

Technical Briefing – Rapid Transit

To Rapid Transit Implementation Working Group **Date** March 6, 2017
From The Shift Team
Subject Preferred Downtown Routing

The preferred Downtown routes for Rapid Transit are illustrated in Exhibit 1.

Rapid Transit stations are proposed at:

1. Clarence Street and Angel Street (N+E);
2. Clarence Street and Queens Ave (N+E);
3. King Street and Clarence Street (Central Transit Hub);
4. King Street and Waterloo Street (N+E);
and,
5. King Street and Talbot Street (S+W).

Summary

Downtown London is one of the largest transit trip generators and critical to the success of Rapid Transit. Downtown London is the natural choice to connect the north, east, south and west Rapid Transit corridors, providing a new way for Londoners to connect to the Downtown to live, shop, work, and play.

The preferred routing for the North + East Rapid Transit route uses a combination of King Street and Clarence Street through Downtown. The preferred routing for the South + West route utilizes King Street for east-west travel to Wellington Street. The Rapid Transit concept is based on providing dedicated lanes for RT vehicles through downtown, wherever possible, to provide a premium service and ensure reliability.

In addition to a detailed technical evaluation, the following considerations influenced the selection of the preferred routing:

- The Dundas Place Flex Street concept prioritizes pedestrians and will not be available for transit starting September 2017;
- Queens Avenue is proposed to be reconfigured to accommodate a cycle track providing a major cycling link across the Downtown;
- Using King Street for Rapid Transit achieves the objective of eliminating general traffic on Kensington Bridge;
- The “centre of gravity” for existing transit users is at Dundas Street and Richmond Street, so locating Rapid Transit stations as close as possible to this intersection best serve current transit riders and major transit trip generators;

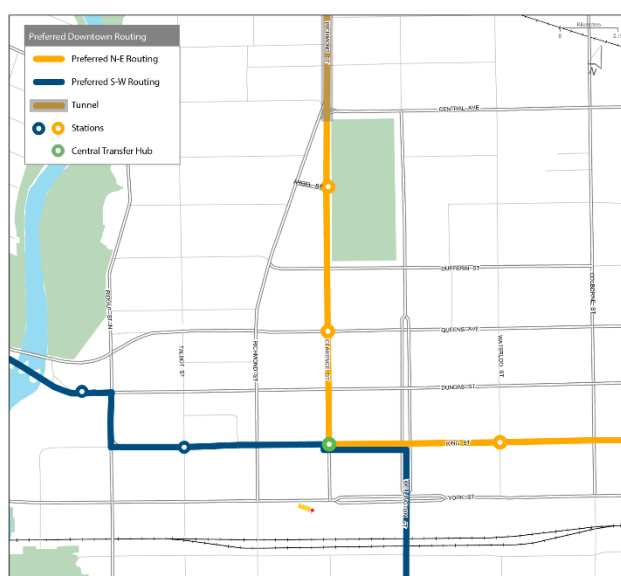


Exhibit 1: Preferred Downtown Rapid Transit Routes

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- Providing two-way Rapid Transit on a single street, as opposed to one-way service parallel streets (e.g. King/Queens couplet) is desirable from both a user experience and life-cycle cost perspective;
- King Street and Queens Avenue will see significant increases in regular transit service with the removal of buses from Dundas Place and transit priority measures will be required regardless of Rapid Transit;
- All routes are constrained by the presence of designated heritage properties. To avoid heritage impacts, the transit routes and station locations must be located where existing right-of-way is generally sufficient;
- King Street is a good candidate for converting general traffic lanes to dedicated transit lanes, given its current one-way eastbound configuration, and lack of connectivity beyond the Thames River to the west and Western Fair to the east. The overall capacity of the road network is not significantly reduced by adding rapid transit to King Street; and,
- York Street has a wider right-of-way and is closer to the VIA station and bus terminal. However, York Street is farthest away from the majority of existing transit user destinations. In addition, converting two existing traffic lanes to transit-only and restricting left-turns would significantly compromise vehicular access to and through the Downtown given other parallel streets cannot be widened to handle diverted traffic.

Issue

Two-way transit lanes on King Street through Downtown were presented as the preferred route at Public Information Centre #2, held May 28 and 30, 2015, and at Public Information Centre #3, held December 2, 2015. At Public Information Centre #4 on February 23, 2017, we heard concerns related to the selection of King Street through the Downtown.

The preferred routes will be defined in the Rapid Transit Master Plan, which requires City Council approval. This Technical Briefing provides a summary of the analysis completed to date in support of the preferred downtown routes.

Transit Route Changes for Dundas Place

The Dundas Place Flexible Street Class Environmental Assessment, accepted by Council on December 19, 2016, moves existing bus routes off of Dundas Street and onto King Street and Queens Avenue. Changes to eleven (11) routes are planned for implementation in September 2017. Exhibit 2 illustrates the current proposed routing concept prepared by LTC, as of March 3, 2017. Refinements may be made by LTC to these routes as appropriate.

As a result of this re-routing, King Street will carry approximately 1 eastbound bus every 1 to 2 minutes during peak hours. Westbound buses will travel on Queens Avenue.

Changes to the public right-of-way are required to install bus stops and accommodate these route changes. Approximately 12 parking spots will be removed: 10 spots on King Street between Ridout Street and Wellington Street, plus 2 spots on Ridout Street south of Dundas Street.

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Exhibit 2: LTC Proposed 2017 Routing Concept to accommodate My Dundas Flexible Street



Rapid Transit Master Plan Analysis

The following table summarizes the advantages and inconveniences of the preferred North + East and South + West routes, based on the analysis completed to date. Details on the development and evaluation of the alternatives follows.

Advantages	Inconveniences
Shortest routes providing fastest Rapid Transit travel times	Removes two loading zones from King Street: <ul style="list-style-type: none"> • North side and south side east of Talbot Street
Single, convenient transfer point (Central Transit Hub) at or near King Street and Clarence Street	Removes remaining on-street parking from: <ul style="list-style-type: none"> • King Street between Ridout Street and Wellington Street (49 spots: 31 north, 18 south) • Ridout Street between Dundas Street and King Street (6 spots)
Maintains York Street, Richmond Street and Wellington Street as major arteries for general traffic	Reduces King Street to one-lane of traffic eastbound, with no left-turns at Talbot Street.
Stations are within easy walking distance (400 metres, 5 to 7 minutes) of major destinations including the VIA train station, intercity bus station, Covent Garden Market, commercial areas, and Budweiser Gardens	Converts Clarence Street operations to: <ul style="list-style-type: none"> • Northbound-only from King Street to Queens Avenue • Two-way from Queens Ave to Dufferin Ave

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Advantages	Inconveniences
	<ul style="list-style-type: none"> • Southbound-only from Central Ave to Dufferin Ave
Maintains driveway accesses along King Street, including Covent Market underground parking	Removes bike lane from King Street between Ridout Street and Wellington Street
Best serves existing transit ridership in the Downtown, with consideration of future route constraints on Dundas Street	
Generally fits within the existing right-of-way, minimizing property take and avoiding heritage buildings	
Supports the “My Dundas” flexible street between Wellington Street and Ridout Street	
Supports Activity Generators and Priority Sites for Redevelopment identified in “Our Move Forward: London’s Downtown Plan”	
Supports planned cycling infrastructure on Queens Avenue	

North + East Downtown Routing Alternatives

Since the North + East transit route will carry more passengers, this route was identified first. The route must travel between the tunnel portal for the Richmond / CPR rail grade separation, and the two-way on King Street through the Old East Village which starts at Waterloo Street and Dundas Street / King Street.

From the tunnel portal, the Rapid Transit (RT) route could continue south on Clarence Avenue, or turn west and then continue south on Richmond Street. There are four potential east-west streets: Queens Avenue, Dundas Street, King Street, and York Street. Characteristics of these east-west streets include:

- Queens Avenue is more than 400m from the existing VIA train station. Transferring to inter-regional buses and rail, and potential future high speed rail, would be inconvenienced by additional transfer time or a long walk. Routing along Queens Avenue and locating the Central Transit Hub on Queens Avenue does not serve as many major destinations compared to the other east-west streets, considering an ideal 400m walk radius from the Hub Station. As a result Queens Avenue was excluded from the routing options.
- Dundas Street between Wellington Street and the Thames River is envisioned as a flexible street, as identified in “My Dundas: Dundas Place Flexible Street Class Environmental Assessment”. This study proposes that Dundas Street exclude all transit routes to allow more flexibility for wide pedestrian areas, special events and street closures. Transit would be allowed on Dundas Street only between the Thames River and Ridout Street. Due to the other priorities for Dundas Street, it was excluded from the routing options.
- King Street is currently one-way eastbound with a bike lane and on-street parking. King Street runs from the Thames River (at Thames Street) to the Western Fair grounds (at

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Ontario Street), and as such does not serve as a major throughway. The capacity of King Street to carry general traffic would be reduced with the conversion of two lanes to RT only. King Street is centrally located to major destinations and opportunity sites for redevelopment and/or increased utilization. There are existing driveways along both sides of King Street, and turning traffic will potentially impede RT speeds and create conflicts. King Street was carried forward as a routing option.

- York Street is a major east-west corridor for general traffic to the east and west through Downtown. To the west, York Street is one of the two Thames River crossings near downtown. To the east, York Street becomes Florence Street and continues to Highbury Avenue. The south side of York Street has limited block depth due to the CN Rail corridor, which limits the potential for future intensification. There are existing driveways along both sides of York Street, which would be restricted to right-in/right-out only. Converting two lanes to RT on this major corridor would have significant impacts to the overall performance of the downtown transportation network. However, locating the Central Transit Hub on York Street would provide a convenient connection to the inter-regional bus station and train station. York Street was carried forward as a routing option.

The resulting North + East transit route downtown alternatives are:

1. Clarence-King
2. Richmond-King
3. Clarence-York
4. Richmond-York

These alternatives are illustrated in Exhibit 2. The alternatives vary in length from approximately 1.1 km to 1.7 km, resulting in a difference in RT travel time of about 90 seconds excluding dwell time at stations.

These alternatives were compared and their suitability for the RT route was assessed based on a critical flaw analysis, provided in Exhibit 3. The evaluation assumes Richmond and York RT would run in dedicated lanes in the centre of the existing street; while Clarence and King RT would run in curb lanes. The evaluation considered:

- Providing a direct route through the downtown for transit passengers (e.g. shortest route length and fewest left-turns);
- Minimizing walking distance (i.e. a desirable walking distance of 400m or less) between RT stations and existing destinations, Activity Generators and Priority Sites for Redevelopment (Exhibit 1.5) throughout downtown and the potential future high-speed rail station (assumed to be the current VIA Rail Train station on York Street west of Clarence Street);
- Maintaining reasonable access for general traffic to and through Downtown and minimizing adverse impacts to traffic operations, e.g. intersections, on-street parking, driveway access; and,
- Providing opportunity for public realm improvements within the right-of-way.

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Exhibit 3: North-East Route Alternatives through Downtown

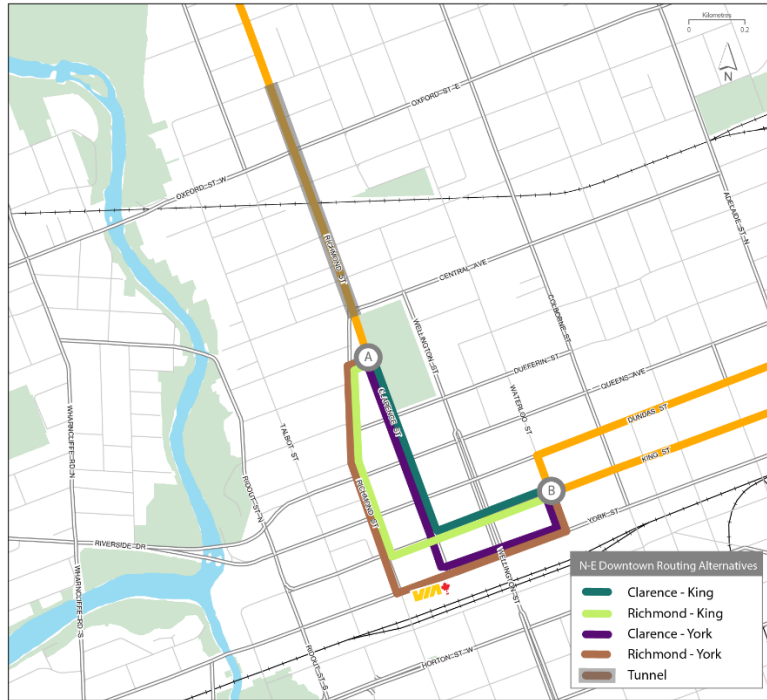


Exhibit 4: Evaluation of North-East Routes through Downtown

Alternative	Description	Evaluation
Clarence-King	<p>From the tunnel portal, south on Clarence Street to King Street, then east on King Street</p> <p>RT Stations: 1. Clarence at Angel, 2. Clarence at Queens, 3. Hub: Clarence at King.</p> <p>Clarence Street: two-lanes converted to transit-only, removal of on-street parking, maintain one or two lanes for general traffic</p> <p>King Street: two-lanes converted to transit-only, removal of on-street parking, removal of bike lane, maintain one lane for eastbound general traffic.</p>	<ul style="list-style-type: none"> Shortest route (1.1 km) Requires one left turn in the south/east direction (from Clarence Street to King Street) and no left-turns in the north/west direction RT stations along Clarence will serve the most combined Activity Generators and Priority Sites for Redevelopment* Central Transit Hub would be at or near Clarence/King, which is about 200m from existing VIA train station. Conversion of two north-south lanes and two eastbound lanes for transit only. Reduction in on-street parking on Clarence and King. Driveway access generally maintained on Clarence and King; RT may be impeded by turning traffic.

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Alternative	Description	Evaluation
		<ul style="list-style-type: none"> ○ Provides opportunity for public realm improvements on Clarence and King. <p>This is the preferred alternative.</p>
<p>Richmond-King</p>	<p>From the tunnel portal, west to Richmond Street, south on Richmond Street to King Street, then east on King Street</p> <p>RT Stations: 1. Richmond at Angel, 2. Richmond at Queens, 3. Hub: King at Clarence.</p> <p>Richmond Street: two-lanes converted to transit only, removal of on-street parking, maintain two lanes for general traffic</p> <p>King Street: two-lanes converted to transit-only, removal of on-street parking, removal of bike lane, maintain one lane for eastbound general traffic.</p>	<ul style="list-style-type: none"> ○ Medium length route (1.4 km) ○ Requires two left turns in the south/east direction (from Angel Street to Richmond Street, and from Richmond Street to King Street) ○ Requires one left turn in the north/west direction (from Angel Street to Clarence Street) ○ RT stations on Richmond will serve more Activity Generators and fewer Priority Sites for Redevelopment* than stations on Clarence ○ Central Transit Hub would be at or near Clarence/King, which is about 200m from existing VIA train station ○ Conversion of two north-south lanes and two eastbound lanes for transit only. Reduction in on-street parking on King. ○ Driveways on Richmond will become right-in/right-out only. ○ Full-moves driveway access generally maintained on King; RT may be impeded by turning traffic. ○ Disturbs established public realm improvements on Richmond ○ Numerous Designated Heritage buildings are located on all four corners of the intersection of Richmond Street and King Street, which limits the feasibility to widen roads and limits turning radii for RT. <p>This alternative is not preferred.</p>
<p>Clarence-York</p>	<p>From the tunnel portal, south on Clarence Street to York Street, east on York Street, then north on Waterloo Street then east on King Street</p>	<ul style="list-style-type: none"> ○ Medium length route (1.4 km) ○ Requires two left turns in the south/east direction (from Clarence Street to York Street, and from York Street to Waterloo Street)

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Alternative	Description	Evaluation
	<p>RT Stations: 1. Clarence at Angel, 2. Clarence at Queens, 3. Hub: Clarence at York.</p> <p>Clarence Street: two-lanes converted to transit-only, removal of on-street parking, maintain one or two lanes for general traffic</p> <p>York Street: two-lanes converted to transit-only, maintain two-lanes for general traffic plus dedicated turn lanes</p> <p>Waterloo Street: two-lanes converted to transit-only, removal of on-street parking, maintain two-lanes for general traffic plus left-turn lanes</p>	<ul style="list-style-type: none"> ○ Requires one left turn in the north/west direction (from King Street to Waterloo Street) ○ RT stations along Clarence will serve the most combined Activity Generators and Priority Sites for Redevelopment* ○ Central Transit Hub would be at or near Clarence/York, which is about 70m from existing VIA train station ○ Conversion of two north-south lanes and two east-west lanes for transit only. Reduction in on-street parking on Clarence and Waterloo. ○ Driveways on York will become right-in/right-out only. ○ Full-moves driveway access generally maintained on Clarence; RT may be impeded by turning traffic. ○ Provides opportunity for public realm improvements on Clarence. ○ Numerous Designated Heritage buildings are located on all four corners of the intersection of Clarence Street and York Street, which limits the feasibility to widen roads and limits turning radii for RT <p>This alternative is not preferred.</p>
<p>Richmond-York</p>	<p>From the tunnel portal, west to Richmond Street, south on Richmond Street to York Street, east on York Street, then north on Waterloo Street then east on King Street</p> <p>RT Stations: 1. Richmond at Angel, 2. Richmond at Queens, 3. Hub: Clarence at York.</p> <p>Richmond Street: two-lanes converted to transit only, removal of on-street parking, maintain two lanes for general traffic</p> <p>York Street: two-lanes converted to transit-only,</p>	<ul style="list-style-type: none"> ○ Longest route (1.7 km) ○ Requires three left turns in the south/east direction (from Angel Street to Richmond Street, from Richmond Street to York Street, and from York Street to Waterloo Street) ○ Requires two left turns in the north/west direction (from King Street to Waterloo Street, and from Angel Street to Clarence Street) ○ RT stations on Richmond will serve more Activity Generators and fewer Priority Sites for Redevelopment* than stations on Clarence

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Alternative	Description	Evaluation
	maintain two-lanes for general traffic plus dedicated turn lanes Waterloo Street: two-lanes converted to transit-only, removal of on-street parking, maintain two-lanes for general traffic plus left-turn lanes	<ul style="list-style-type: none"> ○ Central Transit Hub would be at or near Clarence/York, which is about 70m from existing VIA train station ○ Conversion of two north-south lanes and two east-west lanes for transit only. Reduction in on-street parking on Waterloo. ○ Driveways on Richmond and York will become right-in/right-out only. ○ Disturbs established public realm improvements on Richmond ○ Numerous Designated Heritage buildings are located on three corners of the intersection of Richmond Street and York Street, which limits the feasibility to widen roads and limits turning radii for RT <p>This alternative is not preferred.</p>

* “Activity Generators” and “Priority Sites for Redevelopment” are defined in “Our Move Forward: London’s Downtown Plan” (Feb 2015)

South + West Downtown Routing Alternatives

The South + West transit route must coincide with the preferred North + East transit route, on Clarence Street and King Street, in order to provide a Central Transit Hub with easy transfer between the two routes. The Central Transit Hub should be located as close as possible to the existing inter-regional bus and train stations on York Street west of Clarence Street.

The South + West transit route must also travel between Wellington Road and either the Queens Avenue Bridge or Kensington Bridge to cross the Thames River.

There are four potential east-west streets to meet the routing criteria: Queens Avenue, Dundas Street, King Street, and York Street. Characteristics of these east-west streets include:

- Queens Avenue is more than 400m from the existing VIA station. Two RT stations would be provided for transfer between the North + East and South + West routes. Queens Avenue is included in the evaluation of routing options.
- Dundas Street between Wellington Street and the Thames River is envisioned as a flexible street, as described previously. Due to the other priorities for Dundas Street, it was excluded from the routing options.
- King Street is the preferred street for the North + East route. King Street was carried forward as a routing option.
- York Street does not provide for a Central Transit Hub, given the preferred North + East route on King Street. RT passengers would have to walk about 150m between York Street

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and King Street to transfer between the RT lines. Providing a Central Transit Hub with easy transfer between the two routes is a critical success factor for the RT network, and as such, York Street was excluded from the routing options.

The resulting downtown alternatives developed for the South + West transit route are:

1. Wellington-Queens
2. Wellington-King

These alternatives are illustrated in Exhibit 4. The alternatives vary in length from approximately 1.5 km to 1.7 km, resulting in a difference in RT travel time of about 30 seconds, excluding dwell time at stations.

These alternatives were compared and their suitability for the RT route was assessed based on a critical flaw analysis, provided in Exhibit 5. The evaluation assumes Wellington RT would run in dedicated lanes in the centre of the existing street; while Queens Avenue or King Street RT would run in dedicated curb lanes. The evaluation considers the same elements described for the North + East route, plus the general principle that an in-line central transit hub will provide the simplest transfer between the RT routes.

Exhibit 5: South-West Route Alternatives through Downtown



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Exhibit 6: Evaluation of South-West Routes through Downtown

Alternative	Description	Evaluation
Wellington-Queens	<p>From Wellington Street, continuing north to Queens Avenue, then west on Queens Avenue over the Thames River (Queens Avenue Bridge) to Riverside Drive.</p> <p>RT Stations: 1. Hub: Wellington at King, 2. Hub: Queens at Clarence, 3. Queens at Talbot.</p> <p>Wellington Street: two-lanes converted to transit-only, removal of planted median, removal of on-street parking, maintain two lanes for general traffic plus left-turn lanes at intersections</p> <p>Queens Avenue: two-lanes converted to transit-only, removal of on-street parking, maintain one lane for westbound general traffic.</p> <p>Queens Avenue bridge: two-lanes converted to transit-only, provide two-lanes for westbound general traffic</p>	<ul style="list-style-type: none"> ○ Longest route (1.7 km) ○ Requires one left-turn in the north/west direction (from Wellington Street to Queens Avenue) and no left-turn in the east/south direction ○ RT stations on Queens will serve more Priority Sites for Redevelopment and fewer Activity Generators* than stations on King ○ RT station at Wellington/King is closest point along this alternative to transfer to inter-regional service at existing VIA station (approx. 300m walk) ○ Providing two Hub stations requires additional infrastructure to accommodate transfers between platforms and across intersections. ○ Conversion of two north-south lanes and two westbound lanes for transit only. Reduction in on-street parking. ○ Disturbs established public realm improvements on Wellington ○ Does not provide an in-line station shared by both RT routes ○ Does not support planned cycle infrastructure on Queens Avenue <p>This alternative is not preferred.</p>
Wellington-King	<p>From Wellington Street, west on King Street, then north on Ridout Street, and west on Dundas Street over the Thames River (Kensington Bridge) to Riverside Drive.</p> <p>RT Stations: 1. Hub: King at Clarence, 2. King at Talbot, 3. Dundas at Ridout.</p> <p>Wellington Street: two-lanes converted to transit-only, removal of planted median, removal of on-street parking, maintain two lanes for</p>	<ul style="list-style-type: none"> ○ Shortest route (1.5 km) ○ Requires two left-turns in the north/west direction (from Wellington Street to King Street, and Ridout Street to Dundas Street) ○ Requires one left turn in the east/south direction (from Ridout Street to King Street) ○ RT stations on King will serve fewer Priority Sites for Redevelopment and more Activity

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Alternative	Description	Evaluation
	<p>general traffic plus left-turn lanes at intersections</p> <p>King Street: two-lanes converted to transit-only, removal of on-street parking, removal of bike lane, maintain one lane for eastbound general traffic.</p> <p>Ridout Street: two-lanes converted to transit-only, removal of on-street parking, maintain one or two lanes for southbound general traffic</p>	<p>Generators* than stations on Queens</p> <ul style="list-style-type: none"> ○ Central Transit Hub would be at or near Clarence/King, which is less than 200m from existing VIA station. ○ Conversion of two north-south lanes and two eastbound lanes for transit only. Reduction in on-street parking. ○ Provides opportunity for public realm improvements on King. <p>This is the preferred alternative.</p>

* “Activity Generators” and “Priority Sites for Redevelopment” are defined in “Our Move Forward: London’s Downtown Plan” (Feb 2015)

The most direct route is from Wellington Street to King Street, then west on King Street to Ridout Street, then north on Ridout Street to Dundas Street, then west on Dundas Street and the Kensington Bridge / Riverside Drive to Wharncliffe Road. This route also provides a Central Transit Hub at or near King St & Clarence St, which is less than 200m to the VIA train station and potential future high speed rail.

Supporting Information

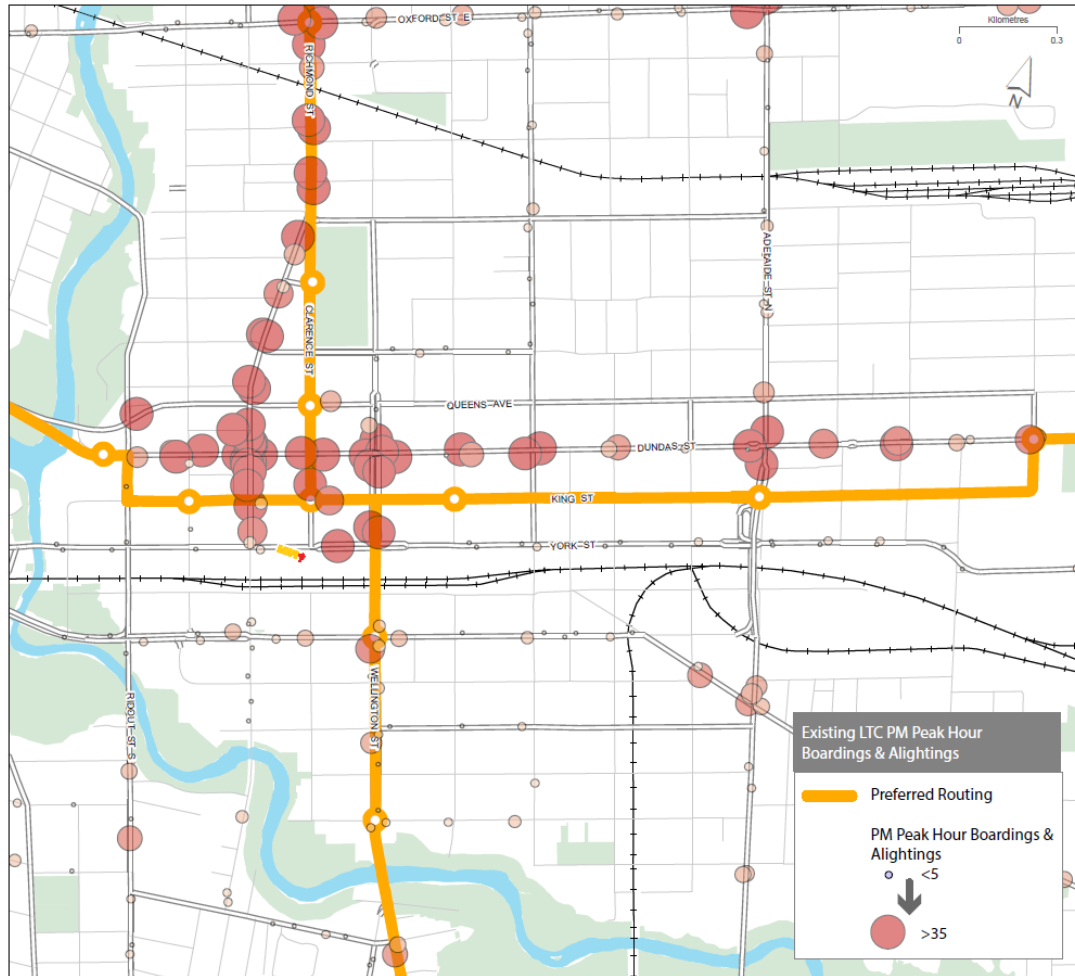
Existing Transit Demand

Exhibit 6 illustrates the combined transit demand of boardings (ons) and alightings (offs) around the downtown. This data is for the PM peak hour from 2014. The map shows the existing transit demand is centred around Richmond Street and Dundas Street.

With the transition to a flexible street, excluding transit, for Dundas Street between Ridout Street and Wellington Street, transit ridership will be best served with two-way RT along King Street. The distance from Dundas Street to King Street is about 150m or a 2 to 3 minute walk. King Street is preferred over York Street, which is just over 300m or a 5 minute walk, plus the distance from the existing transit stop to the RT station.

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Exhibit 7: Existing LTC Boardings and Alightings (PM Peak Hour, 2014)



Existing Traffic Demand

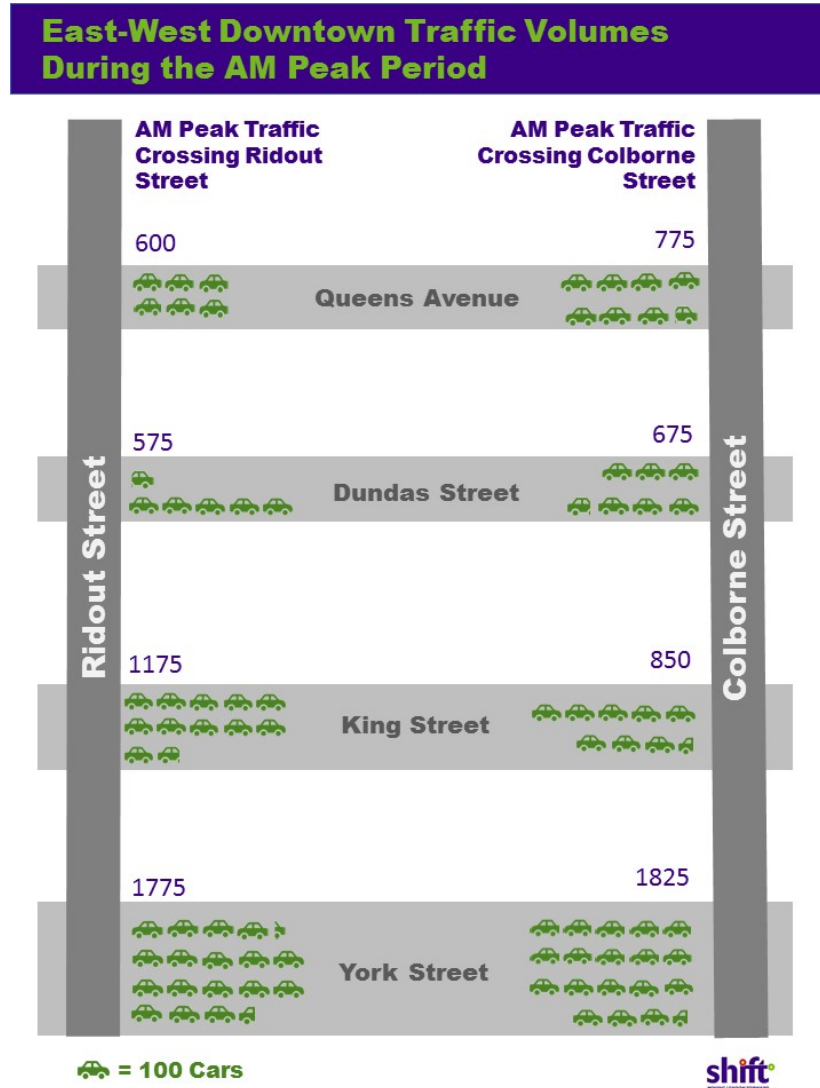
York Street is a major east-west thoroughway into, through, and out of the downtown. As shown in Exhibit 7, using existing traffic volumes, York Street provides the most general traffic capacity.

Putting two rapid transit lanes on King Street requires the removal of one eastbound traffic lane. ON-street parking will also require removal, as illustrated in the next section.

Putting two rapid transit lanes on York Street would require removal of one eastbound and one westbound traffic lane, requiring a more significant change in travel patterns. In order to provide sufficient capacity for general traffic, it is likely that the on-street parking on King Street would be partially or fully removed, to provide additional capacity for through traffic.

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Exhibit 8: Existing traffic demand entering Downtown



Existing On-street Parking Demand and Utilization

The following figures illustrate the existing on-street parking supply along Queens Avenue, Dundas Street and King Street between Ridout Street and Wellington Street. Each downtown RT route alternative will have some reduction to on-street parking.

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Exhibit 9: Excerpt from Figure 2B “2014 On-Street Parking Supply”, from “Downtown London Parking Study, 2014 Update”

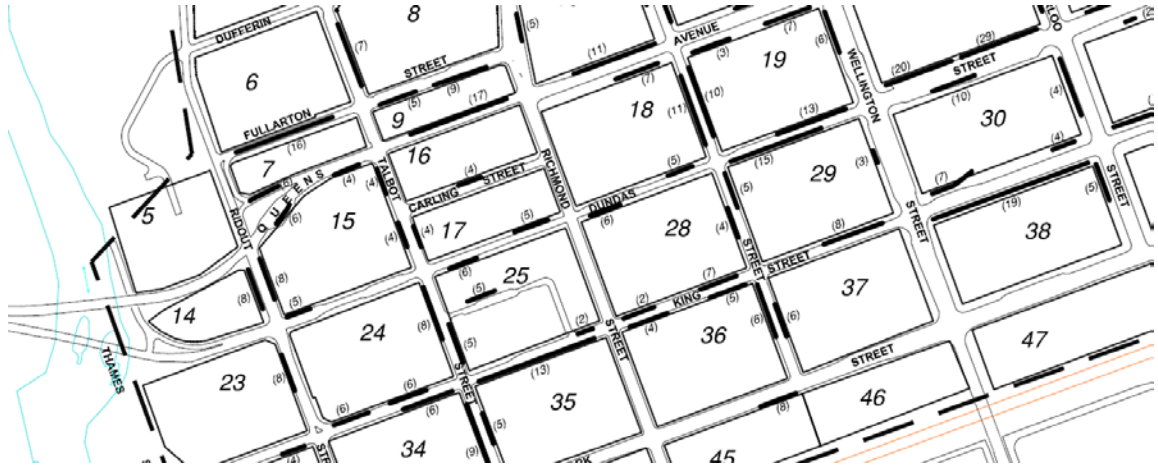


Exhibit 10: Excerpt from Figure 6C “2014 On-Street Parking Utilization during Weekday Peak Period (12pm)”, from “Downtown London Parking Study, 2014 Update”



Exhibit 11: Excerpt from Figure 6D “2014 On-Street Parking Utilization during Weekend Peak Period (2pm)”, from “Downtown London Parking Study, 2014 Update”

