Prepared for

City of Fredericton

397 Queen Street
Fredericton, New Brunswick
E3B 1B5

Consulting Services for

Trails/Bikeways Master Plan

Prepared by
SGE Acres Limited
In association with
Marshall Macklin Monaghan

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SGE Acres

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1 Introduction

1.1 Project Objective and Scope

The City of Fredericton enjoys a substantially developed off-road trail system that utilizes abandoned rail rights-of-ways, with a number of on-road routes and an extensive public park system. However, gaps exist in the current system. In 2006, SGE Acres Limited (a member of the Hatch group of companies), in association with Marshall Macklin Monaghan, was retained to develop a Trails/Bikeways Master Plan for the City of Fredericton. The SGE Acres Team reports to a Steering Committee of City Staff.

The overall intent of the Master Plan is to develop a user-friendly network of on-road and off-road facilities for non-motorized movement within the City. The network will include trails, bikeways, parks, environmental and recreation corridors as well as designated streets that work together to provide alternative and desirable methods for moving around Fredericton with the system working in a cohesive and integrated manner.

The overall goal of this project is to create a well-connected, safe and functional Master Plan. In this context, the SGE Acres Team was instructed by the Steering Committee to follow an integrated system approach to the preparation of the Master Plan that included the involvement of the general public, community trail and bicycle stakeholders and special needs groups such as the mobility challenged.

The philosophy of the Master Plan is to meet the needs of all age groups, including those residents and visitors with mobility challenges, by enhancing choices and opportunities for multi-modal travel and recreational pursuits that promote physical activity and healthy lifestyles.

1.2 Active Transportation Defined

The Master Plan is about Active Transportation. AT is normally defined as any form of self-propelled (non-motorized) transportation that relies on the use of human energy such as walking, skiing, cycling, inline skating and jogging. These modes can utilize on-road and off-road facilities (sidewalks, bike lanes, multi-use trails) and may also be combined with public transit, especially for trips to and from work, shopping and entertainment areas, school and other community facilities like recreation centres.

For the Master Plan, this definition is expanded to incorporate the requirements of special needs populations. Fredericton has a number of mobility challenged trail users and the Master Plan seeks to expand the number of users and the facilities offered. For this reason, mobility challenged users of non-emission mobility assistance devices, such as

motorized wheelchairs, are considered pedestrians and the recommended network is designed to accommodate them wherever possible.

Active Transportation is defined under four categories for the Master Plan. They are:

- *Active Commuting* which involves journeys to and from work.
- *Active Workplace Travel* which includes trips during working hours such as the delivery of materials or attending meetings.

- *Active Destination Oriented Trips* which includes trips to and from school, shops, visiting friends and running errands.
- *Active Recreation* which involves the use of an AT mode for fitness or recreational pursuits, such as hiking or cycling.

The large university and community college population in Fredericton requires liberal interpretation of these definitions. For example, a student at the University of New Brunswick who attends classes and also has a part-time job off-campus that involves regular trips to Downtown Fredericton is engaged in a combination of active commuting, active workplace travel and active destination oriented trips.

In addition to the four categories, a portion of any trip that involves non-motorized transportation modes is considered a form of Active Transportation. In this context, AT involves maximizing the use of active modes and methods of travel and reducing the dependence on motorized modes that include private automobiles and motorcycles.

1.3 Existing and Planned Routes

Fredericton currently has no on-road bicycle lanes in use but has an extensive system of off-road trails mostly located on abandoned rail beds that provide an excellent starting point for the Master Plan. These numerous trails provide access across much of the City mostly in an east-west direction and are an outstanding and well used resource to build upon. Exhibit 1.1 illustrates existing and planned AT routes throughout the City that were either currently constructed or at a reasonable level of planning at the time of writing (mid 2007). This information was gathered from a number of sources including background field data, trails mapping, air photos and discussions with City Staff and area stakeholders.

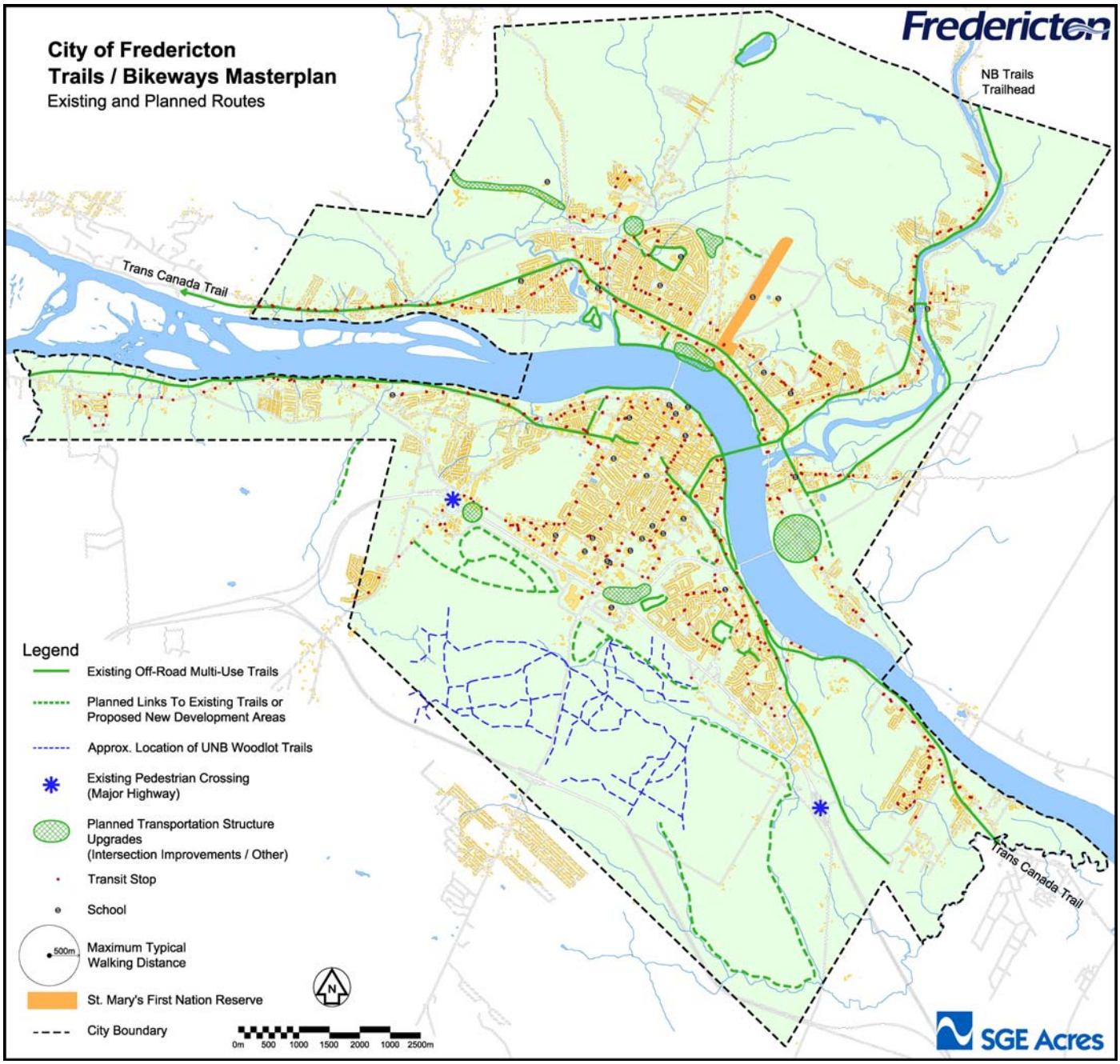
Many existing trails are located within municipal parks and/or provide direct access to them. The centerpiece of the City's parkland is the highly acclaimed 400 acre Odell Park located adjacent to the downtown core. The park is home to many walking trails, mature vegetation and wildlife

including deer as well as the Odell Arboretum. Other notable parks in Fredericton include the Fredericton Botanical Garden, The Green, Carleton Park, Officers Square, Wilmot Park, Killarney Park, and the nearby 1,400 acre Mactaquac Provincial Park which provides several nature trails, beaches, camping, sailing, boating and an 18-hole golf course.

The mapped information in Exhibit 1.1 includes existing off-road trails that are formally recognized by the City as trail routes, as well as informal trails currently in use by residents but located on lands owned by the University of New Brunswick. Planned routes shown are mainly taken from approximations of future AT routes in new master planned areas as well as potential future connections that have existed as part of Fredericton's long-term recreational facilities planning. The map also indicates elements of planned roadway transportation infrastructure upgrades in the Municipal Plan (2006) that could be developed in tandem with on or off-road AT facilities and the location of existing, formalized pedestrian crossing infrastructure of major barriers.

In order to illustrate pedestrian needs and the importance of integrating these into the Trails/Bikeways Master Plan, all Master Plan mapping contains a visual representation of a typical maximum walking distance of an average resident or visitor. This distance can be applied to the location of AT facilities, separation of routes and destinations, distance to transit stops, etc. The distance chosen was based on the average person walking 50 metres per minute for 10 minutes (or a 20 minute round trip) which translates into a 500 metre distance. Taking into consideration an overall aging population and different user characteristics, a 550 metre "tipping point" (preferred maximum distance from the AT network) is considered a reasonable distance for Fredericton.

Exhibit 1.1
Existing and Planned Routes



1.4 Benefits to Fredericton

Changing values towards the environment and healthy lifestyle choices are now acknowledged in public policy as priorities at the municipal, provincial and national levels. While the public policy debate about workable solutions to global issues like greenhouse gas emission targets and reducing obesity in children is ongoing, the professional and academic evidence on the benefits of an Active Transportation Plan for urban areas like Fredericton is compelling.

According to the Canadian Fitness and Lifestyle Institute, 57% of the population of New Brunswick is classified as inactive. This compares to 55% in Nova Scotia, 59% in Prince Edward Island and 58% in Newfoundland and Labrador. Western provinces have an overall total of 46% while Ontario and Quebec are 52% and 55% inactive respectively. Of the inactive New Brunswick population, the portions most likely to be inactive include women, older adults and household members in lower income and lower educational brackets.

The Canadian Community Health Survey (2001) produced by Statistics Canada ranks walking as the most popular physical recreation activity in the country especially among women. When completed, the Trails/Bikeways Master Plan will offer an inexpensive, accessible and practical recreational option to residents of Fredericton that is particularly attractive to many of the groups classified as inactive.

The overall benefits of the Master Plan can be grouped into the three basic themes: physical fitness, environmental health and economic strength.

Creating More Options For Physical Fitness

The Master Plan will enhance fitness and provide options for residents and visitors to enjoy physical activity, outdoor recreation and to gain physical fitness through more practical use of the network for commuting and daily errands. Use of the network's recreational routes can also improve mental outlook and social relationships, and provide a mechanism for building ties within neighbourhoods and larger communities. According to medical research, a more active population can also reduce risk rates for certain diseases such as coronary heart disease which, in turn, then reduces the costs of medical care, workplace absenteeism and institutional care requirements especially for an aging population[1].

The fitness and overall health benefits of increased participation in Active Transportation can be many. Examples of potential health benefits include:

[1] The Cost of Physical Inactivity in Halifax Regional Municipality, GPI Atlantic, 2004.

- A reduction in disease rates. Research shows that 36% of heart disease, 27% of osteoporosis, 20% of stroke, hypertension, Type 2 diabetes and colon cancer, and 11% of breast cancer are attributed to physical inactivity[2].

- According to the 2004 Canadian Community Health Survey (CCHS), obesity rates for youth (aged 12-17) and adults have risen from three to nine percent and from 14% to 23% respectively from 1978/79 to 2004. These rates are now acknowledged as a major public health issue[3].

- According to the Public Health Agency of Canada, age population studies in the U.S. and Canada have shown that general well-being is somewhat greater and depression much less frequent in people who exercise regularly as opposed to those who get little or no exercise.

Improving Environmental Health

Active Transportation under the Master Plan focuses on more options for movement by non-polluting, energy efficient travel modes as opposed to motorized transportation such as an automobile. The Master Plan also supports Fredericton's commitment to the Federation of Canadian Municipalities Partners for Climate Protection program that focuses on meeting the targets of the Kyoto Protocol.

Personal automobile ownership and use have been climbing steadily for decades and the promotion of AT offers a significant tool to combat the resulting air, water, noise, and visual pollution associated with motorized transportation. As an example, according to the Harvard University School of Public Health, air pollution contributes to the deaths of 60,000 people nationally in the United States and if five million Canadians walked or cycled instead of using their automobiles for short trips (three kilometres per week), emissions would be reduced by 30 metric tones in only six months[4]. Other environmental factors and benefits include:

- *Reducing Greenhouse Gas Emissions* - According to Transport Canada, road transportation accounts for 70% of transportation-related greenhouse gas emissions with 45% originating from light cars and trucks. Short distance motor vehicle trips are the least fuel-efficient and generate the most pollution per kilometre.

- *More Efficient Land Uses and Less Sprawl* - According to the Institute of Transportation Engineers, automobile dependant urban development

[2] Ibid.
[3] Canadian Community Health Survey. Health Canada and Statistics Canada, 2004.
[4] Go For Green, 1994.

patterns are very land intensive and typically require three times as much space as pedestrian oriented communities.

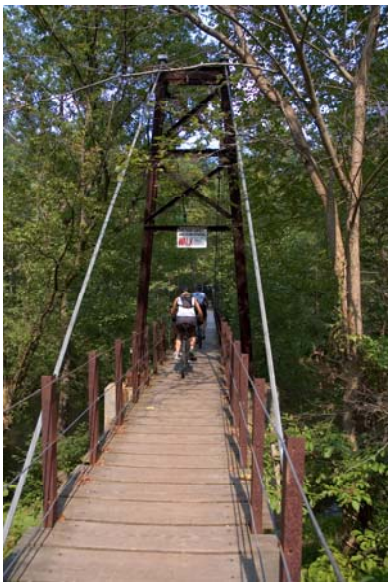
- *Reduced Demand For Hydrocarbon Fuels* - If half of the workers in Canada who lived within walking distance of their workplaces left their cars at home, 22 million litres of fuel would be saved per year[5].

- *Providing A Viable Alternative To The Car For Urban Travel* - In addition to recreation, AT is also efficient, affordable and accessible. In urban core areas, cycling is often the fastest travel mode for shorter distances up to 10 kilometres[6].

Creating Positive Economic Spinoffs

Trails and on-road networks provide benefits to local economies during both construction and operational phases. The network can also become an attractive destination for visitors and residents. Fully developed networks can also be used by commercial enterprises to attract new employees or by economic development organizations to prompt a business to relocate to space in close proximity to the network. Other benefits include:

- *Lower Costs* - AT facilities are far less expensive to build and maintain than conventional roadway systems, require much less land and are an attractive, cost-effective component of a multi-modal transportation system. Greater motor traffic volumes often necessitate continuous roadway expansions and according to a 1996 report in Victoria, B.C., widening a two lane urban arterial to four lanes can cost in the range of $1.3 million per kilometre.



- *More Local Jobs* - According to the New Brunswick Trails Council, trails in New Brunswick employ around 1,500 people for an average of six months of the year.

- *Tourism Anchor Project* - The San Antonio Riverwalk in San Antonio, Texas is considered to be the anchor of the local tourism industry and contributes an estimated $1.2 billion annually to the local economy.

- *Positive Local Economic Impacts* - The combined economic impact from the construction and operation of the *Welland Canal Parkway and Trails System* (Regional Municipality of Niagara) will grow from about $40 million in Year 1, to about $65 million by Year 5, approximately $120 million by Year 10 and reach over $200 million by Year 15[7].

[5] Ibid.
[6] Ibid.
[7] IMC Consulting, 1996.

- *Increased Value Of Real Estate* - The results of surveying real estate agents that sell properties in the Bruce Trail (Ontario) area revealed that 80.5% felt that this major trail will either make a home easier to sell or that the presence of the trail would have no negative impact[8].

Another benefit to Fredericton is the City's image and identity as a leader in Active Transportation and environmental awareness. In November 2006, the Halifax Regional Municipality approved in principal $100 million to implement HRM's AT Plan over a 20-year period. The City of Fredericton can become the second urban area in Atlantic Canada to formally implement an AT Plan.

1.5 Vision, Goal and Objectives

All actions under the Master Plan should be guided by a vision (preferred future) for trails and bikeways in Fredericton with the necessary supporting programming. The goal and supporting objectives should adhere to the vision. The recommended vision is:

A sustainable, visible and connected Trails/Bikeways network of on-road and off-road facilities that are accessible to all, attractive to residents and visitors alike, and unique to the character and heritage of the City of Fredericton.

Framed by the vision, the recommended goal of the Master Plan is:

To develop and promote a comprehensive AT network consisting of off-road facilities wherever possible and supported by key on-road links where needed and/or desired.

The goal will be supported by the following recommended objectives:

1. To develop a city-wide AT network consistent with the overall vision of the project, the City of Fredericton Municipal Plan (2006), other local strategic plans and Provincial legislation.

2. To build upon the existing off-road network to enhance user experiences and minimize cost outlays.

3. To create conditions for network users that promotes safety of use and accessibility for all ages, skill levels and mobility types including special needs populations.

4. To develop and regularly update a long-term implementation plan for the overall network that is consistent with the City's financial priorities and resources.

[8] Schutt, 1997.

5. To review existing strategies for promoting public interest in Active Transportation and recommend improvements to both content and delivery. This objective should include educating road users, including pedestrians, cyclists, inline skaters and motorists on intersection policies, right-of-way policies, signing plans, parking and end-of-trip facilities and promotion.

2 Framing the Master Plan

2.1 Introduction

The Master Plan will contain on-road and off-road facilities with supporting programming. Many cities that pursue an Active Transportation Plan also have to craft new municipal policies in their land use designations, development controls and regulations. The City of Fredericton is in the fortunate position of having a comprehensive policy framework for AT-related actions under the Master Plan. This section reviews the City of Fredericton Municipal Plan (2006), Province of New Brunswick legislation, existing conditions (2006/07) and the results of consultations (to June 2007) as building blocks for the Master Plan.

2.2 Municipal Plan

The City of Fredericton Municipal Plan (2006) contains strategies and policies that establish a pattern of intended growth for the City in physical terms (including new development areas and environmental policies) as well as healthy lifestyle promotion and the continued functioning of municipal infrastructure and transportation systems.

The Municipal Plan is an important policy document and speaks directly to Active Transportation, trails, pedestrians and bicycle use. The remainder of this section is a summary of excerpts from the 2006 Municipal Plan that support the master planning process and the future development of the network. Plan sections reference various official policy statements as well as providing more area specific guidelines (illustrated in section 2.2.3) for integrating AT initiatives into the fabric of the City.

The Municipal Plan's overall intent is shown on the Generalized Future Land Use Map while the Transportation Map demonstrates how movement in the City will be accommodated. Both maps illustrate the intention to maintain continued growth with a focus in available areas close to the urban core and in commercial zones. These themes helped to frame AT route decisions in terms of consumer destinations and daily commuter demand, as well as potential home-work AT trips and structural barriers such as major highways. The Transportation Map also illustrates opportunities for potential "piggybacking" of AT construction during planned automobile structure upgrades and planned new construction initiatives.

Exhibit 2.1
Municipal Plan – Generalized Future Land Use

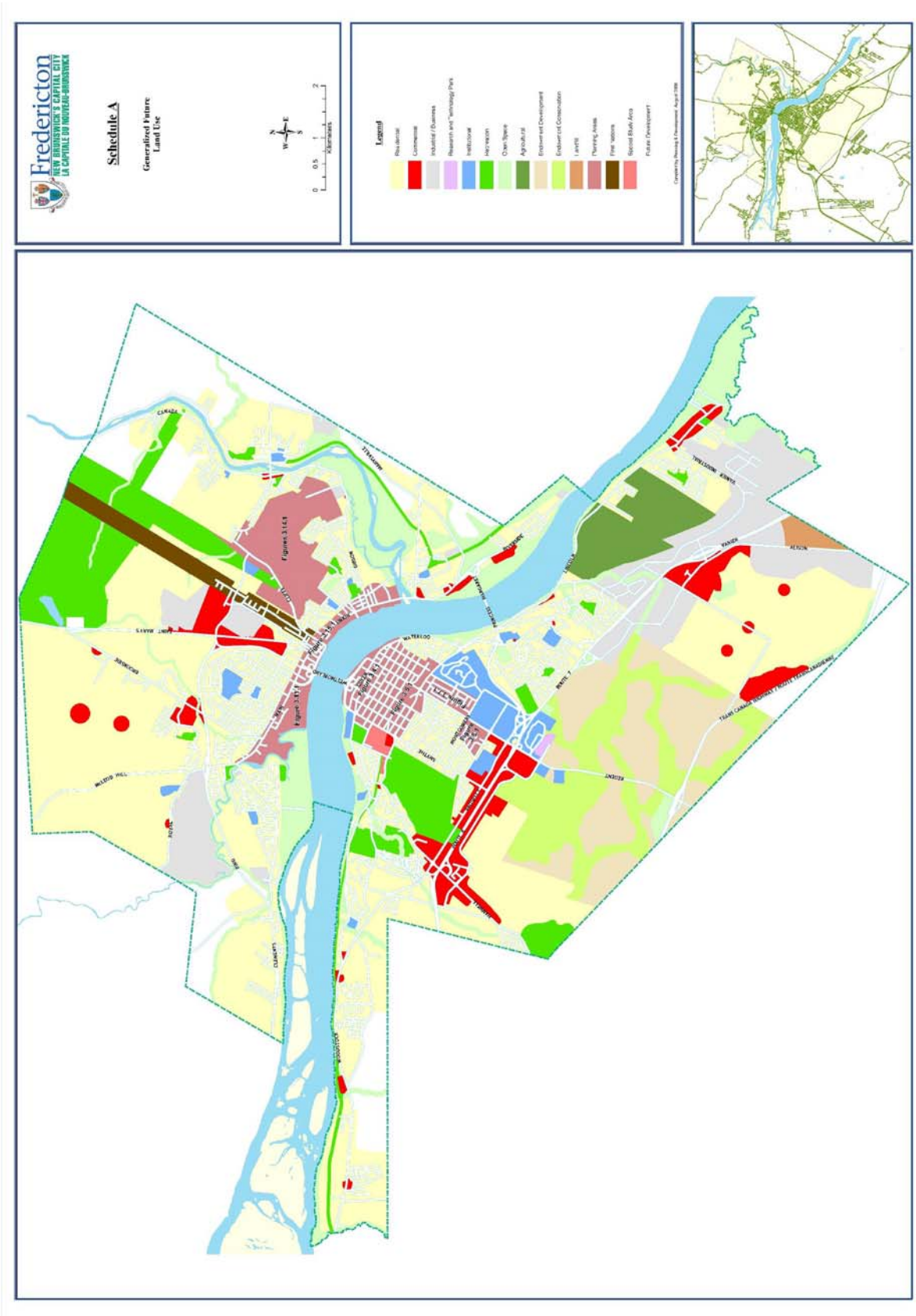


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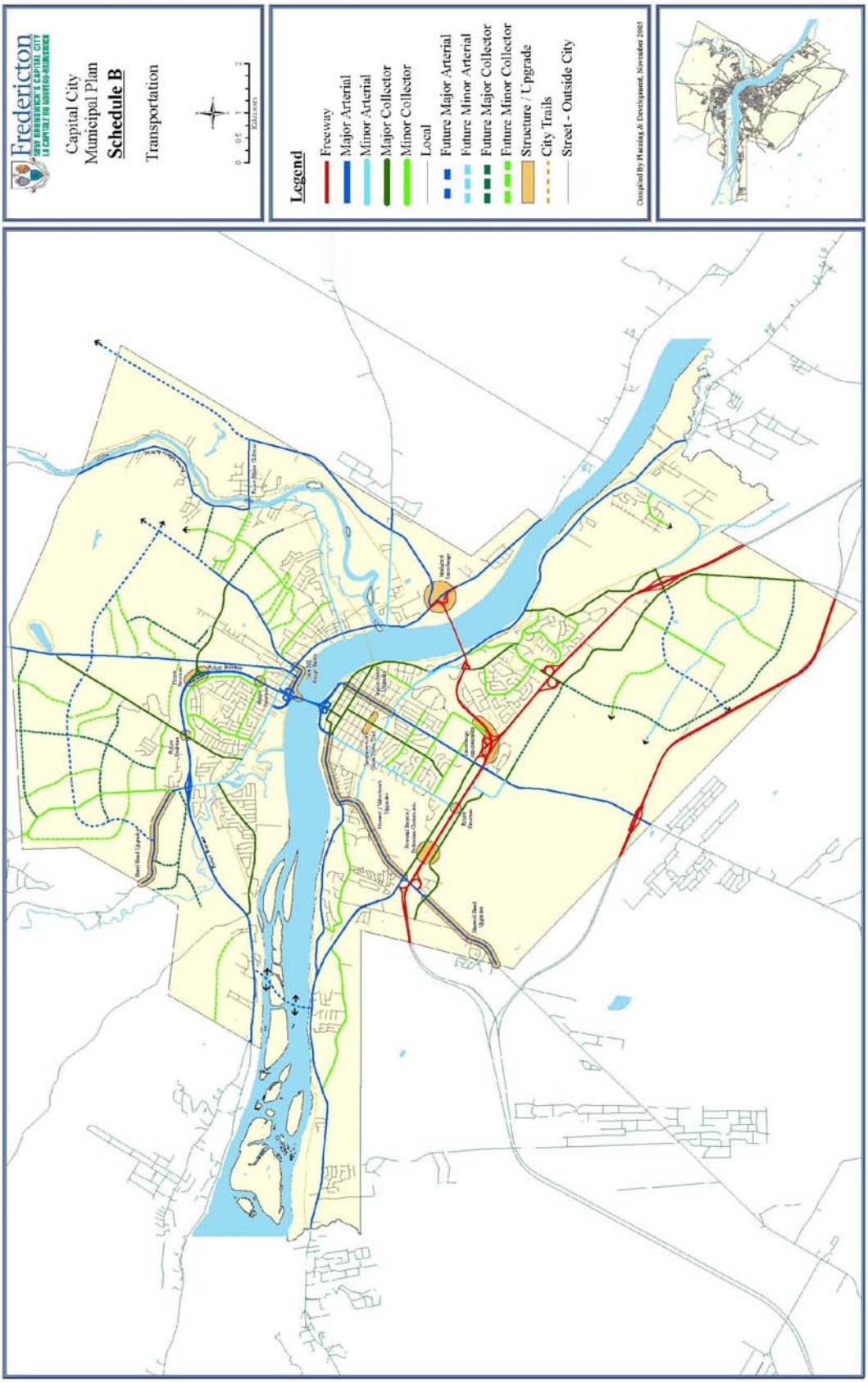
Exhibit 2.2
Municipal Plan – Transportation



2.2.1 Section 1 Plan Concept

This part of the Municipal Plan contains the following statements, and makes specific reference to the Master Plan.

1.2 A Future Vision for Fredericton
"The City's transportation initiatives will include greater emphasis on public transit, bicycle, and pedestrian facilities. Accommodation for these alternative modes of transportation will be integrated with the continued growth of the City's street network."

1.3 Growth Strategy Goals
Transportation Systems
(17) To provide for safe, effective and integrated transportation systems.

Recreation
(22) To provide quality and varied forms of recreation for the citizens of Fredericton.

2.2.2 Section 2 Objectives and Policies

This formal section of the Municipal Plan contains the following policy statements that relate to Active Transportation.

2.4 General Land Use and Development
2.4.1 Policies

Disabled Persons
(11) Council shall incorporate standards required for disabled persons where appropriate in the City's transportation system and development approval process.

2.5 Housing
2.5.2 Policies
Concept Plan
(11) Council may require, in the consideration of residential development proposals, the preparation of a concept plan(s) which satisfactorily addresses:
(i) The transportation impacts, including the provision for vehicular access and parking, public transit and pedestrian and bicyclist needs.

Manufactured Housing Developments
(13) Council shall permit new manufactured housing developments that:
(f) Meet the requirements of the municipality for an internal street network and adequately accommodate the needs of both vehicles and pedestrians.

2.9 Transportation
2.9.1 Objectives
(1) To create a balanced, multi-modal transportation system that provides the infrastructure necessary for residents to choose their preferred mode of transportation including driving, using public transit, walking, or cycling.
(4) To facilitate and promote the use of public transit.
(5) To provide a network of pedestrian and bicycle facilities throughout the City and to promote their use.

2.9.2 Policies
Multi-Modal System
(1) Council shall recognize all modes of transportation, including vehicular, bus, bicycle, pedestrian, and air as essential components of the overall transportation system in the City of Fredericton.

Kyoto Protocol
(2) Council shall work toward meeting its commitment to reduce greenhouse gas emissions under the Kyoto Protocol by encouraging the use of more environmentally responsible transportation such as public transit, walking, and cycling.

Disabled Persons
(3) Council shall require that all aspects of transportation incorporate standards required for disabled persons.

Criteria for New Developments
(11) Council shall consider the following transportation-related criteria when evaluating new development proposals:
(f) Sidewalks should be provided on arterial and collector streets, where required;
(g) Connecting pathways should be provided from cul-de-sacs and in other locations where the safety and convenience of pedestrians can be enhanced;
(h) Provision for the use of bicycles should be made;
(i) Residential streets shall be appropriately designed to provide a safe, convenient and livable environment for residents, motorists and pedestrians.

Cycling
(23) Council shall encourage bicycling as a mode of transportation and may facilitate:
(a) The provision of properly designed, safe and convenient facilities for bicycle travel;
(b) The creation of a bicycle network linking all parts of the City and incorporating safe connections between linear open spaces and roadways;
(c) The separation of bicycle and pedestrian traffic on the “Green” and other high traffic trails;
(d) The provision of adequate parking facilities for bicycles, particularly in the City Centre and in other locations where demand warrants including schools, churches, service, health, recreational, shopping and commercial facilities and major employment nodes;
(e) The provision of bicycle lanes or wider paved shoulders on appropriately selected collector and arterial streets;
(f) The identification of deficiencies in the existing trail system that would encourage more bicycle usage.

Pedestrians/Trails/Sidewalks

Sidewalks
(24) Council shall ensure that a network of sidewalks and pathways is in place to provide safe and convenient pedestrian movement. Particular emphasis shall be placed on the provision of:
(a) Pedestrian facilities in the City Centre;
(b) Sidewalks along arterial and collector roads;
(c) Sidewalks and other pedestrian linkages connecting residential neighbourhoods with schools, parks, bus routes and other pedestrian destinations;
(d) Safe pedestrian crosswalks, preferably at intersections;
(e) Pedestrian facilities connecting the universities with residential areas;

(f) Adequately maintained sidewalks and other pedestrian facilities for use in all seasons.

Trails

(25) It shall be the policy of Council to maintain a system of multi-use trails for non-motorized traffic throughout the City.
(26) Council shall regard the trail system as a component of the City's transportation infrastructure and shall encourage and promote the use of the trails by residents as a healthy transportation choice.

Trail Master Plan

(27) Council shall consider preparing a trail master plan to identify opportunities to further develop the trail system. The master plan should include consideration of the following:
(a) Options to provide a linear trail in Lower St. Mary's;
(b) Potential trails in a north/south direction on both sides of the St. John River;
(c) Further investigate the possibility of constructing a pedestrian bridge on the Carleton Street bridge piers or providing improved pedestrian and bicycle infrastructure on the Westmorland Street Bridge;
(d) Studying approaches to winter trail maintenance to encourage use of the system in the winter season.

Lighting and Paving of Trails

(28) Council will consider the feasibility of installing lighting and paving or some other form of hard surfacing on high use sections of trails.

Emergency Communications System on Trails

(29) Council should consider ways of providing some form of emergency communication infrastructure on isolated sections of the trail system.

Trail Crossings at Arterial Streets

(30) It shall be the policy of Council to undertake improvements, where necessary, where trails cross arterial streets to improve crossing safety.

Snowmobiles

(31) Council will work with representatives from the snowmobile clubs to:
(a) Provide a safe system of snowmobile trails in the City of Fredericton that allow for access to amenities required by users;
(b) Relocate trails where conflicts exist with adjacent land uses or pedestrian and cycling routes;
(c) Provide safe crossings where snowmobiles cross roadways.

2.9.3 Proposals

Third St. John River Crossing
(2) Council shall recognize the necessity for a third river crossing to be constructed to accommodate vehicle, bicycle and pedestrian traffic in the future as generally illustrated on Schedule “B” of this Municipal Plan. It is proposed that Council work with the Province of New Brunswick to identify the preferred location of the right-of-way for the bridge corridor and take measures to protect it.

City Centre
(10) Council shall address the transportation requirements of the City Centre through implementation of Section 3.4, “City Centre Planning Area”, and the following:
(a) Council shall investigate and implement measures, where feasible, to reduce the volume of vehicular traffic and required parking in the City Centre;
(b) Council shall place particular emphasis on quality pedestrian facilities in the City Centre and shall continue to upgrade sidewalks and undertake measures to enhance the City Centre pedestrian environment;
(c) Council shall focus the public transit system on the City Centre and shall emphasize the continued enhancement of public transit service and facilities in the City Centre area as a means of reducing traffic congestion and the demand for parking spaces.

Primary Commercial Areas
(11) It is proposed that Council recognize Main Street and the Prospect Street/Hanwell Road/Bishop Drive area as high traffic areas and shall seek to:
(c) Incorporate the requirements of public transit in order to minimize traffic disruption and maximize transit convenience for the general public;
(d) Provide safe and convenient facilities for pedestrians and cyclists.

Secondary Commercial Areas
(12) Council shall address the transportation requirements of secondary commercial areas as required to:
(b) Incorporate the requirements of public transit in order to minimize traffic disruption and maximize transit convenience for the general public;
(c) Ensure adequate pedestrian and cyclist facilities including linkages to surrounding residential areas.

Cycling
(27) It is proposed that the City provide convenient and secure short and long-term bicycle storage and parking in appropriate locations in the City Centre.

Pedestrians/Trails/Sidewalks

Sidewalks
(28) It is proposed that Council consider providing new sidewalk infrastructure in areas where substantial development is taking place including Hanwell Road, Clements Drive, Woodstock Road, and Brookside Drive.

Pedestrian Crossing at Highways
(29) It is proposed that Council encourage the Province of New Brunswick to provide safe, grade-separated pedestrian crossings across provincial highways including:
(a) Route 8 connecting Skyline Acres and the University of New Brunswick;
(b) Route 8 connecting Prospect Street, Bishop Drive, and the Malls;
(c) The northside Ring Road near the Brookside Mall.

Trail Connections
(30) Council shall work with private landowners and developers to provide connections between the main trail system and residential neighbourhoods, commercial areas, parks, and other major facilities and land uses.

Trails in Neighbourhood Design
(31) It is proposed that Council encourage, where possible and desirable, the developers of new residential subdivisions to provide lands appropriate for the integration of a system of neighbourhood trails into subdivision development and to provide connections between neighbourhood trails and the main trail system.

2.12 Recreation

2.12.1 Objectives
(3) To develop an integrated system of parks, linear parkways, open spaces, and natural areas, throughout the City.
(4) To develop and maintain a City-wide interconnecting network of trails to provide valuable recreation and transportation opportunities.

2.12.2 Policies
Park Classification
(3) Council shall establish the following classification of parks and recreation facilities to guide and rationalize the continued development of the City’s recreation and open space system. A variety of types and sizes of parks, recreational facilities and activities is desirable to meet the diverse interests of the population.

(a) Municipal Facilities
Municipal level recreation facilities are those that serve the City as a whole. These facilities should be accessible by transit, automobile via arterial streets and trail linkages. Examples include:
(i) City Parkland: Large areas of natural open space for low intensity activities such as walking, cycling and nature study. Odell Park serves this function and is complemented by Killarney Lake Park.
(ii) Urban Trail System: Major pedestrian and bicycle trails along watercourses, railway land or other rights-of-way and forming part of an integrated linear open space system. The riverfront trail system falls under this category. Associated trail amenities such as playgrounds and washroom facilities may also be provided.

(b) Community Facilities
Community level facilities are those that serve more than one neighbourhood but are not intended to serve the City as a whole. Examples include:
(i) Community Park: (e.g. Reading Street, Royal Road). Passive landscaped or natural areas. Community parks are intended to provide residents with ample opportunity for both passive and active recreational activities.
(ii) Playgrounds & Wading Pools: (e.g. Queen Square and Henry Park) Suitable for younger children. Ease of access from surrounding neighbourhoods, central location, and pedestrian/ bicycle linkages are key considerations when developing these types of facilities.

Trail Master Plan
(5) Council shall consider preparing a trail master plan to determine new trail locations, specific linear open space alignments and improvements. Council shall provide for public consultation during the planning phases of linear open space systems.

Connections
(6) Council shall pursue the connection of the linear open space system with other recreation facilities, the downtown and other commercial areas, educational institutions and residential neighbourhoods.

Land Acquisition
(10) Council shall actively seek to acquire land through dedications, easements, purchase or other methods for:
(a) Developing trails and reserving rights-of-way between major parks;
(b) Preserving and developing riverbanks and stream valleys for trails and other public use;
(c) Reserving abandoned rail beds and developing them for public use.

Complementary Uses
(12) Council may permit the development of commercial recreation and other complementary land uses within the designated parks, linear parks and open space areas where:
(a) Such uses enhance the recreation value of the area;
(b) The use complements the intended use and aesthetic character of the subject area and is compatible with surrounding land uses;
(c) Parking, pedestrian access and other requirements can adequately be accommodated.

2.12.3 Proposals

Linear Open Spaces
(1) Council shall continue to improve and enhance the linear open space system to provide quality and continuous pedestrian and bicycling linkages throughout the City by:

(a) Eliminating identified gaps along the north side of the St. John River;
(b) Developing a north/south network of trails on both sides of the St. John River;
(c) Investigating the possibility of constructing a second pedestrian/bicycle bridge crossing, either by retrofitting the Westmorland Street Bridge or by constructing a pedestrian bridge on the Carleton Street Bridge piers;
(d) Providing trails in selected ravines and stream shorelines, where appropriate;
(e) Providing paths or lanes in road rights-of-way where required to connect public parks and open spaces;

Council may use a combination of the foregoing to provide for an interconnected system of pedestrian and bicycle linkages. Unless otherwise specified, the use of trails for motorized vehicles should be prohibited.

2.14 Institutional and Protective Services
2.14.2 Policies

Development Guidelines
(3) Council shall have regard to the following factors when considering proposals for new or expanding institutional uses:
(e) Appropriate pedestrian and transit access should be designed into the project.

Schools
(6) Council shall encourage the provision of elementary schools in all growing residential areas of the City. Specifically, elementary school sites should:
(a) Have well maintained, safe and convenient pedestrian access into surrounding residential areas;

Health
(11) Council recognizes the Dr. Everett Chalmers Hospital as the primary health care facility in the Fredericton region and shall seek to ensure:
(a) The provision of adequate vehicular, transit and pedestrian routes and access to the hospital;

2.2.3 Section 3 Specific Planning Areas

This section of the Municipal Plan deals with some aspects of Active Transportation in specific locations within the City.

3.4 City Centre

3.4.2 Goals
A Place For People
A City Centre which is a people place - providing ease of entry, usable for a wide variety of activities, and enjoyed by residents and visitors in a pedestrian-oriented environment.

3.4.3 Role
Pedestrian Oriented Activity
(2) The City Centre shall be recognized and shall be promoted as a place for social and cultural activity on the part of all residents and visitors, in an accessible and pedestrian-friendly environment.

3.4.4 Activity and Character
The City Centre consists of several character areas (Figure 3.4.1 in the 2006 Municipal Plan), each bearing a distinct pattern of development and physical characteristics. Careful analysis of these character areas leads to an appropriate framework for development, and to the establishment of appropriate objectives and policies for: the pedestrian environment; for traffic, transit and parking; for servicing; and for the design of the downtown.

Riverfront Open Space Area
Vision for the Area: This area has considerable potential for an enhanced year-round recreational program. A variety of activities, including use of the St. John River, should be developed in a manner sensitive to the area's "green" character. Amenable pedestrian/bicycle linkages to downtown streets and other open spaces should be provided. Consideration should be given to use of the Saint Anne Point Drive area for appropriate community events, to a pedestrian link to the Riverfront via Carleton Street, to the enhancement of the Regent Street Wharf area as a focal point and gathering place.

Retail Commercial Core
Vision for the Area: Despite alteration over time, this area has an integrity, scale, and heritage appeal sufficient to be enhanced as a distinct or "specialty" shopping, dining and entertainment environment for residents and visitors. As such, this area must be ready to receive pedestrians and customers with ease. Attention should be paid to streetscapes, building facades and the scale of development. Laneways and other potential mid-block connectors should be fully developed to provide intimate and interesting urban spaces. Many older buildings can and should be sympathetically renovated. Ground floor retail uses should be pursued and residential occupancy of upper floors should be encouraged.

Carlton Street Institutional Area
Vision for the Area: The heritage character of this area is of prime importance providing a sense of tranquility in an otherwise busy part of the downtown. It accepts pedestrians in a southern "gateway". It should therefore be considered for its linkage potential.

3.4.6 People and Place
Policies

Riverfront Link
(2) The City of Fredericton shall pursue the development of an adequate and appropriate pedestrian link to the Riverfront at Carleton Street. Other pedestrian linkage opportunities shall be sought.

Pedestrian Links
(9) Pedestrian routes and connections shall primarily be at-grade. However, on Westmorland Street and King Street (locations where views and vistas will not be adversely affected), above grade linkages shall be considered acceptable subject to design review. Where practical, pedestrian links using pedways or alleyways shall be established, and should also link up with off-street parking facilities (concept in Figure 3.4.3 in the 2006 Municipal Plan). Businesses operating on pedways or alleyways shall be recognized and encouraged. Additional pedestrian spaces such as squares, gardens, or courtyards within new developments shall be encouraged.

Pedestrian Access
(11) Access to the downtown for pedestrians and cyclists, from the riverfront trail and via the Old Burial Ground, shall be maintained. Development of the railway bridge as a pedestrian access to the downtown from Fredericton North shall be encouraged.

3.4.7 Traffic Transit and Parking

Objective

To create an efficient and integrated traffic, transit parking and pedestrian system.

Policies

Street Hierarchy

(1) The hierarchy of streets shall be redefined in support of policies to create an improved pedestrian environment. Accordingly, Westmorland Street between the bridge and Brunswick Street shall be redesigned from Arterial to Collector, while Queen Street between Northumberland and Regent Streets, Northumberland Street between Queen and King Streets, and York Street between Campbell and Brunswick Streets, shall be redesigned from Collector to Local Street (Figure 3.4.4 in the 2006 Municipal Plan).

Slip Lanes

(4) To ensure a safe and pedestrian-friendly environment, slip-lanes for right-hand turning movements shall be discouraged in the City Centre.

Bicycle Facilities

(7) Cyclists shall be accommodated on the Riverfront trail, but with right-of-way deferred to pedestrians. Bicycle routes on City Centre streets shall continue to be designated and signed. Adequate bicycle parking shall be provided at key activity site.

Skateboarding

(8) Skateboarding shall be limited to designated paths and sites.

Central Bus Terminal

(9) The City Centre shall continue to accommodate a central bus terminal located at Kings Place and will, as necessary, accommodate transit bus overflow on Queen Street between Carleton and York Streets.

Public Transit Use

(10) The use of public transit, particularly by downtown employees, shall be encouraged and promoted.

3.4.9 Design
Design Principles

Downtown Views
(7) Where possible, the siting of new buildings and enhancement of pedestrian connectors should capitalize on opportunities to view landmarks, streetscapes, and the river.

Optimized Use of Pedestrian Linkages
(14) The design of pedestrian linkages (lanes, alleys, or other passages) should be such that they are secure and intimate places for leisure and shopping. Distinctive designs should be developed for banners or other elements marking “themed” areas or destinations.

Sympathetic Streetscape Design
(19) Sidewalk surface materials, lighting standards, benches, planters, kiosks, trees and other furnishings should remain consistent throughout the downtown, but capable of modification in materials, rhythm and composition depending on the character area. All street furnishings should be installed recognizing purpose, microclimate, and pedestrian traffic flow.

3.5 Residential Town Plat
3.5.6 Transportation and Traffic
Objectives
To create and maintain an efficient and integrated traffic, transit, parking and pedestrian system.
To maintain an efficient transportation network for the movement of pedestrians and vehicles.

Policies
Arterial Streets
(3) It shall be the policy of Council to ensure that the physical design of arterial streets in the Residential Town Plat are sensitive to the historical character of the area, is aesthetically appealing, and respects the needs of pedestrian and bicycle traffic.

Collector Streets
(5) Collector streets shall be intended to equally serve the needs of vehicle traffic, access to property, and pedestrian traffic.

Pedestrians

(12) It shall be the policy of Council to consider the needs of pedestrians when dealing with issues pertaining to right-of-way improvements in the Residential Town Plat.

(13) Council shall maintain the sidewalk system in the Residential Town Plat.

(14) Council shall explore, in consultation with the University of New Brunswick, the feasibility of establishing a pedestrian linkage that will connect the university to Church Street in accordance with established pedestrian crossing measures.

3.5.7 Heritage and Design Review

Policies

(i) Retain and enhance the presence of street trees, which provide identity to communities and offer shade and shelter for pedestrians;

(j) Facilitate pedestrian access by means of walkways and pathways.

3.5.9 Recreation/Open Space

Policies

(1) Council shall endeavor to create a park square and trail connection by completing the pedestrian trail linkage through the former railway yards as shown as Character Area “E” (Figure 3.5.3 in the 2006 Municipal Plan) and outlined in Section 3.5.12 of this Plan in accordance with established pedestrian crossing measures.

(2) Council shall endeavor to complete the cross town trail system as shown on Schedule “B” of the Municipal Plan by establishing a pedestrian trail linkage between York Street and Smythe Street in accordance with established pedestrian crossing measures.

(4) Council shall encourage a pedestrian entrance into the railway yards off of Aberdeen Street and Regent Street (see Figure 3.5.3 in the 2006 Municipal Plan)

3.7 College Hill

3.7.3 Site Development Guidelines

Policies

(2) It shall be the position of Council to encourage that residential dwellings consisting of two or more dwelling units.

(d) Provide adequate facilities for the on-site storage of garbage, bicycles, and the occupants personal belongings.

3.7.4 Parking and Transit

Objective

To provide suitable and appropriate parking and promote alternate modes of transportation.

Policies

(2) Council shall seek to encourage student ridership on City transit buses in order to reduce traffic and parking impacts in the College Hill Planning Area.

3.7.6 Municipal Servicing

Objectives

To provide a well maintained system of public streets and sidewalks.

Policies

(2) Council shall seek to maintain a high standard of sidewalk maintenance in the College Hill Planning Area, and shall encourage the continued repair and improvement of streets and sidewalks in locations where necessary.

3.9 The University of New Brunswick Woodlot

Guiding Principles

(2) Areas identified for potential development should be used for sustainable development that includes:
(e) Transit-supportive land use;
(5) UNB should promote and facilitate the use of areas of the UNB Woodlot as a natural green space for public use within a controlled and managed environment. Planning shall seek to integrate with the larger trail network already established within Fredericton through collaboration with the City and the redesign/extension of existing infrastructure.

3.9.1 UNB Endowment Conservation Area

Conservation Area Use

Council intends that lands located in the UNB Endowment Conservation designation are primarily used by the University:
(c) For community and/or recreational uses including parks, trails, picnic areas, educational establishments, or community buildings.

3.9.2 UNB Endowment Development Area

Residential Applications

All applications for amendment to the Zoning By-Law to permit residential development in the UNB Endowment Development designation shall be accompanied by the following documentation:
(a) A conceptual plan for the development of the property including proposed public and private streets, parks and open spaces, potential land uses for sub-areas within the property including the type of use and the

potential density, pedestrian and bicycle circulation, provision for pubic transit, storm water management planning, tree retention and, if necessary, proposed buffering between conservation and development areas.

Commercial Criteria
Proposals for the development of land for commercial use in the UNB Endowment Development designation shall be in accordance with the following criteria:
(f) Development proposals will demonstrate that the needs of pedestrians, cyclists and public transit have been accommodated as part of the overall development of the property.

Commercial Applications
All applications for amendment to the Zoning By-Law to permit commercial development in the UNB Endowment Development designation shall be accompanied by the following documentation:
(a) A conceptual site plan for the development of the property that includes proposed public and private streets and/or lanes, access, loading areas and parking, pedestrian and bicycle circulation, provision for public transit, storm water management planning, building footprints, landscaping and tree retention and, if necessary, proposed buffering.

Industrial Criteria
Lands intended to be developed with industrial/business and research and technology uses in the UNB Endowment Development designation shall be in accordance with the following criteria:
(f) Development proposals will demonstrate that the needs of pedestrians, cyclists and public transit have been accommodated as part of the overall development of the property.

Industrial Applications
All applications for amendment to the Zoning By-Law to permit industrial/business development and research and technology uses in the UNB Endowment Development designation shall be accompanied by the following documentation:
(a) A conceptual site plan for the development of the property that includes proposed public and private streets and/or lanes, pedestrian and bicycle circulation, provision for public transit, storm water management planning, landscaping and tree retention and, if necessary, proposed buffering.

3.11 Main Street Area

3.11.6 Recreation

Policies

(1) The City will continue to attempt to acquire frontage along the riverfront as opportunities arise in order to continue a linear pathway system.

(4) The City will pursue, in consultation with abutting property owners, the development of any future abandoned railway right-of-way as a part of the City's overall linear open space system.

(5) The development of a town square should be pursued as an outdoor people place and a focal point for pedestrians, special events and other outdoor activities.

3.11.9 Pedestrian Movement

Objective

(1) To provide shoppers and residents of Main Street with an improved pedestrian circulation system which is more people friendly.

Policies

(1) The City will continue to acquire river frontage as the opportunity arises in order to connect a pedestrian pathway along the river.

(2) The City will work with Main Street businesses to develop areas where the pathway system along the railway right-of-way and the riverfront can access strategic locations on Main Street.

(3) The City will work toward providing sidewalks on both sides of Main Street.

(4) Consideration will be given to adequate crosswalks as the street is upgraded.

3.11.11 Urban Design

Policies

Accessibility

(8) The City will encourage development to occur in such a way as to encourage pedestrian traffic.

(9) The City will design and install intersection curb ramps in order to accommodate the needs of the disabled.

3.14 Northeast Fredericton

3.14.1 Vision

A Connected Community

The Plan Area will have a system of linear pathways, sidewalks, and trails providing access from residential development to Leo Hayes High School, the former Rifle Range, Killarney Park, and the Nashwaak River.

An Urban Community

The road network and neighbourhood design will enhance the attractiveness of alternative modes of transportation including walking, cycling, and public transit.

With Links to the Natural Environment

Residents of the Plan Area will maintain a connection to nature through a well-planned system of parks, linear pathways and open spaces. The Kaine Creek corridor will be preserved as an open space providing passive recreational opportunities for residents and habitat for plant and animal species. Residents will also have easy access to other natural areas including the Killarney Park and the Nashwaak River.

3.14.2 Goals

The goals of this Plan are:

(8) To expand the City's trail system and provide access to the system from new neighbourhoods within the Plan Area.

3.14.4 Residential Land Use

Policies

(9) It shall be the policy of Council to that residential uses in the Plan Area be developed in accordance with the following criteria:

(d) The proposed development includes, where possible and feasible, pedestrian connections to linear trail systems, major parks, recreation facilities, and schools.

3.14.8 Recreation/Open Space

Objectives

(2) To plan for the provision of open space corridors and trails to provide linkages from the Plan Area to Killarney Lake Park, the St. John River, the Nashwaak River, and Leo Hayes High School.

Policies

Trails and Pathways

(3) It shall be the policy of Council to encourage the provision of a pedestrian linkage between the former Rifle Range and the Nashwaak River through the Kaine Creek corridor.

(4) It shall be the policy of Council to encourage the development of pathways and/or sidewalks to connect neighbourhoods to commercial facilities, parks, public transit stops, and other residential areas.

(5) It shall be the policy of Council to develop pathways linking the Plan Area, where possible, with the former Rifle Range, Killarney Lake Park, Leo Hayes High School, the St. John River, and the Nashwaak River.

3.14.10 Transportation
Objectives
(3) To provide an appropriate balance in the transportation system to accommodate the needs of motor vehicles, users of public transit, pedestrians, and cyclists.

3.15 Union Street Area
3.15.6
Policies
(2) Council shall pursue the acquisition of river frontage, as opportunities arise, in order to achieve a linear parkway system. River frontage shall be acquired through such means as public dedication through the subdivision process, as a component of major riverfront developments, by deed to the City or by property acquisition by the City of Fredericton. The establishment of a linear trail along the riverfront in the Plan Area shall be a priority of Council with regard to the linear parkway system in the Plan Area and shall be achieved with the cooperation of affected property owners.
(3) Council will pursue the development of abandoned railway rights-of-way as a part of the City's overall linear open space system.
(4) Council shall ensure that new developments along the riverfront and the railway right-of-way do not impede the proposed linear parkway system.

3.15.10 Transportation
Objective
The maintenance and enhancement of the transportation network for the efficient movement of pedestrian, bicycle and vehicular traffic.

Policies
(2) Council shall address the transportation requirements of secondary commercial areas, as required, to:
(c) Ensure adequate pedestrian and cyclist facilities including linkages to surrounding residential areas.
(3) Council will continue to upgrade sidewalks within the entire Planning Area and particularly along Union Street in accordance with available financing and budget priorities.
(4) Council shall examine the feasibility of establishing a sidewalk on the south side of Union Street between the Devon Park Plaza and Carleton Park.
(5) Council shall examine the feasibility of establishing additional pedestrian crosswalks across Union Street so as to provide safe, designated crossing areas. This shall be conducted with the assistance of the Development Services Department, the Director of Engineering and Public Works and Fredericton Transit.

(6) Council will work in conjunction with property owners to develop public pedestrian accesses to both the proposed riverfront and railway right-of-way linear parkway system.

2.3 Provincial Legislation

New Brunswick Provincial Statutes

There are Provincial statutes that will influence or define the Active Transportation network and supporting polices and programs under the Master Plan. Each is summarized in this section within the context of potential cycling, transit, pedestrian, trail and alternative modes of transportation links.

The primary Acts with regulatory powers influencing the Master Plan are the Municipalities Act and the Motor Vehicle Act. New Brunswick does not currently have an Act specifically addressing Active Transportation as it does with off-road vehicles but the Motor Vehicle Act does make reference to non-motorized transportation and contains the basis for AT regulation in the Province. The Municipal Thoroughfare Easements Act offers a legal means for Fredericton to address easement rights to an existing “traveled thoroughfare” and to potentially extend key segments of the AT network though areas that may have previously been prohibitively expensive or generally difficult to achieve.

2.3.1 Municipalities Act

The *Municipalities Act* defines the powers of municipalities within the Province of New Brunswick, establishes municipal boundaries, provides the legal basis to pass bylaws and governs various aspects of municipal responsibilities. Specifically pertaining to the development of the Fredericton Trails/Bikeways Master Plan, the *Municipalities Act* allows actions by City Council as outlined below.

City Council may close any section of a “highway” as defined below but allow pedestrian traffic on that route. Enabling sections of the *Act* include:

187*(1) In this section, "highway" means any public street, road, lane, alley or way.*

187*(2) Subject to this section, the council of a municipality may by by-law stop up and close any, or any portion of any, highway within the municipality.*

187*(3) The closure under subsection (2) may be permanent or for such period as is specified in the by-law.*

187*(4) Where the closure of a highway or any portion of a highway under subsection (2) is permanent, the municipality*
(a) may hold, sell, lease or otherwise dispose of any right, title or interest that it has in the soil and freehold thereof, and
(b) is discharged from any obligation to maintain or keep such highway or portion thereof in repair.

187*(5) The council may by by-law close any, or any portion of any, highway to vehicular traffic and not to pedestrian traffic and provide for the erection of barriers to enforce the observance thereof.*

187*(8) No by-law under this section that affects a provincial highway as defined in the Motor Vehicle Act is valid until approved by the Lieutenant-Governor in Council.*

Enabling statutes of the *Municipalities Act* also pertain to trail/bikeways as follows.

Provincial Dog Regulation - *Municipalities Act.*
8*(1)No person who owns a dog shall*
(a) permit his dog to run at large;

2.3.2 Motor Vehicle Act

Under the *Motor Vehicle Act (MVA)*, a cyclist riding on a designated roadway has all of the rights and responsibilities that the operator of a motor vehicle has, except where they cannot be applied due to the nature of the vehicles in question. Cyclists must legally use a bicycle path instead of a roadway where one has been provided and are prohibited from traveling on controlled access highways.

Due to rapid advances in technology and a greatly expanded interest in self-propelled transportation, especially in urban areas, not all non-motorized modes of transportation are specifically addressed under the *MVA*. Regardless of the challenges, the *MVA* creates the on-road regulatory framework for the Master Plan. Relevant sections appear below.

160(1) The use of any controlled-access roadway by pedestrians, bicycles, or other non-motorized traffic or by any person operating a motor-driven cycle may be prohibited as follows:
(a) by local authorities by by-law, with respect to any controlled-access roadway under their jurisdictions;
(b) by the New Brunswick Highway Corporation by order, with respect to any controlled-access roadway under its administration and control; and
(c) by the Minister of Transportation by order, with respect to all other roadways, including, without limiting the generality of the foregoing, those under the administration and control of a project company.

169(1) Pedestrians are subject to traffic control signals at intersections as provided for in this Part unless required by by-law of a local authority, within its jurisdiction, to comply strictly with such signals in such jurisdiction.

169(2) Local authorities are hereby empowered by by-law to require that pedestrians comply with the directions of any official traffic-control signal in their jurisdiction and may by by-law prohibit pedestrians from crossing any roadway in a business district or any designated highways except in a cross walk.

174(1) Where sidewalks are provided it is unlawful for any pedestrian to travel along or upon an adjacent roadway.

174(2) Where sidewalks are not provided any pedestrians travelling along or upon a highway shall, when practicable, travel only on the extreme left side of the roadway or its shoulder, not more than two abreast, facing traffic which may approach from the opposite direction and shall give way to the left to traffic approaching on the roadway.

176 Every person riding a bicycle upon a roadway has all of the rights and is subject to all of the duties applicable to the driver of a vehicle by this *Act*, except those provisions which by their very nature can have no application.

177(3) No person shall ride on or operate a bicycle on a highway unless the person is wearing a bicycle helmet in accordance with the regulations and the chin strap of the helmet is securely fastened under the person's chin.

179(3) Wherever a usable path for bicycles has been provided adjacent to a roadway, bicycle riders shall use such path and shall not use the roadway.

2.3.3 Off-Road Vehicle Act

The *Off-Road Vehicle Act (ORVA)* governs all-terrain vehicles (ATV's) and other motorized modes of off-road transportation (including motorized snow vehicles) in the Province of New Brunswick.

The *Act* does not permit operation of ATV's and other off-highway vehicles within 7.5 metres of the traveled portion of a highway. It does, however, give substantial powers to municipalities to regulate ATV use in that municipalities may designate highways or parts thereof along or across which off-road vehicles may be driven. Additionally, municipalities may also prohibit the use of ATVs as the may so choose. Relevant sections of the *Act* appear below.

7.4(1) No motorized snow vehicle trail manager and no person or association acting on behalf of the motorized snow vehicle trail manager shall groom a

motorized snow vehicle managed trail, identify a trail as a motorized snow vehicle managed trail by posting or erecting signs or otherwise administer, control or operate a motorized snow vehicle managed trail
(b) on municipal land, unless the motorized snow vehicle trail manager has first obtained the written consent of the municipality that owns or leases the land, authorizing the use of the trail as a motorized snow vehicle managed trail;
(c) on Crown Lands, unless the motorized snow vehicle trail manager has first obtained a lease from the Crown in right of the Province, authorizing the use of the trail as a motorized snow vehicle managed trail; and
(d) on a highway as defined under the *Highway Act*, unless the motorized snow vehicle trail manager has first obtained a highway usage permit under that *Act*, authorizing the use of the highway or any part of it as a motorized snow vehicle managed trail.

7.4(1.1) No motorized snow vehicle trail manager and no person or association acting on behalf of the motorized snow vehicle trail manager shall construct a motorized snow vehicle managed trail within 25 metres of a private residence unless the motorized snow vehicle trail manager or person or association acting on behalf of the motorized snow vehicle trail manager has first obtained the written consent of the person entitled to withhold consent with respect to the land on which the private residence is situated.

7.91(1) No all-terrain vehicle trail manager and no person or association acting on behalf of the all-terrain vehicle trail manager shall groom or otherwise maintain an all-terrain vehicle managed trail, identify a trail as an all-terrain vehicle managed trail by posting or erecting signs or otherwise administer, control or operate an all-terrain vehicle managed trail
(b) on municipal land, unless the all-terrain vehicle trail manager has first obtained the written consent of the municipality that owns or leases the land, authorizing the use of the trail as an all-terrain vehicle managed trail;
(c) on Crown Lands, unless the all-terrain vehicle trail manager has first obtained a lease from the Crown in right of the Province, authorizing the use of the trail as an all-terrain vehicle managed trail; and
(d) on a highway as defined under the *Highway Act*, unless the all-terrain vehicle trail manager has first obtained a highway usage permit under that *Act*, authorizing the use of the highway or any part of it as an all-terrain vehicle managed trail.

7.91(1.1) No all-terrain vehicle trail manager and no person or association acting on behalf of the all-terrain vehicle trail manager shall construct an all-terrain vehicle managed trail within 25 metres of a private residence unless the all-terrain vehicle trail manager or person or association acting on behalf of the all-terrain vehicle trail manager has first obtained the written consent of the person entitled to withhold consent with respect to the land on which the private residence is situated.

16 Subject to the regulations and any municipal by-law enacted under section 37, no person shall operate an off-road vehicle within 7.5 metres of the travelled portion of a highway.

37(1) A municipality may enact by-laws, subject to the approval of the Minister
(a) designating highways or parts thereof along or across which off-road vehicles may be driven;
(b) regulating or prohibiting the use of off-road vehicles.

37(2) A municipality may enforce by-laws enacted under subsection (1) by the imposition of penalties not exceeding one hundred dollars for each offence.

2.3.4 Parks Act

The City of Fredericton has no provincial parks within its boundary but the year-round recreational destination of Mactaquac Provincial Park provides a reasonably nearby facility and any future park designations in or around the City could impact the Trails/Bikeways Master Plan. The *Parks Act* establishes the authority of the Province to create and manage provincial parks. Designated parks may take a variety of forms and permit a variety of uses as described in the *Act* and may include recreational trails as designated by the Minister.

1 In this *Act* "provincial park" means
(a) any area of land established and maintained under this *Act* and the regulations as a recreational park, campground park, beach park, wildlife park, picnic ground park, resource park, park reserve, or any combination thereof, and includes a recreational trail, or any portion of a recreational trail, designated by the Minister of Natural Resources under Section 1.1 and any land acquired for the purpose of development as a provincial park.

1.1(1) The Minister of Natural Resources may designate a recreational trail, or any portion of a recreational trail, for the purposes of the definition "provincial park" in Section 1.

6(1)For municipal purposes, any land set apart as a provincial park or added thereto, so long as it remains part of the provincial park, shall be deemed to be separated from any municipality of which it formed a part immediately before it became a provincial park or a part thereof.

13 The Minister, or anyone designated by him to act on his behalf, may open for travel or close to travel any highway, road, trail or other area in a provincial park that is not under the administration and control of the Minister of Transportation or the New Brunswick Highway Corporation

2.3.5 Municipal Thoroughfare Easements Act

This is a fairly unique *Act* as it allows municipalities, with the consent of the Province, to designate potential easement rights to an existing “traveled thoroughfare” for the purposes of municipal services. The thoroughfare must exist as a traveled route at the time of application and may not be an existing road, highway or street.

This *Act* permits Fredericton to potentially develop use rights to sections of the AT network that might otherwise be too difficult or expensive to complete. Relevant sections of the *Act* appear below.

1 In this *Act* "existing traveled thoroughfare" includes a lane, alley or other way used by the public and not already vested in a municipality, but does not include a road, street or highway.

2(1)The Lieutenant-Governor in Council, on application by a municipality, may by Order-in-Council vest in that municipality the easement rights to an existing traveled thoroughfare and up to three metres on either or both sides thereof, located in that municipality, for those municipal services as are prescribed in the Order.

2(2)Upon the registration of a certified copy of the Order in Council by the municipality made under subsection (1), in the registry office established under the *Registry Act* for the county in which the existing travelled thoroughfare lies, the easement rights described in the Order become vested in the municipality for the municipal services as are prescribed in the Order and thereupon all right and title, of any person in the lands described cease to exist to the extent of such easement rights.

2.4 Existing Conditions

Movement Systems and Land Use Patterns

The Master Plan will build upon the already existing off-road trail system to provide for essential new on and off-road linkages that work in tandem with the transit system. The Master Plan will also address the challenges and opportunities of integrating AT travel modes into existing built areas and provide clear direction for how to best incorporate network links into new developments. Through an approach that recognizes the present and expected future form of the City, the Master Plan will be an integral part of daily movement by residents and visitors.

The Master Plan will be framed by the City's geography, historic settlement patterns, legacy transportation systems and expected future conditions as expressed in the Municipal Plan (see Section 2.2).

The Fredericton area has a long history of habitation by the Maliseet and Mi'kmaq Aboriginal Peoples before contact with European settlers. First Nations fished the Woolastook (St. John River) and farmed squash and corn around Fredericton until French and English settlers contact. Today, the St. Mary's First Nation Reserve is located on the north side of the St. John River within the City's limits. St. Mary's First Nation is one of six Maliseet Nations on the St. John River and is governed by a Chief and Council. According to the Government of Canada, as of June 2006, the Nation has a registered membership of 1,325, with 676 living on the 310 acre St. Mary's reserve.

In the late seventeenth century, the French were the first Europeans to arrive in the Fredericton area followed by Acadians from Nova Scotia and later English settlers from Britain. In 1783, the United Empire Loyalists settled in the area after the American Revolution and Fredericton became the capital of New Brunswick in 1785.

Today, the City's movement systems and land use patterns range from reasonably narrow older urban streets to modern highways and post World War II styled suburban-type community design. Current land use patterns are a reflection of:

1. British and French colonial town planning and land use principles.

2. River valley geography with rich water resources, arable soils and abundant tree cover.

3. Senior government transportation and infrastructure decisions.

4. Changing market forces for transportation modes that have resulted in the abandonment of some rail lines that are now used for off-road trails.

5. Past and current municipal planning decisions.

6. Market demand.

Older (Pre 20th Century) Areas

Older areas of Fredericton developed outward from the St. John River as the main "highway" for trade and transportation. The development style was compact and laid out in a highly permeable grid pattern common in early British town planning. Originally constructed to serve horse travel and walking, the present downtown area is characterized by narrow streets with buildings close to the street line and sidewalks on both sides. These areas benefit from an exceptionally dense network of pedestrian facilities and visually attractive settings. However, **they are also restricted in their potential to accommodate other AT modes due to right-of-way space limitations and the majority of land already having been developed.**

Post War Developments

As with most North American cities, during the post World War II boom in residential development, Fredericton experienced rapid suburban-style growth built on the premise of safer, cleaner communities with larger building lots and fueled by increased private auto ownership. The resulting changes to commuter patterns and community design have produced a modern urban and suburban form of development that is based around the automobile as an essential element of daily life. Newer development of this nature is typified by a curvilinear street pattern, generous numbers of cul-de-sacs, separation of residential and commercial development, a hierarchical street system and a far less permeable community form for pedestrians, bikes or vehicular traffic.

Areas of Fredericton with this development pattern include neighbourhoods to the south, west and east of the Downtown Core as well as the majority of development on the north side of the river. It is worth noting that sections of the City have also experienced lot-by-lot linear development along rural highways such as McLeod Hill during the same time period with the emphasis in private automobiles as the dominant mode of transportation. Implementing an AT network in these areas can be particularly challenging because walking and wheeling infrastructure is not common.

In order to avoid a future that requires retrofitting automobile-centric community design with AT facilities, it is essential that future planned development areas in Fredericton include AT planning from the beginning of the planning and regulatory approval process, and that new growth areas are

identified in the Master Plan. While it is difficult to determine the exact layout and density of planned development areas, the Master Plan network must still identify the essential links through planned growth areas such as the Northwest and Northeast Growth Area, the UNB Woodlot and in the Doak Road Master Plan that focus on creating essential network connections with the larger network.

Neighbourhoods

Fredericton is composed of various distinct neighbourhoods and two major districts of the City. The "Northside" and the "Southside" form the main districts of the City and are bisected by the St. John River. The Northside consists of separate boroughs that were once separate communities including: Devon, Nashwaakis, Marysville and Barkers Point. Consisting of largely suburban residential areas with numerous retail businesses and various professional firms, the Northside is experiencing significant commercial growth and contains large tracts of land slated for residential development. It is also home to the Northside Business District and Killarney Lake Park which is a popular family destination and has the only swimming beach within City limits.

The Southside district contains the primary "downtown" area of the City with various government offices, historical buildings, banks, law offices and business establishments. It is also home to major cultural attractions such as the Playhouse, the York-Sunbury Museum and the Beaverbrook Art Gallery. The Provincial Legislature Building, Christ Church Cathedral and many Victorian era homes add to the grandeur of the area. New commercial and industrial development is occurring to the south of the traditional urban core and large new master planned neighbourhoods are planned for the future. Slightly to the southeast of downtown are the campuses of St. Thomas University and the University of New Brunswick.

Marysville is a historic neighbourhood located on the Nashwaak River to the north of the urban core and home to nineteenth century saw mill buildings which now serve as Provincial Government offices. The neighbourhood was originally a separate town based around a profitable lumber industry operated by Alexander Gibson. Facing foreign competition in the post World War II years, the mill experienced difficulties for decades and closed permanently in 1980. In 1973, Marysville was amalgamated with Fredericton.

University of New Brunswick

The University of New Brunswick (UNB) is a significant landowner in both Fredericton and within the larger Province as a whole. As outlined in a news release of October, 2004, "UNB's land endowment dates back to 1800 when the University was granted substantial tracts of land by King George III.

These lands were intended for the University's support. Today, through acquisitions and donations, UNB's land endowment comprises nearly 8,300 acres in 11 locations throughout New Brunswick."

UNB's Fredericton land holdings include the main downtown campus in which the majority of the university's administrative, teaching and research facilities are situated, as well as the UNB Woodlot located in the southern portion of the City and extending to the municipal border. At 3,815 acres, the Woodlot is the most significant of all University land holdings. It has been used for various activities throughout its history including unofficial recreational hiking and walking by local residents.

The University of New Brunswick is an important stakeholder in the development of the Master Plan not only because of land ownership but also because the Fredericton campus is home to nearly 8,000 full time students.

UNB students and faculty represent a demographic that is often very attracted to using a trails and bikeways network for daily commuting as well as longer distance travel choices. The demand for cycling facilities within the University community as well as the suitability of the campus for AT travel modes is evident in the establishment of the UNB Bike Patrol which was initiated in 2001 and operates on campus from early spring to late fall.

AT was recognized in the 2003 UNB Fredericton Campus Plan designed to provide a conceptual physical development framework and as stated on the UNB website, to "facilitate campus development as the opportunity occurs, addresses issues such as building sites, parking, road and pedestrian circulation routes, campus gateways, interfaces with the surrounding community, environmental issues, safety and aesthetic quality of the buildings and landscaping."
The University has recently adopted a new Land Management Strategy for all of its holdings (including the Woodlot in Fredericton). UNB has been experiencing pressure in recent years to better allocate its land resources in terms of use and management.

Exhibit 2.3 presents the UNB strategy for responsible land development that will be carried out under strict principles of appropriate design and long-term sustainability. The Land Management Strategy designates 50% of the Woodlot (four times the size of Odell Park) as endowment conservation lands while opening up the remaining areas to development proposals. Limited areas of the land are now in the process of being developed for commercial and residential occupation with a 270 acre initial concept plan brought forward by the University in 2005.

All development within the Woodlot is subject to guiding principles that govern the determination of the best use of UNB's land endowment and the administration of the land management strategy. The adopted guiding principles include:

1. View Land as an Important Endowment Resource
2. Support Teaching and Research
3. Sustain and Increase Land Endowment
4. Plan Strategically
5. Practice Responsible Stewardship
6. Strive for Excellence in Design and Development
7. Enhance UNB's Reputation
8. Enhancing Neighboring Communities
9. Investigate Partnerships
10. Seek Multi-Pronged Solutions.

Regarding the Fredericton Trails/Bikeways Master Plan, the designated heritage conservation lands are based on ecological and environmental planning principles and do not follow the existing informal hiking/walking trails on the site. The designation includes provisions for trail development in a buffer area between the conservation and development zones but, at the present time, UNB does not have the capacity to manage a large recreational area like the Woodlot and does not actively encourage or discourage the use of land for recreational purposes.

According to the UNB Manager of Real Estate and Planning, the University has a willingness to be recognized as a part of the overall Fredericton AT network (including both the campus and Woodlot lands). This involvement will require future discussions between UNB and the City of Fredericton as to how AT connections may be achieved, promoted and managed as potential travel corridors.

Exhibit 2.3
UNB Woodlot

2.5 Consultation Findings

The consultation program for the Trails/Bikeways Master Plan has focused on obtaining input from stakeholders such as trails groups, bicycle clubs, City staff, mobility challenged users, and large institutional land owners such as UNB.

Summary of Key Findings

Consultation meeting and presentations have included:

November 30, 2006 – Kick-off Meeting with City Staff
December 13, 2006 – Stakeholder Drop-in Session and Group Discussion
December 14, 2006 – Focused Discussion Meeting with City Staff
January 10, 2007 – Stakeholder Presentation and Focused Discussion
February 15, 2007 – Draft Network Review Meeting with City Staff.

There is a high level of community-wide support for an integrated Active Transportation Plan from both current and potential users that meets the needs of various age groups, user types (walkers, cyclists, etc.), special needs populations (including mobility challenged), youth, students and visitors.

In addition to network discussions, the consultations covered a wide range of policy, operational and funding topics. One topic that was discussed was the recommendation to build the neighbourhood AT network within 550 metres (walking distance for an average user) of schools, transit terminals, recreation facilities and other local destination areas wherever possible. Although some questions were raised as to the effectiveness of the measure, basic agreement was obtained when travel data was explained to the participants.

The need to integrate the Master Plan into the City's bus network was also discussed during the consultations. While Canadian data is limited, the comprehensive 2001 National Household Travel Survey suggests Americans who walk to and from public transit facilities or bus stops have an average (mean) physical activity time of 19 minutes. While this study is U.S. based, it does indicate the need to focus the AT Plan on effective links to transit facilities within a 20 minute walking distance (10 minutes each way) to capture up to 50% of the targeted population. Beyond a 25 minute walk, the number of transit users drops significantly. The average person walks 50 metres per minute which translates into a 500 metre distance to a transit facility or stop. Taking into consideration an overall aging population, a 550 metre "tipping point" (preferred maximum distance from the AT network to public transit stops) was considered by participants in the consultations as a reasonable distance for Fredericton.

At various times in the consultation process, participants were asked to answer a number of focused questions designed to determine their preferred vision for the Master Plan and to identify specific attractions and barriers that the network must address. Questions asked of City Staff and stakeholders included:

1. What are the top three outstanding features of the existing Fredericton Trails/Bikeways system?

2. What are the top three challenges or issues for the existing Fredericton Trails/Bikeways system?

3. What key priorities should the new Master Plan address?

4. Describe in your own words your "vision" of an ideal future for the Fredericton Trails/Bikeways Master Plan.

A summary of responses is presented on a topic by topic basis.

Stakeholder Sessions

A. What are the top three outstanding features of the existing Fredericton Trails/Bikeways system? The responses resulted in 12 outstanding features.

1. "Train Bridge" - The "Old Train Bridge" pedestrian/bike trail link was identified as the central hub of the City AT network. It is used by residents and visitors of all ages as a travel route as well as a gathering place and forms the only exclusive non-automobile river crossing in the area.
2. The "River Walk"/Green - This area (South Riverfront Trail) is heavily used by residents traveling to and around the Downtown Core.
3. The security of off-road trail links - Despite some concerns being expressed regarding evening security, overall, the system has a good reputation.
4. Trails linking to City limits and potential connections with regional and/or provincial systems.
5. Trail connections to and within municipal parks.
6. The system connects many destinations.
7. The system is easy to use and inexpensive (no user fees).
8. Winter grooming of some links allows multi-season use.
9. The potential to increase municipal revenues through events such as the Fredericton Marathon and general tourism.
10. The system currently attracts non-resident users.
11. Trail "loops" with no backtracking required.
12. Current users regularly employ a form of an unofficial "park and ride" system - Residents from the north side of the City will park their cars at the north side of the Old Train Bridge and walk across for work,

shopping, etc. It should be noted that the lack of parking facilities and unofficial nature of this practice was also mentioned as a challenge for the system.

B. What are the top three challenges or issues for the existing Fredericton Trails/Bikeways system? The responses resulted in eight challenges being identified.

1. "The Hill" - Steep slopes running from the edge of the Downtown Plat toward Highway 8 are a significant challenge to the existing and future system. Although sidewalks exist in some areas, many users will not walk or cycle in this area and find the slopes too difficult for reasonable use. Major travel routes such as Regent Street are located on the hill and carry large volumes of traffic making the possibility for implementing on-road AT travel more difficult again.
2. The enforcement of the "rules of the road" for both cyclists and drivers.
3. A lack of north-south AT links on both sides of the river.
4. A lack of trip-end facilities such as: showers, bike parking, and change rooms. This applies to work trips as well as the general system which lacks on-trail facilities or central shared amenities such as washrooms, information kiosks and shelters.
5. Rural road shoulders are too narrow for riding/walking.
6. A lack of on-road system links.
7. Crossing Routs (old Trans Canada Highway) is very difficult.
8. Municipal standards for storm drains and other facilities are not bicycle friendly.

C. What key priorities should the new Master Plan address? (not prioritized)

1. Trip-end facilities and overall system amenities.
2. Crossing larger roads (safety).
3. Gaps in the current system (Downtown, Victoria Street).
4. Trail to street travel interfaces.
5. Mid-block crossings.
6. Crosswalk signal timing.
7. Hard surfaces for trail links.
   The issue of how best to achieve a system that is attractive to all users and provides ease of travel verses a strong desire to retain a more "natural" system was discussed at length. Potential suggestions included "twinning" portions of the existing trail system to include both hard and soft-top sections so as to provide for running and nature walking as well as inline skating, strollers, etc.
8. Isolated neighbourhoods that are not serviced by nearby trails.

D. Describe in your own words your “vision” of an ideal future for the Fredericton Trails/Bikeways Master Plan. The key vision statements are listed below.

1. Addition of a second pedestrian bridge over the river.
2. Connections with the regional and provincial system.
3. Effective interaction between walkers, cyclists and drivers.
4. Trails and bikeways that do not cross in front of private driveways and/or include a provision for the driveway user to defer to the trail user.
5. Entire City connected and accessible.
6. Connections to nearby communities.
7. Buildings such as the York Street Station (former rail) added to the system as locations for trail amenities, historical interpretation, etc.

Staff Sessions

Key comments received from City Staff are outlined below.
Barriers to System Development:

1. “The Hill”.
2. A lack of an additional bridge crossing.
3. Gaps in the current system (on-road).
4. Access to downtown.
5. Citizen attitude toward cyclists and lack of road rules.
6. The trail lighting issue needs clarification.
7. By-laws do not currently permit motorized patrol vehicles. This could be addressed to allow police ATVs, etc.
8. The highway around UNB is a major barrier and a dangerous crossing.
9. Narrow streets and vehicle speeds.

Potential System Needs and Improvements:

1. Trail amenities need to be included such as phones and power sources for motorized wheelchairs.
2. Parking lots need to be integrated into the system to provide access points as well as natural monitoring, etc.
3. Parking should be provide and/or improved at either end of the train bridge.
4. Year-round trail use should be encouraged by grooming portions of the system.
5. There was no consensus of opinion on the plowing of the central core system.

General Discussion:

1. City buses will all be made wheelchair accessible in the future.
2. Police patrol trails between June and September.
3. All users must be accommodated by the system.
4. Education is an essential part of developing a successful network.
5. Recognition of what may be needed for by-law changes is needed.

6. Cliffe Street (north side) should be a considered route.
7. Skateboards and inline skates are not permitted on sidewalks currently. The City should take a proactive approach to this issue.
8. Curb cuts are being implemented in the City and more are desired.
9. By-laws need to be updated to deal with lanes in linear parks.
10. Potential use of “pocket bikes” and/or motorized “scooters” on trails needs to be addressed.
11. Maple Street to Westmorland St. Bridge areas may need a route.
12. Parking lots need to be included in Crime Prevention Through Environmental Design (CPTED) audits.
13. The College Hill area needs access to the network.
14. Fire Department needs to know how and where they can access trails.
15. All City Departments agreed that a strong educational component is necessary for the project.
16. Tourism potential needs to be expanded.
17. Police suggested that a volunteer trails patrol system be implemented.
18. Bus stops should be included in any trail mapping and possible rest stops and AT routes provided to access them.
19. City employees are currently trained in CPTED and have the potential to access CPTED issues.

2.6 Summary

City policies and provincial legislation provides the regulatory framework for the Master Plan while City Staff and stakeholder participants indicated a high level of community support for the development and implementation of the Master Plan. Safety from automobile traffic and potential crime were identified as concerns but geographical barriers such as “the hill” were stated as being the most prominent and difficult to overcome. Input to the Master Plan supported the initial assessment of the City’s existing system as having strong east-west travel links but lacking acceptable north-south facilities that would serve as both recreational and commuter travel corridors.

Participants were proud of the off-road system the City has and especially the “Old Train Bridge” and riverside park areas currently served by trail linkages. An awareness of the need for AT support infrastructure such as trip-end facilities, staging areas, parking and the like was evident during all consultations as was the need for the network to connect destinations within the urban core with on-road facilities and bicycle lanes and to allow longer distance travel linkages into surrounding communities.

3 Developing the Network

3.1 Introduction

This section outlines the process followed to arrive at the recommended on-road and off-road network. The process initially involved an inventory development and assessment of conditions for both existing and planned AT routes. When sufficient research and ground assessments were completed, a candidate route network was produced and revisited by the SGE Acres Team to solidify routing decisions in detail.

The candidate route network was then further refined into on-road and off-road facilities for all segments and the locations of potential gateways/staging areas were determined. On and off-road segments were then further broken down into draft AT facility types and mapped for additional review. Once the Master Plan facility types are confirmed, the next steps in the process will be to confirm the final network map and develop any supporting measure for development of the network.

3.2 Network Approach

A six step approach was used to prepare the network plan. They are:

1) *Developing A Route Selection Process:* which includes a set of principles that derive qualitative and quantitative criteria to assist in selecting a preferred route and facility type.

2) *Completing an Inventory and Assessment of Existing Conditions:* which compiles and digitally maps all existing or previously planned pedestrian, trail and on-road and off-road cycling facilities to establish a base condition. This includes a mapped inventory of user destinations and barriers to AT travel within Fredericton.

3) *Identifying and Assessing Candidate Routes:* which involves selecting and investigating potential AT routes and evaluating each to determine its feasibility of inclusion as part of the recommended network.

4) *Suggest Route Networks:* which involves mapping each network and system for review.

5) *Determining Facility Types for Selected Routes*: which involves choosing an appropriate facility type for each route or system and illustrating this on a map.

6) Selecting the Network Plan.
Once work is complete on route selection and facility type determination, these system segments are re-amalgamated to form the recommended AT network plan.

3.3 Route Selection and Evaluation Criteria

The route selection process is based on a set of principles from which the location of appropriate routes and the preferred facility type are selected. The following is the list of principles that were used to evaluate the existing network and recommend new or upgraded routes:

Attractive: AT routes should take advantage of attractive and scenic areas, views and vistas.

Diverse: The AT network should provide a diverse range of route options and experiences for users.

Visible: The AT network should be a visible component of the transportation system.

Connected: All cycling, pedestrian and trail routes should be connected to form an overall AT network that fully services existing and future developments. The AT network should connect key gateways throughout Fredericton and the surrounding region through a “spine” of on-road and off-road facilities.

Accessible: Routes and facilities should be easily accessible within local districts and neighbourhoods, and provide access to major destinations throughout Fredericton.

Safe: Care should be taken to plan a network which is an attractive and practical option for a variety of users. The network should strive to minimize risk while accommodating a range of ages, experience levels, security concerns and overall travel desires.

Accommodating: New and existing on-road and off-road rights-of-way should be designed to accommodate Active Transportation modes, where feasible.

Integrated: The AT network should be integrated with other modes of transportation, particularly public transit. Primary routes should provide direct access to transit nodes and other major transportation facilities.
Supported: Support services and facilities such as bicycle parking should be available along cycling routes and at destinations. Routes should be selected that provide opportunities to develop supporting facilities.

Distributed: The density of the recommended AT network will be higher in more heavily urbanized areas in order to maximize access to as many destinations by as many users as possible. In downtown areas, cycling facilities should be located at a density comparable to the existing arterial and collector road network and provide efficient connections to major transit facilities. Non-route amenities such as staging areas should occupy key travel locations and urban entry points that will take advantage of both resident and visitor travel desires.

As illustrated in Exhibit 3.1, a point scale ranking (poor to excellent) was applied to information gathered during field assessments. Various evaluation factors and criteria were considered by the SGE Acres Team to select or reject a potential candidate route and weighed against each other. For example, "Risk Assessment" was viewed as having greater importance in selecting a route relative to "Cost".

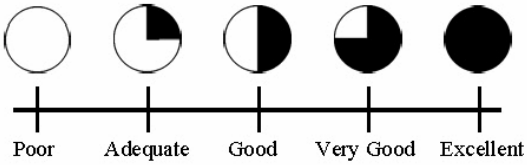
In summary, route selection was based on the experience of the SGE Acres Team, decisions made in the field by City Staff regarding the application of the route selection criteria as well as quantitative information such as traffic volumes, road and rights-of-way width, distance from key destinations and from the next nearest proposed route. Potential routes were screened using this approach and those routes that, in the opinion of the team, were less desirable compared to a similar route, were eliminated from further consideration.

The development of a connected, visible, core AT system that is integrated into the larger Fredericton transportation network and accessible to as many users as possible is the goal of network development. It is also recognized that budgeting and other concerns create an environment which favours the development of a well defined and effectively designed system that all parts of the City can feed into. In this context, the recommended network is the “backbone” and all other AT infrastructure (e.g. sidewalks, streets and trails) even if not officially designated in the AT Plan, reaches into neighbourhoods and communities and still forms an integral part of the larger system.

Exhibit 3.1

Recommended Route Selection Evaluation Criteria

FACTOR	EVALUATION CRITERIA	ROUTE ASSESSMENT	
		Route A	Route B
Risk Assessment	♦ Are there numerous mid-block or railway track crossings? ♦ Is there a high volume of automobiles, trucks and transit vehicles? ♦ Is there sufficient right-of-way width to accommodate trail connections? ♦ Does the route provide a safe crossing of major barriers? ♦ Are there poor sight-lines? ♦ What is the posted speed limit of the route, if applicable? ♦ Can the route accommodate any preferred facility type?		
Connectivity/ Access	♦ Does the route provide a vital connection to existing routes and trails? ♦ Does the route provide direct access to major destinations and connect major nodes throughout the town? ♦ Does the route connect to municipal networks, supporting services and facilities?		
Convenience	♦ Does the route include adequate traffic control devices to cross intersecting roads? ♦ Are mid-block crossings possible where demand warrants? ♦ Is the route a potential part of the "Spine" network? ♦ Does the route provide a direct path to the destination(s)?		
Attractiveness	♦ Does the route provide access to Fredericton's scenic routes, vistas and destinations? ♦ Is the route highly visible? ♦ Does the route provide diversity of user experience?		
Cost	♦ Is the route the most cost-effective solution? ♦ Is there the ability to reduce costs by combining route development with existing road works?		
Route Alignment	♦ Is the road right-of-way width sufficient to accommodate cycling facilities or does it require widening? ♦ Can potential existing barriers be overcome? ♦ Is the location suitable with respect to adjoining land uses, potential environmental considerations or other land use issues?		
DECISION		 Route Recommended	 Route Not Recommended



3.4 Barriers and Destinations

Exhibit 3.2 provides a summary of major destinations and physical barriers to AT route development in Fredericton. The Municipal Plan, parks mapping, air photos, tourism maps, topographical mapping sources and groundproofing were among the major inputs. Comments from stakeholders and City Staff were also included.

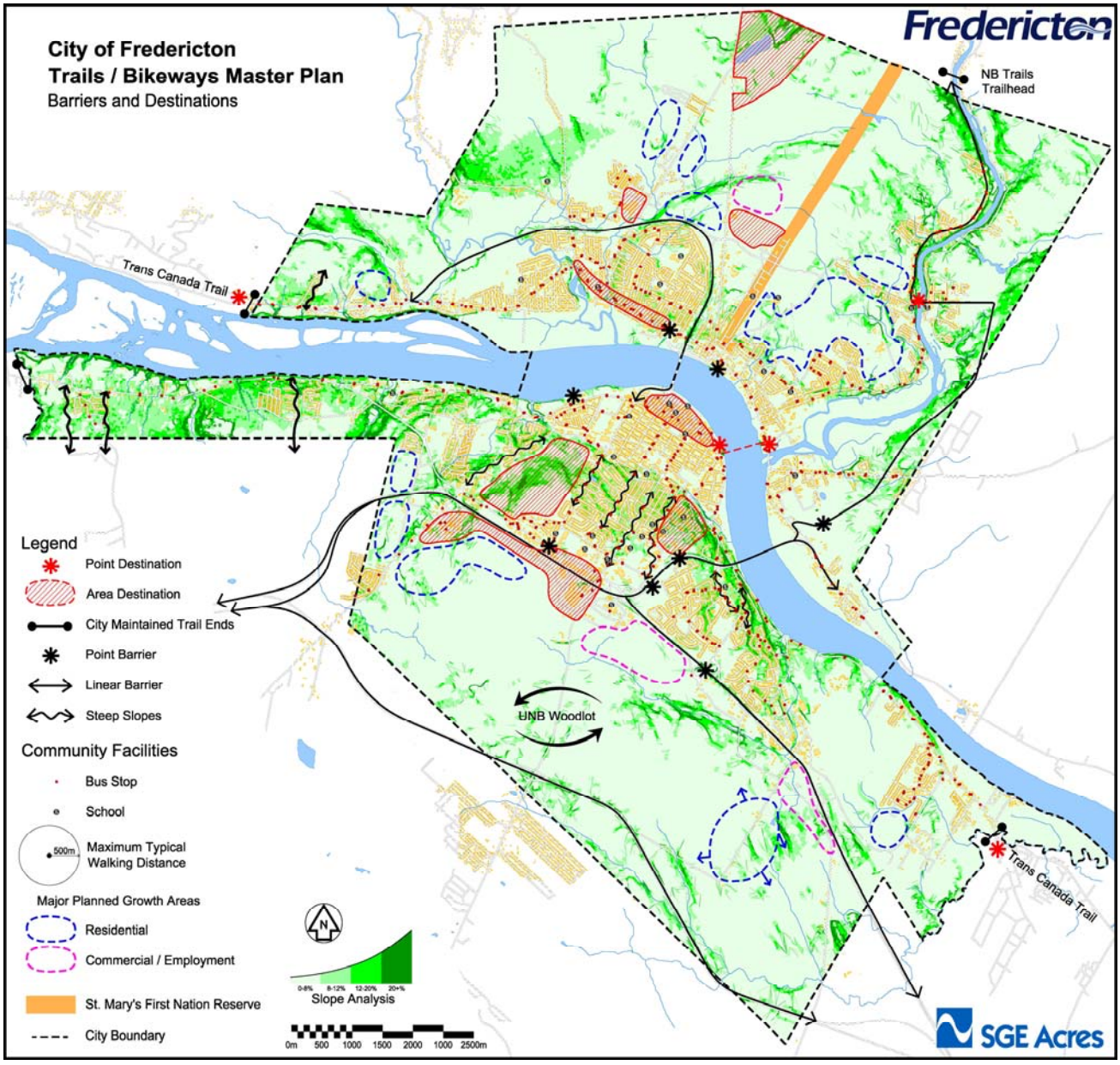
Mapped destinations take in a wide range of specific point, as well as larger area destinations that appeal to a variety of users. Major commercial and employment areas, the pedestrian bridge, the UNB campus and TransCanada Trail connections as potential trailheads were identified. Major residential and commercial/employment growth areas were also mapped to provide information on the future AT needs of the City.

Barriers, as with steep slopes, are also generally defined as either physically linear or point specific in nature except that they create challenges to the creation of an effective Active Transportation network. Physical barriers can often be overcome through engineered solutions or alterations to the existing transportation system, while making the system attractive and practical enough to attract and retain new users is more a function of the overall strategy. Topographical barriers within Fredericton are less straightforward to overcome. In addition to physical barriers, it is worth noting that social barriers can also be significant obstacles to the success of the Master Plan. Social barriers can include such things as:

- Inadequate knowledge of safe and convenient walking and wheeling routes to schools and other destinations;
- Inadequate skills on the part of AT users to safely share the roads with automobiles;
- Limited awareness on the part of motorists of the needs and rights of walkers and wheelers;
- Lack of support in the workplace for users of AT;
- Lack of encouragement of youth to make regular trips by AT modes;
- Inadequate institutional support, such as inadequate shower facilities or insecure bicycle parking;
- Continued high degree of culturally reinforced dependency on the automobile; and
- Perception of walking and wheeling as a recreational activity.

Exhibit 3.2

Barriers and Destinations



3.5 Crime Prevention Through Environmental Design (CPTED)

Crime Prevention through Environmental Design (CPTED) is another consideration in preparing the network and selecting facility types. CPTED is based on the idea that portions of our physical environment can be manipulated to produce behavioural effects in the people that use and interact within a space. Specifically, it refers to the application of a range of design initiatives and principles to an area or site in order to reduce the incidence and fear of crime and thereby improve quality of life. This can be accomplished by reducing or eliminating aspects of the physical environment that lend themselves to supporting criminal behaviour.

According to the Design Against Crime Research Centre of Central Saint Martins College of Art & Design in London England, the application of CPTED has been shown to reduce crime and the fear of crime in numerous evaluations and to even increase property values and investment in the area it has been applied to.

Fear of crime can often keep people from walking and biking around their community or from using parks or trail systems that remove them from the perceived safety of the automobile. This barrier becomes even more pronounced within certain groups such as women, children, the physically challenged and senior citizens. Tools such as community policing, neighbourhood watch organizations, group travel and public education campaigns all help to address the issue but CPTED offers a unique approach that creates “built in” physical crime prevention elements that exist in and of themselves and are not dependant on the continued vigilance of active organizations and residents.

There are four main CPTED principles:

1) Natural Surveillance – Areas that maximize the visibility of users are less likely to be targets of crime. Design features include adequate lighting, doors and windows facing onto streets and paths, and pedestrian-friendly street and sidewalk design.

2) Territorial Reinforcement – Physical design can help define the limit of public and private spaces. By doing this, facility users develop a sense of territorial control while potential offenders, sensing this control, are deterred.

3) Natural Access Control – Reduces the opportunity for crime by denying access to potential targets and creating a sense of risk in potential offenders. This is gained by designing streets, sidewalks, building entrances and neighbourhood gateways to clearly indicate public routes and to discourage access to private areas.

4) Maintenance – Facilities that are properly maintained are more inviting to users than those that are run down. Well maintained facilities also generally provide a safer environment for users.

CPTED and Active Transportation

The Fredericton Master Plan poses some challenges for implementing CPTED design principles as multi-modal pathways are often through their own nature, large, linear and sometimes removed from the public eye. Many AT users such as hikers and cyclists among others also specifically seek out AT experiences that are not strongly urban in nature and may not follow all CPTED principles such as nature trails and off-road hiking routes. In these cases, it must be remembered that the strict application of crime prevention principles may in fact reduce the quality of a space and discourage use. It also should be noted that when incorporating CPTED principles into the overall design of an AT network, care should be taken to avoid creating sterile and un-interesting routes with little or no natural features. A balance should be struck between aesthetics and safety in the urban to rural segments of the network.

There are examples of various CPTED principles that have been successfully applied to natural and urban AT systems in many municipalities across North America and Europe, and aspects of the Master Plan should then be examined against these ideas during the detailed design and construction stage and adjustments made as may be necessary.

In order for an AT network to be effective, users must feel safe and secure. More specifically:

- Users of the network should be easily visible to people on adjacent roadways where possible.

- Bushes or other shrubbery can provide hiding places for potential offenders; caution should be exercised in their placing. Bushes that are planted further back from paths and sidewalks make it more difficult for people to move unseen.

- Pedestrian and bicycle routes should be located in areas with significant street frontage (and the associated doors and windows) as opposed to streets with few buildings fronting onto them.

- Network facilities should be well maintained. Burned out lights, overgrown paths, or damaged sidewalks/bike routes indicate a general state of disrepair and detract from the feeling of security of the area.

CPTED offers a relatively inexpensive and effective crime prevention tool but should not be thought of as a flawless system. Researchers at the Design Against Crime Research Centre have found that the efficacy of CPTED can be reduced (or increased) by demographic factors (e.g. high densities of people) and socio-economic factors. Social conditions in some circumstances may nurture fear, reduce the inclination of people to intervene in criminal activity and result in the withdrawal of people into the home, which can become heavily fortified.

Additionally, any design process is a continuous learning experience that must be adapted to the local environment and culture in order to be effective. Certain past CPTED measures have resulted in a failure to anticipate criminal actions such as when communal entrance porches encouraged to permit neighbourhood visibility, have let adaptable burglars reach upper windows of residences.

In the more developed urban areas of Fredericton, the application of CPTED principles should also be considered as part of a larger urban design strategy. Successful implementation will then serve to reduce opportunities for criminal behaviour but also enhance and beautify the urban fabric of the City and create even more successful urban spaces. The reduction and possible elimination of crime is an important goal that must be balanced against equally important goals of creating workable, successful and enjoyable spaces for users of the AT network and all residents.

Benefits Of Incorporation

Specific and effective CPTED design guidelines can require a fairly detailed examination of criminal activity by municipal districts, building forms and design challenges to reach maximum effectiveness. Without this level of examination, it is still possible to incorporate safety principles that should be considered when designing any public space and as CPTED is an evolving system, attention should be paid to advances in the field and new research that could impact the effectiveness of design measures. By incorporating CPTED principles and/or auditing procedures into the design of the AT Network, the safety of users (both perceived and real) may be increased. If people feel secure using the network, they are likely to use it more often and in greater numbers.

CPTED principles are also most effective when combined with design decisions which help to accommodate emergency services such as police patrols and fire service responders. This tandem approach to passive security may take the form of providing access points to the network that are reasonably frequent, clearly visible and marked for ease of identification by responders. Other efforts may include providing emergency phones at strategic locations. It is recommended that emergency services be consulted during the detailed development stage of new AT network segments.

3.6 Recommended Network Concept

The concept for the Fredericton Trails/Bikeways Master Plan builds on the existing urban form and development patterns in the City and the needs of users. It recognizes the challenges and barriers that full build-out of the system faces but also the need to integrate new growth areas and to accommodate current commuters, recreational users and visitors as well as to provide an attractive transportation alternative to the private automobile.

The Recommended System Concept, as illustrated in Exhibit 3.3, recognizes that Fredericton has a very good existing off-road system (including abandoned rail lines and a high quality and well used rail bridge) and that the Municipality covers a relatively small geographical area with most of the regional population located within the City's boundaries[9]. The concept intention focuses on:

- Completing key missing connections within the existing system.
- Identifying needed north-south routes.
- Raise standards for items such as gateway treatments, rest stops and other amenities.
- Increasing the network level of intensity closer to the City core.

The recommended *urban core zone* would receive the highest design and facilities treatment with the recommended *urban-suburban zone* maintaining high quality facilities and the recommended *suburban-rural zone* including mainly recreational routes with essential commuter links being upgraded.

The three zones are defined by present urban density, projected AT use patterns and planned future development. They represent a movement from mainly recreational AT linkages in the suburban-rural zone with few higher intensity amenities and incorporating mainly granular surfaced off-road routes into a fully paved off-road system in the urban-suburban zone also including a significant number of bicycle lanes. The core urban zone provides a fully paved off-road system, on-road dedicated bicycle lanes wherever possible and numerous staging area locations. The core urban area is also the recommended zone for the location of any "extra wide" off-road facilities (i.e. to support inline skaters), heavier infrastructure such as pedestrian bridges, specialized trip support services such as vehicle parking and together with the urban-suburban zone, represents the key area for the implementation of an AT promotional campaign. Key, higher quality core-rural connectors are recommended that would provide focused high level routes in and out of the City and utilize planned or existing pedestrian infrastructure to overcome barriers and minimize costs.

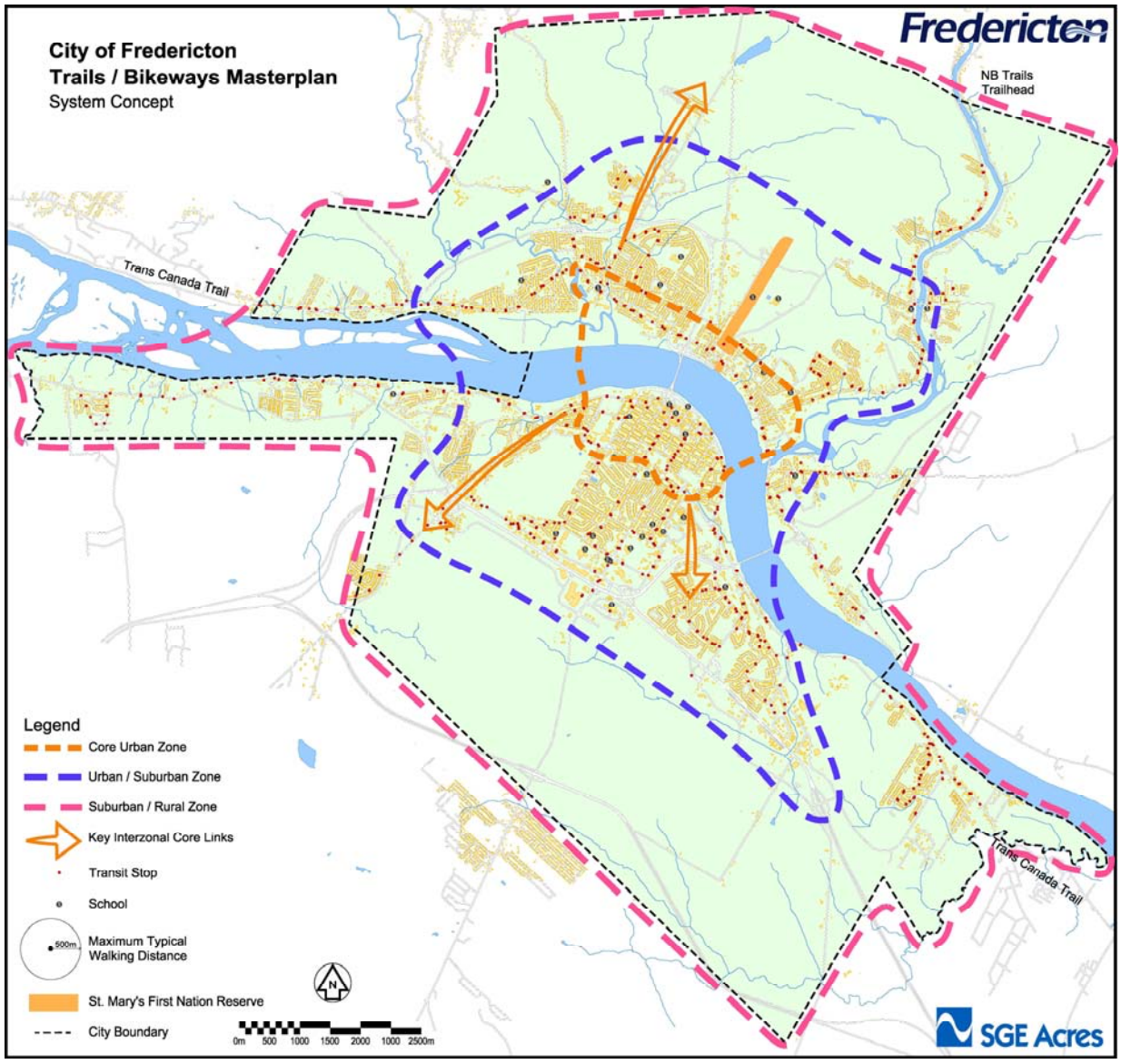
[9] Preliminary data from the 2006 Census of Canada shows the population of the City of Fredericton at 50,535 (6.2% increase from 2001) while the 2006 population of the Fredericton Census Agglomeration at 85,688 (5.3% increase from 2001).

The existing pedestrian bridge provides a solid base for building out from, and typical walking/riding distances from either end of the bridge would allow access to most destinations.

Key strategic decision areas include mainly heavier AT infrastructure such as new bridges, pedestrian overpasses and tunnels that would address the strong desires for AT connections through existing barriers such as provincial highways. This type of infrastructure can be cost prohibitive to install within a short time frame and decisions must be made that maximize potential system impacts and address potential system obstacles.

Two examples of where this type of infrastructure decision should be made include the installation of a grade separated highway crossing allowing direct access to the UNB campus from the city core area and the potential installation of an AT bridge across the river utilizing the old Carlton Street bridge piers. In regards to the Carlton Street bridge, if the piers are determined to be structurally sound, the use of pre-fabricated bridge spans to create a second AT crossing may be a more cost-effective and high impact decision than to attempt to retrofit the adjacent Westmorland Street bridge for effective AT use.

Exhibit 3.3
System Concept



4 Recommended Network

4.1 Community Connectivity

The Trails/Bikeways Master Plan acknowledges that the majority of people who will use AT options will likely do so most often in the immediate proximity of their home, work/school, or shopping locations. Any trip that requires five minutes or less is almost always easier by foot than by car while walking/riding trips of up to 30 minutes in length are common for engaged walkers/riders. The 550 metre typical one-way walking distance included on all project mapping provides a basis from which to build future links and maintain connections with the larger network.

The recommended network recognizes that it is essential for neighbourhoods to be connected internally. Decreased automobile traffic on local streets, replaced by increased AT use, will improve the safety of residents and assist in creating an improved sense of community. For there to be increased AT use, there must be safe, connected routes from where people live to where they wish to go.

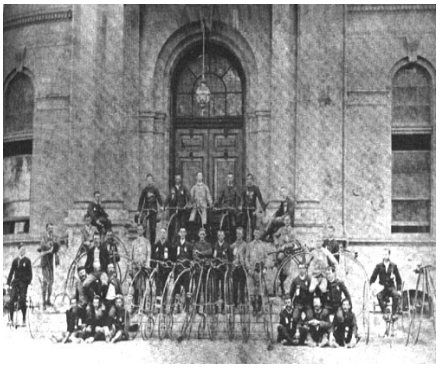
To assist with travel distances for both pedestrian and wheeled travel, access to, and linkages with, transit facilities and proposed transit hubs are provided in the network wherever possible. All transit stops should ideally be connected to walkways and sidewalks and land use controls and regulations updated to include provisions for the development and maintenance of the planned network. Community off-road trails and on-road facilities are an integral part of the urban fabric and must be planned for the efficient movement of people for utilitarian as well as for recreational purposes. AT routes must be developed on par with sidewalks and roadways for the future system to reach full potential.

Ideally, in new development areas, AT facilities should be constructed prior to or in conjunction with the construction of other infrastructure and built structures. Where trail and on-road construction does not follow this level of priority, there can be conflicts with existing residents who may have misconceptions about the effects of AT development on their lifestyles and property values.

4.2 Network Facility Types

The recommended Trails/Bikeways network includes AT routes throughout the City based on a series of hierarchical facility types. Facility types are broken into two basic categories of on-road routes and off-road routes and are further subdivided according to type of use expected and encouraged, expected volume of users, available space and ROW constraints, type of route (commuter vs. neighbourhood, etc.), and relationship to the overall

Master Plan in terms of maintaining important City-wide connections and ease of transition from one facility type to another.



For the purposes of the Master Plan, two “design vehicles” or modes are used to act as the primary form of transportation that must be considered. The two design modes are cycle-based and pedestrian-based and are not intended to be exclusive but represent the majority of AT facility users and most other user categories will be accommodated by the requirements of each. Skateboarders, inline skaters and cross-country skiers have special design requirements which should be considered when designing a trail or other off-road facility. As may be the case with certain areas of the Fredericton network, such as the South Riverfront Trail, expansion of the standard recommended trail width should be considered in areas in order to accommodate high volumes and uses such as inline skating.

The recommended facility types for AT routes in Fredericton include:

Off-Road

1. Multi-use Trail A. (hard top, asphalt or concrete surface).
2. Multi-use Trail B. (soft top, granular surface).

On-Road

1. Bicycle Lanes (standard lanes, contra-flow facilities (opposite running bike lanes on one-way streets) and lanes with on-street parking).
2. Paved Shoulders (usually most suitable for rural highways and commuter routes).
3. Signed-only Routes (most suitable for routes that are “local” in nature and consist of no formalized separation of cycle traffic from automobile).

There are various individual design treatments for each category which may be appropriate in specific areas of the City. Recommended design guidelines for each facility type as well as associated AT infrastructure features are included in Section 5 of this document.

4.3 Gateways

Gateways are important stationary positions that serve to both inform users and highlight the AT system, amenities and other items as may be appropriate. They indicate network locations that may be significant access points, are a main transition area from one type of travel experience to another and promote the system and destinations it leads to.

Gateways also offer opportunities to convey safety information, provide user facilities, and promote tourism and general area attractions. They can be designed very simply as signage only or be created as rest areas with seating, landscaping or even telephone and drinking water access. For example, if

designed with consideration for local historic attractions, gateways can also be themed to passively promote segments of the travel route or link with larger system or Municipal branding initiatives.

As indicated on the On and Off-Road Network map (Exhibit 4.1), gateway locations have been recommended based on natural features and views. This creates a sense of transition and user expectation when moving into the more urban areas of the City, transitioning from either end of the TransCanada Trail and the main AT routes in and out of the City. The more internal gateway locations include opportunities to capitalize on heavily traveled areas such as the riverfront, take advantage of historic attributes of the City and to build more sophisticated network facilities at key travel points such as near the UNB campus and at either end of the pedestrian bridge.

4.4 Network Mapping

Exhibit 4.1 represents an AT network that has been planned, groundproofed, revised and reconfigured to provide a solid vision for the end system that works within the realities of strategic Municipal priorities. The network includes locations for system gateways and illustrates on and off-road routes within the original network concept and adhering to physical realities. The map is intended to illustrate a complete future system and includes existing, currently proposed and various new routes. Informal UNB Woodlot walking trails have not been included as part of the system in order to illustrate their unique legal and ownership status and to comply with the expressed wishes of the University.

Exhibit 4.2 builds on Exhibit 4.1 by further defining the network in terms of not only on and off-road designations but types of facility treatments within each class. Exhibit 4.2 illustrates the recommended Fredericton Trails/Bikeways Master Plan. This Master Plan incorporates all official AT routes in the City and is intended to be the final network plan to be worked toward over the course of implementation and future planning.

The overall system is based upon the principal of providing neighborhood connectivity within a framework of on-road and off-road routes that connect communities within Fredericton as well as neighbouring areas. The Master Plan is designed for integration with the Municipal Plan, particularly with respect to transit systems and residential growth. In addition to the recommended network plan and as mentioned in Sections 5 and 6 of this document, other complementary initiatives are recommended to increase non-motorized travel in the City. These complementary initiatives should include adequate parking and trip-end facilities for commuters, streetscaping that creates AT friendly environments, the application of CPTED principles in detailed design and a transit system that is supportive of AT, among others.

Exhibit 4.1

On & Off Road Network

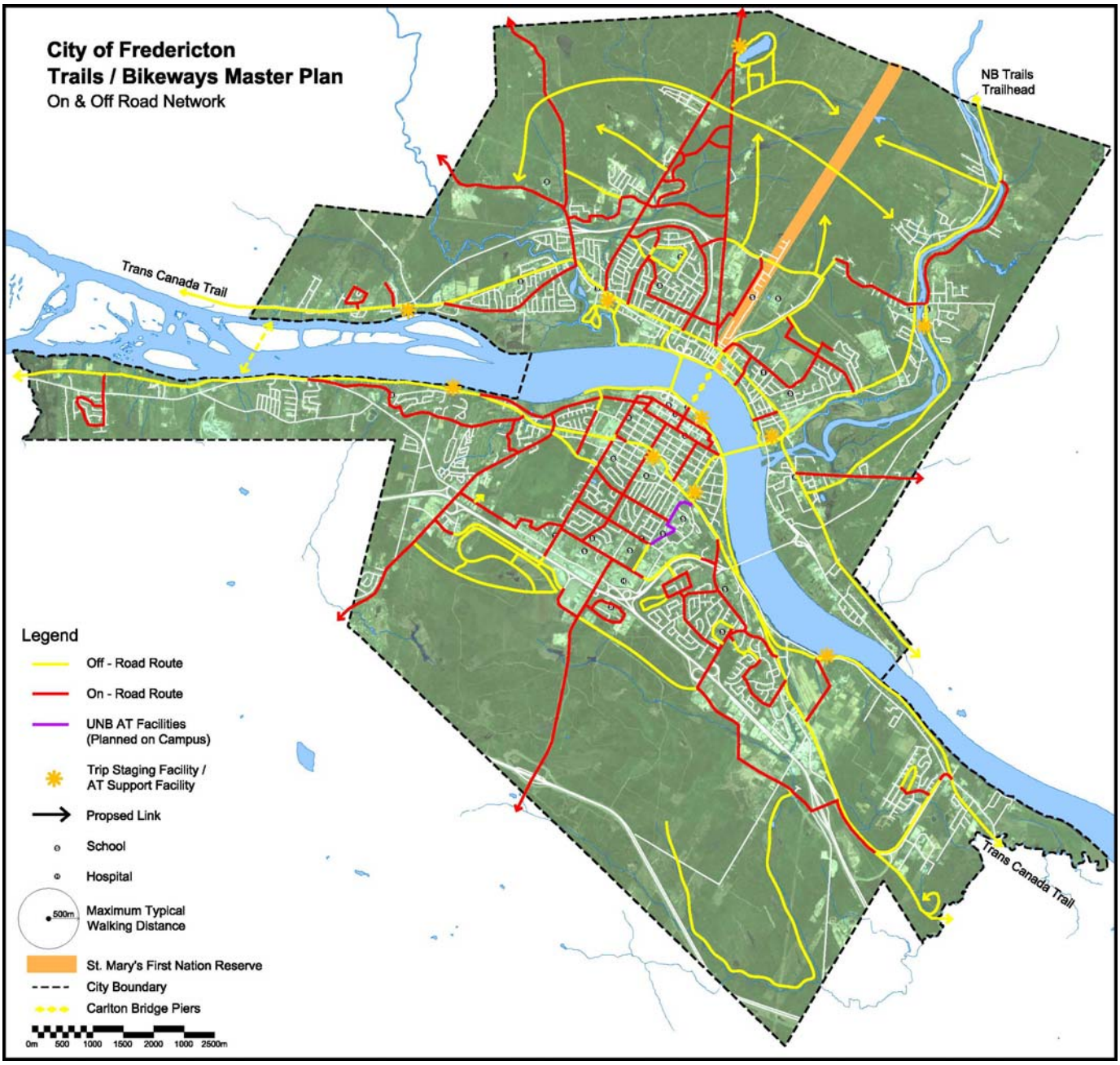


Exhibit 4.2

Route Facility Types

5 Design Guidelines

5.1 Network Facilities

The two basic classes of AT routes that have been determined for Fredericton include off-road and on-road facilities with various design sub-groupings within them. Off-road facilities refer to routes that operate on their own right-of-way, independent of the existing street network, while on-road routes refer to network facilities that operate on or along existing roads and are incorporated into the present or future street system. Off-road routes typically operate through open spaces, woodlots, valley and parklands, as well as power or transportation utility corridors and stormwater retention areas.

Design standards associated with each "class" of facility are subject to a number of factors including site conditions, location, potential level of use, and existing or appropriate materials. Connections between different facility types should be provided at locations where the two different classes of facilities intersect and may require special design treatments such as ramping or pavement markings to assist with the transition from one to another. This section sets out a series of design guidelines for each class of facility and the sub-groupings as identified on the Route Facility Types map.

5.2 Standard Bicycle Lanes

A bike lane is defined as a facility located in the travelled portion of the street or roadway and is designed for one-way cyclist traffic. Bike lanes are defined on the road through pavement markings and signage. The following guidelines relating to bike lanes are presented as options, and may not necessarily indicate the final treatment that would be appropriate in parts of Fredericton as this would depend on local conditions.

Fredericton should adopt bicycle friendly design guidelines for all streets, whether a road is designated as part of a cycling network or not. Bicycle friendly roadway features typically include, among other things, wide curb lanes plus drainage grates that are bicycle friendly and ideally located out of the desired path for cycling. Other features include traffic control devices that are programmed with bicycles in mind, particularly detector loops that have their sensitivity adjusted to allow bicycles to actuate a traffic signal.

The minimum design width for a bike lane on a street with an urban cross-section without on-street parking should be 1.5 m from the face of the curb. A preferred width of 1.8 m is recommended, especially on roadways with higher AADT's, speed limits, and commercial vehicle volumes (trucks / buses) such as those on busy arterial roadways. This is consistent with TAC guidelines.[10] Bike lane widths of 2.0 m should be considered on roads with

[10] Geometric Design Guide for Canadian Roads, TAC, 1999. (TAC Table 3.4.6.2)

motor vehicle operating speeds, or posted speed limits between 60km/h and 80 km/h. Bike lane widths should not exceed 2.2 m because the excess width may encourage motorists to drive in the bike lanes, since they will be wide enough to accommodate a motor vehicle.

Lane widths less than 1.2 m should not be designated or signed as bike lanes except for short distances when constraints may make it necessary. When the available lane width narrows below 1.2 m, bike lane signs and pavement markings should cease, and a Bike Lane Ends sign posted (refer to TAC Bikeway Traffic Control Guidelines for Canada).[11] Table 5.1 summarizes the widths of bike lanes recommended for various circumstances.

Exhibit 5.1 Bike Lane Classification

Classification	Minimum Width	Desired Width
Standard Bike Lane.	1.5 m	1.8 m
Bike Lane Adjacent to On-Street Parking Aisle.	1.5 m	1.8 m
Bike Lanes on Rural Roads with Posted Speed Limit between 60 - 80 km/h.	1.5 m	2.0 m
Bike Lanes in Constrained Right-of-way.	1.2m	1.5 m

On-road cycling facilities are not recommended on roadways with posted speed limits greater than 80 km/h and bike lanes in constrained rights-of-way are not recommended on high-speed roads (>50 km/h) with heavy commercial vehicle or truck percentages (> 12%) and/or AADT's (>3000).

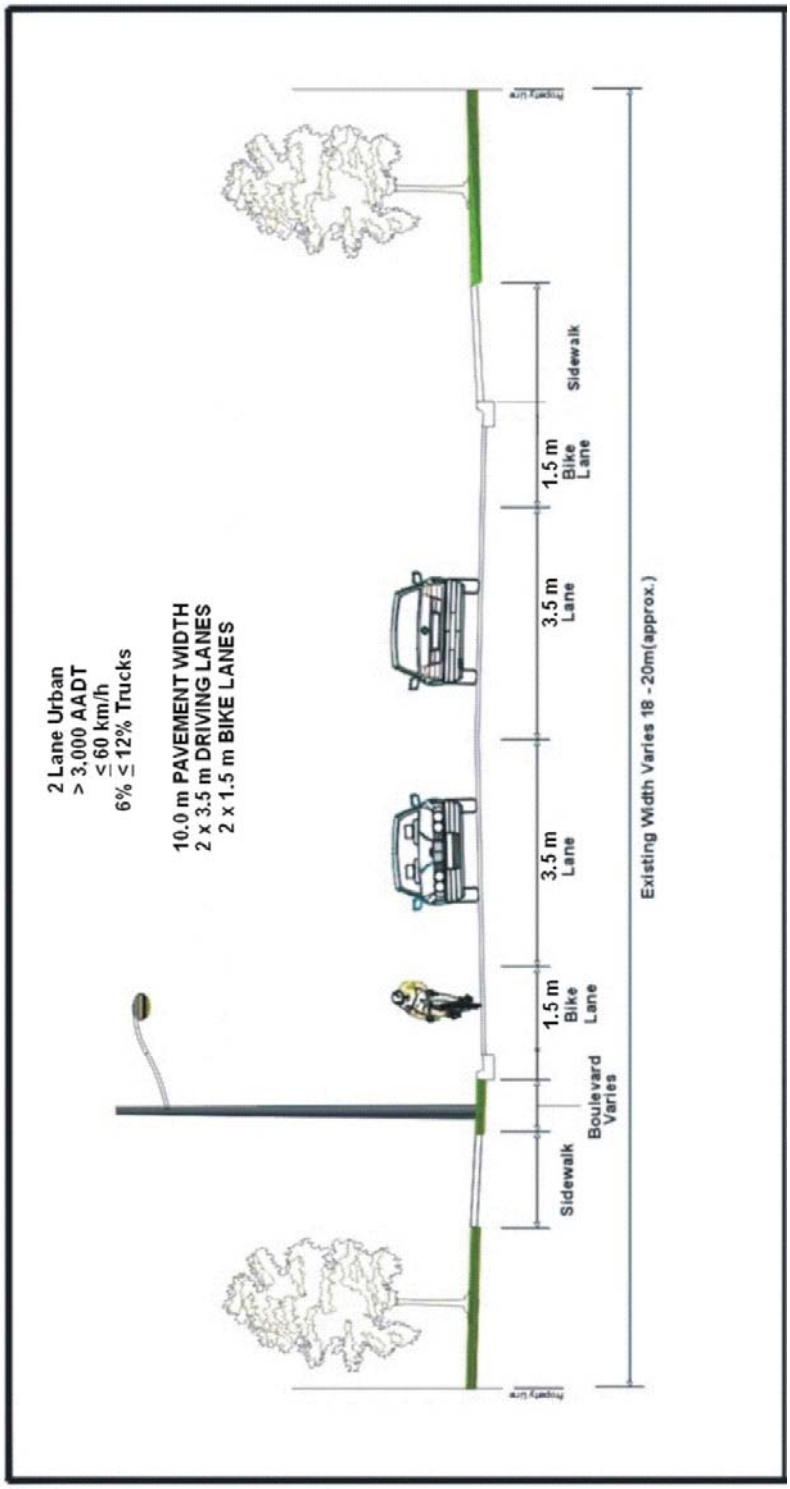
If the edge line does continue along a roadway following the termination of a bike lane along with the cycling route, and the available lane width between the edge line and the shoulder / curb of the roadway is less than 1.2 m, then the edge line should be removed or, as a minimum, be allowed to wear off. The risk is that cyclists may attempt to ride in the space provided by the edge line although it is less than 1.2 m in width. Cyclists should not be encouraged to ride in this constrained space since a cyclist who accidentally strikes a curb may "bounce" back into the motor vehicle travel lane. Therefore, curbed roadways with edge lines less than 1.2 m from the face of the curb should not be signed or marked as bike lanes. Once the edge lines have been removed or have worn away, bicycle route signs supplemented by "share the road" signs should be implemented.

[11] Bikeway Traffic Control Guidelines for Canada, Transportation Association of Canada (TAC), (1999).

Exhibit 5.1 illustrates a typical urban road cross-section standard modified to accommodate bike lanes.

Whenever possible, it is recommended that bike lanes be provided on all collector and arterial roads designated to have cycling facilities, provided that there is sufficient roadway width and AADT volumes and commercial vehicle percentages are within acceptable limits. After review, in locations where a bike lane may not be deemed feasible, consideration should be given to providing a Signed Bicycle Route.

Exhibit 5.1 Example of an Urban Cross Section with 1.5m Bike Lanes



Bike lanes are typically recommended where feasible for collector and arterial roads designated to have cycling facilities. In locations where a bike lane is not deemed feasible following a review, consideration should be given to providing a wide curb lane. If this is not possible, as a minimum, a Bicycle Signed-Only Route should be provided if thresholds permit. Efforts should be made to provide as high level of facility type as possible at all times.

Accommodating inline skaters as well as other potential future travel modes should be a priority under the Master Plan wherever possible. Considering the additional space requirements, it is recommended that any inline skating routes be designated as portions of the off-road network. It must be recognized, however, that inline skaters may prefer to use a bike lane even though the design dimensions used in this report are specifically tailored for a bicycle as a design vehicle.

Inline skaters require more maneuvering space than pedestrians or wheelchair users to allow for the avoidance of hazards and other users. Additionally, inline skating is typically a meandering activity, requiring extra maneuvering space. The minimum recommended operating space for an inline skater is 2.3m. This is based on the average pedestrian space requirement, plus an additional maneuvering allowance of 0.4m on either side. Exhibit 5.3 from the Design, Signage and Maintenance Guidelines, Waterfront Regeneration Trust, 1997, illustrates the typical operating envelope for an inline skater.

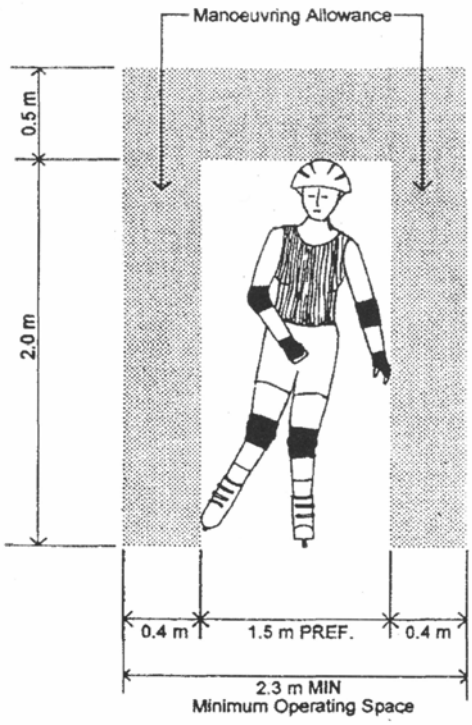


Exhibit 5.3: Inline Skater Operating Spaces

5.3 Bicycle Lanes with On-Street Parking

Bike lanes on roads with on-street parking are located to the left of and adjacent to parked vehicles along the curb. Designing this type of cycling facility must take into consideration the potential hazard to cyclists of car doors opening into the travelled portion of the bike lane and overall, the facility is not as desirable as a standard bicycle lane designation. In order to allow clearance for vehicle doors, and to minimize collisions with cyclists, the combined bicycle/parking lane should be a minimum of 4.0 m wide. This width allows for a 1.8 m bike lane and a 2.2 m wide curbside-parking stall. The extra distance added to the typical 2.0 m wide parking stall provides space for the opening of car doors, and encourages cyclists to travel a safe distance from the parked vehicles. Exhibit 5.4 illustrates an example of bike lanes adjacent to on-street parking. As an alternative, the width of the bike lane may be reduced if the parking aisle is greater than 2.4 m wide.

Bike lanes on roads with on-street parking should be considered in commercial and residential areas where the demand for and turnover of parking is high, and where commercial and residential property owners may not accept the reduction or prohibition of on-street parking.

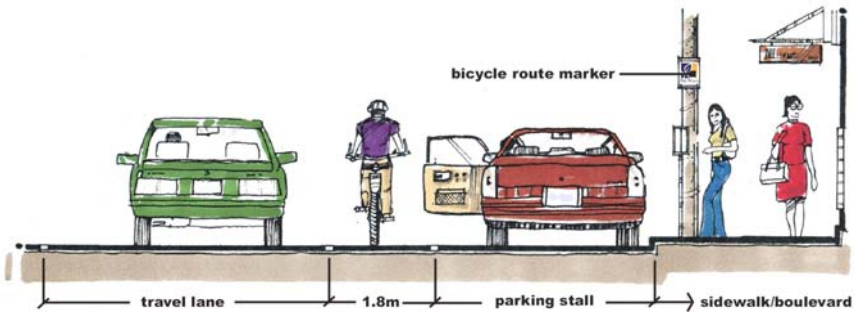


Exhibit 5.4 Typical Bike Lane with On-Street Parking

Where it is not feasible to install dedicated bike lanes, the applicability of a signed route or a multi-use boulevard trail should be evaluated. Other route alignments may also need to be considered.

Where the road right-of-way or other factors limit the opportunity to provide parking bays, standard on-street curb parking should be assumed. For both applications, the desired width of the parking lane should be a minimum of 2.2 m, with the adjacent bike lane 1.8m.

5.4 Multi-use Trails/Two-way Bikeway Boulevards

Two-way bikeway boulevards are constructed within a road right-of-way, typically in place of a sidewalk, though where space permits a separate facility adjacent to a sidewalk may be considered.

Two-way bikeway boulevards are typically located on one side of a roadway, as illustrated in Exhibit 5.5. Although constructed within the road right-of-way, boulevard bikeways should be separated from regular motor vehicle travel lanes through either a change in roadway elevation (a boulevard bikeway is usually placed at the same height as a sidewalk) and / or by concrete barriers, medians or bollards.

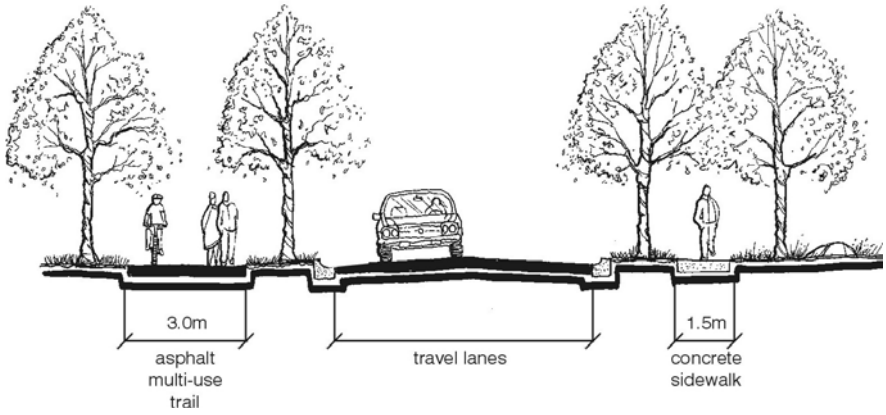


Exhibit 5.5: Schematic of a Roadway with a Two-Way Bikeway Boulevard

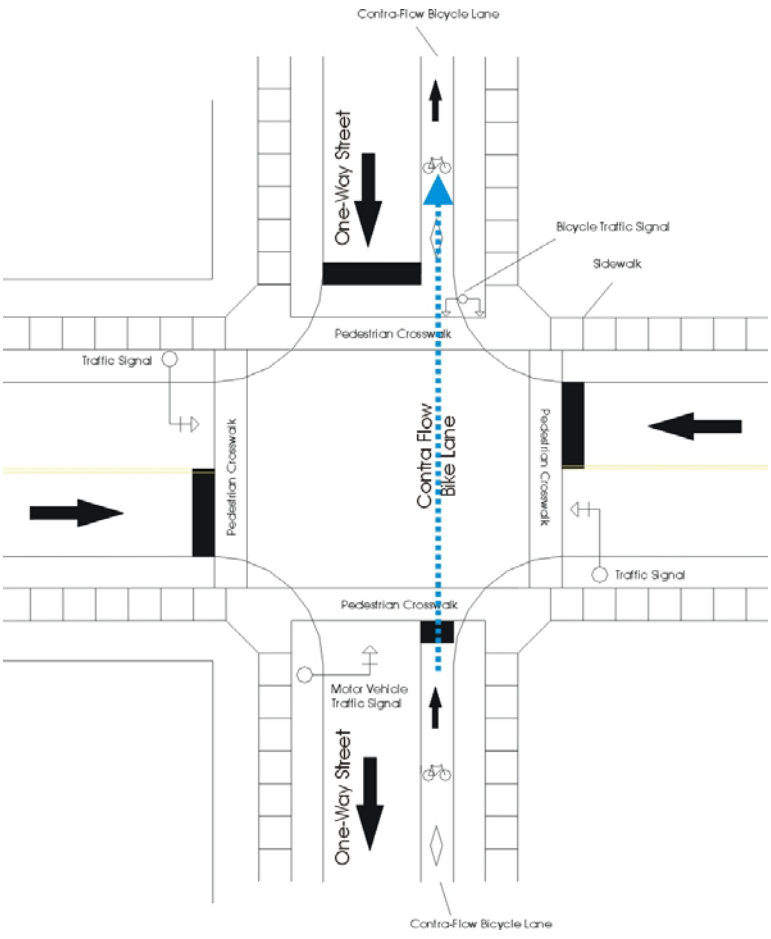
More costly than other cycling facility types to implement and maintain, the application of two-way bikeway boulevards should be used along primary recreational corridors, reverse frontage lotting, and segments where there are few if any mid-block driveways.

Appropriate signing at intersections where two-way bikeway boulevards are present is very important to warn and provide clear direction to both motorists and cyclists as to where they should proceed when traveling through an intersection. Travel corridor widths for bikeway boulevards need to accommodate multi-modal, bi-directional traffic usually consisting of both pedestrians and cyclists and should therefore reflect the requirements of an off-road multi-use trail. A minimum width of 3.0 – 3.4 metres is recommended.

5.5 Contra-flow Bike Lanes

Contra-flow bike lanes on one-way streets carry cyclists in the direction opposite motor vehicle traffic. These lanes may be considered in locations where there are a series of one-way streets and no other feasible alternate cycling route connections exist. Design considerations such as lane widths, horizontal and vertical curves for contra-flow bike lanes are similar to those of standard bike lanes with the exception that signing along the route indicates that the lane is contra-flow. One-way streets with two-way cycling facilities allow cyclists to travel in both directions along the roadway with a contra-flow lane on the left side and a standard bike lane or shared roadway facility on the right. Exhibit 5.6 illustrates a typical schematic for a contra-flow bike lane.

Exhibit 5.6 Contra-flow Bicycle Lanes



5.6 Paved Shoulders

A Paved Shoulder cycling route is located on roads with rural sections and no curbs. When off-road routes are not feasible or desirable, paved shoulders or bike lanes should be considered to establish key connections between adjacent systems and to facilitate utilitarian use. On rural roads, a marked edge line should designate a paved shoulder. Signs should also be used to indicate the presence of cyclists. Exhibit 5.7 illustrates a typical paved shoulder bicycle route facility.

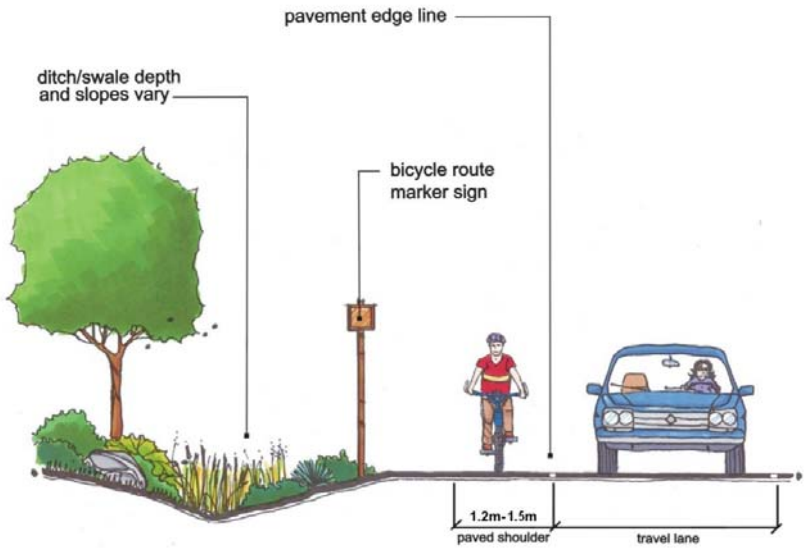


Exhibit 5.7 Typical Paved Shoulder

The TAC (Geometric Design Guide for Canadian Roads, GDGCR) provides standards for shoulder widths for undivided rural highways based on design speed and AADT volumes. Although these standards are not specifically intended to incorporate on-road cycling facilities, the widths recommended are in some cases sufficient to accommodate a 1.2m to 1.5m paved shoulder cycling route and 0.5 m to 1.0 m for additional granular shoulder width. On rural roads with speed limits in excess of 60 km/h, a 2.0m paved shoulder with and adjacent 0.5m granular shoulder width is preferred. Exhibit 5.8 illustrates the shoulder of a typical roadway platform.

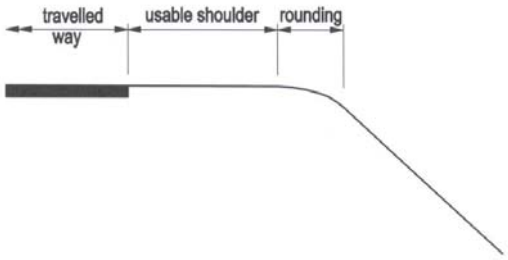


Exhibit 5.8 Typical Roadway Shoulder

Paved shoulder cycling routes should have a preferred design width of 2.5 m, including 1.5 m to 2.0 m of paved section and 0.5 m to 1.0 m of gravel shoulder. In locations where 1.5 m paved section for a paved shoulder cannot be achieved, especially in constrained rights-of-way, a minimum paved shoulder width of 1.2 m with an adjacent granular shoulder of at least 0.5 m is a reasonable compromise. If this cannot be achieved, any additional paved shoulder width is better than none at all in situations where no curbs are present.

The decision on whether to sign a road with paved shoulders that are less than 1.2 m in width as a signed-only bicycle route should depend on the AADT volume and percentage of commercial vehicle traffic that the road experiences, as well as a number of other factors such as roadway geometry, gradients, horizontal/vertical curves and sight lines. Some roads that do not have adequate paved shoulder widths may be designated as signed-only cycling routes if the roadway characteristics permit. Although not to be encouraged, if a paved shoulder width is significantly less than 1.2m, and a cyclist chooses to ride to the right of the edge line, an adjacent gravel shoulder would still provide a “recovery” area.

Paved shoulders also offer an added bonus in the reduction of maintenance costs associated with grading of gravel shoulders. They serve as a refuge for disabled vehicles, accommodate emergency vehicles and extend the life of the vehicle lanes through improving the lateral support for the roadway structure. They can also reduce run-off-the-road collisions. Paved shoulders are recommended on all arterial roads with rural cross sections designated for cycling facilities if exclusive bike lanes cannot be provided.

Paved shoulders on rural roads should not be denoted as reserved bicycle lanes since they must still be used as a refuge for disabled vehicles. If a rural road is upgraded to an urban section (with curbs) the paved shoulders should be converted into bike lanes.

5.7 Signed Only Cycling Routes

Signed-Only cycling routes are bicycle routes designated by bicycle route signing along a street. Signed-Only routes are typically installed local / collector streets. Apart from “bicycle route” or “share the road” signs, there are generally no changes made to the roadway and no separation of a specific bicycle travel route indicated. Signed-Only routes are the least desirable facility type in terms of visibility, potential safety and willingness of new users to travel on them, but they are also the least infrastructure intensive and therefore, the least costly and time consuming network designation to implement.

It is recommended that paved shoulders or bike lanes be provided on all collector and arterial roads designated for cycling facilities which have an adequate ROW. However, Signed-Only Routes can be used on lower volume roads, or on collector or arterial roads as an interim solution or where a road segment has an insufficient ROW.

Streets with signed-only cycling routes should typically only be signed as on-road bike routes if there is adequate pavement width to safely accommodate both motor vehicles and cyclists, and when adequate sight lines, road repair conditions and acceptable AADT volumes exist. Otherwise, alternative routes should be investigated or paved shoulders / bike lanes implemented when the opportunity presents itself at a future date. Roads that are presently not suitable for on-road cycling facilities but are recommended for installation in the future should be upgraded to at least minimum standards before being signed as part of the cycling network.

5.8 Signed Only Cycling Routes with Wide Curb Lanes

Signed-Only cycling routes within wide curb lanes are similar to signed-only cycling routes, with the exception that the travel lane shared by motorists and cyclists is wider than a standard motor vehicle travel lane (> 3.5 metres).

Wide curb lanes should have sufficient width to allow motorists to pass cyclists without encroaching on an adjacent travel lane (if one exists). Wide curb lanes should be encouraged for all road classifications to provide cycling friendly streets, whether they are designated as part of the cycling network or not.

Research indicates that as lane widths begin to exceed 4.0 m, this tends to increase confusion and improper lane use by motor vehicles in congested urban environments, and may encourage unsafe passing manoeuvres in rural environments. In general, it has been concluded that a wider lane will provide a greater level of safety than a narrower lane. The recommended wide curb lane width for roads that are proposed for designation as on-road cycling routes is 4.2 m and 4.5 m.

Signed-only cycling routes along wide curb lanes greater than 4.0m in width should have pavement markings added to the curb lane, such as those illustrated in Exhibit 5.9, to help to deter unsafe passing maneuvers by motorists and increase driver awareness of cyclists on the road. Bicycle route signing should also be applied along the cycling route in the same manner as for a standard signed route.

Exhibit 5.9 Wide Curb Lane with Bicycle Pavement Markings and Signing (City of Ottawa)

A schematic illustration of a typical signed-only cycling route in an urban area with a wide curb lane is provided in Exhibit 5.10

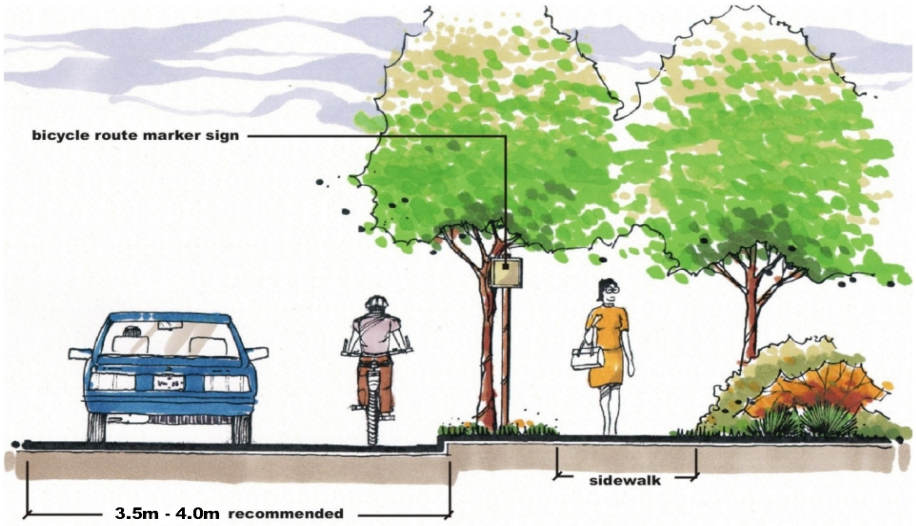


Exhibit 5.10 Signed-Only Cycling Route with Wide Curb Lane

5.9 Multi-Use Trails

Off-road, multi-use trails are the top AT facility category and should be designed to accommodate a variety of user groups. These groups may include pedestrians, hikers, cross-country skiers, equestrians and cyclists. A review of various multi-use trail design guidelines from across North America indicates that standards vary depending upon the route's location, the anticipated number of users and the permitted uses.

In Fredericton's case, standards are recommended based on accommodating as many user groups as possible in urban areas with wide, paved multi-use trails and providing for an expected recreational and tourist user in rural areas with a granular surface. Beyond surface materials, no difference in route widths or general dimensions are recommended.

Multi-use, bi-directional trails that are capable of accommodating cyclists should have a minimum tread width between 3.0m and 3.4m. On popular, heavily travelled multi-use trails, minimum widths of 4.0m to 5.0m are recommended to allow for a wider variety and greater number of users. As multi-use trails can accommodate all users and by their nature allow for minimal conflict with motorized vehicles, they should be considered as the preferred facility type for all AT routes in Fredericton and especially within parks and open spaces as well as rural areas where sufficient space and construction opportunities exist.

Considering the variety of users of a multi-use trail, it is important that the route be viewed as a three dimensional corridor rather than only a surface facility. Sufficient clearance from trees and vegetation, overhead signs, public utilities and other features must be provided both in terms of

horizontal measurements as well as vertical. CPTED considerations should also be a part of any multi-use trail design especially those located away from heavily travelled areas and public view. It is important that safety be a primary concern when developing detailed route designs but as has been mentioned previously, the creation of an enjoyable travel route is also vital. A balance must be struck between aesthetic and natural amenities and user safety. As a starting point, the recommended minimum clear height for a multi-use trail is 2.4m – 3.0m.

A typical cross-section for a multi-use recreational trail is illustrated in Exhibit 5.11.

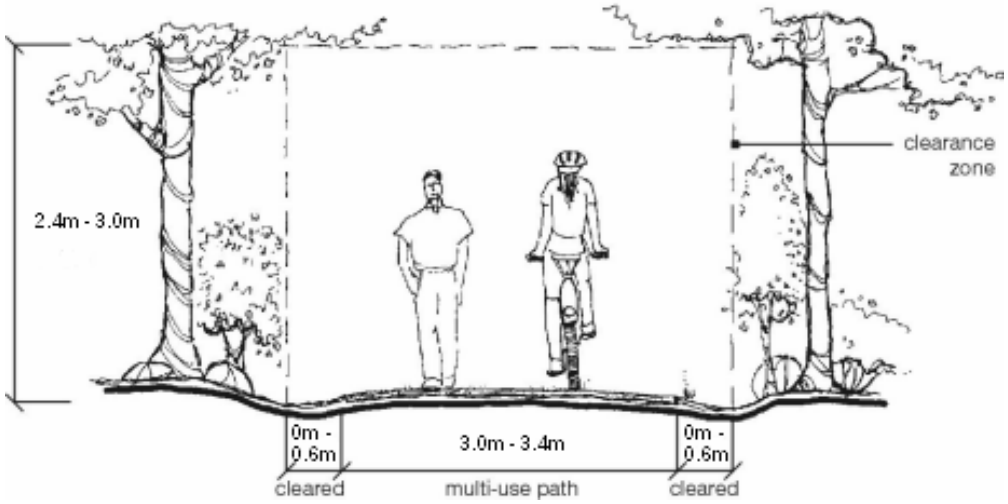


Exhibit 5.11 Off-Road Multi-Use Trail

5.10 Bridge Standards

The design of new structures or the modification of existing bridges must now comply with the standards of the Canadian Highway Bridge Design Code (2002). The following is an excerpt relating to the structure geometry:

"Roadway and sidewalk widths, curb widths and heights, together with all other geometrical requirements not specified in the Code, shall comply with the standards of the Regulatory Authority, or in their absence, with the TAC Geometric Design Guide for Canadian Roads."

"Sidewalks and cycle paths shall be separated from traffic lanes by a barrier or guide rail, or by a curb having a face height of at least 150 mm and a face slope not flatter than one horizontal to three vertical. Sidewalks and cycle paths not so separated shall be designed as part of the roadway."[12]

The TAC Geometric Design Guide for Canadian Roads and the Canadian Highway Bridge Design Code do not provide details on the side clearances

[12] CAN/CSA-S6-00 Canadian Highway Bridge Design Code, Section 1.6.2.1

required on bridge decks. Side clearances are the distance between the edge of the travelled way and adjacent curb or barrier. Where side clearances on a bridge are wider than the approach roadway shoulder width / side clearance, the bridge side clearance should match that of the approach roadway.[13]

Given that the Canadian Highway Bridge Design Code does not prescribe structure clearances and cross section dimensions, examples of best practices are provided from the Ontario Ministry of Transportation's (MTO) August 2002 document, "Revision Information Sheet for Geometric Design Standards for Ontario Highways".

Section D.7.2.3 of this document, which now forms part of the Geometric Design Standards for Ontario Highways, provides the following direction with regard to sidewalks, curbs and bicycle routes on bridges.

- Where required, the widths of sidewalks and bicycle routes on bridge decks should meet the following requirements:
- The edge of a sidewalk adjacent to the roadway on a bridge should match that of the approach sidewalk.
- Where the approach roadway is not provided with a curb, the sidewalk width should be at least 1.5 m.
- Paved bike lane and bicycle route widths should be in accordance with the Ministry's Ontario Bicycle Routes Planning and Design Guidelines.
- Bicycle routes should be at least 1.5 m wide for one-way traffic.
- The height of curbs should not be less than 150 mm above the adjacent roadway except to match the height of curbs on the approach roadway.
- Curbs should not be used in conjunction with barrier walls except where the curb and the barrier wall are separated by a sidewalk. [14]

Section D.7.2.5 of the same source also states that where practicable, underpassing roadway cross-sections should match that of the approach roadway.

Horizontal clearances from the edge of the through traveled way to the face of an abutment or pier should also meet or exceed the minimum clear zone widths specified in the Ministry's Roadside Safety Manual.

[13] Revision Information Sheet for Geometric Design Standards for Ontario Highways, Section D.7.2.2.
[14] Revision Information Sheet for Geometric Design Standards for Ontario Highways, Section D.7.2.2.

Exhibit 5.12 sets out the minimum side clearances at bridges prescribed by MTO.

Exhibit 5.12 Minimum Side Clearances at Bridges

		Urban Roads			Rural Roads		
	Design Speed (km/h)	Left	Right		Left	Right	
			No Sidewalk	Sidewalk		No Sidewalk	Sidewalk
FREEWAY 4-LANE DIVIDED	100 to 120	2.5a	3.0 a		2.5a	3.0 a	
FREEWAY MULTI-LANE DIVIDED	100 to 120	2.5 a	3.0 a		2.5 a	3.0 a	
ARTERIAL DIVIDED	90 to 110	2.0 a	2.5 a	1.5	2.0	3.0 a	
	80	2.0 a	2.5 a	1.5	1.5	2.5 a	
ARTERIAL UNDIVIDED	90 to 110	-	2.0	1.5	-	3.0 a	2.5 a
	80	-	2.0	1.5	-	2.5 a	2.0 b
COLLECTOR UNDIVIDED	90 to 100	-	1.25 c	1.0	-	2.5 a	1.5 c
	70 to 80	-	1.25 c	1.0	-	1.5 d	1.25
	60	-	1.0	1.0	-	1.5 d	1.25
LOCAL UNDIVIDED	60 to 80	-	1.0	0.5	-	1.25	0.5 d

Notes:
1. If a barrier is to be placed between the sidewalk and roadway, then clearance should be the same as when there are no sidewalks.
2. All clearance should meet requirements for sight distance.
3. The width of a median on a bridge should match that of the approach roadway.
4. L = Length of bridge between centreline of abutment bearings.

a - For bridges with L>50 m, consideration can be given to decreasing the clearances to 1.5 m.

b - For bridges with L>50 m, consideration can be given to decreasing the clearance by up to 0.5 m.

c - For bridges with L>50 m, consideration can be given to decreasing the clearance by 0.25 m.

d - For bridges with L>50 m, consideration can be given to increasing the clearance by up to 0.75 m.

e – The values of the clearances given above are the minimum values. Consideration may be given to providing more than the minimum if justification is provided.

Source: Ontario Ministry of Transportation, Geometric Design Standards for Ontario Highways, Revision Information Sheet, February 8, 2002, Table D7-1, pg. D7-2.

Additional guidance is provided by the Ministry's Ontario Bicycle Routes Planning and Design Guidelines (1996). The following is an excerpt from this provincial guideline reference related to accommodating cyclists on existing bridges:

To allow cyclists to cross an existing bridge safely, the structure may require alterations to provide adequate width for all bridge users. A bicycle route can be routed across the bridge in one of three ways:

1. Creating a bike lane or shoulder bikeway on the travelled way;
2. Reserving a sidewalk for cyclists only, or for shared use with pedestrians if there is adequate width; or

3. Widening the roadway to permit shared use of the right lane by motor vehicles and bicycles.

The creation of a bike lane on a bridge is an option if the bridge has shoulders, or if the traffic lanes are wide enough to permit the creation of a wide curb lane to accommodate bicycles on the traveled way.

5.11 Trail Bridges

There are typically two basic types of trail bridges, linear or ramped-type bridges. The approach paths of a flat or linear-type bridge do not ramp significantly. This type of bridge crosses over travel barriers such as waterways that are lower in elevation than the trail. The approach paths of a ramped-type bridge are sloped to gain elevation and cross barriers such as a railway that are at the same elevation or higher than the trail.

These two bridge types are illustrated in Exhibit 5.13

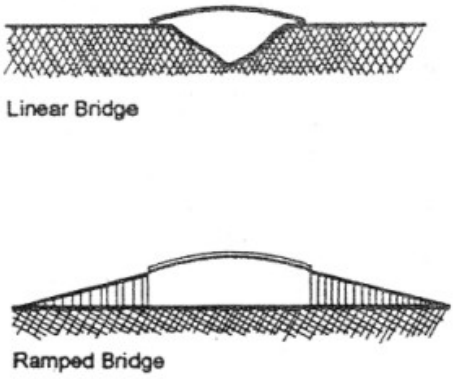


Exhibit 5.13 Linear and Ramped Bridges

In general, a linear-type bridge is preferable because it is the simplest to build and has a flat runout, ensuring access for all trail users. Space limitations and increased bridge heights on ramped bridges may require ramp grades as steep as a maximum of 8.0%, which can cause excessive exit speeds. This is especially hazardous if the end of the bridge is located at an intersection.

In these situations, curved ramps should be used. Wherever possible, ramps should be elliptical or circular rather than being interrupted by 180 degree turns at landings. In addition, bridge approaches should not be located near intersections, both road/trail and trail/trial, or where visibility is limited.

Bridges should be 0.6m wider (0.3m wider on each side) than the trails they are serving, to provide adequate side clearance for the railings. They should also be wide enough and strong enough to support maintenance vehicles where required. An immovable bollard located at the centre of each

approach can be used to prevent heavy vehicles from crossing a light duty bridge.

The bridge travel surface should be a non-slip material. Untreated wood or flat metal surfaces become slippery when wet or icy. Bridge slats made of self-weathering steel with raised dimples for traction have been used successfully. Open metal grating, on the other hand, is noisy and provides a less desirable riding surface for cyclists.

Bridges less than 3.6 metres wide should not be configured in a way that encourages two-way cycling traffic or encourages cyclists to ride on them or as part of a high use multi-use path. Warning signage and centre line bollards can be used to slow cyclists down and alert them to a constricted bridge crossing ahead. In some cases, it may be necessary to sign the bridge as a pedestrian only bridge and request that cyclists walk their bicycles.

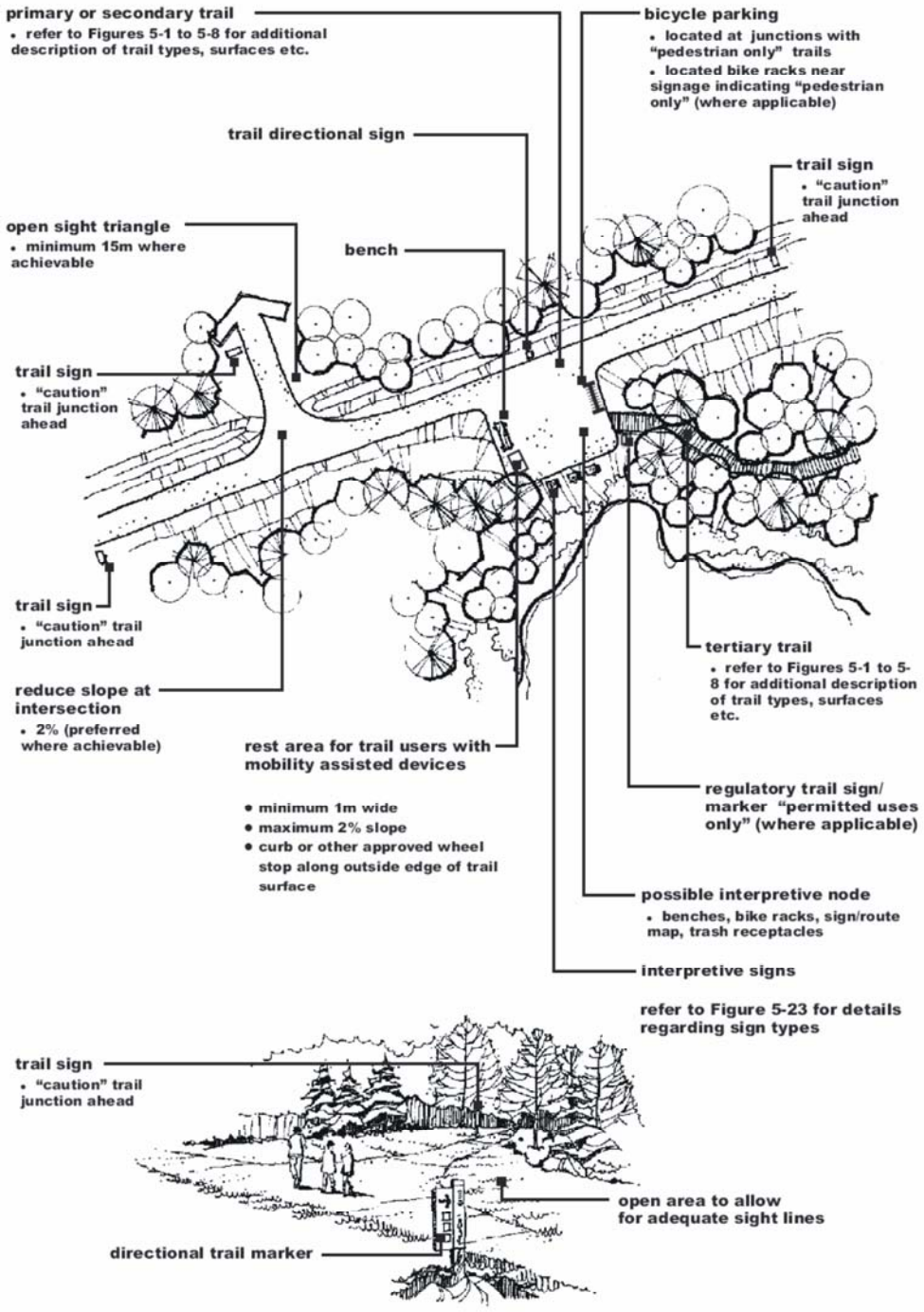
Typically pre-fabricated bridges are recommended as a cost-effective solution, except when crossing very wide spans or limited access highways. Key design considerations include:

- Surface type. Applying stain grit to paint and using this to cover the wooden surface, adding a “rough” texture. However, wears down over time and must be re-applied.
- Apply asphalt shingles or tar and stone to the wooden surface of the bridge to increase the traction and “grip” on the bridge.
- Place an open webbed rubber track on top of the wooden surface to provide more traction.
- Metal grate surfaces are effective also, but they tend to be more expensive and are not as desirable for inline skaters and cyclists. Concrete surfaces are often used for major and more expensive crossing structures.
- Vertical railings should be located on the outside of the bridge structure to avoid damage by service and snow removal vehicles.
- Cover plates should be used to cover expansion joints.

5.12 Trail Junctions

Trail junctions are an intersection of two or more trails. Junctions are ideal locations for rest stops and/or trail signage. It is important that adequate sight lines be provided at trail junctions to avoid collisions between users. Exhibit 5.14 illustrates an example of a trail junction.

Exhibit 5.14: Example of a Trail Junction
Source: Guelph Trail Master Plan



NOT TO SCALE

SGE Acres Limited

5.13 Lighting

There is often great debate about whether or not off-road trails should be lit stemming mainly from concerns with user safety. Safety and security concerns are certainly very valid issues and are addressed within the Trails/Bikeways Master Plan through the general application of CPTED principles as one example but it is important that the issue of lighting be assessed against various potential costs as well as any perceived benefits.

A fully lit municipal trail system is very rare with the majority of systems having limited key trail sections permanently lit if there is any lighting provided at all. This is due to a number of factors including cost and maintenance, property rights issues, impacts of lighting on the natural environment and safety. These factors are outlined in more detail below.

1. Cost and Maintenance

Most off-road trail systems are enjoyed to a significant degree because of their natural setting and would be negatively visually impacted by overhead wire installation. Lighting of these areas would then require the installation of an underground power supply and fixtures. According to the City of Guelph, Ontario, they estimated a probable cost of $2000 per fixture and $40,000 per kilometer to install an initial system of this nature. Following this model, the costs for Fredericton to fully light just the Nashwaak Trail alone could cost upwards of $350,000 assuming fixtures were installed at 300m intervals. These costs do not take into consideration providing an ongoing power supply or if additional construction is necessary due to underground bedrock, flood prone areas or other obstacles.

Once a lit trail system is in place, it then becomes necessary to maintain lamp fixtures, replace burned out or broken bulbs and monitor the general upkeep. These are additional costs that would have to be added to annual City budgets as lighting systems that are not maintained well can often create the perception of neglect among users, attract criminal elements and work to counteract the intended purpose of providing a safer user environment.

When a regular and more detailed electrical maintenance regime of this sort is needed, it also may then become necessary to construct trail access points which can accommodate larger motorized vehicles (emergency, maintenance, etc.) as well as a trail substructure and width that can withstand the weight and size of these vehicles. Besides adding additional costs to system construction this can also create a less attractive environment for users of off-road facilities and encourage use by unofficial motorized vehicles.

2. Property Rights Issues

Excessive new lighting in what were otherwise unlit areas can cause conflicts with neighbouring property owners. Depending on distances, lighting can cause negative impacts on residents in terms of direct light entering homes as well as sleeping patterns, illuminated rear yards, etc. There may also be the perception that lighting trails will encourage criminal elements to use the system during evening hours as a means to access properties.

3. Natural Environment

The effects on wildlife including potential negative effects on both flora and fauna from artificial light in wooded areas is becoming recognized as a significant disruption to the natural environment. Nocturnal animals such as Lynx and Raccoons may be particularly impacted.

The Environmental Agency of England and Wales has conducted research into the topic and states that light pollution impacts on wildlife in a number of ways, including:

- Causing migrating birds to collide with lighted buildings;
- Causing a “false dawn” which disrupts bird behaviour;
- Causing moth deaths as they are attracted to the light (possibly a factor in the recent decline in urban moth populations); and
- Disrupting tree and plant habits that are controlled by day length (e.g. leaf fall and flowering).

In addition to direct impacts on the immediate natural environment, lighting of the Fredericton off-road network would require additional power use that has further negative environmental impacts if being drawn from a non-renewable and/or greenhouse gas producing source.

4. Safety

While usually provided as the main reason behind the desire to light a trail system, creating a safe and secure environment may be in fact based on a false perception of personal safety created by a lit nighttime area. Limited data exists to support either lighting or not lighting a trail system or wooded area but lighting an extensive linear system has various potential security concerns that should be considered. They include:

A) Lighting the system may cause users who would normally not feel comfortable using a trail during the evening to do so. This in itself may create additional safety concerns as the trail may be no more safe that if it was unlit but it now attracts additional users.

B) In urban areas, nighttime lighting is usually more contiguous and constant than in areas such as parks and trail systems where it is more sporadic and spaced out. This can create "light islands" around or under fixtures. As trail users move from darker areas to these more lit environments and back out again, it may be difficult to visually adjust to changing light levels and can, in fact, create an environment where the trail user is being seen instead of the user seeing any others. The potential for criminals to remain concealed is high.

C) Lighted areas that are fairly isolated from built up districts may attract undesirable elements that may use the light as a gathering or meeting point.

D) A 2005 CPTED review of a trail system in Banfield Park for the City of Victoria by Liahona Security concluded that due to the more isolated nature of the trail, the lack of much natural surveillance and other issues, lighting of the trail space would act as a facilitator to criminal activity rather than a detriment.

For all of the above reasons, it is recommended that Fredericton adopts a policy of not lighting any trails except segments of the off-road network located in the downtown core if CPTED principles are applied. The lighting of select downtown trails rather than the entire system would cause little impact on wildlife, utilize far more natural surveillance than other segments of the system, be a part of more continuous overall lighting in the area and have minimal impacts on residential properties. Cost outlays would also be far less and allow for the opportunity to "dress up" fixtures and trail infrastructure and amenities to a high standard. These upgrades could also be marketed as a tourist attraction.

Beyond the core district, the only segments of the Trails/Bikeways Master Plan recommended to be regularly lit are higher use AT bridges as well as any pedestrian or bicycle underpasses and their approaches.

5.14 Signage

It is recommended that all routes included in the system be signed with a common themed visual indicator or indicators. Indicators may include such things as a Trail/Bikeways logo, a common colour scheme and/or a particular shape of signage to be used throughout with the primary purpose of visually linking routes into the larger system and providing an easily identifiable cue for users. One advantage of choosing a logo as opposed to text as a system identifier is that it is universally understandable and not reliant on language.

This is a particular advantage considering the different languages spoken within Fredericton, the foreign student population and the potential to attract visitors from abroad. When choosing a system identifier, simplicity is advantageous over complexity and, if possible, something transferable from

colour to black and white is desirable in terms of multi-media applications and use. Many well known corporate brands offer examples of successful identifier design.

Bicycle Route signs can be used to "brand" or identify routes that constitute the system. This type of sign may be designed in various sizes depending on its intended application. Designation signs may be mounted alone or with other signs at logical, highly visible locations on both on and off-road network route segments. The National Capital Commission (NCC) has been very successful at "branding" the Ottawa Area's Capital Pathway network through its signing system. An example of an NCC pathway sign is shown in Exhibit 5.15.

Exhibit 5.15 NCC Branding Sign

Way-Finding signs may include the network logo or "brand" and communicate other information to AT users such as directional arrows and distances in kilometres to major attractions, trail access points and settlement areas. Way-finding signs should be mounted on standard sign poles and be located on all legs of an intersection or off-road trail junction, as well as at gateways. Way-finding signs should also be integrated with any printed versions of the Trails/Bikeways Plan for public use to provide clarity and a consistent look.

Regulatory signs are intended to control particular aspects of travel and use along the road or off-road AT system. Signs restricting or requiring specific behaviour is not legally enforceable unless it is associated with a provincial law or municipal by-law. Where applicable, it is recommended that authorities discreetly include the by-law number on signs to reinforce their regulatory function.

Warning signs are used to highlight bicycle route conditions that may pose a potential safety or convenience concern to AT system users. Examples are steep slopes, railway crossings and surface changes. These signs are diamond in shape, with a black legend on a yellow background. Exhibit 5.16 illustrates examples of warning signs.

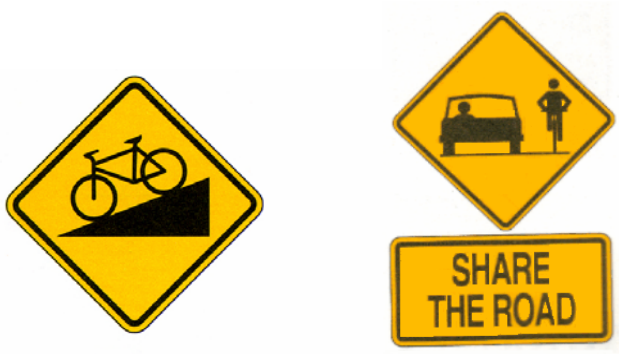


Exhibit 5.16 Examples of Warning Signs

Interpretative signs provide specific information about points of ecological, historical, cultural and general interest, as well as current land uses along the system. They represent a broad range of possible sign formats and applications, depending on the interpretative program and complexity of information to be communicated. It is recommended that the City consider implementing TAC (Transportation Association of Canada) recommended advance trail crossing signs at mid-block locations where grade or sign line concerns exist.

In order for a particular route segment to be designated as a bicycle route, it should be signed as such to create safe and user-friendly routes. There may also be legal liability issues if a route is designated as a bike route, but is not signed. In order to maximize the ease of understanding for system signage, signage for routes in Fredericton should be both consistent in type and format as well as visually linked through a prominent system identifier.

5.15 Snow Clearing

As the AT system is expanded, roads with key designated on-road cycling facilities or signed-only cycling routes that are part of the AT system should receive consideration for snow clearing and removal based on projected user demand. It is difficult to estimate the possible level of demand for on-road bicycle facilities during the winter months but maintenance costs vs. user desires should form the basis of a policy.

In the short-term, special emphasis should be placed on maintaining key community linkages in more potentially heavily used routes in the urban core. Depending on public reaction and cost-benefit determinations, the

clearing of on-road system linkages may then be expanded, restricted or eliminated in future years. An informal approach to determining user demand such as developing contacts within the local cycling community during the first few years of system implementation is recommended.

Off-road multi-use trails should receive snow clearing and removal only when they form essential segments of the urban network linking into sections of the on-road network which have been designated for clearing. The overall goal should be to maintain a limited but functioning, core on-road AT network with the inclusion of off-road cleared routes where necessary. An example of this would be the downtown "loop" trail which services a heavily traveled, mixed residential, service, employment and commercial area. In order to limit potential liability for the majority of the network not designated to receive snow and ice removal services, the City should erect seasonal signs each winter advising that trails are not maintained and the public uses them at their own risk. This could also be achieved through inclusion of warnings on permanent network signage.

The recommended approach acknowledges the fact that many people may be unwilling to use bicycles during winter and that pedestrian traffic on off-road routes will likely be of a more recreational nature for the majority of users during these times. Refraining from a heavy snow clearing and maintenance schedule especially concerning off-road trails, allows recreational walkers and cross-country skiers to continue to use and enjoy the trail system while not expending significant resources to accommodate what may be a small winter cyclist or utilitarian pedestrian user group at these times.

Following the end of winter, AT use can be delayed due to accumulated piles of snow that may still be present in locations where the sun does not reach until later in the season. Should a small section of the AT system be blocked by snow and debris accumulation, it could effect an entire area. Several weeks of system use could be added to the year with one well-timed snow and debris cleaning per year that would effectively open up much of the system to spring use.

5.16 Bicycle Parking

Bicycle parking facilities are an important tool for encouraging more bicycle use and increased users of the network. A lack of adequate parking supply or type can deter many from considering using their bicycle as a basic mode of transportation. There are four basic components to providing effective parking for bicycles that should be considered in Fredericton.

They include:

- The bicycle rack element;
- The rack;

- The rack area; and
- The rack area site.

1. Bicycle Rack Element

The bicycle rack element is the portion of a bike rack that supports the bicycle. Bicycle rack elements can be joined on any common base or arranged in a regular array and fastened to a common mounting surface. The racks may be used to accommodate a varying number of bicycles securely in a particular location. Examples of various types of available bicycle rack designs include the “Ring” rack and the “Ring and Post” rack. Exhibit 5.17 illustrated these particular rack designs. Other designs can run into the more flamboyant and whimsical but care should be taken to ensure a rack element that is compatible with the site, durable, simple for cyclists to use and safe for potential conflicts with automobiles and pedestrians.

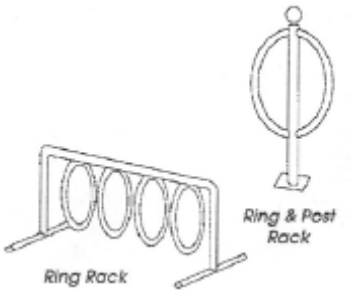


Exhibit 5.17: Bicycle Rack Designs

The rack element should:

- Support the bicycle upright by its frame in two places;
- Prevent the wheel of the bicycle from tipping over;
- Enable the frame and one or both wheels to be secured;
- Support bicycles without a diamond-shaped frame with a horizontal top tube;
- Allow front-in parking: a U-lock should be able to lock the front wheel and the down tube of an upright bicycle; and
- Allow back-in parking: a U-lock should be able to lock the rear wheel and seat tube of the bicycle.

Bicycle racks should not only allow for a secure lock between the bicycle and the rack, but should also provide support for the bicycle frame itself. The rack element should also be designed to resist being cut or detached by common hand tools such as bolt and pipe cutters, wrenches and pry bars.

2. Bicycle Rack

Bicycle racks should consist of a grouping of the rack elements either by attaching them to a single frame or allowing them to remain as single elements mounted in close proximity to one another. Racks, whether as single units or grouped together, should be securely fastened to a mounting surface to prevent the theft of a bicycle attached to a rack. Another alternative is to create a bicycle rack that is so large that it cannot be easily lifted or moved from its position with bicycles attached.

Easy and independent bike access should be provided to the bicycle rack. Inverted “U” rack elements should be mounted in a row and placed on 750 mm (approximately 30”) centres to allow enough room for two bicycles to be secured to each rack element. Bicycle racks should be arranged in a way that is quick, easy and convenient for a cyclist to lock and unlock their bicycle.

3. Bicycle Rack Area

This refers to what is essentially the “bicycle parking lot” and includes the area where more than one bicycle rack is installed. Bicycle racks are separated by aisles, much like a typical motor vehicle parking lot. The recommended minimum width between aisles should be 1.2 m to provide enough space for one person to walk with one bicycle. Aisle widths of 1.8 m are recommended in high traffic areas where many users may retrieve their bicycle at the same time, such as after a school class. A 1.8 m depth should be provided for each row of parked bicycles since conventional bicycles are just less than 1.8 m long and can be accommodated in that space.

Rack areas with a high turnover rate of arriving and departing cyclists such as in high traffic trailheads, tourist attractions or educational facilities should ideally have more than one entrance to help facilitate user flow. If possible, the rack area should be sheltered to protect the bicycles from the elements and may be developed in conjunction with AT trip staging areas and amenities.

4. Bicycle Rack Area Site

Bicycle racks area sites are generally designated to serve urban or built up areas as opposed to rural areas due to the common behaviours of urban and rural cyclists. The exception may be locating rack sites near to major destination points such as trailheads, tourist attractions or rest sites that experience high user volumes and are also of a nature which encourages cyclists to stop for more extended periods while knowing their bicycles are secure. An example of this sort of area in Fredericton is the Killarney Lake Park swimming beach. In general, most rural cyclists are traveling significant distances without stopping to do things such as shop, etc. and if they do choose to stop it is often in are area of low population and pedestrian

traffic. In these cases, cyclists may not perceive bicycle security to be of a major concern and may ignore any racks provided.

Urban area bicycle rack sites should be located to serve higher density buildings, shopping areas, major pedestrian streets, recreational destinations, employment zones, and institutional facilities such as schools and government offices with an emphasis on high traffic, visible sites so as to increase passive security. CPTED principles should be consulted prior to the creation of any new rack site. Bicycle racks should be placed as close as possible to the entrance that it serves, but not in a location where they would inhibit pedestrian flow in and out of any building.

Urban rack areas should be no more than 15 metres from a building entrance, and should be clearly visible along a major building approach line. Bicycle rack areas that are hard to find or that are located far from a building entrance are generally perceived as vulnerable to vandalism and will generally not be used by cyclists to a significant degree. To encourage use of a bicycle rack by cyclists, the rack site should be clearly visible and well lit if within urban areas. Lighting may be forgone if sites are located in rural parts of the network.

Multiple buildings in an area should not be served by one larger, distant bike rack. Rather, smaller bike racks should be placed in a convenient location at each building, but not in a manner that would obstruct utility access openings, garbage disposal bins, doorways or other building access points. Bicycle racks can be placed on concrete, asphalt or brick surfaces and should be securely fastened to the surface to prevent shifting or removal. If they cannot be fastened to the surface, then they should be large and heavy enough so that they cannot be easily moved.

Bicycle racks placed on grass surfaces typically cannot be securely fasted to the ground or suffer from footing erosion over time especially in areas prone to flooding. If placed on grassed surfaces, they should also be heavy enough so that they cannot be moved and not be of a material that floats if within a floodplain. To avoid excessive bicycle riding on the grass, bicycle racks should only be placed on grass surfaces located within close proximity to a paved or granular surface cycling route, such as on off-road multi-use trail, or an on-road route. Bicycle racks on grass surfaces should be considered temporary, and every effort should be made to relocate them to a permanent, hard surface area.

Bicycle racks should not be placed within the following areas:

- Bus loading areas;
- Goods delivery zones;
- Taxi zones;
- Sensitive environmental areas;

- Emergency vehicle zones;
- Hotel loading zones;
- Within 4.0 m of a fire hydrant;
- Within 2.5 m of a driveway or access lane; and
- Within 10.0 m of an intersection.

6 Network Implementation

6.1 Phasing and Network Priorities

Implementation of the Trails/Bikeways Master Plan is a long-term and high profile undertaking requiring multi-year budgetary commitment and inter-departmental involvement. Implementation phasing should be approached with the objective of creating reasonably immediate, tangible, short-term impacts as well as a multi-year program of further development.

There are three building blocks to successful implementation: municipal standards and regulations, education and promotion, and capital projects. While the tendency is some municipalities is to focus on capital projects, we recommend that the other building blocks be put in place prior to the funding of capital projects. The result will be more effective and efficient implementation. In this context, it is recommended that phasing of the overall Master Plan consist of four phases:

Phase 1: Years 1 and 2
Phase 2: Years 3 and 4
Phase 3: Years 5 and 6
Phase 4: Years 7 to 20.

Establishing two-year initial phases to the Master Plan gives the City the added flexibility to implement policy changes, roll-out an educational and promotional program and develop a number of essential links. It also provides the City with the time to gain the knowledge and experience of working with AT infrastructure issues and solidifying partnering opportunities that it will need to accomplish full build-out in Phase 4. Years 7 to 20 are designated for Phase 4 and this timeframe can be reassessed after Phases 1 to 3 and either divided into shorter phases at that time or a progressive pattern of work based on yearly measurable goals.

Phases 1 to 3 of implementation should contain a number of strategic actions recognized as guiding principles or goals during the initial years of construction (after policies and standards are set, and the education and promotion program is ongoing). These are recommended to include:

Phase 1:

- Formally adopt the Master Plan, make changes in City standards and regulations, and commence implementation of the education and promotional program. During this phase, an annual budget of $75,000 is recommended for the roll-out of the education and promotional program.

- Designation of all on-road facility types of any sort that have been identified under the Master Plan to become signed routes as soon as possible. This approach is high impact, highly cost-effective, requires comparably little time and establishes the routes as bicycle friendly. It also raises both AT and automobile user awareness and establishes precedent for improving the segments of the routes to bicycle lanes and paved shoulders where identified.

- Scheduling network implementation improvements with already planned and/or scheduled capital road and servicing projects.

- Designation of AT corridors for those parts of the networks within areas expected to be developed within the next five to ten years. This does not require specific alignment decisions but should be included as official policy.

Phase 2:

- Completion of major strategic linkages (both on-road and off-road as needed) within the existing system to help facilitate increased use of the system and raise the profile of the Master Plan. An example of this is the missing link(s) between the current Valley, Lincoln and Crosstown Trails within the urban core. Priority should also be given to the possibility of partnering with outside organizations such as NB Trails and the TransCanada Trail both in terms of construction scheduling and potential funding.

- Connection of existing AT facilities with transit routes and major destinations such as shopping areas and schools wherever possible.

Phase 3:

- Commencement of formal discussions with the Provincial and Federal Governments to establish a potential AT funding arrangement and/or permit changes to relevant legislature that would promote the use of AT and ease implementation of the Master Plan.

- Petitioning senior levels of government for the inclusion of AT facilities in any plans for new roadway construction, improvements, resurfacing, etc. even if not officially designated as part of the network.

- Extension of existing and recently constructed facilities to connect with each other where feasible in order to create longer, more complete routes and continuous service for as much of the network as possible.

6.2 Recommended Policies and Guidelines

To implement the Trails/Bikeways Master Plan, the following policy recommendations are put forward.

1. The vision, goals and objectives, and network development approach contained in this report should be formally adopted by City Council. They should also be formally reviewed on an annual basis during implementation. To facilitate implementation, the Route Selection Evaluation Criteria (Exhibit 3.1) should be formally adopted by the City of Fredericton as an internal policy document and planning tool.

2. The capital works activities of the City of Fredericton, the Province of New Brunswick, UNB and other major land owners/developers should make Active Transportation modes more convenient and less risky by removing barriers to walking and cycling and improving connections to public transit. Improvements should include connections between communities and within new residential and commercial areas.

3. The City of Fredericton and partners should support efforts to achieve a greener and healthier population by encouraging residents and visitors to choose Active Transportation modes as part of a commuting and fitness regime and to reduce greenhouse gas emissions through less dependence on the private automobile for travel, especially for short distance trips.

4. The City of Fredericton should implement a system of monitoring users of the Trail/Bikeways networks with a goal of increasing trips and general use by residents and visitors as Master Plan implementation moves forward.

5. Design guidelines contained in Section 5 of this report should be formally adopted by the City of Fredericton as an internal planning and design tool to guide network implementation and to establish set standards of AT development.

6. An interdepartmental Active Transportation Advisory Committee should be established in the City of Fredericton early in the implementation process to ensure compliance with the Master Plan. Provisions should be made to include representatives of external AT stakeholder groups such as bicycle clubs, economic development and tourism, local businesses, youth and the mobility challenged.

7. The City of Fredericton should commence formal discussions with private land owners to secure easements, options or agreements of purchase and sale where network connections are required. Easements are a preferred option because of lower costs.

8. All new subdivision developments proposed within Fredericton should be subject to an AT review as part of the approval process. The review process would gage the suitability of any proposal against the goals and objectives of the Master Plan and act as a planning tool to ensure compliance.

6.3 Educational and Promotional Framework

Overall success of the Trail/Bikeways Master Plan will be measured in a more active population, healthier environment and lower rates of obesity as well as potentially increased tourism, less traffic congestion and a more attractive environment for residents.

These success indicators must be incorporated into the formal roll-out of the Master Plan under an educational and promotional framework. There are many successful experiences from other settings that the City of Fredericton can use to craft the educational and promotional framework. This section contains examples and ideals that City Staff can draw upon.

An educational and promotional campaign must be founded on the reality that trails and bikeways are often not fully understood by much of the public with various assumptions surrounding what each route type may consist of, what sort of users travel on them and how they can interact together and within the larger transportation system. The term “Active Transportation” is often also not well understood particularly by those who don’t use it. Non-users who are otherwise active tend to equate it only with physical activity and report that they are already active, in other settings, as a partial rationale for not pursuing Active Transportation. Others equate AT with public transit and it is again the nonusers, in particular, who offer that they already use public transit, making AT somewhat redundant for them. Even current users of various AT modes have often not clearly grasped the concept and in fact, as it is a reasonably new concept, many have not heard of Active Transportation as a term.

Social barriers arising from preconceived notions represent one of the major disincentives for travel by AT modes and public transit. At a focus group for youth conducted as part of Go for Green’s 2005 National Active Transportation Survey, the bus was identified as the “loser cruiser”, and the majority agreed that their parents considered it “unsafe” for them to travel to school by walking/wheeling. Adults, commenting in similar focus groups held in other Canadian cities, indicated that the general attitude from non-walkers and non-wheelers ranged from viewing them as “fitness fanatics” to eccentric. It is also significant to note that many people not currently using AT understand the health and environmental benefits of it but have great difficulty imaging switching from motorized transportation to something else.

When misconceptions surrounding what AT is and how it works have been addressed, it is then important to educate potential new users in the basics of system use. Engineered elements of the Trails/Bikeways network and various design solutions are very important to ensuring a safe and functioning system but education is equally important and becomes a barrier if not in place. If AT users and motorists do not know how to respond correctly to a travel indicator or safety device such as a traffic signal or flasher, for example, the crossing will not operate safely. Engineered elements must be in place but unlike motorized vehicles, people often receive little or no training in AT "rules of the road".

One of the most important educational needs for implementation of the Master Plan is the perceptions of pedestrians and cyclists by motorists. Motorists do not routinely look for AT users, especially during heavy vehicle traffic times and this is in part a result of how motorists have been educated. There can be an underlying assumption that walkers and wheelers should not be in the road, and the City of Fredericton (including educators and law enforcement officers) need to work to change these views if all modes of transportation are to be accepted as legitimate users of the street network. At the same time, cyclists and pedestrians need to become more aware of the rules of the road, their responsibility for their own safety as well as proper and permitted interaction with motorised vehicles. Cyclists in particular often navigate in an environment designed primarily for automobile use and a lack of knowledge surrounding road etiquette can be dangerous and promote negative feelings between the two travel modes.

There are three basic approaches for educational programs that are aimed at permanently changing perceptions and achieving ongoing awareness. We recommend that this programs be incorporated into the City of Fredericton framework.

1. General Public Awareness Campaigns - These programs involve increasing knowledge and motivating positive behavioural changes. They can sensitize motorists to their responsibilities toward pedestrians, cyclists, and other AT uses as well as educating AT users as to how they are expected and required to act within the road network.

2. Campaigns to Targeted Groups and Situations - These may include educational materials targeting groups such as older adults, children, cyclists or motorists. They may also focus on specific issues such as crosswalks, school zones, or crossing at signalized locations. To obtain best results, it is important for targeted campaigns to be institutionalized within an organization so they can be implemented on a long-term basis.

3. Individual Campaigns - Similar to targeted campaigns, these differ in that the target audience is reached through an intermediary such as a pediatrician, parent, or a grandparent and on a one-on-one basis. For

example, school crossing guards or classroom teachers may instruct students about safe behaviour when getting on or off the school bus or how to cross streets safely. This approach has been used with success for many years within school systems to achieve a variety of goals.

A large number of innovative educational campaigns have been undertaken in different municipalities across the country to achieve similar goals. Effective examples that can be transferred to Fredericton include:

- Flyers could be sent to households along with utility bills or recycling information. The flyers provide safety tips for AT users and motorists and address some of the common causes of conflicts and how to avoid them.

- Large highway signs erected at locations where they would attract the most attention and provide feedback on the percentage of drivers yielding to pedestrians during the past week along with the record. The numbers on these signs were changed on a weekly basis.

- Small signs erected at a number of crosswalks instructing pedestrians how to safely cross the street. These signs instruct pedestrians to extend their arm while placing one foot in the street, wait until cars stop, and thank drivers with a wave and a smile.

- A classroom intervention which is designed for all elementary and junior high students. This intervention could include a special folder with a summary of the program, an “I YIELD TO PEDESTRIANS” bumper sticker, a copy of an information pamphlet for each pupil to take home, and a 20-minute lesson plan explaining the proper way to walk and bike on the streets prepared for each home room in the target community. The lesson plan could teach safe crossing skills by demonstration, role-playing, and practice with feedback. Posters explaining the correct way to cross the street could also be sent to senior high schools and seniors residences.

- Crosswalk guards received a two hour training session and a large supply of pins to give to pupils when they exhibited proper crossing behaviour. Although children can be encouraged to signal their intention to cross the street by extending their arms, the guard crossing with the children using a stop sign in the usual manner.

- School Boards can be approached to conduct safety audits of their neighbourhoods. The school boards could work with parents, students and teachers, organizing public meetings to review the situation around all of their schools. These meetings can determine both the safest routes and areas where improvements are required. A “Walking School Bus” (http://www.walkingschoolbus.org) and other programs to promote greater student activity could also be implemented.

A number of excellent hard copy and online publications have become available in other parts of the country and abroad that may also be considered for promotion of the Master Plan in Fredericton. These include the following:

- Walking, The Activity of a Lifetime - Produced as part of Ontario's Active 2010 program, this 12-page booklet is an excellent introduction to the benefits of walking. It provides methods to begin and maintain a walking program. www.active2010.ca.

- International Walk to School Day (www.iwalktoschool.org) - Many New Brunswick school districts have become involved in the program which is coordinated by the government of New Brunswick's Sport, Recreation and Active Living Branch, the Department of Education, the Healthy Learners Program, and Go for Green.

- Pedestrian and Bicycle Information Centre (www.pedbikeinfo.org) - This American organization has operated since 1999 with a mission to improve the quality of life in communities through the increase of safe walking and bicycling as a viable means of transportation and physical activity.

- Bike Sense - This guide to skills of the road, bike handling, traffic signals, and other issues is a 34-page booklet is published by the Greater Victoria Road Coalition. It provides very detailed information about cycling and traffic skills.

- Bicycles at Rest - This pamphlet is produced by Capital Bike and Walk of Victoria, BC. (wwwcapitalbikeandwalk.org). It features guidelines on bike rack choices and efficient site planning.

- National Centre of Biking and Walking (www.bikewalk.org) - This US based NGO maintains up-to-date inventories of walking guidelines, bicycle policies, and other technical resources.

- Vélo Québec (www.velo.qc.ca) – This organization has continuously encouraged the use of the bicycle, whether for tourism purposes or as a means of clean and active transportation, so as to improve the environment and the health and well being of the public. They have developed a series of technical guides for biking and offer workshops in the basics of facility design and operation.

The delivery of educational information as part of the roll-out and on-going implementation of the Master Plan should be prepared to reaches a wide range of residents of varying ages and demographics by taking advantage of a variety of media in a multi-faceted communications strategy that has support from a stable level of annual funding. This should likely include

advertisements on transit vehicles and bus shelters and the distribution of cycling information through pamphlets as well as promotion through the non-print media such as the City of Fredericton website.

Promotion

A strong marketing program aimed at changing behaviour is required to encourage more use of AT and the Master Plan. Current attitudes toward active modes of travel will mean that the public may be slow to respond to improvements in infrastructure that makes walking and wheeling more convenient although research shows that people will use facilities once they are put in place and effectively promoted.

Well-known and nation-wide programs provide a solid foundation for the Master Plan. Examples that can be reviewed to prepare the Fredericton strategy include the following:

- Active and Safe Routes to School – This is a national program that encourages students to walk, bike or use other human-powered modes of transportation to travel to and from school. The benefits of this program include increased physical activity, less traffic congestion around schools, safer streets, and improved air quality in our communities. This program should be encouraged in every school possible.

- Commuter Challenge – The Commuter Challenge is a friendly competition between Canadian communities to encourage the use of sustainable modes of transportation to and from work.

- International Trails Day – International Trails Day, held the first Saturday of June, is dedicated to celebrate trails, their development, uses and the healthy lifestyle they encourage.

- International Walk to School Week – During International Walk to School Week, children walk to school with parents, school staff and community leaders. They learn safe routes to school, and safe pedestrian and cycling skills. Typically held in the first week of October, this program can be linked with the Active and Safe Routes to School Program.

In addition to these existing resources, relatively simple new initiatives can substantially assist in promoting AT use in Fredericton and reducing social barriers. Examples that should be considered by the City include:

- Integrate the Trails/Bikeways Network into Municipal Maps - City street maps should have the network included as an integral part of its featured information. This should include the off-road system, important links with transit and locations of dedicated bicycle parking and other amenities. This profiling raises the status of the AT system and helps to

make it an accepted transportation alternative as opposed to a strictly recreational option.

- Award System – A number of Canadian cities have instituted annual awards for the outstanding participation of individuals in biking or walking. This system is a very low cost method of highlighting participation and shifting public perception. Schools and businesses that make significant investment in AT policies or facilities such as bicycle racks or employee changing facilities should similarly be recognized.

- Work Closely with School Boards – School boards should provide elementary grades with walking and wheeling education that would result in AT becoming an integral part of life at school. All schools could be encouraged to take part in Walk to School Week. Courses such as the CAN-BIKE bicycle-training program could be incorporated into the physical education curricula.

- Utilize Hospitals and Health Facilities to Promote Active Transportation Among Their Clients - These institutions already operate under a mandate to build healthier communities and believe in both improving lifestyle behaviours and in addressing the underlying conditions that lead to poor health choices. Measures could include constructing bicycle parking facilities, including AT information in flyers, advertising on websites, etc.

In summary, education and promotions should become an integral part of the continuing development of the Trails/Bikeways Master Plan. Effective efforts to raise awareness and educate users, businesses, facility administrators and motorists about the advantages of AT, rules of the road and how they can participate in the development of the network is a key building block to achieving full build-out of the system and a healthier, more productive population.

6.4 Municipal Standards and Regulations

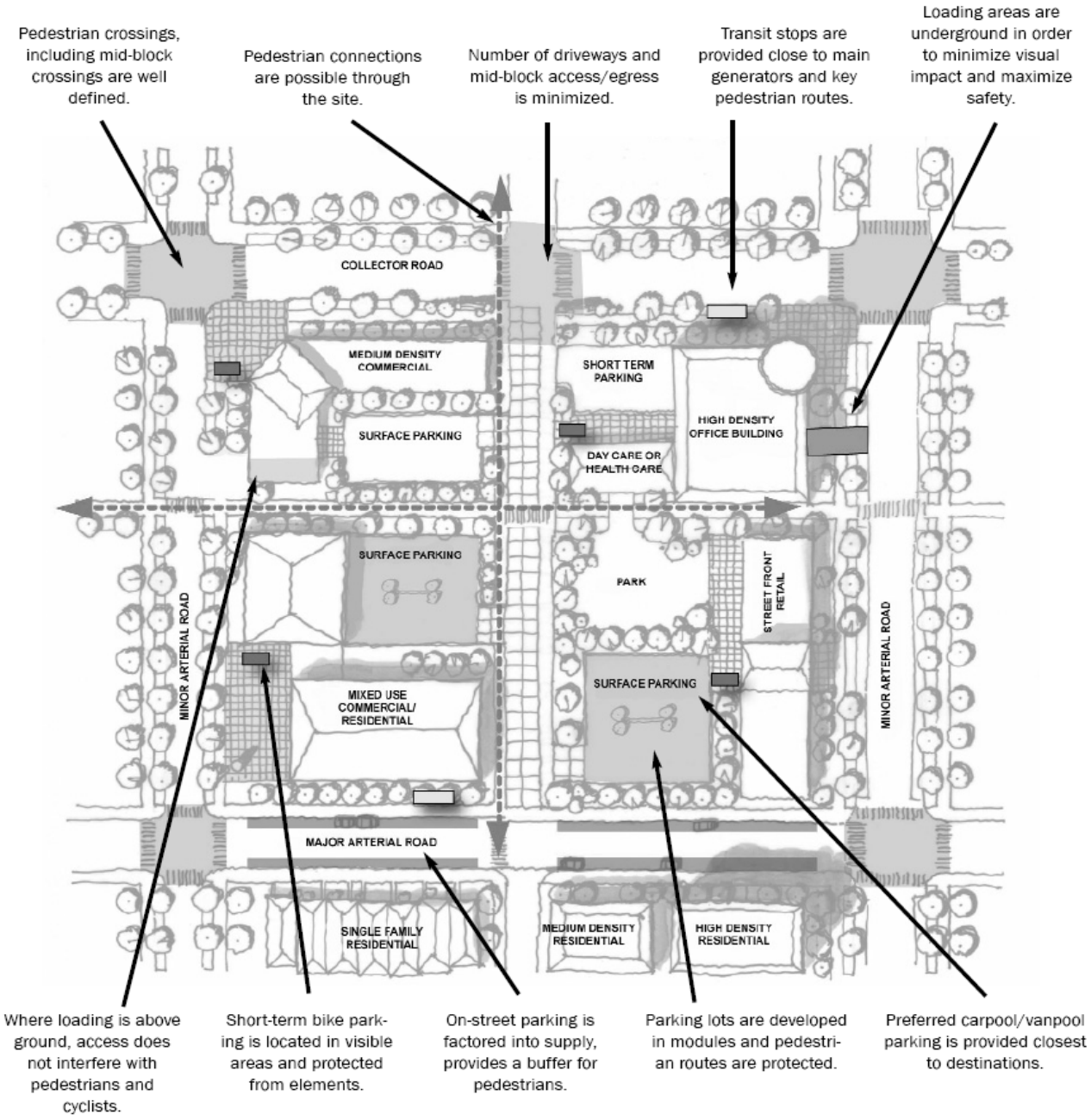
All new developments in the City of Fredericton should be designed and planned to include AT elements consistent with the Canadian Institute of Transportation Engineers' "Promoting Sustainable Transportation Through Site Design: An ITE Proposed Recommended Practice". This should include all new construction of housing and commercial subdivisions as well as individual building such as schools, public facilities, recreation centers, government offices and new commercial developments.

The CITE site design guide is available online without charge and includes a comprehensive examination of various methods to promote more integrated and effective uses of AT travel modes in conjunction with transit facilities and based on-site design practices and standards. As stated in the guide, "An underlying theme of this report is the integral relationship between land use

and transportation. The report is based on the premise that effective site design can enhance the attractiveness, convenience and safety of walking, cycling and transit use, while not compromising the efficiency of travel by other modes." The guide takes an inclusive approach to site development and sustainable transportation with policy tools tailored for use by elected officials, municipal staff and various land development professionals.

An example of how site layout design elements can be applied is illustrated in Exhibit 6.1 from Chapter 3 of the guide.

Exhibit 6.1 Site Design Elements



Adopting municipal standards and regulations such as development controls, zoning requirements and by-laws that will better support the Trails/ Bikeways Master Plan is an extensive process unique to each municipality but one that can be very effective in creating a future development model that is responsive to AT users. Examples of potential zoning requirements that could be adopted include:

- Lowering building square footage based parking stall requirements to account for on-street parking if applicable and the installation of bicycle support facilities such as racks and employee change facilities.
- Requiring carpool parking to be located nearest to retail building entrances.
- Integrating transit route and stop planning into site development to encourage easy access and use.
- Encouraging mixed-use development that minimizes the need for car based trips to and from destinations.

It is recommended that the City of Fredericton adopt a policy of regular reviewing zoning standards and applicable by-laws against policies provided in “Promoting Sustainable Transportation Through Site Design: An ITE Proposed Recommended Practice” and to make updates as necessary.

6.5 Probable Capital Costs and Financial Considerations

The City of Fredericton currently has numerous costing factors in use for specific public works items but no consolidated trail and bicycle facility costs. In this setting, the estimates of probable costs in this section were developed based on comparable data from related projects with geography and construction factors similar to those used in Fredericton. A detailed summary of network capital costing items is included in Exhibit 6.2. In addition, a $75,000 annual budget is recommended for the education and promotional framework.

The preliminary estimate of probable costs is based upon the following assumptions:

1. All values are 2007 constant dollars ($2007) and include a 35% contingency and HST.

2. Staff required for implementation will be a reallocation of current City of Fredericton staff. Therefore, no new hires are anticipated.

3. Funding commitments from senior governments and other sources will be determined by the City of Fredericton prior to implementation. No cost-sharing assumptions are included.

4. Pavement marking treatments (both sides) for bike facilities constitute an estimated cost of $20,000 per kilometre.

6. There are 38 kilometres of existing soft surface trails that are recommended for conversion to hard surface at an average cost of $45,000 per kilometre.

7. Estimated costs for new hard and soft surface multi-use trails include per kilometre rates of $150,000 and $100,000 respectively.

8. Paved shoulder surfacing is estimated at $55,000 per kilometre for both urban and rural roadways. This assumes sufficient road platform widths exist presently in the roadways.

9. It is recommended that all on-road routes be signed in Phase 1. This work will involve 44 kilometres with an average of eight signs per kilometre at $500 per sign.

10. Retrofitting of the Carlton Street Bridge as an AT facility is estimated to cost $444,444.00 per prefabricated 75 metre span. Utilizing the current eight piers, nine 75 metre spans would cost a total $4.0 million. This cost estimate includes assumptions of a steel structure with wooden decking, delivery, installation, construction of shoreline abutments and bridge approaches. Costs may be lower depending on local fabrication capacities and more detailed confirmation of bridge design and pier capacities.

11. Potential costs to retrofit an existing road bridge such as the Princess Margaret Bridge by cantilevering a new trail and structure on one side is anticipated to cost between $7.0 and $10.0 million. This cost was not included in the preliminary estimates table.

12. Installing an AT bridge facility linking the UNB campus across Highway 8 is estimated to cost $1,500 per square metre. Assuming a four metre wide bridge that is 125 metres in length, the costs is assumed to be $750,000.

13. Existing soft surface multi-use trails that are part of the network but not intended to be upgraded to hard surface have not been included in the estimates of probable costs.

Exhibit 6.2
Preliminary Estimate of Probable Costs

Fredericton Trails/Bikeways Master Plan
Network Development - Preliminary Estimate Of Probable Costs

ITEM	PROPOSED	UNIT	UNIT PRICE 2007 DOLLARS	NETWORK SEGMENT COSTS
On-Road Bike Lanes				
1. Bike Facilities (Both Sides) - Pavement Marking Treatment	38.0	per km	$20,000	$760,000
2. Bike Lanes Associated With New Road Construction (for information)	0.0	per km	$150,000	$0
Subtotal Bike Lanes	**38.0**			**$760,000**
On-Road Paved Shoulders				
3. Paved Shoulders (assumes sufficient road platform)	23.0	per km	$55,000	$1,265,000
4. Paved Shoulders Associated With New Road Construction (for information)	0.0	per km	$55,000	$0
Subtotal Paved Shoulders	**23.0**			**$1,265,000**
On-Road Signed Only Routes				
5. Signed Only Routes (Average of 8 Per Km)	44.0	per km	$4,000	$176,000
Subtotal On Road Signed Only Routes	**44.0**			**$176,000**
Off-Road Multi-Use Trails				
6. Multi-Use Hard Surface Trails (new construction)	30.0	per km	$150,000	$4,500,000
7. Multi-Use Soft Surface Trails To Hard Surface Trail Conversion	38.0	per km	$45,000	$1,710,000
8. Multi-Use Soft Surface Trails (new construction)	29.0	per km	$100,000	$2,900,000
Subtotal Off Road Trails	**97.0**			**$9,110,000**
Bridge Structures				
9. UNB Highway Bridge Crossing	500 square metres	per sq. m	$1,500	$750,000
10. Carlton Bridge Prefab. Retrofit Units (installed)	75m spans	x9	$444,444	$4,000,000
Subtotal Bridge Structures				**$4,750,000**
Full Network Build-out Costs				**$16,061,000**

NETWORK STATISTICS (KM)	TOTAL
Bike Lane	38.0
Paved Shoulder	23.0
Signed Routes	44.0
Multi-Use Trails (hard and soft surface, new and existing)	130.0
Totals	**235.0**

Additional Notes:

1. Unit Prices Reflect 2007 Dollars, and do not include the cost of property acquisition, utility relocations, major roadside drainage works or applicable taxes.
2. Major river crossing costs not included unless otherwise noted.