

City of Fredericton

Active Transportation Connection Plan

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Active Transportation Connection Plan

Introduction

The City of Fredericton has undertaken to prepare an Active Transportation Connection Plan to help guide the growth of cycling and pedestrian infrastructure over the next 10+ years. The Trails/Bikeways Master Plan, created in 2007, was the starting point for the City in terms of documenting Active Transportation (AT) facility planning in Fredericton. With the Transportation Master Plan update on the horizon, it is time to update this earlier work. Parsons was engaged to provide an update with a focus on implementation, including identification of current gaps and opportunities with a recommendation for an action plan.

OBJECTIVES

The key objectives of this Connection Plan are:

1. Determine where the most prevalent trail gaps exist.
2. Determine the best manner of connecting bike lanes to trails.
3. Identify priority intersections for bike lane marking improvements, and the appropriate manner in which these bike lanes should be implemented.
4. Consider the limits of trail paving.
5. Prioritize the location of trail crossings, and determine the appropriate treatment.
6. Identify future trail or bike lane neighbourhood connections.
7. Identify cycling and pedestrian issues in need of future consideration

To satisfy these objectives, the Connection Plan includes a high-level summary of findings based on public and City staff input. The input from City staff are considered alongside the public input to provide a comprehensive package of data that help guide new plans for the City.

Objectives 1, 2, 6 and 7 can be answered through input from municipal staff and the public, with consideration for the context of opportunities for improving connectivity between neighbourhoods and providing safe routes to schools, major destinations, parks, trails and open space areas. Objective 3 is addressed by updating the Design Guidelines in Chapter 5 to address intersection improvements. A similar approach is be used for Questions 4 and 5.

This final deliverable is a standalone document with reference to the 2007 Trails/Bikeway Master Plan. This is a bridge document between now and a larger future study as part of the overall Transportation Master Plan process.

Methodology

The following methodology have been employed to gather adequate data and insight in order to address the stated objectives.

SITE VISIT AND STAFF REVIEW

Members of the study team visited Fredericton in mid-August to launch the project, and to interact with City staff, councillors, and advocacy groups. During this visit, the following points of engagement were used to broaden the understanding of Fredericton’s active transportation network, and to begin assessing trail and bike lanes gaps, connections, and opportunities:



- A presentation was made to Transportation Committee on August 16th to launch the study. Following the presentation, committee members participated in an open discussion on what they have experienced from working with their constituents. For a record of the presentation, consult Appendix A
- Parsons staff met with City of Fredericton planning and engineering staff to discuss their identified trail and bike lanes opportunities and constraints. The study team also met with the City’s legal representatives to gain an understanding of limits to road treatments, particularly concerning Provincial roads.
- A cycling tour of Fredericton was held with City staff and City Councillors. The tour focused on both areas recognized as being successful pieces of infrastructure, and those areas staff identified as being problematic. Multiple stops were made to hold on-site discussions on what made each particular area a success, or a problem.
- A roundtable discussion with multiple City agencies was held in Odell Park to discuss competing and shared departmental priorities concerning trail and bike lane infrastructure. Representatives from Planning, Traffic Engineering, Recreational Services, Police, and Fire attended.



DIGITAL CONSULTATION

An online survey was launched at the Transportation Committee meeting described above. At the meeting, a short presentation was made by Parsons and City staff. Following the presentation, the survey was made available on the City of Fredericton’s website in both English and French. The survey period lasted from August 16 to September 8, 2016.

The survey, hosted on Survey Monkey, consisted of 16 questions aimed to better understand the experience of cyclists and pedestrians in Fredericton. The study team used a mix of closed and open-ended questions to provide a variety of findings, and to provide the public opportunity to give a deeper contextual nature to the findings. The survey took approximately 15 minutes to complete. Consult Appendix B for the full survey text.

Upon launch, the survey collected over 250 responses within 24 hours of its launch. By the conclusion of the survey period, the survey collected 498 responses. An interpretive framework was developed in order to sort through and identify themes within the survey responses. These themes were based on the results of the survey, and were iteratively determined during analysis in consultation with the study team.

GIS ANALYSIS

Existing GIS data provided by the City was layered with original GIS data produced using the feedback from the site visit and survey to create maps representing some of the findings of this plan.

Findings

SITE VISIT AND STAFF REVIEW

DISCUSSIONS WITH CITY OF FREDERICTON STAFF AND COUNCILLORS

There is a shared desire to improve active transportation infrastructure within the City. The need for physical improvements and connections are key elements of this plan, particularly through intersections.

There was a consensus that the current status quo for the treatment of bike lanes through intersections is inadequate. In the existing conditions, bike lanes are continuous mid-block, but do not carry through intersections. This leaves users without clear indication on how to manage merging vehicles, right turning vehicles (both channelized and unchannelized right turn lanes), and how to negotiate making a safe left-turn lane.

There is a desire for additional trail connections, while balancing other considerations such as maintenance costs and the impact of new infrastructure on emergency response. Additional education is needed for both motorists and active transportation users, specifically concerning laws and bylaws regulating sharing the road, sharing the trail network, when and how to yield, and how to facilitate a safe trail crossing.

Discussions with City staff culminated in over 50 trail connections, trail crossings, and trail or bike lane extensions being identified as potential options to improve the active transportation connections within Fredericton. The status of these options have been reviewed on case-by-case basis, and categorized as follows:



1. Identified (no design, no funding, no consultation);
2. Conceptual (Internal discussions and a desire to move forward);
3. Designed, but not budgeted/scheduled;
4. Designed and scheduled; and,
5. Being built this year.

Discussions with staff also reviewed several intersection and trail crossings that are of concern, and would be suitable candidates for improvement or study. All options are discussed in the Implementation Section.

TRAIL CROSSINGS (EXISTING CONDITIONS)

There are essentially two categories of trail crossings that are encountered in Fredericton:

- Crossing of a City of Fredericton managed roadway; and,
- Crossing of a provincially managed roadway.

Crossings of a City managed roadway can be formalized and upgraded with a variety of tools, such as line painting, vehicular signage, installation of medians, and other forms of pedestrian and cyclist prioritization. Provincially managed roadways, of which there are several in Fredericton, are more challenging to facilitate formalized trail crossings across.

This is particularly challenging given that provincially managed roads are typically associated with higher vehicle speeds, presenting challenging crossing environments for pedestrians and cyclists. The use of medians with a depressed centre was discussed as a viable option that would not formalize the crossing but rather help calm reported high speeds of vehicles using the provincial roadways, and provide refuge for active transportation users seeking to cross. Trail crossings and their treatment are addressed in the design guidelines, contained in Appendix C.



DIGITAL CONSULTATION

The following sections will document findings of the survey responses (498). A discussion of themes within these findings form the basis for the recommendations.

KEY HIGHLIGHTS OF SURVEY RESPONDENTS

Table 1 provides an overview of the responses for the survey respondents for questions 1 through 4. In general, survey participants cycle frequently (83.8% at least once a week) and for a significant portion of the year (76.4% cycle five months a year or more). There is also a high level of comfort with cycling in traffic, but a strong preference for separation (90.1% are comfortable on trails, and prefer the use of bike only infrastructure).

Survey Question	Findings
Question 1 – Typically, how often do you cycle?	<ul style="list-style-type: none"> • 62.3% of respondents cycle three times a week or more • 21.5% cycle once or twice a week • 8.7% cycle once or twice a month • 4.7% cycle once or twice a year • 2.8% of respondents never cycle
Question 2 - During how many months of the year do you typically cycle?	<ul style="list-style-type: none"> • 13.8% of respondents cycle all year long • 25.5% cycle 7-9 months a year • 37.0% cycle 5-6 months a year • 17.6% cycle 3-4 months a year • 3.0% cycle 1-2 months a year • 3.0% never cycle
Question 3 - Please indicate your level of cycling comfort	<ul style="list-style-type: none"> • 7.7% of respondents are comfortable in traffic; roads are fine as they are and do not require bike-only infrastructure. • 60.1% are comfortable in traffic, but prefer using bike lanes or other bike-only infrastructure • 30.0% are comfortable cycling on trails, but have concerns about cycling in traffic • cycle 5-6 months a year • 1.0% do not cycle now, and are not interested in starting • 1.2% did not answer
Question 4 - Typically, why do you cycle?	<ul style="list-style-type: none"> • 26.6% cycle for recreation • 9.3% cycle to get to work/school or to run errands • 61.3% Cycle for both recreation and to get to work/school or to run errands • 2.8% did not answer

EXISTING SUCCESSFUL ELEMENTS

In response to question five, *List up to three things that make the existing Fredericton trails/bikeway system great*, the most frequent responses were concerning the trail network within Fredericton, specifically:

- The extensiveness of the trail system (196 responses);
- The paved nature of the trail system (178 responses);
- The scenic nature of Fredericton’s trail network (113 responses); and,
- The maintenance level of the trail network (89 responses).

People also reported that bike lanes were also an important part of the existing system (40 responses).

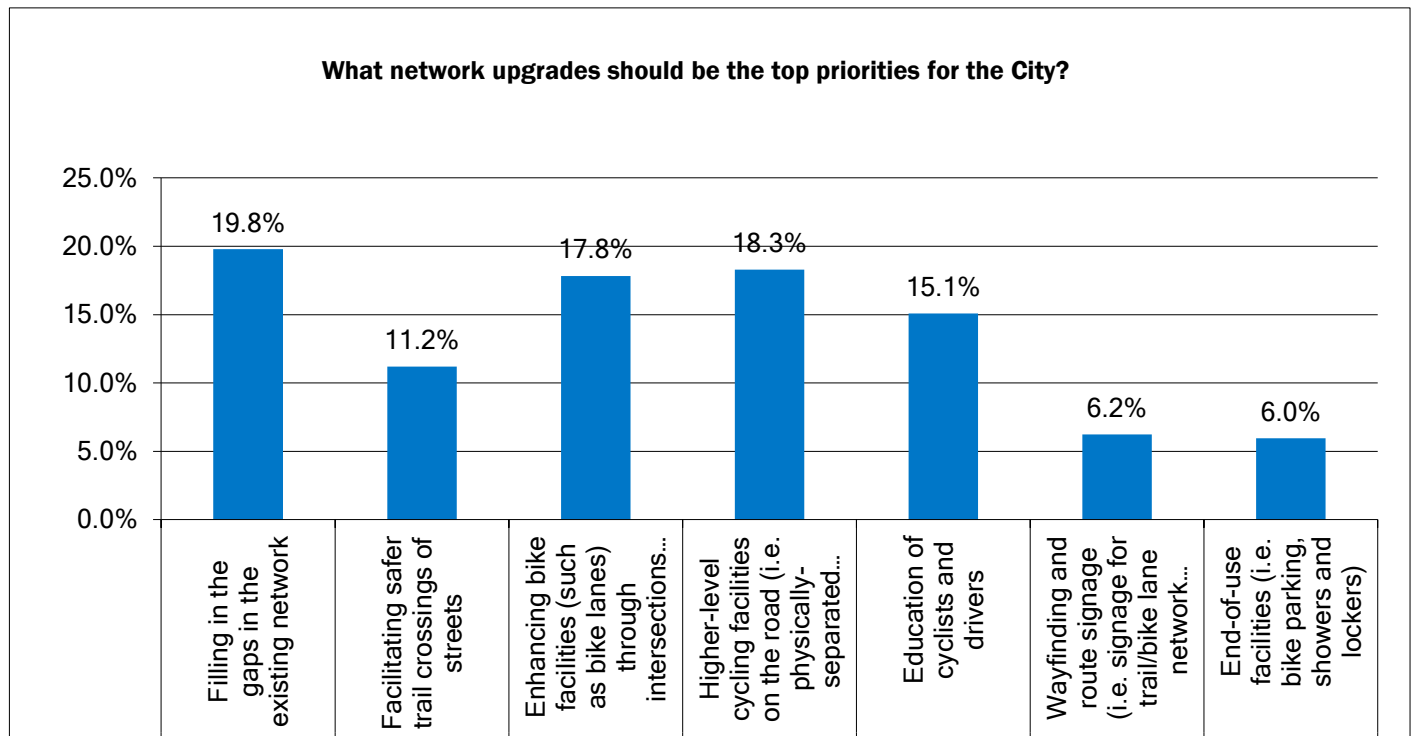
CHALLENGES AND OPPORTUNITIES

Respondents indicated that while there are successful elements within the City’s active transportation network, there are several areas that are existing challenges, and some areas that offer an opportunity for improvements. Respondents indicated that a lack of bike lanes (100 responses) was a key challenge, as well as the dropping of bike lanes through

intersections, and the width of bike lanes (55 and 47 responses respectively). A key challenge identified was the lack of trail connectivity (90 responses) and challenging trail crossings (53 responses).

Respondents also indicated that there needs to be an increased focus on educating motorists, cyclists, and pedestrians on proper sharing of roadway and trail infrastructure.

When discussing opportunities and considering *what network upgrades should be the top priorities for the City* (Q7), responses focused around filling in gaps within the existing network (302 responses), providing higher level cycling facilities on the road (279 responses), enhancing bike facilities through signalized intersections (272 responses), and education of cyclists and drivers (230 responses). The full results of this question can be seen in the graph below:



Q8. List up to three locations where you think there is a gap in the existing TRAIL network that should be addressed:

- Southside Riverfront trail (55 Responses);
- Crosstown - Gap from Regent to Smythe (46 Responses);
- North Riverfront Trail (40 Responses);
- Killarney Lake to Trail System (28 Responses);
- Downtown - East West (26 Responses);
- Lincoln (26 Responses); and,
- Uptown to Downtown (25 Responses).

Q9. List up to three locations where you think there is a gap in the existing BIKE LANE network that should be addressed:

- Southside Riverfront trail (55 Responses);
- Crosstown - Gap from Regent to Smythe (46 Responses);
- North Riverfront Trail (40 Responses);
- Killarney Lake to Trail System (28 Responses);
- Downtown - East West (26 Responses);
- Lincoln (26 Responses); and,
- Uptown to Downtown (25 Responses).

Q10. List up to three intersections that are in the highest need of an upgrade to cyclist safety:

- Regent and Prospect (61 Responses);
- York and King (28 Responses);
- Regent and King (27 Responses);
- Brookside and Ring Road (27 Responses);
- Smythe and Dundonald (24 Responses);
- Westmorland bridge and Queen (19 Responses);
- Regent and Queen (18 Responses); and,
- York and Dundonald (16 Responses).

Q11. List up to three additional trails that should be paved:

- Lincoln (52 Responses);
- No Paving (43 Responses);
- Northside (40 Responses);
- Gibson (38 Responses);
- Valley (36 Responses);
- North Riverfront (34 Responses); and,
- South Riverfront (25 Responses).

Q12. List up to three locations where trail crossings (i.e. where a trail crosses a public street) require improvement:

- Northside and Gibson/Canada (42 Responses);
- Lincoln Trail at Lincoln Road - Near Farm (38 Responses);
- Valley Trail and Woodstock Road (27 Responses);
- Valley Trail and Hanwell (27 Responses);
- Valley Trail and Smythe - Near Superstore (25 Responses);
- Northside Trail and St Marys (20 Responses); and,
- Lincoln Trail crossing Dunn's (18 Responses).

Q13. Think of a neighbour or friend who does not cycle the trail or bike lane network now. What do you think is the most important improvement the City can make to encourage them to cycle:

- Increased segregation from traffic (63 Responses);
- Additional bike lanes (35 Responses);
- Safety (30 Responses);
- Education of the rules of the road - for Drivers (29 Responses);
- Promotion and celebration, such as bike days, festivals, health benefits (26 Responses);
- Additional trails (20 Responses);
- Provide downtown infrastructure (19 Responses);
- Pave more trails (19 Responses); and,
- Bike Rentals (19 Responses).

GIS ANALYSIS

Below are Figures 1 through 8, which represent a GIS analysis of findings from the survey, as well as conceptual trail and cycling projects. The identification of gaps by the public was instrumental in developing a priority framework for the City of Fredericton.

Figure 1: Gaps in the Bike Lane Network - North

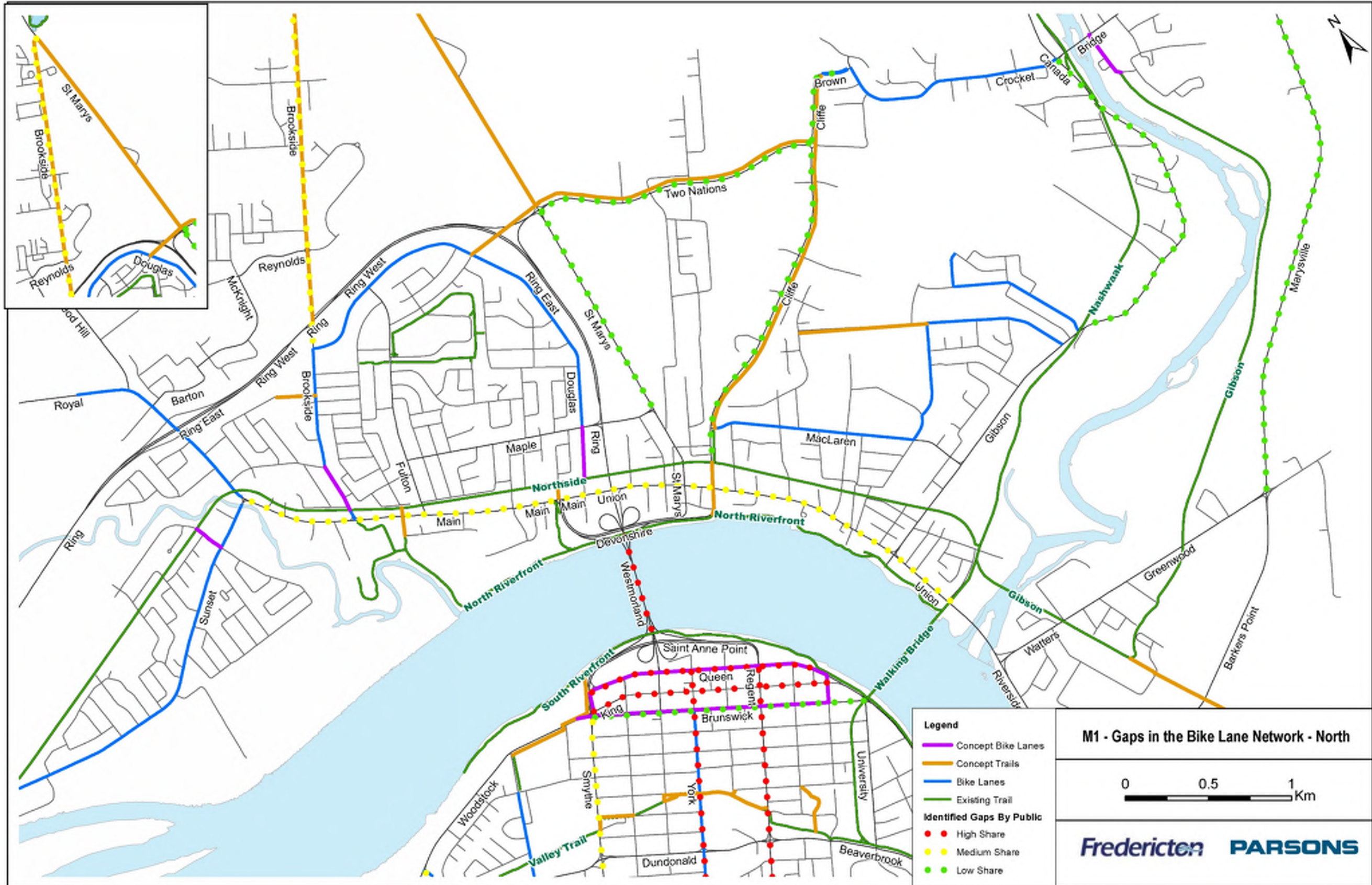


Figure 2: Gaps in the Bike Lane Network – South

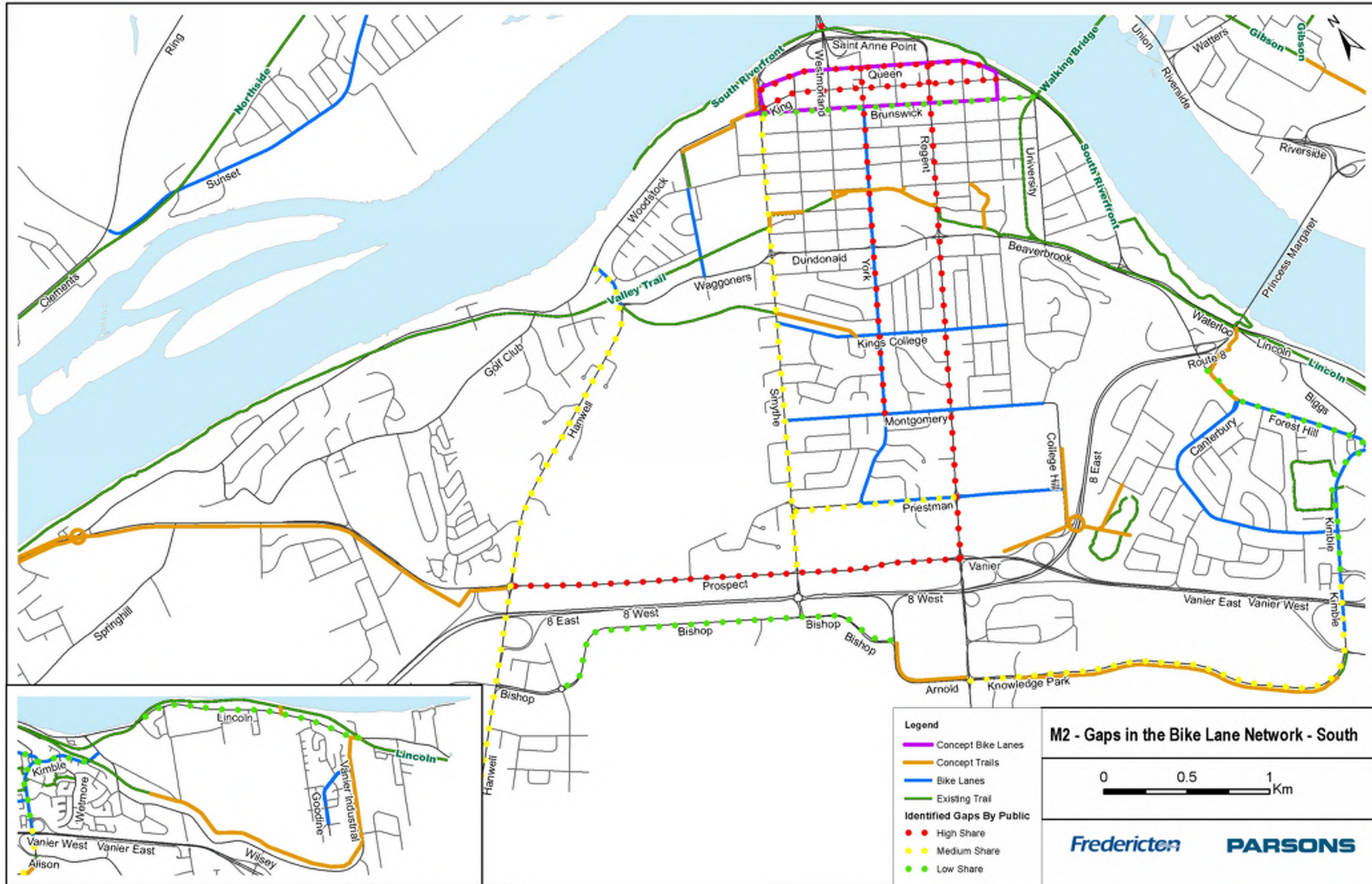


Figure 3: Gaps in the Trail Network – North



Figure 4: Gaps in the Trail Network – South

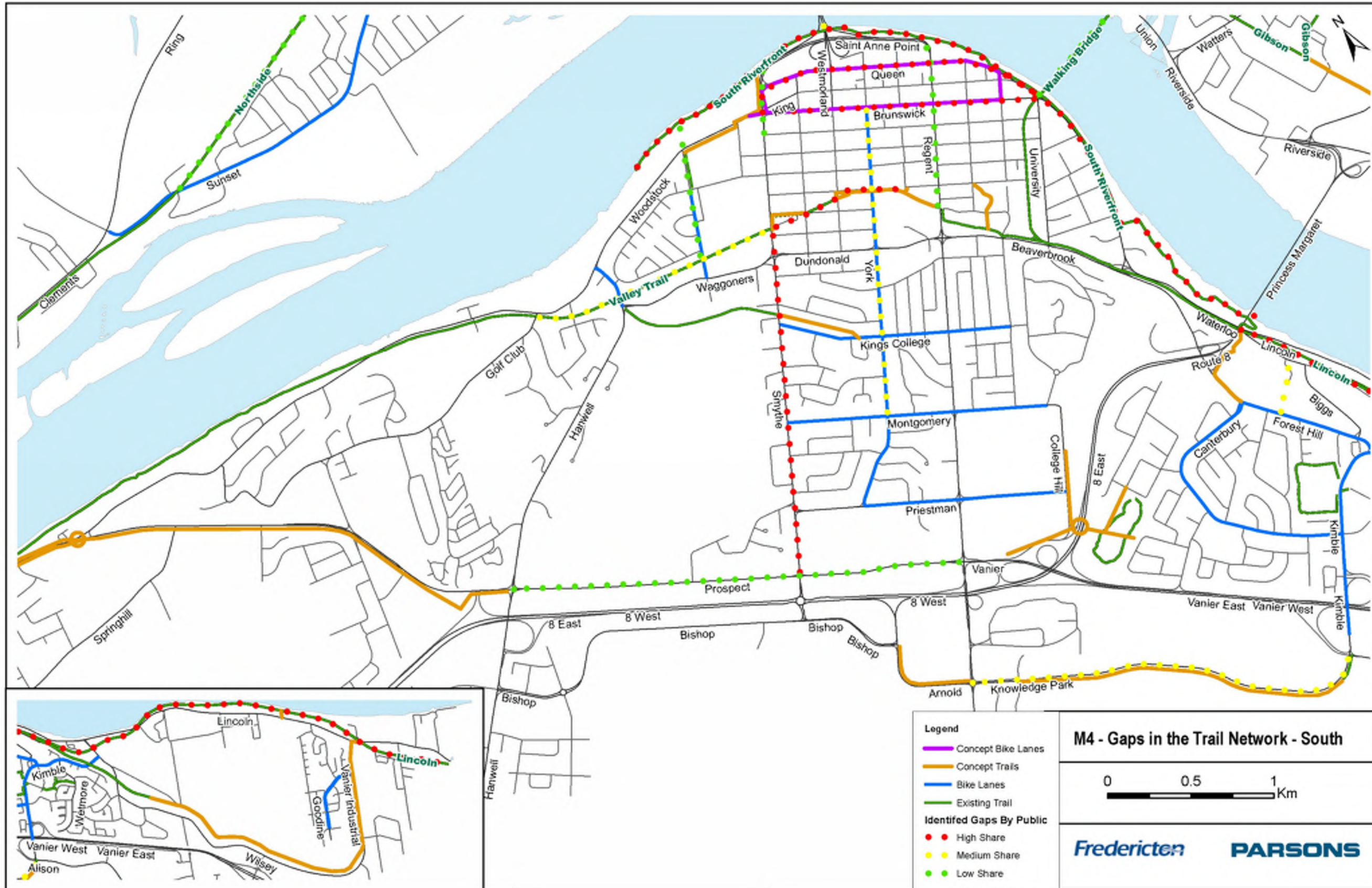


Figure 5: Identified Intersection Upgrades - North

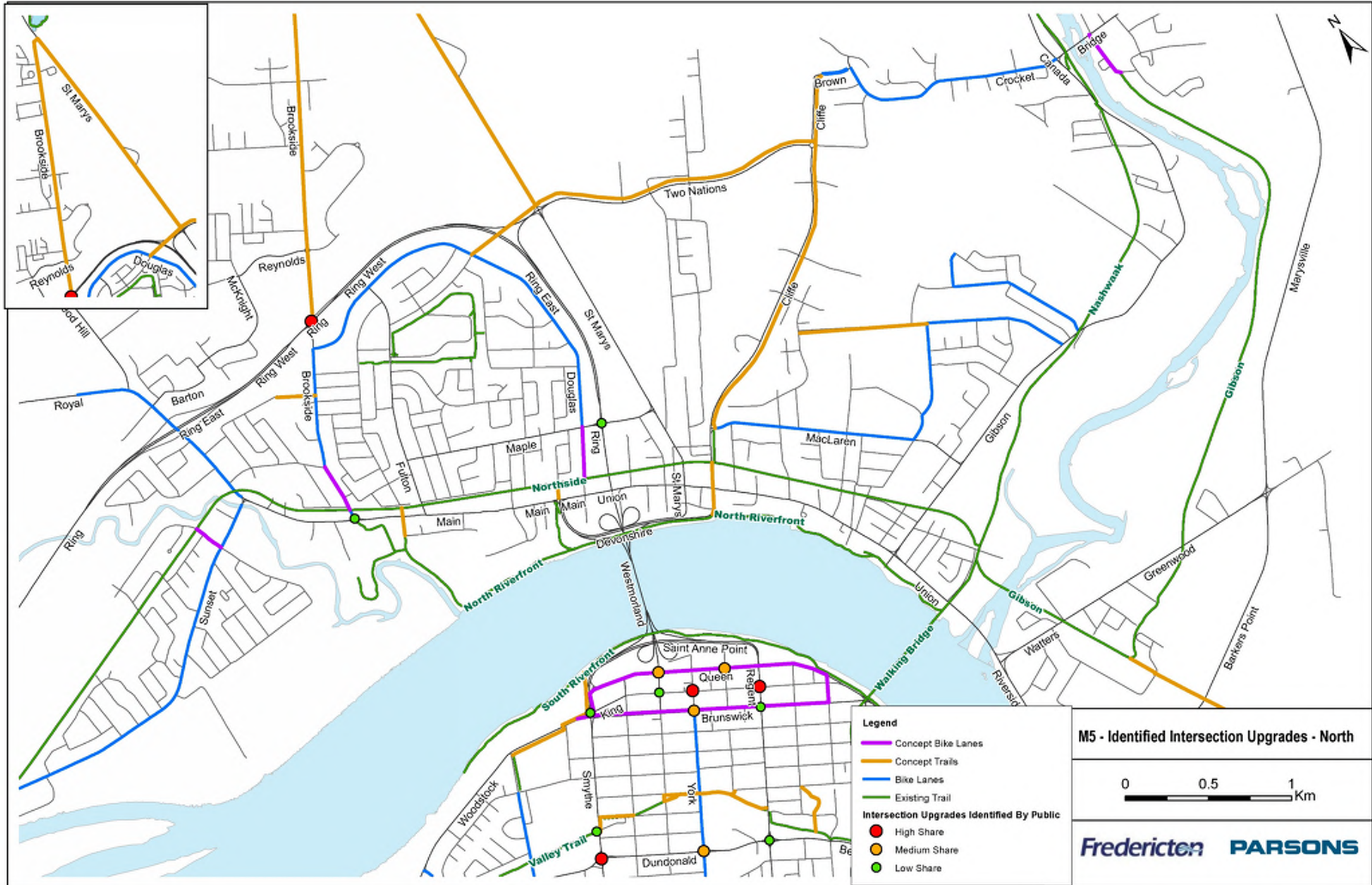


Figure 6: Identified Intersection Upgrades - South

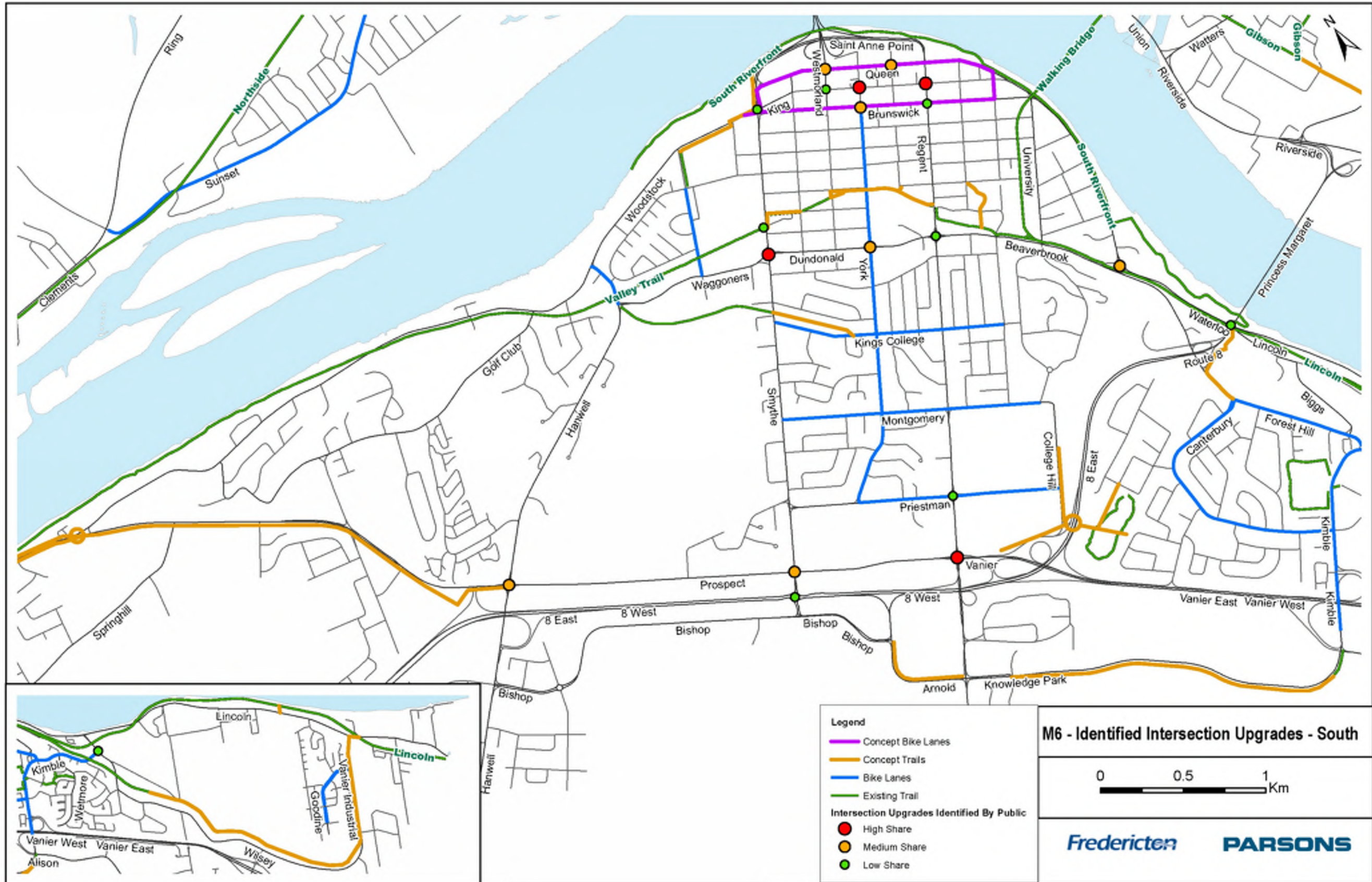


Figure 7: Identified Trail Crossing Upgrades - North

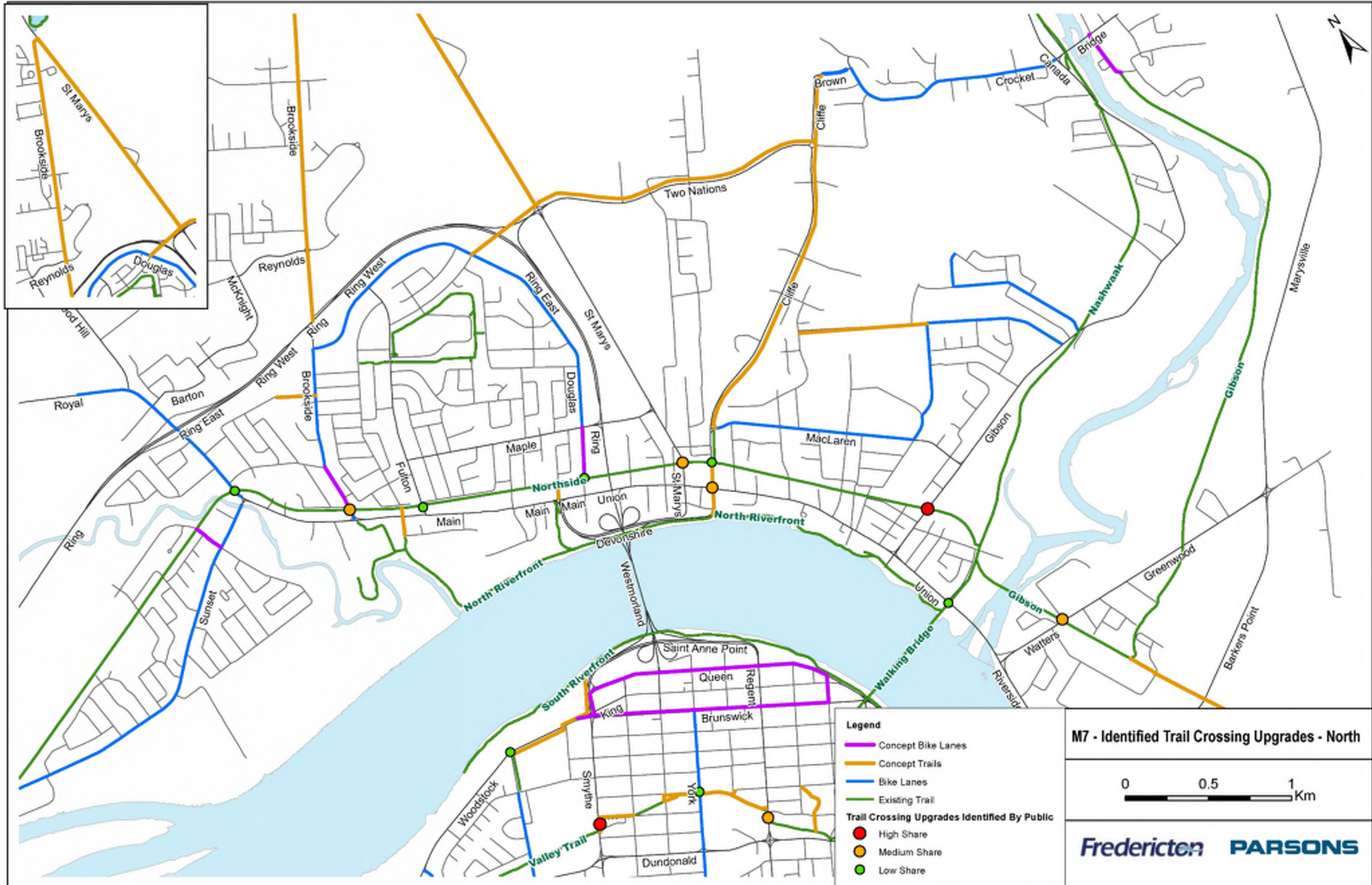
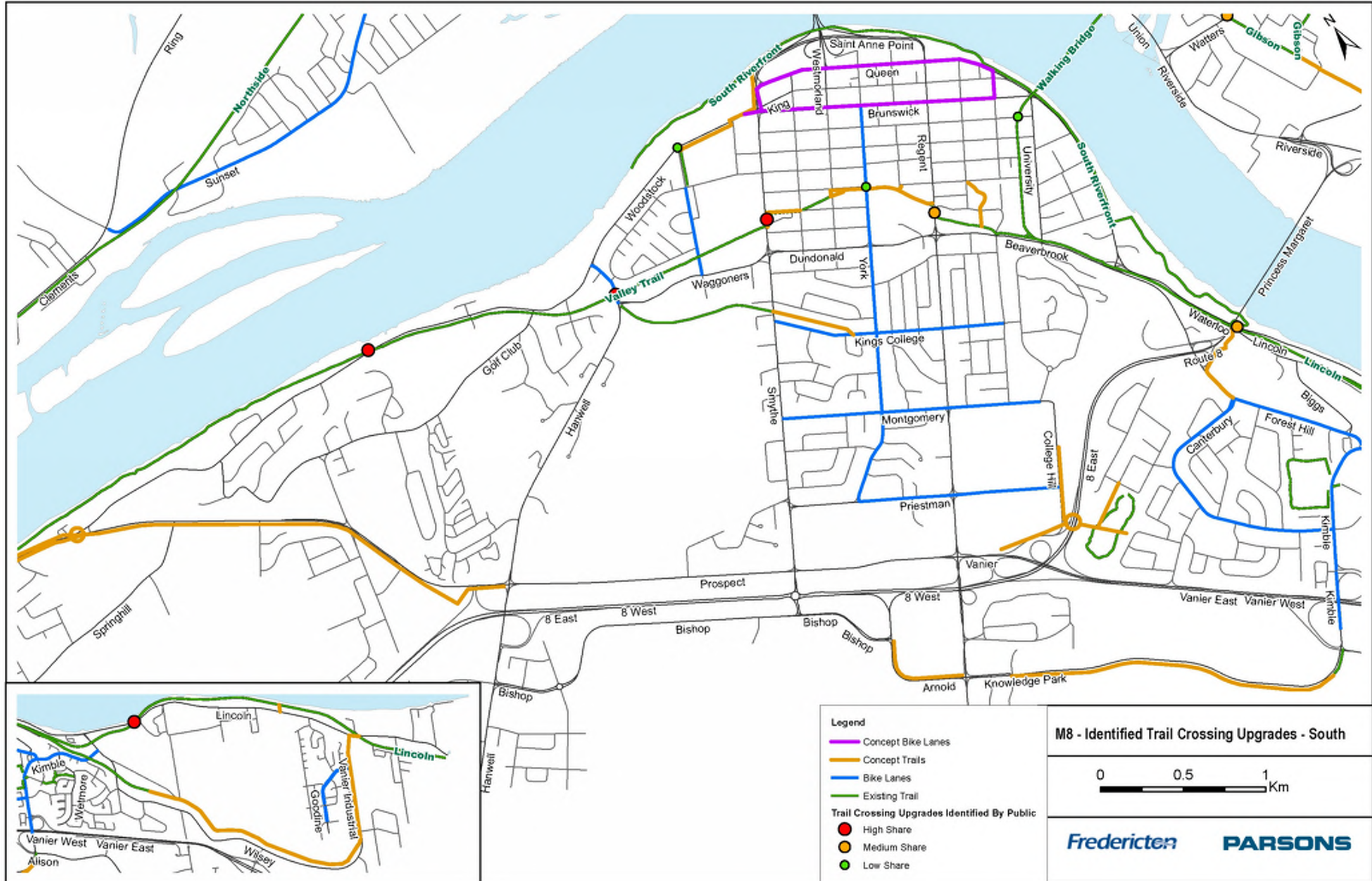


Figure 8: Identified Trail Crossing Upgrades - South



Recommendations

The design guidelines, reflecting current best practices for active transportation infrastructure design, are contained in Appendix C.

These guidelines should be observed as a series of recommendations concerning design guidance that satisfy the stated objectives related to design of facilities. These design guidelines should be considered as an update to the Design Guidelines in Chapter 5 of the existing 2007 Trails/Bikeway Master Plan.

Implementation

In consultation with City of Fredericton staff and the general public, an implementation strategy was developed that is embodied by an Active Transportation Priority Matrix (ATPM), detailed below. The ATPM considers potential projects that have varying degrees of planning and design work completed (from none, to fully designed), and considers new project locations that emerged as a result of consultation.

The strategy, detailed below, has a temporal aspect that prioritizes what emerged through consultation as key projects, and provides the City of Fredericton a planning horizon in which to seek funding, complete design, and implement the projects described in order to strategically grow the active transportation network.

TIMING AND PRIORITIZATION

Prioritization was based on survey results and City staff feedback gathered during the consultation period, and was refined through a strategic review of each possible connection identified. Although desired in some instances, there are constraints to some projects that affect their prioritization – such as high cost or complexity, which will require further study and feasibility analysis.

Timing is broken down into the following three categories, during which full implementation is contemplated. :

- P1: 2016 to 2020
- P2: 2020 to 2025
- P3: 2026 and beyond

Phase	Project Number	Title	Project Description	Current Status	Reasoning for Phasing; Reflective of Public and Staff Feedback	Notes
P1	P1 - 1	Downtown East-West Bike Facilities	Queen and Brunswick being examined as candidates for bike facilities. Multiple options being considered.	Conceptual.	Highly desired by public and staff. Opportunity to coincide with reconstruction of downtown. Not currently designed or budgeted.	Most of downtown being rebuilt in next 5-8 years, offering a chance to put back something different. Should tie into York / Carleton, with direct access to downtown. Future Downtown East-West facility would benefit greatly from a pilot project and/or incremental installation of permanent facilities.
	P1 - 2	Eco Terra Drive Connection	Unpaved, interim trail connection along Eco Terra from Hillcrest to Irvine. Would continue eastward to tie into existing bike lanes on Irvine.	Scheduled to be built 2016. ✓	Gap in network. Coincides with planned future projects.	Eco Terra has no pedestrian facilities. Interim trail would be upgraded when private development occurs in the area. Property issues need to be resolved.
	P1 - 3	Cliffe Street Trail	Trail has been built to Maclaren, from the Northside Trail in 2015. This would continue north from Maclaren on the east side of Cliffe Street, connecting to LHHS, and eventually turning west onto Two Nations Crossing through a roundabout.	Maclaren to Sunny Brae built in 2016. ✓ Two Nations portion is budgeted and scheduled for 2017.	Gap in network. Coincides with planned future projects. Desire from public input to develop concept for the remainder. Then proceed to detailed design and budgeting.	This would ultimately connect to Killarney Lake Park.
	P1 - 4	Devonshire Trail Connector	This connector would complete the Cliffe Street Trail connection as described above. There is an abrupt end to the North Riverfront Trail, where this connector would begin, crossing Union Street on the east side, and connecting to the Northside Trail and Cliffe Street Trail.	Conceptual.	Gap in network, and staff priority. Desire from public input to develop concept. Then proceed to detailed design and budgeting.	There are ROW constraints at the SE corner of Union and Cliffe that needs to be resolved. Property acquisition is progressing.
	P1 - 5	West End Trail Connection. Valley Trail to South Riverfront Trail.	Multiple phases. It would cross at an existing Woodstock/Wilmot Park crossing, and continue on the North Side of Woodstock, turning north on Smythe Street to connect to the South Riverfront Trail. A new trail connection along Rookwood between Valley Trail & Wilmot Park. Segment from Wilmot Park to North Riverfront Trail.	Woodstock Road – Odell to Rookwood Completed in 2016. ✓ Remainder is Conceptual	Gap in network. Desire from public input to develop concept for the remainder. Then proceed to detailed design and budgeting.	Part of the TransCanada Trail
	P1 - 6	Valley Trail to Crosstown Trail Connector York to Northumberland (Short term)	Would connect Regent Street (Crosstown trail) and Smythe Street (Valley Trail), through the use of Argyle, Aberdeen, an existing trail connection, and a potential connection through private property. Phase 1 is along Aberdeen (York to Carleton), as a boulevard trail. Will relocate pedestrian crossing of York Street to the south leg of the intersection.	Phase 1 built in 2016. ✓	Gap in network. Desire from public input for continuous Valley Trail to Crosstown connection.	

Phase	Project Number	Title	Project Description	Current Status	Reasoning for Phasing; Reflective of Public and Staff Feedback	Notes
P1	P1 – 7	David Kelly Trail	Would connect to existing trail at Patience Lane, moving east towards Route 8, and facilitate a crossing of Route 8 ramps to connect to Hanwell Road.	Scheduled to be built in 2017. ✓	Gap in network.	Project previously delayed due to negotiations with DTI over Route 8 crossing.
	P1 – 8	Brookside Bike Lane extension	Bike lane gap – painted bike lanes would connect Brookside from Hawkins to Main Street. Would take opportunity to improve Northside Trail crossing at Brookside. Existing bike lanes in place from Douglas to Hawkins.	Conceptual.	Gap in network, and staff priority. Desire from public input to develop concept for the remainder. Then proceed to detailed design and budgeting.	Capital project upcoming, could potentially be bundled with this. Short term goal would be to improve this link, but ultimately continuing the bike lanes to extend to the north to Killarney Lake and other residential development along Brookside Drive.
	P1 – 9	Two Nations Connector	A trail connection between Two Nations Crossing and Fulton Heights. Has to cross Route 105.	Conceptual.	Opportunity to coincide with reconstruction of interchange. Desire from public input to develop concept for the remainder. Then proceed to detailed design and budgeting.	Province is planning for an interchange upgrade. No construction date set. Provincial crossing challenges. Property would be required.
	P1 – 10	Gardiner Way Connector	A trail connection from Gardiner Way to the Northside Trail.	Conceptual.	Gap in network, and staff priority. Desire from public input to develop concept for the remainder. Then proceed to detailed design and budgeting.	Neighbourhood is close to trail, but disconnected. Crossing of provincial road poses challenges. A crossing point has been requested by residents in previous years. Also provides access to transit stops on south side of the street.
	P1 – 11	Douglas Avenue Bike Lane Extension	Bike lanes on Douglas Avenue end at Maple. Extension of Bike Lanes to Main Street or at least Northside Trail.	Conceptual.	Gap in network. Desire from public input to develop concept for the remainder. Then proceed to detailed design and budgeting.	An extension of an existing facility.
	P1 – 12	Cycling facility improvements through intersections	Improvements of intersection layout or the treatment of an existing cycling facility treatment through intersections at the following areas: a) York & Dundonald b) York & Montgomery c) York & Priestman d) York & King e) York & Brunswick f) Regent & King's College g) Brookside & Douglas h) Brookside & Hawkins	Identified.	Desire from public input to develop concept. Then proceed to detailed design and budgeting.	These are from either the survey results or an assessment of network gap, or municipal staff input. Note: Regent Street received a high share of public interest in cycling facilities.

Phase	Project Number	Title	Project Description	Current Status	Reasoning for Phasing; Reflective of Public and Staff Feedback	Notes
P1	P1 – 13	Cycling Facility installation	Installation of painted bike lanes or upgrades to existing designated cycling facility along the following streets: a) York Street (Brunswick to Priestman) b) Priestman (Between Regent and Smythe)	Identified.	Desire from public input to develop concept. Then proceed to detailed design and budgeting.	These are from either the survey results or an assessment of network gap. Note: Explore possibility of upgrading York Street bike lanes with elements of protection. Note: Both Regent and Prospect Streets received a high share of public interest in cycling facilities.
	P1 – 14	McGloin Street Bike Lane	New bike lane from Gibson Trail to western end of McGloin Street.	Identified	Gap in network.	Provides partial connection between Gibson Trail and Nashwaak Trail. When the Nashwaak Bridge is rehabilitated in the future, discussions should be had with the Department of Transportation and Infrastructure to include a trail on a new structure to complete the trail link.
	P1 – 15	Trail Crossing Upgrade	Improvement of the trail crossings at the following urban crossings: a) Valley Trail at Hanwell b) Northside at Gibson c) Northside at Brookside d) Gibson at Greenwood e) Northside at St. Marys i) Northside at Cliffe	Identified.	Desire from public input to develop concept. Then proceed to detailed design and budgeting.	These are from either the survey results or an assessment of network gap, or municipal staff input.
	P1 – 16	Trail Crossing Upgrade	Improvement of the trail crossings at the following rural crossings: a) Lincoln Trail at Lincoln b) Valley Trail at Woodstock c) Lincoln at Dunn’s Crossing	Identified.	Desire from public input to develop concept. Then proceed to detailed design and budgeting.	These are from either the survey results or an assessment of network gap, or municipal staff input.
P2	P2 – 1	Hillcourt trail Connection	Connection between Northside Trail, across Main Street, and connecting to North Riverfront Trail.	Conceptual.	Opportunity for land to be acquired through infrastructure project. Reflects objectives of Main Street Plan. Desire from public input on concept for future planning purposes.	A planned water/sewer project may provide the required land to facilitate connection between Northside Trail and North Riverfront Trail.
	P2 – 2	Valley Trail to Crosstown Trail Connector	Would connect Regent Street (Crosstown trail) and Smythe Street (Valley Trail), through the use of Argyle, Aberdeen, an existing trail connection, and a potential private connection. Segment is a connection across the Sobeys property to connect onto Aberdeen Street.	Conceptual.	Gap in network. Desire from public input on concept for future planning purposes.	Would need to work with private landowner to acquire property for trail as part of new development.
	P2 – 3	Queen Square Connector	A Paved connection from the Crosstown Trail, north through Queen Square and exiting onto Saint John Street.	Conceptual	Gap in network.	Potential public opposition to paving of the trail in Queen Square. Land to accommodate connection will be required from a light industrial property on McLeod Avenue. Improves accessible access to the park.

Phase	Project Number	Title	Project Description	Current Status	Reasoning for Phasing; Reflective of Public and Staff Feedback	Notes
P2	P2 - 4	Vanier Industrial	A trail on the west side of the Vanier Industrial Drive that would extend the Vanier Trail. It would then cross Lincoln Road to connect onto the Lincoln Trail.	Conceptual.	Gap in network, and staff priority. Desire from public input on concept for future planning purposes.	The connection to Lincoln Trail needs consideration. There is the potential for future capital projects to include this, and a culvert has recently been replaced along Vanier that would accommodate the trail. No funding committed, but Parks and Trees has identified this as a priority as it would complete a major loop.
	P2 - 5	Lincoln Road Trail Connector	Trail connection from Lincoln Road to Lincoln Trail.	Identified.	Gap in network. Desire from public input on concept for future planning purposes.	Existing City property. Neighbourhood is close to trail, but disconnected. Crossing of provincial road poses challenges. Opportunity to connect future bike lanes on Lincoln Road to Lincoln Trail.
	P2 - 6	Lynn Trail Connection	Connection from Northside Trail, across Main Street, towards North Riverfront Trail and the WSB. Segment south of Main Street would be converted from sidewalk to trail with wider boulevard when sidewalk needs to be replaced.	Conceptual.	Gap in network. Desire from public input to develop concept plan.	Property challenges to accommodate connection between Main Street and the Northside Trail in north segment.
	P2 - 7	Sunset to Royal Bike Lane Connector	Existing bike lanes on Sunset and Royal do not continue through intersection. Considering shifting bike lanes to Manressa Drive with a trail connection to improve the crossing conditions.	Identified.	Gap in network.	Intersections are tight, connection to trail from Royal would keep people away from constrained intersection conditions.
	P2 - 8	Dykeman Connector	Trail connection to Brookside Drive from Dykeman Street to tie into bike lanes.	Conceptual.	Gap in network. Desire from public input to develop concept for the remainder. Then proceed to detailed design and budgeting.	City owned land, offers no significant challenges. Connects neighbourhood to existing bike lanes.
	P2 - 9	Kings College Connector	Trail connection from Odell Park Trail across Smythe Street to Kings College Road. Bike lanes exist on Kings College Road.	Conceptual.	Gap in network. Desire from public input to develop concept for the remainder. Then proceed to detailed design and budgeting.	ROW required, but major storm sewer lines underneath. Negotiations for the land are underway. Would provide for a more direct tie into Odell Park with a relocated pedestrian crossing. Would provide cycling connection between Valley Trail and Universities.
	P2 - 10	Cycling facility improvements through intersections	Improvements of intersection layout or the treatment of an existing cycling facility treatment through intersections at the following areas: a) Canterbury & Forest Hill b) Canterbury & Kimble c) Kimble & Forest Hill d) Douglas & Maple e) Crocket & Bridge	Identified.	Desire from public input to develop concept. Then proceed to detailed design and budgeting.	These are from either the survey results or an assessment of network gap, or municipal staff input.

Phase	Project Number	Title	Project Description	Current Status	Reasoning for Phasing; Reflective of Public and Staff Feedback	Notes
P2	P2 - 11	Cycling Facility installation	Installation of painted bike lanes or upgrades to existing designated cycling facility along the following streets: a) Lincoln Road (Adams to Trail Connection) Possibility to strengthen Kings College (Windsor to Smythe) in interim.	Identified.	Desire from public input to develop concept. Then proceed to detailed design and budgeting.	These are from either the survey results or an assessment of network gap. A north-south cycling facility through O'Dell Park could be explored.
	P2 - 12	North Riverfront Trail	Walking Bridge to Hillcourt, fill existing gaps.	Identified.	Desire from public to develop concept to fill existing gaps in network.	Property acquisition required.
	P2 - 13	Cliffe Trail Extension	Extend trail on east side of Cliffe from Two Nations to Brown Blvd.	Identified.	Gap in network.	Connects trail and bike lanes.
	P2 - 14	Two Nations Trail Extension	Extend trail from Killarny access to St. Mary's Street.	Identified.	Gap in network.	
	P2 - 15	Montgomery Street bike lane extension	Extend bike lanes from York Street to Duffie Drive along Montgomery Street .	Identified.	Gap in network.	
	P2 - 16	Knowledge Park Drive	Would provide a connection on the south side of Knowledge Park Drive from just east of Regent Street, to the Grant Harvey Centre and onto Kimble Drive via a temporary trail. A permanent facility will be built when Knowledge Park Drive is upgraded.	Conceptual.	Gap in network. Desire from public input on concept for future planning purposes.	
	P2 - 17	West End Trail Connection	Multiple phases. Ultimate build out would connect from Valley Trail, moving north on the east side of Rookwood Avenue to Woodstock Road on the south side. It would cross at an existing Woodstock/Wilmot Park crossing, and continue on the North Side of Woodstock Road, turning north at Smythe Street to connect to the South Riverfront Trail. Segment is from Valley Trail to Wilmot Park.	Identified.	Gap in network.	Requires narrowing Rookwood (removal of existing bike lanes) to accommodate trail on east side.
	P2 - 18	Trail Crossing Upgrade	Improvement of the trail crossings at the following urban crossings: a) Northside at Douglas b) Northside at Fulton c) Northside at Royal d) Nashwaak at Canada (Both Crossings) e) Nashwaak at Bridge f) Lincoln at George	Identified.	Desire from public input to develop concept. Then proceed to detailed design and budgeting.	These are from either the survey results or an assessment of network gap, or municipal staff input. Note: Lincoln and George identified by public as a concern. Initial review indicates concern may be sightlines and potential pedestrian conflicts.

Phase	Project Number	Title	Project Description	Current Status	Reasoning for Phasing; Reflective of Public and Staff Feedback	Notes
P2	P2 - 19	Kimble Drive Connection	Trail from Canterbury to Knowledge Park Drive along Kimble. Connects existing bike lanes with future trail.	Identified.	Desire from public input to develop concept. Then proceed to detailed design and budgeting.	These are from either the survey results or an assessment of network gap, or municipal staff input.
P3	P3 - 1	Eco Terra Drive Connection	Connection from Cliffe (and future Cliffe Trail) To Eco Terra Trail	Identified.	Gap in network.	
	P3 - 2	Valley Trail to Cross-Town Trail Connector	Would connect Regent Street (Cross town trail) and Smythe Street (Valley Trail), through the use of Argyle, Aberdeen, an existing trail connection, and Smythe to Northumberland. Northumberland to Smythe segment.	Conceptual. Identified.	Gap in network. Desire from public input on concept for future planning purposes.	Argyle could be narrowed, possibly turned into a one way street, or on street parking reduced. Would need public support. Would continue onto Smythe, and use a shifted pedestrian crossing to access the trail.
	P3 - 3	Arnold Drive Connection	A paved trail on the north/east side of Arnold Drive, where there is no pedestrian or cycling facility today. It will connect from Regent to Bishop.	Conceptual.	Gap in network. Desire from public input on concept for future planning purposes.	Large residential development off Bishop, where there is a sidewalk on the north side. A trail may be built on the southside (between Lian and Smythe Street) along Bishop, but there are environmental constraints.
	P3 - 4	David Kelly Trail Extension	Would continue David Kelly Trail to the northwest, extending the trail from the aforementioned David Kelly project. Would continue on the south side of Prospect Street West, connecting to the Valley Trail (potentially via a roundabout).	Identified.	Gap in network.	Potential candidate for development based funding. Needs to take into account high speeds and poor pedestrian conditions
	P3 - 5	Cycling Facility installation	Installation of painted bike lanes or upgrades to existing designated cycling facility along the following streets: a) Route 8 (Greenwood to Bridge) b) Bridge (McGloin to Route 8) c) St. Marys (Maple to Two Nations) d) Bishop (Avonlea to Arnold)	Identified.	Desire from public input to develop concept. Then proceed to detailed design and budgeting.	These are from either the survey results or an assessment of network gap, or municipal staff input.
	P3 - 6a	Skyline Acres Connection Across Route 8 (Overpass)	A pedestrian bridge connecting Skyline Acres with the University Campus	Identified.	Gap in network.	Significant cost. Requires a thorough cost-benefit analysis. Would require new trail connections on both sides of the structure.

Phase	Project Number	Title	Project Description	Current Status	Reasoning for Phasing; Reflective of Public and Staff Feedback	Notes
P3	P3 – 6b	Skyline Acres Connection Across Route 8 (Roundabout)	Alternative to pedestrian bridge. This trail, from Skyline Acres, down towards a new roundabout along Route 8, would permit a crossing. The trail would then connect along College Hill Road, and towards a major employment hub in the DECH and towards the commercial areas of Prospect Street and the Universities.	Identified.	Gap in network.	Provides significant traffic benefits to the network. Alternative to a pedestrian bridge. Would have to be bundled with a provincial roundabout project to move forward, Will require coordination with provincial agencies. This will require property to facilitate trail connections.
	P3 – 7	Forest Hill to Lincoln Trail Connector	Trail extending from Forest Hill Road, adjacent to Route 8, connecting into the Lincoln Trail.	Identified.	Gap in network.	Challenging grades and may require property acquisition. Would provide a valuable trail connection for neighbourhood.
	P3 – 8	St. John River NS Connection	A new crossing of the St. John River. Public desire to rehabilitate and use existing piers in the River from former Carleton Bridge.	Identified.	Desire from public input.	Significant cost. Piers would need extensive rehabilitation. Alternative may be to improve cycling facilities on WSB. Carries a significant cost as well.
	P3 – 9	Waterloo Row Trail Connection	Boulevard Trail on North side of Waterloo Road, connecting the Walking Bridge with the Lincoln Trail.	Identified.	Gap in network.	More direct and scenic route from Lincoln Trail towards Downtown.
	P3 – 10	Orchard Drive Connector	A trail connection from Orchard Drive to the Valley Trail.	Conceptual.	Gap in network.	Neighbourhood is close to trail, but disconnected. Crossing of high speed provincial road poses challenges.
	P3 – 11	Trail Connection to Lower St. Mary's.	A trail connection from Gibson Trail to Lower St. Mary's crossing Route 8.	Identified.	Gap in network and desire from public input.	Utilizing old rail right-of-way (property acquisition required). Needs to be coordinated with the future DTI project at North End of the PMB. Lower St. Mary's is currently disconnected from rest of AT network.
	P3 – 12	St. Mary's Street Trail	Extend trail from Killarney Lake Park to Two Nations Crossing, via St. Mary's Street.	Identified.	Gap in network	Requires significant ROW.
	P3 – 13	Brookside Drive Trail	Trail from Ring Road to Killarney Lake Park.	Identified	Gap in network and identified by public	Requires significant ROW.

Based on consultation with City of Fredericton staff, the following represents an initial list of potential limits of trail paving:

- Lincoln Trail to trail connection on Lincoln Road;
- Valley Trail to new connection at intersection of Prospect/Woodstock;
- Nashwaak Trail to Bridge Street;
- Northside Trail to Gardiner Way Connector; and,
- Gibson Trail to Greenwood Drive.

Conclusion

Fredericton has many strong components to its active transportation network that exist today, including an extensive trail system, both paved and unpaved, and on-road bike lanes. This was evident by the appreciation and perceived value held by survey respondents, and the extensive use of these facilities that was observed.

City staff and the general public have shown a clear desire to further the state of active transportation in Fredericton. To accomplish this, the City must build upon the network that has completed to date, with new trails and cycling infrastructure that incorporates a higher level of service, and turn focus towards filling gaps that exist between facilities. The guidance contained in this Active Transportation Connection Plan provides the most recent best practices for the City to use when designing and constructing bike lanes, trails, intersections, and trail crossings. It also contains an implementation plan that informs where projects should be located, and when they should be built.

What this plan does not do is prescribe a design or facility to the projects contained in the ATPM, and instead leaves this at the hand of City staff, to be guided by public input. While the exact nature of these facilities will be determined during the functional planning process and/or the design process, the nature of these installations will be guided by the design guidance described herein. This plan will serve as a toolbox to support and strengthen these initiatives, and to inform future updates to Master Plans.

As described in the presentation given to Transportation Committee in November of 2016, at which the preliminary findings of this plan were presented, Fredericton is well positioned to make significant, publically desired investments in their active transportation network. With the strategy contained herein, the City can move forward with planning, budgeting, and designing projects that are shown to be desired by the City and the public alike, including but not limited to downtown cycling facilities and improved trail crossings. Through the adoption of the prioritization and design guidance contained in this plan, it is possible to make significant and meaningful additions to the City of Fredericton's active transportation network.

Appendices

APPENDIX A: SITE VISIT

PRESENTATION TO TRANSPORTATION COMMITTEE (AUGUST 2016)

Fredericton 
Smart. Sustainable.
Active Transportation Connection Plan
Transportation Committee – August 16th, 2016



Presented by:
Jon Lewis, P.Eng.
Traffic Engineer



Outline

- History of Active Transportation
- Current State
- Active Transportation Connection Plan

1/6/2017

History

- Pre 2007
 - Engineering built sidewalks
 - Parks and Trees built Trails
 - No Paved Trails
- 2007
 - Trails / Bikeways Master Plan completed
 - Set framework for developing cycling facilities over next decade





Trails / Bikeways Master Plan





Trails / Bikeways Master Plan

- Bike Lanes
 - Dedicated bike lanes introduced through City where space available
 - Generally Not Continuous Through Intersections
- Bike Routes
 - Roadways without space for bike lanes (signed as bike routes to connect facilities)
 - Enables parking
- Paved Trails
 - Ongoing process: Improves Accessibility

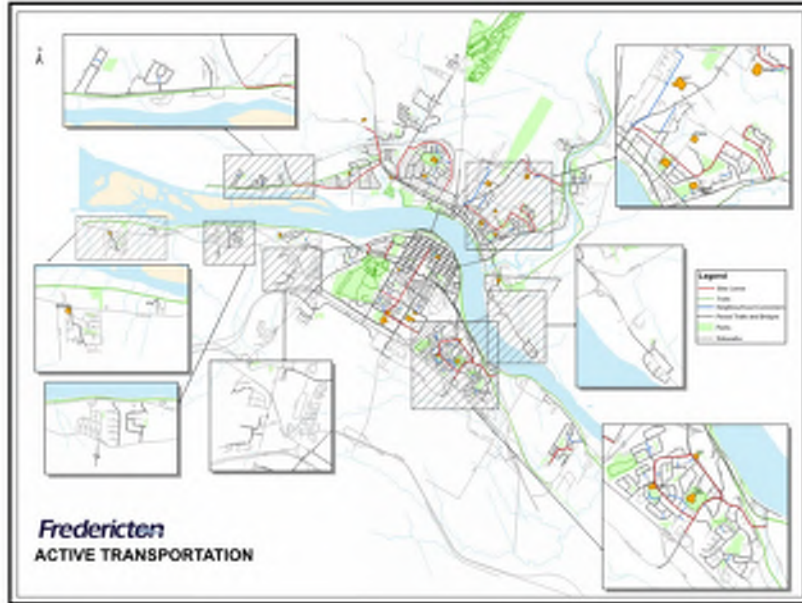
Fredericton

Current AT System

- Sidewalk: 240 km
- Paved Trail: 19 km
- Unpaved Trail: 37 km
- Bike Lanes: 24 km
- Bike Routes: 18 km

Fredericton

1/6/2017



Where are we going?

- We have many active transportation gaps in our system
- We want to generate an implementation plan for the next 5 to 10 years
- We want to ensure that Council and Public priorities are addressed and prioritized in the implementation plan



1/6/2017

Where are we going?

- Initiated a Study to gather public input to identify and prioritize how we fill cycling gaps in our active transportation networks
 - **Active Transportation Connection Plan**
- This will feed into our future analysis of transit stop locations
- Better connect trails, bike lanes, and sidewalks to transit stops to create a more balanced and connected transportation network

Fredericton 

Where are we going?

- We want your input!
- Visit our webpage and complete the survey

www.fredericton.ca/activetransportationplan

Fredericton 

1/6/2017

PARSONS



Kate Whitfield, P.Eng.,
MCIP, RPP

Fredericton

PARSONS

- Leader in transportation, bridges/structures and environmental/infrastructure
- 2,000+ projects throughout the US and 29 Countries across the world including Canada
- 90 staff in Ottawa
- ISO certified



Fredericton

1/6/2017

PARSONS



- Planning, Design & Construction Services
- Over 50 years of success in the National Capital Region
- Focus on urban infrastructure
- Multi-disciplinary approach

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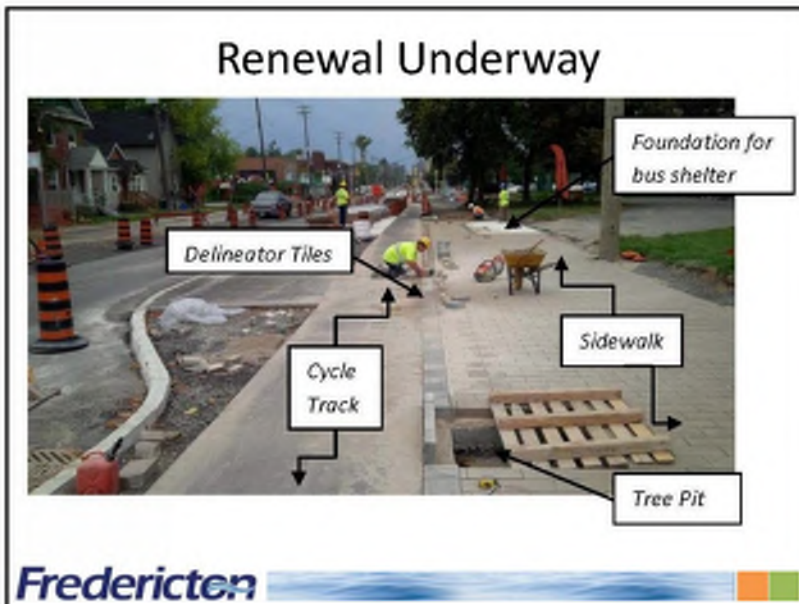
Main Street Today



= Incomplete!

Fredericton

1/6/2017



1/6/2017



1/6/2017



1/6/2017



1/6/2017



Cyclists through Intersections

- Option A: widening and paint
- Option B: additional guidance across intersection (i.e., chicken tracks)
- Option C: green thermoplastic at high conflict areas



Photo showing "chicken tracks" through intersection

Fredericton 

1/6/2017



AT Plan: Study Process

1. Launch of website and media campaign
2. Online survey from Aug 16th to Sept 6th
3. Data collection: Bike tour, meetings with City Staff and Cycling Working Group
4. Creation of draft AT Connection Plan including update to mapping
5. Report to Transportation Committee in fall 2016

Fredericton 

1/6/2017

The Questions Before Us

- Gaps in the trail and bike lane network?
- The best way to help cyclists through signalized intersections?
- Ways to improve trail crossings at streets?
- Prioritization?
- Action plan?

Fredericton

Final Deliverable

- AT Connection Plan
 - Report to future Transportation Committee Meeting
- Updated AT mapping
- Action plan with timetable
 - With consideration for other planned infrastructure upgrades

Fredericton

1/6/2017

We Want Your Feedback!

- What do you feel are the most pressing gaps in the City?
 - Bike Lanes;
 - Trails;
 - Intersection Crossings;
 - Education;
 - End of use facilities (bike parking, Fix-It Stations);
 - Other issues or concerns?



APPENDIX B: ONLINE SURVEY

The City of Fredericton is conducting an active transportation survey with the goal of further improving cycling connections in the city. We want to better understand the wants and needs of cyclists and to identify gaps in the current trail and bike lane network. Your feedback will help us set future priorities for improving active transportation infrastructure in Fredericton.

This survey should take approximately 20 minutes to complete.

Here are definitions of some terms used in the survey:

Gap: A missing link in the trail or existing bike lane network

Bike Lanes: Painted bike lanes on the road

Trails: Paved or unpaved multi-use pathways for cyclists and walkers

Trail Crossing: Where a trail crosses a public street

Segregated facilities: On or off-road cycling facilities physically separated from motor vehicle traffic

Questions

(1) Typically, how often do you cycle?

- Three times a week or more
- Once or twice a week
- Once or twice a month
- Once or twice a year
- Never

(2) During how many months of the year do you typically cycle?

- 1-2 months a year
- 3-4 months a year
- 5-6 months a year
- 7-9 months a year
- All year long
- Never

(3) Please indicate your level of cycling comfort level (select one):

- I do not cycle now, and am not interested in starting
- Comfortable cycling on trails, but have concerns about cycling in traffic.
- Comfortable in traffic, but prefer using bike lanes or other bike-only infrastructure
- Comfortable in traffic; roads fine as they are and do not require bike-only infrastructure
- No answer

(4) Typically, why do you cycle?

- Recreation
- To get to work/school or to run errands
- Both
- No answer

(5) List up to three things that make the existing Fredericton trails/bikeway system great:

(6) List up to three challenges related to the existing Fredericton trails/bikeway system:

(7) What network upgrades should be the top priorities for the City? (select up to three):

- Filling in the gaps in the existing network
- Facilitating safer trail crossings of streets
- Enhancing bike facilities (such as bike lanes) through intersections with traffic lights
- Higher-level cycling facilities on the road (i.e. physically-separated space)
- Education of cyclists and drivers
- Wayfinding and route signage (i.e. signage for trail/bike lane network destinations and connections)
- End-of-use facilities (i.e. bike parking, showers and lockers)
- Other (please specify)

(8) List up to three locations where you think there is a gap in the existing TRAIL network that should be addressed:

(9) List up to three locations where you think there is a gap in the existing BIKE LANE network that should be addressed:

(10) List up to three intersections that are in the highest need of an upgrade to cyclist safety:

- X & X
- X & X
- X & X
- No answer

(11) List up to three additional trails that should be paved. Please consult the following map for names of trails should you need them: (LINK)

(12) List up to three locations where trail crossings (i.e. where a trail crosses a public street) require improvement:

(13) Think of a neighbour or friend who does not cycle the trail or bike lane network now. What do you think is the most important improvement the City can make to encourage them to cycle?

We now have just a few final questions to ask you to help us understand the feedback we receive from this survey. These questions will ONLY BE used in a consolidated form to help us analyze the results. The information will be kept strictly confidential and will not be shared.

(14) What is your postal code?

(15) What is your age?

- 18 or under
- 19 to 30
- 31 to 40
- 41 to 50
- 51 to 60
- 61 and over

(16) What is your gender?

(17) If you have any additional comments, please provide them below:

APPENDIX C: DESIGN GUIDANCE

Introduction

Design Guidelines are addressed in Chapter 5 of the City of Fredericton Trails and Bikeways Master Plan (2007). The purpose of this memorandum is to provide an update to these design guidelines.

Cycling facility design in New Brunswick is typically governed by the following documents:

- Geometric Design Guide for Canadian Roads, Transportation Association of Canada, 1999;
- Bikeway Traffic Control Guidelines for Canada, Transportation Association of Canada, February 2012 (2nd Edition);
- Traffic Signal Guidelines for Bicycles, Transportation Association of Canada, April 2014.

A number of other guidance documents serve as an important resource for the municipality, including but not limited to:

- Cycling Facilities, Ontario Traffic Manual Book 18, December 2013;
- Pedestrian Crossing Treatments, Ontario Traffic Manual Book 15, June 2014;
- NACTO Urban Bikeway Design Guide, March 2014 (National Association of City Transportation Officials);
- NACTO Urban Street Design Guide, October 2013; and,
- Planning and Design for Pedestrians and Cyclists, veloQuebec.

The focus of this document is design guidance and not facility type selection. The design guidance should be used to specify appropriate dimensions and details for the chosen treatment, in order to optimize space and cyclist safety.

Design Guidance

Paved Multi-Use Trails

Multi-Use Trails can be classified into two main categories: off-road multi-use trails and two-way bikeway boulevards.

Off-road multi-use trails are not necessarily constructed within the road right-of way. In Fredericton, they are typically constructed on decommissioned rail lines or through a park, and accommodate a broader variety of users. The current minimum trail width is 3.5m (note: increased from the standard of 3.0 m to 3.4 m in the 2007 Master Plan). This should be increased to a minimum width of 4.0 to 5.0m on popular, heavily travelled multi-use trails.

Two-way bikeway boulevards exist within a road right-of way with a separation between the roadway and the bikeway. They are best described as a shared pedestrian/bicycle facility, raised within the boulevard and in an urban environment. The bikeway is usually elevated from the road, the same way a sidewalk is, and the separation can include concrete barriers, median or bollards. The current standard for two-way bikeway boulevards is a minimum width of 3.0 - 3.4m, which should be increased in areas where a high volume of users is expected to allow for passing within the bikeway. OTM Book 18 recommends a desired width of 4.0m. This width excludes a splash strip which typically has a 1.0m horizontal clearance on each side. The suggested minimum is 3.0m, which can be reduced to 2.4m over very short distances to avoid infrastructure that would be costly to relocate. Reducing the minimum width to 2.4m should be avoided in heavily travelled areas. A vertical clearance zone of 2.4m – 3.0m should be maintained.

The trail dimensions can be seen below in Figure 1.

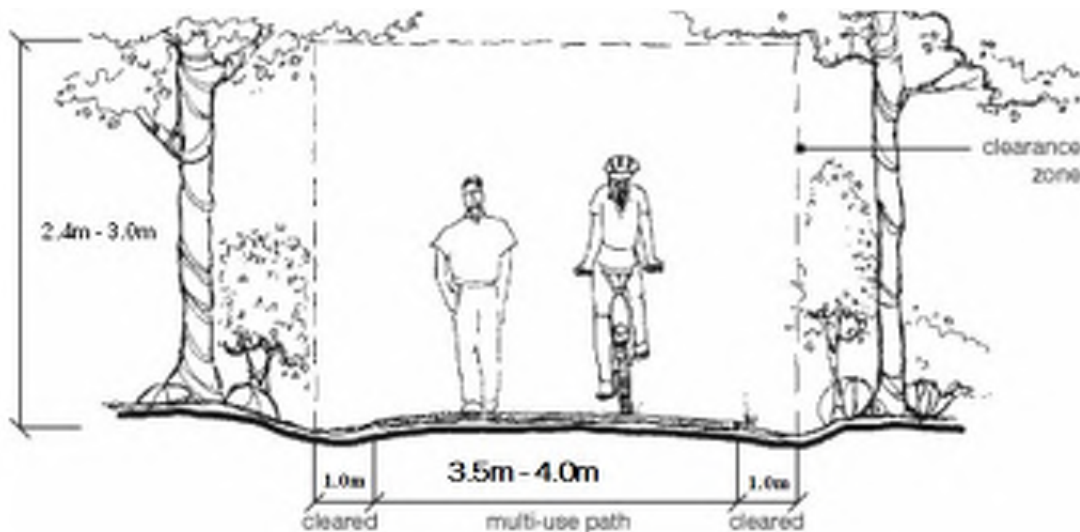


Figure 9: Image taken from Fredericton's 2007 Trails and Bikeways Master Plan and Modified for Recommended Standards

Bikes lanes

A bike lane designates a portion of the road for cyclists so that they are not required to share a lane with motor vehicles. Motor vehicles are not permitted to enter the bike lane except where a dashed line is used. A conventional bike lane is separated from the rest of the roadway with a single solid painted line, and a separated bike lane is separated from the rest of the roadway with some form of a barrier/buffer.

Both conventional bike lanes and separated bike lanes can have varying lane widths. The lane width should be chosen based on the volume of bicycle traffic as well as the speed of motor vehicle traffic. If there is a high volume of bicycle traffic, a wider lane will be required to allow for passing within the bike lane. If motor vehicle traffic is traveling at a high speed, having a wider lane will allow for more space between the cyclists and the vehicle traffic, creating a safer environment. Line painting, signage and pavement markings are used to identify a bike lane. The signage includes "Reserved Bike Lane" signs. The pavement markings include a bicycle stencil with a width of 1.0m and a diamond symbol with a width of 0.5m.

Conventional Bike Lane (Painted bike lane, no buffer)

A conventional painted bike lane designates a portion of the road for cyclists using painted lines and signage. OTM Book 18 recommends a desired lane width of 1.8m and a minimum lane width of 1.5m, including the 0.3m gutter (the typical gutter width in Ontario roadways). Bike lane widths typically include the gutter width in their minimum dimension as gutter widths can vary within a roadway. The desired width may be increased up to 2.0m where high volumes of cyclists are anticipated, and the minimum may be reduced to 1.2m in a low speed constrained corridor with no gutter. The risk of vehicles parking in bike lanes increases where bike lanes have a width greater than 2.0 m.

It is noted that at present, the existing conventional bike lanes in the City of Fredericton may not meet this minimum standard. Existing bike lanes are in place with a width of 1.2 m including a 0.4 m gutter.

Separated Bike Lane (Painted bike lane with buffer)

A separated bicycle lane designates a portion of the road for cyclists and includes a physical barrier between the motor vehicle lane and the bicycle lane. In high-speed traffic, cyclists will feel safer with a barrier between the bike lane and the motor vehicle lane (note: perceived safety). There are four options for barrier type, including a marked buffer, flexible bollards, concrete curbs or a parking lane. A marked buffer consists of a buffer lane painted on the road between the

bike lane and the rest of the roadway. When choosing a barrier type, considerations include the requirement for street sweeping and snow plowing. According to OTM Book 18, the typical width requirement for a street sweeper is 2.0m. Therefore, if the allowable space for a bike lane is constrained to be less than 2.0m, a marked buffer or a parking lane buffer would be more suitable than a physical barrier. This will also reduce the chance of a cyclist clipping a physical barrier when passing another cyclist. The lane and buffer widths recommended by OTM Book 18 for each barrier type can be seen in Table 1 and the cross-sections for a bike lane with each type of barrier can be seen in Figure 2.

Table 1: Desired and Suggested Minimum Widths for Separated Bicycle Lanes, Table taken from OTM Book 18

Facility	Desired Width	Suggested Minimum
Marked Buffer	1.8 m lane + 1.2 m buffer	1.5 m lane + 0.5 m ^b buffer
Flexible Bollards	2.0 m ^c lane + 1.2 m buffer	1.5 m ^d lane + 0.5 m buffer
Planters / Concrete Curb / Median	2.0 m ^c lane + 1.2 m buffer	1.8 m ^d lane + 0.5 m buffer
On-Street Parking	1.8 m lane + 1.2 m buffer	1.5 m lane + 0.8 m ^e buffer

^aFor bidirectional separated facilities, the same desired and minimum lane widths apply (per lane). Barrier widths are independent of the number of lanes. Where facilities are vertically separated, practitioners should refer to Table 4.6 – Desired and Suggested Minimum Widths for Raised Cycle Tracks.

^bMaintenance standards for marked buffers should be the same as for lanes since cyclists may use them for overtaking.

^cPractitioners should provide a minimum of 2.0 m effective width between the curb and the physical component of the barrier where high volumes of cyclists are anticipated. This will reduce the risk of cyclists clipping the physical buffer or curb while overtaking other cyclists.

^dMaintenance procedures and costs should be considered since small street sweeper vehicles typically require 2.0m of unobstructed running width, otherwise the removal of flex bollards may be required before they can be used. Designers should check the requirements for their municipality and factor in higher maintenance costs should their chosen facility widths require the use of specialized equipment or manual sweeping. See Section 8 for further information on maintenance considerations. Impacts on drainage and garbage collection should also be taken into account.

^ePractitioners should provide the widest buffer possible to reduce the risk of a cyclist colliding with an opening car door, recognizing that the space available for avoiding debris or imperfections and overtaking is limited.

Source: Adapted from AASHTO Guide for Planning, Design and Operation of Bicycle Facilities, 2012

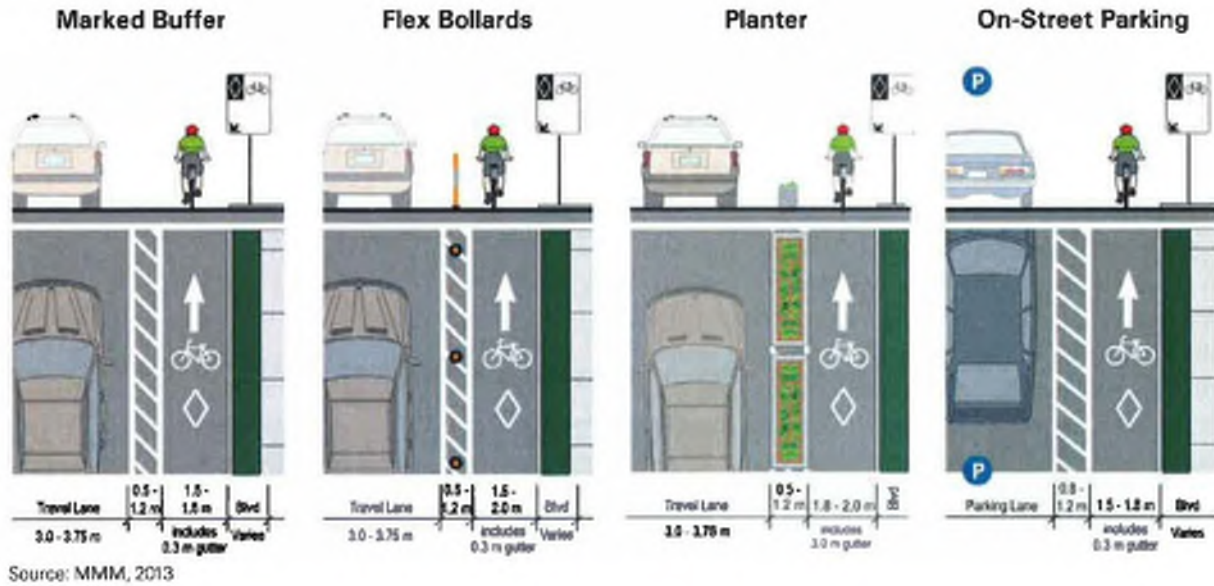


Figure 2: Painted Bike Lane with Buffer- Image taken from OTM Book 18

Bicycle Lanes with On-Street Parking

The 2007 Master Plan includes provision for conventional bike lanes adjacent to on-street parking. The standard in the document is a 2.2 m parking lane and a 1.8 m bike lane adjacent to a travel lane. OTM Book 18 recommends the inclusion of a dooring zone for a bicycle lane with on-street parking. This is a 1.0m space between the bicycle lane and the parking lane. The bike lane has a recommended width of 1.5m, and a parking lane width of 2.5m. In a situation with a space constraint, the buffer width can be reduced to 0.5m. White dashed line painting should be used where the vehicle may cross into the bike lane in order to exit the parking lane.

As mentioned previously in the Separated Bike Lanes section, the parking lane can be used as a buffer between the bike lane and the rest of the roadway (referred to as a ‘parking protected bike lane’). This configuration is highly recommended as it incorporates a dooring zone between the bike lane and the parking lane, and provides separation from motor vehicle traffic. Additionally, this prevents vehicles from having to drive through the bike lane in order to exit their parking lane. For Parking Protected Bike Lanes, the recommended buffer width is 1.2m.

At present, the City of Fredericton has some examples where a reserved bike lane exists on one side of the road and an advisory bike lane on the other (referred to as a “signed bike route” in Fredericton). This is achieved by not posting the reserved bike lane designation sign on the advisory side of the road. This approach is done in order to permit on-street parking on one side of the road (i.e., legal on-street parking in the bike lane). While the advantage of this approach is the ability to provide legal on-street parking on a roadway while also providing a type of cycling facility, the disadvantage is the confusion it contributes to in terms of when it is legal to park in a marked (but not reserved) painted bike lane. Further to this, it contributes to a perception of lower quality cycling facilities. For routes where a higher order cycling facility is required, the removal of on-street parking should be considered with the inclusion of a reserved bike lane on each side of the road (with inclusion of a buffer where possible/deemed appropriate). An alternative option is to continue to provide a reserved bike lane on one side of the street where parking is not permitted and then utilize following treatment on the side with parking as shown in Figures 3:

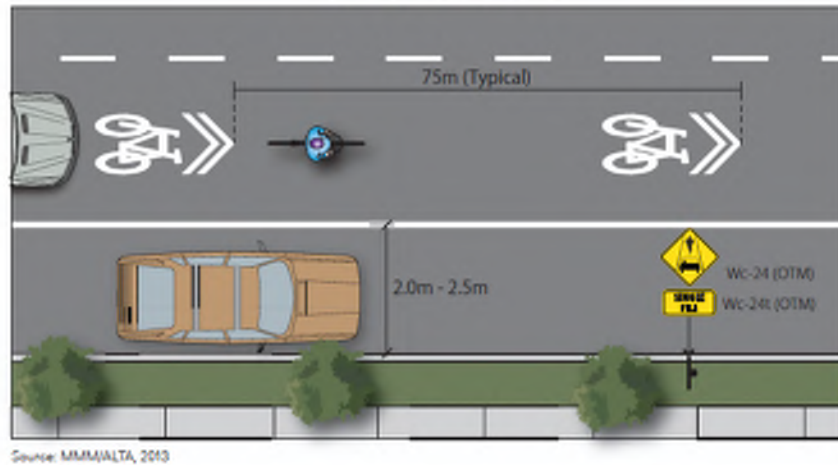


Figure 3: Narrow Signed Bicycle Route with Sharrows and On-Street Parking - Image taken from OTM Book 18

As represented in the figure, space dedicated to on-street parking is defined by a painted line and a sharrow marking is used (outside of the dooring zone) to communicate an appropriate line of travel for cyclists. There are many limitations to this option: (a) on local residential streets where parking utilization is low, parking lane markings are not typically the practice therefore sharrow placement is difficult; (b) this alternative does not provide the same level of cycling safety and comfort as a defined space for cyclists on the roadway; and (c) less clearly defined line of travel for cyclists when a car is not parking in the area designated for on-street parking (i.e., not travelling adjacent to the curb). On this basis, the preferred approach is to post no stopping signs and not permit on-street parking where there is a cycling facility.

Contraflow Bike Lanes

The City of Fredericton Trails and Bikeways Master Plan includes contraflow bike lanes, which allow two directions of bicycle travel down a one-way street. OTM Book 18 recommends a desired lane width for a contraflow bike lane of 2.0m, and a minimum lane width of 1.8m. In areas with high-speed motor vehicle traffic, the inclusion of a 1.0m wide buffer zone is recommended. Contraflow bike lanes can also be separated from the rest of the roadway with a parking lane. The recommended bike lane width is 1.8m with a 1.0m dooring zone, assuming a parking lane width of 2.5m. The recommended minimum width for a contraflow bike lane with a parking lane buffer is 1.8m, with a 0.5m dooring zone.

Raised Cycle Tracks

Raised cycle tracks are an additional cycling facility type option available for consideration by the City of Fredericton. This is a bikeway adjacent to, and vertically separated from the rest of the roadway. A raised cycle track can be a one-way or two-way bikeway. Typically, a one-way raised cycle track requires a lane width of 2.0m and a two-way raised cycle track requires a width of 4.0m (OTM Book 18). A raised cycle track is often adjacent to a sidewalk space at the same grade. A demarcator strip is often utilized to differentiate between the two spaces, in addition to signage and pavement marking treatments.

Intersections

Currently bike lanes in the City of Fredericton are discontinued at intersections. Going forward, the priority should be continuing through intersections. The required treatment depends on the complexity of the intersection and whether or not a conflict zone exists. There are a number of options to improve cycling safety and comfort:

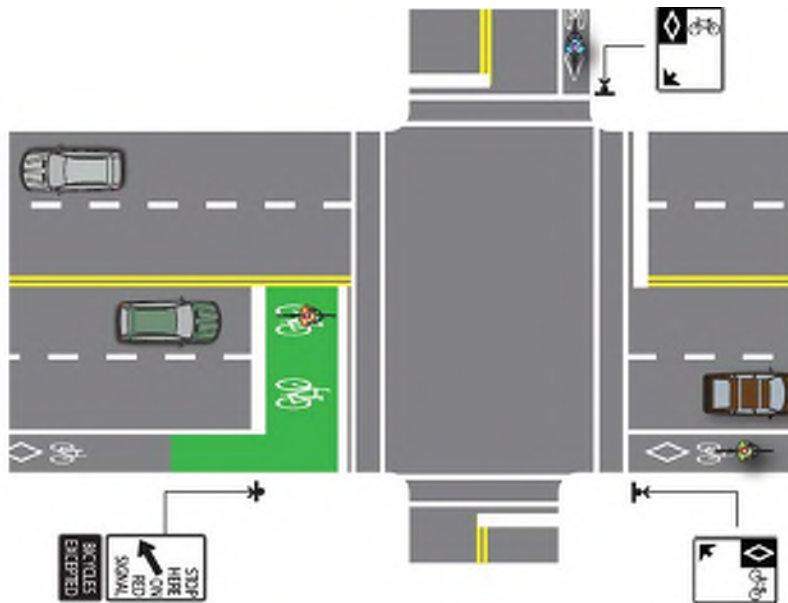
- Moving the bicycle lane stop bar further ahead than motor vehicle lane stop bar;
- Bike Box;
- Two-stage left turn box;
- Pavement markings through an intersection; and,
- Green surface treatment on the bike lane through the conflict zone.

Stop Bar Position

In a typical 4-way intersection, the bike lane line painting continues up to the stop bar at the intersection. To increase safety for cyclists, there is the option to include a staggered stop bar. In this case, the bike lane stop bar would be 1.0, to 2.0m ahead of the adjacent lane’s stop bar. This increases the visibility of the cyclist and mitigates against conflicts between cyclists and motorists marking a right turn.

Bike Box

A bike box provides a refuge area for bicycles in front of queued vehicles, between the stop bar and the crosswalk, at a signalized intersection. The use of bike boxes is recommended for high volume intersections where there is a high proportion of cyclists making a left turn. The bike box increases the visibility of cyclists and allows them to complete a left turn at the intersection without having to merge into the motor vehicle lane. OTM Book 18 recommends that the depth of the bike box is 5.0m, which can be reduced to 4.0m in a constrained situation. A bike box is marked with green surface treatment and bike stencils. In an intersection with a high volume of right-turning vehicles, the restriction of right-turns on red should be considered. Right-turning vehicles will have to advance into the bike box in order to make the turn, which could prevent bicycle access to the bike box. A bike box in a four-way intersection can be seen in Figure 4.



Source: MMN/ALTA, 2013

Figure 4: Bike Box in a 4-way intersection - Image taken from OTM Book 18

Two-Stage Left Turn Box

A two-stage left turn box designates a refuge area for cyclists making a two-stage left turn at an intersection. This allows cyclists to cross the intersection in one direction and wait in their designated area before crossing in the next direction. The box is located in front of the stop bar of the cross street, placing the cyclist at the front of the queue of traffic for the second stage of their turn. The box is marked with green surface treatment, a bicycle stencil, and an arrow indicating the direction in which the cyclist will be turning out of the intersection. This is shown in Figure 5.

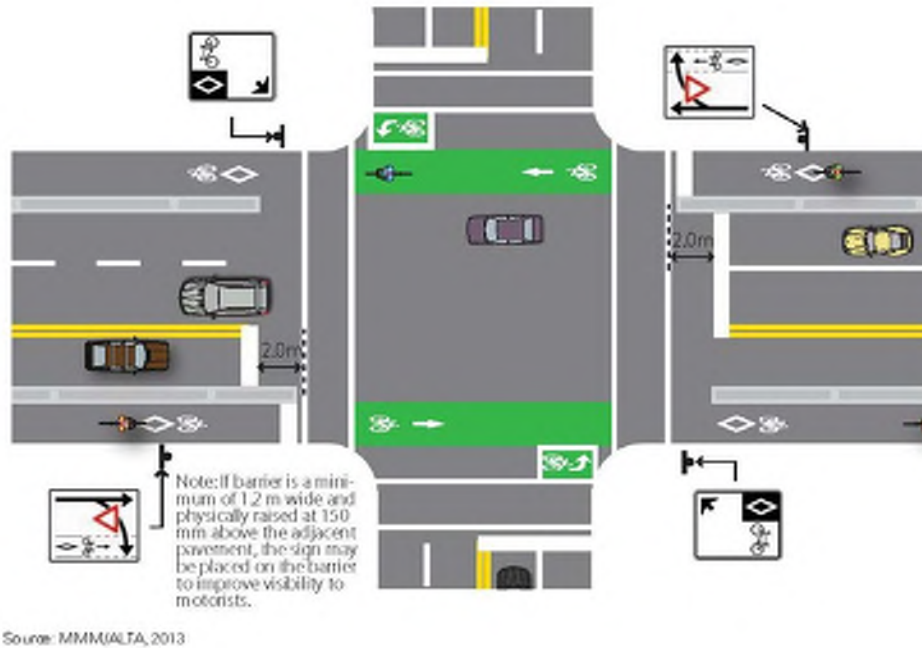


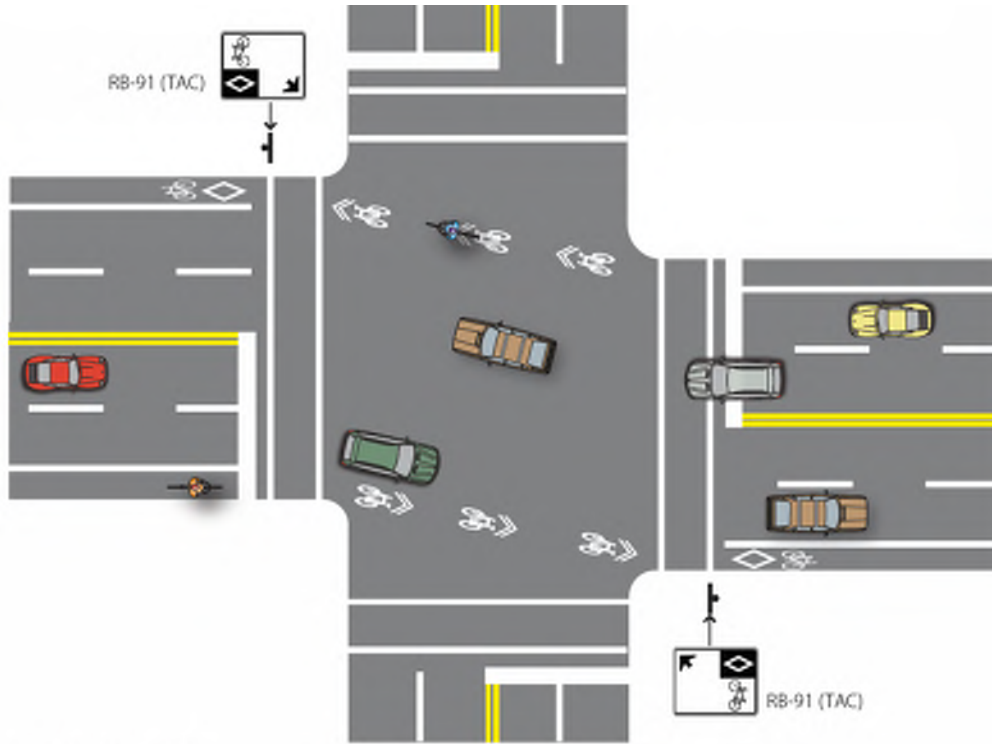
Figure 5: Two-Stage Left Turn Box - Image from OTM Book 18

Pavement Markings through an Intersection

According to TAC, marking a bicycle lane through a conflict zone can be done with any of the following treatments, listed in an order of increasing visibility:

- No treatment;
- Dashed guidelines instead of a solid white line indicate that motor vehicles can cross through the bicycle lane. This should be accompanied by a “Yield to Bicycles” sign;
- Bike stencils painted on the lane through the conflict zone at 1.5m to 10m spacing;
- Sharrows painted on the lane at 1.5m to 15m spacing;
- Green surface treatment on the bike lane through the conflict zone.

A situation where an intersection is in higher need of pavement markings occurs when the bicycle lanes on either side of the intersection do not align, where a skew greater than 1.5m exists. This means the cyclists and the vehicles will be crossing the intersection at an angle. In this case either sharrows placed at 1.5m spacing or dashed guide lines can be used. The width of the pavement markings should be consistent with the width of the bike lane. These pavement markings offer guidance for cyclists between the two bike lanes and increase awareness of cyclists for vehicles crossing through the intersection. An example of the use of sharrows through a misaligned intersection can be seen in Figure 6.

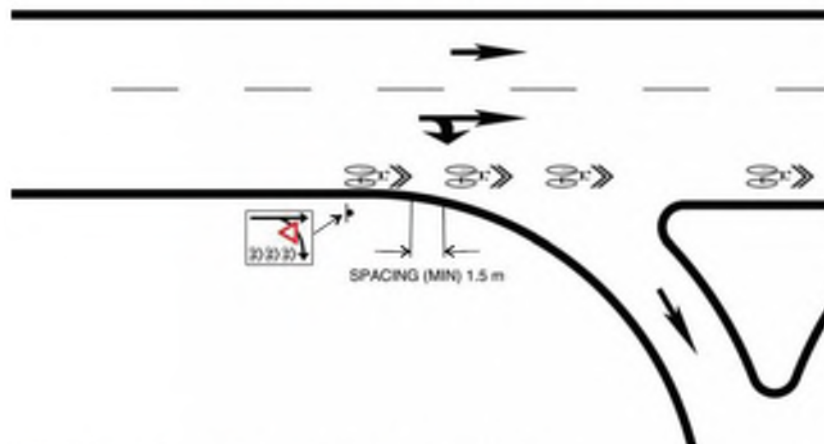


Source: MMM/ALTA, 2013

Figure 6: Sharrows through a misaligned intersection - Image from OTM Book 18

A situation with a 4-way intersection including a right-turn channel creates a conflict zone prior to the intersection. The right turning vehicles have to cross through the bike lane in order to access their right-turn channel. Depending on the traffic volume at the intersection, any of the previously mentioned treatments can be applied. Figure 7 shows an example for which the treatment includes dashed guidelines through the conflict zone, a “Yield to Bicycles” sign, and bike stencils painted on the pavement at 1.5m spacing.

Figure 5.12 – Sharrow Markings in a Conflict Zone



Source: TAC Bikeway Traffic Control Guidelines for Canada, 2012 (Figure 54, p. 102)

Figure 7: White dashed markings and bicycle stencils through a conflict zone - Image taken from OTM Book 18

In the case of a right-turn lane instead of a right-turn channel, measures should exist to allow the cyclists to position themselves to the left of the right-turning vehicles. Treatment includes a transition zone to allow vehicles to merge into the far right lane, followed by a combined bike lane/ turning zone before the stop bar. Pavement markings may include a directional arrows for both the right turning vehicles and the bicycles. This is shown in Figure 8.

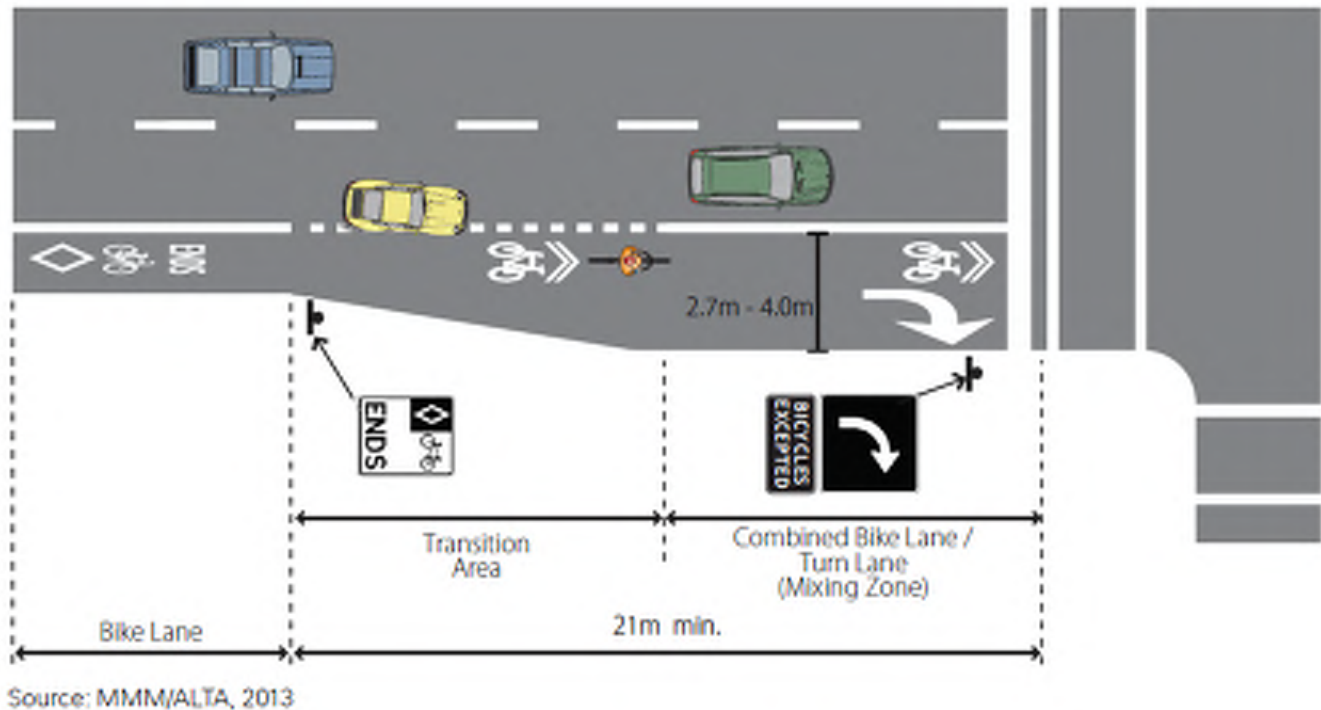


Figure 8: Bicycle Lane Transition to Shared Right-Turn (Except Bicycles) Lane, image from OTM Book 18

Green Surface Treatment

Green surface treatment can be used on bike lanes to improve visibility of the bike lane and increase safety. This is often implemented in a “conflict zone” or an area with increased risk of collision. For example, through an intersection or across a right-turn channel.

Other Intersection Treatment Options

- Protected intersections minimize the risk of a blind-spot collision and decrease crossing distances for cyclists at an intersection. A Protected Intersection has bulb-outs (or “eye brows”) at all four quadrants, increasing their visibility and allowing them to make a left turn at a crossroad.
- Bike Signals can be used at intersections to designate a time and space for cyclists to cross.

Trail Crossings

Different trail crossings require different treatments depending on the design context of other environmental factors. Varying factors include whether it is a signalized or unsignalized intersection or a mid-block crossing, the speed of traffic on the road and the volume of motor vehicle and bicycle traffic. Crossings can be classified into two general categories: low-speed urban trail crossings, and high-speed rural trail crossings.

In New Brunswick, the Motor Vehicle Act indicates that a crosswalk must connect sidewalks. A determination is required regarding whether or not a crosswalk connecting two multi-use trails meets this definition. The City of Fredericton has constructed crosswalks at signalized and unsignalized intersections (connecting two sidewalks) and utilizing RA-5s at mid-block locations.

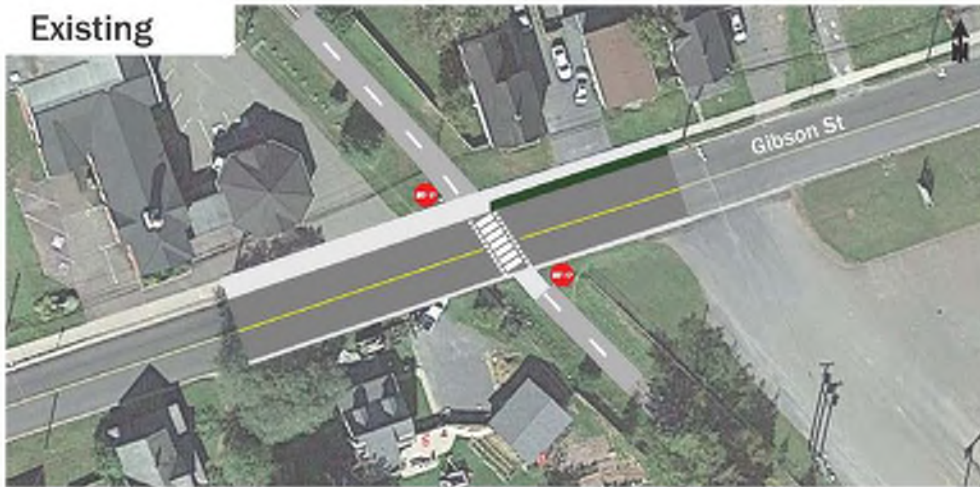
Figures 8 and 9 provides a sample illustration of the existing signage and pavement marking treatment at the mid-block crossing of the Northside Trail at Gibson Street (north of Devon Avenue). Zebra strips are used to delineate a pedestrian crossing space with elephants feet denoting where cyclists can cross. Stop signs are installed for the trail users where the trail meets the sidewalk. Trail Crossing Warning Signage is currently present for this crossing (as shown in Figure 8).



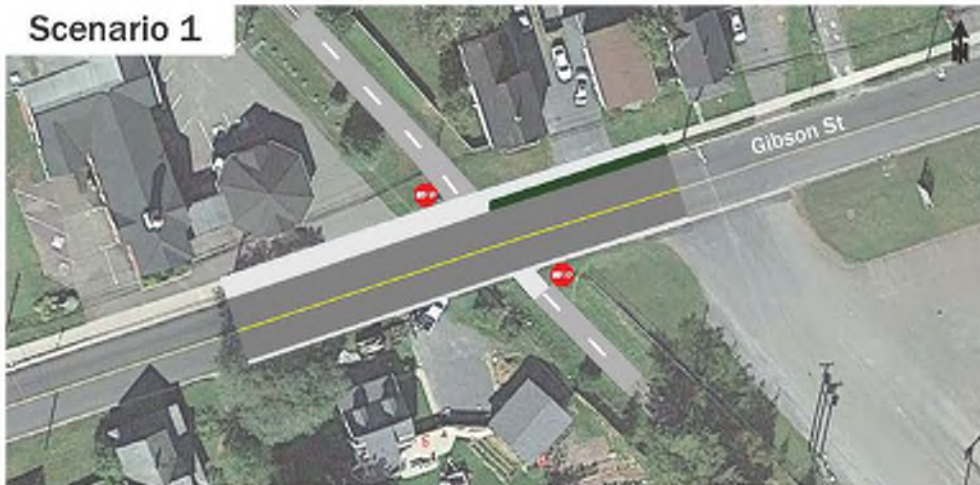
Figure 8: Streetview image of Gibson, facing south to Trail Crossing (including signage)

Northside Trail at Gibson Street (East of Devon Avenue)

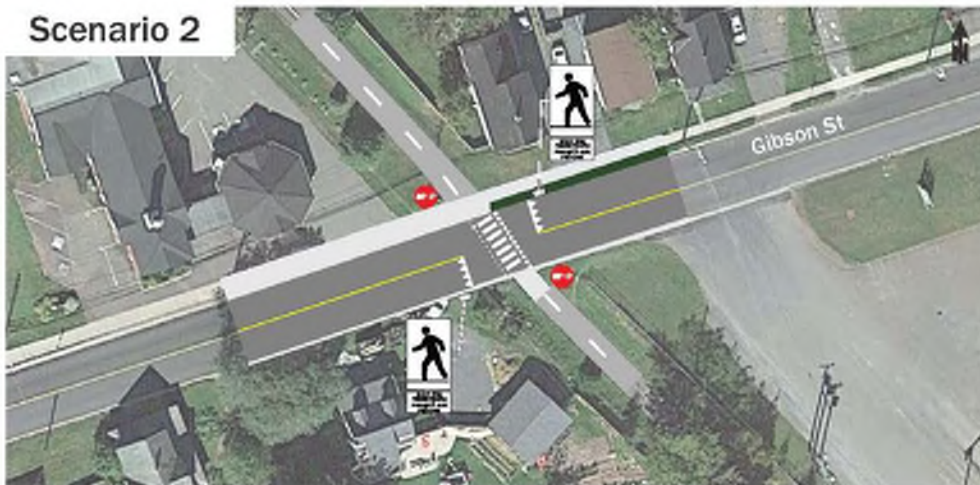
Existing



Scenario 1



Scenario 2



Note: Scenario 2 based on the concept of a Pedestrian Crossover recently introduced in Ottawa

Figure 9: Example Trail Crossing

The figure includes an illustration for Scenario 1 for discussion purposes. In Scenario 1, a stop sign exists for the trail users and there are no pavement markings on the roadway.

Scenario 2 is based on the concept of a Pedestrian Crossover recently introduced in Ontario and currently in operation in Ottawa. Pavement markings indicating a yield condition and new signage communicates to the roadway users to stop for pedestrians using the crossover. It is important to note that in Ontario, cyclists are required to dismount and walk across pedestrian crossovers. For more detailed information, visit the City of Ottawa website at:

<http://ottawa.ca/en/residents/transportation-and-parking/road-safety/pedestrian-crossovers>

Additional signage options are available for consideration by the City to communicate the presence of an upcoming trail crossing to the roadway users.

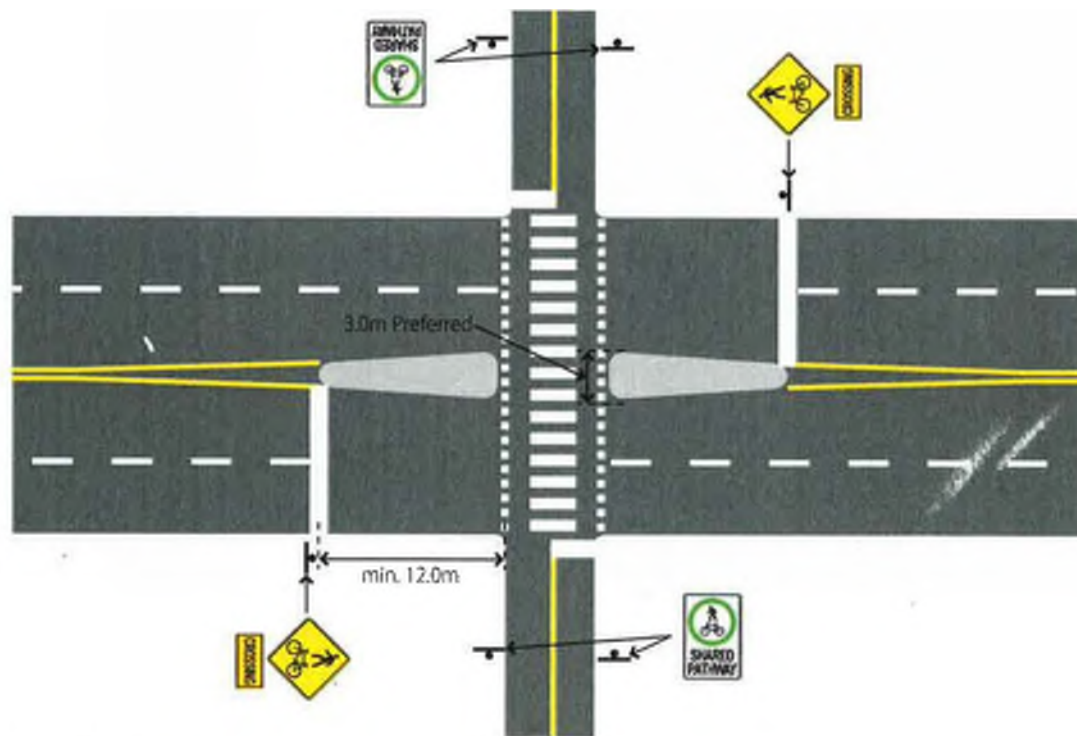
Low-speed Urban Trail Crossing

In a low-speed urban area, the City of Fredericton could consider a Pedestrian Crossover type approach as described above. This could be implemented in conjunction with a raised crossing.

For higher speed and/or higher volume urban trail crossings, other options include:

- A mountable refuge median with the pedestrian crossover;
- Full stop control for the roadway;
- A signalized mid-block crossing.

The concept of a refuge median is illustrated in Figure 10.



Source: MMM/ALTA, 2013

Figure 10: Midblock trail crossing at a non-signalized intersection - Image from OTM Book 18

High-Speed Rural Trail Crossing

In a high-speed low volume area, having stop control for the vehicles is often unwarranted unless there is a high volume of pedestrians and cyclists.

An appropriate treatment should be selected based on sightlines, width of crossing, traffic volume and pedestrian/cyclist volume. Sight lines can be limited by bends in the road and overgrown foliage. With some treatments, the cyclist needs to have a clear view of oncoming traffic in order to make a decision on when to cross safely. In an area with high traffic volume, it can be lengthy for the cyclist to have an opportunity to cross safely.

Possible treatments include:

- Having a stop sign for cyclists who then have to cross when it is safe to do so. This is recommended for usage only where the cyclist has proper sight lines of oncoming traffic, and where the volume of oncoming traffic is low enough that the cyclist will have a chance to cross safely between cars.
- A stop sign for the cyclist and a mountable refuge median in the middle of the crossing so that only one direction of traffic has to be crossed at a time. This is recommended for a 4-lane crossing where the cyclist has sufficient sight lines of oncoming traffic, and where the volume of oncoming traffic is low enough that the cyclist will not have an excessive wait time.
- In an area with high vehicle volume or limited sight lines, where the cyclist would have difficulty finding a time to cross safely, a midblock crossside should be implemented (note: once legislative changes are made).

Temporary Measures until Legislative Changes are in Place

Since most of the solutions are not immediate solutions for improving trail crossings in the City of Fredericton, short-term solutions should be taken to improve connectivity in the interim. Options for temporary solutions include

- Removal of existing roadway pavement markings until legislation changes;
- Consistently providing clear sight triangle at each crossing;
- Consistently sign trail approaches and roadway approaches (i.e., new signage including Bikes/Peds yield to cars – refer to Figure 11 for example);
- Focus on education;
- Consider median refuge islands at high conflict locations where space permits;
- Realign trail crossings where possible so that the trail crosses perpendicular to the intersecting road;
- Improve roadway lighting.

The City of Fredericton will be preparing a separate report on trail crossings for consideration by Council.



Figure 11: Example of Pedestrian Yield to Car signage (Ottawa)

Sight Triangles

Sight triangles can be used to ensure a clear line of sight for approaching motorists, cyclists, and pedestrians at trail crossings. At trail crossings, a 5 metre by 5 metre triangle should be kept clear of foliage and obstruction, as measured from the apex of the road and trail meeting, as shown in Figure 12.



Figure 12: Sight Triangle Example

Crossrides

Crossrides are not a recognized crossing treatment in New Brunswick but have recently become a legal option in Ontario. They are an effective solution for achieving continuity at crossings in a cycling network and should be explored by the City of Fredericton going forward.

A crossride provides stop control for the vehicles and allows cyclists to ride across the crossing without dismounting. According to OTM Book 18, a crossride can exist in three different configurations: a separated crossride, a full-sized combined crossride, a reduced width combined crossride (or mixed crossing), and a midblock crossride. For each of these configurations, “zebra-stripe” line painting is used to designate the pedestrian crossing and “elephant’s feet” markings are used to designate the bicycle crossing. When choosing which type of crossing to use, the configurations at the approach and end of the crossing should be considered.

Crossrides can be used at both signalized intersections and unsignalized crossings.

Option A: Separate Crossride

- A separate crossride provides separate spaces for both cyclists and pedestrians. This includes 2.5-3m width for the cyclists to cross and 2.5m for the pedestrians, with a separation of 0.3m, as seen in Figure 12.

Option B: Full-Sized Combined Crossride

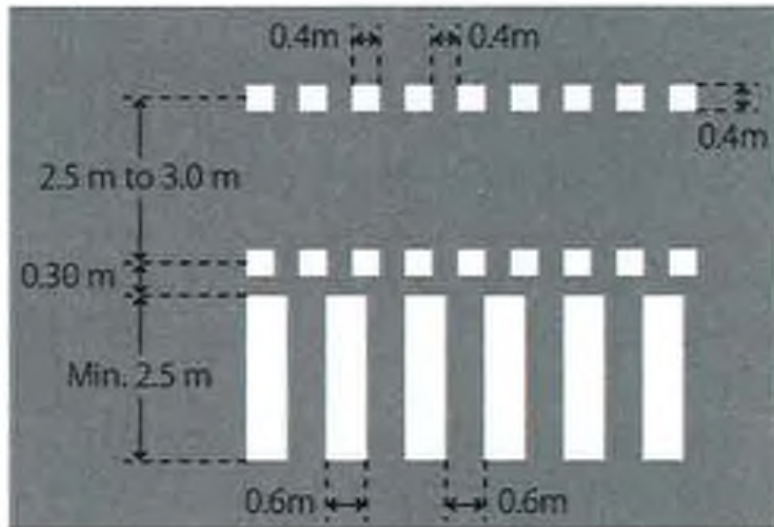
- In the case of a combined crossride, the cyclists can cross on either side of the pedestrian crossing area. This configuration takes up a total width of 5.0m, as seen in Figure 13.

Option C: Reduced Width Combined Crossride

- A reduced width combined crossing, or a mixed crossing, has a shared designated area for cyclists and pedestrians. This configuration should only be used for low-volume crossings where a space constraint exists. A reduced width combined crossing only requires a width of 4.0m, as seen in Figure 14.

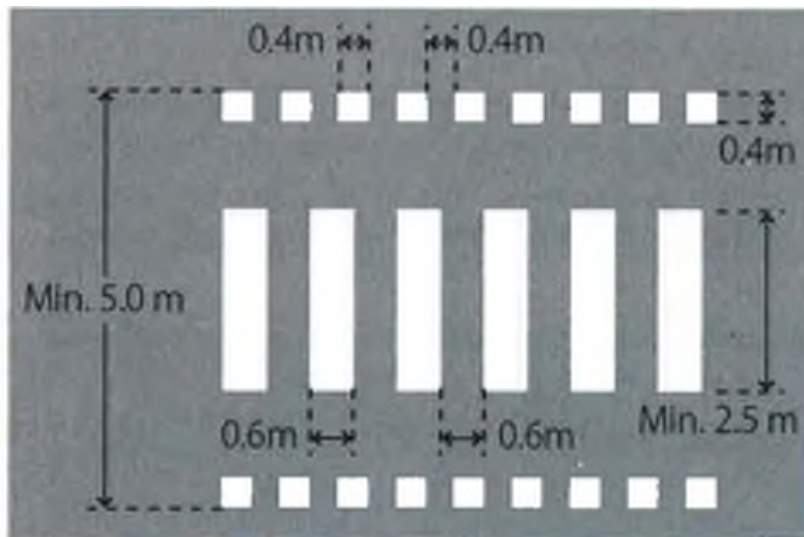
Option D: Midblock Crossride

A midblock crossride can exist with or without signalization. OTM Book 18 recommends using a midblock crossing if signalized intersections are more than 215m away. An unsignalized midblock crossing on a multi-lane roadway may require a refuge median. OTM Book 18 recommends a desired median width of 3.0m, a minimum median width of 2.0m and a minimum median length of 12.0m. A midblock unsignalized crossing requires “Bicycle Crossing” warning signs as well as Stop Bar line painting for oncoming motor vehicle traffic. A Midblock Crossride is shown in Figure 11.



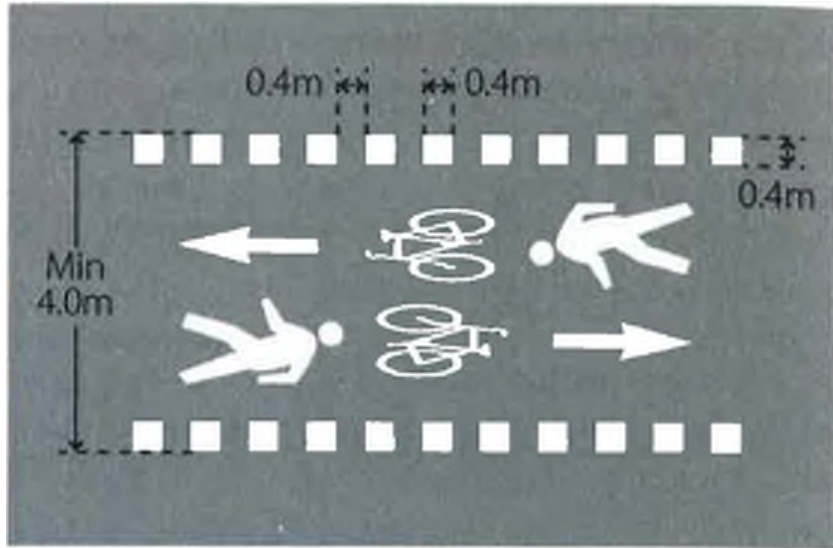
Source: Based on TAC Bikeway Traffic Control Guidelines for Canada, 2012 (Figure 39, p. 92)

Figure 13: Separate Crossride - Image taken from OTM Book 18



Source: TAC Bikeway Traffic Control Guidelines for Canada, 2012 (Figure 38, p. 91)

Figure 14: Combined Crossride - Image taken from OTM Book 18



Source: MMM/ALTA, 2013

Figure 15: Mixed Crossride - Image taken from OTM Book 18