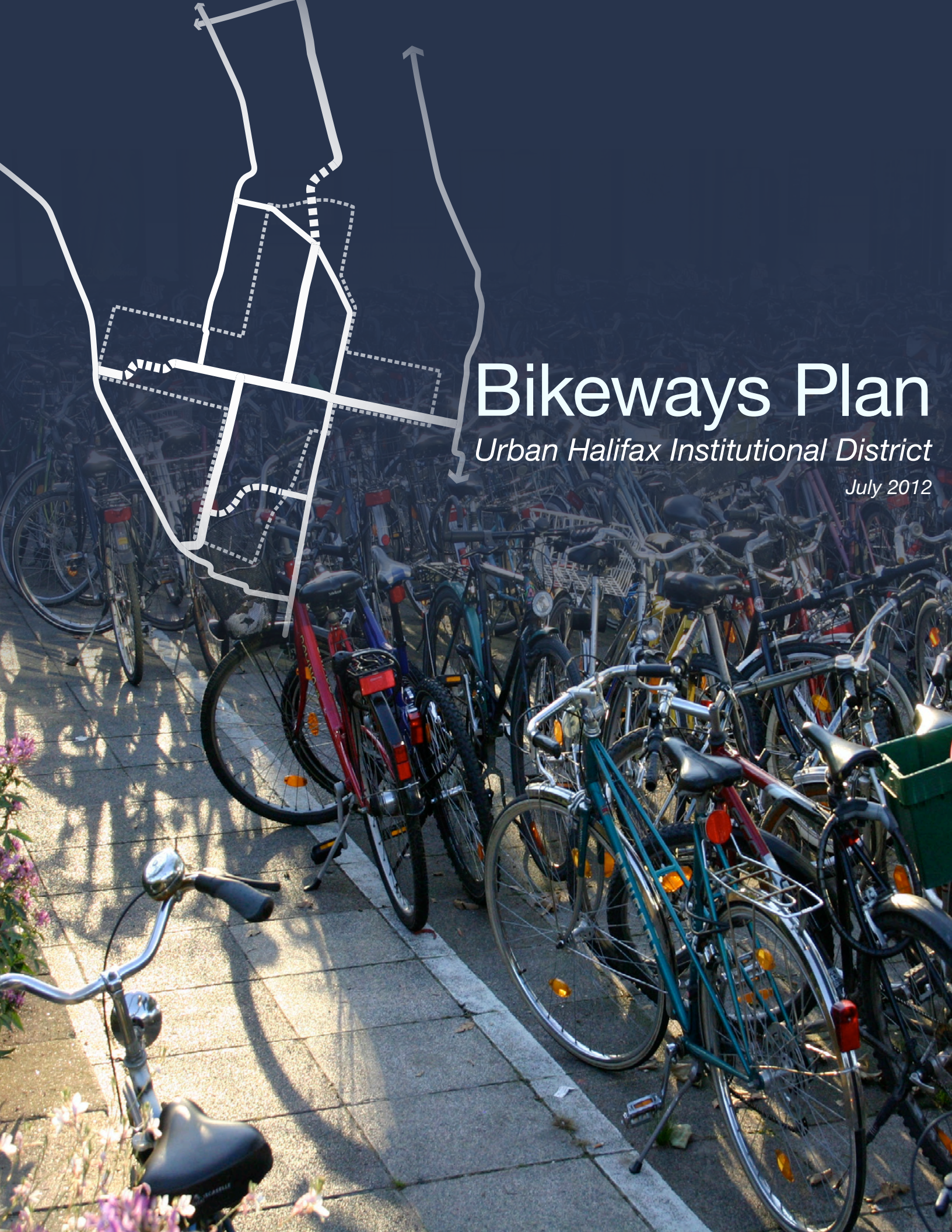


Bikeways Plan

Urban Halifax Institutional District

July 2012

Institutional District Partners









Additional Project Funding

Nova Scotia Health Promotion and Protection
Conserve Nova Scotia



Cities & Environment Unit
Architecture & Planning Dalhousie University

Institutional District Transportation Demand Management Committee

Support for Active Transportation and the Institutional District Bikeways Plan

The Institutional District Transportation Demand Management (TDM) Committee was formed to support sustainable transportation options in the Institutional District. Founding partners include Dalhousie University, Saint Mary's University, Capital Health, and the IWK Health Centre.

The institutions believe in active transportation projects that support the health and wellness of our community members, employees, students and visitors. The Urban Halifax Institutional District Bikeways Plan (the "Bikeways Plan") supports the need for collaboration between the partner institutions and Halifax Regional Municipality to advance implementation of the Vision and Guiding Principles described in the Bikeways Plan.

The Bikeways Plan identifies priority investments in infrastructure, facilities and programming to support the growth of a safe and connected cycling network in the Institutional District. Key elements include six guiding principles aimed at supporting the maximum of new riders, design concepts for key cycling corridors, examples of effective signage and branding, details on a potential bike share system, and guidance on end-of-trip facilities.

The Plan was developed with the input and involvement of a number of agencies, community members, and government representatives including HRM officials. We recognize that detailed roadway design concepts will require further development to consider the impacts on all institutional users and that final consultation with the immediate community and approval by HRM is required.

The 2011 Bikeways Plan, developed by Dalhousie University, Capital Health, IWK Health Centre and Saint Mary's University as of this date is adopted as the official policy guide and bikeways master plan for the four partner institutions.

Adopted this the 15 day of JULY 2012

Approved:

Tom Traves

Dalhousie University

Capital Health

Allan Horsburgh

IWK Health Centre

Saint Mary's University

Acknowledgements

Cities & Environment Unit would like to thank the Bicycle Action Committee, the Transportation Demand Working Group and the community members who participated in the public sessions for their input into the development of this Plan. We hope that the content and recommendations presented in this document provide sufficient insight and evidence to inspire action in the Institutional District.

Document Images:

Cities & Environment Unit, unless otherwise noted.

Contact:

Cities & Environment Unit
Faculty of Architecture & Planning
Dalhousie University
5257 Morris Street
PO Box 15000
Halifax, NS B3H 4R2
ceu@dal.ca
www.ceunit.dal.ca
902.494.3926



Summer Street, existing condition

Vision for the Institutional District

Establish a cycling environment that will attract new riders of different ages and abilities and demonstrate a new priority for cycling within the District.

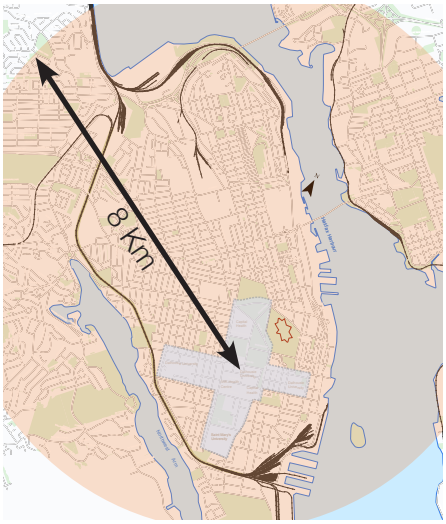


Proposed Summer Street Bikeway, looking south toward University Avenue intersection

EXECUTIVE SUMMARY



The blue shaded area highlights the study area for this Plan - this is where the partner institutions are located and is referred to as the Institutional District.



The District is ideally situated to transform into a bicycle friendly area. The red-shaded area highlights places in HRM that are within eight kilometres of the District, a distance that is suitable for cycling trips.

The Urban Halifax Institutional District Bikeways Plan is intended to establish a cycling-supportive environment that will attract new riders of different ages and abilities and demonstrate a new priority for cycling within Halifax's Urban Institutional District. The District, encompassing the lands controlled by Dalhousie University, Saint Mary's University, Capital Health and the IWK Health Centre on the Halifax peninsula, is a major regional destination for staff, students and visitors. These four institutions have committed to encouraging cycling within and to the District by establishing greater levels of safety, comfort, convenience and connectivity.

Cycling has the most potential as an option for commuting within eight kilometres of a destination. A large number of daily commuters to the District live within an eight-kilometre radius, but do not cycle. This indicates a need to make the District a cycle-friendly area by providing better facilities, infrastructure and supports. Many characteristics of the District provide potential for cycling: the terrain is generally flat; HRM's entire Regional Centre is within eight kilometres, and is home to most commuters to the District; there are already many dedicated cyclists in the District; cycling is an affordable commuting option for students; and the Institutional Partners have the power to encourage cycling through Employer Based Trip Reduction initiatives. Increased cycling in the District will have significant environmental, health, tourism, transportation and community benefits.

The Bikeways Plan was developed through a community-based planning process designed to engage staff, students and visitors of the partner institutions, in addition to members of the surrounding community. Participants at a series of public engagement sessions held in February and March 2011 identified strengths and issues of the current cycling environment, contributed to the development of the Plan's Guiding Principles and helped to identify the priority routes of the District's Bikeways Network. Based on this work, the Plan identifies barriers to cycling in and around the District, including problematic intersections and a lack of bikeway connectivity.

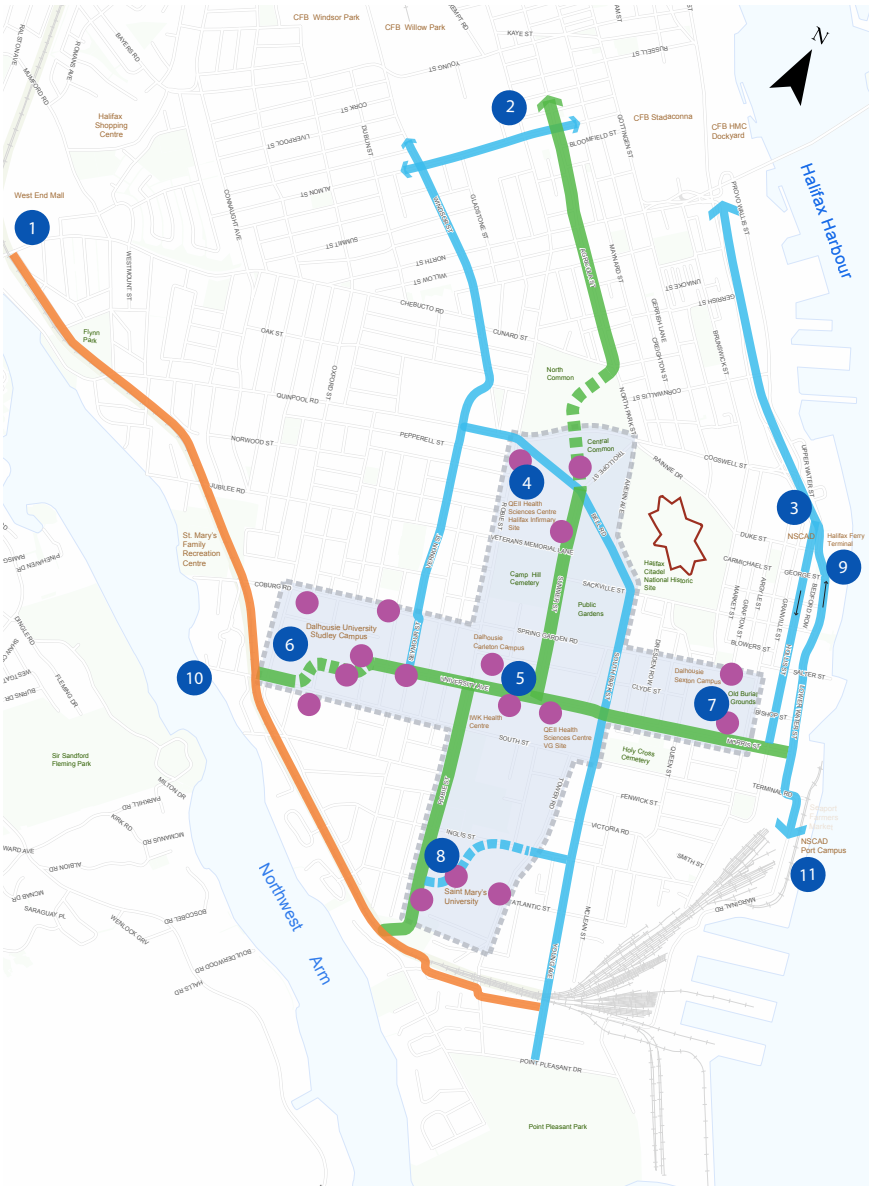
Participants at the community engagement sessions contributed to the development of six Guiding Principles for a cycling-supportive environment within the Institutional District:

- Invest in bicycle infrastructure and programs that are designed to capture the maximum number of new riders
- Integrate bicycles as an essential component of a multi-modal transportation system
- Develop a sense of place for the Institutional District's bicycle environment
- Prioritize bicycles along designated cycling routes

- Develop a connected and continuous network of bicycle routes
- Design and maintain a cycling environment for all seasons

While the Bikeways Plan makes recommendations specifically for the Institutional District, it has the potential to showcase how high-quality cycling infrastructure can establish cycling as a legitimate transportation option not only within the District, but across the entire region. With this in mind, the Plan is informed by HRM's Active Transportation Functional Plan, the Halifax Urban Greenway, the Blueprint for a Bicycle Friendly HRM and the Halifax Cycling Coalition's proposed Crosstown Connector. HRM's Regional Plan identifies sustainable transportation options such as cycling as key commuting modes on the Peninsula. A cultural shift toward sustainable transportation is occurring in HRM and the Institutional District is well positioned to lead this change.

Bikeways Network Map



A Forward Looking Plan

- Focus on new riders
- Cycling is integral to the District's transportation system
- Contribute to a sense of place
- Priority routes
- Connected and continuous
- All season cycling

Characteristics of the Network

- Separate from traffic
- Clearly identified routes within the District
- Direct and simple routes
- Supported by Bike-share systems and long-term bicycle parking areas
- Connections beyond the District

Bikeways Network: Legend

- Bikeways (highest comfort and safety; includes separated bike lanes and on-street bike lanes)
- Off-street Bikeways (highest comfort and safety; includes off-street bike paths and multi-use paths)
- Upgraded On-street Bike Routes
- Halifax Urban Greenway (off-street multi-use path)
- Halifax Urban Institutional District
- 8 Bike-share stations
- Long-term bike parking

The Plan's Guiding Principles and international best practices informed the development of the proposed Bikeways Network, one that would provide cohesion, comfort, directness, safety and attractiveness. In order to achieve the goal of encouraging interested but concerned residents to begin cycling, the Bikeways Network emphasizes the development of continuous, direct, and low-stress bike routes, including physically-separated bike lanes and bike paths along higher traffic-volume streets.

Recommendations for priority cycling routes in the District include University Avenue, Morris Street, South Park Street, Robie Street, Summer Street and Vernon Street. Priority for cyclists is also recommended at major intersections along these routes. Recommended on-street and off-street infrastructure types are based on existing right-of-way widths and other characteristics.

The Plan recognizes that future connections outside the District are essential to promoting a region-wide cycling culture. Potential connections to the District are identified, and the Institutional Partners are encouraged to work with HRM and Metro Transit to provide park and bike and park and ride hubs at key entry points to the peninsula.

In addition to bikeways infrastructure, Employer Based Trip Reduction initiatives will support cycling in the District: end-of-trip facilities such as bike parking, a bike-share program, and education and awareness campaigns. Effective signage and wayfinding increases visibility of cycling routes, allowing inexperienced cyclists to feel more comfortable when using the Bikeways Network. A bike-sharing system with multiple points at which the public can access bicycles is recommended, including several locations at which a bike-share station would be appropriate based on population density. Adequate end-of-trip facilities such as bike-parking, showers and change rooms are also an incentive to many reluctant cyclists.

Developing a cycling-supportive culture in the District and the wider region is essential to the success of the Plan. Collaborating with organizations and events, and organizing additional cycling-supportive events will help to normalize cycling as a transportation mode choice. Social marketing and promotional campaigns have also been shown to successfully change transportation behaviors. The Plan presents immediate and long-term goals, with implementation phased over five years. Projected costs are detailed, and potential partnerships with HRM and other institutions and organizations are suggested.

Table of Contents

1.0 Introduction 1

Vision for the Institutional District 1
Community-based Planning Process 1
Plan Approach 2
Scope of the Plan 3
Opportunity Within the District 3
The Need for Leadership and Action 11

2.0 Defining the District 15

Barriers to Cycling 16

3.0 Guiding Principles 19

4.0 Network 21

Best Practices: Route Type 22
Best Practices: Intersections 23
Network Map 26
University Avenue 28
Morris Street 30
Robie Street 32
Summer Street 34
South Park Street 36
Vernon & Seymour Street 38
Future Connections 40

5.0 Cycling in the Institutional District 43

Complimentary Infrastructure and Programs 43
Bikeways Wayfinding and Route Signage 43
Bike-Share 47
End of Trip Facilities 52
Education 56
Supporting a Culture of Cycling 56
Long-Term Sustainability and Implementation 59
Network Infrastructure: Preliminary Cost Estimate 60
Plan Implementation: Phasing 61

References 62



1.0 Introduction

1.0 Introduction

VISION FOR THE INSTITUTIONAL DISTRICT



The Urban Halifax Institutional District presents a unique opportunity to explore innovation in bikeways planning. The shared commitment to the Bikeways Plan by the institutional partners provides an opportunity to reconsider the priority of cycling within the District. This Plan demonstrates the potential for cycling to function as a legitimate mode of transportation for a larger number of employees, students, visitors and community members traveling to and within the Institutional District each day. This Plan provides a framework for future infrastructure development, programming and broader cycling recommendations for the institutional partners. Once implemented, it will ensure a high level of safety, comfort, convenience and connectivity within the Institutional District, encouraging more people to cycle.

Vision

Establish a cycling environment that will attract new riders of different ages and abilities and demonstrate a new priority for cycling within the District.

COMMUNITY-BASED PLANNING PROCESS



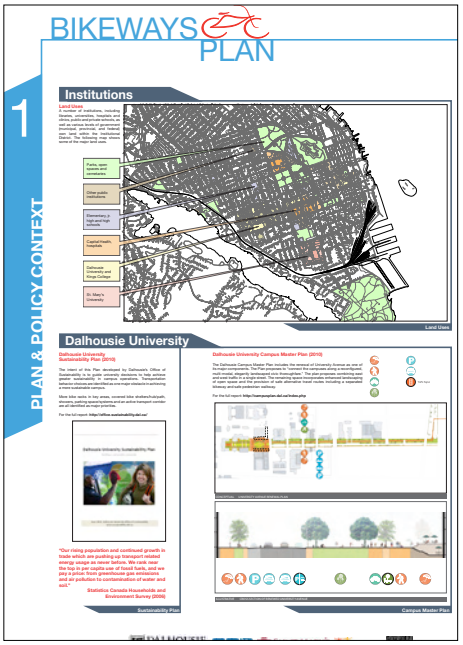
The community-based approach used to develop this plan considers community engagement and public involvement as fundamental to understanding the current issues around cycling, and brainstorming solutions and long-term goals. Throughout the planning process a wide range of stakeholders and groups were engaged to contribute ideas and provide feedback. Ideas gathered from community engagement sessions were refined and drawn together to develop community-based solutions that reflect the local context as well as current best practices with respect to bikeways planning in other jurisdictions. This community-based approach described below is essential for developing solutions and recommendations that meet the needs of the District. This approach will continue to inform plan implementation activities such as future programming, design, events and outreach.



The following descriptions outline the different approaches and exercises used to gather community input, which informed the development and refinement of the ideas in the Bikeways Plan.

Community Engagement Session 1: February 10, 2011

The first session centered on the development of draft Guiding Principles (a framework) that would guide development of the Plan and cycling in the Institutional District over the long-term. Participants included representatives from the various institutions, the local cycling community and the public at large.



Context posters developed for the community engagements sessions

This first session also included group work to understand current strengths and issues of the cycling environment within the Institutional District, and across the peninsula. These discussions informed the Guiding Principles and a long-term vision for the future of cycling within the District.

Community Engagement Session 2: February 16, 2011

The second engagement session allowed Cities & Environment Unit (CEU) to confirm the Guiding Principles developed at the first session. These Principles were advanced, informing the design of the Bikeways Network and additional infrastructure within the District as well as connections to the District.

Public Open House - Draft Plan Review: March 24, 2011

CEU planners presented the key elements of the draft plan using a series of posters. Network maps, route designs and other recommendations were represented. This session allowed the public and representatives from the institutions to provide feedback and ask questions clarifying the proposed cycling infrastructure described in the Plan. This third public session allowed the participants to see the culmination of their work from earlier sessions as well as an opportunity to understand how the Vision for bikeways in the District will be achieved.

Bicycle Action Committee Meetings

It was essential to relate the planning in the Institutional District to cycling initiatives and planning in other parts of Halifax. The Bicycle Action Committee (BAC) was formed with representation from stakeholders of the local cycling community, elected officials, district institutions and Halifax Regional Municipality (HRM). The BAC provided feedback and technical expertise to guide the development of the plan.

Institutional District Transportation Committee Meetings

At key moments in the planning process CEU planners met with senior staff from each of the partner Institutions to discuss the goals and scope of the Plan and broader transportation goals for the District. The committee also worked to build support for the plan within their respective organizations.

PLAN APPROACH

In addition to the community-based planning process, the Plan was guided by two important concepts: locally-focused solutions and advancing best practices in bikeway network design.

Locally-Focused Solutions

In order to determine recommendations for policies, programming and infrastructure, CEU planners considered the local context within the District. Key elements considered include: major destinations, population density, locations of students and employees, transportation behaviours, current cycling initiatives as well as proposed cycling routes identified within HRM's Active

Transportation Functional Plan. This approach informed recommendations and interventions that are sensitive to the local characteristics of the District and the needs of staff, faculty, visitors and students who commute there daily.

Learning From the Best

It is important to examine and learn from communities where bikeway infrastructure, policy and programming has been successful in achieving a greater modal share. Vancouver, Portland and Montreal are good examples of cities where a commitment to giving priority to cycling on city roads has resulted in the development of a thriving cycling culture. Best practices from these cities informed the strategies, design standards and broad recommendations of the plan to develop a cycling environment that attracts the maximum number of new cyclists.



SCOPE OF THE PLAN

Recommendations regarding infrastructure, design and programming are identified for the Institutional District. Within the District, institutional partners are best able to use their collective influence and power as key landowners to improve the cycling environment. This approach ensures that in partnership with HRM the key components of the Bikeways Plan could be implemented largely based on a shared commitment and political will for improving the cycling environment in the District



The development of cycling infrastructure in the District can act as a catalyst for action on implementing the larger regional cycling network. This area of HRM is the place to advance from merely tolerating and accommodating bikes and pedestrians, instead designing our streets and buildings for people not just automobiles. Accordingly, this Plan recommends that the institutional partners and HRM see the District as an opportunity to demonstrate how cycling, walking and transit can become the desired modes of transportation if proper infrastructure and support is in place.

The Plan recommendations are also informed by HRM's Active Transportation Functional Plan, the Halifax Urban Greenway, Blueprint for a Bicycle Friendly HRM, Halifax Cycling Coalition's crosstown connector and other relevant cycling documents. The Institutional District represents a sizable area of the peninsula that with improved infrastructure and facilities could be transformed into a demonstration area for best practices in cycling. Moreover, the District could be the basis of a broader commitment to cycling on the peninsula and Halifax Regional Municipality in the long-term.



The Institutional District is the area within the red boundary; it covers a significant part of the southern portion of the Halifax peninsula .



OPPORTUNITY WITHIN THE DISTRICT

Cycling has great potential to serve as the primary mode of transportation for shorter trips (less than 8 kilometres), where it is most competitive with other modes of transportation: personal automobile, taxi, carpool and transit (UBC,2010). Based on travel data from Dalhousie University, Saint Mary's University and Statistics Canada, a large number of students and employees commuting to the district live within 5 to 8 km, but are not choosing cycling. There is significant potential to shift this commuting behaviour through improvements to the cycling environment. There is also the potential to shift the transportation mode choices of many more of the peninsula's 70,000 residents, in addition to tourists, toward cycling as a primary mode for trips to, and within, the District. To ensure cycling becomes a key component of transportation, corresponding facilities, infrastructure and supports are needed.

Policy Framework

Cycling and sustainable transportation are identified by HRM and the partner institutions in their respective planning documents. HRM's Regional Municipal Planning Strategy (MPS) identifies the goal of developing the Regional Centre as a series of walkable, compact and mixed-use communities (HRM, 2006). Moreover, the MPS identifies cycling as a viable transportation mode for residents on the Peninsula living in close proximity to employment, services and amenities (HRM, 2006).

An Active Transportation (AT) Functional Plan was developed by HRM identifying the long-term cycling network. The AT Plan provides a framework for cycling to become a key mode of transportation in HRM and supports the District as an area to demonstrate the potential for cycling (HRM, 2006). Dalhousie University's Campus Master Plan builds on work completed by the Office of Sustainability, recognizing the importance of decreasing the number of single occupant vehicle (SOV) trips to the campus and recommends a redesign of University Avenue to create a more pedestrian and cycling-friendly environment (Dalhousie, 2010). Dalhousie has also identified the need to integrate end-of-trip facilities within the design of future campus development in buildings, public spaces and key roads such as University Avenue (Dalhousie Office of Sustainability, 2010A). Saint Mary's University recently adopted a campus Sustainability Strategy that emphasizes the importance of reducing the University's carbon footprint (Saint Mary's University, 2009). In addition, Capital Health is committed to promoting healthy behaviours for both staff and patients. Also, each of the partner institutions is growing at a pace that makes it more difficult to provide parking, asserting the need for transportation alternatives such as cycling to shift transportation behaviour for those trips within 8km of the District. The various policy and planning goals highlight the support at both the Institutional and Regional level to develop a bicycle-friendly environment in the District that supports a transportation shift.

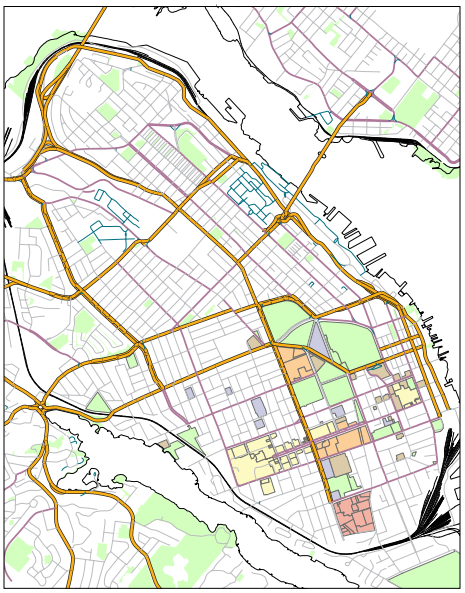
Global and Local Forces

Governments, citizens and institutions around the world are questioning our reliance on automobiles in the face of rising oil costs, climate change, growing rates of obesity and increasing demand for more humane built environments. This confluence of forces has resulted in cities throughout North America, Europe and Latin America shifting priority to sustainable modes of transportation, including cycling. Within Nova Scotia, transportation is a key issue as our population faces reduced infrastructure budgets, high obesity rates, climate change and growing traffic congestion within HRM. The Province is recognizing the need to reevaluate the status quo with the development of a Sustainable Transportation Strategy. Locally, HRM is exploring potential north-south connector routes on the peninsula and a host of other groups (Halifax Cycling Coalition, EAC TRAX, Sustainable Transportation Task Force, Active Transportation Alliance, Nova Scotia Bikeways Coalition) are advocating for sustainable modes of transportation such as walking and cycling. A cultural shift toward sustainable transportation is occurring in HRM and the Institutional District appears well positioned to lead this change.

The Case for Cycling (Current Situation and Future Opportunities)

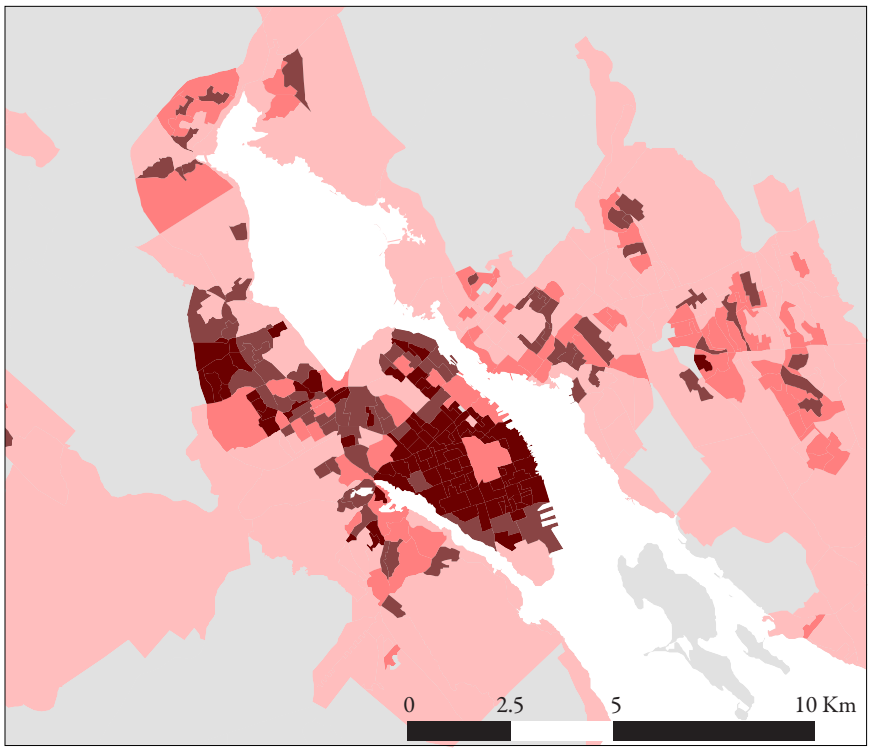
The Institutional District has characteristics that make it unique within HRM as a destination able to attract a significant increase in cycling with the proper support. Key characteristics of the District include:

- High number of daily trips to, and within the District; many are currently single occupant vehicle (SOV) trips (roughly 40,000 daily trips)
- The District is flat and well suited to cycling
- The District is in close proximity to many hotels, cruise ships and other key tourist areas in the Regional Centre
- The District is within 8 km of all residents in the Regional Centre of HRM
- Within the District there is already a relatively high use of cycling (Dalhousie Students, Staff and Faculty at 5%)
- Many District commuters live within a reasonable cycling distance (less than 8 km)
- Students often have limited disposable income and cycling offers an affordable transportation option
- The Institutional Partners have the power to use TDM strategies to encourage cycling (e.g., parking management, employer-based trip reduction)

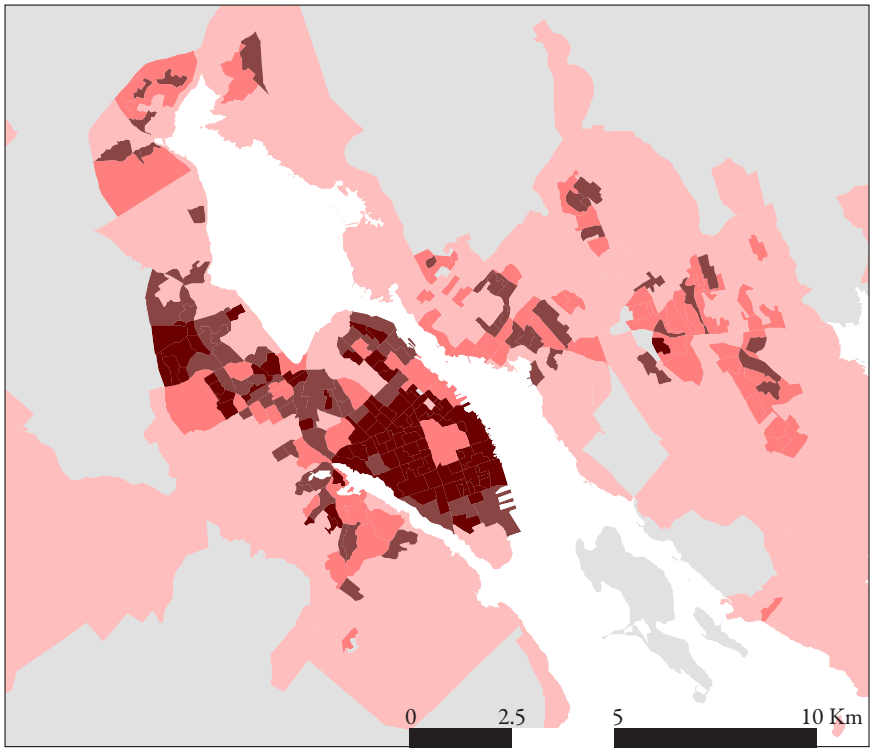


This map illustrates the street hierarchy on the peninsula. Major thoroughfares (arterials) represented in orange. Within the District the majority of the arterials dead end, indicating less reliance as through road. Local streets (grey) or local collectors (purple) are also recognized. This map reinforces the potential to shift priority from cars to cyclists in the District without impacting regional transportation patterns.

Dalhousie Student Population Density



Dalhousie Staff & Faculty Population Density



Persons per square kilometre

- 2-10
- 11-50
- 11-100
- 100+

These maps illustrate the large number of commuters from Dalhousie who are within reasonable cycling distance (3-10 km).

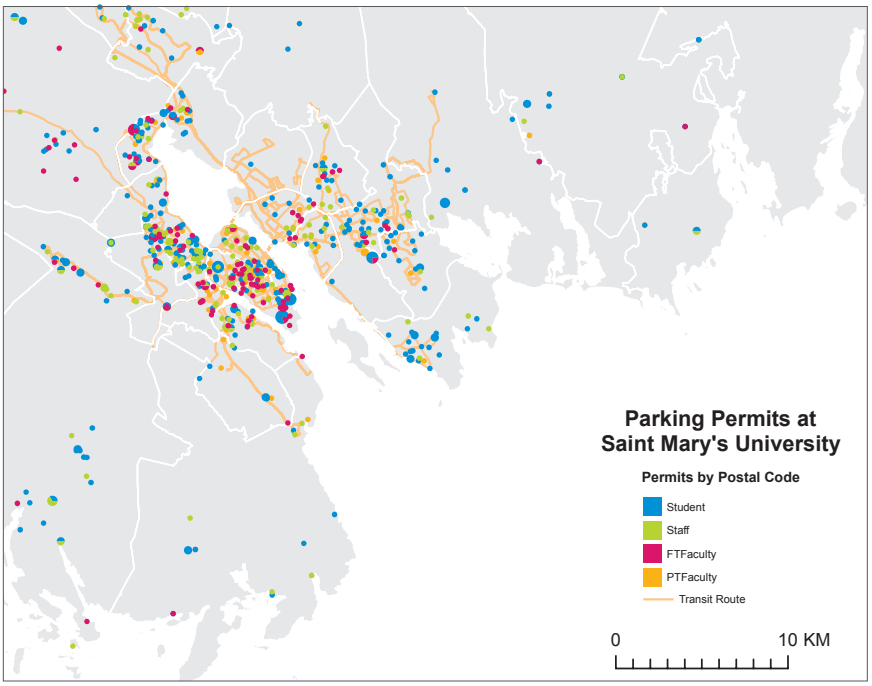
Unique Location (Developing Cycling from the District Outwards)

A large portion of HRM's 370,000 residents live within suburban or rural areas of the Municipality (HRM, 2006). However, a large portion of employment within HRM is concentrated within the Regional Centre. Within the Halifax peninsula much of the employment is concentrated in the downtown area and within the Institutional District. Generally, commuter traffic on the peninsula is concentrated on key arterials that connect to the entry points of the peninsula such as the MacKay and MacDonald bridges as well as the Armdale roundabout, Bedford Highway and the Bicentennial Highway. East-west arterials such as Chebucto and Quinpool are the major traffic circulators connecting to key entry points of the peninsula. Within the Institutional District, only Robie Street and Spring Garden Road serve as key traffic circulators for the peninsula, while most roads in the District are used primarily as local streets. Accordingly, there is an opportunity to shift the priority from automobiles to cycling on many roads in the District, encouraging students and employees to use sustainable forms of transportation such as cycling. The general public uses few roads in the District as major thoroughfares on a daily basis.

In order to develop a cycling environment that attracts the maximum number of new riders, cycling must be given priority over other less sustainable forms of transportation (SOV, carpool, transit). As priority is shifted to cycling, commuters who currently rely on the personal automobile to commute from suburban areas must be provided with options to make the transition to sustainable transportation. Although suburban commuters may not be willing to cycle the entire distance to and from the District each day, commuters may be able to cycle the final leg of the trip if supports are in place (bike and ride, bike routes, bike-sharing). From both an environmental and health perspective, it is important for institutions in the District, in partnership with HRM and MetroTransit, to take a leadership role in shifting the transportation behaviours of commuters. To foster a broader shift in transportation behaviour, improved conditions for cyclists in the District must be complemented by options to access the District using sustainable modes.

It is possible to envision the District as an area where cyclists are given priority over motorists within the road design and transportation policies, encouraging cycling as a primary mode of transportation. As cycling is prioritized through the development of infrastructure and facilities, its popularity will increase, reinforcing the ability of the institutions to provide incentives for cycling and disincentives (parking costs etc) for less sustainable forms of transportation. This approach will reduce the environmental impact of transportation within the District and foster a healthier population. The location of the District and the high number of commuters within cycling distance (less than 8 Km) provides an excellent opportunity to shift trips from SOV to cycling and transit with the proper supports and investment in sustainable transportation.

Saint Mary's University Parking Permit by Postal Code



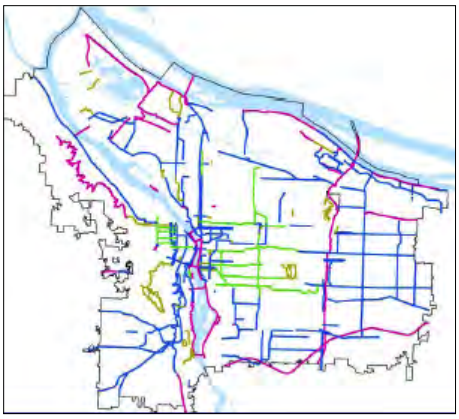
This map illustrates the high number of commuters from SMU currently driving to the District that live within a reasonable cycling distance (less than 8 km).

Environmental Benefits

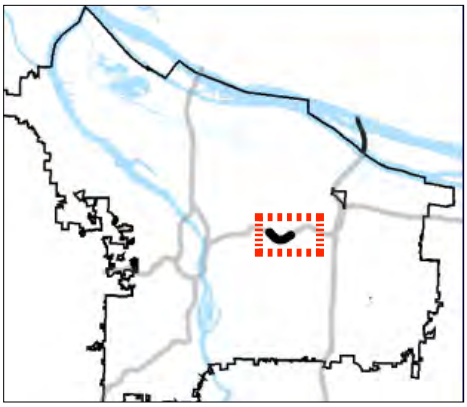
By encouraging new cyclists to commute to the Institutional District and reducing the number of SOV trips there is significant potential to reduce greenhouse gas (GHG) emissions and air pollution. Each SOV commuter represents a GHG footprint of roughly 4 tonnes each year (Translink, 2011). A significant opportunity exists for GHG mitigation given the roughly 40,000 daily trips. By developing a cycling network in the District there is significant potential to increase the cycling modal share, an attainable goal given the number of staff, students and faculty living within a reasonable cycling distance (see maps on pg 7 & 9). The reduction in SOV trips would also improve air quality by reducing emissions of nitrogen oxides, carbon monoxide, hydrocarbons and particulate matter (Translink, 2011). As cycling becomes a viable form of transportation throughout HRM, broader regional emission reductions could occur as the modal share for cycling increases.

Health Benefits

An increase in the number of new cyclists will improve the overall health of the students and employees in the District. The use of cycling as a primary or secondary mode of transportation can reduce heart disease risk by 36%, colon cancer and Type 2 diabetes by 20%, osteoporosis by 11%, and reduce the risk of obesity, a significant benefit considering 67% of the Nova Scotia population is classified as overweight (Best, 2004; Halifax Cycling Coalition; Statistics Canada Health Profile, 2006). Studies suggest that residents in walkable and cycle friendly communities are half as likely to be overweight based on the potential for greater use of active transportation (Lawrence Frank, 2009). Denmark has experienced a 200% return in health care costs for every dollar



300 mile Portland Bike Network



1 mile of Urban Freeway

invested in cycling and walking infrastructure (Geller, 2009). By supporting active transportation and cycling in the Institutional District there is significant potential to foster a healthier community in the long-term, thereby reducing long-term health costs.

Tourism Benefits

As fuel costs increase there is likely to be a greater number of short-distance tourism trips and a shift to regional tourism. The 2010 Tourism Strategy points to a significant decline in international travel with a need to support more unique regional and domestic tourism options (Nova Scotia Government, 2009). At the same time tourism sectors related to cycling, eco-tourism, and sport performed strongly in the last five years (Nova Scotia Government, 2009). The development of a cycling culture in the District through improved awareness, infrastructure, and strong branding will make it a major destination for cycle tourism. The Institutional District's cycling infrastructure and network could be seen as the basis for a series of tourist friendly recreational bike routes that could attract eco-tourists.

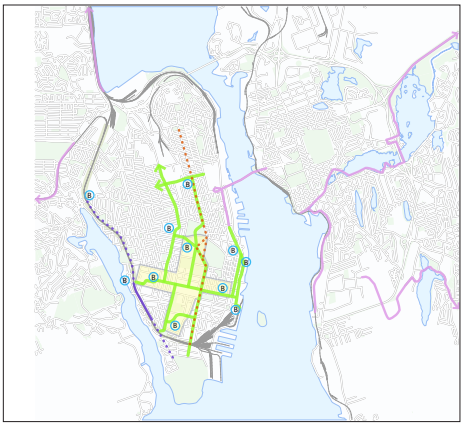
Other successful bike tourism regions have seen significant revenue from bike tourism. Portland, Oregon reports revenue of $7 million annually from tours, races, events, and routes (Geller, 2009). In Maine in 1999 there were 2 million bike tourists as a result of the Explore Maine strategy that improved connections for cyclists and tourists, an initiative that targets connections with Nova Scotia (Maine Department of Transportation, 2001). It is estimated that cycle tourists spend roughly $150-163/day based on estimates from Canadian bike tour operators. Merchants and stores in pedestrian and bike friendly areas often have greater street traffic and sales (Eastwind Cycle, 2009).

Transportation Benefits

A shift to cycling will also assist in reducing capital expenditures related to transportation. A shift to active transportation reduces costs for roadway maintenance, based on the reduced impact associated with cycling in contrast to automobiles. The Victoria Transportation Policy Institute (2004) estimates a $0.06 reduction in roadway maintenance costs for each 3.2 km trip by Bicycle. The City of Portland estimates their entire Bikeways Network (300 miles) cost the City 60 million dollars, roughly equivalent to the construction of 1 mile of urban freeway (Portland Office of Transportation, 2009). A modal shift away from SOV trips for students, staff and faculty from the partner institutions will result in significant reductions in the long-term roadway costs for HRM.

Community Benefits

The development of cycling infrastructure also improves the quality of life for residents of the community. By encouraging a culture of walking and cycling, residents will become more reliant on local services and amenities, increasing the amount of money circulating in the local economy. Proximity to a trail or active transportation route increases residential property values by 9% (Best, 2004). A real estate report from ERE suggests people are willing to pay $26,000 more for homes in pedestrian friendly communities (Best, 2004). The prioritization of active transportation will improve health among residents and support the development of an active population. With roughly 220,000 people in Nova Scotia between the ages of 45 and 59 there is a need to keep communities healthy and age-friendly to support the large baby boomer demographic. Such pedestrian and age-friendly areas are projected to rise in value the faster compared to more sprawling auto dependent communities over the next twenty-five years (Yarmouth ERC, pg.34). Overall the development of a cycle-friendly community will have significant co-benefits related to quality of life that reinforce local and regional goals in HRM.



This map illustrates the opportunities to connect the Institutional District Bikeways Network to other existing, planned and proposed cycling routes that would encourage suburban commuters to choose cycling (see page 41 for larger map and legend).

THE NEED FOR LEADERSHIP AND ACTION

Purpose of the Plan

Although transportation planning is largely the jurisdiction of HRM, the partner institutions have collectively decided to use their influence as major landowners to accelerate the shift to sustainable transportation modes within the District. This Bikeways Plan is early evidence of this commitment. Accordingly, the Bikeways Plan provides a unique opportunity to test ideas around bikeways infrastructure and programming to develop a cycling environment that attracts the maximum number of new riders.



Land Ownership in the District

- Dalhousie University and Kings College
- Capital Health, hospitals
- IWK Health Centre, hospitals
- St. Mary's University
- Parks, open spaces and cemeteries
- Elementary, jr. high and high schools
- Other public institutions

The Plan builds on existing HRM initiatives such as the AT Functional Plan, the Blueprint for a Bicycle Friendly HRM and the Dalhousie Campus Master Plan to ensure recommendations reinforce long-term goals for cycling in HRM. Therefore recommendations for routes in the District connect to the proposed AT Plan connections to the Institutional District, providing opportunities for partnership with HRM to expedite the implementation of long-term cycling goals. The Bikeways Plan will be a catalyst encouraging the development of a cycling culture in the District that will extend beyond the boundaries of the District and throughout HRM .

Institutional District as Model for Cycling Innovation

To encourage cycling as a viable form of transportation in the District, infrastructure, policy and programming must provide a level of safety that attracts new cyclists. The Institutional District is an excellent location to attract new cyclists, considering the large student population and educated workforce at the institutions, both characteristics often associated with cycling populations in other cities (Halifax Cycling Coalition, 2010). Moreover, the District is well positioned to serve as a showcase for cycling due to its central location on the Peninsula and the high number of short trips occurring daily. Census and survey data from Dalhousie and SMU illustrate that many commuting trips to the District by students, community members and employees are less than 5 km, a distance well suited for cycling if proper infrastructure is in place (Mans, 2010; SMU, 2010).

Institutional Leadership (Employer-Based Trip Reduction)

Developing the Bikeways Plan connects to the broader goals of promoting sustainable transportation and reducing SOV trips, goals supported by Transportation Demand Management (TDM), practices and programs that attempt to reduce vehicle miles traveled (Mans, 2010). TDM practices are increasingly being instituted by large employers, business associations and institutions in the form of Employer Based Trip Reduction (EBTR) initiatives (Mans, 2010). EBTR initiatives take different forms, including: employer support actions, transportation services, incentives and disincentives, and alternative work arrangements (Mans, 2010).

The development and implementation of a Bikeways Plan is a good example of a transportation services approach to EBTR, providing facilities and supports to attract new cyclists will reduce SOV trips. The partner institutions within the District have considerable opportunity to complement improvements in future infrastructure with other EBTR strategies to attract the maximum number of new cyclists in the District and shift transportation behaviours.

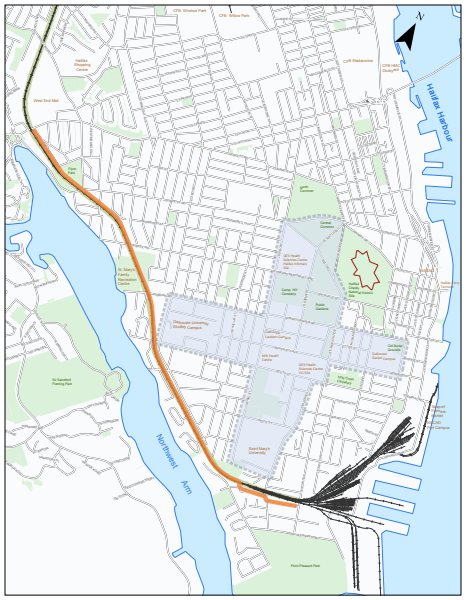
Mans (2010) cites benefits connected to EBTR strategies, including: reduced parking demand and its associated costs; reduced congestion; and improved employee recruitment, retention and productivity. Cycling and its associated

environmental and health benefits are well aligned with the goals of the institutions in the District.

Through committing to the development and implementation of the Plan, the institutions are recognizing their ability to influence transportation behaviors. The Plan should be viewed as an opportunity to explore creative approaches to influencing transportation behaviors through progressive programs and policies such as transportation management associations (TMA), parking management, employee transit passes, bike/park and ride and bike-share. Institutional leadership in the form of political will and resources to develop infrastructure, incentives and programming is critical to advancing cycling in the District and throughout Halifax. In the long-term cycling represents a cost-effective strategy to pursue goals related to healthy lifestyles and sustainability.

Building on Momentum for Cycling Locally

The development of a District cycling network will complement existing work and initiatives toward a regional cycling network in HRM. For example, the Halifax Urban Greenway (off-road multi-use trail) will provide a safe connection to the Studley Campus from the Armdale Roundabout. In addition, HRM is exploring a north-south connection for cyclists on the peninsula that reinforces north-south connections in the Institutional District. Other exciting cycling advocacy and awareness initiatives (e.g., Halifax Cycling Coalition, Nova Scotia Bikeways Coalition, Active Transportation Alliance, Switch: Open Street Sundays, Sustainable Transportation Task Force, Bike Week, etc.) are inspiration for the Plan. Even provincial policies such as the one-metre rule are reinforcing the idea of cycling as a legitimate form of transportation.



The proposed Halifax Urban Greenway, illustrated in orange, is well positioned to connect to the western portion of the District. The first phase of this off-road multi-use trail has been constructed from Beaufort to South Street. The project was spearheaded by local community members who saw the potential for a multi-use trail to support recreation and commuting purposes. For more info check out the website: halifaxurbangreenway.org



2.0 Defining the District

5.3 Public Transpor

2.0 Defining the District

The Institutional District is characterized by east-west and north-south corridors that connect major destinations within the District. The east-west corridor is the area between Dalhousie's Studley Campus to the west and the Sexton Campus to the east. The north-south corridor is the area between the QE II Health Sciences Centre to the north and Saint Mary's University in the south. The District is well positioned to serve as a catalyst for a cycle-friendly peninsula that will expand beyond the District. District employees, students and visitors currently accounts for roughly 40,000 trips daily. For the purposes of this Plan this physical area will be referred to as the Institutional District, providing an area of focus for identifying a Bikeways Network and supporting facilities, programming and policies. The District has great potential for cycling based on its central location and large number of single occupancy vehicle (SOV) trips. It is difficult to provide a hard number for the proportion of single occupant vehicle trips for the entire District; however the increasing gap between demand for parking and parking supply (lots or parkades) at the health and educational institutions points to the need and opportunity for cycling and sustainable transportation to become a viable commuting option. The data from Dalhousie University and Saint Mary's identifies roughly 6,000-7,000 daily SOV trips that could be shifted to cycling. Respondents of the transportation survey for Dalhousie living within 10 km of campus preferred cycling related improvements as an approach for encouraging sustainable transportation on campus. The District is a densely populated area with a mix of residential, commercial, institutional zoning as well as a number of major recreational areas that could be utilized for off-road cycling connections, indicating significant opportunity to encourage cycling as a form of commuting. This Plan outlines infrastructure design, programming and recommendations to give priority to cyclists over other forms of transportation.










17
1
3
2
4
12
16
5
6
11
15
10
9
8
7
14
13
North Common
Central Common
QEII Health Sciences Centre Halifax Infirmary Site
Camp Hill Cemetery
Public Gardens
Halifax Citadel National Historic Site
Dalhousie University Studley Campus
Dalhousie Carleton Campus
IWK Health Centre
QEII Health Sciences Centre VG Site
Dalhousie Sexton Campus
Old Burial Grounds
Holy Cross Cemetery
Saint Mary's University
NSCAD
NSCAD Port Campus
Seaport Farmers Market
Northwest Arm
Harbour
CHEBUCTO RD
CUNARD ST
QUINPOOL RD
OAK ST
OXFORD ST
NORWOOD ST
PEPPERELL ST
COBURG RD
VETERANS MEMORIAL LANE
SACKVILLE ST
SPRING GARDEN RD
SOUTH ST
MORRIS ST
CLYDE ST
BISHOP ST
SALTER ST
BLOWERS ST
DUKE ST
COGSWELL ST
RAINNIE DR
TERMINAL RD
FENWICK ST
VICTORIA RD
INGLIS ST
POINT PLEASANT DR
ROBIE ST
VERNON ST
SEYMOUR ST
SUMMER ST
BELL RD
AHERN AVE
TROLLOPE ST
NORTH PARK ST
DRESDEN ROW
QUEEN ST
TOWER RD
MCLEAN ST
YOUNG AVE
LOWER WATER ST
UPPER WATER ST
GEORGE ST
CARMICHAEL ST
GRANVILLE ST
BEDFORD ROW
HOLLIS ST
MARKET ST
GRAFTON ST
ARGYLE ST
MARGINAL RD
SMITH ST
GERRISH ST
CREIGHTON ST
CORNWALLIS ST
BRUNSWICK ST
MAYNARD ST
AGRICOLA ST
UNIACKE ST

Intersections

1 AGRICOLA ST/CUNARD ST/NORTH PARK ST

- Very challenging intersection for cyclists travelling in all directions; dangerous merging with traffic required.
- No direct connection from Agricola St. to North Common pathways.

2 WELSFORD ST/ROBIE ST

- Cyclists must dismount at pedestrian crossing to connect with North Common pathways.

3 WINDSOR ST/ST. VINCENT'S NURSING HOME

- Cyclists and pedestrians must cross St. Vincent's parking lot and pass through a narrow opening in fence to connect to Quinpool Rd. via Quingate Place.
- Route crosses private property and is subject to possible closure by St. Vincent's administration.

4 QUINGATE PL/QUINPOOL RD/VERNON ST

- North and south travel through intersection currently not permitted.

5 CENTRAL COMMON/BELL RD/SUMMER ST

- Connecting from Central Common multi-use path to Bell Rd. bike lane or Summer St. is awkward.

6 BELL RD/SACKVILLE ST/SOUTH PARK ST

- Bell Rd. bike lane ends before intersection.
- Merging with traffic to make left turn onto Sackville St. is challenging.

7 SPRING GARDEN RD/SOUTH PARK ST

- South Park St. bike lane ends before intersection.
- Potential conflicts between cyclists and south-bound buses stopping on South Park St. south of intersection.

8 UNIVERSITY AVE/SOUTH PARK ST

- South Park St. bike lane ends before intersection.
- Left turn onto Morris St. from South Park St. requires challenging merge with traffic.
- Alignment of University Ave. & Morris St. awkward for cyclists travelling west on University from Morris St.

9 UNIVERSITY AVE/SUMMER ST

- Complex interaction between cyclists, pedestrians and vehicles.

10 IWK/UNIVERSITY AVE

- No direct access to west-bound lane on University for cyclists departing from the Health Centre.

11 VERNON ST/COBURG RD/SEYMOUR ST

- Off-set intersection is awkward for cyclists travelling the Vernon St./Seymour St. corridor.

12 QUINPOOL RD/COGSWELL ST/BELL RD/ROBIE ST

- Very challenging intersection for cyclists travelling in all directions.

Rights-of-Way/Connectivity

13 GORSEBROOK AVE

- Mid-block barricade limits connectivity for cyclists.

14 SAINT MARY'S UNIVERSITY CAMPUS

- Lack of bikeways traversing the campus.

15 DALHOUSIE STUDLEY CAMPUS

- Lack of bikeways traversing the campus.

16 BELL RD APPROACHING QUINPOOL RD

- Vehicles queue during peak hours; traffic lanes are narrow with no room for cyclists to pass between cars and the curb.

17 AGRICOLA ST

- Traffic lanes are narrow; cyclists are forced to ride uncomfortably close to parked cars.



3.0 Guiding Principles

3.0 Guiding Principles

At the first Public Session, participants were asked to identify the fundamental aspects of a cycling-supportive environment within the District. Some common themes emerged, informing the development of these six Guiding Principles. These Principles will act as filters through which proposed infrastructure, program and policy initiatives can be tested for suitability. Guiding Principles also inspire best practices and innovative policy changes.

1. INVEST IN BICYCLE INFRASTRUCTURE AND PROGRAMS THAT ARE DESIGNED TO CAPTURE THE MAXIMUM NUMBER OF NEW RIDERS.

- Reach out to citizens that are interested in cycling, but concerned about safety.
- Design for all ages; an environment designed for youth and seniors will work for all.
- Establish a distance criteria for prioritizing investment in infrastructure (i.e., trips within 8km of the District)

2. INTEGRATE BICYCLES AS AN ESSENTIAL COMPONENT OF A MULTI-MODAL TRANSPORTATION SYSTEM.

- Consider infrastructure needs at transfer points (i.e., between modes: cars, transit, bikes, pedestrian trips).
- Rethink how we use streets; allocation of space on the street.
- Improve relationships between: cyclists, motorists, pedestrians.
- Foster a culture of cycling.
- Ensure that cycling is easy and convenient (i.e., access to: bikes, showers, bike parking, bike pumps, etc.).

3. DEVELOP A SENSE OF PLACE FOR THE INSTITUTIONAL DISTRICT'S BICYCLE ENVIRONMENT.

- Design cohesive and clear signage, markings, branding, etc.
- Work toward a common language for provincial, HRM and Institutional District routes.

4. PRIORITIZE BICYCLES ALONG DESIGNATED CYCLING ROUTES.

- Establish priority of cycling in hierarchy of transportation modes.
- Give priority to bicycles at intersections along designated cycling routes.

5. DEVELOP A CONNECTED AND CONTINUOUS NETWORK OF BICYCLE ROUTES.

- Connect riders to their destinations along direct, efficient routes.
- Provide easy connections between institutions and campuses.

6. DESIGN AND MAINTAIN A CYCLING ENVIRONMENT FOR ALL SEASONS.

- Make cycling an option for all seasons.



4.0 Bikeways Network

4.0 Bikeways Network

The principles of cohesion, comfort, directness, safety and attractiveness are commonly identified as international best practices for bikeway design (City of Portland, 2010). These same principles are reflected in this Plan's Guiding Principles, developed by participants at the first public workshop. The proposed Institutional District Bikeways Network implements these Guiding Principles through a series of primary and secondary north-south and east-west corridors that traverse the District and connect it to existing and planned active transportation infrastructure on the peninsula and beyond. The experience of other cities that have seen bicycle ridership grow as bikeway networks have expanded indicates that a large group of interested but concerned residents will choose cycling more often if they have access to low-stress bikeways that limit their exposure to automobile traffic (City of Portland, 2010). As per the first Guiding Principle of the Bikeways Plan, encouraging this large group of potential riders to choose cycling for their commute to the District and/or for travel within the District is a primary goal. To achieve this goal the proposed Bikeways Network emphasizes the development of continuous, direct and low-stress bike routes, including physically-separated bike lanes and bike paths along higher traffic volume streets.

The Bikeways Network map, cross sections and plan-view renderings on the following pages illustrate the primary and secondary cycling routes within the District, and the proposed on-street and off-street infrastructure for each of these routes.

Monitoring Infrastructure Use

To monitor the number of cycling and active transportation trips occurring in the district, a bicycle counter will be installed in the concrete at key points. This automated counter will provide data for preset time intervals. Counters will be installed on the key physically-separated routes (i.e., University, Robie, Summer, South Park).



No one type of bicycle infrastructure is the answer to every site or situation; different streets need different solutions. The following presents an overview of some solutions from other cities.

Bicycle Boulevard

Bicycle Boulevards are defined as light-traffic streets that give priority to cyclists through traffic calming and distinctive visual cues.



Bicycle Boulevard - Traffic Calming



Bicycle Boulevard

Bicycle Lane

Bicycle Lanes represent a common approach to cycling infrastructure in many cities. Painted lines -a width of approximately 1.5m - define cyclist space.



Sharrow / Bicycle Lane

Bicycle Path

Bicycle Paths are an off-street approach to bicycling infrastructure, commonly found in a city's green spaces.



Bicycle Path

Cycle Track

Cycle Tracks are defined by the physical separation they provide from other modes of transportation. This separation is seen to increase safety. For this reason, separated bicycle infrastructure is increasingly preferred.



Cycle Track



Cycle Track

Intersections are known to be sites of bicycle-vehicle conflicts. The following roadway treatments offer some solutions for providing greater safety.



Bike Box / Colour Treatment



Bike Box

Bike Boxes

The Bike Box is a pavement treatment that denotes a space for cyclists in front of cars at intersections. This space allows cyclists to assert their presence, attain visibility, and enter the intersection with priority.

Colour Treatments

Many cities employ colour treatments to mark spaces where cyclists pass through intersections. This heightened visibility raises awareness and promotes caution.

Colour Treatment



Sharrows

A combination of "share" and "arrow," the "sharrow" is a tool used to define space on the street for cyclists often used to identify that cyclists should be respected at intersections or along designated cycling routes.



Sharrows



Sharrows

Elephant's Feet Bicycle Crossing Lines

Elephant's feet bicycle markings (dashed white lines) are used to define a bicycle crossing area and are typically used where a physically-separated multi-use trail or bikeway intersects a roadway. Elephant's feet markings are placed on each side of crosswalk markings to designate a shared pedestrian/cyclist crossing or placed on one side of the crosswalk markings to designate separate pedestrian and cyclist crossings.



Image source: contessak, flickr.com

Bus Bulges

The use of bus bulges should be considered as a means of reducing the impact of transit on cyclists. A bus bulge allows buses to stop in a travel lane to pick-up and drop-off passengers, instead of cutting across the bikeway to reach the curb. In addition to enhancing a bicycle-friendly environment, bus bulges reduce delays to buses and increase the space available for pedestrians, bus shelters, street furniture and landscape enhancements. They shorten the crossing distance for pedestrians, thus reducing the signal phase. They also improve bus service reliability, the public image of transit and can increase the speed of other vehicle traffic by eliminating merging manoeuvres (TransLink, 2007).



Image source: TransLink, 2007

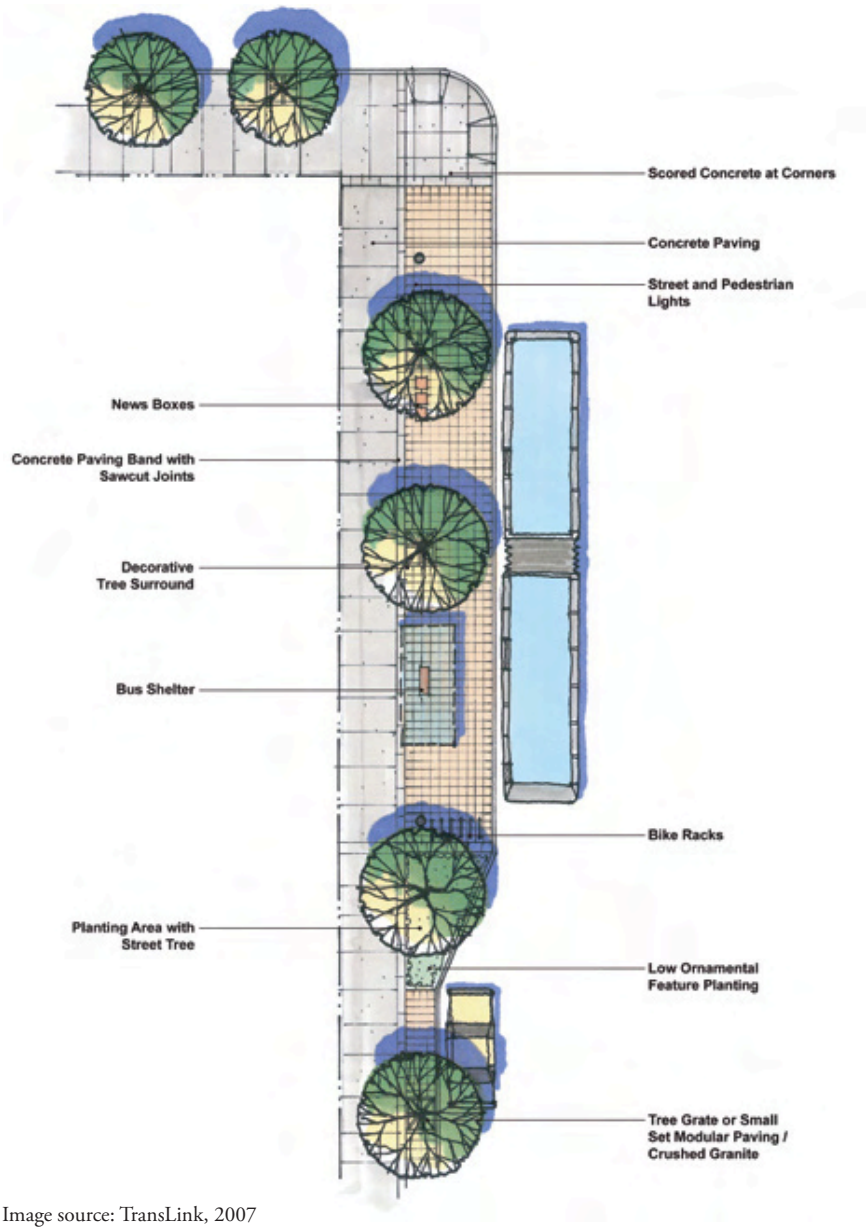
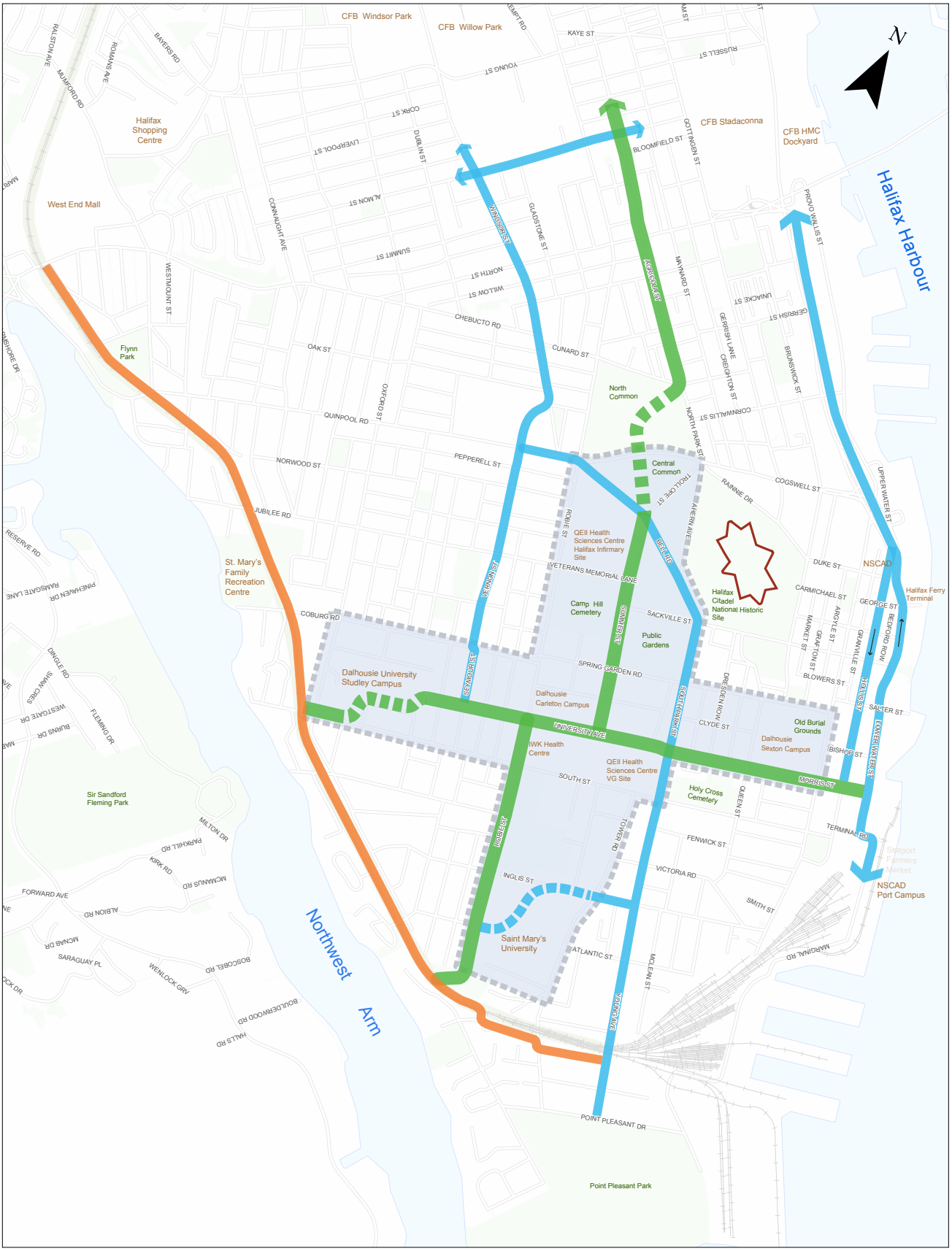


Image source: TransLink, 2007


N
Halifax Harbour
Northwest Arm
CFB Windsor Park
CFB Willow Park
CFB Stadaconna
CFB HMC Dockyard
Halifax Shopping Centre
West End Mall
Flynn Park
St. Mary's Family Recreation Centre
North Common
Central Common
Camp Hill Cemetery
Public Gardens
QEII Health Sciences Centre Halifax Infirmary Site
Halifax Citadel National Historic Site
NSCAD
Halifax Ferry Terminal
Dalhousie University Studley Campus
Dalhousie Carleton Campus
Dalhousie Sexton Campus
Old Burial Grounds
IWK Health Centre
QEII Health Sciences Centre VG Site
Holy Cross Cemetery
Saint Mary's University
NSCAD Port Campus
Seaport Farmers Market
Sir Sandford Fleming Park
Point Pleasant Park
Point Pleasant Dr
Jubilee Rd
Coburg Rd
Spring Garden Rd
University Ave
Morris St
South St
Inglis St
Atlantic St
Victoria Rd
Fenwick St
Terminal Rd
Chebucto Rd
Quinpool Rd
Cunard St
Oak St
Norwood St
Pepperell St
Sackville St
Duke St
Cogswell St
Rainnie Dr
Bell Rd
Agricola St
Gottingen St
Bloomfield St
Young St
Kaye St
Russell St
Barrington St
Gladstone St
Maynard St
Robie St
Veterans Memorial Lane
Summer St
Sexmour St
Vernon St
South Park St
Queen St
Tower Rd
Robie St
Lower Water St
Upper Water St
Brunswick St
Granville St
Hollis St
Barrington St
Argyle St
Market St
Grafton St
Carmichael St
George St
Bedford Row
Salter St
Bishop St
Blowers St
Clyde St
Dresden Row
Creighton St
Gerrish Lane
Gerrish St
Cornwallis St
North Park St
Tobin Dr
Arern Ave
Robie St
Mcleay Ave
Mcleay St
Macdonald Bridge
Macdonald Rd
Point Pleasant Dr
Point Pleasant Park
Connaught Ave
Dublin St
Liverpool St
Cork St
Young St
Summit St
North St
Willow St
Westmount St
Oxford St
Robie St
Mumford Rd
Bayers Rd
Rowans Ave
Windsor St
Milton Dr
Parkhill Rd
Kirk Rd
Mcmanus Rd
Forward Ave
Albion Rd
Mcnab Dr
Saraguay Pl
Wenlock Grv
Boscobel Rd
Boulderwood Rd
Hall's Rd
Dingle Rd
Shaw Cres
Westgate Dr
Burns Dr
Fleming Dr
Reserve Rd
Pinehaven Dr
Ramsgate Lane
Shoreline Dr
Mary

Bikeways Network: Legend

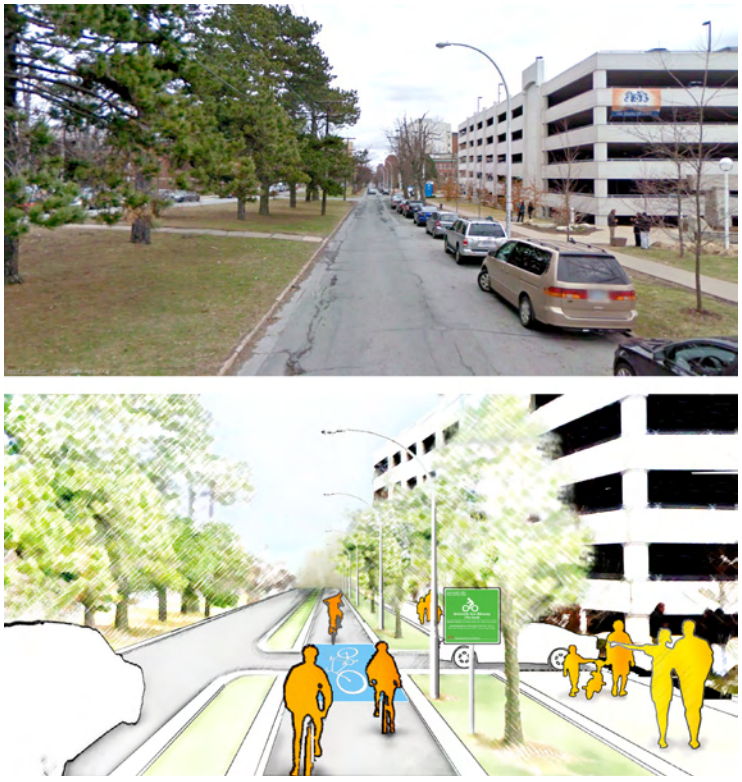
Bikeways (highest comfort and safety; includes separated bike lanes and on-street bike lanes)

Off-street Bikeways (highest comfort and safety; includes off-street bike paths and multi-use paths)

Upgraded On-street Bike Routes

Halifax Urban Greenway (off-street multi-use path; Phase 1 South St. to Roxton Rd. completed; for more information visit: www.halifaxurbangreenway.org)

Halifax Urban Institutional District



University Avenue Bikeway looking east



Route Length: 1.5Km
Route Direction: West

West

University Ave. Bikeway (The Quad)

Decision Points : University & Summer, Robie & University

Key Destinations on The Quad: IWK Health Centre, Dalhousie Studley Campus, Killam Library, Kings College

Bikeways Institutional District



Existing University Avenue looking East

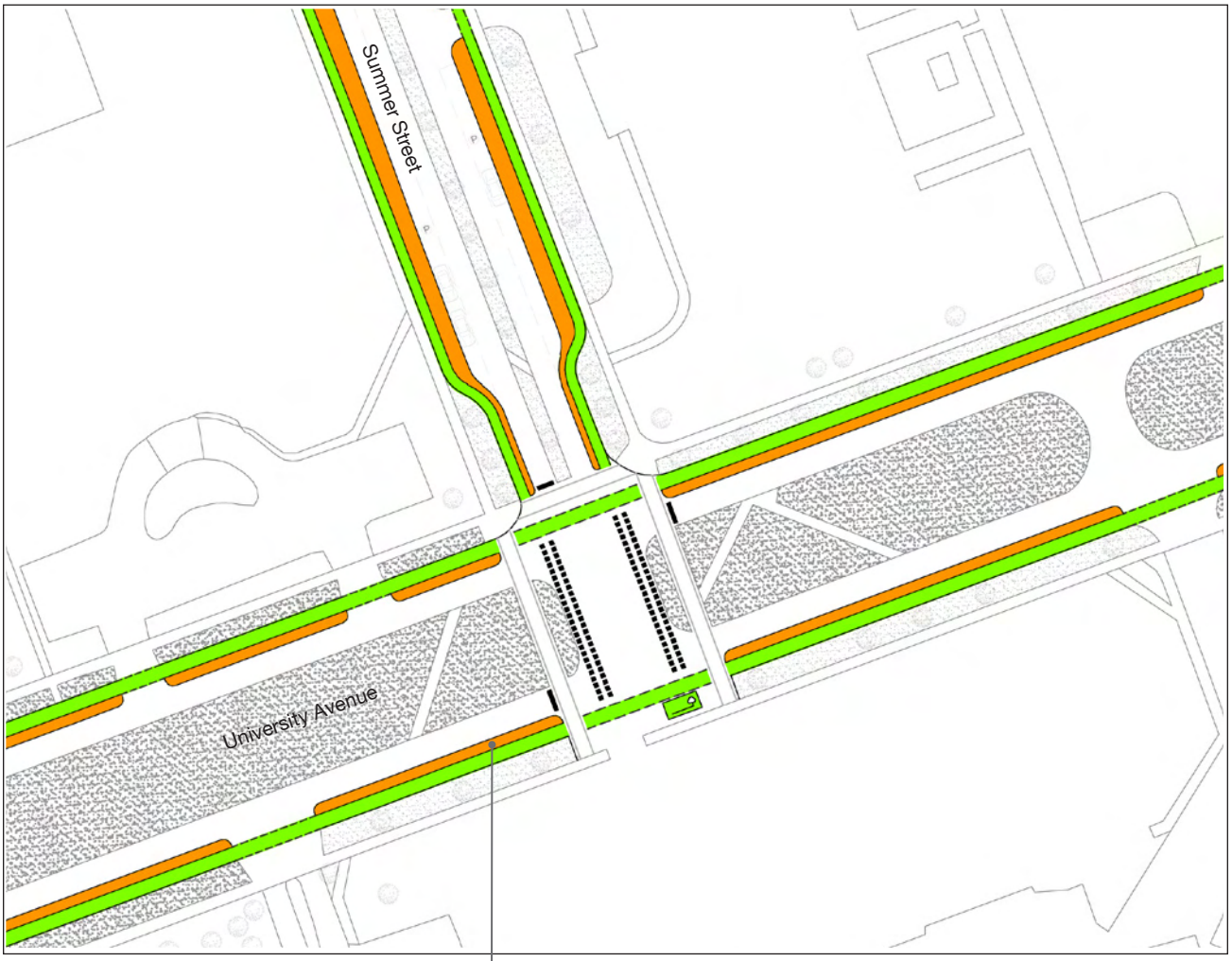


Existing University Avenue looking West



* All dimensions in metres

Proposed Design: University Avenue Looking West



University Avenue & Summer Street

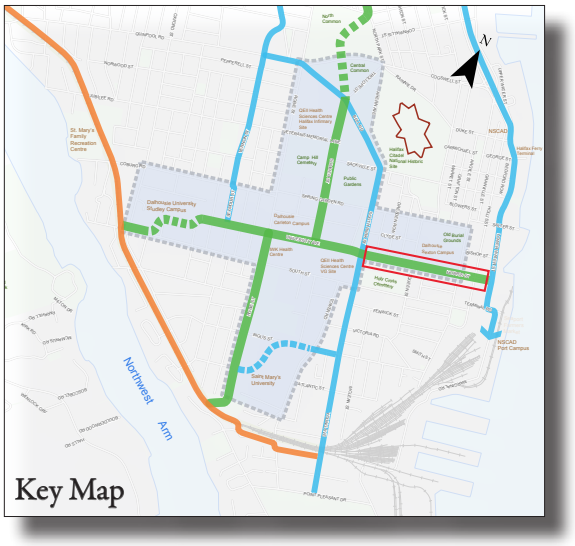
Legend

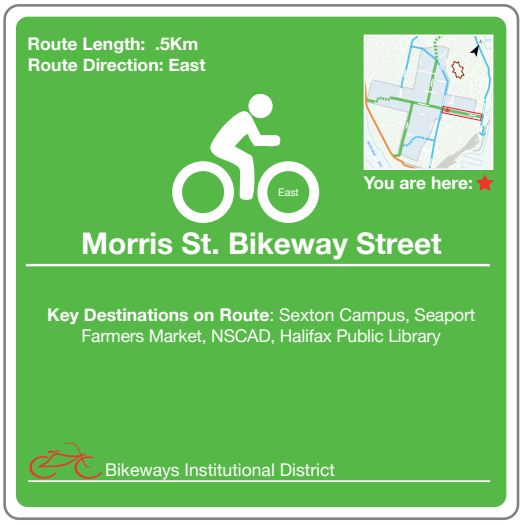
Landscaped buffer

- Two-stage turn queue box (colour recommended)
- Bicycle lane or path (colour optional)
- Intersection bike crossing markings & other conflict areas
- Painted buffer
- Physical buffer
- Pedestrian crossing
- Elephant's Feet bicycle crossing
- Landscaping

An Active Transportation Corridor

Dalhousie's Campus Master Plan includes a concept for University Avenue as an active transportation corridor. The Bikeways Plan builds on the concept in a way which recognizes University Avenue's historic form, while providing a design that is easily implemented in the short-term. Dalhousie is currently working with HRM to finalize the design for University Avenue.



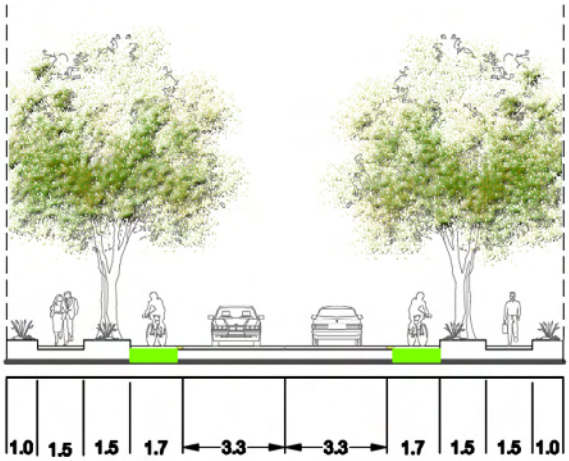




Morris Street Looking East

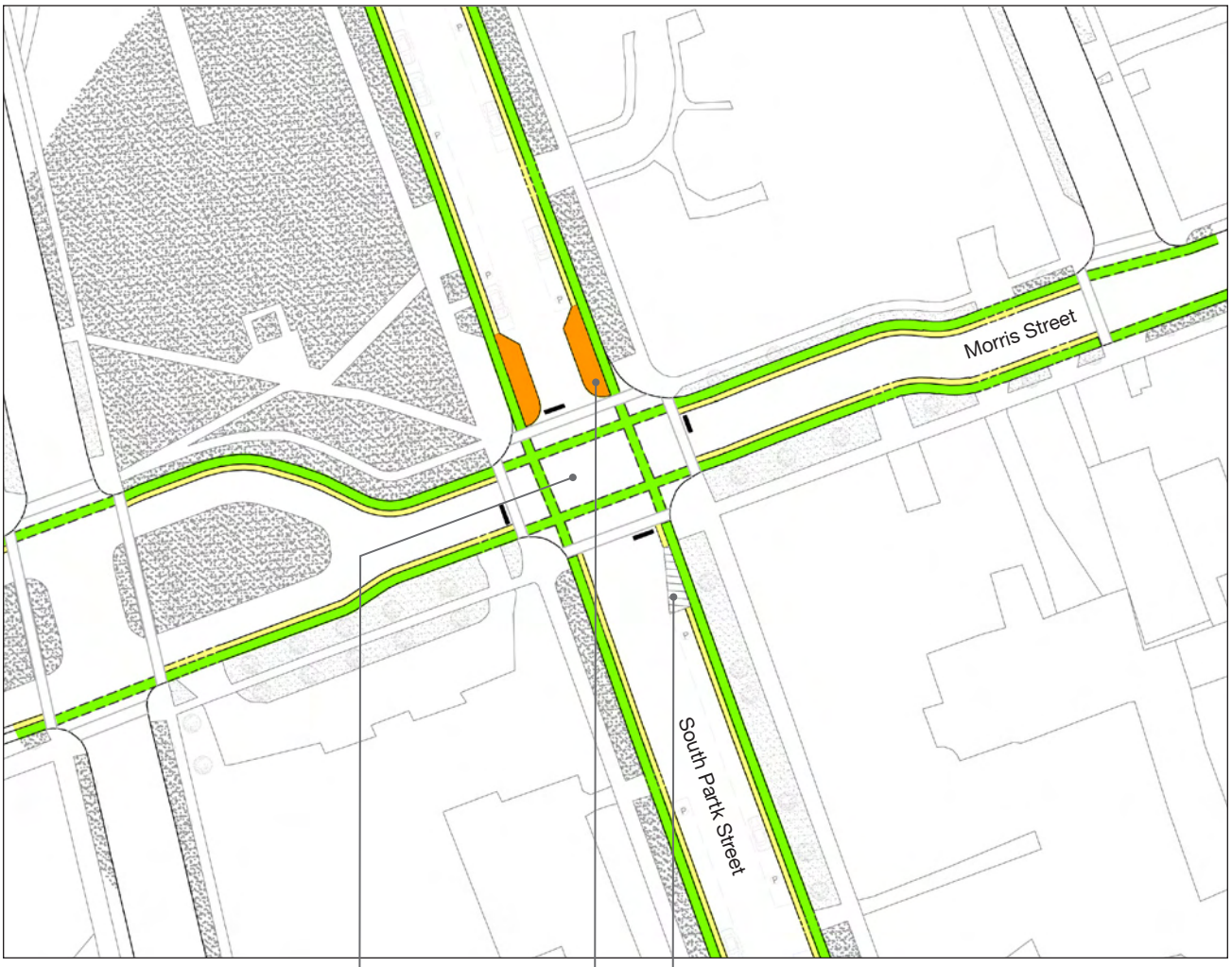


Morris Street Looking West



* All dimensions in metres

Proposed Design: Morris Street Looking East



Morris Street & South Park Street

Realigned intersection

Bus bulge (with pedestrian crossing across bike lane to access bus stop)

Painted markings indicate end of on-street parking in advance of an intersection

Legend

- Bicycle lane or path (colour optional)
- Intersection bike crossing markings & other conflict areas
- Painted buffer
- Physical buffer
- Pedestrian crossing
- Landscaping



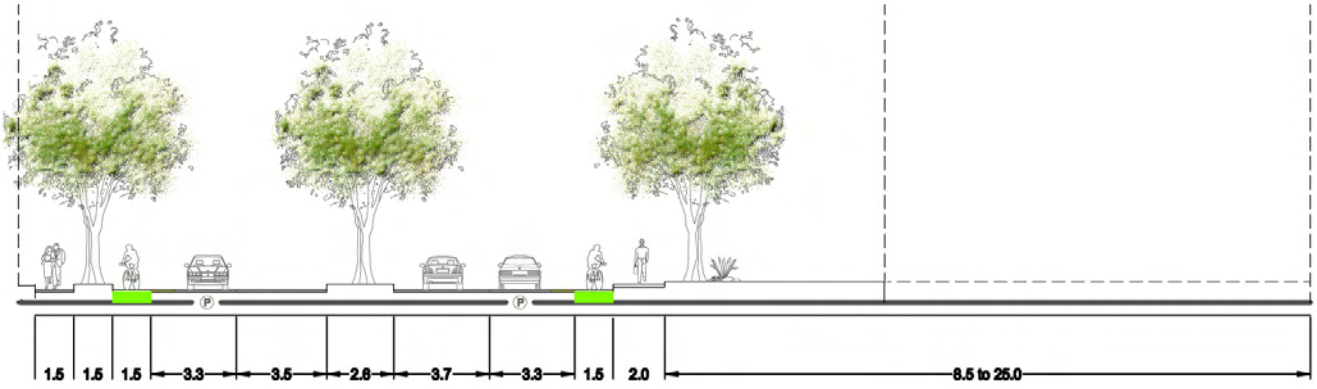




Robie Street Looking North

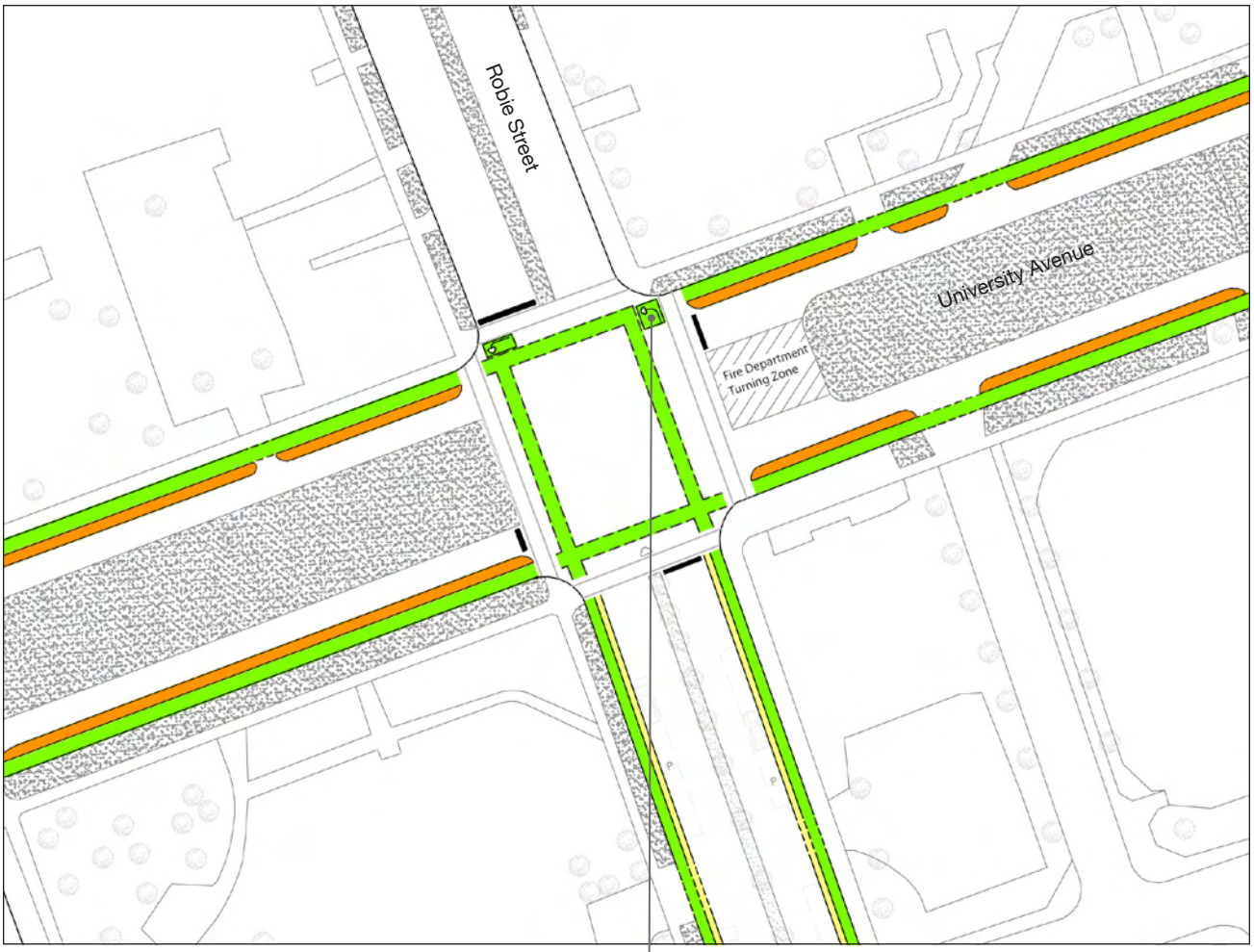


Robie Street Looking South



* All dimensions in metres

Proposed Design: Robie Street Looking North

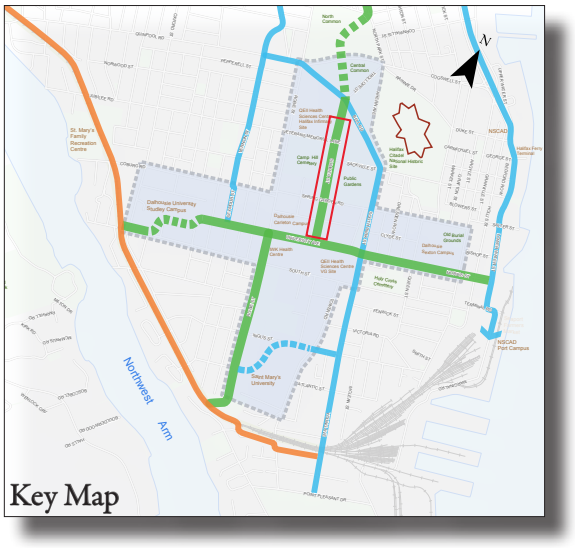


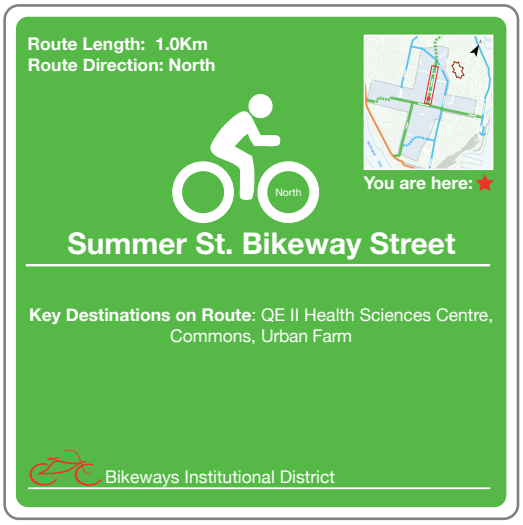
Robie Street & University Avenue

Two-stage turn queue box for cyclists turning left into the University Avenue Bikeway from the north bound Robie Street Bikeway

Legend

- Two-stage turn queue box (colour recommended)
- Bicycle lane or path (colour optional)
- Intersection bike crossing markings & other conflict areas
- Painted buffer
- Physical buffer
- Pedestrian crossing
- Landscaping







Summer Street Looking North

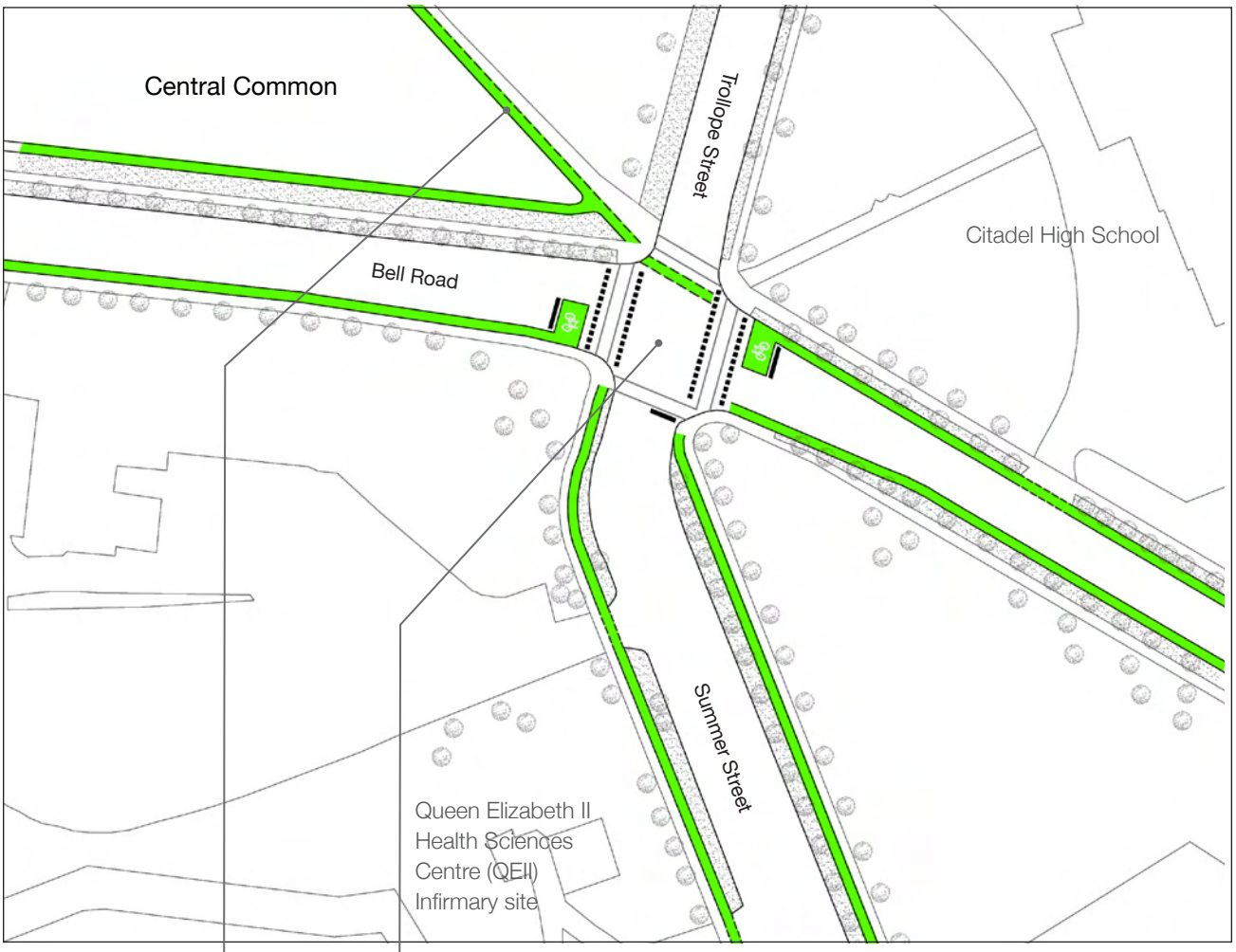


Summer Street Looking South



* All dimensions in metres

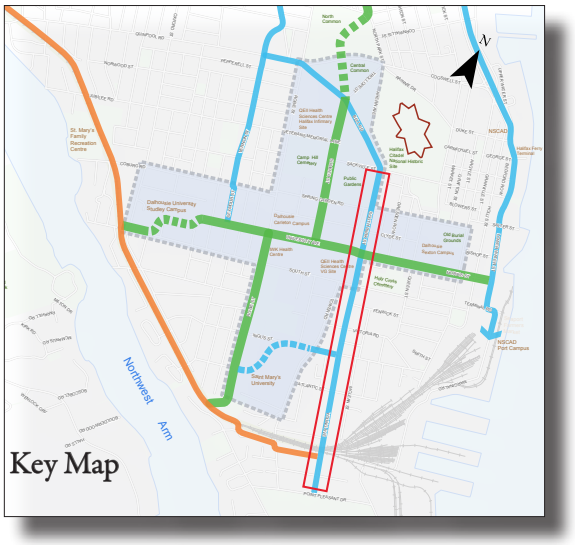
Proposed Design: Summer Street Looking North



Summer Street & Bell Road

Legend

- Bike box with bike symbol (colour recommended)
- Bicycle lane or path (colour optional)
- Intersection bike crossing markings & other conflict areas
- Painted buffer
- Physical buffer
- Pedestrian crossing
- Combined pedestrian and bicycle crossing
- Landscaping



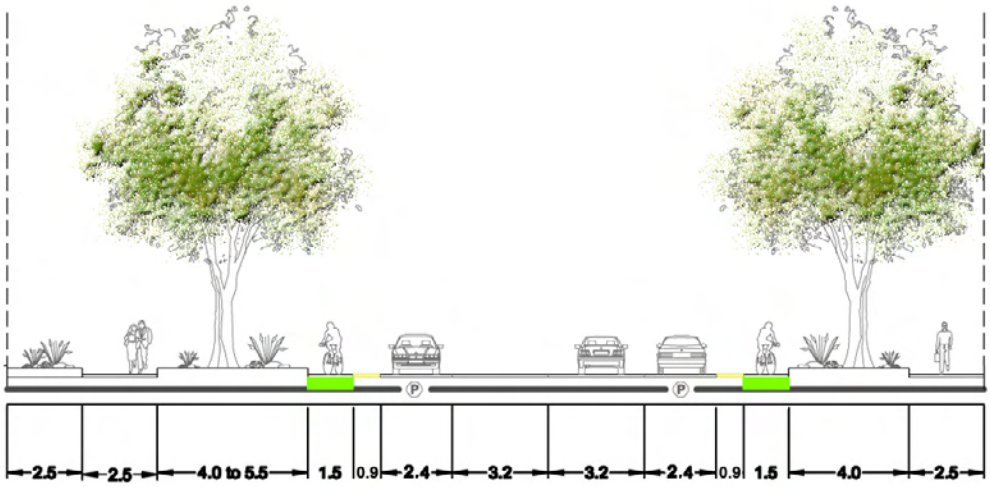




South Park Street Looking North

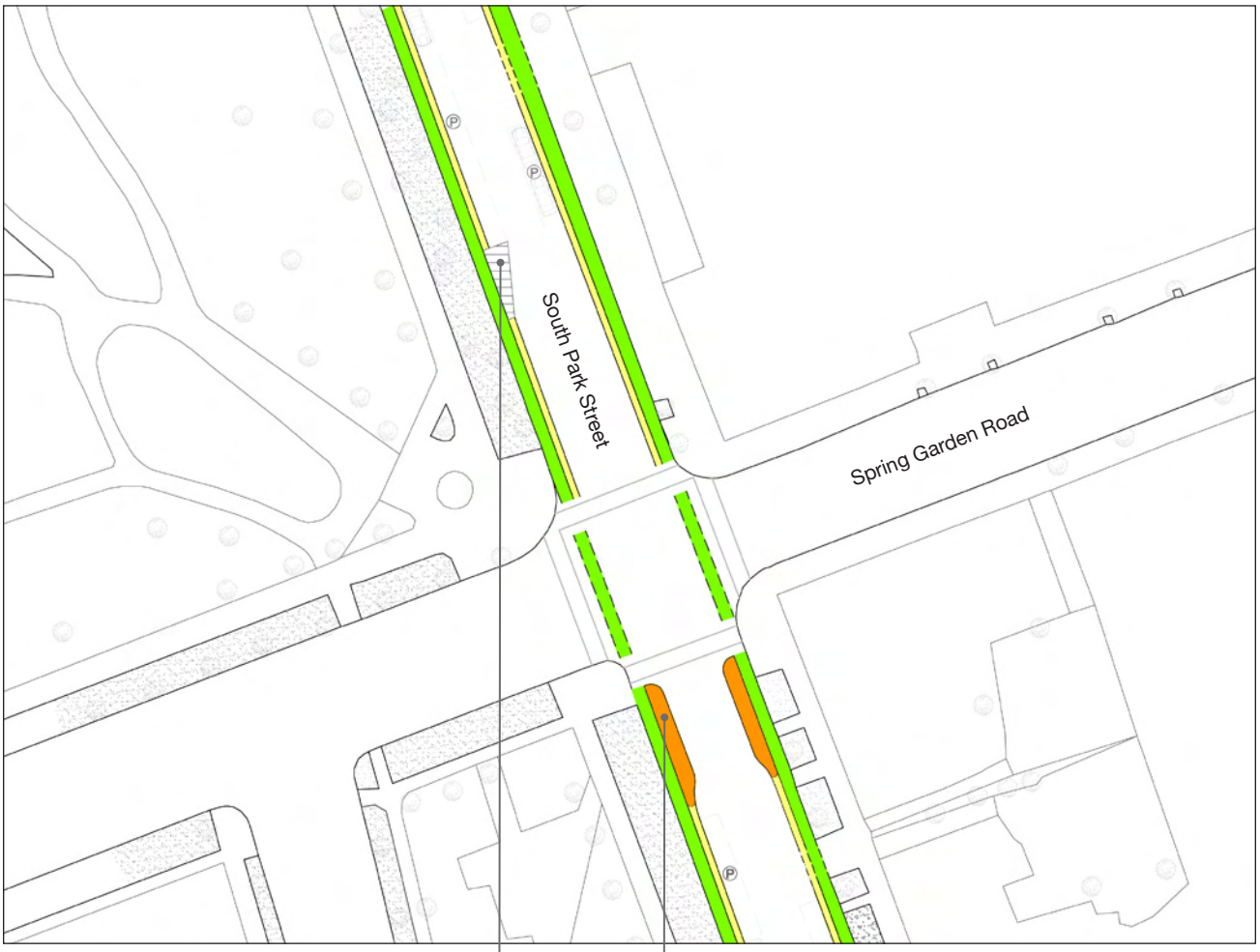


South Park Street Looking South



* All dimensions in metres

Proposed Design: South Park Street Looking North



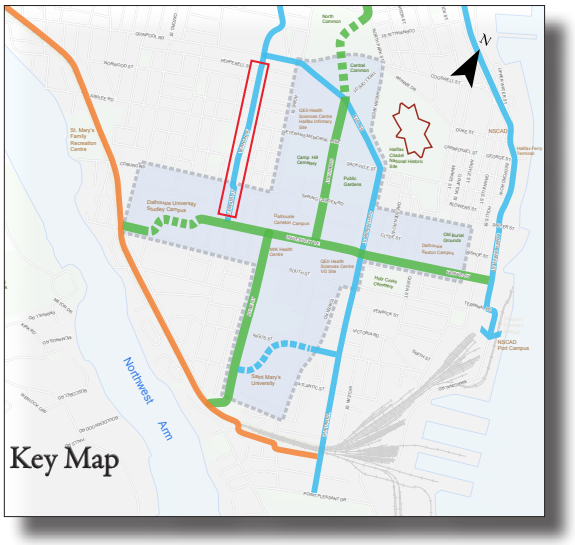
South Park Street & Spring Garden Road

Bus bulge (with pedestrian crossing across bike lane to access bus stop)

Painted markings indicate end of on-street parking in advance of an intersection

Legend

- Bicycle lane or path (colour optional)
- Intersection bike crossing markings & other conflict areas
- Painted buffer
- Physical buffer
- Pedestrian crossing
- Landscaping







Vernon Street Looking North

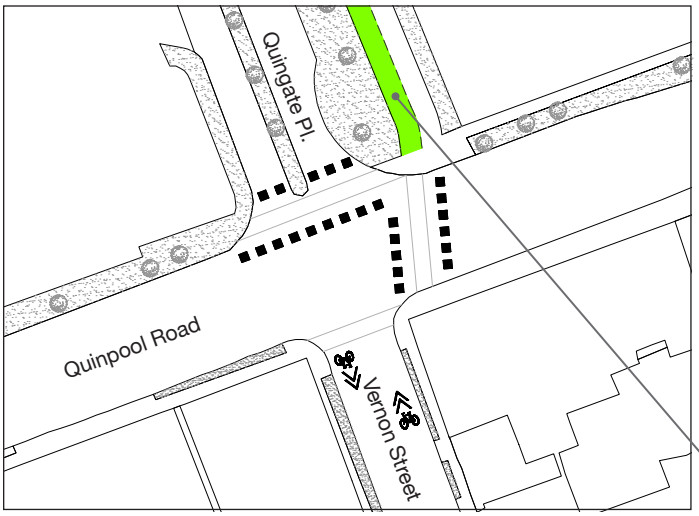


Vernon Street Looking South

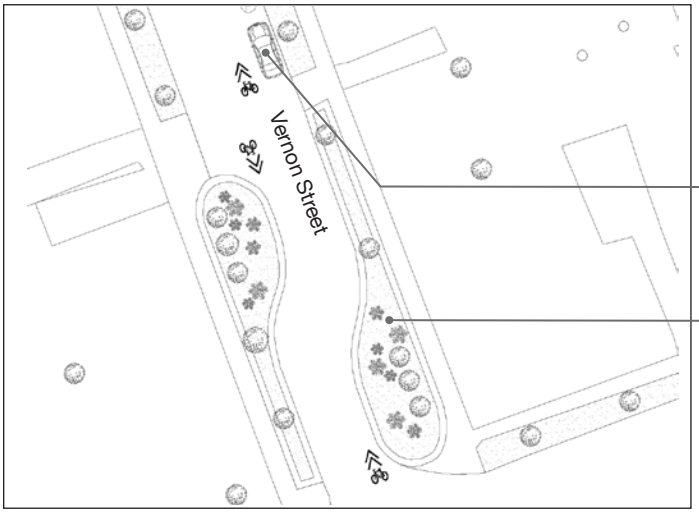


* All dimensions in metres

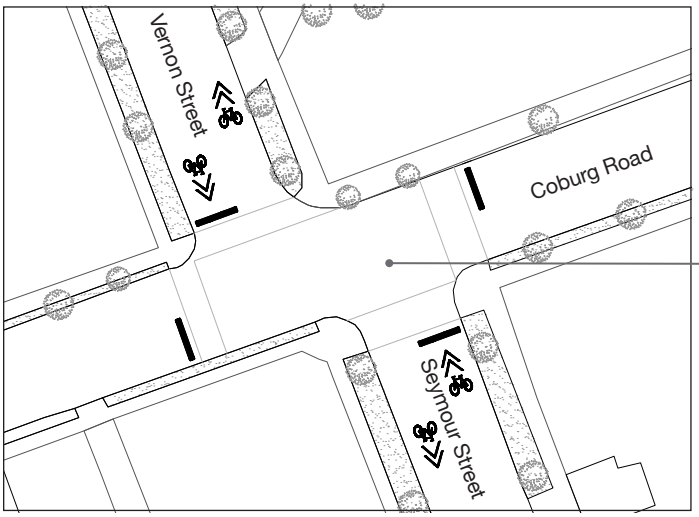
Proposed Design: Vernon Street Looking North



Vernon Street & Quinpool Road



Vernon Street: traffic calming at typical intersection



Vernon/Seymour/Coburg Road Intersection

Legend

- Pedestrian crossing
- Bicycle lane or path (colour optional)
- Combined pedestrian and bicycle crossing
- Shared lane "sharrows" marking
- Landscaping

Existing multi-use trail

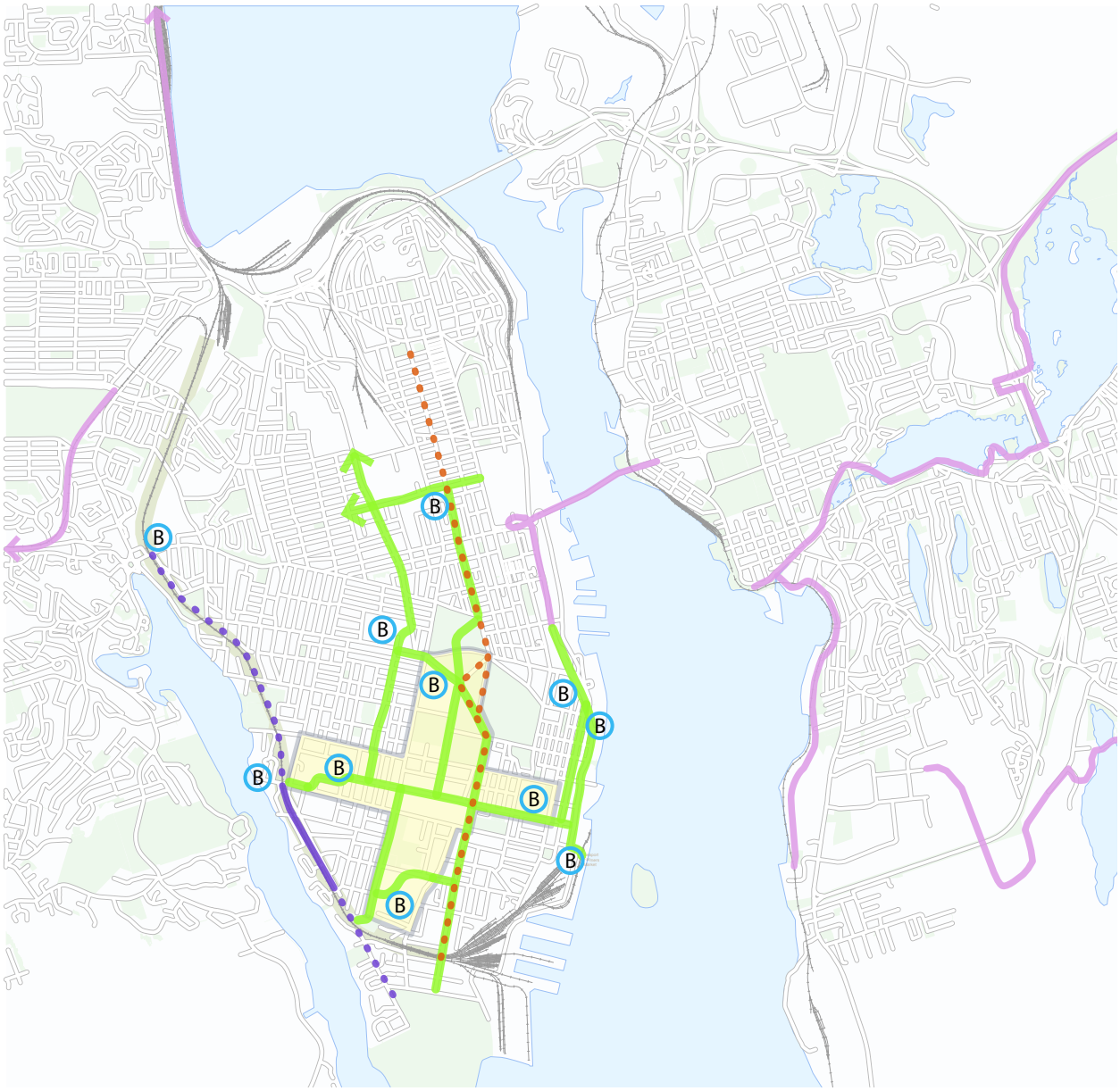
Existing on-street parking remains

Traffic calming bulge with ornamental garden

New 4-way signalized intersection

FUTURE CONNECTIONS (BUILDING OUT FROM THE DISTRICT)

In addition to developing the Bikeways Network within the Institutional District it is also important to build transportation connections to the District from other parts of the peninsula, Dartmouth and outlying suburban areas. To effectively capture the maximum number of potential cycling commuters living within a reasonable cycling distance (less than 8 km) of the District, a larger active transportation network must feed into the District's primary and secondary cycling routes. By developing a larger variety of options for suburban and rural commuters travelling to the District, there is greater opportunity for a broader cross-section of the population to embrace more sustainable modes. The map on the opposite page identifies potential connections to the District that largely reinforce HRM's proposed on-street and off-street active transportation routes. HRM, MetroTransit and the institutional partners should consider opportunities to provide park & bike and park & ride options at key entry points to the peninsula to decrease congestion and parking demand on the peninsula. Implementation of the Bikeways Plan should be seen as part of a broader movement toward improving sustainable transportation options and decreasing the dominance of the automobile.



Legend

- Urban Halifax Institutional District
- Proposed Institutional District Bikeways Network
- Existing Multi-Use Trails
- Existing Halifax Urban Greenway (Phase 1)
- Planned Halifax Urban Greenway
- Proposed Crosstown Connector (Halifax Cycling Coalition)
- Proposed Bike-share Station



5.0 Cycling in the Institutional District

5.0 Cycling in the Institutional District

COMPLIMENTARY INFRASTRUCTURE AND PROGRAMS



There are additional supports or infrastructure needed to complement the Bikeways Routes and Network, which will improve the experience of cycling. This section describes the quality and experience of cycling in the District by identifying these facilities and supports, including wayfinding, programming, education, bike parking and bike-sharing. Additional incentives and supports that will encourage cycling as well as major events that may reinforce the goals of the Plan are identified. These elements should not be viewed in isolation, but instead considered as part of the development of a comprehensive approach to improving cycling in the District.

BIKEWAYS WAYFINDING AND ROUTE SIGNAGE

Throughout the planning process, participants emphasized a general lack of awareness of current cycling routes in HRM and the poor continuity of cycling routes throughout the District. To develop cycling as a legitimate mode of transportation in the District, a cohesive approach to wayfinding signage and route marking should exist. Wayfinding and signage will contribute to a cohesive visual identity for Bikeways Streets and On-street Routes, directing cyclists to key destinations. By providing route and destination-based wayfinding, the profile of cycling will be elevated in the District, providing greater clarity to cyclists and reminding motorists that they are sharing the road with cyclists.

A coherent and legible wayfinding system developed for the District could be replicated in other parts of HRM and potentially other regions of the province. As a first step, implementing such a system on property owned by the Institutional District partners would demonstrate innovative approaches to the development of a high-quality cycling environment.

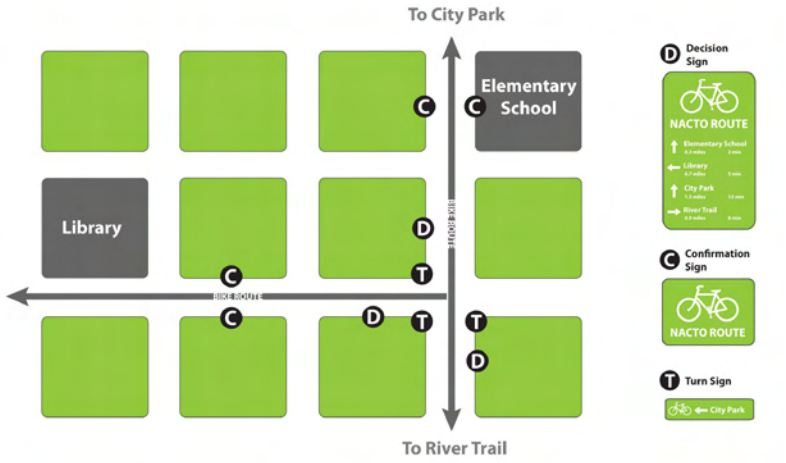
There are different sub-categories of an effective wayfinding and route marking system. The following descriptions provide a brief explanation of the elements that should be implemented within the District.

Bikeways Route Map

Purpose

The Bikeways Route Map should visually represent the elements of the Bikeways Network: Bikeways Streets, On-street Routes, bike parking, major destinations and bike-share stations. The Bikeways Route Map provides an opportunity for cyclists to orient themselves and to determine the safest routes when cycling in the District. A network map can also be used to market the District as a cycle-friendly area and familiarize a range of different people with the Bikeways Network. The institutional partners could use the Bikeway Route Map to

make sustainability statements, publish health facts highlighting the benefits of cycling, and guide visitors within the District.



Example of a Route Network Map

Possible Locations:

Maps will be approximately 0.9m x 1.2m in size, with consistent branding and imagery:

- Intersection of Summer St. and University Ave.
- Intersection of Bell Rd. and Summer St.
- Intersection of North Park St. and Cunard St.
- Saint Mary's University campus
- Studley, Sexton and Carleton campuses (Dalhousie)
- Capital Health sites (x2)
- IWK site

Placement

Maps will be sited in key locations along bikeways throughout the District, where possible in close proximity to bike-share stations or other new infrastructure. Maps will be located at key intersections as well as entry points to the District.

Costing

- $13,500 (based on printing, materials and construction costs for nine locations)

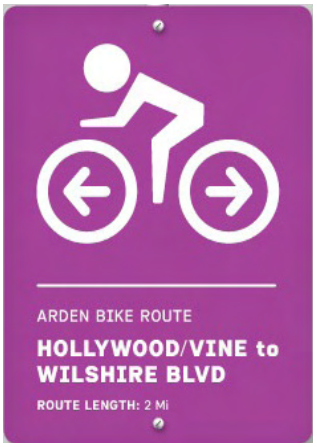
Route Wayfinding

Purpose

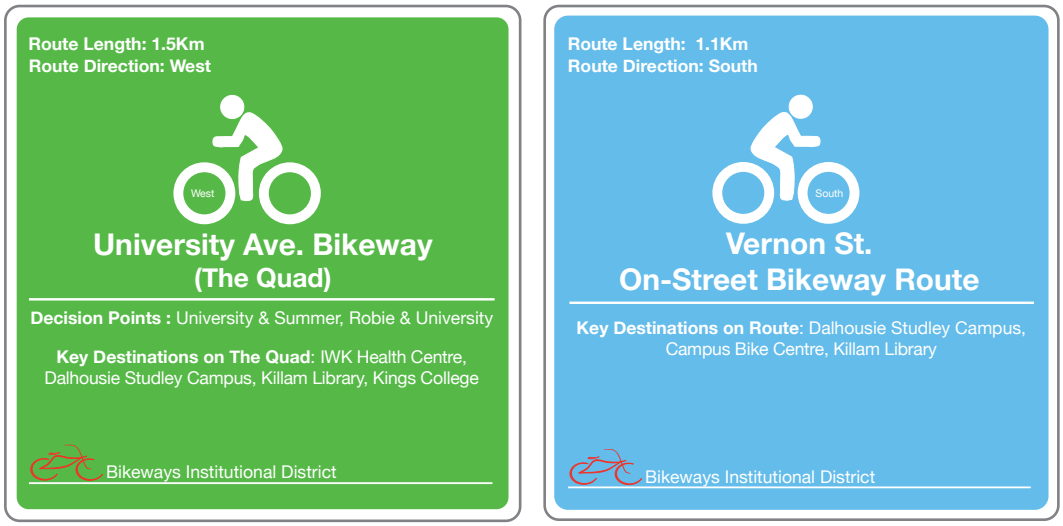
Route-based wayfinding alerts cyclists that they are on a designated bikeway within the District. Route wayfinding provides additional visual cues to motorists that cyclists have priority along Bikeways Routes, providing greater comfort for cyclists.

Placement

NACTO's inventory of best practices recommends placing signs every 200 metres along off-street facilities and every 2-3 blocks along on-street routes (NATCO, 2011). In addition, signs should be placed after turns to confirm the route. Signs should be placed approximately 2.1 metres (7 feet) above grade.



Route wayfinding sign from California



Route Wayfinding Concept (colour coded based on route type)

Costing

$4800 (based on printing and construction costs using existing poles)

- Bikeways Streets $2,400 (4.5 km = 12 route wayfinding signs)
- On-street Bikeway Route $2,000 (4.05 km = 10 route wayfinding signs)
- Off-street multi-use paths $400 (800 metres = 2 route wayfinding signs)



Berkeley, CA



Chicago, IL



Oakland, CA



Example of a decision point sign

Decision Signs

Purpose

These decision points provide guidance for cyclists as they approach the intersection of two different Bikeways routes. Signs will also direct cyclists to key destinations, providing distances and average times to reach these destinations.

Possible Locations and Examples

These signs are best-suited for high-profile intersections such as:

- Morris St. and South Park St., Morris St. and Lower Water St., South Park St. and Inglis St.
- Summer St. and University Ave., Summer St. and Bell Rd.
- University Ave. and Seymour St., Vernon St. and Jubilee Rd.
- Robie St. and University Ave., Robie St. and Inglis St.

Placement

These signs will be placed at an approximate height of 2.1 metres (7 feet) above grade along routes in advance of key intersections to inform cyclists they may need to turn to reach a different route in the Network or a specific destination in the District.

Costing

- $3,600 (based on printing, materials and construction costs for the nine locations, and two turn signs at each intersection at $200/sign)



Oakland, CA



Portland, OR (concept)



Portland Metro Cities, OR

Examples of decision point signs

BIKE SHARE

Bike-sharing is a publicly accessible system of accessing bicycles to facilitate mobility throughout a specific physical area (DeMaio, 2009). Bike-sharing systems work most effectively when multiple locations are available for users to gain access to bicycles, ensuring the system is practical for a variety of different trips (DeMaio, 2009). When a bike-share user completes their travel by bicycle, the bike is parked at a permanent station at which point it becomes available to another user. Bike-sharing provides increased transportation options for short trips, reducing the reliance on SOV trips for travel within the service area.

Bike-sharing has recently been implemented in North American cities such as Montréal and Washington, DC. Often governments or quasi-governmental jurisdictions such as transportation agencies are the primary service providers for these systems; however, educational institutions (e.g., Washington State University in 2010) have also taken on the role of service provider. Bike-sharing programs are most effective within smaller physical area that is characterized by a high number of short trips at different times throughout the day.

Delivery

There are a range of different approaches to bike-sharing programs: public bike programs, bike rental programs and private bike programs (DeMaio, 2009). The public bike program (bike-sharing) is the most widespread and most flexible system, utilized by public, institutional, non-profit and educational groups to provide bicycles to a specific membership or open group. Within this model, bikes are often available at unattended stations, accessed using a fee system based on the time elapsed between the bicycle being released from one station and parked at another station. One challenge to the long-term sustainability of bike-sharing systems is the cost recovery for service provision (DeMaio, 2009). However, given the long-term goals of the institutional partners, bike-sharing could be seen as a core component of a strategy to increase green mobility options and promote healthy lifestyles. There are also significant savings to be realized from reducing the demand for parking in the District by encouraging a shift from cars to bicycles. Therefore, the institutions should see value in subsidizing a bike-share system in partnership with local and provincial governments. A successful bike-share system in the District could be replicated elsewhere in HRM and Nova Scotia.

Promising Approaches

Recently Montréal has developed a bike-sharing system with custom designed bicycles and stations, and a unique business model. Montreal's system is one of the largest in the world with 5,000 bicycles at 400 stations throughout the central part of the city (BIXI, 2010). The BIXI system was developed by Montréal-based Public Bicycle System.



Image source: www.bixisystem.com

Nova Scotia's Helmet Law

Cyclists in Nova Scotia are legally required to wear helmets, which is a potential barrier to the successful implementation of a bike-share system. Cities worldwide are exploring a variety of approaches to overcoming this barrier. Melbourne, Australia, for example, has installed bicycle helmet vending machines next to 7-Eleven stores - the machines dispense helmets for $5.00 each, $3.00 of which is refunded if the helmet is returned to the store. Mexico City opted to repeal its helmet law to ensure maximum ridership of its bike-share system (Swiggum, 2010). Vancouver, BC is pursuing implementation of a Public Bicycle System (PBS), having issued a Request for Expressions of Interest in April, 2011 (www.vancouver.ca). A working paper prepared by The World City Bike Collaborative in 2008 recommends that users of a PBS in Vancouver be exempt from mandatory helmet laws (www.cycle-helmets.com).









All images this page: www.bixisystem.com

Stations

BIXI stations are portable and do not require excavation; instead the stations are heavy enough to be secure. This feature reduces installation costs and enables easy removal for winter storage. The information technology at the stations is solar powered, eliminating the need for a dedicated electrical connection. The use of wireless technology eliminates the need to physically connect the systems to a telecommunications network. The system is durable and able to withstand a range of different climates, and its versatility facilitates easy installation in a variety of locations.

Accessing the BIXI

The BIXI system has a flexible approach to payment, using wireless technology to allow the use of credit cards or membership cards for easy payment options. The BIXI stations can be connected to a real-time network map, allowing users to identify a local station with bikes available on a system website. Overall, this system is very user friendly, making the experience of picking up a bike convenient and easy.

Bikes

BIXI system bicycles are also unique and custom designed, featuring adjustable seat positioning and a lightweight aluminum frame that makes the bike suited to a wide range of users. The bikes come with active lighting and are often equipped with baskets. The bikes also come with a five-year warranty and are proven to be reliable and durable.

Turnkey System Operations

The BIXI system can be implemented and operated by any organization as a stand-alone system or as part of a larger transportation network. All of the physical parts of this system are easily installed and assembled with additional options available for the long-term sustainability of the system (e.g., ongoing operation, maintenance, customer relationship and training).

Application for the District

The Institutional District has considerable potential for a bike-sharing system. The BIXI system could be used for the District, ensuring easy implementation of the system and long-term reliability. The development of stations beyond the ten identified bike-share station locations (see pages 48-49) could be phased in coordination with the construction of the Bikeways Network in the District. It is important to note that BIXI type systems are most effective when bike-share stations are within 300-500 metres of each other to ensure easy access to an alternative station if one dock is at capacity.

The bike-share system could be offered free to students, staff and faculty as a way for institutions to encourage sustainable transportation in the District. Users could access the bikes by swiping Dalcards or other institutional identification cards. The bikes could also be rented out to non-institutional users through a subscription service similar to the one in Montréal ($80/year plus $1.50/hour)

to achieve some cost recovery; fees can be paid by credit card at the stations. The bike-share system could be developed in partnership with HRM to share long-term operating and management costs and ensure a coordinated strategy to expand bike-sharing throughout the urban core.

Costing for BIXI type system in the District

(based on the ten station locations described on pages 50-51)

Station Capital Costs

- Average station cost: $40,500, includes 9 bikes per station, software and docks.
- Projected costs for a 10-station system: $364,500 before HST (source: Business Manager, Public Bicycle System Company).

Annual Operation and Maintenance Costs

- One full-time employee: $40,000 (responsible for maintenance, redistribution and repairs).
- Website development (one-time startup cost and first year of operation): $10,000 (integrate real-time software for locating bicycles).

Total Startup Costs

- Projected cost for a 10-station system, operations and maintenance for one year: $414,500.
- Additional operational funding would likely be needed to extend memberships to the general public and administer the funds, revenue and memberships.

Proposed Bike-Share Station Locations

The criteria for selecting optimal bike-share station locations include proximity to major destinations and trip generators and proximity to transit hubs to support multi-modal trips.

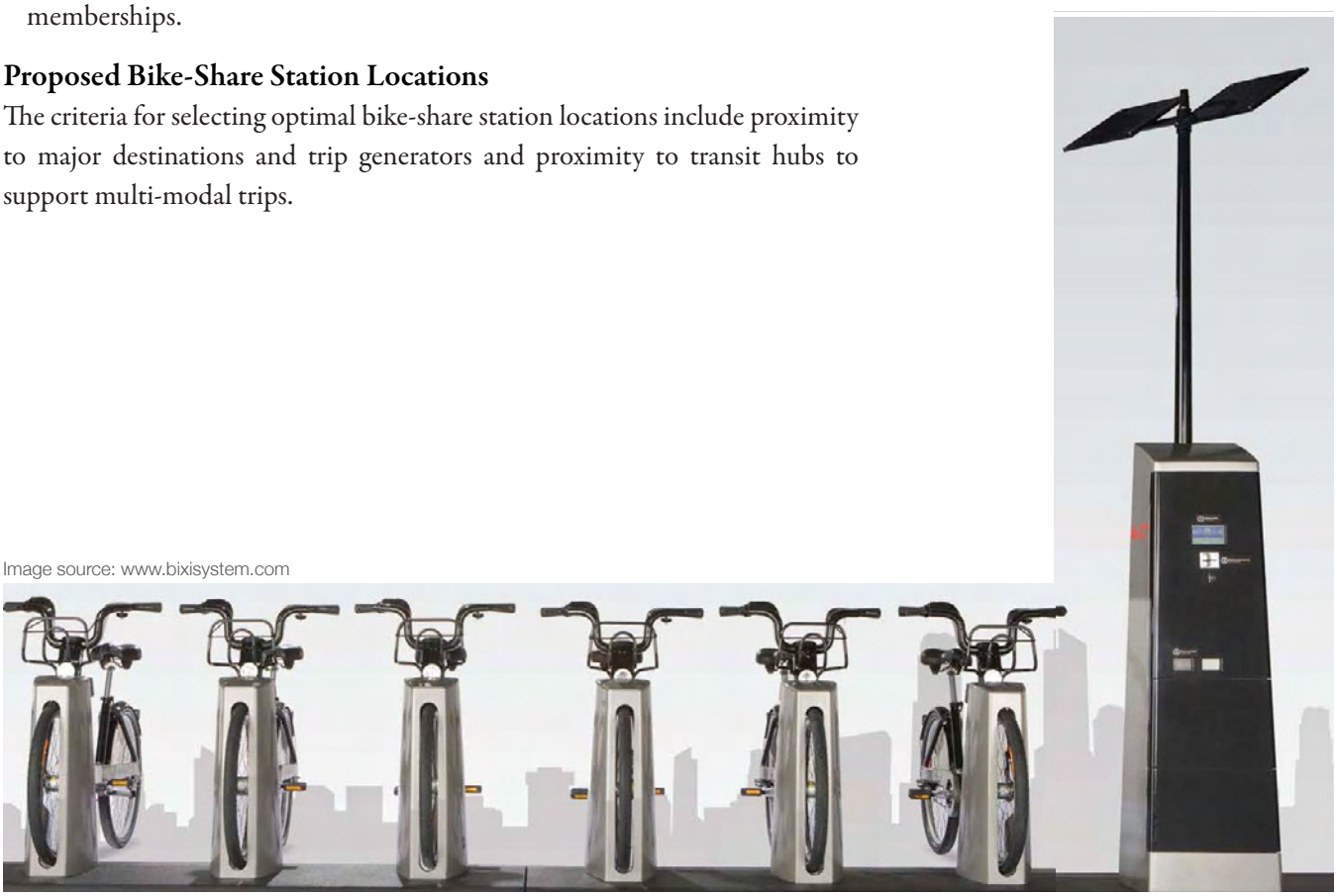


Image source: www.bixisystem.com

Proposed Bike-Share Station Locations

Station 1: Armdale Entry Point

Recently, Capital Health has located bike-share facilities at the Village at Bayers Road mall and Halifax Shopping Centre. The recent closure of The Bay on Mumford Road adds to the large amount of parking that could potentially serve as a park and ride centre for suburban and rural commuters. For example, the Institutional partners could negotiate for parking to be provided in this area for staff as parking is reduced in the District, encouraging commuters to leave their cars and travel by bicycle or transit to the District.

Station 2: Agricola & Almon

Many commuters travel through the peninsula's north end to access the District. A station could be proposed as part of the redevelopment of the Bloomfield Centre property adjacent to Agricola Street, which is a candidate street for a north-south cycling connector being considered by HRM. This station could also be seen as a park and ride type destination with options for commuters to exchange a car for a bicycle as they finish their commute to the Institutional District.

Station 3 & 9 : Scotia Square & Ferry

Commuters arriving from Dartmouth on transit could take advantage of bike-share stations in the Scotia Square area and at the ferry terminal. These bike-share stations would support multi-modal trips that combine transit and cycling.

Station 4 &11: Urban Farm and Quinpool

The Queen Elizabeth II Health Sciences Centre is surrounded by considerable student populations and high density apartments. The site of the former Queen Elizabeth High School is to be used as an urban farm, a project that is intended to demonstrate ideas about sustainability and health. In addition, the Quinpool Centre is a major destination for students and community members in the District and would be an excellent location for a bike-share station.

Station 5: Summer & University

Bike-share stations should be developed in a variety of locations at major destinations to ensure connectivity and convenience for a variety of trips. A station should be located in close proximity to the Summer St. and University Ave. intersection, a key destination for Dalhousie, Capital Health and IWK commuters and the intersection of two major Bikeways in the Network.

Station 6: Studley Campus

The Killam Library is a major destination and well located geographically to serve the Studley Campus of Dalhousie University. This area is also close to many major buildings used by Faculty and Students and in close proximity to the Dalhousie Campus Bike Centre.

Station 7&12: Sexton Campus & Seaport

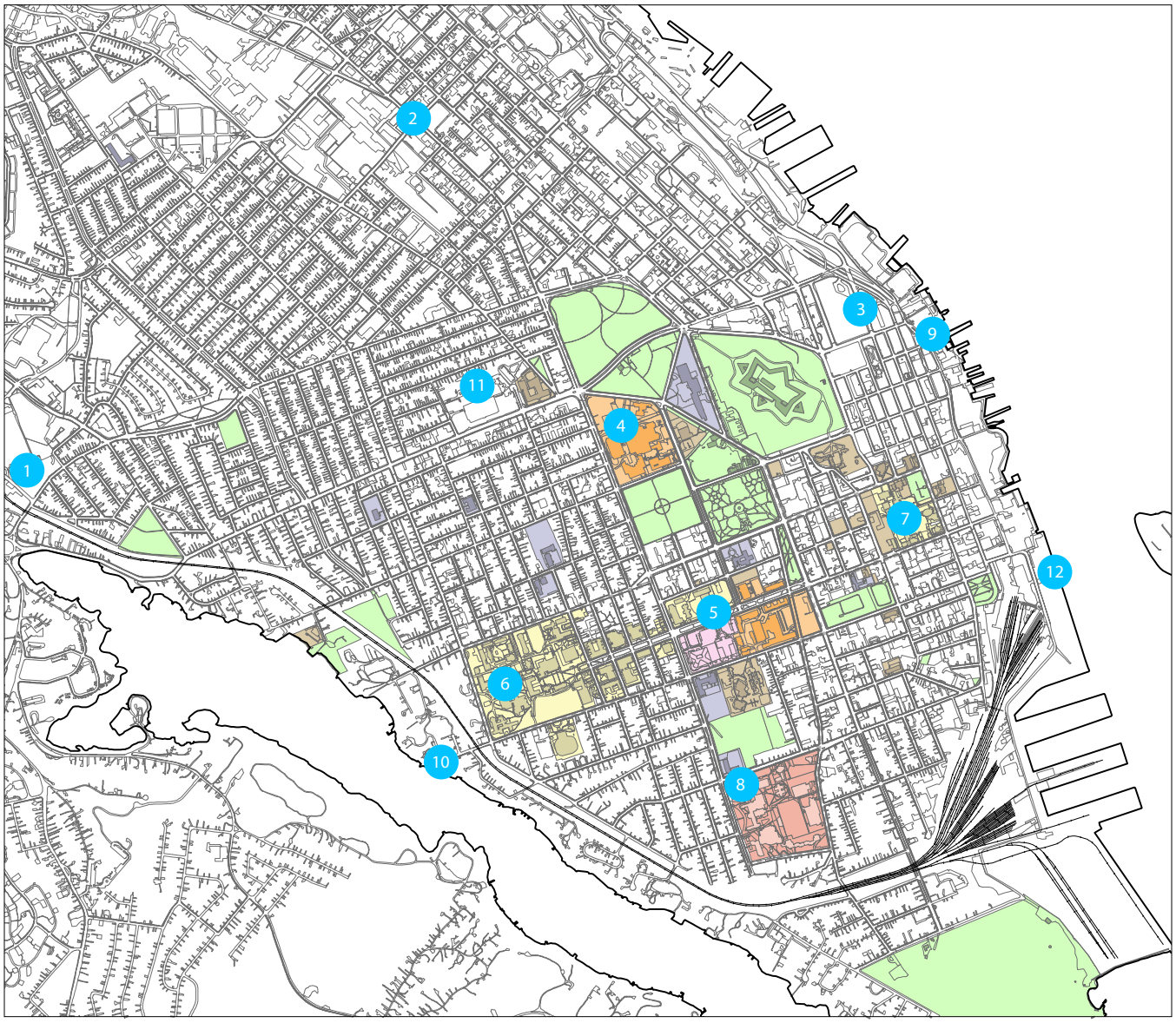
The Sexton Campus is well located to serve the eastern portion of the district. Many students have classes on this campus, but use the facilities on the Studley campus. The Seaport station is well positioned to serve tourists from the cruise ships, students at Nova Scotia College of Art and Design as well as trips to the Seaport Farmers Market

Station 8: Saint Mary's University

A station on the Saint Mary's University campus ensures that faculty, staff and students have access to bicycles for travel within the District. This bike-share station is in close proximity to Point Pleasant Park, a popular recreational destination on the peninsula.

Station 10: Dingle Ferry Connection

Should a small ferry service across the Northwest Arm for commuters from Purcells Cove and Spryfield ever be developed, it could be supported by a bike-share station at the western end of South Street. This station would support multi-modal trips that combine a ferry crossing and cycling.



Summary

Cost: Free for institutional users with identification and rental fee for other users ($80/year plus $1.50/hour, first 1/2 hour free)

Partnerships: Institutional partners and Halifax Regional Municipality to support the long-term operating costs and capital costs.

Helmets: Store helmets at nearby institutional buildings or businesses (e.g., library, school, stores, hotels).

Implementation: By using a turnkey system (e.g., BIXI) the stations could be easily sited without any construction requirements (BIXI, 2010).

Risk and Liability: Users would accept all risk associated with borrowing bicycles as is the case with other successful bike-share systems.

- Bike-Share Stations
- Dalhousie University and Kings College
- Capital Health, hospitals
- IWK Health Centre, hospitals
- St. Mary's University
- Parks, open spaces and cemeteries
- Elementary, junior high and high schools







Image source: Halifax Cycling Coalition



Image source: Halifax Cycling Coalition

END OF TRIP FACILITIES

In order to develop the Institutional District as a bicycle-friendly environment that attracts the maximum number of new cyclists, end of trip facilities should be highly visible and in close proximity to all major destinations. End of trip facilities include bike parking, showers and change rooms. A lack of adequate end of trip facilities can serve as a significant barrier to commuters who are interested in using cycling on a regular basis.

End of trip facilities are also a relatively affordable option for improving the quality of the cycling environment, while providing a visual cue for developing awareness that cycling is supported in the District. Overall, end of trip facilities represent the basic needs for cycling commuters if cycling is to be viewed as a legitimate form of transportation in the Institutional District.

Bicycle Parking

Throughout the District there is a need for both short-term and long-term parking for bicycles in highly visible locations that are safe and convenient. The City of Portland defines short-term parking as areas for short-term visitors for less than two hours, while long-term parking is defined as areas for employees, students and residents who are intending to stay longer than two hours (Portland, 2009). Long-term parking also should be in a secure, weather protected, well lit location. Overall, parking is an easy option for the institutional partners to support cycling.

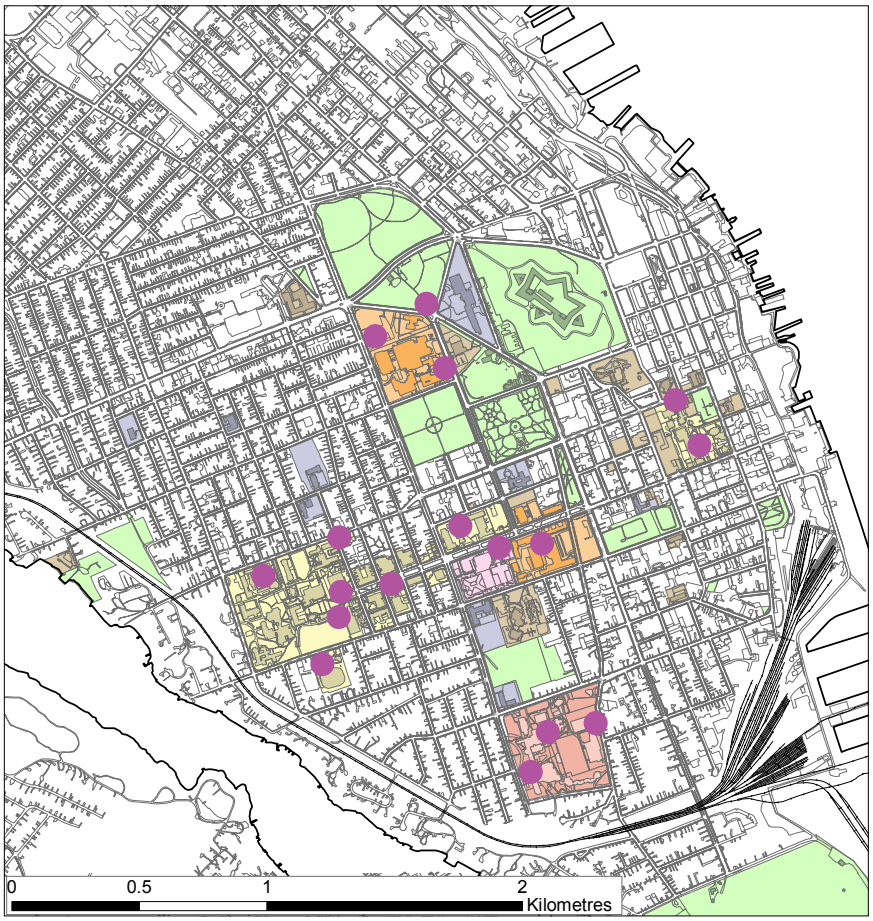
HRM's Downtown Halifax Land Use By-law requires one bike parking space for every 250 square metres of gross floor area within new university, college and school buildings. This standard should be adopted by the Institutional District for all existing and future buildings. Dalhousie's Office of Sustainability identified 750 bike parking spaces (as of June 2012) on campus, a shortfall of approximately 54 spaces based on the proposed minimum requirement (Dalhousie Office of Sustainability, 2009). There is also a lack of long-term bike parking areas in the Institutional District. The institutional partners should commit to develop short-term spaces at the identified standard as well as high-profile long-term parking areas as per the map on page 51.

Bike Parking Design Principles

To ensure high quality and function of bike parking the following criteria, based on research by Dalhousie's Office of Sustainability and this Plan's Guiding Principles, should guide parking design and siting (Dalhousie Office of Sustainability, 2011):

- Locate bike parking in highly visible and well-lit locations
- Ensure close proximity to entrance of destination
- Provide a high level of accessibility
- Incorporate all-weather protection
- Provide high profile facilities at major destinations

Long-term Bike Parking Facilities



Long-term Bike-Parking Stations

Dalhousie University and Kings College

Capital Health, hospitals

IWK Health Centre, hospitals

St. Mary's University

Parks, open spaces and cemeteries

Elementary, junior high and high schools

Other public institutions

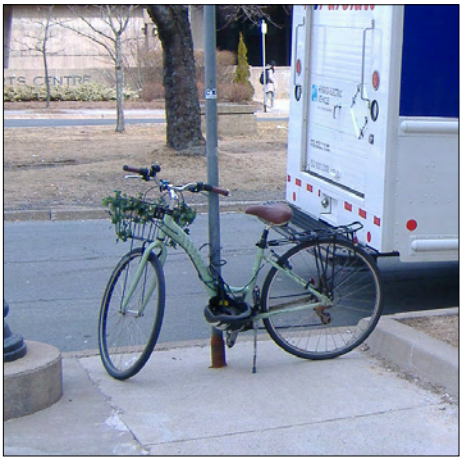
Long-term Bike Parking Locations

- South Commons by the Skate Park
- Urban farm site adjacent to QE2 Health Sciences Centre (Robie Street side)
- QE2 Health Sciences Centre (Summer Street entrance)
- Sexton Campus Medjuk Building (Spring Garden entrance)
- Sexton Campus, main entrance of Engineering Building (internal courtyard)
- Victoria General Hospital, University Avenue Access Point (improve covered area)
- IWK Health Centre, University Avenue entrance
- Carleton Campus, Tupper Building (along glass wall or within the internal courtyard)
- Studley Campus, Student Union Building (front of the building; extend existing concrete pad)
- Studley Campus, Killam Library building (along the side of building or in central plaza)
- Studley Campus, Bike Centre (in front of the Studley Gym)
- Studley Campus, LeMarchant and Coburg (recessed forecourt of Mona Campbell Building)
- Kings University, Quad area
- Studley Campus, Dalplex, (main entrance)
- Saint Mary's University, Patrick Powell Library (central courtyard)
- Saint Mary's University, The Tower, (Tower Road entrance)
- Saint Mary's University, Sobey Building, (main entrance off of Robie Street)









Bicycle Parking Costing and Implementation

To reduce costs and expedite the process of implementing bicycle parking, the District partners should incorporate bike infrastructure guidelines as an element of all future construction or landscaping projects. The installation of bike parking is often a minor addition to a larger landscaping or construction project. Dalhousie's Office of Sustainability has had success in using this approach for a variety of facility renewal projects. Another approach for increasing the supply of bicycle parking spaces is to develop bike parking cages in existing underground parking areas.

Short-term Bike Parking Costs

- $750/unit (based on basic staple rack capital costs of $250 and installation costs of $500)

Long-term Bike Parking Costs

- $10,000/unit based on underground parking area with cage design for roughly 10-15 bicycles
- $40,000-$60,000 for smaller outdoor units with covering serving roughly 20 bicycles
- $70,000-$80,000 for site specific showcase designs, providing high capacity covered bicycle parking stations (40-50 bike capacity)

Projected Bike Parking Costs

Short-term Bike Parking

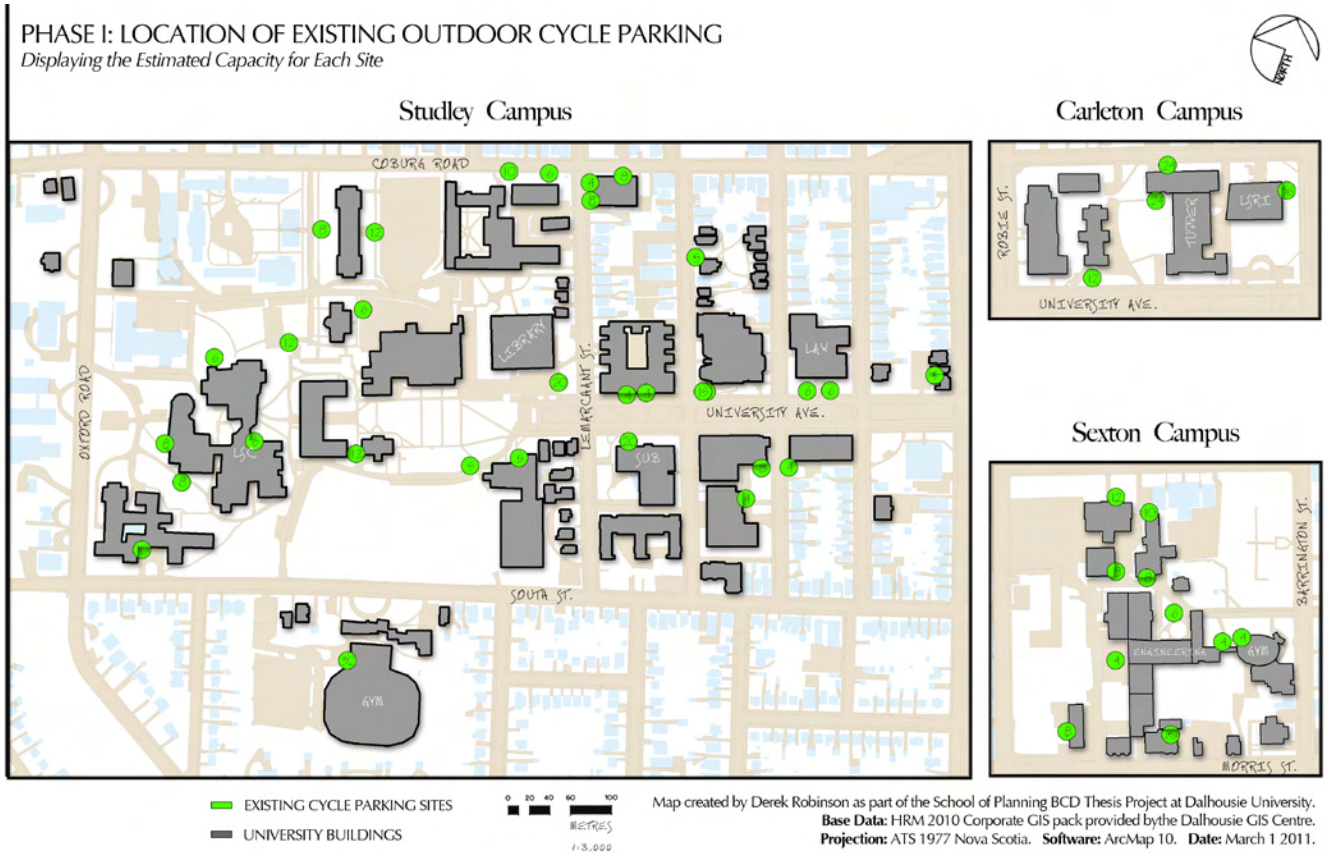
- Dalhousie: $195,000 (this estimate is based on a shortfall of 260 short-term spaces. As of June 2012 Dalhousie has a total of 750 spaces installed on campus, up from 544 spaces counted during the development of this Plan)
- Saint Mary's University: $63,750 (based on shortfall of 85 short-term spaces)
- Capital Health and IWK Health Centre (need additional information)

Long-term Bike Parking (based on map on page 51)

- Dalhousie: $525,000 (based on three showcase areas, one for each campus and six medium-capacity outdoor units
- Saint Mary's University: $170,00 (based on one-high profile and two medium-capacity outdoor parking areas)
- Capital Health and IWK health Centre: $180,000 (two high-profile areas and three cage designs in covered parking areas)

PHASE I: LOCATION OF EXISTING OUTDOOR CYCLE PARKING

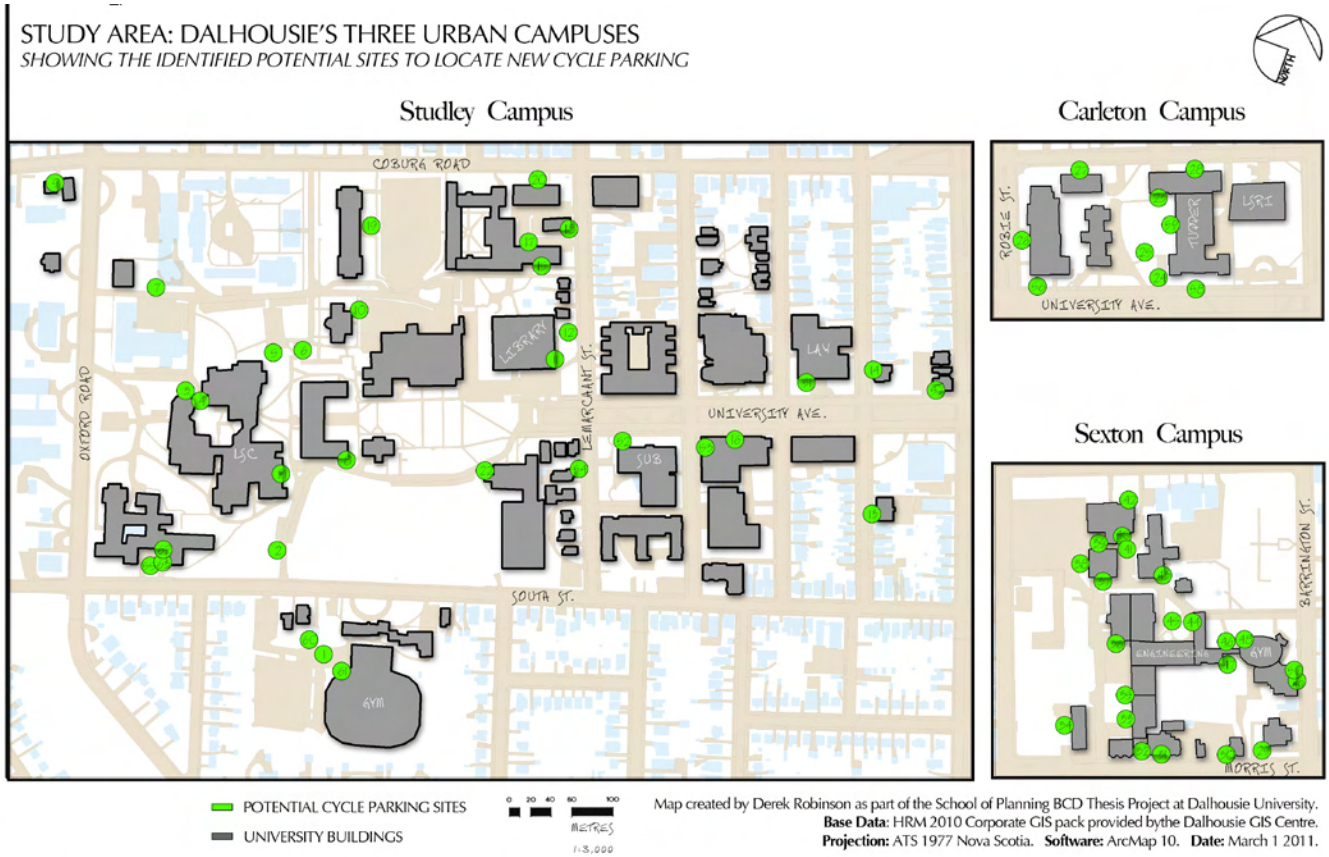
Displaying the Estimated Capacity for Each Site



Map created by Derek Robinson as part of the School of Planning BCD Thesis Project at Dalhousie University.
Base Data: HRM 2010 Corporate GIS pack provided bythe Dalhousie GIS Centre.
Projection: ATS 1977 Nova Scotia. **Software:** ArcMap 10. **Date:** March 1 2011.

STUDY AREA: DALHOUSIE'S THREE URBAN CAMPUSES

SHOWING THE IDENTIFIED POTENTIAL SITES TO LOCATE NEW CYCLE PARKING



Map created by Derek Robinson as part of the School of Planning BCD Thesis Project at Dalhousie University.
Base Data: HRM 2010 Corporate GIS pack provided bythe Dalhousie GIS Centre.
Projection: ATS 1977 Nova Scotia. **Software:** ArcMap 10. **Date:** March 1 2011.

EDUCATION

The implementation of the Bikeways Plan and the shift toward prioritizing cyclists in the District will require an educated population where both cyclists and motorists have mutual respect. To develop a culture of cycling in the District it is necessary to provide learning opportunities related to cycling safety, sharing the road, and repair and maintenance of bicycles. The Bike Centre, a pilot project funded by Dalhousie and Clean Nova Scotia, is currently taking on this role on the Studley Campus. The Bike Centre ideally would be funded on a long-term basis and potentially replicated in other parts of the District. Education is key to attracting new cyclists and helping people overcome their barriers related to cycling in an urban setting.

Cycling Education Programming

Since the fall of 2009 the Campus Bike Centre has offered drop-in sessions and classes in bicycle repair/maintenance and cycling safety education. The Centre will also be offering a small bicycle term-loan program. The long-term vision of the Centre includes developing funding support for the ongoing educational programming and assisting in the operation of a bike share system.

Motorist Education

As the Bikeways Plan is implemented it may be necessary to use media and awareness campaigns to inform motorists of the changes to the road network. It is essential that motorists are informed of the importance of sharing the road; locally the Halifax Cycling Coalition organizes annual Share the Road days with the help of the Halifax Regional Police. These events help to educate motorists and encourage a shift in behaviour.

SUPPORTING A CULTURE OF CYCLING

To develop a strong culture of cycling in the District it is important to be supporting cycling and normalizing cycling. By organizing frequent events it will be possible to demonstrate the viability of cycling and encouraging cycling. Through building on existing annual events and creating new events there will be opportunities to build a culture of cycling, attract new riders and demonstrate to a broader population the viability of cycling for the Institutional District.

Annual Events

There are currently a number of major cycling related events occurring in HRM, which the Institutional District partners could take a greater role in championing to foster a culture of cycling. Annual events provide an excellent opportunity to celebrate and validate cycling as a mode of transportation, encouraging new cyclists to participate. Annual events also provide a baseline for measuring the growth of cycling within the region and to build a case for further investments in facilities and infrastructure.

Dalhousie Campus Bike Centre

Mission

To establish Dalhousie University as a community leader in active and sustainable modes of transportation. We will accomplish this by offering a safe space for Dalhousie community members; providing educational programming; and continuing the work of other community minded cycling organizations in building a vibrant cycling culture.

Vision

The Dalhousie Campus Bike Centre envisions itself as becoming a leader in the Halifax cycling community. The Dal Bike Centre will work to make it possible to live in Halifax without a car; that cycling is seen not just as recreational activity but as a viable mode of transportation; and community members participate in cycling as part of a healthy and active lifestyle. People should not be afraid to ride their bikes to campus. In fact it should be seen as a preferred mode of transportation. Our vision is to make Dalhousie into a green, sustainable, bike friendly campus.

Goal

Promote cycling as an alternative mode of transportation and as a form of recreation. Become a leading figure in the Halifax Regional Municipality cycling community. Recognize the importance and impact of bicycle traffic in and around the campus. Endorse the bicycle as a viable, economical and desirable mode of transportation. Support development strategies that include bicycle facilities, which create linkages to current and potential urban and recreational routes. Represent the interests of bicyclists.

Events that the institutional partners could champion to build a culture of cycling include:

Bike Week

Building on HRM's Bike Week, develop a Bike to Work Week campaign and encourage competition between the different institutions and their departments within the District; winners would be identified based on kilometers commuted and team participation using the City of Victoria as a model. Education and training can be offered to build the confidence of new cyclists to participate. Bike to work week competitions can also be combined with additional festivals and celebrations in the District and throughout HRM to raise awareness of cycling as a viable form of transportation.

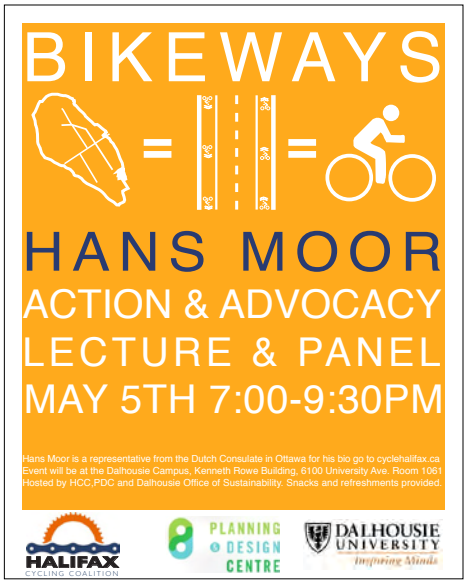


Image source: www.biketowork.ca

Bike to Work's mandate is to encourage and promote the use of the bicycle as transportation to work. In 2009, Victoria had 622 teams, 7233 cyclists, with 14% (1041) of them being new cyclists. Approximately 172,111.56 total km were covered, saving about 47.7 tonnes of CO2.

Active Transportation Month

June was recently named Active Transportation Month in Halifax and Nova Scotia. This presents an opportunity to build on the momentum of HRM's Bike Week and continue to host weekly events celebrating cycling. The institutions could encourage cycling by organizing ongoing competitions between institutions or providing incentives to students and employees to cycle. For example, key streets within the District could be designated as car free at particular times of the day as a way of prioritizing cycling and providing disincentives for SOV trips. By increasing parking rates in the District during Active Transportation Month funding could be raised for future cycling projects. These annual events should be seen as opportunities to demonstrate new ideas and champion cycling as a transportation mode choice.



Public lecture hosted with local advocacy groups to discuss plan implementation and learn from the experiences of other cities (Ottawa and Holland).

Switch: Open Street Sundays

The Institutional District should also participate in major events that celebrate and encourage cycling. The citizen-based Sustainable Transportation Task Force, launched by the Planning & Design Centre in 2010, is now collaborating on *Switch: Open Street Sundays*, a project inspired by Bogota, Columbia's regular Ciclovia event. The goal of the project is to open a network of bicycle routes along existing streets to active transportation every Sunday during the summer. By providing participants with a comfortable and safe environment to try various active modes, Switch will demonstrate the potential for active transportation as a daily transportation mode choice while encouraging healthy lifestyles. Projects like this could be connected to the development of the Bikeways Network and seen as opportunities to test the proposed bikeway routes and build awareness of future infrastructure investments.

Social Marketing Campaigns

Community-based social marketing techniques have successfully affected people's transportation behavior. A series of events or campaigns could be organized focusing on groups who may be interested in cycling as a mode of transportation, but are discouraged by specific barriers. By identifying barriers and then designing

HRM Bike Week – May 27 to June 5

Bike Week aims to celebrate, educate and increase participation in all types of cycling throughout the region. It's an exciting, community-driven event that encourages people of all ages and abilities to get outside and be more active. Last year more than 4500 residents participated in over 30 Bike Week events held throughout HRM.

Bike Week Open Street Party

The Open Street Party is a chance for anyone to walk, bike, rollerblade or skateboard around the Common on traffic-free streets. Held on the North Common, the Open Street Party incudes food, music, dancing, synchronized cycling, bike fashions shows, a bike rodeo for kids and bike valet parking sponsored by HRM.





Image source: HRM Halifax Cycling Coalition

a program for a small group of riders to address the barriers there is greater potential for long-term behavior change. These events will be organized to increase awareness of cycling, encourage new cyclists and garner greater support for cycling throughout the community.

Another approach to developing a culture of cycling is to host well known speakers such as transportation planners, professors or cycling advocates who have successfully championed cycling in other cities. These lectures help to inform the general public and decision makers of cycling best practices. These events can challenge perceptions around cycling and encourage new approaches locally in HRM. These educational events can also be seen as opportunities to partner with local cycling and transportation advocacy groups to build an informed community of cyclists and advocates who can lobby for cycling in HRM. Such public lectures would showcase and promote cycling within the Institutional District, helping to build an understanding of how cycling fits into a sustainable transportation system.

Promotional Campaigns

As part of each institution's branding, marketing and promotions it may be helpful to integrate ideas of cycling and sustainable transportation to encourage students, staff, faculty and visitors to try cycling for their commute, short trips or recreation. This promotion campaign could highlight the environmental, health and economic benefits of cycling in an effort to attract new cyclists and build awareness for the potential of cycling within the District. Each institution should promote the Bikeways Plan internally, using personal stories to dispel assumptions regarding the barriers to cycling in the District. The institutional partners should employ a wide range of conventional and social media to grow a culture of cycling in the District.

Setting Goals

Each of the institutional partners should develop internal modal share targets for cycling or for other forms of sustainable transportation. Currently, Dalhousie conducts annual commuting surveys to understand transportation behaviour and establish baseline data. After each institutional partner establishes the baseline for people commuting by bicycle, the TDM working group could set short and long-term targets for cycling mode share for the District as a whole.

To implement both the immediate and long-term actions described in this Plan, the institutional partners must embrace the idea that cycling should be given priority in the District. This will require both the political will and financial resources necessary to make the shift to a bicycle-friendly environment. Although many of the actions described in the Plan are within the jurisdiction of the institutional partners, there are some key infrastructure elements that will require partnering with HRM. Implementing bicycle education and programming initiatives should be approached as opportunities to partner with local cycling and sustainable transportation advocacy groups to build a culture of cycling in the District and HRM.

Costs and Partnerships

The routes of the Bikeways Network align with the goals of HRM's Active Transportation Plan and should be seen as an opportunity to partner on capital costs. In addition, senior levels of government and national funding programs (e.g., FCM's Green Municipal Fund) might choose to fund and showcase innovative approaches to cycling infrastructure. The institutional partners should also develop their own internal revenue streams to support the long-term implementation of the Plan.

Recommended steps to support implementation of the Bikeways Plan include:

- Re-negotiate parking provisions for staff and faculty at Dalhousie University; reducing and eventually eliminating parking subsidies supports a shift to alternative modes.
- Dedicate a portion of Dalhousie University, Capital Health and IWK Health Centre parking fees to investments in sustainable transportation initiatives (e.g., bikeways infrastructure, bike-share system).
- Access government funding intended to help the province meet its targets for the reduction of greenhouse gas emissions.
- Develop a Transportation Management Association to work collaboratively with the institutions to encourage sustainable transportation choices and provide integrated parking management.

Taking Action on Bike Infrastructure

In implementation of the Plan the institutional partners must be strategic and capitalize on opportunities to improve the cycling environment. Construction of new buildings, renovations, landscaping and road maintenance are all opportunities to integrate cycling infrastructure.

The Dalhousie Office of Sustainability has worked with Facilities Management and the campus planning committee to ensure that the issue of sustainable transportation (e.g., bike infrastructure and facilities) is discussed at the early stages of any facility renewal or new construction project. This approach allows smaller bike infrastructure projects to be added to larger capital projects with minimal additional cost, expediting the process of developing bike infrastructure.

NETWORK INFRASTRUCTURE: PRELIMINARY COST ESTIMATE

The following cost estimates are inclusive of design (where applicable), construction and HST[1].

Bikeways Network Element	Infrastructure Type	Unit	Quantity	Unit Cost	Cost
1. On-Street Bikeways					
University Avenue	On-Street Bike Lanes separated by curbs & planting strip	per km	1.6	$1,000,000	$1,600,000
Morris Street	Painted on-street bike lanes	per km	0.9	$25,000	$21,250
Robie Street	On-Street Bike Lanes buffered by on-street parking	per km	1.0	$500,000	$500,000
South Park Street	On-Street Bike Lanes buffered by on-street parking	per km	1.2	$500,000	$600,000
Vernon St./Seymour St.	Traffic calmed bike boulevard (shared street)	per km	1.1	$300,000	$330,000
Sub Total					$3,051,250
2. Off-Street Bikeways					
Summer Street	One-way off-street bike path on both sides	per km	1.0	$500,000	$500,000
Dalhousie Studley Campus	Two-way off-street bike path	per km	0.5	$300,000	$150,000
Saint Mary's Campus	Two-way off-street bike path	per km	0.6	$300,000	$180,000
Bell Road (north side, between Summer and Robie St.)	Two-way off-street bike path	per km	0.3	$200,000	$60,000
Sub Total					$890,000
3. Signaling & Signs					
Coburg at Seymour & Vernon St.	New signalized 4-way intersection	each	1	$220,000	$220,000
Bikeway traffic control & wayfinding	Signs (on existing poles)	each	42	$200	$8,400
Network Maps	Panels	each	6	$1,500	$9,000
Sub Total					$237,400
4. End of Trip Facilities					
Short term bicycle parking (Dal)	Basic staple rack: $250/installation:$500	each	260	$750	$195,000
Long-term bicycle parking (Dal)	Showcase covered station; 40-50 bikes	each	3	$75,000	$225,000
Long-term bicycle parking (Dal)	Outdoor covered unit for approx. 20 bikes	each	6	$50,000	$300,000
Short term bicycle parking (SMU)	Basic staple rack: $250/installation:$500	each	85	$750	$63,750
Long-term bicycle parking (SMU)	Showcase covered station; 40-50 bikes	each	1	$75,000	$75,000
Long-term bicycle parking (SMU)	Outdoor covered unit for approx. 20 bikes	each	2	$50,000	$100,000
Long-term bicycle parking (Capital Health/IWK)	Covered parking garage bike cages; 10-15 bikes	each	3	$10,000	$30,000
Long-term bicycle parking (Capital Health/IWK)	Showcase covered station; 40-50 bikes	each	2	$75,000	$150,000
Sub Total					$1,138,750
5. Bikeshare System					
System capital costs	10 station BIXI system (9 bikes/station)	each	1	$420,000	$420,000
Bikeshare startup	Website development	each	1	$10,000	$10,000
Operations (for 1 year)	One full-time employee (ongoing cost)	per year	1	$40,000	$40,000
Sub Total					$470,000
Total					$5,787,400
Margin of error +30%					$7,523,620
Margin of error -30%					$4,051,180

The cost estimates and phasing for implementation represent a final draft subject to final approval from the institutional partners. The Transportation Demand Management working group will facilitate further discussions to finalize fiscal commitment for the implementation of the Plan.

1. Cost estimates based on the following sources:
Public Bike System Company (BIXI systems). (April 2011). Personal communication with author.
Curran, Andrew, TransLink. (April 2011). Personal communication with author.
Design and Construction Services, HRM Infrastructure and Asset Management. (April 2011).
Koblents, Hanita, Active Transportation Coordinator, HRM Strategic Transportation Planning. (April 2011). Personal communication with author.
SGE Acres Limited, Marshall Macklin Monaghan, Go for Green. (2006). HRM Active Transportation Plan.

Route Infrastructure

Year1	Year 2	Year 3	Year 4	Year 5
University Ave.				
	Summer St. Morris St.			
		Agricola St. South Park St. Lower Water St.		
			Windsor St. Vernon St. Seymour St.	
				Robie St. Dal. Studley Campus connect to HUGA Trail Young Ave. SMU off-street Bike Path

End of Trip Facilities

Year1	Year 2	Year 3	Year 4	Year 5
Short-term Bike Parking				
	4 Bikeshare Stations			
		6 Bikeshare Staions		
			Add Faciliteis to Respond to Growing Demand	

References

Better Environmentally Sound Transportation, 2004. Business Case for Active Transportation.

Bike to Work Victoria. 2011. About Us. Retrieved from: http://www.biketowork.ca/victoria/home

City of Portland. 2010. Portland Bicycle Plan for 2030. Portland Bureau of Transportation.

City Vancouver. 2010. Technical Briefing on Separated Bike Lanes. Media Briefing.

Clean Nova Scotia. Campus Bike Centre. http://bikecentre.dal.ca/

Dalhousie University. 2010. Campus Master Plan. Retrieved from: http://campusplan.dal.ca/

Dalhousie Office of Sustainability. 2009. Bike Parking at Dalhousie Report.

Dalhousie Office of Sustainability. 2010A. Dalhousie Sustainable Transportation Plan.

Dalhousie Office of Sustainability. 2010B. Traffic Count Report.

Dalhousie Office of Sustainability. 2011. Multi-Criteria Bike Parking Study for Dalhousie.

DeMaio, Paul. 2009. Bike-Sharing: Its history, models and provision. Velo City Conference

Eastwind Cycle. 2009. Nova Scotia Bikeways: Scoping the Blue Route.

Frank, Lawrence. 2009. Promoting Physical Activity through Healthy Community Design. Bombardier Foundation.

Geller, Roger. 2009. Tale of Two Cities. Presentation of the Portland Office of Transportation.

Halifax Cycling Coalition. 2011. Who We Are. Retrieved from http://www.cyclehalifax.ca/

Halifax Regional Municipality. 2006. Regional Planning Strategy

Halifax Regional Municipality. 2011. Bike Week. Retrieved from: http://www.halifax.ca/bikeweek/index.html

Halifax Regional Municipality. 2006. Active Transportation Functional Plan

Halifax Urban Greenway. 2007. Greenway-Related Reports. Retrieved from:http://halifaxurbangreenway.org/

Litman, Todd. 2004. Quantifying the benefits of non-motorized travel for achieving TDM objectives. Victoria Transport Policy Institute.

Local Government Commission Center for Livable Communities. The Economic Benefits of Walkable Communities.

Maine Department of Transportation. 2001. Bicycle Tourism in Maine, Economic Impacts and Marketing Recommendations.

Mans, Bruce. 2010. Employer Based Trip Reduction Strategies at Dalhousie.

National Association of City Transportation Officials. 2011. Urban Bikeway Design Guide. Retrieved from:http://nacto.org/cities-for-cycling/design-guide/

Public Bike System. 2011. BIXI System. Retrieved from:http://www.bixisystem.com/home

Saint Mary's University. 2009. Sustainability Strategy Task Force Report. Board of Governors Approval.

Saint Mary's University. 2010. SMU Consumption Statistics. Retrieved from:http://www.smu.ca/sustainability/utility.html

Statistics Canada. 2006. Nova Scotia Health Profile.

Steiger, Hailey. 2009. Parking Management at Sexton Campus. Masters Independent Project Report for, Dalhousie School of Planning.

Swiggum, Carrie. 2010. Helmet law complicates Vancouver's bike share plan. Thethunderbird.ca. Retrieved from: http://thethunderbird.ca/2010/11/25/helmet-laws-throw-wrench-into-vancouvers-public-bike-share-plan/

Transportation Association of Canada. 2010. Active Transportation Design Guidelines.

Translink. 2011. Air Care Emissions Info: Greenhouse Gases. Air Care: Partners in Clean Air. Retrieved from: http://www.aircare.ca/ap-ghg.php

Translink. 2007. Main Street Transit & Pedestrian Priority Corridor Plan.

University of British Columbia. 2010. Motivators and deterrents of bicycling: comparing influences on decision to ride. Transportation 38:153-168. Retrieved from: http://www.springerlink.com/content/ex63304355024117/fulltext.pdf (Paper from Cycling in Cities Study)