



STAFF REPORT ACTION REQUIRED

Feasibility of a Pilot Project for Separated Bicycle Lanes on Richmond Street and/or Adelaide Street

Date:	October 12, 2011
To:	Public Works and Infrastructure Committee
From:	General Manager, Transportation Services
Wards:	Ward 20 Trinity-Spadina Ward 28 Toronto-Centre-Rosedale
Reference Number:	P:\2011\ClusterB\TRA\TIM\pw11008tim

SUMMARY

City Council, at its meeting of July 12, 13, and 14, 2011, in considering a report titled "Bikeway Network – 2011 Update" (PW5.1) directed the (Acting) General Manager, Transportation Services to assess the feasibility of separated bike lanes on Richmond Street and/or Adelaide Street from Bathurst Street to Sherbourne Street. This report presents the findings of this assessment and, in addition, responds to a further request by the Public Works and Infrastructure Committee, at its meeting of June 23, 2011, to report on the implementation of the separated bike lanes on Richmond Street as a pilot project in the Spring of 2012.

Transportation Services has completed a preliminary assessment of the feasibility of uni-directional and bi-directional separated bicycle lanes on both Richmond Street and Adelaide Street. Transportation Services staff have also undertaken preliminary consultations with the affected City Divisions and agencies, including City Planning, Solid Waste Management, TTC, Fire Services and Emergency Medical Services, as well as internal staff involved in traffic and road operations.

Implementing separated bicycle lanes in the Richmond-Adelaide corridor would require the removal of at least one curb lane which would have significant impacts on parking and loading activity and on traffic operations and capacity. Bi-directional bicycle lanes would limit the direct impacts to either Richmond Street or Adelaide Street. However, the estimated cost of implementing bi-directional bicycle lanes, even on a pilot project basis, is in the order of \$1.2 to \$1.35 million, primarily due to the extensive work required to

modify the traffic control signals at every signalized intersection to facilitate two-way bicycle traffic. A bi-directional bicycle lane pilot project would also result in a significant "throw-away cost" if the pilot was not successful or had to undergo significant modifications to implement as a permanent solution.

Implementing uni-directional bicycle lanes (i.e. one-way westbound on Richmond Street and eastbound on Adelaide Street) would be significantly less costly to implement because it would not require modifications to the traffic control signals. However, the parking, loading and traffic impacts would essentially be doubled, affecting both Richmond and Adelaide Streets, rather than just one of these streets.

There are several major physical constraints along both streets which need to be addressed prior to the implementation of separated bicycle lanes, either as a pilot or as a permanent installation (e.g. reconfiguration of the Richmond/Jarvis intersection). In addition, there are several locations on Richmond Street and on Adelaide Street where the curb lanes are currently occupied or will be occupied in the next few years due to construction activity associated with major new developments. There are also several capital works projects in the Richmond-Adelaide corridor, scheduled from 2012 to 2015 (TTC track replacement, resurfacing and water main replacement) which need to be coordinated with the implementation of separated bicycle lanes. As a result of these constraints and coordination issues, it is not possible or advisable to implement separated bicycle lanes on Richmond Street from Sherbourne Street to Bathurst Street in 2012, even on a pilot project basis, as suggested by Public Works and Infrastructure Committee.

Furthermore, a Municipal Class Environmental Assessment is required to implement permanent separated bicycle lanes on Richmond Street or Adelaide Street. A pilot project could be implemented in advance of the EA study, however, the scheduled capital works projects and the development-related construction constraints will delay the implementation of a pilot project. Therefore, Transportation Services recommends that an Environmental Assessment (EA) study be initiated now to assess the feasibility of a permanent separated bicycle lane within the Richmond-Adelaide corridor. A pilot project could be considered as part of the EA study if the study process indicates that a pilot project would contribute to a successful permanent design solution.

RECOMMENDATION

The General Manager, Transportation Services recommends that City Council:

1. Authorize the General Manager of Transportation Services to initiate a Municipal Class Environmental Assessment study for separated bicycle lanes within the Richmond-Adelaide corridor, between Bathurst Street and Sherbourne Street, which could include consideration of a pilot project to install and evaluate separated bicycle lanes on the preferred alignment during the course of the study.

FINANCIAL IMPACT

Funding to undertake the proposed Environmental Assessment study, estimated at \$0.250 million, is included in the 2012 Capital Budget and 2013-2021 Capital Plan Submission for Transportation Services (Cycling Infrastructure Project).

If Council directs staff to proceed with a pilot project in 2012, the preliminary estimated cost to implement separated bicycle lanes on Richmond Street and/or Adelaide Street will be in the order of \$400,000 to \$1.35 million, depending on whether the uni-directional or bi-directional bicycle lane options is installed. Funding for the pilot project will be accommodated within the 2012 Capital Budget and 2013-2021 Capital Plan Submission for Transportation Services, subject to approval, by rescheduling other cycling infrastructure projects.

The Deputy City Manager and Chief Financial Officer has reviewed this report and agrees with the financial impact information.

DECISION HISTORY

On July 12, 2011 City Council, in considering Item PW5.1, requested, among other things, the Acting General Manager, Transportation Services, to assess the feasibility of separated bicycle lanes on Adelaide Street and/or Richmond Street, from Bathurst Street to Sherbourne Street, and separated north-south bicycle lanes in the most suitable route within the corridor from Peter to Simcoe Streets, connecting the existing Beverley Street bicycle lanes to the Waterfront, as part of a larger overall transportation operations study of this area.

On June 23, 2011 the Public Works and Infrastructure Committee, also in considering Item PW5.1, requested the Acting General Manager, Transportation Services, to report to the Public Works and Infrastructure Committee on a pilot project for separated bicycle lanes on Richmond Street to inform the larger overall transportation operations study of the area, for implementation in the Spring of 2012.

ISSUE BACKGROUND

The Toronto Bike Plan adopted by City Council in July, 2001, recognized the importance of providing an east-west bikeway in the Richmond-Adelaide corridor and recommended that the City undertake a study to determine the feasibility of accommodating bicycle lanes in the corridor, including consideration of separated bicycle lanes. Implementing separated bicycle lanes in the Richmond-Adelaide corridor will significantly improve bicycle safety and access to the many employment, residential, cultural and entertainment destinations in Toronto's downtown core. This proposed east-west bikeway will become an integral part of the City's emerging downtown separated bikeway network.

COMMENTS

1. Design Options

There are two general design options for separated bicycle lanes. Uni-directional lanes are one-way bicycle lanes provided on both sides of a two-way street (or on one side of a one-way street) and operate in the same direction as the adjacent traffic; bi-directional bicycle lanes operate as a two-way bicycle facility on only one side of the street (regardless of whether the street operates as one-way or two-way). Uni-directional bicycle lanes are easier to integrate with conventional bicycle lanes or shared traffic lanes at both ends of the segregated portion of the route and therefore can be implemented incrementally if necessary. Bi-directional bicycle lanes can have a narrower footprint than uni-directional lanes, however, bi-directional lanes are more prone to conflicts at intersections and are more complex to transition from the separated facility to conventional bicycle lanes or shared traffic lanes at the ends of the facility.

The selection of a bi-directional or uni-directional design depends on a variety of factors, including: one-way versus two-way operation of the street; the available pavement width; connections with other bikeways in the network; and the cost and ease of implementation. This feasibility assessment for the Richmond-Adelaide corridor considered both uni-directional (i.e. westbound on Richmond Street and eastbound on Adelaide Street) and bi-directional (i.e. either on Richmond or Adelaide Street) as shown schematically in Appendix 1).

2. Corridor Analysis

Transportation Services staff evaluated uni-directional and bi-directional separated bicycle lane options for both Richmond Street and Adelaide Street, between Bathurst Street and Sherbourne Street. Implementation of uni-directional bicycle lanes would require removal of one traffic lane from both streets; whereas, bi-directional bicycle lanes would require removal of one traffic lane from one of these streets.

2.1 Traffic Impacts

Within the scope of this study, traffic capacity analysis has been conducted at major intersections along both Richmond Street and Adelaide Street to assess the impact of removing of one traffic lane to accommodate separated bicycle lanes. The analysis indicates that the anticipated additional delay varies greatly by intersection, ranging from a few seconds up to one minute.

From a traffic impact perspective alone, implementing separated bicycle lanes on Adelaide Street would likely have fewer negative traffic impacts than on Richmond Street. Richmond Street has higher traffic volumes, especially east of Yonge Street and more variability by time of day. As a result, removing a traffic lane will generally result in more significant delays on Richmond Street than on Adelaide Street. Adelaide has four

traffic lanes along the entire length between Bathurst Street and Sherbourne Street; whereas Richmond Street has four lanes between Sherbourne and Peter Street and only three traffic lanes between Peter Street and Bathurst Street. In addition there are two locations where Richmond Street is narrowed for a short section. There are only three through traffic lanes at the Jarvis Street intersection due to the offset alignment of the intersection. Realignment of this intersection would be required to maintain three lanes through the intersection to mitigate the anticipated additional delay. A curb extension also narrows Richmond Street from three to two traffic lanes on the approach to Bathurst Street. The curb extension would need to be reconstructed to maintain two traffic lanes and the separated bicycle lane to the intersection.

The intersection analysis completed for this feasibility review does not take into consideration the impacts of traffic diverted to other streets. Given the role of the Richmond-Adelaide corridor serving the downtown core, with direct connections to/from the Don Valley Parkway, a more comprehensive corridor analysis should be completed and the findings coordinated with the larger downtown traffic operations study which Transportation Services will undertake in 2012.

2.2 Parking and Loading Impacts

On Richmond Street and Adelaide Street, on-street pay parking is allowed in most sections and for all time periods except the morning peak period. Taxi stands, commercial loading and bus parking areas are designated at specific locations along both of these streets. In addition to these designated curb-lane areas there is considerable informal loading and commercial delivery activity in the curb lanes throughout the day. Appendix 4 illustrates the curb-lane parking and loading regulations on both Richmond Street and Adelaide Street.

The implementation of separated bicycle lanes will have an impact on commercial deliveries on whichever side of the street the new facility is installed because parking and loading may have to be prohibited on that side. The parking impacts will be greater on Adelaide Street because parking is currently permitted on both sides east of Victoria Street. Maintaining parking on both sides would reduce Adelaide Street to a single lane of traffic. Recognizing the importance of loading/unloading to the businesses in the Richmond-Adelaide corridor, it would be advisable to provide designated loading zones when the separated bicycle lanes are implemented. Transportation Services recommends that a more detailed analysis and consultation regarding the loading demands and requirements be undertaken, as part of an Environmental Assessment study, to develop a plan that addresses the needs of the businesses along the corridor.

2.3 Other Operational Impacts

Transportation Services has consulted with operating divisions and agencies to identify issues and potential mitigating measures, including the following agencies: Toronto Transit Commission, Solid Waste Management, Emergency Medical Services, Fire Service and Toronto Police Service.

The TTC express bus service and streetcar service (which use the tracks on Richmond and Adelaide Streets for short turns and diversions) will likely experience more significant impacts on Richmond Street than on Adelaide Street because the traffic delays will be greater on Richmond Street, as described above. The impact on the bus service can be minimized by locating the separated bicycle lanes on the opposite side of the street (i.e. the south side of Richmond Street and/or the north side of Adelaide Street).

Solid Waste Management collects garbage from residential and commercial properties and public litter bins along both streets. Commercial and public litter bin collections are minimal on both streets and will not likely be significantly impacted by the installation of separated bicycle lanes. There are 32 residences on Richmond Street from which garbage is collected and 17 residences on Adelaide Street. Residential collection is located primarily west of Spadina Avenue. If parking is maintained in this residential section of Richmond Street the Solid Waste collection trucks will block the only available traffic lane during their collection period. The collection vehicles will have less impact on traffic flow on Adelaide because it has a consistent four-lane width along the entire corridor.

The separated bicycle lane design will need to accommodate access to the properties along the route by Emergency Medical Services, Fire Service and the Toronto Police Service. There are a number of design options which are being reviewed to accommodate these agencies which would be assessed through the detailed design process. However, the intersection analysis undertaken for this feasibility review does not adequately assess the impact that capacity reductions in the Richmond-Adelaide corridor would have on emergency response time. A more comprehensive corridor analysis, undertaken as part of an Environmental Assessment study, would address this critical issue.

The design of the separation treatment will also have to be compatible with the summer and winter maintenance equipment and activities. Again, these issues will be resolved through the detailed design process. Many of the above operational issues are being reviewed and resolved as part of the design and consultation process for the Sherbourne Street separated bicycle lanes. The Sherbourne experience will inform the design of separated bicycle lanes in the Richmond-Adelaide corridor.

A more detailed summary of existing conditions and potential impacts is presented in Appendices 2 and 3.

3. Constraints/Timing

3.1 Scheduled Capital Work Projects

Capital works scheduled on Richmond and Adelaide Streets are summarized in the following table and illustrated in Appendix 5.

Street	Section	Capital Work	Timing
Richmond Street	Church St. to York St.	TTC track replacement	2013
	Victoria St. to York St.	Major road resurfacing	2013
	Power St. to Church St.	Major road resurfacing	2015
Adelaide Street	Spadina Ave. to University Ave.	Watermain replacement	2012
	University Ave. to Victoria St.	Watermain replacement	2013
	Peter St. to Spadina Ave.	TTC track replacement	2015

The scope of the work on Adelaide Street, between Spadina Avenue and Victoria Street in 2012/13, is extensive and precludes consideration of the implementation of separated bicycle lanes along this section within this timeframe.

3.2 Developments and Curb-lane Occupation

There are four locations along Adelaide Street where one or two traffic lanes are currently occupied by construction hoarding due to the adjacent building construction. Two of these four projects are expected to be completed in Summer 2012. However, there are a further six major development sites along Adelaide Street that are expected to be under construction in 2012 and 2013 which may require the closure of the curb lane during construction. There is currently only one curb-lane closure due to the adjacent building construction on Richmond Street at Sherbourne Street – it is anticipated to be completed in early 2012. However, six new major development projects are anticipated to start construction in 2012 and 2013, between Bathurst Street and Sherbourne Street, which may require curb lane occupation.

Construction-related curb-lane closures have a significant impact on traffic capacity. Further reducing capacity by removing another lane to accommodate separated bicycle lanes needs to be considered in more detail and coordinated with the ongoing developments in the Richmond-Adelaide corridor.

The location of development-related construction projects are illustrated in Appendix 5.

4. Estimated Costs

The estimated costs for implementing separated bicycle lanes in the Richmond-Adelaide corridor range from \$400,000 for uni-directional bicycle lanes on both streets to \$1.35 million for bi-directional bicycle lanes on Adelaide Street. The cost for constructing separated bicycle lanes can be itemized into the following three categories:

1. Design of traffic signal modifications for existing signalized intersections;
2. Installation of traffic signal modifications for existing signalized intersections;
and
3. Installation of the separation treatment and new pavement markings.

Uni-directional separated bicycle lanes have significantly lower costs because the existing traffic signals may require only minor modifications. Bi-directional bicycle lanes have significantly higher costs because the traffic signals at all of the existing signalized intersections have to be modified to facilitate two-way bicycle traffic.

A more detailed breakdown of the estimated costs for the different design options is contained in Appendices 2 and 3.

5. Pilot Project – Feasibility and Timing

A Municipal Class Environmental Assessment study is required because the changes required to implement separated bicycle lanes on Richmond Street would significantly alter the "purpose, use and capacity" of the street. A pilot project could be implemented in advance of the commencement of the EA study, however, the EA study would need to commence within a year of the pilot project being implemented to assess and approve a permanent design solution.

As discussed earlier in this report, a bi-directional bicycle lane pilot project on either Richmond Street or Adelaide Street would cost in the order of \$1.2 to \$1.35 million. Uni-directional bicycle lanes would be much more practical to implement on a pilot project basis, given the lower capital investment, however, the traffic, parking and loading impacts would be doubled. Regardless of the cost and practicality of implementing separated bicycle lanes, the scheduled capital works and development-related curb-lane closures over the next couple of years limit the City's ability to implement a continuous, connected facility in 2012 or 2013.

Therefore, it would be more prudent to commence the Environmental Assessment study to assess the feasibility of permanent separated bicycle lanes in the Richmond-Adelaide corridor. A pilot project could be included as part of the EA study process to evaluate the preferred design and alignment option. The Municipal Class Environmental Assessment process would enable staff to more thoroughly address the critical design, operational and timing issues that will ultimately determine the success of the project. The EA process ensures a comprehensive consultation process with stakeholders and the general public and will identify potential mitigating measures to minimize any negative impacts associated with a reduction in the number of general traffic lanes in the Richmond-Adelaide corridor. This approach would reduce the risk of incurring significant "throw-away costs" if the pilot project was unsuccessful and had to be removed or if the permanent solution resulted in major modifications to the pilot project design.

CONTACT

Saikat Basak, P.Eng.
Transportation Engineer
Cycling Infrastructure & Programs
Transportation Services
Tel: 416-392-8589
Email: sbasak@toronto.ca

Daniel Egan
Manager
Cycling Infrastructure & Programs
Transportation Services
Tel: 416-392-9065
Email: degan@toronto.ca

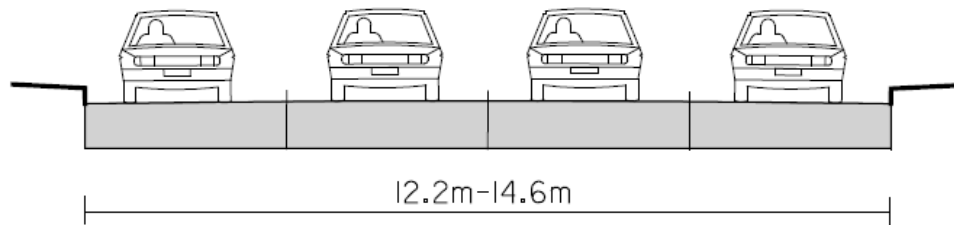
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Gary Welsh, P.Eng.
General Manager

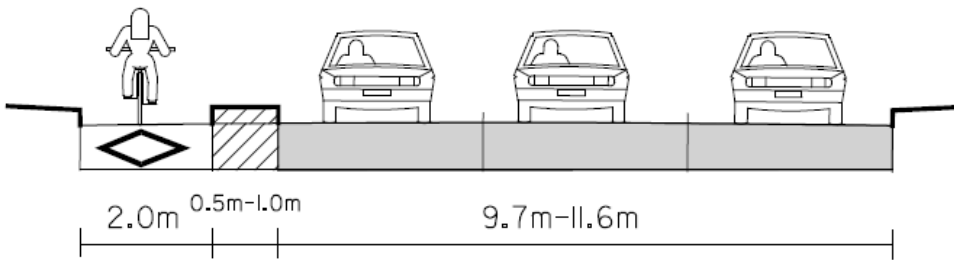
ATTACHMENTS

- Appendix 1 Schematic of Separated Bicycle Lane Design Options
- Appendix 2 Richmond Street - Impacts of Separated Bicycle Lanes
- Appendix 3 Adelaide Street - Impacts of Separated Bicycle Lanes
- Appendix 4 Parking and Loading Regulations in the Richmond-Adelaide Corridor
- Appendix 5 Capital Works and Development Constraints in the Richmond-Adelaide Corridor

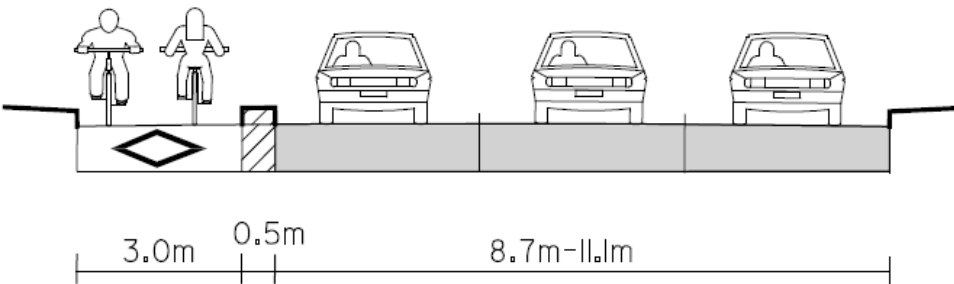
Appendix 1A
Schematic of Separated Bicycle Lane Design Options
Richmond St.: Sherbourne St. to Peter St.
Adelaide St.: Sherbourne St. to Bathurst St.



EXISTING






UNI-DIRECTIONAL DESIGN OPTION

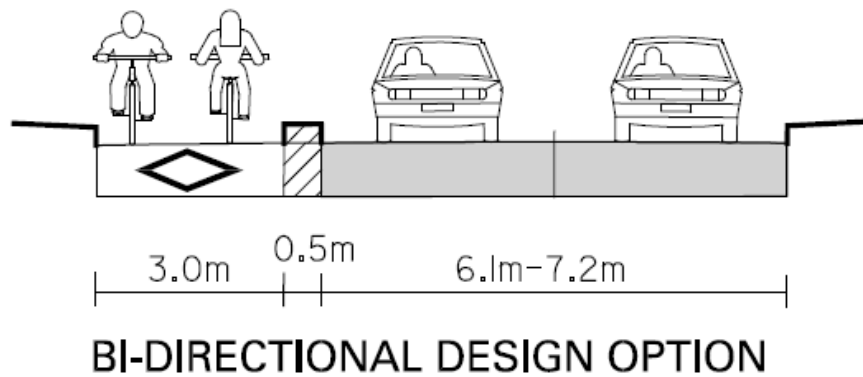
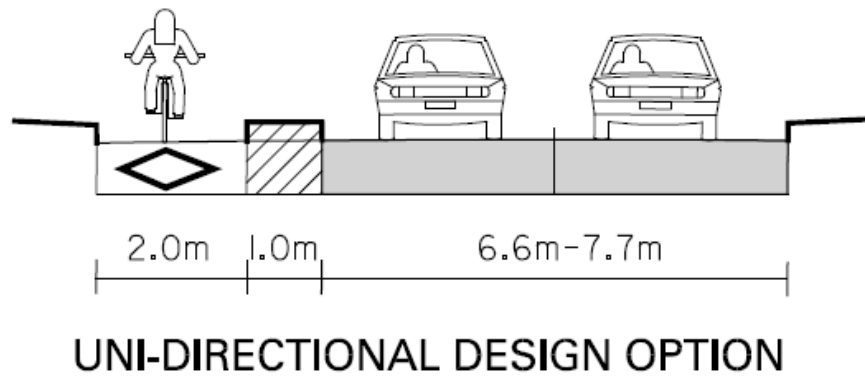
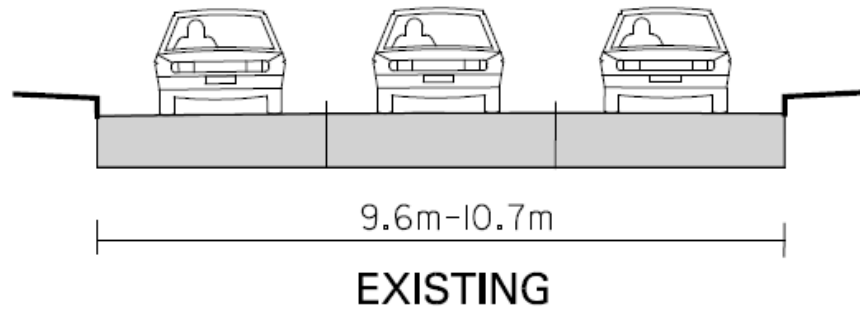


BI-DIRECTIONAL DESIGN OPTION




LEGEND

-  BICYCLE FACILITY
-  GENERAL PURPOSE LANE
-  MEDIAN

Appendix 1B
Schematic of Separated Bicycle Lane Design Options
Richmond St.: Peter St. to Bathurst St.



LEGEND

	BICYCLE FACILITY		MEDIAN
	GENERAL PURPOSE LANE		

Appendix 2

Richmond Street

Impacts of Separated Bicycle Lanes

The following describes some of the impacts that would be associated with the installation of separated bicycle lanes (either uni-directional, or bi-directional) on Richmond Street. These impacts were identified in preliminary analysis and consultations with City divisions and agencies, and would be assessed in more detail in a comprehensive consultation process involving the residential and business communities along the proposed routes, cycling organizations and the general public as part of the Municipal Class Environmental Assessment process.

The implementation of separated bicycle lanes on Richmond Street, from Bathurst Street to Sherbourne Street would require the removal of one traffic lane.

Background:

Richmond Street, from Bathurst Street to Sherbourne Street, is a one-way major arterial roadway with four traffic lanes operating in the westbound direction, from Sherbourne Street to Peter Street and three westbound lanes from Peter Street to Bathurst Street. There are two locations where Richmond Street is narrowed for a short section. Richmond Street narrows to three traffic lanes on the approach to Jarvis Street due to the alignment of the intersection. Realignment of this intersection would be required to maintain three lanes through the intersection to mitigate the anticipated additional delay. A curb extension narrows Richmond Street from three to two traffic lanes on the approach to Bathurst Street. The curb extension may need to be reconstructed to maintain two traffic lanes and the separated bicycle lane at the intersection.

Richmond Street varies in width from 12.5 to 14.4 metres between Sherbourne Street and Peter Street, and 9.6 to 10.7 metres between Peter Street and Bathurst Street. The 24 hour traffic volume on Richmond Street ranges from 8,400 (west of Spadina Avenue) to 19,800 (east of Spadina Avenue) vehicles.

The major signalized intersections on Richmond Street are generally operating at an acceptable level of service and delay during the morning and afternoon peak periods, except for the Jarvis Street intersection. During the morning peak period, intersections east of Yonge Street operate with higher delay compared to the intersections west of Yonge Street. The current delay is likely explained by the higher traffic volumes at these intersections and more vehicles turning off of Richmond Street to access their destinations as they enter into the downtown core.

Traffic Impacts:

The analysis of intersection operational conditions indicates that removing a traffic lane to accommodate separated bicycle lanes will have varying impacts depending on the

intersection. Generally the impacts will be greater east of Yonge Street than west of Yonge Street. Additional delays ranges from a few seconds to one minute per intersection depending on the intersections. The most significant delays would occur at Church Street and Jarvis Street during the morning peak period. The Jarvis Street intersection would require capital work to realign the intersection to maintain three lanes through the intersection to mitigate the anticipated additional delay. The traffic impacts for the intersections in the core (Yonge, Bay, York and University Streets) are more difficult to assess due to the prevalence of pick-up / drop-off and commercial loading and delivery activity. These intersections show very little change in operation and delay between the two scenarios; however, this can probably be attributed to the existing high level of activity blocking the curb lanes.

The intersection analysis completed for this feasibility review does not take into consideration the impacts of traffic diverted to other streets. Given the role of the Richmond-Adelaide corridor serving the downtown core, a more comprehensive corridor analysis should be completed and the findings coordinated with the larger downtown traffic operations study which Transportation Services will undertake in 2012.

Parking and Loading:

On Richmond Street parking is permitted on one side only. East of Yonge Street parking is permitted on the north side of the road and west of Simcoe Street parking is allowed on the south side. There is one taxi stand located in front of the Hilton Hotel on the south side between York Street and University Avenue. Overnight bus parking is also permitted on Richmond Street on the north side between Yonge Street and York Street. In addition, there is one designated loading zone located on the south side between John Street and Widmer Street. However, commercial loading/unloading is also permitted within "No Parking" zones. Appendix 4 illustrates the parking regulations in the Richmond-Adelaide Corridor.

There are approximately 120 parking spaces available on Richmond Street. Parking surveys indicated that 63 to 78 of the available parking spaces were occupied depending on the time of the day. Loading activities, especially within the downtown core from Church Street to York Street are mostly concentrated on the north side of the street.

The implementation of separated bicycle lanes on Richmond Street will either impact parking supply and other permitted usage as mentioned above or the traffic capacity if the parking supply has to be maintained. West of Peter Street, Richmond Street would operate with one traffic lane if parking was maintained or two traffic lanes if all parking was removed. These two options need to be analyzed in greater detail to identify potential impacts and mitigating measures.

Other Operational Impacts:

The loss of a curb side traffic lane on Richmond Street will impact TTC operations. The TTC operates five downtown express bus routes # 141, 142, 143, 144 and 145 during

morning and afternoon peak periods which operate on Richmond Street. Bus stops for these routes are located between Jarvis Street and Peter Street on the north side of the street. There are streetcar tracks in the centre lanes between Church Street and York Street and TTC operates the 501-Queen streetcar westbound between Church Street and Victoria Street.

Solid Waste Management collects garbage from residential and commercial properties and public litter bins along Richmond Street. Commercial and public litter bin collections are minimal and will not likely be impacted from installation of separated bicycle lanes. There are 32 residential collections on Richmond Street from which garbage is collected; 23 residences are west of Spadina Avenue and the remaining nine residences are located between Sherbourne Street and Jarvis Street.

The separated bicycle lane design will need to accommodate access to the properties along the route by Emergency Medical Services, Fire Service and the Toronto Police Service. In addition, the impact of reduced capacity on emergency response times must be assessed.

The design of the separation treatment will have to be compatible with the summer and winter maintenance equipment and activities. The width of the separated bicycle lanes need to allow the snow ploughing vehicles to access and clean the separated bicycle lanes.

Estimated Cost:

The following table provides a preliminary estimate of the major costs associated with the implementation of uni-directional and bi-directional separated bicycle lanes on Richmond Street.

Preliminary Cost Estimate for Richmond Street Separated Bicycle Lanes

Item	Uni-directional	Bi-directional
Design of traffic signal modifications		\$250,000
Installation of traffic signal modifications*		\$800,000
Separation treatment and pavement markings**	\$200,000	\$200,000
Total	\$200,000	\$1,250,000

*\$50,000 per signalized intersection -- 16 signalized intersections between Bathurst and Sherbourne.

** Includes installation of physical barriers (e.g., curbs, bollards, etc.) and new pavement markings.

Appendix 3

Adelaide Street

Impacts of Separated Bicycle Lanes

The following describes some of the impacts that would be associated with the installation of separated bicycle lanes (either uni-directional, or bi-directional) on Adelaide Street. These impacts were identified in preliminary analysis and consultations with City divisions and agencies, and would be assessed in more detail in a comprehensive consultation process involving the residential and business communities along the proposed routes, cycling organizations and the general public as part of the Municipal Class Environmental Assessment process.

The implementation of separated bicycle lanes on Adelaide Street, from Bathurst Street to Sherbourne Street would require the removal of one curb side traffic lane.

Background:

Adelaide Street, from Bathurst Street to Sherbourne Street is a one-way major arterial roadway with four traffic lanes operating in the eastbound direction along the entire corridor. The road is generally 12.2 or 14.6 metres wide. The 24 hour traffic volume on Adelaide Street ranges from 10,400 to 16,900 vehicles.

Traffic Impacts:

All the major signalized intersections on Adelaide Street are currently operating at an acceptable level of service and delay during the morning and afternoon peak periods. The analysis of intersection operational conditions indicates that removing a traffic lane to accommodate separated bicycle lanes will have minimal impact at all intersections except for Jarvis Street. Additional delays ranges from a few seconds at most intersections to 57 seconds at Jarvis Street during the afternoon peak period.

The intersection analysis completed for this feasibility review does not take into consideration the impacts of traffic diverted to other streets. Given the role of the Richmond-Adelaide corridor serving the downtown core, a more comprehensive corridor analysis should be completed and the findings coordinated with the larger downtown traffic operations study which Transportation Services will undertake in 2012.

Parking and Loading:

On Adelaide Street parking is allowed on both sides of the road between Sherbourne Street and Victoria Street, except for the section from George Street to Jarvis Street, where parking is allowed on the south side only. Between Victoria Street and Simcoe Street parking is prohibited. For the section west of Simcoe Street parking is allowed on the north side only. There are no designated loading zones on Adelaide Street. However,

commercial loading/unloading is permitted within "No Parking" zones. Appendix 4 illustrates the parking regulations in the Richmond-Adelaide Corridor.

There are approximately 168 parking spaces available on Adelaide Street. Parking surveys indicated that 72 to 98 of the available parking spaces were occupied depending on the time of the day. There is also frequent commercial loading/unloading activity in the curb lanes with the majority of this activity occurring on the south side of the street.

The implementation of separated bicycle lanes on Adelaide Street will either impact parking supply and other permitted usage as mentioned above; or the traffic capacity if the parking supply has to be maintained. However, existing parking supply east of Victoria Street will be impacted more where parking is currently allowed on both sides of the road.

Other Operational Impacts:

The loss of a curb side traffic lane on Adelaide Street will impact TTC operations. TTC operates five downtown express bus routes # 141, 142, 143, 144 and 145 on Adelaide Street during morning and afternoon peak periods. Bus stops for these routes are located between Jarvis Street and Peter Street on the south side of the street. TTC also operates 510-Spdina streetcar eastbound on Adelaide Street between Spadina Avenue and Charlotte Street. There are streetcar tracks in the centre lanes between Spadina Avenue and Church Street.

Solid Waste Management collects garbage from residential and commercial properties and public litter bins along Adelaide Street. Commercial and public litter bin collections are minimal on both streets and will not likely be impacted from installation of separated bicycle lanes. There are 17 residences on Adelaide Street from which garbage is collected, all of which are west of Spadina Avenue.

The design of the separated bicycle lanes will need to accommodate EMS, Fire and Police service access to the properties along the route.

The design of the separation treatment will have to be compatible with the summer and winter maintenance equipment. The width of the separated bicycle lanes need to allow the snow ploughing vehicles to access and clean the separated bicycle lanes.

Estimated Cost:

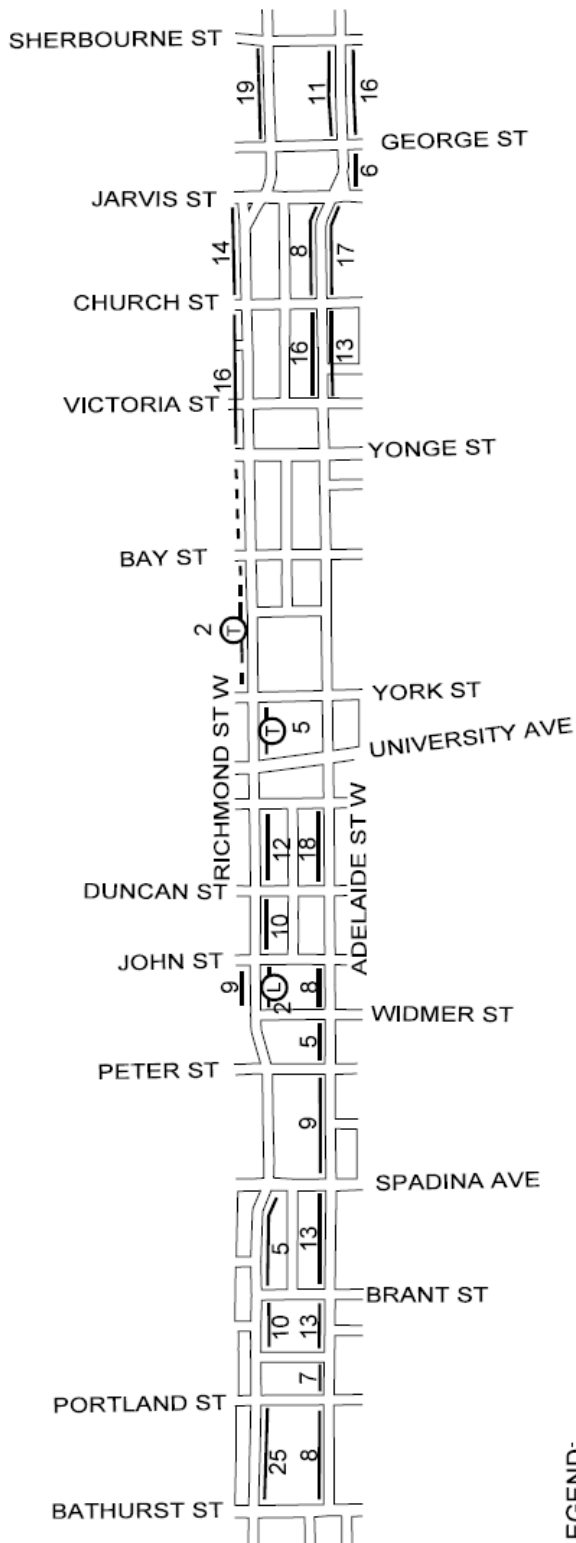
The following table provides a preliminary estimate of the major costs associated with the implementation of uni-directional and bi-directional separated bicycle lanes on Adelaide Street.

Preliminary Cost Estimate for Adelaide Street Separated Bicycle Lanes

Item	Uni-directional	Bi-directional
Design of traffic signal modifications		\$250,000
Installation of traffic signal modifications*		\$900,000
Separation Treatment and pavement markings**	\$200,000	\$200,000
Total	\$200,000	\$1,350,000

*\$50,000 per signalized intersection -- 16 signalized intersections between Bathurst and Sherbourne.

** Includes installation of physical barriers (e.g., curbs, bollards, etc.) and new pavement markings.



LEGEND:

- Pay & Display Parking
- - - Overnight Bus Parking
- (T)— Taxi Stand
- (L)— Loading Zone
- 12 Number of Spaces



PARKING AND LOADING REGULATIONS RICHMOND - ADELAIDE CORRIDOR APPENDIX 4

