City of London
Transportation 2030 Master Plan

Transit Priority Strategy
For
Bus Rapid Transit Implementation

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Transit Priority Strategy for BRT Implementation

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Figures

Figure 2.1: Proposed Rapid Transit Network ................................................................. 3
Figure 3.1 Example Contra-Flow Bus Lane on One Way Street .................................. 5
Figure 3.2: Example Contra-Flow Lane in Off Peak Direction ...................................... 6
Figure 3.3A: Queue Jump Lanes/Queue Jumpers Utilizing Extended Right Turn Lane for Buses ...................................................................................................................... 7
Figure 3.3B: Queue Jump Lanes/Queue Jumpers Utilizing Set Back General Traffic Stop Bar .................................................................................................................................. 7
Figure 3.4: Queue Jump Lanes/Queue Jumpers at Tee Intersection .................................. 8
Figure 4.1: Map of Dundas St / Oxford St E Route .......................................................... 11
Figure 4.2: Map of Oxford St West Route ...................................................................... 13
Figure 4.3: Map of Richmond St Route ........................................................................... 14
Figure 4.4: Map of Wellington St Route ......................................................................... 15
Figure 5.1: Modified Stop Bar for Bus Priority ................................................................. 18
Figure 5.2: Bus Lanes Through Bottleneck Area .............................................................. 19
Figure 5.3A: Bus Only Left Turn Lane ............................................................................. 20
Figure 5.3B: Separate Right Turn Lane to Create Bus Only Lane ...................................... 21
Figure 5.3C: Separate Bus Lane at Intersections ............................................................... 22
Figure 5.4: Use of Right Turn Lanes for Queue Jump Lanes/Queue Jumpers .................. 25
Figure 5.5: Median Queue Jump Lanes/Queue Jumpers at Intersection .......................... 32
Figure 5.6: Extended Right Turn Lanes for Bus Queue Jump Lanes/Queue Jumpers ...... 33
Figure 5.7: Minor Road Widening to Provide Queue Jump Lanes/Queue Jumpers .......... 34

Tables

Table 5.1: Overview of Opportunities & Constraints ......................................................... 35
Table 5.2: Overview of Preliminary Transit Priority Plan .................................................... 36
1.0 Introduction

The City of London is preparing a Transportation Master Plan (TMP) that will guide the development of the City’s transportation system forward towards Year 2030. A primary goal of this plan is to develop a more sustainable transportation system for London with significantly improved public transit services and much greater support for active forms of transportation. The study team consists of a multi-disciplinary team of City staff and consultants. The prime consultant engaged by the City to lead the consulting team is AECOM Canada Ltd (AECOM). Paradigm Transportation Solutions Ltd (Paradigm) has been engaged by AECOM to assist with the project by helping to develop a plan for the early implementation of Bus Rapid Transit (BRT) in London, as part of the overall Transportation Master Plan.

In a second interim report entitled “City of London – Towards a More Sustainable Transportation System in London – 2030 Transportation Master Plan; Smart Moves, March 2011”, a plan is developed for an initial phase of higher order transit services in London, utilizing Bus Rapid Transit (BRT) technology. This plan consists of BRT services in two main corridors in London, connecting through the downtown area to outlying activity centres. These corridors have been identified as a north/south corridor primarily along Richmond Street and Wellington Street and an east/west corridor primarily along Oxford Street West and Dundas Street/Oxford Street East combination.

It is envisaged that implementation of improved transit in the proposed BRT corridors would be staged over the 20 year period to 2030. It is recommended that the initial “pre-BRT” phase be comprised of frequent semi-express service utilizing existing roadway facilities with transit priority measures to achieve reliable and convenient higher capacity transit services. A key element of this plan will be the development and implementation of transit priority measures that give public transit vehicles priority over general traffic to ensure improved running times and high schedule reliability in each corridor. In the longer term, the plan envisages that the corridors will be widened to enable the bus rapid transit services to operate on exclusive lanes. The initial pre-BRT phase is a short-term strategy aimed at building ridership quickly at a lower capital cost with minimal disruption to the road network, before implementing a full BRT system. This clearly should be the starting point from which the City builds on. The initial BRT service will lead to growth along the corridors to justify stronger transit priority measures.

This paper outlines a proposed strategy for the development of relatively simple and low cost transit priority measures, which could be the focus of the initial phase. It includes a discussion of the range of transit priority measures that are used in urban areas to improve transit operations, a description of the current conditions in each corridor and a discussion of the specific measures that should be investigated for the initial phase of the BRT project. The investigations, findings, conclusions and recommendations of this task are documented in the following sections of this paper.
2.0 Overview of Bus Rapid Transit Plan

The plan for the initial development of Bus Rapid Transit (BRT) services is illustrated in Figure 2.1. The plan consists of a north/south corridor primarily along Richmond Street and Wellington Street and an east/west corridor primarily along Oxford Street West and Dundas Street/Oxford Street East combination. These corridors are planned to connect through downtown London with identified activity centres near the outlying ends of each corridor. In this paper, these routes have been investigated as four routes connecting downtown London to the outer ends of each route. As part of the Transportation Master Plan study, a separate analysis has investigated transit services and operations within the downtown area.

An overview of the plan the four initial routes is as follows:

- The Dundas Street/Oxford Street route will consist of a BRT corridor connecting from downtown London east along Dundas Street, Highbury Avenue and Oxford Street East to a major terminal at Fanshawe College with a possible extension east along Oxford Street East to about Clarke Road. In conjunction with this route, potential development nodes have been identified at Dundas Street and Highbury Avenue and at Highbury Avenue and Oxford Street East. Fanshawe College is expected to be a major activity centre that is served directly by this route and the station at the College would also serve as an interface between the BRT route and local transit services in the north east area of London.

- The Oxford Street West route will consist of a BRT corridor connecting from the downtown along Richmond Street and Oxford Street West to a terminal at Oakridge Mall in the western area of London. The route would serve several existing major commercial nodes along Oxford Street West. Potential development nodes on this route have been identified at Oxford Street West and Wonderland Road and at Oxford Street and Hyde Park Road.

- The Richmond Street route will consist of a BRT corridor connecting from downtown London north along Richmond Street to a terminal at Masonville Mall in the north area of London. A possible alternative to this route is a diversion from Richmond Street via University Drive to directly serve the University of Western Ontario campus, returning to Richmond Street via Western Road. This alternative route will require further discussions with the University of Western Ontario to confirm the feasibility and a preferred plan. Potential development nodes have been identified in the vicinity of Richmond Street and Fanshawe Park Road. It is also anticipated that the terminal at Masonville Mall would serve as a connection between the BRT route and the local transit services in the north area of London.

- The Wellington Street route will consist of a BRT corridor connecting from downtown London south along Wellington Street to the Victoria Hospital complex and a terminal at White Oaks Mall in the south area of London. The London Health Sciences Hospital complex will be a major activity centre served directly by the BRT route and the terminal at White Oaks Mall will provide connections with local bus routes in the south area of London. The White Oaks Mall area has been identified as a potential development node.

Early implementation of transit improvements within these four BRT corridors will help the City move aggressively towards the new transportation vision supporting this TMP update. These four corridors are very consistent with current transit ridership patterns and they will support identified transit oriented development nodes that would encourage a shift in travel activity towards the public transit services in London. It is proposed that transit service in the two east-west and two north-south corridors be operated as single east-west and north-south routes. In the longer term, it is anticipated that other corridors will be developed as transit priority routes with buses operating in exclusive transit or high occupancy vehicle (HOV) lanes.
For the overall TMP to be successful, it is critical to begin the shift towards increased transit use as quickly as possible. To achieve early improvements in public transit services, the proposed strategy is to develop a range of transit priority measures that can be achieved through minor geometric improvements, traffic changes and traffic signal control modifications. The use of these types of transit priority measures in the initial phase should enable transit ridership to grow quickly, thus building support for the later implementation of full BRT services. These types of transit priority measures can also be implemented with less disruption to the existing built urban environment and at a reduced capital cost.

Figure 2.1: Proposed Rapid Transit Network
3.0 Overview of Transit Priority Measures

Transit priority measures are utilized in many different situations to enable transit vehicles to move efficiently and reliably through urban congestion. These measures help to reduce the travel time for transit vehicles, making the service more attractive to customers and also less costly to operate. By reducing the day to day variability of travel time, transit priority measures can also increase the reliability of services for customers. In the identified rapid transit corridors in London, relatively simple transit priority measures offer a means of implementing an initial phase of bus rapid transit service with less disruption and lower costs than fully separated rapid transit services.

Transit priority measures can take many different forms that involve geometric changes to the roadways, traffic operational measures, traffic signal control measures or combinations of these measures. By their very nature, they tend to be innovative in order to respond to specific conditions and constraints. This section of the report provides a general overview of different types of transit priority measures, largely based on research conducted by the Canadian Urban Transit Association\(^1\) (CUTA). Section 5 of the report discusses the application of these types of transit priority to the London corridors.

There are also related measures that may be utilized to support special express bus services. For example, at very busy bus stops, off-bus prepayment systems may be used to enable passengers to purchase a proof of payment ticket before bus arrival. This speeds up the passenger boarding process and may be used to enable passengers to board at all doors on the bus. Another innovation may be the addition of express bus runs in the peak directions between major origins and destinations that adds capacity and reduces travel time. Many new BRT services utilize unique vehicle livery designs or “brands” to increase the public visibility of the service.

3.1 Bus Lanes

The designation of a roadway lane for use by buses only or by buses and other high priority vehicles (e.g., high occupancy vehicles, taxis, emergency vehicles) is a common form of transit priority in many urban areas. The general strategy is to enable buses to operate separately from general mixed traffic, usually in congested corridors or through critical areas. Different types of bus lanes include:

- With flow or curb bus lanes are probably the most common form of bus lane. Typically these exist along major arterial routes and are often in effect for peak traffic periods only. The strategy is to enable buses to move through congested areas with reduced levels of delay as compared to mixed traffic operations. If bus stops are present along the route, then curb lanes may be used to accommodate the bus stops. However, with flow bus lanes can also be designated in centre lanes if curb side bus stops are not required. The effectiveness of with flow curb lanes may be limited by the need to accommodate right turning vehicles in these lanes.

- Contra-flow bus lanes are bus lanes that travel in the opposite direction to the flow of mixed traffic. By travelling in the opposite direction, there are fewer problems with enforcement and conflicts with turning vehicles. Contra-flow bus lanes may be utilized on one way streets or on multi lane roadway facilities where the traffic volume and congestion is much heavier in one direction than the other direction. Schematic examples of contra-flow bus lanes are shown in Figures 3.1 and 3.2, taken from Design and Implementation of Transit Priority at Signalized Intersections, STRP Report 15, Canadian Urban Transit Association, November 2000.
Reference 1.

- Freeway bus lanes are bus lanes on access controlled roadway facilities. These may involve designating existing general purpose lanes for buses only, widening the roadway to provide new lanes or the use of paved roadway shoulders for buses only.

![Diagram of Contra-Flow Bus Lane on One Way Street](source)


**Figure 3.1: Example Contra-Flow Bus Lane on One Way Street**
3.2 Queue jump lanes/queue jumpers

Queue jump lanes/queue jumpers are a special form of bus lanes which typically utilize a section of bus lane and usually some traffic control measures to enable buses to pass through traffic bottleneck areas with reduced delay. Some examples of queue jump lanes/queue jumpers are as follows:

- Provision of a section of bus only lane at an approach to a busy intersection used in combination with a special “bus advance” phase is a typical queue jump lanes/queue jumpers lane arrangement. Figure 3.3A shows a schematic of a queue jump lanes/queue jumpers that utilizes an approaching right turn lane with a short section of bus lane to enable buses to reach the intersection and avoid mixed traffic queues. This configuration in combination with a special bus only traffic signal advance phase enables buses to advance ahead of the general traffic.

- Use of an advanced stop bar in combination with an approaching bus lane can enable buses to move in front of the through traffic queue at an intersection. This configuration allows buses to move ahead of a general traffic queue on the next through green phase and is illustrated in Figure 3.3B.

- At tee intersections, a separate bus only lane approaching the intersections may be used to enable buses to turn through the intersection independently of the general traffic. A schematic configuration of this example is shown in Figure 3.4. With some minor changes, this concept could also be utilized at a four leg intersection.

More examples of queue jump lanes/queue jumpers are shown in Figures 5.4, 5.6 and 5.7 in Section 5 of the report.
Figure 3.3A: Queue jump lanes/queue jumpers Utilizing Extended Right Turn Lane for Buses


Figure 3.3B: Queue jump lanes/queue jumpers Utilizing General Traffic Stop Bar Set Back

Source: City of Ottawa Report
With queue jump lanes/queue jumpers, the placement and provisions for bus stops near the intersection requires careful attention to ensure that it operates efficiently, both from the perspective of the bus operations and also the general traffic flow. The foregoing examples are only a few cases of queue jump lanes/queue jumpers. The physical constraints and the traffic conditions at intersections need to be investigated to determine which forms of queue jump lanes/queue jumpers are most likely to operate effectively.

3.3 Traffic Signal Priority

Provision of priority for buses at intersections controlled by traffic signals may take many forms. A few examples are discussed below.

Passive traffic signal priority for buses involves setting traffic signal timing at road intersections to favour movements that are heavily used by buses. For example, a left turn phase at a signal which has many buses making that particular movement might be extended beyond the time that would normally be provided for general traffic operations in order to reduce the time for buses to clear the intersection. Another example would be the use of a special advance bus only signal phase at an intersection with an approaching bus lane. In Ontario, a white vertical bar on a black background is utilized as the signal display aspect for a bus only signal phase. Passive traffic signal measures are usually easier and less costly to implement but less effective from an overall traffic operations efficiency perspective since the control strategy is not designed for the real time variations in bus and traffic volumes.

Active traffic signal priority measures typically utilize technology to detect approaching buses and to adjust the traffic signal control plan in real time to provide priority for buses to move through the intersection. Some examples of active traffic signal priority are:
• Use of detection devices (e.g., electro-magnetic loops, video) at intersections to detect approaching buses in combination with a special signal response phase to provide priority for the buses to move through the intersection. One example might be an electro-magnetic loop in an approaching bus only lane that would activate an early green phase to enable the bus to advance though the intersection. Some agencies have utilized detection devices at intersections to distinguish buses in general traffic lanes from other traffic (through the electro-magnetic response pattern or through video pattern recognition).

• Provision of compatible equipment on the buses and at intersection traffic controllers that enables signals transmitted by approaching buses to be received by detection equipment at the traffic signal controller. The detection of an approaching bus can then initiate special pre-planned signal phases to help the bus clear the intersection more quickly. The special signal phases may include an extended green phase or a shortened side street green phase to accommodate the approaching buses. This form of traffic signal priority has been utilized in many communities in Canada and elsewhere and can provide priority to approaching buses in mixed traffic lanes as well as special bus lanes. Off the shelf systems such as the 3M Opticom Priority Control System have been utilized to implement this form of bus priority. Transit signal priority technologies are available that are compatible with priority measures that are used for emergency vehicle signal pre-emption. For example, some systems such as Opticom have two levels of signal priority available. One level may be used for emergency vehicles with more disruptive signal timing plans while the second level that is less disruptive to overall traffic operations may be used for public transit vehicles.

• More advanced traffic priority systems for buses utilize advanced vehicle location (AVL) systems on the buses with a central traffic control system to track individual buses on the street network and to adjust traffic signal timing to provide improved travel conditions for buses. This more advanced system might modify traffic signal progression along a road corridor as well as modify the signal plan at individual intersections to achieve transit priority.

3.4 Traffic Operational Measures

There are many traffic operational measures that can be utilized to provide transit priority for buses and agencies such as the City of London regularly utilize these types of measures to facilitate efficient operation of buses. A few relevant examples to the BRT corridors include:

• Only using bus bays where conditions such as extended bus stop times or hazardous traffic conditions warrant. Bus bays in most other situations result in extended delays to buses due to difficulties in re-entering the traffic stream after stopping.

• Effective signing and regulations to restrict traffic stopping and parking near bus stops.

• Locating stop bars at intersections to ensure minimal conflict between turning buses and stopped vehicles.

• Location of bus stops at intersections to better accommodate transit customer needs (e.g., access to activity centres, transferring between routes).

• Exemptions from prohibited movements (e.g., “No Left Turns – Except Buses”).
3.5 London Experience

During the past 5 to 10 years, the London Transit Commission (LTC) has taken a number of steps to improve and enhance public transit services in the City. Measures that support higher capacity, express bus services include the implementation of an advanced vehicle location (AVL) Smart Bus system using technology on the bus to determine the bus location in real time and to communicate between the bus and the central transit control. In conjunction with the Smart Bus project, LTC has installed some real-time message signs at important bus stops to inform customers of arriving buses. The LTC buses are already equipped with transmitters that can be used to communicate with intersection signal controllers and all traffic signals in London have receiving devices installed on the traffic control system.
4.0 Overview of London BRT Corridors

An overview description of each of the four identified BRT routes is provided below with additional detailed notes in Appendix A of this paper.

4.1 Dundas St / Oxford St East Route

This BRT route is located along Dundas Street from downtown London to Highbury Avenue, along Highbury Avenue from Dundas Street to Oxford Street East and along Oxford Street East to Fanshawe College and extending further east towards Clarke Road. A map of the route is shown in Figure 4.1.

Figure 4.1: Map of Dundas St / Oxford St E Route

The section of Dundas Street east of downtown London and extending to about Quebec Street at Western Fair Grounds generally has one through travel lane in each direction plus turn lanes at intersections and sections of on-street parking. The roadway right of way is constrained through most of this area by mixed commercial and other uses along both sides of Dundas Street. The intersections are fairly closely spaced with average spacing between signalized intersections of about 250 metres. East of Quebec Street and extended to Highbury Avenue, Dundas Street has two through travel lanes in each direction. This roadway section has a limited right of way constrained by adjacent land uses which are a mix of industrial, residential...
and commercial uses. There are traffic signals at Egerton and Highbury intersections which are spaced about 1.2 km apart.

Highbury Avenue is a major north–south arterial roadway through the east side of London. From Dundas Street to Oxford Street East, Highbury Avenue has two through lanes in each direction and auxiliary turning lanes at the signal controlled intersections. The adjacent land uses are industrial and institutional uses and the roadway appears to have some extra right of way for expansion. However, the rail overpass structure north of Dundas Street is a major constraint on the roadway. It has been noted by the City that the London Psychiatric Hospital lands along Highbury and Oxford will be developed to “Multi-family, High Density Residential”, “Multi-family, Medium Density Residential”, and “Office/Residential” uses.

Oxford Street East from Highbury Avenue east to Clarke Road has two through lanes in each direction and auxiliary turning lanes at the signal controlled intersections. There are a range of land uses along this section including a high school, some fronting on residential uses, Fanshawe College and industrial uses east of the College. The right of way is highly constrained in some areas and appears to have some additional space in other areas. The London Transit Commission (LTC) has a major transit terminal at Fanshawe College with convenient bus access and egress to Oxford Street. The terminus of this BRT route will require some further consideration but at this time, it is expected to be in the vicinity of Oxford Street East and Clarke Road.

4.2 Oxford Street West Route

This BRT route will share a section of Richmond Street with the Richmond Street route which is discussed in the next section. West of Richmond Street, the route extends about 6 km along Oxford Street West to Oakridge Mall at Hyde Park Road. A map of this route is shown in Figure 4.2.

West of Richmond Street to Wharncliffe Road, Oxford Street has two through lanes in each direction with auxiliary turn lanes at signalized intersections. The right of way is generally constrained by adjacent development which is a mix of residential, office and commercial uses. The structures at the rail underpass and the river crossing are limited to four roadway lanes and are significant constraints. West of Wharncliffe, Oxford Street generally has two through lanes in each direction with auxiliary turn lanes at all significant intersections. The signalized intersections are generally well spaced with average spacing of about 590 metres. There are significant commercial developments in the vicinity of Cherryhill Boulevard, Wonderland Road and Hyde Park Road.
4.3 Richmond Street Route

The Richmond Street route extends along Richmond Street from downtown London to Masonville Mall at the intersection with Fanshawe Park Road, over a distance of about 5.5 km as shown in Figure 4.3 below.

North of downtown London to University Drive, Richmond Street has two lanes in each direction with some auxiliary lanes at significant intersections. Between the downtown and Oxford Street, the roadway is tightly constrained by relatively high density residential, office and commercial developments along the corridor. North of Oxford Street to University Drive, the development adjacent to the roadway consists primarily of detached residential development with some local activity centres such as the St Josephs Hospital complex.

The University of Western Ontario (UWO) and the University Hospital complex is located about 1 km west of Richmond Street via University Drive. This complex is one of the major generators of transit travel activity within London and a BRT connection to the complex via University Drive and the existing bailey bridge across the river should be contemplated in the short term. The specific campus routing west of the river and the related transit priority measures will be developed in consultation with UWO officials. Once through the campus, the route would follow Western Road north to Richmond Street, as shown in Figure 4.3 below.
North of Western Road to Masonville Mall, Richmond Street has two through lanes in each direction plus a centre turn lane in many sections and auxiliary turn lanes at the signalized intersections. The adjacent land uses are largely low density residential uses and the road appears to have some extra right of way available through much of this area. The London Transit Commission has a major transit terminal located adjacent to Masonville Mall, south of Fanshawe Park Road.

4.4 Wellington Street Route

The Wellington Street route connects south from downtown London as far as White Oaks Mall as shown in Figure 4.4. Wellington Street forms a major arterial route connecting the London central business district with the Highway 401 corridor and carries heavy traffic volumes. South from downtown London to just north of Base Line Road, Wellington Street has two through lanes in each direction and some auxiliary turn lanes at signalized intersections. The road corridor is very constrained by adjacent development through much of this length with numerous driveway connections and minor side street intersections. The land use adjacent to the corridor is mixed residential and commercial near the downtown and largely residential further south approaching Base Line Road. The river crossing structure south of the downtown is limited to four lanes.

East of Wellington Street and south of Base Line Road, the large London Health Sciences Centre and
Parkwood Hospital complex is the major activity centre along this corridor. There is no immediate plan to route the Wellington Road BRT through the Parkwood Hospital complex. The possible alternate routes through this area will require further detailed investigations in close consultation with the local area stakeholders.

Further south, Wellington Street has two and in some areas three lanes in each direction with auxiliary turn lanes at signalized intersections. The adjacent land uses include sections of residential and commercial uses with some open space along the east side of the road. The right of way appears to have some flexibility for widening in many sections of this corridor. The BRT route would end at White Oaks Mall where the London Transit Commission currently has a terminal adjacent to the mall building.

**Figure 4.4: Map of Wellington St Route**
5.0 Preliminary Transit Priority Plan

This section of the paper outlines preliminary plans for transit priority in each of the initial four BRT routes. The plans are provided to indicate the types of transit priority measures that should be considered and also to provide some order of magnitude cost estimates. The final plans will require further investigation following the Class Environmental Assessment (Class EA) process.

5.1 Transit Priority for the Dundas St / Oxford St East Route

Transit priority measures that should be considered for this route are discussed below.

Traffic Signal Optimization for BRT Operations:

The section of Dundas Street between Colborne St and Egerton St is about 1.9 km in length and has 9 signalized intersections which is an average signal spacing of about 240 metres. The corridor is also significantly constrained with generally one through lane in each direction and very limited opportunities for road widening. It is expected that there might be up to three BRT stops in this section (e.g., Colborne, Adelaide and Quebec intersections). Synchronization of the signals along this section to optimize the BRT operations rather than general traffic operations is a possible strategy to improve operational performance of BRT. Queen Street (one way westbound) and King Street (one way eastbound) offer alternate routes for general traffic to avoid this section of the Dundas St corridor. However, a preferred strategy that would provide greater operational benefits would be the provision of transit priority at signalized intersections, particularly for the section of Dundas Street between Colborne St and Egerton St.

Transit Priority at Traffic Signals:

This measure would likely consist of equipping buses with transmitter devices, equipping traffic signal controllers with receiving devices along with development and installation of traffic signal timing plans that provide priority to approaching BRT buses. The signal timing plans in all cases would provide extended green phases to enable BRT buses to continue through the intersection on that phase and/or would provide reduced side street green phases to provide an earlier commencement of a main street green phase to reduce the stop delay for approaching BRT buses. Other more advanced technologies could be considered but these would depend on an overall strategy for the total LTC bus fleet.

For this BRT route and for the other BRT routes, it is expected that special buses with a unique brand (e.g., similar to the iXpress bus service utilized by Grand River Transit in Waterloo Region). An effective strategy would be to equip all the BRT buses with transmitters and to equip all the signals along each of the four routes with receiving devices and appropriate traffic signal plans for transit priority. This strategy is expected to provide some reductions in running time along the corridor and to provide reduced variability in BRT bus running times for greater reliability of schedules.

Bus Only Lanes:

Provision of bus only lanes along major sections or throughout the corridor would be very difficult to achieve in the short term through roadway widening as the corridor does not appear to have extended sections with additional right of way available and in many sections there are existing buildings close to the edge of the road right of way. Therefore, the primary means to develop continuous sections of bus only lanes would involve utilization of existing traffic lanes. The westerly section of Dundas Street only has one through lane in each direction so development of bus only lanes would not leave any remaining through lanes for general traffic. The easterly section of Dundas Street, the section of Highbury Street and the section of Oxford...
Street each have two through lanes in each direction so the use of an existing lane for a bus only lane would reduce the number of through lanes for mixed traffic to a single lane. Based on these conditions, it is assumed that continuous bus only lanes in the corridor are not feasible in the short term and in the longer term would require acquisition of additional right of way for widening to provide the additional lanes.

**Queue jump lanes/queue jumpers Bus Lanes:**

Queue by-pass bus lanes are typically utilized at busy intersections to enable buses to bypass intersection approach congestion to pass through the intersection with reduced intersection delay. There are various configurations that are utilized as queue jump lanes/queue jumpers, as follows:

- Section of bus only lane on an intersection approach with an extra receiving lane on the far side of the intersection or with a transit only advance signal phase to enable buses to clear the intersection in advance of the general traffic lanes.

- Utilization of a right turn only lane to enable buses to approach and travel through an intersection. The through movement can be achieved in several ways:
  - Providing an extra far side receiving lane section designated for buses only. This might also be utilized for a far side bus stop.
  - Providing an extra bus only approach lane through a channelized right turn island. This could be utilized in combination with a far side bus only receiving lane or a bus only advance signal phase.
  - Setting the stop bar for general traffic back from the intersection so that buses utilizing the right turn only lane may advance into a general traffic lane in front of stopped vehicles.
  - Widening the overall intersection approach to provide a bus only turn lane where there is an available receiving lane. This is most likely utilized for left turns but with appropriate lane configuration and availability might also be used for right turns.

- Use of bus only bypass lanes at freeway ramps or at the entrance to major activity centres.

Queue jump lanes/queue jumpers tend to be innovative in design and developed for the specific opportunities and conditions at each location. The most effective forms of transit priority measures typically involve both coordination of both transit operations and traffic engineering considerations. In this corridor, the implementation of queue jump lanes/queue jumpers where feasible represents a practical approach to provide transit priority to support a BRT service.

Possible options for transit priority queue jump lanes/queue jumpers at intersections along the corridor are discussed below:

- Dundas St & Colborne St intersection. This intersection is quite constrained by adjacent land uses, particularly on the west side of Colborne St and this would appear to make physical widening of the road difficult in the short term. However, the removal of on-street parking in both the eastbound and westbound directions should be investigated as a means of facilitating bus movements through the intersection. In conjunction with minor widening of the boulevard there may be sufficient width available to have designated bus lanes through the intersection. If this is not feasible in the short term, a more aggressive transit priority signal timing plan might be utilized at this intersection to favour east – west bus movements along Dundas Street.

- Dundas & Adelaide intersection. One option to consider at this intersection is to utilize eastbound right turn lane in conjunction with shifting the stop bar at least 30 metres west of intersection to allow buses to advance to the front of the through traffic queue during a red light phase. If required by the
intersection traffic patterns, an eastbound right turn only phase would further facilitate buses moving forward into the through lane. This concept is shown in Figure 5.1.

In the westbound direction, there is only a single lane at the intersection. A second westbound lane for buses only could possibly be created approaching the intersection by removing some streetscape areas plus some on-street parking but this would have an impact on adjacent land uses and pedestrian safety and does not appear feasible in the short term.

- Dundas St between Adelaide St and Quebec St intersections. Due to limited right of way and building proximity to the road in this area, queue jump lanes/queue jumpers opportunities are very limited. It is noted that Queens Avenue and King Street form a one-way couplet on each side of Dundas Street in this area and offer an alternate route for general traffic. Also, measures to remove on-street parking such as small off-street lots, implemented in combination with minor road widening could provide some longer term potential to develop bus lanes along this section of Dundas Street. In the short term, an aggressive transit priority signal timing plan could be utilized to favour east – west bus movements along Dundas Street.
- Dundas St through the Quebec St and Egerton St intersections. One option that should be considered in this area would be the designation of eastbound and westbound curb lanes through both intersections as bus only lanes (except right turning vehicles). This concept is illustrated in Figure 5.2 below.

![Figure 5.2: Bus Lanes through Bottleneck Area](image)

- Dundas St & Highbury Ave intersection. This intersection is a key intersection to provide some priority for bus movements. It has also been identified as a possible development node. One option that should be considered would be some road widening to provide a second left turn lane for eastbound to northbound left turning buses only. This would involve widening Highbury through the intersection and would likely require additional right of way. For southbound to westbound right turning buses, there is an existing short southbound right turn lane on Highbury. The available right of way for further road widening is very limited and there is also an existing slope for the Highbury Ave railway crossing structure. Further design investigation would be required to determine if any improvements to provide a southbound to westbound queue jump lanes/queue jumpers are feasible. An illustration of the eastbound to northbound buses only left turn lane is shown in Figure 5.3A.

- Highbury Ave & Regional Mental Health Centre (RMHC) intersection. At this intersection, the existing northbound right turn lane could be used to enable northbound buses to travel through the intersection with a new bus only receiving lane section on the north side of the intersection. A more extensive option would be provision of road widening to provide a separate new right turn lane with the existing right turn lane being used as a bus only through lane as shown in Figure 5.3B. The need for a queue jump lanes/queue jumpers in the southbound direction may not be great. However, road widening of Highbury Avenue should be investigated to provide a southbound bus only approach lane section with the existing far side bus bay serving as a receiving lane. This existing bus bay could be extended south to enable buses to merge into traffic in the through lanes.
Figure 5.3A: Bus Only Left Turn Lane
Highbury Ave & Oxford St intersection. For northbound to eastbound right turning buses, a potential bus priority option would be widening the existing right turn lane to provide a second (i.e., inner) buses only right turn lane that would utilize the existing eastbound bus bay on Oxford St as a receiving lane and possibly a bus stop. Special pavement cross-hatching might be needed to reinforce the bus only lane section. This concept is illustrated in Figure 5.3C. For the westbound to southbound left turning buses, the stop bar on Oxford St could be set back about 30 metres or more to enable buses to advance to the front of the westbound traffic queue, similar to the example shown in Figure 5.1. Other options, such as widening for a bus only left turn lane would appear to be restricted by the limited right of way and existing development on the west side of the intersection.
• Oxford St & Fanshawe College entrance. At this location, it is assumed that the BRT buses would utilize the current bus terminal on the campus in the short term. The current arrangement appears to operate reasonably for left turning buses and the limited right of way would likely restrict further widening Oxford Street in the short term. Depending on the traffic patterns, a transit actuated signal for eastbound left turning buses might also be considered but does not appear necessary.

• Oxford St & First St intersection. Southbound buses leaving the Fanshawe College campus would benefit from a bus actuated transit priority signal at this intersection. The eastbound bus bay could be extended through the intersection to provide a queue jump lanes/queue jumpers but additional right of way is likely required. If this extension is not feasible in the short term, consideration should be given to eliminating this bus bay or moving the eastbound stop bar on Oxford Street far enough back that buses could leave the bus bay into a through lane in front of the traffic queue at the intersection.

• Oxford St & Second St intersection. The need for transit priority may be lower at this intersection. If traffic delay is a problem here, consideration could be given to road widening for a westbound bus only lane through the intersection. An eastbound bus only lane may also be feasible but the available right of way requires further investigation.

• Oxford St & Third St intersection. The need for transit priority at this intersection is expected to be lower. There appears to be right of way available for road widening to provide a bus only queue jump lanes/queue jumpers lane in the westbound directions but this may not be needed until the longer term.

• Oxford & Clarke intersection. The need for transit priority will depend on the terminus of the Dundas St / Oxford St East BRT route and bus turning arrangements in this area. There are level rail crossings.
immediately west and north of the intersection which need to be recognized and there are no short street blocks for turning buses.

In summary, the suggested bus priority plan for the short term implementation of the Dundas St / Oxford St East BRT route should consist of the following:

- Transit priority at traffic signals along the full route (about 16 signalized intersections).
- Transit queue jump lanes/queue jumpers at several locations such as:
  - Dundas St & Adelaide St intersection
  - Section of Dundas St in vicinity of Quebec St and Egerton St intersections
  - Dundas St & Highbury Ave intersection
  - Highbury Ave & RMHC intersection
  - Highbury Ave & Oxford St intersection

It is anticipated that the cost of these measures would be about $1.5 million to $2.0 million, not including engineering, property and any utility relocation.

5.2 Transit Priority for the Oxford St West Route

The Oxford St West BRT route is located along Oxford Street West, between Richmond Street and Hyde Park Road, over a distance of about 5.9 kms. Within this corridor Oxford Street has 2 through travel lanes in each direction as well as a centre left turn through most of the corridor west of Platt’s Lane. The major physical constraints on the roadway are structures at two rail grade separation structures (west of Talbot St and west of Capulet Ln) and a river crossing west of Talbot St. In addition there is residential and commercial development along both sides of most of the corridor that would be sensitive to any major expansion of the corridor. Transit priority options to support short term implementation of BRT in this corridor are discussed below.

Transit Priority at Traffic Signals:

Along the Oxford St West BRT route, there are 11 traffic control signals that are typically spaced several hundred metres apart. In general terms, provision of priority for transit will provide some reductions in running time and should also improve the reliability of the transit schedules. As in the Dundas St / Oxford St East Corridor, it is expected that the most cost effective means of providing transit priority at signals would be through equipping buses with transmitter devices, equipping traffic signal controllers with receiving devices along with development and installation of traffic signal timing plans that provide priority to approaching BRT buses.

One location where transit priority at a signalized intersection should be given high priority is the intersection of Oxford Street and Richmond Street. This intersection has development on all four corners in close proximity to the intersection and physical road widening options appear to be very limited. BRT buses will be turning northbound to westbound (outbound) and eastbound to southbound (inbound) at this intersection. Consideration should be given to providing special signal timing plans or signal phases at this intersection that could be initiated by an approaching bus and would reduce the intersection clearance time. There will also be northbound and southbound Richmond Corridor BRT buses utilizing this intersection so it may be necessary to distinguish between Oxford St West and Richmond BRT route buses to provide efficient transit priority. A special transit signal priority plan for this intersection is a critical component of the overall plan.
Bus Only Lanes:

Provision of continuous bus only lanes throughout the corridor will be difficult due to physical constraints (rail overpass and river crossing structures) and impacts on adjacent development. However, there are some sections where bus only lanes in the form of queue jump lanes/queue jumpers will provide improved transit operational efficiency and will support the BRT strategy. Continuous bus only lanes in the corridor are not likely feasible in the short term and, in the longer term, would require acquisition of additional right of way for widening to provide the additional lanes.

Queue jump lanes/queue jumpers Bus Lanes:

Possible short term options for transit priority queue jump lanes/queue jumpers at intersections along the route are discussed below:

Oxford St & Richmond St intersection. This busy and important intersection has development on all four quadrants and no extra row on the south leg of Richmond. There is some additional row on both sides of the west leg of Oxford St; however, the tight corners appear to restrict any possible road widening to benefit buses. This intersection warrants further investigation for longer term improvements but the only option identified at this time is the provision of transit priority with the signal operations.

Oxford St & Talbot St intersection. This intersection has a far side westbound bus bay that could be utilized for a westbound queue jump lanes/queue jumper created by widening Oxford Street east of the intersection to create a bus only lane that continues through the intersection into the existing bus bay. There appears to be sufficient right of way and boulevard space for this widening. In the eastbound direction, there is an existing right turn lane that could be used by buses to advance through the intersection. This would require a new receiving lane for buses on the far side of the intersection. The available space and right of way for this will need to be confirmed. A second option for eastbound buses would be to allow buses to use the right turn lane and to set back the stop bar for the through lanes, similar to the example in Figure 5.1.

Oxford St & Wharncliffe Rd intersection. This intersection appears to have insufficient extra right of way along the south side for widening to create a queue jump lanes/queue jumper. On the north side there is extra right of way west of the intersection but irregular row east of the intersection. If additional row could be obtained through redevelopment or through a property acquisition, a westbound right turn lane with an exception for buses and a bus only receiving lane on the far side of the intersection would be beneficial to BRT operations. This option should be further investigated as a long term improvement.

Oxford St & Woodward Ave intersection. This intersection has minimal extra right of way both east and west of the intersection that would permit road widening. One potential option would be to designate the approaching curb lanes as right turn only except buses in both directions for an appropriate approach distance. This option would require traffic signing, lane markings and enforcement rather than physical road widening. The potential impact on general traffic of only having one though lane in each direction is expected to be a problem and needs to be further investigated.

Oxford St & Cherryhill Blvd intersection. This intersection appears to have extra right of way and boulevard on both the north and south sides of Oxford St. An option to providing a queue jump lanes/queue jumper would be to widen Oxford St through the intersection in both directions to create a “right turn only lane except buses” approaching the intersection and a bus only receiving lane on the far side of the intersection. The far side receiving lane could serve as a bus stop at this location. An example of this configuration is shown in Figure 5.4.

Oxford St & Proudfoot Ln intersection. In the eastbound direction this intersection has a far side bus bay
and appears to have extra right of way along the south side. An option for the eastbound BRT buses would be to widen Oxford St to provide a “right turn only except buses” lane and a bus only receiving lane on the far side of the intersection, similar to the example shown in Figure 5.4. In the westbound direction, there is a westbound right turn only lane approaching the intersection but there does not appear to be right of way on the far side for a bus only receiving lane. However, one potential option for westbound BRT buses would be to designate the approaching right turn lane as “right turn only except buses” and to provide a special westbound signal phase for right turns only except buses or to use the vertical white bar signal display in conjunction with the right turn phase. This would allow buses to advance through the intersection on the right turn phase.

Oxford St & Wonderland Rd intersection. This intersection has westbound and eastbound right turns lanes on Oxford St. An option to providing BRT priority in both directions at this intersection is to designate these lanes as “right turn only except buses” and to widen the road to provide bus only receiving lanes on the far side of the intersection. The receiving lanes could serve as far side bus stops and should have an extension with a merge taper to enable buses to re-enter the through lane. There appears to be sufficient right of way to widen Oxford St for the receiving lanes but the impact on existing utility pole lines will need to be investigated. This option is illustrated in Figure 5.4.

Figure 5.4: Use of Right Turn Lanes for Queue jump lanes/queue jumpers
Oxford St & Capulet Ln intersection. This intersection has a westbound right turn only lane approaching the intersection and appears to have extra right of way on the far side, north of Oxford St. An option for westbound BRT operations would be to designate the existing lane as “right turn only except buses” and to widen Oxford to provide a new bus only receiving lane on the far side of the intersection, similar to the example shown in Figure 5.4. In the eastbound direction, there is an existing right turn only lane leaving the intersection and there appears to be some extra right of way along the south side although there is also an existing utility pole line. An option to improve the eastbound BRT operations would be widening Oxford St to provide a new approach lane for “right turns only except buses”. The feasibility of this will depend on the impacts and cost of relocating the utility pole line along the south side.

Oxford St & Guildwood Blvd intersection. This intersection has a westbound right turn only lane that could be utilized as a “right turns only except buses” lane. There appears to be some extra boulevard and right of way to widen Oxford St to provide a bus only receiving lane on the far side of the intersection although the impact on a utility pole line and trail adjacent to the sidewalk will need to be further investigated. There is some boulevard space available along the south side of Oxford St in this area but with fronting on residential development and other constraints, road widening might have more significant impacts. Also, it is not clear that this intersection is sufficiently congested to require road widening for the BRT service.

Oxford St & Guildwood Gate intersection. This intersection has both eastbound and westbound right turn only lanes approaching the intersection that could be utilized as “right turn only except buses”, similar to the example shown in Figure 5.4. In the eastbound direction, there is a bus bay west of the intersection. In this area, Oxford St could be widened to provide an eastbound receiving lane with an appropriate merge taper for buses. In the westbound direction there is some right of way and boulevard space available to provide a westbound receiving lane but the impact on a utility pole line and trail adjacent to the sidewalk will need to be further investigated.

Oxford St & Hyde Park Rd Intersection. The BRT priority plan at this intersection will need to reflect the route terminus plans which are not known at this time. There is a westbound right turn only lane on Oxford St approaching and leaving the intersection. The section approaching Hyde Park Rd could be utilized as “right turn only except buses” lane in conjunction with the existing receiving lane on the far side of the intersection as far as the entrance to Oakridge Mall. This lane would be shared with right turning traffic into the Mall. This option could be implemented with traffic signing, lane markings and enforcement rather than physical road widening. No other options have been identified for this intersection but this may be revisited when the BRT terminal plan is known.

In summary, the suggested bus priority plan for the short term implementation of the Oxford St West BRT route should consist of the following:

- Transit priority at traffic signals along the full route (about 11 signalized intersections).
- Transit queue jump lanes/queue jumpers as discussed above at several locations such as:
  - Oxford St & Talbot St intersection
  - Oxford St & Woodward Ave intersection
  - Oxford St & Cherryhill Blvd intersection
  - Oxford St & Proudfoot Ln intersection
  - Oxford St & Wonderland Rd intersection
  - Oxford St & Capulet Ln intersection
  - Oxford St & Guildwood Blvd intersection
5.3 Transit Priority for the Richmond St Route

The Richmond Street BRT route is located along Richmond Street, between Dufferin Avenue and Hillview Blvd, over a distance of about 5.2 kms. There are 14 signalized intersections in this corridor, including the signals at Dufferin Avenue and Hillview Blvd, resulting in an average signal spacing of 400 metres. Within this corridor Richmond Street has 2 through travel lanes in each direction. In the section of the corridor south of the river, there are extended sections where the road only has four lanes with fronting on residential development while the north end of the corridor, north of the river generally has five lanes or more. The major physical constraints on the roadway are the twin structures crossing the Thames River as well as the fronting on development and restricted right of way between the river crossing and downtown London. Transit priority options to support short term implementation of BRT in this corridor are discussed below.

Transit Priority at Traffic Signals:

Along the Richmond Street BRT route, there are 14 traffic control signals that are typically spaced several hundred metres apart. In general terms, provision of priority for transit will provide some reductions in running time and should also improve the reliability of the transit schedules. As in the Dundas St / Oxford St East Corridor, it is expected that the most cost effective means of providing transit priority at signals would be through equipping buses with transmitter devices, equipping traffic signal controllers with receiving devices along with development and installation of traffic signal timing plans that provide priority to approaching BRT buses.

As noted previously, one location where transit priority at a signalized intersection should be given high priority is the intersection of Oxford Street and Richmond Street. No options for physical improvements at this intersection have been identified and recognizing the importance to both BRT routes, special transit priority plans for the signals at this intersection are very important.

Bus Only Lanes:

Provision of bus only lanes throughout the corridor will be difficult due to physical constraints (i.e., proximity of adjacent high density development and the river crossing structure). However, there are some sections where bus only lanes in the form of queue jump lanes/queue jumpers will provide improved transit operational efficiency and will support the BRT strategy. It is noted that a section of Richmond St from south of Windermere Road to Masonville Mall has a wide boulevard and extra right of way along the east side of the corridor that could potentially be used for an extended length of bus only lane except right turns. This bus only lane may not be required in the early phases of the BRT development but the opportunity for this longer term improvement should be considered in the design of shorter queue jump lanes/queue jumpers.

Queue jump lanes/queue jumpers Bus Lanes:

Possible short term options for transit priority queue jump lanes/queue jumpers at intersections along the route are discussed below:
Richmond St & Dufferin Ave intersection. No opportunities are identified for queue jump lanes/queue jumpers due to limited right of way and adjacent development.

Richmond St & Central Ave intersection. A potential option could be the provision of bus only lane approaching and leaving intersection but there would be some impact on the existing streetscape. This option should be further investigated considering impacts and design details.

Richmond St & Pall Mall St, Oxford St intersections. No opportunities identified for queue jump lanes/queue jumpers due to limited right of way.

Richmond St between Oxford St & Huron St intersections. This section is almost 1.4 km in length with a four lane roadway (2 lanes NB, 2 lanes SB) with no auxiliary lanes for left turns at numerous driveways and ten local street intersections. The corridor also appears to have extra row on both sides along the full section. It is anticipated that overall traffic flow could be improved substantially along this section of the corridor with an additional lane serving as a centre two way left turn lane. This improvement could potentially improve traffic flow to the extent that the curb lane could be designated as a bus only lane except right turns in each direction. There will be some impacts on the street frontage with the related road widening and these impacts should be further investigated. This improvement will also be relatively costly. It is recommended that this widening be further investigated in conjunction with the longer term implementation of BRT in this corridor.

Richmond St & Grosvenor St intersection. This intersection has separate far side bus bays both northbound and southbound. An option to provision of transit priority would be the provision of a bus only approach lane in the northbound and southbound direction. Alternatively, if this improvement is found to not be feasible, consideration should be given to discontinuing use of the bus bays.

Richmond St & Cheapside St intersection. One option at this intersection would be the provision of northbound and southbound approach and receiving lanes for buses only except right turns. This will have some impact on adjacent residential properties which will require further investigation.

Richmond St & Victoria St intersection. One option at this intersection would be the provision of northbound and southbound approach and receiving lanes for buses only except right turns. This will have some impact on adjacent residential properties which will require further investigation.

Richmond St & Huron St Intersection. No opportunities have been identified for queue jump lanes/queue jumpers due to constrained right of way at this intersection.

Richmond St & University Dr intersection. No opportunities identified for queue jump lanes/queue jumpers due to constraints along the roadway, particularly on the east side. However, it is noted that this intersection may need to accommodate buses travelling to and from the University of Western Ontario complex. Further investigation of options that may involve special transit signal priority or physical modifications on the west side of Richmond Street should be further investigated.

Richmond St & Bernard Ave intersection. No opportunities identified for queue jump lanes/queue jumpers lane due to very constrained right of way.

Richmond St & Windermere Rd intersection. One option for northbound buses would be to designate the northbound right turn lane as a bus lane except right turning vehicles and to provide a bus only receiving lane on the opposite side of the intersection, similar to the example shown in Figure 5.4. For southbound buses there appears to be sufficient right of way to provide a bus only except right turning vehicles approach lane and a bus only receiving lane on the south side of Windermere.
Richmond Street between Windermere Rd & Masonville Mall. This section appears to have sufficient boulevard and right of way along the east side of Richmond to permit the development of a continuous bus only lane for the full distance of about 1.3 km. This section does not have individual residences fronting on the street so the impact would be less than in other areas. The cost of this option will be significant so it may not be feasible in the initial phase of development. However, it should be considered for the longer term development of BRT in the corridor.

Richmond St & Western Rd intersection. An option for southbound buses would be to expand the current southbound right turn cut off to create a right turn only lane except buses and to continue this lane through the signalized intersection with a bus only receiving lane. For northbound buses, a section of bus only lane could be developed approaching the intersection with a receiving bus only lane north of the intersection.

Richmond St & Shavian Blvd/Sunnyside Dr intersection. This intersection is located a considerable distance from the central area and does not appear to have high levels of congestion. It is not anticipated that this intersection will warrant significant changes to accommodate the initial implementation phase of BRT. However, there does appear to be sufficient right-of-way available on both sides of Richmond Street for curbside bus lanes if the conditions are found to warrant improvements.

Richmond St & Hillview Blvd/Mall Entrance Intersection. It is assumed that the buses may utilize the existing transit terminal north of this intersection. One option for provision of a queue jump lanes/queue jumpers would be to provide a new northbound approach lane for buses only except right turns with a farside receiving bus only lane entering the bus terminal.

In summary, the suggested bus priority plan for the short term implementation of the Richmond Street BRT route should consist of the following:

- Transit priority at traffic signals along the full route (about 14 signalized intersections). This should include a special transit signal plan for the traffic signals at Oxford Street and at University Drive intersections with higher levels of priority for approaching bus movements.
- Transit queue jump lanes/queue jumpers as discussed above at several locations such as:
  - Richmond St & Grosvenor St intersection
  - Richmond St & Cheapside St intersection
  - Richmond St & Victoria St intersection
  - Richmond St & Windermere Rd intersection
  - Richmond St & Western Rd intersection
  - Richmond St & Hillview Blvd/Mall Entrance intersection

It is anticipated that the cost of these measures would be about $1.8 million to $2.2 million, not including engineering, property and any utility relocation.

5.4 Transit Priority for the Wellington St Route

The Wellington St BRT route is located along Wellington Street and Wellington Road, with a diversion route through the London Health Sciences Centre and Parkwood Hospital complexes, over a one-way distance of about 6.6 kms from Horton St to White Oaks Mall. There are 12 signalized intersections in this corridor, including the signals at Horton St, a new signal for the Hospital connection and White Oaks Mall entrance, resulting in an average signal spacing of 600 metres. Within this corridor, Wellington Street generally has a four lane cross-section north of Base Line Road and is very constrained by a limited right of way and
adjacent development. South of Base Line Road, Wellington Road generally widens to five or six lanes and is less constrained. The Health Sciences and Hospital complexes are the major activity centres in this corridor and would not be well served by a BRT route located on Wellington Road. Therefore, it is proposed at this time that the BRT route would run through these two institutions, generally utilizing the existing driveways within the sites. The specific route will require further investigation in consultation with the Health Sciences and Parkwood Hospital administration.

Transit priority options to support short term implementation of BRT in this corridor are discussed below.

Transit Priority at Traffic Signals:

Along the Wellington Street/ Wellington Road BRT route, there are 12 traffic control signals that are typically spaced several hundred metres apart. In general terms, provision of priority for transit will provide some reductions in running time and should also improve the reliability of the transit schedules. As in the other corridors, it is expected that the most cost effective means of providing transit priority at signals would be through equipping buses with transmitter devices, equipping traffic signal controllers with receiving devices along with development and installation of traffic signal timing plans that provide priority to approaching BRT buses.

Bus Only Lanes:

Provision of bus only lanes throughout the corridor will be difficult in the short term due to physical constraints (i.e., proximity of adjacent high density development and the river crossing structure). However, there are some sections where bus only lanes in the form of queue jump lanes/queue jumpers will provide improved transit operational efficiency and will support the BRT strategy. The BRT diversion through the London Health Sciences Centre and Parkwood Hospital complexes may require some bus only connections for efficient routing.

Queue jump lanes/queue jumpers Bus Lanes:

Possible short term options for transit priority queue jump lanes/queue jumpers at intersections along the route are discussed below:

Wellington St & Horton St intersection. This intersection has minimal additional right of way for physical improvements. However, the northbound right turn lane could be designated “right turn only except buses” to enable buses to travel through the intersection to the far side bus stop. In the southbound direction, removal of on-street parking could be utilized to provide a bus only lane south of Horton Street. However, this option is not expected to be an acceptable option unless alternate parking is provided nearby for businesses. The provision of off-street parking to enable the curb lane to be used for buses only is a potential long term option that should be investigated.

Wellington St & Grey St intersection. No opportunities have been identified for queue jump lanes/queue jumpers due to limited right of way, except removal of parking on west side of intersection for SB bus lane.

Wellington Rd & Grand Ave intersection. This intersection has a nearside northbound bus bay that could be filled in to improve transit operations through the intersection. No other opportunities for queue jump lanes/queue jumpers have been identified due to the constrained right of way.

Section of Wellington Rd between Grand Ave and Base Line Rd. This section of the corridor is severely constrained by a narrow right of way, adjacent fronting on development and the roadway geometry. Physical road widening options for queue jump lanes/queue jumpers will be difficult and costly to achieve and are
unlikely to be feasible in the short term. The provision of aggressive transit priority signal plans would be possible in the short term and should be considered.

Wellington Rd & Base Line Rd intersection. It is expected that buses will be turning at this intersection (i.e., southbound to eastbound outbound and westbound to northbound inbound). Additional bus only turning lanes might be considered at this intersection but there does not appear to be right of way available at present for the necessary road widening. This may be further investigated as a long term option.

Health Sciences and Parkwood Hospital Complex BRT Route. The plan is to develop the BRT route through these two institutional complexes between Baseline Road and a new intersection with Wellington Road about 400 metres south of Commissioners Road. The details of this route will need to be developed in partnership with the Hospital authorities. The guiding principles should be that the BRT route operates as far as possible on designated bus lanes or even a bus only road (e.g., the connection from Parkwood Hospital to Wellington Road should be a bus only road), that the BRT route have stop(s) close to the main activity areas, that the route be as direct as possible, recognizing the existing hospital facilities and activities and that at intersections the BRT buses has priority over general traffic. One option for the crossing of Commissioners Road would be to widen the north and south leg of the intersection to provide two median bus only lanes for northbound and southbound buses. A schematic illustration of this option is shown in Figure 5.5.

Wellington Road (Baseline Rd – Waterman Ave). Subject to the final BRT route in this area, transit priority measures may be required along Wellington Road, through the Commissioners Road East intersection. These measures could include the use of right turn lanes for through bus movements, similar to the concept illustrated in Figure 5.6.

The BRT route through the Hospital complex is expected to have a new bus only roadway connection from the Parkwood Hospital to Wellington Road with a special traffic control signal at the intersection with Wellington Road. This new connection could be located directly opposite Waterman Avenue or further south where a former driveway is located.

Wellington Rd & Wilkins St intersection. One option to facilitate BRT operations would be to designate the southbound right turn lane as “right turn only except buses” and to provide a new southbound receiving bus only lane through to the existing bus bay. In the northbound direction, there appears to be sufficient right of way to provide a new bus only lane approaching and leaving the intersection if the northbound traffic conditions warrant.

Wellington Rd & Southdale Rd intersection. One option at this intersection would be to designate the northbound right turn only lane as “right turn only except buses” and to modify the island and related curbs on the north east quadrant to enable buses to travel though the intersection into the northbound receiving lane north of Southdale. An option for southbound traffic would be to designate the southbound right turn lane as right turns only except buses and in conjunction with this to modify the islands and related curbing on the north west and south west quadrants to enable buses to travel though the intersection to a southbound bus only receiving lane south of Southdale. This option is illustrated in Figure 5.6.
Figure 5.5: Median Queue jump lanes/queue jumpers at Intersection
Wellington Rd & Montgomery Gate Intersection. The level of traffic congestion at this intersection has not been investigated so the need for queue jump lanes/queue jumpers in the short term is unknown. There appears to be sufficient right of way to provide bus only lanes approaching and leaving the intersection in both the southbound and northbound directions. It is assumed this would not be required during the initial implementation phase.

Wellington Rd & Bradley Ave intersection. For northbound buses, the existing northbound right turn lane could be designated as right turn only except buses with construction of a new northbound receiving lane north of Bradley and modifications to the traffic island on the north east quadrant. For southbound buses, the road could be widened to provide a right turn only except buses lane approaching the intersection and a buses only receiving lane on the southwest quadrant of the intersection utilizing the existing bus bay. A schematic illustration of this concept is shown in Figure 5.7 below.
In summary, the suggested bus priority plan for the short term implementation of the Wellington BRT route should consist of the following:

- Transit priority at traffic signals along the full route (about 12 signalized intersections).
- Transit queue jump lanes/queue jumpers as discussed above at several locations such as:
  - Heath Sciences & Parkwood Hospital connection to Commissioners Road intersection
  - New bus only road connection to Wellington Rd
  - Wellington Rd & Wilkens St intersection
  - Wellington Rd & Southdale Rd intersection
  - Wellington Rd & Bradley Ave intersection

It is anticipated that the cost of these measures would be about $2.0 million to $2.4 million, not including engineering, property and any utility relocation.

5.5 Summary of Preliminary Plan

In reviewing the routes for the developing an initial phase of BRT service, there are a number of
opportunities in each corridor for bus priority as well as constraints that limit the City’s ability to implement short term improvements to accommodate BRT services. An overview of the main opportunities and constraints is provided in Table 5.1 below.

**Table 5.1: Overview of Opportunities & Constraints**

<table>
<thead>
<tr>
<th>BRT Route</th>
<th>Opportunities for Transit Priority</th>
<th>Constraints for Transit Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dundas/Oxford</td>
<td>16 traffic signals where BRT buses may be given priority utilizing special signal plans</td>
<td>CBD – Quebec St section of Dundas St has existing development close to roadway and generally 1 thru lane in each direction</td>
</tr>
<tr>
<td>East</td>
<td>Number of intersections with right turn lanes that may be utilized for queue jumpers</td>
<td>Highbury Ave structure crossing rail line</td>
</tr>
<tr>
<td></td>
<td>Open space on east side of Highbury and south side of Oxford may enable widening for bus lane(s)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Established transit terminal at Fanshawe College is readily accessible for BRT buses.</td>
<td></td>
</tr>
<tr>
<td>Oxford West</td>
<td>11 traffic signals where BRT buses may be given priority utilizing special signal plans</td>
<td>Key intersection of Richmond &amp; Oxford is very constrained by adjacent development</td>
</tr>
<tr>
<td></td>
<td>Oxford St generally has auxiliary lanes and is less constrained by adjacent development west of Platts Lane</td>
<td>Oxford St structures at river crossing and two rail crossings</td>
</tr>
<tr>
<td></td>
<td>Number of intersections with right turn lanes and/or adjacent bus bays that may be utilized for queue jumpers</td>
<td></td>
</tr>
<tr>
<td>Richmond</td>
<td>University of Western Ontario campus is a major transit trip generator</td>
<td>Richmond St between CBD and Oxford is very constrained by adjacent development.</td>
</tr>
<tr>
<td></td>
<td>About 14 traffic signals where BRT buses may be given priority utilizing special signal plans</td>
<td>Key intersections of Richmond &amp; Oxford and Richmond &amp; University are very constrained by adjacent development.</td>
</tr>
<tr>
<td></td>
<td>Richmond St north of Windermere is less constrained along east side</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Established transit terminal at Masonville Mall is readily accessible for BRT buses</td>
<td></td>
</tr>
</tbody>
</table>
Wellington | About 12 traffic signals where BRT buses may be given priority utilizing special signal plans  
Number of right turn lanes and bus bays that may be utilized for queue jump lanes  
Considerable open space along east side of Wellington Rd from Baseline to Southdale  
Established transit terminal at White Oaks Mall is readily accessible for BRT buses

Wellington St between Grand Ave and Baseline Rd is significantly constrained by adjacent development and also has numerous driveways and curvilinear alignment

An overview of the preliminary plan for "pre-BRT" transit service in London is provided in Table 5.2 below. Overall, the plan will provide bus priority to enable an early implementation of bus rapid transit (BRT) plan for the four major routes connecting to downtown London, with a combined length of about 25 kms outside the downtown area. The cost of the suggested transit priority measures is estimated to be approximately $7 to $9 million.

**Table 5.2: Overview of Preliminary Transit Priority Plan**

<table>
<thead>
<tr>
<th>BRT Route</th>
<th>Length outside CBD (km)</th>
<th>Number of Signalized Intersections</th>
<th>Approximate Cost of Initial Implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dundas/Oxford East</td>
<td>6.9</td>
<td>16</td>
<td>$1.5 to $2.0 Million</td>
</tr>
<tr>
<td>Oxford West</td>
<td>5.9</td>
<td>11</td>
<td>$1.5 to $2.0 Million</td>
</tr>
<tr>
<td>Richmond</td>
<td>5.2</td>
<td>14</td>
<td>$1.8 to $2.2 Million</td>
</tr>
<tr>
<td>Wellington</td>
<td>6.6</td>
<td>12</td>
<td>$2.0 to $2.4 Million</td>
</tr>
</tbody>
</table>
6.0 Next Steps

A primary thrust of the London 2030 Transportation Master Plan is the early development of initial rapid transit corridors to accommodate an increased share of peak travel demand and to form a framework to support increased density development within the existing London urban area. The rapid transit corridors are proposed as bus rapid transit (BRT) services operating largely along existing City streets, utilizing transit priority measures to ensure efficient and effective transit service. This approach will have a lower implementation cost and less impact on the existing urban area than the development of completely segregated rapid transit facilities. In turn, this will enable the BRT plan to be implemented within a much shorter time frame and will demonstrate the City’s commitment to the new Transportation Master Plan.

This technical paper provides an overview of transit priority measures that have been successful in many other cities and that are recommended for implementation in London. The two primary measures to achieve transit priority to support the BRT plan are transit priority at signalized intersections and queue jump lanes/queue jumpers arrangements at signalized intersections where the conditions appear favourable to implement measures at reasonable cost and acceptable impacts. The paper reviews the conditions along each route and discusses possible options to implement transit priority measures. However, the investigations to date have been at a relatively high level and at this stage the plan serves primarily to demonstrate the nature of the specific changes that should be considered.

An important next step will be a preliminary design study for each corridor that provides a more detailed investigation of the constraints, geometric improvements, utility relocations, additional property requirements and the impacts on the existing urban area. It is recommended that the preliminary design study should follow the Environmental Assessment process to help identify and assess the wide range of impacts of the plan. The potential for development of an alternate route adjacent to the University of Western Ontario should be investigated in partnership with the University as soon as a high priority component of the plan for the Richmond corridor.

In addition to the required preliminary design study noted above, the City should conduct a detailed investigation into the most appropriate strategy and technologies to provide transit priority at over 50 signalized intersections in the corridors. This investigation should review the experience of the many different jurisdictions in Canada and USA that currently provide transit priority at signals to determine the approach that best suits London’s needs and existing traffic control system.

The development of effective transit priority plans requires the knowledge and experience of different disciplines within the City organization. In particular, it is important that the plans incorporate transit operations, traffic engineering and civil engineering input throughout. An approach that is suggested for London would be the establishment of a “Transit Priority Task Force” to carry out the necessary studies and develop the final plans for the transit priority measures. The task force would require a clear mandate that supports the early implementation of “pre- BRT” plans focused on effective transit priority measures. It is recommended that a first step towards the detailed planning work be the establishment of such a task force.
Appendix A

Notes on BRT Corridors
<table>
<thead>
<tr>
<th>Road</th>
<th>Section Limits</th>
<th>Traffic Control</th>
<th>Lanes</th>
<th>Adjacent ROW</th>
<th>Other Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dundas St</td>
<td>Colborne St – Maitland St</td>
<td>TCS at Colborne</td>
<td>1 WB T/R, 1 WB L, 1 EB at Maitland Wide WB T lane full length</td>
<td>Extra row west section, Min row east section.</td>
<td>Parking along south side full length</td>
</tr>
<tr>
<td>Dundas St</td>
<td>Maitland St – William St</td>
<td>TCS at Maitland</td>
<td>1 WB &amp; 1 EB wide lanes, unmarked &amp; allows turns +/-</td>
<td>No extra row</td>
<td>About 10 m of pvmt, wide sidewalks</td>
</tr>
<tr>
<td>Dundas St</td>
<td>William St – Adelaide St</td>
<td>TCS at William</td>
<td>1 WB &amp; 1 EB wide lanes at William 1 EB T only, 1 EB R, 1 WB T near Adelaide</td>
<td>No extra row</td>
<td>Some parking on north side, FS bus stop near Adelaide</td>
</tr>
<tr>
<td>Dundas St</td>
<td>Adelaide St – Rectory St</td>
<td>TCS at Adelaide &amp; Elizabeth/Lyle</td>
<td>1 WB &amp; 1 EB at Adelaide, No WB left at Adelaide</td>
<td>No extra row</td>
<td>Parking both sides, some s/w bump outs</td>
</tr>
<tr>
<td>Dundas St</td>
<td>Rectory St – Quebec St</td>
<td>TCS at Rectory &amp; Ontario</td>
<td>1 WB &amp; 1 EB west of Rectory, 1 WB &amp; 2 EB Rectory to near Quebec</td>
<td>No extra row</td>
<td>Parking both sides (Rectory – Ontario). Parking north side Ontario - Quebec</td>
</tr>
<tr>
<td>Dundas St</td>
<td>Quebec St – west of Highbury</td>
<td>TCS at Quebec &amp; Egerton</td>
<td>2 WB &amp; 2 EB at Quebec &amp; continues to west of Highbury</td>
<td>No extra row</td>
<td>No parking on street</td>
</tr>
<tr>
<td>Dundas St</td>
<td>Highbury approach</td>
<td>TCS at Highbury</td>
<td>2 WB, 1 EB L, 2 EB T, 1 EB R East side has 2 WB T, 1 WB L, 2 EB R</td>
<td>Min extra row, possible minor widening SE</td>
<td>No parking on street</td>
</tr>
<tr>
<td>Highbury Ave</td>
<td>Dundas approach</td>
<td>TCS</td>
<td>1 SB L, 2 SB T, 1 SB R, 2 NB T</td>
<td>Extra slope row north of intersection</td>
<td>No parking on street</td>
</tr>
<tr>
<td>Highbury Ave</td>
<td>Structure over CP Rail</td>
<td>none</td>
<td>2 SB L, 2 NB L</td>
<td>Extra row for slope each side of structure</td>
<td>narrow sidewalks each side</td>
</tr>
<tr>
<td>Road</td>
<td>Section Limits</td>
<td>Traffic Control</td>
<td>Lanes</td>
<td>Adjacent ROW</td>
<td>Other Notes</td>
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<tr>
<td>Highbury Ave</td>
<td>Intersection for Reg. Mental Heath Centre (RMHC)</td>
<td>TCS at RMHC driveway</td>
<td>1 NB R, 2 NB T, 1 NB L, 2 SB T</td>
<td>Some row behind sidewalks</td>
<td>Industrial on west, Institutional on east</td>
</tr>
<tr>
<td>Highbury Ave</td>
<td>RMHC to Oxford</td>
<td>TCS at Oxford</td>
<td>1 NB R, 2 NB T, 1 NB L, 2 SB T receiving lanes</td>
<td>Extra row on Highbury, both sides for 200 m south of Oxford</td>
<td>Channelized NB Right at Oxford, open space on SE quadrant of intersection. FS bus stop SB on Highbury in bay</td>
</tr>
<tr>
<td>Oxford St</td>
<td>Highbury intersection</td>
<td>TCS</td>
<td>1 WB L, 2 WB T, 1 WB R, 2 EB T receiving lanes</td>
<td>Minimal row outside sidewalks, buildings set well back</td>
<td>High school open space on north side of Oxford for 300 m east of Highbury. FS bus stop EB on Oxford in bay</td>
</tr>
<tr>
<td>Oxford St</td>
<td>E of Highbury to Fanshawe Coll &amp; First St</td>
<td>TCS at First St</td>
<td>2 WB T, 2 EB T, 1 EB L at Fanshawe entrance</td>
<td>1-2 m on each side, buildings set well back</td>
<td>TCS at First for SB only from Fanshawe, NB L &amp; R from First St</td>
</tr>
<tr>
<td>Oxford St</td>
<td>First St to Second St</td>
<td>TCS at Second St</td>
<td>1 EB L, 2 EB T, 1 WB L, 2 WB T at Second St</td>
<td>1-2 m on each side, buildings set well back</td>
<td></td>
</tr>
<tr>
<td>Oxford St</td>
<td>Second St to Clarke St</td>
<td>TCS at Third St &amp; Clarke St</td>
<td>1 EB L, 2 EB T, 1 WB L, 2 WB T at Third St</td>
<td>Extra row along south side of Oxford, buildings well set back</td>
<td></td>
</tr>
<tr>
<td>Oxford St</td>
<td>Clarke intersection</td>
<td>TCS at Clarke</td>
<td>1 EB L, 2 EB T, EB Right cutoff channelized. Same EB, NB &amp; SB</td>
<td>Some extra row along south side</td>
<td>Level rail crossing of both Oxford and of Clarke, close to intersection</td>
</tr>
<tr>
<td>Road</td>
<td>Section Limits</td>
<td>Traffic Control</td>
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<td>Other Notes</td>
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</tr>
<tr>
<td>Oxford St W</td>
<td>Intersection with Richmond</td>
<td>TCS at Richmond, NB Left phase</td>
<td>1 NB L, 2 NB T/R, 2 SB T on Richmond 1 EB R, 2 EB T, 1 EB L + centre median on Oxford</td>
<td>No extra row on Richmond Extra row both sides of Oxford</td>
<td>Bldgs close to street on Richmond, Bldgs set back on Oxford, WB Bus bay on Oxford,</td>
</tr>
<tr>
<td>Oxford St W</td>
<td>Richmond to River</td>
<td>TCS at Talbot</td>
<td>2 EB and 2 WB thru lanes each direction, centre left turn lane to west of Talbot, EB Right at Talbot</td>
<td>Extra row on both sides Talbot to Richmond</td>
<td>4 lanes under rail structure, 4 lanes across river structure</td>
</tr>
<tr>
<td>Oxford St</td>
<td>River to Wharncliffe Rd N</td>
<td>TCS at Wharncliffe</td>
<td>East of Wharncliffe to Grace 2 WB T, 2 EB T, 1 centre left turn, centre median both sides of Wharncliffe</td>
<td>Sections of extra row on north side</td>
<td>5 lane section on Wharncliffe at Oxford (2T, 1L NB &amp; SB)</td>
</tr>
<tr>
<td>Oxford St</td>
<td>Wharncliffe to Woodward Ave/Platts Ln</td>
<td>TCS at Woodward</td>
<td>2 EB T, 1 EB L &amp; 2 WB T, 1WB L at Wharncliffe &amp; Woodward</td>
<td>Minimal extra row both sides,</td>
<td>Narrows to 4 lanes midway between Wharncliffe &amp; Woodward Extra WB receiving lane west of Woodward intersection.</td>
</tr>
<tr>
<td>Oxford St</td>
<td>Woodward to Proudfoot Ln</td>
<td>TCS at Cherry Hill Blvd, TCS at Proudfoot Ln</td>
<td>2 EB T, 2 WB T, 1 centre LT</td>
<td>Some extra row both sides but irregular</td>
<td>Possible extra WB lane approaching Cherry Hill to create thru bus lane</td>
</tr>
<tr>
<td>Oxford St</td>
<td>Proudfoot Ln to Wonderland Rd</td>
<td>TCS at Wonderland</td>
<td>1 EB R, 2 EB T, 1 EB L; 1 WB R, 2 WB T, 1 WB L at Wonderland</td>
<td>Some extra row but irregular</td>
<td>Appears to be row available to widen for receiving lane both EB and WB. Utility pole lines both sides</td>
</tr>
</tbody>
</table>
### Notes on Oxford St West Route (continued)

<table>
<thead>
<tr>
<th>Road</th>
<th>Section Limits</th>
<th>Traffic Control</th>
<th>Lanes</th>
<th>Adjacent ROW</th>
<th>Other Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxford St</td>
<td>Wonderland Rd to Capulet Ln</td>
<td>TCS at Capulet Lane</td>
<td>Between Capulet &amp; Wonderland 1 EB R, 2 EB T, 1 WB R, 2 WB T, centre left turn lane</td>
<td>Min extra row between Wonderland &amp; Capulet</td>
<td>Appears to be row for extra WB receiving lane west of Capulet</td>
</tr>
<tr>
<td>Oxford St</td>
<td>Capulet Ln to Guildwood Blvd</td>
<td>TCS at Guildwood Blvd</td>
<td>2 EB, 2 WB at Rail Overpass, 5 lanes west of rail, 1 WB R at Laurel + 5 lanes</td>
<td>Minimal extra row</td>
<td>Blvd with extra path on north side</td>
</tr>
<tr>
<td>Oxford St</td>
<td>Guildwood Blvd intersection</td>
<td>See above</td>
<td>1 EB R, 2 EB T 1 EB L, 1 WB L, 2 WB T at Guildwood</td>
<td>Minimal extra row</td>
<td>Possible blvd space for new WB receiving lane</td>
</tr>
<tr>
<td>Oxford St</td>
<td>Guildwood Blvd to Guildwood Gate</td>
<td>TCS at Guildwood Gate</td>
<td>1 EB R, 2 EB T, 1 EB L, 1 WB R, 2 WB T, 1 WB L; 5 lanes in mid-section</td>
<td>Minimal extra row</td>
<td>EB bus bay east of intersection could be extended thru lane, possible WB receiving lane but extra path on north side.</td>
</tr>
<tr>
<td>Oxford St</td>
<td>Guildwood Gate to Hyde Park Dr  (HPD)</td>
<td>TCS at Hyde Park Dr</td>
<td>5 lane mid-section; EB at HPD 1 R, 2 T, 1 L; WB at HPD 1 L, 2 T</td>
<td>Extra row north side, some minor row on south side</td>
<td>Oxford narrows to 3 lanes further west, space for extra WB receiving lane west of intersection.</td>
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</table>
# Notes on Richmond Street Route

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<tr>
<th>Road</th>
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<th>Adjacent ROW</th>
<th>Other Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Richmond St</td>
<td>Dufferin Ave</td>
<td>TCS at Dufferin</td>
<td>SB – 1 R, 2 T, 1 L, NB 1 L, 2 T at Dufferin</td>
<td>No extra row</td>
<td>Dufferin is skewed crossing Richmond</td>
</tr>
<tr>
<td>Dufferin to Central Ave</td>
<td>Pedestrian TCS at Angel, TCS at Central</td>
<td>SB 2 T, NB 2 T at Angel SB 1L, 2T, NB 1L, 2 T at Central</td>
<td>Some extra row on east side thru Central, used for streetscaping</td>
<td>Central skewed across Richmond. Possible queue jump lanes/queue jumpers lane NB but impact on streetscape</td>
<td></td>
</tr>
<tr>
<td>Central to Oxford St</td>
<td>TCS at Pall Mall St, Oxford St</td>
<td>NB 2T, SB 1L, 2T at Pall Mall, NB 2T, SB 2T at rail crossing</td>
<td>No extra row</td>
<td>Level rail crossing 200 m south of Oxford. East side parking north of Pall Mall</td>
<td></td>
</tr>
<tr>
<td>Oxford St to Grosvenor St</td>
<td>TCS at Grosvenor</td>
<td>Oxford SB 1R, 2T, 1L, NB 1L, 2T Mid section 2T NB &amp; SB Grosvenor NB 1L, 2T, SB 1L, 2T</td>
<td>Extra row both sides to north of Grosvenor but fronting on residential</td>
<td>Far side bus bays NB and SB at Grosvenor No left turn lanes at St James &amp; Sydenham</td>
<td></td>
</tr>
<tr>
<td>Grosvenor to Huron St</td>
<td>TCS at Cheapside St, Victoria St &amp; Huron St</td>
<td>NB 2T, SB 2T lanes thru full section</td>
<td>Extra row both sides to Huron but fronting on residential</td>
<td>No left turns at Cheapside, Victoria &amp; Huron intersections. Appears to be extra row – consider TWLTL?</td>
<td></td>
</tr>
<tr>
<td>Huron St to Bernard Ave</td>
<td>TCS at University Dr &amp; at Bernard Ave</td>
<td>NB 1L, 2T, SB 2T at University Dr NB 2T, SB 2T at Bernard</td>
<td>Minimal extra row, fronting on residential</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bernard Ave to north side of Thames River</td>
<td></td>
<td>NB 2L, SB 2L</td>
<td>Minimal extra row</td>
<td>NB river crossing has extra wide sidewalk</td>
<td></td>
</tr>
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</table>
**NOTES ON RICHMOND STREET ROUTE (CONTINUED)**

<table>
<thead>
<tr>
<th>Road</th>
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<th>Other Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Richmond St</td>
<td>North side of Thames to Windermere Rd</td>
<td>TCS at Windermere</td>
<td>NB 1L, 2T, 1R; SB 1L, 2T lane</td>
<td>Extra row &amp; blvd space south of Windermere, extra row &amp; blvd space north of Windermere, especially east side</td>
<td>Wide blvd for NB receiving lane</td>
</tr>
<tr>
<td>Richmond St</td>
<td>Windermere Rd to Western Rd</td>
<td>TCS at Western Rd</td>
<td>Mid-section NB 2T, SB 2T, 1 TWLTL At Western, NB 1L, 2T, SB 1L, 2T plus SB Right cut-off</td>
<td>Extra row &amp; blvd both sides, especially east side.</td>
<td>NB right turn lanes at 4 driveways could be continuous bus lane past Western Rd</td>
</tr>
<tr>
<td>Richmond St</td>
<td>Western Rd to Masonville Mall</td>
<td>TCS at Shavian Blvd/Sunnyside Dr, TCS at Hillview Blvd/Mall</td>
<td>NB 1L, 2T, SB 1L, 2T at Sunnyside, NB 1L, 2T, SB 1L, 2T at Hillview TWLTL mid block</td>
<td>Extra row &amp; wide blvd on east side, some extra row &amp; blvd on west side.</td>
<td>Opportunity for NB bus lane at Hillview into terminal</td>
</tr>
<tr>
<td>Road</td>
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<td>Lanes</td>
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<tr>
<td>Wellington St</td>
<td>Horton St intersection</td>
<td>TCS at Horton</td>
<td>4 lanes under rail structure At Horton NB 1L, 2T, 1R; SB 1L, 2T 1R</td>
<td>Minimal extra row</td>
<td>NB far side bus bay; Bathurst St connections only about 45 m north of Horton Possible far side bus only designations?</td>
</tr>
<tr>
<td>Wellington St</td>
<td>Horton to Grey St</td>
<td>TCS at Grey</td>
<td>Centre median from Horton to South; At Grey NB 1L, 2T, SB 2T + parking</td>
<td>Minimal on west side, minor extra room on east side</td>
<td>Grey one way WB Parking along west side in each block</td>
</tr>
<tr>
<td>Wellington St</td>
<td>Grey to River Crossing</td>
<td></td>
<td>NB 2T, SB 2T, centre median &amp; left turn lane at intersections 4L on bridge</td>
<td>Minimal on west side, minor extra room on east side</td>
<td>Parking lane on west side to South St</td>
</tr>
<tr>
<td>Wellington Rd</td>
<td>River Crossing to Rowntree Ave</td>
<td>TCS at Grand Ave, Pedestrian TCS at Emery St</td>
<td>Grand Ave SB 2T, NB 1L, 2T; balance of section has 4L</td>
<td>Minimal row both sides, residential &amp; other development fronting on</td>
<td>Two curves in Wellington; driveways with poor sight distance</td>
</tr>
<tr>
<td>Wellington Rd</td>
<td>Baseline Rd Intersection</td>
<td>TCS at Baseline</td>
<td>Widens from 4L to 7L about 90 m north of Baseline; At Baseline SB 1L, 3T, NB 1L, 3T; channelized NB R</td>
<td>Minor extra row on west side north of Baseline, extra row on east side south of Baseline</td>
<td>SB nearside bus stop with no bay, NB near side bus stop in bay. Could extend NB lane 45m to intersection.</td>
</tr>
<tr>
<td>Road</td>
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<tr>
<td>Baseline Rd</td>
<td>Wellington St to Victoria Hosp Entrance</td>
<td>TCS at Vic Hosp Ent</td>
<td>At Wellington WB 1L, 1T, 1R; EB 1L, 2T; At Vic Hosp EB 1L, 1T, 1R; WB 1L, 2T</td>
<td>Minimal extra row both sides</td>
<td>Vic Hosp Ent 2 L SB, 2 L NB</td>
</tr>
<tr>
<td>Commissioners Rd</td>
<td>Western Counties Rd intersection</td>
<td>TCS at West Co intersection</td>
<td>Comm Rd EB 1L, 2T; WB 1L, 2T; West Co NB 1 L, 1T/R; SB 1 R, 1T/L</td>
<td>Open space on all quadrants</td>
<td>West Co Rd 2 lanes</td>
</tr>
<tr>
<td>Wellington Rd</td>
<td>Commissioners Rd intersection</td>
<td>TCS at Comm. Rd</td>
<td>NB 1L, 3T, 1R; SB 1L, 3T, 1R</td>
<td>Open space along east side north &amp; south</td>
<td>Continuous SB R &amp; NB L north of Wilkins; far side bus bay south of Wilkins</td>
</tr>
<tr>
<td>Wellington Rd</td>
<td>Waterman Ave to Wilkins St</td>
<td>TCS at Wilkins</td>
<td>At Waterman NB 1L, 2T; SB 3T At Wilkins NB 1L, 2T; SB 1 R, 2T</td>
<td>Extra row east &amp; west side</td>
<td>Extra row east side to south of Southdale; extra row west side south of Southdale</td>
</tr>
<tr>
<td>Wellington Rd</td>
<td>Wilkins to Southdale Rd</td>
<td>TCS at Southdale</td>
<td>SB 2L; NB 1L, 2T lanes south of Wilkins; At Southdale SB 1 L, 3T, 1R; NB 1 L, 2T, 1R</td>
<td>Extra row east side to south of Southdale; extra row west side south of Southdale</td>
<td>Widens from 5L to 8L about 180 m north of Southdale; 3 NB receiving lanes north of Southdale.</td>
</tr>
<tr>
<td>Wellington Rd</td>
<td>South of Southdale to north of Bradley Ave</td>
<td>TCS at Montgomery Gate</td>
<td>SB 3L; NB 1 L, 2T; centre median</td>
<td>Extra row both sides</td>
<td>Commercial on west side, backing on residential east side</td>
</tr>
<tr>
<td>Wellington St</td>
<td>Bradley Ave</td>
<td>TCS at Bradley</td>
<td>SB 1L, 2T, 1T/R; NB 1L, 2T, 1R</td>
<td>Extra row both sides</td>
<td>SB far side bus bay</td>
</tr>
<tr>
<td>Wellington St</td>
<td>South of Bradley</td>
<td>TCS for Mall access 390 m south of Bradley</td>
<td>SB 3L; centre TW/L; NB 2 L</td>
<td>Extra row both sides</td>
<td>LTC appears to utilize terminal between 2nd &amp; 3rd driveway</td>
</tr>
</tbody>
</table>
January 13, 2012

AECOM Canada Ltd.
300 - 300 Town Centre Boulevard
Markham, ON L3R 5Z6

ATTN: Dick Gordon, P.Eng., MCIP, RPP

RE: London 2030 Transportation Master Plan
    Transit Priority Strategy for BRT Implementation

Please find below the City and LTC comments on the draft report for Transit Priority Strategy for BRT implementation. Please resubmit the final technical report once finalized. Please let me know if you require further clarification. **WBO edit notes shown in red below.**

**General Comments**

- Please provide an Executive Summary for the document listing the transit priority measures by corridor and their respective costs. This summary with few clear coloured transit priority concepts should be included in the main body of the report, as the case of all other previous and upcoming technical reports. Discussed and agreed this is not required in this report. There will be a summary overview by AECOM in the main body of the report.

- Introduction should state that this is a short-term strategy aimed at building ridership quickly at a lower capital cost with minimal disruption to the road network, before implementing a full-fledged BRT. This clearly should be the starting point from which we build upon. BRT will lead to growth along the corridors to justify stronger transit priority measures. **Text added to Intro.**

- A section or the tables in Appendix “A” should include the existing investment LTC has placed in its AVL/Smart Bus system, and the real-time message signs installed at few bus stops. All buses are already equipped with transmitters, and all traffic signals in the city have receiving devices (Opticom devices). **Section 3.5 added**

- Discussion of Transit Priority at traffic signals in Section 5 should also include research on the compatibility of TSP with other types of signal priority to dispel concerns that it will interfere with any existing signal priority for emergency vehicles. **Text added in section 3.3**

- Another Appendix “B” should be added to include a map and/or a table listing all transit priority opportunities and constraints of each BRT corridor. **New Table 5.1 added**

- It is preferred to use the term “Queue jump lanes/Queue jumpers” throughout the report instead of “Queue bypass lanes”. **Done**

- The report format needs to be revisited. For example, some details in Section 5.1 need to be moved to Section 3. All the text under “Transit Priority at Traffic Signals” in Section 5.1 belongs to Section 3.2. The same applies for the first 3 bullet points under Queue jump lanes; these are details that belong to Section 3.2. I don’t understand this and it doesn’t fit the whole report. The descriptions in Section 3 are generic forms of transit priority while the descriptions in Section 5 are specific to each corridor. Some text has been added to Section 3 to note that applications to the London corridors are discussed in Section 5.

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Please explore/add other measures/examples of transit priority measures to Section 3. For example, off-coach payment systems (vending machines at the bus stops/terminals) to reduce dwell times. Also, the potential of adding express runs in the peak direction of the peak periods between major origins and destinations. Text added in section 3.0

**Detailed Comments**

**Cover:**
- Replace the bus/bike picture with a Queue Jump Lane picture. Done

**Page 6**
- Add a figure similar to Figure 3.3 concept, but for an extra far side receiving lane for buses only. Text added to note examples in Section 5.
- Add a figure for a stop bar "for general traffic" back from the intersection. Figure 3.3B added
- Figure 3.4 illustrates the “Bus Only Left Turn” at Tee intersections; how about full (4-legged) intersections? Text added to note this possibility.

**Page 10**
- For Highbury Ave, should mention the London Psychiatric Hospital lands along Highbury and Oxford. These lands will be developed to "Multi-family, High Density Residential", "Multi-family, Medium Density Residential", and "Office/ Residential". Text added

**Page 12/13**
- For Figures 4.4, please show a solid yellow line along the Wellington St corridor and a dotted line through the hospital complex as shown in Figure 4.3 for consistency. The dotted routes represent potential options that should be further investigated in more detail. Figure modified
- There is no immediate plan to detour the Wellington Rd BRT route through the Parkwood Hospital complex. This was communicated via a letter in response to a 2009 Site Plan application on the Parkwood hospital property. Among the reasons cited include potential operating conflicts with other roadway users and the varying travel times and demands of patients, visitors and staff would not support the BRT. The diversion of the BRT route onto hospital property would also represent a significant increase in walking distance from the nearby residential target market, including the higher density residential areas located west of Wellington Rd and would be within 1km of the BRT stop at Wellington Rd and Commissioners. Text modified to note this point.
- A statement should be provided in the report that further detailed study will be needed to confirm the feasibility of rerouting the Richmond and Wellington BRT corridors through UWO and Hospital complexes. Text modified to note this point.

**Page 15/16**
- Please provide a concept and clear recommendations for the intersection of Dundas St & Colborne St and between Adelaide and Quebec intersections. If Queue jump lanes are not possible, any other transit priority measure should be identified. Text modified to note that if widenings are not feasible in the short term, more aggressive transit priority at signals should be considered.

**Page 17**
- Please provide a concept plan (figure) and clear recommendations for the Highbury Ave and Regional Mental Health Centre intersection. New Figure 5.3B added.

**Page 18**
- Please provide a concept plan (figure) and clear recommendations for the Highbury Ave and Oxford St intersection. New figure 5.3C added

**Page 19**
- Sec 5.2; 1st paragraph: the centre left turn lane on Oxford St starts only west of Platt’s Lane, so it is not exactly through most of the corridor as noted. Text updated.

**Page 25**
- Please provide justification for not seeing the need for a queue jump lane at the Richmond/Shavian/Sunnyside intersection! Text modified.
- What is the ”special transit priority plan” stated in the 1st bullet point on this page? Text modified.
What are the alternate routes for Wellington Rd between Grand Ave and Baseline Rd? The BRT corridors should be confirmed as part of this study and/or alternatives should be identified! The statement on the bottom of the page suggests that it is costly and difficult to develop RT along this section of the corridor even in the long term, so what are the options? Text modified.

Transit priority measures for Wellington Rd from Baseline Rd to Waterman Ave need to be evaluated. Also, it should be noted that the main access to Parkwood Hospital will be from the Waterman intersection, which will be signalized. Text with suggested measures added.

Next Steps: recommends “that the preliminary design study should follow the Municipal Engineers Association Class Environmental Assessment process” what about the transit exemptions under EA reg. 231/08? The consulting team should address what components of the EA requirements will be covered by the completion of the TMP. It is expected that the main report will note the various EA requirements.

Yours truly,

Maged Elmadhoon, M. Eng., P. Eng.
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Cc.  John Ford, Director of Transportation and Planning; LTC
     Shahna McNally, Senior Transit Planner; LTC
     John Lucas, Manager, Transportation Planning and Design; City of London