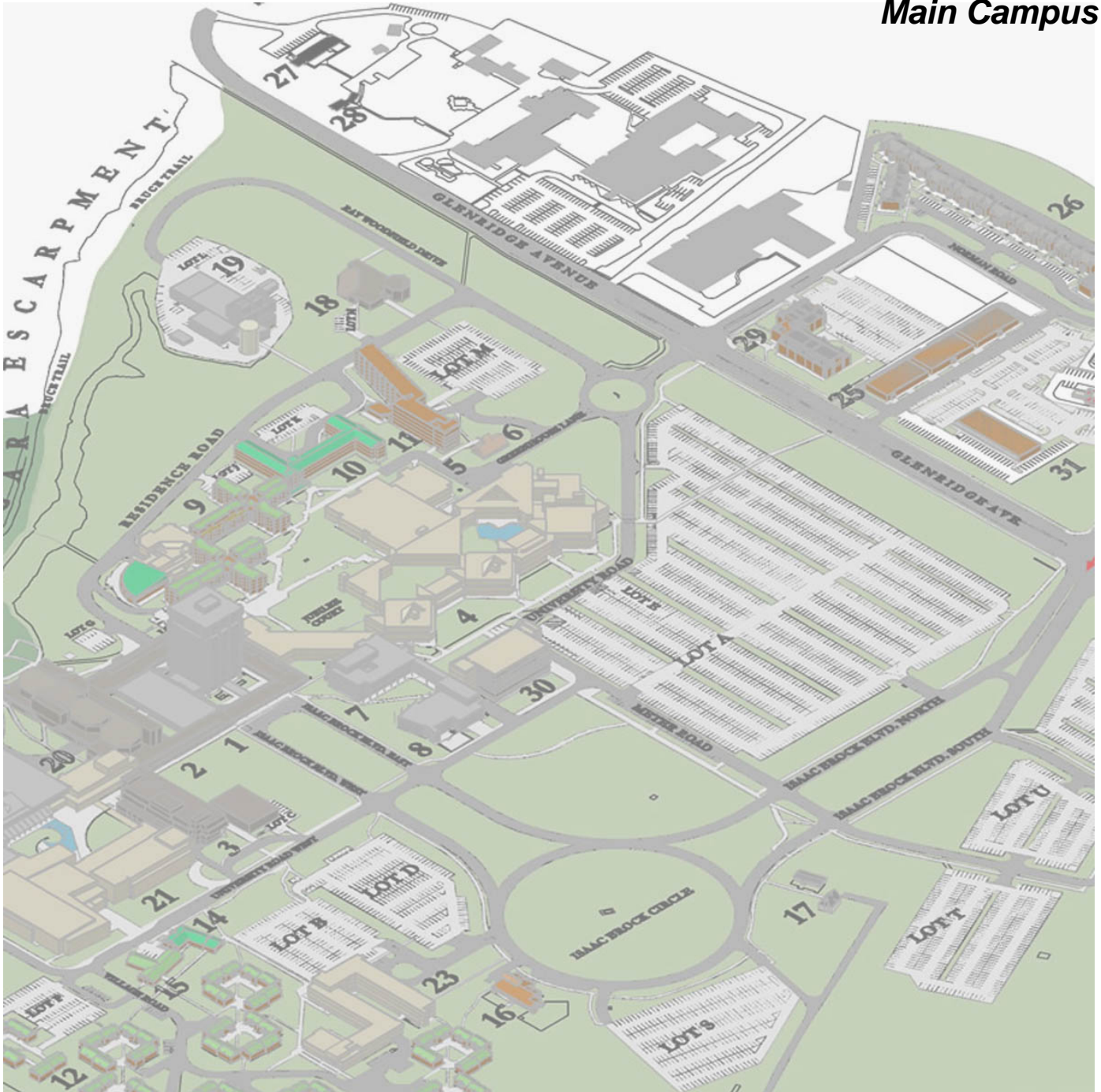


PRELIMINARY BIKEWAYS MASTERPLAN

Brock University Main Campus



Brock University
Preliminary Bikeways Masterplan
Main Campus – St. Catharines

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1 Introduction

Cycling is rapidly increasing in popularity and importance in Canadian society today. This is being accelerated by the recognition of the need for and benefits of reductions in our carbon 'footprint' and the contaminant emissions from internal combustion engines, together with the increased awareness of the importance of exercise for human health. Recreational cycling and cycling tourism are growing phenomena, but increasingly there is a trend for people to use cycling both to provide exercise and as a sustainable and pollution-free means of transport to their place of work or study.

The Regional Niagara *Bikeways Master Plan* (2003) suggests that as much as 7% of the population in Niagara at least occasionally commute to school or work.

Recognizing these trends, and in keeping with the 2003 *Campus Plan*, Brock University has commissioned this conceptual study as a first step in the preparation of a bikeways masterplan for the St. Catharines Campus.

The 2003 *Campus Plan* prepared by Urban Strategies Inc. and Marshal Macklin Monaghan makes the following recommendations:

1. *A comprehensive and continuous network of bicycle trails and routes should be developed throughout the campus. The network should be coordinated with the Region of Niagara's efforts in this regard.*
2. *Bicycle racks should be located near all building entrances. In particular, new bicycle racks should be included in the design and landscaping of University Road and the building entrances that face it.*
3. *All campus gateways should incorporate bicycle lanes.*
4. *Brock University should advocate for the creation and extension of a comprehensive bicycle route network throughout the Niagara Region. In particular, it should promote safe bicycle connections eastward along or parallel to St. David's Road.*

In addition, the *Campus Plan* states that the University will implement *transportation demand management* aimed at the reduction of single-occupant auto trips:

Brock University recognizes that increases in enrolment cannot be matched by comparable increases in auto usage to, from and on the campus. Accordingly, the University will move toward a 15% reduction in the proportionate rise of single-occupant auto travel over the 30-year planning horizon. This 15% reduction in single-occupant auto trips would be achieved by increasing the total number and proportion of trips made to the campus in carpools, by transit, on foot and by bicycle.

Brock's *Guide to the Planning, Design and Architecture of the Natural and Built Environments* (Urban Strategies Inc., April 2007) further recognizes the importance of promoting "continuous bicycle pathways that link to existing bicycle trails and to the surrounding community".

The *Campus Plan* recognizes the unique nature and charm of the campus setting:

The campus of Brock University is one of the most dramatic in Canada. Situated on the summit of the Niagara Escarpment, Brock University enjoys a visually stunning and internationally recognized setting.

Whereas this setting provides breath-taking vistas for recreational cyclists in the area, the presence of the Escarpment (a rise of approximately 55 metres) and the significant impact of the nearby 406 Highway present challenges to cyclists wishing to access the Brock Campus from nearby residential areas in the cities of St. Catharines and Thorold.

This study, constituting a conceptual or preliminary 'master plan' for cycling at the Brock University *Main Campus* and adjacent facilities, examines the external context of how the Brock Campus fits into the surrounding *Regional Bike Network*, makes recommendations for a proposed on-campus bike network that connects to the Regional network and proposes 'end-of-ride' bicycle facilities including storage or 'parking' provisions. In addition, cycling plans and practices at other comparable universities have been reviewed and limited interviews conducted with several 'stakeholders' associated with Brock University, who have previously expressed interest in and opinions on the subject of cycling to and on campus. Recommendations are also made with respect to future work required for the development of a detailed Bikeways Masterplan.



It should be noted that, although the intent has generally been preserved, campus development has not followed the 2003 *Campus Plan* exactly in all cases. This *Preliminary Bikeways Master Plan* document attempts to recognize recent campus improvements and those presently underway or planned for the immediate future.

It is noted that the location and natural setting of Brock's *Main Campus* has led to the use of facilities by cycle touring groups. Although the observations and recommendations herein are, for the most part, applicable to that endeavour, there has been no attempt made to specifically address tourism concerns.

2 External Context

2.1 Main Connections to External Bike Network

The Niagara Region presently designates the following Regional Roads as part of the proposed *Regional Bikeways Network*:

- RR50 Merrittville Highway (from Decew Road to St. David's Road)
- RR71 St. David's Road (apart from the section between the access ramps at the 406 Highway Interchange)
- RR50 Glenridge Avenue
- RR56 Collier Road (to Beaverdams Road)
- RR67 Beaverdams Road

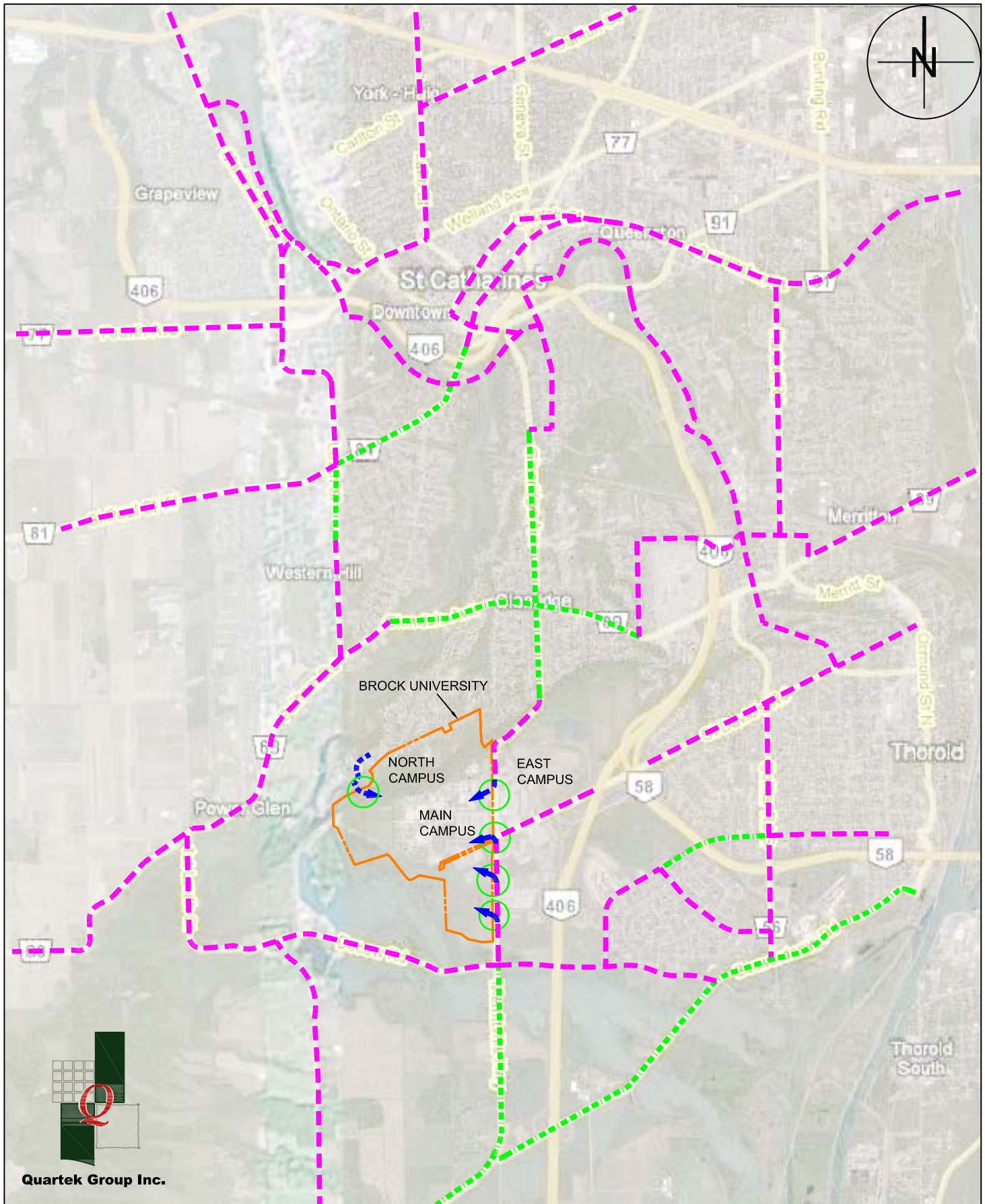
In addition, *the City of Thorold* has designated Richmond Street, Confederation Avenue and Decew Road as part of its *Bike Network* and is planning to provide bike lanes on these in the near future. Richmond and Decew are also designated as Bike Routes on the Region's Bikeway Plan. The City of Thorold is currently conducting a *Bicycle Route Feasibility Study* to identify future bicycle routes.

Roads designated as part of the Region's Bike Network will have bike facilities in both directions. In addition, the standard right-of-way for Regional Roads was increased in width about 2 years ago, to allow for the possibility of bike lanes being added (to all Regional Roads) at some time in the future.

In theory, when the bike lanes identified on the Region's and cities' Bike Networks as shown in Figure 1 have all been realized, students, staff and visitors to Brock can use the above-mentioned routes to reach the Brock Campus from residential areas in surrounding municipalities as shown in Table 1 below.




Table 1 – Available Routes to/from Campus	
from Thorold	<ul style="list-style-type: none"> • St. David's Road <u>or</u> • Collier Road, Beaverdams Road, Decew Road and Merrittville Highway <u>or</u> • Richmond Street, Decew Road and Merrittville Highway
from St. Catharines	<ul style="list-style-type: none"> • Burleigh Hill and one of the Thorold routes above • Glenridge Avenue
from Pelham (Fonthill)	<ul style="list-style-type: none"> • Merrittville Highway (RR50) • Cataract Road, Decew Road and either Merrittville Highway or off-road trail

With some of these routes however, there presently exist serious issues which the simple inclusion of bike lanes are unlikely to resolve.



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-  EXISTING MUNICIPAL BIKE ROUTES
-  PROPOSED MUNICIPAL BIKE ROUTES
-  BIKE ACCESS TO CAMPUS

The section of St. David's Road between the access ramps at the Hwy. 406 interchange is owned by the provincial Ministry of Transportation (MTO). This is a particularly difficult area for cyclists (and pedestrians) as the current road layout is designed to facilitate easy (and relatively fast) entry and egress of motorized vehicles onto/off the highway. An Environmental Assessment (EA) for the provision of bike facilities along St. David's Road (from Burleigh Hill to Glenridge Avenue) was recently prepared through cooperation between St. Catharines, Thorold and the Niagara Region. However, the recommendations of the EA report were not accepted by the MTO. These recommendations included the provision of a 4 metre wide protected pathway (for pedestrians and cyclists) in a median along the centre of St. David's Road in the area of the interchange. This arrangement removes one of the eastbound lanes on St. David's Road. The City of St. Catharines is currently preparing an amendment to the EA to address the concerns of the MTO.

The development of *Brock's property east of the Glenridge Quarry Naturalization Area* may present future opportunities for improved, or at least additional, external cycling connections that could include linkage to Tremont Drive or a multi-use trail under Hwy. 406, etc. However, as such development is not imminent, a more immediate solution to the St. David's Road access situation should be pursued.

The section of Glenridge Avenue at the northern end of the Brock Campus is a steep slope that ascends the Niagara Escarpment. In the downward direction, there are signs prohibiting motorists from overtaking cyclists at this relatively narrow and steep section of road. The effectiveness of these signs has been questioned by commuting cyclists consulted during the course of this study. Despite a sign prohibiting bicycles on the sidewalk, many cyclists elect to use the sidewalk, either mounted or dismounted, when climbing Glenridge Avenue toward campus, due to safety concerns associated with the steepness and narrowness of the roadway, as well as relatively high traffic volumes. The issue of conflict between bicyclists and pedestrians on the sidewalk therefore arises. One possible resolution of this issue which has been suggested is to cantilever a new sidewalk (for pedestrians) off the existing concrete sidewalk, leaving the concrete sidewalk for cyclists. Another approach to this problem is bike'n'ride, with possible future implementation of *bike racks on city buses*. This allows for the convenient use of bicycles at both ends of the trip, with the central, most difficult part of the trip (including the ascent of the escarpment) provided by bus. The University, possibly through the auspices of a cycling committee or users group, should encourage St. Catharines Transit to provide this facility by adding bike racks to their buses.

Clearly, both of the two most direct routes on the external bike network for cyclists wishing to reach the main Brock Campus from the most dense adjacent areas of population have significant issues that need to be resolved. In order to effectively encourage cycling as a viable alternative mode of transportation (to the car), safer, more convenient access to and egress from the various campuses must be facilitated. It is recommended that further discussions take place on these and other issues relating to cycling between Brock and the Niagara Region, the City of

St. Catharines, the City of Thorold and the MTO. Although these external linkage routes are not under the university's control, a persistent lobby will be useful in getting the appropriate authorities to place and keep this issue high on their priority lists.

2.2 Other External Connections

2.2.1 Hydro Road and Twelve Mile Creek Valley Trails

At the north-west corner of the Campus, *Hydro Road* winds down the face of the Niagara Escarpment, connecting the Main Campus to the *North Campus* via Lockhart Drive, and allowing convenient, although arduous, bike access to the west end of the Campus from the residential area north of Lockhart Drive. This route would become more attractive if a means of crossing Twelve Mile Creek existed in the area of Rotary Park or Power Glen. This could provide a significant area of West St. Catharines with a convenient bike route to the western end of the Campus. Various parties have previously promoted the use of the 'bailey' bridge crossing Twelve Mile Creek adjacent to the old DeCew Falls Generating Station powerhouse for recreational purposes. Most recently (February 2009), a proposed 'DeCew Falls Trailway Connection Project' has been put forward by Justin Banninga of Hydro One and David T. Brown of the Brock's Department of Tourism & Environment. In the interest of recognizing historical heritage and promoting tourism, health and recreation, this project would study the feasibility of the linkages across the DeCew Falls Generating Station penstocks and across Twelve Mile Creek using the 'bailey' bridge.

Further, the possible pedestrian and cycling linkage of the Hydro Road to the informal *Twelve Mile Creek valley* trail system could provide another commuting route and link the Main Campus and downtown St. Catharines communities. This could become quite significant in light of potential university-related developments contemplated for downtown St. Catharines.

2.2.2 Bruce Trail

As the *Bruce Trail* traverses the northern part of the Campus (east to west), there is potential for connections from this trail to the internal and external bike networks. However, as cycling on this hiking trail is not encouraged, the formalization of any of these connections is not appropriate.

2.2.3 Thorold-Fonthill Spur Line

The Region is considering the construction of a bicycle trail along the abandoned *Thorold-Fonthill spur rail line*. This would add another route for cyclists from Fonthill, to link up with other connections to the Brock Campus referred to above.

3 Internal Context

3.1 The Campus Today

The campus of Brock University is in a very unique setting, being situated at the top of the Niagara Escarpment, a UNESCO *World Biosphere Reserve*, and within the City of St. Catharines and the City of Thorold. The escarpment presents a challenge for cyclists approaching the campus from the north, but provides beautiful views of the City of St. Catharines and Lake Ontario when on campus.

As identified in the *Campus Plan*, the property can be viewed in five parts – the Main Campus, North Campus, West Campus, South Campus and East Campus. The Main Campus is the core academic area, including all existing buildings except one which is on the North Campus at the base of the escarpment. Proposed development on the West, South and East Campuses will be complimentary to these core academic land uses. This *Preliminary Bikeways Master Plan* is developed in the context of this *Campus Plan* referenced above.

3.2 The Campus Road Network

3.2.1 Existing Roadways

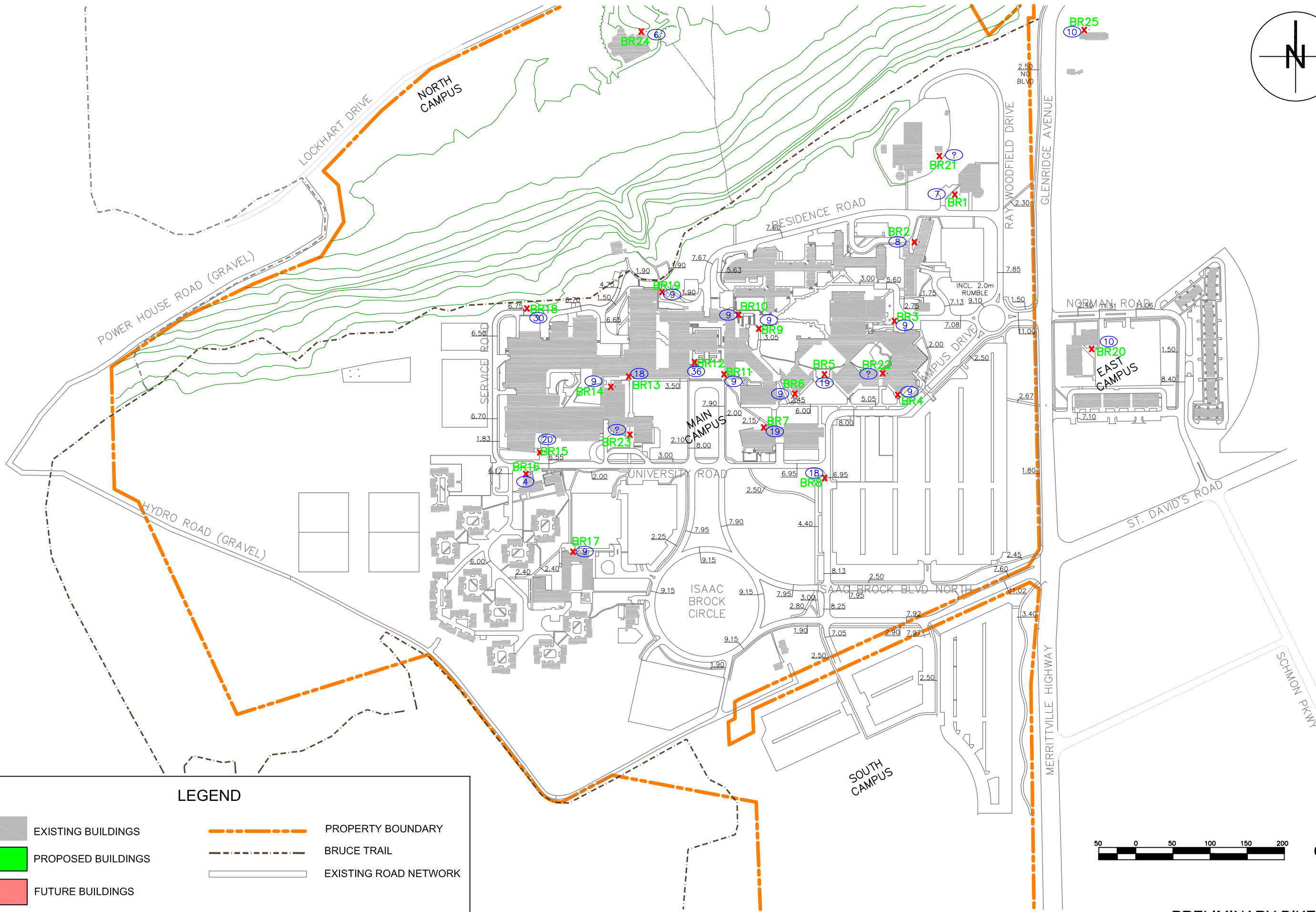
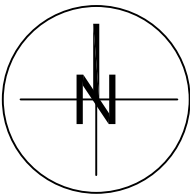
The existing road network provides two main access points to the campus, referred to as Shaver Gate and St. David's Gate, with St. David's Gate being the primary gateway to the campus. An existing gravel road on the west edge of the campus, referred to as *Hydro Road*, is shared with Ontario Power Generation as an access to the DeCew Power Generating Station to the Northwest. Although it is an important link for trail networks, it is currently not used for public road access to the campus.

Existing roads on campus are paved, but generally are relatively narrow and do not provide identified cycling facilities. Approximate pavement widths are shown on Figure 2.









3.2.2 Future Road Network

The *Campus Plan* will further develop St. David's Gate as the primary gateway to the campus for all modes of transportation, but will add two secondary gateways to the south known as the Thorold Gate and Tecumseh Gate. This will provide four access points along Glenridge Avenue and Merrittville Highway.

Internally, a portion of Hydro Road will be improved and connected to St. David's Road and University Road to become a part of the "*circulator road*", which also includes the existing University Road and the proposed Campus Drive. These will be the higher order roads on campus to facilitate access for



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	EXISTING BUILDINGS		PROPERTY BOUNDARY
	PROPOSED BUILDINGS		BRUCE TRAIL
	FUTURE BUILDINGS		EXISTING ROAD NETWORK
	BIKE RACK I.D. BIKE RACK CAPACITY		
	PAVEMENT WIDTH		



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 PRELIMINARY BIKEWAYS MASTER PLAN
 EXISTING CONDITIONS
 APRIL 2009 FIGURE 2

drop-off, parking, destination searches and transit circulation. Other campus streets are intended for local access only to buildings and/or facilities, and will be designed and constructed accordingly.

3.3 Walkways

Pedestrian movement is very important on any university campus, and the safety and comfort of the pedestrians is vital. A network of walkways exists on campus for the movement of pedestrians from residences and parking areas to the buildings, as well as between the various buildings. Currently, these walkways are strictly for pedestrians and none are designated for shared use with bicycles.

The *Campus Plan* will extend this pedestrian network and add new pathways and trails as other development takes place. A new multi-use trail is proposed within the landscape buffer along the west side of Glenridge Avenue, which will be shared by pedestrians and cyclists.

3.4 Bicycle Storage Facilities

Currently, bicycle storage on campus is accommodated by means of bike racks provided at various locations, primarily near the academic and recreational buildings. Based on information provided by the Facilities Management Department and our field inventory, locations and capacities of existing bike racks are shown on Figure 2. The existing bike racks are in approximately 25 different locations, with a total capacity of at least 280 bicycles, including 2 locations in the East Campus area, accommodating 20 bicycles.

In addition, indoor bicycle storage is permitted in many of the student residence facilities.

Other amenities are not currently provided specifically for cyclists.

4 Review of Cycling Plans and Practices at Comparable Universities

A limited review of web-based information found that many cycling facilities are now provided at comparable university campuses across Canada. Representative institutions for which relevant information is available include McMaster University in Hamilton, Queen's University in Kingston, University of Western Ontario in London, University of Waterloo in Waterloo, Ontario, University of Victoria in British Columbia, and University of British Columbia in Vancouver. Facilities provided include:

- Designated bicycle routes on campus
- Bicycle racks at convenient locations
- Shelters for covered bicycle parking
- Secure, enclosed bicycle parking
- Bicycle lockers
- Clothing lockers
- Access to shower and change facilities
- Pressurized air hose
- Electric bicycle charging station
- Bicycle User's Committee Information Board
- Cyclist route kiosk

These facilities are provided in varying numbers and to different degrees of sophistication at different institutions and campuses because they need to be adapted to the unique situations and needs at each location. Some initiatives have been introduced as pilot projects with user fees in order to evaluate the feasibility and the demand for such facilities. One example of an apparently successful pilot project is the user-pay bicycle lockers at McMaster University, where additional lockers have been added since the original initiative.

5 Stakeholder Consultation

Consultation for this conceptual or preliminary master plan exercise was quite minimal. Several parties who have indicated their interest in the issue of cycling to and on campus through previous correspondence were contacted and asked to comment on various issues including access to campus, bikeways on campus, end-of-ride facilities, and cycling advocacy. The issues raised and opinions expressed are listed below.

- Cycling to/from and on campus should be actively promoted and supported through the implementation of recommendations in the *Campus Plan* and additional initiatives that will make cycling an attractive alternative to the use of motor vehicles.
- The most important issue at present is the lack of safe cycling access to and from campus.
- Glenridge Avenue is problematic for cyclists both downhill (due to the level of traffic, lack of bike lanes or dedicated trail and significant slope).
- St. David's Road is dangerous as a cyclist commuting route due to the high-speed automobile traffic at the Hwy. 406 on and off ramps and the lack of dedicated cycling lane or trail.
- Shared bicycle-automobile routes are preferable to shared bicycle-pedestrian trails, as long as sufficient width is provided to bicycles.
- Some additional bicycle 'parking' or storage would be useful and the location of such facilities should be reviewed to ensure that they can be easily found and identified by arriving cyclists.
- The 'ring rack' style being installed recently by Facilities Management is generally satisfactory and probably preferred over other styles.
- Some secured parking facilities, preferably protected from the weather, should be provided.

6.1 Guiding Principles

Prior to recommending bicycle routes and other amenities, certain guiding principles were identified to direct the range and scope of facilities considered and focus evaluation of various options. These guiding principles at this preliminary stage have been derived from Brock's *Campus Plan* (2003), Regional Niagara's *Bikeways Master Plan* (2003), documentation of emerging best practices in North America, consultation with Facilities Management staff, with staff of Regional Niagara and local municipalities and with a limited number of stakeholders, and the Consultant's experience in the planning and design of roadwork and multi-use trails.

General Guiding Principles:

1. Continued increasing usage of bikeway facilities is expected.
2. Campus development and the provision of cycling facilities and amenities should promote cycling as a preferred alternative to the automobile for commuting to/from campus and getting around campus.
3. On campus, bicycles should generally be separated from pedestrians, for the safety and comfort of pedestrians. Bicycles are considered vehicles and should generally be on the roads where feasible if no separate facility is provided.
4. Where sufficient space is available (e.g. areas of new "green-field" construction), bicycles should be separated from both pedestrians and vehicular traffic by creating separate off-road pathways.
5. All campus gateways shall incorporate provision for safe and convenient transition from external roadways to on-campus bicycle routes.
6. In a transit hub area, it is preferable to separate bicycles from the bus and car traffic.
7. Cyclists will search for the most direct route to their destination, so identified routes should be as direct as possible from gateways to the most popular destinations on campus.
8. Bicycle racks or other parking/storage facilities should be located in highly visible areas provided within a short walking distance to entrances of all major destination buildings on campus.
9. A significant portion of the cycling community will want access to secure and perhaps weather protected bicycle parking and a reasonable number of these could be expected to be willing to pay at least a nominal fee for it.
10. Appropriate way-finding strategy and signage at gateways and other significant points should be developed to identify most direct routes to significant destinations for first-time or infrequent visitors to campus.
11. Existing site lighting should be enhanced as necessary to ensure that all bicycle routes are well lit for the safety of the users.

6.2 Projections of Bicycle Traffic

Quantification of existing bicycle traffic and projections of future traffic should be carried out in conjunction with the preparation of a detailed bikeways master plan. This quantification should be based on counts at peak periods during the spring and/or fall semesters.

6.3 Proposed Bicycle Routes

Preliminary recommended bicycle routing has been developed with a 2-stage approach. The first stage is the provision of routes primarily recognizing and utilizing the existing built campus environment. The second stage suggests bicycle routes based on the fulfillment of the 2003 *Campus Plan*. These short-term and long-term route networks are outlined below and presented schematically on Figures 3 and 4 respectively. Gateways refer to those identified in the *Campus Plan*.

6.3.1 Short Term Network

The recommended bikeways *Short Term Network*, shown in Figure 3 and summarized in Table 2, is based on designating bicycle routes on the existing campus. One exception is the addition of the proposed *Niagara Health and BioSciences Research Complex (NHBRC)*, the construction of which is hoped to commence in late 2009, along with a corresponding road realignment.

These routes will provide good access from the external road network to the various building areas on campus. From these routes, bicycles can be walked along pathways between the buildings to convenient bicycle rack or storage locations.

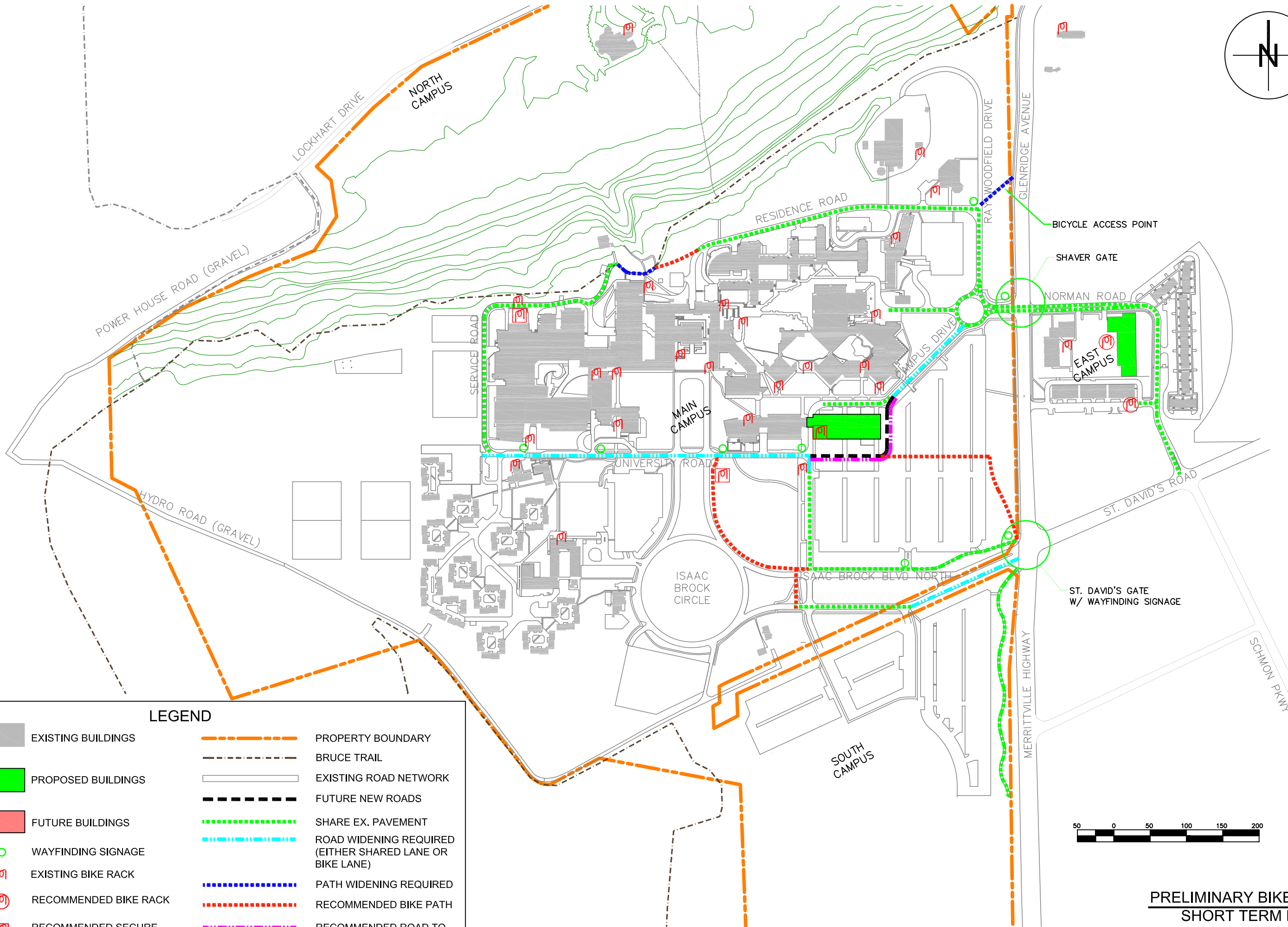
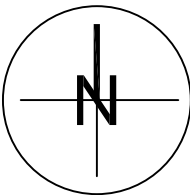
It is recommended that a designated route to the base of the Schmon Tower not be provided in the short- or long-term. The high level of bus, taxi, personal vehicle and pedestrian traffic suggests that the bike route along Isaac Brock Blvd. should terminate at University Road. This location may then be a preferred location for a secure, covered bike parking area.

6.3.2 Long Term Network

The bikeways *Long Term Network* is designed to accommodate the ultimate build-out of the university property based on the 2003 *Campus Plan*. The layout is shown on Figure 4 and the routes are summarized in Table 3. With the exception of the removal of the superfluous east-west route across the parking lot from the new *NHBRC*, all components of the *Short Term Network* are included, with some significant extensions and additions to accommodate future expansion of the campus.

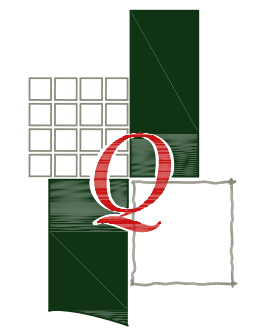
Table 2 - Short Term Bike Route Network

<p>Access Points</p>	<p>Two main access points are identified for bicycle access to campus.</p> <ol style="list-style-type: none"> 1. Paved path from Glenridge Avenue to Ray Woodfield Drive near Residence Road (north end of main campus); 2. St. David's Gate (intersection of St. David's Road and Glenridge Avenue). <p>Shaver Gate is available as an access point, but will be used primarily by those crossing through the intersection from the east side of Glenridge Ave.</p>
<p>Route at north edge of campus</p>	<p>The recommended route incorporates the following elements, presented from east to west:</p> <ul style="list-style-type: none"> • widen existing paved path to 3.0m from Glenridge Ave. to Ray Woodfield Drive • shared use of Residence Road • create new paved path from Residence Road to the existing path north of the Thistle Complex • widen the existing path to Alphie's Lane • follow Alphie's Lane and the service road around the Walker Complex to University Road <p>The roads in this north edge route are low volume with respect to motor vehicles, and therefore can be shared safely with bicycles.</p>
<p>Bicycle routes at "front" of campus (south side of existing academic facilities)</p>	<p>Other designated bicycle routes on the main campus would include:</p> <ul style="list-style-type: none"> • reconstruction and widening of University Road to include marked bicycle lanes • use the existing paved path on the north side of Isaac Brock Blvd. North from St. David's Gate, connecting to a new bicycle path beside Isaac Brock Blvd. East up to University Road • new bicycle path going north from St. David's Gate along Glenridge Ave., then west across Parking Lot A, connecting to the new University Road near the proposed <i>NHBRC</i> • new bicycle path connecting the north and south legs of Isaac Brock Blvd., then share the existing Isaac Brock Blvd. South leg easterly to St. David's Road • bicycle lane added to the eastbound lane of St. David's Road from Isaac Brock Blvd. South to Glenridge Avenue • utilize the existing Meter Road as a link between University Road and Isaac Brock Blvd. North leg • existing road to be shared with other vehicles on Norman Road (East Campus)



LEGEND

- | | | | |
|--|---------------------------------|--|--|
| | EXISTING BUILDINGS | | PROPERTY BOUNDARY |
| | PROPOSED BUILDINGS | | BRUCE TRAIL |
| | FUTURE BUILDINGS | | EXISTING ROAD NETWORK |
| | WAYFINDING SIGNAGE | | FUTURE NEW ROADS |
| | EXISTING BIKE RACK | | SHARE EX. PAVEMENT |
| | RECOMMENDED BIKE RACK | | ROAD WIDENING REQUIRED (EITHER SHARED LANE OR BIKE LANE) |
| | RECOMMENDED SECURE BIKE STORAGE | | PATH WIDENING REQUIRED |
| | | | RECOMMENDED BIKE PATH |
| | | | RECOMMENDED ROAD TO INCLUDE BIKE LANES |

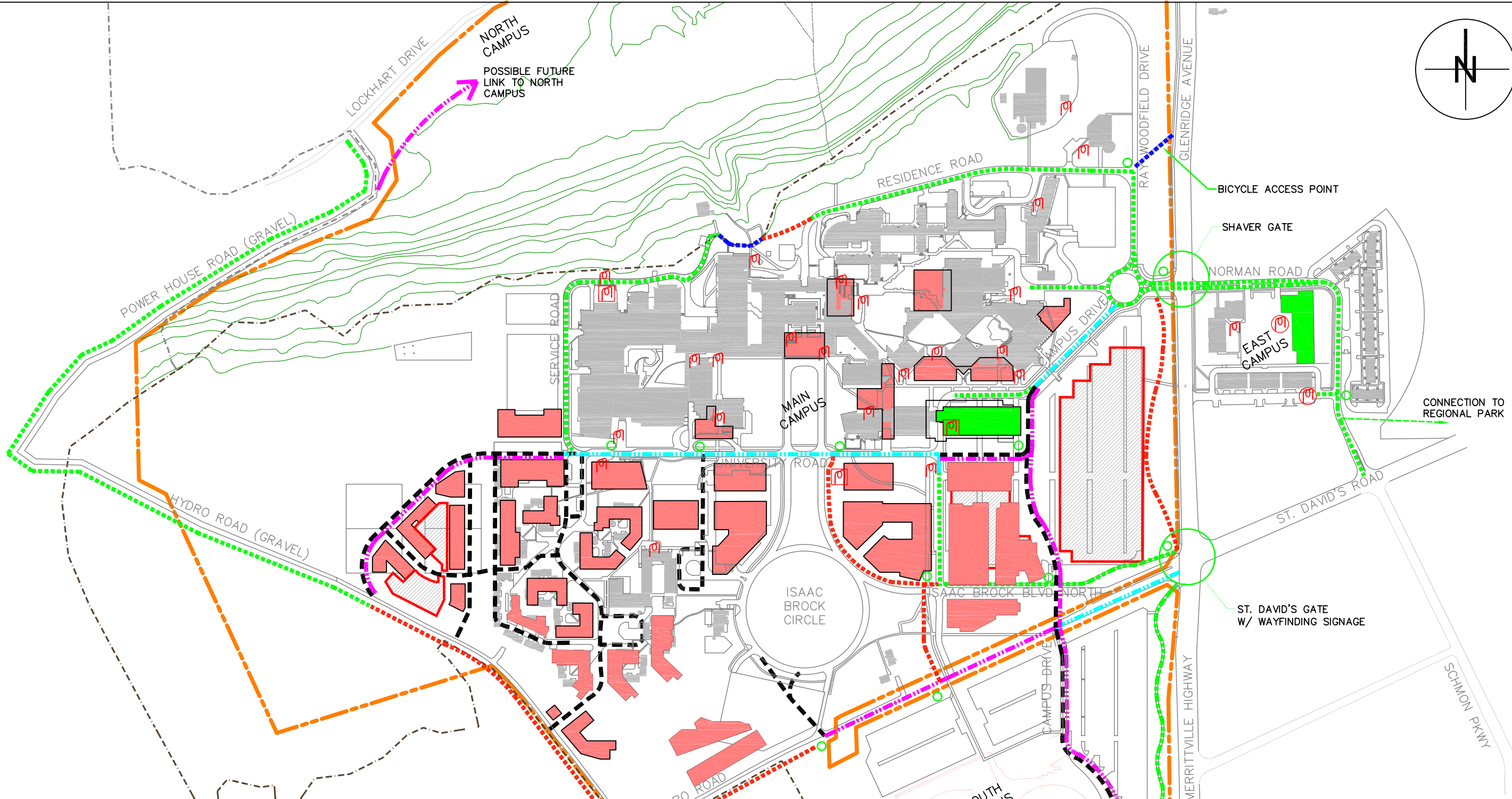
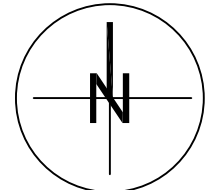


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**BROCK UNIVERSITY
PRELIMINARY BIKEWAYS MASTER PLAN
SHORT TERM BIKEWAYS NETWORK
APRIL 2009
FIGURE 3**

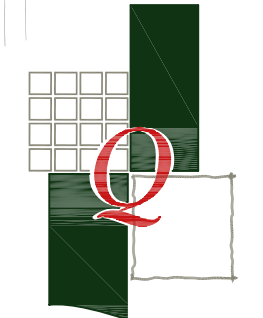
Table 3 - Long Term Bike Route Network

<p>Access Points</p>	<p>Two access points in addition to the Short Term Network to be provided from Merrittville Highway to serve the planned South Campus area</p> <ol style="list-style-type: none"> 1. Thorold Gate at the south limit of the planned south parking lot near the Regional Niagara HQ driveway 2. Tecumseh Gate at the south limit of the planned road access at or near Schmon Parkway <p>One additional recommended access point is from Lockhart Drive in the north via Power House Road and Hydro Road. This access is physically demanding due to the uphill climb on Power House Road, and will serve only a small population that might be using Lockhart Drive and Riverview & Windermere Roads. For these reasons, this access will likely not be heavily used, but would be available for those that wish to use it.</p>
<p>Route from Thorold Gate</p>	<p>Existing multi-use recreational along the east property limit adjacent to Merrittville Highway to provide safe cycling access between Thorold Gate and St. Davids Gate</p>
<p>Route from Tecumseh Gate</p>	<p>Two options to be provided:</p> <ul style="list-style-type: none"> • bicycle lanes on new new road from Tecumseh Gate around proposed athletic fields to link up with the path along Isaac Brock Blvd. • existing multi-use recreational trail along the east property limit adjacent to Merrittville Highway to be extended southerly to Tecumseh Gate providing safe cycling access between Tecumseh Gate and St. David’s Gate
<p>Hydro Road Route</p>	<p>In keeping with the <i>Campus Plan</i>, Hydro Road is to maintain its present “country road” character. In addition, the Bruce Trail parallels the road for some distance. Accordingly, separate dedicated bicycle path is recommended alongside Hydro Road down the escarpment to Lockhart Drive.</p>
<p>North Campus</p>	<p>Although not detailed, possible future road linkage from Main Campus to North Campus is referenced in the <i>Campus Plan</i>. A bike route should parallel this if/when it happens. Consideration should be given to incorporating bike racks on possible future shuttles from North Campus to Main Campus.</p>



LEGEND

	EXISTING BUILDINGS		PROPERTY BOUNDARY
	PROPOSED BUILDINGS		BRUCE TRAIL
	FUTURE BUILDINGS		EXISTING ROAD NETWORK
	WAYFINDING SIGNAGE		FUTURE NEW ROADS
	EXISTING BIKE RACK		SHARE EX. PAVEMENT
	RECOMMENDED BIKE RACK		ROAD WIDENING REQUIRED (EITHER SHARED LANE OR BIKE LANE)
	RECOMMENDED SECURE BIKE STORAGE		PATH WIDENING REQUIRED
			RECOMMENDED BIKE PATH
			RECOMMENDED ROAD TO INCLUDE BIKE LANES



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PRELIMINARY BIKEWAYS MASTER PLAN
LONG TERM BIKEWAYS NETWORK
APRIL 2009
FIGURE 4

6.4 Typical Bikeway Cross-Sections

Drawing on the Consultant's experience in roadwork and multi-use trails, and on the experience and policies of Regional Niagara and other local agencies involved in establishing cycling facilities, the preferred and minimum dimensions in Table 4 below are recommended for on-campus bicycle routes:

Table 4 – Recommended Widths for Bicycle Routes		
Condition	Preferred (m)	Minimum (m)
Driving lane for local road (car only)*	4.0	3.5
Bicycle Lane on road (add to car lane)	1.5	1.2
Shared Lane on road (bike & car)	4.5	4.0
Bicycle path (2-way, off-road)	3.0	2.5

* In cases of very low vehicular traffic, regular driving lane width can be sufficient for shared use also.

Typical cross-sections for different types of proposed bikeway facilities, developed from the recommended parameters above, are depicted on Figure 5.

For on-road facilities, Figure 5 shows the shared lane arrangement as well as the separate designated bike lanes. For the identified network, the shared lane arrangement applies to Residence Road, the service road around Walker Complex, Ray Woodfield Drive, Meter Road and Norman Road. Designated bike lanes apply to University Road, Campus Drive, Hydro Road and St. David's Road.

For off-road facilities, Figure 6 shows the typical multi-use path, which can be shared with pedestrians or dedicated to bicycles only. This cross-section applies to all off-road paths, whether new paths or the widening of existing paths.

6.5 Proposed Cycling Amenities

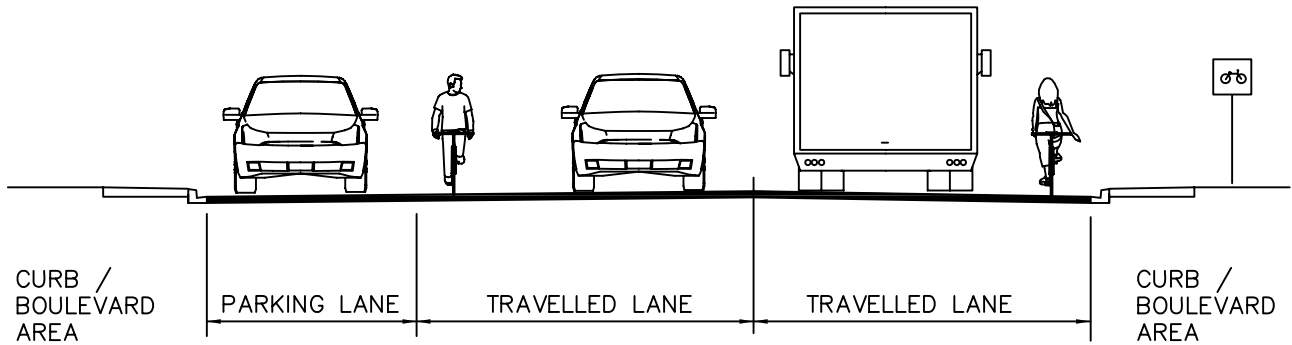
6.5.1 Bicycle Racks

Existing bicycle rack locations have been established by experience based on observation of bicycle user habits and needs expressed by the university community. However, racks are not always highly visible and priority is not always given to ensuring accessibility. In particular, the use of some racks is prevented during winter months by snow plowing practices. Limited stakeholder consultation suggests that there could be some improvement in terms of bike parking locations.

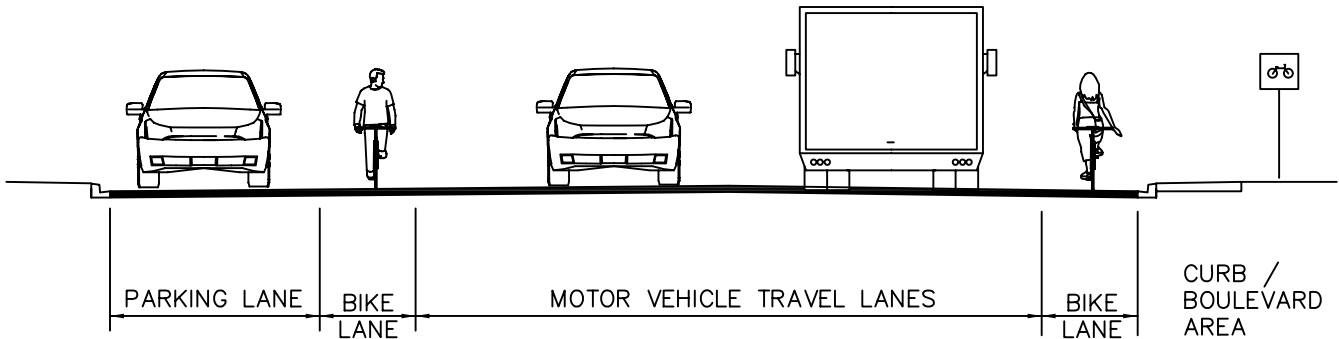
A preliminary review of practices in jurisdictions areas with mandated by-laws and/or guidelines suggests that the number of bicycle parking spots should be in the order of 10% or more of the number of vehicle parking spots provided. At

ROAD CONFIGURATION AND CHARACTERISTICS	PREFERRED STANDARD	MINIMUM OR INTERIM SOLUTION (CONSTRAINED PROJECTS)
a) 2 LANE URBAN ≤ 6% TRUCKS NOT CRV		
b) 2 LANE URBAN ≤ 12% TRUCKS CRV		

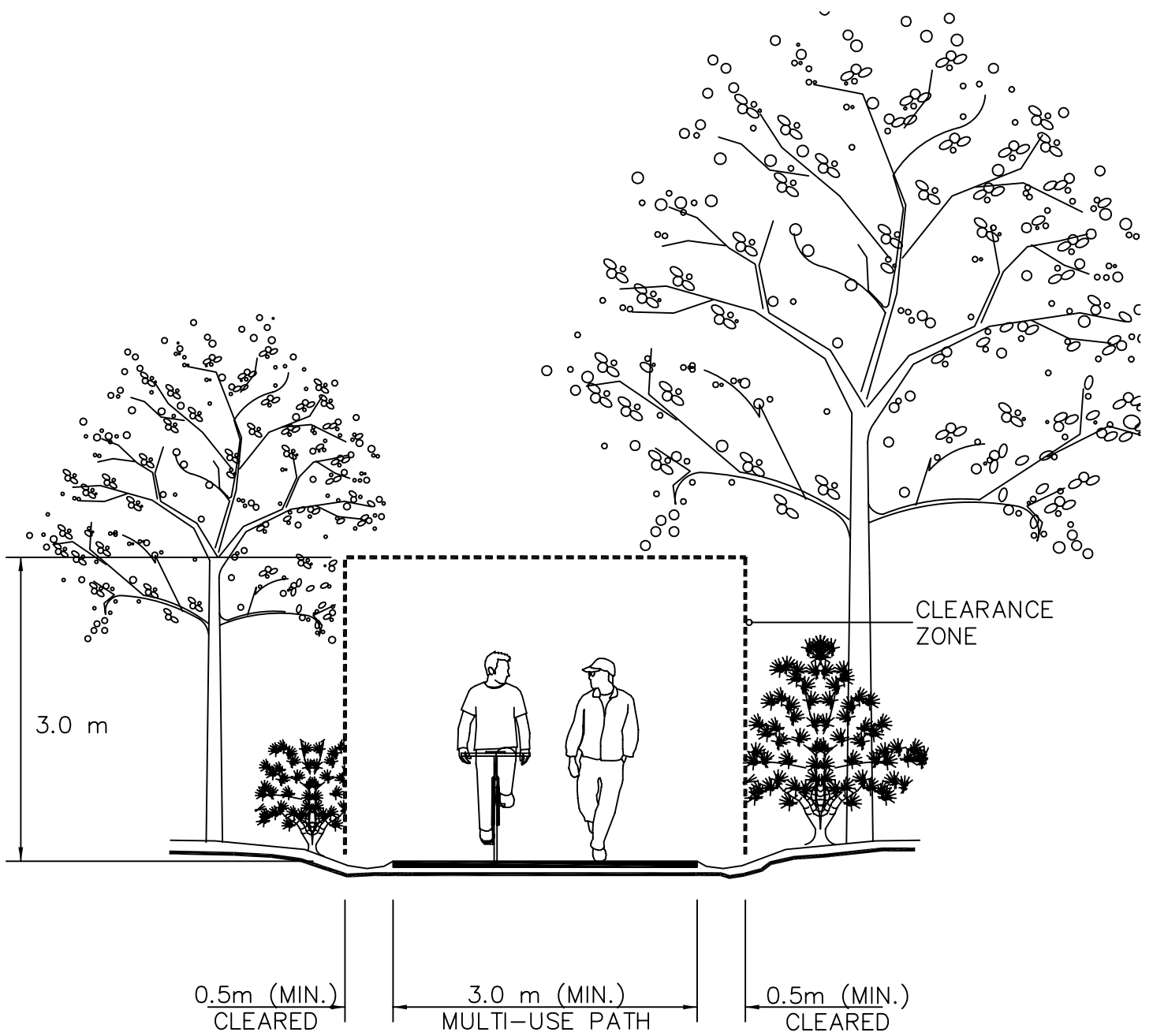
BL = BIKE LANE WCL = WIDE CURB LANE SL = SHARED LANE CRV = COMMERCIAL VEHICLE ROUTE
 NOTE: EDGE OF BIKE LANE = EDGE OF PAVEMENT



a) SIGNED ROUTES – SHARED LANE



b) BIKE LANE



MULTI-USE TRAIL



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PRELIMINARY BIKEWAYS MASTER PLAN
RECOMMENDED OFF-ROAD BIKEWAY CONFIGURATION

FIGURE 6

present, the bike racks in place would provide parking for something almost in this range. However, visibility and accessibility issues suggest that the realizable number could be considerably less than 10% of the vehicle parking spots on campus. Also, the relative number of bicycle parking spots that should be made available would be expected to increase in years to come, given anticipated changes in societal views on alternative transportation and the desire to promote cycling to and on campus.

Bicycle rack locations should be reviewed and improved with respect to number, visibility, accessibility, convenience and bicycle security. It is recommended that a suitable forum be set up to allow users to submit suggestions for preferred locations or other related issues. Preliminary recommended locations for additional new bicycle racks are shown on Figure 3, but these should be confirmed through further consultation with key users and stakeholders.

Existing bicycle racks on campus consist of various different styles and sizes. The looped style like the “Ring Rack™ by Bike Up Bicycle Storage Systems (see photo), which is the most prevalent of those on site, is preferred by many cyclists, and is very practical in that it allows convenient lock-up of the bicycle tire and frame to the hanging ring on the rack for bicycle security without putting undue strain on any part of the bicycle. Facilities Management has selected this style as the preferred rack and it is recommended here that additional or replacement bicycle racks should generally be of this style in order to establish a consistent type of rack throughout the campus. Different styles should be considered only if the above style does not suit the unique requirements of a specific location.



6.5.2 Secure Bicycle Parking Facilities

University campuses are not immune to the high frequency of bicycle theft prevalent elsewhere. Accordingly, it is believed that there is a demand for secure bicycle parking facilities that is likely to grow with the increased use of cycling as a transportation alternative of choice. Various methods can be used to provide secure bicycle storage. Some options are:

- interior area as part of new building construction
- addition to existing building enclosed by walls and roof
- exterior covered area enclosed by fencing with gate access
- bicycle lockers

For all of these options, various types of racks or support systems can be investigated for bicycle parking to maximize use of the area available, including vertical bicycle racking. Detailed recommendations for such systems are beyond the scope of this document, but should be investigated.

In the short term, we recommend consideration of the following:

- provision of a secure bicycle storage area to be included in the design of the proposed new *NHBRC* currently being contemplated;
- provision of an exterior covered and secured storage area near the Walker Complex, likely on the north side near the rear entrance to the building;
- provision of some bicycle lockers or secure parking facility at the south-east corner of the Isaac Brock Blvd. / University Road intersection.

Any or all of these initiatives can be introduced as pilot projects with user fees to determine if there is a demand for these types of facilities.

6.5.3 Shower and Locker Facilities

In order to encourage bicycle commuting to campus, end-of-ride facilities should include access to shower facilities. Commuters will be less inclined to cycle without the opportunity to quickly shower and change prior to interacting with others. Although students and staff generally have access to showers in the Walker Complex, it is recommended that consideration be given to including shower facilities in conjunction with the provision of new bicycle storage facilities at the new *NHBRC*.

6.5.4 Way-Finding Signage

Clear and concise information signage is very important in helping visitors reach their destination safely and quickly, particularly for the first-time or infrequent visitor. Where the bikeway facilities are on the road or immediately adjacent to it, the road signage may be adequate, but where off-road paths are used for bicycle routes, additional way-finding signs, consistent in style with vehicular and pedestrian way-finding signage, should be implemented. Some examples of such locations are:

- Ray Woodfield Drive at Residence Road, where the access path enters from Glenridge Avenue
- St. David's Gate for the path going north in the landscape buffer
- intersection of pathways in the landscape buffer west of Glenridge Avenue
- intersection of new path from South Campus with Hydro Road

6.5.5 Mass Transit Bicycle Accommodation

Cooperation between operators and users of various “green” transportation options is likely to create synergy encouraging all such modes. Accordingly, mass transit initiatives that cater to cyclists could be expected to increase the use of both as alternatives to personal automobiles.

As mentioned in Section 2, St. Catharines Transit does not at present have bike rack facilities on any of their buses, despite some pleas in the past from the Brock cycling community. In contrast, Niagara Falls Transit does offer bike racks on their “Brock Rapid” route to/from the university. It is recommended that the cycling community at Brock, possibly through a users group (refer to Section 5.5.6 below) strongly lobby St. Catharines Transit for at least a pilot project trial of on-bus bike racks for those routes serving Brock campuses. This would be especially relevant for routes using Glenridge Avenue, given that the bicycle route to campus along Glenridge Avenue entails a challenging climb and unsafe shared use of either the road (with vehicles) or the sidewalk (with pedestrians).

Similarly, at such time as inter-campus shuttles are implemented, they should be outfitted with bike racks to accommodate commuting and “one-way” cyclists not desiring to negotiate the escarpment.

6.6 Bicycle Users Group

The formation of a ‘bicycle users group’ or ‘cycling committee’ should be encouraged by university leadership. The users group or committee would be useful in developing new initiatives on campus, lobbying transit and the local municipalities in developing safe bicycle routes to/from campus, assisting with the operation of end-of-ride facilities and bike ‘parking’ on campus and possibly even in facilitating co-operative bicycle maintenance services.

6.7 Bicycle User Information

As designated cycling facilities develop, printed information and particularly web-based information should be constantly updated. The cycling community tends to be technologically current and is likely to make good use of on-line information. Once adopted, the detailed bikeways master plan should be readily available in printed form and online as a downloadable PDF document, and additional information on free and user-pay bike parking and other facilities should be readily accessible. This will serve to attract new students as well as foster good will with the greater Niagara community. In addition, readily available resources will facilitate the furtherance of cycle tourism using the university’s facilities, should that be an area considered worth pursuing.

7 Costs

From the Consultant's past experience with roadway and building projects, and limited consultation with suppliers, the 'order of magnitude' costs listed in Table 5 for various recommended facilities have been compiled for future consideration. For budgeting purposes, it is recommended that these values be re-visited and refined.

Table 5 - 'Order of Magnitude' Costs for Recommended Facilities

Item	Unit	Cost (\$)
Bicycle lane on road (add to new road, one side)	metre of road	85
Bicycle lane on road (add to existing road, one side)	metre of road	125
Bicycle path (2-way, off-road)	metre of path	150
Widen existing path by 1.0 metres	metre of path	70
Bicycle racks – 'Ring Rack' style (installed, with pad)	per bicycle	150
Bicycle 'lockers' (installed, with pad)	per bicycle	1100
Secured, covered bicycle 'parking' - outdoors	per bicycle	1000
Secured, weather-protected bicycle 'parking' - indoors	per bicycle	2000

8 Recommendations

Key recommendations resulting from this study are summarized in the Table 6 below.

Table 6 – Recommendations	
Bicycle Access to Campus	<ul style="list-style-type: none"> • lobby Regional Niagara, City of St. Catharines, City of Thorold and M.T.O. for provision of safe cycling facilities on St. David’s Road and support initiatives for same • lobby City of St. Catharines and Regional Niagara for provision of safe cycling facilities on Glenridge Avenue and support initiatives for same • lobby St. Catharines Transit for the provision of bike racks on buses serving Brock University’s Main Campus
Short Term Bikeways Network	<ul style="list-style-type: none"> • create bikeways network for present campus development conditions by designating bike routes on existing bike paths and roads, widening existing paths and roads, and construction of new paths
Long Term Bikeways Network	<ul style="list-style-type: none"> • enhance and extend bikeways network in conjunction with future campus development by providing bike lanes on new roads, constructing new path alongside Hydro Road, and extending multi-use trail along Glenridge Ave.
End-of-Ride Facilities and Other Initiatives	<ul style="list-style-type: none"> • provide additional bicycle racks at highly visible locations • provide secure bicycle parking facilities, possibly as pilot projects with user fees • provide shower facilities and lockers for cycling commuters at 2 or 3 key locations, possibly at the walker Complex and the planned <i>NHBRC</i> • provide way finding signage, consistent with other on-campus signage, at gates and other key locations • create Cycling Committee or Bicycle Users Group
Follow-up Work	<ul style="list-style-type: none"> • carry out counts of bike traffic at key locations at peak periods of summer/shoulder seasons • observe and evaluate areas of high demand for bike racks/parking • consult with students / staff / stakeholders / cycling organizations • consult with Niagara Region, City of St. Catharines, City of Thorold, St. Catharines Transit • carry out conceptual design and more refined cost estimation for budgeting purposes • investigate potential sources of funding for cycling initiatives