LONDON TRANSIT COMMISSION

Transit Network
Rapid Transit Integration Framework

FINAL REPORT

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Submitted by:

DILLON CONSULTING

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EXECUTIVE SUMMARY

Dillon Consulting Limited (Dillon) was retained by the London Transit Commission (LTC) to develop a Rapid Transit Integration Strategy and Financial Plan, to identify any modifications to the LTC route network that are required to better integrate into the proposed Rapid Transit (RT) network, and confirm high-level capital (fleet) requirements and costs, operating costs, and passenger revenue projections between 2020 and 2035 for both the RT Network and modified LTC route network.

The study builds on the 2019 LTC route network recommended in the 2015 London Transit Route Network and Service Guideline document, and incorporates planned service and route adjustments in the 2016 Annual Service Plan. The study is based on new information received on the structure of the RT network. The Full BRT Network technology option was assessed based on the preferred RT network identified in the May 5, 2016 Staff Report presented to the Strategic Priorities and Policy Committee.

Changes to the LTC network are recommended based on service design principles established through consultation with LTC, to maintain connections, meet policy-based headways, provide direct service, minimize duplication with RT service, and maintain effective operations. Several LTC routes are proposed to be altered or eliminated, and two new routes are recommended to be added.

It is important to note that the Rapid Transit Integration Strategy sets out a framework for future modifications of the LTC network that will support the implementation of Rapid Transit. Much like the 2015 London Transit Route Network and Service Guideline document, the framework recommended in this report will be subject to further in-depth analysis and review by LTC staff as part of the annual service planning process. Given the extended nature of the forecast (and the number of variables that can change between 2020 and 2035), it is expected that the annual service plan process will lead to a number of changes to the recommendations set out in this strategy. The value of this document is to provide a strategic direction of how the LTC network should integrate with Rapid Transit and to identify the order of magnitude investment required to get there.

The changes to the LTC network result in 708,044 annual LTC revenue service hours in 2035 (compared to 688,136 proposed for 2019). This equates to an annual LTC operating cost of $107.7 million in 2035 (compared to $65.0 million in 2015), and requires capital investment of $21.7 million for additional LTC fleet by 2035. This is illustrated in the two tables below.

Table E1 – Summary of Annual Revenue Service Hours

System	2015	2019	2024	2035
LTC Routes	581,286	654,250	688,136	708,044
Richmond/ Dundas RT	0	12,082 (Quick Start)	12,082 (Quick Start)	50,631
Oxford / Wellington RT	0	0	32,760	32,760
Total	**581,286**	**666,332**	**732,978**	**791,435**

Table E2 – Summary of Annual Operating Cost (2020 – 2035)

System	2015	2019	2024	2035
LTC Routes	$65,021,934	$77,720,681	$89,592,371	$107,745,893
RT	-	$860,000	$5,484,873	$12,913,000
Total	**$65,021,934**	**$78,580,681**	**$95,077,244**	**$119,938,893**

Dillon was requested to forecast ridership on the LTC and RT networks using a first principles methodology. Using this methodology, 2035 ridership is forecasted to be approximately 24.3 million on LTC routes, and 7.3 million on RT routes. Assuming an average fare of $1.87 in 2035 (assuming an increase in fares charged to customers and U-Pass participants, as well as a 1.5 percent annual increase), as well as $1.65 million in operating revenue, 2035 system-wide revenue is estimated at approximately $60.6 million.

Table E3– Projected Annual Transit Ridership (2024 and 2035)

System	2024	2035
LTC Routes	22,050,775	24,293,470
RT Routes	3,399,327	7,287,697
Total	**25,450,102**	**31,581,167**

The Business Case estimates 2035 ridership as 31.6 million, of which 23.7 million are LTC riders and 7.9 million are RT riders. LTC ridership is estimated as a higher proportion in first principles estimates due to incorporation of the 2035 LTC route network. The Business Case estimates did not consider changes to the LTC route network to better serve the RT network, and these improvements will result in increased ridership on LTC routes as well as connections to the RT corridors.

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1.0 INTRODUCTION

Dillon Consulting Limited (Dillon) was retained by the London Transit Commission (LTC) to develop a Rapid Transit Integration Strategy and Financial Plan.

The purpose of this study is to:

- Identify any modifications to the LTC route network that are required to better integrate into the proposed Rapid Transit network; and
- Confirm high-level capital (fleet) requirements and costs, operating costs, and passenger revenue projections between 2020 and 2035 for both the Rapid Transit Network and modified LTC route network.

The study builds on the 2019 LTC route network recommended in the 2015 London Transit Route Network and Service Guideline document, and is based on new information received on the structure of the Rapid Transit network.

The study also incorporates planned service and route adjustments in the 2016 Annual Service Plan.

For the purposes of analysis conducted in this report, the Full BRT Network technology option was assessed based on the preferred network identified in the May 5, 2016 Staff Report presented to the Strategic Priorities and Policy Committee. A high level analysis was also conducted on the Hybrid Network for comparison.

It is important to note that the Rapid Transit Integration Strategy sets out a framework for future modifications of the LTC network that will support the implementation of Rapid Transit. Much like the 2015 London Transit Route Network and Service Guideline document, the framework recommended in this report will be subject to further in-depth analysis and review by LTC staff as part of the annual service planning process. Given the extended nature of the forecast (and the number of variables that can change between 2020 and 2035), it is expected that the annual service plan process will lead to a number of changes to the recommendations set out in this strategy. The value of this document is to provide a strategic direction of how the LTC network should integrate with Rapid Transit and to identify the order of magnitude investment required to get there.

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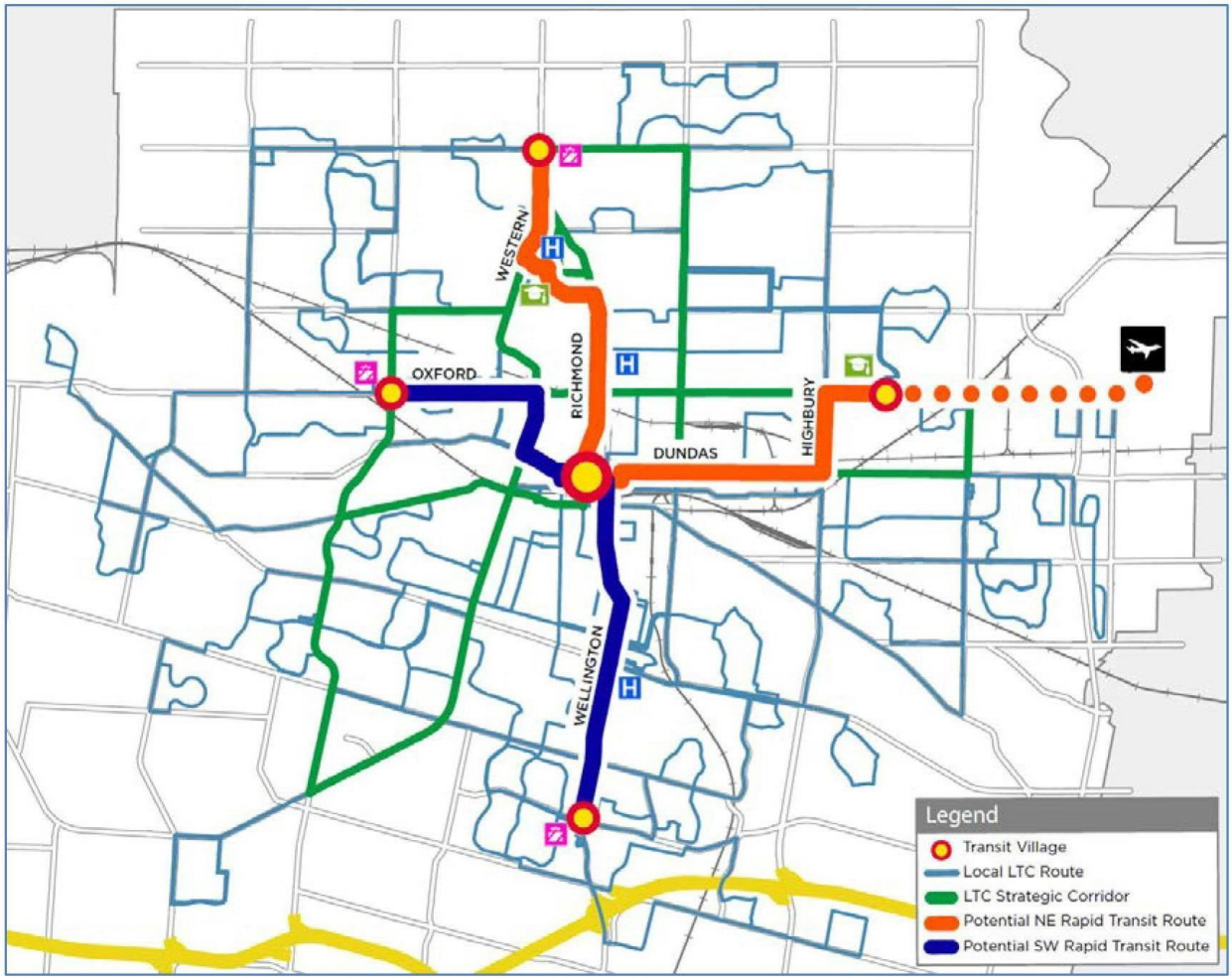
2.0 PROPOSED RT NETWORK AND ASSUMPTIONS

2.1 RT Network Assumptions

The City of London is currently undertaking an Environmental Assessment called "Shift" which will assess alternatives and define where Rapid Transit (RT) will go, what it will look like and how it will be implemented. The study proposes RT along two corridors, shown in **Figure 1**.

Figure 1 – Proposed RT Corridors



The study assessed four alternative technology solutions for each of the corridors:

1. Base BRT Network – Implementation of the BRT network previously developed in the TMP and LTC business case, updated to reflect changed conditions.
2. Full BRT Network – Implementation of full BRT on all RT corridors.
3. Hybrid of BRT and LRT Network – Implementation of LRT along the north and east RT corridors, and implementation of BRT along the south and west corridors.
4. Full LRT Network – Implementation of full LRT on all RT corridors.

The preferred alternative network was presented to Council in early May 2016 and recommended Option 2 (Full BRT on all corridors). Detailed design is planned to begin in mid-2016, and operation of the system is anticipated to begin from 2020-2025. **Figure 2** illustrates the Full BRT Network Alternative corridors, station locations, and technology, as outlined in the May 5, 2016 Staff Report presented to the Strategic Priorities and Policy Committee.

For the purposes of analysis conducted in this report, the Full BRT Network technology option was assessed based on the preferred network identified in **Figure 2** below. A high level analysis was also conducted on the Hybrid Network for comparison.

The Dillon team identified modifications to the LTC route network and confirmed high-level capital (fleet) requirements and costs, operating costs, and passenger revenue projections.

The north-east "L" Line is proposed using BRT technology, connecting Masonville Mall and Western University in the north, the University Hospital, St. Joseph's Hospital, the downtown, and Fanshawe College in the east. The route will operate primarily on Richmond Street north of the downtown, Clarence Street in the downtown and King Street, Dundas Street and Oxford Street east of the downtown.

The south-west "7" Line will also use BRT technology, connecting White Oaks Mall in the south, Victoria Hospital and Parkwood Institute, the downtown, and western London (terminating at Oxford Street and Wonderland Road). The route operates primarily on Wellington Road south of the downtown and Oxford Street north-west of the downtown.

A transfer point between the two routes will be located downtown, at the intersection of Clarence Street and King Street.

The service is recommended to run for 18 hours each day, 7 days per week (6 peak hours, and 12 off-peak hours). **Table 1** illustrates the proposed schedule for both RT corridors. ***An assumption was made that the RT corridors would operate during the same timeframe as LTC routes for the purpose of this analysis.***

Figure 2 – Recommended RT Corridors (Shift)

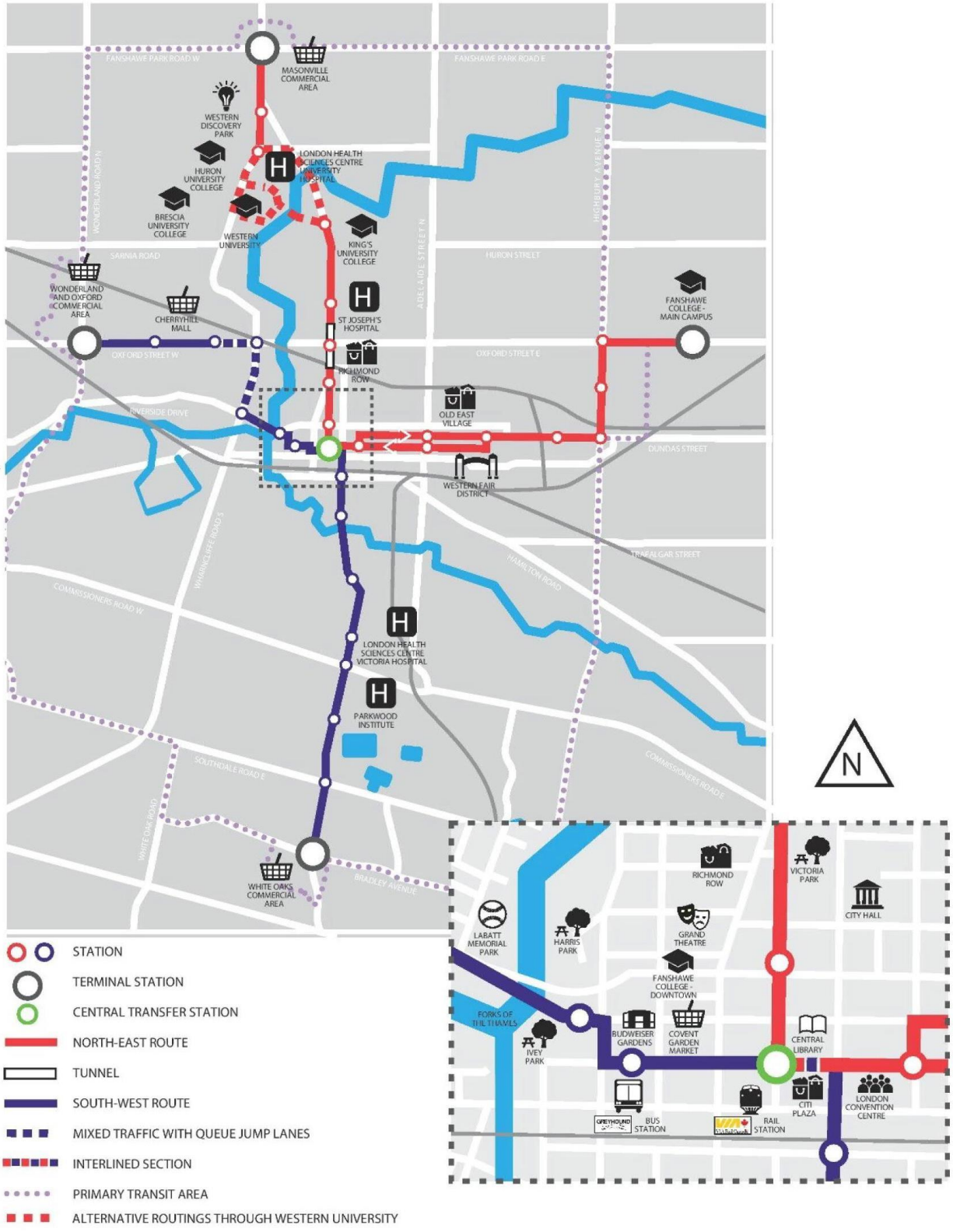


Table 1 – Proposed RT Hours of Service and Headways

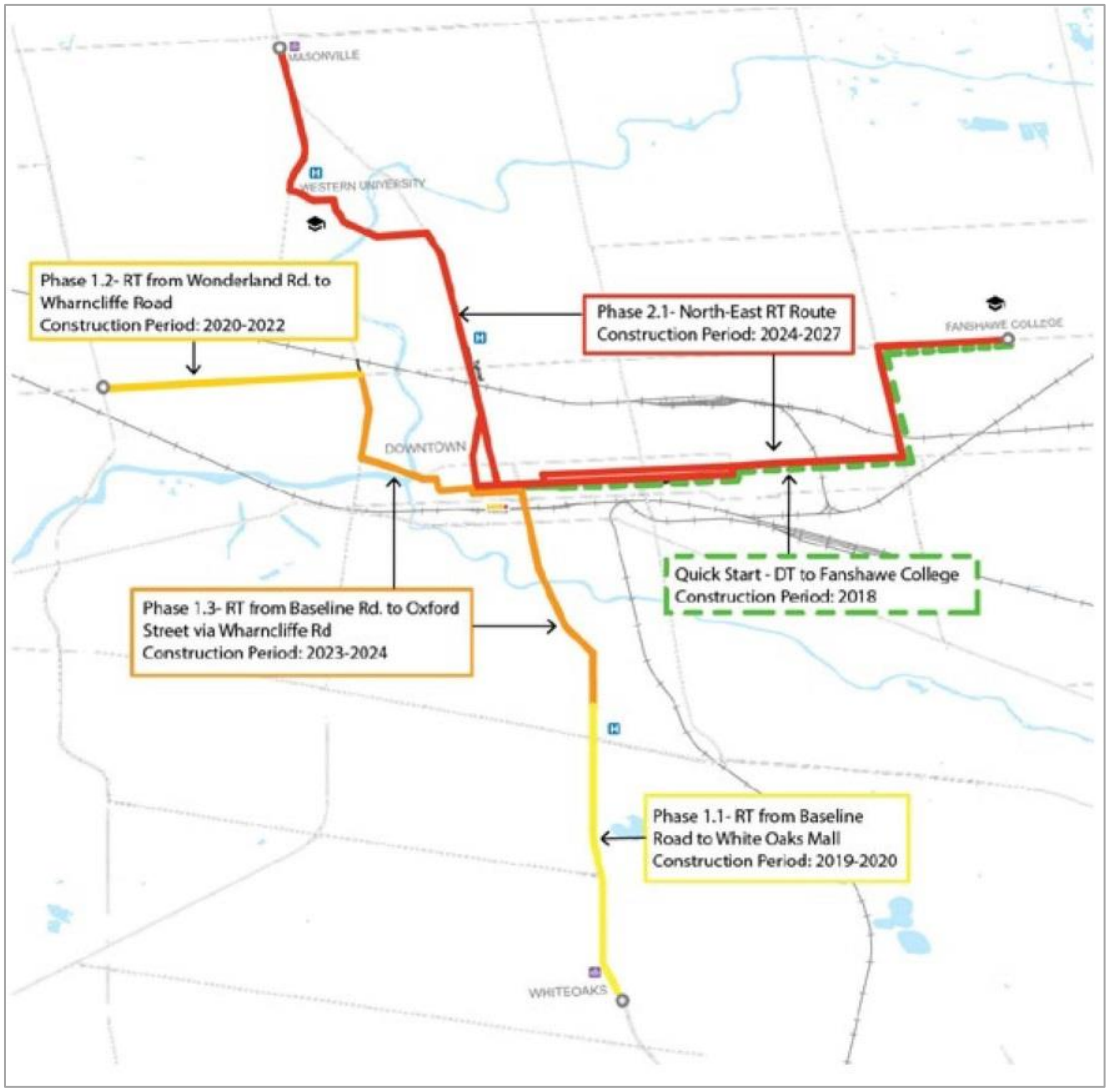
Period		Hours of Service	Headway	
			"L" Line	"7" Line
Weekday	Early Morning	6:00am – 7:00am	10	10
	AM Peak	7:00am – 9:00am	5	10
	Midday	9:00am – 2:00pm	10	10
	PM Peak	2:00pm – 6:00pm	5	10
	Evening	6:00pm – 9:00pm	10	10
	Late Evening	9:00pm – 12:00am	10	10
Saturday	Early Morning	6:00am – 8:00am	10	10
	Morning	8:00am – 10:00am	10	10
	Midday	10:00am – 5:00pm	10	10
	Evening	5:00pm – 9:00pm	10	10
	Late Evening	9:00pm – 12:00am	10	10
Sunday	Morning	7:00am – 9:00am	10	10
	Midday	9:00am – 5:00pm	10	10
	Evening	5:00pm – 11:00pm	10	10

RT service under the both network options is scheduled to be implemented between 2018 and 2027. **Table 2** and **Figure 3** illustrate the proposed staging of service implementation.

Table 2 – Proposed Staging for RT Network

Implementation Timeframe	Phase	Description
North-East "L" Corridor		
2018	Quick Start	Semi-express service between Downtown and Fanshawe College
2024-2027	Phase 2.1	Construction of BRT along entire corridor
South-West "7" Corridor		
2019-2020	Phase 1.1	Construction of BRT from White Oaks Mall to Base Line Road
2020-2022	Phase 1.2	Construction of BRT from Wonderland Road to Wharncliffe Road
2023-2024	Phase 1.3	Construction of BRT from Baseline Road to Oxford Street via Wharncliffe Road

Figure 3 – Proposed RT Staging



2.2 LTC Route Structure Design Principles

The integrated route structure is based on a number of assumptions regarding how service integrates into the RT network. This is based on direction received from the Shift Team as well as best practices from other municipalities that have implemented RT corridors.

RT Network Design Assumptions

There are two types of network design approaches that can be used to integrate local services with RT: "Through-routing" and "Connection-based" networks. "Through-routing" is employed where local routes are permitted to use the RT corridor, including the exclusive lane which provides transit vehicles priority on the network. In this design, local routes can feed into local residential areas and then connect to the RT corridor on route to their final destination (completes full set of "feeder," "line haul," and

"distribution" functions). This approach provides a high proportion of passengers with direct, "one-seat" travel and eliminates the unreliability associated with transfers.

A "connection-based" approach mimics the network design required for fixed-rail services. In this approach, RT routes operate only in the RT corridor and are protected from traffic congestion by transit priority measures. In suburban areas outside the downtown, passengers must rely on feeder bus networks, park-and-ride lots, and active transportation to access service at the stations on the RT corridor.

For London Transit, the Shift Team has recommended the use of a connection-based network outside of the downtown and a through-routing network within the downtown area (bounded by Oxford Street to the north, Waterloo Street to the east, York Street to the south and Wharncliffe Road to the west). However, this should not preclude having some services branch off from the RT corridors and operating as through-routing services.

Based on this network philosophy, the following "rules" were applied when assessing potential modifications to the proposed 2019 LTC network to better connect to the proposed RT corridors:

1. Within the downtown area, LTC bus routes are permitted to operate on exclusive RT lanes, however, they will only be permitted to stop at designated RT stations.
2. Outside of the downtown area, LTC buses will be encouraged to connect to a RT station to allow passengers to complete their trip on RT.
3. On six-lane roadways that include an exclusive RT lane, LTC buses are permitted in the mixed traffic lane to provide a more local service while RT vehicles would operate in a dedicated right-of-way. This allows greater stop spacing for RT and allows better access to transit stops using a local parallel LTC route.
4. On four-lane roadways that include an exclusive RT lane outside of the downtown, local LTC buses are permitted to use short sections of the RT corridors where no other roadway option exists. When this occurs, the assumption is that local LTC buses will not be permitted to stop to pick-up/drop off passengers on the four lane RT corridor, except at a designated RT station.

3.0 RECOMMENDED LTC ROUTE STRUCTURE WITH RT IN PLACE

The following section of the report describes the recommended service strategy for the LTC route network with the full implementation of RT. The LTC service strategy builds on the 2019 service plan identified in the 2015 London Transit Route Structure and Service Guideline document as well as modifications made in the 2016 Annual Service Plan and identifies:

1. Routes that duplicate the RT corridors that can be eliminated
2. Routes that need to be restructured to fit within the "Connection-based" network design concept assumed for RT
3. Potential secondary RT routes that will help increase transit mode share
4. Service level enhancements to the recommended 2019 network that will improve connectivity to the RT network.

3.1 Service Design Principles

Five primary service design principles have been established to guide the overall assessment of LTC routes and their interaction with RT services. These principles are important in that they ensure that the resulting system will be effective and focused on the customer. Using these principles, as well as the above noted RT Network Design assumptions as a guide (**Section 2.0**), each of the proposed 2019 LTC routes (as recommended in the 2015 London Transit Route Network and Service Guideline Study) were assessed to determine potential modifications to better integrate into the proposed RT network. The five principles are described in more detail below:

Principle #1 – Ability to Maintain Connections

Transit routes are most successful when they connect origins and destinations together. The best routes connect people directly between where they live and places where they can work, shop, learn, socialize, and take care of their personal business. They also easily connect with other routes to broaden these opportunities and do so without taking people too far out of their way. The specific application of this connectivity principle for LTC means that:

When making a decision to modify an existing LTC route to connect to a RT corridor, it is important to understand whether the change will improve or worsen the ability for customers to conveniently get to an existing destination along the route. For example, if a proposed route to connect to RT results in the route no longer stopping at other key destinations (e.g. shopping centre, medical facility, school, etc.), a decision will need to be made regarding the benefit of the modification to the customer. If more than two local connections are no longer conveniently made as a result of the proposed route modification, there may be merit in maintaining the route alignment as is.

On the other hand, existing LTC routes that lack a variety of destinations (serve mostly residential areas, for example) would likely benefit from a direct and more frequent connection to RT services that provide these connections.

Principle #2 – Ability to Meet Policy-Based Headways

Under the recommended Full BRT Option, London's proposed "L" Line corridor is planned to operate every 5 minutes during peak periods and every 10 minutes during off-peak periods while the "7" Line BRT corridor is planned to operate every 10 minutes during all periods. These are good frequencies that will generally not require customers to use a timetable, either when boarding the service directly or transferring from one of the regular LTC routes.

When transferring from the RT service to a regular route, it is important that the frequencies of the regular LTC route are enough that customers will not be waiting for excessive amounts of time during most time periods. For key LTC routes, frequencies no more than twice those of the RT service are suggested, particularly during key travel periods. For the Full BRT option, this means that routes that connect to the periphery of a RT corridor should aim to have a minimum 10 to 20 minute service during peak periods and 20 minute service during off-peak periods, particularly the midday period on weekdays and shopping hours on weekends. ***For LTC routes that are projected to have lower ridership, decisions to adjust headways based on this principle will be based on demand and meeting minimum productivity standards in LTC's service standards document (particularly outside the weekday peak periods).***

More frequent service can be operated if warranted by ridership demand. Outside of these time periods (e.g. late evenings and weekends), service frequency should be demand-based and aligned with ridership to ensure the system continues to be cost-effective. All routes will be assessed through annual reviews, and headways may be increased or decreased to suit demand as appropriate.

Table 3 illustrates the proposed headways for LTC routes that connect to the proposed RT corridors. Each potential connecting route was assessed to meet the headway guidelines identified below. The assessment of route structure modifications to integrate with the proposed RT corridors (presented in **Section 3.0** of this report) also evaluates the effectiveness of implementing the 'policy-based' headway noted in **Table 3** below. For example, infrequent routes with low ridership may not warrant the policy-based headways noted below if the route were restructured to connect to the RT network. In certain cases, it may be more cost effective to continue the route downtown with lower headways then it would be to short-turn the route at a RT station and implement the policy-based headways noted below. This formed part of the evaluation process.

Table 3 – Proposed Headways for LTC Routes connecting to RT

Operating Period	RT	LTC Bus Connections
Weekday		
Early AM	10	Demand-based
AM Peak	5 - "L" line 10 - "7" line	10 20
Midday	10	20
PM Peak	5 - "L" line 10 - "7" line	10 20
Early Evening	10	20
Late Evening	10	Demand-based
Saturday		
Early Morning	10	Demand-based
Midday	10	20
Late Evening	10	Demand-based
Sunday/Holiday		
Early Morning	10	Demand-based
Midday	10	20
Late Evening	10	Demand-based

Principle #3 – Directness of Service (Travel Time)

The introduction of RT service and the resulting restructuring of LTC routes should not take customers too far out of their way to complete their journey or increase their overall travel time. They should not be taken too far off the logical path to their destination just to connect with a RT service and the amount of time to complete their trip should not be so much that it becomes unattractive or unacceptable to the customer. Backtracking more than a short distance or increasing the amount of time is to be discouraged when assessing the need to restructure a LTC route to connect to a new RT corridor.

The evaluation of LTC routes in **Section 3.0** of this report took into account the amount of backtracking required to make a connection to RT and compared the change in travel time of routes from the furthest point of the route and the final destination (typically downtown London). It was assumed that the RT routes would travel at a faster speed than LTC routes and that a waiting time of half of the difference between the LTC and RT peak period headway would be applied (e.g. if LTC headway is 10 min and RT headway is 5 min, the average wait time would be 2.5 minutes).

As a general rule of thumb, route modifications that connect to RT that increase travel time by more than 10 percent (or 5 minutes) from end to end were not considered to be a benefit to passengers. In this situation, consideration was made to maintaining the existing alignment with service directly to the main destination (e.g. downtown).

Principle #4 – Minimize Duplication with RT

The design philosophy of the RT corridors is to operate a connection-based network with local LTC routes. This means there is preference to connect local transit routes and operate a feeder/line haul service, where local routes merge and connect to RT stations and allow passengers to complete the rest of their trip on a faster and higher frequency service. Since RT stations are typically spaced farther apart, operating local buses on these corridors with stops located between stations can slow down the progression of RT vehicles if buses and RT vehicles share the same right-of-way.

The 2019 network was reviewed to assess routes that overlap and provide service on the proposed RT corridors. Where this occurs, the objective was to minimize this overlap by eliminating the route or short-turning the route at a RT station. This would apply if the above three principles were maintained. The exception is where regular LTC routes provide a local service with more frequent stop spacing, allowing RT to increase the spacing of stations and thus speed of service. Where this occurs, regular routes will operate in mixed-traffic lanes and to ensure bus stops located between RT stations do not delay RT vehicles.

Principle #5 – Ability to Maintain Effective Operations

With any proposed change to a route, it is important that the change continue to maintain effective operations and integration into the entire network. These system-wide operating principles include connectivity to other routes, good schedule adherence and the ability to maintain clock-face headways where frequencies are low. Each route modification was also evaluated based on the ability to maintain an effective operation.

3.2 Recommended 2035 LTC Network with RT in Place

The five principles identified above were applied to each of the proposed 2019 routes and service levels to create a recommended 2035 network, integrated with the proposed RT system. This is presented in **Table 4** below. The table identifies any potential issues or opportunities that would result with the introduction of RT. Where applicable, a recommendation is made to modify the route or frequency of service. This is evaluated based on the five principles noted above, with revenue vehicle hour and peak vehicle requirements noted.

It should be noted that the focus on these recommendations and evaluation is to integrate the 2019 LTC network with RT. This does not represent a full assessment of other potential modifications that would be required in the fullness of time to the local LTC network. LTC staff will still be required to undertake periodic strategic reviews every five-years and more detailed annual service plans to address capacity and schedule adherence issues, the need to service growing areas of the municipality, accommodating passenger requests or responding to complaints and adjusting services that do not meet the adopted service standards.

Table 4 – Evaluation Summary of LTC Routes with RT in Place

Route	Issue / Proposal	Proposed Modification	Evaluation					Impacts to Service Hours & Bus Requirements	Recommendation
			#1 - Ability to Maintain Connections	#2 - Directness (Travel Time)	#3 - Service Frequency	#4 - Duplication with RT	#5 - Effective Operations		
Route 1	The proposed 2019 route provides downtown connections to the Ridgeview Heights neighbourhood and St. Joseph's Hospital in the north and the Chelsea Green neighbourhood and Victoria Hospital in the south. The route operates at a15 min peak headway. The route splits into two branches (A/B) at Thompson Road and King Edward Avenue. With the implementation of RT, the route will no longer be able to stop on the Richmond corridor in the north, and will somewhat duplicate the Wellington RT corridor in the south. It is proposed that the north portion of the route be realigned to connect to a RT station on the Richmond corridor. Given the close proximity to UWO, an opportunity exists to provide a direct connection to the campus. It is proposed that the south portion of the route be eliminated. Service to South Street Hospital is proposed to be provided via a modified Route 6 (see Route 6). Service on the current branch A/B routes is proposed to be provided with a new Route 1A/B, disconnected from the Route 1 in the north and connecting to the Wellington RT at Bond Street (see Route 1A/B).	1. Maintain existing alignment along Kipps Lane and Huron Street. Travelling west on Huron Street, re-align route to travel north on Richmond Street providing a transfer opportunity at a RT Station south of University Drive. From here, the route would turn west onto University Drive, terminating at UWO. 2. Provide service to the South Street Hospital (via South Street, Colborne Street, and Grey Street) through a revised Route 6 (see Route 6). 3. Provide service to the area currently served by branch A/B routes with a revised Route 1A/B (see Route 1A/B). 4. Reduce weekday peak headway from 30 min to 10 min (7:00am to 9:00am and 2:00pm to 6:00pm). 5. Reduce Saturday base headway and early evening headway from 30 min to 20 min (8:00am to 10:00am; 5:00pm to 9:00pm). 6. Reduce Sunday base headway from 30 min to 20 min (9:00am to 7:00pm).	Passengers destined downtown or to St. Joseph's Hospital will now transfer to the Richmond RT corridor. This connection is still direct and only requires a short transfer. The new route provides a direct connection to Western University. Passengers destined to the south end of the City will transfer twice, to the Richmond RT corridor, and then again to the Wellington RT corridor.	*To Downtown:* -1 min (5%) south-westbound from Adelaide Street & Kipps Lane to downtown London *From Downtown:* +9min (50%) north-eastbound from downtown to Adelaide Street & Kipps Lane. The north-eastbound travel time is slightly higher than the expected standard (due to the longer average transfer time). Travel time to UWO is significantly reduced in both directions.	Route already meets frequency targets.	Modification eliminates duplication of the Richmond Street RT service on the Richmond corridor between Huron Street and downtown. This will also eliminate duplication of the Wellington Street RT service.	Round trip time reduced to 40 to 45min (from 60min). No operating issues noted with proposed change. Route able to operate using a clock-face headway.	-18,665 Annual Service Hours No Change in Peak Period Buses *(Removal of entire Route 1 except for Ridgeview Heights portion)*	The modification improves upon 2019 frequency with less service hours. While the northbound connection from downtown is slightly longer, there is an improved connection directly into UWO campus. Northbound travel time increase is due to the longer potential transfer time. **Implement proposed modification as noted.** **Implementation Year: 2027**
Route 1A/B	The current Route 1A/B is connected to Route 1 at Thompson Road and King Edward Avenue. Given the recommendation to eliminate the south portion of Route 1, it is proposed that Route 1A/B be maintained as a standalone route, connecting to the Wellington RT corridor at Bond Street.	1. Disconnect Route 1A/B from Route 1. Maintain current alignment of Route 1A/B and connect to the Wellington RT corridor at Bond Street. (Rename this route to avoid confusion.) 2. Operate at a 10 min peak frequency (20 min per branch), and a 40min frequency (20 min per branch) at all other times.	Maintains connection to Wellington corridor. Passengers destined downtown will be required to transfer to the Wellington RT corridor through a direct connection with short transfer time.	*To Downtown:* +1min (3%) south-eastbound from downtown to Commissioners & Deveron. *From Downtown:* +1min (6%) north-westbound from Commissioners & Deveron to downtown.	Improved service in weekday evenings, Saturday early mornings and evenings, and all day Sunday.	Elimination of Route 1 south of downtown eliminates duplication of the Wellington RT corridor. Route 1A/B connection into Wellington RT supports use of this service.	40-45min round trip time. Route able to operate using a clock-face headway.	+16,442 Annual Service Hours +2 Peak Period Buses *(Addition of 1A/B back into the corridor)*	The modification supports use of the Wellington RT corridor, provides improved service at several time periods, and maintains existing travel times. **Implement proposed modification as noted.** **Implementation Year: 2027**

Route	Issue / Proposal	Proposed Modification	Evaluation					Impacts to Service Hours & Bus Requirements	Recommendation
			#1 - Ability to Maintain Connections	#2 - Directness (Travel Time)	#3 - Service Frequency	#4 - Duplication with RT	#5 - Effective Operations		
Route 2	The route services Dundas Street and Wharncliffe/Western Road, connecting Western University and Argyle Mall through the downtown. The 2A/B branches service residential neighbourhoods east of Highbury Avenue. The 2019 plan has Route 2 operating at a 10min peak headway to the University and along Dundas. Route 2A/2B operates at a 20min peak headway. The route duplicates the proposed RT service along Dundas Street and along Wharncliffe Road south of Oxford. There is potential to exclude the western portion of the route to minimize overlap. The portion of Route 2 between downtown and UWO would be replaced with a realigned Route 6 (see Route 6).	1. Eliminate the western part of the route and realign the eastern part of the route to create a loop serving the 2A/B portion of the 2019 route east of Highbury. The modified Route 2A/B route would be a two-direction loop travelling on Dundas Street, Bonaventure Drive, Trafalgar Street, and Hale Street, with connections to a RT station on Dundas west of Highbury Avenue. 2. On this realigned route, provide branch headways of 10min per direction in the peak and 30min per direction over the midday, early evening, Saturday, and Sunday base periods.	Connectivity to Argyle Mall is maintained for residents east of Highbury. For other residents, this connection is maintained via a short transfer to/from the Dundas RT.	*To Downtown:* -4 min (12%) westbound from Bonaventure & Dundas to Downtown. *From Downtown:* -11min (24%) eastbound from downtown to Argyle Mall.	Improved frequencies to support connection to RT.	Route 2 is no longer able to operate on Dundas with RT operating on the same corridor. The modification would also help build ridership on the RT corridor by eliminating duplication.	Round trip time reduced to 45-60min (from 90-120min). Route able to operate using a clock-face headway.	-7,132 Annual Service Hours No Change in Peak Period Buses	This modification represents a significant savings in revenue service hours and peak period requirements. Additional capacity will be required between the downtown and Western University (added to Route 6). Due to the higher speed of the RT, travel time savings are apparent to the customer to maintain a downtown and Western University connection. **Implement proposed option as recommended.** **Implementation Year: 2020**
Route 102/106 (formerly Route 2C/6A)	The route forms a loop between the downtown and UWO via Western Road / Wharncliffe Road (102) and Richmond Street (106). The 2016 service plan added bi-directional service on both corridors (previously 102 operated only southbound, and 106 operated only northbound). The route operates only on weekdays in the fall and winter, at a high frequency due to a significant student residential population – 10min headways in the peak, 12-15min headways in the base, and 40min headways in the late evening. There is opportunity to unlink Route 102 and 106, and increase the frequency on Route 102 to compensate for removal of Route 2 off Western Road / Wharncliffe Road. Route 106 duplicates the proposed RT service along Richmond Street. There is potential to remove this route once the RT service is operational in 2027.	1. Unlink Route 102 and 106. 2. Increase frequency of Route 102 in 2020, to 6min during the peak (8:00am to 11:00am and 2:30pm to 6:30pm), 10 min during the midday (11:00am to 2:30pm), and 20min in the late evening (6:30pm to 10:00pm). 3. Eliminate Route 106 in 2027 to avoid duplication of the Richmond RT service.	Connection between UWO and downtown is maintained.	No change to travel time along 102. Route 106 is replaced with the Richmond RT, offering rapid service along the Richmond corridor.	Frequency along the Western Road / Wharncliffe Road corridor increases in 2026 to continue to serve UWO.	Elimination of Route 106 in 2027 avoids duplication with Richmond RT service.	Route 102 round trip time increased to 60min (from 40-48min) due to turnaround in the downtown. Route able to operate using a clock-face headway.	<u>2020</u> +8,433 Annual Service Hours +10 Peak Period Buses <u>2027</u> +996 Annual Service Hours +4 Peak Period Buses	This modification will avoid duplication of the Richmond RT corridor. Additional capacity is required along the Western Road / Wharncliffe Road corridor in 2026, which is provided by increased frequencies on Route 102. **Implement proposed option as recommended.** **Implementation Year: Increased Frequency: 2020** **Removal of Route 106: 2027.**

Route	Issue / Proposal	Proposed Modification	Evaluation					Impacts to Service Hours & Bus Requirements	Recommendation
			#1 - Ability to Maintain Connections	#2 - Directness (Travel Time)	#3 - Service Frequency	#4 - Duplication with RT	#5 - Effective Operations		
Route 3	The route services Hamilton Road and Clarke Road, connecting the to the RT network in the downtown and residents to Argyle Mall in the east end. The 2019 plan has the route operating at a 15min peak headway (30min branch headway). There is no opportunity to modify this route to better integrate with RT without sacrificing coverage on Hamilton Road. Improvements to frequency should be demand-based.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**Maintain Route 3.**
Route 4	The route provides a direct connection from Fanshawe College to south-western neighbourhoods and is very well utilized. South of downtown, it parallels the Wellington RT corridor providing a local service and allowing the Wellington RT service to maintain longer station spacing. North of downtown, the route duplicates the Richmond RT corridor to Oxford Street. The route also provides a direct connection between downtown and Fanshawe College, duplicating the same origin-destination pair as the Dundas RT. The 2016 plan recommends a branch 104 service on this route. Under this plan, Route 4 operates on the full length of the route between White Oaks Mall and Fanshawe College at a peak headway of 15min. Route 104 operates only between the downtown and Fanshawe College at a peak headway of 30min. There is potential to minimize duplication of the Dundas RT corridor by eliminating this new branch Route 104. This portion of the route will be serviced by the Dundas RT service. Duplication of the Richmond RT corridor can also be minimized by rerouting Route 4 onto Colborne Street. This would maintain service in an area previously served by Route 1.	1. Maintain alignment south of downtown and along Oxford Street east of Colborne Street. 2. Re-align the route within downtown to travel north along Ridout Street and use the King Street RT corridor and Queen Street for east-west travel through downtown. Travel north on Wellington Street, east on Dufferin Avenue, north on Colborne Street, east on Oxford Street, and continue to Fanshawe College. 3. Eliminate Route 104.	Minimal impacts to connections as the route alignment is very similar. Provides service on Colborne Street and Dufferin Avenue that is removed with the realignment of Route 1 (see Route 1). Direct connections to downtown, both RT corridors, and Fanshawe College are maintained.	No change to travel time due to near-identical alignment.	Service frequency is reduced between downtown and Fanshawe College (as this portion duplicates the Dundas RT service). Frequency is maintained south of downtown.	Modification eliminates duplication of the Richmond RT service and origin-destination pair between downtown and Fanshawe College.	Round trip time slightly increased to 90-120min (from 90-105min). Route able to operate using a clock-face headway.	-6,615 Annual Service Hours -3 Peak Period Buses *Note: These impacts reflect route realignment and the removal of Route 104.*	The modification provides service back on Colborne Street which was eliminated as part of the Route 1 modification. Modification removes excess service between the downtown and Fanshawe College. **Implement proposed option as recommended.** **Implementation Year: 2020**

Route	Issue / Proposal	Proposed Modification	Evaluation					Impacts to Service Hours & Bus Requirements	Recommendation
			#1 - Ability to Maintain Connections	#2 - Directness (Travel Time)	#3 - Service Frequency	#4 - Duplication with RT	#5 - Effective Operations		
Route 5	The route serves Commissioners Road and Springbank Drive, connecting into downtown at the eastern route terminus. The 2019 plan has Route 5 operating at a 30min peak headway. There is opportunity to improve service as the route connects to downtown where two RT corridors converge. Demand on this route is low during the off-peak periods, however overall productivity is fairly good during the weekday peak and off-peak periods. This should increase when RT is introduced.	1. Reduce Saturday evening headway from 60min to 30min (5:00pm to 9:00pm). 2. Reduce Sunday afternoon headway from 60min to 30min (12:00pm to 6:00pm).	N/A	N/A	Ridership on route does not warrant significant service increase. Weekend increase eliminates 60 min service.	N/A	N/A	+868 Annual Service Hours No Change In Peak Period Bus	The service change improves weekend connectivity to RT for passengers destined to other destination outside of the downtown. **Implement proposed option as recommended.** **Implementation Year: 2027**
Route 6	The route services Richmond Street, connecting UWO to downtown and the London Health Sciences Centre/Victoria Hospital/Parkwood Hospital. The 2019 plan has the route operating at a 20min peak headway. The route will overlap with the Richmond RT once it is operational in 2027. Therefore, there is potential to realign the route to Western Road / Wharncliffe Road at this time. South of the downtown and north of Base Line Road, the route provides a parallel local service for the Wellington RT service. With the removal of Route 1 between the downtown and Baseline Road, there is also an opportunity to realign Route 6 to provide service and local coverage to the South Street Hospital at Colborne Street and South Street (where a high volume of passenger activity occurs).	1. Modify Route 6 north of the downtown to operate on Western Road and Wharncliffe Road between UWO and the downtown. 2. Restructure route south of the downtown to serve the South Street Hospital area. 3. Reduce weekday peak headway from 20min to 15min (7:00am to 8:00am). 4. Reduce weekday base period headway from 30 min to 20 min (8:00am to 2:00pm and 2:00pm to 7:00pm).	Connection between UWO and the downtown (via Western Road), and the Victoria Hospital / Parkwood Hospital is maintained. Connection to the University Hospital / London Health Sciences Centre also maintained. Service alignment maintains local access to South Street and Colborne Street (formerly covered by Route 1), where there is high passenger activity.	*To Downtown:* +3min (15%) northbound from Parkwood Hospital to downtown. *From Downtown:* +2min (13%) southbound from downtown to Parkwood Hospital.	Improved service provides better connections to RT, and a parallel service to the Richmond and Wellington RT corridors.	The route duplicates the Wellington RT corridor, however, provides a local service with closer stop spacing on parallel roads.	Round trip time increased to 100-120min (from 80-90min). Route able to operate using a clock-face headway.	+8,541 Annual Service Hours +4 Peak Period Buses	The modification eliminates the duplication along Richmond and replaces the service on the Western corridor that was lost with the elimination of Route 2 (very high student population). The route south of the downtown is maintained with a slight modification to maintain local coverage to the hospitals. **Implement proposed option as recommended.** **Implementation Year: 2027**
Route 7 (formerly Route 22)	The route connects Argyle Mall in the east to downtown. The 2019 plan has Route 7 operating at a 30min peak headway. The current alignment for the route travels in close proximity to the RT corridor along Dundas Street, but does not directly connect to it. Therefore, it provides a parallel local service to the Dundas RT service and a direct connection downtown from Argyle Mall and surrounding neighbourhoods.	1. As a future modification, the ridership on this route should be monitored closely. If the route attracts little ridership on Florence Street/York Street between Highbury Avenue and the downtown, consideration should be made to short turning this route at Highbury Avenue and Dundas Street and operating as a true 'feeder' service for residents along Wavell Street.	N/A	N/A	Service frequency improvements already made as part of the 2015 London Transit Route Network and Service Guidelines document.	Though the service does not duplicate RT, it runs in close proximity providing a more Local service with closer stop spacing.	N/A	N/A	**Maintain Route 7.** In the future, if ridership increases, consideration should be made to improving frequency.

Route	Issue / Proposal	Proposed Modification	Evaluation					Impacts to Service Hours & Bus Requirements	Recommendation
			#1 - Ability to Maintain Connections	#2 - Directness (Travel Time)	#3 - Service Frequency	#4 - Duplication with RT	#5 - Effective Operations		
Route 9	The route services the Whitehills and Gainsborough Meadows neighbourhoods with a direct connection to downtown via Sarnia Road and Platt's Lane. Route 9A and 9B runs counterclockwise and clockwise around the Wonderland/Aldersbrook loop, respectively. The 2019 plan has the route operating at a 15min peak headway. The route duplicates much of the Oxford RT service between Wonderland Road and downtown. There is potential to short-turn the route and connect to the RT station at Wonderland and Oxford. This would support use of the RT service and provide a new direct connection to Westhill Centre Plaza and London Mall.	1. Modify the route to continue south on Wonderland Road from the Gainsborough Meadows neighbourhood, terminating at the RT station at Wonderland and Oxford. 2. Increase weekday peak period and midday headway in each direction to 20min from 30min (7:00am to 7:00pm). 3. Increase weekday evening headway in each direction to 30min from 60min (7:00pm to 11:00pm). 4. Increase Saturday early morning headway in each direction to 30min from 60min (6:00am to 10:00am). 5. Increase Saturday midday headway in each direction to 20min from 60min (10:00am to 7:00pm). 6. Increase Saturday evening headway in each direction to 30min from 60min (7:00pm to 11:00pm). 7. Increase Sunday daytime headway in each direction to 20min from 60min (9:00am to 7:00pm). 8. Introduce new service Sunday early morning at a 40 min headway in each direction (7:00am to 9:00am). 9. Increase service on Route 10 to accommodate capacity reduction on Sarnia Road from realignment (impacts captured under Route 10).	New connection provided to Westhill Centre Plaza and London Mall. Connection to downtown maintained via transfer onto Oxford RT corridor. Connection to UWO maintained on Route 31.	*To Downtown:* +3min (12%) southeastbound from Aldersbrook & Blackacres to downtown. *From Downtown:* +5min (19%) northwestbound from downtown to Aldersbrook & Blackacres.	Improved service in most time periods. Ridership warrants increase in off-peak frequency.	Modification eliminates duplication of the Oxford RT service east of Wonderland Road.	Round trip time maintained approximately the same, at 30-60min (from 40-75min). Route able to operate using a clock-face headway.	+1,617 Annual Service Hours -1 Peak Period Buses	The modification eliminates duplication on the Oxford RT while still maintaining a good level of service for passengers. Permits off-peak frequency to increase without an increase in service hours. **Implement proposed option as recommended.** **Implementation Year: 2022**

Route	Issue / Proposal	Proposed Modification	Evaluation					Impacts to Service Hours & Bus Requirements	Recommendation
			#1 - Ability to Maintain Connections	#2 - Directness (Travel Time)	#3 - Service Frequency	#4 - Duplication with RT	#5 - Effective Operations		
Route 10	The route operates from the White Oaks Mall to UWO, with limited service extending to Masonville Mall. Ridership is busiest north of Oxford Street to UWO and on the weekends to Masonville Mall. The 2019 plan has Route 10 operating at a 20min peak headway. There is an opportunity to increase the frequency of Route 10 to accommodate existing demand and support ridership growth. This is particularly important with the realignment of Route 9 off of Sarnia Road (discussed under Route 9 above).	1. Operate the route to Masonville Mall during all time periods. 2. Reduce weekday base and early evening headway from 30min to 20min (9:00am to 2:00pm and 6:00pm to 9:00pm). 3. Reduce Saturday midday headway from 30min to 20min (10:00am to 5:00pm). 4. Reduce Sunday late evening headway from 60min to 30min (6:00pm to 11:00pm).	Improved connection to Masonville Mall at all time periods.	N/A	Improved service in many time periods.	N/A	N/A	+8,444 Annual Service Hours No Change In Peak Period Buses	This frequency improvement supports the removal of Route 9 from Sarnia Road and improves connections to the Oxford RT and the Wellington RT. **Implement proposed option as recommended.** **Implementation Year: 2024**
Route 11	The route connects Westmount Mall to the downtown, traveling along Commissioners Road, Base Line Road, Emery Street, Wharncliffe Road, and York Street. The 2019 plan has Route 11 operating at a 30min peak headway. There are no opportunities to connect this route to the RT corridor outside of the downtown without impacting system coverage and customer travel time.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**Maintain Route 11.**
Route 12	The route provides service along Wharncliffe Road, connecting residential and commercial/industrial areas in southwest London to the downtown. The 2019 plan has Route 12 operating at a 20min peak headway.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**Maintain Route 12.**

Route	Issue / Proposal	Proposed Modification	Evaluation					Impacts to Service Hours & Bus Requirements	Recommendation
			#1 - Ability to Maintain Connections	#2 - Directness (Travel Time)	#3 - Service Frequency	#4 - Duplication with RT	#5 - Effective Operations		
Route 13	The route operates along Richmond Street and Wellington Road, connecting Masonville Mall, UWO, the London Health Sciences Centre/Victoria Hospital/Parkwood Institute, and White Oaks Mall. The 2019 plan has Route 13 operating at a 15min peak headway, and Route 13A/B operating at a 30min peak headway. The route duplicates the Richmond RT service (north of Queens Avenue) and Wellington RT service (south of Queens Avenue). The northern section of the route must be eliminated or modified, as the local bus will not be able to operate alongside the RT service. There is potential to eliminate the route south of Queens Avenue as well, and maintain only the 13A/B loops. The Jalna Boulevard loop currently in Route 26 can also be incorporated. Construction on the RT corridor between White Oaks Mall and Base Line Road is anticipated to be complete in 2020, while construction between Base Line Road and downtown London will not be complete until 2024. For this period of time (from 2020 to 2024), Route 13 will operate express service between Base Line Road and White Oaks Mall, as it cannot make stops within the RT corridor.	1. From 2020 to 2024, operate the section of the route from Base Line Road to White Oaks Mall as a semi-express service with stops only at the RT stations. 2. In 2024, eliminate the portion of the route south of downtown, except for the current 13A/B branches that extend into the east and west side of Wellington. 3. Modify the 13A/B branches to create one continuous bi-directional loop route, connecting to the RT station at White Oaks Mall. 4. Operate the 13A/B branch portion of route at 30 min headway per direction during AM and PM peaks, 40 min headway during early mornings, midday, and early evening period, and 60min per direction in late evenings. 5. Operate the 13A/B branch on Saturday at 40min headway per direction during base and early evening periods, and 60min early morning and late evening. 6. Operate the 13A/B branch on Sunday at 40min headway per direction during base period, and 60min early morning and evening. 7. Operate the portion of route on Richmond north of downtown at the same frequency (no change) 8. In 2027, eliminate the route north of downtown.	Direct connection to White Oaks Mall maintained, at the RT station. Connection to all other destinations maintained through a transfer to the RT service.	*To Downtown:* +1min (4%) northbound from Adelaide & Osgoode to downtown. *From Downtown:* +4min (15%) southbound from downtown to Adelaide & Osgoode.	Improved service frequency at many time periods.	Modification eliminates duplication of RT on Richmond Street and Wellington Road.	Round trip time decreased to 40-80min (from 90-120min). Route able to operate using a clock-face headway.	<u>2024</u> +15,881 Annual Service Hours +4 Peak Period Buses <u>2027</u> -2,360 Annual Service Hours No Change In Peak Period Buses	The Wellington Road RT will be implemented in 2024 while the Richmond RT will be implemented in 2027. This recommendation will need to be implemented in two phases. **Implement proposed option between White Oaks Mall and downtown as recommended.** **Implementation Year: 2024** **Removing service north of downtown on Richmond** **Implementation Year: 2027**

Route	Issue / Proposal	Proposed Modification	Evaluation					Impacts to Service Hours & Bus Requirements	Recommendation
			#1 - Ability to Maintain Connections	#2 - Directness (Travel Time)	#3 - Service Frequency	#4 - Duplication with RT	#5 - Effective Operations		
Route 14	The route services Highbury Avenue, connecting the Ridgeview Heights neighbourhood in the north to White Oaks Mall in the south. The route is also interlined with Route 10, providing a continuous two-way peripheral route in south London. The 2019 plan has Route 14 operating at a 20min peak headway. There is an opportunity to improve service as the route is a Base Arterial Route and provides connection to Wellington RT corridor at White Oaks Mall and Dundas RT corridor at Oxford St. and Highbury Ave.	1. Reduce weekday base and early evening headway from 30min to 20min (9:00am to 2:00pm and 6:00pm to 9:00pm). 2. Reduce Saturday midday headway from 30min to 20min (10:00am to 5:00pm). 3. Reduce Sunday late evening headway from 60min to 30min (6:00pm to 11:00pm).	N/A	N/A	Improved service frequency at many time periods.	N/A	N/A	+4,051 Annual Service Hours No Change In Peak Period Buses	This frequency improvement will improve connection the Dundas RT corridor and allow Route 14 to continue to interline with Route 10. **Implement proposed option as recommended.** **Implementation Year: 2024**
Route 15	The route serves the southwest London area, including the Berkshire Village and Southcrest Estates areas. The route connects Westmount Mall to downtown. The 2019 plan has Route 15 operating at a 15min peak headway. Opportunities were explored to connect this route to the Wellington RT corridor. Analysis of this option revealed an increase in travel time and the reduction of coverage in neighbourhoods that would no longer receive transit service. This was not carried forward. There is opportunity to improve service as the route connects to RT corridors in the downtown, and improvements to service on this route is required to enhance connections to other destinations in the city.	1. Reroute to connect to the Wellington RT corridor at Wellington and Commissioners.	Rerouting would eliminate direct connection to downtown.	*To Downtown:* +7min (30%) northbound from Viscount & Andover to downtown. *From Downtown:* +11min (58%) southbound from downtown to Viscount & Andover. This is not within the service performance targets.	Improved service frequency on Saturdays.	N/A	Rerouting Route 15 would require separation from Route 31 (the two routes are currently interlined), and would make achieving a clock-face headway challenging.	N/A	Do not reroute to connect to the Wellington RT corridor. Increase headway on Saturdays, as this will help improve connections to RT. **Maintain existing route alignment.** **Implementation Year: 2027**
Route 16	The route services Adelaide Street from Fanshawe Park Road in the north to Commissioners in the south. Service is provided to the London Health Sciences Centre/Victoria Hospital/Parkwood Hospital. The 2019 plan has Route 16 operating at a 15min peak headway, and Route 16A/B operating at a 30min headway. There is an opportunity to improve service as Route 16 is a base arterial route with connections to the Dundas and Wellington RT corridors and is identified as a potential future RT corridor in The London Plan.	1. Reduce weekday base mainline headway (9:00am to 2:00pm) from 20min to 10min. 2. Reduce Saturday morning mainline headway from 30min to 20min (8:00am to 10:00am). 3. Reduce Sunday base mainline headway from 30min to 20min (9:00am to 7:00pm).	N/A	N/A	The frequency increase improves connections to both RT corridors. Ridership on this corridor is high and frequency improvement expected to maintain productivity targets.	N/A	N/A	+8,745 Annual Service Hours +3 Peak Period Buses	Headway increase during off-peak periods will help improve connections to RT **Implement proposed option as recommended.** **Implementation Year: 2024**

Route	Issue / Proposal	Proposed Modification	Evaluation					Impacts to Service Hours & Bus Requirements	Recommendation
			#1 - Ability to Maintain Connections	#2 - Directness (Travel Time)	#3 - Service Frequency	#4 - Duplication with RT	#5 - Effective Operations		
Route 17	The route primarily services Oxford Street between Argyle Mall to the east and the Riverbend and Byron neighbourhoods to the west. The 2019 plan has Route 17 operating at a 20min peak, midday and early evening headway. There is opportunity to improve service as the route forms part of the Frequent Transit Network.	1. Reduce Saturday early morning headway from 40min to 30min (6:00am to 8:00am).	N/A	Maintaining the route provides direct east-west travel on a major corridor.	N/A	Duplicates part of the RT corridors between Wharncliffe and Wonderland, and Highbury and Fanshawe College.	No operations issues identified.	+122 Annual Service Hours No Change In Peak Period Buses	Headway increase during off-peak periods will help improve connections to RT **Implement proposed option as recommended.** **Implementation Year: 2027**
Route 19	The Route provides a direct connection between the Hyde Park Power Centre and downtown London via Hyde Park Road and Riverside. The 2019 plan has Route 19 operating at a 30min peak headway. There is an opportunity to connect the route to the Oxford RT corridor at Wonderland Road. There is also potential to extend service hours to improve late evening coverage.	1. Modify to route to eliminate the portion east of Wonderland Road to the downtown. Connect the route to the RT Station at Oxford and Wonderland. 2. Extend service by one hour from 11:00pm to 12:00am weekdays and Saturdays. 3. Modify service levels to interline with Route 31 and 32. Increase weekday peak from 30 min to 15 min headway, weekday midday from 30 min to 20 min headway, weekday evening from 60 min to 30 min headway, Saturday evening from 60 min to 30 min headway, and Sunday midday from 60 min to 30 min headway. Add new service weekday late evening at a 30 min headway, Saturday early morning at a 45 min headway, Saturday late evening at a 60 min headway, and Sunday evening at a 60 min headway.	Outside of the downtown, existing connections to destinations are maintained.	*To Downtown:* +9min (37%) increase south-eastbound from Gainsborough & Hyde Park to downtown. *From Downtown:* +19min (92%) increase north-westbound from downtown to Gainsborough & Hyde Park. This is not within the service performance targets.	Does not meet policy-based headway improvement to 20min when connecting to a RT corridor. Ridership is low on this route and off-peak headway increase would likely not meet productivity targets.	Modification would eliminate the portion of the service on Riverside east of the downtown	New route does provide a clock-face headway, which may make it difficult to make connections with the Oxford RT.	+6,718 Annual Service Hours +2 Peak Period Buses	The new route structure will result in an increase in service hours as a result of the need to improve frequency to connect to RT. This is a low ridership route and there is little benefit to make the connection. **Maintain existing route structure and frequency. Extend service by one hour.** **Implementation Year: 2027**

Route	Issue / Proposal	Proposed Modification	Evaluation					Impacts to Service Hours & Bus Requirements	Recommendation
			#1 - Ability to Maintain Connections	#2 - Directness (Travel Time)	#3 - Service Frequency	#4 - Duplication with RT	#5 - Effective Operations		
Route 20	The route connects Fanshawe College to downtown and residential areas to the west of UWO. The 2019 plan has Route 20 operating at a 15min peak headway. The route cannot operate on Dundas Street between downtown and Highbury Avenue, since RT will be operating in this corridor. The route also duplicates much of the Oxford RT route between Wonderland Road and downtown, and the Dundas RT route between downtown and Fanshawe College. There is opportunity to realign this route to reduce duplication of RT routes.	1. Re-align the route to travel along Oxford Street between Wonderland Road and Fanshawe College, maintain local connections to Proudfoot Lane, Cherryhill Boulevard, and Mornington Avenue. 2. Add one roundtrip at 12:00am. 3. Increase Saturday early morning headway from 45 min to 40 min (6:00am to 8:00am). 4. Increase Sunday base period headway from 30 min to 20 min (9:00am to 7:00pm).	Transfer to RT is required for passengers destined downtown. All other connections are maintained, or provided directly via new RT service.	*To Downtown:* -1min (2%) eastbound from Oakcrossing to downtown *From Downtown:* -5min (15%) westbound from downtown to Oakcrossing.	Improves service frequency on Oxford Street. No additional service frequency improvements required to connect to RT.	Modification would eliminate duplication of both the Dundas RT and Oxford RT.	Round trip time reduced to 60min (from 90-120min). Route able to operate using a clock-face headway.	-13,368 Annual Service Hours -4 Peak Period Buses	Modification reduces duplication with RT while improving service levels on Oxford St. Connections to Fanshawe College are maintained. **Implement proposed option as recommended.** **Implementation Year: 2022**
Route 21	The route serves residential neighbourhoods in northeast London, and connects directly to downtown. The 2019 plan has Route 21 operating at a 15min peak headway. This route will require modifications to remove service off Richmond Street to the downtown to avoid duplication of service with the RT corridor. The revised corridor will connect to a RT station on Richmond. Rather than turning the route around, there is an opportunity to connect to UWO. The corridor also runs parallel to the east-west RT corridor near Oxford Street at Fanshawe College. Opportunities to connect this route to this corridor should be explored.	1. Re-structure route to begin route at Fanshawe College, travel north to Beckworth Avenue and loop around the Huron Heights neighbourhood, travel west along Huron Street, south on McNay Street to Cheapside Street. At the intersection of Cheapside Street and Richmond, head north on Richmond operating express to University Drive. Turn west on University Drive. 2. The route realignment assumes a RT station is in place at the intersection of Richmond Street and Cheapside to facilitate connections to the RT corridor.	Connections are improved with link to Fanshawe College and UWO. Downtown connection is maintained through link to RT.	*To Downtown:* -1min (3min) westbound from Oakville & Huron to downtown *From Downtown:* +6min (25%) eastbound from downtown to Oakville & Huron	Service frequency increased	Modification would eliminate duplication of RT service along Richmond Street.	Round trip time increased to 100-120min (from 60min). Route able to operate using a clock-face headway.	+9,061 Annual Service Hours +3 Peak Period Buses	The modification is required to eliminate duplication on the Richmond RT corridor. It also improves connections to UWO, Fanshawe College and the Dundas RT corridor. **Implement proposed option as recommended.** **Implementation Year: 2027**
Route 23	The route connects Westmount Mall in the southwest to downtown, providing service to several residential areas. The 2019 plan has Route 23 operating at a 30min peak headway. There is opportunity to improve headways during the peak periods.	1. Introduce service on Sundays, operating at 30min headway during the day (9:00am to 7:00pm) and 60min headway in the evening (7:00pm to 11:00pm).	N/A	N/A	Improved service frequency during the weekday peak, and new service on Sundays.	N/A	N/A	+2,868 Annual Service Hours No Change In Peak Period Bus	The service increases improve connections to downtown. **Implement proposed option as recommended.** **Implementation Year: 2027**

Route	Issue / Proposal	Proposed Modification	Evaluation					Impacts to Service Hours & Bus Requirements	Recommendation
			#1 - Ability to Maintain Connections	#2 - Directness (Travel Time)	#3 - Service Frequency	#4 - Duplication with RT	#5 - Effective Operations		
Route 24	The route services Viscount Road and Baseline Road, providing connections from the south Byron neighbourhood to the London Health Sciences Centre/Victoria Hospital/Parkwood Institute. The 2019 plan has Route 24 operating at a 30min peak headway. There is potential to improve service as the route provides direct connection to Wellington RT corridor.	1. Reduce weekday peak period headway from 30min to 20min (7:00am to 9:00am and 2:00pm to 6:00pm). 2. Reduce weekday base headway from 60min to 30min (9:00am to 2:00pm). 3. Introduce Saturday and Sunday service at a 60min headway at all time periods of the day.	N/A	N/A	N/A	N/A	N/A	+4,972 Annual Service Hours +1 Peak Period Bus	The service level increase improves connections to the Wellington RT corridor. **Implement proposed option as recommended.** **Implementation Year: 2024**
Route 25	The route services Highbury Avenue and Fanshawe Park Road, connecting Fanshawe College with Masionville Mall. The 2019 plan has Route 25 operating at a 30min peak headway. There is an opportunity to improve service as the route connects to Richmond RT corridor at Masonville Mall and Oxford RT corridor at Fanshawe College.	1. Reduce weekday peak period headway from 30min to 15min. 2. Reduce weekday late evening headway from 60min to 30min (9:00pm to 12:00am), and midday headway from 30min to 20min (9:00am to 2:00pm). 3. Reduce Saturday morning and late evening headway from 60min to 30min (8:00am to 10:00am and 9:00pm to 12:00am). 4. Reduce Sunday late evening headway from 60min to 30min (7:00pm to 11:00pm). 5. Introduce new service Sunday morning at a 60 min headway (7:00am to 9:00am).	N/A	N/A	Improved service frequency during many time periods.	N/A	N/A	+5,680 Annual Service Hours +2 Peak Period Buses	The frequency improvement is required to meet policy based headways for routes connecting to RT. **Implement proposed option as recommended.** **Implementation Year: 2027**

Route	Issue / Proposal	Proposed Modification	Evaluation					Impacts to Service Hours & Bus Requirements	Recommendation
			#1 - Ability to Maintain Connections	#2 - Directness (Travel Time)	#3 - Service Frequency	#4 - Duplication with RT	#5 - Effective Operations		
Route 26	The route connects residential neighbourhoods to the south directly to downtown, traveling mainly along Wharncliffe Road, Highview Avenue, Homeview Road, and White Oak Road. The 2019 plan has Route 26 operating at a 30min peak headway. The route parallel to the proposed RT along Wellington and to Route 93. There is potential to eliminate the route and compensate with additional service on Route 93.	1. Eliminate route. 2. Re-align Route 93 to traverse from Wharncliffe Road to Wellington Road via Highview Avenue, Ferndale Avenue, Dundalk Drive, Jalna Boulevard, and Bradley Avenue. 3. Provide additional off-peak service on Route 93 to compensate for elimination of Route 26. Provide headways of 15 min in peak, 20 min off-peak in weekdays, 20 min weekday evenings and weekends, 30 min weekday late evenings, and 40 min weekend late evenings. 4. Route 93 will be a local route south of Highview Avenue and run Express north of Highview Avenue.	Connection to White Oaks Mall maintained, and service to residential neighbourhoods continued. Direct connection to downtown no longer available, and passengers will be required to transfer to the Wellington RT service.	*To Downtown:* -2min (7%) northbound from Jalna & Bradley (west stop) to downtown *From Downtown:* +6min (33%) southbound from downtown to Jalna & Bradley (west stop)	Corridor still provides a high frequency with extension of Route 93.	Modification will encourage more connections to the Wellington RTcorridor from Southdale, reduce duplication of service on Wharncliffe Road and provide a direct express connection to UWO.	No operations issues identified	-11,730 Annual Service Hours -2 Peak Period Buses *These are the impacts for removal of Route 26. For impacts due to changes to Route 93, see Route 93.*	Implement Proposed Option as recommended. **Implement proposed option as recommended.** **Implementation Year: 2024**
Route 27	The route is short, and provides service between Fanshawe College and the residential neighbourhoods to the northwest. The 2019 plan has Route 27 operating at a 30 min peak headway. The route has a good connection to the Dundas RT corridor, and there is opportunity to improve service as the route is a Base Arterial Route with high ridership during the school semester.	1. Increase fall/winter weekday peak headway from 15 min to 10 min (7:30am to 9:00am and 2:00pm to 6:00pm). 2. Increase spring/summer weekday headway to 20 min at all time periods (7:30am to 12:00am).	N/A	N/A	N/A	N/A	N/A	+2,371 Annual Service Hours +1 Peak Period Buses	The route already has a good connection to the Dundas RT corridor. **Maintain Route 27 with service improvements.** **Implementation Year: 2020**
Route 28	The route provides service primarily along Wharncliffe Road and Wonderland Road, connecting Westmount Mall to a smaller residential area to the southwest. The 2019 plan has Route 28 operating at a 30min peak headway. The route does not connect to RT and has low ridership. Therefore, service improvements are not warranted.	N/A	N/A	NA	NA	N/A	NA	N/A	The route does not connect to RT. It is a low ridership route and service improvements should be demand-based. **Maintain Route 28.**

Route	Issue / Proposal	Proposed Modification	Evaluation					Impacts to Service Hours & Bus Requirements	Recommendation
			#1 - Ability to Maintain Connections	#2 - Directness (Travel Time)	#3 - Service Frequency	#4 - Duplication with RT	#5 - Effective Operations		
Route 29	The route is a short-turn of Route 10, and provides service between UWO and a residential area near Oxford and Wonderland, traveling mainly on Sarnia Road and Wonderland Road. The 2019 plan has Route 29 operating at a 15min peak headway. There is potential to remove this route, as the area around Westhill Centre Plaza is served by Route 9, and Route 10 provides a direct connection (With improved service frequencies) between Westhill Centre Plaza and UWO.	1. Eliminate route.	Direct connection between Capulet Lane and UWO removed.	Direct connection maintained between Westhill Centre Plaza and UWO via Route 10.	Route 10 service frequencies improved at many time periods.	N/A	No operations issues identified.	N/A	The direct connection between Capulet Lane and UWO is important to maintain, as many students live in this neighbourhood. **Maintain route.**
Route 30	The route services predominantly employment areas, connecting to White Oaks Mall in the west. The 2019 plan has Route 30 operating at a 40min peak headway.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**Maintain Route 30.**
Route 31	The route connects residential areas to the northwest UWO. The 2019 plan has Route 31 operating at a 30min peak headway. Ridership does not warrant service improvements, however the route is interlined with Route 32, and therefore headways must match on both routes.	1. Increase weekday peak headway from 30 min to 15 min (7:00am to 9:00am and 2:00pm to 6:00pm). 2. Increase weekday base period headway from 30 min to 20 min (9:00am to 2:00pm). 3. Add new service Saturday early morning at 45 min headway (6:00am to 8:00am) and Saturday late evening at 60 min headway (11:00pm to 12:00am). 4. Increase Sunday base period headway from 60 min to 30 min (8:30am to 6:30pm). 5. Add new service Sunday evening at 60 min headway (6:30pm to 11:30pm).	N/A	N/A	N/A	N/A	N/A	+5,318 Annual Service Hours +2 Peak Period Buses	The route connects to UWO. Frequency improvements should be implemented to maintain interlining with Route 32. **Maintain Route 31, with service improvements.** **Implementation Year: 2027.**

Route	Issue / Proposal	Proposed Modification	Evaluation					Impacts to Service Hours & Bus Requirements	Recommendation
			#1 - Ability to Maintain Connections	#2 - Directness (Travel Time)	#3 - Service Frequency	#4 - Duplication with RT	#5 - Effective Operations		
Route 32	The route connects the Ridgewood Heights and Stoney brook Acres neigbhourhoods to UWO. The 2019 plan has Route 32 operating at a 30min peak headway. Due to the updated alignment of the RT, Richmond Street is unserviced between Windermere Road and University Drive. There are a series of mid- and high-density residential buildings in this area which would benefit from direct service. There is potential for Route 32 to be modified to provide service to this area. There is also opportunity to improve service levels as the route connects to the Richmond RT corridor at Richmond and Windermere.	1. Modify route to run along Richmond from Windermere Road to University Drive. 2. Reduce weekday peak headway from 20min to 15min 7:00am to 9:00am and 2:00pm to 6:00pm. 3. Reduce weekday late evening headway from 60min to 30min (6:00pm to 11:00pm). 4. Reduce Saturday early evening headway from 60min to 30min (5:00pm to 11:00pm). 5. Introduce new late evening Saturday service at a 60min headway (11:00pm to 12:00am). 6. Reduce Sunday daytime headway from 60min to 30min (9:00am to 7:00pm, and introduce a new late evening service at a 60min headway (7:00pm to 11:00pm).	Connections to UWO are maintained with proposed realignment.	N/A	Improved service, and extended operating hours on weekends	N/A	No Change in round trip time. Route able to operate using a clock-face headway.	+7,182 Annual Service Hours +2 Peak Period Buses	The modification will improve connections to the RT corridor and provide local service to a high density area no longer serviced by LTC with the introduction of RT **Implement proposed option as recommended.** **Implementation Year: 2027**
Route 33	The route travels south from UWO along Western Road and Platt's Lane, through the Cherryhill neighbourhood and Village Mall, and continues on to Proudfoot Lane and Farrah Road. The 2019 plan has Route 33 operating at a 15 min peak headway. Due to the proposed elimination of Route 9 from Sarnia Road, service levels must be improved to compensate.	1. Increase peak and midday headway during the Fall/Winter Schedule from 15min to 10min (7:45am to 6:00pm).	N/A	N/A	N/A	N/A	N/A	+2,131 Annual Service Hours +1 Peak Period Bus	**Implement proposed option as recommended.** **Implementation Year: 2024**
Route 34	The route connects Masonville Mall to UWO, serving residential streets to the west of Masonville Mall as well. The 2019 plan has Route 34 operating at a 30min peak headway. The route overlaps with the proposed RT route along Richmond Street, and therefore there is potential to eliminate the portion of the route along Richmond, modifying the route to be a loop. There is also potential to reroute the alignment north of Fanshawe Park Road and improve service to provide improved connection to Richmond RT corridor.	1. Modify the route to eliminate the connection to UWO. This will shorten the route with a direct connection to the RT corridor and allow for an increased service frequency. 2. Reduce weekday peak period headway from 30min to 15min (7:30am to 9:00am and 2:30pm to 6:30pm). 3. Introduce midday service operating at a 30min headway (9:00am to 2:30pm).	Direct connection to UWO not maintained – passengers must transfer to Richmond RT.	*To UWO:* -4min (20%) southbound from Pinnacle & Fanshawe to UWO *From UWO:* +8min (66%) northbound from UWO to Pinnacle & Fanshawe	Improved service during many time periods.	Modification of the route will eliminate duplication of RT along Richmond Street	Roundtrip time decreased to 20-30min (from 30min). Route able to operate using a clock-face headway.	+1,483 Annual Service Hours +1 Peak Period Bus	**Implement Proposed Option as recommended.** **Implementation Year: 2027**

Route	Issue / Proposal	Proposed Modification	Evaluation					Impacts to Service Hours & Bus Requirements	Recommendation
			#1 - Ability to Maintain Connections	#2 - Directness (Travel Time)	#3 - Service Frequency	#4 - Duplication with RT	#5 - Effective Operations		
Route 35	The route connects Argyle Mall to residential streets to the southeast. The 2019 plan has Route 35 operating at a 30min peak headway.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**Maintain Route 35.**
Route 36	The route services Oxford Street east of Fanshawe College, providing connections to the College and the airport. The 2019 plan has Route 36 operating at a 30min peak headway. There is potential to improve service to meet growing demand to the Airport, particularly from Fanshawe College students. Route 36 also provides connection to Oxford RT corridor from Fanshawe College.	1. Reduce weekday peak period headway from 30min to 15min (7:00am to 9:00am and 2:30pm to 6:00pm). 2. Extend weekday service to the early evening period at a 30min headway (6:00pm to 10:30pm).	N/A	N/A	Improved peak service, and extended service hours.	N/A	N/A	+2,530 Annual Service Hours +1 Peak Period Bus	**Implement proposed option as recommended.** **Implementation Year: 2027**
Route 37	The route services Dundas Street, Veterans Memorial Parkway, and Sovereign Road, connecting to Argyle Mall in the north terminus. The 2019 plan has Route 37 operating at a 30 min peak headway. No modifications are required to this route.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**Maintain Route 37.**
Route 38	The route connects Masonville Mall to surrounding residential neighbourhoods. The 2019 plan has Route 38 operating at a 30min peak headway. There is opportunity to improve service as route provides connection to Richmond RT corridor at Masonville Mall.	1. Reduce weekday peak period headway from 30min to 15min (7:00am to 9:00am and 2:00pm to 6:00pm). 2. Reduce Sunday base headway from 60min to 30min (9:00am to 7:00pm).	N/A	N/A	Improved service in weekday peak periods and on Sundays.	N/A	N/A	+1,818 Annual Service Hours +1 Peak Period Bus *(interlined with Route 39)*	**Implement proposed option as recommended.** **Implementation Year: 2027**
Route 39	The route services Fanshawe Park Road west of Richmond Street, connecting to Masonville Mall at the eastern terminus. The 2019 plan has Route 39 operating at a 30min peak headway. As noted in Part 2, there is opportunity to improve service as route provides connection to Richmond RT corridor at Masonville Mall.	1. Reduce weekday peak period headway from 30min to 15min (7:00am to 9:00am and 2:00pm to 6:00pm). 2. Reduce Sunday base headway from 60min to 30min (9:00am to 7:00pm).	N/A	N/A	Improved weekday service.	N/A	N/A	+1,818 Annual Service Hours +1 Peak Period Buses *(interlined with Route 38)*	**Implement proposed option as recommended.** **Implementation Year: 2027**
Route 40	The route services Fanshawe Park Road east of Richmond Street, connecting to Masonville Mall at the western terminus. The 2019 plan has Route 40 operating at a 30min peak headway. The route connects to the Richmond RT corridor at Masonville Mall, and there is opportunity to improve service to better serve this connection.	1. Reduce weekday peak period headway from 30min to 15min (7:00am to 9:00am and 2:00pm to 6:00pm).	N/A	N/A	N/A	N/A	N/A	+1,518 Annual Service Hours +1 Peak Period Buses	**Implement proposed option as recommended.** **Implementation Year: 2027**

Route	Issue / Proposal	Proposed Modification	Evaluation					Impacts to Service Hours & Bus Requirements	Recommendation
			#1 - Ability to Maintain Connections	#2 - Directness (Travel Time)	#3 - Service Frequency	#4 - Duplication with RT	#5 - Effective Operations		
Route 51, 53, 54, 55	These community bus routes serve three potential loops – the Proudfoot Loop, Cherryhill Loop, and Wonderland Loop. No modifications are required to these routes.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**Maintain Routes 51, 53, and 54.**
Route 90	This express route operates on the Richmond Wellington corridor between Masonville Mall and White Oaks Mall, duplicating much of the proposed RT service on Richmond and Wellington. The route should be eliminated once RT is introduced. Elimination of the route will be phased in accordance with completion of construction on RT corridors.	1. Eliminate the southern half of the route once RT is introduced on the Wellington corridor from White Oaks Mall to downtown London (2024) 2. Eliminate the northern half of the route once RT is introduced on the Richmond corridor from downtown London to Masonville Mall (2027).	RT will provide service to areas currently covered by Route 90. Currently there is no RT stop proposed at Windermere or Grand. The closest proposed stations to these are Richmond/Ambleside or Richmond/University Drive, and Wellington/South and Wellington/Bond.	Travel time will be the same or reduced on RT.	Frequency will be increased on RT, from 20min peak service to 10min peak service.	Modification eliminates duplication of the RT corridor.	No operations issues identified.	2024 -8.096 Annual Service Hours -4 Peak Period Buses 2027 -19,228 Annual Service Hours -8 Peak Period Buses	**Implement proposed option as recommended.** **Implementation Year: 2024 (remove service south of downtown)** **Implementation Year: 2027 (remove service remaining service north of downtown)**
Route 91	The route offers express service along Oxford Street from Wonderland Road to Fanshawe College. The 2019 plan has Route 91 operating at a 10min peak headway. No modifications are required to this route.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**Maintain Route 91.**
Route 92	The route offers express service along Adelaide Street, connecting to Masonville Mall in the north and the London Health Sciences Centre/Victoria Hospital/Parkwood Institute in the south. The 2019 plan has Route 92 operating at a 10min peak headway. There is opportunity to improve service as route is a parallel express route on Urban Corridor with planned intensification. Also connects to Richmond and Wellington RT corridor at Masonville Mall and White Oaks Mall and to the Dundas RT corridor.	1. Reduce weekday base headway from 30min to 20min (10:00am to 3:00pm).	N/A	N/A	Improved service frequency at all time periods on weekdays.	N/A	No operations issues identified.	+1,265 Annual Service Hours +0 Peak Period Buses	**Implement proposed Part 2 modifications.** **Implementation Year: 2027**

Route	Issue / Proposal	Proposed Modification	Evaluation					Impacts to Service Hours & Bus Requirements	Recommendation
			#1 - Ability to Maintain Connections	#2 - Directness (Travel Time)	#3 - Service Frequency	#4 - Duplication with RT	#5 - Effective Operations		
Route 93 – New	Wharncliffe Road has been identified as an Urban Corridor in the London Plan. Urban Corridors are designated as future potential RT corridors. Intensification is expected along the corridor in the future. The purpose of this new Express Route is to provide passengers with a direct north-south connection on the west side of London without travelling through the downtown core (similar to the proposed Route 92 - EXPRESS Adelaide corridor). The Express Route will provide residents on the west end of London with a direct connection to the White Oaks Transit Village, Western University and the Masonville Transit Village. The corridor also intersects with the proposed Oxford Street RT corridor. As removal of Route 26 is recommended (above), there is potential for Route 93 to be modified in the southern portion to compensate for Route 26.	1. Introduce new Express Route on Wharncliffe Road beginning at White Oaks Mall travelling west on Southdale Road to Wharncliffe, then north to Woodward Avenue, Western Road and Richmond Street terminating at Masonville Mall. 2. Key stops to include White Oaks Mall, on Wharncliffe at the intersections of Southdale Road, Base Line Road and Horton Street, the intersection of Woodward Avenue and Oxford Street, Western Road and Sarnia Road, Western University and Masonville Mall. 3. Operate service between 7:00am and 10:00am and 3:00pm and 7:00pm with a 15 minute headway and a 20 minute headway from 10:00am to 3:00pm. Weekend base service operates at a 20 min headway. Evening service operates at a 30 minute headway.	Connections to key transfer points along express route maintained, and local connections from Route 26 (eliminated) also maintained.	Express service is maintained for majority of route (local service is provided south of Commissioners Road only). *Southbound:* +5min (15%) from northern terminal (Masonville Mall) to southern terminal (White Oaks Mall) *Northbound:* +9min (28%) from southern terminal (White Oaks Mall) to northern terminal (Masonville Mall)	Service frequency maintained, and service expanded to new time periods to compensate for removal of Route 26.	The route will run parallel to the Wellington RT corridor once completed. However, in the meantime, this route could function well as an interim express route while RT is being constructed.	Round trip time maintained at 80min in peaks, and reduced to 75min during weekday midday period. The round trip time can remain the same despite realignment as there was significant deadheading time in the previous Route 93.	+24,182 Annual Service Hours +5 Peak Period Buses	**Implement proposed option as recommended.** **Implementation Year: 2024**
Sunning-dale Route – New	There is currently no transit service north of Fanshawe Park Road to the west of Richmond Road. There is opportunity to provide a new route in this area connecting to the Richmond RT service at Masonville Mall.	1. Implement new route traveling north on Richmond Road, west on Sunningdale Road, and turning around via Denview Avenue, Silverfox Crescent, and Silverfox Drive. This route alignment can be adjusted once the road structure is further confirmed. 2. Operate this route on weekdays only, at a 30 min peak headway (7:00 am to 9:00 am and 2:00 pm to 6:00 pm) and 60 min base headway (9:00 am to 2:00 pm).	Provides additional connection from residential neighbourhoods in north London to RT.	*Eastbound:* 16 min travel time from Faircloth & Plane Tree to Masonville Mall *Westbound:* 4 min travel time from Masonville Mall to Faircloth & Plane Tree	30 min peak period service	No duplication with RT corridors	30 min round trip time (including layover). No operations issues noted.	+2,151 Annual Service Hours +1 Peak Period Buses	**Implement proposed option as recommended.** **Implementation Year: 2027**

3.3 Summary of Service Hour and Vehicle Impacts

Based on the analysis above, **Table 5** and **Table 6** provide a summary of the proposed annual revenue service hour and peak vehicle requirement modifications that are recommended with the implementation of the Full BRT Option RT network. **Figure 4** illustrates the recommended 2035 LTC network with RT in place. **Appendix A** includes individual maps for routes that are recommended to be modified.

Table 5 – Annual Service Hour Modifications from the LTC Network

Routes	2019	2020	2022	2024	2027	*Change*
Route 1	35,590	35,590	35,590	35,590	16,925	*-18,665*
Route 1A/B	0	0	0	0	16,442	*16,442*
Route 2	46,514	39,382	39,382	39,382	39,382	*-7,132*
Route 102/106 *(formerly Route 2C/6A)*	11,772	20,205	20,205	20,205	12,768	*996*
Route 3	26,902	26,902	26,902	26,902	26,902	*0*
Route 4	39,146	32,532	32,532	32,532	32,532	*-6,615*
Route 5	9,989	9,989	9,989	9,989	10,857	*868*
Route 6	20,319	20,319	20,319	20,319	28,860	*8,541*
Route 7 *(formerly Route 22)*	12,630	12,630	12,630	12,630	12,630	*0*
Route 9	20,274	20,274	21,891	21,891	21,891	*1,617*
Route 10	29,490	29,490	29,490	37,934	37,934	*8,444*
Route 11	12,005	12,005	12,005	12,005	12,005	*0*
Route 12	13,251	13,251	13,251	13,251	13,251	*0*
Route 13	40,596	40,596	40,596	56,477	38,236	*-2,360*
Route 14	21,053	21,053	21,053	25,104	25,104	*4,051*
Route 15	19,680	19,680	19,680	19,680	19,680	*0*
Route 16	29,279	29,279	29,279	38,024	38,024	*8,745*
Route 17	33,079	33,079	33,079	33,079	33,201	*122*
Route 19	9,185	9,185	9,185	9,185	15,903	*6,718*
Route 20	33,886	33,886	20,518	20,518	20,518	*-13,368*
Route 21	19,739	19,739	19,739	19,739	28,800	*9,061*
Route 23	7,632	7,632	7,632	7,632	10,500	*2,868*
Route 24	5,839	5,839	5,839	10,811	10,811	*4,972*
Route 25	11,044	11,044	11,044	11,044	16,724	*5,680*
Route 26	11,730	11,730	11,730	0	0	*-11,730*
Route 27	8,705	11,076	11,076	11,076	11,076	*2,371*
Route 28	3,259	3,259	3,259	3,259	3,259	*0*
Route 29	8,788	8,788	8,788	8,788	8,788	*0*
Route 30	2,151	2,151	2,151	2,151	2,151	*0*
Route 31	10,851	10,851	10,851	10,851	16,169	*5,318*
Route 32	9,257	9,257	9,257	9,257	16,439	*7,182*
Route 33	4,960	4,960	4,960	7,091	7,091	*2,131*
Route 34	2,750	2,750	2,750	2,750	4,233	*1,483*
Route 35	5,086	5,086	5,086	5,086	5,086	*0*
Route 36	3,289	3,289	3,289	3,289	5,819	*2,530*

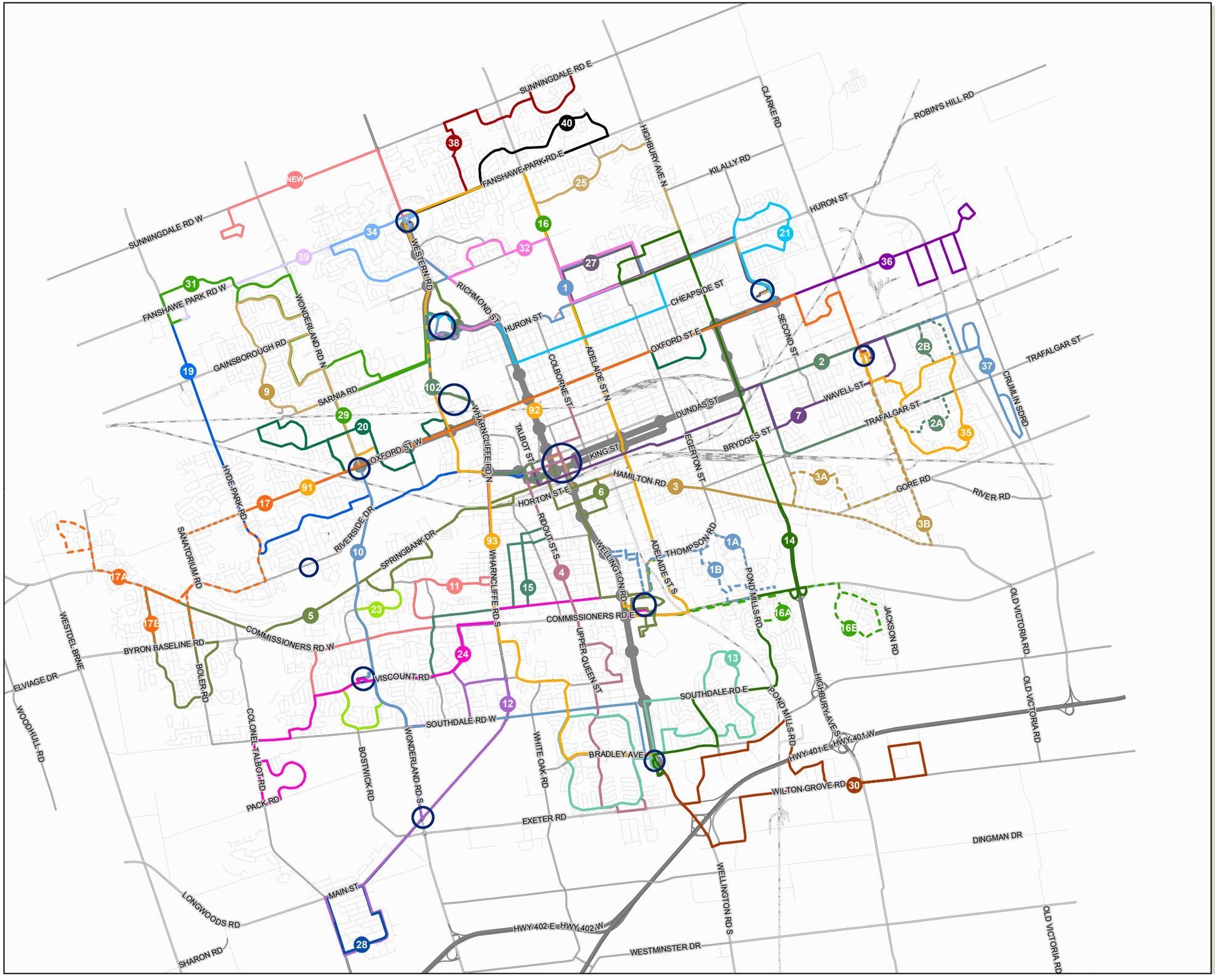
Routes	2019	2020	2022	2024	2027	*Change*
Route 37	949	949	949	949	949	*0*
Route 38	4,744	4,744	4,744	4,744	6,562	*1,818*
Route 39	4,593	4,593	4,593	4,593	6,411	*1,818*
Route 40	5,790	5,790	5,790	5,790	7,308	*1,518*
Community Bus	12,285	12,285	12,285	12,285	12,285	*0*
Route 90	19,228	19,228	19,228	11,132	0	*-19,228*
Route 91	16,825	16,825	16,825	16,825	16,825	*0*
Route 92	10,120	10,120	10,120	10,120	11,385	*1,265*
Route 93 (New)	0	0	0	24,182	24,182	*24,182*
Sunningdale Route (New)	0	0	0	0	2,151	*2,151*
TOTAL	***654,250***	***651,307***	***639,556***	***688,136***	***708,044***	*53,794*
CHANGE VS 2019	***0***	***-2,943***	***-14,694***	***33,886***	***53,794***	

Table 6 – Peak Period Bus Requirement Modifications from the LTC Network

Routes	2019	2020	2022	2024	2027	*Change*
Route 1	4	4	4	4	4	*0*
Route 1A/B	0	0	0	0	2	*2*
Route 2	12	12	12	12	12	*0*
Route 102/106 *(formerly Route 2C/6A)*	4	14	14	14	8	*4*
Route 3	6	6	6	6	6	*0*
Route 4	10	7	7	7	7	*-3*
Route 5	2	2	2	2	2	*0*
Route 6	8	8	8	8	12	*4*
Route 7 *(formerly Route 22)*	2	2	2	2	2	*0*
Route 9	5	5	4	4	4	*-1*
Route 10	7	7	7	7	7	*0*
Route 11	2	2	2	2	2	*0*
Route 12	3	3	3	3	3	*0*
Route 13	8	8	8	12	8	*0*
Route 14	5	5	5	5	5	*0*
Route 15	4	4	4	4	4	*0*
Route 16	7	7	7	10	10	*3*
Route 17	6	6	6	6	6	*0*
Route 19	2	2	2	2	4	*2*
Route 20	8	8	4	4	4	*-4*
Route 21	4	4	4	4	7	*3*
Route 23	2	2	2	2	2	*0*
Route 24	2	2	2	3	3	*1*
Route 25	2	2	2	2	4	*2*
Route 26	2	2	2	0	0	*-2*
Route 27	3	4	4	4	4	*1*
Route 28	1	1	1	1	1	*0*
Route 29	4	4	4	4	4	*0*
Route 30	1	1	1	1	1	*0*

Routes	2019	2020	2022	2024	2027	*Change*
Route 31	2	2	2	2	4	*2*
Route 32	2	2	2	2	4	*2*
Route 33	2	2	2	3	3	*1*
Route 34	1	1	1	1	2	*1*
Route 35	1	1	1	1	1	*0*
Route 36	1	1	1	1	2	*1*
Route 37	1	1	1	1	1	*0*
Route 38	1	1	1	1	2	*1*
Route 39	1	1	1	1	2	*1*
Route 40	1	1	1	1	2	*1*
Community Bus	0	0	0	0	0	*0*
Route 90	8	8	8	4	0	*-8*
Route 91	6	6	6	6	6	*0*
Route 92	5	5	5	5	5	*0*
Route 93 (New)	0	0	0	5	5	*5*
Sunningdale Route (New)	0	0	0	0	1	*1*
TOTAL	***158***	***166***	***161***	***169***	***178***	*20*
CHANGE VS 2019	***0***	***8***	***3***	***11***	***20***	

Note: This does not include spares. For capital cost estimates, a spare ratio of 20% has been assumed.



london transit

TRANSIT NETWORK -
RAPID TRANSIT INTEGRATION FRAMEWORK

RECOMMENDED 2035
LONDON TRANSIT NETWORK
FIGURE 4

RT Route
LTC Bus Route
Major Destination / Transit Village

0 0.250.5 1 km

N
W E
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MAP DRAWING INFORMATION:
DATA PROVIDED BY LTC

MAP CREATED BY: KS
MAP CHECKED BY: DAK
MAP PROJECTION: NAD 1983 UTM Zone 17N

FILE LOCATION: I:\GIS\163037

DILLON CONSULTING

PROJECT: 16-3037
STATUS: FINAL
DATE: 8/26/2016

4.0 FINANCIAL PLAN

The following section of the report details the fleet requirements and costs, service hours, operating costs, projected ridership and revenue between 2019 and 2035.

4.1 Service Hour Assumptions

Service hours were calculated based on the recommendations contained in the recommended route structure and phasing plan outlined in **Section 3.0** of this report. **Table 7** illustrates the revenue service hours projected to be operated under each horizon year. **Table 8** shows the total service hours (including an estimate for non-revenue vehicle hours, such as the time buses travel to and from the transit garage).

Table 7 – Summary of Annual Revenue Service Hours

System	2015	2019	2024	2035
LTC Routes	581,286	654,250	688,136	708,044
Richmond/ Dundas RT	0	12,082 (Quick Start)	12,082 (Quick Start)	50,631
Oxford / Wellington RT	0	0	32,760	32,760
Total	**581,286**	**666,332**	**732,978**	**791,435**

Table 8 – Summary of Annual Total Service Hours

System	2015	2019	2024	2035
LTC Routes	631,833	711,142	747,974	769,614
Richmond/ Dundas RT	0	13,000 (Quick Start)	13,000 (Quick Start)	54,479
Oxford / Wellington RT	0	0	35,250	35,250
Total	**631,833**	**724,142**	**796,224**	**859,343**

Hours of service for LTC routes will need to continue to increase to better integrate with the RT corridor. As described in **Section 3.0**, this is phased in with the phasing of RT services.

4.2 Operating Costs Assumptions

Operating costs for the various service strategies started with a base cost of $100.06 per hour (2019). The annual operating cost was applied to the proposed platform hours (revenue and auxiliary). Costs were escalated each year to reflect anticipated operating increases reflective of past trends. **Table 9** provides the hourly operating cost that was applied to LTC bus services each year based on the service hours projected in **Section 3.0** above.

For new service hours added to the LTC system, a marginal hourly rate was used between 2015 and 2023. There are five general components that go into the calculation of total hourly costs for bus services:

- Driver salary and benefits;
- Vehicle fuel;
- Vehicle maintenance;
- Administration and supervisor costs (e.g. salary and benefits); and
- Transit garage maintenance.

The marginal rate only takes into account those elements that see a direct increase resulting from increased service hours. These are driver salary and benefits, vehicle fuel, vehicle maintenance and transit garage maintenance. Given the amount of expansion that is projected to occur, the Full Direct Hourly cost was used to cost any LTC service improvements in 2024 and beyond. This reflects the need to potentially expand administration costs (e.g. hire new on-road supervisors, etc.).

Based on the increase in service hours, **Table 9** below illustrates the projected operating costs between 2019 and 2035.

Table 9 – Summary of Hourly Operating Cost for LTC Services (2015 – 2035)

2015	2019	2024	2035
$102.91	$109.29	$119.78	$140.00

Total annual costs based on the above rates are represented in **Table 10** below. For the RT system, cost estimates were provided by the Shift team.

Table 10 – Summary of Annual Operating Cost (2020 – 2035)

System	2015	2019	2024	2035
LTC Routes	$65,021,934	$77,720,681	$89,592,371	$107,745,893
RT	-	$860,000	$5,484,873	$12,913,000
Total	**$65,021,934**	**$78,580,681**	**$95,077,244**	**$119,938,893**

4.3 Ridership Forecasting

One of the primary objectives in implementing the recommended RT network is to increase transit ridership and move towards the Transportation Master Plan's mode share target. For this to occur, improvements are required to the LTC network to feed passengers to the network that do not live within walking distance of a planned station.

The ridership forecasts on the RT network were assessed based on the phasing plan noted in **Section 3.0**. With this significant investment in RT, the Commission will need to have a long-term focus. While the capital and operating cost associated with RT and corresponding local transit investment are immediate, ridership and therefore passenger revenue growth will not be realized immediately. Travel behaviours from existing residents have been established and the ridership growth targets may take a few years to materialize. This may result in an initial drop in productivity and financial performance during the first few years.

Ridership Forecasting Methodology

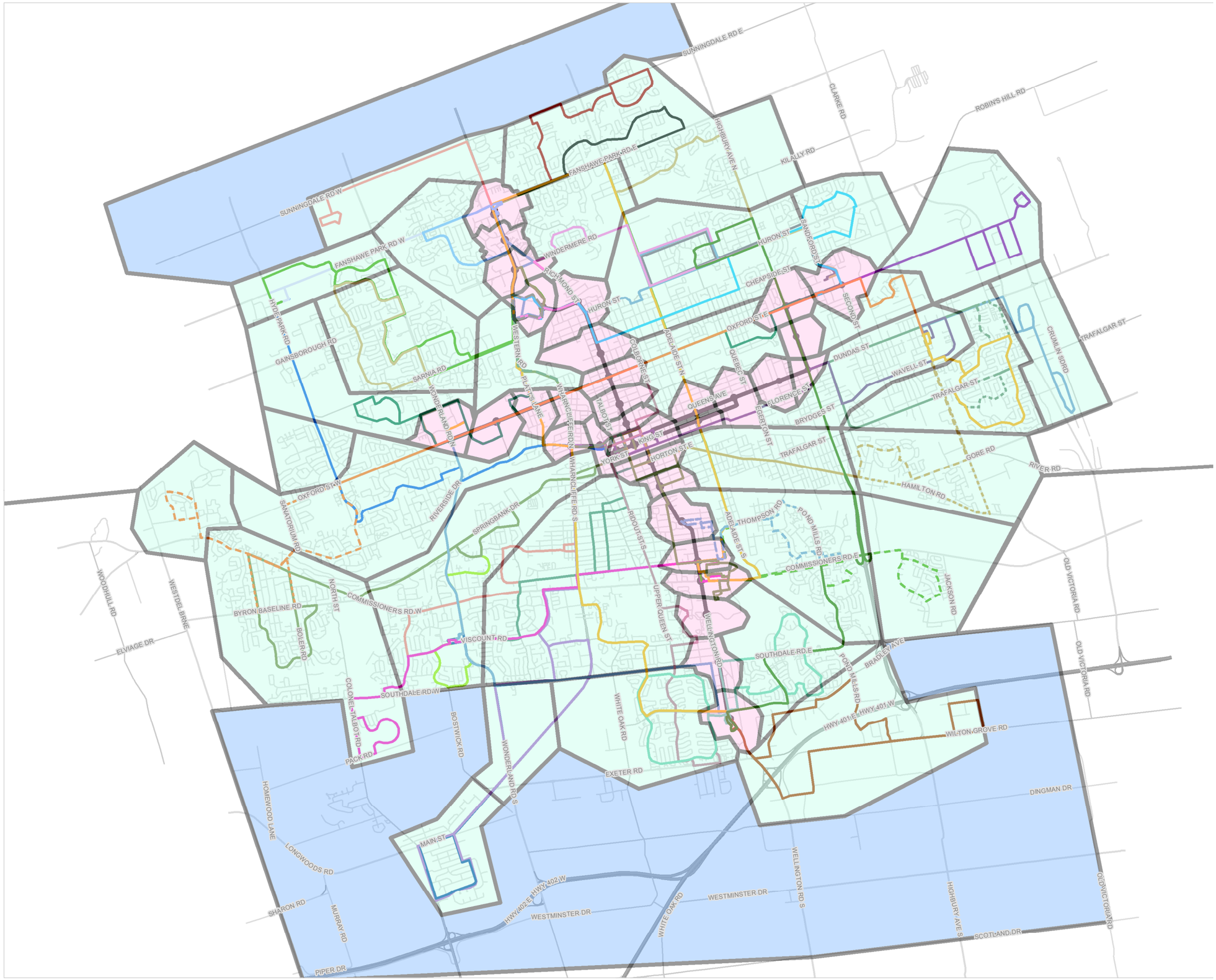
The Dillon Consulting team was requested to conduct a ridership forecasting exercise for the 2024 and 2035 horizon years using a first principles methodology. This methodology is different than the methodology used to prepare the Business Case ridership estimates. The 2024 horizon represents the completion of the "7" RT corridor and implementation of the Quick Start program on portions of the "L" corridor, along with improvements with the LTC network. The 2035 horizon represents the completion of the full RT network along with corresponding service improvements to the LTC network as identified in **Section 3.0**.

The approach uses the City of London's 2011 TransCAD travel demand model as a starting point to understand overall person trip productions and attractions for each traffic zone and how these are assigned to the network. The model is based on the previous London Transportation Master Plan and was modified by the City as part of the Shift RT EA. This information was combined with the model's 2034 forecasts of person trips to provide a basis for growth and changes in travel patterns in future years. Total person trips were extracted from the two model years (2011 and 2034) for each of the models transportation analysis zones (TAZs or zones).

Automatic Passenger Count data provided by LTC was used to determine existing boardings and alightings (2014) in each traffic zone and compare to total person trip productions and attractions. This provided an estimate of existing transit mode share.

The model contains 705 traffic zones. For ease of analysis, individual traffic zones were grouped into larger megazones based on natural barriers, land use, presence of transit service, etc. For the RT corridors, an 800 metre walking distance was developed around each RT station to determine the boundary of each megazone. The exception is the downtown area which incorporates three RT Stations within one megazone (due to the close proximity of these stations).

Figure 5 illustrates the zone structure that was used as part of the analysis.



TRANSIT NETWORK - RAPID TRANSIT INTEGRATION FRAMEWORK

RAPID TRANSIT AND MEGAZONE BOUNDARIES

FIGURE 5

- RT Route
- LTC Bus Route
- LTC Route Megazone
- RT Route Megazone
- Park & Ridge Megazone

0 0.5 1 2 km

N W E S

MAP DRAWING INFORMATION:
DATA PROVIDED BY MNR

MAP CREATED BY: KSS
MAP CHECKED BY: DAK
MAP PROJECTION: NAD 1983 UTM Zone 17N

FILE LOCATION: G:\GIS\163037\Ridership Forecasting

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PROJECT: 16-3037
STATUS: FINAL
DATE: 8/26/2016

Transit productions and attractions were calculated for each megazone using the 2014 LTC Automated Passenger Count (APC) boarding and alighting data. Since this data also includes transfers between bus routes, the number of boardings and alightings was reduced in applicable zones to avoid double counting of trips due to transfers. In megazones such as the downtown area (RT10) where there are multiple bus routes converging, a higher transfer rate was assumed. In megazones where there are only one bus route, zero transfers were assumed. This exercise reduced the number of boardings and alightings by between 20 and 22 percent system-wide (to account for transfers).

Total person-trip productions and attractions in 2011 and 2034 were extracted from the City of London TransCAD model, and interpolated and extrapolated to 2014, 2024, and 2035 estimates using linear trendline analysis.

Transit productions and attractions in each megazone were then estimated at the 2024 and 2035 horizon years, considering a number of factors.

At a base level, transit use can be expected to grow continuously in the future to account for:

1. Population and employment growth;
2. External factors beyond Transit's control (i.e. the rising cost of auto ownership/operation; changing societal attitudes; realization of increased intensification around transit corridors, etc.); and
3. System-wide Improvements not related to service enhancements (i.e. improved customer service and marketing, increase in use of technology, etc.).

Population and employment growth isn't expected to be significant over the short and long term horizon. As well, recent trends in the transit industry Canada-wide show a decline or stabilization in transit ridership. For this reason, the growth rate in ridership due to population/employment growth and other factors was estimated to be minimal (0.75 percent per year). This was increased slightly to 1 percent for each RT zone (to account for the intensification plans around both corridors and in each transit village as identified in The London Plan) and reduced slightly (0.5 percent) around all other megazones outside the RT zones.

Section 3.0 identifies a number of changes are proposed to the LTC route network to better support the proposed RT network, including frequency improvements to many routes. This improved service will result in increased transit ridership.

To calculate the impact of service level enhances to LTC routes, a service elasticity formula was used to assess impact on ridership. Service elasticity rates for transit frequency changes range from 0.3 to 0.5 percent. Meaning, for every 1 percent improvement in transit service frequency, a 0.3 to 0.5 percent increase in transit ridership can be expected. To be conservative, a 0.3 percent elasticity rate was used.

The existing and planned service frequency of each LTC transit route was calculated for each megazone to determine an average service frequency change. The average change was weighted against the ridership levels on each route (to ensure a large frequency change in a low ridership route did not overestimate the total change in ridership in a zone that includes several other routes with minimal service frequency changes). The service elasticity rate was applied to this average service frequency change by megazone to determine any impact on ridership from service levels improvements.

For the 2024 horizon year, ridership increases due to service improvements were reduced by 25 percent. While operating costs for expansion are immediate, the ridership associated with the new service hours takes time to fully develop. Assumptions were made related to the rate at which new service hours achieve mature ridership levels. As a rule of thumb, ridership for service changes implemented in 2024 would only reach 75 percent of the ridership forecast in that year. This was accounted for in the ridership projections.

Increased transit ridership will also occur within RT zones with this operation of RT. Research was conducted to better understand ridership increases resulting from implementation of RT services in other municipalities across North America. **Table 11** reflects a list of other RT services implemented in other municipalities and the new corridor ridership that occurred over a 1 to 5 year time horizon.

As illustrated in **Table 11** below, the impacts of RT introduction are varied, representing increases from 4 percent to 20 percent new corridor ridership per year.

Of the cities noted, London is most similar to Oakland with respect to population. London's population is approximately 381,000, compared to Oakland's population of 420,000. The cities differ in terms of population growth rates – London experienced a 3.7 percent population increase from 2006 to 2011, while Oakland experienced a 7.3 percent population increase from 2010 to 2015.

Table 11 – Ridership Growth Rates for RT Corridors

Municipality	RT	Impacts	Timeframe	Annual Corridor New Ridership Increase
Los Angeles	BRT	40% increase in ridership 30% of trips from new riders 25% reduction in travel time	3 years	4%
Miami	BRT	85% increase in ridership 50% of trips from new riders 30% reduction in travel time	5 years	8.5%
Brisbane	BRT	60% increase in ridership 45% of trips from new riders	2 years	13.5%
Vancouver	BRT	30% increase in ridership 25% of trips from new riders 16% reduction in travel time	2 years	3.75%
Boston	BRT	100% increase in ridership 30% of trips from new riders 20-30% reduction in travel time	18 months	20%
Oakland	BRT	20% increase in ridership 30% of trips from new riders 17% reduction in travel time	1 year	6%

Data taken from the Bus RT Practitioner's Guide, TCRP, March 2007.

Each of the RT zones were assessed and a ridership growth rate was applied to the projected boardings and alightings prior to RT implementation. The following represents the growth rates assumed:

Eastern Transit Corridor Quick Start (2018) – A Quick Start scheme along the eastern RT corridor is proposed, to demonstrate to riders what RT service will involve. The Quick Start scheme is described as buses in mixed traffic with transit signal priority and RT station spacing and service headways. This represents a service improvement from current levels, and thus a ridership increase can be expected. The increase in ridership has been estimated as a one-time 2.5 percent increase over existing ridership in the corridor at 2024 (taking into account normal ridership growth due to population and employment growth, external factors, and system-wide improvements as discussed above). The reason for this is that Quick Start will not increase travel time significantly since buses continue to operate in mixed traffic. Since the combined frequency of existing bus routes in this corridor is also very high, the implementation of Quick Start will not improve service levels dramatically until 2027 when the exclusive transit lanes are completed.

South West RT Corridor (2024) - BRT is proposed to be constructed on the south-west corridor. The Business Case cites construction periods of 2019-2020 for the segment from Baseline Road to White Oaks Mall, 2020-2022 for the segment from Oxford Road & Wonderland Road to Wharncliffe Road, and 2023-2024 for the segment connecting the above two. RT service has been assumed to be operational in the final construction year. Following implementation, ridership is expected to increase at a relatively high rate for approximately three years, and at a slightly lower rate for an additional two years following this. The increases in ridership shift from conventional transit, new ridership that previously drove as

well as a result of population and employment growth around specific RT stations. The following annual increase rates were assumed for the first three years of growth following implementation:

- 7.5 percent for RT megazones within the proposed Transit Villages (White Oaks Mall and Oxford Road & Wonderland Road);
- 10 percent for downtown; and
- 5 percent for all other RT megazones.

These increase rates were applied to the ridership at the previous time horizon (e.g., to estimate the impacts of RT implementation in the downtown in 2035, the 2024 ridership in the downtown megazone was increased by the factors shown above).

All zones are assumed to experience 1 percent annual increases in ridership in the fourth and fifth year of implementation (i.e., the two years immediately following the first three years of operation).

North East RT Corridor (2027) – BRT is proposed to be constructed on the north-east corridor, with a construction period of 2024-2027. Service has been assumed to be operational in 2027, with a 5 minute peak period headway.

Given the fact that BRT will be operating at a higher frequency, slightly higher growth rates were assumed in the north-east corridor than in the south-west corridor. However, the differentiation of growth rates by key locations remained similar to the south-west corridor:

- 7.5 percent for RT zones within the proposed Masonville Mall Transit Village;
- 7.5 percent for the megazone on Highbury in between Dundas Street and Oxford Street (this land is currently vacant and slated for significant redevelopment and intensification);
- 6 percent for Western and Fanshawe recognizing an already significant use of the transit system by students and limited likelihood for the student population to expand;
- 10 percent for downtown; and
- 6 percent for all other RT stations.

These increase rates were applied to the ridership at the previous time horizon (e.g., to estimate the impacts of RT implementation in the downtown in 2035, the 2024 ridership in the downtown megazone was increased by the factors shown above).

All zones are assumed to experience 1 percent annual increases in ridership in the fourth and fifth year of implementation (i.e., the two years immediately following the first three years of operation).

Park-and Ride areas – In addition to the ridership increases noted above, transit ridership may increase due to newly installed Park & Ride towards the northern and southern terminals of the RT network. It was assumed that these Park & Ride lots are implemented in 2024, and that 1 percent of all trips in the Park & Ride megazones will use transit to complete one leg of their trip. This is assumed to grow by 0.75 percent per year.

Transit Trip Assignment Process

With the 2024 and 2035 forecasts complete at the district level, it was necessary to disaggregate the person trips back down to the TAZ level for assignment in the model. The disaggregation was based on ratios of the original productions and attractions for the model zones in 2024 and 2035 within each district. This resulted in a generalized increase or decrease in trip for the individual TAZs within each district, but maintains the overall distribution of trips between the TAZs.

The forecasted person trips to this point represent the afternoon 3-hour peak period. These were reduced to 39 percent of the peak period value to represent the peak hour, as currently applied in the City's travel demand model.

The resultant disaggregated peak hour productions and attractions were then transferred to an origin/destination matrix format using a Fratar matrix balancing procedure. This process takes an existing origin/destination matrix and adjusts the matrix while balancing the rows (i.e., productions) and columns (i.e., attractions) to match the new production and attraction totals for the zones. As with the disaggregation above, this maintains the general travel patterns established in the base origin/destination matrix. The model's original 2034 peak hour origin/destination matrix served as the base matrix for the Fratar procedure. Trips were then annualized to estimate annual ridership for each scenario, and a post-processing procedure corrected any outlying results from the model. The final results are illustrated in **Table 12** below.

Table 12 – Projected Annual Transit Ridership (2024 and 2035)

System	2024	2035
LTC Routes	22,050,775	24,293,470
RT Routes	3,399,327	7,287,697
Total	**25,450,102**	**31,581,167**

Mode share has not been calculated as a measure of transit ridership. This would require an estimate of the total person-trips in 2035. While the City of London TransCAD model does generate this value, it has not been calibrated with the same assumptions as the first principles estimates, and therefore using it to calculate mode share would result in a value derived from inconsistent assumptions.

4.4 Passenger Revenue

London receives revenue from three sources: passenger fares, U-pass revenue and other operating revenue (e.g. advertising).

Passenger fares are calculated by multiplying the average fare by the projected ridership. The average fare is calculated by dividing the total passenger revenue by the total revenue passengers. The current average fare along with the projected increase (due to fare increases) is illustrated in **Table 13.**

Table 13 – Summary of Annual Average Fare

2015	2019	2024	2035
$1.37	$1.47	$1.58	$1.87

The average fare noted above assumes both an increase in fares charged to customers as well as U-Pass rate, and incorporates a 1.5 percent annual increase.

An increase in U-Pass revenue is particularly important since U-Pass holders represent approximately 49 percent of London Transit's ridership base. With the introduction of a new RT service to both Western University and Fanshawe College, ridership from U-Pass holders is anticipated to increase, potentially increasing the proportion of passengers that are U-Pass holders beyond 49 percent. However, revenue from U-Pass holders does not increase with increased use of the system by post-secondary students. Revenue increases only occur with growth in the overall student population and an increase in the U-Pass rate. Since the student population at both Western University and Fanshawe College are not anticipated to increase dramatically, the only method to recover additional revenue from post-secondary students is to increase the annual U-Pass rate.

While there are annual escalation clauses that are built into each U-Pass agreement, consideration should be made to renegotiate each of these agreements with the introduction of RT prior to 2027 when the RT corridor connecting both Fanshawe College and Western University is built and operating. This will ensure that the benefit receives from post-secondary students from RT is adequately reflective in the U-Pass revenue stream.

The projected increase in revenue for each of the horizon years from 2015 and 2035 is illustrated in **Table 14**.

Operating revenue was also added to the passenger revenue projection. In 2014, London Transit received $1.65 million in operating revenue. This was held constant to 2035.

Table 14 – Projected Passenger Revenue Growth (2015 to 2035)

System	2015	2019[1]	2024	2035
Fare Revenue	$30,578,649	$34,893,422	$40,300,513	$58,908,191
Other Revenue	$1,650,000	$1,650,000	$1,650,000	$1,650,000
Total	$32,228,649	$36,543,422	$41,950,513	$60,558,191

4.4.1 Financial and Operating Performance

Table 15 presents a summary of the forecasted financial and operating performance between 2015 and 2035 with the implementation of RT.

Table 15 – Projected Transit Ridership and Financial Performance

System	2015	2019	2024	2035
System Performance				
Population	381,300	385,180	416,991	458,698
Annual Revenue Service Hours	581,286	666,332	732,978	791,435
Revenue Passengers	22,369,165	23,738,470	25,450,102	31,581,167
Boardings Per Capita	58.7	61.6	61.0	68.8
Boardings Per Revenue Service Hour	38.5	35.6	34.7	39.9
Financial Performance				
Annual Revenue	$32,228,649	$36,543,422	$41,950,513	$60,558,191
Annual Operating Cost	$65,021,934	$78,560,681	$95,077,244	$119,938,893
Total Revenue/Total Operating Cost Ratio	0.50	0.47	0.44	0.50
Net Operating Cost	$32,793,285	$42,037,259	$53,126,731	$59,380,702

4.5 Capital Requirements

The only capital cost represented for LTC is for fleet. Fleet requirements for LTC were calculated based on the recommendations contained in the recommended route structure and phasing plan outlined in **Section 3.0** of this report. Fleet requirements for LTC were estimated based on existing allocation of articulated 60 foot buses between routes, and a spare ratio of 20%. It has been assumed that regular 40 foot buses are used as spares for articulated buses. **Table 16** illustrates LTC's fleet requirements under each horizon year:

Table 16 – Summary of Annual LTC Fleet Requirements (2015 – 2035)

System	2015	2019	2024	2035
LTC Routes (40ft buses)	166	177	183	197
LTC Routes (60ft buses)	10	13	20	16
Total	**176**	**190**	**203**	**213**

[1] 2019 ridership has been estimated using linear trendline analysis based on 2015 and 2024 ridership.

LTC will require fleet expansion to continue to increase service to better integrate with the RT corridors. As described in **Section 3.0**, this is phased in with the phasing of RT services.

A capital cost for each vehicle type was obtained from LTC, and has been assumed to be $535,000 for a 40 foot bus, and $853,000 for an articulated bus. (The Shift Business Case assumes $800,000 for articulated buses, it has been assumed that there will be some 40 foot buses included in the fleet.) The capital costs of vehicles are more closely tied to Canadian-United States exchange rates than inflation, and have not been escalated in the future as these rates are difficult to predict.

Capital costs for RT were obtained from the Shift Business Case, and are shown in **Table 17**.

Table 17 – Summary of Annual RT Capital Costs (2015 – 2035)

System	2015	2019	2024	2035
Total Capital Cost	-	$22,289,667	$42,473,475	$101,646,050

Total capital costs based on the above unit costs and requirements are represented in **Table 18** below. For the RT system, cost estimates were provided by the Shift team.

Table 18 – Summary of Annual Capital Cost (2015 – 2035)

System	2015	2019	2024	2035
LTC Routes	-	$8,444,000	$17,625,000	$21,703,000
RT Routes	-	$22,289,667	$42,473,475	$101,646,050
Total	**-**	**$30,733,667**	**$60,098,475**	**$123,349,050**

5.0 SUMMARY AND CONCLUSIONS

Total transit system ridership in 2035 is estimated based on first principles to be 31,581,167, of which 24,293,470 represent LTC riders and 7,287,697 represent RT riders.

The Shift Business Case estimates 2035 ridership as 31,600,000, of which 23,700,000 represent LTC riders and 7,900,000 represent RT riders.

One of the reasons for the higher proportion of LTC ridership is due to incorporation of the 2035 LTC route network. The estimates provided in the Shift Business Case did not consider changes to the LTC route network to better serve the RT network. Several LTC routes will be restructured, and several will have improved service as well. These service improvements will result in increased ridership on LTC routes as well as connections to the RT corridors.

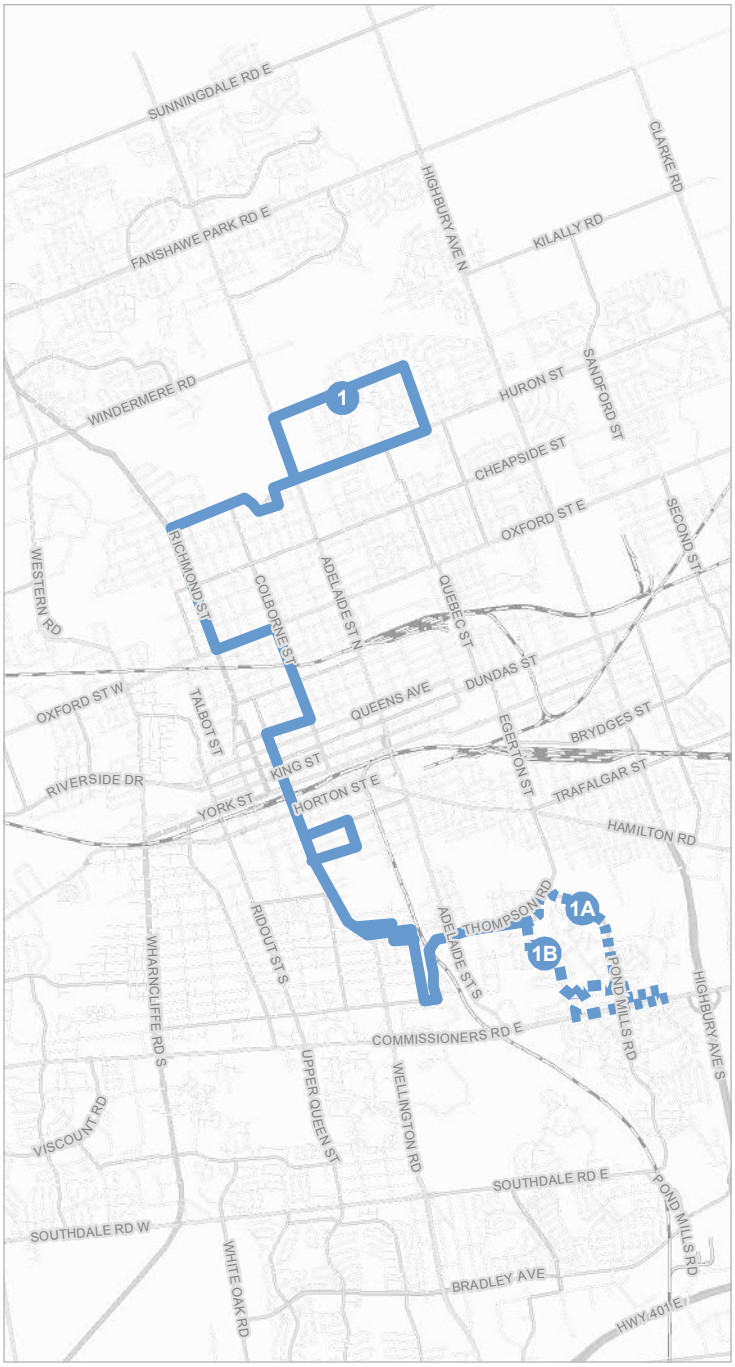
Three themes emerge when comparing transit productions and attractions from the first principles 2035 estimate and the 2034 City of London TransCAD model:

- The first principles estimate includes more trips to/from downtown. This reflects future intensification within the downtown and a higher propensity for transit use in dense, mixed-use areas of the City.
- The first principles estimate includes more trips at intersections of key arterials which act as major transfer points. Examples of these are Highbury Avenue & Oxford Street, Windermere Road & Western Road, Highbury Avenue & Dundas Street, Wharncliffe Road & Riverside Drove, and Oxford Street & Richmond Street.
- The first principles estimate balances productions and attractions more at Western & Fanshawe. The City of London TransCAD model favours productions at these locations. While this accounts for the PM peak time period of the model, attractions at these locations may have been underestimated.

APPENDIX A

Proposed Route Modifications

Route 1 - 2019 (base)



Route 1, 1A/B - 2027 (proposed)

Headway

	MONDAY-FRIDAY						SATURDAY					SUNDAY		
	Early Morn.	AM Peak	Midday	PM Peak	Early Eve.	Late Eve.	Early Morn.	Morning	Midday	Early Eve.	Late Eve.	Morning	Midday	Evening
Base	40	30	40	30	60	60	60	60	40	60	60		60	60
Proposed 1 *Full BRT*	20	10	20	10	15	20	20	20	20	20	40	40	20	20
Proposed 1A *Full BRT*	40	20	40	20	40	40	40	40	40	40	40	40	40	40
Proposed 1B *Full BRT*	40	20	40	20	40	40	40	40	40	40	40	40	40	40

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TRANSIT NETWORK - RAPID TRANSIT INTEGRATION FRAMEWORK

ROUTE 1

RT Route

LTC Bus Route

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MAP DRAWING INFORMATION:
DATA PROVIDED BY LTC

MAP CREATED BY: KSS
MAP CHECKED BY: DAK
MAP PROJECTION: NAD 1983 UTM Zone 17N

FILE LOCATION: I:\GIS\163037

0 0.5 1 km

PROJECT: 16-3037 STATUS: FINAL DATE: 8/26/2016

Route 2 - 2019 (base)

Route 2 - 2020 (proposed)

Headway

	MONDAY-FRIDAY						SATURDAY					SUNDAY		
	Early Morn.	AM Peak	Midday	PM Peak	Early Eve.	Late Eve.	Early Morn.	Morning	Midday	Early Eve.	Late Eve.	Morning	Midday	Evening
Base	30	20	30	20	30	60	60	30	30	30	60		60	60
Proposed *Full BRT*	20	10	30	10	30	30	30	30	30	30	30	30	30	30

london transit

TRANSIT NETWORK - RAPID TRANSIT INTEGRATION FRAMEWORK

ROUTE 2

RT Route

LTC Bus Route

DILLON CONSULTING

MAP DRAWING INFORMATION:
DATA PROVIDED BY LTC

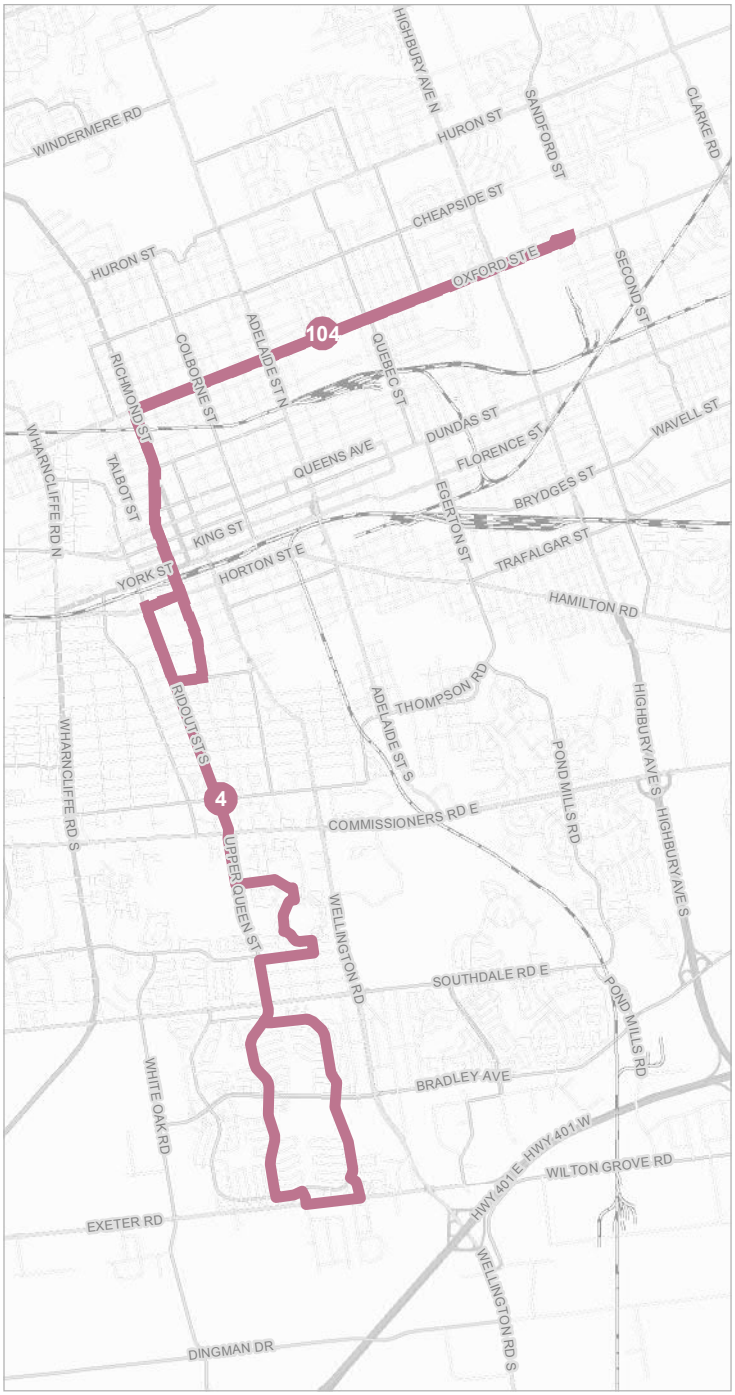
MAP CREATED BY: KSS
MAP CHECKED BY: DAK
MAP PROJECTION: NAD 1983 UTM Zone 17N

FILE LOCATION: I:\GIS\163037

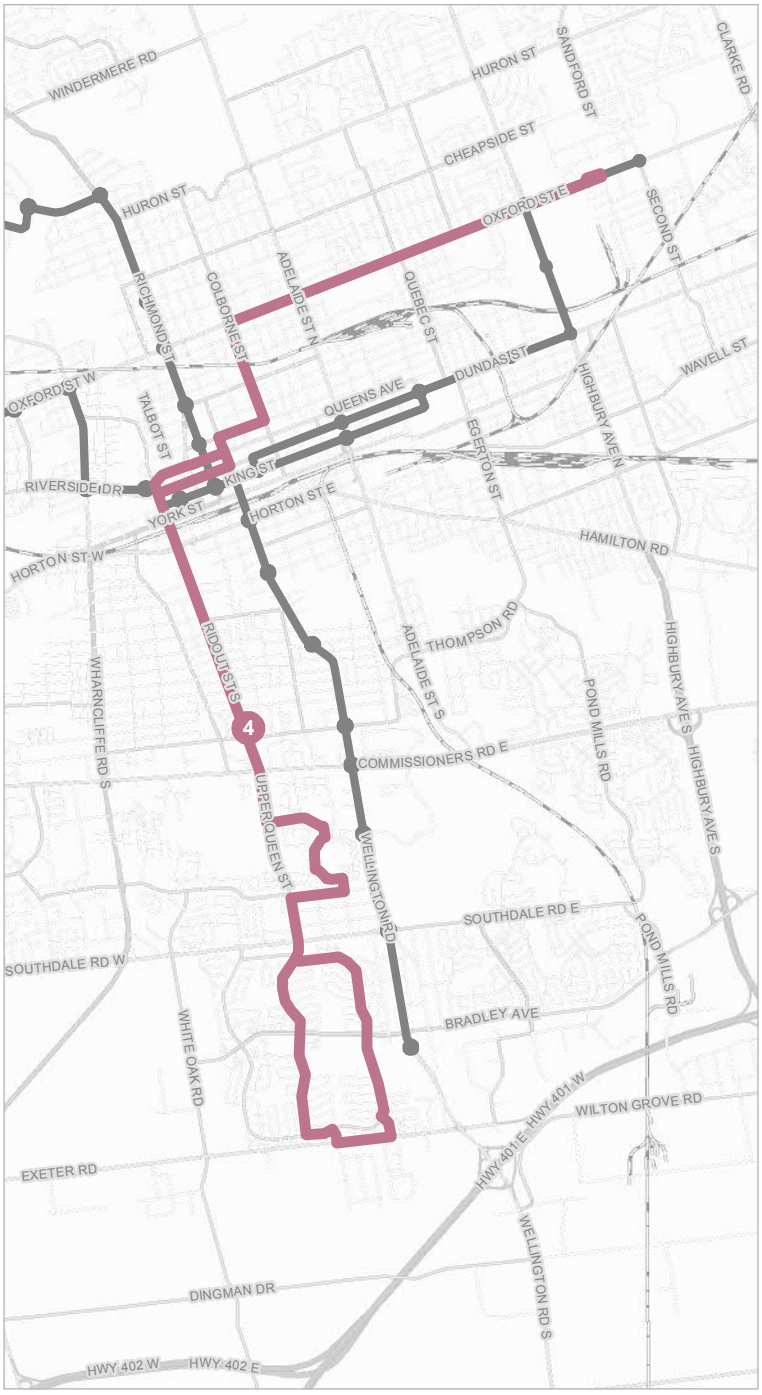
0 0.5 1 km

PROJECT: 16-3037 STATUS: FINAL DATE: 8/26/2016

Route 4, 104 - 2019 (base)



Route 4 - 2020 (proposed)



Headway

	MONDAY-FRIDAY						SATURDAY					SUNDAY		
	Early Morn.	AM Peak	Midday	PM Peak	Early Eve.	Late Eve.	Early Morn.	Morning	Midday	Early Eve.	Late Eve.	Morning	Midday	Evening
Base	30	15	20	15	30	30	30	30	30	30	30	30	30	30
Base 104	30	30	30	30				30	30					
Proposed 4 *Full BRT*	30	15	20	15	20	30	30	30	30	30	30	30	30	30
Proposed 104 *Full BRT*														

london transit

TRANSIT NETWORK - RAPID TRANSIT INTEGRATION FRAMEWORK

ROUTE 4

RT Route

LTC Bus Route

DILLON CONSULTING

MAP DRAWING INFORMATION:
DATA PROVIDED BY LTC

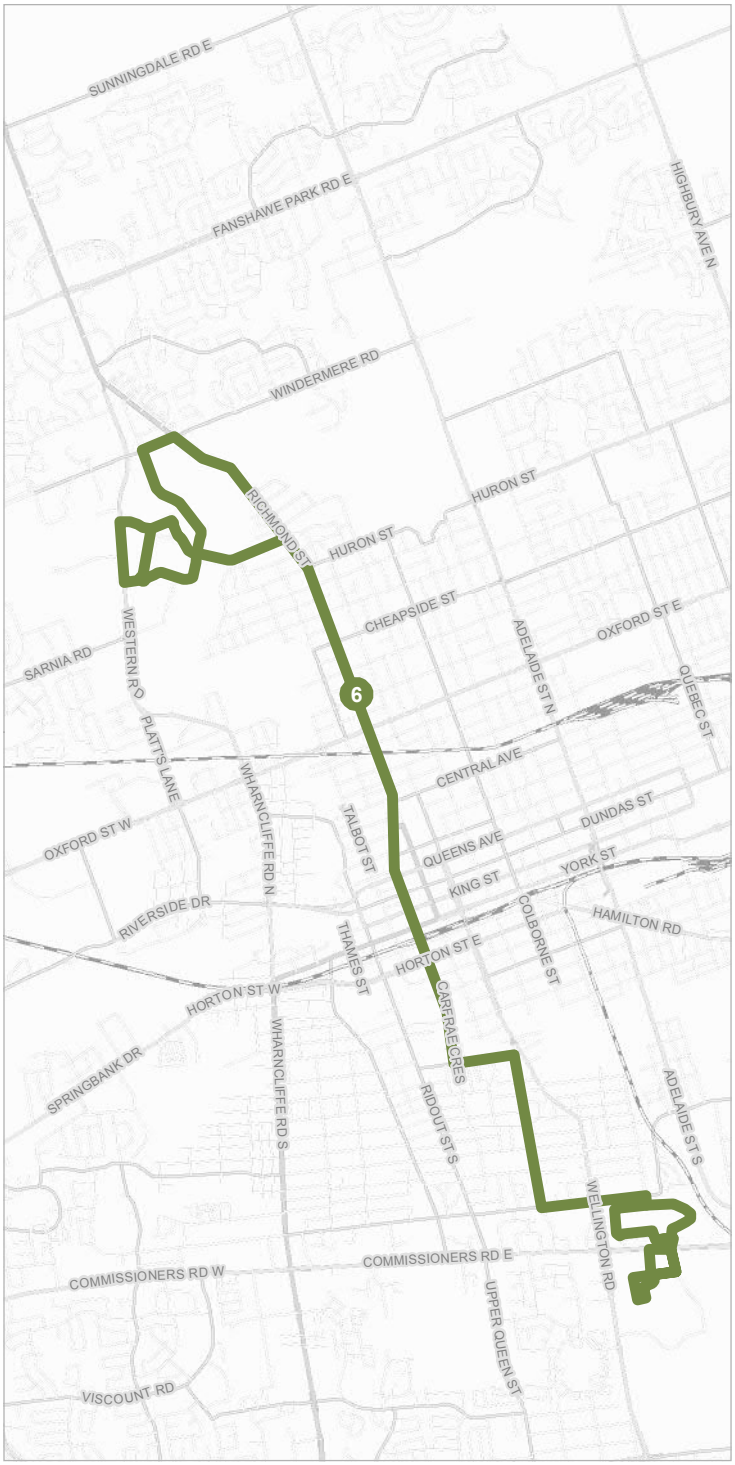
MAP CREATED BY: KSS
MAP CHECKED BY: DAK
MAP PROJECTION: NAD 1983 UTM Zone 17N

FILE LOCATION: I:\GIS\163037

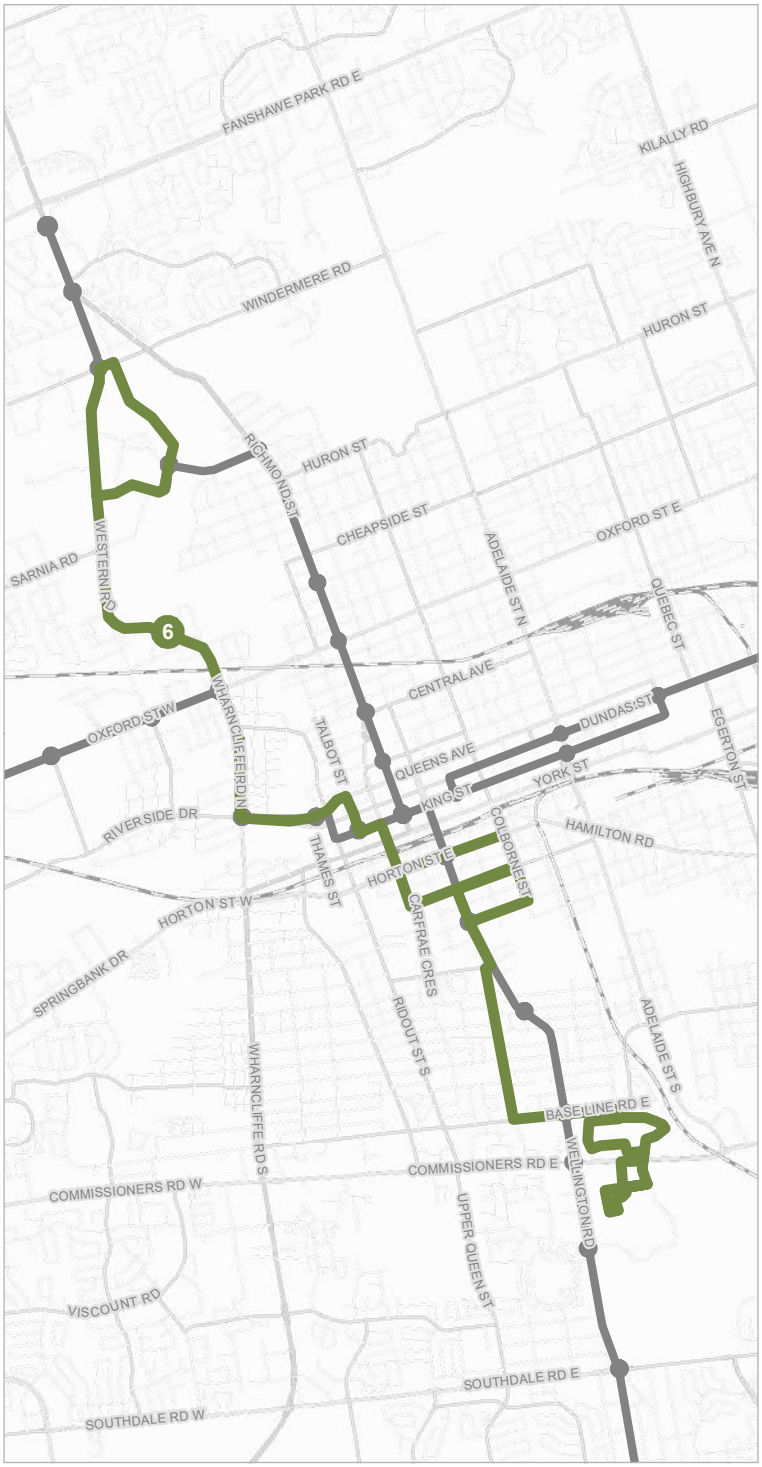
0 0.5 1 km

PROJECT: 16-3037 STATUS: FINAL DATE: 8/26/2016

Route 6 - 2019 (base)



Route 6 - 2027 (proposed)



Headway

	MONDAY-FRIDAY						SATURDAY					SUNDAY		
	Early Morn.	AM Peak	Midday	PM Peak	Early Eve.	Late Eve.	Early Morn.	Morning	Midday	Early Eve.	Late Eve.	Morning	Midday	Evening
Base	20	20	30	30	30	30	30	20	20	30	30		30	30
Proposed *Full BRT*	20	15	20	15	30	40	30	20	20	30	30	30	30	30

london transit

TRANSIT NETWORK - RAPID TRANSIT INTEGRATION FRAMEWORK

ROUTE 6

RT Route

LTC Bus Route

DILLON CONSULTING

MAP DRAWING INFORMATION:
DATA PROVIDED BY LTC

MAP CREATED BY: KSS
MAP CHECKED BY: DAK
MAP PROJECTION: NAD 1983 UTM Zone 17N

FILE LOCATION: I:\GIS\163037

0 0.5 1 km

PROJECT: 16-3037 STATUS: FINAL DATE: 8/26/2016

Route 9 - 2019 (base)

Route 9 - 2024 (proposed)

Headway

	MONDAY-FRIDAY						SATURDAY					SUNDAY		
	Early Morn.	AM Peak	Midday	PM Peak	Early Eve.	Late Eve.	Early Morn.	Morning	Midday	Early Eve.	Late Eve.	Morning	Midday	Evening
Base	30	30	30	30	60	30	60	60	60	60	30		60	30
Proposed *Full BRT*	30	20	20	20	30	30	30	30	20	20	30	40	20	30

london transit

TRANSIT NETWORK - RAPID TRANSIT INTEGRATION FRAMEWORK

ROUTE 9

RT Route

LTC Bus Route

DILLON CONSULTING

MAP DRAWING INFORMATION:
DATA PROVIDED BY LTC

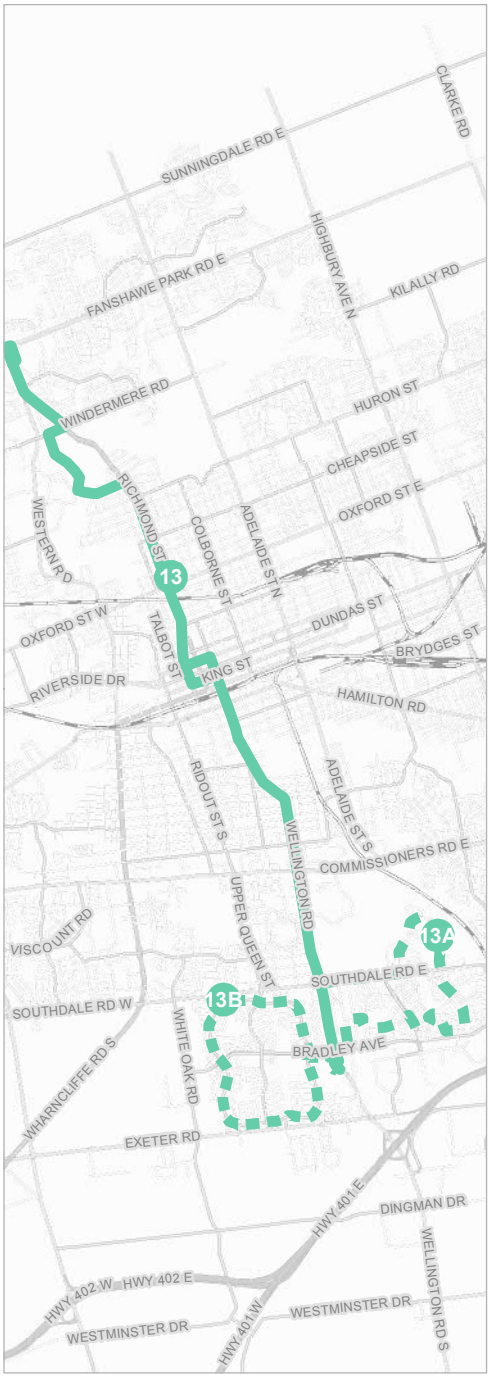
MAP CREATED BY: KSS
MAP CHECKED BY: DAK
MAP PROJECTION: NAD 1983 UTM Zone 17N

FILE LOCATION: I:\GIS\163037

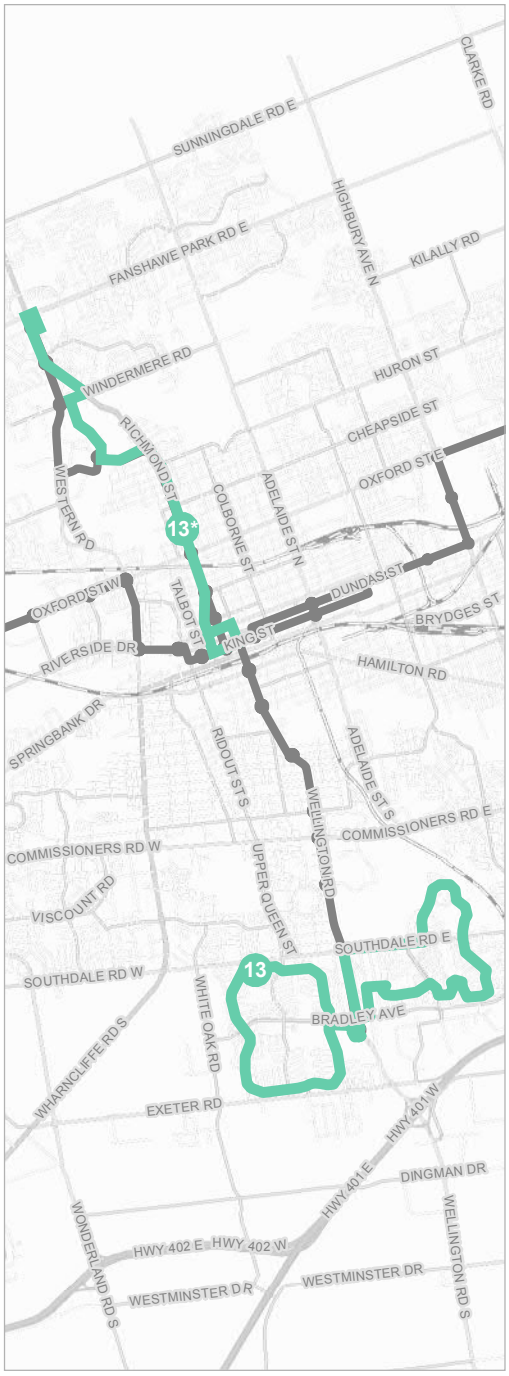
0 0.5 1 km

PROJECT: 16-3037 STATUS: FINAL DATE: 8/26/2016

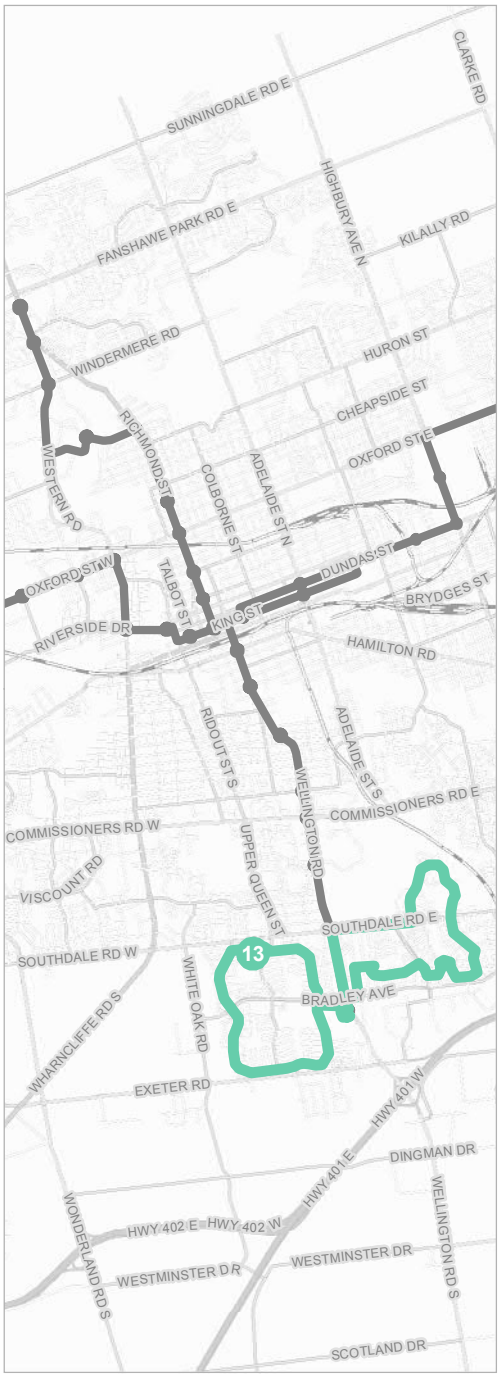
Route 13 - 2019 (base)



Route 13 - 2024 (proposed)



Route 13 - 2027 (proposed)



Headway

	MONDAY-FRIDAY						SATURDAY					SUNDAY		
	Early Morn.	AM Peak	Midday	PM Peak	Early Eve.	Late Eve.	Early Morn.	Morning	Midday	Early Eve.	Late Eve.	Morning	Midday	Evening
Base 13A/B	30	30	30	30	40	60	60	30	30	40	60	60	60	60
Proposed 13 North (2024-27) *Full BRT*	15	15	15	15	20	60	30	15	15	20	30	30	30	30
Proposed 13 (2024-27) *Full BRT*	20	15	20	15	20	30	30	20	20	20	30	30	20	30
Proposed 13 (2027-) *Full BRT*	20	15	20	15	20	30	30	20	20	20	30	30	20	30

london transit

TRANSIT NETWORK - RAPID TRANSIT INTEGRATION FRAMEWORK

ROUTE 13

RT Route

LTC Bus Route

DILLON CONSULTING

MAP DRAWING INFORMATION:
DATA PROVIDED BY LTC

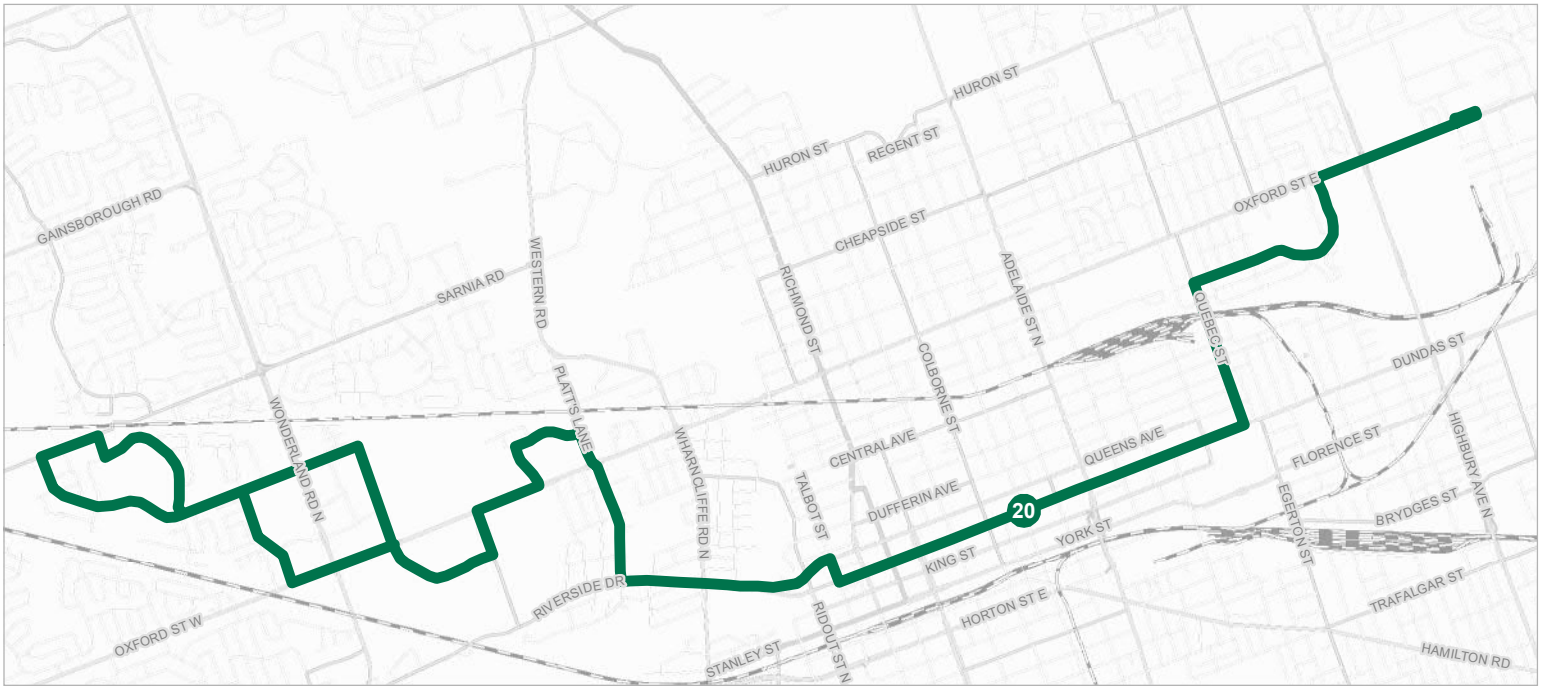
MAP CREATED BY: KSS
MAP CHECKED BY: DAK
MAP PROJECTION: NAD 1983 UTM Zone 17N

FILE LOCATION: I:\GIS\163037

0 0.5 1 km

PROJECT: 16-3037 STATUS: FINAL DATE: 8/26/2016

Route 20 - 2019 (base)



Route 20 - 2022 (proposed)

Headway	MONDAY-FRIDAY						SATURDAY					SUNDAY		
	Early Morn.	AM Peak	Midday	PM Peak	Early Eve.	Late Eve.	Early Morn.	Morning	Midday	Early Eve.	Late Eve.	Morning	Midday	Evening
Base	20	15	20	15	20	30	45	30	20	30	30		30	30
Proposed *Full BRT*	20	15	20	15	20	20	40	30	20	30	30	45	20	30

london transit

TRANSIT NETWORK - RAPID TRANSIT INTEGRATION FRAMEWORK

ROUTE 20

RT Route

LTC Bus Route

DILLON CONSULTING

MAP DRAWING INFORMATION:
DATA PROVIDED BY LTC

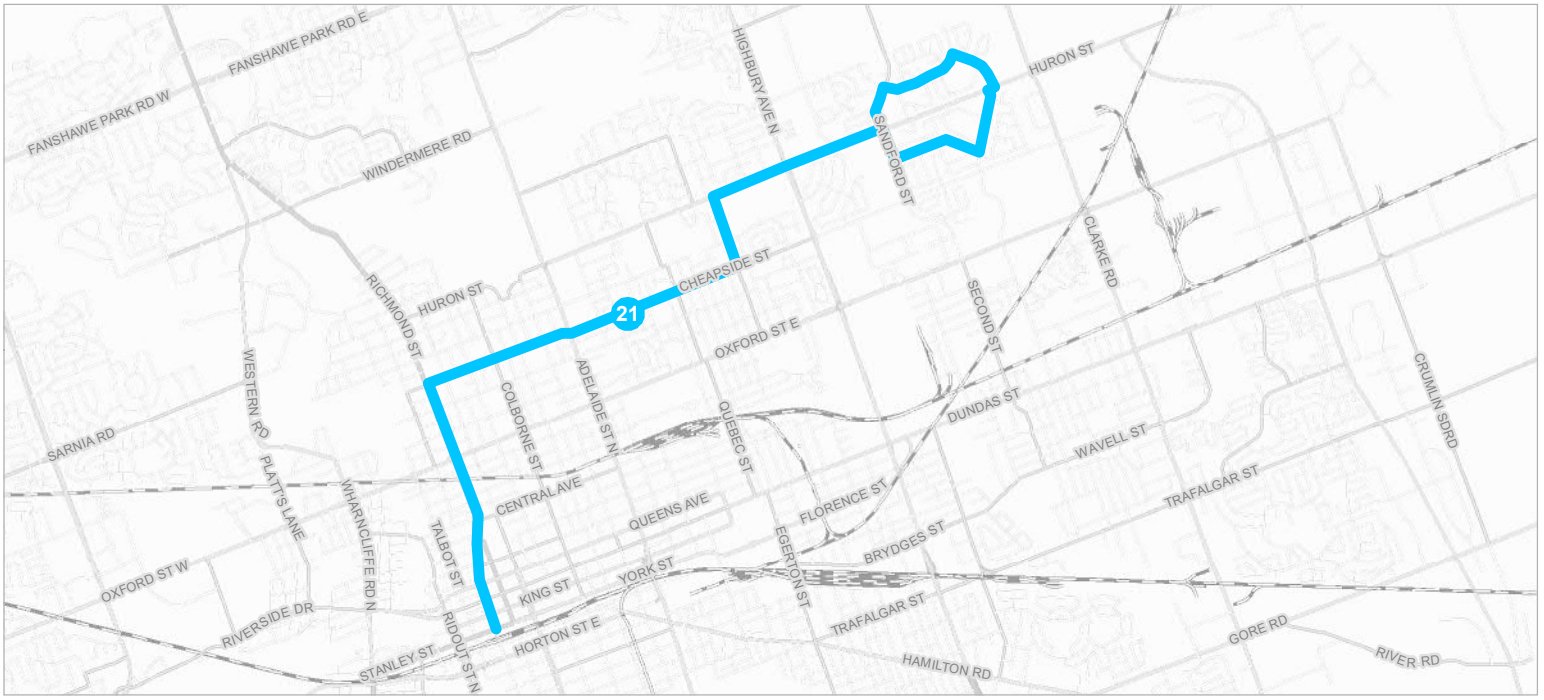
MAP CREATED BY: KSS
MAP CHECKED BY: DAK
MAP PROJECTION: NAD 1983 UTM Zone 17N

FILE LOCATION: I:\GIS\163037

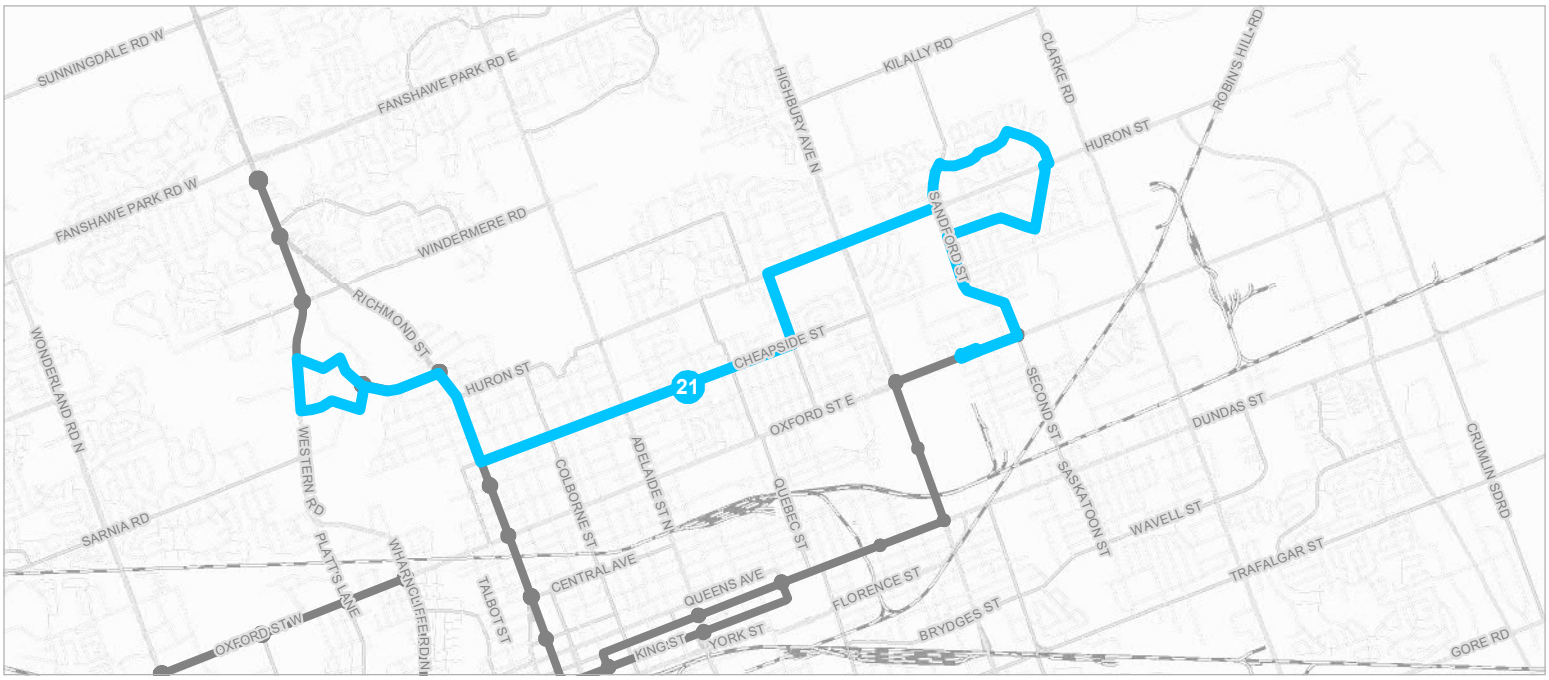
0 0.5 1 km

PROJECT: 16-3037 STATUS: FINAL DATE: 8/26/2016

Route 21 - 2019 (base)



Route 21 - 2027 (proposed)



Headway

	MONDAY-FRIDAY						SATURDAY					SUNDAY		
	Early Morn.	AM Peak	Midday	PM Peak	Early Eve.	Late Eve.	Early Morn.	Morning	Midday	Early Eve.	Late Eve.	Morning	Midday	Evening
Base	15	15	15	15	20	30	30	30	20	30	30		30	30
Proposed *Full BRT*	15	15	20	15	20	60	30	30	30	30	30	60	30	30

london transit

TRANSIT NETWORK - RAPID TRANSIT INTEGRATION FRAMEWORK

ROUTE 21

RT Route

LTC Bus Route

DILLON CONSULTING

MAP DRAWING INFORMATION:
DATA PROVIDED BY LTC

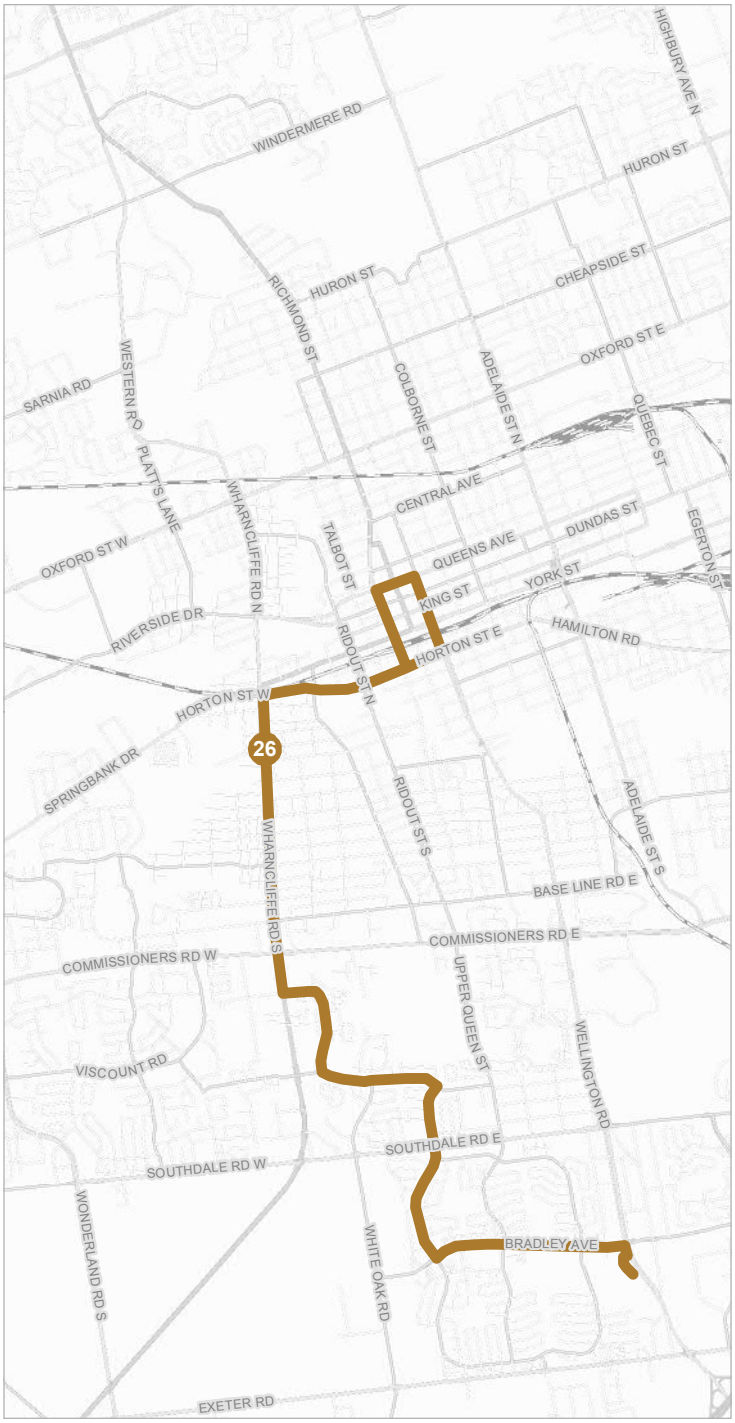
MAP CREATED BY: KSS
MAP CHECKED BY: DAK
MAP PROJECTION: NAD 1983 UTM Zone 17N

FILE LOCATION: I:\GIS\163037

0 0.5 1 km

PROJECT: 16-3037 STATUS: FINAL DATE: 8/26/2016

Route 26 - 2019 (existing)



Route 93 - 2024 (proposed)

Headway

	MONDAY-FRIDAY						SATURDAY					SUNDAY		
	Early Morn.	AM Peak	Midday	PM Peak	Early Eve.	Late Eve.	Early Morn.	Morning	Midday	Early Eve.	Late Eve.	Morning	Midday	Evening
Base 26	30	30	30	35	30	60		30	30	30			30	60
Proposed 93 *Full BRT*	30	15	20	15	20	30	30	20	20	20	40	30	20	40

london transit

TRANSIT NETWORK - RAPID TRANSIT INTEGRATION FRAMEWORK

ROUTE 26, 93

RT Route

LTC Bus Route

DILLON CONSULTING

MAP DRAWING INFORMATION:
DATA PROVIDED BY LTC

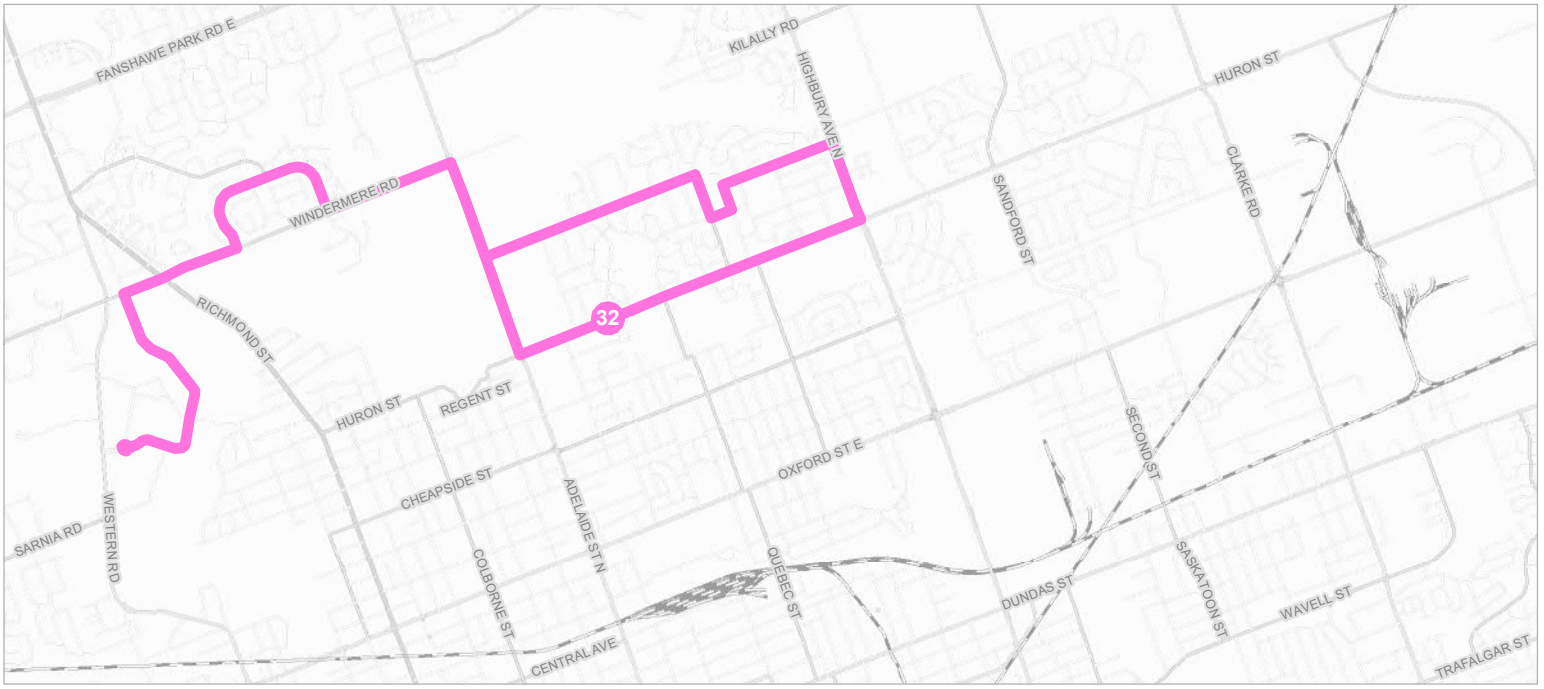
MAP CREATED BY: KSS
MAP CHECKED BY: DAK
MAP PROJECTION: NAD 1983 UTM Zone 17N

FILE LOCATION: I:\GIS\163037

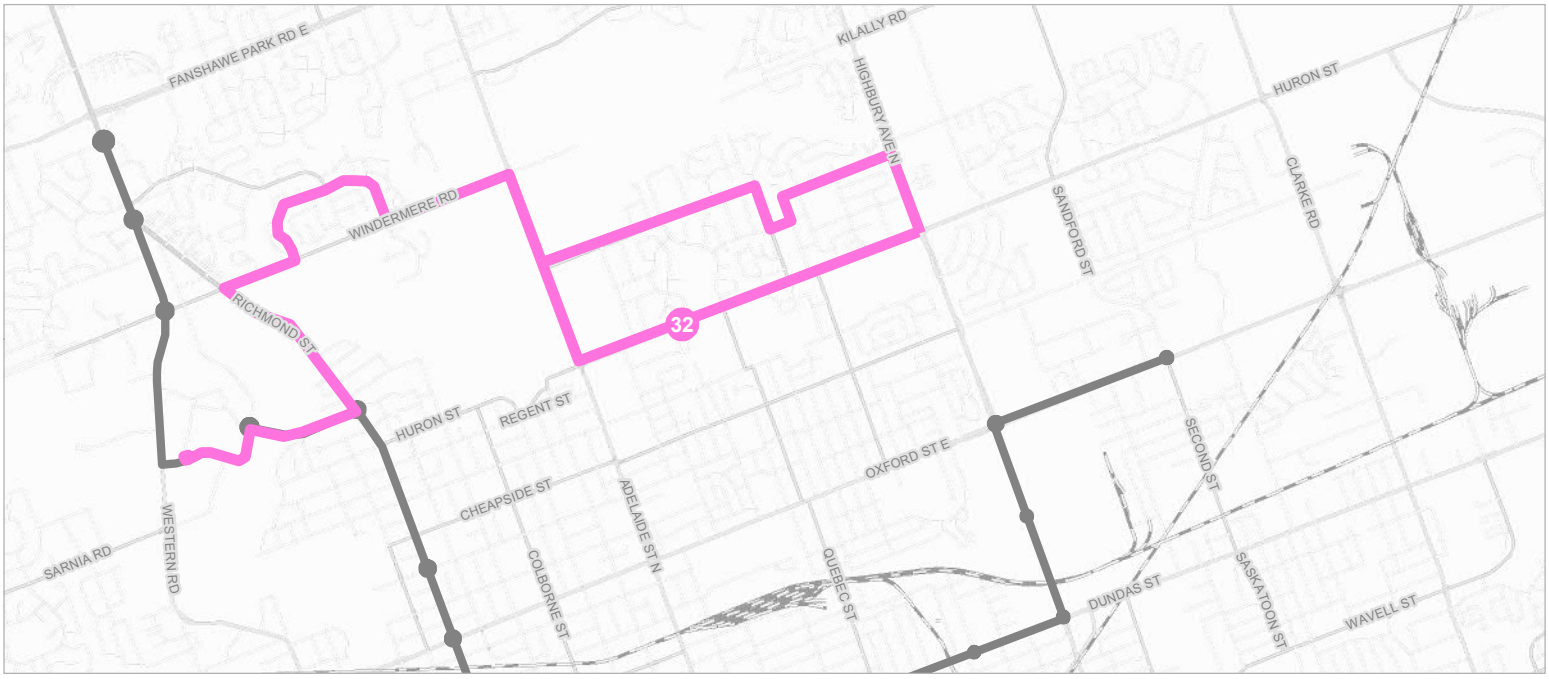
0 0.5 1 km

PROJECT: 16-3037 STATUS: FINAL DATE: 8/26/2016

Route 32 - 2019 (base)



Route 32 - 2027 (proposed)



Headway

	MONDAY-FRIDAY						SATURDAY					SUNDAY		
	Early Morn.	AM Peak	Midday	PM Peak	Early Eve.	Late Eve.	Early Morn.	Morning	Midday	Early Eve.	Late Eve.	Morning	Midday	Evening
Base	30	30	30	30	60			30	30	60				
Proposed *Full BRT*	30	15	20	15	30	30	45	30	30	30	60		30	60

TRANSIT NETWORK - RAPID TRANSIT INTEGRATION FRAMEWORK

ROUTE 32

RT Route

LTC Bus Route

DILLON CONSULTING

MAP DRAWING INFORMATION:
DATA PROVIDED BY LTC

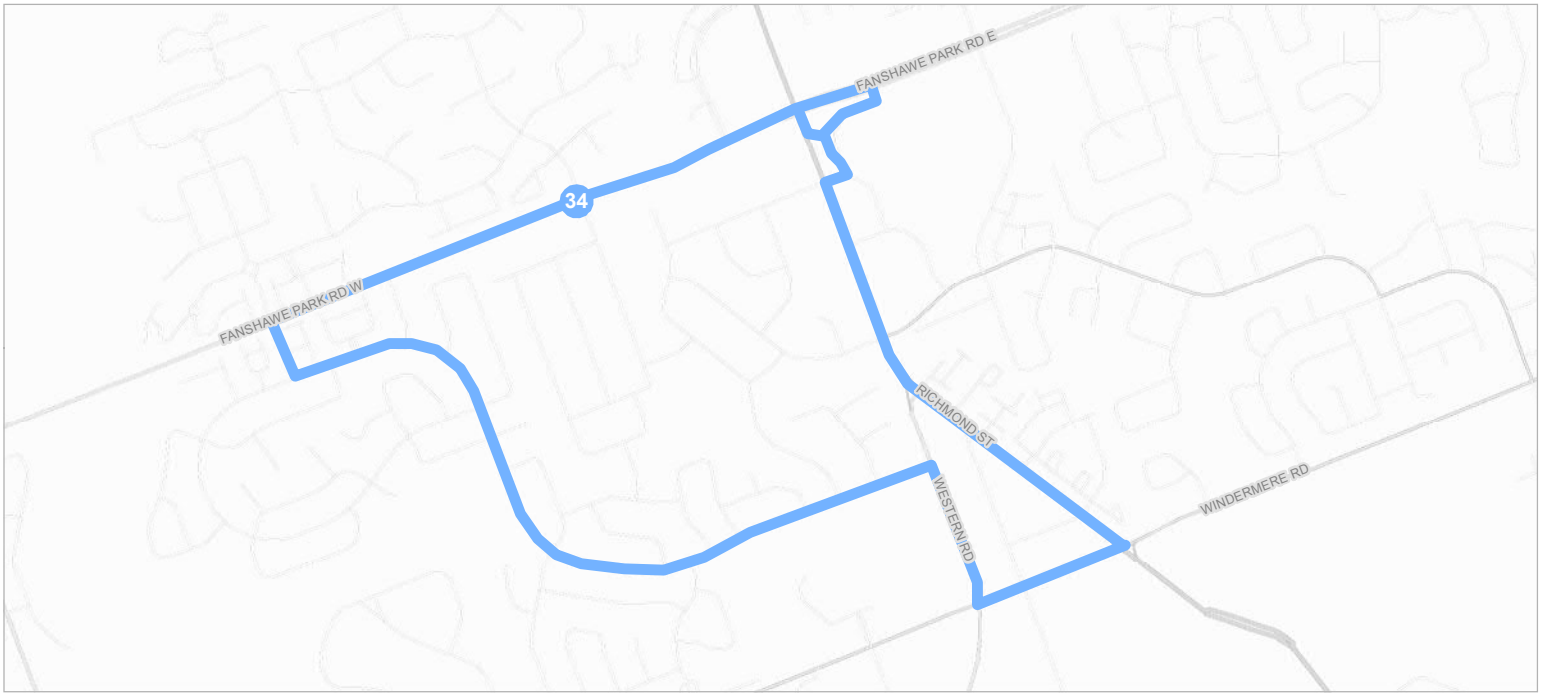
MAP CREATED BY: KSS
MAP CHECKED BY: DAK
MAP PROJECTION: NAD 1983 UTM Zone 17N

FILE LOCATION: I:\GIS\163037

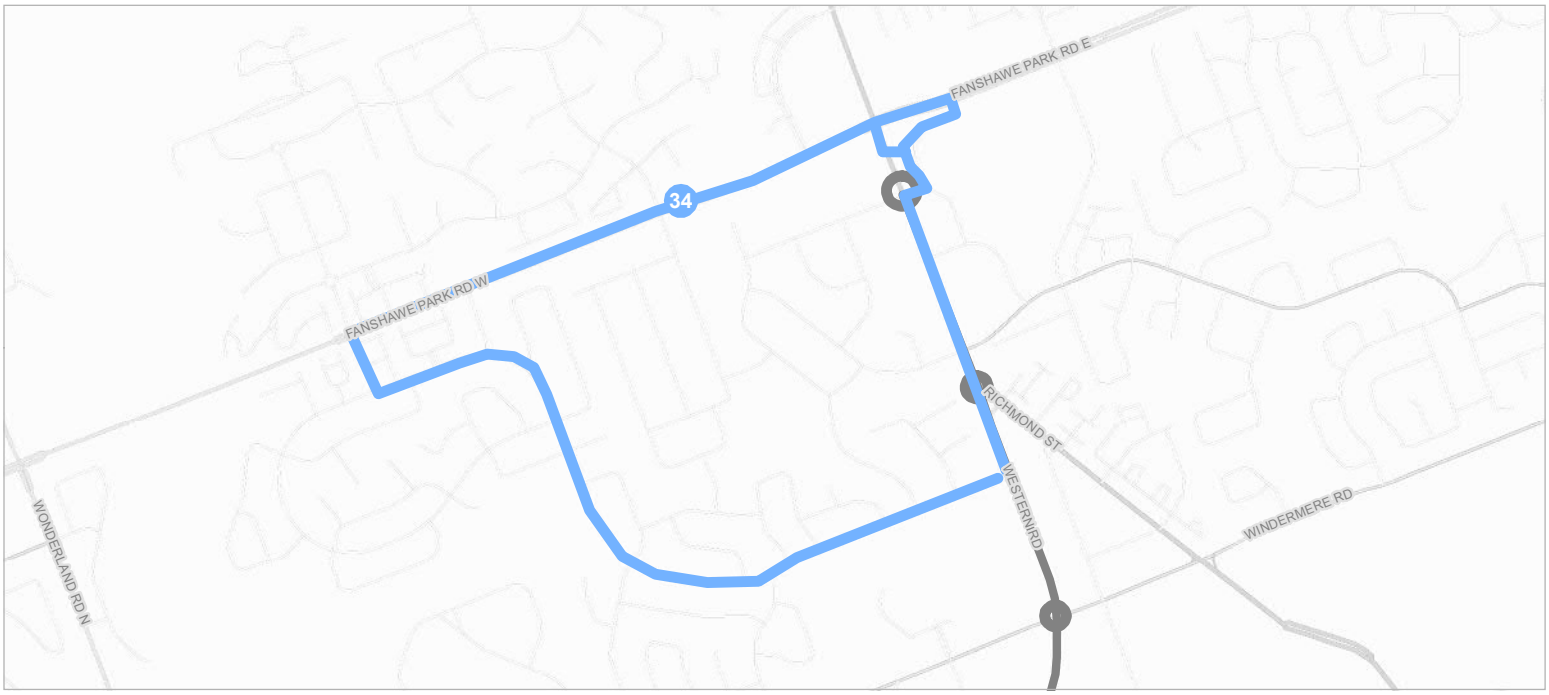
0 0.5 1 km

PROJECT: 16-3037 STATUS: FINAL DATE: 8/26/2016

Route 34 - 2019 (base)



Route 34 - 2027 (proposed)



Headway

	MONDAY-FRIDAY						SATURDAY					SUNDAY		
	Early Morn.	AM Peak	Midday	PM Peak	Early Eve.	Late Eve.	Early Morn.	Morning	Midday	Early Eve.	Late Eve.	Morning	Midday	Evening
Base		30		30		30								
Proposed *Full BRT*		15	30	15		30								

london transit

TRANSIT NETWORK - RAPID TRANSIT INTEGRATION FRAMEWORK

ROUTE 34

RT Route

LTC Bus Route

DILLON CONSULTING

MAP DRAWING INFORMATION:
DATA PROVIDED BY LTC

MAP CREATED BY: KSS
MAP CHECKED BY: DAK
MAP PROJECTION: NAD 1983 UTM Zone 17N

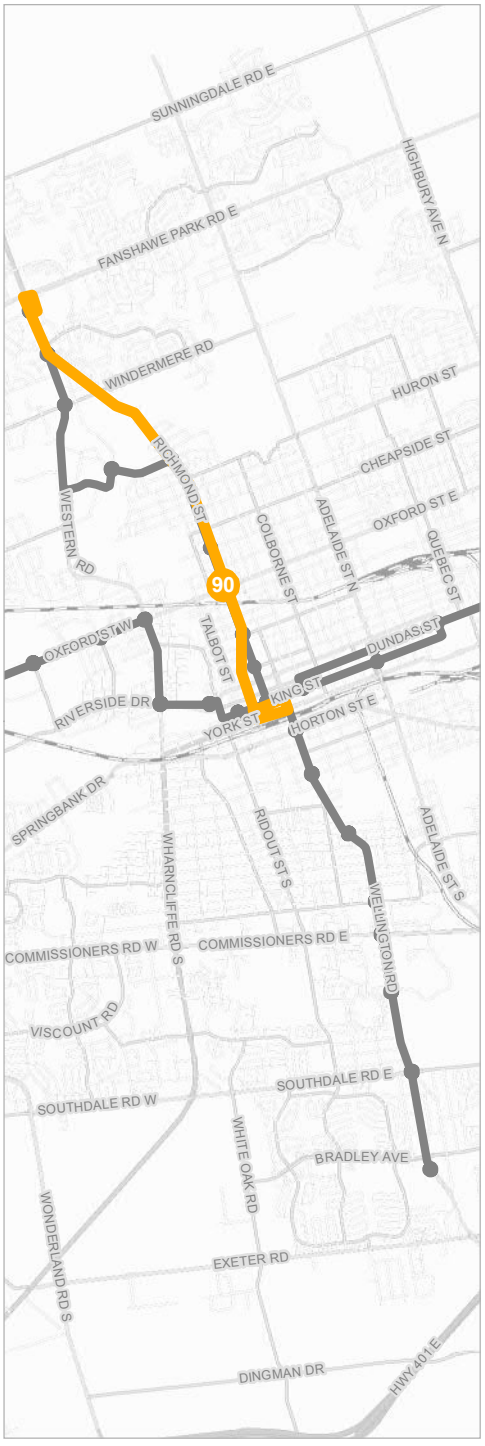
FILE LOCATION: I:\GIS\163037

0 0.25 0.5 km

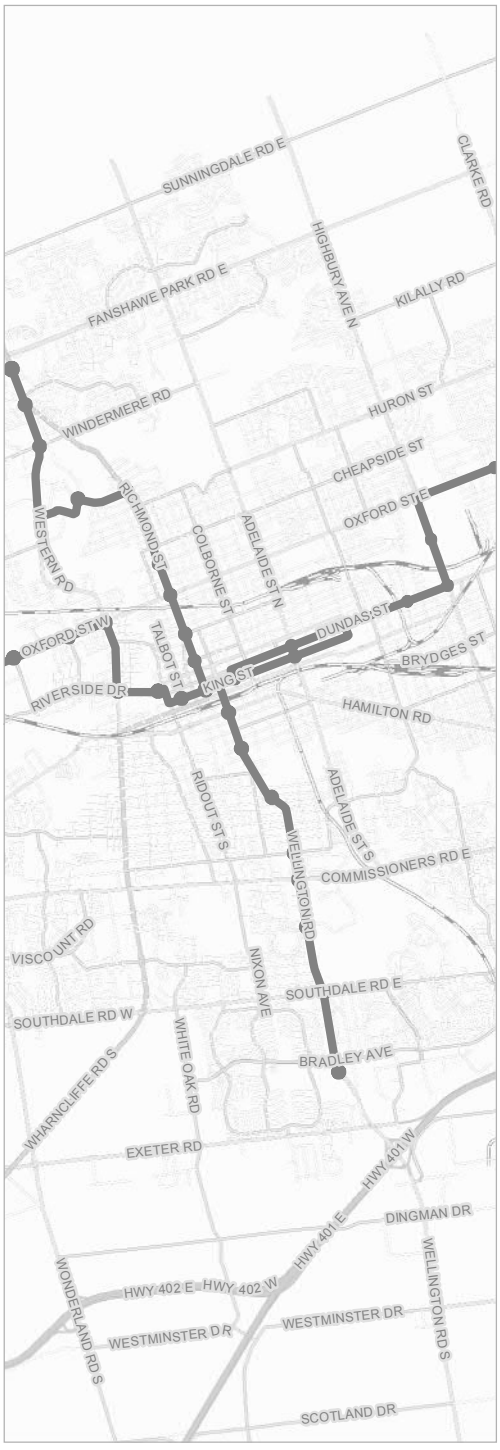
PROJECT: 16-3037 STATUS: FINAL DATE: 8/26/2016

Route 90 - 2019 (base)

Route 90 - 2024 (proposed)



Route 90 - 2027 (proposed)



Headway

	MONDAY-FRIDAY						SATURDAY					SUNDAY		
	Early Morn.	AM Peak	Midday	PM Peak	Early Eve.	Late Eve.	Early Morn.	Morning	Midday	Early Eve.	Late Eve.	Morning	Midday	Evening
Base		10	20	10										
Proposed (2024-27) *Full BRT*		10	20	10										
Proposed (2027-) *Full BRT*														

london transit

TRANSIT NETWORK - RAPID TRANSIT INTEGRATION FRAMEWORK

ROUTE 90

RT Route

LTC Bus Route

DILLON CONSULTING

MAP DRAWING INFORMATION:
DATA PROVIDED BY LTC

MAP CREATED BY: KSS
MAP CHECKED BY: DAK
MAP PROJECTION: NAD 1983 UTM Zone 17N

FILE LOCATION: I:\GIS\163037

0 0.5 1 km

PROJECT: 16-3037 STATUS: FINAL DATE: 8/26/2016

Route 102/106 - 2019 (base)

Route 102/106 - 2027 (proposed)

Headway

	MONDAY-FRIDAY						SATURDAY					SUNDAY		
	Early Morn.	AM Peak	Midday	PM Peak	Early Eve.	Late Eve.	Early Morn.	Morning	Midday	Early Eve.	Late Eve.	Morning	Midday	Evening
Base 102		10	15	12	40									
Base 106		10	15	12	40									
Proposed 102 (2020) *Full BRT*		6	10	6	20									
Proposed 106 (2020) *Full BRT*		15	15	10	40									
Proposed 102 (2027) *Full BRT*		6	10	6	20									
Proposed 106 (2027) *Full BRT*														

london transit

TRANSIT NETWORK - RAPID TRANSIT INTEGRATION FRAMEWORK

ROUTE 102/106

RT Route

LTC Bus Route

DILLON CONSULTING

MAP DRAWING INFORMATION:
DATA PROVIDED BY LTC

MAP CREATED BY: KSS
MAP CHECKED BY: DAK
MAP PROJECTION: NAD 1983 UTM Zone 17N

FILE LOCATION: I:\GIS\163037

0 0.5 1 km

PROJECT: 16-3037 STATUS: FINAL DATE: 8/26/2016

New Sunningdale Route - Existing (2019)

New Sunningdale Route - Proposed (2027)

Headway

	MONDAY-FRIDAY						SATURDAY					SUNDAY		
	Early Morn.	AM Peak	Midday	PM Peak	Early Eve.	Late Eve.	Early Morn.	Morning	Midday	Early Eve.	Late Eve.	Morning	Midday	Evening
Base														
Proposed NEW *Full BRT*		30	60	30										

london transit

TRANSIT NETWORK - RAPID TRANSIT INTEGRATION FRAMEWORK

NEW SUNNINGDALE ROUTE

RT Route

LTC Bus Route

DILLON CONSULTING

MAP DRAWING INFORMATION:
DATA PROVIDED BY LTC

MAP CREATED BY: KSS
MAP CHECKED BY: DAK
MAP PROJECTION: NAD 1983 UTM Zone 17N

FILE LOCATION: I:\GIS\163037

0 0.5 1 km

PROJECT: 16-3037 STATUS: FINAL DATE: 8/26/2016