Segregated Bicycle Lane Pilot Project

Cycling Expert Peer Review

Prepared for **City of Ottawa**
By **Vélo Québec Association**

October 2010

Vélo Québec
ASSOCIATION

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1 Introduction

1.1 About this Project

Ottawa's bicycle infrastructure includes an extensive network of off-street bicycle paths implemented by the National Capital Commission (NCC) over the last 40 years as well as a scattered network of on-street routes implement more recently by the City. The resulting bicycle route network, composed of primarily of recreational paths with some interconnections to on-street routes, does not necessarily respond well to the needs of cyclists, especially for destinations in the downtown core.

With the rising popularity of cycling as a mode of transportation, the City has undertaken efforts to improve and expand on-street bicycle facilities. The City's strategy for developing its bicycle route network has been formalized in the Ottawa Cycling Plan (OCP). The plan aims to create a more complete, interconnected network that will serve the needs of cyclists with different levels of skill and experience, paving the way for much higher levels of bicycle use than today. Council approved the OCP in July 2008 along with a set of recommendations brought forth by the transportation committee. One of these recommendations was that City staff should evaluate the feasibility of implementing a segregated, on-street bicycle facility running east-west and propose a first pilot project.

In response, in January 2010, staff initiated a study and a series of public consultations for a pilot project for segregated bicycle lanes running east-west through the downtown core. The bicycle lanes are to be installed on a temporary basis (i.e., using removable separators) for a two-year trial period. If deemed successful, the lanes are to be installed permanently on the third year. City staff are currently aiming to have the pilot project implemented by the spring of 2011.

1.2 Mandate

The City retained McCormick Rankin Corporation (MRC) to assist it with selecting an alignment for segregated bicycle lanes in a study area that is delineated by the Ottawa River to the north, the Queensway to the south, Elgin Street to the east, and Preston Street to the west. Through a two-stage selection process conducted by MRC and supplemented by public consultations, the field of 33 potential east-west corridors in the study area was narrowed down to three corridors: Gladstone Avenue, Somerset Street, and Laurier Avenue. MRC has since undertaken preliminary designs for segregated bicycle lanes on the selected corridors and is further evaluating their potential impacts.

The City has asked Vélo Québec, a cycling expert group based in Montreal, to peer-review MRC's work and assist with devising selection criteria for the final alignment of the segregated bicycle facility.

1.3 About Vélo Québec

Vélo Québec, is a non-profited organization that was founded 1967 to promote cycling in the Province of Quebec. Today, Vélo Québec is internationally recognized and among the largest cycling organizations in the world. The main division, **Vélo Québec Association**, is presently involved in the following activities:

- cycling advocacy
- promotion of active transportation
- implementation and oversight of the 4,000 km, Quebec-wide *Route Verte* bicycle route network
- training courses on bicycle facility design
- consulting on bicycle facility planning and design and technical issues such as highway codes, road signage and pavement markings for cyclists
- publication of technical documents and reports on bicycle and pedestrian facility planning and design

The other divisions are **Vélo Québec Événements**, which coordinates major cycling events, such as the annual *Tour de l'île* in Montreal; **Vélo Québec Voyage**, a travel agency that organizes bicycle tours across Canada and abroad; and **Vélo Québec Éditions**, which publishes four magazines (*Vélo Mag*, *Géo Plein Air*, *Québec Science*, and *Nature Sauvage*) as well as various books, guides, maps, and other resources associated with cycling, outdoor recreation, nature, science, sports, and tourism.

Since the initiation of the *Route Verte* project in 1995, Vélo Québec Association has worked with the Government of Quebec, the City of Montreal, and a host of other municipalities across Quebec, providing technical advice on the planning and design of bicycle facilities. Since 2002, it has been a key partner of the City of Montreal in the development and implementation of the *Bicycle Accessibility and Mobility in Downtown Montreal* plan. The City of Trois-Rivières (2009-2010) and the Montreal borough of Côte-des-Neiges-Notre-Dame-de-Grâce (2007) have retained its services to produce bicycle master plans. It has also offered training sessions on the design of bicycle facilities in a number of cities across Canada, including Victoria, Vancouver, Calgary, Edmonton, Winnipeg, Toronto, Ottawa, Montréal, Québec City, Moncton, and Halifax.

The technical documents by Vélo Québec Association include:

- Planning and Design for Pedestrians and Cyclists (2010)
- Technical Handbook of Bikeway Design (2nd ed. 2003; 1st ed. 1992)
- The State of Active Transportation in Canada: an Overview (2010)
- Complémentarité entre le vélo et les transports publics (1999)
  Complementarity between Bicycles and Public Transit
- Guide de réalisation de la Route verte (1997)
  Route Verte Implementation Guide

Every five years starting in 1995, Vélo Québec has conducted research and produced detailed reports on the state of cycling in the Quebec (*État du vélo au Québec en 1995 et 1996*; *…en 2000*; *and …en 2005*). The reports investigate levels of bicycle use, bicycle ownership, public attitudes towards cycling, participation in bicycle tourism, and the development of bicycle programs and infrastructure. The fourth such report, on the state of cycling in Quebec in 2010, is due next year.

2 Project History

The segregated bicycle facility pilot project was initiated when Council approved the Ottawa Cycling Plan (OCP) in July 2008. Council approved the OCP along with a set of recommendations from the Transportation Committee, which included a recommendation that "east-west routes (e.g. Gladstone from Preston to Elgin) be evaluated for the feasibility of an on-street dedicated cycling lane separated from regular traffic by a median and a first pilot project be suggested". A technical study was initiated in January 2010. A Public Advisory Committee, with representatives from various community associations, BIAs, cycling community groups, City of Ottawa Advisory Committees, religious institutions and residents-at-large, was established in April 2010 to assist with selecting an alignment for the pilot project.

Four public open houses were held in June 2010 in various locations throughout the Centertown area to present the initial findings of the technical study and solicit feedback from the general public. The 170 participants identified Somerset Street, Gladstone and Laurier Avenues as the top three preferred routes for an east-west segregated bicycle facility. Somerset Street received the most support (155 of 271 written comments), mainly because it is the most direct cross-town route with good connections to other cycling routes and key destinations. However, BIA representatives expressed very serious concerns about negative impacts on businesses if on-street parking spaces were removed. Gladstone Avenue (41 of 271 written comments) and Laurier Avenue (26 of 271 written comments) received modest public support with less opposition from BIA representatives.

3 Bicycle Facility Design Issues

Standards for the design of several types of bicycle facilities are laid out in Vélo Québec's *Planning and Design for Pedestrians and Cyclists* handbook, published in 2010. The sections below highlight design issue for on-street, segregated bicycle facilities.

3.1 Segregated versus Non-Segregated Facilities

Most current cyclists and the overwhelming majority of potential cyclists—people who would like to cycle but are afraid to do so on urban streets—would prefer to be separated from vehicular traffic. This assertion is supported by the City of Ottawa's own research as well as by recent academic research, including work by the Cycling in Cities research program at the University of British Columbia.[1] Bicycle facilities that separate cyclists from vehicular traffic increase their sense of comfort and, if designed properly, can also increase their safety. The provision of separated bicycle lanes can therefore remove an important barrier to bicycle use, especially less experienced cyclists.

There are many common types of bicycle facilities that offer different degrees of separation from traffic and, consequently, different levels of comfort for their users. The common types of bicycle facilities can be classified in increasing order of comfort as follows:

- bicycle lane between parked cars and traffic lanes
- bicycle lane between the curb and traffic lanes
- bicycle lane with coloured surfacing between the curb and traffic lanes
- raised bicycle lane (also called cycle track), elevated several centimeters above the adjacent traffic lanes[2]
- segregated on-street bicycle path, separated from other traffic lanes by a physical barrier such as a median or parked cars

In addition to offering cyclists a greater level of comfort, separation from traffic also reduces the possibility of encroachment of cars and delivery trucks into the bicycle facility. This type of encroachment is frequent on downtown streets with high-rise buildings, where messengers and delivery truck drivers are liable to stop on-street or double park to save a few minutes rather than entering an off-street loading bay. The same applies on commercial streets: many drivers are likely to briefly stop on-street or even double park rather than finding a vacant on-street parking stall or proceeding to an off-street parking lot. In both cases, the stopping or double parking vehicles would be encroaching into and blocking a conventional bicycle lane. Even raised bicycle lanes cannot entirely prevent illegal stopping and parking. However, bicycle paths with physical separators can limit or completely prevent this from occurring. The effectiveness depends on the type of separation used, as follows:

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[1] See the description of Cycling in Cities opinion survey: http://www.cher.ubc.ca/cyclingincities/survey.html

[2] Raised cycle lanes can be elevated either to sidewalk level, like in Amsterdam and other Dutch cities, or to an intermediate level between the sidewalk and the traffic lanes, like in Copenhagen. The latter offers better separation between pedestrians and cyclists.

- a painted median with delineator posts is the least effective, because cars and small trucks can sneak between posts
- separation by on-street parking is very effective provided that cars are parked between the bicycle lanes and traffic lanes during delivery hours
- a concrete median is very effective as cars and trucks can still park with two wheels on the median but usually won't encroach into the path itself
- a higher barrier or planters totally prevent encroachment into the path and the buffer zone that separates it from the traffic lanes[3]

Segregation buffer treatments are discussed in greater detail in Section 3.8 below.

3.2 Unidirectional versus Bidirectional

Segregated bicycle paths can be implemented as two unidirectional paths heading in opposite directions on opposite sides of the road or as a single bidirectional path on one side of the road.

The unidirectional configuration is functionally similar to bicycle lanes. Unidirectional paths can also be combined with advanced stop lines or "bike boxes" at intersections to facilitate left turns. Furthermore, it is simpler to interconnect unidirectional separated paths with conventional bicycle lanes or shared traffic lanes at either end of the segregated portion of the route.

The main advantage of the bidirectional configuration over the unidirectional configuration is that its footprint can be narrower, as cyclists can use the counter directional lane for passing. The minimum recommended width for a bidirectional path is 3.0 m (1.5 m per lane). In the unidirectional configuration, each lane needs to be made wide enough to allow passing within its limits; a minimum lane width of 1.5 m is acceptable but a width of 2.0 m is recommended in order to allow passing and to facilitate maintenance operations, such as street cleaning and snow removal. With a 2.0 m width per lane, a two-way bicycle facility would require at least 4.0 m of the street right-of-way. However, bidirectional paths have significant disadvantages with respect to unidirectional paths: they are more prone to conflicts at intersections (see Figure 1); they are incompatible with bike boxes; and they are more complex to interconnect with conventional bicycle lanes or shared traffic lanes at either end of the segregated portion of the route.

[3] Planters can also help enhance the streetscape. However, as with other raised barriers, they have impacts on street maintenance (sweeping and snow removal) and drainage.

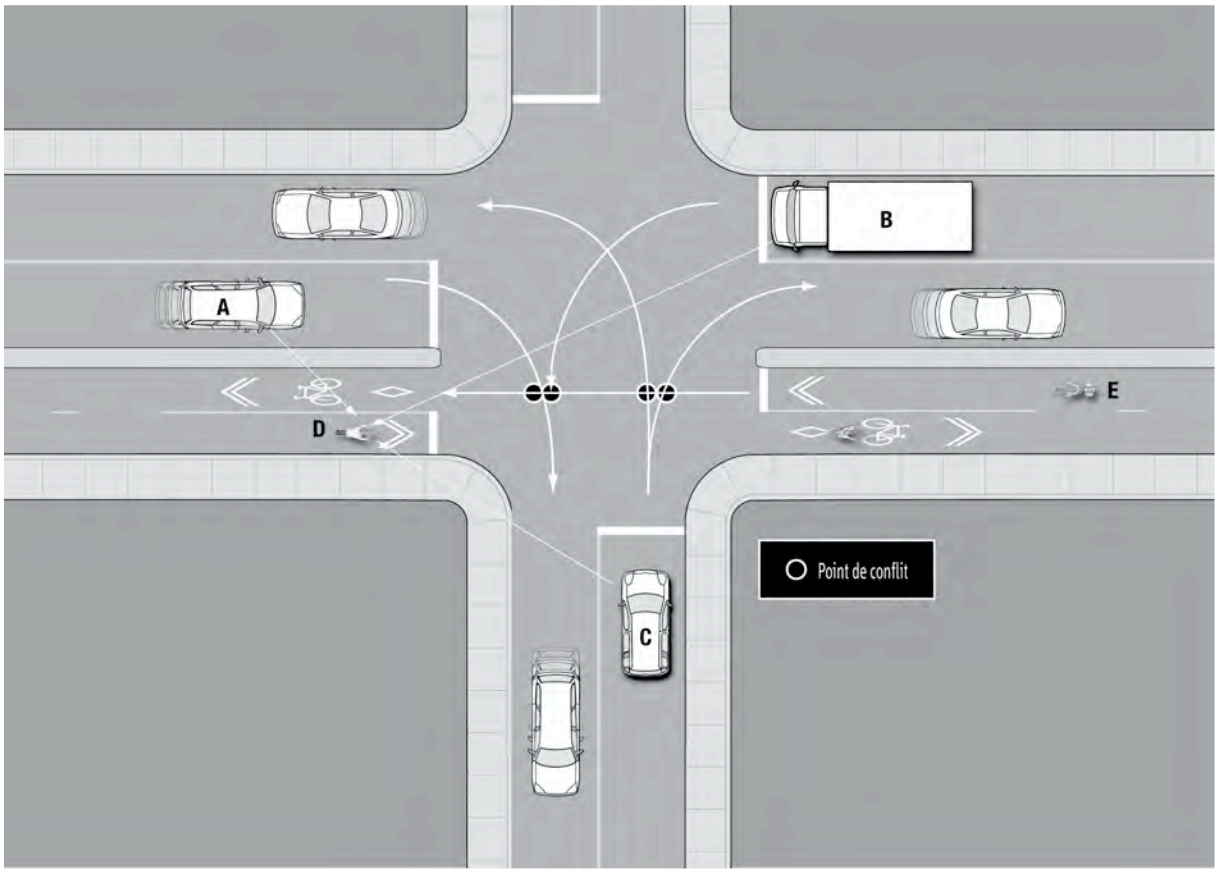

Figure 1. Potential bicycle-car conflict at an intersection on a two-way street with a bidirectional segregated bicycle facility

3.3 On One Street versus Split between Two Streets

To minimize the loss of traffic lanes, parking lanes, or sidewalks on a given street, it may be tempting to split the two directions of bicycle facility between two neighbouring, parallel streets. This is not recommended for several reasons. First, a two-way facility on one street affords better accessibility—cyclists traveling on a bicycle corridor split between two streets could be forced to go around the block if their destination is on the other street. Second, creating a one-way facility on two-way street is of questionable utility: cyclists will still have the legal right to use the traffic lanes running in the opposite direction and may prefer to do so rather than transferring to the bicycle facility on the neighbouring street. A more dangerous possibility is the potential that some cyclists may use the one-way facility in the opposite direction rather than transferring to the neighbouring street to use the facility running in the correct direction.

3.4 Safe Bicycle Operation

For a segregated, one-way bicycle facility, while a minimum width 1.5 m is sufficient for basic bicycle operation, a width of 2.0 m is required to allow faster cyclists to pass slower ones. Facilities narrower than 2.0 m are not recommended in areas where high volumes of cyclists are expected. Sufficient width is also critical for street maintenance (see Section 3.8.3).

At intersections, the design must take into account the different possible movements of cyclists. Those going straight are usually not impeded by cars (they have priority over turning cars) or pedestrians. Cyclists turning right might have to wait for pedestrians. With a 2.0 m wide path, other cyclists can pass them, but with a narrower path other cyclists will be forced to queue.

With a segregated facility, left-turning cyclists cannot cross to the left turn lane ahead of the intersection. If car traffic permits, they can make a left from the path. Otherwise they will have to first cross the street onto which they wish to turn and await the green light to proceed across the street from which they are turning. An advanced stop line or "bike box" on the cross street facilitates this type of L-shaped movement, providing a space for cyclists to wait for the second green light without interfering with the pedestrian crossing or traffic lanes.

Segregated bicycle facilities require extra care to assure good visibility at intersections. Prohibiting parking between the bikeway and the adjacent traffic lanes provides good visibility. Any barriers and planters between the bicycle path and traffic lanes should be less than 75 cm tall so that lights on bicycles remain visible at night. The use of higher vegetation should be restricted to mid-block areas and avoided for at least 30 m before an intersection or driveway entrance.

3.5 Automobile Right Turns

It is strongly recommended that on-street bicycle path segregation be maintained right up the stop bar at an intersection. In terms of cyclist comfort and protection from traffic, the approach to the intersection is where segregation is the most valuable. Dropping segregation on the approach to create a mixed bicycle-automobile traffic zone would largely defeat the purpose of having a segregated bicycle facility in the first place.

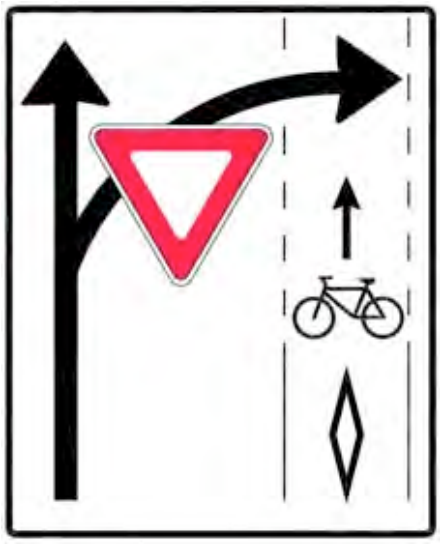

Figure 2. Transportation Association of Canada recommended right-turn yield/bicycle priority signage

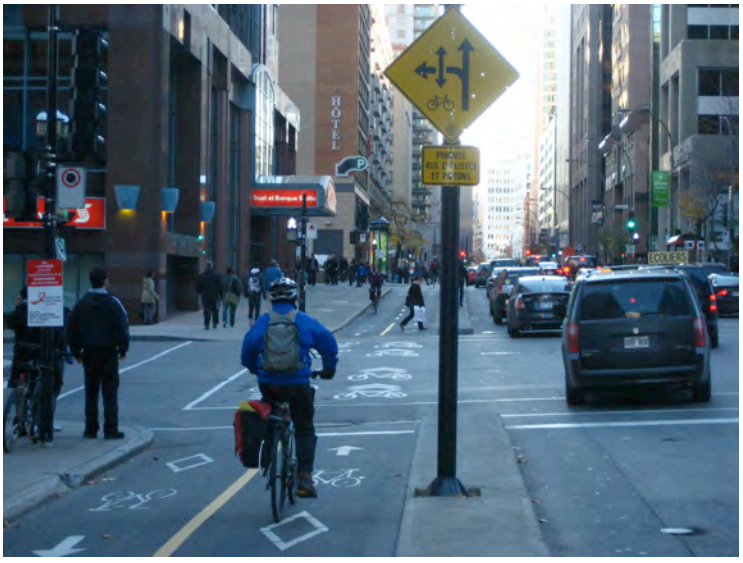

Figure 3. Bicycle priority sign on de Maisonneuve Boulevard in Montreal

A segregated, on-street bicycle path is more analogous to a sidewalk than to a traffic lane. Just as pedestrian are not expected to mingle with automobiles on the approach to the intersection, bicycles should not be expected to do so either. And just as right-turning vehicles must yield to pedestrians, they should also yield cyclists. A traffic sign to this effect should be posted near the intersection. Figure 2 shows a traffic sign recently proposed by the Transportation Association of Canada (TAC) instructing automobiles turning right to yield to cyclists going straight through an intersection.

It is suggested that the right edge of the traffic lane adjacent to the segregated on-street bicycle path be considered the edge of the road (i.e., the curb lane) rather than the sidewalk curb. The installation of concrete separators between the outer traffic lanes and the bicycle lanes (see Section 3.8 below) can reinforce this interpretation.

A number of North American jurisdictions create bicycle lanes and segregated on-street bicycle paths without mixed zones ahead of intersections. In Quebec, the Ministry of Transportation standards require that bicycle lanes be continued all the way to the stop bar. It's bicycle lane design standards do not include designs for a mixed bicycle-traffic zone ahead of the intersection. Similarly to the Quebec standards, TAC also recommends that bicycle lanes continue all the way to the stop bar at an intersection. Examples of how bicycle facilities relate to intersections in other jurisdictions include the following:

- **Montreal, QC:** The Saint Zotique Street bicycle facility in Montreal consists of a segregated on-street bicycle path running along the curb along each side of the road. Segregation in this case is provided with bollards and cars parked between the bicycle lanes and the traffic lanes. The segregation continues right up to the stop bars at intersections (Figure 4). A number of other segregated bicycle facilities in Montreal feature a two-way, segregated track on one side of the road. In all cases, segregation is maintained up to the stop bar at every intersection. This includes the Claire-Morissette bicycle path on de Maisonneuve Boulevard through downtown Montreal. A sign similar to that recommended by TAC (Figure 2) is posted ahead of intersections on de Maisonneuve Boulevard (Figure 3).
- **Cambridge, MA:** The City of Cambridge, Massachusetts has numerous bicycle lanes, some of which are elevated to sidewalk level to provide separation from traffic lanes. On the approach to intersections, segregated bicycle lanes are lowered to street level, essentially becoming conventional bicycle lanes (Figure 5). The bicycle lanes are maintained all the way to the stop bar at intersections. In the absence of a dedicated right turn lane, vehicles are required to turn right from the traffic lane immediately to the left of the bicycle lane. Pavement markings to that effect are provided (Figure 6).

Figure 4. Segregated on-street bicycle path on Saint Zotique Street in Montreal

Figure 5. Transition from segregated to conventional bicycle lane, Vassar Street, Cambridge, MA

Figure 6. Bicycle lane and right turn pavement markings, Main Street, Cambridge, MA

3.6 Bicycle Parking

Bicycle parking for short-term use should be installed on the sidewalk, provided it does not obstruct pedestrian traffic. If sidewalk space is limited, bicycle parking can be provided within parking lanes, by converting automobile parking stalls into bicycle corrals as commonly practiced in Montreal (Figure 7). Bicycle parking for longer-term use, such as for visitors, employees or building tenants, should be accommodated off-street, on private

properties. Surface or underground parking garages are generally ideal locations for off-street bicycle parking. Where no such facilities are available, building owners should be encouraged to make other arrangements for secure bicycle parking within their properties. In New York City, for example, where no secure bicycle parking is available, a bylaw requires that building owners allow cyclists to use freight elevators to bring their bicycle to their office or apartment.

Figure 7. Bicycle parking in on-street automobile parking stalls in Montreal

3.7 Road Markings

It is recommended that the bicycle and chevron symbol be painted on the pavement at all points where the bicycle lane enters into conflict with either automobile or pedestrian traffic. This includes all intersections and all driveways crossing the bicycle facility. It is also recommended that bicycle and chevron symbols be painted frequently on stretches of the bicycle facility that are lined with on-street parking. The purpose is to warn people getting out of or into parked automobiles of the presence of the bicycle path and encourage them to look before crossing.

3.8 Segregation Buffer

3.8.1 Dimensions and Materials

A number of segregation buffer treatments are possible, though some might not be feasible due to space constraints. The typical dimension for a unidirectional segregated bicycle facility are 1.8 to 2.0 m for the bicycle lane, 0.3 to 1.0 m for a buffer, and 2.1 to 2.5 m for parking lanes, if included. When parking lanes are included, it is recommended that the buffer be at least 0.5 m to limit the incursion of open car doors into the bicycle facility.

If the buffer is constrained to the minimal width (0.3 m), paint and delineator posts (Figure 8) or a concrete divider (Figure 9) can be used. The former solution is not recommended for an all-year facility as the delineator posts are likely to be damaged by snow removal equipment. In Montreal, posts anchored directly to the asphalt are only used on segregated facilities that are shut down for the winter; the posts are removed for the duration of the snow removal season. For an all-year facility, if delineator posts are used, they should be mounted on top of a concrete divider to prevent damage during snow removal.

Concrete dividers can be permanent or temporary. Temporary dividers are made of precast concrete and are 0.3 m wide, 0.5 m tall, and around 1.5 m long. They can be designed to have interlocking ends to facilitate assembly. The precast modules can but do not have to be equipped with vertical posts. While posts do not need to be installed along continuous sections of the temporary barrier, it will still be necessary to install them at the ends of each section, especially near intersections and driveways crossing the bicycle facility in order to clearly signal the presence of the barrier to motorists. Temporary buffers with posts are presently being used along certain segments of the Claire-Morissette bicycle path in downtown Montreal.

Figure 8. Painted line and posts as separators

Figure 9. Permanent concrete divider as a separator

While a width of 0.3 m is appropriate for a temporary separator, it is preferable for permanent separator to have a width of at least 0.5 m and preferably 0.75 m if space allows. Narrower separators do not provide pedestrians with sufficient space to stand (to board a

taxi for example). It is also more difficult to install delineator posts or sign posts and impossible to install lampposts or traffic lights on narrower separators. On streets with a speed limit of 50 km/h or less, traffic lanes can run directly adjacent to the separator median.

3.8.2 Drainage

A continuous separation between a bicycle path and the traffic lanes can interfere with drainage. This problem is easily solved by making short openings in the median or barrier at regular intervals, allowing runoff to drain into a single set of inlets along the sidewalk curb. The best practice is to use side (in-curb) inlets in order to provide an even surface on the bicycle path. If standard sewer grates are used, the grilles should be kept at an angle of at least 45° with respect to travel direction.

3.8.3 Street Maintenance

In designing segregators for on-street bicycle facilities, consideration must be given to maintenance operations, notably street sweeping and snow removal. Segregated bicycle paths must be wide enough to allow small equipment to operate between the curb and the separator (temporary or permanent barrier or median). Usually, a minimal width of 1.8 to 2.0m is required to accommodate sidewalk equipment, depending of the type of equipment used by the municipality. The bicycle path and the roadway are swept separately. For snow clearing, snow from the sidewalk and the street can be accumulated in the path before it is cleared if the separator is a low median. Snow removal can then proceed in one pass, but must be done rapidly to avoid drainage obstruction.

With a higher barrier or planters, snow has to be accumulated in two piles: one for the car lanes and one for the sidewalk and bicycle path. And snow removal must be done in two passes.

3.8.4 Para-Transit

Concrete separators, whether temporary or permanent, may also interfere with para-transit operations. To limit conflicts between para-transit and the bicycle facility, para-transit vehicles should be encouraged to stop on the street crossing the bicycle facility corridor. This should be particularly feasible in the downtown area, given that blocks are relatively short. Another alternative is to create designated para-transit stops along the bicycle facility at frequently used locations. Data on the distribution and frequency of para-transit pick-ups and drop-offs is available and can be used to determine where designated para-transit stops should be located.

4 Corridor Selection Criteria

MRC, in consultation with City staff, devised a number of selection criteria to narrow the field of candidate corridors for implementation of a segregated bicycle facility. The process proceeded in two stages, with a distinct set of criteria used at each stage. The results of each selection stage were presented to the Public Advisory Committee and to the public at large through a series of open houses.

Sections 4.1 and 4.2 below provide an overview of and brief commentary on the selection criteria used by MRC for the first two stages of the selection process. Section 4.3 proposes a set of criteria that could be used for the final selection of corridor for the pilot project.

4.1 Stage I Criteria

Stage I consisted of a screening of the 33 possible east-west corridors in the study area. Four screening criteria were used, including:

1. Designated Cycling Route in the Ottawa Cycling Plan.
2. Continuity of the Route
3. Connection to East-West Destinations
4. Traffic Signals at Main Crossings

Based on these criteria, 22 of the 33 possible corridors screened out. The Public Advisory Committee decided that one of the corridors that was screened out, Cooper Street, should be carried forward. Therefore, a total of 12 corridors were carried forward to the Stage II selection process. These include:

1. Albert Street
2. Catherine Street
3. Cooper Street
4. Gilmour Street
5. Gladstone Ave.
6. `Laurier Ave.
7. Lisgar Street
8. MacLaren Ave.
9. Queen Street
10. Slater Street
11. Somerset Street
12. Wellington Street

All four criteria that were used for this initial screening are considered appropriate. No additional criteria are necessary at this stage of the selection process.

4.2 Stage II Criteria

In Stage II, the 12 corridors carried forward from the Stage I screening were subjected to an expanded set of 13 selection criteria organized under seven distinct categories as follows:

- *Preferred Locations for Cyclists*
    1. Continuity of Route
    2. Key Destinations
- *Safety Considerations for Cyclists*
    3. Cyclists Conflict with Vehicles
    4. Adjacent Land Uses
    5. Traffic Volumes
    6. Truck Traffic
- *Impact on Transit Operations*
    7. Impact on Transit Operations
- *Impact Vehicle*
    8. Bus Blockages
    9. Impact on Vehicle Travel Lanes
- *Impact on Local Businesses*
    10. Impact to On-Street Parking
    11. Impact on Loading Zones / Taxi Stands / Hotel Zones
- *Impact on Pedestrians*
    12. Streetscape / Urban Design Impacts
- *Implementation Costs*
    13. Relative Implementation Costs

For a few corridors, MRC considered the possibility of splitting the bicycle facility between two neighbouring streets so as to minimize the loss of parking on the primary street. For example, for Somerset Street, the possibility of putting a one-way bicycle lane on Somerset and a one-way bicycle lane in the opposite direction on a neighbouring street (Lisgar or Maclaren) was considered as a separate option.

It was decided that three corridors would be carried forward to the final selection stage. The three that received the highest scores according to Stage II evaluation criteria were:

1. Albert Street & Slater Street (one-way on each)
2. Somerset Street (two-way)
3. Somerset Street paired with a residential street
   (one-way Somerset Street and one-way Lisgar Street or Maclaren Street)

A public consultation was conducted and members of the public were asked to choose their preferences among the same set of corridors that were evaluated by MRC in Stage II, including the options for splitting corridors between two neighbouring streets. The three options ranked highest by the public were:

1. Somerset Street (two-way)
2. Laurier Avenue (two-way)
3. Gladstone Avenue (two-way)

Given that the differences in the scores attributed to each corridor by MRC using the Stage II criteria were small, it was decided that the three corridors favoured by the public rather than those with the highest scores would be carried forward to detailed analysis and final selection.

All thirteen of the criteria proposed by MRC for this stage of the selection process are considered relevant and appropriate as are the corridors selected for further analysis.

4.3 Proposed Final Evaluation Criteria

It is recommended that the criteria proposed below be included among the final evaluation criteria for selecting the alignment for the pilot project. They include some criteria that had previously been used by MRC as well as some new criteria. These criteria should help differentiate the three remaining corridors and build a strong case for the final selection.

4.3.1 Criteria Relating to Cycling

This category encompasses criteria that pertain to current and potential future levels of bicycle use on each corridor. Given that improving the cycling environment for current and potential cyclists is a key goal of this project, these criteria should be given considerable weight in the final analysis.

The proposed criteria include the following:

1. **current bicycle traffic:** corridors in which a large number of bicycle trips originate and terminate should preferred; data can readily be obtained from the Origin-Destination Study
2. **potential bicycle traffic:** corridors in which a large number of non-bicycle trips under 5 km[4] originate and terminate should preferred; data can readily be obtained from the Origin-Destination Study
3. **linkages to surrounding areas:** corridors providing better linkages across the Rideau Canal and the O-Train line and better proximity to Ottawa River crossings should be preferred
4. **linkages with other bicycle facilities**: corridors that offer a strong potential for interconnection with existing and planned City bicycle facilities and interconnection

[4] A distance of 5 km is considered the maximum practical distance for most utilitarian bicycle trips for an average cyclist. Commuting trips can however be considerably longer.

with the existing NCC facilities along the Rideau Canal and the Ottawa River should be preferred

5. **merit of segregation:** corridors with higher overall traffic volumes, higher truck traffic volumes, higher traffic speeds, and which have a higher potential for illegal stopping/double parking should be strongly preferred as segregation on such corridors will provide the greatest benefit to cyclists

4.3.2 Criteria Relating to Impacts on Other Modes of Transportation

This category includes criteria that pertain to the impacts of implementing the segregated bicycle facility on other modes of transportation using the same corridor. Given that reducing automobile dependency is a policy goal for all levels of government, impacts on automobile traffic should be given less weight than impacts on other modes of transportation.

6. **transit stop conflicts:** corridors with fewer bus stops and lower frequency of bus service should be preferred as there will be fewer conflicts between bicycle and passenger entering or exiting buses
7. **automobile traffic impacts:** corridors with the most limited impacts on automobile travel time should be preferred, although the weight assigned to this criterion should be limited for the reasons mentioned above
8. **curbside garbage collection:** streets without curbside garbage collection should be preferred

4.3.3 Criteria Relating to Impacts on Business

This category includes criteria that pertain to the impacts of implementing the segregated bicycle facility on businesses in the corridor.

9. **parking impacts:** corridors in which implementation of the bicycle facility will have the lowest relative impact on the total parking supply—i.e., all on- and off-street parking in the corridor, including underground garages and surface parking lots next to or behind buildings within an acceptable walking distance—should be preferred
10. **shopping environment impacts:** implementation of the bicycle facility will provide sidewalks with additional buffering from automobiles and improve the pedestrian environment, with likely benefits for street-level commerce; corridors with a significant amount of street-level commerce should therefore be preferred

5 Preliminary Final Evaluation

This section provides an informal, cursory evaluation of the three remaining corridors based on the 10 final evaluation criteria proposed in Section 4.3. The following sections briefly compare the three corridors with respect to each criterion. The corridor that is thought to best fulfill each criterion is identified. A summary of the results is provided in Table 1 at the end of this section.

Based on this cursory evaluation, Laurier Avenue appears to have an advantage over the Somerset and Gladstone on most of the 10 proposed criteria. Laurier's advantages include the following:

- generates more bicycle traffic
- has greater potential for generating new bicycle traffic
- has an excellent Rideau Canal crossing
- is close to Ottawa River crossing (Portage Bridge)
- has a high potential for linkage with Bike West and NCC paths west of downtown
- has a much greater merit for segregation
- has no transit stops
- has no curbside garbage collection along most of its length
- has ample off-street parking that can mitigate the loss of on-street parking

5.1 Current Bicycle Traffic

Based on the most recent OD data, the Laurier corridor attracts by far the largest number of bicycle trips of the three corridors under consideration. Over a 24-hour period, 2,060 bicycles trips terminate in the Laurier corridor, 1,300 terminate in the Somerset corridor, and 1,130 terminate in the Gladstone corridor.

Preferred corridor: Laurier

5.2 Potential Bicycle Traffic

Based on the most recent OD data, the Laurier corridor attracts the largest number of non-bicycle trips with a travel distance between 1 km and 5 km. Over a 24-hour period, 27,217 such trips terminate in the Laurier corridor, 18,350 in the Somerset corridor, and 11,390 in the Gladstone corridor.

Preferred corridor: Laurier

5.3 Linkages To Surrounding Areas

The Laurier corridor provides good potential linkages to activity centres east of the Rideau Canal, such as University of Ottawa, the Byward Market, and the Sandy Hill neighbourhood. To the west, it provides good potential linkages to Lebreton Flats, where a number of festivals are held in the summer months. Of the three corridors, it is the only one that provides a good potential linkage to the City of Gatineau, via the Portage Bridge.

Somerset has a good connection across the Rideau Canal via the recently-built footbridge. However, the footbridge connects with the somewhat labyrinth-like University of Ottawa campus and does not offer any direct or convenient routes to points further east. To the west, Somerset offers a direct route all the way to Preston and a bridge over the O-Train line.

Gladstone does not provide a direct link across the Canal; cyclists would have to divert northward to the Somerset footbridge to cross the Canal. To the west, Gladstone offers a direct route all the way to Preston and a bridge over the O-Train line.

Preferred corridor: Laurier

5.4 Linkages with Other Bicycle Facilities

To the east, a bicycle facility on Laurier could be relatively easily linked to the existing bicycle lanes on Laurier Bridge and the bicycle paths along both sides of the Rideau Canal. If bicycle lanes were implemented on Laurier from the bridge eastward towards Strathcona Park, there would be a direct link to the planned pedestrian river crossing and to the existing bicycle paths along both banks of the Rideau River. To the west, a bicycle facility on Laurier would terminate very close to planned Bike West facility as well as to the existing NCC recreational path network, which has a trunk terminating on Commissioner Street near Albert Street. The trunk goes through a tunnel under Wellington Street and links with the NCC's Ottawa River pathway and a pathway crossing the Portage Bridge to Gatineau.

Like Laurier, the eastern end of bicycle facility on Somerset could be easily linked to the paths on both sides of the Rideau Canal. However, due the presence of the University of Ottawa campus, there is limited potential for linkages to other bicycle facilities. Somerset does not offer any potential for direct linkages to the Ottawa River pathway or to the Portage Bridge crossing.

Gladstone does not provide a direct link to the Rideau Canal pathways; a slight deviation east of Elgin street is required to reach the path on the west bank of the Canal and direct connection is available to the path on the east bank of the Canal. Like Somerset, Gladstone does not offer any potential for direct linkages to the Ottawa River pathway or to the Portage Bridge crossing.

Preferred corridor: Laurier

5.5 Merit of Segregation

Of the three corridors, Laurier is the one that merits segregation the most. It has more peak hour traffic and faster traffic than the other two. Also, due to the large number of office towers that straddle it, Laurier is likely to attract more delivery trucks than the other two. Segregation on Laurier would therefore provide an important reduction of delivery truck incursions into the bicycle facility.

Preferred corridor: Laurier

5.6 Transit Stop Conflicts

Somerset and Gladstone both have bus lines running down most of their length, with a large number of bus stops in the study area in both cases. Mitigation measures would be

required to minimize conflicts between boarding and exiting passenger and cyclists using a segregated bicycle facility. Laurier has no active bus lines and no bus stops; there would be no conflicts between cyclists and transit users and no need for potentially expensive mitigation measures.

Preferred corridor: Laurier

5.7 Automobile Traffic Impacts

MRC's modeling predicts that Gladstone would be subject to the fewest traffic impacts as a result of the implementation of a bidirectional bicycle facility. The impacts would be limited to small delays at a few intersections. In comparison, a bidirectional facility would impact virtually the entire length of Laurier and would have severe impacts on Somerset, including the conversion of a stretch of Somerset to one-way for vehicles.

Preferred corridor: Gladstone

5.8 Curbside Garbage Collection

Garbage is collected off-street on Laurier and on-street on both Somerset and Gladstone.

Preferred corridor: Laurier

5.9 Parking Impacts

According to MRC's preliminary design work, all on-street parking would have to be removed to make way for a segregated bicycle facility on Laurier. However, there would still be a vast supply of off-street parking spaces available in the many large, underground parking facilities in the corridor. Around 12,000 off-street parking spaces are available within two blocks of Laurier Avenue. The loss of on-street parking would not interfere with delivery operations on Laurier as most large office buildings have off-street loading bays for that purpose. In contrast, the Somerset and Gladstone corridors have relatively little off-street parking. The loss of on-street parking would have a much greater impact on the total supply of parking in both corridors. On Somerset, the loss of on-street parking could also pose challenges for deliveries to the many small business that line the street.

Preferred corridor: Laurier

5.10 Shopping Environment Impacts

Laurier and Somerset both have a considerable amount of street-level commerce and therefore the shopping environment on both street would be expected to benefit from the buffering provided by a segregated bicycle facility. As commerce on Laurier is oriented primarily to office workers and therefore active during the daytime on weekdays, whereas commerce on Somerset is active all day, including evenings, on weekdays and weekends, the immediate benefits could be greater on Somerset. On Laurier, however, there is greater potential for revitalization of commerce along the street thanks to the improved quality of the sidewalk environment.

Preferred corridors: Laurier and Somerset

Table 1. Summary of Preliminary Final Evaluation

Criterion	Laurier	Somerset	Gladstone
current bicycle traffic	✔		
potential bicycle traffic	✔		
linkages to surrounding areas	✔		
linkages with other bicycle facilities	✔		
merit of segregation	✔		
transit stop conflicts	✔		
automobile traffic impacts			✔
curbside garbage collection	✔		
parking impacts	✔		
shopping environment impacts	✔	✔	
Total	**9**	**1**	**1**

6 Project Follow-Up

6.1 Next Steps

The next steps are to finalize the selection of the corridor on which the segregated bicycle facility will be implemented and to begin detailed design process. Mitigation measures to reduce the negative impacts that the bicycle facility might have on the corridor will have to be planned. Planning the mitigation measures in advance of public consultation may help defuse certain stakeholders' resistance to the project.

Assuming that Laurier Avenue will be selected as the alignment for the segregated bicycle facility, there are three issues that will need to be taken under consideration. These include:

- **Business impacts:** Owners of street-level businesses on the affected section of Laurier Avenue are likely to oppose the creation of the bicycle path, primarily on the grounds that it will lead to the elimination of on-street parking. The principal arguments against this are the following:
  - there are around 12,000 off-street parking spaces available within two blocks of Laurier Avenue; on-street parking on Laurier represents only a small share of the total parking supply in the corridor
  - during peak hours, there is already no on-street parking on Laurier
  - studies of bicycle facility impacts on downtown businesses in other cities have found that usually only a small share of downtown business customers arrive by car; on Bloor Street in the Annex neighbourhood in Toronto, for example, only 10% of people arrive by car[5]
  - at Bank Street and Laurier, 75% of the traffic crossing the intersection is pedestrian; by adding additional buffering between pedestrians and cars, the bicycle facility would improve the pedestrian environment on Laurier Avenue, leading to increased pedestrian traffic and benefits to street-level businesses
  - cyclists attracted to the corridor by the bicycle facility could be potential new customers; the bicycle facility is likely to lure cyclist customers to the corridor not only on weekdays but also on weekends

  The City of Ottawa can also refer to the experience of the City of Montreal with the de Maisonneuve Boulevard bicycle path. The de Maisonneuve corridor is similar to the Laurier corridor in terms of built form: it is lined with many office towers and some residential towers, most of which have ground-floor businesses. Like Laurier, de Maisonneuve has a considerable supply of underground parking. Despite initial

[5] Clean Air Partnership (2009). *Bike Lanes, On-Street Parking and Business A Study of Bloor Street in Toronto's Annex Neighbourhood*. Toronto: Clean Air Partnership (http://www.cleanairpartnership.org/files/BikeLanes_ParkingandBusiness_Year1Report_Feb2009_Final.pdf).

fears and opposition from street-level business owners, the implementation of the de Maisonneuve bicycle path is not known to have precipitated any business closures and by many accounts has had an overall positive impact on street-level businesses in the corridor.

- **Minto condominium visitor parking:** The Minto condominium towers at Laurier and Lyon apparently have limited off-street visitor parking. On evenings and weekends, visitors tend to park on-street near the towers. A possible measure for mitigating the lost on-street parking is to the negotiate the use of the surface parking lot at Laurier and Bay, which is owned by the Ottawa-Carleton District School Board, for weekend and evening use by visitors to the Minto condominiums.
- **Ceremonial route:** The section of Laurier Avenue between the Rideau Canal and Elgin Street may be blocked occasionally during ceremonial processions. Contingency measures, such as a bypass or a detour, would need to be planned in advance to assure a safe connection between the segregated bicycle west of Elgin and points east of the Rideau Canal during ceremonial activities.

Other steps that could be taken outside the limited scope of the pilot project but which could help the project succeed include the following:

- connecting the segregated bicycle facility on Laurier to the bicycle lanes on Laurier bridge and eventually extending the lines eastward along Laurier to connect with the planned footbridge in Strathcona Park
- connecting the western end of the Laurier segregated bicycle facility to the planned Bike West path and the existing NCC paths just west of Bronson Avenue and north of Albert Street
- developing bicycle parking in the corridor, especially by working with employers to develop off-street long-term parking for bicycle commuters (see Section 3.6)

6.2 Monitoring

The segregated bicycle facility pilot project is due to be implemented for two years after which it may be made permanent if deemed successful. A monitoring program will be required in order to measure the success of the initiative. It is recommended that monitoring of the pilot project consist of three elements: a business survey, an intercept survey, and bicycle traffic counts.

6.2.1 Business Survey

The purpose of the business survey is to study the perceived impacts of the segregated bicycle facility on businesses in the chosen corridor. The survey would be addressed to owners or managers of businesses fronting on the street with the segregated bicycle facility. It is suggested that the survey be performed in the spring, summer, or fall the second year of the project, when bicycle traffic is likely to be at its highest.

6.2.2 Intercept Survey

An intercept survey is administered by intercepting individuals in a public space. The survey is either conducted on the spot, as an interview, or the intercepted individual is provided with a paper form or an internet address for an electronic form that can be filled

out later. For the proposed survey, the target group will be cyclists using the segregated bicycle lanes on the chosen corridor. The main focus of the survey would be satisfaction with the segregated bicycle facility. The survey could solicit suggestions for improvements to the facility as well as suggestions for other corridors on which segregated lanes should be implemented. It is suggested that the survey be performed in the spring or fall the second year of the project while universities are in session, as many of the potential users are likely to be students.

6.2.3 Traffic Counts

Automated traffic counters monitoring bicycle traffic 24-hours a day could be installed at the eastern and western limits of the segregated facility. It is suggested that the counters be installed at the beginning of the pilot period in order to track the progression of bicycle traffic on the facility over time. The counters should be left in place for the entire duration of the pilot project in order to track seasonal variations in the use of the facility.