Transportation Analysis Report (2021) with Addendum (2023)

Richmond Hill Centre Secondary Plan

Addendum Version 1

City of Richmond Hill
March 22, 2023

Contents

Tables

Figures

Appendices

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1 Introduction

The City of Richmond Hill has initiated the Richmond Hill Centre Secondary Plan (RHC SP) study to coordinate the expected growth and redevelopment of the area. This study builds upon the recommendations of the 2010 *Richmond Hill Centre Design and Land Use Study* and provide updates to the planning context given the significant amount of time that has passed since the completion of the 2010 study.

The purpose of this work, as of October 2021, is to provide transportation inputs to the overall Secondary Plan study and recommend a transportation network that supports the anticipated growth in the study area and promotes a sustainable travel model such as transit, walk, and cycle. The work includes the following steps:

- Re-examine the existing transportation network and conditions.
- Evaluate the impact of land use scenarios on the transportation network to inform the selection of a recommended land use scenario;
- Evaluate the recommended scenario and provide policy recommendations including Travel Demand Management (TDM), active transportation network, transit options, street network and road classification, and parking strategy; and
- Provide recommendations for phasing and implementation.

This 2021 Transportation Analysis Report (TAR) reviews the changes up until 2021 to the transportation planning context for the study area including land use plans, major infrastructure investments including ongoing vivaNext implementation on Yonge Street and Highway 7, and the proposed Yonge Subway Extension. It documents the existing 2021 conditions, including the existing road, transit, and pedestrian and cycling network. Travel patterns such as mode choice and major trip destinations from the study area are analyzed using 2016 Transportation Tomorrow Survey (TTS) data. Existing and future background traffic conditions are analyzed in detail.

2 Planning Context

This section summarizes the planning context for the RHC SP including provincial, regional, and municipal plans, with a focus on updates since the 2010 *Richmond Hill Centre Design and Land Use Study*.

2.1 Richmond Hill Centre Design and Land Use Study (2010)

The January 2010 *Richmond Hill Centre Design & Land Use Study* communicates the guiding principles that will inform the future growth of the Richmond Hill Centre (RHC). The report proposes a fine-grained grid street network which provides improved east-west connections to mitigate the existing barrier of the rail corridor, while also improving north-south connections. **Figure 2-1** illustrates the recommended road network.

Figure 2-1: Richmond Hill Centre Recommended Road Network

Source: Richmond Hill Centre Design and Land Use Study, 2010

Two new connections south to Markham's Langstaff Gateway Centre are included in the plan, including a multi-use corridor running parallel to the rail corridor and the Red Cedar / Cedar Avenue extension. The multi-use corridor is planned to be a

wide, well landscaped open space that provides a trail for the exclusive use of active modes including pedestrians and cyclists and other self-propelled modes of movement. This path will be adjacent to a dedicated transit-only roadway.

Figure 2-2 details the Active Transportation Network proposed in the study. In addition to the multi-use corridor, recommended future pedestrian and cycling connections to the RHC area include:

- Bike lanes on major Arterial Roads including Highway 7 and Yonge Street;
- On-road cycling routes on new local street L1 (new North-South connection west of Yonge Street); and
- On-road cycling routes on Collector Streets including Garden Avenue Extension, Oneida Crescent, High Tech Road, Red Cedar Avenue and Bantry Avenue.

Figure 2-2: Richmond Hill Centre Recommended Active Transportation Network
Source: Richmond Hill Centre Design and Land Use Study, 2010

2.2 Provincial Planning Context

Provincial planning policies are identified and summarized in **Table 2-1**.

Table 2-1: Provincial Planning Context

Provincial Planning Document	Description & Relevance
Places to Grow Act (2005) / A Place to Grow: Growth Plan for the Greater Golden Horseshoe (2019)	The 2019 Growth Plan was approved through an Order in Council to come into effect on May 16, 2019. It replaces the Growth Plan for the Greater Golden Horseshoe, 2017 that took effect on July 1, 2017. The 2019 Growth Plan sets forth a framework for implementing the Government of Ontario's 2041 vision for building stronger, prosperous *complete* communities by better managing growth in the region. The Growth Plan contains policies applicable to infrastructure planning including directing intensification toward strategic growth areas, supporting a balanced, sustainable, and connected transportation system for all modes, facilitating efficient goods movement in and out of employment areas. Richmond Hill Centre and Langstaff Gateway (to the south of the SP study area) are designated as an Urban Growth Centre that will be planned to achieve minimum density targets of 200 residents and jobs per hectare by 2031 (or earlier).
2041 Regional Transportation Plan (2018)	The 2041 Regional Transportation Plan (RTP) identifies a long-term vision for building an integrated transportation system in the Greater Toronto and Hamilton Area (GTHA). It sets forth a plan for Regional Rapid Transit, the regional Highway Network and Regional Express Rail (RER) now referred to as the GO Expansion Project. Projects in planning or delivery relevant to the study area include: • Bus Rapid Transit (BRT) along Yonge Street, linking Richmond Hill, Aurora, and Newmarket • The Yonge North Subway Extension, from Finch Station in Toronto to Highway 7 in Richmond Hill
GO Expansion (ongoing)	GO Expansion (previously referred to as GO Regional Express Rail, or RER) is an investment program that will transform GO Rail into a Rapid Rail System providing improved service across the GTHA. Peak period peak direction frequency from Langstaff GO station on the Richmond Hill GO Line is planned to improve from every 60 minutes to every 30 minutes.

Provincial Planning Document	Description & Relevance
407 Transitway (ongoing)	The 407 Transitway is an important element of the Region's Transportation Master Plan, connecting the radial network of GO Rail services with an east-west inter-regional transit service that caters to longer distance transit trips. A major gateway station is planned at Yonge Street, connecting the 407 Transitway to the Richmond Hill-Langstaff Gateway at the planned Yonge Subway Extension Richmond Hill Centre Station, and connection to the YRT/Viva and GO Transit bus terminal and GO Transit Richmond Hill regional commuter rail service.

2.3 Regional Planning Context

Regional plans are identified and summarized in **Table 2-2.**

Table 2-2: Regional Planning Context

Regional Planning Document	Description & Relevance
York Region Official Plan (2013)	The York Region Official Plan (YR-OP) provides direction to guide economic, environmental, and community-building decisions to manage growth. It incorporates the Planning for Tomorrow study, undertaken to identify how York Region will accommodate the several provincial planning initiatives. The main theme of the YR-OP is to move York Region towards sustainability, by way of policies that emphasize a reduction in automobile reliance and an increase in active transportation facilities. Richmond Hill Centre lies at the intersection of two streets designated by the YR-OP as regional corridors – Yonge Street and Highway 7. Both are also designated as regional rapid transit corridors and are part of the regional cycling network. The YR-OP directs that regional centres be developed with a fine-grained street network. York Region is currently undertaking the Municipal Comprehensive Review process to review the Region's population and employment forecasts, land budget and Regional Official Plan policies.
York Region Strategic Plan (Vision 2051) (2011)	Vision 2051 is York Region's long-term strategy. It identifies eight goal areas that will guide policies to create strong, caring, and safe communities designed with sustainability in mind. The Vision outlines actions to help achieve these goals, several pertaining to the design of future transportation facilities and the importance of their positive contribution to vibrant communities. Richmond Hill Centre is one of four Regional Centres where intensification is directed to accommodate population and employment growth through 2051.
York Region Transportation Master Plan	Provides infrastructure and policy requirements for a 25-year outlook that allows York Region to achieve its strategic vision of an advanced, interconnected system of mobility within the Region. Further information

Regional Planning Document	Description & Relevance
(YR-TMP) (2016)	pertaining to transportation infrastructure improvements as documented in the YR-TMP is described within **Section 2.3.1** of this report.

2.3.1 York Region Transportation Master Plan (2016)

The 2016 York Region TMP is organized around five objectives:

- Create a world class transit system
- Develop a road network fit for the future
- Integrate active transportation in urban areas
- Maximise the potential of employment areas
- Make the last mile work

The plan details a number of general policies and actions under each objective that will be considered for this project. The plan also makes several specific recommendations and identifies projects that apply to or affect the Richmond Hill Centre Secondary Plan Area as follows:

- Transit Network
  - The Yonge Street and Highway 7 Rapid Transit Corridors, including the vivaNext rapidway north of Highway 7. The TMP also notes that post-2041 the Region expects to convert some or all rapidways to light rail facilities.
  - The Yonge North Subway Extension retains its status as the Region's number one transportation project.
- Road Network
  - The Red Cedar / Cedar Avenue Extension, linking the Richmond Hill Centre and Langstaff Gateway communities by connecting Red Cedar Avenue to Cedar Avenue to support planned growth in these areas.
- Cycling Network
  - New separated cycling facilities on Yonge Street and Red Cedar / Cedar Avenue.

2.3.2 York Region vivaNext Plan (2017)

The vivaNext bus rapid transit (BRT) project will provide improved transit service throughout York Region with the implementation of dedicated bus rapidways and other transit priority measures. The project will also include other urban design

elements such as pedestrian friendly boulevards, separated bike lanes, trees and other greenery.

The vivaNext plan connects Richmond Hill Centre to the rest of York Region with rapidways east on Highway 7 (complete and operational), west on Highway 7 (scheduled completion 2019) and north on Yonge Street, with sections in the study area and north to Newmarket (scheduled completion 2020).

Figure 2-3: vivaNext Rapidway Network and Phasing
Source: YRT/viva, 2018

2.3.2.1 VIVA BRT Yonge Street (Projected completion December 2020)

Currently under construction, the Yonge Street Rapidway project will introduce dedicated bus rapid transit lanes, wider sidewalks, on street and raised bike lanes, and other public realm improvements to Yonge Street from Highway 7 to 19th Avenue/Gamble Road.

2.3.3 York Region Committee of the Whole Report No. 16, November 16, 2017: Richmond Hill/Langstaff Gateway Regional Centre – Growth Capacity and Timing

The 2017 Council Report concludes that development within the Richmond Hill/Langstaff Gateway Urban Growth Centre is limited due to existing transportation network capacity. Localized transportation network improvements can however facilitate the development of 5,000 additional residential units in advance of the delivery of the Yonge Subway Extension.

Staff determined that development may advance based on several principles, including:

- Every reasonable effort will be made to complete identified Regional transportation projects to service the RHC considering the endorsed 2011 Transportation Study, the approved 2016 Transportation Master Plan and 10-year capital plan, as updated from time to time.
- Transportation capacity in the RHC will be monitored by City staff in consultation with local municipalities.
- The provision of the Red Cedar - Cedar Avenue connection be provided in the initial stages of development in the Langstaff Gateway.
- Mobility Plans or Transportation Impact Studies for developments be built upon the 2011 joint Transportation Study and consider the RHC as a whole.
- Active transportation and transit be prioritized for infrastructure delivery and built form.

The report also details several transportation improvements for the Study Area, as identified in the 2011 Centre-Wide Transportation Study, including:

- Add internal road network north of High Tech Road and east of CNR, including bicycle lanes on Oneida Drive
- Signalized control at Red Cedar Avenue and High Tech Road
- The Red Cedar - Cedar Avenue connection, planned to include 4 lanes (two of which are HOV/Transit lanes), bicycle lanes, and sidewalks.
- A multi-use corridor along the rail corridor, including a busway and bike/pedestrian trail, from the Sunnywood extension south of Beresford Drive to Langstaff Road.
- Viva Yonge rapidway and multi-use corridor
- Highway 7 rapidway
- Internal circulator transit route
- Additional transit priority measures on Yonge south of Garden Avenue
- Ensuring non-auto mode split meets targets

Attachment 2 of the 2017 Study is illustrated in **Figure 2-4** planned improvements in the Richmond Hill/Langstaff Gateway Regional Centre. Key improvements include:

- A north-south pedestrian connection along the CN rail corridor
- A north-south Cedar Avenue/Red Cedar Avenue connection

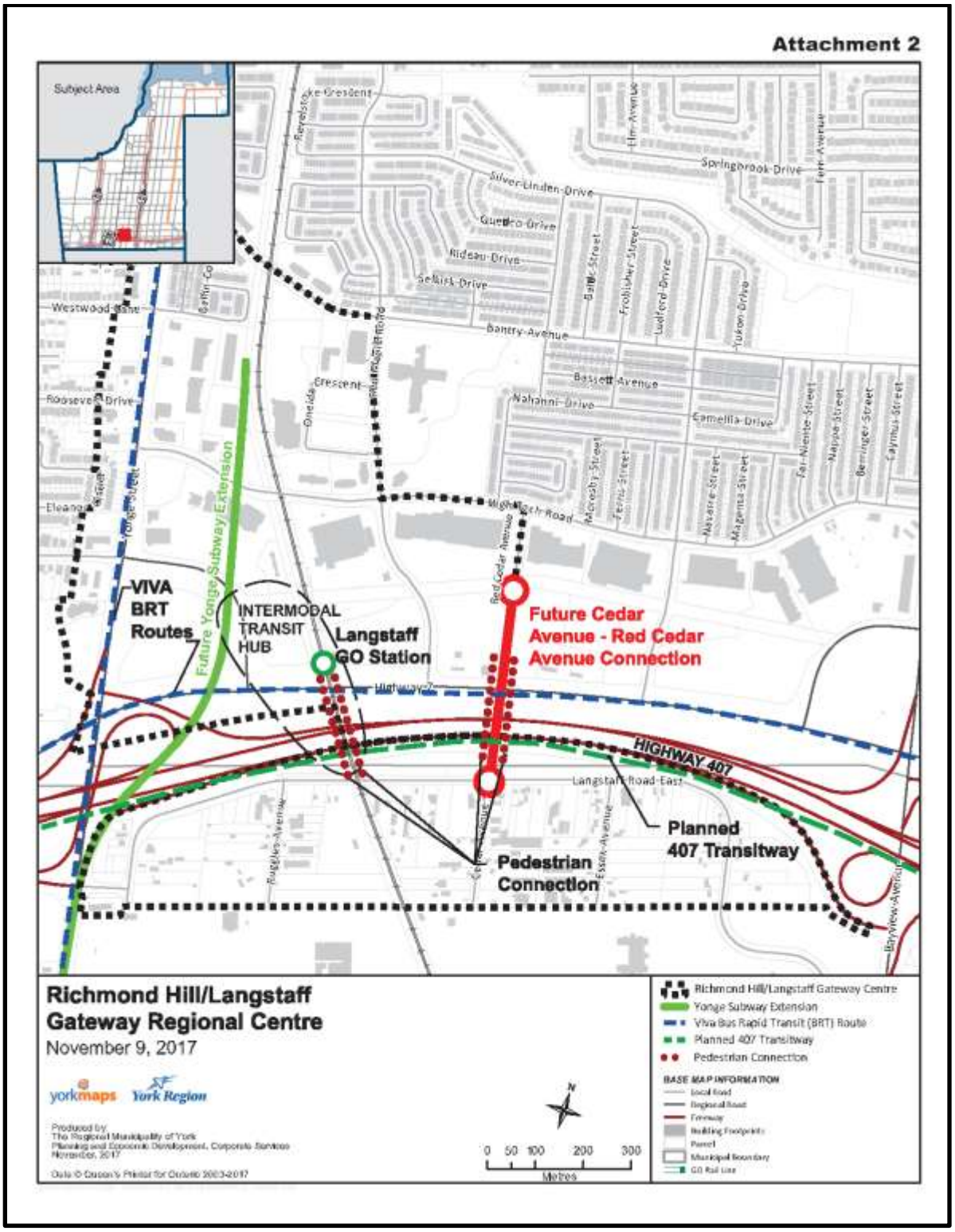


Figure 2-4: Planned Improvements for the Richmond Hill/Langstaff Gateway Regional Centre
Source: Attachment 2 of York Region Committee of the Whole Report No. 16, November 16, 2017

2.3.4 Red Cedar / Cedar Avenue EA (on-going)

York Region is conducting a Municipal Class Environmental Assessment (EA) Study for the extension of Red Cedar/Cedar Avenue from High Tech Road in the study area to Langstaff Road East in the City of Markham. When Highway 407 was built, structures were built under Highway 7 and Highway 407 ETR in support of a proposed roadway. The proposed roadway is anticipated to be extended under Highway 7 and Highway 407 ETR through the existing structures but will not provide direct access to either of these roads.

2.4 City of Richmond Hill Planning Context

This section summarizes City of Richmond Hill planning context relevant to the study area.

2.4.1 City of Richmond Hill Official Plan (2010)

The 2010 Official Plan provides several specific transportation-related policy directions pertinent to the Richmond Hill Centre Secondary Plan Study, including:

- The Yonge Street and Highway 7 Regional Corridors shall be planned as regional public rapid transit corridors in the transportation system.
- Yonge Street shall accommodate a range of transportation users and land uses to contribute to its evolution as a mixed-use corridor and urban main street.

The OP also designates existing and future streets in Richmond Hill Centre, their classification and minimum right of way widths, as shown in **Figure 2-5**. The proposed Garden Avenue extension and Red Cedar Avenue extension (north of Highway 7) are identified as collector streets with a 26 metre right-of-way. The policies of Section 3.5.4 of the OP permit a reduction of this width to 23m, where such width is not detrimental to the movement of traffic and the provision of municipal servicing, utilities, and landscaping.

A grade separation is proposed for the Garden Avenue extension at the CN rail corridor. It identifies future rapid transit corridors, the location of the proposed Richmond Hill Centre Integrated Transit Hub, and existing and proposed town trails and cycling routes, including proposed routes on High Tech Road and Red Maple Road. It also provides direction on land use and urban design to ensure the development of Richmond Hill Centre into a walkable, transit-oriented community.

Figure 2-5: Extract from Richmond Hill Official Plan Schedule A8 - Street Classification
Source: Richmond Hill Official Plan, January 2018 Office Consolidation

*Minor collector roads are 23m

2.4.2 City of Richmond Hill Transportation Master Plan Update (on-going)

The City of Richmond Hill is updating its Transportation Master Plan to identify the City's long-term transportation network needs to the 2041 horizon year. The working vision statement integrates four key principles: connectivity, sustainability, multi-modality, and accessibility.

The draft transportation network is documented in the following sections. The TMP update is expected to be complete in 2019.

2.4.2.1 Draft Active Transportation Network

As shown in **Figure 2-6**, several new active transportation facilities on municipal roads are proposed for Richmond Hill Centre, including:

- North-south buffered bike lanes on the new road west of Yonge Street
- An off-road trail following the GO corridor
- A north-south in-boulevard trail along Red Maple Road between Highway 7 and Bantry Avenue, continuing north as a signed bike route with edge line
- North-south cycle tracks on Cedar Avenue
- East-west signed bike routes on Oneida Crescent and Beresford Drive, connecting to the GO corridor trail and continuing west as a signed bike route with edge line
- East-west cycle tracks on the Garden Avenue Extension, continuing west as a signed bike route with edge line
- Bike lanes on the Garden Avenue jug handle
- A westerly continuation of the Bantry Avenue bike lanes as a signed bike route with edge line on Scott Drive

Figure 2-6: Extract from Richmond Hill TMP Update Map 1a - Draft Active Transportation Network Priorities

Source: City of Richmond Hill

2.4.2.2 Draft Road Network

A shown in **Figure 2-7**, two new collector road links are proposed for Richmond Hill Centre – a north-south urban collector road just west of Yonge Street, and an east-west extension of Garden Avenue with a grade separation at the CN rail corridor. The TMP also includes the Red Cedar / Cedar Avenue underpass. The improvements shown are consistent with the improvements identified in the City's Official Plan.

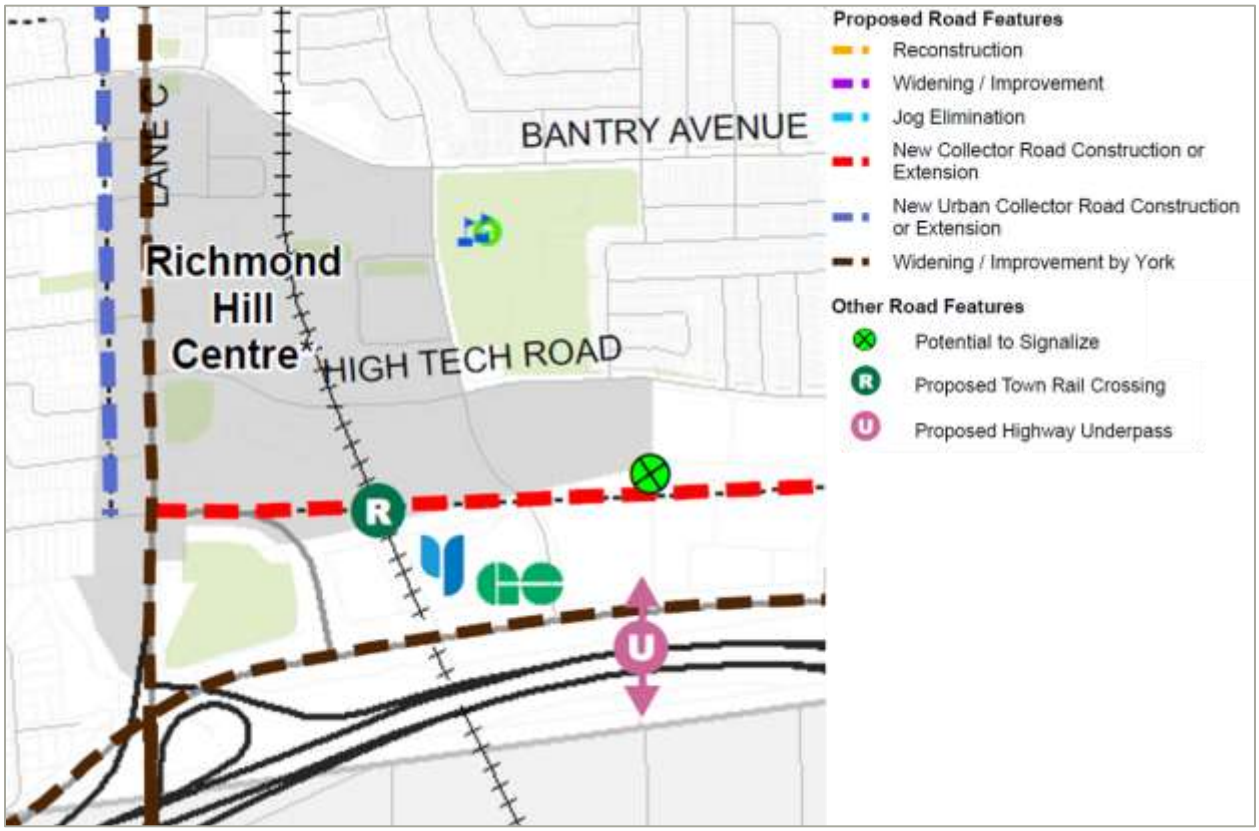


Figure 2-7: Extract from Richmond Hill TMP Update Map 2 - Draft Existing and Proposed Road Network

Source: City of Richmond Hill

2.4.3 High Tech Road Active Transportation and Access Modification Study

This study updated the findings and recommendations of the previous Red Maple Road and High Tech Road Operations Review (2015), focusing on the High Tech Road & 30 High Tech Road/Cinema Driveway. The study highlighted the absence of a protected crossing for pedestrians and peak period vehicular congestion as the primary issues at this location. The study recommends reducing the speed limit to 40km/h on High Tech Road, installing signage directing pedestrians to legal crossing

points, and painting pavement markings designating turning lanes as an initial solution, with the potential to signalize the intersection in the long term.

2.4.4 Red Maple Road Follow-Up: Operations and Safety Review (2018)

This study updated the findings and recommendations of the previous Red Maple Road and High Tech Road Operations Review (2015), focusing on a segment of Red Maple Road between Highway 7 and High Tech Road. Highlighted concerns include:

- Over-capacity outbound left-turning movements from Langstaff GO, Home Depot/Tim Horton's, and 45 Red Maple Road onto Red Maple Road;
- Significant incidence of turning collisions between drivers turning onto and off of Red Maple Road; and
- Pedestrians crossing Red Maple Road mid-block between Home Depot/Tim Horton's and 45 Red Maple Road not at a formal pedestrian crossing.

The study recommends restricting all inbound and outbound left-turning movements at the north driveway to the Home Depot via a centre median and installing a signal at the southern driveway to the Home Depot. These modifications are anticipated to reduce the number of collisions and increase pedestrian safety by providing a protected pedestrian crossing.

2.5 Other Planning Context

2.5.1 City of Markham Langstaff Gateway Secondary Plan (2011)

The Langstaff Gateway Secondary Plan area forms the southern portion of the Richmond Hill/Langstaff Gateway Regional and Urban Growth Centre. The plan provides for the development of a dense, mixed-use, transit-oriented, community.

The plan incorporates the Cedar Avenue Extension and multi-use corridor adjacent to the CN Rail line, including a busway and bicycle/pedestrian trails. It also provides for the implementation of a transit circulator connection north to Richmond Hill Transit Station through the Highway 407 underpass (Multi-use Corridor). Internal improvements include designating Langstaff Road as a 4 lane major collector with a grade separation at the CN rail tracks and implementing transit priority measures on Bayview Avenue. **Figure 2-8** illustrates the proposed Cedar Avenue extension as a local street with a 20 m right-of-way. **Figure 2-9** illustrates connections between the proposed cycling network in the Secondary Plan Area and Richmond Hill Centre.

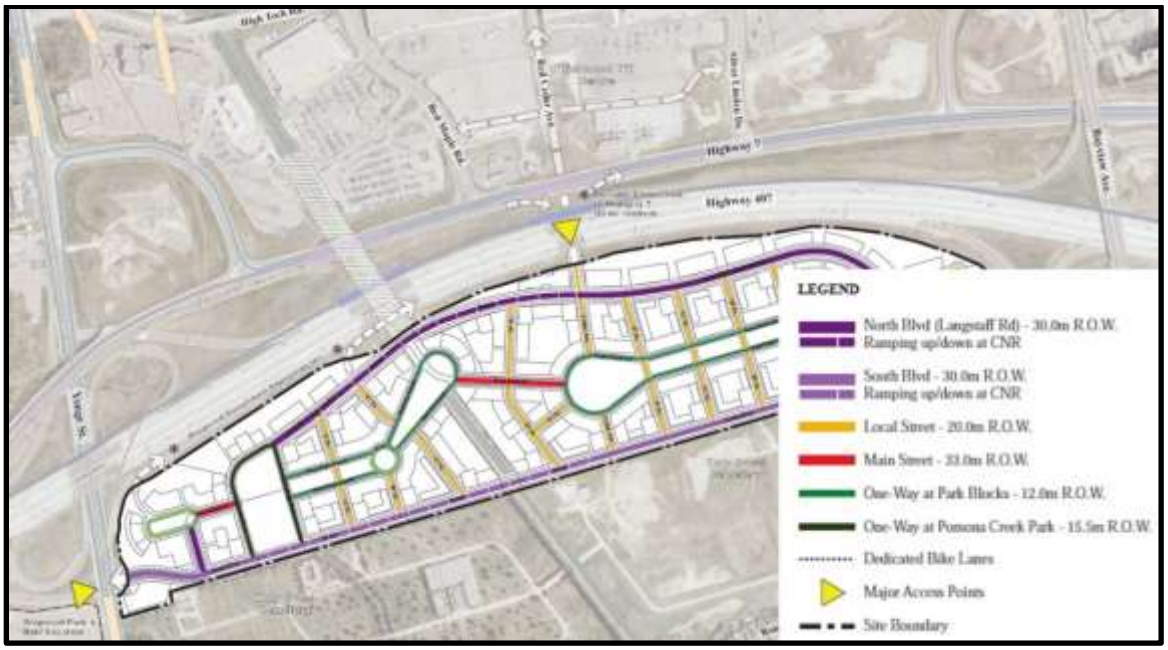


Figure 2-8: Langstaff Gateway Proposed Road Network
Source: Langstaff Gateway Secondary Plan, 2011

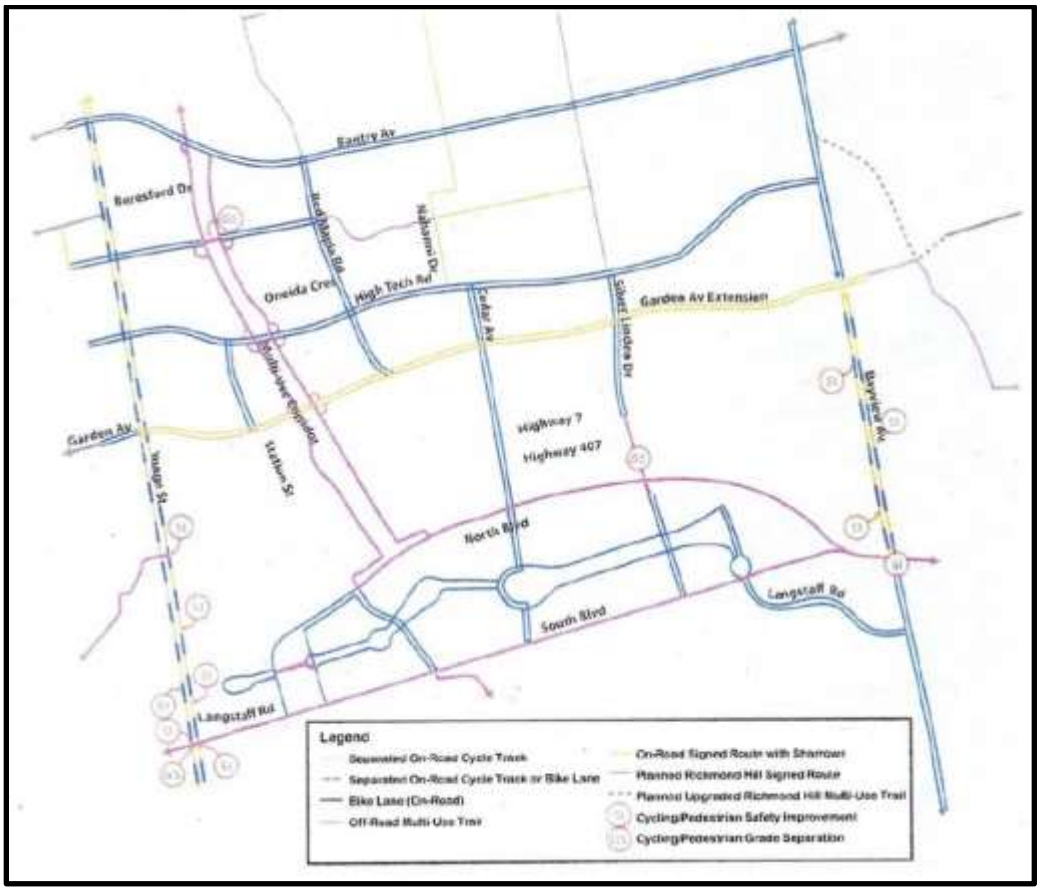


Figure 2-9: Recommended Urban Growth Centre Cycling Network
Source: Langstaff Gateway Secondary Plan, 2011

2.5.2 Yonge North Subway Extension

The planned Yonge North Subway Extension (YNSE) is a cross-jurisdictional project from the City of Toronto into the City of Markham, City of Vaughan, and City of Richmond Hill. The YSE extends 7.4 kilometres north from Finch Station in Toronto to the Richmond Hill/Langstaff Gateway Urban Growth Centre at Highway 7. The YNSE will complete a critical missing link and will include six stations as identified in Metrolinx's Initial Business Case (March 2021), as illustrated in **Figure 2-10**.. It will replace 2,500 bus trips currently serving the demand between Finch Avenue and Highway 7.

Figure 2-10: Yonge-North Subway Extension Alignment and Stations
Source: Metrolinx, 2021

Key considerations for the RHC SP include the identification of two stations within the study area, the first called Bridge Station located along the GO rail tracks between Highway 7 and Highway 407, and the second called High Tech Station located at High Tech Road.

2.5.2.1 Bridge Station

Bridge Station is an in-line at grade station nestled between Highway 7 and Highway 407. It is a major transit hub on a cross configuration with the bus terminal extending

east-west on the upper level and subway and GO extending north-south on the lower level. As illustrated in **Figure 2-11**, most passengers (74%) will be transferring from the bus terminal, 12% from private-owned vehicles, 7% by foot or transfer from the existing GO Langstaff station. This puts great emphasis on the transfer between bus and subway and reason why the alignment of both bus and subway-GO platforms are centred with each other.

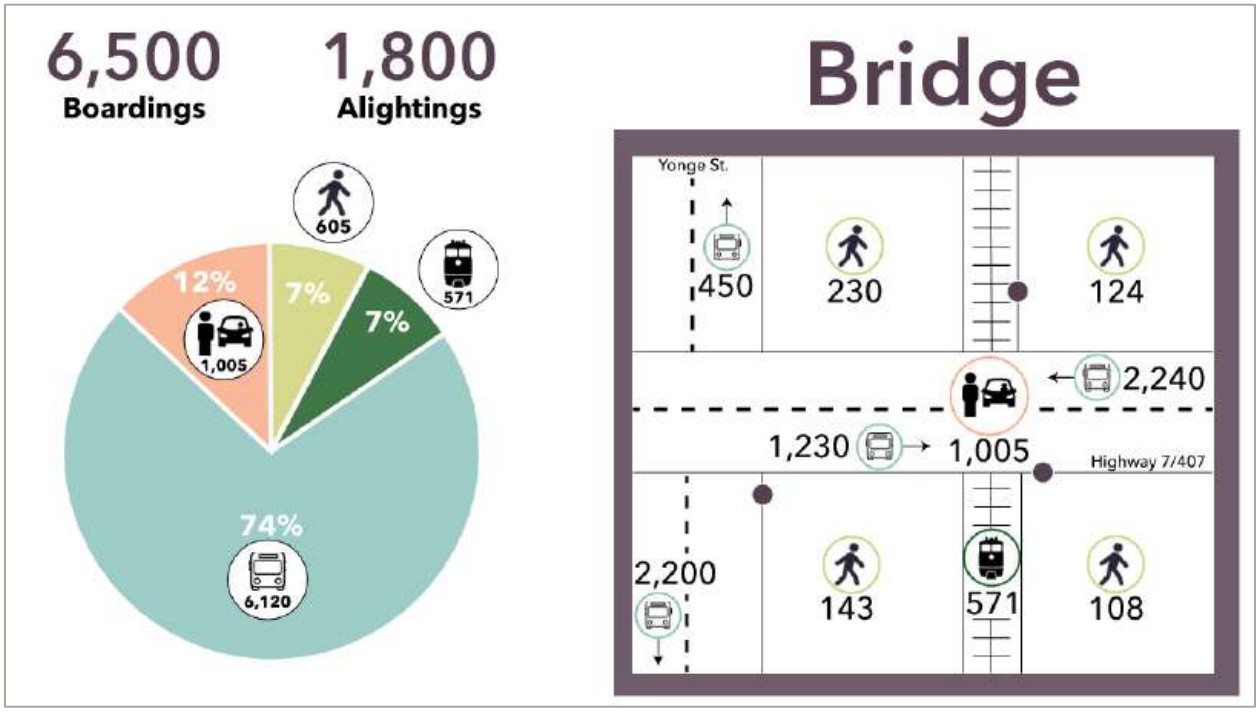


Figure 2-11: Bridge Station Ridership and Access Mode Share
Source: Metrolinx, 2021

Vehicular access to the station is provided via new south legs at the existing Highway 7 to Yonge Street ramp intersection, and at the existing Highway 7 and Red Maple Road intersection. Pedestrian access to the subway is provided at three locations with the main entrance at the southerly end of the existing at-grade GO station platform at Langstaff Road in the City of Markham, providing access to the subway below. The two secondary entrances are located on either side of the rail corridor and are accessed via pedestrian walkways from the existing GO station platform.

2.5.2.2 High Tech Station

High Tech Station is a terminal at-grade station located underneath High Tech Road with north and south entrances on either side of High Tech Road. While subway platforms are at-grade, the station concourse level matches the grade of High Tech Road. As illustrated in **Figure 2-12**, most trips accessing High Tech Station are anticipated to be via private vehicle or transit with a total of 62% of mode share. The remaining 38% are projected via active transportation from the surrounding community.

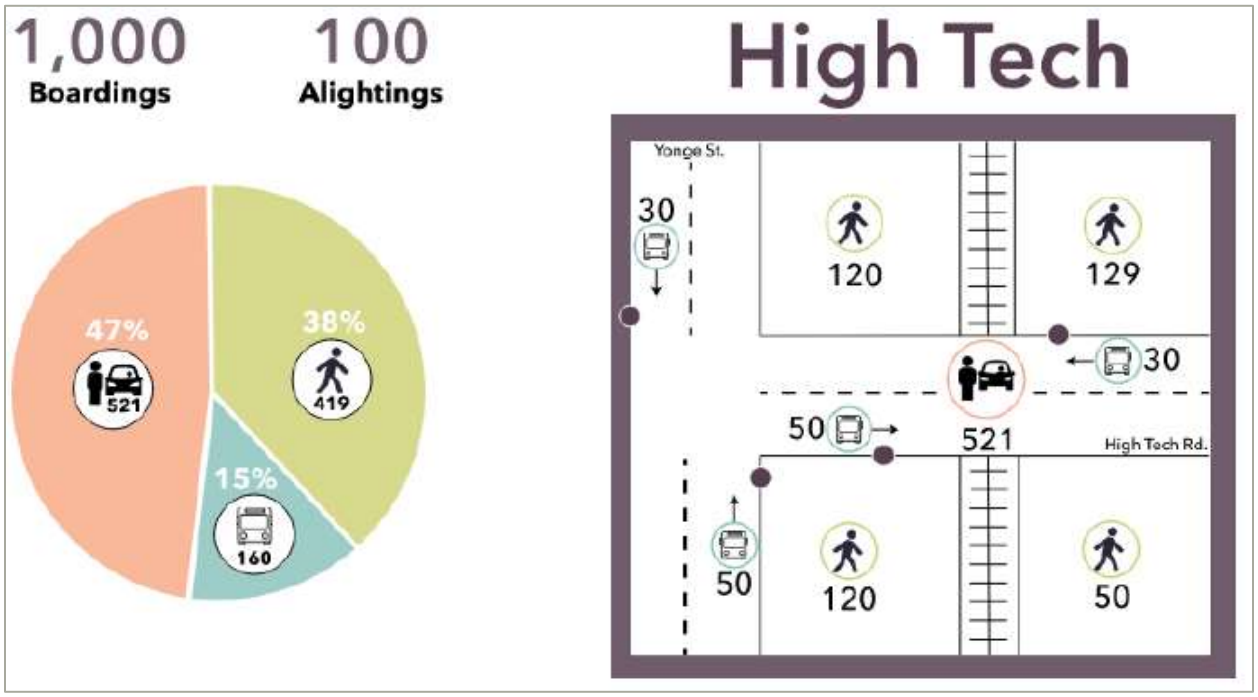


Figure 2-12: High Tech Station Ridership and Access Mode Share
Source: Metrolinx, 2021

3 Existing Conditions

This section documents the existing transportation conditions for the study area including travel patterns and mode share, the transportation system for all modes, traffic operations and traffic infiltration.

3.1 Travel Patterns

The daily trip destinations from the study area and associated mode share are taken from the 2016 Transportation Tomorrow Survey (TTS) and summarized in **Table 3-1**. Most of the trips are within Richmond Hill outside of the study area (28%), the City of Toronto (22%), and internal trips to the study area (16%). Except for trips going to the City of Toronto, which has a 20% transit mode share, most trips from the study area are auto trips. Overall, the combined auto driver and passenger mode share is 87%.

Table 3-1: Daily Trip Destinations and Mode Share *

Trip Destination	Total	% Total Trips	Mode Share - % of Trips			
			Auto Driver and Passenger	Transit	Walk and Cycle	*Other*
Internal	6,380	16%	81%	3%	16%	0%
Rest of Richmond Hill	11,120	28%	90%	3%	2%	4%
Markham	5,890	15%	95%	2%	0%	2%
Vaughan	4,030	10%	87%	7%	1%	5%
Rest of York Region	1,340	3%	94%	4%	0%	1%
Toronto	8,630	22%	78%	20%	0%	1%
Rest of GTHA	2,080	5%	99%	1%	0%	0%
Total	**39,470**	**100%**	**87%**	**7%**	**3%**	**2%**

Source: 2016 TTS
* Extracted for TTS 06 zone 2204, 2205, 2246-2250

The AM Peak Period mode share from 2006 to 2011 Transportation Tomorrow Survey (TTS) and the 2011 modelled mode share from the York Region model is summarized in **Table 3-2** and **Figure 3-1**. From 2006 to 2016, the study area experienced a stable, high percentage of auto driver trips, ranging between 61% and 65%. Transit mode share, including both YRT and GO Transit, is between 14% and 18% during this time. The area has a low active transportation mode share (walk and cycle), around 4%. The modelled auto and transit mode split in the York Region model is similar to numbers in the TTS Survey.

Table 3-2: AM Peak Period Mode Share, Trip Origins **

Mode	# of Trips				% of Trips			
	2006 TTS	2011 TTS	2016 TTS	2011 Modelled *	2006 TTS	2011 TTS	2016 TTS	2011 Modelled *
Auto driver	5,680	6,920	6,910	5,800	61%	63%	65%	68%
Auto passenger	1,300	1,290	500	1,270	14%	12%	5%	15%
Transit	1,520	1,930	1,480	1,440	16%	18%	14%	17%
Walk, cycle	340	360	520		4%	3%	5%	
Other	420	460	1,150		5%	4%	11%	
Total	9,270	10,960	10,570	8,510	100%	100%	100%	100%

* Source: York Region Model. The model only forecasts drive and transit mode.
** Extracted for TTS 06 zone 2204, 2205, 2246-2250

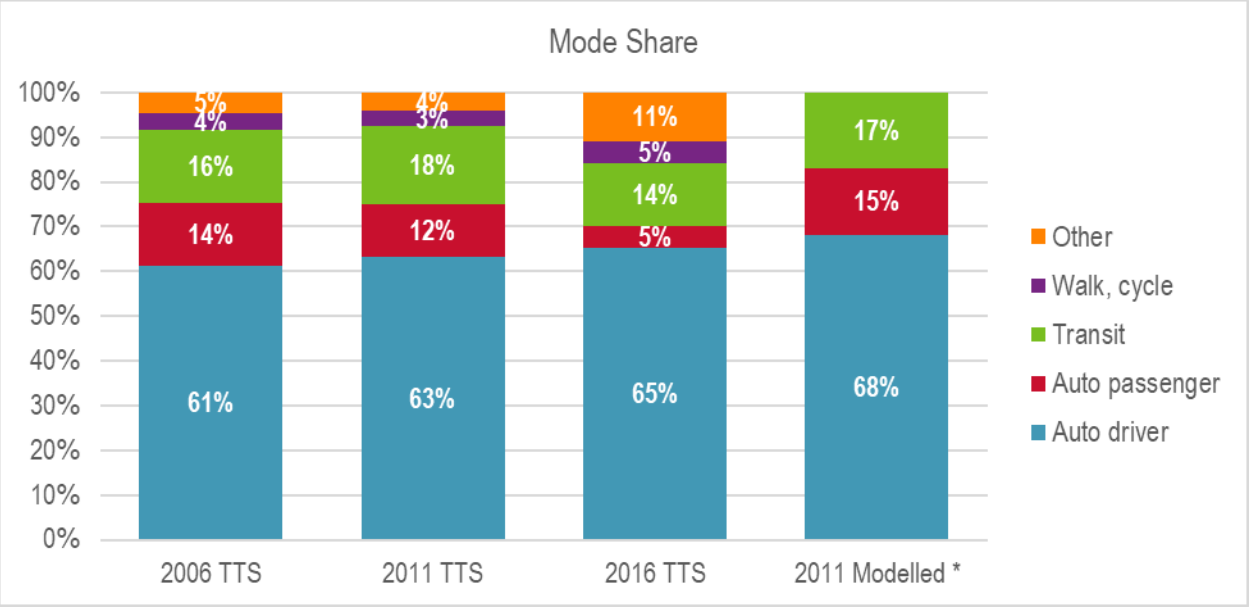


Figure 3-1: AM Peak Period Mode Share, Trip Origins

* Source: York Region Model. The model only forecasts drive and transit mode.
** Extracted for the border study area, TTS 06 zone 2204, 2205, 2246-2250

3.2 Existing Road Network

Existing road classifications, right-of-way (ROW) widths, and jurisdictions prescribed by the Official Plans of York Region and the City of Richmond Hill are shown in **Figure 3-2**. The study area is bounded by Highway 407 ETR which is a tolled, restricted-access privately-leased provincial road to the south. Within the study area, Yonge Street is the primary north-south arterial, and Highway 7 is the primary east-west arterial. Both roads are designated as having ROW widths up to 45m through the study area. Existing collector streets with 26m ROW per the City's OP within the study area include Bantry Avenue, Scott Drive, High Tech Drive, Red Maple Road, Garden Avenue, and Red Cedar Avenue. This arterial and collector network is supported by a small number of local roads, primarily located in the western and northern portions of the study area.

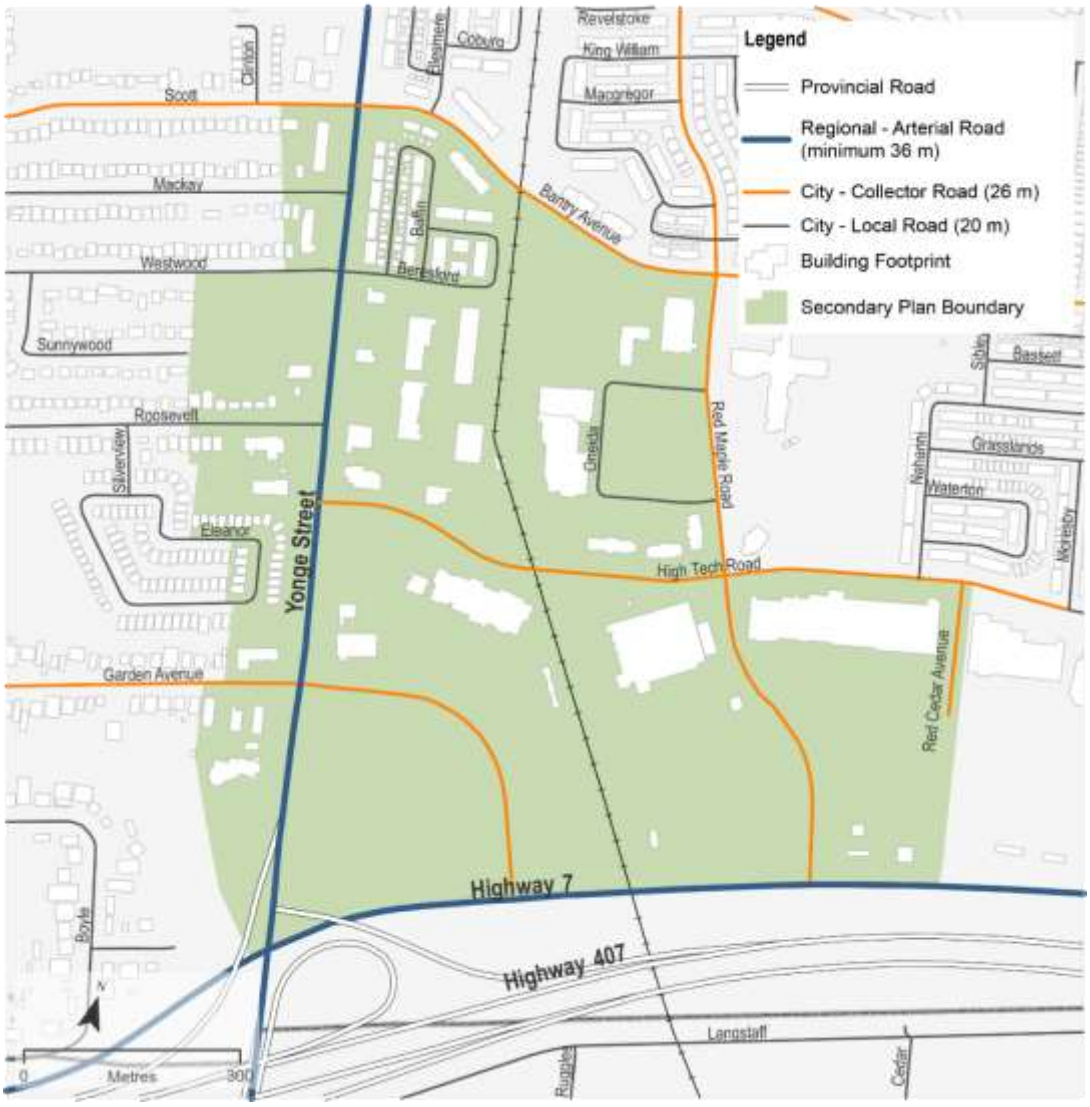


Figure 3-2: Existing Road Network

Source: Richmond Hill Official Plan, Office Consolidation to January 23, 2018

3.3 Existing Transit Network and Transit Usage

This section documents the existing transit network and transit usage patterns.

3.3.1 Existing Transit Network

The existing public transit network within the Study Area is shown in **Figure 3-3** and includes:

- Inter-regional services provided by GO Rail and GO Bus;
- VIVA bus rapid transit; and
- York Region Transit local bus service.

These services converge in the south-western quadrant of the study area at the Richmond Hill Centre Terminal / Langstaff GO Station.

Figure 3-3: Existing Transit Network

3.3.1.1 GO Rail

Langstaff GO Station straddles the boundary between Richmond Hill and Markham. The station is on the Richmond Hill GO Line which operates between Union Station in Toronto and Gormley GO in Richmond Hill. Peak period, peak direction service is currently provided. In off-peak periods, similar service is provided by GO Bus Route 61 (see below).

3.3.1.2 GO Bus

The following GO Bus routes service Richmond Hill Centre Terminal/Langstaff GO.

- 51-52-54 – 407 East – North York-Scarborough-Oshawa GO
- 40 – Hamilton-Pearson-Richmond Hill Centre
- 61 – Union Station-Gormley GO

3.3.1.3 Viva

Four Viva routes, York Region's Bus Rapid Transit system, call at Richmond Hill Centre Terminal. Dedicated bus rapidways are currently used by Viva services on Highway 7 to the east and will soon be operational on Highway 7 to the west and Yonge Street to the north. Viva services are fully integrated with York Region Transit's regular services. Viva services to Richmond Hill Centre include:

- Viva Purple – Highway 7 (Richmond Hill Centre-Markham Stouffville Hospital)
- Viva Pink – Yonge Street and Highway 7 (Finch Station-Unionville GO)
- Viva Blue – Yonge Street (Finch Station-Newmarket)
- Viva Orange – Highway 7 (Martin Grove-Richmond Hill Centre)

3.3.1.4 York Region Transit

Richmond Hill Centre is well served by York Region Transit. Routes include:

- 1 – Highway 7 (Richmond Hill Centre-Box Grove)
- 16 – 16th Avenue (Rutherford Road-Markham Stouffville Hospital)
- 83/83A – Trench (Richmond Hill Centre-Bernard Terminal / Richmond Green High School)
- 85/85C – Rutherford (Napa Valley Ave & Rutherford Road-Orlando Ave & Brodie Drive)
- 86 – Newkirk-Red Maple (Richmond Hill Centre-Shadow Falls Dr & Wolf Trail Cres)
- 87 – Autumn Hill (Richmond Hill Centre-Vaughan Mills Mall Terminal)
- 91/91A/B/E – Bayview (Finch Station-Bayview Ave & Subrisco Ave)
- 98/99 – Yonge (Finch Station-Green Lane)
- 760 – Vaughan Mills/Wonderland (Finch Station-Canada's Wonderland)

YRT also provides Mobility Plus service to Richmond Hill Centre. Mobility Plus is York Region's door-to-door, shared ride, accessible public transit service for people with disabilities. This fall, Mobility Plus and Dial-a-Ride will amalgamate to form On-Demand, YRT's new demand-responsive transit service. The On-Demand service will be accessible to all ages and abilities.

3.3.2 Transit Usage

Weekday transit boardings and alightings in the study area were provided by York Region Transit (YRT). Boardings and alightings for stops within or adjacent to the Secondary Plan Area, broken down by time of day, are shown in **Figure 3-4**. PM peak period (3-7 pm) has the most transit boarding and alighting activities and evening the fewest.

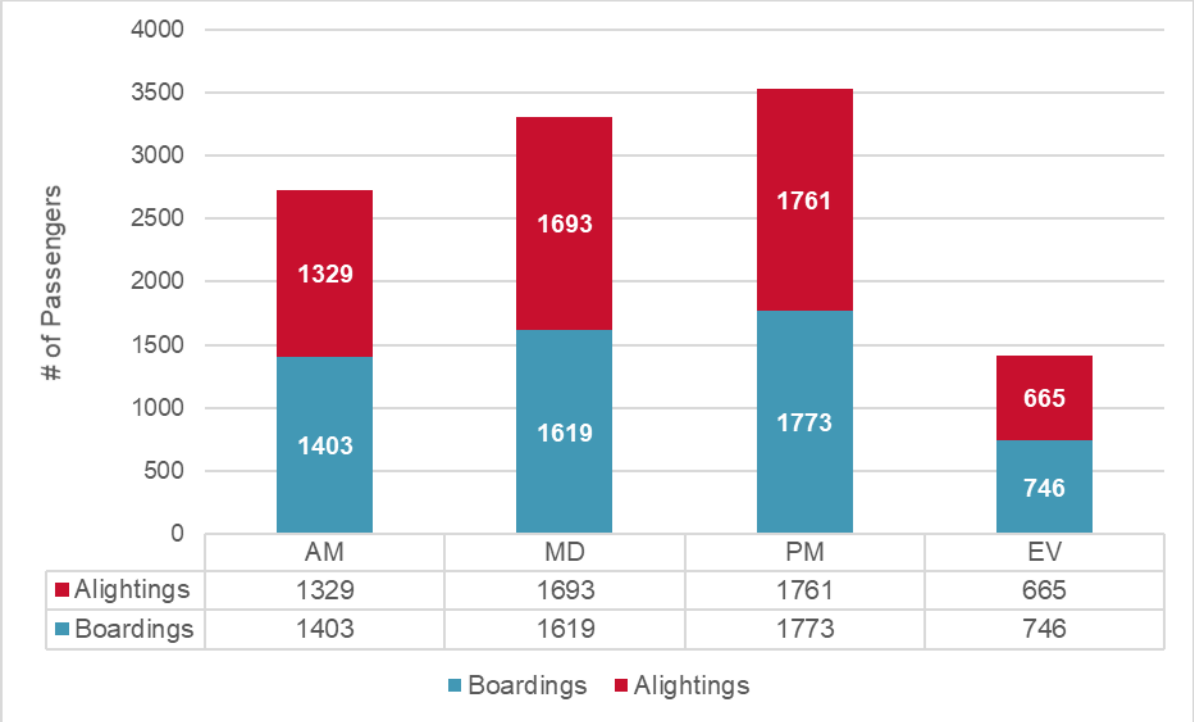


Figure 3-4: Boardings and Alightings by Time Period in the SP Area (Fall 2018)

Time Period: AM: Start of service to 9:00 a.m.; Midday: 9:00 a.m. - 3:00 p.m.; PM: 3:00 p.m. - 7:00 p.m. and Evening: 7:00 p.m. to end of service.

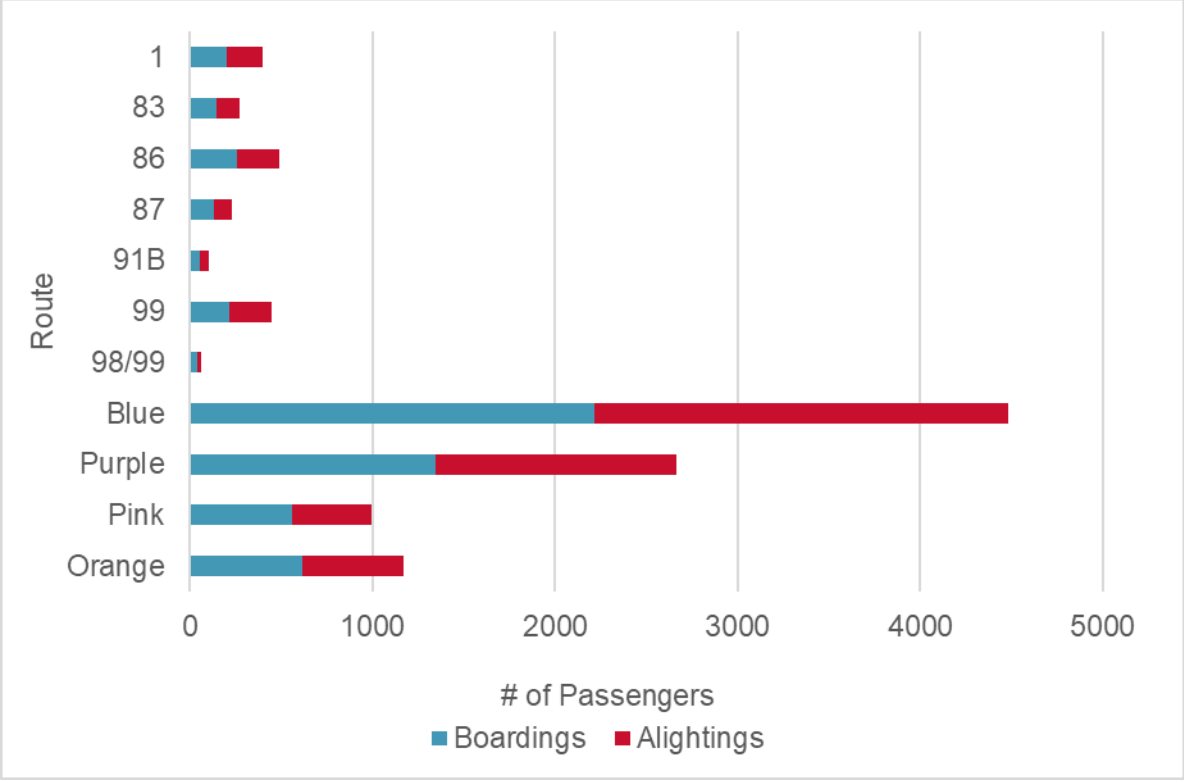


Figure 3-5: Total Boardings and Alightings by Route in the SP Area (Fall 2018)

As shown in **Figure 3-5**, viva Blue is the busiest route within the study area by a significant margin, with over 2,200 daily boardings and over 2,200 daily alightings. Viva Purple is the next busiest route, with about half as many daily boardings and alightings.

Richmond Hill Centre Terminal is the busiest location for boarding and alighting activities by a significant margin. 91% of boarding and 90% of alighting activities within the Secondary Plan Area occur at the cluster of stops which make up the Terminal.

3.4 Existing Pedestrian and Cycling Network

The existing pedestrian and cycling networks are detailed in this section.

3.4.1 Pedestrian

As shown in **Figure 3-6**, sidewalks are provided along at least one side of most public streets within the study area, and paved shoulders shared with cyclists are provided on Highway 7. Roads under MTO jurisdiction, including access ramps to Highway 407, do not provide pedestrian access. Pedestrians can cross under Highways 7 and 407 to Markham using the GO Station platform, and there is a pedestrian bridge across the rail corridor between Highway 7 and High Tech Road. The Cedar Avenue Extension will provide additional pedestrian connectivity from the study area to Markham.

While pedestrian infrastructure is provided along most roads, pedestrian connectivity is generally poor given the large block sizes, large distances between crossing points, large areas of surface parking with patchy pedestrian routes to services, and barriers such as the CN rail corridor.

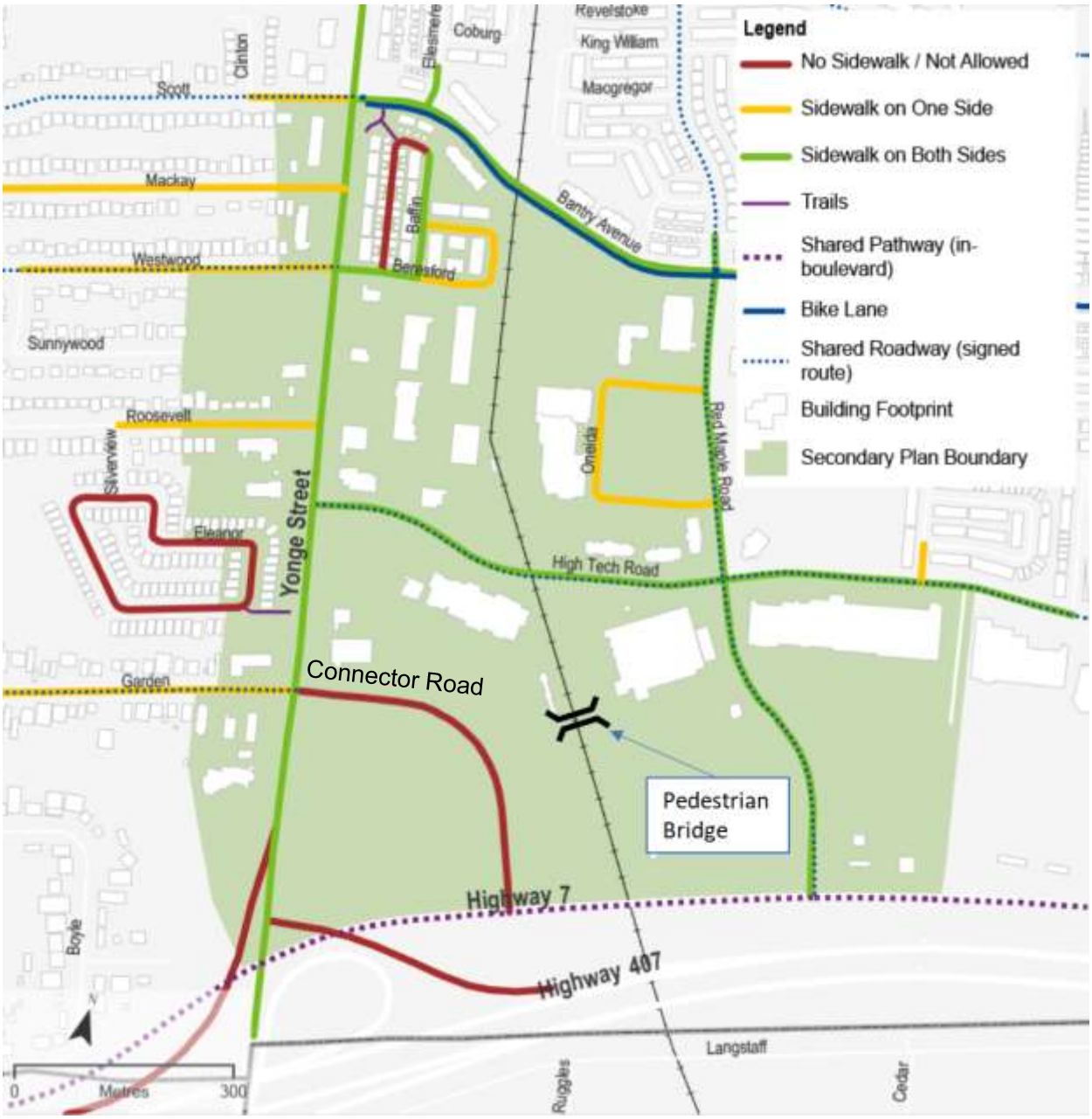


Figure 3-6: Existing Pedestrian and Cycling Networks

3.4.2 Cycling

At present, the only dedicated cycling facilities within the study area are found on Bantry Avenue in the form of painted bike lanes, on Highway 7 with raised paved shoulders, and on Yonge Street north of Garden Avenue in the form of uni-directional bike lanes. There is an in-boulevard pathway on the north and east side of Connector Road, but it is shared with pedestrians. High Tech Road and Red Maple Road are designated as shared roadways; however, no pavement markings or physical barriers provide protection to cyclists. Scott Drive, Westwood Lane, and Garden Avenue are also designated as shared roadways west of Yonge Street.

Both the in-delivery Yonge Street Viva BRT project and Red Cedar / Cedar Avenue Extension (currently in planning) will provide additional dedicated or separated cycling links within and beyond the study area.

3.5 Existing Traffic Analysis

A traffic analysis was undertaken to document the existing conditions. Twenty-one intersections were analyzed within the Broader Network Area, including:

1. Bantry Road & Yonge Street
2. Bantry Road & Red Maple Road
3. Bantry Road & Bayview Avenue
4. High Tech Road & Yonge Street
5. High Tech Road & Red Maple Road
6. High Tech Road & Bayview Avenue
7. 16th Avenue & Red Maple Road
8. Yonge Street & Garden Avenue / Highway 7 Ramp
9. Yonge Street & Highway 7 Ramp
10. Highway 7 & Red Maple Road
11. Yonge Street & Highway 407 WB Off-Ramp
12. Yonge Street & Highway 407 EB Off-Ramp / Langstaff Road
13. Silver Linden Drive & High Tech Road
14. Silver Linden Drive & Highway 7
15. Bayview Avenue / Creswick Road & Highway 7
16. Bayview Avenue & Highway 7
17. 16th Avenue & Yonge Street
18. High Tech Road & Red Cedar Avenue
19. High Tech Road & Far Niente Street
20. Yonge Street & Oak Avenue
21. Yonge Street & Westwood Lane

The locations of these intersections are shown in **Figure 3-7**.

Figure 3-7: Intersection Locations

3.5.1 Methodology

The following highlights the approach to major components of this analysis.

3.5.1.1 Scenarios

An existing conditions (2019) scenario was analyzed. It is noted that at the time of this study (including the collection of up-to-date traffic counts), there is on-going vivaNext construction along Yonge Street within the study area which is expected to be completed in 2020. The construction includes lane closures at different times of the day, including a reduction in off-peak direction through lanes (i.e., reduced lanes on Yonge Street northbound in the AM peak and southbound in the PM peak). In order to avoid the traffic variations caused by the construction works when comparing the existing condition with the future scenarios, it is recommended that the existing conditions analysis supporting the Richmond Hill Centre study replicate the planned vivaNext lane configurations along Yonge Street from Garden Avenue to 16th Ave based on the preferred alignment carried out 2005 Yonge Street Corridor

Public Transit Improvements Environmental Assessment Study as well as the Issued for Construction drawings provided by the York Region.

3.5.1.2 Time Periods for Analysis

This study focused on impacts during the weekday AM peak hours (between 7:00 am and 9:00 am) and PM peak hours (between 4:00 pm and 6:00 pm).

3.5.1.3 Existing Traffic Counts

Intersection Turning Movement Counts (TMC) were provided by York Region, the City of Richmond Hill, and the City of Markham. Any TMC's more than two years old were re-counted by a sub-consultant hired by HDR for the purpose of this study. The dates of the counts are shown in **Table 3-3**.

Table 3-3: Existing Turning Movement Counts

#	Intersecting Roadway	Signalized?	Date of Count*
1	Bantry Road & Yonge Street	Yes	May 07, 2019
2	Bantry Road & Red Maple Road	Yes	November 18, 2018
3	Bantry Road & Bayview Avenue	Yes	May 07, 2019
4	High Tech Road & Yonge Street	Yes	May 07, 2019
5	High Tech Road & Red Maple Road	Yes	November 18, 2018
6	High Tech Road & Bayview Avenue	Yes	May 07, 2019
7	16th Avenue & Red Maple Road	Yes	May 07, 2019
8	Yonge Street & Garden Avenue / Highway 7 Ramp	Yes	May 07, 2019
9	Yonge Street & Highway 7 Ramp	Yes	February 06, 2019
10	Highway 7 & Red Maple Road	Yes	February 06, 2019
11	Yonge Street & Highway 407 WB Off-Ramp	Yes	May 07, 2019
12	Yonge Street & Highway 407 EB Off-Ramp / Langstaff Road	Yes	May 07, 2019
13	Silver Linden Drive & High Tech Road	Yes	May 07, 2019
14	Silver Linden Drive & Highway 7	Yes	February 06, 2019
15	Bayview Avenue / Creswick Road & Highway 7	Yes	May 07, 2019
16	Bayview Avenue & Highway 7	Yes	May 07, 2019
17	16th Avenue & Yonge Street	Yes	May 07, 2019
18	High Tech Road & Red Cedar Avenue	No	May 07, 2019
19	High Tech Road & Far Niente Street	Yes	May 07, 2019
20	Yonge Street & Oak Avenue	Yes	May 07, 2019
21	Yonge Street & Westwood Lane	Yes	May 07, 2019
22	Bantry Avenue and Silver Linden Drive	Yes	April 02, 2019

** All the counts were collected on weekdays (Tuesday – Thursday).*

Traffic volumes were adjusted and balanced on the older counts where the link different was greater than 10%, to compensate for seasonal variation. It is further noted that the above counts reflect conditions during which vivaNext construction on Yonge Street has been ongoing and impacting traffic patterns since 2015.

3.5.1.4 Signal Timings

Signal timing plans were provided by York Region and the City of Richmond Hill. At the time of the study, signal timing plans at the following four locations were not available; therefore, best assumptions were made based on the available information (cycle length at adjacent intersection, signal head configuration, site observations etc.).

- Yonge Street & Westwood Lane
- Yonge Street & Bantry Avenue
- Yonge Street & Oak Avenue
- Yonge Street & 16th Avenue

Signal timing plans are provided in **Appendix A.** Since the existing condition replicates the planned VIVA lane configuration, it was assumed that the north-south left turn will operate as protected phases at signalized intersections along Yonge Street between Garden Ave and 16th Avenue.

3.5.1.5 Intersection Capacity Analysis

Intersection operations were assessed using Synchro 9 software. Synchro 9 can analyze both signalized and unsignalized intersections within a road corridor or network by taking the spacing, intersection, queues, and operations between intersections into account.

Two Measures of Effectiveness (MOE's) are considered in the signalized intersection analysis:

- Volume to capacity (v/c) ratio; and
- Level of Service (LOS) for all intersection movements.

Two MOE's are considered in the two-way unsignalized intersection analysis:

- Volume to capacity (v/c) ratio; and
- The highest movement Level of Service.

A volume to capacity (v/c) ratio indicates the amount of congestion for each lane group. Any v/c ratio greater than or equal to 1.0 indicates that the approach is operating at or above capacity.

Level of service is based on the average control delay per vehicle for a given movement. Delay is an indicator of how long a vehicle must wait to complete a movement and is represented by a letter between 'A' and 'F', with 'F' being the longest delay as described in **Table 3-4**. The volume to capacity (v/c) ratio is a measure of the degree of capacity expected at an intersection.

Table 3-4: Description of LOS

L.O.S.	Control Delay Per Vehicle (seconds)	
	Signalized Intersections	Unsignalized Intersections
A	≤ 10	≤ 10
B	>10 and ≤20	>10 and ≤15
C	>20 and ≤35	>15 and ≤25
D	>35 and ≤55	>25 and ≤35
E	>55 and ≤80	>35 and ≤50
F	>80	>50

3.5.1.6 Calibration

Turning movements with v/c ratios great than 1.10 were calibrated by adjusting one, or any combination of the following variables to obtain the most reasonable/realistic results:

- Lost Time Adjustment (LTA)
- Saturation Flow Rate (ISF)
- Peak Hour Factor (PHF)

These adjustments were made to obtain reasonable and practicable peak hour volumes. In reality, when demand volume exceeds capacity, traffic will seek alternatives during the peak hour, which may result in one or more of the following:

- Unserved demand will seek alternative routes;
- Unserved demand will enter the network at a later or earlier time, causing peak period spreading; and
- Some users will switch to other modes, including transit, auto passengers, walk, or cycle.

The resulting adjusted parameters were applied to specific movements and the adjustments are documented in **Section** Error! Reference source not found.. The adjustments were carried forward to the future scenarios.

3.5.2 Existing Lane Configuration and Turning Movement Volumes

Figure 3-8 illustrates the lane configuration and restrictions in the Study Area. The existing traffic condition analysis was completed based on the methodology discussed in **Section 3.5.1**. To compensate for seasonal differences, the older counts were balanced within a 10% difference for link volumes between the adjacent intersections. The balanced turning volumes are illustrated in **Figure 3-9**.

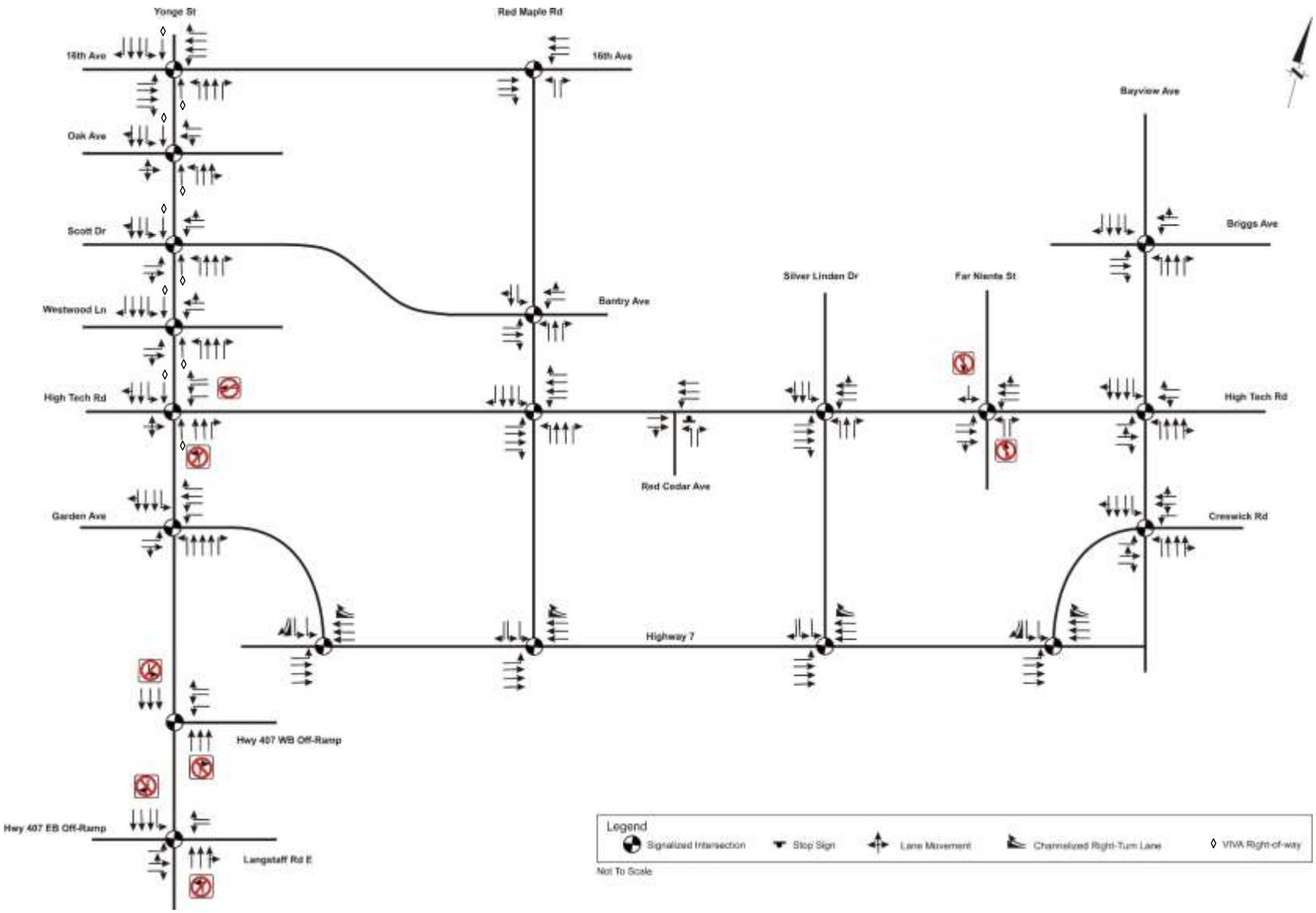


Figure 3-8: Existing Lane Configurations

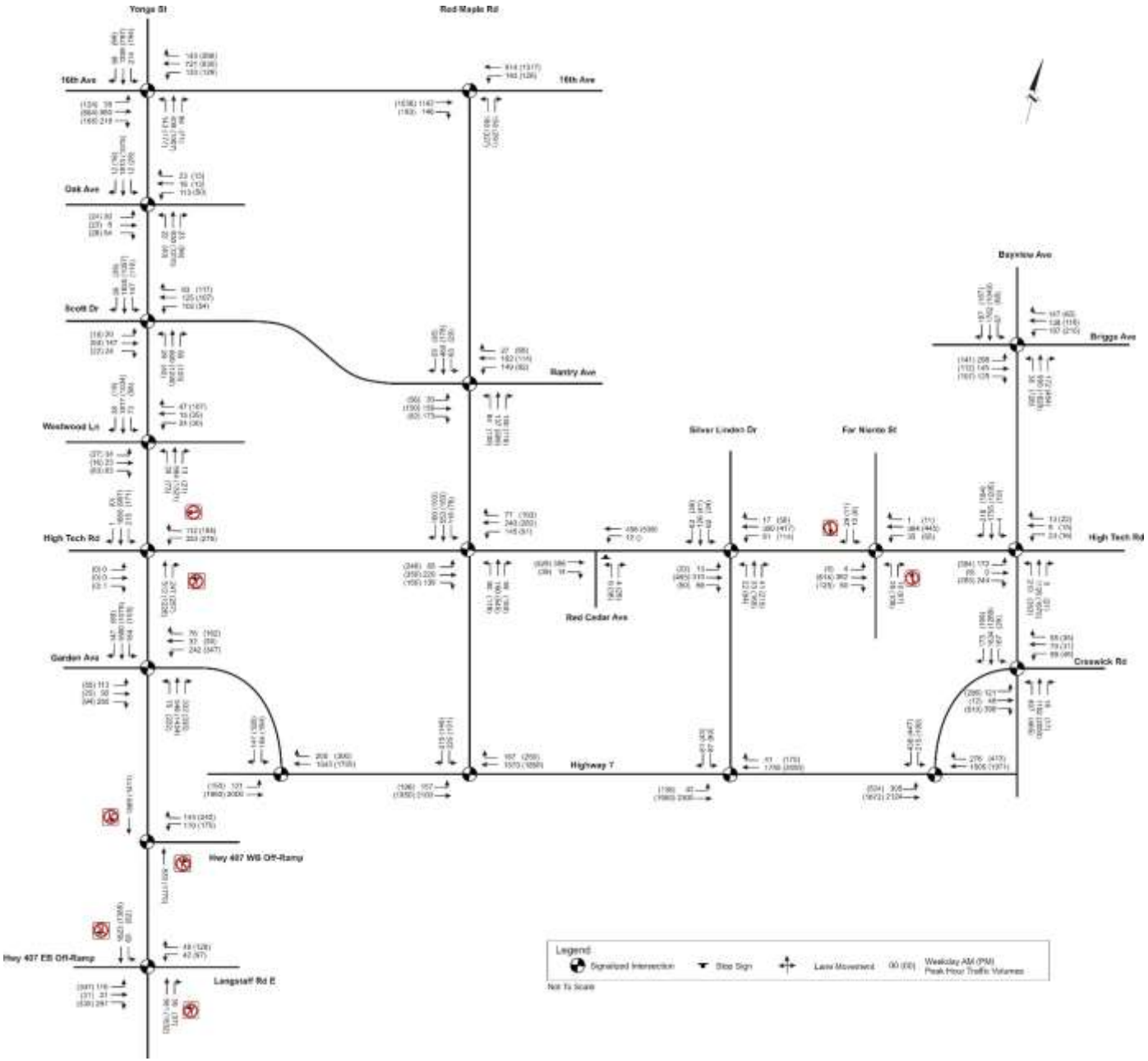


Figure 3-9: Existing AM and PM Peak Hour Turning Movement Volumes

3.5.3 Existing Traffic Operations

Existing traffic operations for weekday AM and PM peak hours were assessed for 20 signalized intersections and one unsignalized intersection within the study area.

3.5.3.1 Intersection Capacity

Detailed LOS and v/c ratios for each turning movement are summarized in the Synchro report shown in **Appendix B. Table 3-5** summarizes the critical movements under existing conditions. Critical movements consider the following measures:

- Through or shared-through movement with v/c of 0.85 or above;
- Exclusive turning movement with v/c of 1.0 or above; and/or,
- Any movement with a LOS E or worse.

The thresholds identified are based on the York Region's *Transportation Mobility Plan Guidelines for Development Applications*, which recommends automobile targets of LOS D or better and v/c ratio of 0.85 or better, in urban environments. **Red bold** text represents movements that exceed the above criteria thresholds.

Table 3-5: Intersection Capacity Analysis Results – Critical Turning Movements under Existing Condition

	Critical Turning Movements (Intersection LOS, delay)	Base		Calibrated		Calibration Adjustments*
		v/c	LOS	v/c	LOS	
AM	**Yonge St & 16th Ave (LOS D, 52.0s)**					
	Eastbound Through	**0.94**	**E**			
	Northbound Left	0.92	**F**			
	Westbound Left	0.92	**F**			
	Southbound Left	0.81	**E**			
	Southbound Through	**0.87**	D			
	Yonge St & Oak Ave (LOS B, 12.2s)					
	Westbound Through-Left	0.80	**F**			
	Northbound Left	0.25	**E**			
	Southbound Left	0.14	**E**			
	Yonge St & Scott Dr (LOS C, 24.5s)					
	Eastbound Left	0.27	**E**			
	Eastbound Through-Right	0.60	**E**			
	Westbound Left	0.91	**F**			
	Westbound Through-Right	0.77	**E**			
	Northbound Left	0.31	**E**			
	Southbound Left	0.68	**E**			
	Yonge St & Westwood Ln (LOS A, 9.8s)					
	Eastbound Left	0.40	**E**			
	Westbound Left	0.37	**E**			
	Northbound Left	0.28	**E**			
	Southbound Left	0.55	**E**			
	Yonge St & High Tech Rd (LOS C, 24.4s)					
	Westbound Left	0.95	**F**			
	Southbound Left	0.52	**E**			
	Yonge St & Garden Ave (LOS D, 45.9s)					**All Movement:**
	Eastbound Left	0.50	**F**	0.48	**E**	*PHF** = 0.96*

	Critical Turning Movements (Intersection LOS, delay)	Base		Calibrated		Calibration Adjustments*
		v/c	LOS	v/c	LOS	
	Eastbound Through-Right	**1.24**	**F**	0.99	**F**	**EBTR:** *LTA = -3.0* *ISF = 2050*
	Westbound Left	0.76	**E**	0.75	**E**	
	Northbound Left	0.51	**E**	0.49	**E**	
	Southbound Left	0.71	**E**	0.69	**E**	
	Southbound Through	**0.91**	D	**0.85**	D	
	Yonge St & Langstaff Rd (LOS B, 19.7s)					
	Westbound Left	0.32	**E**			
	Bayview Ave & Bantry Ave (LOS D, 39.0s)					**All Movement:** *PHF** = 0.96* **EBL:** *LTA = -2.0* *ISF = 2000*
	Eastbound Left	**1.54**	**F**	**1.16**	**F**	
	Eastbound through	0.56	**E**	0.56	**E**	
	Westbound Through-Right	0.82	**E**	0.82	**E**	
	Southbound Through	**0.95**	D	**0.92**	D	
	Bayview Ave & High Tech Rd (LOS C, 32.1s)					
	Eastbound Left	0.63	**E**			
	Eastbound through	0.64	**E**			
	Northbound Left	0.79	**E**			
	Westbound Through-Left	0.33	**E**			
	Bayview Ave & Creswick Rd (LOS D, 40.6s)					**SBTR:** *LTA = -2.0* *ISF = 2000*
	Eastbound Left	0.58	**E**			
	Eastbound Through	0.54	**E**			
	Westbound Left	0.86	**F**			
	Westbound Left-Through-Right	0.69	**E**			
	Southbound Through-Right	**1.12**	**E**	**1.02**	D	
PM	**Yonge St & 16th Ave (LOS D, 47.3s)**					
	Eastbound Left	0.79	**E**			
	Northbound Left	0.92	**F**			
	Southbound Left	0.81	**E**			
	Yonge St & Oak Ave (LOS A 9.9s)					
	Eastbound Left-Through-Right	0.53	**E**			
	Westbound Through-Left	0.65	**F**			
	Northbound Left	0.39	**E**			
	Southbound Left	0.30	**E**			
	Yonge St & Scott Dr (LOS B, 18.6s)					
	Eastbound Left	0.28	**E**			
	Westbound Left	0.36	**E**			
	Westbound Through-Right	0.79	**E**			
	Northbound Left	0.39	**F**			
	Southbound Left	0.63	**E**			
	Yonge St & Westwood Ln (LOS B, 12.9s)					
	Eastbound Left	0.54	**E**			
	Westbound Left	0.37	**E**			
	Northbound Left	0.56	**F**			
	Southbound Left	0.19	**E**			
	Yonge St & High Tech Rd (LOS C, 22.3s)					
	Westbound Left	0.96	**F**			
	Southbound Left	0.62	**E**			
	Yonge St & Garden Ave (LOS C, 34.7s)					
	Eastbound Left	0.79	**E**			
	Westbound Left	0.48	**E**			
	Northbound Left	0.76	**E**			
	Southbound Left	0.55	**E**			
	Yonge St & Langstaff Rd (LOS D, 36.9s)					
	Westbound Left	0.66	**E**			

Critical Turning Movements (Intersection LOS, delay)	Base		Calibrated		Calibration Adjustments*
	v/c	LOS	v/c	LOS	
Bayview Ave & Bantry Ave (LOS D, 35.3s)					
Eastbound Through	0.62	**E**			
Northbound Through	**0.93**	D			
Westbound Through-Right	0.65	**E**			
Bayview Ave & High Tech Rd (LOS C, 27.3s)					
Eastbound Left	0.81	**E**			
Eastbound through	0.84	**F**			
Northbound Left	0.90	**E**			
Westbound Through-Left	0.32	**E**			
Bayview Ave & Creswick Rd (LOS D, 51.5s)					
Eastbound Left	0.59	**E**			
Eastbound Through	0.59	**E**			**SBTR:**
Northbound Left	0.96	**E**			*LTA = -2.0*
Northbound-Through	**0.85**	D			*ISF = 2000*
Westbound Left	0.39	**E**			
Southbound Through-Right	**1.11**	**E**	**1.00**	**E**	
High Tech Rd & Far Niente St (LOS B, 18.8s)					
Northbound Left	**1.07**	**F**			
Highway 7 Ramp & Bayview Ave (LOS D, 35.6s)					
Westbound Left	0.96	**E**			
Eastbound Through	**0.98**	D			

* The default value for PHF, LTA, and ISF are 0.92, 0.00s, and 1900 vphpl, respectively.
** Adjusted PHF was calculated based on an intersection level using the field data, therefore, apply to all movements of the intersection.

Most of the turning movements along Yonge Street and Bayview Avenue within the study area operate approaching/at capacity and/or LOS E/F during AM and PM peak hours.

A comparatively low v/c associated with high delays (LOS ‘E’ or worse) indicates the traffic experiences delays due to the limited green time provided in each cycle. This situation is typically found at fully protected left turns at the intersection of two major roads, where the cycle length is comparatively longer and green time available to the turning movements is constrained by the high through volumes. The north-south left turns at Yonge Street along the vivaNext right-of-Way segment are expected to operate at LOS ‘E’ or ‘F’ during both periods due to the impacts from the vivaNext operations (fully protected phase required, longer cycle length).

The most critical turning movements are the ones that are over capacity (v/c ratio over 1) and experience significant delays (LOS worse than or equal to E). During the AM peak hour, the most critical turning movements are:

- Eastbound through movement at Yonge St & 16th Ave
- Eastbound left movement at Bayview Ave & Bantry Ave
- Southbound through-right movement at Bayview & Creswick Rd

During the PM peak hour, the most critical turning movements are:

- Southbound through-right movement at Bayview & Creswick Rd
- Northbound left movement at High Tech Rd & Far Niente St

The overall intersection LOS and the most critical turning movements for the AM and PM peak hour are summarized in **Figure 3-10** and **Figure 3-11**, respectively. The results show all intersections within study area are operating at LOS D or better.

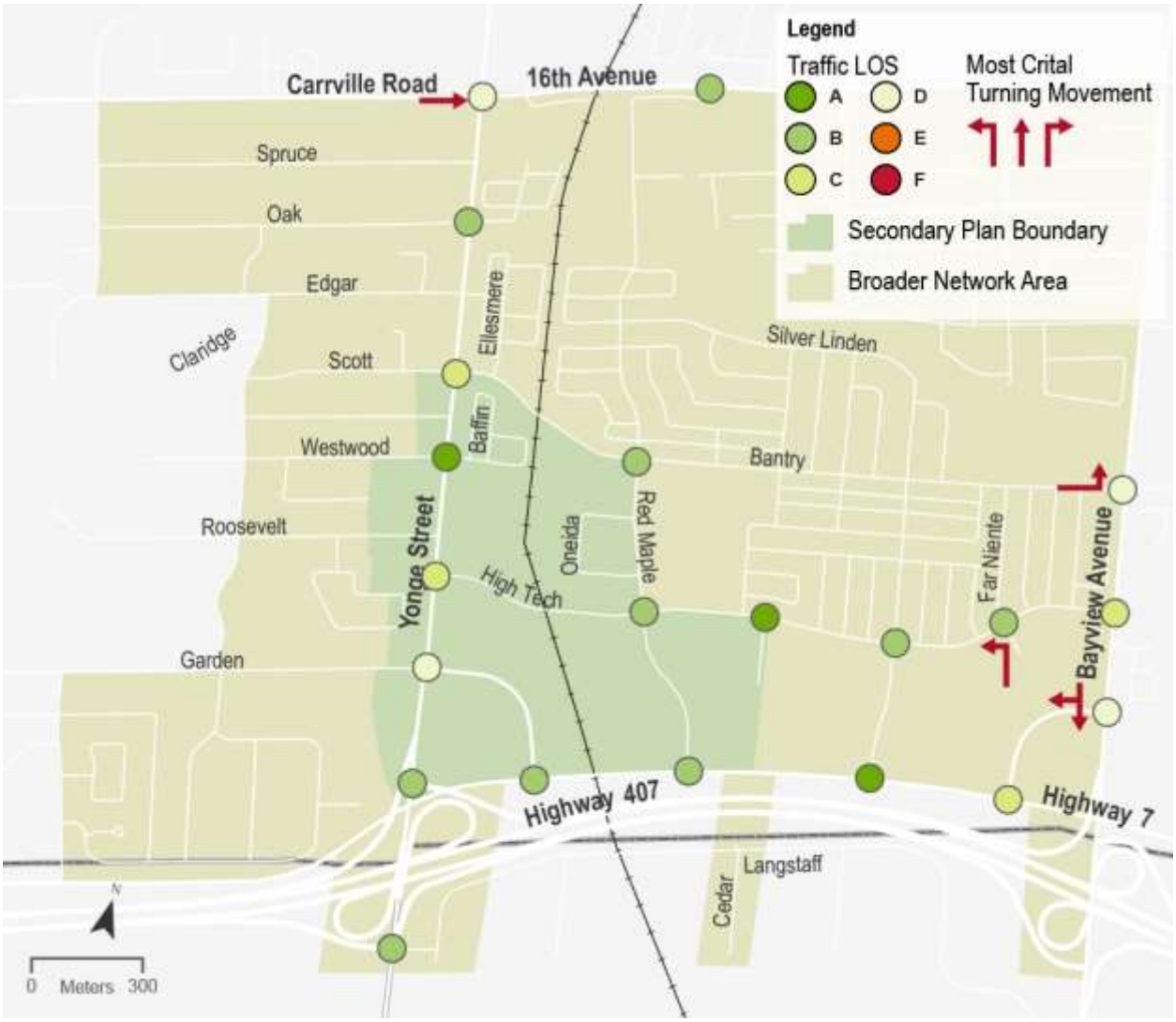


Figure 3-10: Existing Conditions AM Peak Hour Intersection LOS and Most Critical Turning Movements

* post-calibration results based on the calibration adjustments indicated in Table 3-5. The most critical turning movements are the ones that are over capacity (v/c ratio over 1) and experience significant delays (LOS worse than or equal to E).

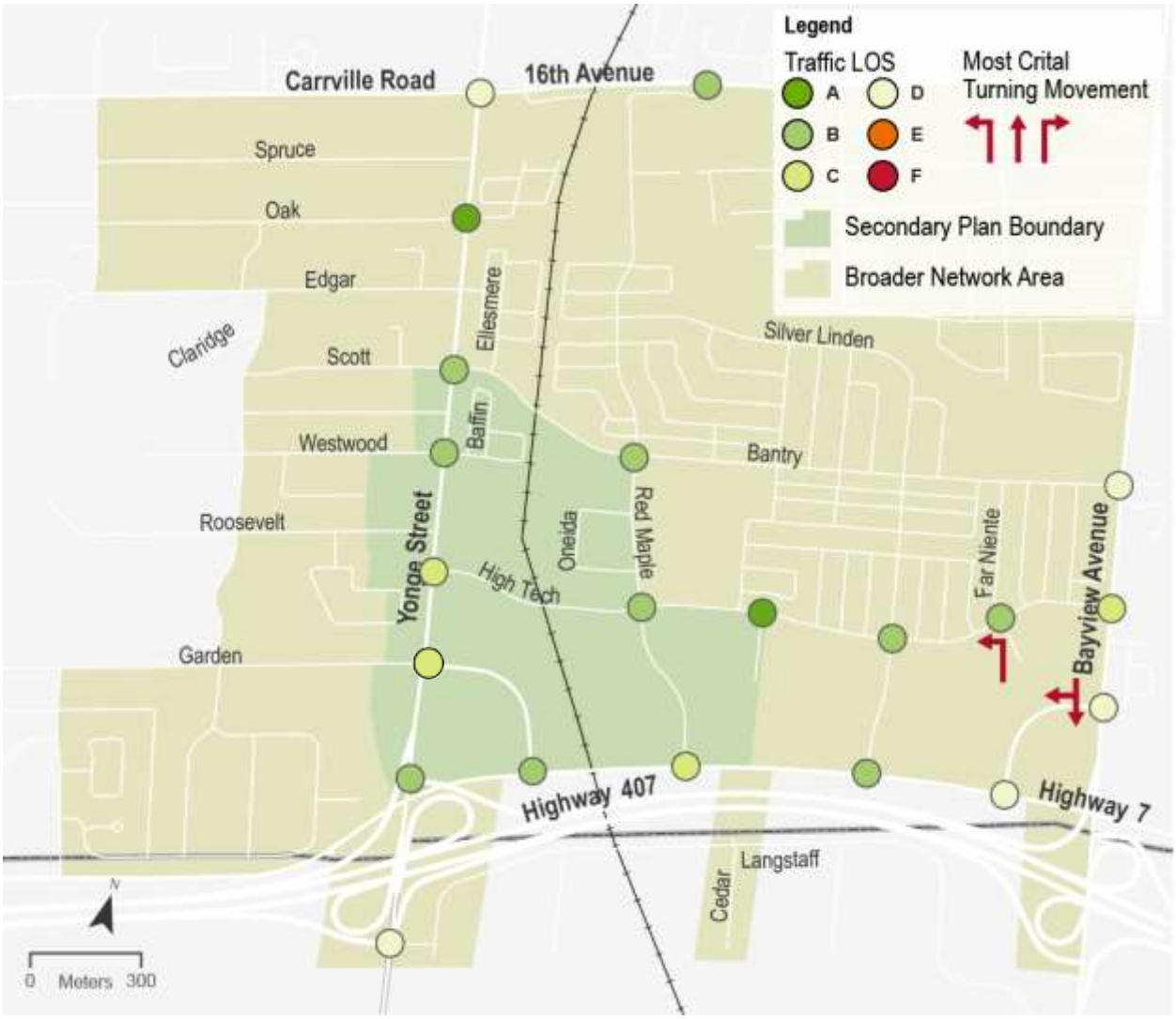


Figure 3-11: Existing Conditions PM Peak Hour Intersection LOS and Most Critical Turning Movements

* post-calibration results based on the calibration adjustments indicated in Table 3-5. The most critical turning movements are the ones that are over capacity (v/c ratio over 1) and experience significant delays (LOS worse than or equal to E).

3.6 Traffic Infiltration Analysis

Traffic infiltration on local streets is usually caused by heavy traffic and congestion on nearby arterial or collector roads which pushes traffic to find alternative routes. It could also be due to construction, such as the on-going BRT construction on Yonge Street in the RHC Secondary Plan area, as well as the prevalent use of real-time traffic navigation applications such as Google Maps and Waze[1]. Traffic infiltration leads to high traffic volumes on local streets and can raise safety concerns due to the high speed from vehicles cutting through local neighbourhoods.

[1] It has been reported that Google Maps or Waze can direct drivers from main roads to quieter side streets to avoid traffic, raising concerns from local residents. https://trnto.com/is-the-waze-map-directing-an-unsafe-number-of-cars-onto-quiet-neighbourhood-streets/

To understand the current levels of traffic that cuts through the residential neighbourhoods (i.e., traffic infiltration) adjacent to Richmond Hill Centre, a traffic infiltration analysis was conducted using Streetlight Origin-Destination data utilizing mobile location information samples collected for a typical weekday (Tuesday to Thursday) throughout the year 2018. **Figure 3-12** and **Figure 3-13** illustrate the residential areas that were considered, including the residential area northwest of Yonge Street and Highway 7 and the residential area north of High Tech Road. **Figure 3-14** illustrates the location of streets that were considered in these study areas, including Scott Drive and Garden Avenue west of Yonge Street and Nahanni Drive and Silver Linden Drive north of High Tech Road.

Figure 3-12: Cut-Through Study on Residential Area A (West of SP Study Area)

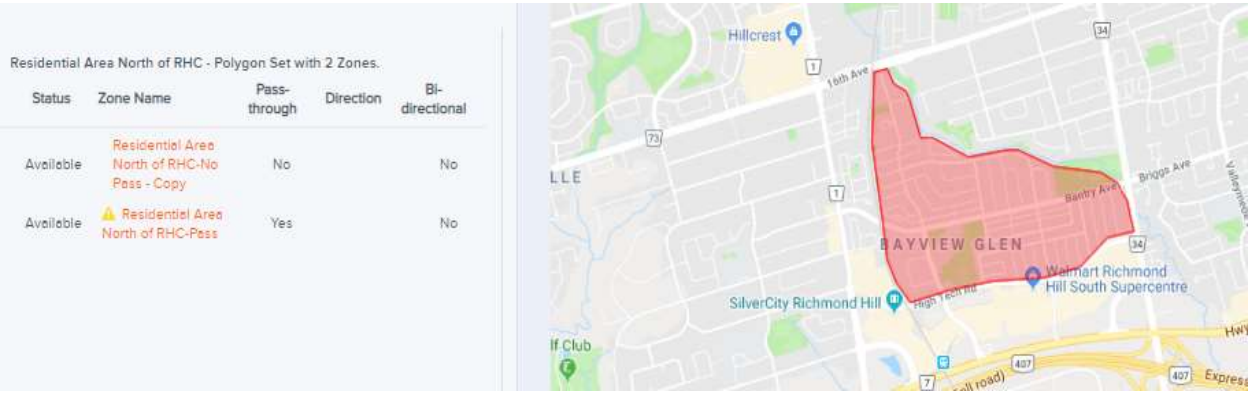


Figure 3-13: Cut-Through Study on Residential Area B (North of SP Study Area)

Figure 3-14: Traffic Infiltration Analysis Locations/Gates

With the boundary defined as shown in the above figures, the Streetlight data provided the percentage of trips that pass through the gates but are not destined to or originating from within the defined study area. Vehicular traffic that uses Scott Drive and Garden Avenue west of Yonge Street and not destined to or originating from Residential Area A is considered cut-through traffic. Similarly, vehicular traffic using Nahanni Drive or Silver Linden Drive north of High Tech Road and not destined to or originating from Residential Area B is considered cut-through traffic. The percentage of cut-through traffic on these streets during peak hours is summarized in **Table 3-6**.

Table 3-6: Percentages of Cut-Through Traffic on Local Streets [1] [2]

	Cut-Through Traffic (%)	
	AM (8AM-9AM)	PM (5PM-6PM)
Nahanni Dr	23%	19%
Silver Linden Dr	30%	16%
Garden Ave	39%	26%
Scott Dr	17%	55%

1 Based on the average of 2018 weekday (Tuesday – Thursday) data.
2 Due to the nature of the Streetlight OD data, the number of trips in this analysis were not expanded based on counts and thus only the percentage numbers are reliable and presented here.

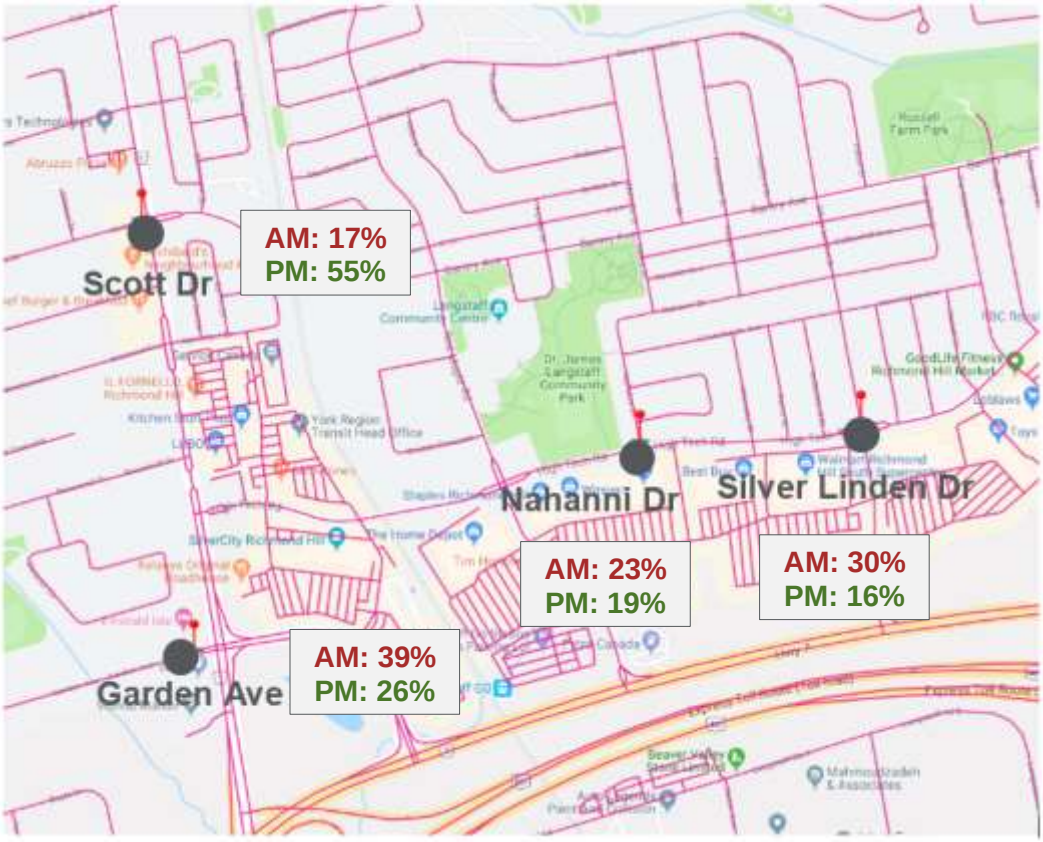


Figure 3-15: Percentage of Cut-Through Traffic

In general, the percentage of cut-through trips ranges between 16% and 30%, except for Garden Avenue in the AM (39% cut-through traffic) and Scott Drive in the PM (55% cut-through traffic). This indicates that there is a high percentage of cut through trips, and local streets are often used as alternative routes for other major arterials[2]. This is likely due to the congestion along major North-South and East-West arterials such as Yonge Street and Highway 7. Other factors that could contribute to this include the on-going BRT construction on Yonge Street and prevalent use of real-time traffic navigation applications such as Google Maps and Waze as noted at the start of the section. Recommendations for mitigating traffic infiltration are made in **Section 8.10.**

[2] For comparison, a recent study conducted by HDR examined traffic infiltration for local streets crossing Bathurst Street and Yonge Street in the Town of Aurora. The study found that the percentage cut-through traffic in weekday ranges between 8% and 51%.

4 Subarea Model Development

A subarea model was developed for the Secondary Plan study area using the EMME travel demand software, using the York Region EMME model as a base. The purpose of this model is to provide detailed traffic and turning movement forecasts for roads that would otherwise not be included in the Regional EMME model, including minor collector and local streets. Volumes produced from this model are used as inputs to the future year Synchro model intersection analysis.

A subarea was extracted from the York Region EMME model and further refined with a disaggregated zone system and detailed road network. The model was developed for both the AM and the PM peak hour. Recognizing that York Region's EMME model is based on the AM peak hour, the AM travel demand matrix was transposed to extract the subarea background demand for the PM model.

4.1 Subarea Model Zone System and Existing Network

The model uses a refined zone system, covering a broader study area bounded by Avenue Road / Pearson Avenue to the West, Carrville Road / 16th Avenue to the North, Bayview Avenue to the South, and the Langstaff Gateway Area to the South. The subarea zone boundary is shown in **Figure 4-1**.

The road network in the existing subarea model includes all arterials and collectors and is shown in **Figure 4-2**. Centroid connectors were specifically modified to reflect access to local and arterial roads accurately. Network assumptions such as free-flow speed and land capacity were consistent with the York Region Model standards.

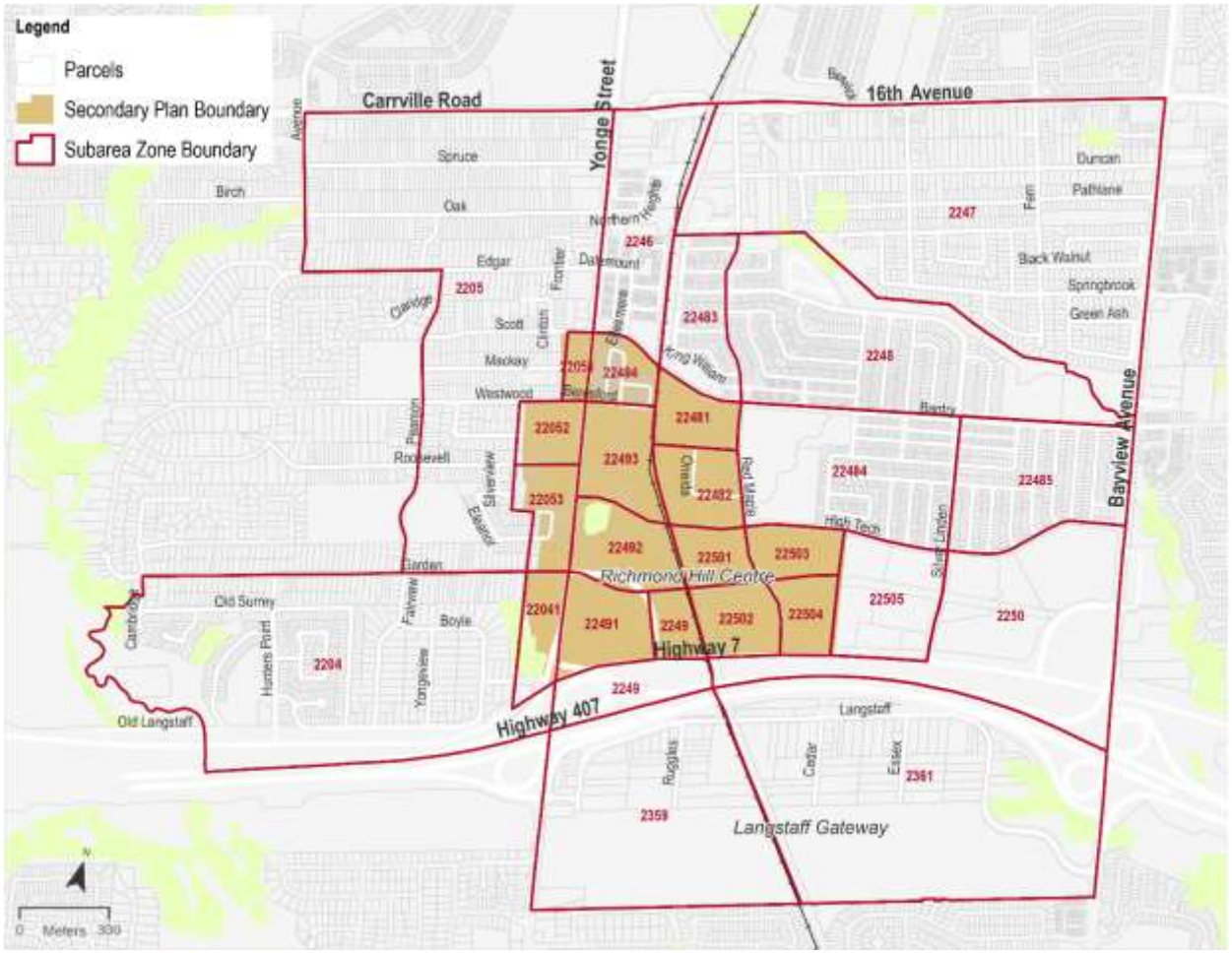


Figure 4-1: Subarea Model Zone Boundary

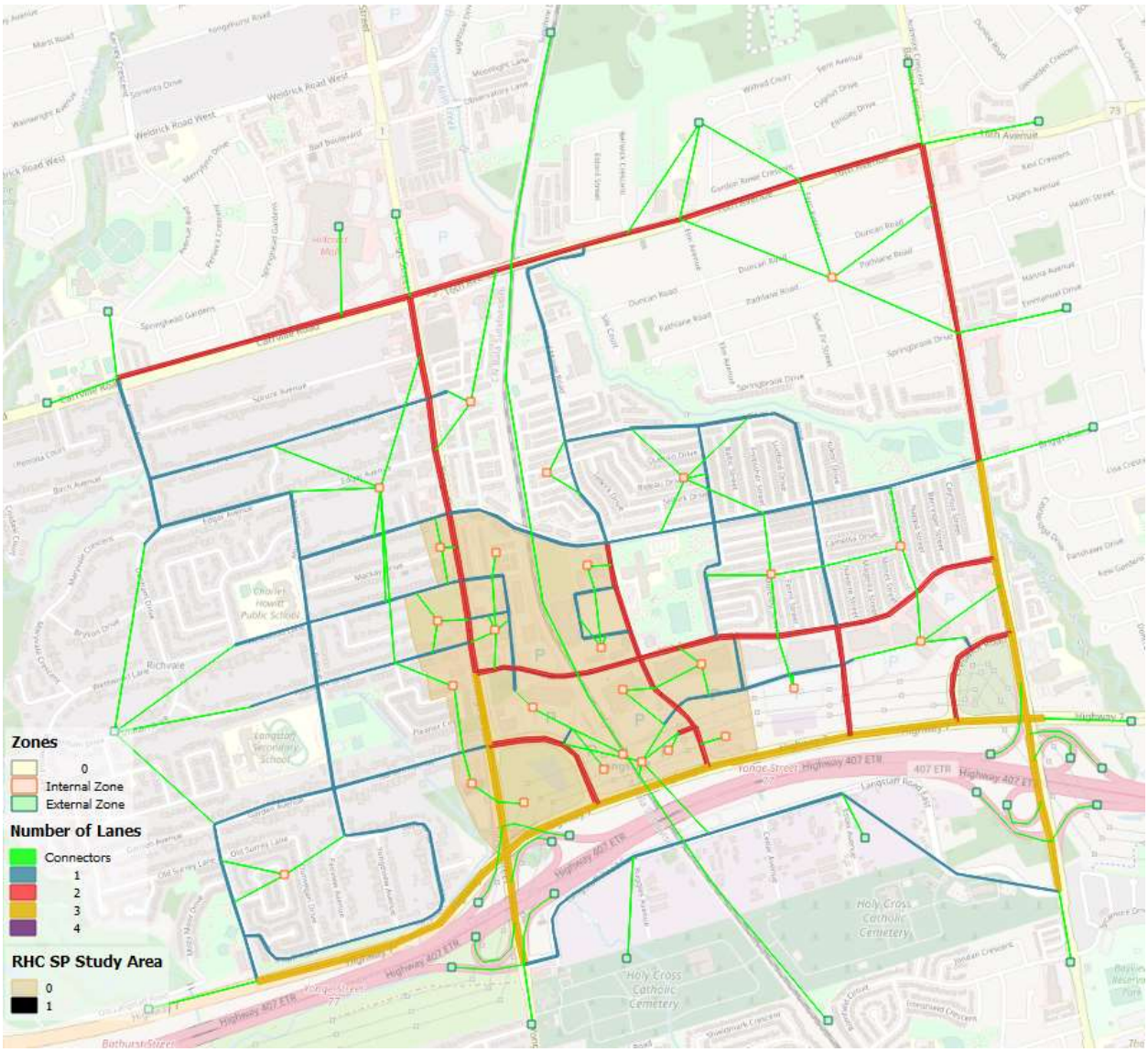


Figure 4-2: Subarea Model Network (Existing)

4.2 Trip Generation and Calibration Methodology

This section documents the methodology used to conduct trip generation and calibrate the existing EMME subarea model. Results of the subarea model are presented at the end.

4.2.1 Trip Generation

The model estimates the number of trips generated in the study area (both trip origin and destination) using trip rates in the Institute for Transportation Engineers (ITE) Trip Generation Manual (9th Edition) and detailed, property-based land use information.

The ITE Trip Generation Manual provides the average vehicle trip generation rate at a site in the AM and PM peak hour. Land use information in the Secondary Plan was

provided by the City, including information such as the number of residential units and Gross Floor Area (GFA) for offices and retail areas. Detailed property land use information is provided in **Appendix C**, and detailed trip generation assumptions and numbers are provided in **Appendix D**.

This trip generation process provides updated trip origin and destination matrices for zones in the subarea. It was then used as control matrices to update the origin-destination (OD) matrix in the model. This updated OD matrix was then calibrated to the traffic counts (discussed in **Section 3.5.1**).

4.2.2 Calibration Target

The GEH statistic was used to determine how well the modelled volumes match the observed volumes. The GEH statistic is commonly used for traffic modelling calibration as it can address both absolute and relative difference between the modelled and observed volume. It avoids some pitfalls that occur when simply using the relative difference, primarily by allowing for greater variance between modelled and observed data at lower values but requiring lesser variance at higher values.

The GEH statistic is calculated as:

$$GEH = \sqrt{\frac{2(M-C)^2}{M+C}}$$

Where M is the hourly modelled volume and C is the observed volume (count).

A GEH value less than 5 is considered a good match between the modelled and observed volume; A value between 5 and 10 is acceptable; and a value higher than 10 usually requires further attention for model calibration. Typically, 80% to 85% GEH values that are less than 5 is considered as very close match between the modelled and observed volume.

4.2.3 Calibration Process

The OD trip matrix is calibrated to traffic counts using the Demand Adjustment tool in EMME. It is noted that the adjustments made to the OD trip matrix are capped based on the relative (ratio) and absolute difference compared to the unadjusted demand matrix to ensure that single zones do not generate unreasonable number of trips.

The calibrated OD trip matrix is then imported back to EMME to perform a standard traffic assignment, where the resulting modelled link volumes are compared with the counts to validate the model.

4.3 Subarea Model Calibration Results

The GEH statistic reflecting the calibration results is shown in **Table 4-1**. After applying caps on the adjustments, 81% and 76% of the links have a GEH value less than 5 in the AM and PM peak hour, respectively, indicating a good match between the modelled and observed volume. More than 90% of links have a GEH value that is

less than 10 in both AM and PM peak hour. The results show that the modelled volumes can match closely with the observed volumes. It is noted that the PM subarea model is not as accurate as the AM model, likely due to the background traffic volumes used in the PM model being based on the transpose of the AM demand matrix taken from the York Region model.

Traffic volumes generated in the subarea model (existing AM and PM Peak Hour) are shown in **Figure 4-3** and **Figure 4-4**, respectively.

Table 4-1: GEH Statistic

GEH	Adjusted Demand, Capped, AM Peak Hour		Adjusted Demand, Capped, PM Peak Hour	
	# of Links	%	# of Links	%
<=5	113	81%	103	76%
5-10	24	17%	21	15%
>10	3	2%	12	9%
Total	**140**	**100%**	**134**	**100%**

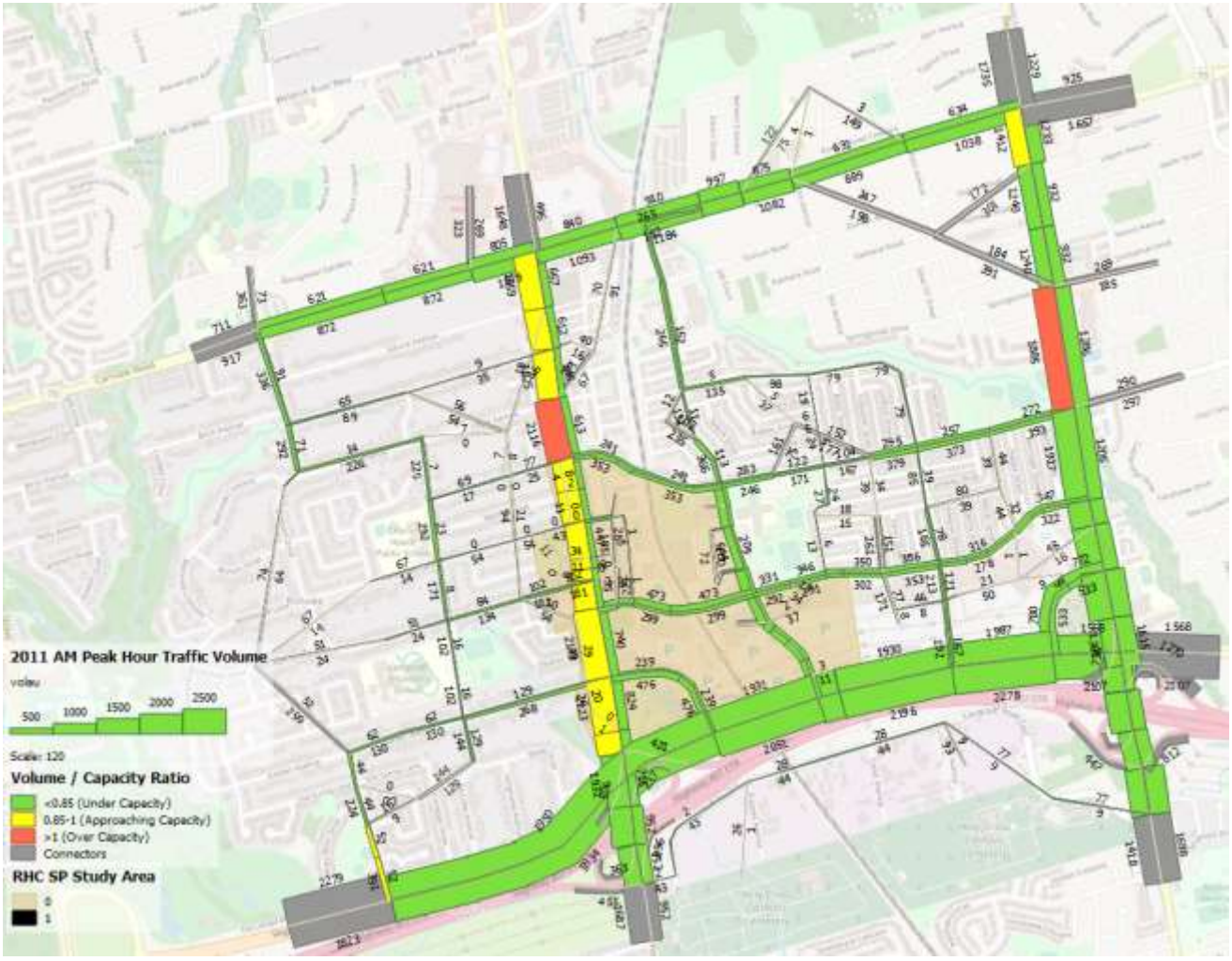


Figure 4-3: Subarea Area Model Traffic Volumes, Existing AM Peak Hour

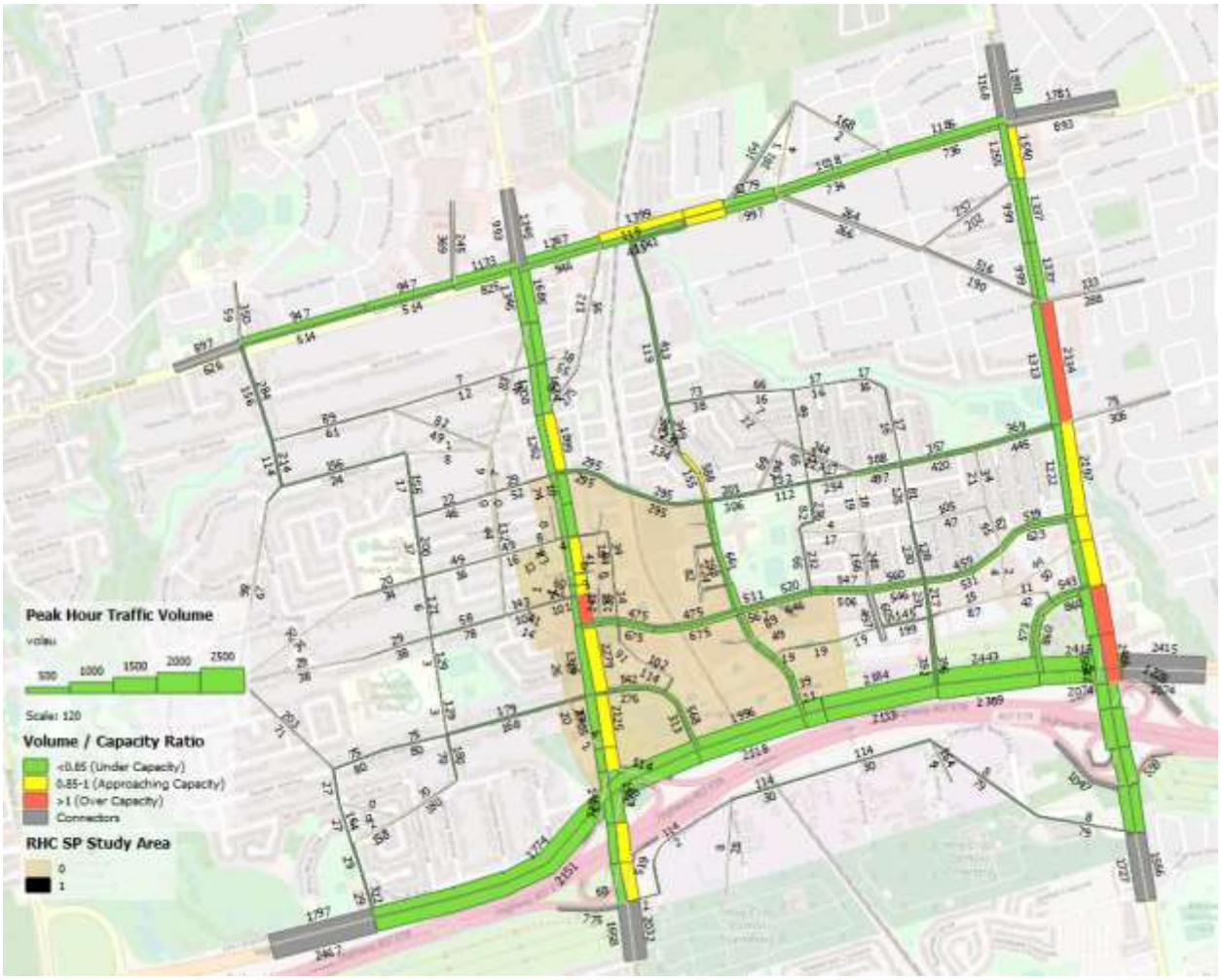


Figure 4-4: Subarea Area Model Traffic Volumes, Existing PM Peak Hour

4.4 2041 Base Case Model Development

This section documents the land use and network assumptions and the forecasted traffic volumes for the 2041 Base Case scenario.

4.4.1 2041 Base Case Land Use

The 2041 Base Case assumes York Region's 45% intensification scenario, where Richmond Hill Centre and Langstaff have combined a population of approximately 12,600 people and 13,300 jobs, as shown in **Table 4-2**. It is noted that these forecasts are lower than in the ultimate vision for the Richmond Hill Centre (2010 RHC Design and Land Use Study) and the Markham Langstaff Gateway area (Langstaff Gateway Secondary Plan 2011). These studies project 15,800 people and 15,700 jobs in Richmond Hill Centre, and 32,000 people and 15,000 jobs in the Langstaff Gateway. Different land use scenarios will be tested in the next phase of the study.

Table 4-2: 2041 Population and Employment Forecast Assumptions

Area	Population		Employment	
	2016	2041	2016	2041
RHC - West	625	3,999	1,301	3,576
RHC - East	0	2,229	1,618	4,209
Langstaff West	0	3,223	396	2,775
Langstaff East	0	3,223	363	2,742
Total	**625**	**12,674**	**3,678**	**13,302**

Source: York Region 45% Intensification Scenario, November 2015

4.4.2 2041 Base Case Network

The 2041 Base Case scenario assumes planned improvements identified in the York Region TMP, including:

- Widening of 16th Avenue from 4 lanes to 6 lanes (4 lanes plus 2 HOV lanes);
- Widening of Bayview Avenue from 4 lanes to 6 lanes (4 lanes plus 2 HOV lanes);
- Yonge Subway Extension; and
- vivaNext improvements.

Within the Secondary Plan area, major transportation network improvements recommended in the 2010 RHC Design and Land Use Study are included:

- Red Cedar / Cedar Avenue extension from Langstaff Gateway to High Tech Road;
- North-south connection west of Yonge Street;
- Garden Avenue Extension to Bayview Avenue;
- Changing the Highway 7 / Yonge Street ramp (Garden Avenue) to a four-way intersection and extend north to High Tech Road;
- Changing the Highway 7 / Bayview ramp to a three-way intersection; and
- High Tech Road Extension to the north-south connector west of Yonge Street.

The 2041 Base Case road network is shown in **Figure 4-5**.

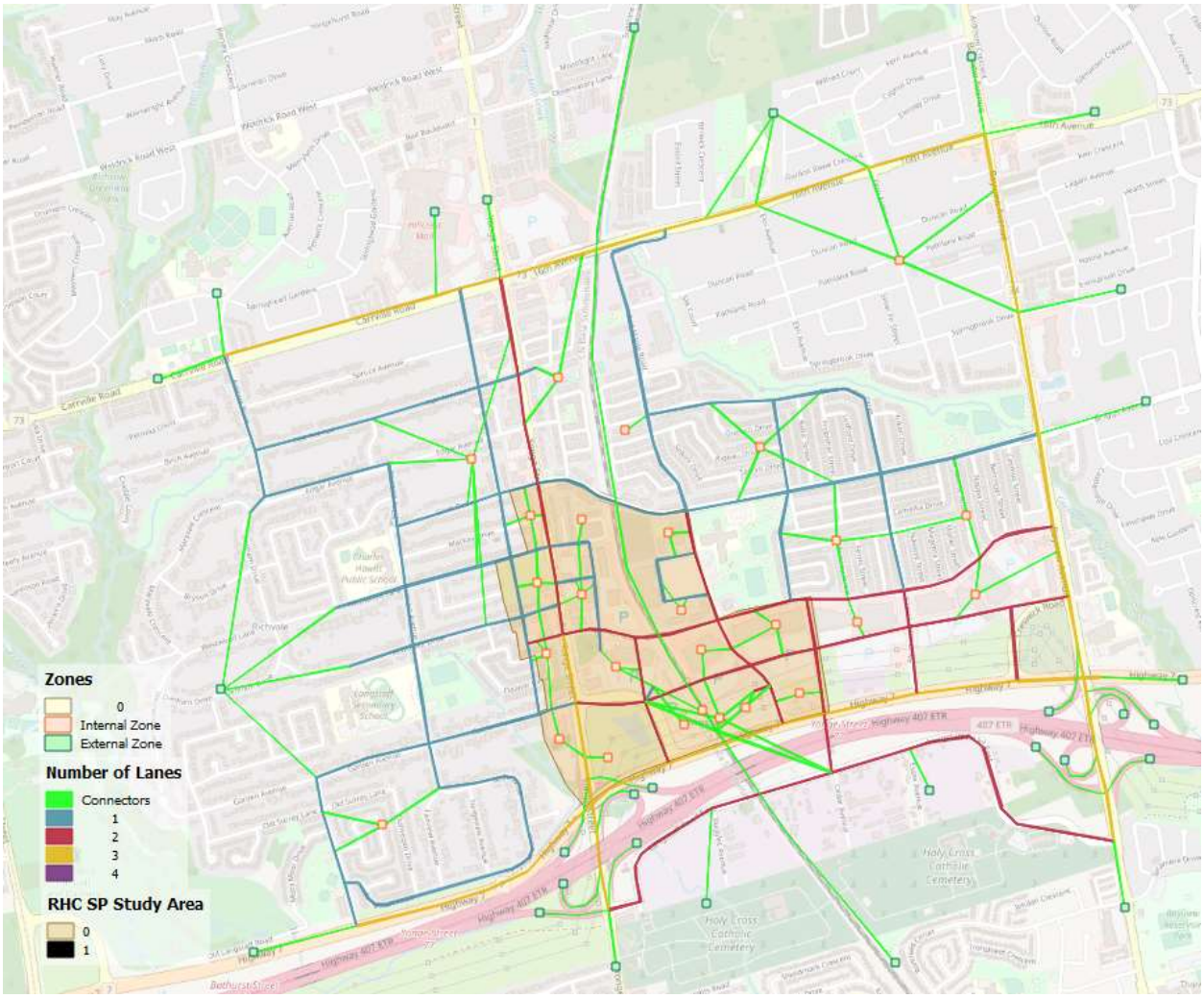


Figure 4-5: 2041 Base Case Network

With these network assumptions, the 2041 Base Case transit modal split for the study area is approximately 29%, as shown in **Table 4-3**. Different mode share scenarios will be tested in the next phases of this study.

Table 4-3: Modelled Modal Split for 2041 Base Case

Mode	% of Trips		% of Trips	
	2011 Modelled	2041 Base Case Modelled	2011 Modelled	2041 Base Case Modelled
Auto driver	5,800	9,550	68%	56%
Auto passenger	1,270	2,550	15%	15%
Transit	1,440	4,900	17%	29%
Total	8,510	17,000	100%	100%

Source: York Region Model, extracted for TTS 06 zone 2204, 2205, 2246-2250

4.4.3 2041 Base Case Traffic Volumes

A demand matrix was extracted for the subarea from the York Region model. The matrix was further disaggregated into the finer zone system, as discussed in **Section 4.1**. Ratios for the demand disaggregation were based on the number of trips generated in the existing conditions, as discussed in **Section 4.2**. It is noted that the growth was only allocated to zones with development potential, i.e., no growth was allocated to zones which consist of stable residential neighbourhoods, water ponds, or hydro utility corridors.

The 2041 AM and PM peak hour traffic volumes are shown in **Figure 4-6** and **Figure 4-7**, respectively. With the projected population and employment growth, the area is expected to be heavily congested in 2041. These volumes were used in the 2041 Base Case Synchro traffic analysis to conduct detailed analysis for traffic operations. The difference between the 2041 base case volumes and the existing 2011 volumes are shown in **Figure 4-8** and **Figure 4-9**.

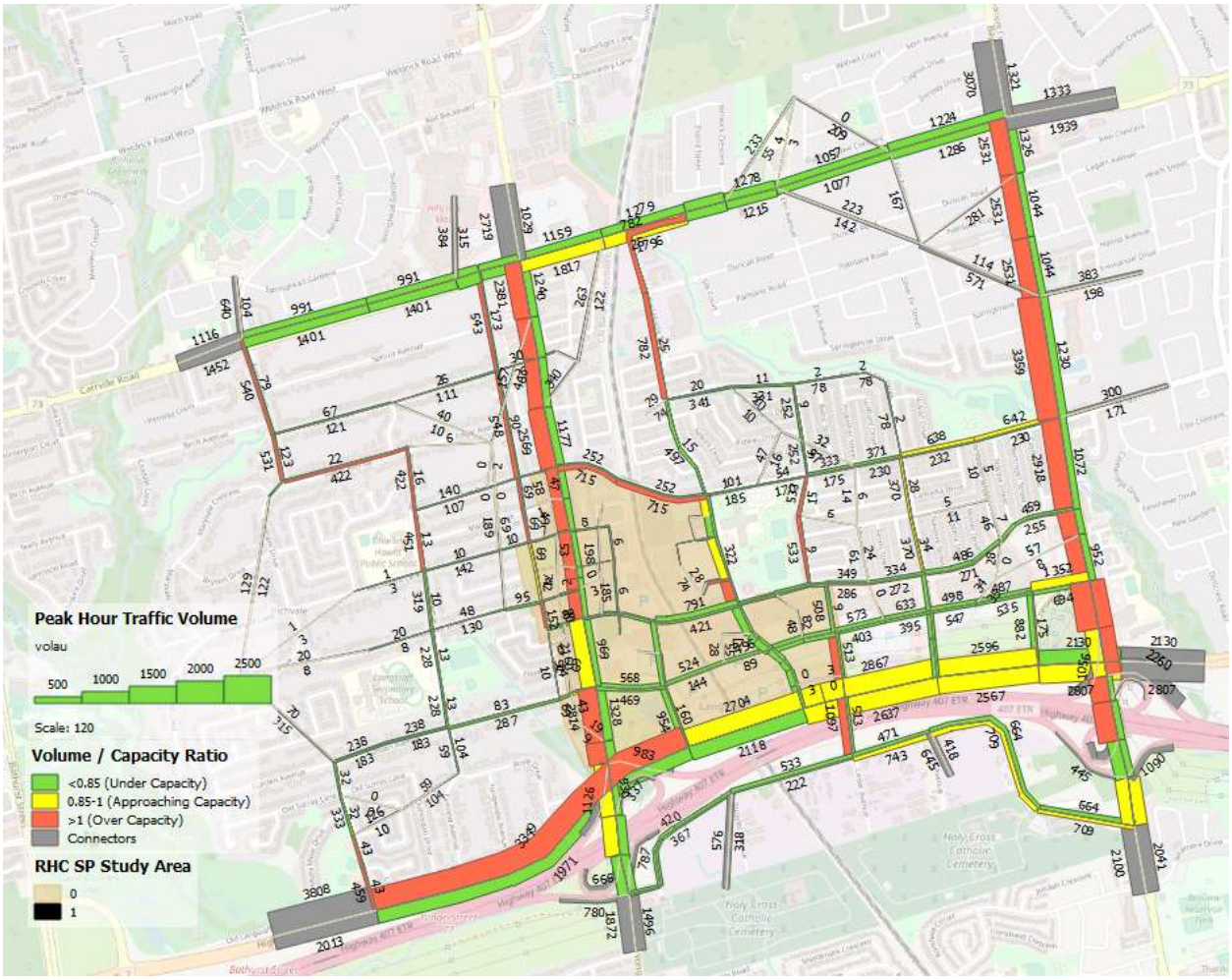


Figure 4-6: 2041 Base Case AM Peak Hour Traffic Volume

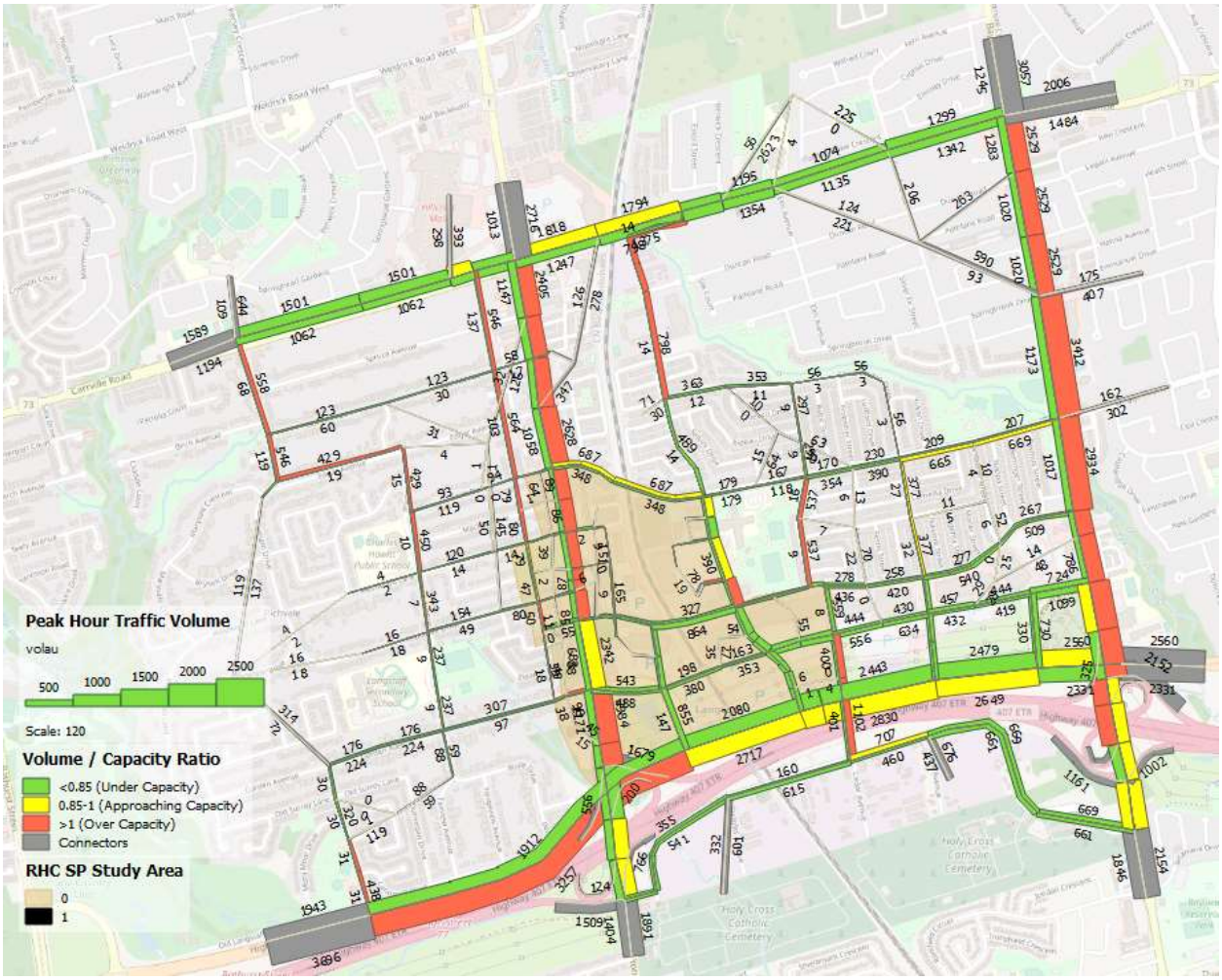


Figure 4-7: 2041 Base Case PM Peak Hour Traffic Volume

Figure 4-8: Change in AM Base Case Traffic Volumes from Existing 2011 to 2041

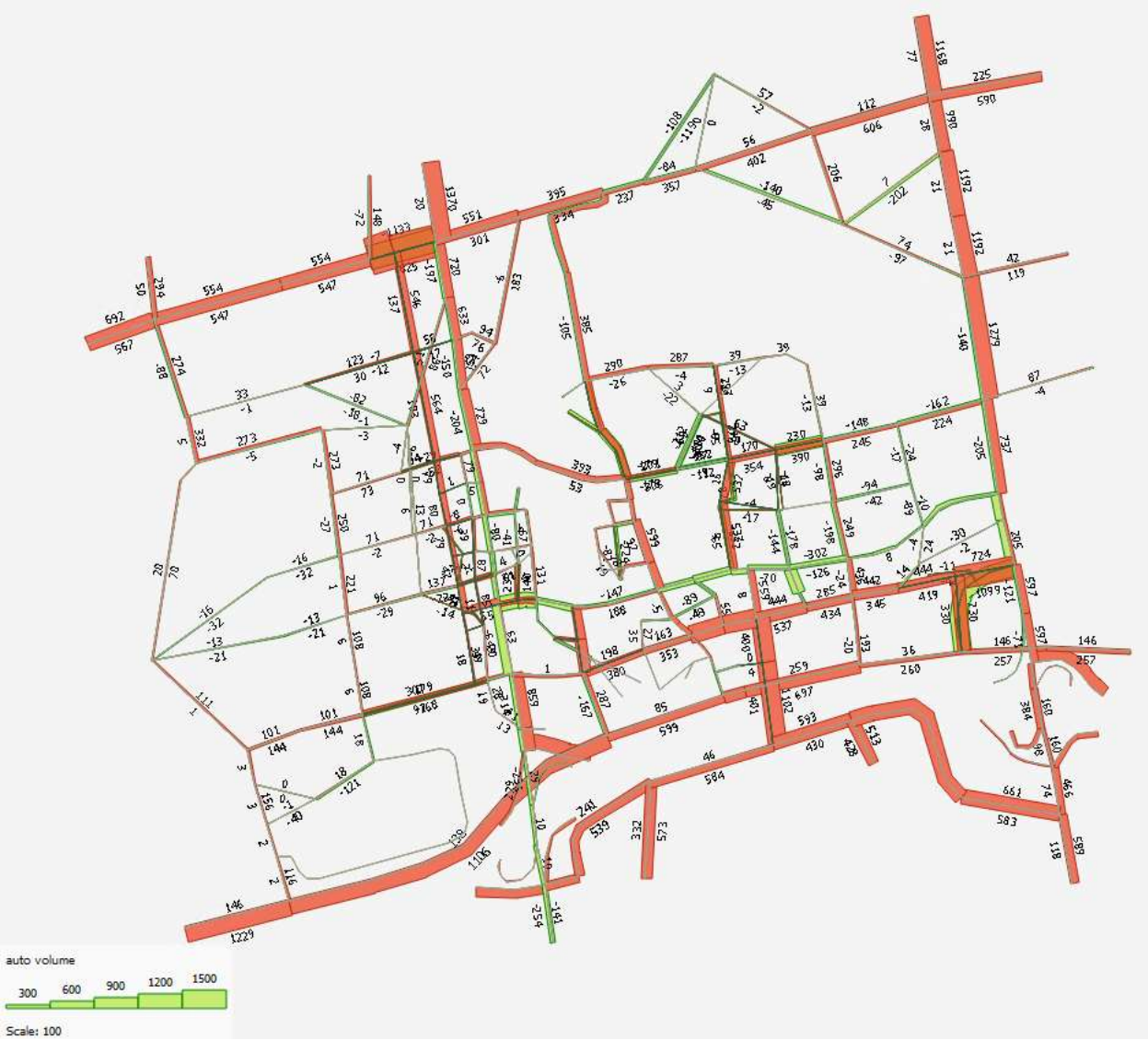


Figure 4-9: Change in PM Base Case Traffic Volumes from Existing 2011 to 2041

5 Future Base Case Traffic Analysis

The “base case” transportation conditions incorporate the planned multimodal transportation system **Section 2**. A traffic analysis considering the currently planned growth and road network as highlighted in **Section 4.4** is conducted for the 2041 horizon year firstly and then an interim 2031 horizon year secondly. This analysis will inform subsequent analysis of the recommended concept scenario.

5.1 Proposed Future Base Case Assumptions

The traffic analysis presented in this section considered the following assumptions. These assumptions are recommended to be considered as part of the base case network when evaluating land use options in the next phase of this study.

5.1.1 Lane Configuration

The following lane configuration assumptions are recommended based on the Synchro analysis:

- At Yonge Street and Scott Drive, an eastbound-right auxiliary lane was included to accommodate the demand from the new north-south collector west of Yonge Street. In addition, the northbound-left movement at this location is currently restricted in all time periods. To provide better connection with the new collector, the restriction was removed, and an auxiliary lane was added for northbound-left movement.
- For the new intersections along the north-south collector west of Yonge Street and Garden Avenue, lane configurations presented in the **Table 5-6** were used.

5.1.2 Traffic Control

The following traffic control assumptions are used in the Synchro analysis:

- At intersections along the north-south collector west of Yonge Street, the 16th Avenue intersection was signalized as the east-west traffic cause significant delays to the northbound-left movement. The rest of intersections are expected to operate at LOS C or better under unsignalized condition as shown in **Table 5-6** and thus these intersections were assumed to be unsignalized
- All intersections along the Garden Avenue extension were assumed to be signalized due to the high turning movement volumes.

5.2 2041 Base Case Traffic Conditions

The 2041 Base Case traffic operation conditions for the weekday AM peak hour and PM peak hour are assessed for a total of 32 intersections including the 21 existing

intersections listed in **Section 3.5**; and eleven new intersections based on the planned network improvement, numbered in **Figure 5-1** as follows:

22. North-South Collector & Carrville Road
23. North-South Collector & Oak Avenue
24. North-South Collector & Scott Drive
25. North-South Collector & Westwood Lane
26. North-South Collector & High Tech Road extension west of Yonge
27. North-South Collector & Garden Avenue
28. Garden Avenue & Red Maple Road
29. Garden Avenue & Highway 7 / Bayview Avenue Connection
30. Garden Avenue & Red Cedar Avenue / Cedar Extension
31. Garden Avenue & Silver Linden Drive
32. Garden Avenue & Highway 7/ Yonge Street Connection (Station Street)

Figure 5-1: Intersection Locations

Traffic signal timings are optimized to reflect future conditions using the built-in Synchro algorithms plus manual adjustments where required. Cycle lengths, advanced phases, clearance times, and offsets were not adjusted relative to the existing signal timing plans at all locations except for the following:

- Red Maple Road & Bantry Avenue: the cycle length increased from 75s to 90s in the AM peak hour to accommodate a need of a new northbound-left advanced phase;
- Yonge Street & Scott Drive: added a new westbound-left phase to accommodate the future traffic demand; no changes to the cycle length;
- High Tech Road & Far Niente Street: the cycle length increased from 75s to 140s in the PM peak hour to account for future conditions; and
- Bayview Avenue & Creswick Road: added an EBR overlap phase in both AM and PM; no change to cycle length.

5.2.1 2041 Traffic Turning Movement Volumes

Future 2041 AM and PM peak hour traffic volumes at each study area intersection are developed based on the application of approach volume growth to existing turning movement volumes. Compounded Annual Growth Rates (CAGR) are applied and then balanced using a Fratar/Furness methodology. The turning movement forecast procedure involves the following steps:

1. Apply adjusted link-level CAGRs from EMME to the existing link volumes to generate future inbound and outbound link volumes at all directions, which would be target volumes;
2. Calculate turning movements using an iterative process to achieve the target volumes with acceptable error (Fratar/Furness method);
3. Adjust turning movement volumes manually based on the future EMME volume plots to obtain reasonable peak hour volumes;
4. Balance the link volume within a 10% difference;
5. Summarize the growth rates based on the balanced volumes to compare against the EMME AM growth rates at a screenline level to ensure a reasonable forecast;

The screenline comparison between balanced TMC and EMME are summarized in **Table 5-1** through **Table 5-4**, with screenlines illustrated in **Figure 5-2.** The balanced future turning movements for AM and PM peak hour are illustrated in **Appendix E**. These volumes were imported into the Synchro model to determine the future traffic operations within the study area.

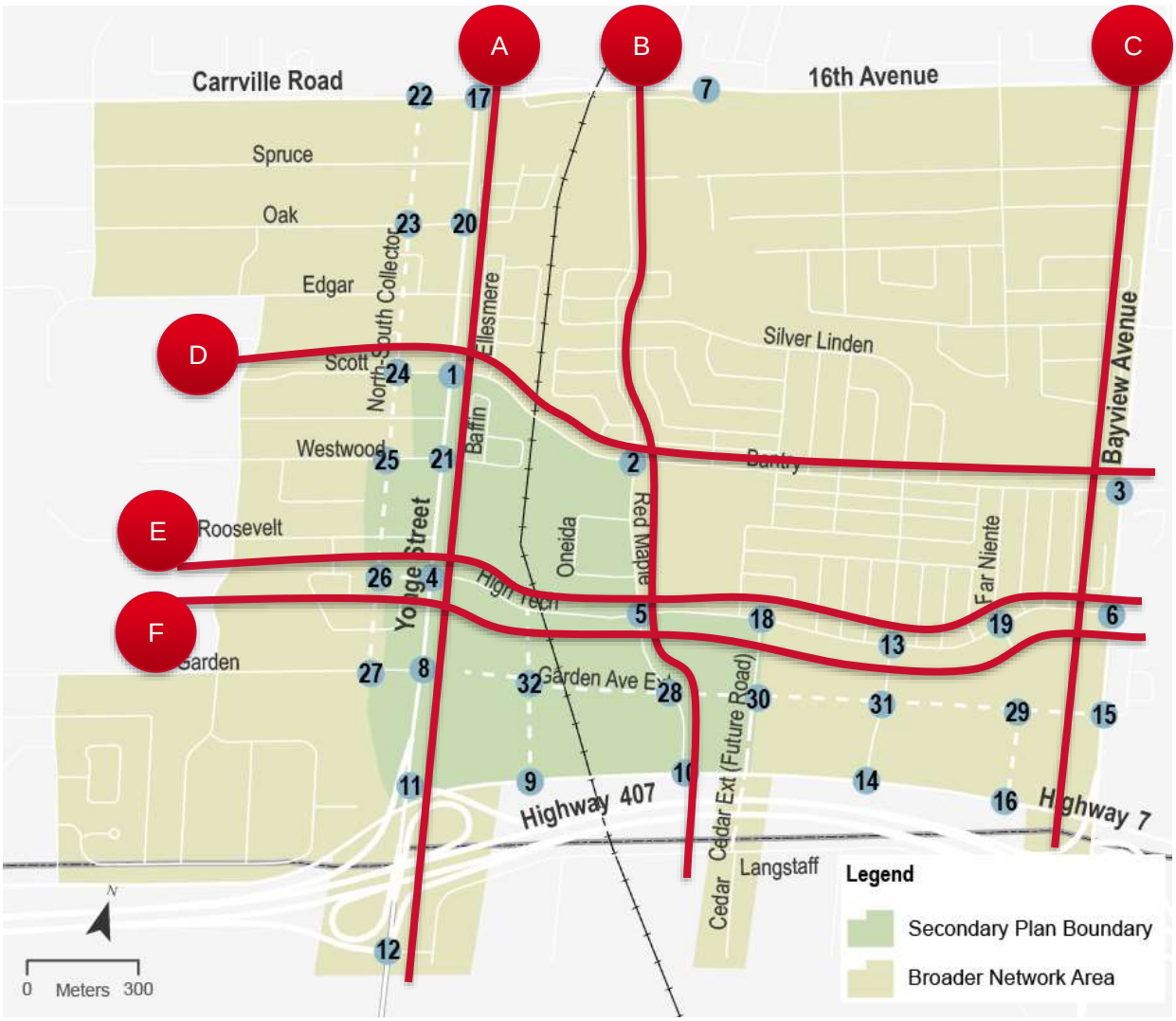


Figure 5-2: Screenlines for Traffic Count and Modelled Traffic Comparison

Table 5-1: TMC vs. EMME Growth Rate Comparison - East-West Screenline – AM Peak Hour

Screenline	Eastbound						Westbound					
Street Name	2011 EMME	2019 TMC	2041 EMME	2041 TMC	EMME CAGR	TMC CAGR	2011 EMME	2019 TMC	2041 EMME	2041 TMC	EMME CAGR	TMC CAGR
A: East of Yonge												
16th Ave	1,098	1,180	1,788	1,674	1.6%	1.6%	840	997	1,148	1,239	1.0%	1.0%
Oak Ave	16	41	105	55	N/A	1.3%	40	154	129	320	4.0%	3.4%
Bantry Ave	353	352	713	587	2.4%	2.4%	241	320	264	352	0.3%	0.4%
Westwood Ln	227	109	319	218	1.1%	3.2%	150	86	8	87	-9.3%	0.1%
High Tech Road	356	462	257	388	-1.1%	-0.8%	389	465	134	241	-3.5%	-2.9%
Garden Ave	476	588	465	508	-0.1%	-0.7%	239	350	566	563	2.9%	2.2%
Highway 7	2,051	2,295	2,148	2,361	0.2%	0.1%	1,931	1,743	2,720	2,521	1.1%	1.7%
Langstaff Rd	43	125	366	245	7.4%	3.1%	2	91	420	166	19.5%	2.8%
Total	**4,620**	**5,152**	**6,161**	**6,036**	**1.0%**	**0.7%**	**3,832**	**4,206**	**5,389**	**5,489**	**1.1%**	**1.2%**
B: East of Red Maple												
16th Ave	1,157	1,292	1,243	1,350	0.2%	0.2%	997	1,057	1,503	1,210	1.4%	0.6%
Bantry Ave	246	319	183	258	-1.0%	-1.0%	283	338	115	166	-3.0%	-3.2%
High Tech Road	292	397	316	486	0.3%	0.9%	331	462	335	449	0.0%	-0.1%
Highway 7	2,196	2,325	2,646	2,503	0.6%	0.3%	1,930	1,737	2,857	2,597	1.3%	1.8%
Total	**3,891**	**4,333**	**4,388**	**4,597**	**0.4%**	**0.3%**	**3,541**	**3,594**	**4,810**	**4,422**	**1.0%**	**0.9%**
C: West of Bayview												
Bantry Ave	393	404	230	270	-1.8%	-1.8%	272	472	642	889	2.9%	2.9%
High Tech Road	322	9	283	9	-0.4%	0.0%	347	44	466	57	1.0%	1.2%
Creswick Rd	533	234	694	280	0.9%	0.8%	772	236	1,374	365	1.9%	2.0%
Highway 7	2,278	2,339	2,564	2,807	0.4%	0.8%	1,987	1,781	2,590	2,052	0.9%	0.6%
Total	**3,526**	**2,986**	**3,771**	**3,366**	**0.2%**	**0.5%**	**3,378**	**2,533**	**5,072**	**3,363**	**1.4%**	**1.3%**

Table 5-2: TMC vs. EMME Growth Rate Comparison – North-South Screenline – AM Peak Hour

Screenline	Northbound						Southbound					
Street Name	2011 EMME	2019 TMC	2041 EMME	2041 TMC	EMME CAGR	TMC CAGR	2011 EMME	2019 TMC	2041 EMME	2041 TMC	EMME CAGR	TMC CAGR
D: North of Bantry												
Yonge St	613	713	1,166	1,126	2.2%	2.1%	2,116	2,008	2,571	2,104	0.7%	0.2%
Red Maple Rd	113	194	16	242	-6.3%	1.0%	366	576	486	779	0.9%	1.4%
Bayview Ave	1,286	1,435	1,252	1,786	-0.1%	1.0%	1,885	2,036	3,361	2,536	1.9%	1.0%
Total	**2,012**	**2,342**	**2,434**	**3,154**	**0.6%**	**1.4%**	**4,367**	**4,620**	**6,418**	**5,419**	**1.3%**	**0.7%**
E: North of High Tech												
Yonge St	504	624	886	915	1.9%	1.8%	1,874	1,876	1,802	1,917	-0.1%	0.1%
Red Maple Rd	315	305	351	452	0.4%	1.8%	820	851	1,525	1,265	2.1%	1.8%
Red Cedar Ave	0	0	0	0	N/A	N/A	0	0	0	0	N/A	N/A
Silver Linden Dr	78	63	11	103	-6.3%	2.3%	165	251	373	345	2.8%	1.5%
Bayview Ave	1,205	1,311	1,094	1,572	-0.3%	0.8%	1,917	1,977	2,920	2,469	1.4%	1.0%
Total	**2,102**	**2,303**	**2,342**	**3,042**	**0.4%**	**1.3%**	**4,776**	**4,955**	**6,620**	**5,996**	**1.1%**	**0.9%**
F: South of High Tech												
Yonge St	740	760	969	1,002	0.9%	1.3%	2,143	2,014	2,145	2,092	0.0%	0.2%
Red Maple Rd	309	302	320	416	0.1%	1.5%	679	837	1,161	1,085	1.8%	1.2%
Red Cedar Ave	0	10	9	70	N/A	9.2%	0	26	492	362	N/A	12.7%
Silver Linden Dr	121	96	147	147	0.7%	2.0%	213	263	643	481	3.8%	2.8%
Bayview Ave	1,193	1,341	925	1,718	-0.8%	1.1%	1,880	2,022	2,568	2,383	1.0%	0.7%
Total	**2,363**	**2,509**	**2,370**	**3,353**	**0.0%**	**1.3%**	**4,915**	**5,162**	**7,009**	**6,403**	**1.2%**	**1.0%**

Table 5-3: TMC vs. EMME Growth Rate Comparison - East-West Screenline – PM Peak Hour

Screenline	Eastbound						Westbound					
Street Name	2011 EMME	2019 TMC	2041 EMME	2041 TMC	EMME CAGR	TMC CAGR	2011 EMME	2019 TMC	2041 EMME	2041 TMC	EMME CAGR	TMC CAGR
East of Yonge												
16th Ave	770	929	1,248	1,216	1.6%	1.2%	1,186	1,227	1,780	1,579	1.4%	1.2%
Oak Ave	53	147	131	158	3.1%	0.3%	15	76	112	116	6.9%	1.9%
Bantry Ave	312	309	353	341	0.4%	0.4%	208	278	696	651	4.1%	3.9%
Westwood Ln	195	95	2	95	-14.2%	0.0%	94	172	235	332	3.1%	3.0%
High Tech Road	534	628	210	317	-3.1%	-3.1%	597	460	182	185	-3.9%	-4.1%
Garden Ave	209	465	468	521	2.7%	0.5%	469	548	529	526	0.4%	-0.2%
Highway 7	2,041	2,134	2,683	2,591	0.9%	0.9%	1,780	2,000	2,077	2,297	0.5%	0.6%
Langstaff Rd	63	130	542	461	7.4%	5.9%	96	225	357	388	4.5%	2.5%
Total	**4,177**	**4,837**	**5,637**	**5,700**	**1.0%**	**0.7%**	**4,445**	**4,986**	**5,968**	**6,074**	**1.0%**	**0.9%**
East of Red Maple												
16th Ave	1,172	1,327	1,637	1,638	1.1%	1.0%	997	1,443	1,503	1,529	1.4%	0.3%
Bantry Ave	281	295	194	226	-1.2%	-1.2%	283	264	115	317	-3.0%	0.8%
High Tech Road	533	587	398	477	-1.0%	-0.9%	479	566	361	480	-0.9%	-0.7%
Highway 7	2,106	2,051	2,742	2,579	0.9%	1.0%	1,930	2,100	2,857	2,383	1.3%	0.6%
Total	**4,092**	**4,260**	**4,971**	**4,920**	**0.7%**	**0.7%**	**3,689**	**4,373**	**4,836**	**4,709**	**0.9%**	**0.3%**
West of Bayview												
Bantry Ave	341	634	704	1,067	2.4%	2.4%	325	396	216	296	-1.4%	-1.3%
High Tech Road	537	39	466	34	-0.5%	-0.6%	472	53	258	36	-2.0%	-1.7%
Creswick Rd	849	58	1,106	71	0.9%	0.9%	568	112	737	134	0.9%	0.8%
Highway 7	2,381	1,871	2,592	2,002	0.3%	0.3%	2,278	2,384	2,426	2,577	0.2%	0.4%
Total	**4,108**	**2,602**	**4,868**	**3,174**	**0.6%**	**0.9%**	**3,643**	**2,945**	**3,637**	**3,043**	**0.0%**	**0.1%**

Table 5-4: TMC vs. EMME Growth Rate Comparison – North-South Screenline – PM Peak Hour

Screenline	Northbound						Southbound					
Street Name	2011 EMME	2019 TMC	2041 EMME	2041 TMC	EMME CAGR	TMC CAGR	2011 EMME	2019 TMC	2041 EMME	2041 TMC	EMME CAGR	TMC CAGR
North of Bantry												
Yonge St	1,758	1,425	2,659	1,911	1.4%	1.3%	1,063	1,209	1,057	1,205	0.0%	0.0%
Red Maple Rd	587	712	486	795	-0.6%	0.5%	181	242	14	313	-8.2%	1.2%
Bayview Ave	1,976	2,034	3,392	2,532	1.8%	1.0%	1,227	1,284	1,173	1,287	-0.1%	0.0%
Total	**4,321**	**4,171**	**6,537**	**5,238**	**1.4%**	**1.0%**	**2,471**	**2,735**	**2,244**	**2,805**	**-0.3%**	**0.1%**
North of High Tech												
Yonge St	1,991	1,410	1,920	1,624	-0.1%	0.6%	846	1,158	759	1,102	-0.4%	-0.2%
Red Maple Rd	868	986	1,532	1,359	1.9%	1.5%	375	364	424	435	0.4%	0.8%
Red Cedar Ave	0	0	0	0	N/A	N/A	0	0	0	0	N/A	N/A
Silver Linden Dr	148	244	384	443	3.2%	2.7%	230	119	11	157	-9.6%	1.3%
Bayview Ave	2,229	2,376	2,879	2,958	0.9%	1.0%	1,389	1,399	1,008	1,409	-1.1%	0.0%
Total	**5,236**	**5,016**	**6,715**	**6,384**	**0.8%**	**1.1%**	**2,840**	**3,040**	**2,202**	**3,103**	**-0.8%**	**0.1%**
South of High Tech												
Yonge St	2,176	1,685	2,329	2,063	0.2%	0.9%	1,094	1,263	683	1,040	-1.6%	-0.9%
Red Maple Rd	721	882	1,104	1,090	1.4%	1.0%	357	434	459	587	0.8%	1.4%
Red Cedar Ave	0	64	482	383	N/A	8.5%	0	51	10	29	N/A	-2.5%
Silver Linden Dr	128	465	703	714	5.8%	2.0%	219	205	166	176	-0.9%	-0.7%
Bayview Ave	2,229	2,344	2,434	2,674	0.3%	0.6%	1,389	1,504	771	1,420	-1.9%	-0.3%
Total	**5,254**	**5,440**	**7,052**	**6,924**	**1.0%**	**1.1%**	**3,059**	**3,457**	**2,089**	**3,252**	**-1.3%**	**-0.3%**

5.2.2 2041 Traffic Operations and Lane Configurations

The future traffic operations for weekday AM and PM peak hours were assessed for 32 intersections within the study area. The lane configuration, overall intersection Level of Service, and critical movement are summarized in **Table 5-6**. Critical turning movements consider the following measures:

- Through or shared-through movement with v/c of 0.85 or above;
- Exclusive turning movement with v/c of 1.0 or above; and/or
- Any movement with a LOS 'E' or worse.

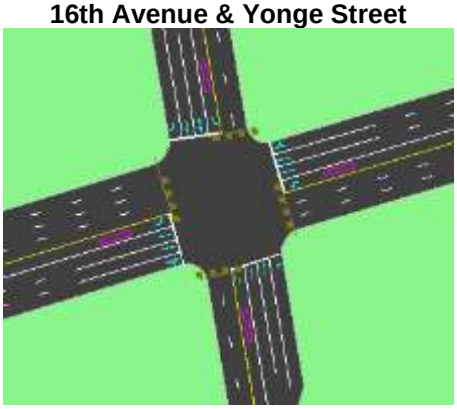
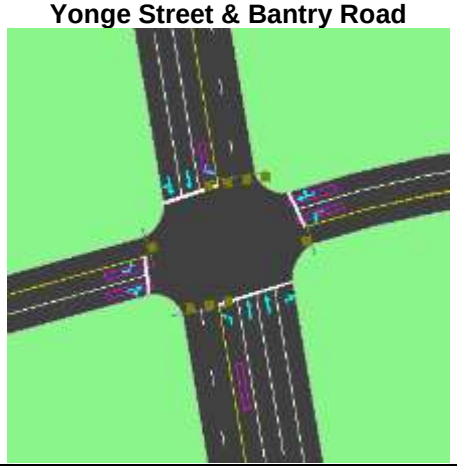
Level of service is based on the average control delay per vehicle for a given movement. Delay is an indicator of how long a vehicle must wait to complete a movement and is represented by a letter between 'A' and 'F', with 'F' being the longest delay. Level of service is shown in **Table 5-5**.

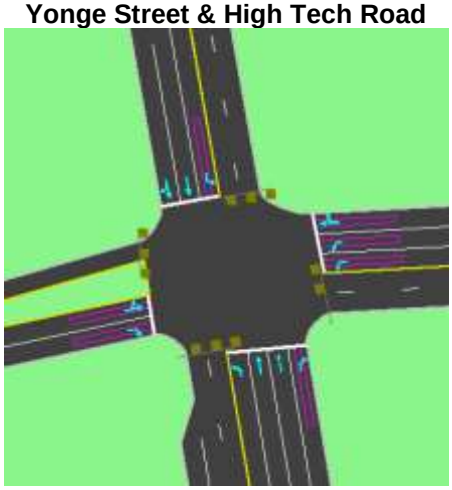
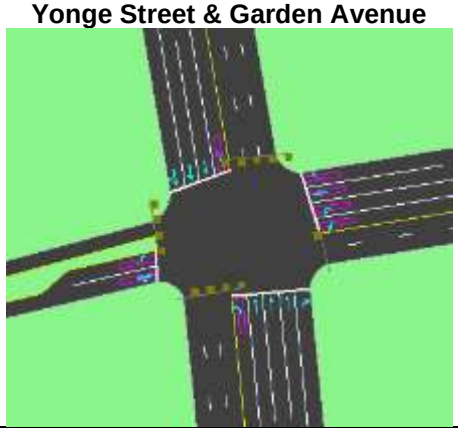
Table 5-5: Level of Service Criteria

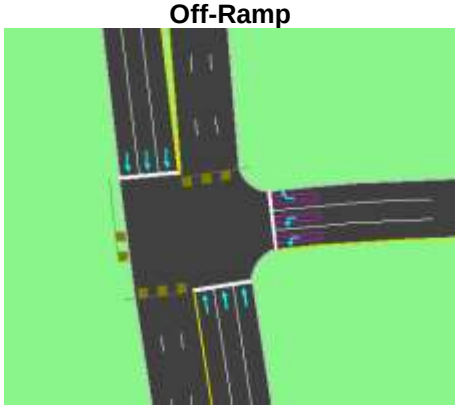
L.O.S.	Control Delay Per Vehicle (seconds)	
	Signalized Intersections	Unsignalized Intersections
A	≤ 10	≤ 10
B	>10 and ≤20	>10 and ≤15
C	>20 and ≤35	>15 and ≤25
D	>35 and ≤55	>25 and ≤35
E	>55 and ≤80	>35 and ≤50
F	>80	>50

Similar to existing conditions, a comparatively low v/c associated with high delays (LOS 'E' or worse) indicates that the traffic experiences delay due to the limited green time provided in each cycle. This situation is typically found at fully protected left turns at major-major intersections, where the cycle length is comparatively longer and green time available to the turning movements is constrained by the high through volumes, as seen for the north-south left turns at Yonge Street along the vivaNext Right-of-Way segment.

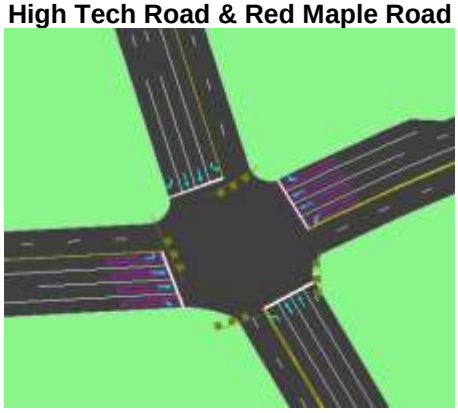
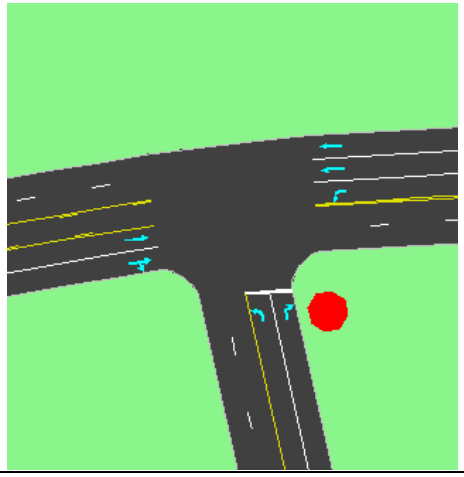
Table 5-6: 2041 Conditions – Critical Turning Movement Summary and Lane Configuration

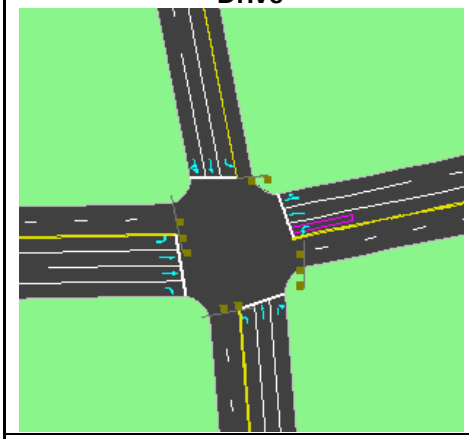
Intersection Lane Configuration *North Up*	2041 AM Peak Hour		2041 PM Peak Hour	
	LOS	*Critical Movements v/c, LOS, and Delay*	*LOS*	*Critical Movements v/c, LOS, and Delay*
16th Avenue & Yonge Street 	F	EBT v/c = 1.09; F (105.8s) WBL v/c = 1.2; F (176.5s) NBL v/c = 1.06; F (128.8s) SBL v/c = 0.9; F (84.3s) SBT v/c = 1.11; F (94.6s)	F	EBL v/c = 1.11; F (133.5s) EBT v/c = 0.87; F (82.9s) WBL v/c = 1.08; F (133.8s) WBT v/c = 1.18; F (131.6s) NBL v/c = 0.81; E (62.4s) NBT v/c = 1.19; F (128.8s) SBL v/c = 1.28; F (208.2s)
Yonge Street & Oak Avenue 	B	WBT v/c = 0.83; E (79.4s) NBL v/c = 0.27; F (82.6s) SBL v/c = 0.35; F (81.9s)	C	EBT v/c = 0.85; E (72.4s) NBL v/c = 0.72; E (75.2s) NBT v/c = 0.95; B (18.1s) SBL v/c = 0.81; F (91.5s)
Yonge Street & Bantry Road 	D	EBT v/c = 0.8; E (73.9s) WBL v/c = 0.72; E (67.3s) NBL v/c = 0.41; E (66.1s) SBL v/c = 0.86; E (61.7s) SBT v/c = 0.9; D (37.8s)	D	EBL v/c = 0.33; E (55.5s) WBT v/c = 0.99; E (76.6s) NBL v/c = 0.23; F (82.9s) NBT v/c = 0.94; C (31.6s) SBL v/c = 0.96; F (129.9s)

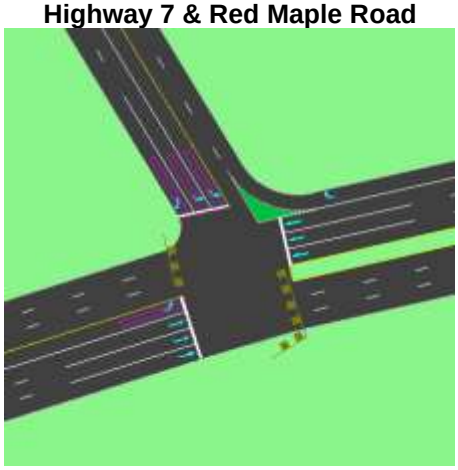
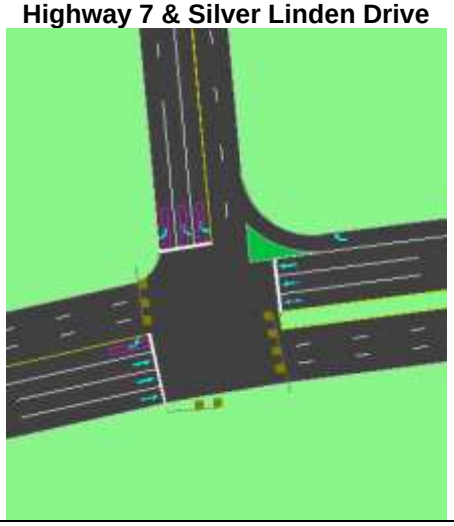
Intersection Lane Configuration *North Up*	2041 AM Peak Hour		2041 PM Peak Hour	
	LOS	*Critical Movements v/c, LOS, and Delay*	*LOS*	*Critical Movements v/c, LOS, and Delay*
Yonge Street & Westwood Lane 	**B**	**EBL v/c = 0.32; E (56.6s) EBT v/c = 0.74; E (67s) WBL v/c = 0.26; E (59.6s) NBL v/c = 0.36; E (61.7s) SBL v/c = 0.62; F (86.8s)**	**C**	**EBL v/c = 0.56; F (87.7s) WBT v/c = 0.85; E (64.5s) NBL v/c = 0.7; E (75.5s) SBL v/c = 0.55; E (77.8s)**
Yonge Street & High Tech Road 	**C**	**EBT v/c = 0.74; E (73.2s) WBL v/c = 0.68; E (74.8s) NBL v/c = 0.78; F (98.4s) SBL v/c = 0.63; F (88.8s) SBT v/c = 0.85; B (12.8s)**	**B**	**EBT v/c = 0.03; E (64.3s) WBL v/c = 0.75; F (87.7s) SBL v/c = 0.36; F (89.5s)**
Yonge Street & Garden Avenue 	**D**	**EBL v/c = 0.48; E (57.9s) EBT v/c = 0.91; E (70.2s) WBL v/c = 0.93; F (84.3s) NBL v/c = 0.85; F (99.1s) SBT v/c = 0.88; D (35.4s)**	**C**	**EBL v/c = 0.45; E (75.1s) WBL v/c = 0.75; E (74.4s) NBL v/c = 0.81; E (71.3s) SBL v/c = 0.66; E (69.2s)**

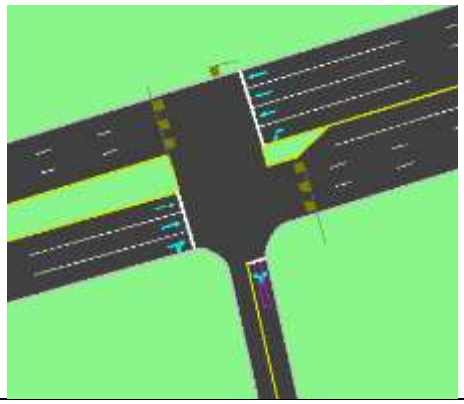
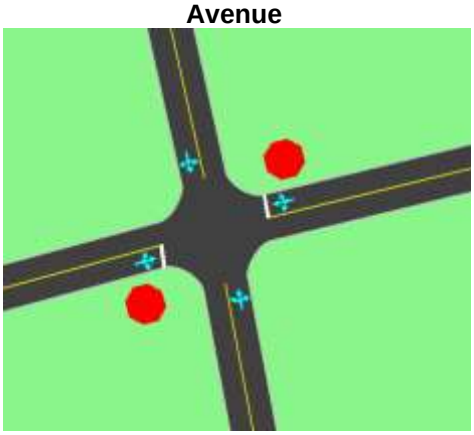
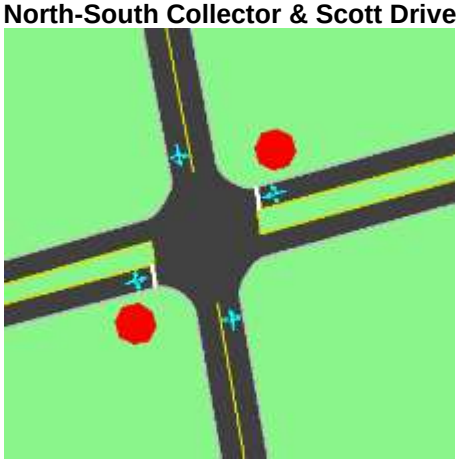
Intersection Lane Configuration *North Up*	2041 AM Peak Hour		2041 PM Peak Hour	
	LOS	*Critical Movements v/c, LOS, and Delay*	*LOS*	*Critical Movements v/c, LOS, and Delay*
Yonge Street & Highway 407 WB Off-Ramp 	**B**	**No Critical Movements**	**C**	**WBR v/c = 0.83; E (57.5s)**
Yonge Street & Highway 407 EB Off-Ramp / Langstaff Road 	**C**	**EBR v/c = 0.9; E (55.1s) WBL v/c = 0.54; E (79.2s)**	**D**	**EBL v/c = 0.9; E (69.6s) EBT v/c = 0.9; E (69.1s) EBR v/c = 0.94; E (61.7s) WBL v/c = 0.89; F (96.5s) WBR v/c = 0.89; E (60.5s) NBT v/c = 0.92; D (46.4s)**
16th Avenue & Red Maple Road 	**B**	**No Critical Movements**	**C**	**WBL v/c = 0.85; E (59.2s)**

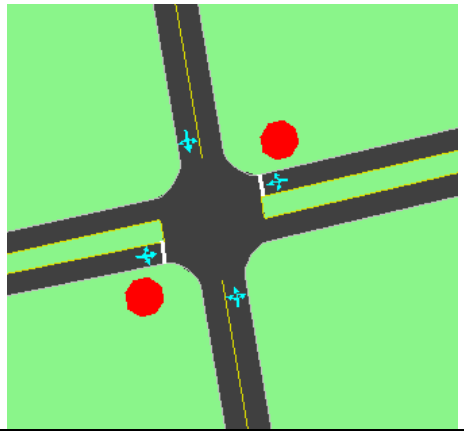
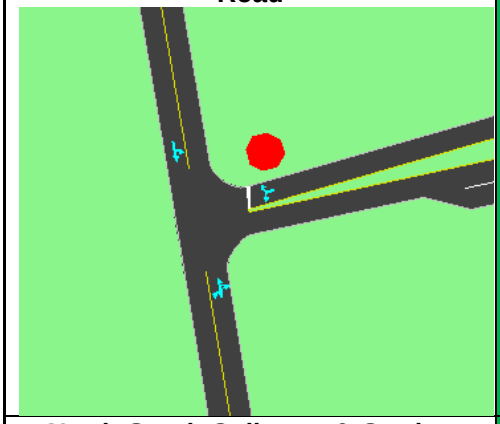
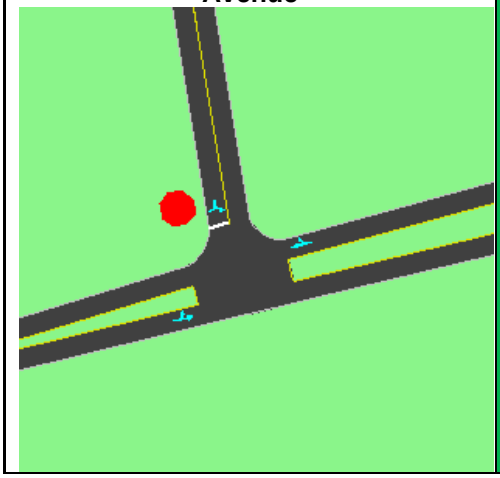
Intersection Lane Configuration *North Up*	2041 AM Peak Hour		2041 PM Peak Hour	
	LOS	*Critical Movements v/c, LOS, and Delay*	*LOS*	*Critical Movements v/c, LOS, and Delay*
Bantry Road & Red Maple Road 	**C**	**SBT v/c = 0.86; C (30.1s)**	**B**	**No Critical Movements**
Bayview Avenue & Bantry Road 	**F**	**EBL v/c = 1.17; F (148.1s) WBT v/c = 1.27; F (176.2s) SBT v/c = 1.25; F (151.5s)**	**F**	**EBL v/c = 0.74; E (56.5s) EBT v/c = 0.78; E (71.4s) WBL v/c = 0.77; E (62.3s) NBT v/c = 1.24; F (149.8s)**
Bayview Avenue & High Tech Road 	**E**	**EBL v/c = 0.41; E (70.3s) EBT v/c = 0.41; E (70.3s) WBT v/c = 0.45; E (79.4s) SBT v/c = 1.07; F (84.8s)**	**B**	**EBL v/c = 0.79; E (70.6s) EBT v/c = 0.77; E (69.2s) WBT v/c = 0.17; E (67.7s)**

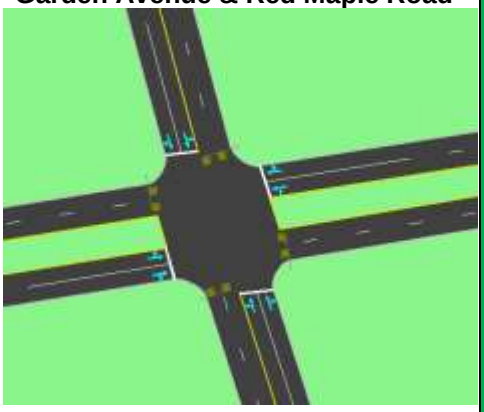
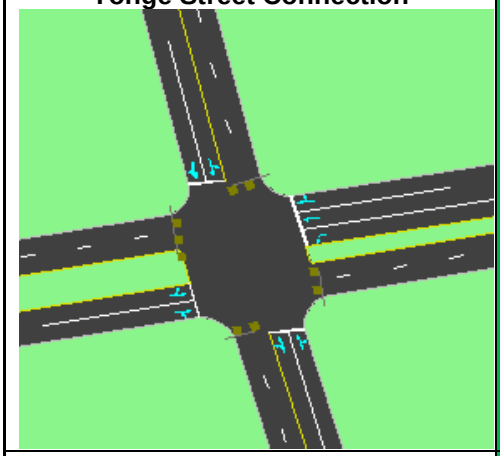
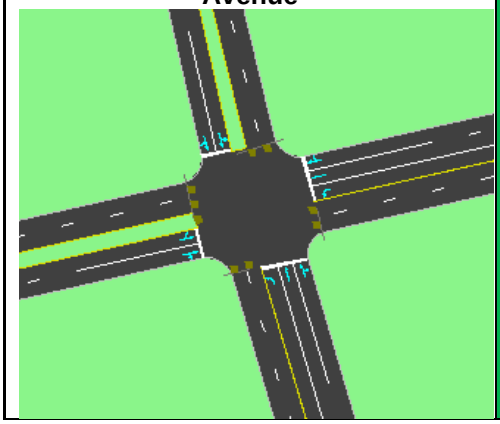
Intersection Lane Configuration *North Up*	2041 AM Peak Hour		2041 PM Peak Hour	
	LOS	*Critical Movements v/c, LOS, and Delay*	*LOS*	*Critical Movements v/c, LOS, and Delay*
Bayview Avenue & Creswick Road 	**E**	**EBL v/c = 0.63; E (76.4s) EBT v/c = 0.64; E (76.3s) WBL v/c = 1.52; F (326.3s) WBT v/c = 1.18; F (162.8s) NBL v/c = 1.08; F (108.4s) SBL v/c = 0.8; E (59.2s) SBT v/c = 1.19; F (110.2s)**	**D**	**EBL v/c = 0.77; E (70.4s) EBT v/c = 0.77; E (70.6s) WBL v/c = 0.53; F (86.3s) NBL v/c = 1.15; F (128.6s) NBT v/c = 0.96; D (50.5s) SBT v/c = 0.93; D (43.7s)**
High Tech Road & Red Maple Road 	**B**	**No Critical Movements**	**B**	**No Critical Movements**
High Tech Road & Red Cedar Avenue 	**A**	**No Critical Movements**	**A**	**No Critical Movements**

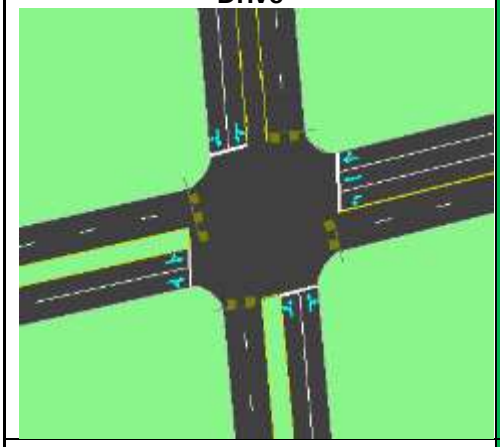
Intersection Lane Configuration *North Up*	2041 AM Peak Hour		2041 PM Peak Hour	
	LOS	*Critical Movements v/c, LOS, and Delay*	*LOS*	*Critical Movements v/c, LOS, and Delay*
High Tech Road & Silver Linden Drive 	**B**	**No Critical Movements**	**B**	**No Critical Movements**
High Tech Road & Far Niente Street 	**B**	**No Critical Movements**	**B**	**NBL v/c = 0.7; E (71.6s)**
Highway 7 Ramp & Yonge Street 	**C**	**WBT v/c = 0.87; D (41.2s)** **SBL v/c = 0.78; E (56.5s)**	**A**	**SBL v/c = 0.37; E (55.3s)**

Intersection Lane Configuration *North Up*	2041 AM Peak Hour		2041 PM Peak Hour	
	LOS	*Critical Movements v/c, LOS, and Delay*	*LOS*	*Critical Movements v/c, LOS, and Delay*
Highway 7 & Red Maple Road 	**C**	**EBL v/c = 1.11; F (113.3s) WBT v/c = 0.98; C (27.5s)**	**C**	**EBL v/c = 0.98; F (86s) WBT v/c = 0.9; D (44s)**
Highway 7 & Silver Linden Drive 	**B**	**No Critical Movements**	**B**	**EBL v/c = 0.88; D (41.5s) SBL v/c = 0.44; E (55.2s)**
Highway 7 & Bayview Avenue 	**C**	**SBR v/c = 0.87; D (52.5s)**	**B**	**EBL v/c = 0.89; E (64s) SBL v/c = 0.38; E (59.5s)**

Intersection Lane Configuration *North Up*	2041 AM Peak Hour		2041 PM Peak Hour	
	LOS	*Critical Movements v/c, LOS, and Delay*	*LOS*	*Critical Movements v/c, LOS, and Delay*
North-South Collector & 16th Avenue / Carrville Road 	**D**	**EBT v/c = 0.92; E (74.6s)**	**C**	**No Critical Movements**
North-South Collector & Oak Avenue 	**A**	**No Critical Movements**	**B**	**No Critical Movements**
North-South Collector & Scott Drive 	**C**	**No Critical Movements**	**A**	**No Critical Movements**

Intersection Lane Configuration *North Up*	2041 AM Peak Hour		2041 PM Peak Hour	
	LOS	*Critical Movements v/c, LOS, and Delay*	*LOS*	*Critical Movements v/c, LOS, and Delay*
North-South Collector & Westwood Lane 	**A**	**No Critical Movements**	**A**	**No Critical Movements**
North-South Collector & High Tech Road 	**A**	**No Critical Movements**	**A**	**No Critical Movements**
North-South Collector & Garden Avenue 	**A**	**No Critical Movements**	**A**	**No Critical Movements**

Intersection Lane Configuration *North Up*	2041 AM Peak Hour		2041 PM Peak Hour	
	LOS	*Critical Movements v/c, LOS, and Delay*	*LOS*	*Critical Movements v/c, LOS, and Delay*
Garden Avenue & Red Maple Road 	**B**	**No Critical Movements**	**B**	**No Critical Movements**
Garden Avenue & Highway 7 / Yonge Street Connection 	**C**	**No Critical Movements**	**D**	**No Critical Movements**
Garden Avenue & Red Cedar Avenue 	**C**	**No Critical Movements**	**C**	**No Critical Movements**

Intersection Lane Configuration *North Up*	2041 AM Peak Hour		2041 PM Peak Hour	
	LOS	*Critical Movements v/c, LOS, and Delay*	*LOS*	*Critical Movements v/c, LOS, and Delay*
Garden Avenue & Silver Linden Drive 	**B**	**No Critical Movements**	**B**	**No Critical Movements**
Garden Avenue & Highway 7/ Bayview Avenue Connection 	**A**	**No Critical Movements**	**B**	**No Critical Movements**

*The calibration adjustments indicated in Table 3-5 were carried to future scenario to ensure comparable results between existing and future conditions

Intersections within the study area are expected to be operating at LOS 'D' or better at an intersection level during both AM and PM peak hours with exceptions of following 4 intersections:

- Yonge Street & 16th Avenue (AM and PM);
- Bayview Avenue & Bantry Avenue (AM and PM);
- Bayview Avenue & High Tech Road (AM only); and
- Bayview Avenue & Creswick Road (AM only).

Some intersections yield to an overall LOS 'D' or better are expected to experience capacity issues or/and high delay at certain turning movements, especially at major streets such as Yonge Street, where the green split balance needed to be maintained for the dominated through vehicles while serving constrained turning demand. In additional, the north-south left turns at Yonge Street along the vivaNext

Right-of-Way segment are expected to operate at LOS ‘E’ or ‘F’ regardless of the comparatively low v/c ratio due to the impacts from the vivaNext operations (fully protected phase required, longer cycle length).

The overall intersection LOS and the most critical turning movements are summarized in **Figure 5-3** and **Figure 5-4** for AM and PM peak hour, respectively.

The LOS and v/c ratio for each turning movement are summarized in the Synchro report shown in **Appendix F**.

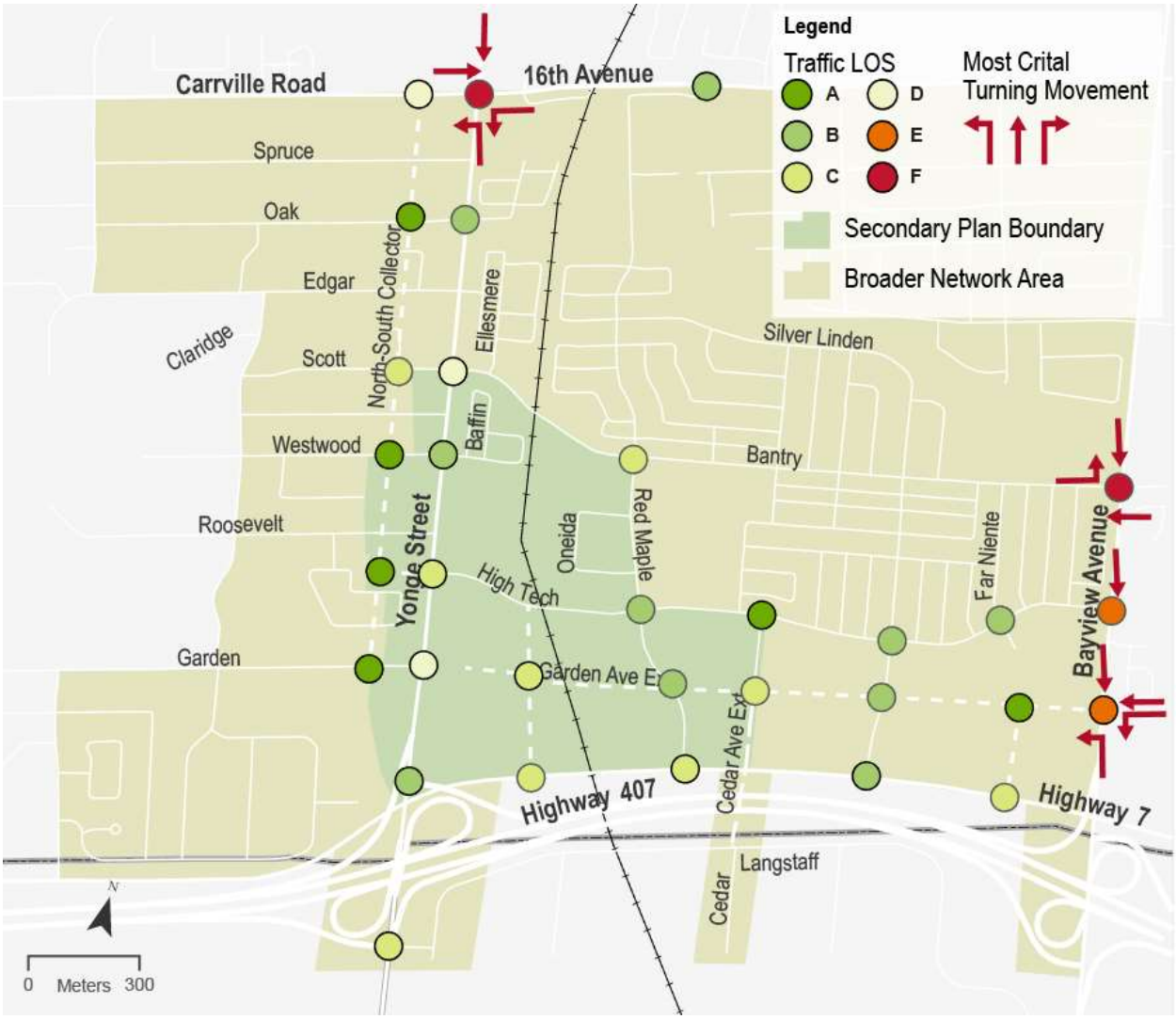


Figure 5-3: 2041 Base Case AM Peak Hour Intersection LOS and Most Critical Turning Movements

* post-calibration results based on the calibration adjustments indicated in Table 3 5. The most critical turning movements are the ones that are over capacity (v/c ratio over 1) and experience significant delays (LOS worse than or equal to E).

Figure 5-4: 2041 Base Case PM Peak Hour Intersection LOS and Most Critical Turning Movements

* post-calibration results based on the calibration adjustments indicated in **Table 3-5**. The most critical turning movements are the ones that are over capacity (v/c ratio over 1) and experience significant delays (LOS worse than or equal to E).

5.3 2031 Base Case Traffic Conditions

The 2031 base case traffic operation conditions for the weekday AM peak hour and PM peak hour are assessed at the 32 intersections within the study area, leveraging the 2041 analysis. The 2031 traffic demand were generated using interpolation between 2019 and 2041 volumes presented in **Section 3.5 and Section 5**. The lane configurations and signal timing assumptions are consistent with the 2041 conditions described in the **Section 5**. The balanced future turning movements for AM and PM peak hour are illustrated in **Appendix E**.

5.3.1 2031 Traffic Operations and Lane Configurations

The critical movement and the associated overall LOS at the intersection are summarized in **Table 5-7**. Lane configurations are consistent with those presented in

the 2041 analysis in **Table 5-6**. Critical turning movements consider the following measures:

- Through or shared-through movement with v/c of 0.85 or above;
- Exclusive turning movement with v/c of 1.0 or above; and/or
- Any movement with a LOS 'E' or worse.

Table 5-7: 2031 Conditions – Critical Turning Movement Summary

Intersection	2031 AM Peak Hour		2031 PM Peak Hour	
	LOS	*Critical Movements v/c, LOS, and Delay*	*LOS*	*Critical Movements v/c, LOS, and Delay*
16th Avenue & Yonge Street	**E**	**EBT v/c = 1; F (116.1s) WBL v/c = 1.12; F (149.2s) NBL v/c = 0.93; F (102.8s) SBL v/c = 0.86; F (80.7s) SBT v/c = 1.03; E (73s)**	**E**	**EBL v/c = 1.02; F (118s) EBT v/c = 0.78; E (61.5s) WBL v/c = 1.03; F (118.8s) WBT v/c = 1.05; F (86.3s) NBL v/c = 0.79; E (69.2s) NBT v/c = 0.95; E (55.8s) SBL v/c = 1.19; F (178.4s)**
Yonge Street & Oak Avenue	**B**	**WBT v/c = 0.8; F (80.2s) NBL v/c = 0.27; F (86.2s) SBL v/c = 0.26; F (80.6s)**	**B**	**EBT v/c = 0.77; E (67.9s) NBL v/c = 0.57; E (68.9s) SBL v/c = 0.61; F (80.5s)**
Yonge Street & Bantry Road	**D**	**EBT v/c = 0.77; E (73.8s) WBL v/c = 0.69; E (65.5s) NBL v/c = 0.35; E (62.5s) SBL v/c = 0.8; E (59.7s) SBT v/c = 0.88; C (34.8s)**	**C**	**WBT v/c = 0.88; E (62.6s) NBL v/c = 0.31; F (85.6s) SBL v/c = 0.68; E (79.8s)**
Yonge Street & Westwood Lane	**B**	**EBL v/c = 0.34; E (60.4s) EBT v/c = 0.69; E (60.6s) WBL v/c = 0.3; E (65.5s) NBL v/c = 0.33; E (60s) SBL v/c = 0.6; F (83.2s)**	**B**	**EBL v/c = 0.56; F (91.1s) WBT v/c = 0.79; E (58.1s) NBL v/c = 0.65; E (66.9s) SBL v/c = 0.5; E (71.1s)**
Yonge Street & High Tech Road	**C**	**EBT v/c = 0.59; E (70.6s) WBL v/c = 0.93; F (99.7s) SBL v/c = 0.61; E (79.4s)**	**C**	**EBT v/c = 0.02; E (66.5s) WBL v/c = 1.1; F (152.3s) SBL v/c = 0.59; F (90.6s)**
Yonge Street & Garden Avenue	**D**	**EBL v/c = 0.47; E (57s) EBT v/c = 0.93; E (72.7s) WBL v/c = 0.81; E (71.5s) NBL v/c = 0.75; F (89.3s)**	**C**	**EBL v/c = 0.49; E (76.7s) WBL v/c = 0.78; E (76.6s) NBL v/c = 0.8; E (71.7s) SBL v/c = 0.65; E (73.6s)**
Yonge Street & Highway 407 WB Off-Ramp	**B**		**B**	**WBR v/c = 0.77; E (56.2s)**
Yonge Street & Highway 407 EB Off-Ramp / Langstaff Road	**C**	**EBR v/c = 0.86; D (51.8s) WBL v/c = 0.44; E (76.3s)**	**D**	**EBL v/c = 0.76; E (57.8s) EBT v/c = 0.76; E (57.1s) EBR v/c = 0.9; E (56.1s) WBL v/c = 0.77; E (79.6s) NBT v/c = 0.89; D (41.8s)**
Bayview Avenue & Bantry Road	**E**	**EBL v/c = 1.29; F (192.7s) WBT v/c = 0.98; F (84.7s) SBT v/c = 1.15; F (107.1s)**	**D**	**EBL v/c = 0.76; E (63.6s) EBT v/c = 0.73; E (72.7s) WBL v/c = 0.83; E (72.7s) WBT v/c = 0.61; E (57.1s) NBT v/c = 1.06; E (76.5s)**
Bayview Avenue & High Tech Road	**D**	**EBL v/c = 0.49; E (71.9s) EBT v/c = 0.49; E (71.9s)**	**C**	**EBL v/c = 0.77; E (70.2s) EBT v/c = 0.76; E (69.4s)**

Intersection	2031 AM Peak Hour		2031 PM Peak Hour	
	LOS	*Critical Movements v/c, LOS, and Delay*	*LOS*	*Critical Movements v/c, LOS, and Delay*
		WBT v/c = 0.41; E (76.9s) **SBT v/c = 0.92; D (53.3s)**		**WBT v/c = 0.25; E (70.2s)** **NBL v/c = 0.83; E (66.5s)**
Bayview Avenue & Creswick Road	**E**	**EBL v/c = 0.60; E (74.9s)** **EBT v/c = 0.60; E (74.7s)** **WBL v/c = 1.27; F (236.2s)** **WBT v/c = 0.99; F (107.4s)** **NBL v/c = 0.98; F (80.8s)** **SBT v/c = 1.08; E (66.1s)**	**D**	**EBL v/c = 0.74; E (74.7s)** **EBT v/c = 0.75; E (74.9s)** **WBL v/c = 0.53; F (86.3s)** **NBL v/c = 1.16; F (134.3s)** **NBT v/c = 0.95; D (46.1s)** **SBT v/c = 0.93; D (44.6s)**
High Tech Road & Far Niente Street	**A**	**No critical movements**	**B**	**NBL v/c = 0.79; F (81.9s)**
Highway 7 Ramp & Yonge Street	**C**	**No critical movements**	**A**	**SBL v/c = 0.48; E (57.3s)**
Highway 7 & Red Maple Road	**C**	**EBL v/c = 1.02; F (84.5s)**	**C**	**EBL v/c = 0.92; E (72.5s)** **WBT v/c = 0.87; D (47.1s)**
Highway 7 & Silver Linden Drive	**B**	**SBL v/c = 0.54; E (56.3s)**	**B**	**EBL v/c = 0.85; D (41.3s)** **SBL v/c = 0.38; E (55.1s)**
Highway 7 & Bayview Avenue	**C**	**SBR v/c = 0.9; E (55.9s)**	**C**	**EBL v/c = 0.88; E (57.2s)** **SBL v/c = 0.48; E (60s)**

*note: Intersection operates at LOS 'D' or better with no critical movement during both AM and PM peak hour are excluded from the above able.

In general, the overall LOS associated with critical movements are slightly better compared to 2041 conditions, but the patterns are similar. The LOS and v/c ratio for each turning movement are summarized in the Synchro report shown in **Appendix G**. The 2031 model will be used to inform phasing and implementation recommendations in the future phases of this study.

5.4 Background Transportation Conditions Summary

The background transportation conditions inform the development of the Recommended Concept Scenario which will identify future population and employment growth within the RHC and inform further transportation analysis.

Since the completion of the 2010 Richmond Hill Centre Design and Land Use Study, additional planning work has been completed which further inform context surrounding the development of the Richmond Hill Centre Secondary Plan. This includes the completion of the York Region TMP, York Region Richmond Hill / Langstaff Gateway Regional Centre study, the Markham Langstaff Gateway Secondary Plan and Markham OPA 183, and most recently the Yonge North Subway Extension. These studies identify future transportation infrastructure needed to support the area including an active transportation connection along the CN Rail tracks and the Red Cedar / Cedar Avenue Extension.

An updated transportation analysis has also been conducted to set an updated baseline for future conditions analysis. The peak period mode share in the study area has been consistent over the past 15 years with auto driver and passenger trips about 75%, transit 15% and active transportation about 5%. A significant shift in non-auto mode share is expected in the future and this will be assessed in future phases of this study.

Looking at the transportation network, there are gaps in the active transportation network today and the redevelopment of the study area should plan for a finer grid street network with dedicated pedestrian and cyclist facilities which will be needed to support the higher order transit improvements in the study area.

An existing traffic analysis identifies current conditions for traffic operations. While specific turning movements experience delays, overall operations are considered acceptable at all study area intersections during the AM and PM peak hours.

Future 2031 and 2041 traffic operations were also assessed through the development of a detailed study area model which accounts for projected growth in the Region as well as within the Study Area. Based on the analysis, operational concerns are noted at study area intersections, particularly at the major arterial road intersections adjacent to the study area. This includes intersections at Yonge/16th Avenue, Bayview/Bantry, Bayview/High Tech, and Bayview/Garden Extension. The development of the Secondary Plan Recommended Scenario should seek to mitigate these operational concerns.

A traffic infiltration analysis also identifies that about 16-30% of traffic using Scott Street and Garden Avenue west of Yonge, and Nahanni Drive and Silvern Linden Drive north of High Tech Road, can be considered “cut-through” traffic. The number of cut-through trips are expected continue to grow in the 2041 Base Case scenario due to significant congestions on Yonge Street and Bayview Avenue. Growth within the Richmond Hill Centre should be managed to minimize impacts on residential neighbourhoods.

6 Recommended Concept Scenario

Based on the findings of the existing and future background analysis, consultation with the public and stakeholders, and visions for the Richmond Hill Centre, a Recommended Concept Scenario has been identified.

The recommended concept scenario includes a dense street and block network highlighted in **Figure 6-1**. In this dense network, several rail crossings have been recommended, as the rail corridor is a major barrier to connectivity in the area. Integration with transit station infrastructure should be accommodated wherever possible and in coordination with the YNSE project. Potential opportunities for integration along with a demonstration of the built form are illustrated in **Figure 6-2** (without development in the Hydro Lands) and in **Figure 6-3** (with development within the Hydro Lands, illustrating potential land use types).

Figure 6-1: Recommended Concept Scenario – Street and Block Network

Figure 6-2: Recommended Concept Scenario – Demonstration Plan (without Hydro Lands Development)

Figure 6-3: Recommended Concept Scenario – Demonstration Plan with Land Use Type* (with Hydro Lands Development)

*Residential = Orange; Office = Blue; Retail = Red

7 Recommended Concept Scenario Transportation Analysis

The recommended scenario was developed considering the March 2021 Metrolinx YNSE (Yonge North Subway Extension) IBC (Initial Business Case) recommendations, with two subway stations in the study area south of Highway 7 and at High Tech Road. This scenario contains a dense street grid, open spaces and parks, and high-rise developments.

7.1 Subarea Model of Recommended Scenario

The recommended scenario incorporates intensified land use in the RHC SP area and in the anticipated development identified in the City of Markham's Langstaff Gateway Secondary Plan. This scenario was analysed for its PM peak traffic performance. It is noted that while development of the hydro lands within the RHC SP area has been considered, this analysis does not include it.

7.1.1 Recommended Scenario Land Use and Trip Generation

Trips were generated according to the ITE Trip Generation Manual (10th Edition) for the PM peak period according to land use by Gross Floor Area (GFA). The proposed development land use in the RHC, which was categorized by residential, retail, and office space, were further disaggregated into land use types in the ITE manual according to assumptions in **Table 7-1**. Since the transportation model was developed using the 9th edition of the ITE manual, land use types that were no longer available in the 10th edition retained their 9th edition trip generation formulas. A summary of the land use in the entire study area can be found in **Table 7-2**. The detailed trip generation is included in **Appendix H**.

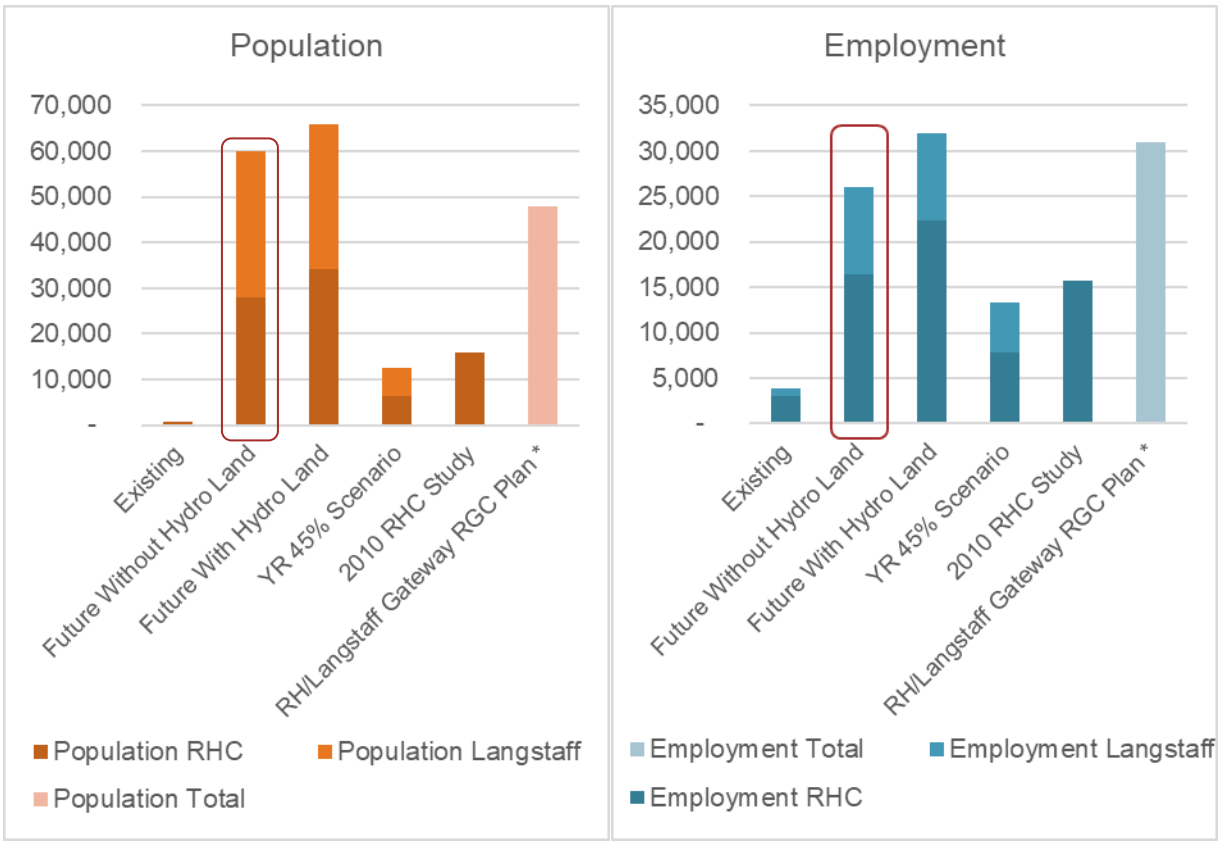
Table 7-1: Land Use Breakdown

Land Use	ITE Land Use Type	% Breakdown	ITE Code
Residential	Mid-Rise Residential with 1st-Floor Commercial	55%	231
Residential	Multifamily Housing (Low-Rise)	35%	220
Residential	Senior Adult Housing - attached	10%	252
Office	General Office	85%	710
Office	Medical Office	15%	720
Retail	Specialty	50%	826
Retail	Restaurant	25%	931
Retail	Cinema/Entertainment	5%	445
Retail	Fitness/Recreation	10%	492
Retail	Hotel	10%	310

Table 7-2: Study Area Land Use Summary

	Residential Units	Office GFA	Retail GFA
RHC and existing	18,000	4,160,000	631,000
Langstaff	15,000	2,900,000	383,000

Based on the land use GFA's, the recommended scenario developments result in the estimated population and employment in **Figure 7-1**, labelled "Future Without Hydro Land". This scenario includes developments in the RHC and Langstaff neighbourhoods but excludes the potential development of the lands which currently accommodate the hydro corridor.



* RH/Langstaff Gateway RGC Plan represents 2031 Projections

Figure 7-1: Recommended Scenario Projected Land Use

7.1.2 Recommended Scenario Network

The recommended scenario network was revised from the 2041 base network according to the street typology designed for the recommended scenario. This results in the transportation network shown in **Figure 7-2**. The changes include a denser street grid involving more local roads, laneways, and multi-modal paths. This network serves two transit stations and supports active modes to a greater extent.

The denser street grid involves making the following changes to the 2041 base network:

- Shifting the north-south road east of Yonge Street. to align with Baffin Court. and extending it to Garden Avenue.
- Extending Roosevelt Dr. to the north-south road.
- Adding a road halfway between High Tech Road and Garden Avenue from Yonge Street to the northward extension of the Highway 7 off-ramp (Station Street). This road is connected to High Tech Station by an active mode path.
- L-shaped local roads are added southeast and southwest of the station
- The blocks bounded by High Tech Road, Highway 7, Red Cedar Avenue, and the railway are broken into smaller blocks by new local roads.

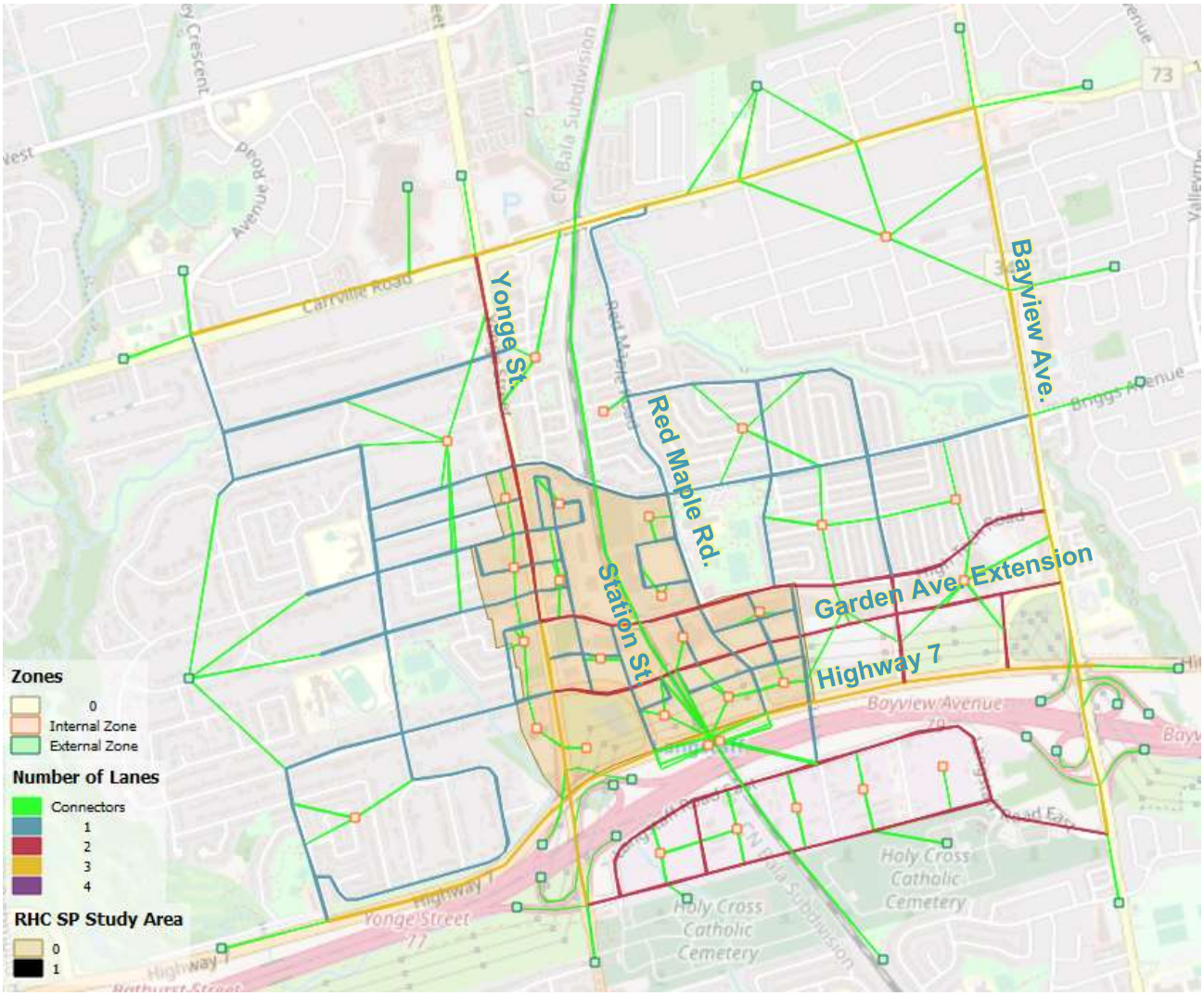
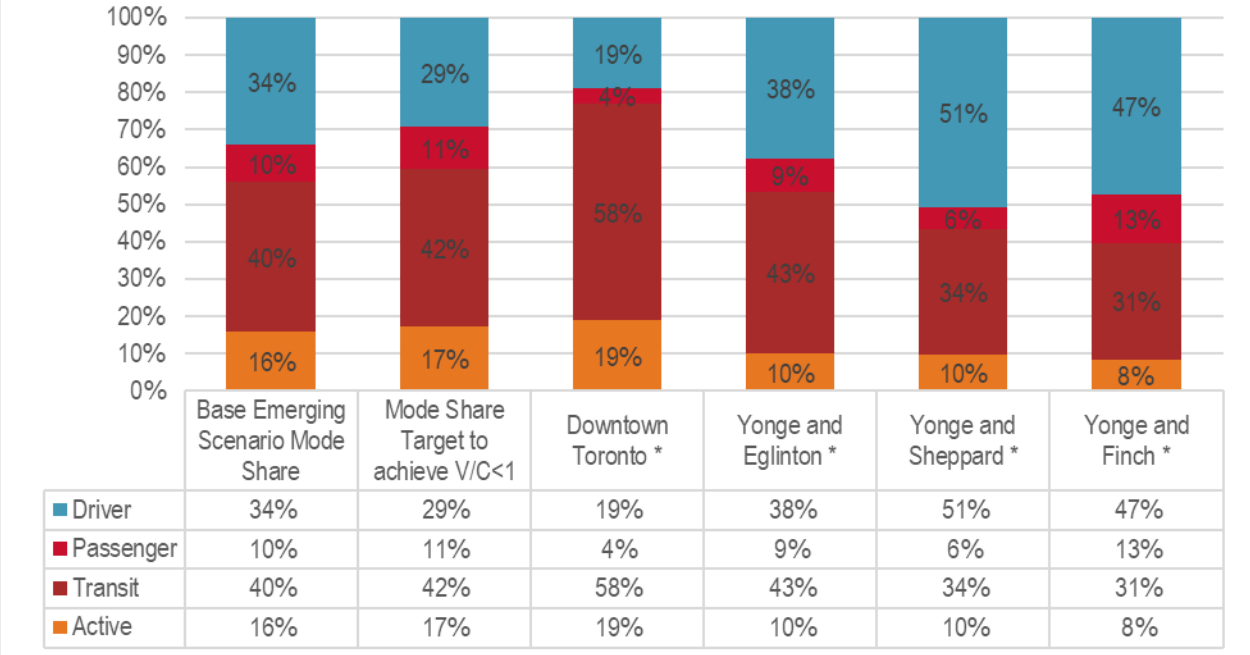


Figure 7-2: Recommended Scenario Network

7.1.2.1 Mode Share

The assumed mode share did not change from that developed for the base scenario, which were developed using 2016 Transportation Tomorrow Survey (TTS) data based on proxy sites with levels of transit and densification similar to the developed state of the RHC in the recommended scenario. **Figure 7-3** compares the mode share assumptions used with the mode share of other proxy sites.



	Base Emerging Scenario Mode Share	Mode Share Target to achieve V/C<1	Downtown Toronto *	Yonge and Eglinton *	Yonge and Sheppard *	Yonge and Finch *
Driver	34%	29%	19%	38%	51%	47%
Passenger	10%	11%	4%	9%	6%	13%
Transit	40%	42%	58%	43%	34%	31%
Active	16%	17%	19%	10%	10%	8%

* Based on 2016 TTS

Figure 7-3: Mode Share Assumptions

Note that these mode share assumptions represent a full build-out scenario and are subject to monitoring and evaluation. These assumptions should not be used elsewhere without careful consideration and analysis of the specific context and conditions of the project. Future analysis and planning efforts should incorporate up-to-date data and analysis to ensure that transportation plans remain responsive to changing conditions and needs over time.

7.1.3 Recommended Scenario Traffic Volumes

Using the model developed for the 2041 base case, the trip generation was updated according to the recommended scenario land use. The new trip generation was distributed across the same disaggregated zones used in the base case, but with the recommended scenario street network. This was performed for autos in the PM peak hour only since this was the most critical period. The resulting traffic volumes are shown in **Figure 7-4**.

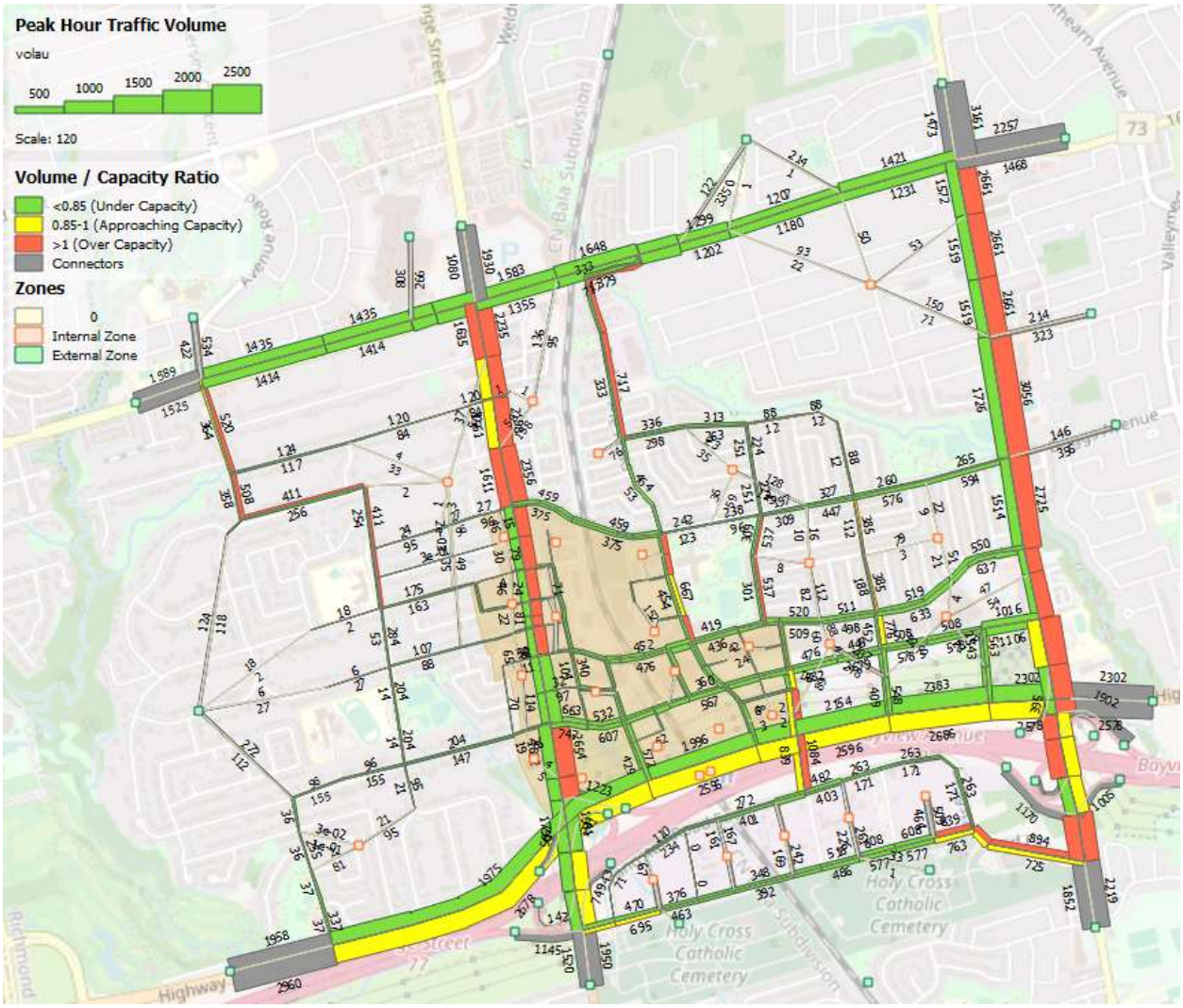


Figure 7-4: Recommended Scenario PM Peak Hour Traffic Volumes

The overall traffic pattern in the recommended scenario is not significantly different from that of the 2041 base case scenario. Bayview Avenue and Yonge Street remain congested in the peak direction, as does the Red Cedar Avenue extension. Most of the newly added streets in the densified street grid perform adequately. However, Highway 7 becomes slightly relieved near the interchange at Yonge Street Conversely, the Langstaff developments increase demand around the intersection of Langstaff Road and Bayview Avenue

Screenline analyses were conducted for the five screenlines illustrated in **Figure 7-5**. Results in **Table 7-3** show the distribution of traffic across the screenlines by their sources – that is, whether they come from the RHC, Langstaff, or are part of the background traffic. For most screenlines, there is more traffic from RHC and Langstaff than background traffic.

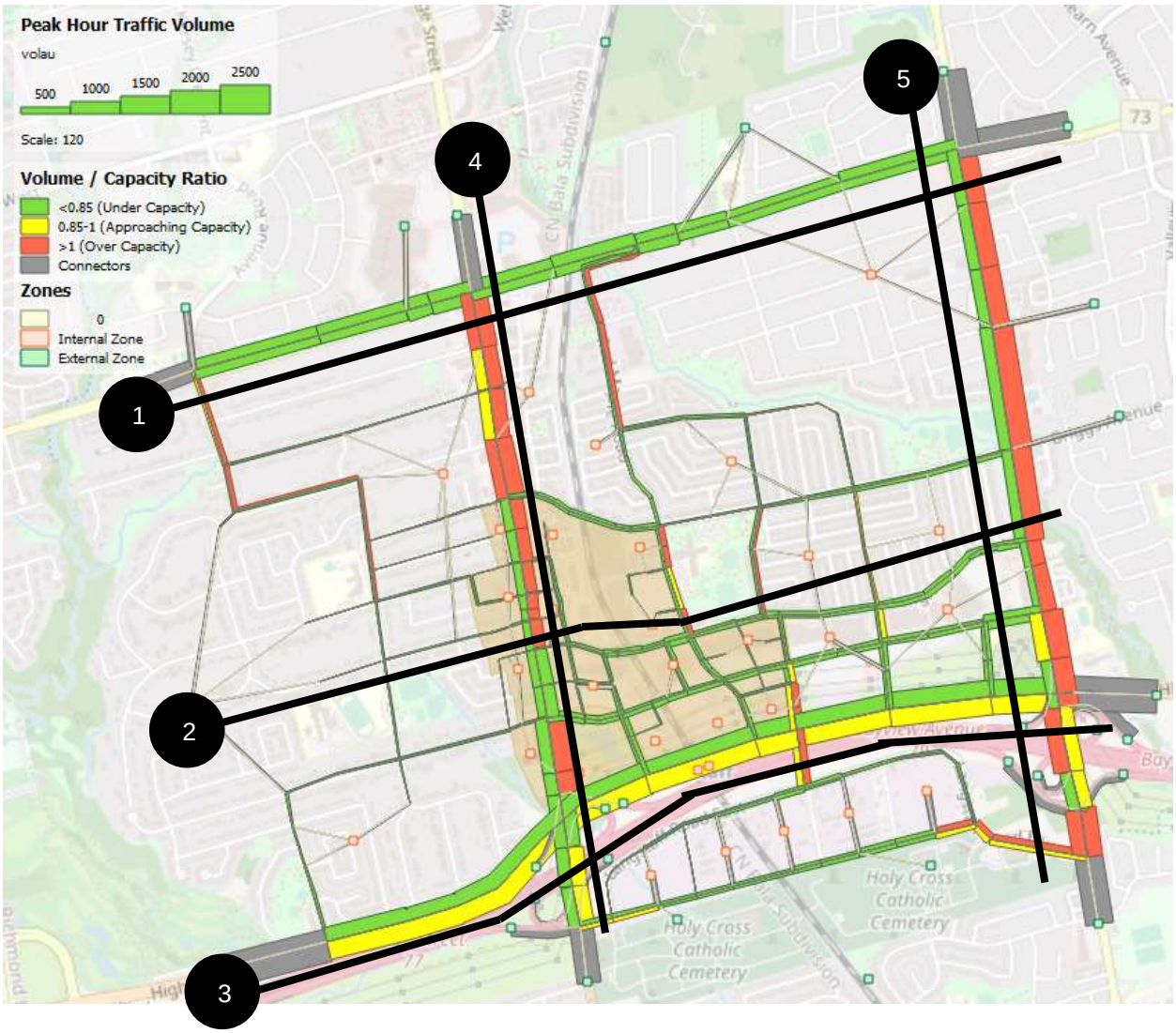


Figure 7-5: Screenline Traffic Volume-to-Capacity Ratios

Table 7-3: Screen Line Traffic Distribution

#	Screenline	% Share of Travel Demand		
		Richmond Hill Centre	Langstaff	Background Traffic
1	South of 16th Avenue	37%	14%	49%
2	North of High Tech Road	38%	15%	47%
3	South of Highway 7	24%	23%	53%
4	East of Yonge Street	42%	28%	30%
5	West of Bayview Avenue	39%	23%	38%

Table 7-4 shows the total traffic volumes and level of congestion across the screenlines, by direction. Screenlines 1, 2, and 3 are over-capacity in the northbound

direction, as is in line with the congestion of Yonge Street and Bayview Avenue in the peak direction. The roads at other screenlines, however, perform adequately.

Table 7-4: Screenline Volumes and Capacity

#	Screenline	NB/EB			SB/WB		
		Volume	Capacity	V/C	Volume	Capacity	V/C
1	E-W: South of 16th Avenue	5,613	4,300	1.31	3,540	4,300	0.82
2	E-W: North of High Tech Road	6,119	5,300	1.15	3,572	5,300	0.67
3	E-W: South of Highway 7	5,992	5,400	1.11	4,134	5,400	0.77
4	N-S: East of Yonge Street	3,348	6,400	0.52	3,316	6,400	0.52
5	N-S: West of Bayview Avenue	4,293	5,800	0.74	4,146	5,800	0.71

V/C <0.85	V/C 0.85-1	V/C > 1
Under Capacity	Approaching Capacity	Over Capacity

7.2 Future Intersection Capacity Analysis

The 2041 traffic operation conditions for the weekday PM peak hour were assessed for the following intersections with locations shown in **Figure 7-6**:

- Yonge Street & 16th Avenue / Carrville Road
- Yonge Street & Oak Avenue / Northern Heights Drive
- Yonge Street & Scott Drive / Bantry Avenue
- Yonge Street & Westwood Lane / Beresford Drive
- Yonge Street & High Tech Road
- Yonge Street & Garden Avenue
- Yonge Street & Highway 407 Westbound Off-Ramp
- Yonge Street & Langstaff Road East / Highway 407 Eastbound Off-Ramp
- Bantry Avenue & Red Maple Road

- High Tech Road & Red Maple Road
- High Tech Road & Station Street
- High Tech Road & Red Cedar Avenue
- High Tech Road & Silver Linden Drive
- Garden Avenue Extension & Silver Linden Drive
- Highway 7 & Silver Linden Drive
- Garden Avenue Extension & Red Cedar Avenue
- Garden Avenue Extension & Red Maple Road
- Highway 7 & Red Maple Road
- Highway 7 & Station Street
- Garden Avenue Extension & Station Street
- Langstaff Road East & Cedar Avenue

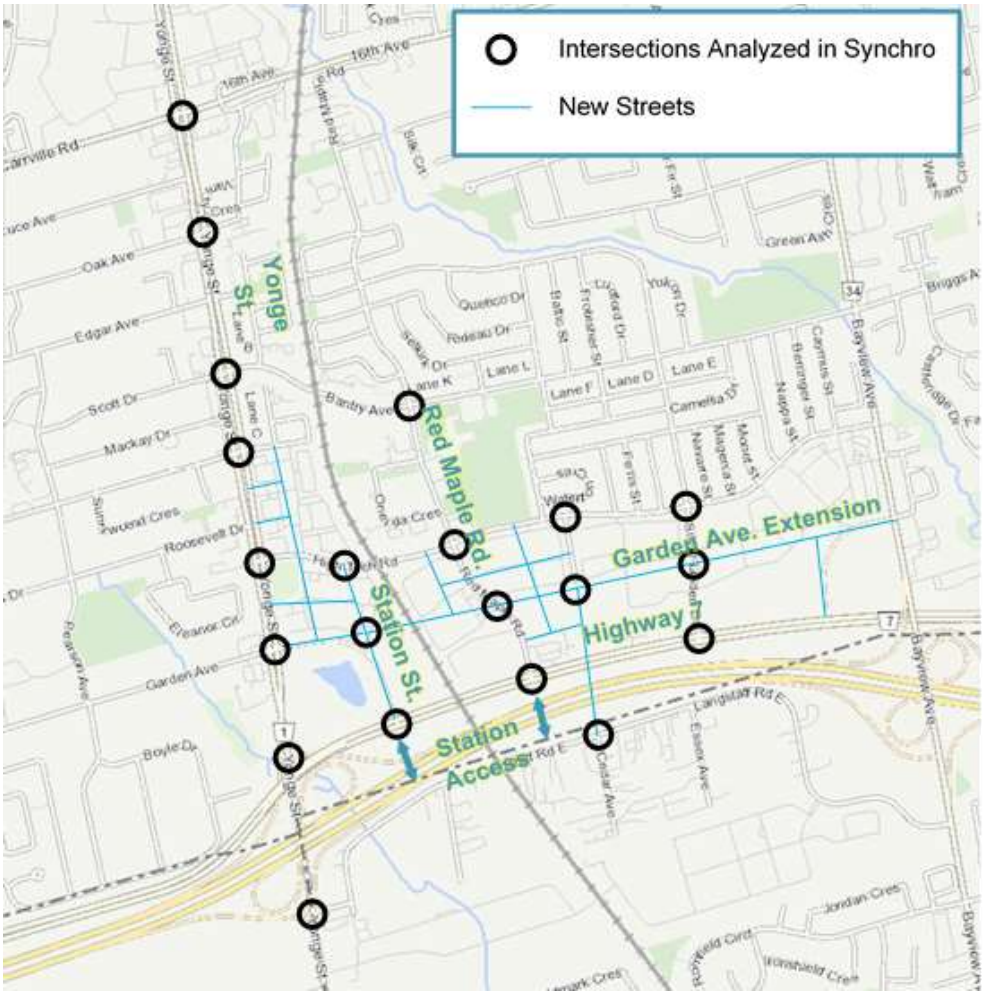


Figure 7-6: Intersections Analyzed in Synchro

Traffic signal timings are optimized to reflect future conditions using the built-in Synchro algorithms plus manual adjustments where required. Cycle lengths, advanced phases, clearance times, and offsets were not adjusted relative to the existing signal timing plans at all locations.

7.2.1 2041 Traffic Turning Movement Volumes

For the currently existing intersections, the future 2041 PM peak hour traffic volumes were estimated using a bi-proportional balancing methodology (as referred to in NCHRP Report 255). During this process, the traffic growth rates between existing (2011) and future (2041) models were calculated for each of the intersection approaches; these traffic growth rates were then applied to the existing (2019) traffic counts to estimate the future expected traffic volumes approaching and leaving the intersection. The bi-proportional balancing methodology was used to estimate the future turning movement volumes considering existing traffic patterns and expected traffic volumes approaching and leaving the intersection, via a multi-iteration calculation process.

For the new intersections without existing counts and existing modelled volumes available, the 2041 PM peak hour traffic volumes were derived from the future EMME modelling outputs. The estimated future 2041 traffic volumes for all the analyzed intersections in the recommended scenario are presented in **Appendix I**.

7.2.2 Assumptions

The traffic analysis presented in this section considers the following assumptions, including lane configurations and traffic control.

7.2.2.1 Lane Configurations

The following lane configurations for new roads were assumed for the 2041 Synchro analysis:

- Garden Avenue Extension is assumed to have a 2-lane cross-section;

  Garden Avenue is assumed to have a 4-lane cross-section. However, to test the potential for flexibility in street operations, such as the usage of curbside lanes for parking, a scenario that only has one lane in each direction was assessed in Synchro.

- Station Street is assumed to have a 2-lane cross-section;
- Cedar Avenue is assumed to have a 2-lane cross-section;
- The south leg at Highway 7 & Station Street is assumed to be a station access point with a 2-lane cross-section;
- The south leg at Highway 7 & Red Maple Road is assumed to be a station access point with a 2-lane cross-section; and
- Garden Avenue Extension & Red Maple Road is assumed to have a dedicated southbound left-turn lane.

7.2.2.2 Traffic Control

The following intersections are assumed to be signalized:

- Garden Avenue Extension & Station Street;
- Garden Avenue Extension & Red Maple Road;
- Garden Avenue Extension & Red Cedar Avenue;
- Garden Avenue Extension & Silver Linden Drive;
- Langstaff Road East & Cedar Avenue; and
- High Tech Road & Red Cedar Avenue.

7.2.3 Proposed Mitigation Measures

With the assumptions, the intersection of Langstaff Road East & Cedar Avenue has capacity constraints. To address this, the following preliminary mitigation measures are proposed:

- A dedicated eastbound left-turn lane with a storage of 160 metres with a protected and permissive eastbound left-turn phase; and
- A dedicated westbound right-turn lane with a storage of 40 metres.

These mitigation measures were implemented in the 2041 Synchro model for the PM peak hour. The results of this analysis are presented in the next section.

7.2.4 2041 Traffic Operations

The future traffic operations for the weekday PM peak hour were assessed for 21 intersections within the study area. The lane configuration, overall intersection Level of Service (LOS), critical movements, and critical 95th percentile queue lengths based on the assumptions and proposed preliminary mitigation measures are summarized in **Table 7-5**. Critical turning movements involve the following measures:

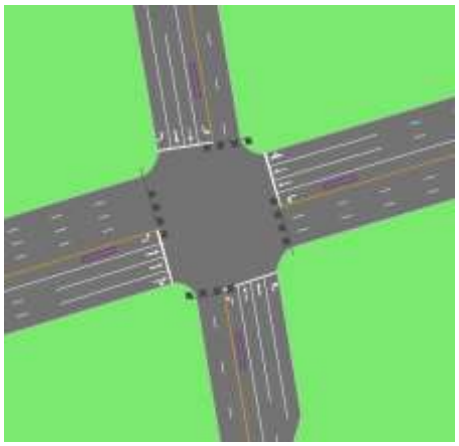
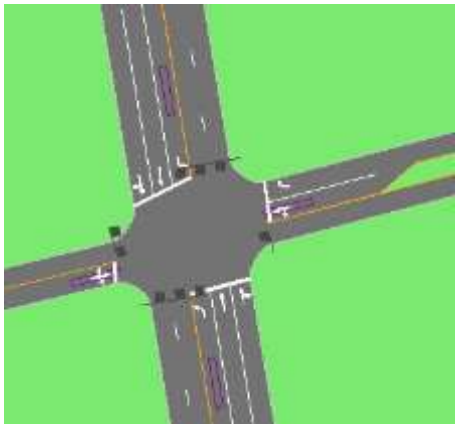
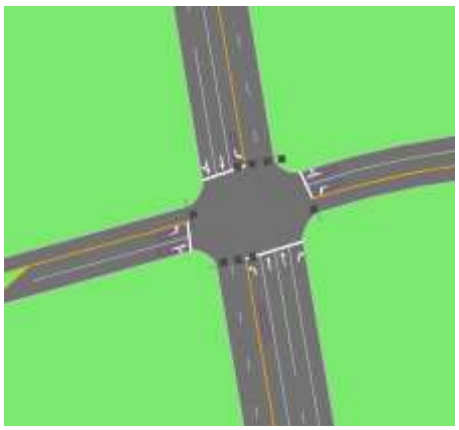
- Through or shared-through movement with v/c of 0.85 or above;
- Exclusive turning movement with v/c of 1.0 or above; and/or
- Any movement with a LOS E or worse.

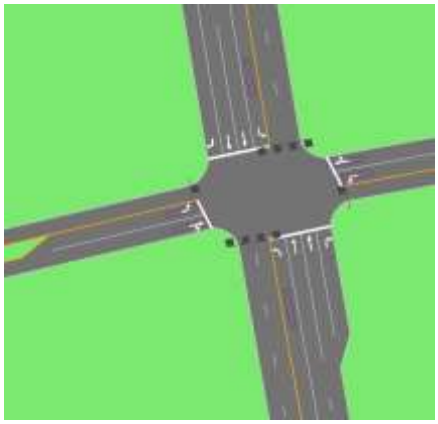
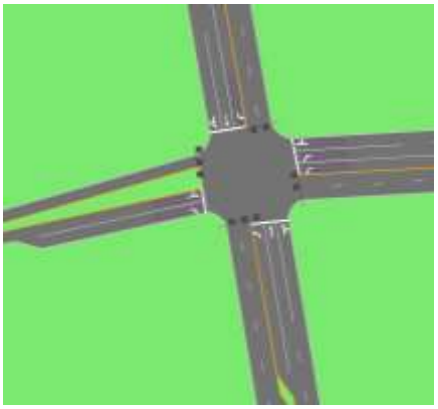
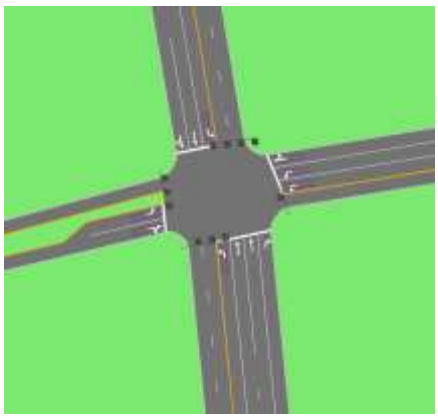
Level of service is based on the average control delay per vehicle for a given movement. Delay is an indicator of how long a vehicle must wait to complete a movement and is represented by a letter between ‘A’ and ‘F’, with ‘F’ being the longest delay. Level of service criteria were previously presented in **Section 3.5**. Queue lengths are considered critical if they exceed the available storage length. Detailed queueing results are presented in **Appendix J,** and detailed LOS and v/c ratios for each turning movement are summarized in **Appendix K**.

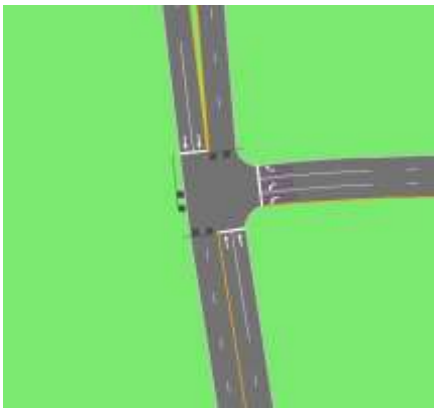
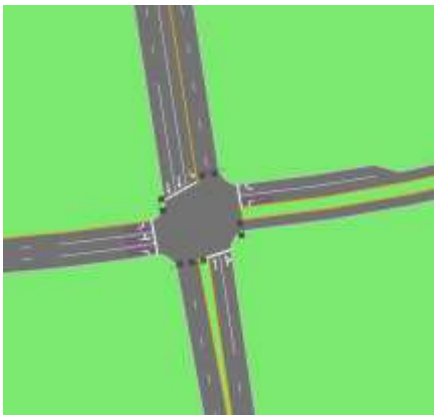
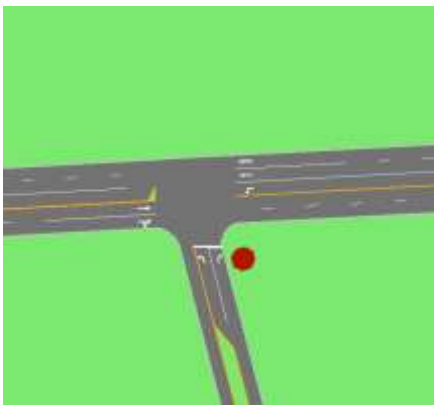
A comparatively low v/c associated with high delays (LOS ‘E’ or worse) indicates that the traffic experiences delay due to the limited green time provided in each cycle.

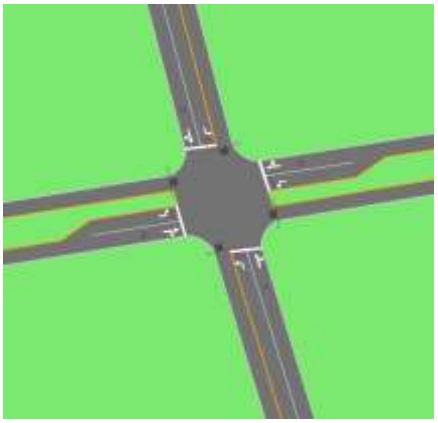
This situation is typically found at fully protected left turns, where the cycle length is comparatively longer and green time available to the turning movements is constrained by the high through volumes, as seen for the north-south left turns along Yonge Street. This situation is also found for the east-west left turns along Yonge Street, where the cycle lengths are comparatively longer than the green time available for these movements.

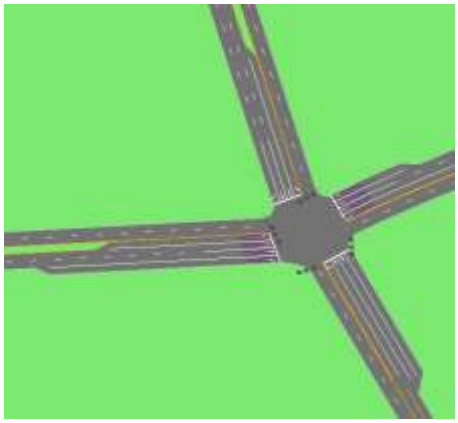
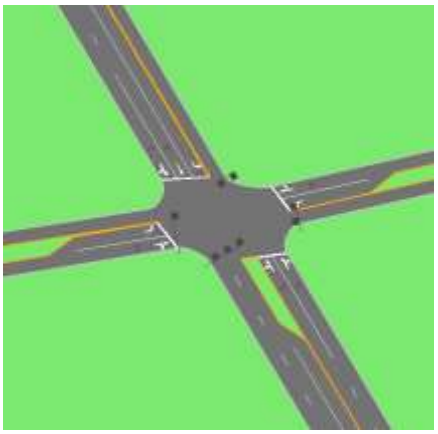
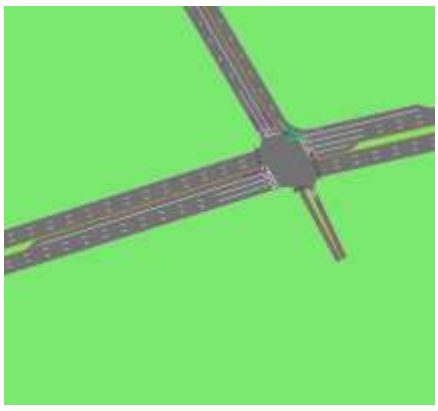
Table 7-5: 2041 Conditions – Critical Turning Movement Summary and Lane Configuration

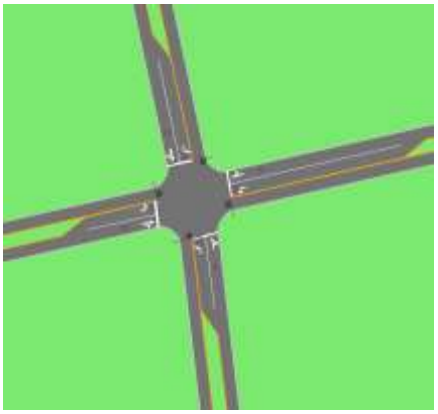
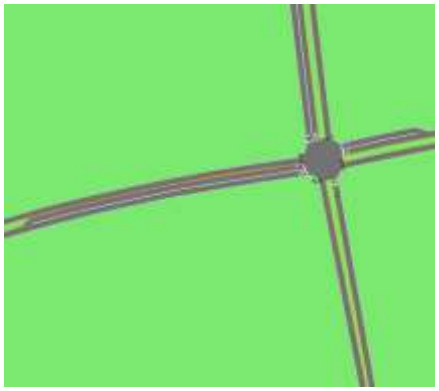
Intersection Lane Configuration (North Up)	2041 PM Peak Hour	
	LOS	Critical Movements v/c, LOS, Control Delay, and Critical Queues
Yonge Street & 16th Avenue 	**F**	**EBL v/c = 1.13; F (137.4s); 106.9m** **EBT v/c = 1.05; F (83.5s);** **WBL v/c = 1.11; F (131.7s)** **WBT v/c = 1.09; F (97.3s)** **NBL v/c = 0.91; F (94.6s); 112.3m** **NBT v/c = 1.04; F (82.3s)** **SBL v/c = 1.07; F (136.5s); 129.3m**
Yonge Street & Oak Avenue 	**B**	**EBT v/c = 0.76; E (70.4s)** **WBT v/c = 0.63; E (79.6s); 35.8m** **NBL v/c = 0.73; E (63.2s)** **SBL v/c = 0.25; E (61.2s)**
Yonge Street & Scott Drive 	**C**	**EBL v/c = 0.45; E (72.5s)** **WBT v/c = 0.92; E (69.8s)** **NBL v/c = 0.34; E (70.2s)** **SBL v/c = 0.80; F (83.5s)**

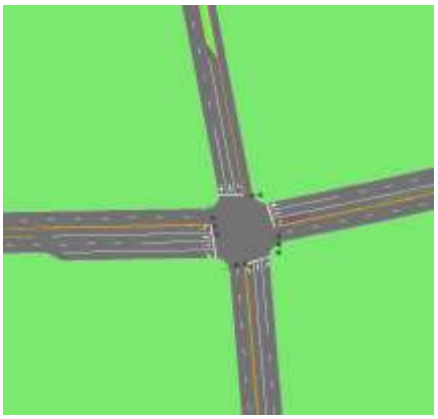
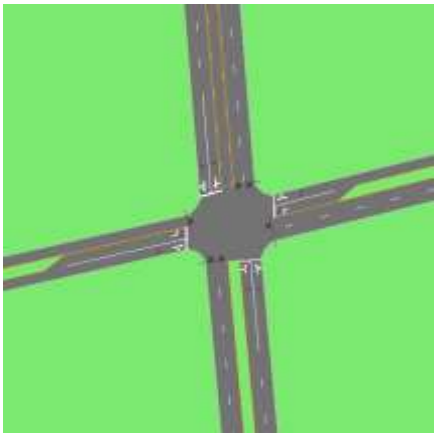
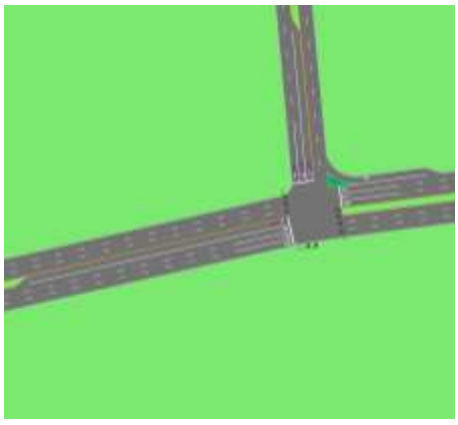
Intersection Lane Configuration (North Up)	2041 PM Peak Hour	
	LOS	Critical Movements v/c, LOS, Control Delay, and Critical Queues
Yonge Street & Westwood Lane 	C	EBL v/c = 1.70; F (411.3s); 67.5m WBT v/c = 0.88; D (54.1s) NBL v/c = 0.31; E (78.8s) SBL v/c = 0.58; F (89.1s)
Yonge Street & High Tech Road 	A	WBL v/c = 0.3; E (64.9s) SBL v/c = 0.61; F (82.6s)
Yonge Street & Garden Avenue 	D	EBL v/c = 0.29; E (71.5s) WBL v/c = 0.95; F (90.1s) NBL v/c = 0.93; F (80.2s) SBL v/c = 0.62; E (63.0s) SBT v/c = 0.94; E (63.4s)

Intersection Lane Configuration (North Up)	2041 PM Peak Hour	
	LOS	Critical Movements v/c, LOS, Control Delay, and Critical Queues
Yonge Street & Highway 407 WB Off-Ramp 	**D**	**WBR v/c = 1.07; F (105.1s)** **NBT v/c = 0.99; D (42.9s)** **SBT v/c = 0.86; C (26.3s)**
Yonge Street & Highway 407 EB Off-Ramp 	**F**	**EBL v/c = 0.89; E (71.9s)** **EBT v/c = 0.89; E (71.8s)** **WBL v/c = 1.12; F (157.0s)** **WBR v/c = 1.23; F (151.6s); 140.1m** **NBT v/c = 1.59; F (297.5s)** **SBL v/c = 1.47; F (258.1s); 213.1m**
High Tech Road & Station Street 	**A**	**No Critical Movements**

Intersection Lane Configuration (North Up)	2041 PM Peak Hour	
	LOS	Critical Movements v/c, LOS, Control Delay, and Critical Queues
Garden Extension & Station Street 	**B**	**No Critical Movements**
Highway 7 & Station Street 	**C**	**EBL v/c = 0.86; E (71.8s)** **SBL v/c = 0.70; E (68.3s)** **WBR v/c = 0.34; B (15.1s); 55.2m**
Bantry Avenue & Red Maple Road 	**B**	**No Critical Movements**

Intersection Lane Configuration (North Up)	2041 PM Peak Hour	
	LOS	Critical Movements v/c, LOS, Control Delay, and Critical Queues
High Tech Road & Red Maple Road 	**C**	**EBL v/c = 0.99; E (66.6s); 111.2m**
Garden Extension & Red Maple Road 	**D**	**EBT v/c = 0.85; D (46.1s)** **SBL v/c = 0.48; C (20.6s); 61.9m**
Highway 7 & Red Maple Road 	**C**	**EBL v/c = 0.84; E (64.7s)**

Intersection Lane Configuration (North Up)	2041 PM Peak Hour	
	LOS	Critical Movements v/c, LOS, Control Delay, and Critical Queues
High Tech Road & Red Cedar Avenue 	**A**	**No Critical Movements**
Garden Extension & Red Cedar Avenue 	**C**	**NBT v/c = 0.89; C (29.2s)**
Langstaff Road East & Cedar Avenue 	**C**	**SBT v/c = 1.01; E (77.7s)**

Intersection Lane Configuration (North Up)	2041 PM Peak Hour	
	LOS	Critical Movements v/c, LOS, Control Delay, and Critical Queues
High Tech Road & Silver Linden Drive 	**B**	**No Critical Movements**
Garden Extension & Silver Linden Drive 	**B**	**SBT v/c = 0.85; C (23.8s)**
Highway 7 & Silver Linden Drive 	**C**	**WBT v/c = 0.87; C (30.2s)** **SBL v/c = 0.65; E (56.8s)**

Intersections within the study area are expected to be operating at LOS 'D' or better at an intersection level during the PM peak hour, with exceptions at the following two intersections:

- Yonge Street & 16th Avenue; and
- Yonge Street & Langstaff Road East / Highway 407 EB Off-Ramp.

The overall intersection LOS for all 21 intersections during the PM peak period are summarized in **Figure 7-7**.

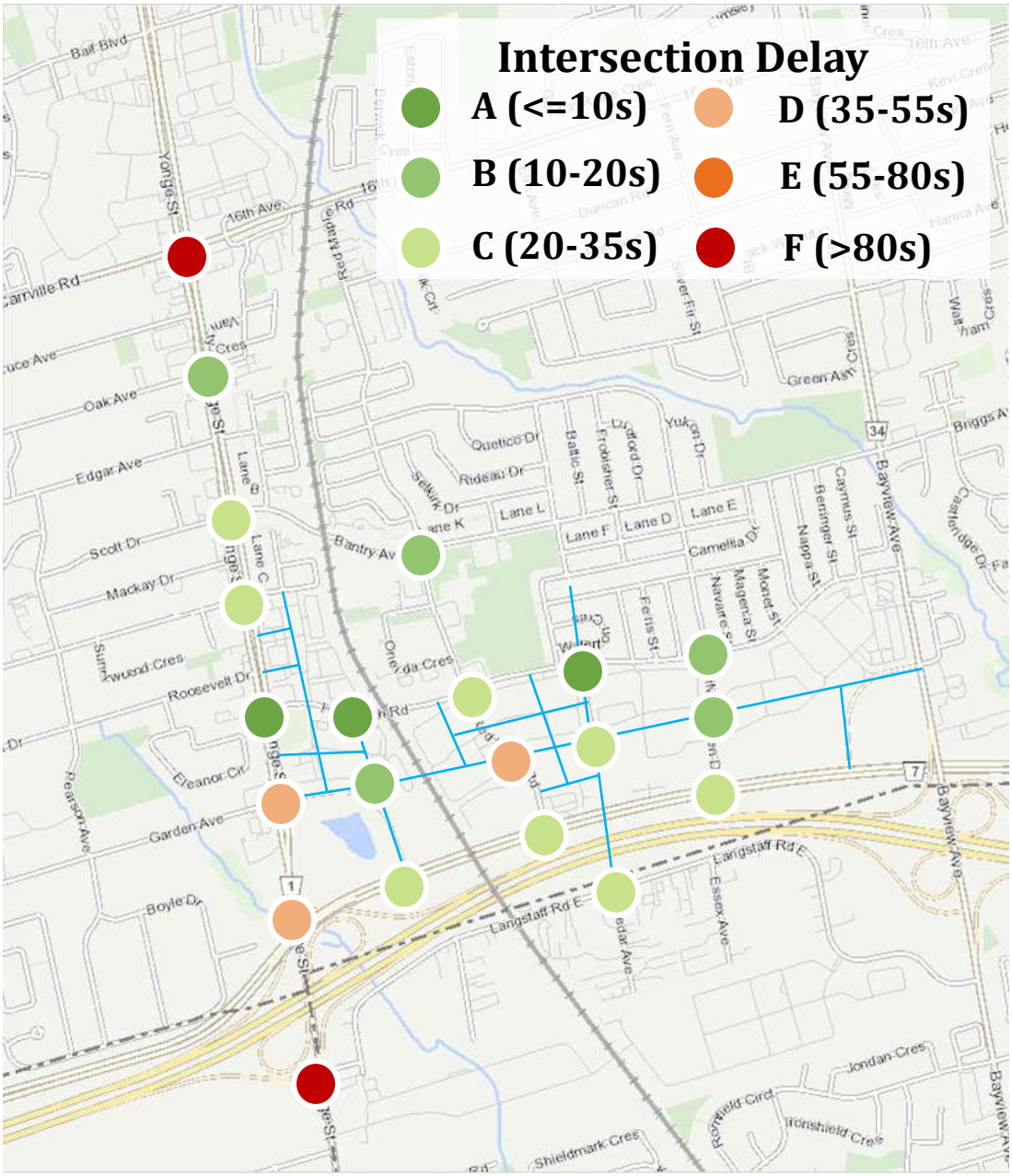


Figure 7-7. 2041 PM Peak LOS and Intersection Delay

The intersection at the Garden Avenue extension and the minor street immediately east of Yonge Street is recommended to be an unsignalized, right-in-right-out intersection. Trips requiring left turn movements would rather be served by the rest of the dense street network. Queuing results show that the WBT queues at Yonge Street and Garden Avenue (31.4m) allow ample space for right-turning vehicles exiting the minor street onto the Garden Avenue extension. However, given its proximity to a major arterial, traffic volumes should be monitored with respect to bus movements and coordination with YNSE station plans.

7.3 2041 Traffic Infiltration Analysis

The 2041 traffic infiltration analysis uses results from the subarea model discussed in **Section 7.1**. Select link analysis was conducted at the four locations examined under existing conditions: Garden Ave, Scott Drive, Nahanni Drive, and Silver Linden Drive, as discussed in **Section 3.6**. For the purposes of future analysis, the aggregate amount of future traffic infiltration has been reported for the neighbourhoods west of Yonge Street (total of Garden Avenue and Scott Drive), and north of High Tech Road (total of Nahanni Drive and Silver Linden Drive), as summarized in **Table 7-6**.

Table 7-6: 2041 Base Case Traffic Infiltration Analysis, AM Peak Hour

Location	% of Cut-through Trips, Existing (Streetlight OD Data, AM Peak Hour) [1]	Subarea Model, 2041 AM Peak Hour, Recommended Concept		
		Total Trips	Total Cut-through Trips	% Cut-through Trips
Low Density Neighbourhood west of Yonge Street	17% -39%	690	150	22% (20-25%)
Low Density Neighbourhood north of High Tech Road	23% - 30%	780	1,100	71% (50-90%)

1 Due to the nature of the Streetlight OD data, the number of trips in this analysis were not expanded based on counts and thus only the percentage numbers are reliable and presented here

The number of cut-through trips is consistent with existing conditions for the neighbourhoods west of Yonge Street, while a significant increase north of High Tech Road is projected. As illustrated in **Figure 7-8**, some of the traffic generated within the RHC SP uses the residential street network north of High Tech Road to access Bantry Avenue and 16th Avenue via Silver Linden Drive and Red Maple Road to avoid future congestion on Yonge Street and Bayview Avenue.

Further modal shift towards transit on Yonge Street and Bayview Avenue may assist in reducing congestion on those corridors while traffic calming measures including narrowed lanes and speed humps may assist in addressing speeding and safety concerns associated with increased traffic on these streets.

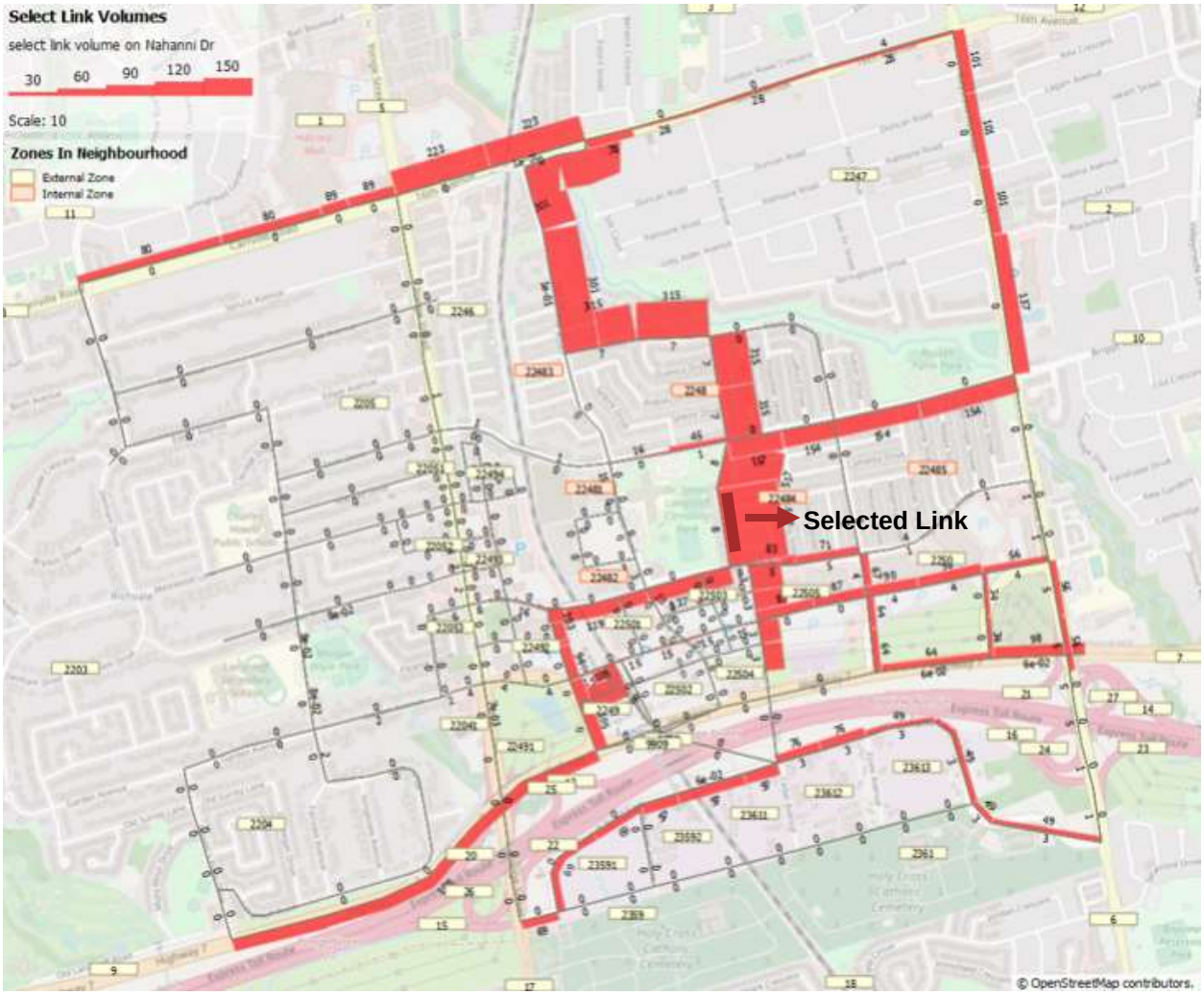


Figure 7-8: Select Link Assignment at Nahanni Drive north of High Tech Road, 2041 Base Case AM Peak Hour

7.4 2041 Sensitivity Analyses

Sensitivity analyses were conducted to determine the impacts of altering the proposed road infrastructure. The alterations that were tested include the reduction of lanes on High Tech Road, the retainment of the Highway 7 and Yonge Street ramp, and the removal of the Garden Avenue extension rail corridor crossing. Each alteration was tested cumulatively to the previous alteration.

7.4.1 High Tech Road Lane Reduction

In this analysis, the 2 lanes per direction on High Tech Road were reduced to 1 lane per direction, and no dedicated right-turn lanes were included along High Tech Road with exceptions at Yonge and Bayview. The purpose of this analysis was to determine the impacts of reducing auto capacity to allow for cycling facilities in the curb lanes. The impacts of interest include traffic movements at intersections along High Tech Road, namely turns and whether dedicated right-turn lanes are required.

The resulting network volumes of this analysis are shown in **Figure 7-9**. With the reduction of lanes from 2 to 1 in each direction, High Tech Road volumes reduce most significantly east of Red Cedar Avenue. Most of this traffic is diverted to the Garden Avenue extension and to Bantry Avenue, resulting in increased volumes on Station Street for access, as seen in **Figure 7-10**. The intersection of High Tech Road and Red Cedar Avenue sees increased volumes and is evaluated in the Synchro analysis below.

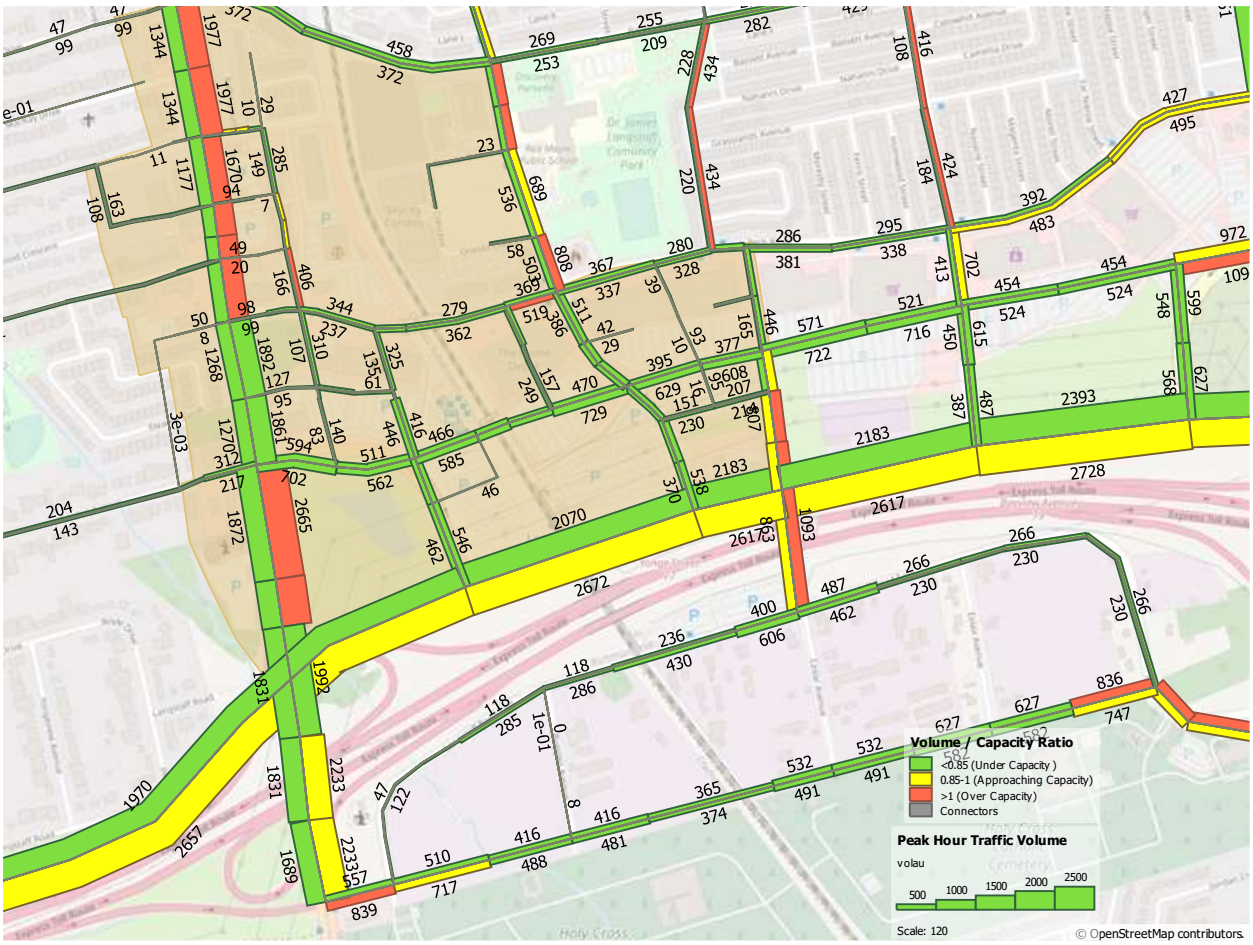


Figure 7-9: Network Volumes for the High Tech Road Lane Reduction Analysis

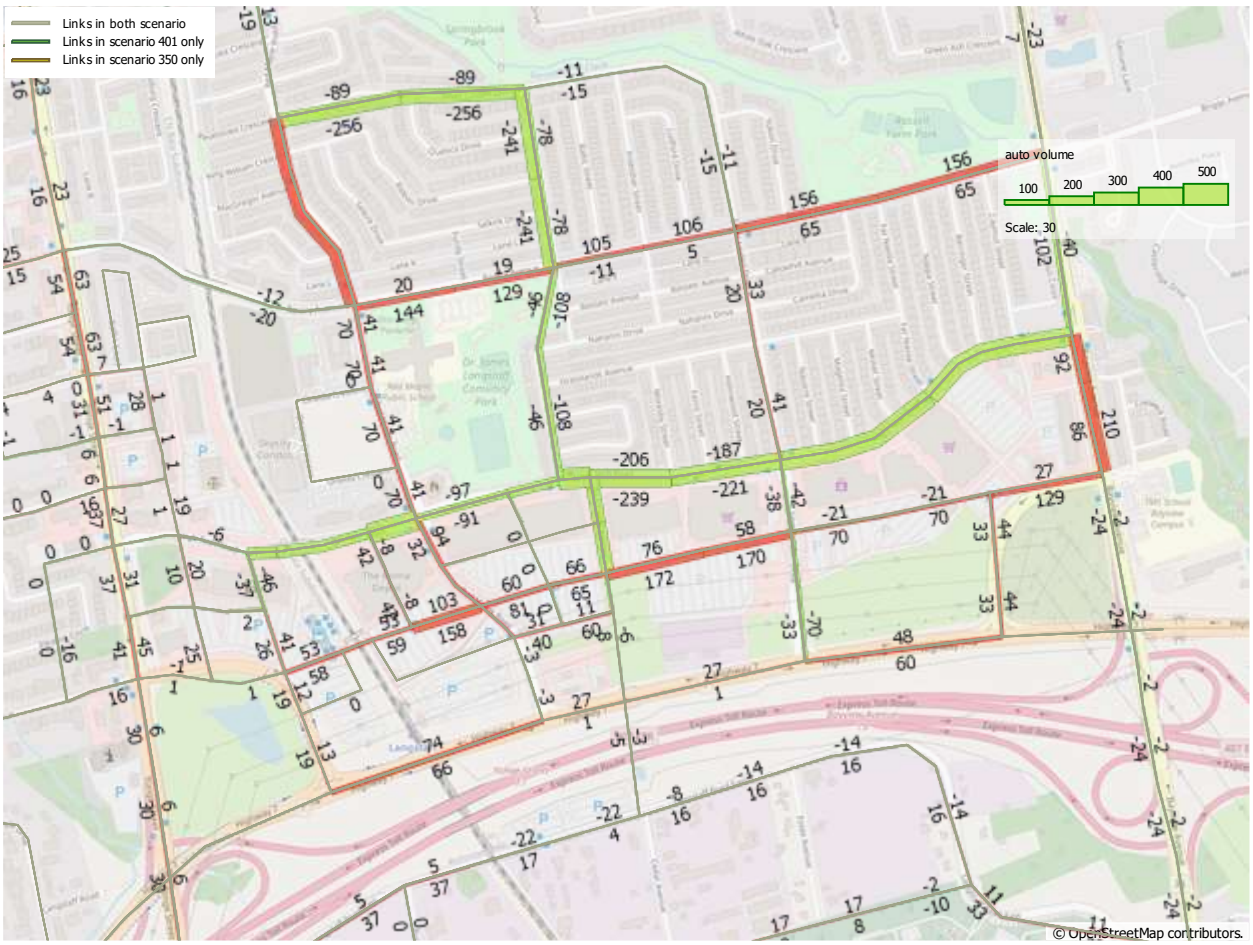
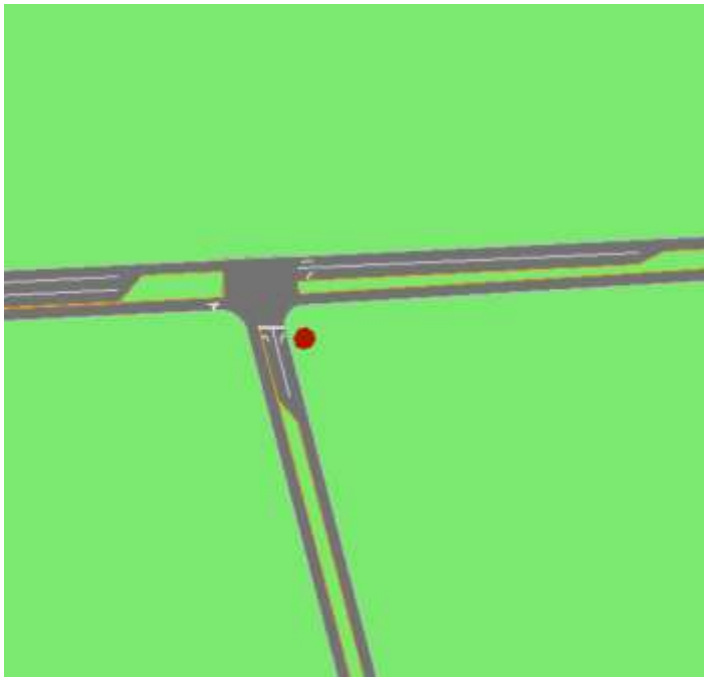
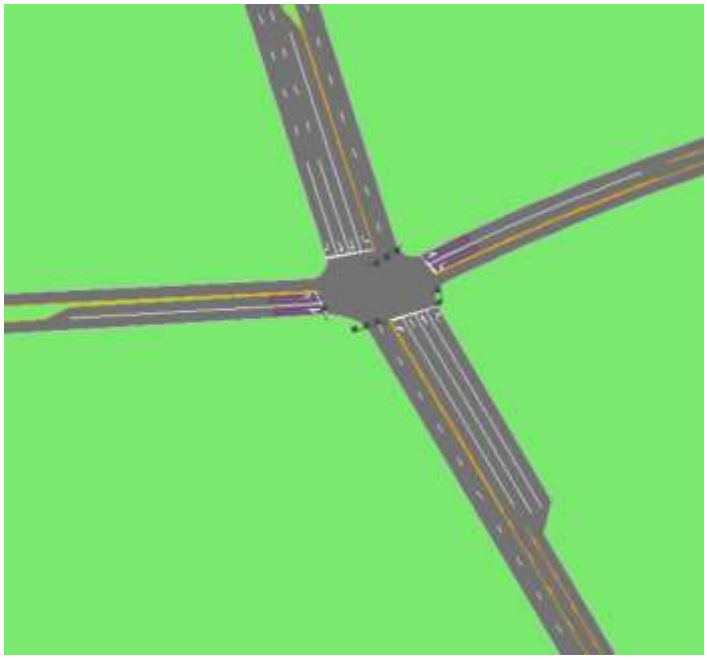
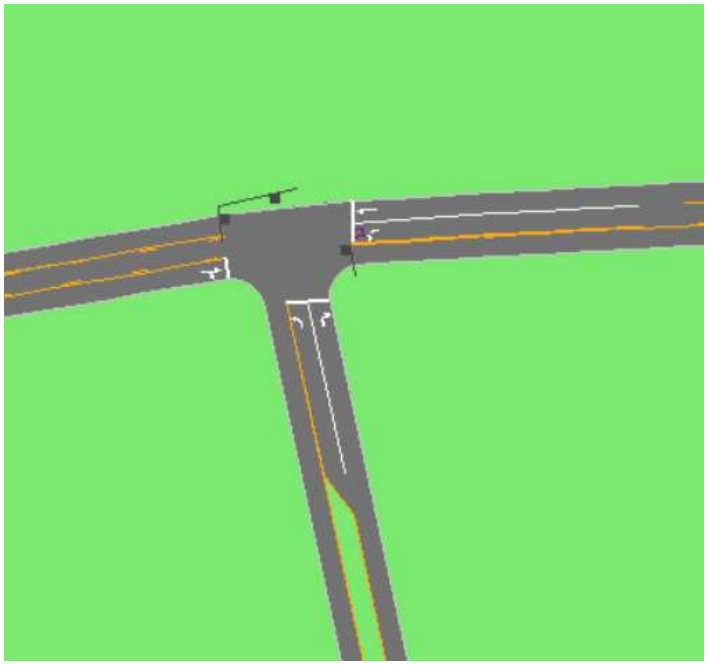
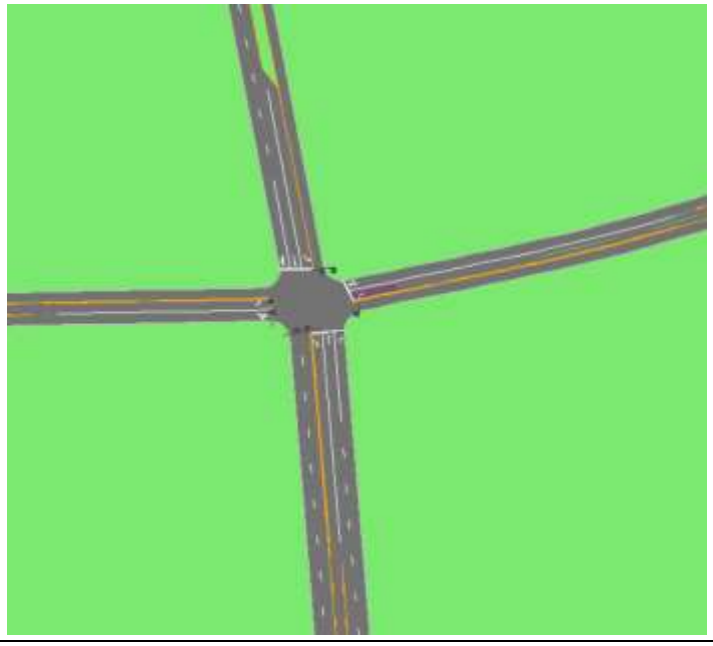


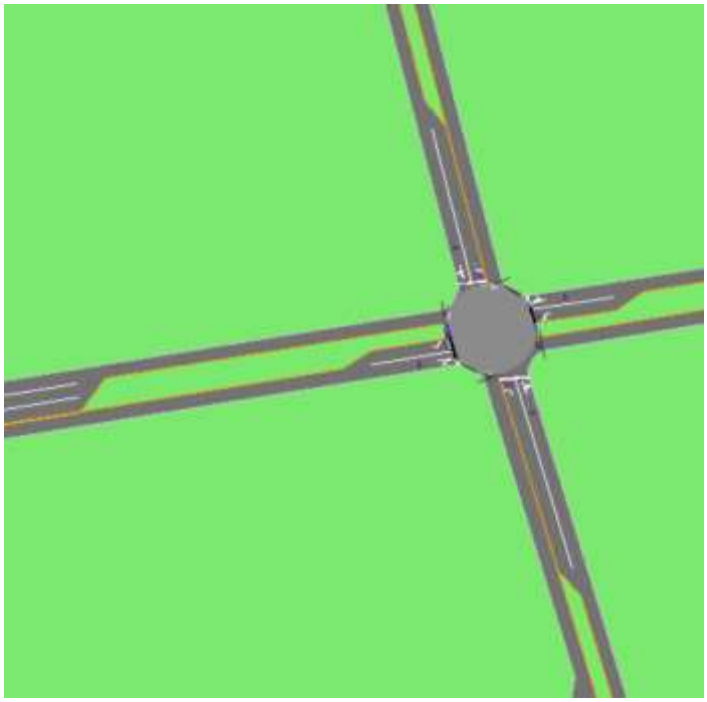
Figure 7-10: Change in Volumes from Removing 1 Lane per Direction on High Tech Road

The future traffic operations for the weekday PM peak hour with reduced capacity on High Tech Road were assessed for 4 intersections within the study area. The lane configuration, overall intersection Level of Service (LOS), critical movements, and critical 95th percentile queue lengths of the intersections along High Tech Road are summarized in **Table 7-7**. The lane configuration and overall intersection Level of Service (LOS) of the intersections along High Tech Road and the intersection at Garden Avenue and Station Street are summarized in **Table 7-7**. At High Tech Road & Red Maple Road, a protected and permissive eastbound left-turn phase is proposed in order to improve operations at this intersection. With this mitigation measure implemented, none of the intersections have any critical movements in this sensitivity analysis. Detailed queueing results, LOS, and v/c ratios for each turning movement are presented in **Appendix L**.

Table 7-7: High Tech Lane Reduction – LOS Summary and Lane Configuration

Intersection Lane Configuration (North Up)	2041 PM Peak Hour LOS
High Tech Road & Station Street 	**A**
High Tech Road & Red Maple Road 	**C**

Intersection Lane Configuration (North Up)	2041 PM Peak Hour LOS
High Tech Road & Red Cedar Avenue 	**A**
High Tech Road & Silver Linden Drive 	**B**

Intersection Lane Configuration (North Up)	2041 PM Peak Hour LOS
Garden Avenue and Station Street 	**B**

All intersections along High Tech Road are expected to be operating at LOS 'B' or better at an intersection level during the PM peak hour. Given that there are no major capacity issues on High Tech when converting curb lanes to bike lanes, the reduction of traffic lanes on High Tech for bike lanes is recommended and does not require dedicated right-turn lanes.

7.4.2 Garden Avenue Extension

With lanes on High Tech Road reduced, further alterations were tested – first the retainment of the Highway 7 – Yonge Street ramp, and then the removal of the Garden Avenue extension rail corridor crossing in addition to the ramp retainment.

7.4.2.1 Highway 7 – Yonge Street Ramp Analysis

In the recommended concept scenario, the ramp between Highway 7 and Yonge Street is removed and replaced by the Garden Avenue extension running east-west and Station Street running north-south. In this sensitivity analysis, the ramp is retained to reduce the turning movements vehicles need to make to access Bridge Station from Yonge Street, as shown in **Figure 7-11**. In this sensitivity scenario, the Garden Avenue extension forms a T-intersection with the Highway 7 – Yonge Street ramp and Station Street is moved away from the ramp to be adjacent to the rail corridor instead. This maintains a path from Highway 7 to Yonge Street that is free of intermediate turns.

Another purpose of the analysis was to assess the delays that bus movements would be subject to. In the recommended concept scenario, buses are expected to traverse multiple intersections to access Bridge Station from Yonge Street. The delays resulting from these intersections could impact bus operations and are reported below.

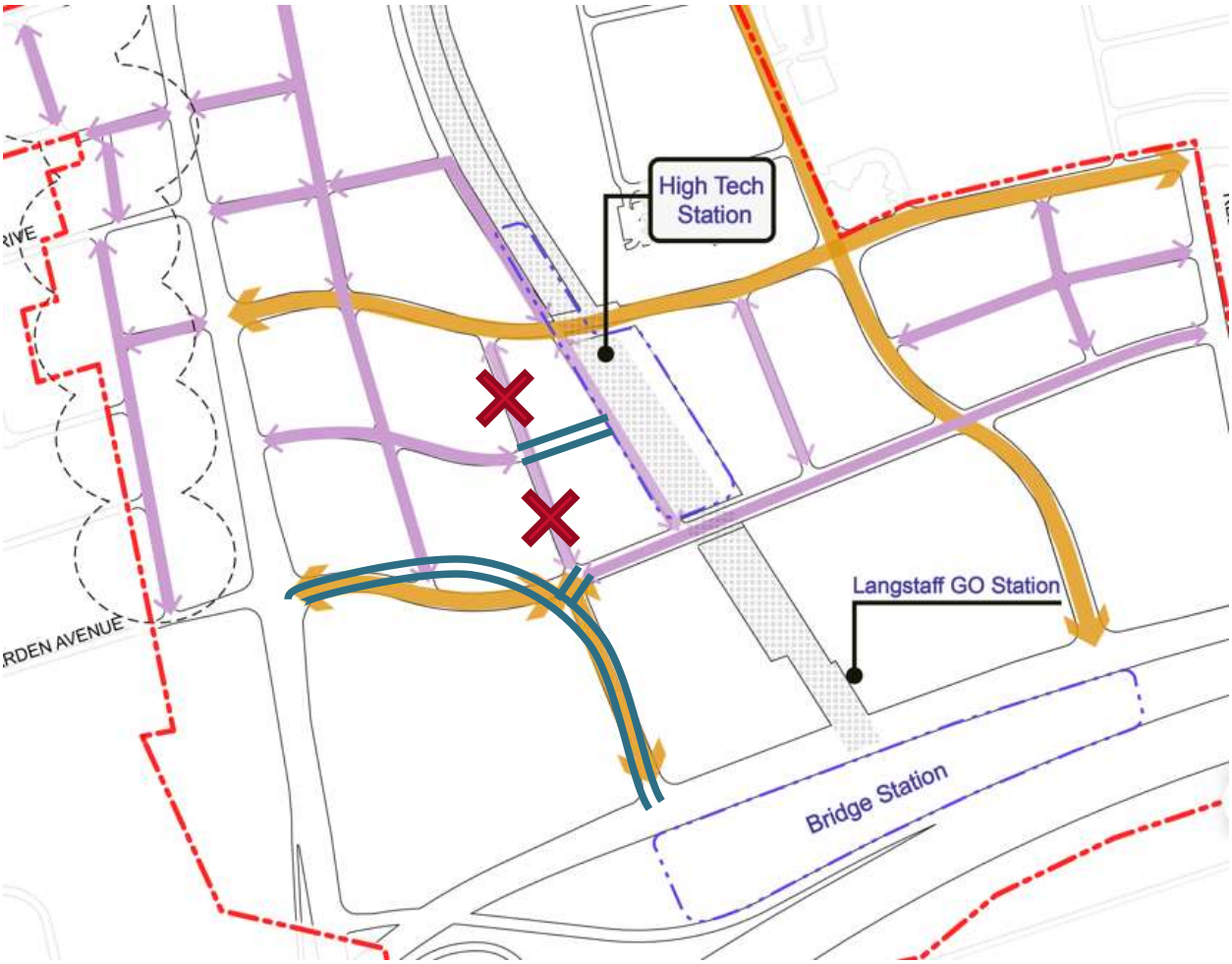


Figure 7-11: Retainment of the Highway 7 - Yonge Street Ramp

The resulting volumes in **Figure 7-12** show that the overall congestion patterns do not change significantly between retaining and revising the Highway 7 – Yonge Street ramp. The volume comparison in **Figure 7-13** show some changes in volumes around the intersection of the Garden Avenue extension and the Highway 7 – Yonge Street ramp. Traffic is diverted from some streets to the Highway 7 – Yonge Street ramp, but the overall network is not significantly affected.

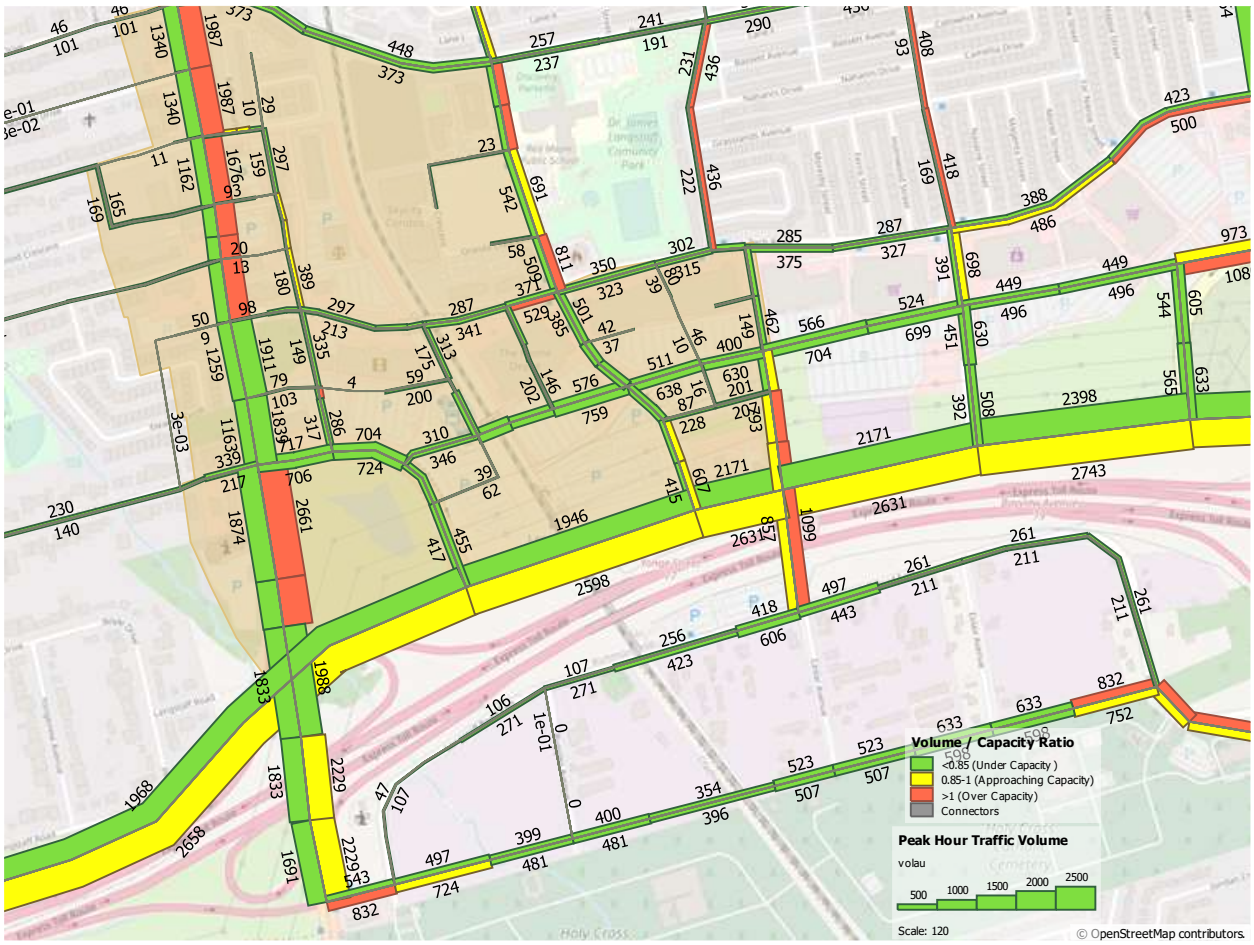


Figure 7-12: Network Volumes for the Highway 7 – Yonge Street Ramp Analysis

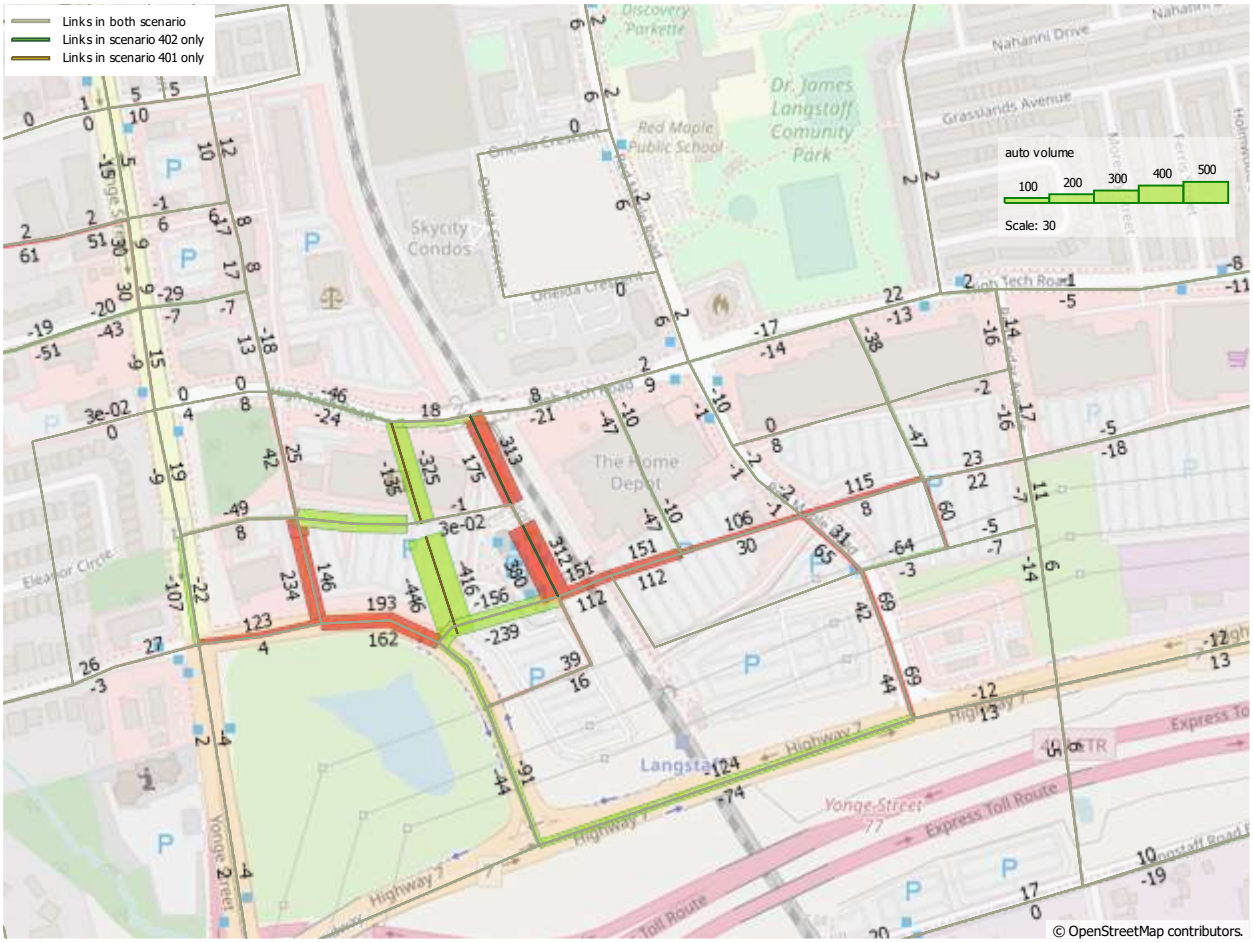
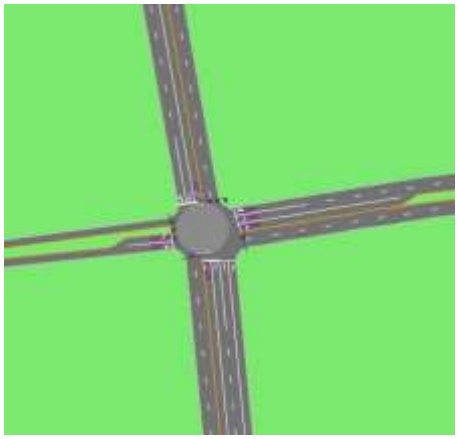


Figure 7-13: Change in Volumes from Retaining the Highway 7 - Yonge Street Ramp

The future traffic operations for the weekday PM peak hour with reduced capacity on High Tech Road and including the Highway 7 – Yonge Street ramp were assessed for 3 intersections within the study area. The lane configuration, overall intersection Level of Service (LOS), critical movements, and critical 95th percentile queue lengths of the intersections along the Highway 7 – Yonge Street ramp are summarized in **Table 7-8**. Detailed queueing results, LOS, and v/c ratios for each turning movement are summarized in **Appendix M**.

Table 7-8: Highway 7 – Yonge Street Ramp – Critical Turning Movement Summary and Lane Configuration

Intersection Lane Configuration (North Up)	2041 PM Peak Hour	
	LOS	Critical Movements v/c, LOS, Control Delay, and Critical Queues
Yonge Street & Garden Avenue 	**D**	**EBL v/c = 0.32; E (73.4s)** **WBL v/c = 1.03; F (103.1s); 121.4m** **NBL v/c = 1.00; F (94.6s); 197.1m** **SBL v/c = 0.62; E (63.7s)** **SBT v/c = 0.99; E (71.9s)**
Garden Avenue Extension & Highway 7 – Yonge Street Ramp 	**A**	**No Critical Movements**

Intersection Lane Configuration (North Up)	2041 PM Peak Hour	
	LOS	Critical Movements v/c, LOS, Control Delay, and Critical Queues
Highway 7 & Highway 7 – Yonge Street Ramp 	**C**	**EBL v/c = 0.83; E (68.4s)** **SBL v/c = 0.66; E (64.1s)**

All intersections along the Highway 7 – Yonge Street ramp are expected to be operating at LOS 'D' or better at an intersection level during the PM peak hour.

For buses accessing Bridge Station from Yonge Street through the Highway 7 – Yonge Street ramp, the delay at the intersection at the Garden Avenue extension is insignificant at 2.7s. In the recommended concept scenarios, the intersection to be crossed by bus movements is at Garden Avenue and Station Street. The movements to be used by buses accessing Bridge Station from Yonge Street are the NBL and EBR movements. In comparison, these movements experience delays of 17s (LOS B) and 26s (LOS C) respectively. While retaining the ramp results in a shorter delay for buses, the bus operations would still be acceptable in the recommended concept scenario, without the Highway 7 – Yonge Street ramp retained. Transit priority solutions, such as dedicated turning lanes and transit signal priority, may also be explored further through the Yonge North Subway Extension project.

7.4.2.2 Garden Avenue Extension Rail Corridor Crossing

With the extension of Garden Avenue, the road would need to cross over the rail corridor. A sensitivity test was performed to determine the impact on the intersection at High Tech Road and Red Cedar Avenue from removing this crossing.

The resulting volumes are shown in **Figure 7-14**. There is spare capacity on Red Maple Road, which would assist in diverting traffic to the network between Red Maple Road and Red Cedar Avenue. There may be some issues at the Red Maple Road and High Tech Road intersection and the Station Street and High Tech Road intersection, but this is mitigated by spare capacity on Highway 7 which serves rail

corridor crossings without major issues. The Garden Avenue bridge is still recommended to provide direct routing and to allow for a more complete street implementation on both High Tech Road and Garden Avenue to support the vision for the RHC.

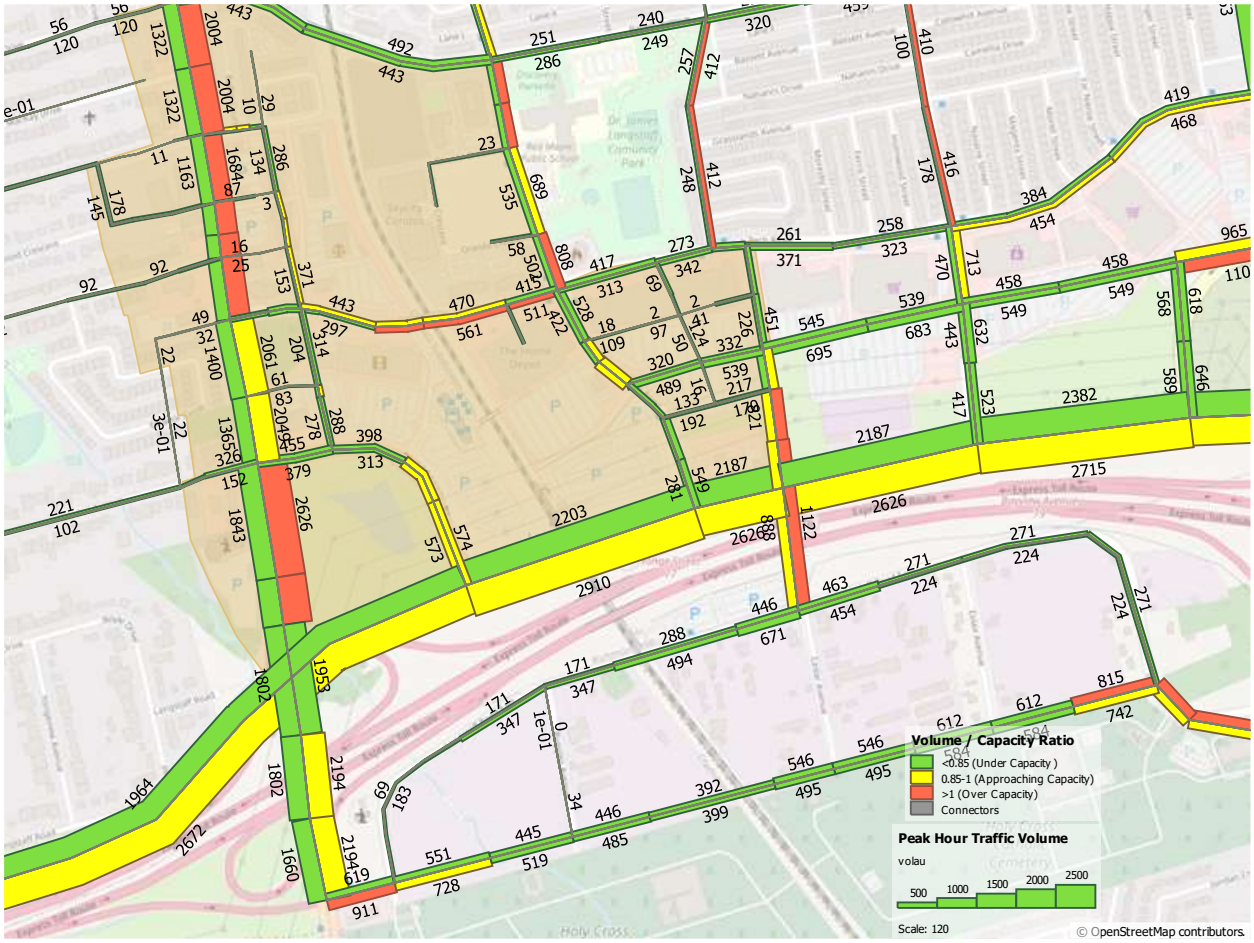


Figure 7-14: Network Volumes for the Removal of the Garden Avenue Rail Crossing

Due to high EBR turn volumes at the Garden Avenue and Red Cedar Avenue intersection (over 300 vehicles in the 2041 PM peak recommended concept scenario), a conservative scenario was tested where these volumes are assumed to divert to the EBR at High Tech Road and Red Cedar Avenue. This resulted in the intersection performance results summarized in **Table 7-9**.

Table 7-9: Rail Crossing Removal – Critical Turning Movement Summary and Lane Configuration

Intersection Lane Configuration (North Up)	2041 PM Peak Hour	
	LOS	Critical Movements v/c, LOS, Control Delay, and Critical Queues
High Tech Road & Red Cedar Avenue 	**C**	**EBT v/c = 0.91; C (31.9s)** **NBL v/c = 0.86; C (33.7s); 100.1m**

Since the delay to the eastbound through movement is not critical in this scenario, a dedicated eastbound right-turn lane is not anticipated to be needed, even without the Garden Avenue extension rail crossing. The Synchro report for this analysis is included in **Appendix N**. Thus, cycling facilities are recommended on High Tech Road regardless of whether a rail corridor crossing is provided along the Garden Avenue extension.

8 Transportation Recommendations

The Recommended Concept land use scenario (highlighted in **Section 6**) is supported by a dense transportation network of streets and paths designed for multimodal connectivity to maximize access to and from the multiple transit services existing and planned throughout the RHC study area. The two planned YNSE subway stations, existing Langstaff GO station, YRT bus terminal and Viva BRT services, and the planned 407 transitway will all enable a significant shift away from auto modes which will be enabled by the Recommended Concept land use and transportation plan.

Recommendations for integrating land use and transportation, the street network, active transportation, transit, parking and TDM and traffic infiltration are highlighted in the following sections.

8.1 Integrating Land Use and Transportation

York Region's Official Plan 2010 promotes integrating land use and transportation in complete and sustainable communities while the ongoing Municipal Comprehensive Review is planning for intensification in existing built-up areas and transit supportive growth in Major Transit Station Areas.

> *Residents want compact, walkable communities that offer employment opportunities, community facilities, local services, stores, and places for social connection.*
> -York Region's Municipal Comprehensive Review

The RHC SP supports these Regional policies, envisioning a complete and sustainable community which fully integrates the land use and transportation planning. Firstly, the land use vision creates travel destinations in proximity to each other through mixing of land uses and high densities. Secondly, the transportation system maximizes mobility for people of all ages and abilities through a fine-grid street network where active modes such as walking or cycling are convenient, safe, and comfortable options, and where longer distance travel is served by frequent and convenient transit services and future micromobility services.

The recommended land use plan and transportation system combined are critical to achieving a modal share which maximizes travel by active transportation, transit, and micromobility, which has been introduced in the Region and City's Official Plan Updates.

8.2 Achieving the Recommended Mode Share

As highlighted in **Section 7.1.2**, a significant shift in mode share towards active transportation and transit is required for the efficient operation of the transportation system. Approximately 34% of trips originating from or destined to the RHC SP should be made by private automobile drivers with the remainder auto passengers, transit, or active transportation. These mode shares are in-line with other existing regional centres with similar land use and transportation network characteristics including Yonge-Sheppard and Yonge Eglinton. A comparison of the existing street networks in those areas is provided in to highlight the need for a fine-grained street network required to support the future required mode share. Achieving the high modal split levels assumed by the transportation analysis and critical to the functioning of the network will require a fine grained network of streets, pedestrian and cycling connections throughout the study area and in particular crossing the rail corridor. In addition to a fine grain network of north south streets, key improvements to support desired level of connectivity include the development of a new pedestrian and cycling bridge north of High-Tech Road, a new mid-block crossing south of High-Tech Road that connects to the station, and an extension of Garden Avenue.

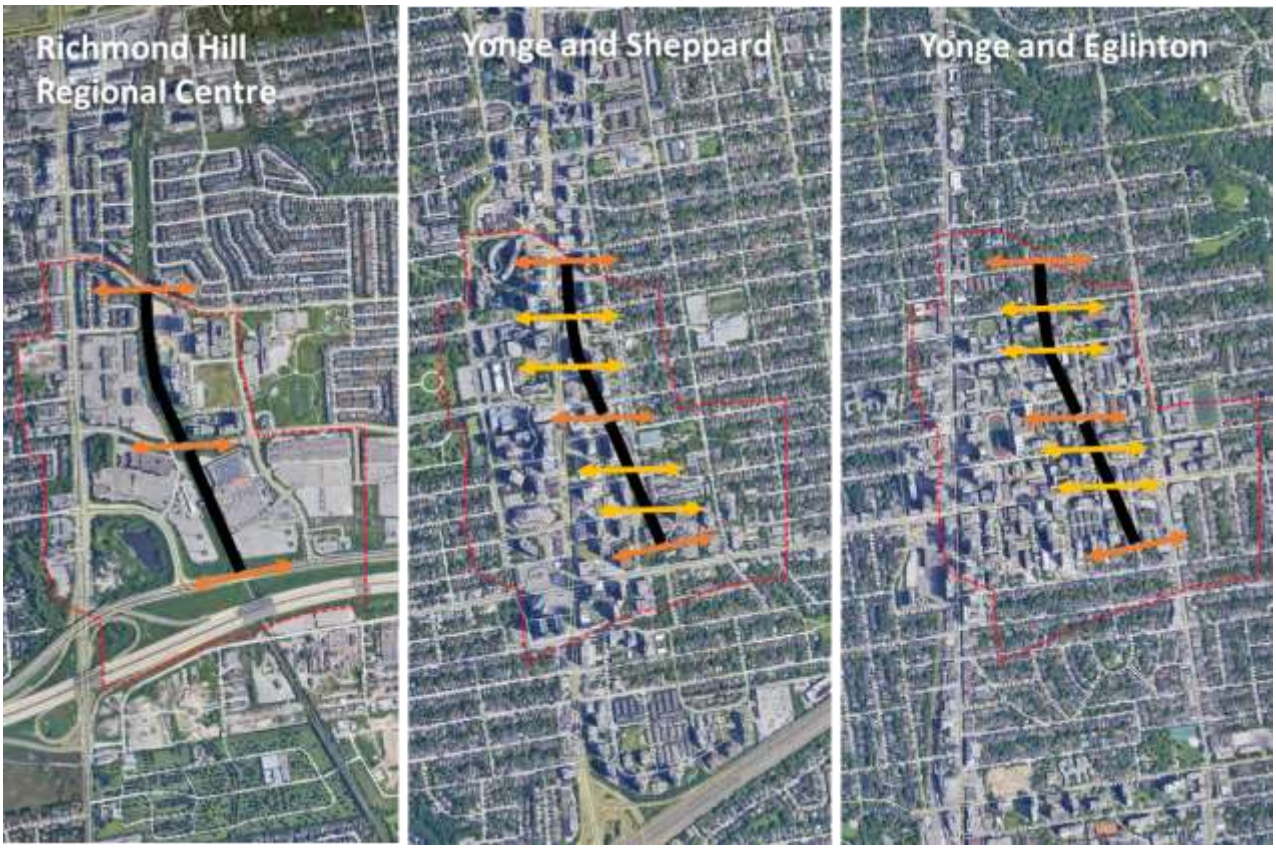


Figure 8-1: Fine-Grained Street Network Required to Support Transit-Supportive Modal Share

8.3 Fine-Grained Street Network

York Region 2016 Transportation Master Plan calls for building a “Finer Grid Network”, and for the Region to work with the Province and local municipalities to plan for and protect for continuous collector roads to provide alternate routes for vehicles, cyclists, and pedestrians to reach destinations more quickly and safely. It will also better manage congestion by spreading traffic throughout the network. The 2016 TMP also identifies support for local municipalities for mitigating / bridging barriers (watercourses, railways, etc.) in the major collector road network.

The RHC SP recommended street network of the recommended concept scenario is illustrated in **Figure 8-2**. Building upon the framework set forth by Yonge Street, Highway 7, High Tech Road, and the planned Cedar / Red Cedar Avenue extension, a dense network of collector, local and private laneway connections is proposed with recommended right-of-way (ROW) widths as follows:

- Major Collector Roads: 26 metre ROW, protected cycling lanes
- Minor Collector Roads: 23 metre ROW, dedicated cycling lanes
- Local streets: 20 metre ROW
- Laneways / Private connections

Typical cross-sections providing guidance for required Major Collector and Minor Collector are provided in **Figure 8-3** and **Figure 8-4** respectively. For Local Streets, typical cross-sections for roadways with parking, roadways with cycling lanes, and roadways with multi-use paths are provided in **Figure 8-5**, **Figure 8-6**, and **Figure 8-7** respectively.

Note that these cross-sections may not be consistent with most recently published City standard cross-sections. These cross-sections are conceptual and are intended as guidelines. The design of roadways within the RHC should also consider elements from the City standard cross-sections, such as in-boulevard cycle tracks, where applicable.

Figure 8-2: Recommended Street Network

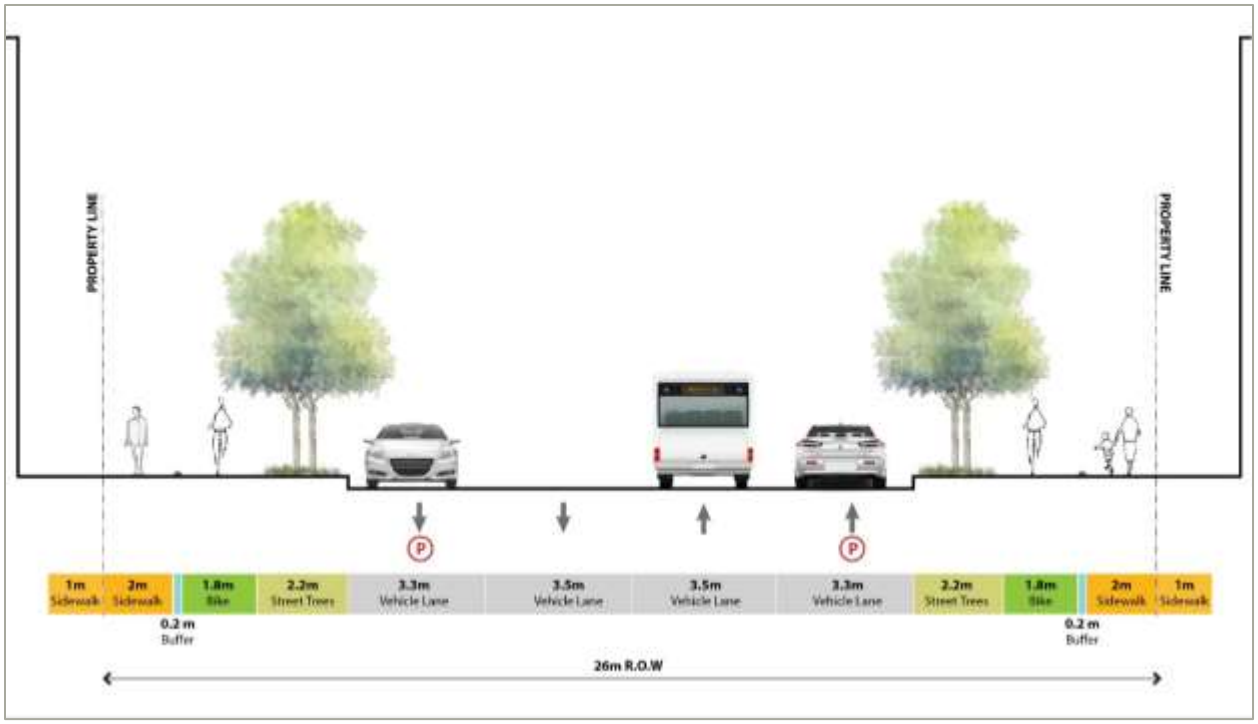


Figure 8-3: Major Collector Road Typical Cross-section, 26 metre ROW

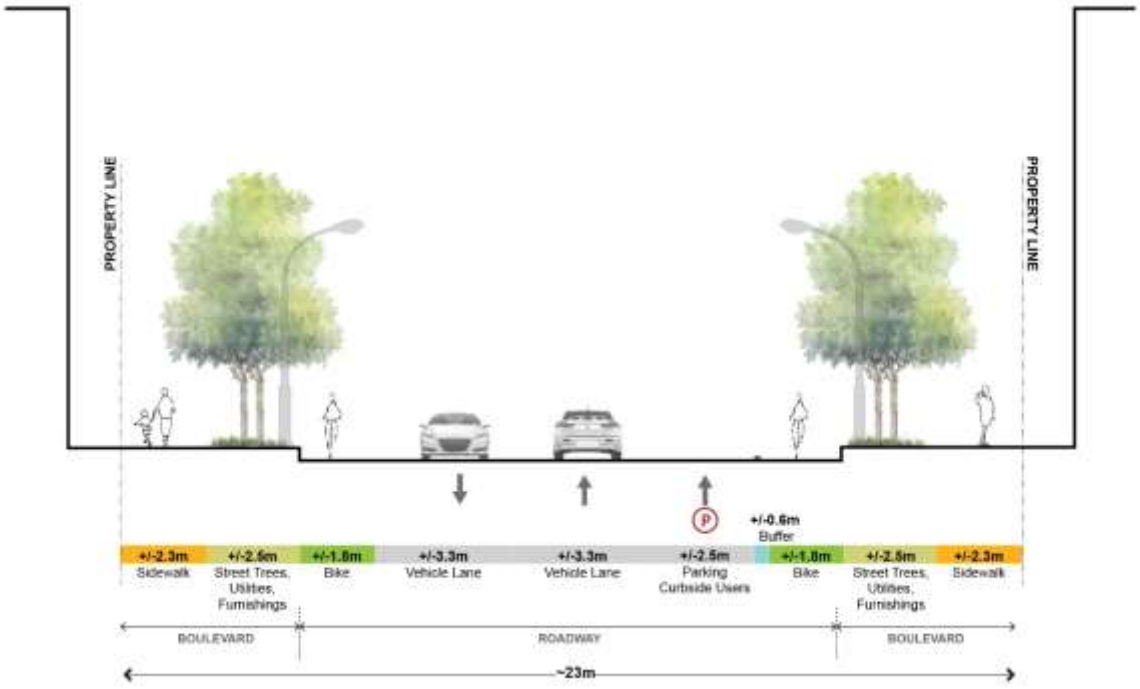


Figure 8-4: Minor Collector Road Typical Cross-section, 23 metre ROW

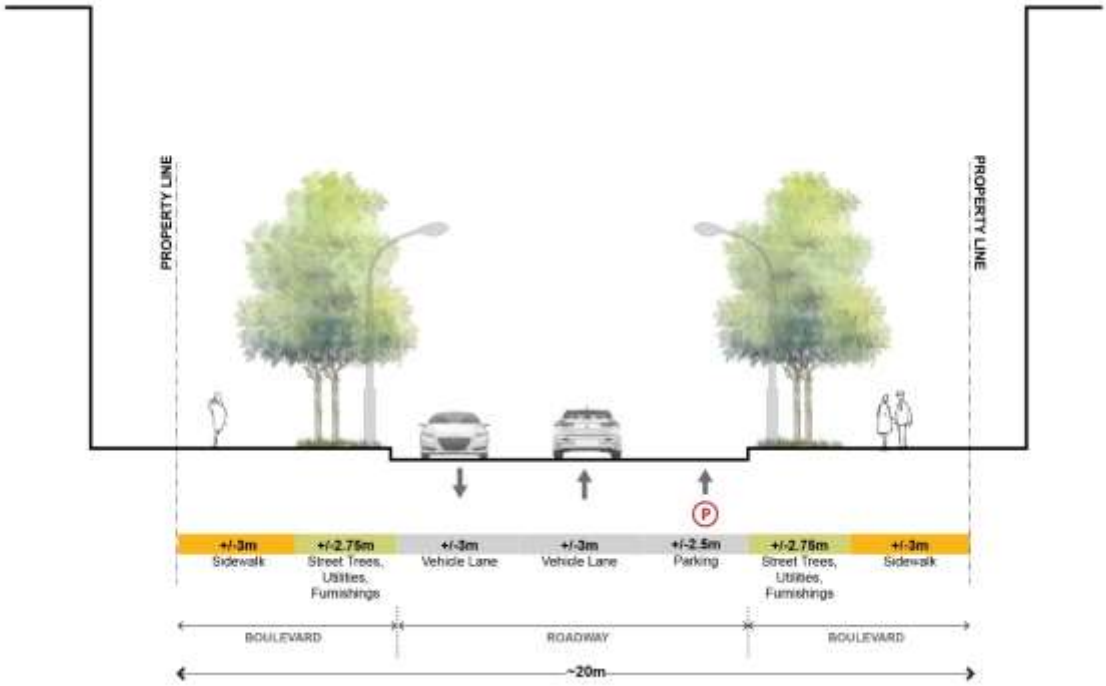


Figure 8-5: Local Road Typical Cross-section for Roadways with Parking, 20 metre ROW

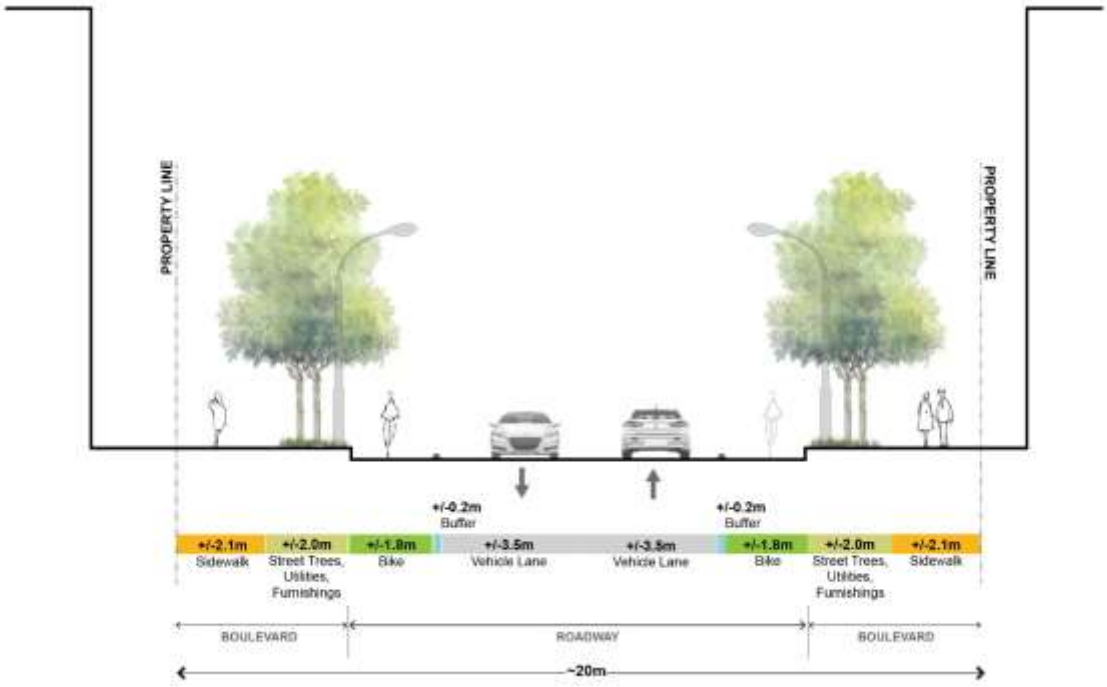


Figure 8-6: Local Road Typical Cross-Section for Roadways with Bike Lanes, 20 metre ROW

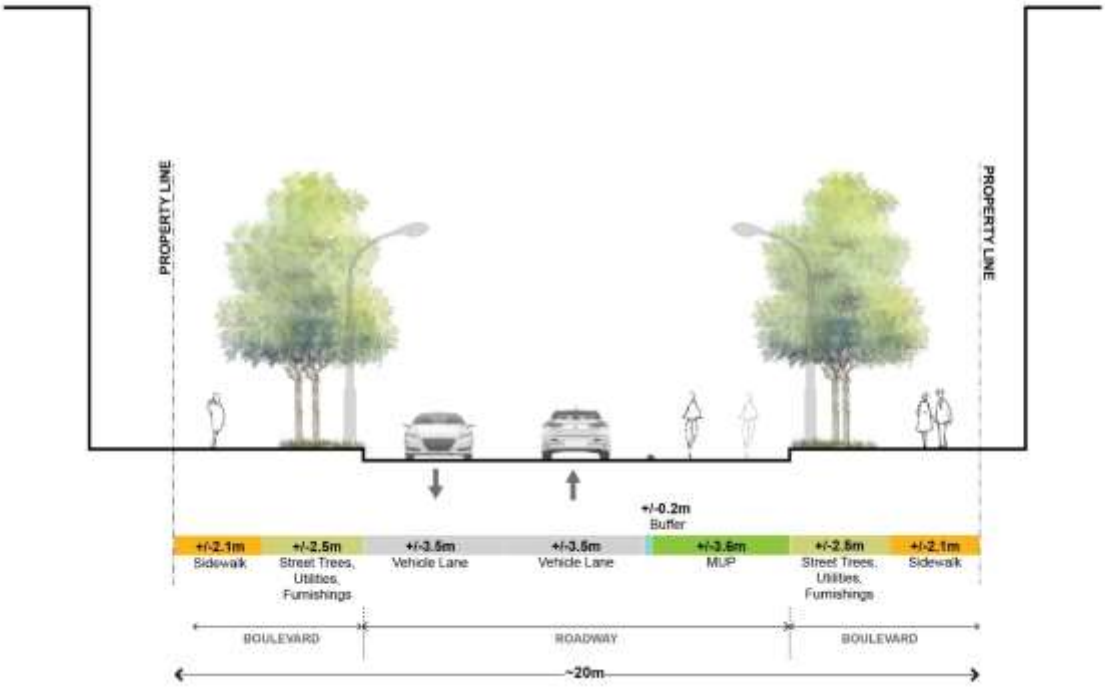


Figure 8-7: Local Road Typical Cross-Section for Roadways with Multi-Use Paths, 20 metre ROW

The shared use of street rights-of-way among various modes create trade-offs for design. Multi-modal levels of service should not be sacrificed to increase auto levels of service. This may be an issue at intersections, where auto volumes may demand larger intersections and more motor lanes, but at the expense of walkability due to long crossings and the safety of cycling turning movements. Baseline requirements for active modes should be set and maintained so that the ever-increasing vehicular demands do not hinder them.

Given that street networks are hard infrastructure that have lasting effects on the transportation system through reserved rights-of-way and shaping development blocks, the horizon of consideration should extend beyond that of more flexible infrastructure. Thus, given that the RHC, with two major higher-order transit stations, is geared for increased intensification, the layout of the street network should consider not only the horizon traffic forecasts but also potential needs for other infrastructure pertaining to transit, public realm, goods movement and deliveries, network resiliency, and emerging needs.

8.4 Intersection Controls

Most new major intersections are recommended to be signalized with dedicated turning lanes at intersections that are expected to be at critical capacity otherwise, as explained in **Section 7.2.3**.

Recommended lane configurations are illustrated in **Figure 8-8** while new traffic signals are recommended at the following intersections:

- Garden Avenue Extension & Station Street;
- Garden Avenue Extension & Red Maple Road;
- Garden Avenue Extension & Red Cedar Avenue;
- Garden Avenue Extension & Silver Linden Drive;
- Langstaff Road East & Cedar Avenue; and
- High Tech Road & Red Cedar Avenue.

The need for new traffic signals is driven by capacity requirements but also multimodal safety needs to provide protected crossing opportunities for pedestrians and cyclists.

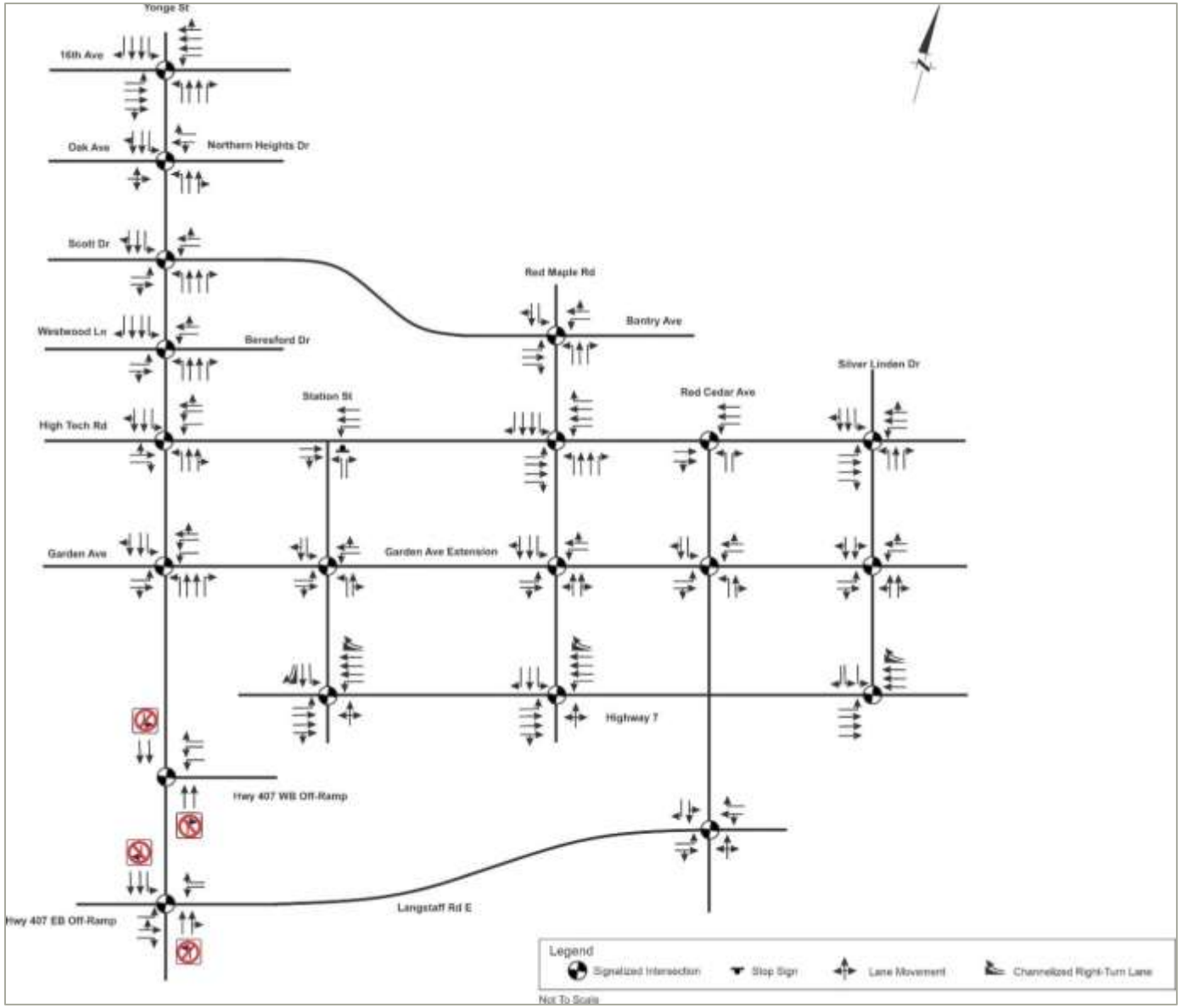


Figure 8-8: Recommended Lane Configurations

8.5 Active Transportation

The recommended fine-grid street network in concert with the land use plan and off-street connections are all critical in making active transportation a viable option for travel within and beyond the RHC SP. While the network connectivity must provide for convenient, direct routing, the facilities themselves must be designed to be comfortable for users of all ages and abilities.

Further to the dense street network which includes dedicated and protected spaces for cyclists and pedestrians, RHC's active transportation network features a vision for pedestrian and cycling network spines and mid-block connections for further block permeability and accessibility for active modes, as illustrated in **Figure 8-9**.

Figure 8-9: Pedestrian and Cycling Network Spines

In addition to the on-street facilities, two east-west spines will connect both sides of the RHC within at the northern end of the study area between Bantry Avenue and High Tech Road. The northerly connection will connect Yonge Street to Red Maple Road and the Langstaff Community Centre while running adjacent to a new open space / park area and crossing the rail corridor. The second east-west spine is located between High Tech Road and the proposed Garden Avenue extension. This southerly spine will connect Yonge Street to the Red Cedar / Cedar Avenue Extension, crossing the rail corridor at the proposed at-grade concourse of High Tech Station.

The north-south spine is planned to be located along the west side of the rail corridor connecting the Markham Langstaff Secondary Plan area to the Bridge Centre Station

in the south, High Tech Station, the east-west spines, and areas to the north of the RHC study area.

The vision for on-street pedestrian and cycling facilities and spines and public parkland are complemented by a network for Privately Owned, Publicly Accessible Spaces (POPS), plazas and pedestrian connections to create a diverse network of open space and a granular development pattern.

As illustrated in **Section 8.1**, cycling facilities are recommended to be added to existing streets as well as proposed streets. The recommended cycling facilities are either dedicated or protected lanes. The need for physical protection depends on the speed and volumes of auto traffic adjacent to the cycling facility. Cycling lanes need to be safe and feel safe for them to be sufficiently utilized, and their utilization is an effective way to reduce auto demand. The promotion of cycling is also aligned with the objectives of York Region and City of Richmond Hill, which have identified a draft active transportation network in their TMP, shown in **Section 2.4.2**.

Attention must also be paid to the convenience of pedestrians in terms of crossing opportunities across motorways. A lack of a safe means to cross at locations where there is demand for pedestrian crossing have been identified in **Section 2.4.3** and **Section 2.4.4**.

Crossings and intersections are critical points for active modes in general due to grade changes (rail corridor and highway crossings) or modal conflicts (large intersections).

It is important to avoid just adding active transportation facilities as a supplementary measure once other modes have had their needs met, because this can create a disjointed or inconvenient network. The active mode network should be as seamless as possible, especially at major crossings where various infrastructure are competing. Users may be deterred from active modes if there is a single major obstacle along their journey. In the context of the RHC, High Tech Station is both an opportunity and a critical point which can either make active modes appealing by providing a smooth rail crossing or transit access point or present an obstacle if it is difficult to entre or pass through by certain active modes. A high active mode share has been projected to access this station in **Section 2.5.2**, which calls for attractive active mode facilities to capture the demand. Recommendations for the general active mode network, but for High Tech Station especially, include effortless grade changes when it comes to crossings, preventions, and protections against conflicts with other modes, and the ability to maintain operability through adverse weather conditions.

The integration of active transportation facilities with site-specific plans is a critically important consideration in ensuring a multimodal transportation system which prioritizes and encourages walking, cycling and transit as primary travel modes. Dedicated facilities for pedestrians and cyclists are imperative to encouraging the significant mode shift required to achieve the vision for the study area. Based on this approach, a Multi-Modal Level of Service (MMLOS) assessment was not conducted.

8.6 Transit

Existing studies and plans are aiming towards the development of transit-oriented communities in the RHC and Langstaff Gateway. Furthermore, there are larger-scale transit-oriented plans and projects underway that require local feeder support, most notably the GO train and the Yonge North Subway Extension at High Tech Station and Bridge Station. However, as with other modes, this area is not just important as a destination or interchange but also serves those passing through.

Several major transit services to support in this area include

- Regional GO Expansion and GO bus routes
- The Yonge North Subway Extension
- vivaNext BRT on Highway 7 and Yonge Street
- The 407 transitway, proposed to begin as BRT with potential to upgrade to LRT

The success of local transit and regional transit complement each other. Thus, continuous coordination and foresight is needed by considering the plans of larger networks and the assumptions made in terms of the local support needed to ensure their successful utilization and performance. Bridge station is intended to serve as a major transit-to-transit interchange, with most of the projected subway access taking place by bus, mentioned in **Section 2.5.2**. Therefore, the station and its vicinity would benefit from considerations for bus operations.

Other local measures that can be used to improve transit services overall include transit priority signaling, designated or protected rights-of-way for transit vehicles, effective information dissemination and way-finding, and multi-modal integration. Transit priority and dedicated rights-of-way are particularly useful on congested arterials and have already been implemented or recommended on Yonge Street and on Bayview Avenue. The entrances to the Bridge Centre Station bus terminal at Highway 7 and Station Street and at Highway 7 and Red Maple Road should also incorporate dedicated transit signal phases to be considered by the YNSE project.

Shuttle services or on-demand micro-transit can also supplement conventional fixed-route transit services. York Region Transit already offers Mobility-on-Request services and these services can be expanded within the Richmond Hill Centre and the surrounding neighbourhoods. They can be used to connect low density residential areas to the subway, providing a first- and last-mile solution. These services may be provided by condominium boards, other residential organizations, or through Transportation Management Associations such as SmartCommute Markham-Richmond-Hill.

8.7 Parking and TDM Strategy

Significant mode shift is required to allow the area to support future travel demand. However, the shift must be supported by proactive parking and Travel Demand

Management (TDM) strategies which reduce minimum parking requirements for developments and prioritize requirements for other modes instead. The City's ongoing Parking and TDM Strategy for New Developments will provide direction to site-specific development applications in the RHC SP area to provide an appropriate amount of parking with the potential to reduce the minimum parking requirement through identification of a TDM plan and implementation strategy including monitoring and follow-up protocols.

There are a variety of TDM measures that developers can provide, from infrastructure to financial incentives. **Table 8-1** highlights measures that will be suggested to developers which will be most easily and consistently implemented. This list of measures is not final or exhaustive.

The details of the schedule (i.e., length of car share membership etc.) can be adjusted at the site plan application stage, but a reasonable time commitment must be achieved to ensure effective delivery of the proposed TDM measures. The potential measures listed have been inspired by the York Region Mobility Plan Guidelines, the City of Richmond Hill Sustainability Metrics, and most influentially by the City of Vancouver TDM approach. Associating points to each measure is the next step in the process.

Parking management strategies should be further investigated in collaboration with the City and in consideration of the City's Parking and Transportation Demand Management Strategy.

Table 8-1: TDM Measures

Category	TDM Measure
Financial Incentives	⇨ Car share memberships & subsidization of the service provider to encourage expansion to new areas ⇨ Public transit passes & subsidies
Active Transportation	⇨ Additional Long-Term Bicycle Parking (beyond minimum requirements) ⇨ Improved Access to Long-Term Bicycle Parking ⇨ Enhanced Short-Term Bicycle Parking ⇨ Improved bicycle parking facilities (i.e., showers and change rooms) ⇨ Secure Public Bicycle Parking ⇨ Bicycle Maintenance Facilities ⇨ Improved End-of-trip Amenities ⇨ Public Bicycle Share Space ⇨ Shared Bicycle Fleet & subsidization of the service provider to encourage expansion to new areas ⇨ Shared Micromobility ⇨ Walking Improvements and pedestrian network connectivity
Alternative Commute Services	⇨ Car Share Spaces ⇨ Car Share Vehicles with Spaces ⇨ Additional Pick-Up/Drop-Off Spaces ⇨ Shuttle Bus Service ⇨ Vanpool/Carpool Service ⇨ Guaranteed Ride Home (SmartCommute)
Support, Promotion, Information	⇨ Transportation Marketing Services ⇨ Real-Time Information ⇨ Multimodal Wayfinding Signage ⇨ Commute Trip Reduction Programs (Smart Commute, Region of Peel) ⇨ Information to residents, employees, and visitors about transit, rideshare and taxi services, bicycling facilities, and overflow parking options.
Parking Management	⇨ Parking Pricing / Paid Parking ⇨ Parking Supply ⇨ Unbundle Parking ⇨ Location of off-Street Parking ⇨ Overflow Parking Plan ⇨ Carpool and efficient vehicle parking ⇨ Dedicated spaces to priority uses ⇨ Shared parking agreements between developments & mixed use development
Other	⇨ Innovative Strategies (i.e., valet, off-site parking agreements, rented parking)

8.8 Mobility Hubs

While each mode of travel is typically accommodated independently, the integration of multiple travel modes should also be considered through the provision of multi-modal facilities to enable more mobility options. Planning for multiple modes should consider both points of complement and points of friction. Points of complement allow different modes to support each other's usage, such as mobility hub interchanges between transit and other modes, whereas points of friction create

trade-offs between providing for different modes, such as locations with limited space for accommodating different modes and their conflicting movements.

Within the RHC Secondary Plan area, there are opportunities to improve mobility by providing a greater number of options through the Mobility Hub concept - multi-modal one-stop hubs to facilitate smart and easy access to green, shared mobility services such as e-car sharing, ride sharing and bike sharing. These hubs may vary in scale from major transit station areas (High Tech and Bridge Centre Station areas) to smaller-scale hubs at other locations in and surrounding the RHC such as at open space locations, Langstaff Community Centre, Yonge-Carrville KDA along the North-South Active Transportation Spine, etc. Designing hubs with an emphasis on enhanced cycling facilities, such as bicycle storage or parking facilities, sheltered bicycle parking, or bike stations/rooms, would serve to further promote cycling mode share within RHC.

Mobility hubs should be spaced 200-300m apart and be placed in locations where people can gather. This may include parks and courtyards, major intersections, transportation network connections, and entrances to buildings or transit stations. Depending on the scale, hubs may include bus stops, dedicated car share parking spaces with electric vehicle charging stations, parking lay-bys for ride sharing, bike share stations, comfortable and safe waiting areas with displays for real-time data for all modes, benches, open space, free Wi-Fi, wayfinding information, and retail support.

Implementation of mobility hubs can vary, based on site-specific conditions. Property developers can be encouraged or incentivized to implement smaller mobility hubs within their developments as part of their TDM measures. Metrolinx may integrate various sizes of mobility hubs into the design of the YNSE stations, where these hubs may be managed independently by Metrolinx or in partnership with other parties. The City or the Region may implement mobility hubs within the public boulevard, either independently or in partnership. In general, mobility hubs should be managed either independently or in partnership between developers, landowners, park owners, the City, or the Region, depending on the specific location of the hubs. Bike share stations, bus stops, and other transit facilities incorporated in mobility hubs should be managed by the appropriate transit agency, such as York Region Transit or Metrolinx.

A large scale mobility hub is illustrated in **Figure 8-10** while a smaller scale hub with multiple shared micromobility devices is illustrated in **Figure 8-11**.

Figure 8-10: Large-Scale Mobility Hub

Figure 8-11: Small-Scale / Curbside Mobility Hub

8.9 Loading and Deliveries

Loading space requirements should be reviewed on a site by site basis for new development. Typically, loading would be based on the programming for each building, depending on the vehicle types and frequencies of deliveries. If there are uses that require larger trucks, then the loading space should be sized accordingly. If

there are uses that will have frequent deliveries, then multiple loading spaces may be required to avoid overlap and delays which will in turn result in congestion on public streets.

Recognizing the vision for RHC, it should be further noted that site-specific loading may not be feasible for each site. Further loading and delivery strategies should consider:

- On-street loading areas may be designated at specific curbside areas.
- Off-peak deliveries in particularly constrained areas to mitigate curbside capacity issues and conflicts.
- Real-time monitoring technologies to provide curbside usage information to delivery service providers to proactively mitigate conflicts and delays
- A consolidated delivery building with efficient access to the Regional arterial road network for large vehicles, combined with cargo-bikes or smaller delivery vehicles to accommodate first or last mile for deliveries.

8.10 Traffic Infiltration Mitigation

Due to congestion along major arterials, there is currently a substantial amount of cut-through traffic on local roads ranging from 16-30% typically and peaking at 55% at one location, as shown in **Section 3.6**. This traffic is not originating from or destined to the RHC area. Traffic infiltration is expected to increase in the future, examined in **Section 7.3**, with some local streets experiencing over 50% of volumes coming from cut-through traffic.

Mitigation efforts should focus on modal prioritization through street design while encouraging slow vehicle operating speeds. Specific measures include:

- Traffic control, calming, and enforcement measures: real-time speed signs, speed bumps, chicanes, raised crosswalks, textured pavement, traffic calming signage, Community Safety Zone designations and increased fines for speeding, and automated ticketing systems
- Intersection controls such as turn restrictions, however this measure should only be implemented with detailed analysis considering factors such as traffic operation efficiency and safety, and enforcement
- Reduced speed limits and self-enforcing street design following TAC 2017 Geometric Design Manual guidance such as narrowed lanes, designated parking areas, on-street bicycle lanes with buffers
- Enhanced public realm prioritizing street right-of-way allocation to walk and cycle connections

Monitoring of traffic conditions should be undertaken as initial phases of development are implemented. Funding for implementation of traffic infiltration mitigation measures should be explored during the site plan approval process for

individual developments within the RHC study area to assist the City with implementation.

9 Implementation and Phasing

Implementation of the recommended transportation system including requirements for further study, development phasing, transportation innovation zone opportunities, monitoring, and funding programs are highlighted in the following sections.

9.1 Transportation Network Implementation

The recommended street network illustrated in **Figure 8-2** and the off-street cycling improvements and midblock connections in **Figure 8-9** should be implemented as follows:

- Major and Minor Collector Roads: Schedule C Municipal Class EA study
- Local Streets: To be delivered by adjacent properties as a condition of site plan approval
- Private laneways / connections: To be delivered by adjacent properties as a condition of site plan approval
- Off-street cycling facilities (east-west cycling spines): Schedule A+ Municipal Class EA study
- Off-street cycling facilities (north-south cycling spine): integrated with YNSE subway project within YNSE project limits, Schedule A+ Municipal Class EA outside of YNSE project limits
- Midblock connections (privately owned publicly accessible spaces): Site plan approval

Recommended infrastructure projects are subject to Municipal Class Environmental Assessment requirements which are identified based on the following Schedules (MCEA Project Schedules, December 2015):

- Schedule A projects are limited in scale, have minimal adverse environmental effects, and include several municipal maintenance and operational activities. These projects are pre-approved and may proceed to implementation without following the full Class EA planning process. Examples include new sidewalks and cycling facilities within existing ROW.
- Schedule A+ projects are also limited with minimal adverse environmental effects but may have impacts on the public and may be approved locally after public input. Examples include intersection modifications, signalization and reconfiguration, and in-boulevard treatments such as streetscaping and public amenities.
- Schedule B projects have the potential for some adverse environmental effects, and the municipality is required to undertake a screening process with the public and relevant review agencies to ensure that they are aware of the project and their concerns are addressed. Once outstanding concerns resolved, the project may proceed to the implementation stage. Examples

include reconstruction or widening the road where the new facility will not be utilized for the same purpose, use, or capacity (i.e., conversion of vehicular lane to bike lane), new road construction less than one (1) km in length, and new sidewalks or cycling facilities outside of existing ROW with a construction cost under $2.6M (MCEA Clarification on Cost Thresholds, March 2019).

- Schedule C projects have the potential for significant adverse environmental effects and must proceed under the full planning and documentation procedures specified in the Class EA document (Phases 1 to 4), including an Environmental Study Report (ESR) which must be made available for review by the public and regulatory review agencies. Examples include new road construction exceeding the cost threshold of $2.6M and/or greater than one (1) km in length including major transit projects which fall under the six (6)-month Transit Project Assessment Process (TPAP).

9.2 High Tech Road Cycling Pilot Program

A pilot program is recommended to test the usage and performance of dedicated bike lanes on High Tech Road, including protected intersections for cyclists. Pilots provide a learning and transitioning opportunity towards implementing more permanent infrastructure. Pilot programs can be conducted using cost-effective measures such as temporary planter boxes, curbs, bollards, or lane markings before committing to more long-term infrastructure; however, it should be noted that the type of cycling facility may affect use of facilities and pilot program findings.

9.2.1 Dedicated Bike Lane Pilot Examples

Pilot programs for dedicated bike lanes have been implemented in various locations in the GTA such as Bloor Street West and an extensive network in the Region of Waterloo, shown in **Figure 9-1** and **Figure 9-2** respectively. After implementing the pilot on Bloor Street West, it became the facility with the second highest cycling volume in the city, with improved safety for all road users[3]. The Region of Waterloo's cycling network pilot tested different separation methods for different streets and collected user feedback regarding the separation methods. It was found that preferences depended on the mode of travel, with cyclists most preferring bollards on curbs as a separator[4].

[3] Bloor Street Bike Lanes Evaluation, City of Toronto https://www.toronto.ca/services-payments/streets-parking-transportation/cycling-in-toronto/cycle-track-projects/bloor-street-bike-lanes/

[4] Region of Waterloo Separated Cycling Lanes, "What we've heard so far" https://www.regionofwaterloo.ca/en/exploring-the-region/separated-cycling-lanes.aspx#

Figure 9-1: Bloor Street West Bike Lane Pilot (City of Toronto)

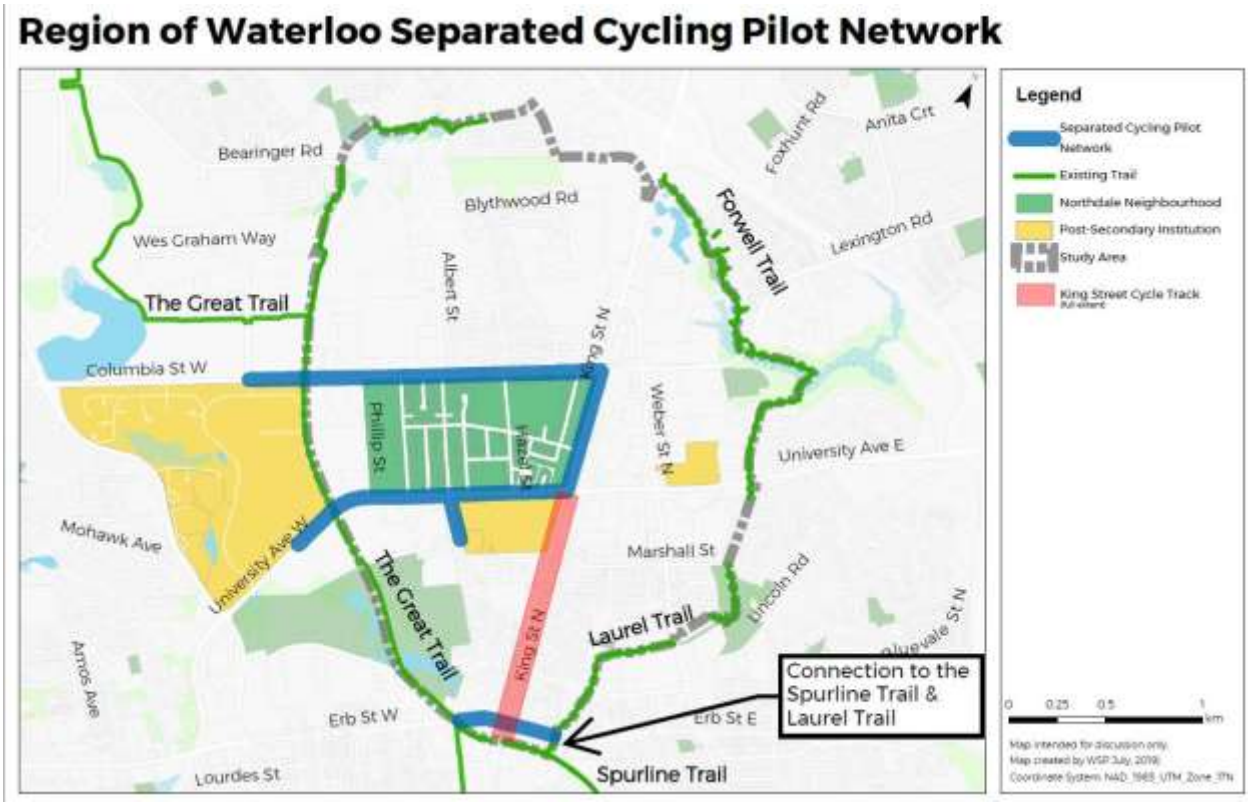


Figure 9-2: Region of Waterloo Separated Cycling Pilot Network

9.2.2 Protected Intersections for Cyclists

Protected intersections for cyclists is a practice where curbs and particular lane layouts are introduced to provide a barrier between auto and cyclist movements. Intersections are locations where vehicle and cyclist collisions are prone due to the lack of infrastructure providing cyclists and drivers separate rights-of-way and also due to the lack of awareness of road users. This is a critical safety concern given the lack of protection that cyclists have in spaces that conflict with vehicular movements, especially when large trucks are involved.

An example of a protected intersection is illustrated in **Figure 9-3**, which is based on the Amsterdam Model. Essential elements of this model are, as numbered in the figure:

1. Cycling signals, providing phases for cyclists that are separate from vehicular movement phases.
2. Forward stop bars, allowing cyclists to stop ahead of vehicles for visibility.
3. Corner islands, which can be coloured, to provide physical and visual separation between cycling and vehicular movements, especially for right-turning vehicles.
4. Setback bicycle crossing, moving bicycle paths away from vehicular paths during the crossing.

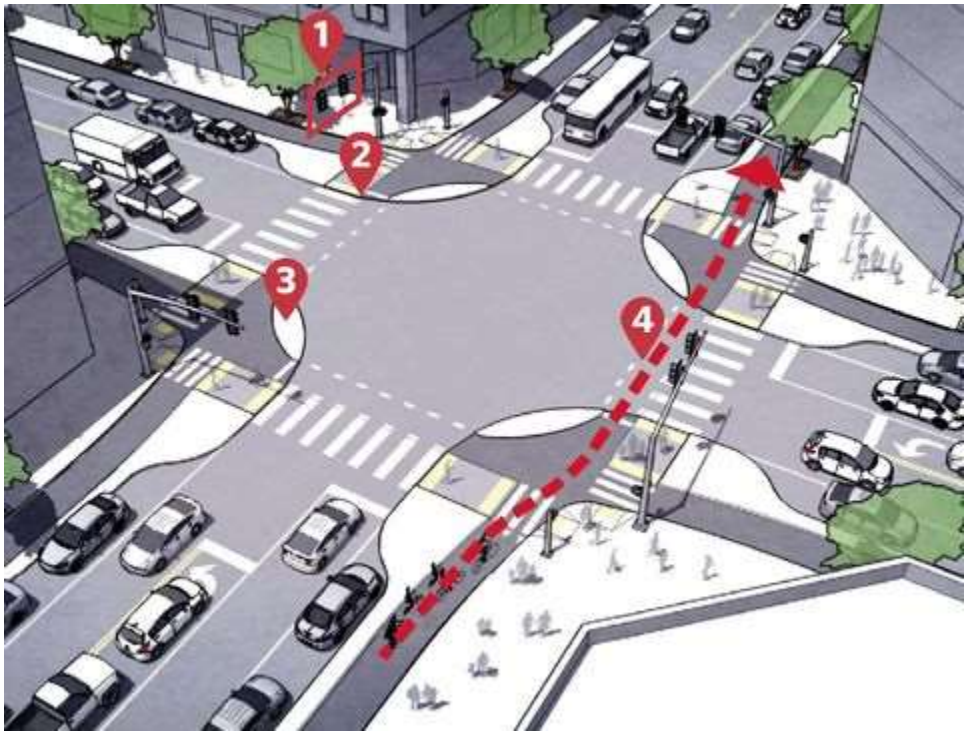


Figure 9-3: Protected Intersection for Cyclists

9.3 Further Traffic Study Requirements

It is noted that the study recommendations are identified based on available information and a high-level analysis. Based on the proposed developments within the RHC SP and the associated detailed traffic impact analysis to be completed at the site-plan application stage, the City of Richmond Hill and the Regional Municipality of York are recommended to periodically review traffic operations and implement additional improvements such as dedicated turning lanes, storage lengths, and signal timing plans.

9.4 Transportation Innovation Zone

A Transportation Innovation Zone (TIZ) was established Q2 2020 by the City of Toronto at the Exhibition Place grounds for the purpose of understanding and testing emerging transportation technologies in-lieu of any federal or provincial guidance on use of new mobility devices and prior to wide-scale implementation. The City of Toronto's initiative was driven by the need to foster economic development, support COVID-19 recovery efforts and provide knowledge sharing across the region. The City of Toronto is developing a Transportation Innovation Challenge to invite and manage trials for new mobility services at the TIZ until 2025. A similar concept may be implemented in the RHC in concert with the completion of YNSE construction and surrounding area development.

The TIZ concept may assist in implementing the EcoMobility hub concept by providing the public with an opportunity to interact with new technologies in a real-world environment while providing City of Richmond Hill and York Region staff information on implementation challenges, particularly with respect to safety, in a controlled environment. It is noted also that the City of Toronto's TIZ may also provide City and Region with sufficient information to implement shared mobility services without the need for TIZ designation.

The implementation of one of more TIZs within the RHC would allow the City to test emerging technologies, including but not limited to the Mobility Hub concept, in a controlled environment to gain a better understanding of potential impacts, opportunities, implementation challenges, safety concerns, and more. Establishment of potential TIZs should be aligned with recommendations that arise from the City of Richmond Hill Transportation Master Plan, as well as any other future planning documents providing a framework for the implementation of new technologies within the City.

9.5 Monitoring Program

Until the full implementation of the transportation network including the YNSE and recommended grid street and active transportation networks, incremental growth via new development will need to be reviewed in the context of the available transportation network capacity, particularly at adjacent regional intersections along Yonge Street. A transportation monitoring program will be developed and undertaken with landowners to monitor development levels and travel patterns as the transportation network and associated improvements are implemented through development. The findings of the Monitoring Program would reveal significant changes in trends, assumptions, or the ability to provide more or less transportation system capacity than that required to accommodate the projected transportation demand associated with the development levels.

At appropriate times, a monitoring program will also be conducted by the City to inform Transportation Impact Studies submitted with development applications, and may include:

- The travel characteristics of employees, residents and visitors including modal split, vehicular occupancy, trip distribution and peak hours of travel;
- An evaluation of trip volumes from a multi-modal perspective on streets and at key intersections, and the future capacity of all transportation modes against development levels and network improvements provided for by this Secondary Plan;
- An evaluation of transit ridership and traffic volumes in the context of available capacity, new or approved transit availability, and the future total capacity of the transit network;
- An evaluation of existing, planned, and proposed development;

- An evaluation of parking availability, usage, and location in relation to land use, as well as the performance of shared mobility options; and
- The findings of the transportation monitoring program will inform future comprehensive transportation analysis supporting new transit infrastructure and/or improvements to transit service as well as any future reviews of this Secondary Plan. The findings may also be considered in the review of individual development applications and the implementation or refinement of required TDM programs, as well as any future reviews of this Plan.

To ensure that the RHC Secondary Plan and transportation study recommendations are implemented and the progress towards the ultimate vision is maintained, the City should monitor project status on an annual basis as follows:

- Within the first year, initiate required environmental assessment studies and design for Schedule C and A+ projects;
- Within the first three (3) years, complete high priority studies and implement recommended municipal infrastructure
- Five (5) years following the implementation of the YNSE, the City should conduct a YNSE monitoring study to assess the level of development and transportation conditions. This study may be used to inform and update implementation policies within respective Secondary Plan studies relative to transportation capacity;
- Continue to monitor goods movement through the area and develop strategies to maintain efficiency in the transportation network; and
- Consider implementing a Transportation Innovation Zone to implement an EcoMobility hub pilot program alongside one or more development applications.
- Implement smart video detection technology to monitor conditions as implementation occurs. This technology can provide a source of traffic and multimodal count information, curbside activity monitoring and real-time information, real-time parking information, traffic, and vulnerable road user safety through near-miss collision detection, etc.

9.6 Funding Tools and Programs

The funding opportunities outlined below should be considered to assist in the implementation of the improvements identified in this document and defray the cost to existing taxpayers.

9.6.1 Development Charges

The City already conducts development charges studies to collect funds for transportation service improvements under the Development Charges (DC) Act and should continue to update its development charges studies in the future. DC studies typically identify all types of transportation infrastructure required to serve development growth, including roads, and active transportation infrastructure. A

potential refinement to the DC By-Law may include the addition of EcoMobility hubs if not yet covered under the By-Law.

9.6.2 Federal Gas Tax Fund

The federal Gas Tax Fund, legislated in 2011 as a permanent source of infrastructure funding for municipalities, is a key source of funding for all municipalities in Canada. In Ontario, funding is generally allocated on a per capita basis and provided up front, twice a year, to the province, the Association of Municipalities of Ontario, and the City of Toronto. Projects are chosen at the local government level and are prioritized according to the infrastructure needs of each community.

On June 1, 2020, the government of Canada announced that $2.2 billion under the federal gas tax fund would be accelerated to help Canadian communities recover from the COVID-19 pandemic as quickly as possible. In Ontario, funding is administered through the Association of Municipalities of Ontario for transportation projects including public transit, local roads and bridges and highways.

9.6.3 Ontario Gasoline Tax

A similar program to the Federal Gas Tax Fund is offered by the province of Ontario. 2 cents per litre of the collected Ontario Gasoline Tax is transferred to municipalities exclusively for public transit. The allocation is based upon each municipality's proportionate share of the province's population and transit ridership. The funds can be used for either operating or capital costs. Funds could be available specifically for transit service improvements identified in this Plan.

In January 2021, the Ontario government announced $375 million through the Gas Tax program focused on supporting public transit.

9.6.4 Additional Programs

Further to the above noted items, several other funds, grants, and programs are identified which could provide additional funds to support transportation the improvements and programs identified in this study:

- Federation of Canadian Municipalities Green Municipal Fund;
- The Canada-Ontario Infrastructure Program;
- Employment and Social Development Canada funding opportunities, including the Enabling Accessibility in Communities Fund;
- Corporate donations which may consist of money or services in-kind, and have been contributed by a number of large and small corporations over the years;
- Potential future funding that might emerge from the Province in rolling out the Ontario Trails Strategy; and

- Private Citizen Donations / bequests, that can also include a tax receipt for the donor where appropriate.

New or existing relationships with non-profit organizations could be leveraged to obtain funding not directly available to the City of Richmond Hill. This funding could be used to implement certain aspects of the program, such as educational programs proposed as part of the TDM strategy or EcoMobility Hubs. These funding streams include:

- Environment and Climate Change Canada – EcoAction Community Funding Program;
- Ontario Trillium Foundation funding; and
- Corporate Environmental Funds such as those from Shell and Mountain Equipment Co-op that tend to fund small, labour-intensive projects where materials or logistical support is required.

10 EMZO Addendum 2022

In 2022, an enhanced Minister's Zoning Order (EMZO), passed as Ontario Regulation 344/22, updated development density permissions and consequent population and job projections within the RHC. This 2022 Addendum was created to update the recommendations of the initial RHC Secondary Plan (RHC SP) Transportation Analysis Report (hereafter referred to as the "2021 TAR") as contained in Sections 1 to 9 of this document, in order to address and reflect the EMZO permissions. This addendum work includes the following steps:

- Evaluate the impact of updated development density permissions and population and job projections on the transportation network, and
- Update policy recommendations regarding Travel Demand Management (TDM), the active transportation network, transit options, street network and road classification, and parking strategy.

Note that some background planning context has been updated since the 2021 TAR. For example, an update to the York Region Official Plan (YR-OP) was approved in 2022. However, since the primary purpose of this addendum is to address changes in transportation analysis resulting from the EMZO addendum, other background changes such as the 2022 YR-OP were not incorporated into this update.

10.1 Enhanced Minister's Zoning Order

Ontario Regulation 344/22, passed in April 2022, is an enhanced Minister's Zoning Order (EMZO) with updated development densities for a large portion of the lands in the RHC SP area. Specifically, the EMZO increases the maximum density of residential uses, and reduces the density of non-residential uses, such as commercial and office uses, permitted within RHC, when compared to the proposed densities in the 2021 draft RHC SP. The EMZO also makes modifications to the

expected street, block and open space network. The location of the EMZO lands relative to the RHC SP area is shown in **Figure 10-1**.

This addendum is intended to evaluate the transportation impacts of the EMZO's land increased development densities upon the recommended concept scenario outlined in the 2021 TAR.

Note that the boundaries of the RHC SP area, the locations of the road and active transportation networks, and other schedules may be subject to change.

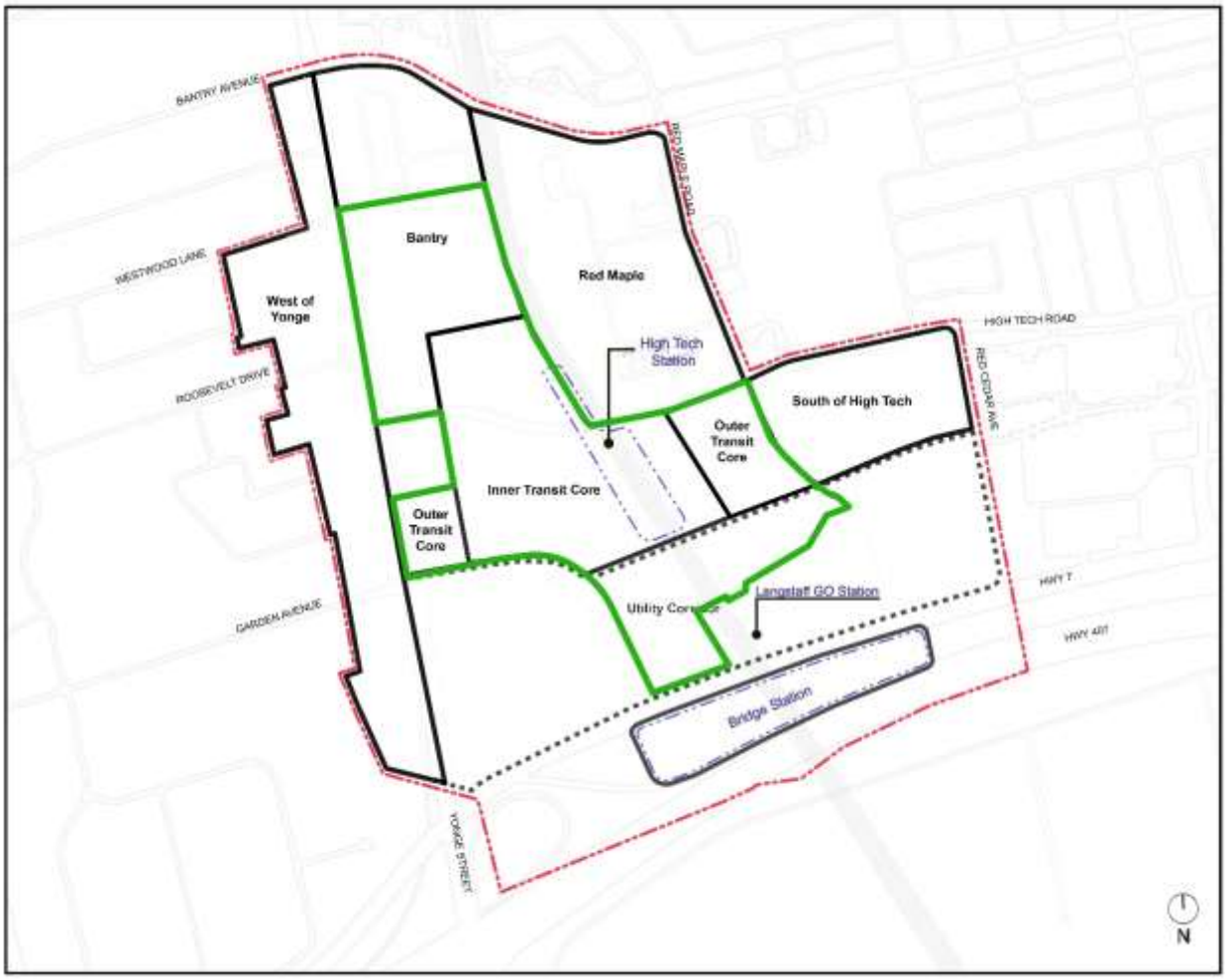


Figure 10-1. EMZO Lands, Relative to RHC SP Lands

10.2 Transportation Analysis

The transportation analysis for this addendum was conducted using the same approach as in the 2021 TAR, with the following changes made to the previous recommended scenario concept:

- Development densities and land uses were updated based on new density assumptions in the following locations:
    - The EMZO lands within the RHC SP study area,
    - The Bridge Transit-Oriented Community lands within Markham's Langstaff Gateway Secondary Plan, and
    - The Bayview Protected Major Transit Station Area.
- The recommended scenario road network was updated to the new recommended concept, such as the network referenced in the EMZO reference Map 301, as shown in **Figure 10-2**.
- The transportation analysis was updated based on the new land use and road network assumptions. The addendum work uses the 11th Edition of the ITE Trip Generation Manual rather than the 10th Edition, as was used in the 2021 TAR.
- Recommendations were updated based on the new transportation analysis results.

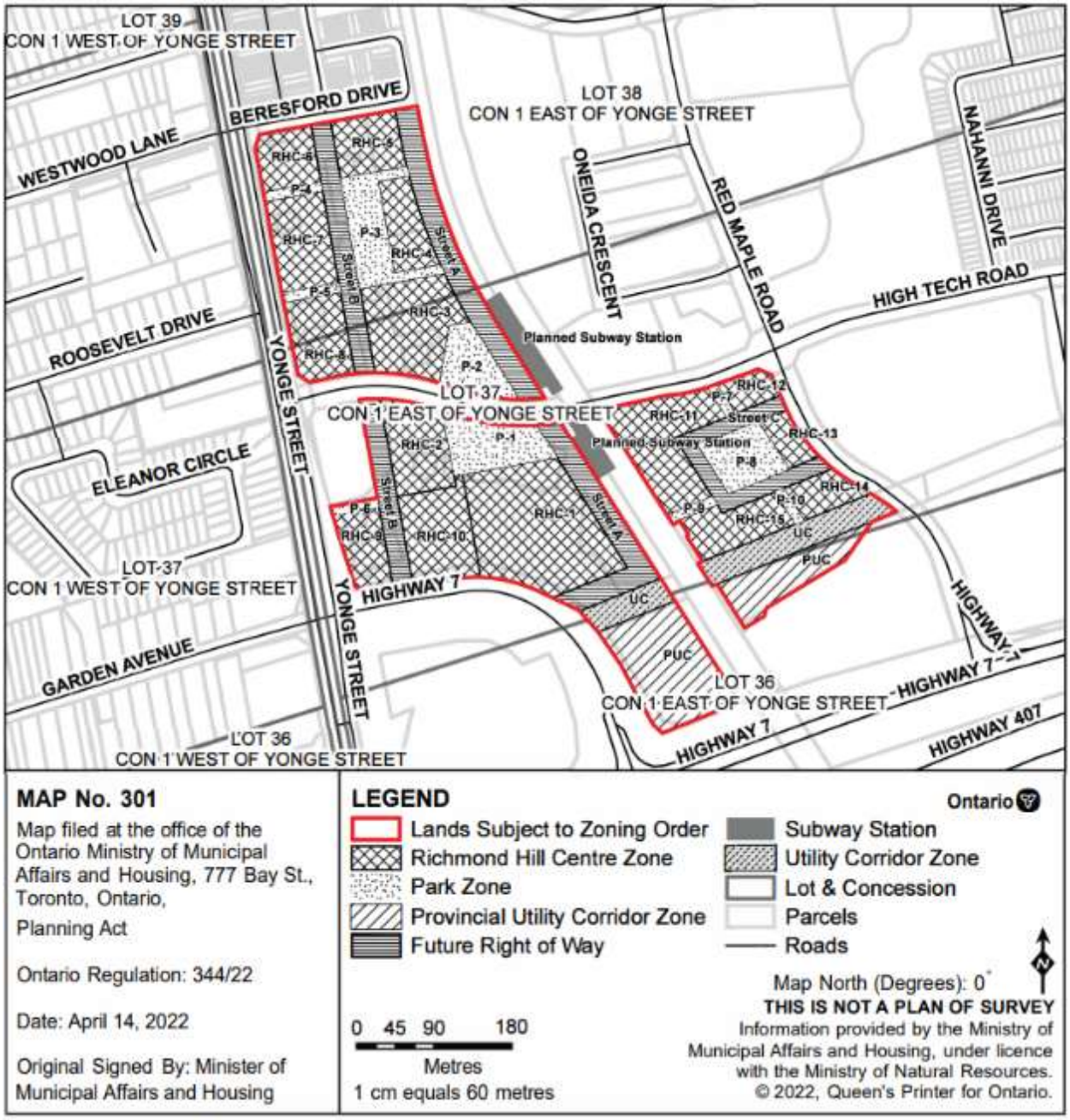


Figure 10-2. EMZO Reference Map with Network Assumptions

This section discusses the updated land uses, density permissions, road and block network, and transportation analysis results used to produce updated recommendations as part of this addendum.

10.2.1 Subarea Model Revisions

The 2041 subarea model used to conduct the transportation analysis for the 2021 TAR was also used for analysis in this addendum. Land use and development

densities and road network assumptions were updated based on the EMZO and are discussed in further detail below.

Note that the subarea model assumes 2041 conditions outside of the RHC SP study area, as it was generated from a 2041 York Region model. However, for the purposes of analysis, fully built-out land uses, and roads were used in the RHC SP study area, even when these land uses or roads are phased to be implemented later than 2041. Unless otherwise stated, all assumptions carried forward from the 2021 TAR are assumed to be 2041 conditions, while updated assumptions are assumed to be full build-out conditions.

10.2.2 Updated Recommended Scenario Land Use and Trip Generation

Trips were generated according to the ITE Trip Generation Manual 11th Edition for the PM peak period according to land use by Gross Floor Area (GFA) for commercial land uses and number of units for residential land uses. The proposed land uses in the RHC SP area were categorized by residential, retail, and office space, then further disaggregated into land use types in the ITE manual according to assumptions in **Table 10-1**. Note that the 2021 TAR analysis was conducted using the 10th edition of the ITE manual, and itself represented an update to the original transportation model used for the baseline analysis, which was developed using the 9th edition of the ITE manual. Thus, ITE land uses were updated for the 11th edition when equivalent land uses could be found; otherwise, they retained their 10th or 9th edition trip generation rates. A summary of the land use in the entire RHC SP study area can be found in

Table 10-2. The detailed trip generation is included in **Appendix O**.

Table 10-1. Land Use Breakdown

Land Use	ITE Land Use Type	% Breakdown	ITE Code (11e)
Residential	Mid-Rise Residential with 1st-Floor Commercial	55%	231
Residential	Multifamily Housing (Low-Rise)	35%	220
Residential	Senior Adult Housing - attached	10%	252
Office	General Office	85%	710
Office	Medical Office	15%	720
Retail	Specialty	50%	826
Retail	Fine Dining Restaurant	25%	931
Retail	Cinema/Entertainment	5%	445
Retail	Fitness/Recreation	10%	492
Retail	Hotel	10%	310

Table 10-2. Study Area Land Use Summary

	Residential Units	Approximate Office GFA (m^2)	Approximate Retail GFA (m^2)
RHC (EMZO, TAR, and existing)	24,000	186,000	41,000
Langstaff (Bridge TOC west of Cedar Ave and Langstaff Gateway SP east of Cedar)	27,000	242,000	39,000

The land use GFAs were updated based on land use yields from the EMZO and planned densities for the Bridge Station Transit-Oriented Community (TOC) in the Langstaff Gateway neighbourhood (note that the Bridge TOC is also subject to a different EMZO through Ontario Regulation 345/22). The locations of the Bridge TOC and Langstaff Gateway, relative to RHC, are shown in **Figure 10-3**. These updated land use assumptions were used to produce updated population and employment estimates, which are shown in **Figure 10-4**.

Figure 10-3. Locations of Bridge TOC and Langstaff Gateway Neighbourhood

Source: Figure 3-4 of Markham Gateway LP Bridge Station Master Plan Transportation Study, December 10, 2021

Figure 10-4. Updated Recommended Scenario - Projected People (Population) and Jobs (Employment)

This addendum also incorporates planned densities for the Protected Major Transit Station Area (PMTSA) located east of the RHC SP area, on the north side of Highway 7 at Bayview Avenue ('Bayview PMTSA'), which has been protected for by the York Region Adopted Official Plan 2022; however, these additional densities are not included in RHC or Langstaff projected people and job totals shown above. The location of the Bayview PMTSA is shown in **Figure 10-5.**

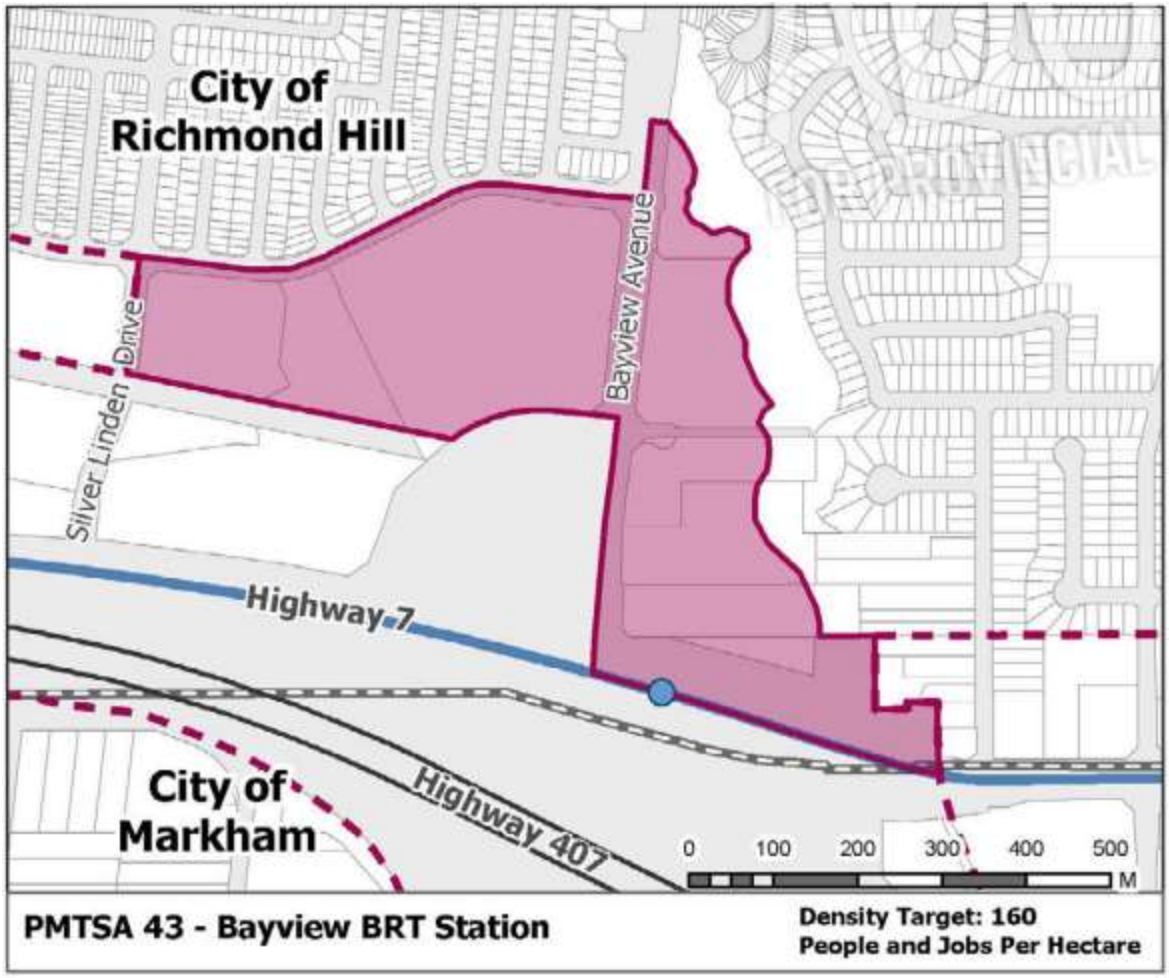


Figure 10-5. Location of Bayview PMTSA
Source: Appendix 2 of York Region Adopted Official Plan 2022, November 4, 2022

10.2.3 Updated Recommended Scenario Network

The 2041 recommended scenario network was updated from the 2021 TAR recommended network, shown in **Figure 7-2**, according to prescribed development densities and modifications in the street and block network contained in the EMZO. This results in the transportation network shown in **Figure 10-6**, which includes the following changes:

- Removing the Garden Avenue extension rail crossing and any associated local streets.
- Removing the proposed Station Street north-south connection between Highway 7 and High Tech Road.
- Removing the denser local street grid providing east-west connections on the east side of Yonge Street.
- Adding a denser local street grid to provide north-south connections on the west side of Yonge Street.

- Retaining the existing conditions of the Highway 7 – Yonge Street connector road (referred to hereafter as the Yonge/Hwy 7 connector).
- Adding a north-south local road parallel to the rail corridor (Street A), which connects the Yonge/Hwy 7 connector and Beresford Drive.

All other assumptions regarding road cross-sections and capacities were unchanged from the 2021 TAR.

Note that the boundaries of the SP area, the locations of the road and active transportation networks, and other schedules may be subject to change over the course of the development of the RHC SP.

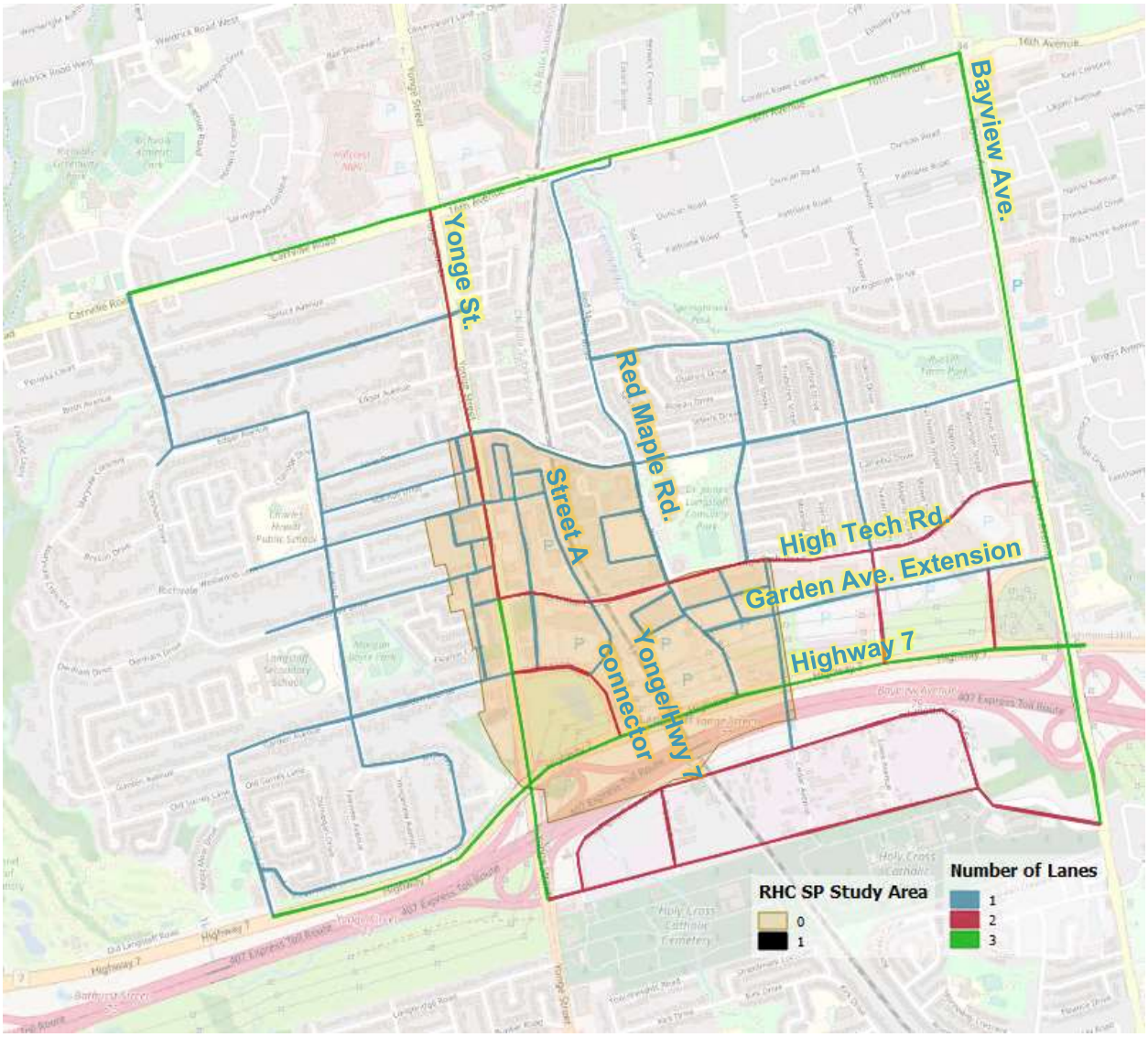


Figure 10-6. Updated Recommended Scenario Network

10.2.4 Mode Share

The mode share assumptions used for the 2021 TAR were preserved for this addendum. These mode share assumptions were developed using 2016

Transportation Tomorrow Survey (TTS) data based on proxy sites with levels of transit and densification similar to the developed state of RHC in the recommended scenario.

Mode shares were initially disaggregated by land use type and direction of travel and calculated by averaging the mode shares found for each proxy site from 2016 TTS data. A detailed breakdown of mode shares by proxy site, land use type, and direction of travel can be found in **Appendix P.** The proxy sites used for obtaining mode share were:

- Yonge Street and Finch Avenue (Finch subway station),
- Yonge Street and Sheppard Avenue (Sheppard subway station),
- Kipling Street and Bloor Street (Kipling subway station),
- Don Mills Road and Bloor Street (Don Mills subway station),
- Scarborough Town Centre (Scarborough Town Centre subway station), and
- Miscellaneous proxy sites for specific land uses.

The resulting RHC mode shares by land use type and direction of travel are shown in **Figure 10-7**.

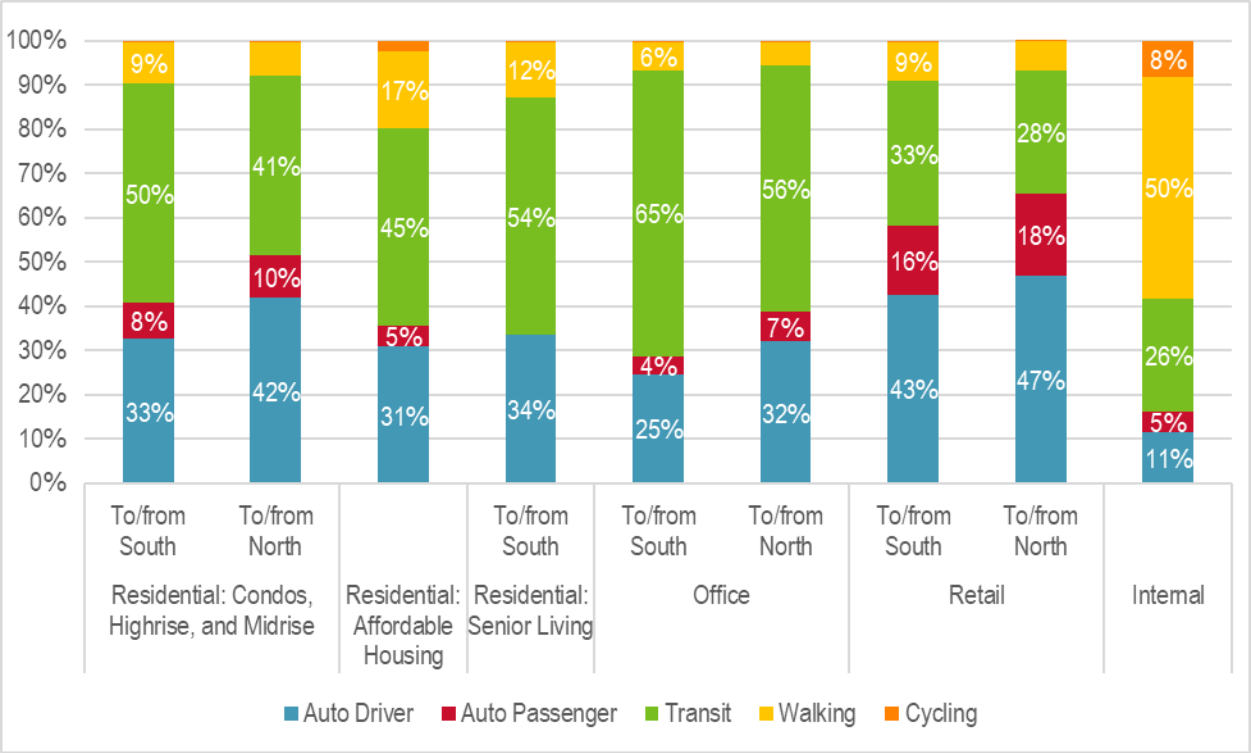


Figure 10-7. RHC Mode Shares from 2016 TTS Proxy Sites, by Land Use Type and Direction of Travel

These mode shares were applied to generated trips to determine the total number of trips by each mode. **Figure 10-8** compares the final RHC mode share, based on

mode share assumptions applied to generated trips, with the mode share of other sites.

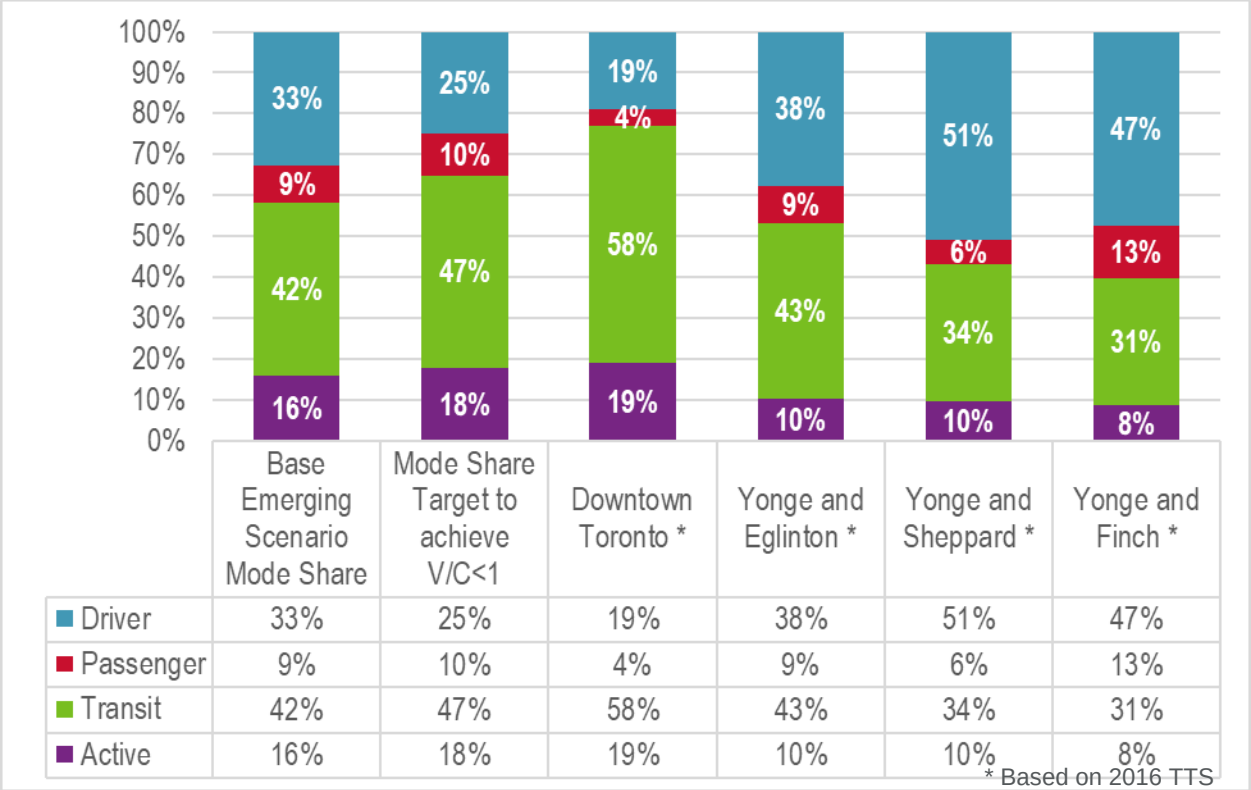


Figure 10-8. Mode Share Assumptions

The RHC is envisioned as a walkable and bikeable community with a focus on supporting non-auto modes of travel. The multimodal transportation strategies recommended in this report and future transit investments are taken into account in the mode share targets. Compared to other proxy sites, the RHC not only will have major rapid transit connections such as the YNSE and Viva lines, but also a GO station to serve commuters. While it is not expected to achieve the mode shares of Downtown Toronto, the RHC transit network would offer more in terms of non-auto modes of travel than most other proxy sites. These mode shares are an input to the resulting auto traffic volumes – therefore, the resulting traffic performance depend on the implementation of transit, active mode, and micro-mobility strategies.

As mentioned in **Section 7.1.2.1,** these mode share assumptions represent a full build-out scenario and are subject to monitoring and evaluation. Future analysis and planning efforts should incorporate up-to-date data and analysis relevant to the specific project planning context and conditions to ensure that transportation plans remain responsive to changing conditions and needs over time.

10.2.5 Impacts of Virtual and Remote Work

In addition to future changes to mode shares, virtual work is also expected to impact to commuter travel patterns, particularly for office jobs which make up a significant portion of peak hour travel demand in the Greater Toronto Area. The widespread adoption of virtual work platforms and meetings due to the COVID-19 pandemic has enabled certain types of jobs to either work entirely remotely, or to delay start time of trip to avoid peak hour congestion.

According to the Indeed & Glassdoor's Hiring and Workplace Trends Report 2023, remote work postings in Canada increased from 3.0% to 11.2% between September 2019 and September 2022, while searches for remote work postings increased from 0.6% to 4.6% in the same time frame.

Although we do not yet have complete data on how work-from-home rates have changed through 2022 and 2023 with the waning of the COVID-19 pandemic, it is a reasonable assumption that increased rates of work-from-home and delayed start-time of trip will result in reduced commuter travel and, consequently, a reduced need for building automobile capacity to accommodate peak hour auto travel combined with the transit-supportive development and mobility options envisioned for Richmond Hill Centre.

10.2.6 Updated Recommended Scenario Traffic Performance

The following sections outline the updated traffic performance results arising from the updated land uses, development densities, and road network assumptions.

10.2.6.1 Future Network Traffic Volumes

For the transportation analysis, trip generation was updated according to the updated recommended scenario's development densities and land uses and ITE Manual 11th Edition trip generation rates. The new trip generation was distributed across the same disaggregated zones used for the 2021 TAR for autos in the PM peak hour, using the updated recommended scenario street network. The resulting traffic volumes are shown in **Figure 10-9.**

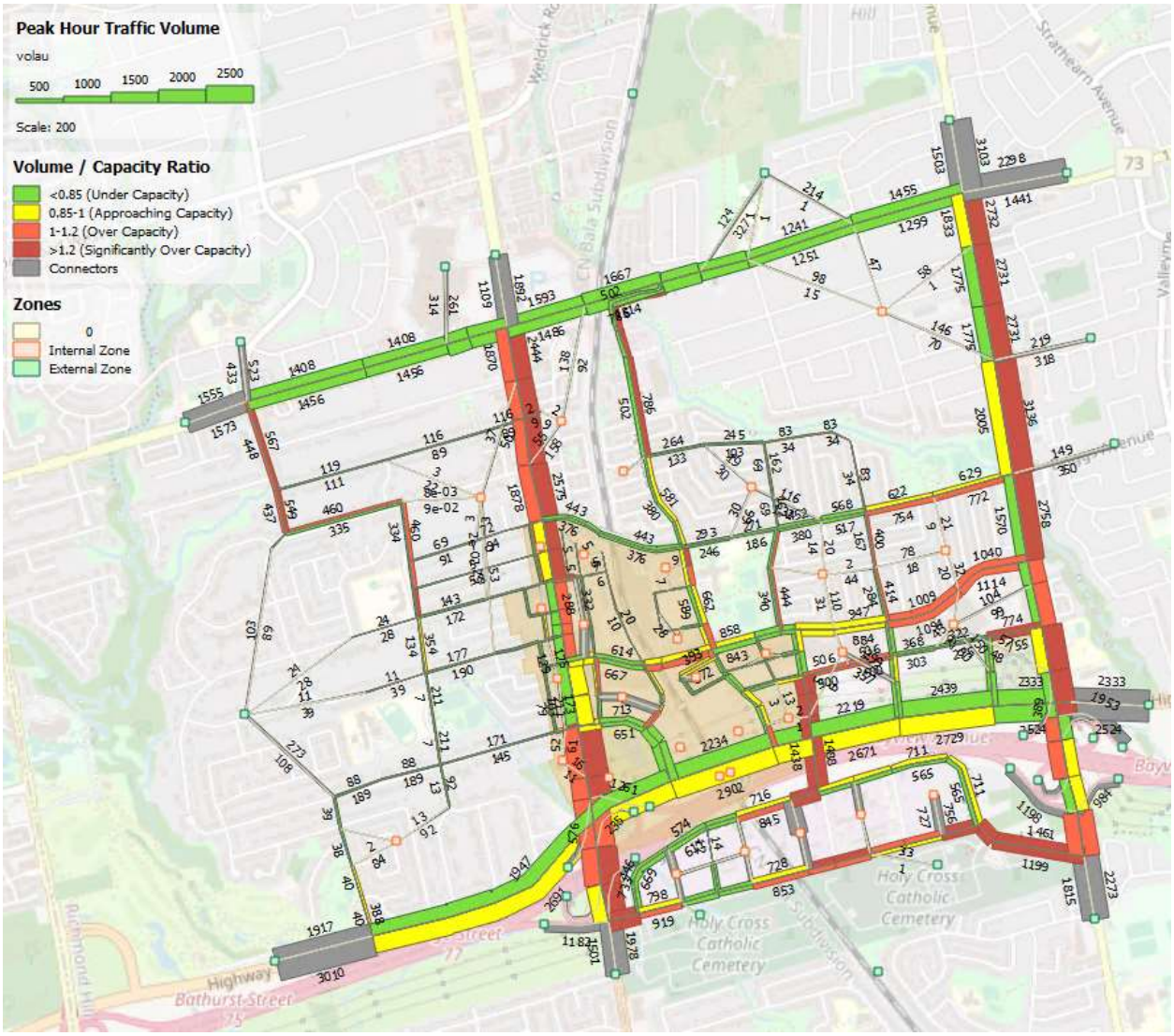


Figure 10-9. Updated Recommended Scenario PM Peak Hour Traffic Volumes

The overall traffic pattern in the updated scenario is not significantly different from that of the 2041 recommended scenario from the 2021 TAR; however, overall volumes and levels of congestion are significantly worsened. Almost the entire lengths of Yonge Street and Bayview Avenue are over capacity in the northbound direction, and significant portions of Yonge Street are also over capacity in the southbound direction. Congestion in the northbound direction is also present along the Red Cedar Avenue Extension and Red Maple Road.

Additionally, Bantry Avenue and High Tech Road have also become congested in the eastbound direction, whereas they were under capacity in the 2021 TAR analysis. High Tech Road, in particular, has become more congested, especially at its rail crossing.

Note that the increased congestion on Bantry Avenue and High Tech Road may be partly attributable to the removal of the Garden Avenue extension which was in the previous SP recommended network. Without an additional rail crossing to improve

east-west connectivity in the RHC SP area, there is higher traffic demand on these two roads. Particularly, there is more congestion on the High Tech Road rail crossing. While the road network in the RHC can function without the Garden Avenue extension rail crossing, traffic volumes are impacted. A comparison of **Figure 7-12** and **Figure 7-14** from sensitivity tests done as part of the previous SP work shows the impact of having an additional crossing compared to not having an additional crossing. Not having an additional crossing generates additional traffic on High Tech Road, bringing the High Tech Road rail crossing from uncongested to approaching or exceeding capacity (depending on the direction and time of day). Without a rail crossing additional to those at Bantry Avenue, High Tech Road, and Highway 7, east-west connectivity in the RHC SP area is greatly reduced, resulting in higher volumes and congestion on the remaining east-west connections and rail crossings. Furthermore, an additional crossing would have even greater impacts on connectivity for non-vehicular modes, which would take significantly longer when having to detour to a faraway crossing to cross the rail corridor. In the event a crossing is provided for non-vehicular modes, for it to be effective, it must safely, conveniently, and comfortably support the use of active transportation and micro-mobility modes.

Screenline analyses were conducted for the five screenlines illustrated in **Figure 10-10**. The distribution of traffic across the screenlines by their sources – that is, whether they come from RHC, Langstaff, or are part of the background traffic – is shown in **Table 10-3**. For most screenlines, there is more traffic from RHC and Langstaff than background traffic.

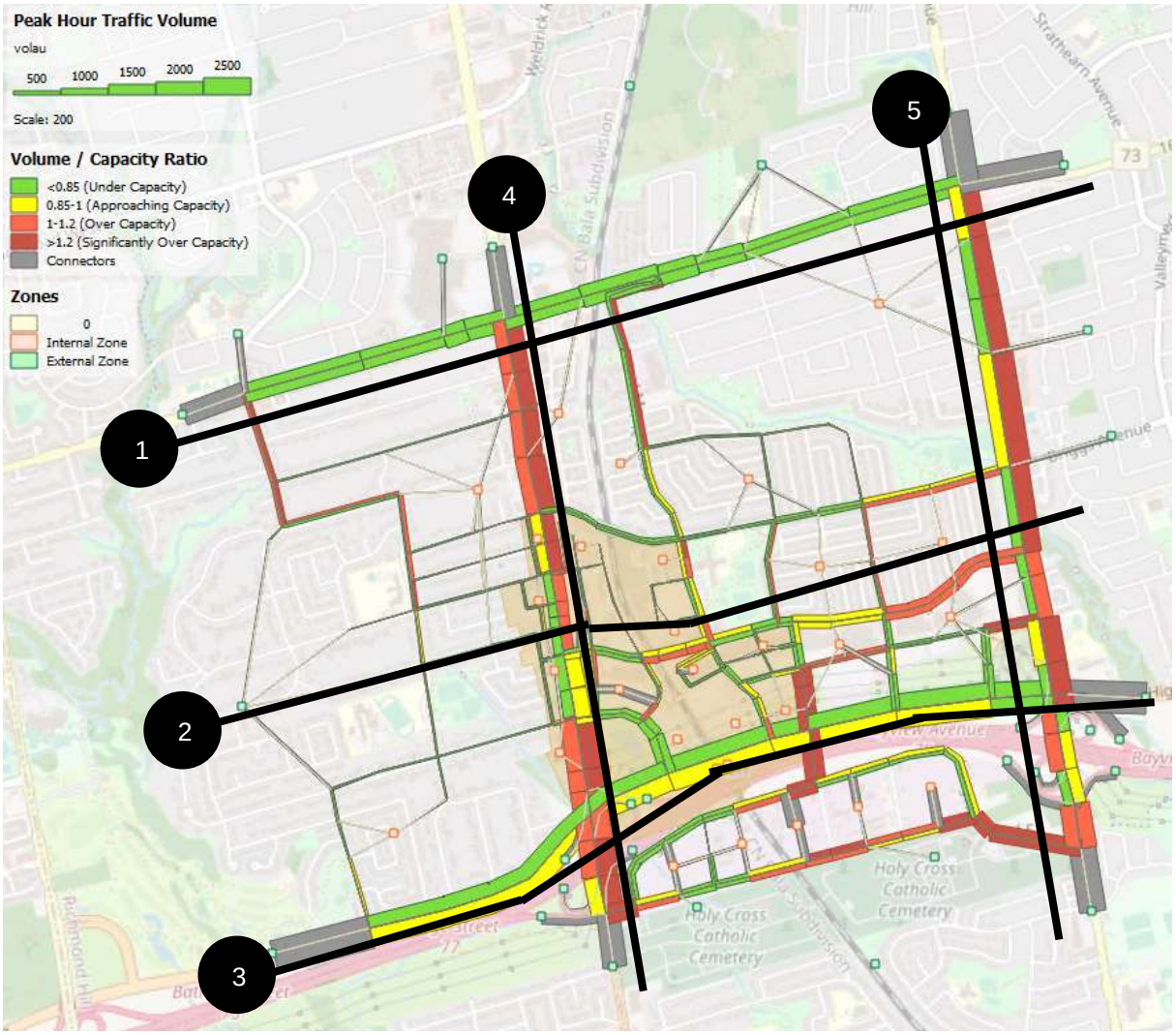


Figure 10-10. Screenline Traffic Volume-to-Capacity Ratios

Table 10-3. Screenline Traffic Distribution

#	Screenline	% Share of Travel Demand		
		RHC	Langstaff	Other Traffic
1	South of 16th Avenue	30%	26%	45%
2	North of High Tech Road	25%	26%	49%
3	South of Highway 7	15%	43%	42%
4	East of Yonge Street	31%	29%	39%
5	West of Bayview Avenue	23%	29%	48%

Table 10-4 shows the total traffic volumes and level of congestion across the screenlines, by direction. All screenlines are approaching or are over capacity in both directions, except for Screenline 2 in the southbound direction. In the northbound direction, all three screenlines are over capacity, with Screenlines 1 and 3 significantly over capacity (V/C > 1.3). This illustrates the significant worsening of

traffic conditions that is expected to result from the increased density of development in RHC and Langstaff due to the aforementioned EMZO and the Bridge TOC.

Table 10-4. Screenline Volumes and Capacity

#	Screenline	NB/EB			SB/WB		
		Volume	Capacity	V/C	Volume	Capacity	V/C
1	E-W: South of 16th Avenue	6,500	4,700	1.39	4,700	4,700	0.99
2	E-W: North of High Tech Road	7,000	6,800	1.02	4,500	6,800	0.66
3	E-W: South of Highway 7	7,200	5,400	1.34	5,400	5,400	1.00
4	N-S: East of Yonge Street	5,800	6,400	0.91	5,600	6,400	0.87
5	N-S: West of Bayview Avenue	7,700	8,100	0.95	7,700	8,100	0.95

V/C<0.85	V/C 0.85-1	V/C >1
Under Capacity	Approaching Capacity	Over Capacity

10.2.6.2 Future Intersection Capacity Analysis

The 2041 traffic operation conditions for the weekday PM peak hour were assessed for the following intersections with locations shown in **Figure 10-11:**

- Yonge Street & 16th Avenue / Carrville Road
- Yonge Street & Oak Avenue / Northern Heights Drive
- Yonge Street & Scott Drive / Bantry Avenue
- Yonge Street & Westwood Lane / Beresford Drive
- Yonge Street & High Tech Road
- Yonge Street & Yonge/Hwy 7 connector
- Yonge Street & Highway 407 Westbound Off-Ramp
- Yonge Street & Langstaff Road East / Highway 407 Eastbound Off-Ramp
- Bantry Avenue & Red Maple Road
- High Tech Road & Red Maple Road
- High Tech Road & Street A
- High Tech Road & Red Cedar Avenue
- High Tech Road & Silver Linden Drive

- Garden Avenue Extension & Silver Linden Drive
- Highway 7 & Silver Linden Drive
- Garden Avenue Extension & Red Cedar Avenue
- Garden Avenue Extension & Red Maple Road
- Highway 7 & Red Maple Road
- Highway 7 & Yonge/Hwy 7 connector
- Street A & Yonge/Hwy 7 connector
- Langstaff Road East & Cedar Avenue

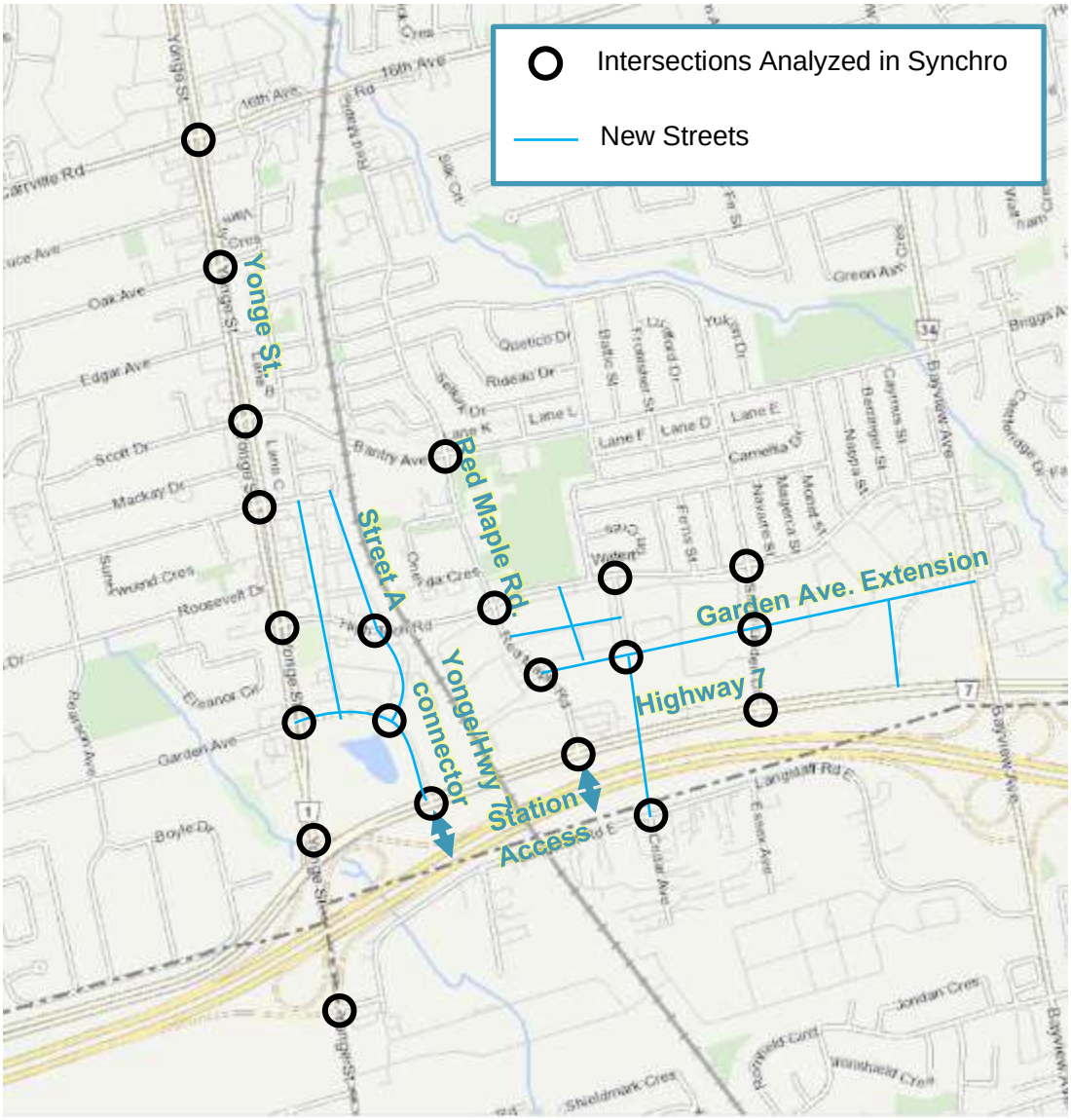


Figure 10-11. Intersections Analyzed in Synchro

10.2.6.3 Assumptions

The traffic analysis presented in this section considers the following assumptions, including lane configurations and traffic control.

The following lane configurations for new roads were assumed for the 2041 Synchro analysis:

- Garden Avenue Extension (east of the railway) is assumed to have a 2-lane cross-section;
- Street A (adjacent to the rail corridor) is assumed to have a 2-lane cross-section;
- The Yonge/Hwy 7 connector is assumed to have a 4-lane cross section;
    - However, to test the potential for flexibility in street operations, such as the usage of curbside lanes for parking, a scenario that only has

one lane on the eastbound approach to Yonge was assessed in Synchro.

- Cedar Avenue is assumed to have a 2-lane cross-section;
- The south leg at Highway 7 & Yonge/Hwy 7 connector is assumed to be a station access point with a 2-lane cross-section, while the north leg through-lane is assumed to be bus-only;
- The south leg at Highway 7 & Red Maple Road is assumed to be a station access point with a 2-lane cross-section;
- Garden Avenue Extension & Red Maple Road is assumed to have a dedicated southbound left-turn lane; and
- Dedicated left-turn lanes are assumed along Garden Avenue Extension.

Unless otherwise stated, lane configuration assumptions were carried forward from the 2021 TAR.

The following new intersections are assumed to be signalized and circled in **Figure 10-11**:

- Street A & Yonge/Hwy 7 connector;
- Garden Avenue Extension & Red Maple Road;
- Garden Avenue Extension & Red Cedar Avenue;
- Garden Avenue Extension & Silver Linden Drive;
- Langstaff Road East & Cedar Avenue;
- High Tech Road & Red Cedar Avenue; and
- High Tech Road & Street A.

Traffic signal timings were optimized to reflect future conditions using the built-in Synchro algorithms, plus manual adjustments where required to provide improved level of service or v/c ratios for priority movements. Cycle lengths, clearance times, and offsets were not adjusted relative to the existing signal timing plans at all locations, as it was assumed that the existing clearance times are sufficient, and modifications to the cycle lengths or offsets may negatively impact corridor-wide traffic operations. Advanced left-turn phases were introduced where necessary to improve traffic operations. Bus-only phases were not included in the Synchro analysis, as the north-south transit phases along Yonge Street run concurrently to the vehicle phases.

10.2.6.4 2041 Traffic Turning Movement Volumes

For the currently existing intersections, the future 2041 PM peak hour traffic volumes were estimated using a bi-proportional balancing methodology (as referred to in

NCHRP Report 255). During this process, the traffic growth rates between existing (2011) and future (2041) models were calculated for each of the intersection approaches; these traffic growth rates were then applied to the existing (2019) traffic counts to estimate the future expected traffic volumes approaching and leaving the intersection. The bi-proportional balancing methodology was used to estimate the future turning movement volumes considering existing traffic patterns and expected traffic volumes approaching and leaving the intersection, via a multi-iteration calculation process.

For the new intersections without existing counts and existing modelled volumes available, the 2041 PM peak hour traffic volumes were derived from the future EMME modelling outputs. The estimated future 2041 traffic volumes for all the analyzed intersections in the recommended scenario are presented in **Appendix Q**.

10.2.6.5 Proposed Mitigation Measures

With the assumptions stated above, the intersections of Langstaff Road East & Cedar Avenue, Yonge Street & Scott Drive / Bantry Avenue, and Yonge Street & Westwood Lane / Beresford Drive have capacity constraints. To address this, the following preliminary mitigation measures are recommended:

- At Langstaff Road East & Cedar Avenue, a dedicated eastbound left-turn lane with a storage of 160 metres with a protected and permissive eastbound left-turn phase;
- At Langstaff Road East & Cedar Avenue, a dedicated westbound right-turn lane with a storage of 40 metres;
- At Yonge Street & Scott Drive / Bantry Avenue, a protected and permissive eastbound left-turn phase; and
- At Yonge Street & Westwood Lane / Beresford Drive, a protected and permissive eastbound left-turn phase.

Note that these mitigation measures are recommended based on a preliminary Synchro analysis. The purpose of these recommendations is to provide conservative results, i.e. based on a hypothetical best case scenario; if these recommendations are not implemented, traffic conditions would worsen compared to the results shown below. Further monitoring and evaluation would be required prior to implementing these recommendations. Additionally, some of these recommendations are located within the City of Markham and are largely caused by growth in the Langstaff neighbourhood. Due to their geographic location, these improvements would not be implemented by the City of Richmond Hill.

Additional required improvements such as protected turning lanes may be required over the course of development, as specific development sites within the RHC may impact intersection demands. Therefore, the above list of proposed mitigation

measures should be reviewed and updated as needs arise due to additional traffic generated by specific developments. These needs and improvements should be driven and delivered through development as identified through site specific traffic impact studies at the implementation stage.

These mitigation measures were implemented in the 2041 Synchro model for the PM peak hour. The results of this analysis are presented in the next section. While these mitigations improve intersection performance as modelled in Synchro, network-wide congestion as modelled in Emme are more effectively alleviated by mode shift and TDM measures.

10.2.6.6 2041 Traffic Operations

The future traffic operations for the weekday PM peak hour were assessed for 21 intersections within the transportation analysis study area.

Level of Service (LOS) is based on the average control delay per vehicle for a given movement. Delay is an indicator of how long a vehicle must wait to complete a movement and is represented by a letter between 'A' and 'F', with 'F' being the longest delay, as described in **Table 10-5**.

Critical turning movements involve the following measures:

- Through or shared-through movement with v/c of 0.85 or above;
- Exclusive turning movement with v/c of 1.0 or above; and/or
- Any movement with a LOS 'E' or worse.

Queue lengths are considered critical if they exceed the available storage length. Detailed queueing results are presented in **Appendix R,** and detailed LOS and v/c ratios for each turning movement are summarized in **Appendix S**.

Table 10-5. Description of LOS

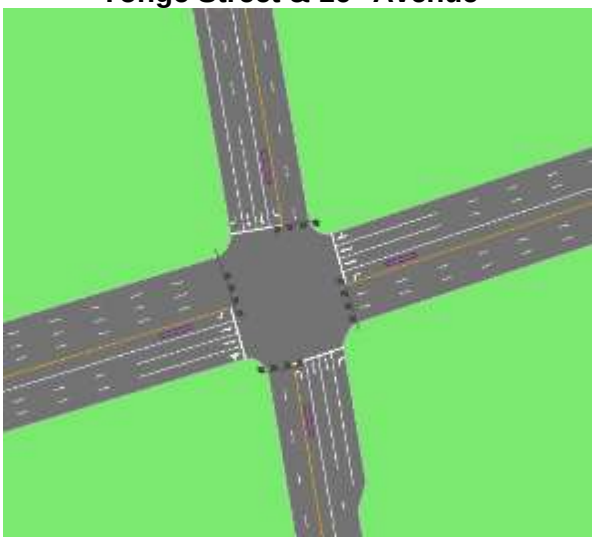
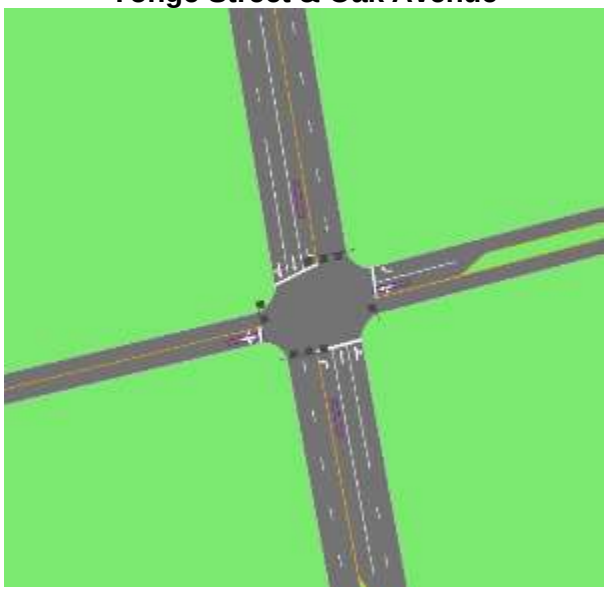
L.O.S.	Control Delay Per Vehicle (seconds)	
	Signalized Intersections	Unsignalized Intersections
A	≤ 10	≤ 10
B	>10 and ≤20	>10 and ≤15
C	>20 and ≤35	>15 and ≤25
D	>35 and ≤55	>25 and ≤35
E	>55 and ≤80	>35 and ≤50
F	>80	>50

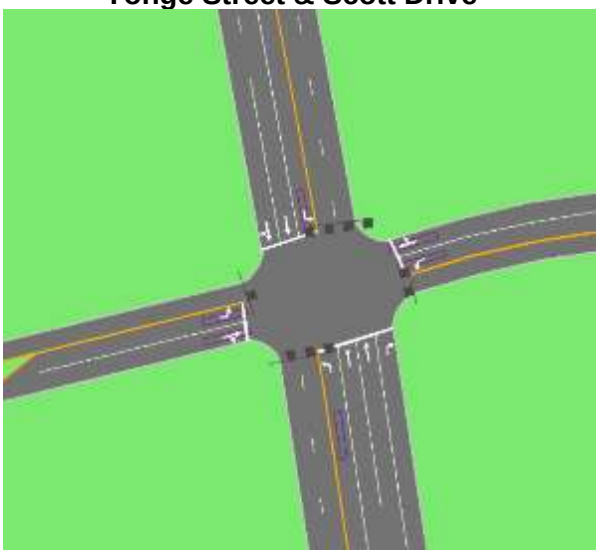
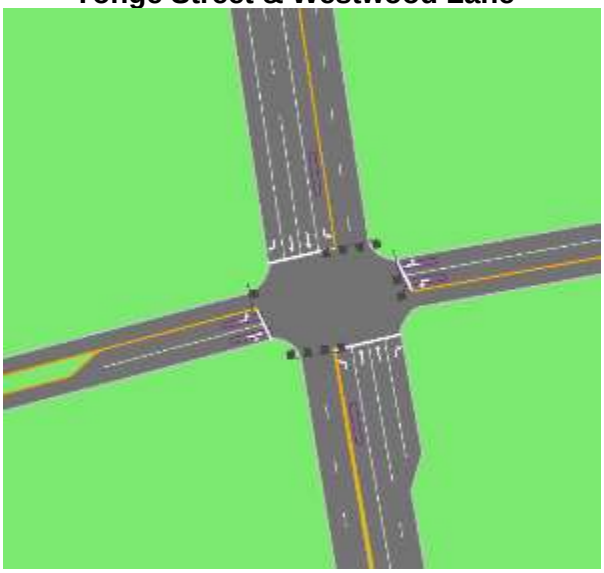
A comparatively low V/C associated with high delays (LOS 'E' or worse) indicates that the traffic experiences delay due to the limited green time provided in each cycle. This situation is typically found at fully protected left turns, where the cycle length is comparatively longer and green time available to the turning movements is constrained by the high through volumes, as seen for the north-south left turns along

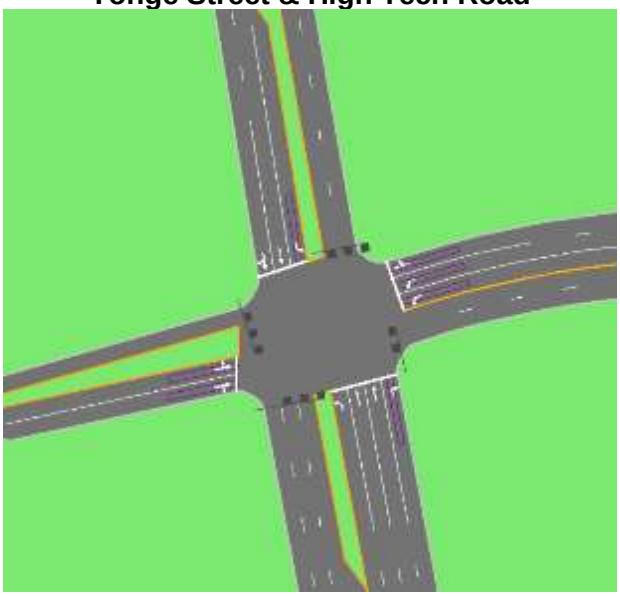
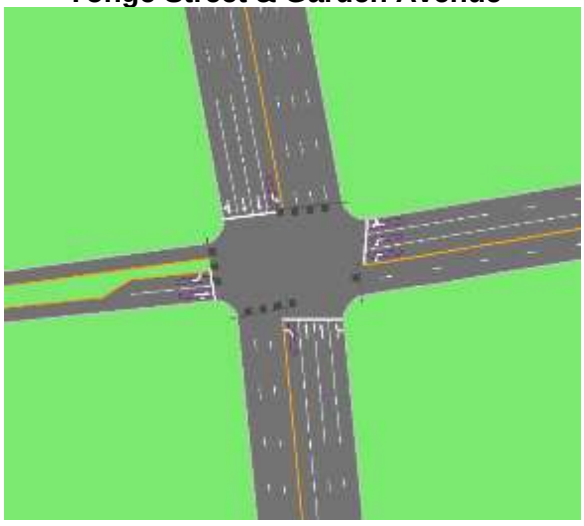
Yonge Street. This situation is also found for the east-west left turns along Yonge Street, where the cycle lengths are comparatively longer than the green time available for these movements.

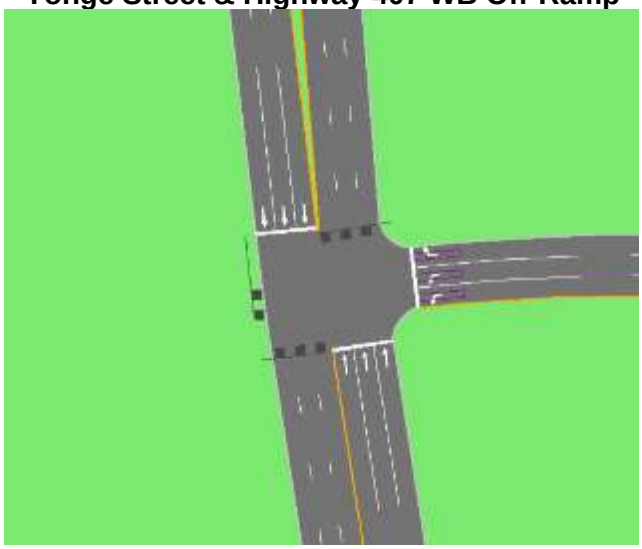
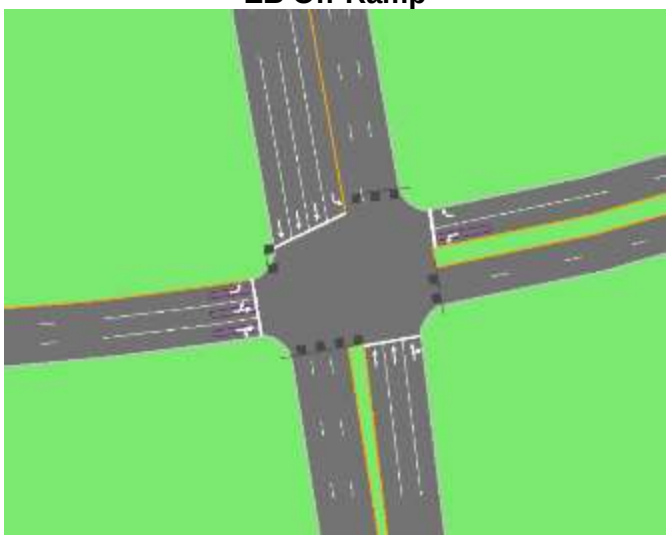
The lane configuration, overall intersection Level of Service (LOS), critical movements, and critical 95th percentile queue lengths based on the assumptions and proposed preliminary mitigation measures are summarized in **Table 10-6.**

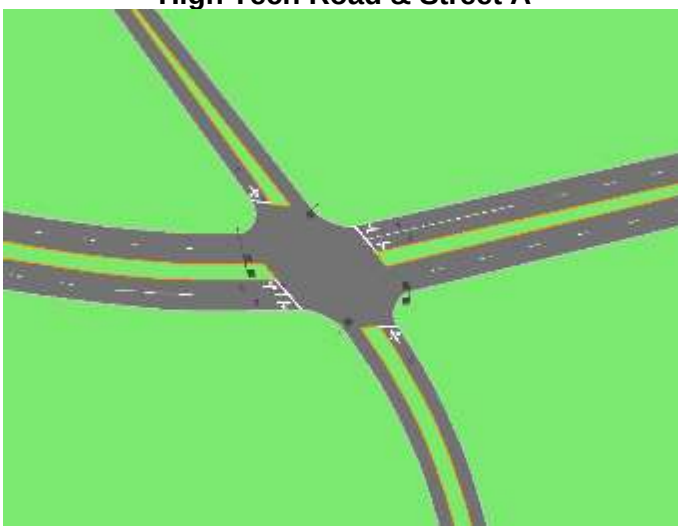
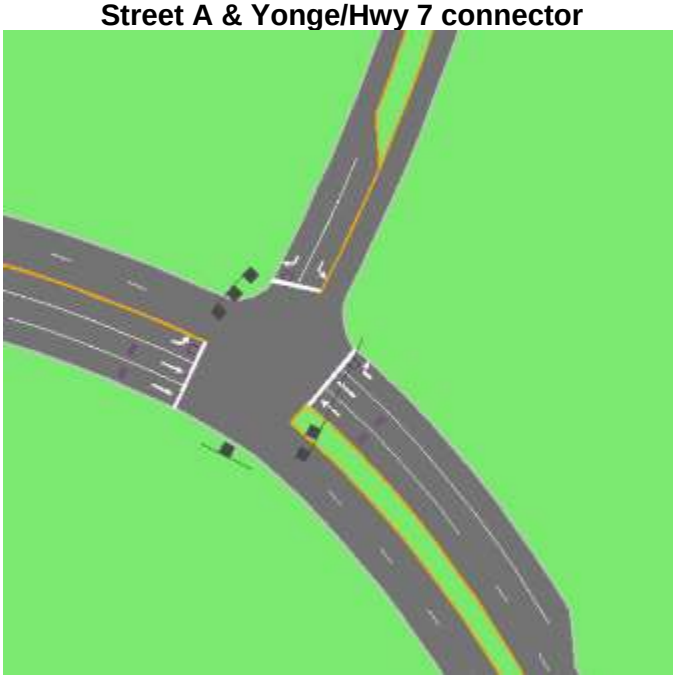
Table 10-6. 2041 Conditions – Critical Turning Movement Summary and Lane Configuration

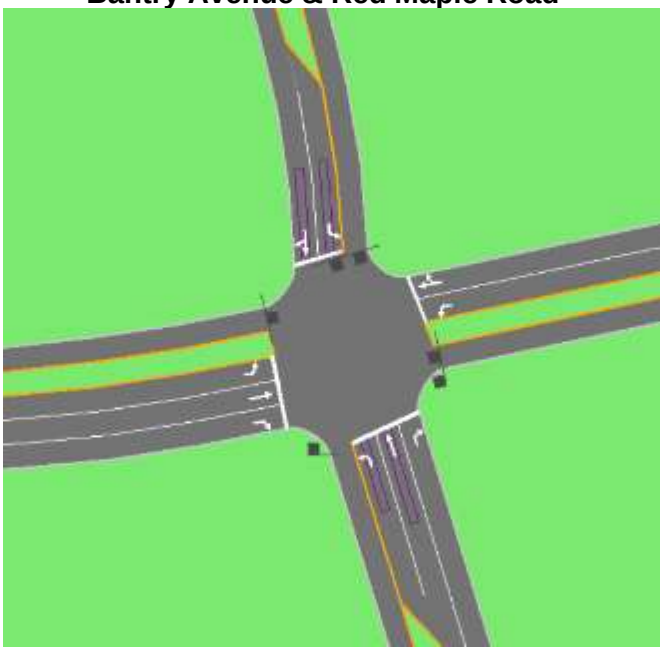
Intersection Lane Configuration (North Up)	2041 PM Peak Hour	
	LOS	Critical Movements v/c, LOS, and Control Delay
Yonge Street & 16th Avenue 	F	EBL v/c = 1.02; F (108.8s) EBT v/c = 1.16; F (125.5s) WBL v/c = 1.33; F (210.7s) WBT v/c = 1.01; E (72.9s) NBL v/c = 1.01; F (110.7s) NBT v/c = 1.04; F (82.3s) SBL v/c = 1.22; F (185.3s) SBT v/c = 0.89; D (52.1s)
Yonge Street & Oak Avenue 	B	EBT v/c = 0.76; E (62.7s) WBT v/c = 0.92; F (135.8s) NBL v/c = 0.66; E (61.7s) SBL v/c = 0.18; E (60.5s)

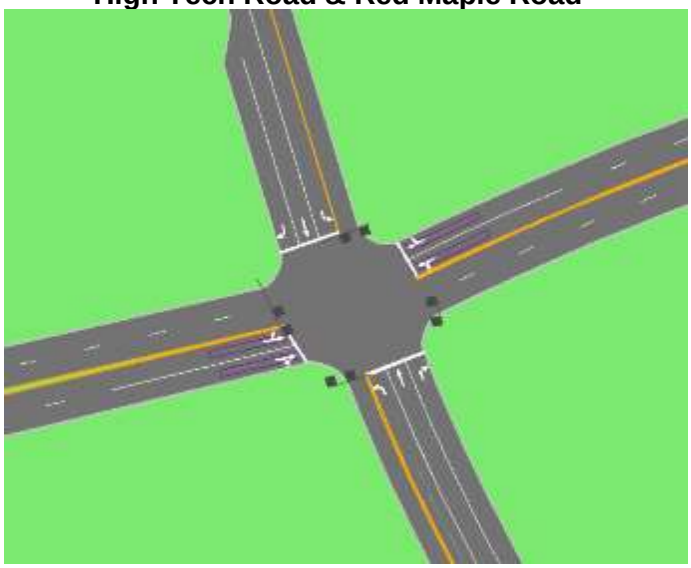
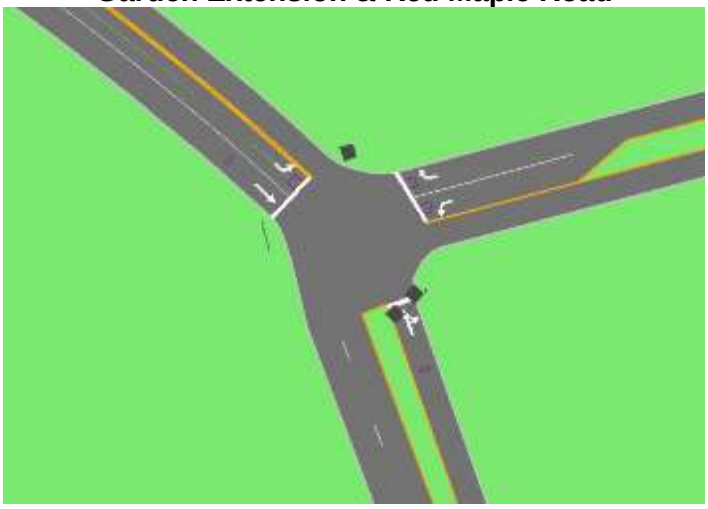
Intersection Lane Configuration (North Up)	2041 PM Peak Hour	
	LOS	Critical Movements v/c, LOS, and Control Delay
Yonge Street & Scott Drive 	D	EBL v/c = 0.81; E (74.2s) WBT v/c = 1.07; F (110.5s) NBL v/c = 0.7; F (88.3s) NBT v/c = 0.93; C (32.1s) SBL v/c = 0.97; F (129.7s) SBT v/c = 0.98; D (50.7s)
Yonge Street & Westwood Lane 	D	EBL v/c = 0.88; F (81.8s) WBT v/c = 0.96; E (68.4s) NBL v/c = 0.61; E (76s) SBL v/c = 0.83; F (85.7s) SBT v/c = 0.86; C (25s)

Intersection Lane Configuration (North Up)	2041 PM Peak Hour	
	LOS	Critical Movements v/c, LOS, and Control Delay
Yonge Street & High Tech Road 	C	EBT v/c = 0.66; E (60.8s) WBL v/c = 0.94; F (92.3s) SBL v/c = 0.75; F (87.3s); 109.2m EBT v/c = 0.93; E (63.5s) WBL v/c = 0.98; F (100.1s) NBT v/c = 0.87; C (26.4s) SBL v/c = 0.75; F (89.8s)
Yonge Street & Garden Avenue 	E	EBL v/c = 0.46; F (80.9s) EBT v/c = 0.91; E (65.1s) WBL v/c = 1.09; F (117.6s) NBL v/c = 1.07; F (106.6s) NBT v/c = 0.98; D (45s) SBL v/c = 0.92; F (102s) SBT v/c = 1.08; F (94s)

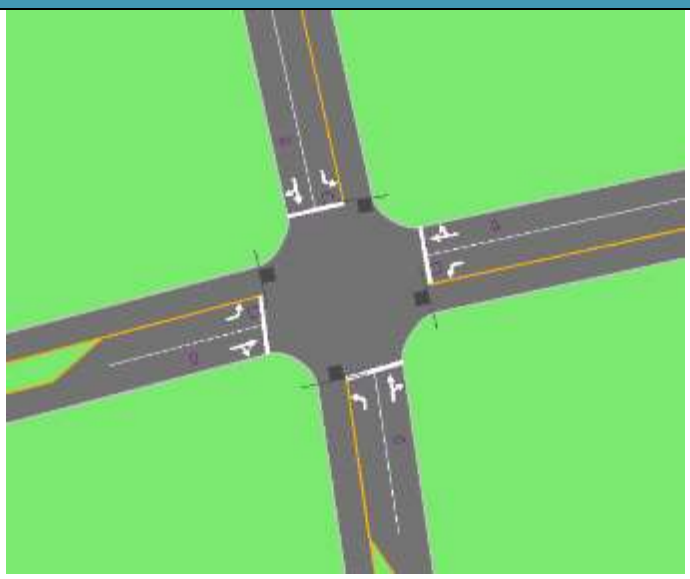
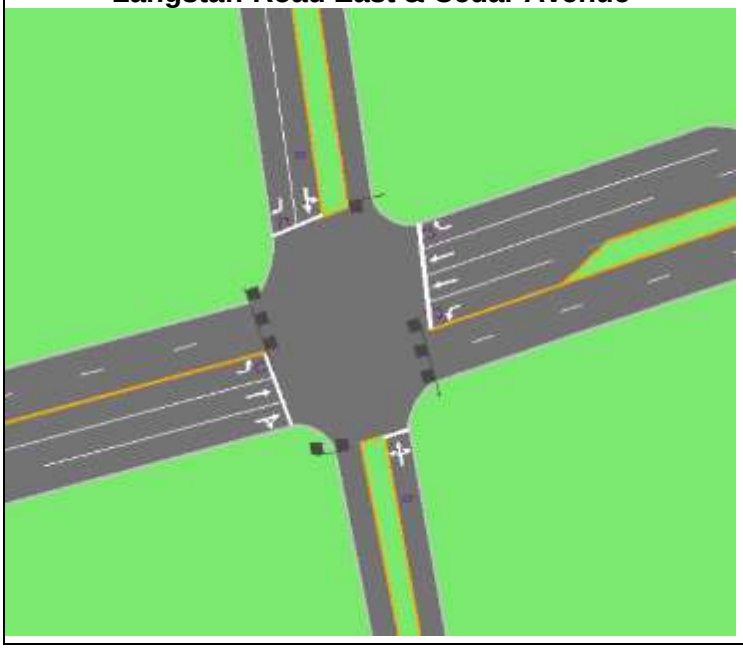
Intersection Lane Configuration (North Up)	2041 PM Peak Hour	
	LOS	Critical Movements v/c, LOS, and Control Delay
Yonge Street & Highway 407 WB Off-Ramp 	D	WBR v/c = 0.96; E (71.8s) NBT v/c = 0.92; C (34.2s) SBT v/c = 0.89; C (30.9s)
Yonge Street & Langstaff Road East / Highway 407 EB Off-Ramp 	F	EBL v/c = 0.91; F (81.6s) EBT v/c = 0.89; E (66.3s) WBL v/c = 1.38; F (233.5s) WBR v/c = 2.01; F (482.2s) NBT v/c = 1.6; F (309s) SBL v/c = 2.33; F (627.2s)

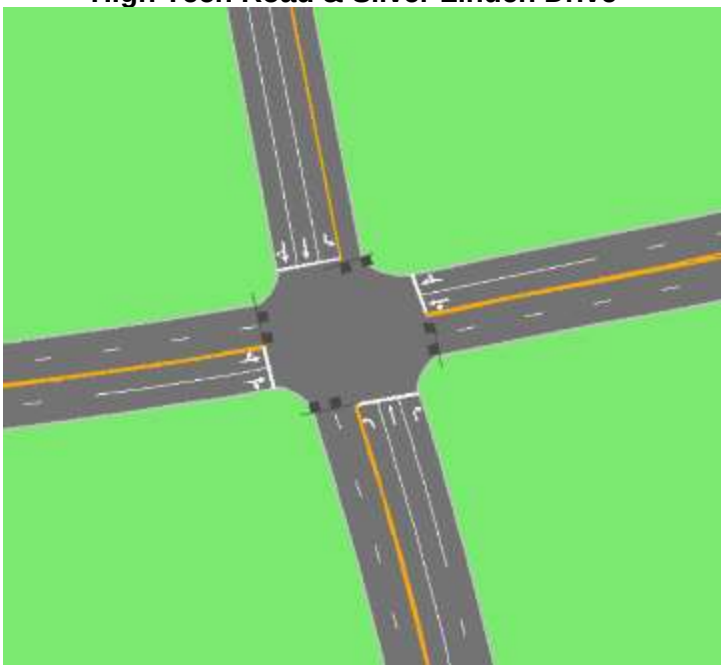
Intersection Lane Configuration (North Up)	2041 PM Peak Hour	
	LOS	Critical Movements v/c, LOS, and Control Delay
High Tech Road & Street A 	**B**	**No Critical Movements**
Street A & Yonge/Hwy 7 connector 	**B**	**No Critical Movements**

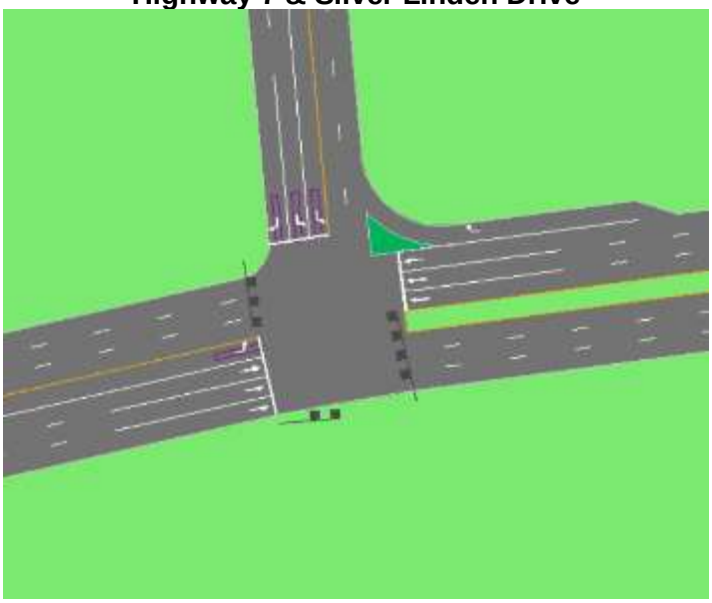
Intersection Lane Configuration (North Up)	2041 PM Peak Hour	
	LOS	Critical Movements v/c, LOS, and Control Delay
Highway 7 & Yonge/Hwy 7 connector 	E	EBL v/c = 1.27; F (178.7s) EBT v/c = 0.97; D (44.6s) WBT v/c = 1.1; F (95.1s) SBL v/c = 1.28; F (172s)
Bantry Avenue & Red Maple Road 	B	No Critical Movements

Intersection Lane Configuration (North Up)	2041 PM Peak Hour	
	LOS	Critical Movements v/c, LOS, and Control Delay
High Tech Road & Red Maple Road 	E	EBT v/c = 1.08; E (79.9s) WBT v/c = 0.99; D (49.4s) NBL v/c = 0.98; F (80.3s) SBL v/c = 0.76; E (75.6s)
Garden Extension & Red Maple Road 	C	WBL v/c = 0.75; E (70.3s)
Highway 7 & Red Maple Road	D	EBL v/c = 1.02; F (96.7s) WBT v/c = 0.98; D (52.5s) SBL v/c = 0.68; E (62.7s)

Intersection Lane Configuration (North Up)	2041 PM Peak Hour	
	LOS	Critical Movements v/c, LOS, and Control Delay
		
High Tech Road & Red Cedar Avenue 	**B**	**No Critical Movements**
Garden Extension & Red Cedar Avenue	**F**	**EBT v/c = 0.89; D (36.2s)** **WBL v/c = 1.46; F (250s)** **NBL v/c = 0.98; E (70.2s)** **NBT v/c = 1.39; F (212.5s)** **SBL v/c = 0.81; F (117.4s)**

Intersection Lane Configuration (North Up)	2041 PM Peak Hour	
	LOS	Critical Movements v/c, LOS, and Control Delay
		
Langstaff Road East & Cedar Avenue 	**D**	**EBL v/c = 1.09; F (89.3s)** **SBT v/c = 1.03; E (79.5s)**

Intersection Lane Configuration (North Up)	2041 PM Peak Hour	
	LOS	Critical Movements v/c, LOS, and Control Delay
High Tech Road & Silver Linden Drive 	**C**	**WBT v/c = 0.97; D (39.4s)** **SBL v/c = 0.56; E (57.6s)**
Garden Extension & Silver Linden Drive 	**B**	**No Critical Movements**

Intersection Lane Configuration (North Up)	2041 PM Peak Hour	
	LOS	Critical Movements v/c, LOS, and Control Delay
Highway 7 & Silver Linden Drive 	**C**	**WBT v/c = 1.01; D (53.2s)** **SBL v/c = 0.64; E (56.2s)**

Intersections within the transportation analysis study area are expected to be operating at LOS 'D' or better at an intersection level during the PM peak hour, with exceptions at the following six intersections:

- Yonge Street & 16th Avenue;
- Yonge Street & Garden Avenue;
- Yonge Street & Langstaff Road East / Highway 407 EB Off-Ramp;
- Highway 7 & Yonge/Hwy 7 connector;
- High Tech Road & Red Maple Road; and
- Garden Avenue Extension & Red Cedar Avenue.

The overall intersection LOS for all 21 intersections during the PM peak period are summarized in **Figure 10-12.**

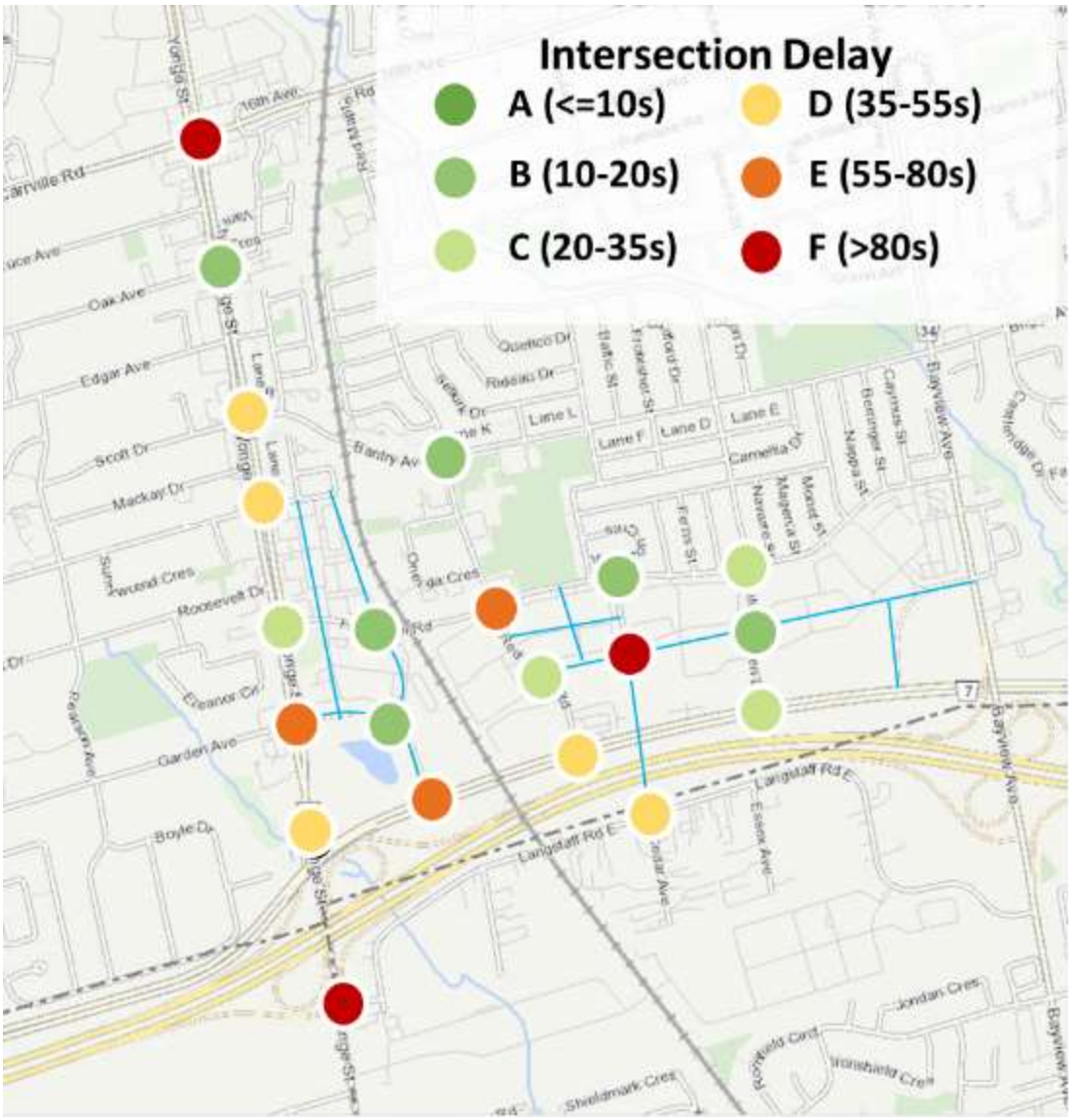


Figure 10-12. Intersection Delay and LOS for All Intersections

10.2.6.7 Transit Priority Considerations

Further to input from York Region Transit, it is recognized that up to 150 buses in the peak period will utilize the Highway 7 to Yonge Street Connector to access Bridge Station. We note that there were no bus-only phases included in the Synchro analysis. Since the existing north-south transit phases along Yonge Street run concurrently to the vehicle phases, no additional delay is anticipated at the intersections along Yonge Street. However, if transit priority measures such as bus-only phases are implemented at any other intersections to enable other movements, this would increase auto delay and result in lowered LOS at any affected intersections. Further study through the Yonge North Subway Extension project should consider these impacts in more detail.

10.3 Transportation Recommendations, Implementation, and Phasing

The updated recommended concept includes increased development densities and a revised road network in the RHC and Bridge TOC lands. The proposed road network in the draft RHC SP area features a relatively dense network of streets and paths designed for multimodal connectivity to maximize access to and from multiple transit services. As such, the recommended scenario should promote a shift away from auto modes which are enabled by the recommended concept land use and transportation plan. However, additional measures would be needed to support this shift away from auto modes, as outlined below.

The transportation analysis results show that the additional demand resulting from the increased land use densities outlined by the EMZO and Bridge TOC cause a significant increase in traffic congestion. Although it would be possible to increase the road network capacity through measures such as road widening and changes to traffic signal timings, these would not only be insufficient to fully address worsened traffic conditions but would also oppose the vision of RHC as a walkable and bikeable community. Instead, it is recommended to focus on Travel Demand Management (TDM) strategies which will encourage mode shifts away from auto modes and toward transit and active modes.

Note that the below recommendations are based on results of analysis focusing on the RHC SP area. However, these recommendations are subject to updates based on coordination efforts with other nearby initiatives, such as the Bridge TOC, High Tech TOC, and the YNSE.

10.3.1 Continuing to Carry Forward Previous TAR Transportation Recommendations

The full list of recommendations from the 2021 TAR is available in **Section 8.** This addendum supports the recommendations outlined in the 2021 TAR, particularly those focusing on TDM.

Moving forward, it is recommended to focus on the following TDM strategies from the previous 2021 TAR:

- Continuing to promote a fine-grained street and movement network, promoting additional paths of movement for all modes to increase connectivity and provide alternate paths for all modes.
- Making use of mid-block connections for active modes so that the active transportation street grid can be denser than the auto street grid.
- Implementing the proposed pedestrian and cycling crossing over the rail corridor north of High Tech Road.
- Ensuring continuity of active transportation infrastructure throughout the RHC SP area.

- Prioritizing active modes in street and intersection design, particularly safety of pedestrians, cyclists, and other wheeled users, to ensure walkability and safety are not sacrificed for auto movement efficiency.
- Incentivizing site design which prioritizes transit and active transportation access.
- Developing parking strategies which contribute to mode shift from auto modes to transit and active modes.
- Ensuring that active modes are provided the connectivity they need, especially across major barriers such as rail corridors, as they are more impacted by detours than vehicular modes.
- Implementing the City's ongoing Parking and TDM Strategy for New Developments to require developers to identify a TDM plan and implementation strategy, including monitoring and follow-up protocols, for new developments within the RHC SP area.
- Implementing the Mobility Hub concept throughout the RHC SP area to improve integration of multiple modes of travel.
- Mitigating infiltration of cut-through traffic on local streets through various modal prioritization and traffic calming and enforcement measures.
- Supporting the development of and coordinating with other major transit services in this area, including:
    - Regional GO Expansion and GO bus routes,
    - The YNSE and future expansions thereof,
    - vivaNext BRT on Highway 7 and Yonge Street, and
    - The 407 transitway, proposed to begin as BRT with potential to upgrade to LRT.

Further details on implementing and phasing these recommendations are provided in the 2021 TAR, which can be viewed in **Section 9.** In addition to the above measures, future transportation solutions and projects can be considered in conjunction with the findings of this study as they arise.

Note that the conceptual road cross-sections presented in **Figure 8-3, Figure 8-4, Figure 8-5, Figure 8-6,** and **Figure 8-7** may not be consistent with the most recently published City standard cross-sections.

A crucial component of TDM is providing transportation infrastructure that makes travel by active modes convenient, safe, and comfortable. Thus, when designing roads, intersections, or site plans, it is essential for designs to incorporate and promote pedestrian and cycling movements to the greatest extent possible, especially if the sites include challenges such as complicated grading that would otherwise impede pedestrian or cycling mobility. Continuity should be maintained throughout the active mode network not only horizontally but also vertically.

10.3.2 New Transit Priority Recommendations

A new recommendation is to include transit priority measures (TPM) on the Yonge/Hwy 7 connector. Although the full build-out transit service planned for Highway 7 and Yonge Street is yet to be finalized, the connector road is expected to be the primary access route for York Region Transit (YRT) bus services to access the Bridge Station Terminal. As such, it is estimated that this connector road will be used by up to 150 buses per hour in both directions during the rush hour based on early works for the YNSE. To accommodate this high volume of bus traffic, TPM such as transit signal priority and bus-only lanes to ensure transit riders are adequately able to access the Bridge Station via bus modes, are recommended.

10.3.3 Rail Crossing Recommendation

An essential component of promoting mode shift away from auto modes toward transit and active modes is developing a highly connected and fine-grained street and movement network. It is particularly important to improve pedestrian and cycling access over the rail corridor, which represents a major barrier to east-west movement within the RHC SP area.

To promote transit and active modes within the RHC, it is strongly recommended to implement multimodal or pedestrian and cycling focused crossings over the rail corridor. An example would be the Garden Avenue extension rail crossing, which was previously recommended but removed in accordance with network assumptions provided by the EMZO. With the increased densities that will be generated from the EMZO, there is even more need for additional east-west connections across the rail corridor than originally projected when this recommendation was made.

A detailed sensitivity test analysing the potential benefits of the Garden Avenue extension was conducted for the 2021 TAR, the results of which can be viewed in **Section 7.4.2.** Although those findings are no longer consistent with the RHC SP addendum as the previous sensitivity did not include EMZO assumptions, the findings are still useful. In the absence of the Garden Avenue crossing, significant vehicular traffic would be diverted to other east-west roads, particularly the other crossings over the rail corridor. With the increased densities and congestion resulting from the EMZO, it is likely that the Garden Avenue extension and crossing would provide greater traffic benefits than were noted in the previous analysis.

Ideally, the rail crossing can be implemented as a continuous, multimodal east-west street supporting both active and auto modes, as previously recommended and shown in **Figure 7-2.** At minimum, it is recommended to be implemented as a pedestrian and cycling connection. A crossing which meets the Yonge/Hwy 7 connector in the currently proposed T-intersection would support the network envisioned by the High Tech TOC project and makes sense if the crossing is intended to be more for local access and circulation. To promote mode shift away from auto modes, it should be designed as a highly multimodal connection that allows for vehicle movements but prioritizes pedestrians and active transportation.

It is also important to consider how to support the development of the Garden Avenue extension, among other similar potential road improvements, moving forward. As the RHC SP area is developed, traffic patterns should be continuously monitored to allow the assessment of developing transportation needs and the development of updated solutions, such as this crossing. Due to the importance of this crossing to active transportation and east-west connectivity within the RHC SP area, it is also recommended for any future studies in this area to include assessments of the need for the Garden Avenue extension.

As previously identified in the 2021 TAR, the Development Charges (DC) Act is a mechanism for generating funding to support the required infrastructure that result from developments without placing the burden entirely on existing tax-payers. The need for a rail crossing at Garden Avenue has been considered in the collection of development charges, which builds financial resources to support its implementation.

10.3.4 High Tech Road Cycling Facilities

Encouraging a mode shift away from auto modes and toward active modes requires robust active transportation infrastructure, especially a fine-grained, well-connected active transportation network to make active modes as safe, attractive, and convenient for RHC residents as possible. Protected cycling facilities recommended for High Tech Road (**Section 8.5**) would provide a crucial east-west connection and rail crossing for cyclists between Yonge Street and Bayview Avenue and connecting to High Tech Station. While **Section 9.2** recommended a pilot project, the City may wish to also consider moving forward as soon as possible with a permanent solution, which aligns with the timing of YNSE construction. The implementation approach following the completion of this Secondary Plan, including the pilot program option is outlined as follows:

1. **Concept design study** to identify alternative cycling facility concepts and a functional design for dedicated on-road cycling facilities (both temporary and permanent) on High Tech Road, including public engagement with current and future residents of the RHC to ensure the selected alternative sufficiently addresses their needs.
2. **Two-phased implementation through Pilot Program,** further to the concept design, implement a pilot program prior to YNSE construction using cost-effective measures such as temporary curbs, bollards, planter boxes or line painting. The decision to implement a Pilot Program may be driven by community input. A permanent solution would be implemented in through further detailed design and construction, in alignment with YNSE construction.
3. **Single-phase approach** maintains the current configuration of High Tech Road (based on community input) and proceeds directly to permanent implementation in alignment with YNSE construction.

10.3.5 Implementation and Phasing

The approximate planned phasing for development of the High Tech TOC (i.e., the EMZO lands) is shown in **Figure 10-13.** Note that this is a draft phasing plan and may be subject to change.

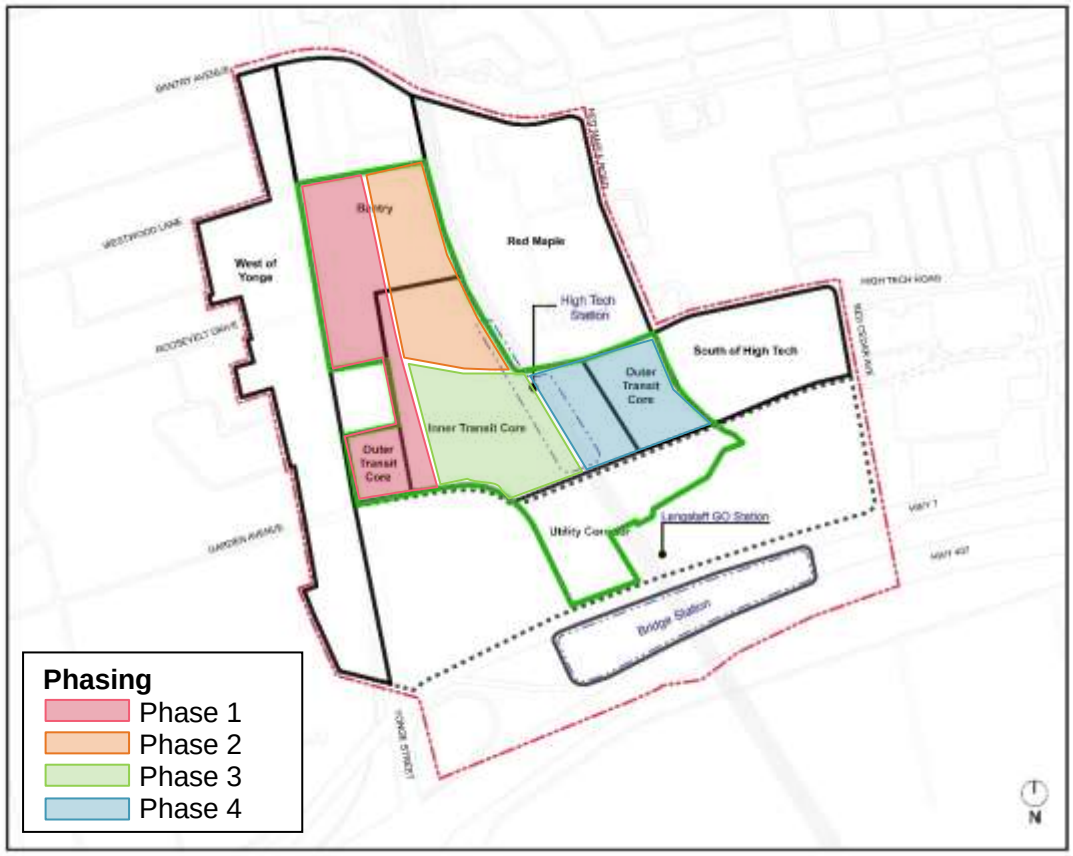


Figure 10-13. Planned Phasing for RHC Development

In general, phasing of RHC development densities should occur concurrently with or after the construction of the YNSE. This is to ensure that new residents of RHC have sufficient transit access to encourage a shift away from auto modes, even in the early stages of development.

To ensure that the long-term vision of RHC as a walkable and bikeable community is supported, any long-term or interim infrastructure implemented in the early stages of development should be implemented with a focus on active and transit transportation modes rather than auto modes. Additionally, all multi-modal infrastructure in the vicinity of the YNSE that can be reasonably implemented prior to the opening of the YNSE should be completed and available for use by the YNSE opening day. This may include but is not limited to micromobility hubs, bicycle storage facilities, cycling facilities on roads such as the High Tech Cycling Pilot Program, and multi-use trails such as the pedestrian and cycling spines outlined in **Figure 8-9**.

Construction of the YNSE should occur concurrently with installation of related projects, particularly those that fall within YNSE project limits, such as transit signal

priority (TSP) measures and off-street cycling facilities. The City should encourage Metrolinx to implement active transportation facilities within YNSE project limits, such as bicycle storage and parking facilities, micromobility hubs, and connections to the RHC pedestrian and cycling networks. Note that, as the YNSE study is in progress, the detailed plan and project list for the YNSE is yet to be finalized and the City should maintain communication with Metrolinx to ensure coordination between the development of the YNSE and RHC.

Following the construction of the YNSE and supporting infrastructure, infrastructure on collector streets should be implemented concurrently with nearby development. Supporting infrastructure may be delivered by the City or by the adjacent properties, depending on the specific conditions of each site. Infrastructure may include changes to the right-of-way, installation of off-street cycling facilities, improvements to pedestrian infrastructure, intersection improvements for active modes, and more.

The next step in implementation should be the implementation of local streets, private laneways, and midblock connections. This may occur concurrently with the implementation of collector street infrastructure. To promote a denser street grid network, it is recommended to require properties to include denser connections, particularly for cyclists and pedestrians, as a condition of site plan approval. These projects should be delivered by individual property developers.

The final step of implementation is the implementation of other programs, such as mobility hubs, the TIZ concept, and other projects. Delivery of these projects should be coordinated with York Region and should be based on findings from ongoing monitoring of RHC traffic conditions.

A summary of groups of projects to be implemented in the RHC, as well as jurisdictions responsible for delivery of each project, is provided in **Table 10-7.** The general approach to infrastructure delivery and responsibility should follow the City's Local Service Policy. Detailed project lists and implementation should be developed based on detailed phasing of development densities, results of the YNSE study, results of RHC traffic monitoring programs, and other relevant emerging information. Note that these phases represent broad areas of improvement and that the timelines of the phases could overlap.

Table 10-7. Summary of RHC Transportation Infrastructure Phasing and Implementation*

Phase*	Type of Projects	Jurisdiction Responsible for Delivery
1: Development of YNSE	YNSE and supporting transit projects, including TSP measures at intersections Cycling facilities within YNSE project limits	Collaboration between Metrolinx, York Region, property developers, and the City of Richmond Hill
2a: Development of RHC	Implement multimodal ROWs on major and minor collector roads, including: • Yonge/Hwy 7 connector • Red Cedar / Cedar Extension (York Region – EA complete) • High Tech Road (including Cycling Pilot Program) • Red Maple Road • Garden Avenue Extension (including potential rail crossing) Off-street cycling facilities (including intersection improvements)	Property developers, where applicable City of Richmond Hill York Region
2b: Development of RHC Properties	Local streets, private laneways, and midblock connections (all modes)	Property developers
3: Pilot Programs and Other Projects	High Tech Road Cycling Pilot Program Mobility Hub concept Transportation Innovation Zone	Collaboration between the City of Richmond Hill, York Region, and property developers as applicable
Ongoing	Monitoring	Collaboration between landowners, York Region, Metrolinx, and the City of Richmond Hill

* Detailed phasing plan to be developed upon finalization of recommended land use and street network schedules.

10.4 Summary

The purpose of this addendum was to update the 2021 Richmond Hill Centre Secondary Plan Transportation Analysis Report to address increased permitted development densities resulting from the 2022 Enhanced Minister's Zoning Order in Ontario Regulation 344/22 and from the planned Bridge Station Transit-Oriented Community (implemented through Ontario Regulation 345/22).

The updated transportation analysis focused on analysis of traffic volumes, congestion, and intersection-level delays in the vicinity of the Richmond Hill Centre Secondary Plan area, assuming full build-out conditions within this transportation

analysis study area and 2041 conditions elsewhere. The results of the analysis found that traffic volumes and congestion increased significantly as a result of the increased planned densities, with numerous corridors and screenlines approaching or exceeding capacity in all directions. Intersection-level delays also worsened, with the number of intersections experiencing LOS ‘E’ or worse increasing from five to six.

To mitigate these traffic problems, it is recommended to implement the Travel Demand Management strategies recommended in the previous transportation analysis report (2021 TAR) with a strong focus on promoting mode shift away from auto modes and toward transit or active modes. This can be done using strategies such as developing a fine-grained street network, ensuring connectivity of transit and active transportation infrastructure, and prioritizing transit and active modes in intersection and road cross-section designs.

An additional recommendation is to implement transit priority measures on the Yonge/Hwy 7 connector to ensure this critical connection is sufficiently able to serve buses accessing the Bridge Station bus terminal.

Finally, it is recommended to encourage the development of multimodal connections over the rail corridor, such as the previously proposed Garden Avenue extension rail crossing, to improve continuity and connectivity of the transportation infrastructure throughout the Richmond Hill Centre Secondary Plan area.