MEMO

TO: Jennie Dann, City of London

FROM: Andrew Shea, WSP Canada Group Ltd

SUBJECT: **North Leg Options**

DATE: **March 20, 2020, revised May 19, 2020**

The purpose of this memorandum is to present the high-level planning analysis and resulting recommendations for higher order transit along London's North Leg.

BACKGROUND

Options to optimize transit in the North Leg were developed and assessed in response to a motion from the December 12, 2019 meeting of the Strategic Priorities and Policy Committee (SPPC)1:

That the following actions be take with respect to the transit routes along Richmond Street and Western Road between the Masonville Transit Hub, Western University, and Downtown:

a) the Civic Administration BE DIRECTED to work with London Transit Commission to identify:

i. enhancements to roadway geometry, including, but not limited to, intersection design;

ii. traffic controls, including signal design and operations;

iii. transit routing and stop locations; and

iv. other potential short and long term improvements to enhance transit service and connectivity along these corridors; and,

b) the Civic Administration BE DIRECTED to report back to a future meeting of the Strategic Priorities and Policy Committee, in advance of the next project intake opportunity for the Public Transit Infrastructure Funding – Transit Stream Program, with the results of the review set out in a) above. (4.1/2/SPPC) (2019-T03)

In 2019, the Transit Project Assessment Process (TPAP) was completed for the Rapid Transit network, including the Downtown Loop and the North, South, East and West legs. The Environmental Project Report (2019) was completed as part of the TPAP to document the Environmental Assessment, following Ontario Regulation 231/08. The Environmental Project Report identifies the potential impacts of the preliminary design and proposed mitigation measures. The approved design for the North Leg has been included in the options assessed as part of this analysis.

610 Chartwell Road
Suite 300
Oakville, ON, Canada L6J 4A5

T: +1 905-823-8500
F: +1 905-823-8503
wsp.com

LONDON RAPID TRANSIT – NORTH LEG

The North Leg, as defined in the Environmental Project Report, begins in the intersection of Queens Avenue and Clarence Street, continuing north along Clarence Street and Richmond Street to University Drive, through Western University via University Drive/Lambton Drive, and northerly on Western Road/Richmond Street to the existing bus terminal at Masonville Place (**Exhibit 1**).

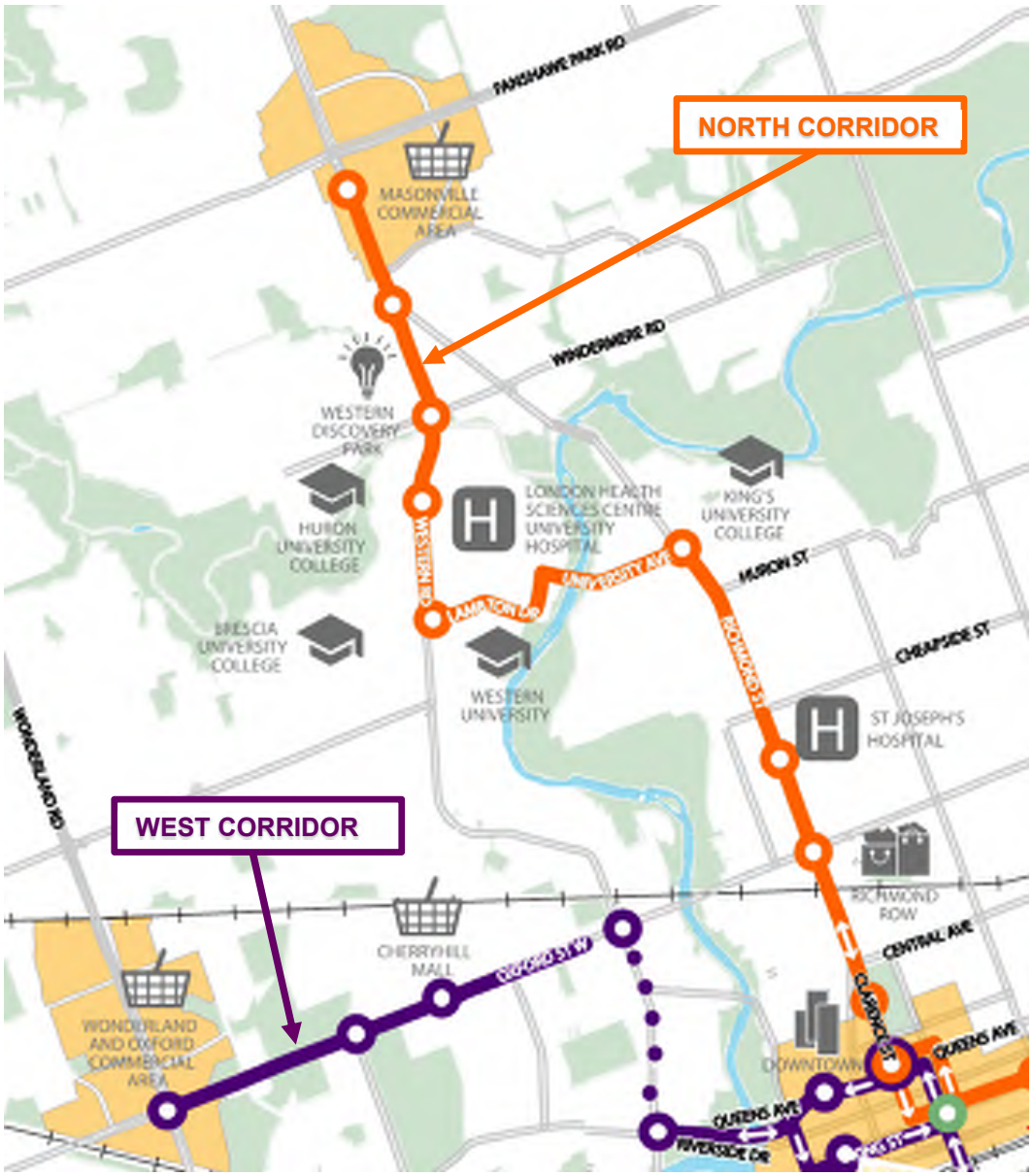


Exhibit 1: North Leg Key Plan

As documented in the Rapid Transit Master Plan (2017), to serve projected ridership in the North Leg of London's Rapid Tranist (RT) network, a bus is required every 5 minutes in each direction is proposed during peak periods, with 10-minute service in off-peak periods.

Projected peak hour ridership for the North Corridor in 2034 is provided in **Exhibit 2**.

As documented in the Environmental Project Report, the Rapid Transit network is planned to operate seven days a week, from 6 a.m. to midnight (12 a.m.). Articulated buses (buses comprising two sections, linked by a pivoting accordion-like join) can carry 70 passengers comfortably, and up to 110 passengers. The resulting capacity of the proposed Rapid Transit service is provided in **Exhibit 2**.

Exhibit 2: Projected peak passengers per hour in the peak direction passenger load (2034) (source: Rapid Transit Master Plan, Exhibit 3.23)

	North	East	South	West
Peak Rapid Transit Ridership in the Peak Direction during the Peak Hour	1450	1350	650	600
Rapid Transit Peak Hour Capacity	840 to 1320	840 to 1320	420 to 660	420 to 660

ALTERNATIVE ROUTES AND DESIGNS

North London is served by two primary transit corridors connecting Downtown London to Masonville Place:

- Richmond Street
- Wharncliffe Road / Western Road

As the city grows, there will continue to be transit needs along both corridors.

Three options were identified to review alternative transit priority measures along these combined corridors, as illustrated in **Exhibit 3**.

Several design options were considered and assessed for each of these routes. These alternatives include:

1. **Option 1 - Intersection improvements along both Richmond Street and Western Road/Wharncliffe Road**: Implement shared right-turn/ queue-jump lanes at selected intersections in both Richmond and Western/Wharncliffe corridors, with supplementary intersection improvements (auxiliary turn lanes) at selected intersections in the Richmond Road corridor.
2. **Option 2 - Higher Order Transit along Western Road paired with intersection improvements along Richmond Street**: The implementation of a centre-running Western/Wharncliffe Rapid Transit (RT) facility, with localized intersection and transit priority measures (i.e. queue-jump lanes) at selected signalized intersections in the Richmond Street corridor.
    a. Option 2a: existing conditions (i.e. buses operating in mixed traffic) on Wharcliffe Road south of Platt's Lane
    b. Option 2b: convert two centre general traffic lanes (GPLs) on Wharncliffe Road south of Platt's Lane to two centre-running bus lanes, and maintain two general traffic lanes; and
    c. Option 2c: widen to add two centre-running bus lanes and maintain four general traffic lanes south of Platt's Lane.
3. **Option 3 - Higher Order Transit along Richmond Street paired with intersection improvements along Western Road**: Richmond Corridor RT (per the approved TPAP) with

new localized transit priority measures (i.e. bus-only queue-jump lanes) at selected intersections in the Western/Wharncliffe corridor.

These routes were also considered in the Rapid Transit Master Plan stage.

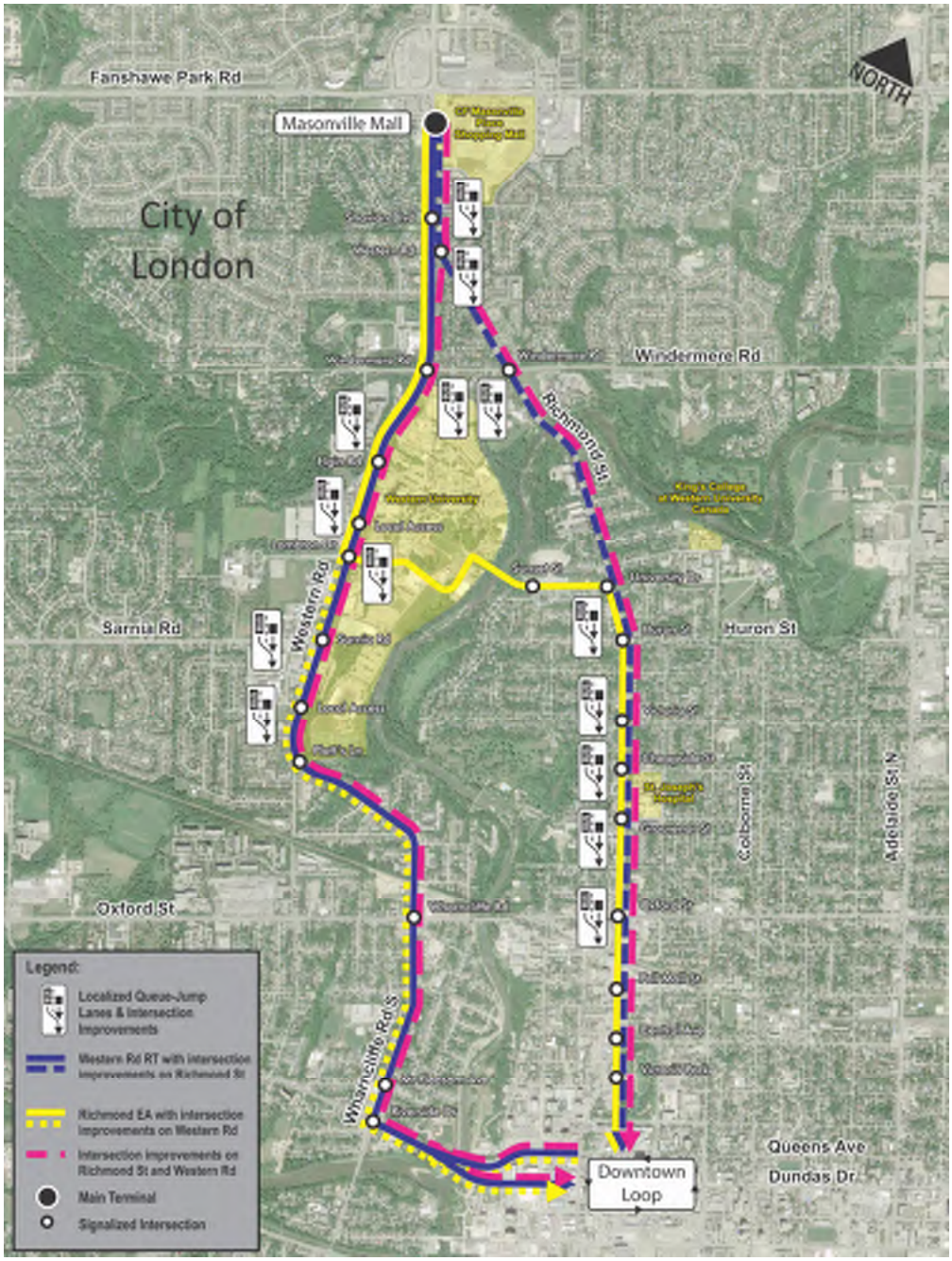


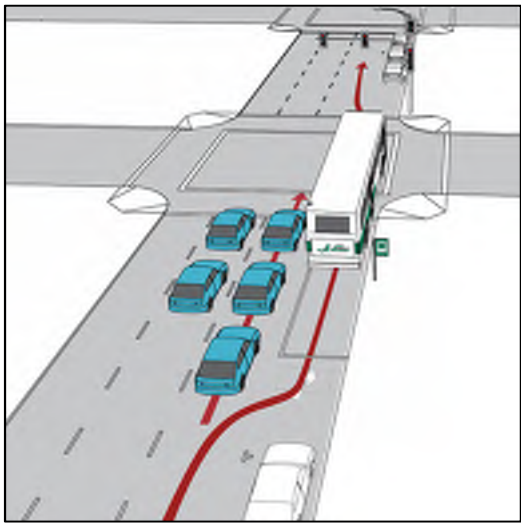
Exhibit 3: Key Map of North Corridor Options

DESCRIPTION OF THE ALTERNATIVE DESIGN CONCEPTS

The following section provides a description of the design options. Conceptual corridor plans for each alternative are provided in **Appendix A**.

OPTION 1: INTERSECTION IMPROVEMENTS ALONG BOTH RICHMOND STREET AND WESTERN ROAD/WHARNCLIFFE ROAD

As an alternative to developing full, rapid transit – that is, buses running primarily on transit-only lanes, a concept was developed that would provide transit priority at selected intersections where general traffic queue-lengths would otherwise impede the movement of buses. This concept is illustrated below in **Exhibit 4**. In this concept, minor roadway widening would provide an additional curb lane for transit use to bypass the queues of general traffic.



https://www.calgary.ca/citycouncil/ward-10/Pages/Latest-news-detail.aspx?SidebarListCategory=0&ArticleID=48

Exhibit 4: Queue-Jump Lane (Typical)

Further, during the Transit Project Assessment Process for the London RT, it was concluded that the existing capacity on the Richmond Road corridor between Central Avenue and Huron Street is severely constrained due to the lack of auxiliary (turning) lanes at critical intersections. Given the lack of such facilities, turning vehicles must wait in the existing through traffic lanes while awaiting a gap in oncoming traffic (for left-turning vehicles) or in pedestrian crossings (for right-turning vehicles). This results in localized blockages and delays to queued through-moving vehicles. As such, opportunities to address such delays at signalized intersections were incorporated into the design concept for Option 1. The assessment assumed that a general roadway widening was not acceptable, per the direction received during the TPAP phase of the project.

OPTION 2: HIGHER ORDER TRANSIT ALONG WESTERN ROAD PAIRED WITH INTERSECTION IMPROVEMENTS ALONG RICHMOND STREET

This option features centre-running bus-only lanes connecting Downtown to Masonville Place in the north but travelling on Wharncliffe Road / Western Road corridor, with two centre-running, transit-only lanes, separated by a physical median to prohibit left-turn movements across the transit lanes. The general concept is illustrated in **Exhibit 5**.

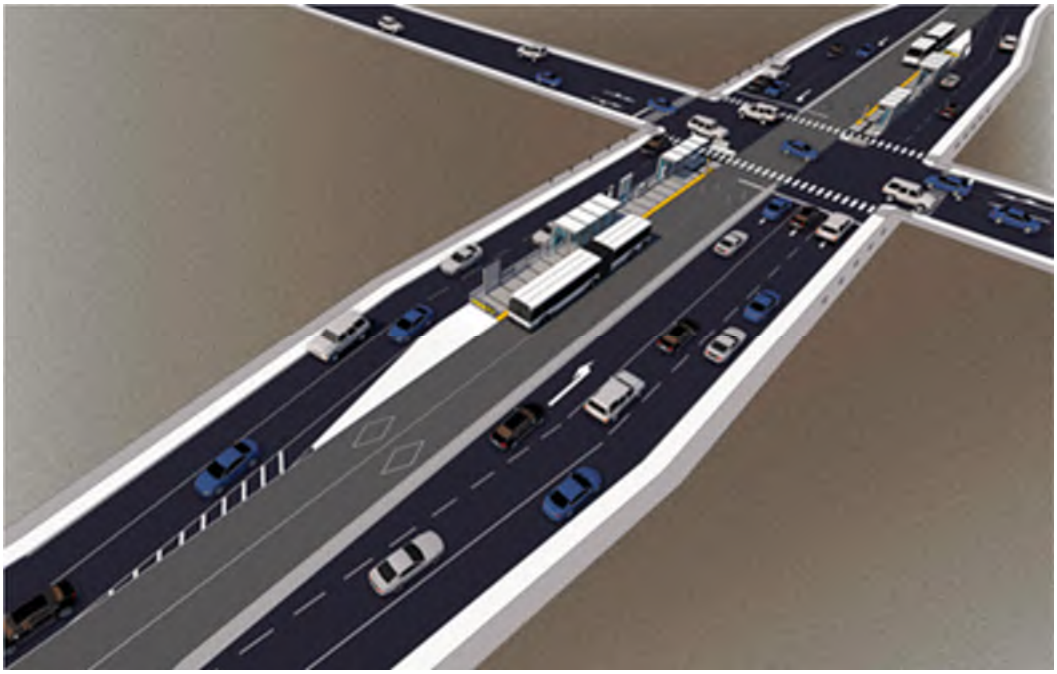


Exhibit 5: Centre-Running RT Facility (Typical)

The portion of Option 2 on Western Road north of Lambton Drive is consistent with the designs put forward in the Environmental Project Report. However, there is a divergence from the Environmental Project Report design in the portion that is south of Lambton Drive, as buses would continue on Western Road / Wharncliffe Road North, to Riverside Drive, rather than traveling through campus and continuing onto Richmond Street.

This change to the corridor route would mean that the portion of Wharncliffe Road south of Oxford Street (between Oxford Street and Riverside Drive) would be required to accommodate buses for both the West and North Rapid Transit corridors, resulting in additional pressure to provide transit priority measures in this section of Wharncliffe Road (the Environmental Project Report currently proposes a mixed traffic design for this section, which would not be sufficient in an Option 2 scenario). With the higher order transit demand of both the West and North RT corridors, this section of Wharncliffe Road would become the busiest section of the city's rapid transit network outside of the downtown core, accommodating the 10-minute frequency of rapid transit services for the west corridor and the 5-minute frequency of rapid transit services for the north corridor. Additionally, conventional transit services in the corridor would continue to operate in an all-stops fashion in the Western Road / Wharncliffe Road corridor, serving typical curbside bus stops.

Due to the interrelationship between Option 2 and the west corridor, the design of Wharncliffe Road North/Western Road immediately north of Oxford Street for Option 2 depends on the preferred design concept for the west corridor in the portion south of Oxford Street. To address this interdependency, the following three "sub-options" were considered and assessed:

Option 2a: Existing Conditions (i.e. buses operating in mixed traffic) south of Platt's Lane: This Sub-Option would see all buses (RT and conventional) operating in mixed traffic immediately north of Oxford Street to Platt's Lane, where they would enter/exit a centre-running sub-only facility. This configuration recognizes and protects the City's recent investment in widening

Western Road. This typical cross-section is illustrated below in **Exhibit 6**. Recognizing that the initial recommendation for the West RT Corridor was to not introduce any RT infrastructure in the Wharncliffe Road corridor, by not introducing any RT infrastructure between Oxford Street and Platt's Lane, this Sub-Option would be directly compatible with the recommended Option for the West RT Corridor.

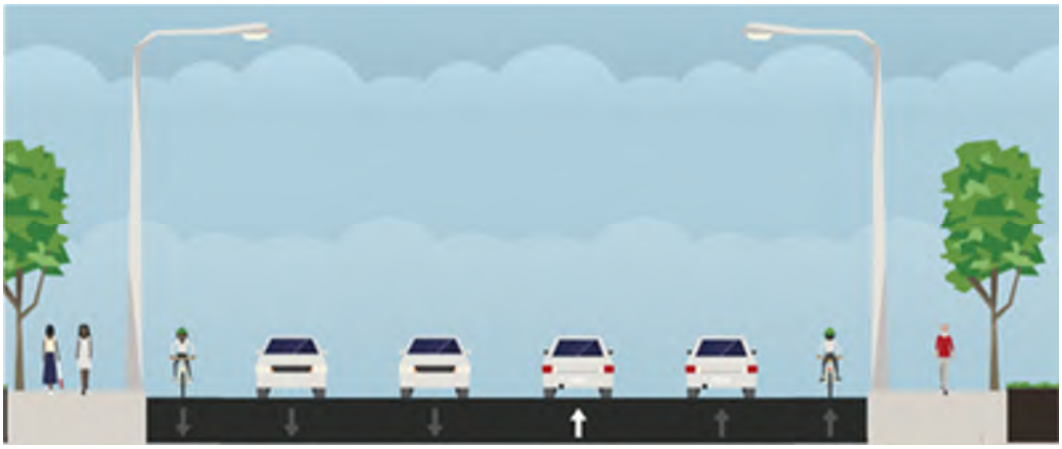


Exhibit 6: Option 2a – Typical Cross-Section, between Oxofrd and Platt's Lane

O**ption 2b: two general traffic lanes south of Platt's Lane with two centre-running bus lanes**: This Option would see RT bus services operating in centre-running dedicated bus lanes north of Oxford Street. The existing roadway width would be largely maintained, as the two centre lanes would be converted to bus-only use, and median installed. Localized widening would be required at intersections and station areas. This would be consistent with the approach to the Richmond Corridor under the TPAP-approved concept, but applied to the Wharncliffe Road corridor between Oxford Street and Platt's Lane. This Option is illustrated below in **Exhibit 7**.

Exhibit 7: Option 2b - Typical Cross-Section, between Oxford and Platt's Lane

Option 2c: four general traffic lanes south of Platt's Lane with two centre-running bus lanes: This Sub-Option would see bus services operating in centre-running dedicated bus lanes north of Oxford Street. The roadway would be widened to maintain two lanes of general traffic capacity (as recently implemented). This Option is illustrated in **Exhibit 8**.

Exhibit 8: Option 2c - Typical Cross-Section, between Oxford and Platt's Lane

This Sub-Option was developed to address the concern of compromising on the general traffic capacity of the roadway under Option 2a. However, this Sub-Option was screened out of further consideration on the basis of the following:

- This Option would introduce significant property impacts and building removals;
- In order to accommodate the widening, relocation of new hydro and aerial utility infrastructure would be required
- The widening of the roadway would also require widening of recently-reconstructed rail crossing north of Oxford Street.

OPTION 3: HIGHER ORDER TRANSIT ALONG RICHMOND STREET PAIRED WITH INTERSECTION IMPROVEMENTS ALONG WESTERN ROAD

Option 3 is consistent with the design concept assessed under the Transit Project Assessment Process and documented in the London RT Network Environmental Project Report. The north leg of London's RT network generally comprises four main segments:

1. Downtown (Queens Avenue) to Central Avenue;
2. Richmond Row / Richmond North: Central Avenue to University Drive
3. Western University Campus
4. Western Road / Richmond Street: Lambton Drive to Masonville Place

The RT design for each segment was considered independently of the others, in order to ensure that the approach chosen reflected the specific challenges and opportunities specific to each corridor. The following is a summary of the design concept for each segment, as presented in the approved Environmental Project Report:

1. Downtown (Queens Avenue) to Central Avenue: Buses would operate in centre-running dedicated bus lanes on Clarence Street between Queens Avenue and Dufferin Avenue, with a centre median stop (southbound only) at Queens Avenue. North of Dufferin Avenue, buses would continue in dedicated lanes along Clarence Street to Central Avenue, however, no northbound general traffic lane would be provided. A centre median stop would be provided at Central Avenue.
2. Richmond North: Central Avenue to University Drive: For this segment, two of the existing four general purpose traffic lanes would be converted to bus-only use. The resulting

roadway configuration would be comprised of two centre-running transit lanes, and two general traffic lanes adjacent to the curb. To mitigate the impacts to general traffic, new auxiliary turn lanes would be provided at signalized intersections. Centre median RT stops would be provided at Oxford Street, Grosvenor Street, and Victoria Street.

3. Western University Campus: Throughout the Western University Campus, University Drive and Lambton Drive would be converted from general traffic use to bus-only use. Transit stops would be provided on University Drive at Richmond Street, and on Lambton Drive at University Drive.

4. Western Road / Richmond Street: Lambton Drive to Masonville Place: Western Road and Richmond Street would be widened to accommodate two centre-running transit-only lanes, with centre median RT stops at Lambton Drive, Elgin Road, University Hospital, Richmond Street, and terminating at the Masonville Transit Terminal. The Richmond Street / Western Road intersection would be reconfigured to better accommodate traffic movements from Richmond Street to Western Road, encouraging general traffic to move onto Western Road and reducing general traffic demand on Richmond Street.

EVALUATION CRITERIA

In total, 12 criteria were used to evaluate the options for the North Leg.

1 Benefit to Transit Operations
2 Increase in Ridership
3 Benefit to Traffic Operations
4 Least Property Impacts
5 Least Cultural Heritage Impacts
6 Least Impact on Trees
7 Least Impact on Utilities
8 Least Impact on Driveways and Access
9 Redevelopment Potential
10 Capital Costs
11 Most Consistency with City's Policy Objectives
12 Least Environmental Assessment Implications

The following sections discuss the relative performance of the Options against each of the evaluation criteria identified above.

BENEFIT TO TRANSIT OPERATIONS

Options 2 and 3 propose dedicated transit lanes, separating buses from general traffic and congestion, therefore improving transit reliability and accommodating a higher service frequency. In Option 1, buses run in mixed traffic. Provision of dedicated transit lanes under Options 2 and 3 best segregate transit services from the influence of potential conflicts with general traffic, resulting in higher operating speeds, and overall predictability and reliability, and is therefore preferred over Option 1. Option 3 is anticipated to offer a better transit operation than that of Option 2 in that Option 2 would focus all of the buses from both the North and West RT corridors on the intersection of Oxford Street West and Wharncliffe Road; one of the busiest intersections in the network, and Wharncliffe Road and Riverside Drive. Both intersections experience congestion. In Option 1, intersection improvements provide transit priority at Riverside Drive and Oxford Street West, which would provide some improvement to transit reliability, but less so than Options 2 or 3.

INCREASE IN RIDERSHIP INCREASE, REDEVELOPMENT POTENTIAL

Land Use / Density

Land use, in terms of residents and jobs per hectare, is an important consideration when planning transit service. The density of residents and jobs provide an indication of ridership potential near transit. MTO's Transit Supportive Guidelines[1] suggest minimum density thresholds for areas within a 5 to 10 minute walk of transit for different types of transit service, specifically:

- 50 residents and jobs per hectare for basic transit service (a bus every 30 minutes or better); and
- 80 residents and jobs per hectare for frequent transit service (a bus every 15 minutes or better).

In 2011, segments of both corridors contained densities of up to 100 residents and jobs per hectare, however, the Richmond Corridor (i.e. Option 3) contains more areas of substantial density than that of the Western / Wharncliffe Corridor. The common area of Western Road, north of Lambton Drive, is a notable area of density. That is, however, the only segment of Option 2 where such density exists. The Richmond Corridor exhibits substantial densities in the 50-100 residents and jobs per hectare between Downtown and Grosvenor Street.

Further, per the Rapid Transit Master Plan, the Richmond / Western corridor currently exhibits the highest population and employment within 500m of the route (considered the catchment area for transit services), when compared against the Western corridor. Potential for future development is comparable to that of the Western corridor, resulting in a larger total population and employment figure of approximately **62,650** by 2034. Conversely, the Western corridor currently exhibits slightly less population and employment within 500m of the route, when compared against the Richmond corridor. Potential for future development, however, is comparable to that of the Richmond corridor, resulting in a total population and employment figure of approximately **48,750** by 2034.

The infrastructure investment proposed in Options 2 and 3 are appropriate given the future expected land use and associated ridership generated. Fixed-route rapid transit facilities have been proved to attract development and redevelopment, which will support the City's intensification objectives and encourage ridership growth. Option 1 provides only minor improvements to transit services in both corridors, but is not anticipated to attract a significant uptake in ridership or development.

[1] MTO's Transit Supportive Guidelines (2012)
http://www.mto.gov.on.ca/english/transit/supportive-guideline/index.shtml

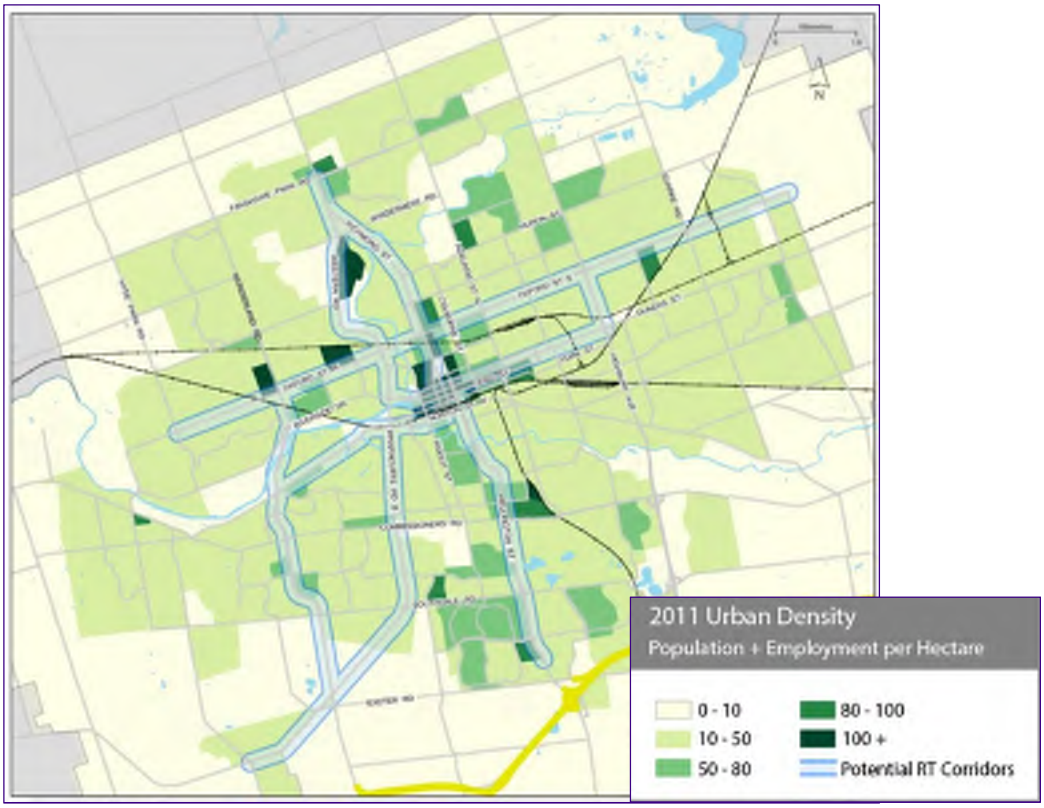


Exhibit 9: London's Rapid Transit Master Plan (2017), Exhibit 2-6

Key Destinations

Option 3 connects more major destinations with rapid transit service than Option 2. The following table summarizes the key destinations served by each.

Exhibit 10: Key Destinations

Option 2: Western / Wharncliffe Corridor	Option 3: Richmond Corridor
Downtown London	Downtown London
TD Stadium	Richmond Row
	St. Joseph's Hospital
	King's College
Western University (periphery only)	Western University (three locations within campus)
Ivey School of Business	Ivey School of Business
Brescia College	Brescia College
Huron University	Huron University
University Hospital	University Hospital
Masonville Transit Village	Masonville Transit Village

BENEFIT TO TRAFFIC OPERATIONS

Options 1 and 2a generally maintain the existing general traffic capacity in the Western / Wharncliffe corridors. In the Richmond Corridor, Options 1 and 3 offers potential to improve on

existing general traffic operations through the introduction of auxiliary turning lanes at signalized intersections in the Richmond Street corridor between Oxford Street and University Drive. Option 2b and 3, however, both require conversion of a general traffic lane to bus-only use in both directions for segments of their route.

The median barriers proposed under Options 2 and 3 will impact the ability of general traffic to turn left at unsignalized accesses and intersections throughout their route. This is expected to result in an overall safer roadway operation in that left-turn movements will only occur at controlled (singalized) intersections on dedicated left-turn signal phases, thereby eliminating potential conflicts, but will impact the route that drivers need to take to reach certain destinations.

LEAST PROPERTY IMPACTS (GENERAL AND CULTURAL HERITAGE)

Options 1 is anticipated to have the fewest property impacts. Option 1 requires the least amount of widening, with impacts focused around signalized intersections. Options 2 and 3 both require widening of the corridor for significant segments, and the introduction of centre-island passenger platforms results in further widening requirements. The following table summarizes the estimated property impacts associated with each alternative. Overall, Option 2b requires the greatest amount of property and impacts the most adjacent buildings, requiring full acquisition of an estimated 14 general properties and 23 heritage properties.

Exhibit 11: Summary of Estimated Property Impacts

	General Property Impacts		Cultural Heritage Property Impacts	
Option	**Partially-Impacted**	**Fully-Impacted**	**Partially-Impacted**	**Fully-Impacted**
Option 1	65	1	24	0
Option 2a	97	9	29	3
Option 2b	125	45	29	23
Option 3	93	9	30	7

LEAST TREES AND UTILITIES

Option 1 requires relatively little widening compared to the alternatives, therefore there are few impacts to trees or utilities under that Option. Impacts are generally limited to trees and utilities at signalized intersections. Options 2 and 3 both require widening throughout much of their routes, resulting in impacts to substantial sections of aerial and subsurface utility infrastructure.

Exhibit 12: Tree and Utility Impacts

Option	Trees	Utilities
Option 1	185	Minor localized impacts to surface utilities and municipal services at queue-jump lane locations in the Richmond corridor and Western / Wharncliffe corridors.

Option 2a	478	It is anticipated that this option will result in the significant impacts to utilities and municipal services throughout the corridor, and only marginally-less than those of the worst performing Option (2b).
Option 2b	508	It is anticipated that this option will result in the greatest impact to utilities and municipal services throughout the corridor.
Option 3	446	It is anticipated that this option will result in significant impact to utilities and municipal services throughout the corridor, and only marginally-less than those of the worst performing Option (2b).

LEAST IMPACT ON DRIVEWAYS AND ACCESS

None of the Options result in significant impacts to driveways. Access to properties fronting on to the Western Road corridor under Option 2, or the Richmond Street corridor under Option 3, would be largely restricted to right-in/right-out operations under the RT concepts due to the implementation of a median barrier.

CAPITAL COSTS

Order of magnitude capital cost estimates were prepared for all alternatives, based on per-metre cost estimates for each typical roadway cross-section, derived from the London RT Network overall cost estimate as prepared in the TPAP/Preliminary Design study. These costs include infrastructure costs and associated contingencies and add-on allowances, utility relocation costs, allowance for property acquisition, and additional bus fleet requirement costs.

Options 2 and 3 would be the most expensive to construct, maintain traffic capacity, and provide the greatest benefit to transit reliability. In Option 1, the capital investment in road infrastructure needed to realize benefit for transit is substantial, and provides less reliability for transit operations than Options 2 and 3. Option 1 also has the potential to result in throw-away costs if dedicated transit lanes are implemented in the future in either the Richmond or Wharncliffe / Western corridors.

The following table summarizes the order-of-magnitude capital cost ranges for each of the Options, calculated on a parametric basis, based on the high-level design concepts presented in **Appendix A**.

610 Chartwell Road
Suite 300
Oakville, ON, Canada L6J 4A5

T: +1 905-823-8500
F: +1 905-823-8503
wsp.com

Exhibit 13: Order-of-Magnitude Capital Cost Estimates

Option	Description	Order-Of-Magnitude Capital Cost
Option1	Intersection improvements along both Richmond Street and Western Road/Wharncliffe Road	$15-$20M (est)
Option 2a	Higher Order Transit along Western Road paired with intersection improvements along Richmond Street, existing conditions (i.e. buses operating in mixed traffic) on Wharcliffe Road south of Platt's Lane	$95-$120M (est)
Option 2b	Higher Order Transit along Western Road paired with intersection improvements along Richmond Street, convert two centre general traffic lanes on Wharncliffe Road south of Platt's Lane to two centre-running bus lanes, and maintain two general traffic lanes	$120-$150M (est)
Option 3	Higher Order Transit along Richmond Street paired with intersection improvements along Western Road	$150-$155M (est)

MOST CONSISTENCY WITH CITY'S POLICY OBJECTIVES

The London Plan designates the majority of the original North RT Corridor outlined in the Environmental Project Report (i.e. Option 3) as a Rapid Transit Corridor, with small portions also designated as Transit Village and Institutional. The Rapid Transit Corridor and Transit Village designations are to be the focus of transit and infrastructure investment and encourage intensification to achieve an urban, vibrant corridor that is supportive of transit. Policy 60.3 of the London Plan states that one of its goals is to "establish a high-quality rapid transit system in London and strategically use it to create an incentive for development along rapid transit corridors and at transit villages and stations".

Options 2 and 3 are most consistent with the City's policy objectives. Both options include the implementation of dedicated rapid transit infrastructure, which has been proven to spur development and intensification in other municipalities in Ontario. Option 1 only proposes dedicated transit queue-jump lanes at intersections. It is unlikely that the redevelopment and intensification envisioned by the London Plan will be achieved without the implementation of dedicated rapid transit infrastructure along the corridor.

LEAST ENVIRONMENTAL ASSESSMENT IMPLICATIONS

Options 1 and 3 do not likely have any Environmental Assessment implications. Options 1 and 3 do not have any Environmental Assessment implications. Option 1 proposes constructing localized intersection improvements; undertakings are pre-approved under the Municipal Class Environmental Assessment. Option 3 has already received approval under Ontario Regulation 231/08 after having completed a Transit Project Assessment Process.

Option 2, however, would require an Addendum to the approved Environmental Project Report for the London RT network. While part of this route was addressed previously, the majority of this route is outside of the original EPR study area. Implementing dedicated transit lanes on Wharncliffe / Western Roads, south of Lambton Drive, would require a number of specialist studies to evaluate the impacts of the widening, including, but not limited to:

- Traffic
- Natural environment
- Stormwater
- Structural
- Archaeology
- Cultural heritage
- Utilities

It is anticipated that an addendum to the Environmental Project Report would take, at minimum, one year to complete. Timing is dependent on when the various studies take place, noting that some studies can only be completed at certain times of year. For example, the natural environment study

610 Chartwell Road
Suite 300
Oakville, ON, Canada L6J 4A5

T: +1 905-823-8500
F: +1 905-823-8503
wsp.com

would have to be completed over a number of months to document existing conditions at different times of the year.

COMPARATIVE ASSESSMENT OF ALTERNATIVES

The following table summarizes the comparative assessment of options. It should be noted that the ratings provided under each category represent their relative performance within a given criteria, but the table does not reflect the relative weight of the assessment criteria against other criteria. For example, given the objective of the project is to improve transit operations, the performance of a design option under the "Transit Operations" criteria may warrant a heavier consideration than that of, say "Utility Impacts". The ratings provided, therefore, should not be simply added to identify a best-performing option, but are intended to guide a discussion on the most appropriate solution to address the need for transit improvements for the City of London.

Exhibit 14: Comparative Assessment of Alternatives

Indicators	Option 1: Intersection improvements along both Richmond Street and Western Road/Wharncliffe Road		Option 2a: Higher Order Transit along Western Road (mixed traffic between Oxford and Platts) paired with intersection improvements along Richmond Street		Option 2b: Higher Order Transit along Western Road (2 General Purpose Lanes between Oxford and Platts) paired with intersection improvements along Richmond Street		Option 3: Higher Order Transit along Richmond Street paired with intersection improvements along Western Road		Least Preferred to Most Preferred ○ ◔ ◑ ◕ ●
	Richmond Street	**Wharncliffe Road / Western Road**	**Richmond Street**	**Wharncliffe Road / Western Road**	**Richmond Street**	**Wharncliffe Road / Western Road**	**Richmond Street**	**Wharncliffe Road / Western Road**	
Description	Auxiliary (turn) lanes added to selected signalized intersections along the Richmond corridor between Oxford and Masonville Place. Localized bus-only queue-jump lanes at selected intersections in the Richmond corridor from Queens to Masonville Place.	Localized bus-only queue-jump lanes at selected intersections in both the Wharncliffe / Western corridor from Oxford Street to Richmond Street. Consistent with the design recommended for the West Corridor between downtown and Oxford.	Auxiliary (turn) lanes introduced at selected signalized intersections along the Richmond corridor between Oxford and Western. Localized bus-only queue-jump lanes at selected intersections in the Richmond corridor from Queens to Masonville Place.	Buses in mixed traffic on Wharncliffe from Oxford to Platt's Lane Centre-running RT on Wharncliffe / Western Road / from Platt's Lane to Masonville Place. Consistent with the design recommended for the West Corridor between downtown and Oxford.	Auxiliary (turn) lanes introduced at selected signalized intersections along the Richmond corridor between Oxford and Western. Localized bus-only queue-jump lanes at selected intersections in the Richmond corridor from Queens to Masonville Place.	Centre-running RT on Wharncliffe / Western Road / from Oxford to Masonville Place. Not consistent with the design recommended for the West Corridor between downtown and Oxford; would trigger the need for centre running .transit south of Oxford.	Centre-running bus lanes on Clarence / Richmond Street from Queens to University, dedicated bus lanes on University / Lambton to Western. RT on Western/Richmond to Masonville Place.	Localized bus-only queue-jump lanes at selected intersections on Wharncliffe / Western between Oxford and Lambton. Consistent with the design recommended for the West Corridor between downtown and Oxford.	

610 Chartwell Road
Suite 300
Oakville, ON, Canada L6J 4A5

T: +1 905-823-8500
F: +1 905-823-8503
wsp.com

Indicators	Option 1: Intersection improvements along both Richmond Street and Western Road/Wharncliffe Road		Option 2a: Higher Order Transit along Western Road (mixed traffic between Oxford and Platts) paired with intersection improvements along Richmond Street		Option 2b: Higher Order Transit along Western Road (2 General Purpose Lanes between Oxford and Platts) paired with intersection improvements along Richmond Street		Option 3: Higher Order Transit along Richmond Street paired with intersection improvements along Western Road		Least Preferred to Most Preferred ○ ◔ ◑ ◕ ●
	Richmond Street	**Wharncliffe Road / Western Road**	**Richmond Street**	**Wharncliffe Road / Western Road**	**Richmond Street**	**Wharncliffe Road / Western Road**	**Richmond Street**	**Wharncliffe Road / Western Road**	
Benefit to Transit Operations	Minor improvement to transit operations along Richmond Street north of Oxford, associated with overall intersection improvements, including queue-jump lanes. Buses in mixed traffic would experience delays associated with congestion and right-turning movements.	Buses in mixed traffic would experience delays associated with congestion and right-turning movements. Minor improvements to transit operations would result from introduction of transit signal priority and queue-jump lanes at selected intersections.	Buses in mixed traffic would experience delays associated with congestion and right-turning movements, impacting both travel time and overall reliability for transit services. Minor improvements to transit operations would result from introduction of transit signal priority and queue-jump lanes at selected intersections.	Centre-running transit is most reliable and capable of accommodating the anticipated 5-minute transit headways. Buses not impacted by right-turning movements. Buses running mixed traffic from Platts to Oxford would experience delays associated with congestion. Would be consistent with mixed traffic for Wharncliffe south of Oxford (West Option 1)	Buses in mixed traffic would experience delays associated with congestion and right-turning movements, impacting both travel time and overall reliability for transit services. Minor improvements to transit operations would result from introduction of transit signal priority and queue-jump lanes at selected intersections.	Centre-running transit is most reliable and capable of accommodating the anticipated 5-minute transit headways. Buses not impacted by right-turning movements. Would trigger the need for centre-running RT on Wharncliffe south of Oxford (West Option 2)	Centre-running transit is most reliable and capable of accommodating the anticipated 5-minute transit headways. Buses not impacted by right-turning movements.	Buses in mixed traffic would experience delays associated with congestion and right-turning movements, impacting both travel time and overall reliability for transit services. Minor improvements to transit operations would result from introduction of transit signal priority and queue-jump lanes at selected intersections.	All options would be expected to result in an improvement in transit operations over existing conditions.
	◔	◔	◔	●	◔	●	●	◔	
Increase in Ridership	Limited potential to attract new ridership due to minor improvement in transit operations.		Moderate potential to attract significant ridership due to rapid transit connections to key trip generators on North London. RT in the Western/Wharncliffe corridor would connect Downtown London with TD Stadium, Western University (periphery only), Ivey School of Business, Brescia College, Huron University, University Hospital, and the Masonville Transit Village		Moderate potential to attract significant ridership due to rapid transit connections to key trip generators on North London. RT in the Western/Wharncliffe corridor would connect Downtown London with TD Stadium, Western University (periphery only), Ivey School of Business, Brescia College, Huron University, University Hospital, and the Masonville Transit Village		Strong potential to attract significant ridership due to rapid transit connections to key trip generators on North London. RT in the Richmond corridor would connect Downtown London with Richmond Row, St. Joseph's Hospital, King's College, three points within Western University, Ivey School of Business, Brescia College, Huron University, University Hospital, and the Masonville Transit Village		
	○		◑		◑		●		

Indicators	Option 1: Intersection improvements along both Richmond Street and Western Road/Wharncliffe Road		Option 2a: Higher Order Transit along Western Road (mixed traffic between Oxford and Platts) paired with intersection improvements along Richmond Street		Option 2b: Higher Order Transit along Western Road (2 General Purpose Lanes between Oxford and Platts) paired with intersection improvements along Richmond Street		Option 3: Higher Order Transit along Richmond Street paired with intersection improvements along Western Road		Least Preferred to Most Preferred ○ ◔ ◑ ◕ ●
	Richmond Street	**Wharncliffe Road / Western Road**	**Richmond Street**	**Wharncliffe Road / Western Road**	**Richmond Street**	**Wharncliffe Road / Western Road**	**Richmond Street**	**Wharncliffe Road / Western Road**	
Benefit to Traffic Operations	Improves general traffic operations by reducing delays and maximizes the efficiency of the existing through-movements at signalized intersections.	Maintains existing traffic operations with dedicated bus-only queue-jump lanes at major signalized intersections in the Wharncliffe / Western Corridor. Existing mid-block left-turns permitted.	Improves general traffic operations by reducing delays and maximizes the efficiency of the existing through-movements at signalized intersections.	Medians between Platts and Masonville restrict left-turns to signalized intersections. Reduced potential for significant collisions due to restriction of mid-block left-turns in sections where median is introduced. Per West Corridor Option 1, maintains existing traffic capacity with on Wharncliffe between Riverside and Oxford.	Improves general traffic operations by reducing delays and maximizes the efficiency of the existing through-movements at signalized intersections.	Increased traffic delays with single lane in each direction between Oxford and Platts. Medians restrict left-turns to signalized intersections. Reduced potential for significant collisions due to restriction of mid-block left-turns. Per West Corridor Option 2, increased traffic delays with single lane, and medians restricting left-turns to signalized intersections, in each direction between Riverside and Oxford.	Minor increase in delay to general traffic between Central and University. Medians restrict left-turns to signalized intersections. Reduced potential for significant collisions due to restriction of mid-block left-turns.	Maintains existing traffic capacity with dedicated bus-only queue-jump lanes at major signalized intersections.	
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Indicators	Option 1: Intersection improvements along both Richmond Street and Western Road/Wharncliffe Road		Option 2a: Higher Order Transit along Western Road (mixed traffic between Oxford and Platts) paired with intersection improvements along Richmond Street		Option 2b: Higher Order Transit along Western Road (2 General Purpose Lanes between Oxford and Platts) paired with intersection improvements along Richmond Street		Option 3: Higher Order Transit along Richmond Street paired with intersection improvements along Western Road		Least Preferred to Most Preferred ○ ◔ ◑ ◕ ●
	Richmond Street	**Wharncliffe Road / Western Road**	**Richmond Street**	**Wharncliffe Road / Western Road**	**Richmond Street**	**Wharncliffe Road / Western Road**	**Richmond Street**	**Wharncliffe Road / Western Road**	
Least Property Impacts	*Whancliffe – Western Queue-Jumps:* 1 full property impact 32 partial property impacts *Richmond Corridor Intersection Improvements and Queue-Jumps:* 0 full property impacts 33 partial property impacts **TOTAL:** **1 full property impacts** **65 partial property impacts**		*Western/Whartcliffe RT Corridor:* 5 full property impacts (Riverside to Oxford) 0 full property impacts (Wharnfliffe / western s of Lambton) 3 full property impacts north of Lambton 0 partial property impacts (Riverside to Oxford) 14 partial property impacts (Wharncliffe/Western s of Lambton) 57 partial property impacts north of Lambton *Richmond Corridor Queue-Jumps:* 1 full property impacts 26 partial property impacts **TOTAL:** **9 full property impacts** **97 partial property impacts**		*Western/Whartcliffe RT Corridor:* 31 full property impacts (Riverside to Oxford) 10 full property impacts (Wharnfliffe / western s of Lambton) 3 full property impacts north of Lambton 0 partial property impacts (Riverside to Oxford) 42 partial property impacts (Wharncliffe/Western s of Lambton) 57 partial property impacts north of Lambton *Richmond Corridor Queue-Jumps:* 1 full property impacts 26 partial property impacts **TOTAL:** **45 full property impacts** **125 partial property impacts**		*Richmond RT Corridor:* 9 full property impacts 91 partial property impacts *Western/Whanrcliffe Queue-Jump Lanes:* 0 full property impacts 2 partial property impacts **TOTAL:** **9 full property impacts** **93 partial property impacts**		
	●		◑		◔		◑		

Indicators	Option 1: Intersection improvements along both Richmond Street and Western Road/Wharncliffe Road		Option 2a: Higher Order Transit along Western Road (mixed traffic between Oxford and Platts) paired with intersection improvements along Richmond Street		Option 2b: Higher Order Transit along Western Road (2 General Purpose Lanes between Oxford and Platts) paired with intersection improvements along Richmond Street		Option 3: Higher Order Transit along Richmond Street paired with intersection improvements along Western Road		Least Preferred to Most Preferred ○ ◔ ◑ ◕ ●
	Richmond Street	**Wharncliffe Road / Western Road**	**Richmond Street**	**Wharncliffe Road / Western Road**	**Richmond Street**	**Wharncliffe Road / Western Road**	**Richmond Street**	**Wharncliffe Road / Western Road**	
Least Cultural Heritage Impacts	*Richmond Corridor Intersection Improvements and Queue-Jumps:* 0 heritage properties would have to be removed 21 heritage properties would be partially impacted *Western Queue-Jump Lanes:* 0* heritage properties would have to be removed 3* heritage properties would be partially impacted ***Total:*** **0* heritage properties would have to be removed** **24* heritage properties would be partially impacted** **Based on London CityMap Data. To be confirmed with Heritage Specialist if option is pursued*		*Western RT Corridor:* 2 heritage properties (Riverside to Oxford) 1* heritage Property (Western/Wharncliffe /Richmond Corridor) will have to be removed. 8* heritage properties would be partially impacted *Richmond Intersection Improvements and Queue-Jump Lanes:* 0 heritage Property (Western/Wharncliffe /Richmond Corridor) will have to be removed. 21 heritage properties would be partially impacted ***Total:*** **3* heritage Properties (Western/Wharncliffe /Richmond Corridor) will have to be removed.** **29* heritage properties would be partially impacted** **Based on London CityMap Data. To be confirmed with Heritage Specialist if option is pursued*		*Western RT Corridor:* 22 heritage properties (Riverside to Oxford) 1* heritage Property (Western/Wharncliffe /Richmond Corridor) will have to be removed. 8* heritage properties would be partially impacted *Richmond Intersection Improvements and Queue-Jump Lanes:* 0 heritage Property (Western/Wharncliffe /Richmond Corridor) will have to be removed. 21 heritage properties would be partially impacted ***Total:*** **23* heritage Properties (Western/Wharncliffe /Richmond Corridor) will have to be removed.** **29* heritage properties would be partially impacted** **Based on London CityMap Data. To be confirmed with Heritage Specialist if option is pursued*		*Richmond RT Corridor:* 7 heritage properties will have to be removed 27 heritage properties would be partially impacted *Western Queue-Jump Lanes:* 0* heritage properties would have to be removed 3* heritage properties would be partially impacted ***Total:*** **7* heritage Property (Western/Wharncliffe /Richmond Corridor) will have to be removed.** **30* heritage properties would be partially impacted** **Based on London CityMap Data. To be confirmed with Heritage Specialist if option is pursued*		
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Least Impact on Trees	**185 trees impacted**		RT corridor: 48 Trees impacted (Lambton to Platt's) 19 (approx.) Trees impacted (Platt's to Oxford) 4 Trees impacted (Riverside to Oxford) 285 trees (Lambton to Masonville) TOTAL = 368 trees impacted) Queue-Jump Lanes on Richmond: 106 trees impacted **TOTAL:** **478 trees impacted**		RT corridor: 64 Trees impacted (Lambton to Platt's) 19 (approx.) Trees impacted (Platt's to Oxford) 34 Trees impacted (Riverside to Oxford) 285 trees (Lambton to Masonville) TOTAL = 368 trees impacted) Queue-Jump Lanes on Richmond: 106 trees impacted **TOTAL:** **508 trees impacted**		RT Corridor: Requires removal of approximately 442 trees in RT corridor Queue-Jump Lanes on Western/Wharncliffe: 4 trees impacted **TOTAL:** **446 trees impacted**		
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Indicators	Option 1: Intersection improvements along both Richmond Street and Western Road/Wharncliffe Road		Option 2a: Higher Order Transit along Western Road (mixed traffic between Oxford and Platts) paired with intersection improvements along Richmond Street		Option 2b: Higher Order Transit along Western Road (2 General Purpose Lanes between Oxford and Platts) paired with intersection improvements along Richmond Street		Option 3: Higher Order Transit along Richmond Street paired with intersection improvements along Western Road		Least Preferred to Most Preferred ○ ◔ ◑ ◕ ●
	Richmond Street	**Wharncliffe Road / Western Road**	**Richmond Street**	**Wharncliffe Road / Western Road**	**Richmond Street**	**Wharncliffe Road / Western Road**	**Richmond Street**	**Wharncliffe Road / Western Road**	
Least Impact on Utilities	Minor localized impacts to surface utilities and municipal services at queue-jump lane locations in the Richmond corridor and Western / Wharncliffe corridors.		It is anticipated that this option will result in the significant impacts to utilities and municipal services throughout the corridor.		It is anticipated that this option will result in the greatest impact to utilities and municipal services throughout the corridor.		It is anticipated that this option will result in significant impacts to utilities and municipal services throughout the corridor.		
	●		◔		○		◔		
Least Impact on Driveways	O driveways impacted No access impacts.		0 driveways impacted Some encroachment into driveways beyond sidewalks. Majority of properties will be able to park one vehicle in driveway. Access becomes right-in/right-out.		7 driveways impacted Some encroachment into driveways beyond sidewalks. Majority of properties will be able to park one vehicle in driveway. Access becomes right-in/right-out.		0 driveway impacts. Some encroachment into driveways beyond sidewalks. Majority of properties will be able to park one vehicle in driveway. Access becomes right-in/right-out.		If a building is impacted, driveway impacts were not counted. Most driveways extend beyond the front of the dwelling, and therefore widening does not impact the ability of the property owner to park one vehicle in the driveway.
	●		◕		◕		◕		
Redevelopment Potential	While redevelopment and intensification will naturally occur, this option is not expected to influence or encourage redevelopment and intensification in either the Richmond or Western corridors.		The presence of a fixed-route, rapid transit system in the Western corridor will encourage redevelopment and intensification. Per the RTMP, the Western corridor currently exhibits slightly less population and employment within 500m of the route, when compared against the Richmond corridor. Potential for future development, however, is comparable to that of the Richmond corridor, resulting in a total population and employment figure of approximately 48,750 by 2034.		The presence of a fixed-route, rapid transit system in the Western corridor will encourage redevelopment and intensification. Per the RTMP, the Western corridor currently exhibits slightly less population and employment within 500m of the route, when compared against the Richmond corridor. Potential for future development, however, is comparable to that of the Richmond corridor, resulting in a total population and employment figure of approximately 48,750 by 2034.		The presence of a fixed-route, rapid transit system in the Richmond/Western corridor will encourage redevelopment and intensification. Per the RTMP, the Richmond / Western corridor currently exhibits the highest population and employment within 500m of the route, when compared against the Western corridor. Potential for future development is comparable to that of the Western corridor, resulting in a larger total population and employment figure of approximately 62,650 by 2034.		Potential for redevelopment in corridor (per RTMP)
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Indicators	Option 1: Intersection improvements along both Richmond Street and Western Road/Wharncliffe Road		Option 2a: Higher Order Transit along Western Road (mixed traffic between Oxford and Platts) paired with intersection improvements along Richmond Street		Option 2b: Higher Order Transit along Western Road (2 General Purpose Lanes between Oxford and Platts) paired with intersection improvements along Richmond Street		Option 3: Higher Order Transit along Richmond Street paired with intersection improvements along Western Road		Least Preferred to Most Preferred ○ ◔ ◑ ◕ ●
	Richmond Street	**Wharncliffe Road / Western Road**	**Richmond Street**	**Wharncliffe Road / Western Road**	**Richmond Street**	**Wharncliffe Road / Western Road**	**Richmond Street**	**Wharncliffe Road / Western Road**	
Most Consistency with City's policy objectives	Does not supports the goals and objectives of London's OP by providing a range of viable transportation options, encouraging sustainable modes of transportation, spurring more compact, efficient forms of development, including TOD, and discouraging sprawling development patterns	In keeping with the goals and objectives of the Blackfriars-Petersville HCD plan, by conserving heritage resources. Not in keeping with the Rapid Transit Corridor designation, as the lack of dedicated transit infrastructure means that the area is unlikely to intensify. Does not supports the goals and objectives of London's OP by providing a range of viable transportation options, encouraging sustainable modes of transportation, spurring more compact, efficient forms of development, including TOD, and discouraging sprawling development patterns.	Does not supports the goals and objectives of London's OP by providing a range of viable transportation options, encouraging sustainable modes of transportation, spurring more compact, efficient forms of development, including TOD, and discouraging sprawling development patterns. Transit queue-jump lanes on Richmond are generally consistent with the direction of the SmartMoves 2030 plan.	Supports the goals and objectives of London's OP by providing a range of viable transportation options, encouraging sustainable modes of transportation, spurring more compact, efficient forms of development, including TOD, and discouraging sprawling development patterns.	Does not supports the goals and objectives of London's OP by providing a range of viable transportation options, encouraging sustainable modes of transportation, spurring more compact, efficient forms of development, including TOD, and discouraging sprawling development patterns. Transit queue-jump lanes on Richmond are generally consistent with the direction of the SmartMoves 2030 plan.	Supports the goals and objectives of London's OP by providing a range of viable transportation options, encouraging sustainable modes of transportation, spurring more compact, efficient forms of development, including TOD, and discouraging sprawling development patterns.	Supports the goals and objectives of London's OP by providing a range of viable transportation options, encouraging sustainable modes of transportation, spurring more compact, efficient forms of development, including TOD, and discouraging sprawling development patterns. In keeping with the goals and objectives of the Blackfriars-Petersville HCD plan, by conserving heritage resources. Not in keeping with the Rapid Transit Corridor designation, as the lack of dedicated transit infrastructure means that the area is unlikely to intensify.	Richmond Street Corridor is designated as a Rapid Transit Corridor. Part of Wharncliffe Road is designated as a Rapid Transit Corridor.
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Least Environmental Assessment Implications	No implications. Localized intersection improvements would be considered a Schedule A+ undertaking (i.e. pre-approved with notification) under the Municipal lass EA process.		TPAP Addendum required for centre-running RT on Wharncliffe/Western between Oxford and Lambton. CHERs and HIAs required for newly-impacted heritage property not assessed during TPAP.		TPAP Addendum required for centre-running RT on Wharncliffe/Western between Oxford and Lambton. CHERs and HIAs required for newly-impacted heritage property not assessed during TPAP.		No implications. Approved design. Localized transit priority measures on Western/Wharncliffe would be considered a Schedule A+ undertaking (i.e. pre-approved with notification) under the Municipal Class EA process.		

Indicators	Option 1: Intersection improvements along both Richmond Street and Western Road/Wharncliffe Road		Option 2a: Higher Order Transit along Western Road (mixed traffic between Oxford and Platts) paired with intersection improvements along Richmond Street		Option 2b: Higher Order Transit along Western Road (2 General Purpose Lanes between Oxford and Platts) paired with intersection improvements along Richmond Street		Option 3: Higher Order Transit along Richmond Street paired with intersection improvements along Western Road		Least Preferred to Most Preferred ○ ◔ ◑ ◕ ●
	Richmond Street	Wharncliffe Road / Western Road	Richmond Street	Wharncliffe Road / Western Road	Richmond Street	Wharncliffe Road / Western Road	Richmond Street	Wharncliffe Road / Western Road	
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Bus Compatibility with West Corridor Options	No impact.		Compatible with mixed traffic options south of Oxford. If centre-running RT lanes are selected for Wharncliffe Road south of Oxford, buses would be required to transition between the curb to median at Oxford, and again at Platt's Lane.		Compatible with centre-running bus lane options south of Oxford. If a mixed traffic operation is selected for Wharncliffe Road south of Oxford, buses would be required to transition between the curb to median at Oxford.		No impact.		
Constructability / Construction Disruption	No specific constructability challenges.		Typical roadway construction lane closures and traffic detours would be required during construction of the RT and queue-jump lane infrastructure.		Typical roadway construction lane closures and traffic detours would be required during construction of the RT and queue-jump lane infrastructure.		Typical roadway construction lane closures and traffic detours would be required during construction of the RT and queue-jump lane infrastructure. Construction of the University Drive bridge would be a significant undertaking and would require environmental protection measures consistent with those of a major river crossing.		
Capital Costs	Option 1 would result in the lowest cost to implement, operate and maintain.		Options 2 and 3 would be the most expensive to construct, maintain traffic capacity, and provide the greatest benefit to transit reliability. Option 2a is likely the lowest cost of the RT options, but also results in the shortest segment of dedicated guideway for transit, and therefore lower transit service speed and reliability.		Options 2 and 3 would be the most expensive to construct, maintain traffic capacity, and provide the greatest benefit to transit reliability.		Options 2 and 3 would be the most expensive to construct, maintain traffic capacity, and provide the greatest benefit to transit reliability. Option 3 is anticipated to result in the highest cost of the Options, but also the longest RT route which therefore serves the greatest number of potential passengers.		
	$15-$20M (est)		$95-$120M (est)		$120-$150M (est)		$150-$155M (est)		
Preliminary Recommendation	**Carry Forward for further consideration as an interim measure**		Do Not Carry Forward		Do Not Carry Forward		**Carry forward for further consideration.**		

CONCLUSIONS AND RECOMMENDATIONS

On balance of the benefits and drawbacks associated with the North Corridor design concepts, presented in this report, it is recommended that Option 3 be carried forward for further consideration. These options can then be considered on a segment by segment basis (similar to the West corridor Review) to determine the preference and priority of interim and long-term transit priority measures servicing the north.

While Option 2 does offer the potential to accommodate RT services between Downtown and Masonville Place, it compromises in a number of areas relative to Option3. Option 2 both duplicates a portion of the West RT Corridor, and serves areas of lesser population and employment than Option 3, and is therefore expected to attract less new ridership. The property impacts associated with Option 2 – both regular and heritage properties – are equal to or greater than those of Option 3. The order-of-magnitude cost estimate of the Options indicates that, at a high level, that Option 3 will likely be higher than Option 2, but the RT Options are all anticipated to result in comparable capital costs. Option 2a would likely be the least expensive of the RT options, but also result in the shortest segment of dedicated guideway. Option 1 may provide some limited benefit to transit operations in the near term, and may provide some relief to existing operational challenges as an interim measures until a full RT facility is realized. It is not, however, anticipated to provide the benefit to transit operations sufficient to affect a notable growth in ridership, nor encourage any substantial redevelopment in the City.

NEXT STEPS / FUTURE WORK

The assessment presented herein represents a high-level assessment of the implications associated with alternative routes and configurations for the London RT North Corridor, and is intended to guide the planning of future analyses and design work. For any proposed works that differ from those identified in the Environmental Project Report, these activities would likely include:

- Technical and/or public stakeholder consultation;
- Travel demand forecasting;
- Detailed traffic analysis;
- Preliminary infrastructure design;
- Cultural heritage impact assessment (Western Road / Wharncliffe Road corridor);
- Utility impact investigation;
- Natural environmental surveys and impact assessment (Western Road / Wharncliffe Road corridor); and
- Stage 1-2 Archaeological investigations (Western Road / Wharncliffe Road corridor).

610 Chartwell Road
Suite 300
Oakville, ON, Canada L6J 4A5

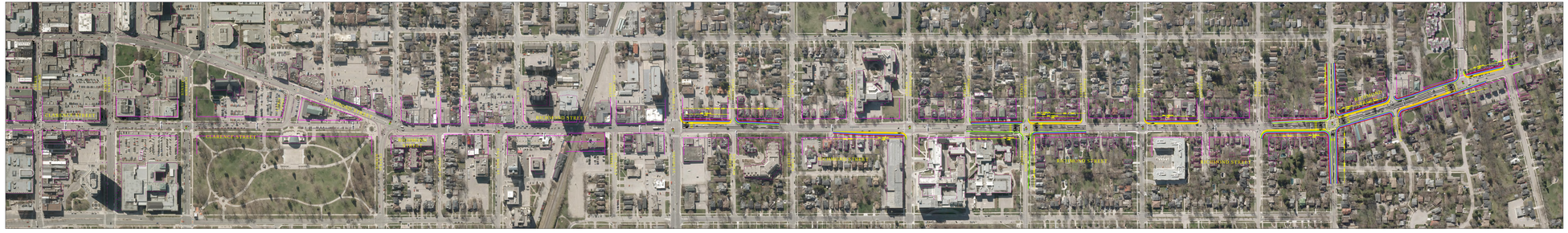
T: +1 905-823-8500
F: +1 905-823-8503
wsp.com

Andrew Shea
Project Manager, Transit Planning and Engineering

APPENDIX A: CORRIDOR DESIGN CONCEPTS

610 Chartwell Road
Suite 300
Oakville, ON, Canada L6J 4A5

T: +1 905-823-8500
F: +1 905-823-8503
wsp.com



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OPTION 1: RICHMOND CORRIDOR QUEUE-JUMP LANES
FROM KING STREET TO HILLVIEW BOULEVARD

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OPTION 1: WESTERN/WHARNCLIFFE CORRIDOR QUEUE-JUMP LANES
FROM OXFORD STREET TO HILLVIEW BOULEVARD

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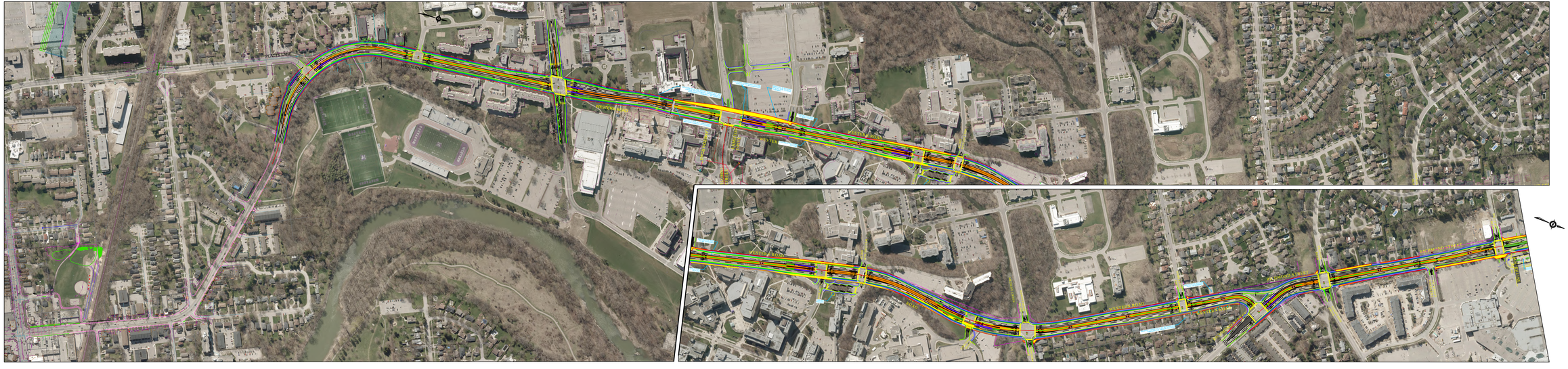

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OPTION 2a: WESTERN/WHARNCLIFFE CORRIDO
FROM OXFORD STREET TO HILLVIEW BOULEVARD – BASE

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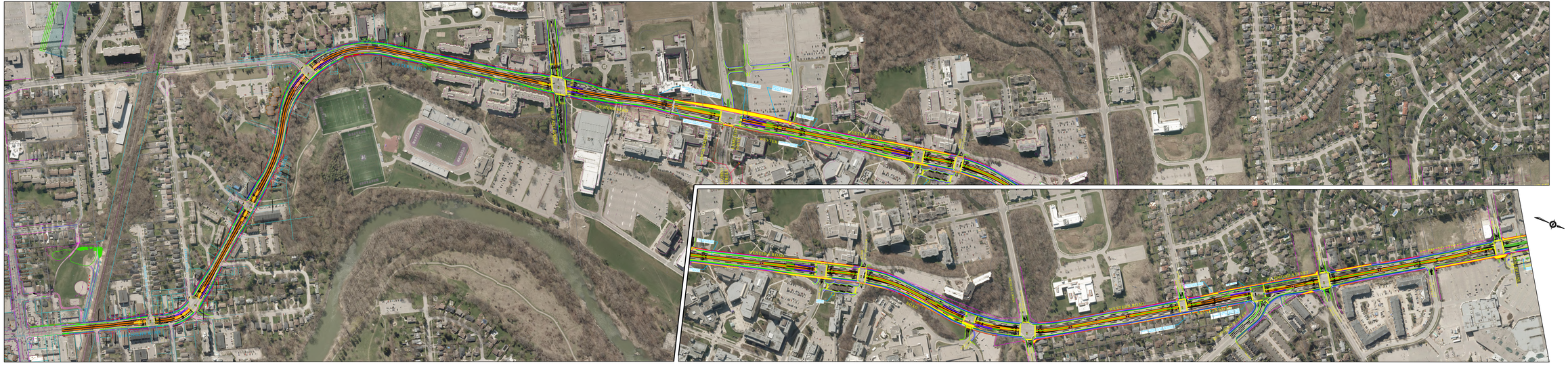

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OPTION 2b: WESTERN/WHARNCLIFFE CORRIDO
FROM OXFORD STREET TO HILLVIEW BOULEVARD (2 GPL)

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OPTION 2c: WESTERN/WHARNCLIFFE CORRIDO
FROM OXFORD STREET TO HILLVIEW BOULEVARD (4 GPL)

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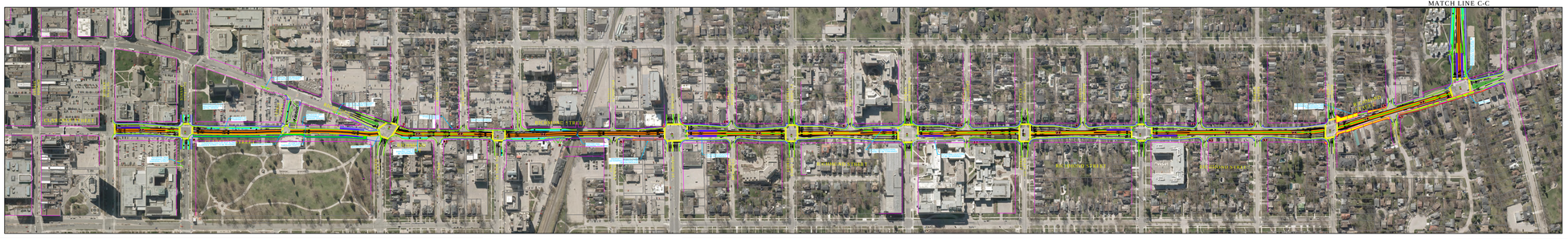

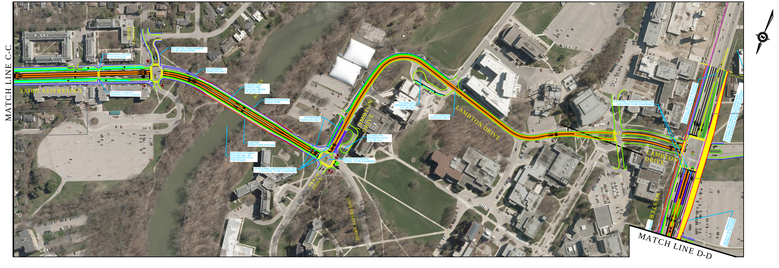

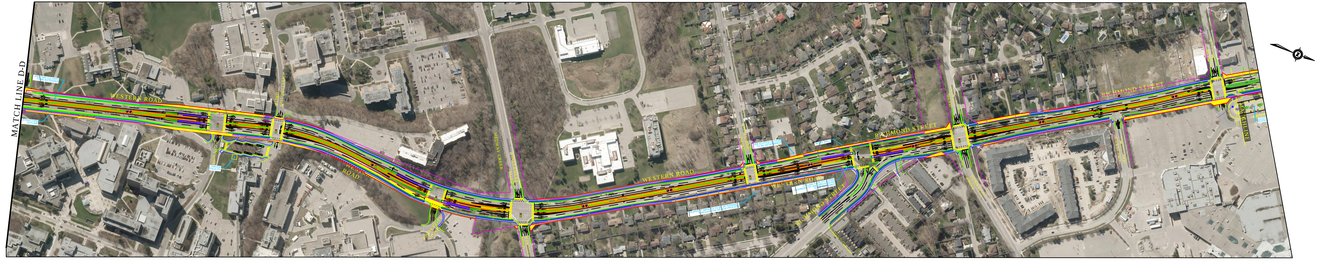

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OPTION 3: RICHMOND CORRIDOR FROM KING STREET TO HILLVIEW BOULEVARD

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