Yonge/Bernard Key Development Area

Peer Review and Transportation Assessment Update

FINAL

City of Richmond Hill

May 1, 2020

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1. Introduction

H.D.R. has been retained by the City of Richmond Hill ('the City') to conduct a Peer Review and Transportation Assessment Update of the *Yonge Street and Bernard Avenue Key Development Area Secondary Plan Transportation Considerations Report,* October 2017, prepared by B.A. Group. The findings and recommendations identified in this report will help guide the City's policy development in the *Draft Yonge and Bernard Key Development Area Secondary Plan* update. **Exhibit 1-1** illustrates the Yonge/Bernard Key Development Area (K.D.A.) boundary.

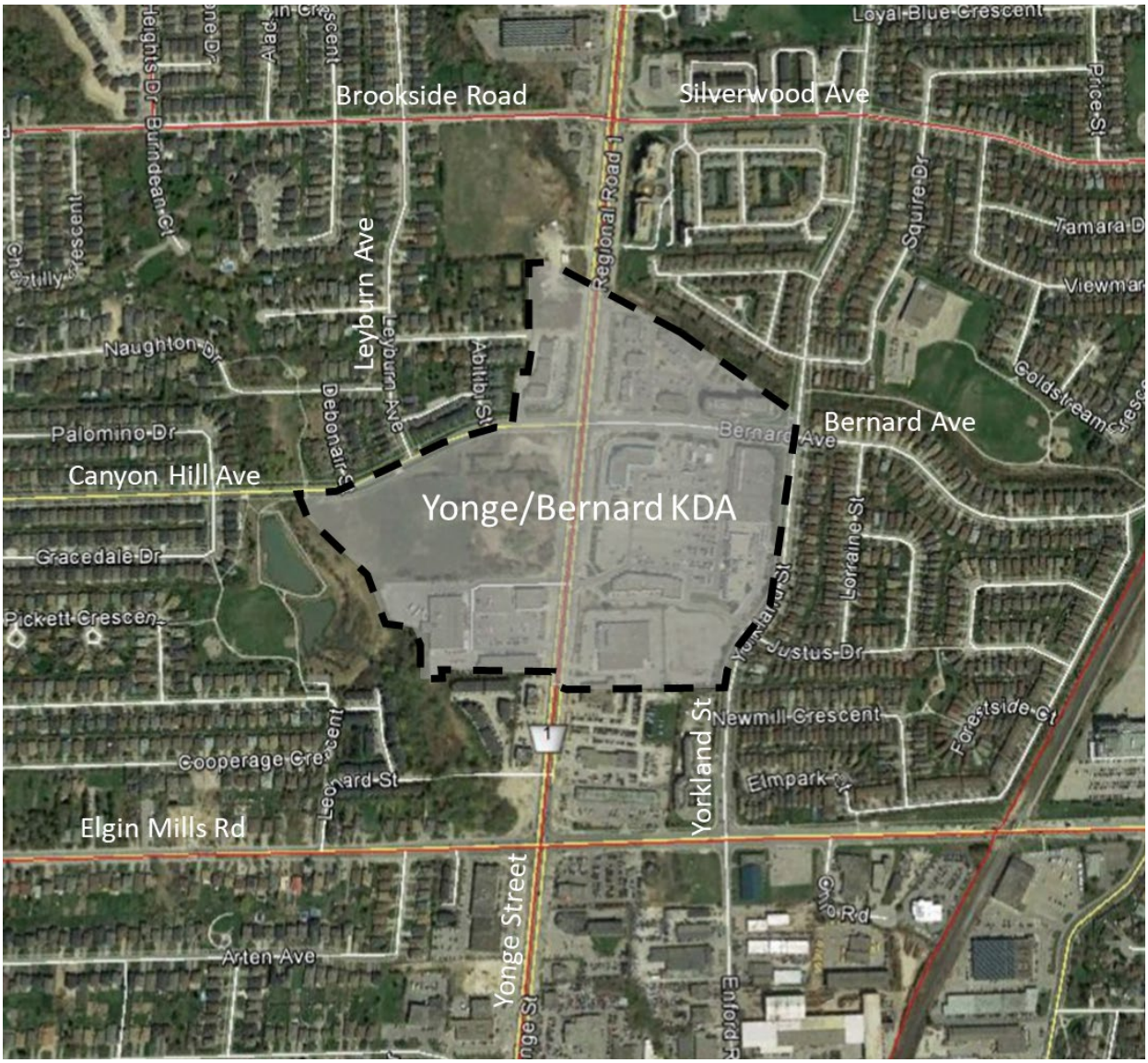


Exhibit 1-1: Yonge/Bernard K.D.A. Boundary

1.1 Project History

In October 2016, a Terms of Reference was issued for the completion of the Yonge/Bernard Planning Study, and a Secondary Plan and Implementing Zoning By-law Development Standards for the Yonge/Bernard Key Development Area (K.D.A.). An Interim Control By-law was adopted by Council in November 2016 to provide the City time to undertake a Secondary Plan and Zoning By-law that would implement the planning direction found in Part II of the Official Plan for the Yonge and Bernard Key Development Area Secondary Plan.

A number of landowner/stakeholder and Agency meetings were held to develop the vision and planning objectives for the K.D.A. Between March and July 2017, a background report and draft scenarios were developed and presented to the public through a workshop and Open House, where feedback was collected to further refine the development options. Following the Preferred Option Policy Direction Report, a Recommendations Report for the Secondary Plan and Zoning By-law was issued on July 4, 2017.

In November 2017 the Draft Secondary Plan and Zoning By-law was completed and adopted by Council. A number of appeals were submitted to the Local Planning Appeal Tribunal (L.P.A.T.) and in May 2019, Council passed a resolution indicating that the Secondary Plan and Zoning By-law shall be updated considering the Yonge/Bernard K.D.A. in the context of the following:

- The Municipal Comprehensive Review of the Regional Official Plan;
- The Richmond Hill Official Plan Update with a view to permitting height and density consistent with Provincial and Regional directions;
- Richmond Hill Centre remaining the top of the City's intensification hierarchy;
- Council wishing to set a more ambitious vision and development aspirations for the City's urban structure overall, including within the Yonge/Bernard K.D.A.; and,
- Current O.P. height and density is too constraining.

1.2 Study Purpose

The key direction from the Council resolution was to investigate greater height and density in the Yonge/Bernard K.D.A. with a renewed urban structure. The purpose of this report is to document the findings and recommendations of the Transportation Assessment Update based on the City's direction for higher density.

The Transportation Assessment Update included the following key considerations:

- An expanded study area to include major major-intersections surrounding the Yonge/Bernard K.D.A.;
- Updated analysis of pedestrian, cyclist, transit, and traffic operations under existing and future 2041 conditions with the Yonge/Bernard K.D.A.;
- A re-examination of the recommended transportation network improvements required to support higher density; and,
- Updated supporting recommendations in regard to parking strategies, Active Transportation, Transportation Demand Management (T.D.M.) strategies, and potential phasing of development based on timing of improvements.

The Peer Review of the *Yonge Street and Bernard Avenue Key Development Area Secondary Plan Transportation Considerations Report,* written by B.A. group, is documented under a separate cover; however, throughout this report there are references to the B.A. report assumptions, findings, and recommendations that are highlighted for comparison.

Table 1-1 provides a comparison of the high-level assumptions made in B.As report and assumptions made for the updated analysis as directed by the City. Land use type was calculated based on net K.D.A. land area.

Table 1-1: Assumptions Comparison Summary

Factor	Assumptions		
	B.A.	H.D.R.	H.D.R.
Density	3 F.S.I.	3 F.S.I.	4 F.S.I.
Land Use Types	90 / 10 Residential / Non-residential	80 / 20 Residential / Non-residential	80 / 20 Residential / Non-residential
Horizon Year for Analysis of Full Build-out of the K.D.A.	2031	2031	2041

A density of 4.0 F.S.I. was proposed by the City (based on updated land use forecasts for the K.D.A.) for transportation analysis of the higher density and year 2041 was selected as a more appropriate horizon year for which full-build-out of the K.D.A. could be achieved. With year 2031 only 11 years away, full-build out of the K.D.A. is unlikely, but 2031 can be a key milestone year for phasing and monitoring. Further information on the proposed density and land uses are provided in **Section 4.7.2.1**.

Key outcomes of this study addressed the following questions:

- Is a density of 4.0 F.S.I. supportable from a transportation capacity perspective?
- What transportation improvements, strategies, or policies are required to support 4.0 F.S.I.?
- What will the non-auto mode shares have to be in order to support 4.0 F.S.I.?
- If 4.0 F.S.I. is not supportable, what is the maximum F.S.I. that can be supportable?

1.3 Study Area

For the purpose of the transportation analysis, B.A. Group defined a study area surrounding the Yonge/Bernard K.D.A. to assess how future development within the Yonge/Bernard K.D.A. would impact traffic operations on the surrounding road network.

Given the proposed higher density for the Yonge/Bernard K.D.A. and public comments on downstream impacts (particularly at the Yonge Street / Major Mackenzie Drive intersection), it has been recommended to assess a primary study area (similar to the B.A. study) and an expanded secondary study area to understand the benefits and impacts that future road improvements may have on the Yonge/Bernard K.D.A. densities, as well as the impacts that Yonge/Bernard K.D.A. may have on the downstream transportation network.

In addition to the nine (9) primary intersections assessed in the B.A. study, proposed expanded secondary area will be bound by Bathurst Street, Gamble Road / 19th Avenue, Bayview Avenue, and Major Mackenzie Drive, and will include the following major intersections for capacity analysis:

- Bathurst Street & Gamble Road
- Bathurst Street & Elgin Mills Road
- Yonge Street & Gamble Rd/19th Avenue
- Yonge Street & Major Mackenzie Drive
- Newkirk Road & Elgin Mills Road
- Bayview Avenue & 19th Avenue
- Bayview Avenue & Elgin Mills Road

Exhibit 1-2 illustrates the Study Area and analysis intersections.

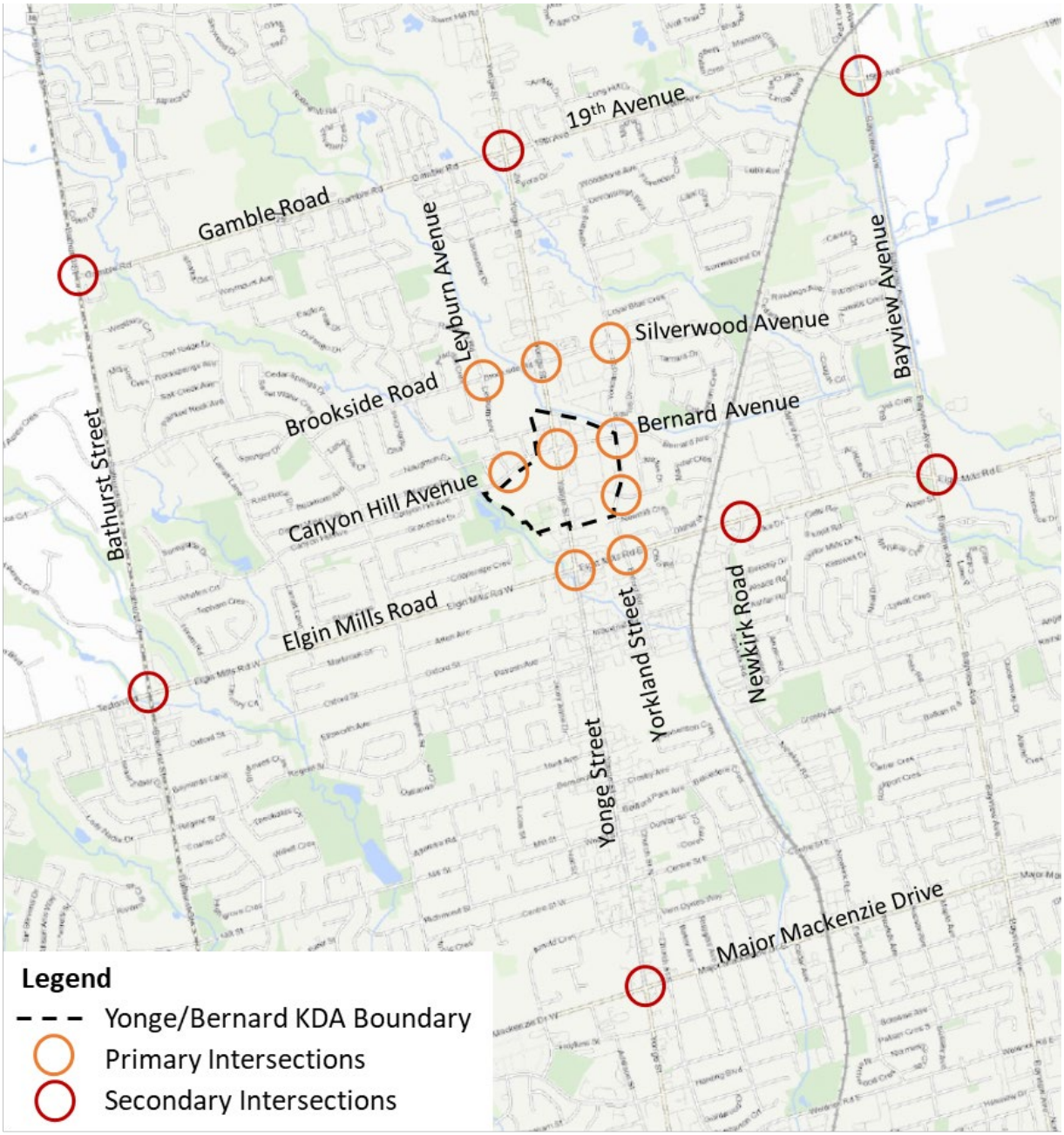


Exhibit 1-2: Study Area and Analysis Intersection

1.4 Study and Analysis Approach

The study approach for the Transportation Assessment Update relied on previous assumptions, inputs, and analysis methodologies from the B.A. report, as well as new considerations based on the peer review conducted and the updated study area. The following summarizes the Study Update and technical analysis approach:

- To properly assess the study area road network in accommodating higher densities, particularly in light of future arterial road improvements planned by the Region of York (please see **Section 4.7.5**) that could benefit the K.D.A., a computer travel demand model was utilized to estimate the changes to travel patterns and volumes within and outside of the study area.

- The computer model was derived from York Region's EMME transportation model for years 2016 (representative existing base year), 2031, and 2041.

- A screenline and link analysis was first conducted using the EMME model to assess the road network without (future background conditions) and with the proposed K.D.A. (future total conditions).

- The following scenarios were assessed based on various assumptions to the key factors:

    - 2031 Background

    - 2031 with K.D.A. at 3.0 F.S.I. and 17% transit mode split

    - 2041 Background

    - 2041 with K.D.A. at 4.0 F.S.I. and 17% transit mode split

    - 2041 with K.D.A. at 4.0 F.S.I. and 30% transit mode split

Of the above scenarios, the lower F.S.I. and lower transit mode split scenarios can also be treated as potential phasing scenarios before 4.0 F.S.I. and 30% transit mode split are attained for the 2041 horizon year.

- Since one of the key questions was to address the feasibility of accommodating 4.0 F.S.I., the last 2041 scenario was also analyzed from an intersection capacity analysis perspective using Synchro to provide volume to capacity ratios, level of service, and delay metrics to confirm the EMME model findings.

- Due to the schedule and timing for conducting this study, only the weekday A.M. Peak Hour was analyzed and documented in this report. Based on existing traffic volumes, traffic conditions and the road network constraints, the A.M. Peak Hour is the critical time period. In addition, the York Region EMME model is only available for the A.M. Peak.

- The critical movements that will determine the density of the K.D.A. are the southbound through and left-turn volumes and metrics at the Yonge Street / Elgin Mills Road intersection as well as the southbound left turn movement at the

Yorkland Street / Elgin Mills Road intersection. During the P.M. peak, the reverse of these movements involve westbound right turns on Elgin Mills Road to Yonge Street and Yorkland Street, both of which are not as critical as the southbound left turns during the A.M. peak.

- Once the above technical analyses had been conducted, active transportation, transit, parking, and T.D.M. strategies were then proposed to support the K.D.A.
- Sensitivity analyses were also conducted using the EMME model to determine what maximum F.S.I. can be supportable if either the recommended strategies or road improvements were not implemented or if the transit mode split were not achieved by 2041. These can also be treated as potential phasing scenarios.

2. Planning and Policy Context

2.1 Provincial Planning Context

Provincial planning policies were reviewed to identify their relevance to the Yonge/Bernard K.D.A. Provincial plans are identified and summarized in **Table 2-1**.

Table 2-1: Provincial Planning Context

Provincial Planning Document	Description/Relevance
Planning Act (2019)	Originally published in 1990, the Planning Act recently enacted Bill 139, which introduced protected Major Transit Station Areas for single-tier and upper-tier municipalities and states: The official plan of a municipality may include policies that identify the area surrounding and including an existing or planned higher order transit station or stop as a protected major transit station area and that delineate the area's boundaries, and if the official plan includes such policies it must also contain policies that, a) identify the minimum number of residents and jobs, collectively, per hectare that are planned to be accommodated within the area; b) identify the authorized uses of land in the major transit station area and of buildings or structures on lands in the area; and, c) c) identify the minimum densities that are authorized with respect to buildings and structures on lands in the area.

Provincial Planning Document	Description/Relevance
Provincial Policy Statement (2014)	Provides direction on land use planning and development as well as the transportation system, including: • Providing appropriate development while protecting resources, public health and safety, and the natural and built environments • Building strong, healthy communities by supporting density and land uses which support active transportation, are transit-supportive, and are freight-supportive • Safe, energy efficient, transportation systems that move people and goods • Integrated transportation and land use considerations at all stages of the planning process • Use of travel demand management (T.D.M.) strategies to maximize efficiency • Land use pattern, density, and mix of uses to minimize length and number of vehicle trips, support current and future use of transit and active transportation
Oak Ridges Moraine Conservation Plan (2017)	Originally published in 2002, the O.R.M.C.P. provides direction on how to protect the Moraine's ecological and hydrogeological features. Part of the study area falls within the boundary of the Oak Ridges Moraine; however, it does not impact the natural core nor the natural linkage areas.

A Place to Grow: Growth Plan for the Greater Golden Horseshoe (2019)	Originally adopted in 2006, the 2019 update sets forth a framework for implementing the Government of Ontario's 2041 vision for building stronger, prosperous communities by better managing growth in the region. The Growth Plan identifies Yonge Street as a priority transit corridor. Policies related to priority transit corridors outlined in A Place to Grow: Growth for the Greater Golden Horseshoe include, but are not limited to: 1. Planning will be prioritized for major transit station areas on priority transit corridors, including zoning in a manner that implements the policies of this Plan. 2. For major transit station areas on priority transit corridors or subway lines, upper- and single-tier municipalities, in consultation with lower-tier municipalities, will delineate the boundaries of major transit station areas in a transit-supportive manner that maximizes the size of the area and the number of potential transit users that are within walking distance of the station. 3. Major transit station areas on priority transit corridors or subway lines will be planned for a minimum density target of: a. 200 residents and jobs combined per hectare for those that are served by subways; b. 160 residents and jobs combined per hectare for those that are served by light rail transit or bus rapid transit; or, c. 150 residents and jobs combined per hectare for those that are served by the GO Transit rail network. d. Within major transit station areas on priority transit corridors or subway lines, land uses and built form that would adversely affect the achievement of the minimum density targets in this Plan will be prohibited. e. All major transit station areas will be planned and designed to be transit supportive and to achieve multimodal access to stations and connections to nearby major trip generators by providing, where appropriate:

Provincial Planning Document	Description/Relevance
	i. connections to local and regional transit services to support transit service integration; ii. infrastructure to support active transportation, including sidewalks, bicycle lanes, and secure bicycle parking; and, iii. commuter pick-up/drop-off areas.
A Place to Grow: Growth Plan for the Greater Golden Horseshoe (2019)	Within all major transit station areas, development will be supported, where appropriate, by: a. planning for a diverse mix of uses, including second units and affordable housing, to support existing and planned transit service levels; b. fostering collaboration between public and private sectors, such as joint development projects; c. providing alternative development standards, such as reduced parking standards; and, d. prohibiting land uses and built form that would adversely affect the achievement of transit-supportive densities. Lands adjacent to or near to existing and planned frequent transit should be planned to be transit-supportive and supportive of active transportation and a range and mix of uses and activities. In planning lands adjacent to or near higher order transit corridors and facilities, municipalities will identify and protect lands that may be needed for future enhancement or expansion of transit infrastructure, in consultation with Metrolinx, as appropriate.

2.2 Regional Planning Context

Regional planning policies were reviewed to identify their relevance to the Yonge/Bernard KDA. 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 (YR-OP) (2010, consolidated 2019)	The York Region Official Plan 2010 (Y.R.O.P. 2010) was last consolidated in April 2019. The Y.R.O.P. 2010 outlines growth management policies for York Region and provides a basis for detailed planning at the local municipal level. Through the Y.R.O.P., the Region envisions building sustainable and healthy communities with safe and accessible mobility systems that prioritize pedestrian and cycling connections, public transit, and streets. With a focus on implementing a comprehensive active transportation network in the Region, the Y.R.O.P. sets a goal to reduce dependence on automobiles and divert to more sustainable modes of transportation.
York Region Transportation Master Plan (Y.R.-T.M.P.) (2016)	In the latest T.M.P. Update completed in 2016, the Region provides direction on policies and actions required to support growth and intensification up to 2041. The objectives of the 2016 T.M.P. Update include improving the regional transit system to be more interconnected, developing a road network that supports all modes of transportation, and integrating active transportation in Urban Areas. As per Map 7 of the Y.R.-T.M.P., Yonge Street has been identified as a Rapid Transit Corridor.
York Region's Sustainability Strategy (2007)	York Region's sustainability strategy is a guide to provide local municipal governments with long-term frameworks to balance economic growth with the natural environment and healthy communities. The thrust of the Sustainability Strategy as it pertains to transportation is to ensure that there is integration between land use planning, growth and transportation; promoting public transit and active modes of transportation; and, ensuring that the system is integrated with the local, intra and inter-regional transportation systems.
York Region's Pedestrian and Cycling Master Plan (2008)	Provides direction to guide the development of improved active transportation infrastructure on Regional roads. To support a more sustainable Region, York Region is actively taking steps to promote alternative transportation choices that will benefit residents by improving public health and air quality while reducing dependence on the private automobile.

Regional Planning Document	Description/Relevance
York Region Transit 2016 Annual Service Plan	The purpose of the York Region Transit (Y.R.T.) 2016 Annual Service Plan is to advance the goals and objectives of the 2016 to 2020 4-year service plan. It provides an overview of the main service initiatives for 2016 and the proposed rapid transit network plan up to 2020.
York Region 10–Year Roads and Transit Capital Construction Program (2020)	Approved on December 19, 2019, this program outlines the planned road and transit improvements required to accommodate growth in population and employment within York Region in the next ten years. Plans within this program include upgrading existing transportation infrastructure to meet current Regional design standards, and are updated on an annual basis. The current plan provides estimated construction timelines for the various planned improvements, including road widening along Elgin Mills Road from Bathurst Street to Yonge Street, as well as a grade separation on Elgin Mills at the GO Rail Crossing.

2.2.1 2020 York Region 10-Year Roads and Transit Capital Construction Program

Approved on December 19, 2019, this program outlines the planned road and transit improvements required to accommodate growth in population and employment within York Region in the next ten years. Plans within this program include upgrading existing transportation infrastructure to meet current Regional design standards, and are updated on an annual basis. The current plan provides estimated construction timelines for the various planned improvements. **Table 2-3** lists the planned road improvements surrounding the Yonge/Bernard K.D.A.

Table 2-3: 2020 10-Year Roads and Transit Capital Construction Program

Street Name	Road Improvement	Current Status
Yonge Street	Widening for Yonge Street Rapidway	By end of 2020
Bayview Avenue	Widening from 2 to 4 lanes from Elgin Mills Road to Stouffville Road	completed
19th Avenue	Widening from 2 to 4 lanes from Jefferson Forest Drive / Linda Margaret Crescent to Bayview Avenue to include on-street cycling facilities	completed
Elgin Mills Road East	Grade Separation over the C.N. Rail Corridor	By 2026

Street Name	Road Improvement	Current Status
Elgin Mills Road West	Widening from 2 to 4 lanes from Bathurst Street to Yonge Street	By 2026
Leslie Street	Widening from 2 to 4 lanes from 19th Avenue to William F. Bell Parkway	Under Construction

It should be noted that Highway 404 is currently under construction for High Occupancy Vehicle (H.O.V.) lanes from Highway 7 to Stouffville Road. 19th Avenue is also to be widened from 2 to 4 lanes from Bayview Avenue to Leslie Street as part of the North Leslie Subdivision development by 2031.

2.2.2 Planned Transit Network Improvements

B.A. identified a number of planned transit improvement projects. **Table 2-4** summarizes construction timeline provided in the B.A. report and provides updated timelines to-date. Consideration for these transit improvements have been incorporated into the analysis where applicable.

Table 2-4: Planned Transit Improvements

Transit Improvement	Timeline per BA report	Timeline to-date
Yonge Street Rapidway	December 2018	Anticipated completion December 2020
Highway 7 & Rapidway – Bayview Avenue to Woodbridge	Completion 2020	Complete - end of 2019
Yonge North Subway Extension	10-year timeline	Anticipated construction start 2030
Toronto-York Spadina Subway Extension	Completion end of 2017	Complete – open to the public Dec 2017
GO Transit Gormley Station Bloomington Station	 Construction started 2016 Construction to start 2017	 Complete Anticipated completion 2020

2.3 Municipal Planning Context

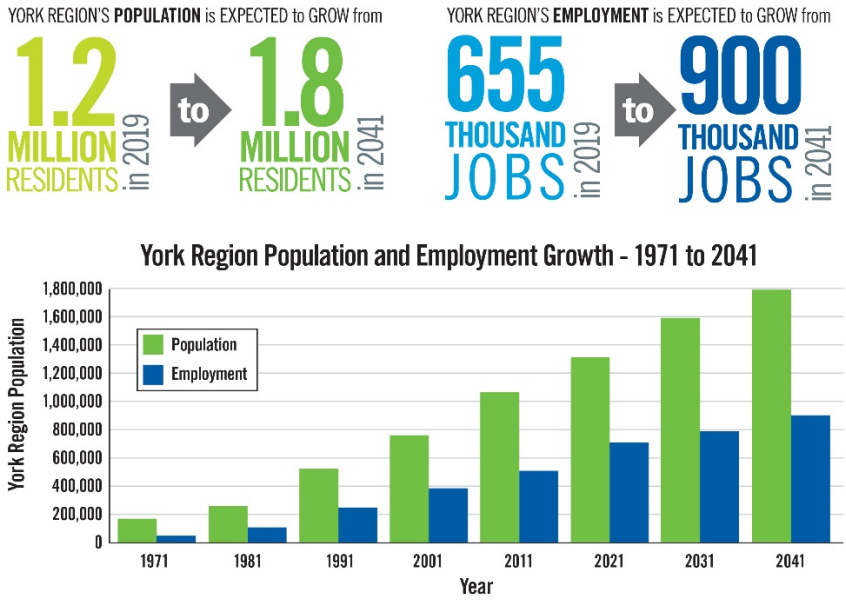
The Richmond Hill Official Plan, July 2010 (herein referred to as the 'Official Plan') was partially approved by the order of the Ontario Municipal Board (currently known as the Local Planning Appeal Tribunal) in January 2018. The Official Plan outlines the City's planning policy framework and provides clear direction for growth in the future, while preserving elements of historic value, and follows a clear set of guiding principles, which include:

- Direct growth to built-up urban areas with existing infrastructure and services in a network of centres and corridors;
- Create and integrated, vibrant, and diverse community that provides a mix of land uses, including a balance of housing, employment, community services, parks, and open spaces;
- Protect and enhance natural environmental systems, functions, and resources over the long term;
- Incorporate and promote sustainable development practices and initiatives;
- Protect employment lands over the long term;
- Promote economic vitality and provide for a balanced and diverse range of employment opportunities;
- Recognise and enhance the inherent and unique aspects of Richmond Hill and create focal points, gateways, experiences and landmarks;
- Strive for design excellence in the public and private realm;
- Plan for transit and pedestrian oriented development; and,
- Promote connectivity, mobility, and accessibility within and between neighbourhoods, employment lands, parks, and open spaces.

3. Regional and Local Context and Growth

3.1 Population and Employment Growth

York Region is one of the fastest growing municipalities in the G.T.A. York Region's population has increased nearly seven-fold since 1971, and population and employment growth are expected to continue across the Region. As such, the transportation system and other infrastructure must be prepared to accommodate future growth. As illustrated in **Exhibit 3-1**, by 2041 the regional population will approach 1.8 million, while employment will approach 900,000.



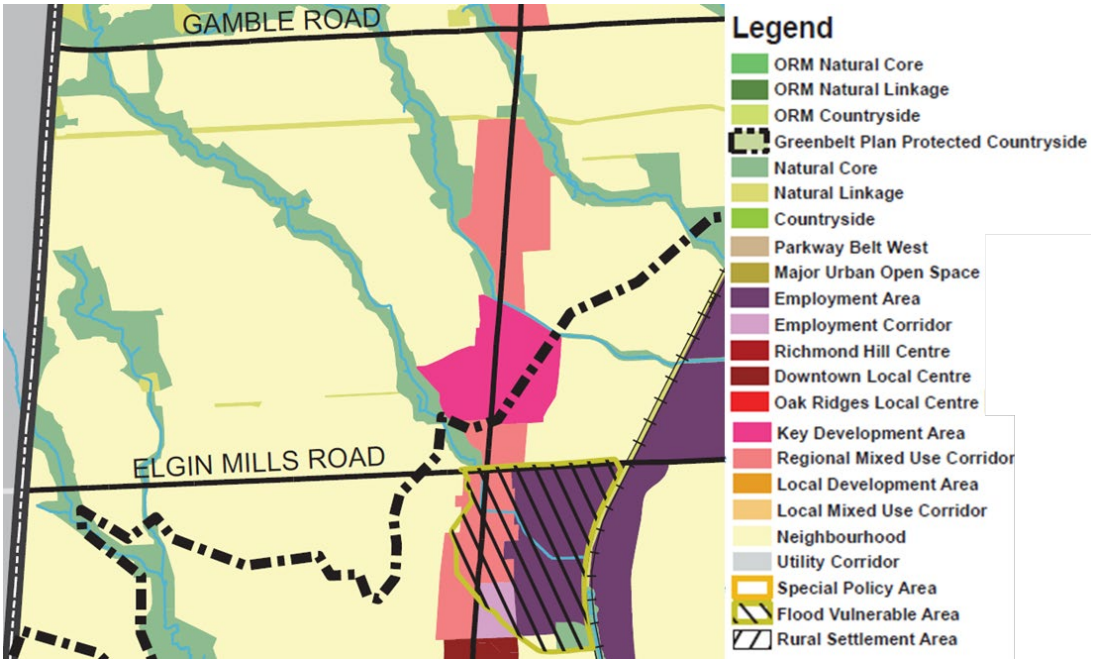
Source: York Region (2020)

Exhibit 3-1: York Region Population and Employment Growth between 1971 and 2041

The City of Richmond Hill itself is experiencing tremendous growth. With a population of over 200,000 people, Richmond Hill Council passed a motion to change the title of Richmond Hill from 'Town' to 'City' on March 25, 2019. According to York Region forecasts, Richmond Hill's population is expected to grow by 69,240 people, reaching 277,950 in 2041. Meanwhile, employment is projected to increase from 79,600 in 2016 to approximately 109,800 in 2041.

3.2 Land use and Future Development Context

Land uses within and adjacent to the Yonge/Bernard K.D.A. consists of mainly low-rise residential and commercial uses. **Exhibit 3-2** illustrates the land use designations along Yonge Street and adjacent to the Yonge/Bernard K.D.A. Yonge Street has been identified as a Regional Mixed Use Corridor.



(Schedule A2 – Land Use) Richmond Hill Official Plan – Office Consolidation to January 23, 2018

Exhibit 3-2: City of Richmond Hill Official Plan Schedule A2

3.2.1 Yonge/Bernard Key Development Area

The Yonge/Bernard K.D.A. is located between Brookside Road/Silverwood Avenue and Elgin Mills Road along Yonge Street. It is designated in Schedule A2 of the City of Richmond Hill Official Plan (Office Consolidation 2018) as a Key Development Area.

Key Development Areas are intensification areas along Regional Corridors where rapid transit services intersect with major nodes of retail and commercial development. They are underbuilt areas where opportunities exist for redevelopment of large parcels of land can support new public streets and more intensive residential and office uses. According to the Richmond Hill Official Plan, the Yonge/Bernard K.D.A. will be a sub-centre for mixed-use high density development due to its proximity to rapid transit on Yonge Street, including the Bernard Transit Terminal, and the opportunity to intensify underutilized lands in the area.

The following land uses are permitted in the K.D.A. designation:

a) Medium and high density residential;
b) Major office and office;
c) Commercial;
d) Major retail and retail;
e) Community uses;
f) Parks and urban open spaces; and,
g) Live-work units.

3.2.2 Active Developments

The City of Richmond Hill's record of active developments within and immediately outside the Yonge/Bernard K.D.A. are listed in **Table 3-2**.

Table 3-1: Active Developments within Yonge/Bernard K.D.A.

Development / Proponent Name	Description	Status	Location
T.S.M.J.C. Properties Inc	Proposed Official Plan and Zoning By-law Amendment Proposed mixed use residential development	Under Application	10909 Yonge Street
Dogliola Developments Inc.	Proposed Site Plan application	Approved	10922, 10944, 10956 Yonge Street
Yonge M.C.D. Inc. (Phase 1)	Proposed Official Plan Amendment, Zoning By-law Amendment, and Draft Plan of Subdivision Proposed mixed use residential development	Approved	59 Brookside Road
Yonge M.C.D. Inc. (Phase 2)	Proposed Official Plan Amendment, Zoning By-law Amendment, and Draft Plan of Subdivision Proposed mixed use residential development	Under Application	59 Brookside Road
Brookside Castle Corporation	Proposed Zoning By-law Amendment Proposed medical office building	Under Application	24 Brookside Road
Multiple	Proposed Zoning By-law Amendment Proposed residential use	Approved	25, 29, 31 Naughton Drive
Jubilee Garden Non-Profit Housing Corp.	Proposed Official Plan Amendment and Zoning By-law Amendment Proposed residential use	Under Application	102 Yorkland Street

Source: City of Richmond Hill, October 2019

4. Transportation Conditions

4.1 Existing Transportation Conditions

4.1.1 Road Network

The primary study area roads in the Yonge/Bernard K.D.A. consists of three regional arterial roads and six municipal collector roads. The expanded secondary study area, consists of three regional arterial roads and one municipal collector road. **Table 4-1** provides a description of the study area roads. **Exhibit 4-1** to **Exhibit 4-3** illustrates the roadway configuration within the study area.

Table 4-1: Road Network Characteristics

Name	Jurisdiction	Classification	Number of Through Lanes	Posted Speed Limit
Primary Study Area Roads				
Gamble Road/19th Avenue	York Region	Regional Arterial Road	Two lanes in each direction from Bathurst Street to Bayview Avenue	60 km/h (Bathurst Street to Bayview Avenue)
Brookside Road	City of Richmond Hill	Municipal Collector Road	One lane in each direction from Shaftsbury Avenue to Yonge Street	50 km/h (Shaftsbury Avenue to Yonge Street)
Silverwood Avenue	City of Richmond Hill	Municipal Collector Road	One lane in each direction from Yonge Street to Yorkland Street	50 km/h (Yonge Street to Yorkland Street)
Canyon Hill Avenue	City of Richmond Hill	Municipal Collector Road	One lane in each direction from Bathurst Street to Yonge Street	50 km/h (Bathurst Street to Yonge Street)
Bernard Avenue	City of Richmond Hill	Municipal Collector Road	One lanes in each direction from Silverwood Avenue & Yorkland Street to Bernard	50 km/h (Silverwood Avenue/Yorkland Street to Yonge Street)

Name	Jurisdiction	Classification	Number of Through Lanes	Posted Speed Limit
			Avenue & Yorkland Street Two lanes in each direction from Yonge Street to Yorkland Street	
Elgin Mills Road	York Region	Regional Arterial Road	One lane in each direction from Bathurst Street Drive to Yonge Street with a two-way left turn lane (T.W.L.T.L.) median Two lanes in each direction from Yonge Street to Bayview Avenue	50 km/h (Bathurst Street Drive to Yonge Street) 60 km/h (Yonge Street to Bayview Avenue)
Rothbury Road/Leyburn Avenue	City of Richmond Hill	Municipal Collector Road	One lane in each direction from Gamble Road to Canyon Hill Avenue	50 km/h (Gamble Road to Canyon Hill Avenue)
Yonge Street	York Region	Regional Arterial Road	Two lanes in each direction from Gamble Road/19th Avenue to Major Mackenzie Drive Centre lane VIVA Rapidway is currently under construction	50 km/h (Gamble Road to Major Mackenzie Drive)

Name	Jurisdiction	Classification	Number of Through Lanes	Posted Speed Limit
Yorkland Street	City of Richmond Hill	Municipal Collector Road	Two lanes in each direction from Bernard Avenue to Elgin Mills Road	50 km/h (Devonsleigh Boulevard to Elgin Mills Road)
Secondary Study Area Roads				
Major Makenzie Drive	York Region	Regional Arterial Road	Two lanes in each direction from Bathurst Street to Bayview Avenue	60 km/h (Bathurst Street to Bayview Avenue)
Bathurst Street	York Region	Regional Arterial Road	Two lanes in each direction from Gamble Road to Major Mackenzie Drive	60 km/h (Gamble Road to Major Mackenzie Drive)
Bayview Avenue	York Region	Regional Arterial Road	Two lanes in each direction from 19th Avenue to Major Mackenzie Drive	60 km/h (19th Avenue to Major Mackenzie Drive)
Newkirk Road	City of Richmond Hill	Municipal Collector Road	One lane in each direction from Elgin Mills Road to Major Mackenzie Drive with a two-way left turn lane (T.W.L.T.L.) median	50 km/h (Elgin Mills Road to Major Mackenzie Drive)

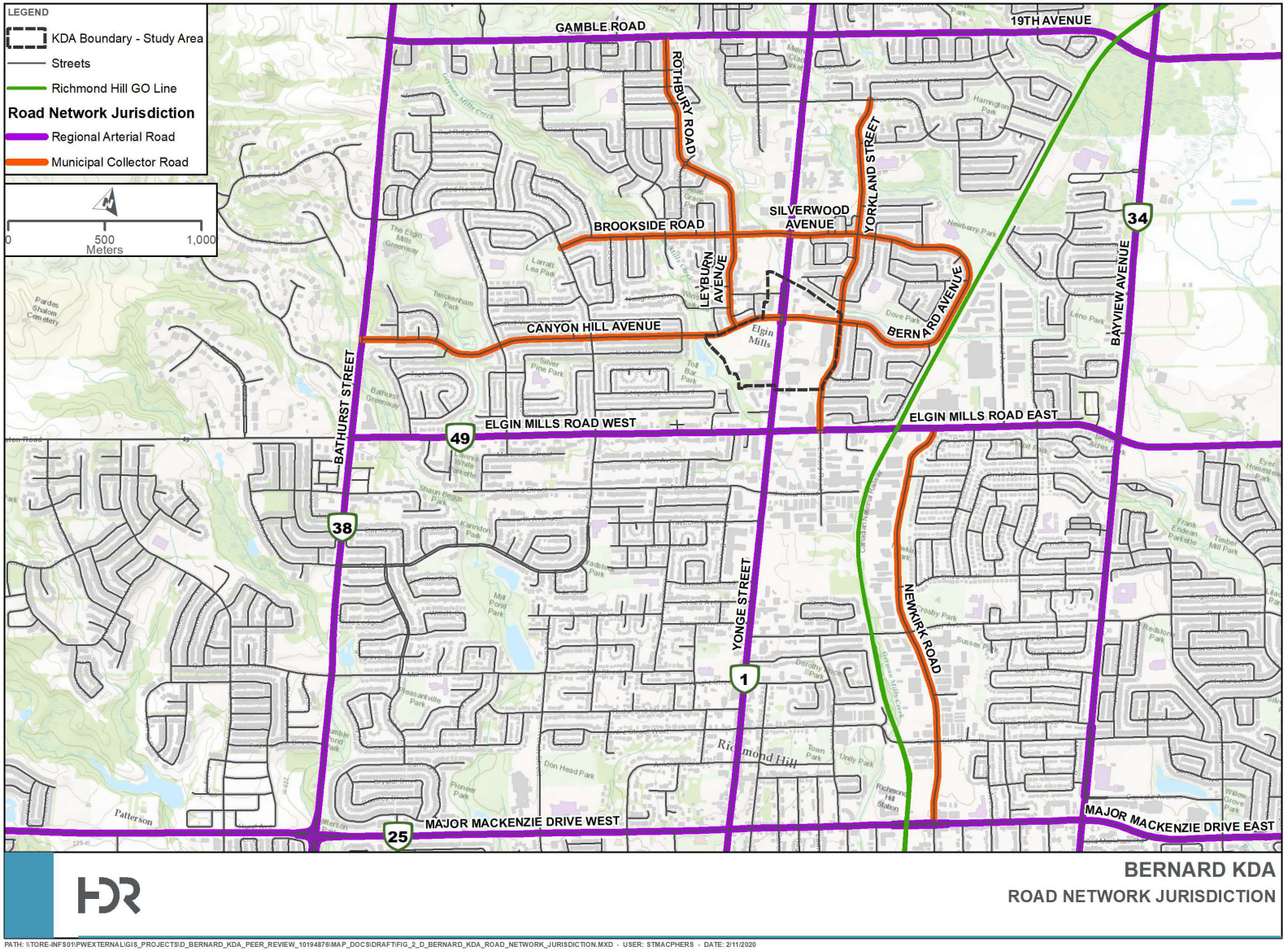


Exhibit 4-1: Road Network Jurisdiction

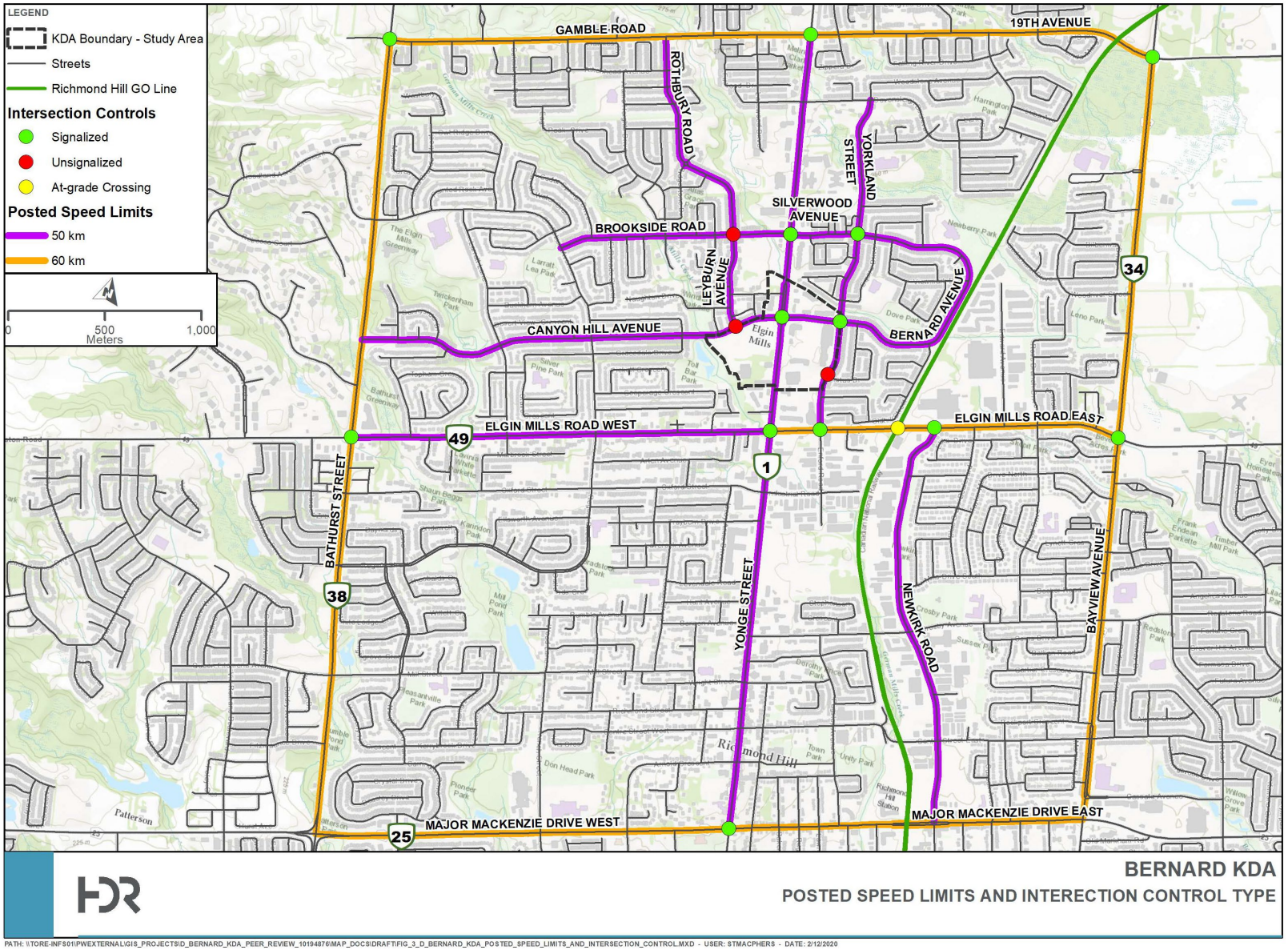


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Exhibit 4-2: Posted Speed Limits and Intersection Control Types

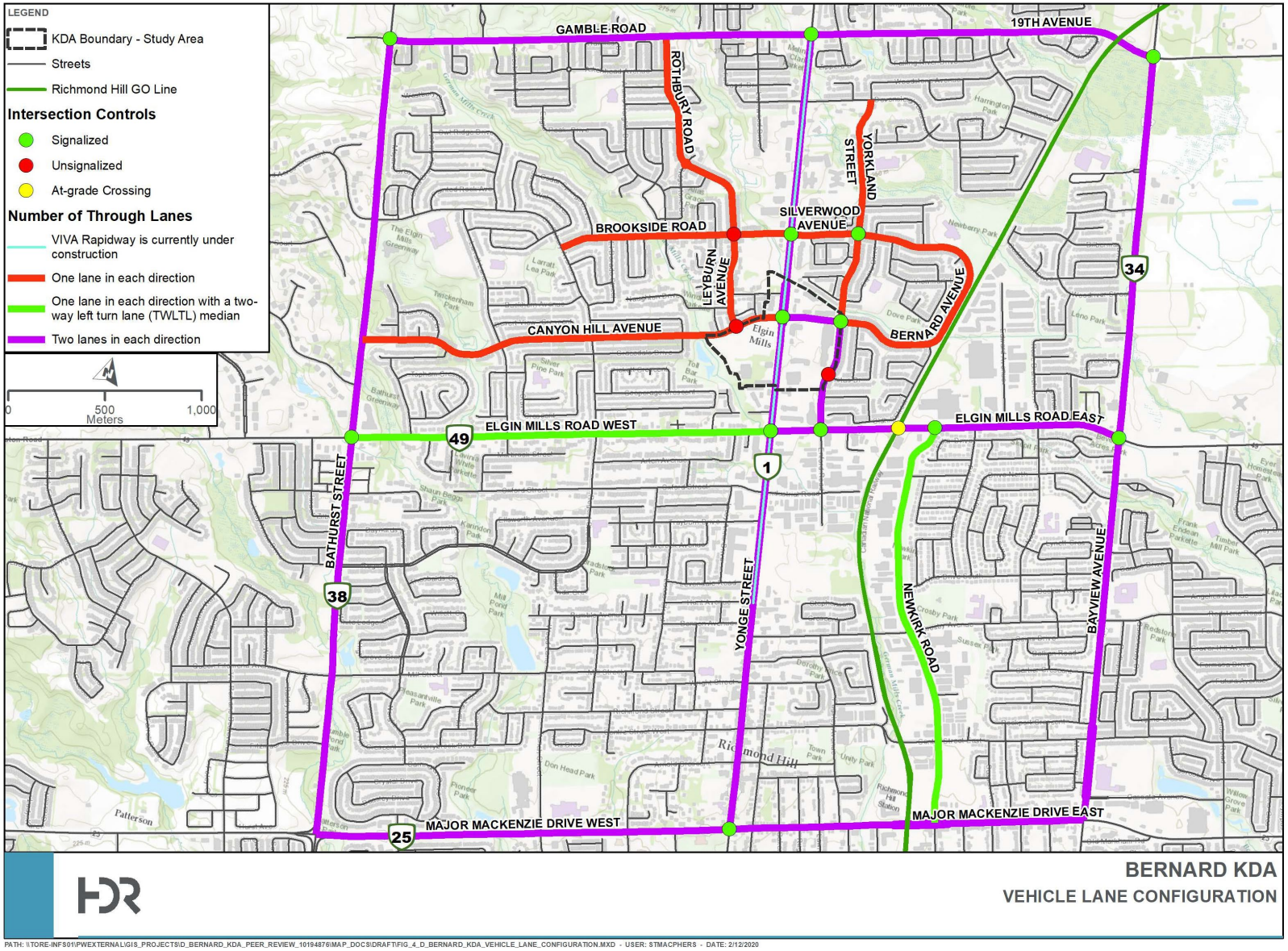


Exhibit 4-3: Vehicle Lane Configuration

4.1.2 Travel Demand

The following section outlines the distribution of existing population and employment within the study area, the existing travel patterns that these generate, and the resulting modal split for travellers within the Yonge/Bernard K.D.A.

4.1.2.1 POPULATION AND EMPLOYMENT CONTEXT

The existing EMME model (2016) was provided by York Region. Land use assumptions for the Secondary study area are listed in **Table 4-2** by 2016 T.T.S. traffic zones. It is noted that these numbers reflect the Region's model and does not account for the proposed growth scenarios that were tested for this study.

Table 4-2: 2016 Population and Employment Data the Secondary Study Area

2016 TTS Traffic Zone	2016 POP	2016 EMP
2210	2,337	2,793
2211	2,271	752
2212	4,423	236
2213	4,341	2,176
2214	4,260	602
2215	3,652	591
2216	5,813	320
2217	2,305	530
2236	4,518	867
2237	3,982	1,315
2238	2,534	362
2239	-	2,227
2240	-	687
2241	4,608	1,462
2242	4,959	1,619
2243	3,182	1,937

The Yonge/Bernard K.D.A. accounts for approximately fourteen (14) percent of the secondary study area's population and ten (10) percent of employment.

The population and employment distributions at traffic zone level from the York Region EMME model are shown in **Exhibit 4-4**. The secondary study area is highly populated throughout the 2016 T.T.S. traffic zones. Employment rates are considerably higher south of Elgin Mills Road, with the exception of two traffic zones with higher employment in the zones north-east of Yonge Street and Elgin Mills Road.

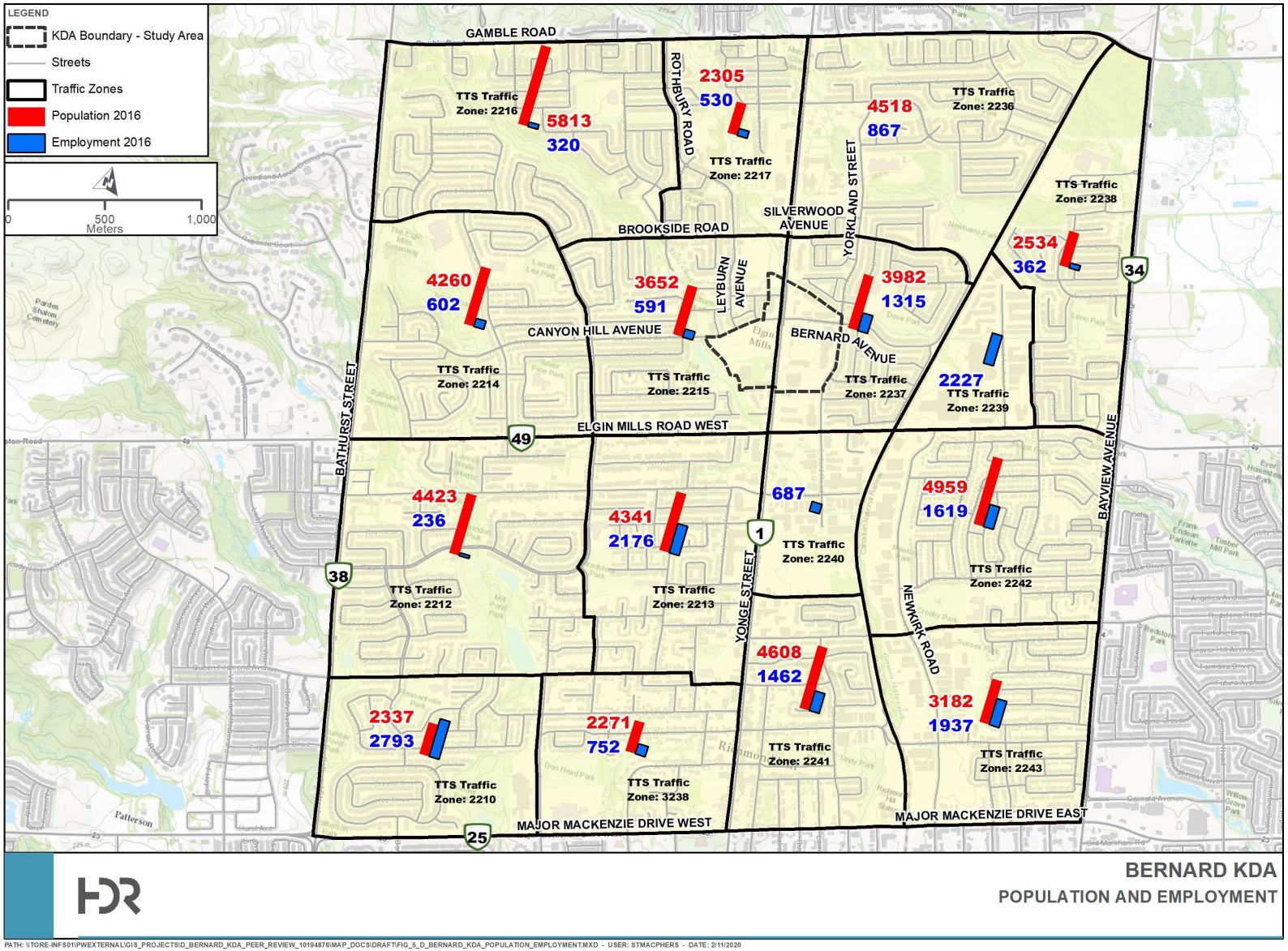


Exhibit 4-4: Traffic Zone Population/Employment

4.1.3 Existing Mode Share

Based on B.A.'s assessment of T.T.S. data, the existing (2011) transit modal split is 11% (within T.T.S. Zones 2214, 2215, 2216, 2217, 2236, and 2237). Given the expansion of the secondary study area to Bathurst Street, Gamble Road/19th Avenue, Bayview Avenue, and Major Mackenzie Drive, T.T.S. data was reassessed using 2016 data for T.T.S. zones 2210 – 2217 and 2236 – 2243 to compare any differences in existing mode share.

The existing mode share for residential, office, and retail trips were obtained from 2016 T.T.S. data. **Table 4-3** summarizes the existing mode share.

In reviewing the mode share results, H.D.R. noticed that the A.M. inbound residential walking mode share (23%) is not realistic and may be caused by large sample size and multiple schools in the study area. H.D.R. reduced the residential walking mode share to 10% compared to B.A.'s assumption of 23%, and the extra 13% was divided amongst auto-driver (70%) and auto-passenger (30%) mode shares.

Similarly, the A.M. inbound and outbound retail transit mode share of 8% and 13%, respectively, is not realistic and may be caused by large sample size. H.D.R. reduced the transit mode share to 5% for A.M. inbound and outbound trips (compared to B.A.'s 8% and 13%, respectively), and extra shares were assigned to Auto-passengers. The adjusted existing mode share is presented in **Table 4-3**.

Table 4-3: Existing and Adjusted Mode Share

Mode	Residential		Office		Retail	
	AM		AM		AM	
	IN	OUT	IN	OUT	IN	OUT
2016 T.T.S. Data Mode Share						
Auto Driver	65%	58%	86%	69%	69%	75%
Auto Passenger	12%	15%	8%	31%	23%	12%
Transit	-	12%	1%	-	8%	13%
Walking	23%	13%	2%	-	-	-
Cycling	-	-	1%	-	-	-
Total	100%	98%*	100%	100%	100%	100%
Adjusted Existing Mode Share						
Auto Driver	74%	58%	86%	69%	69%	75%
Auto Passenger	16%	15%	8%	31%	26%	20%
Transit	-	12%	1%	-	5%	5%
Walking	10%	13%	2%	-	-	-
Cycling	-	-	1%	-	-	-
Total	100%	98%*	100%	100%	100%	100%

* Difference is taxi passenger, school bus and paid rideshare

4.2 Existing Traffic Volumes

Existing traffic volumes were based on the counts from the B.A. report along with turning movement counts provided by the Region for Yonge Street and Major Mackenzie Drive. A summary of the existing traffic volumes for the A.M. peak hour traffic is shown in **Exhibit 4-5**.

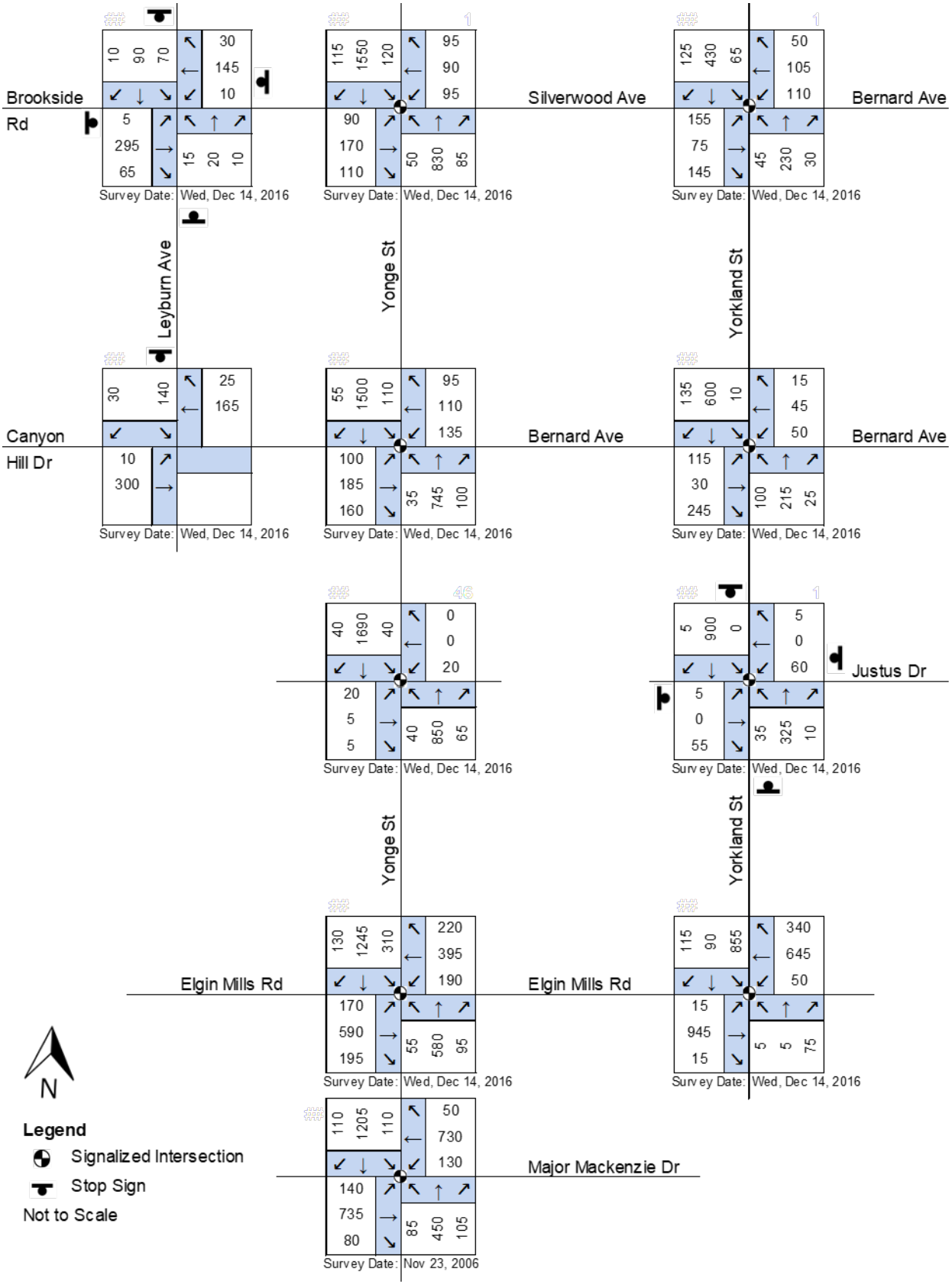


Exhibit 4-5: Existing Traffic Volumes

4.3 Existing Transit Network and Service

The following sections describe the existing transit services that serve the Yonge/Bernard K.D.A. and connectivity to the local and regional transit network. A summary of existing transit ridership is also provided below.

The expanded study area is served by the York Region Transit (Y.R.T.) and VIVA bus network, as well as the GO Transit system illustrated in **Exhibit 4-6**. These transit systems provides connectivity for local residents and businesses to other routes in York Region and Toronto. The existing GO, Y.R.T., and VIVA networks within the study area are described below. Further analysis on existing transit demand is discussed in **Section 4.4**.

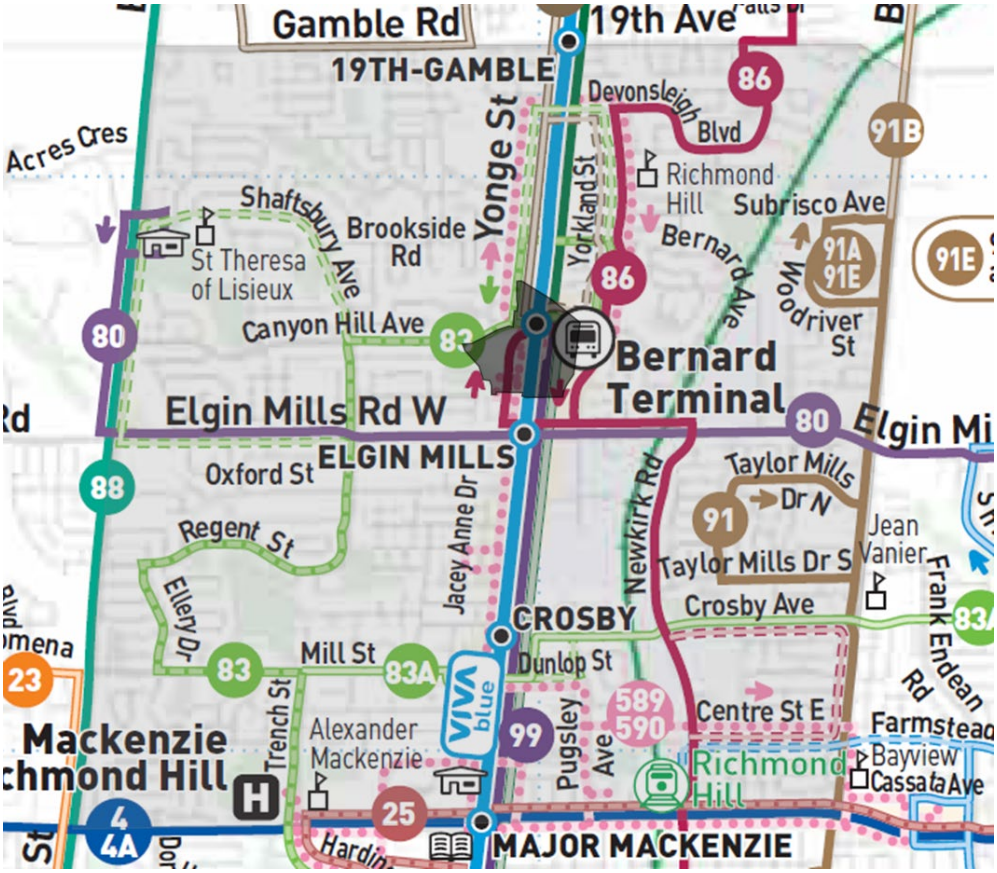


Exhibit 4-6: Expanded Study Area Transit Services

4.3.1 Richmond Hill GO Station

The Richmond Hill GO Station is located at the northeast corner of Newkirk Road and Major Mackenzie Drive. This GO station services the Richmond Hill GO Train line which provides commuter rail service between Richmond Hill and Toronto. The Richmond Hill GO line is expanding with the new Bloomington GO station currently under construction.

Based on the most recent train schedule for weekday service, effective November 2, 2019, there are five southbound trains during the morning and seven northbound trains in the afternoon/evening with headways of approximately 30 minutes. The current train departure schedule from/to Richmond Hill GO Station is listed in **Table 4-4**.

Table 4-4: GO Train Departure Times

AM Trains Southbound (Monday to Friday)	PM trains Northbound (Monday to Friday)
6:25 AM	3:10 PM
6:55 AM	4:30 PM
7:25 AM	5:00 PM
7:55 AM	5:30 PM
8:25 AM	6:00 PM
-	7:00 PM
-	8:00 PM

Source: Information confirmed on January 2, 2020

GO Bus Route 61 also runs from the Richmond Hill GO station to Union Station with headways ranging between 5 to 60 minutes outside of the peak hours. The current bus departure schedule from/to Richmond Hill GO Station is listed in **Table 4-5**.

Table 4-5: GO Bus Departure Times

Southbound Bus FROM Richmond Hill GO (Monday to Friday)	Northbound Bus TO Richmond Hill GO (Monday to Friday)
5:10 AM	9:40 AM
5:35 AM	10:40 AM
5:40 AM	11:40 AM
9:15 AM	12:40 PM
9:20 AM	1:40 PM
10:20 AM	2:40 PM
10:25 AM	8:45 PM
11:20 AM	9:10 PM
12:20 PM	9:40 PM
1:20 PM	10:40 PM
2:20 PM	11:40 PM
-	12:40 AM
-	1:40 AM
-	2:40 AM

Source: Information confirmed on January 2, 2020

Richmond Hill GO Station provides the following services and facilities:

- 727 parking spaces (main lot)
- 1277 parking spaces (east lot)

- Reserved parking
- Carpool parking
- Bicycle racks
- Kiss & Ride Passenger Drop Off
- Shelters/heated shelters
- Public washrooms
- Waiting room
- Pay phones
- Wi-fi

Richmond Hill GO Station is served by several connecting YRT bus routes:

- 4 Major Mackenzie
- 25 Major Mackenzie East
- 82 Valleymede
- 86 Newkirk-Red Maple
- 240 Mill Pond GO Shuttle
- 241 Beverly Acres GO Shuttle
- 243 Redstone GO Shuttle

4.3.2 Bernard Bus Terminal

The Yonge/Bernard K.D.A. is currently served by the Bernard Bus Terminal located at that southeast corner of Yonge Street and Bernard Avenue. This bus terminal has six platforms and serves five different bus routes within the terminal and one route at a bus stop on the southeast side of the Yonge Street and Bernard Avenue intersection as illustrated in **Exhibit 4-7**.

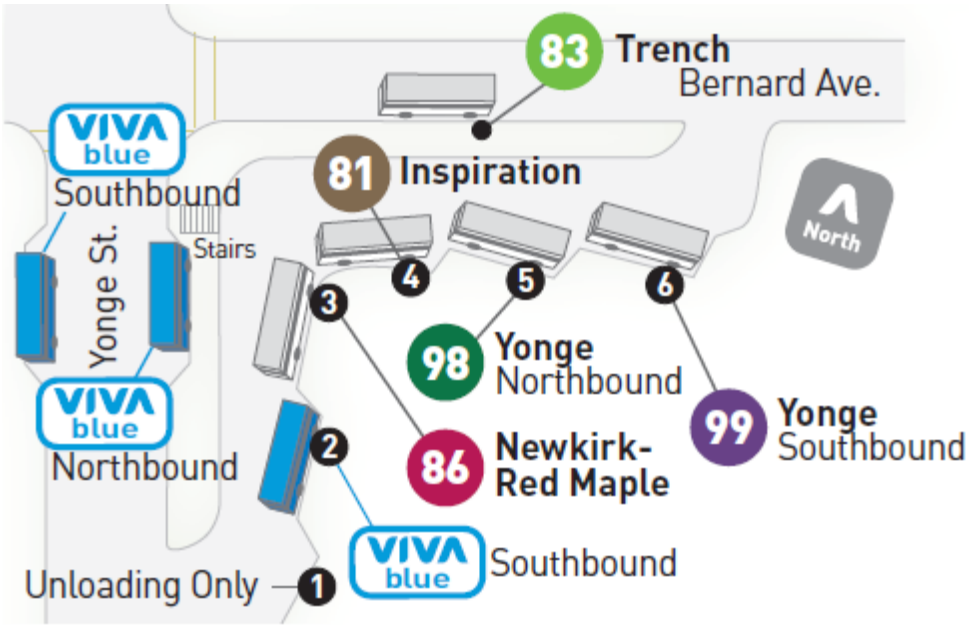


Image Source: York Region Transit Website
Exhibit 4-7: Bernard Bus Terminal

VIVA Service

The **VIVA Blue** bus service currently operates along Yonge Street from Finch GO Bus Terminal to Newmarket GO Bus Terminal. This service operates with headways of less than 10 minutes and stops curbside at the Yonge Street and Bernard Avenue intersection. When the Yonge Street Rapidway is complete, a southbound platform will be located south of Canyon Hill Avenue/Bernard Avenue, and a northbound platform will be located north of Canyon Hill Avenue/Bernard Avenue for passengers to board and alight. Platform 2 at the Bernard Bus Terminal also serves the VIVA Blue southbound bus route. This platform is provided for transit riders transferring from other bus routes servicing the Bernard Bus Terminal.

The **VIVA Blue A** bus is an express route that operates between Finch GO Bus Terminal and Newmarket GO Bus Terminal, but bypasses Richmond Hill Centre Terminal. This service operates with headways of approximately 15 minutes only during the morning and afternoon peak hours.

York Region Transit (YRT) Service

York Region Transit buses servicing the Yonge/Bernard K.D.A. are described in **Table 4-6**.

Table 4-6: Y.R.T. Bus Routes Servicing Yonge/Bernard K.D.A.

Route	From	To	Major Connections	Service Period	Service Frequency
81 Inspiration	Bernard Bus Terminal	Bernard Bus Terminal	none	Monday to Friday (AM and PM Peaks)	30-35 minutes
83 Trench	Bernard Bus Terminal	Richmond Hill Centre Bus Terminal	Hillcrest Mall Mackenzie Richmond Hill Hospital Richmond Hill Centre Bus Terminal/ Langstaff GO Station	Monday to Friday (All day)	35 minutes
86 Newkirk-Red Maple	Shadowfalls Drive & Wolf Trails Crescent	Richmond Hill Centre Bus Terminal	Bernard Bus Terminal Richmond Hill GO Station Richmond Hill Centre Bus Terminal/Langstaff GO Station	Monday to Saturday (all day)	weekday peak hours: 30 minutes Weekday off-peak hours: 45-50 minutes Saturday: 40 minutes
98 Yonge	Yonge Street & Green Lane	Bernard Bus Terminal	Newmarket GO Bus Terminal	Monday to Sunday	Weekday peak hours: 30 – 35 minutes Weekday off-peak hours: 45 – 50 Minutes Weekends: 40 – 50 minutes
98E Yonge	Finch GO Bus Terminal	Newmarket GO Bus Terminal	Bernard Bus Terminal	Monday to Friday	1 bus at 4:55PM from Finch GO Bus Terminal, non-stop to Bernard Bus Terminal

Route	From	To	Major Connections	Service Period	Service Frequency
99 Yonge	Bernard Bus Terminal	Finch GO Bus Terminal	Richmond Hill Centre Bus Terminal Finch GO Bus Terminal	Monday to Sunday	Weekday peak hours: 30 – 35 minutes Weekday off-peak hours: 45 – 50 Minutes Weekends: 40 – 50 minutes
98/99 Yonge Late Night	Yonge Street & Green Lane	Finch GO Bus Terminal	Newmarket GO Bus Terminal Bernard Bus Terminal Richmond Hill Centre Bus Terminal Finch GO Bus Terminal	Monday to Sunday (8:30 pm to 4:00am)	Weekday: 35 - 40 minutes Weekend: 45 – 50 minutes
240 Mill Pond GO Shuttle	Bernard Avenue (on-street)	Richmond Hill GO Station	Richmond Hill GO Station	Monday to Friday (AM and PM Peaks)	30 minutes

Special YRT Services

There are three special bus routes that service Langstaff Secondary school, St. Theresa Catholic High School, and Richmond Hill High School. These school specials only operate one bus in the morning and two buses in the afternoon.

Route 589/590 Richmond Hill Local is a bus route that operates two buses in the morning and four buses in the afternoon. This route services a number of residences, grocery stores, a medical building and Mackenzie Richmond Hill Hospital, as well as Hillcrest Mall.

80 Elgin Mills is a bus route that operates outside of the Yonge/Bernard K.D.A. boundary; however, it services the greater secondary transportation study area. This bus route operates from Bathurst Street and Shaftsbury Avenue to Woodbine Avenue. Buses operate all day, Monday to Sunday with headways of approximately 25 minutes during the peak hours and 50 minutes during off-peak hours.

4.4 Existing Transit Ridership Demand

Weekday transit boarding, alightings and peak transit load data within the study area were provided by York Region Transit (Y.R.T.). The total boardings and alightings for stops within the Key Development Area (K.D.A.) are broken down by A.M. peak (7 – 9 a.m.) and P.M. peak (4 – 6 p.m.) periods as shown in **Exhibit 4-8**. The P.M. peak period has the most boarding and alighting activities.

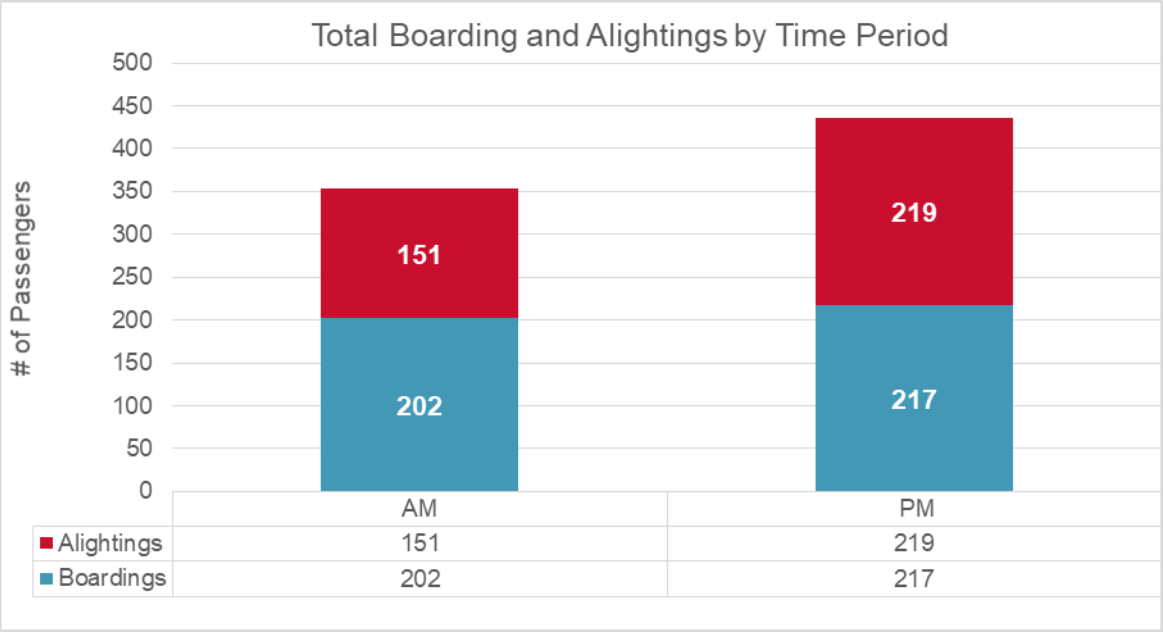


Exhibit 4-8: Total Boardings and Alightings by A.M. and P.M. peak period (Fall 2019)

Exhibit 4-9 shows the boardings and alightings at stops within the Yonge/Bernard K.D.A. for each individual VIVA and Y.R.T. route. VIVA Blue (route 601) is the busiest route within the study area by a significant margin with over 100 boardings and over 90 alightings in the A.M. peak period. VIVA Blue A (route 602) has the lowest boardings/alightings due to its infrequent stops within the study area.

Comparing the two VIVA routes with the other Y.R.T. bus routes, route 86 is the next busiest route with 30 boardings and 15 alightings as it passes through the Bernard Terminal. Route 240, the shuttle to Richmond Hill GO Station, has no boardings or alightings within the A.M. peak period. The reason for this is that GO train riders are more likely to drive to the Richmond Hill GO station, rather than take a bus to the GO

station that only runs every 30 minutes.

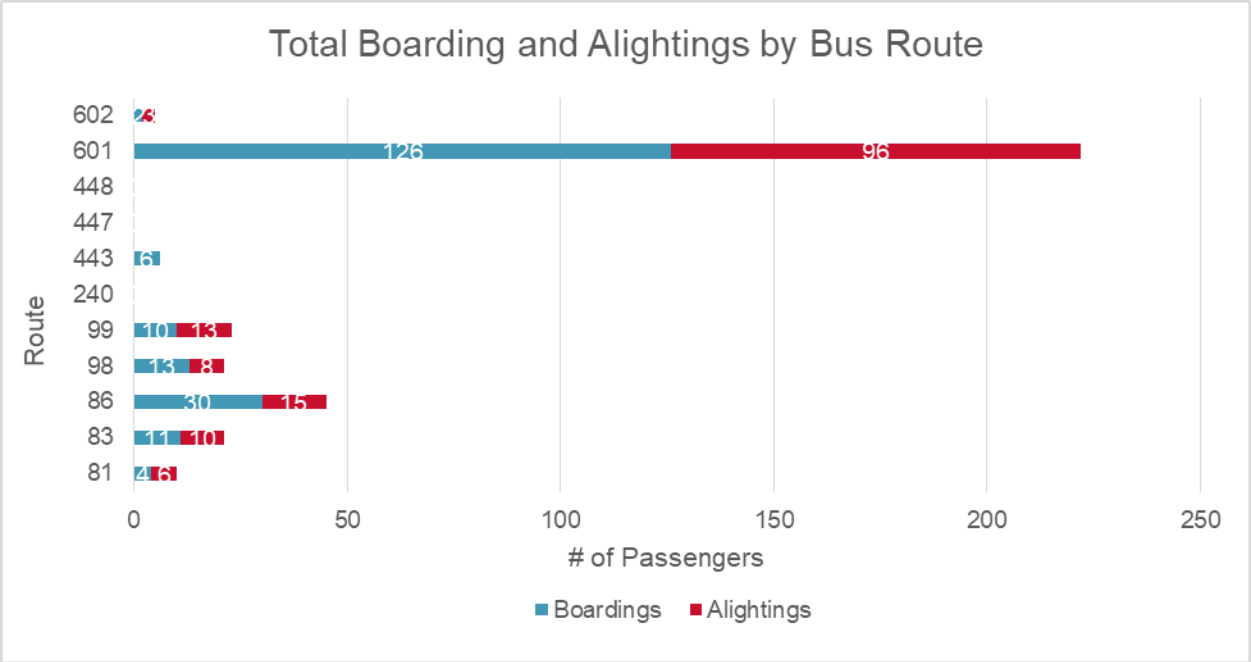


Exhibit 4-9: Total Boardings and Alightings by Route in the A.M. period (Fall 2019)

Exhibit 4-10 shows the total passenger load in both directions on each bus route within the study area for the A.M. peak period. This further confirms that VIVA Blue and VIVA Blue A are the busiest routes. The higher passenger loads on VIVA is due to the higher frequency compared to Y.R.T. routes in the study area. The Y.R.T. routes with the highest passenger loads are the 86 and 83, which travel to the Richmond Hill Centre Bus Terminal.

Through passengers (riders that do not get on or off within the study area) make up a large proportion of transit riders on the routes that pass through the study area. The amount of through passengers can be roughly calculated by subtracting the number of boardings within the study area from the total passenger load in the study area. This analysis shows that about 61% of Y.R.T. users are through passengers while 80% of

VIVA users are through passengers.

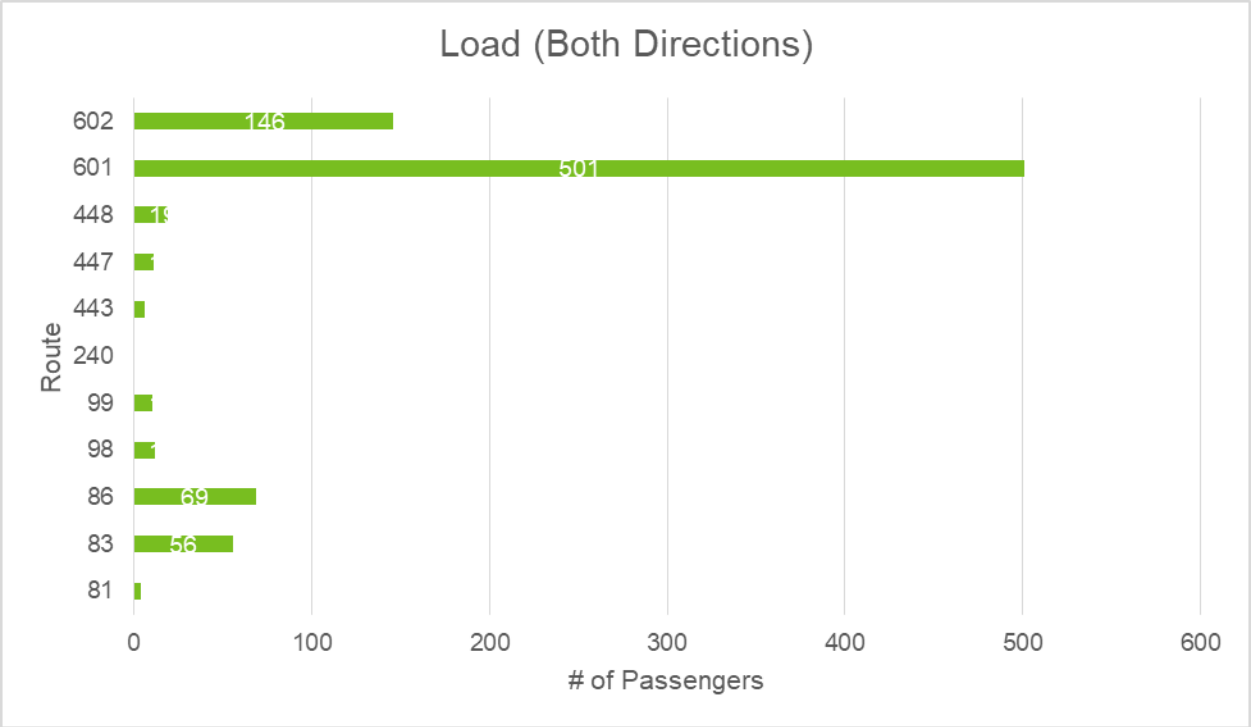


Exhibit 4-10: Total Passenger Load (both directions) by Route in the A.M. period (Fall 2019)

4.5 Traffic Safety Assessment

York Region publishes Annual Traffic Safety Reports, which provides a summary of collision data collected within the region. Its purpose is to provide an understanding of road safety trends on the regional roads and supports the planning and execution of coordinated law enforcement, road safety improvements, and public education campaigns for travellers in York Region.

Based on a review of the Annual Traffic Safety Reports, provided on the Region's website, Yonge Street & Elgin Mills Road and Yonge Street & Major Mackenzie Drive are two intersections within the greater study area that were identified as two of the top 10 high collision intersections in the City of Richmond Hill. **Exhibit 4-11** illustrates the collision trends from 2012 to 2018. As demonstrated by the graph, Yonge Street & Elgin Mills Road experienced a steady decline in collisions. Yonge Street & Major Mackenzie Drive generally experienced a decline in collisions, with the least amount of collisions from 2014 to 2016.

It should be noted that since 2016, there has been on-going construction along Yonge Street, which could be a contributing factor to the decrease in collisions. Although traffic operations typically did not change during construction (i.e. the number of travel lanes

on Yonge Street did not decrease), drivers may have opted to avoid these intersections by traveling a different route, resulting in lower traffic volumes at these intersections. When there were scheduled lane closures, drivers may have experienced delays due to high traffic volumes and slower driving speed, which could also contribute to a decrease in collisions.

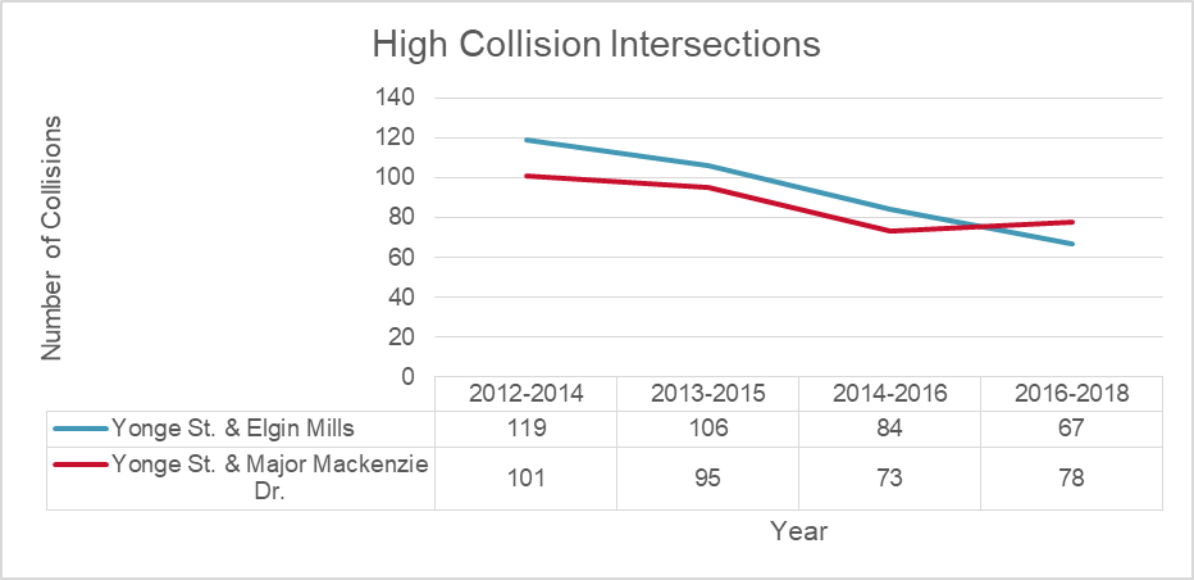


Exhibit 4-11: High Collision Intersections

York Regional Police (Y.R.P.) also provides collision reports to the City on a bi-annual basis. A summary of the 5-year collision history within and surrounding the study area from 2014 to 2018 was provided by the City. **Exhibit 4-12** highlights the roadways and intersections that were reviewed. **Table 4-7** and **Table 4-8** summarizes the number of collision at the selected intersections and road segments, respectively. As illustrated in **Exhibit 4-13** the total number of collisions for the study area (excluding the Regional Roads) range from 12 to 17 collisions, with the highest number of collisions in 2014 and 2018. However, based on the 5-year collision history, there are no significant trends of the collision history within the Yonge/Bernard K.D.A.

Exhibit 4-12: 5-Year Collision History Reviewed on Road Segments and Intersections Within and Surrounding Bernard K.D.A. (January 2014 to December 2018)

Table 4-7: Summary of 5-Year Collision History (Intersections)

Intersections	Number of Collisions by Year				
	2014	2015	2016	2017	2018
Bernard Avenue @ Yorkland Street	3	3	2	3	2
Bernard Avenue @ Lorraine Street	1	0	0	0	0
Bernard Avenue/Silverwood Avenue @ Squire Drive	0	0	0	0	0
Brookside Road @ Aladdin Crescent/Brookgreene Crescent	0	0	0	0	0
Brookside Road @ Alamo Heights Crescent/Burndean Court	0	0	0	0	0
Brookside Road @ Cedar Springs Drive	0	0	1	0	0
Brookside Road @ Chantilly Crescent	0	0	0	0	0
Brookside Road @ Rothbury Road/Leyburn Avenue	0	0	1	0	0
Brookside Road @ Shaftsbury Avenue	0	0	0	0	2
Canyon Hill Avenue @ Abitibi Street	0	0	0	0	0
Canyon Hill Avenue @ Debonair Street	0	1	0	0	0
Canon Hill Avenue @ Leyburn Street	0	0	0	0	1
Canyon Hill Avenue @ Palomino Drive/Gracedale Drive	0	0	0	0	0

Intersections	Number of Collisions by Year				
	2014	2015	2016	2017	2018
Canyon Hill Avenue @ Shaftsbury Avenue	3	0	1	2	2
Leyburn Avenue @ Stancroft Drive	0	0	0	0	0
Leyburn Avenue @ Naughton Drive	0	0	0	0	0
Lorraine Street @ Justus Drive	0	0	0	0	0
Naughton Drive @ Abitibi Street	0	0	0	0	0
Yorkland Street @ Bernard Avenue/Silverwood Avenue	0	1	0	0	0
Yorkland Street @ Justus Drive	2	0	1	1	1
Yorkland Street @ Newmill Crescent	1	0	0	0	0
Total	**10**	**5**	**6**	**6**	**8**

Table 4-8: Summary of 5-Year Collision History (Road Segments)

Road Segments	Number of Collisions by Year				
	2014	2015	2016	2017	2018
Bernard Avenue: Yonge St to Yorkland St	1	0	3	1	0
Bernard Avenue: Yorkland St to Lorraine St	0	0	0	0	0
Bernard Avenue: Lorraine St to Oldhill St	1	0	0	1	2
Bernard Avenue: Yorkland St to Squire Dr	0	0	0	0	0
Bernard Avenue: Squire Dr to Viewmark Dr	0	0	0	0	0
Bernard Avenue: Viewmark Dr to Price St	0	0	0	1	0
Brookside Road: Shaftsbury Avenue to Cedar Springs Dr	0	0	0	0	1
Brookside Road: Cedar Springs Dr to El Dorado St	0	0	0	0	0
Brookside Road: El Dorado St to Chantilly Cres	0	0	0	0	0
Brookside Road: Chantilly Cres to Chantilly Cres	0	0	0	0	0
Brookside Road: Chantilly Cres to Alamo Heights Dr/Burndean Ct	0	0	0	0	0
Brookside Road: Alamo Heights Dr/Burndean Ct to Aladdin Cres	0	1	1	0	0
Brookside Road: Aladdin Cres to Brookgreene Cres	0	1	0	0	0
Brookside Road: Brookgreene Cres to Rothbury Rd/Leyburn Ave	0	0	0	0	0
Brookside Road: Rothbury Road/Leyburn Avenue to Yonge St	1	0	0	0	0

Road Segments	Number of Collisions by Year				
	2014	2015	2016	2017	2018
Canyon Hill Avenue: Shaftsbury Ave to Palomino Dr/Gracedale Dr	1	0	0	0	0
Canyon Hill Avenue: Palomino Dr/Gracedale Dr to Debonair St	0	0	1	0	0
Canyon Hill Avenue: Debonair St to Leyburn Ave	0	0	0	0	0
Canyon Hill Avenue: Leyburn Ave to Abitibi St	0	0	0	0	0
Canyon Hill Avenue: Abitibi St to Yonge St	0	0	0	1	0
Leyburn Avenue: Brookside Rd to Stancroft Dr	0	0	1	0	0
Leyburn Avenue: Stancroft Dr to Naughton Dr	0	0	0	0	0
Leyburn Avenue: Naughton Dr to Naughton Dr	0	0	0	0	0
Leyburn Avenue: Naughton Dr to Lane N	0	0	0	0	0
Leyburn Avenue: Lane N to Canyon Hill Ave	0	0	0	0	0
Justus Drive: Yorkland St to Lorraine St	0	1	0	0	0
Newmill Crescent: Yorkland St to Oldhill St	0	3	0	0	0
Yorkland Street: Bernard Ave/Silverwood Ave to Squire Dr	0	1	0	1	2
Yorkland Street: Squire Dr to Bernard Ave	0	0	0	0	0
Yorkland Street: Bernard Ave to Justus Dr	1	0	2	0	3
Yorkland Street: Justus Dr to Newmill Cres	1	0	0	0	0
Yorkland Street: Newmill Cres to Elgin Mills Road E	1	0	0	1	0
Total	**7**	**7**	**8**	**6**	**8**

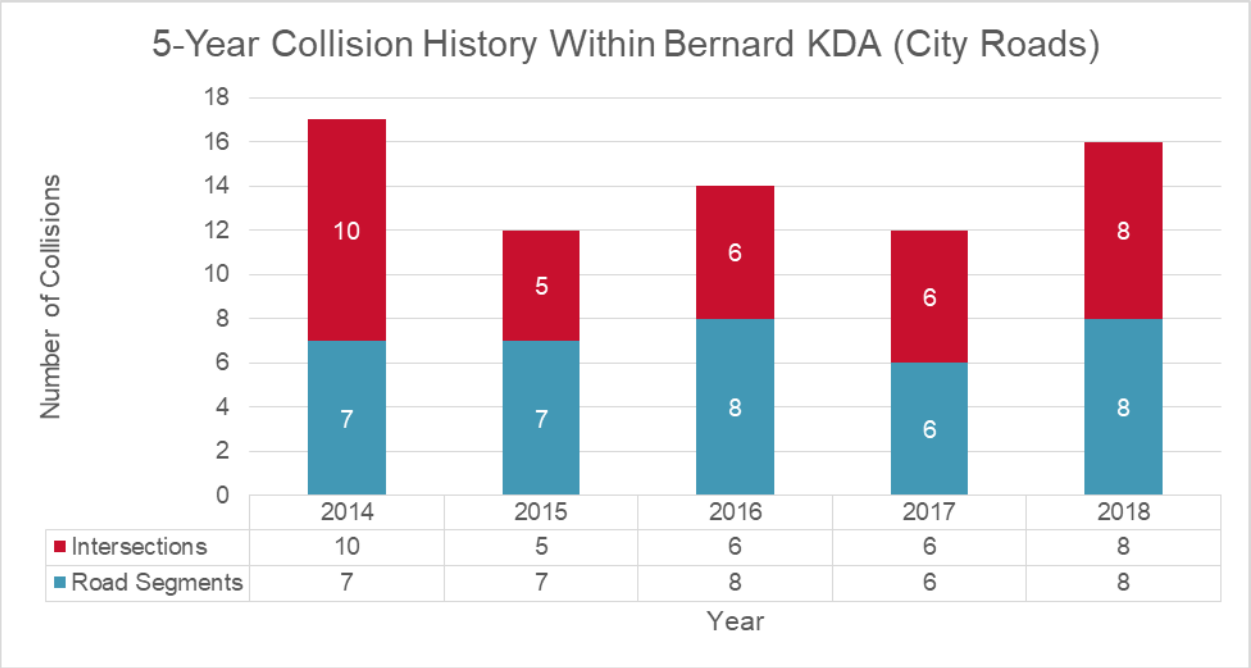


Exhibit 4-13: Summary of 5-Year Collision History

4.5.1 Intersection Improvements

The 2019 Annual Collision Statistics Report provided a pedestrian and cyclist safety index that was developed to prioritize Regional signalized intersections based on risk exposure to pedestrians and cyclists. The index consists of a weighted score that takes into consideration variables such as road characteristic, road user volume, crossing distance, speed limit and environment. The scores for each variable were combined and weighted to determine the scores for each factor (safety, demand, and existing conditions). The sum of the factor scores equates to the total weighted prioritization score (out of 60) for each intersection, with higher scores indicating higher priority for improvement. A ranked list of intersections with scores over 48 (80 per cent of 60) or higher are provided in **Exhibit 4-14**. The intersections of Yonge Street & Elgin Mills Road and Yonge Street and Major Mackenzie Drive received a score of 49 and 50, respectively.

York Region is committed to making road safety a priority and has partnered with York Regional Police to develop and implement safety initiatives to influence driver behaviours and reduce collisions.

These initiatives include the following:

- **Create pedestrian accessible intersections**: Increasing pedestrian crossing times, installing pedestrian countdown signals, implementing zebra crosswalks

- **Enhance opportunities for cyclists**: Designing and constructing new cycling facilities, implementing safe cycling campaigns and safe cycling educational courses
- **Increase awareness for distracted driving**: Launching a pedestrian safety campaign, in partnership with York Regional Police, to enhance awareness on distracted driving and pedestrians
- **Implement road safety reviews**: Undertaking road safety audits to identify safety issues and develop location specific solutions
- **Improve winter driving conditions**: Using new state of the art snow plows to ensure timely winter maintenance response to changing road conditions
- **Implement Red Light Camera program**: Operating red light cameras at 20 Regional intersections to mitigate red light running
- **Promote awareness for impaired driving**: Implementing Mothers Against Drunk Driving campaign, in partnership with York Regional Police, to stop impaired driving
- **Reduce operating speeds**: Introducing Community Safety Zones, installing radar speed boards, and applying speed limit revisions

Intersection improvements at Yonge Street & Elgin Mills Road and Yonge Street & Major Mackenzie Drive are already underway with the construction of the VIVA rapidway. Each signalized intersection along the rapidway segment on Yonge Street will provide zebra crosswalks to enhance visibility, pedestrian countdown signals to provide adequate crossing time, and cross-rides for cyclists to provide adequate space and visibility. These improvements will help further reduce collisions along Yonge Street intersections.

Signalized Intersection	Variable Scores (all /5)										Factor Scores			Total Weighted Score (/60)
	Safety		Demand				Ex. Conditions							
	Collisions	PSI	Ped. Volume	Transit	Attractors	Pop. Density	Traffic Volume	Turning Volume	Speed	Approach Lanes	Safety (/20)	Demand (/20)	Ex. Conditions (/20)	
*Yonge Street and Carrville Road/ 16th Avenue**	5	5	5	5	5	5	5	4	0	5	20	20	14	54
Yonge Street and Mulock Drive	5	5	5	5	5	3	4	4	3	5	20	18	16	54
Major Mackenzie Drive East and Bayview Avenue	5	5	5	3	5	4	4	4	3	4	20	17	15	52
*Highway 7 and Weston Road**	5	5	5	5	3	0	5	5	4	5	20	13	19	52
*Weston Road and Rutherford Road***	5	5	3	3	3	4	5	5	3	5	20	13	18	51
*Highway 7 and Leslie Street**	4	5	5	5	5	0	5	4	4	5	18	15	18	51
*Yonge Street and Major Mackenzie Drive**	5	5	5	5	5	4	4	3	0	4	20	19	11	50
*Highway 7 and Pine Valley Drive**	5	5	4	5	2	1	5	5	3	5	20	12	18	50
*Yonge Street and Elgin Mills Road**	5	5	5	5	4	3	4	4	1	3	20	17	12	49
Yonge Street and Clark Avenue	5	4	5	5	4	5	4	3	0	5	18	19	12	49
Bathurst Street and Carrville Road/ Rutherford Road	5	4	5	3	5	2	5	4	2	5	18	15	16	49
Bathurst Street and Clark Avenue West	5	4	5	3	4	4	5	4	1	4	18	16	14	48

* *Excluded due to recent or imminent construction*
** *Excluded due to identified traffic operational impacts*

Source: York Region – 2019 Annual Collision Statistics Report
Exhibit 4-14: Intersection Prioritization Index

4.6 Future Background Transportation Conditions

4.6.1 Horizon Years

BA projected their transportation analysis to 2031, which is in line with The City of Richmond Hill's Official Plan. Timing of development within the Bernard K.D.A. was discussed in consultation with the City and Region and for analysis purposes the 2041 horizon year was selected to assess the feasibility of the 4.0 F.S.I. Although the City anticipates K.D.A. development to continue beyond 2041, the year 2041 was chosen as

it aligns with York Region's Official Plan, policy forecasts and available forecasts from the Region's transportation model. An updated 2031 analysis was also conducted but with 3.0 F.S.I. to verify the previous B.A. findings.

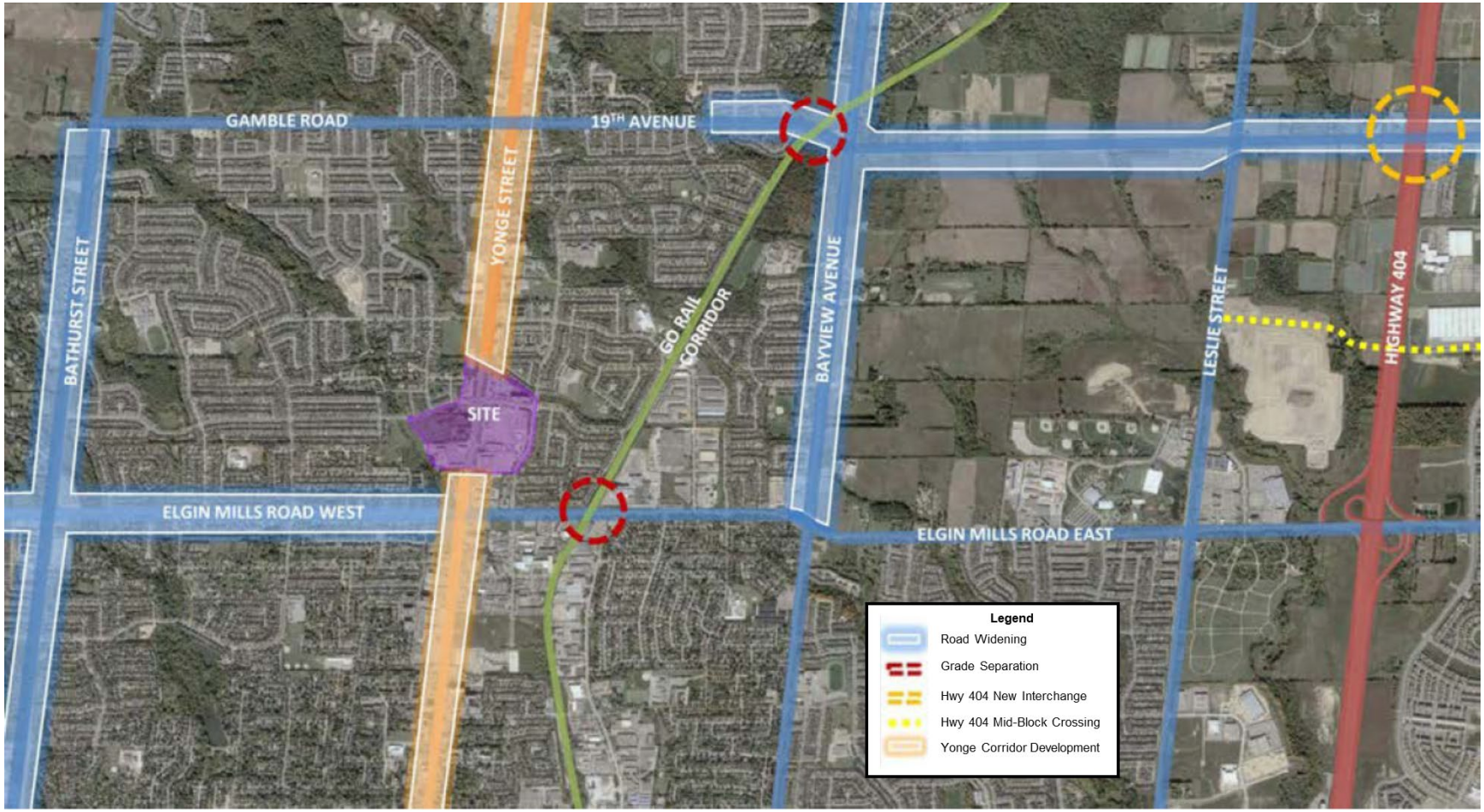
4.6.2 Future Road Improvements

Based on discussions with York Region and the Region's 2020 10-Year Roads and Transit Capital Construction Program, there are future road improvements planned to be implemented by 2031 and beyond 2031 in the vicinity of the study area. However, the timing for future road improvements beyond 2031 is dependent on available funding and required permits. **Table 4-9** lists York Region's future planned road improvements. These road improvements have been incorporated in the York Region 2031 and 2041 EMME models.

Table 4-9: Future Planned Road Improvements

Street Name	Road Improvement	Current Status
Horizon 2031		
Elgin Mills Road Grade Separation	Elgin Mills Road Grade Separation east of Yonge Street	2026
Elgin Mills Road	Widening from 2 to 4 lanes from Bathurst Street to Yonge Street to include on-street cycling facilities	2026
19th Avenue	Widening from 2 to 4 lanes from Bayview Avenue to Leslie Street	By 2031
H.O.V. Expansion on Highway 404	H.O.V. expansion (widening of 2 lanes, one per direction) between Highway 7 and Stouffville Road	2031
Horizon 2041		
Bathurst Street	Widening from 4 to 6 lanes from Major Mackenzie Drive East to Gamble Road to include Transit/H.O.V. lanes and on street cycling facilities	beyond 2031
19th Avenue	New interchange at Highway 404 & 19th Avenue	beyond 2031
New Midblock Crossing over Hwy 404	Midblock crossing at Hwy 404 north of Elgin Mills Road	beyond 2031
Grade Separation	19th Avenue Grade Separation west of Bayview Avenue	beyond 2031
Bayview Avenue	Widening from 4 to 6 lanes from Steeles Avenue to Major Mackenzie Drive	Beyond 2031

Exhibit 4-15 was extracted from the B.A. Report and illustrates the identified road improvements. As mentioned in **Section 2.2.1** of this report, road widening from 2 to 4 lanes along Bayview Avenue from Elgin Mills Road to Stouffville Road is complete. Road widening from 2 to 4 lanes and implementation of bike lanes along 19th Avenue from Jefferson Forest Drive/Linda Margaret Crescent to Bayview Avenue is also complete. The intersection of 19th Avenue and Leslie Street was recently converted to a signalized intersection and the jog has been eliminated.



Source: Yonge Street and Bernard Avenue Key Development Area Secondary Plan Transportation Considerations Report, Oct 2017, B.A. Group

Exhibit 4-15: Identified Infrastructure Improvements

4.6.3 Background Growth

The B.A. study included background growth from 800 residential units and applied a general corridor growth rate of 0.5% per annum to Yonge Street and 1% per annum to Elgin Mills within the 14-year planning horizon. Applying general corridor growth rates is a conservative approach that is appropriate for small scale developments. However, for a larger scale development area, such as the Bernard K.D.A., it is important to consider development and transportation network improvements beyond the study area to provide a broader network perspective and the implications they may have on the growth of the study area corridors.

Given that H.D.R. recommends a larger secondary study area, all active developments within the boundary of Bathurst Street, Gamble Road/19th Avenue, Bayview Avenue, and Major Mackenzie Drive should be included in the assessment. On October 25, 2019, the City of Richmond Hill provided a current list of 28 active developments within the secondary study area, summarized in **Table 4-10**, comprising a total of 865 residential units and approximately 4,700 sq.m. of non-residential uses within the K.D.A., and approximately 1,675 residential units and 1,600 sq.m. of non-residential uses outside the K.D.A.

Table 4-10: Active Developments

	Municipal Address	Description
Northeast Quadrant	10909 Yonge Street	Mixed-use residential development: - 16 storey Apartment Building with 315 apartment units - 23 townhouse units
	11305 Yonge Street	Mixed-use high/medium density residential development: - 10-storey apartment building with 37 units - 49 stacked townhouses
	102 Yorkland Street	Residential development: - 12-storey residential apartment building with 186 units
Northwest Quadrant	10766 Yonge Street, 19 Leonard Street	Retail and Medical Offices development: 1,645.95 Sq.m. GFA
	11488 Yonge Street, 49 Gamble Road	Mixed-use residential development: - 10-storey residential building with 114 units - 56 4-storey townhouses
	24 Brookside Road	7-storey Medical Office development: - 3,048 sq.m.

	Municipal Address	Description
	10922, 10944, 10956 Yonge Street	Residential development: - 129 townhouse units
	59 Brookside Road (Phase 1 and 2)	Mixed-use commercial/residential high rise development: - 2 single detached dwelling units - 28 semi-detached dwelling units - 156 Townhouse units - 108 apartment units
	25, 29, 31 Naughton Drive	Residential development: - 7 single detached dwelling units
	11130 Yonge Street	Mid-rise residential development: - 8-storey apartment building with 114 dwelling units
	15 Colesbrook Road	Residential development: 18 townhouse units
	195 Gamble Road	Residential development: 8 townhouse units
Southwest Quadrant	102, 106 Hunt Avenue	Residential development: - 6 three-storey townhouse units
	107 Hall Street	Residential development: - 22 townhouse dwelling units - 1 relocated heritage building on the subject lands
	44, 48, 54, 60 Arnold Crescent	Residential development: - 4 single detached dwelling units - 37 condominium townhouse units
	222, 224 Regent Street	Residential development: - 11 single detached dwelling units
	35 Wright Street	6-storey office building with 8 units
	251, 253, 259 Oxford Street	Residential development: - 14 single detached dwelling units
	158, 160, 162, 170 Oxford Street	Residential development: 14 new single detached dwelling units
	116 Lucas Street	Residential development: - 1 semi-detached dwelling (2 dwelling units)
	230 Major Mackenzie Drive, 129, 133, 141 Arnold Crescent	Residential development: - 63 condo townhouse dwelling units - 7 detached dwelling units - 1 future residential lot

	Municipal Address	Description
	491 Elgin Mills Road West	Residential development: - 4 single detached dwelling units
	112 Hunt Avenue	Residential development: - 2 single detached dwelling units
	154 Oxford Street	Residential development: - 4 single detached dwelling units
Southeast Quadrant	64, 72 Major Mackenzie Drive East, 115, 119 Church Street South	Residential development: - 1 6-storey building terracing down to 3-storeys with 87 units - 1 semi-detached dwelling (2 dwelling units) - retention of existing single detached dwelling - relocation of a single detached dwelling
	110 Major Mackenzie Drive East	2-storey Medical Office Development: - 542.4 sq.m.
	27, 35, 39 Church Street North	Residential development: - 20 semi-detached dwelling units - retention of single detached residential dwellings

Using York Region's EMME model, it was assumed that background growth from active and anticipated developments was accounted for in the 2031 and 2041 models. The following sections document the future background base case model development for horizon years 2031 and 2041.

4.6.4 Subarea Model Development and Calibration

As part of the transportation analysis work, a subarea model was developed from the York Region EMME model to capture the study area. 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 the weekday AM peak hour only based on the study approach.

4.6.5 Future Background Traffic

This section documents the future background screenline performance in 2031 and 2041 based on the provided A.M. peak hour model as indicated in **Section 4.6.2**. A detailed screenline analysis table is provided in **Appendix A**.

High auto volumes and low transit mode splits (as seen in **Table 4-11**) in both 2041 and 2031 background scenario assumed within the York Region model were found to be lower than expected. As a result, changes to model outputs (as discussed and accepted by York Region) were made to better reflect future expected volumes and capacity. These changes include:

- Eastbound volume reductions of 10% near Bayview Avenue along both Gamble Road/19th Avenue and Elgin Mills Road, to account for peaking;
- Northbound and southbound reductions (as shown in **Table 4-12**) along Bathurst Road, Yonge Road, and Bayview Avenue, to account for a higher transit mode split; and,
- Capacity increases along several corridors (as shown in **Table 4-13**), to better reflect actual capacity.

Table 4-11: Southbound Corridor Transit Mode Split

SB Transit Mode Split*			
Corridor	**2041**	**2031**	**2011**
Bathurst	5%	4%	2%
Yonge	7%	6%	4%
Bayview	10%	9%	4%

*Taken for trips with origins between Highway 7 and Elgin Mills Road, and destinations between Elgin Mills Road and Steeles Avenue

Table 4-12: Auto Volume Reductions along Corridors

2041						
Corridor	Bathurst Street		Yonge Street		Bayview Avenue	
Direction	NB	SB	NB	SB	NB	SB
Lowest Volume Link	1201	2656	763	1674	721	1638
Mode Split	5%	10%	10%	20%	5%	10%
Volume Reduction	60	266	76	335	36	164
2031						
Corridor	Bathurst Street		Yonge Street		Bayview Avenue	
Direction	NB	SB	NB	SB	NB	SB
Lowest Volume Link	932	2264	595	1482	737	1535
Mode Split	5%	10%	10%	20%	5%	10%
Volume Reduction	47	226	60	296	37	154

Table 4-13: Capacity Adjustments

Corridor	Original Capacity	Final Capacity
East-west Corridors		
Gamble Road / 19th Avenue	700 to 900	1000
Elgin Mills Road	900	1000
Major Mackenzie Drive	700 to 900	1000
North-south Corridors		
Bathurst Street	900 to 1200	1200
Yonge Street	800 to 1000	1200
Bayview Avenue	900	1200

It is to be noted that refinements were undertaken in the model to account for a higher transit mode split on the Bathurst Street, Yonge Street, and Bayview Avenue corridors based on the planned Rapidway on Yonge Street and frequent transit service on Bathurst Street and Bayview Avenue. In addition, peak hour spreading adjustments were also applied for high modelled volumes observed along the regional arterial road network.

4.6.5.1 2031 BACKGROUND SCREENLINES

The 2031 A.M. background for east-west and north-south screenlines are shown in **Exhibit 4-16** and **Exhibit 4-17**, respectively.

East-west screenline
2031 AM background traffic

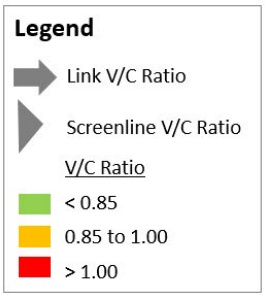


Exhibit 4-16: 2031 A.M. Background East-West Screenline

North-south screenline
2031 AM background traffic

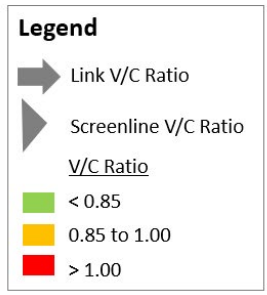


Exhibit 4-17: 2031 A.M. Background North-South Screenline

The 2031 A.M. screenlines indicate acceptable operations, with most v/c ratios under 1.0. The southbound movement at Bayview Avenue and Major Mackenzie Drive is showing congestion.

4.6.5.2 2041 BACKGROUND SCREENLINES

The 2041 A.M. background for east-west and north-south screenlines are shown in **Exhibit 4-18** and **Exhibit 4-19**, respectively.

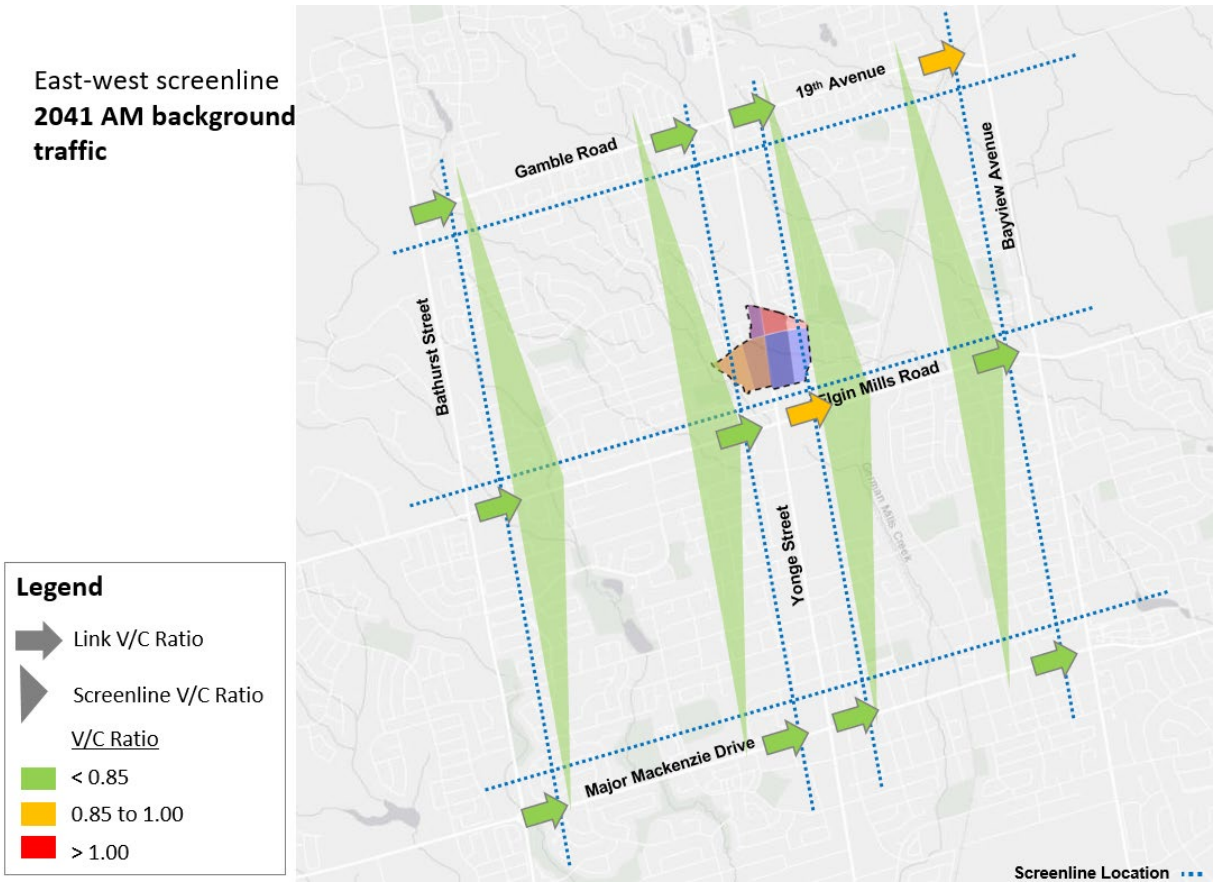


Exhibit 4-18: 2041 A.M. Background East-West Screenline

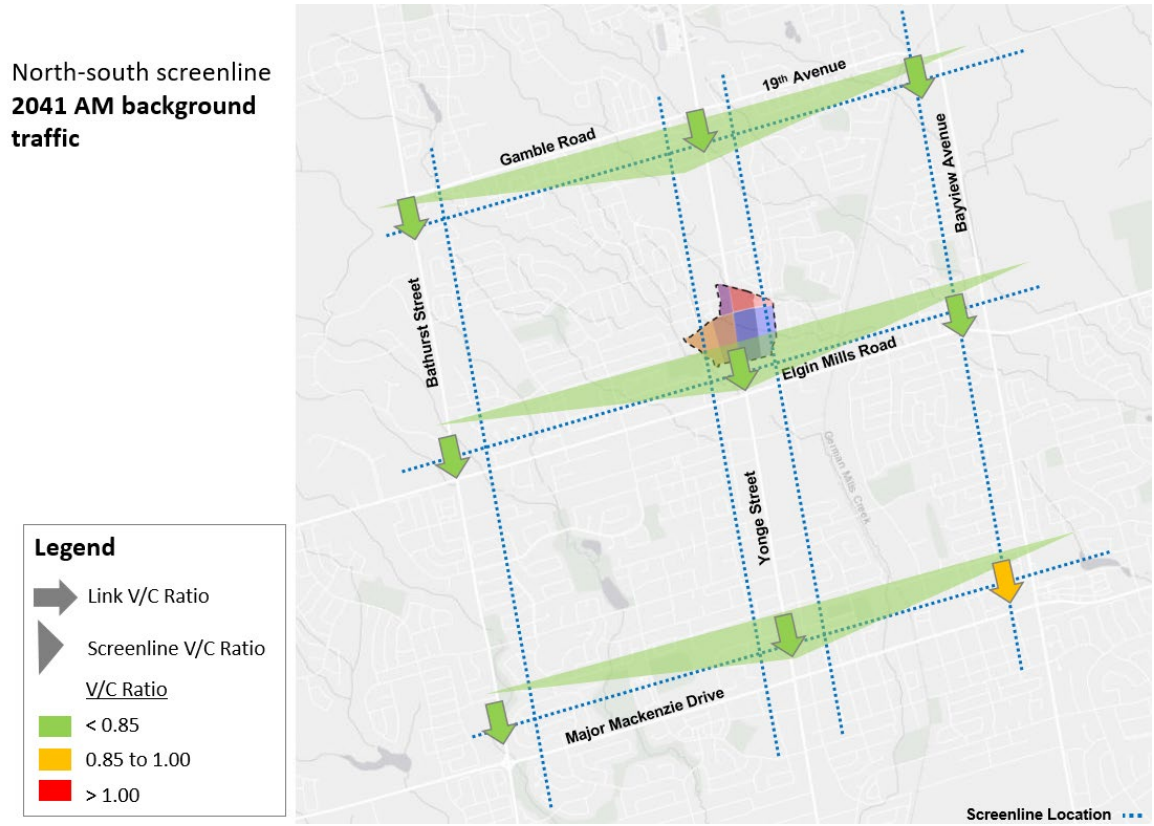


Exhibit 4-19: 2041 A.M. Background North-South Screenline

All 2041 A.M. screenlines will be operating under capacity (1.0), with notable improvements for the entire southbound movement screenline north of Major Mackenzie Drive, and the individual southbound movement at Bathurst Street. Contributing factors are due to planned road improvements between 2031 and 2041, including the widening from 2 to 4 lanes for both Bathurst Street and Bayview Avenue within the expanded study area.

4.7 Future Total Transportation Conditions

4.7.1 Future Road Network

A total of six (6) new road links were proposed in the October 2017 B.A. report. As illustrated in **Exhibit 4-20**, Link E extends from Brookside Road to Yonge Street and meets Link D at Yonge Street to form a signalized intersection. Link H is an extension of Naughton Drive and connects to Link E to form an unsignalized T-intersection.

In May 2018, the South Brookside Tertiary Plan was published. The Tertiary Plan was intended to guide the development within the South Brookside Community and provide specific direction on land use and design considerations. Schedule 1 of the Tertiary Plan, shown in **Exhibit 4-21** illustrates the recommended road network which differs

from the recommended road network established in the B.A. report, such that a link extends from Brookside Road to Naughton Drive and connects to Abitibi Street to form a 4-way intersection.

Through discussion with the City of Richmond Hill, it was determined that a road linking Brookside Road to Yonge Street has been identified through an approved draft plan of subdivision and will be secured as part of the registration of the plan. Land for an extension of Aribiti Street from Naughton Drive to the Brookside Road/Yonge Street Link will be acquired through future development.

Further modifications to the road network were made through consultation with the City of Richmond Hill staff, whereby Link A, illustrated in **Exhibit 4-20**, will be a direct link between Yonge Street and Bernard Avenue on a curved road.

The street network proposed by B.A., the South Brookside Community Tertiary Plan, and the City of Richmond Hill, is recommended to be carried forward for analysis and is illustrated in **Exhibit 4-22**.

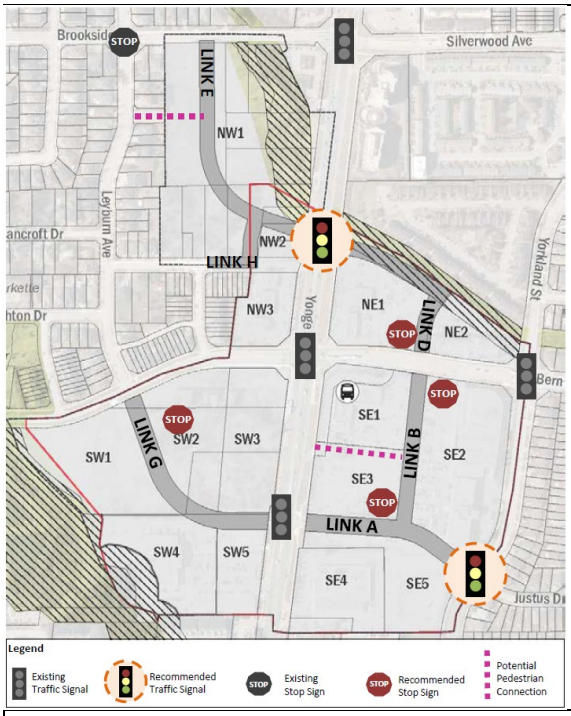


Exhibit 4-20: BA Group Recommended Road Network

Exhibit 4-21: South Brookside Tertiary Plan – Schedule 1

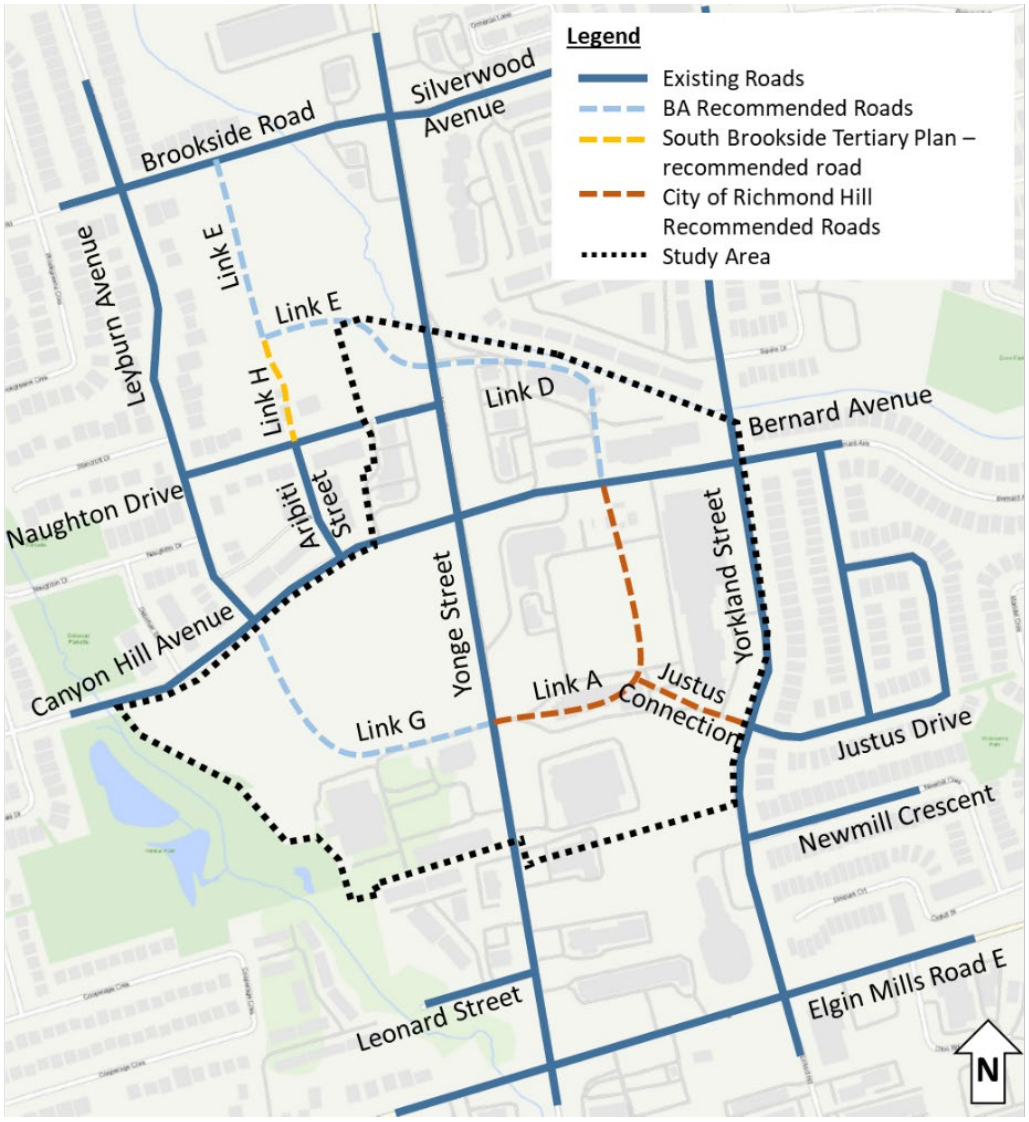


Exhibit 4-22: Recommended Road Network

At the Public Open House on December 10, 2019, residents voiced their concerns regarding traffic infiltration through Link A to the intersection of Yorkland Street and Justus Drive, and opposed the proposed road. However, this link is vital to maintain vehicular and active transportation connections through the property and to Yorkland Street. The recommended alignment of this road link has been adjusted to minimize any traffic infiltration activities by removing the direct link from Yonge Street to Yorkland Street. Further, it is recommended that the City consider converting this road link from public to private to maintain the connection, while minimizing traffic infiltration. However, provision of turn lanes at intersections would be needed, and the road would be designed to function and appear the same as a public road.

4.7.1.1 RECOMMENDED ROAD TYPE AND RIGHT-OF-WAY ELEMENTS

Based on the B.A. report, the following right-of-ways are proposed for the recommended future road network and **Table 4-14** describes their preferred street network elements:

- Collector Streets (Link A and Link G)
- Local Streets (Link D, Link E, Link H, and Justus Connection)

Table 4-14: BAs Preferred Street Network Elements

Type	ROW (m)	Lanes Widths	Cycling Lanes widths	On-street parking	sidewalks
Collector	23	Two 3.5m travel lanes	Two 1.8m bike lanes	2.5m parking lanes (one or both sides)	Min. 2m sidewalks (both sides)
Local	20	two 4.25m shared lanes	two 4.25m shared lanes (sharrows)	2.5m parking lanes (one side)	min. 2m sidewalks (both sides)

While H.D.R. agrees with the proposed road network and street typology for Links A and G, Links D, E, and H, and the Justus Connection, different cross section elements are recommended to be considered to improve pedestrian and cycling connections. Further discussion on Active Transportation is provided in **Section 6** of this report.

4.7.2 Future Travel Demand

4.7.2.1 FUTURE KDA DEVELOPMENT

For the purpose of this analysis, the Yonge/Bernard K.D.A. was divided into seven (7) development zones as illustrated in **Exhibit 4-23**.

Based on consultation with the City of Richmond Hill, two development scenarios were tested – density of 3.0 F.S.I., and Density of 4.0 F.S.I. **Table 4-15** summarizes the proposed development densities scenarios. This density distribution is preliminary for the purposes of this analysis and does not reflect the proposed density allocation of the Bernard K.D.A. Secondary Plan. A detailed summary of the proposed density by parcel is provided in **Appendix B.**

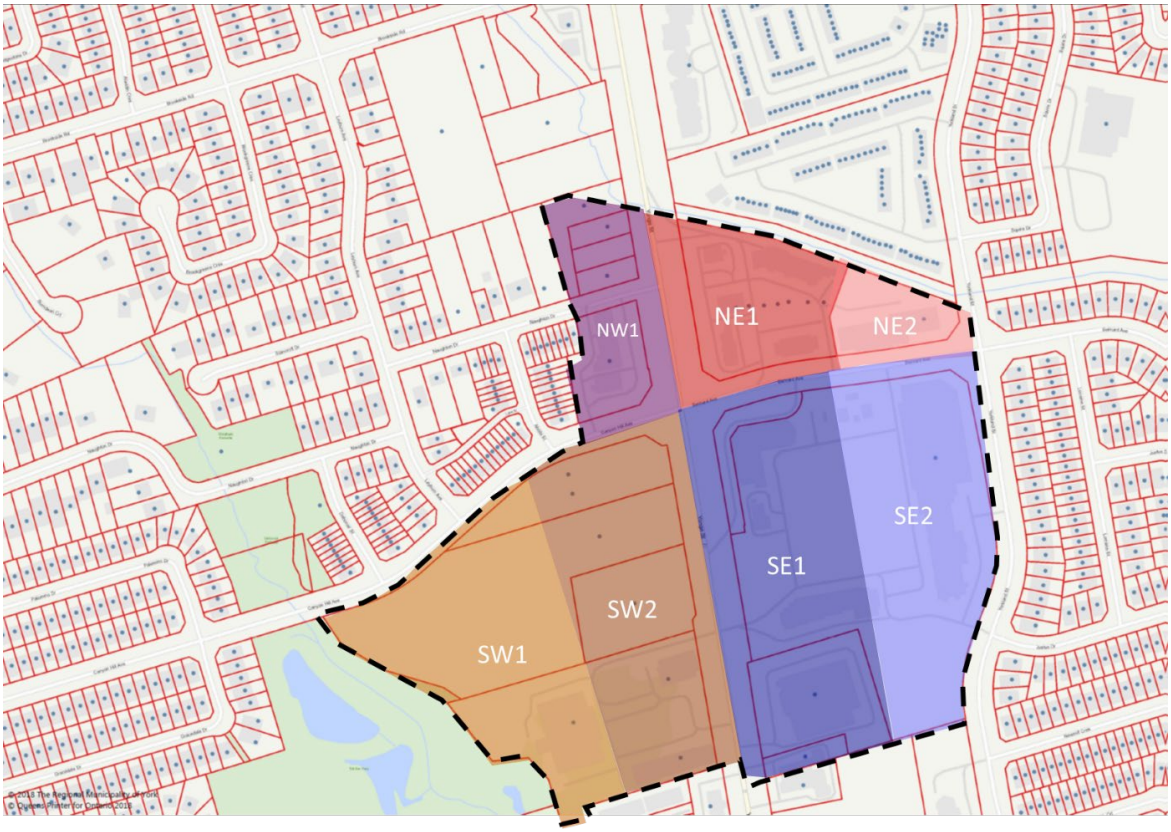


Exhibit 4-23: Development Zones

Table 4-15: Development Densities

POPULATION AND JOB YIELDS (3.0 F.S.I.)			
Horizon	**Residential Units**	**People**	**Jobs**
Pre, and Up to 2031	1,146	2,121	1,659
2031-2041 (Build-out)	3,073	5,840	741
Total	**4,219**	**7,961**	**2,400**
POPULATION AND JOB YIELDS (4.0 F.S.I.)			
Horizon	**Residential Units**	**People**	**Jobs**
Pre, and Up to 2031	1,474	2,745	1,805
2031-2041 (Build-out)	4,334	8,235	1,382
Total	**5,809**	**10,980**	**3,187**

Table 4-16 summarizes the difference in land use assumptions compared to B.A.'s report. It can be noted that at a density of 3.0 F.S.I., there is a reduction in residential

units, slight increase in retail use, and a significant increase in office use. At a density of 4.0 F.S.I., all land uses increase, however, there is significant growth in office uses.

Table 4-16: Land Use Assumption comparison

Land Use Assumption	Residential Units	Office GFA (sq.m.)	Retail GFA (sq.m.)
B.A.	4700	12,675	38,315
H.D.R. 3.0 F.S.I.	4219	35,168	39,795
Difference % with B.A.	-10%	177%	4%
H.D.R. 4.0 F.S.I.	5809	45,511	55,932
Difference % with B.A.	24%	259%	46%

4.7.3 Projected Mode Share

The projected mode share assumed by B.A. was based on projections established in the *Yonge Street Corridor Public Improvements Environmental Assessment (Y.S.C.P.I. E.A.), 2005*. Similar to B.A.'s approach for existing transit modal splits, the Y.S.C.P.I. E.A. projected Richmond Hill's transit split by travel destination. According to B.A., The Y.S.C.P.I. E.A. report projected a 17% transit split. Although the analysis is broken down by travel destination, the origin is not exclusive to Richmond Hill and also includes Aurora and Newmarket. Moreover, the transit modal split presented in the Y.S.C.P.I. E.A. report is only projected to 2021, whereas B.A.'s horizon year is 2031.

Based on the Y.S.C.P.I. E.A., B.A. applied a projected mode share adjustment, provided in Table 31 of the B.A. Report, but only reduced auto-driver mode share. However, H.D.R. believes it is appropriate to also reduce auto-passenger mode-share. **Table 4-17** provides the projected mode share adjustment. This adjustment was then applied to the existing mode shares that were applied to the trip generation and is summarized in **Table 4-18**.

Table 4-17: Projected Mode Share Adjustment

Mode	Residential	Office	Retail
Auto Driver	-6%	-7%	-2%
Auto Passenger	-4%	-3%	-1%
Transit	9%	8%	0%
Walking	0%	1%	3%
Cycling	1%	1%	0%

Table 4-18: Base 2031 Mode Shares

Mode	Residential		Office		Retail	
	AM		AM		AM	
	IN	OUT	IN	OUT	IN	OUT
Auto Driver	68%	52%	79%	62%	67%	73%
Auto Passenger	12%	11%	5%	28%	25%	19%
Transit	9%	21%	9%	8%	5%	5%
Walking	10%	13%	3%	1%	3%	3%
Cycling	1%	1%	2%	1%	0%	0%

B.A. assumed a 17% target residential transit mode share based on Y.S.C.P.I. E.A. transit mode splits; however, as mentioned earlier, the calculation of 17% was not reliable due to the varying origins and projected year.

H.D.R. will apply **18%** and **19%** mode shares to the A.M. and P.M. residential trips, respectively, based on the weighted average of projected transit mode share provided in **Table 4-19**.

For future mode share, B.A.'s target residential transit mode share was 30% based on the City's mode share targets. This shift in modal split inherently reflects other measures supporting that shift, including parking and T.D.M. strategies, in addition to increased transit availability. H.D.R. will apply the same assumption for residential use. The future transit mode share for office and retail is assumed to be 12% and 10%, respectively. The future mode share used to generate future trips is summarized in **Table 4-19**. **Table 4-20** provides a comparison of the transit mode shares that were used by B.A. and assumed by H.D.R.

Table 4-19: Future 2041 Mode Share

Mode	Residential		Office		Retail	
	AM		AM		AM	
	IN	OUT	IN	OUT	IN	OUT
Auto Driver	49%	45%	77%	60%	62%	68%
Auto Passenger	12%	11%	5%	28%	25%	19%
Transit	28%	30%	12%	10%	10%	10%
Walking	10%	13%	3%	1%	3%	3%
Cycling	1%	1%	2%	1%	0%	0%

Table 4-20: Transit Mode Comparison

Scenario	Residential	Office	Retail	KDA Zone
	AM	AM	AM	AM
B.A.	17%	10%	2%	12%
H.D.R. Base 2031	18%	9%	5%	13%
H.D.R. Future 2041	30%	12%	10%	21%

4.7.4 Trip Generation Methodology

B.A.'s trip generation methodology for residential and office travel demand was based on 'First principles'. Residential travel forecasts were developed based on residential typology planned for the site using typical residential unit occupancy trends and typical weekday travel patterns for home-based trips made to/from the surrounding neighbourhood. Office travel demand forecasts were based on a review of the total number employees anticipated to work within the Secondary Plan area combined with T.T.S. and office travel characteristics established in the I.T.E. Trip Generation Manual 9th Edition. Retail travel demand was based on observed travel patterns within the Yonge/Bernard K.D.A.

While B.A.'s methodology for residential and office trip generation is consistent with best practices, H.D.R. has relied on I.T.E. Trip Generation Manual 10th Edition and 2016 T.T.S. data to forecast travel demand within the K.D.A. For retail trip generation, H.D.R. utilized the trip rates per B.A.'s report, which were based on trip generation surveys conducted by B.A. The following sections outline the steps taken to produce the number of person trips for each land use.

4.7.4.1 RESIDENTIAL TRIP GENERATION

Step 1
- **Generate total vehicle trips** using the vehicle trip formula for land use code 222 and dwelling unit numbers during the morning and afternoon peak periods.

Step 2
- **Convert vehicle trips to person trips** using vehicle to person trip rate from I.T.E. manual. The A.M. peak hour vehicle to person trip rate from I.T.E. is 2.52. Based on the characteristics of the Yonge/Bernard K.D.A., vehicle to person trips rates were modified.*

Step 3
- **Generate inbound/outbound person trips** using I.T.E.'s inbound/outbound distribution for both peak periods.

Step 4
- **Generate inbound/outbound vehicle trips** by applying mode share, obtain from 2016 T.T.S. data, to person trips.

*The vehicle to person trip rate from I.T.E. reflects the characteristics of a city centre, which is not representative of the Yonge/Bernard K.D.A. Therefore, utilizing existing auto-driver mode share based on 2016 T.T.S. data, the vehicle to person trip rate was modified, yielding a vehicle to person trip rate of 1.66 in the A.M. peak period.

4.7.4.2 OFFICE TRIP GENERATION

Step 1
- **Generate total vehicle trips** using the average vehicle trip rate for land use code 710 and G.F.A.'s during the morning and afternoon peak periods. The A.M. Average vehicle trip rate used in this study is 1.16 (trips/1000 ft2).

Step 2
- **Convert vehicle trips to person trips** using vehicle to person trip rate from I.T.E. manual. The A.M. peak hour vehicle to person trip rate used in this study is 1.3.

Step 3
- **Generate inbound/outbound person trips** using I.T.E.'s inbound/outbound distribution for both peak periods.

Step 4
- **Generate inbound/outbound vehicle trips** by applying mode share, obtain from 2016 T.T.S. data, to person trips.

4.7.4.3 RETAIL TRIP GENERATION

Step 1
- **Generate total person trips** using B.A.'s person trip rates based on a trip generation survey conducted by B.A. in 2016. **Table 4-21** summarizes the retail trip rates.

Step 2
- **Generate inbound/outbound vehicle trips** by applying mode share, obtain from 2016 T.T.S. data, to person trips.

Step 3
- **Internal trip reduction** is applied to retail vehicle trips based on the I.T.E. handbook 3rd edition. The office-retail and residential-retail trips were eliminated from the total inbound/outbound retail vehicle trips.

Table 4-21: B.A.'s Retail Person Trip Rates

	AM IN	AM OUT
Person Trip Rate (person trip per 100 m2)	2	1.08

4.7.4.4 TRIP GENERATION COMPARISON

Table 4-22 summarizes a comparison of total trips generated. **Table 4-23** through **Table 4-25** provides a summary and comparison of the trips generated for residential, office, and retail uses at 3.0 F.S.I. compared to B.A.'s results.

Table 4-22: Total Trip Generation Comparison

TOTAL			
Scenario 1	**AM**		
	In	**Out**	**Two-Way**
B.A. Trips	1040	1363	2403
3.0 F.S.I. 2031 Base Mode Share H.D.R. Trips	1246	1186	2432
Difference (%) with B.A. 3.0 F.S.I.	206 (20%)	-177 (-13%)	29 (1%)
Scenario 2	**AM**		
	In	**Out**	**Two-Way**
4.0 F.S.I. 2041 Base Mode Share H.D.R. Trips	1689	1613	3302
Difference (%) with B.A. 3.0 F.S.I.	649 (62%)	250 (18%)	899 (37%)
Difference (%) with 3.0 F.S.I. H.D.R.	443 (36%)	427 (36%)	870 (36%)
Scenario 3	**AM**		
	In	**Out**	**Two-Way**
4.0 F.S.I. 2041 Higher Mode Share H.D.R. Trips	1489	1418	2907
Difference (%) with B.A. 3.0 F.S.I.	449 (43%)	55 (4%)	504 (21%)
Difference (%) with 4.0 F.S.I Base Mode Share H.D.R. Trips	-200 (-12%)	-195 (-12%)	-395 (-12%)

Table 4-23: Residential Trip Generation Comparison

RESIDENTIAL				
Scenario 1	**Dwelling Unit**	**AM**		
		In	**Out**	**Two-Way**
B.A. Trips	4,700	355	1,055	1,410
3.0 F.S.I. 2031 Base Mode Share H.D.R. Trips	4,219	348	847	1,195
Difference (%) with B.A. 3.0 F.S.I.	-481 (-10%)	-7 (-2%)	-208 (-20%)	-215 (-15%)
Scenario 2	**Dwelling Unit**	**AM**		
		In	**Out**	**Two-Way**

RESIDENTIAL				
4.0 .F.S.I. 2041 Base Mode Share H.D.R. Trips	5,809	468	1,140	1,609
Difference (%) with B.A. 3.0 F.S.I.	1,109 (24%)	113 (32%)	85 (8%)	199 (14%)
Difference (%) with 3.0 F.S.I. H.D.R.	1,590 (38%)	120 (34%)	293 (35%)	414 (35%)
Scenario 3	**Dwelling Unit**	**AM**		
		In	**Out**	**Two-Way**
4.0 F.S.I. 2041 Higher Mode Share H.D.R. Trips	5,809	338	973	1,310
Difference (%) with B.A. 3.0 F.S.I.	1,190 (24%)	-17 (-5%)	-82 (-8%)	-100 (-7%)
Difference (%) with 4.0 F.S.I. Base Mode Share H.D.R. Trips	0 (0%)	-130 (-28%)	-167 (-15%)	-299 (-19%)

Table 4-24: Office Trip Generation Comparison

OFFICE				
Scenario 1	**GFA (m²)**	**AM**		
		In	**Out**	**Two-Way**
B.A. Trips	12,675	150	23	173
3.0 F.S.I. 2031 Base Mode Share H.D.R. Trips	35,168	390	50	439
Difference (%) with BA 3.0 F.S.I.	22,493 (177%)	240 (160%)	27 (116%)	266 (154%)
Scenario 2	**GFA (m²)**	**AM**		
		In	**Out**	**Two-Way**
4.0 F.S.I. 2041 Base Mode Share H.D.R. Trips	45,511	504	64	569
Difference (%) with B.A. 3.0 F.S.I.	32,836 (259%)	354 (236%)	41 (179%)	396 (229%)
Difference (%) with 3.0 F.S.I. H.D.R.	10,343 (29%)	114 (29%)	14 (28%)	130 (30%)
Scenario 3	**GFA (m²)**	**AM**		
		In	**Out**	**Two-Way**
4.0 F.S.I. 2041 Higher Mode Share H.D.R. Trips	45,511	488	62	551
Difference (%) with B.A. 3.0 F.S.I.	32,836 (259%)	338 (226%)	39 (170%)	378 (218%)
Difference (%) with 4.0 F.S.I. Base Mode Share H.D.R. Trips	0 (0%)	-16 (-3%)	-2 (-3%)	-18 (-3%)

Table 4-25: Retail Trip Generation Comparison

RETAIL				
Scenario 1	**GFA (m²)**	**AM**		
		In	**Out**	**Two-Way**
B.A. Trips	38,315	535	285	820
3.0 F.S.I. 2031 Base Mode Share H.D.R. Trips	39,795	508	290	820
Difference (%) with B.A. 3.0 F.S.I.	1,480 (4%)	-27 (-5%)	5 (2%)	0 (0%)
Scenario 2	**GFA (m²)**	**AM**		
		In	**Out**	**Two-Way**
4.0 F.S.I. 2041 Base Mode Share H.D.R. Trips	55,932	716	409	1125
Difference (%) with B.A. 3.0 F.S.I.	17,617 (46%)	181 (34%)	124 (43%)	305 (37%)
Difference (%) with 3.0 F.S.I. H.D.R.	16,137 (41%)	208 (41%)	119 (41%)	305 (37%)
Scenario 3	**GFA (m²)**	**AM**		
		In	**Out**	**Two-Way**
4.0 F.S.I. 2041 Higher Mode Share H.D.R. Trips	55,932	664	383	1046
Difference (%) with B.A. 3.0 F.S.I.	17,617 (46%)	129 (24%)	98 (34%)	226 (28%)
Difference (%) with 4.0 F.S.I. Base Mode Share H.D.R. Trips	0 (0%)	-52 (-7%)	-26 (-6%)	-79 (-7%)

4.7.5 Future Auto Traffic

Site generated traffic volumes for both 2031 and 2041 horizon years at different build densities and transit mode shares were developed using the I.T.E. Trip Generation Manual. Trip distribution for each quadrant was based on that of the current zone in which the development is located in, as indicated in **Table 4-26** and illustrated in **Exhibit 4-24**. It was assumed that there would be no internal trips within the K.D.A. area. Detailed analysis on the development of site generated volumes is provided previously in **Section 4.7.4.4**.

Table 4-26: Traffic Zone per Bernard K.D.A. Development

Quadrant	Traffic Zone
NE KDA 1	2237
NE KDA 2	2237
NW KDA 1	2215
SE KDA 1	2237
SE KDA 2	2237

SW KDA 1	2215
SW KDA 2	2215
SW KDA 2	2215

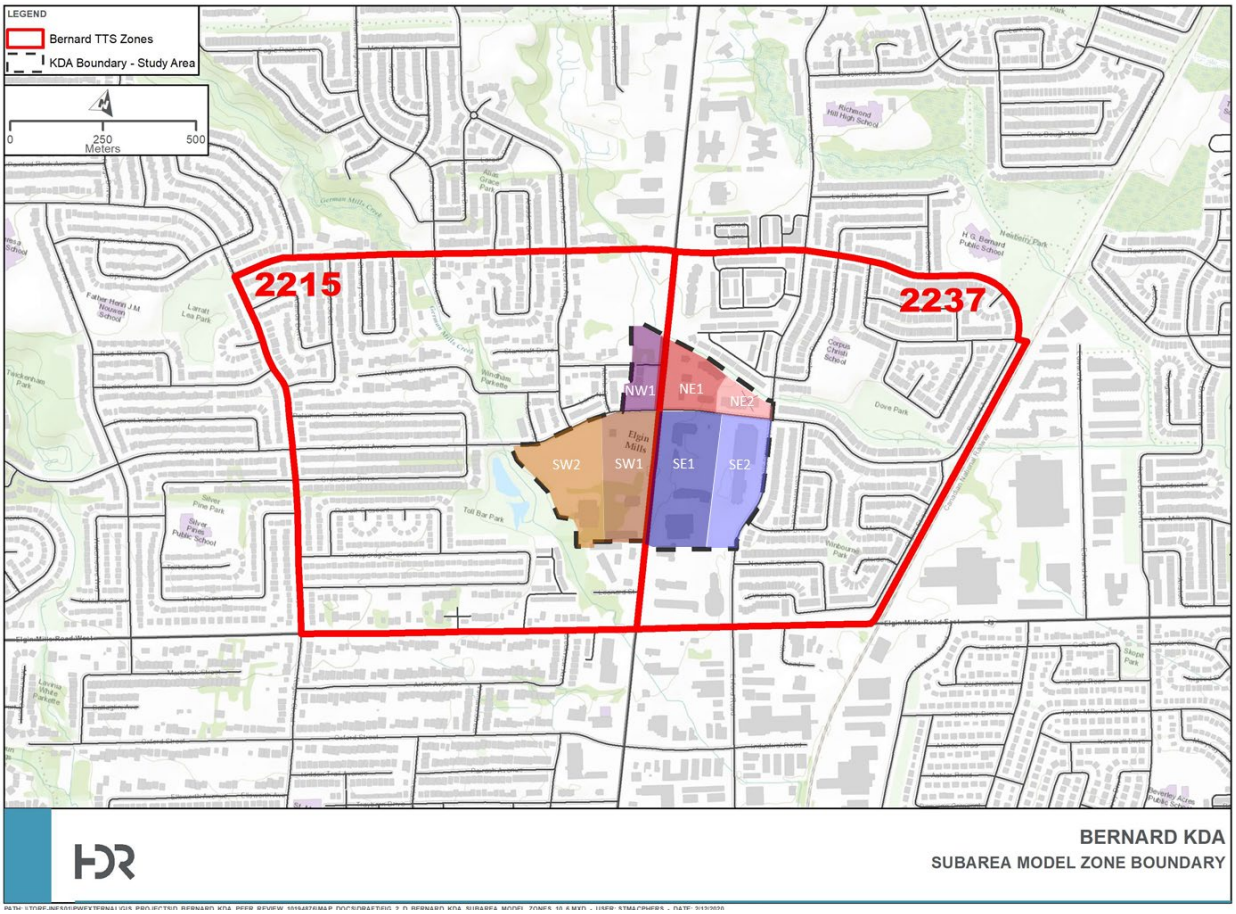


Exhibit 4-24: Location of Development in Zone

Total traffic volumes for the A.M. peak hour for the following scenarios and horizon years were generated using the EMME model:

- 2031 3.0 F.S.I. Base Mode Share
- 2041 4.0 F.S.I. Base Mode Share
- 2041 4.0 F.S.I. Higher Mode Share

An additional 2041 4.0 F.S.I. Higher Mode Share scenario was also conducted for the A.M. peak to consider the network without the road improvement of Bathurst Street widening (from 4 to 6 lanes), and the Highway 404 midblock crossing north of Elgin Mills Road as requested by York Region. This sensitivity test was conducted to generate a potential phasing scenario.

Mode shares for each scenario are listed in **Table 4-27**. Infrastructure improvements for each horizon year are indicated in **Table 4-9**.

Table 4-27: Transit Mode Share Assumptions

Scenario	Transit Mode Share
2031 3.0 F.S.I. Base Mode Share	17%
2041 4.0 F.S.I. Base Mode Share	17%
2041 4.0 F.S.I. Higher Mode Share	30%

Full screenline results are provided in **Appendix A**.

4.7.5.1 2041 4.0 F.S.I. SCREENLINES – HIGHER MODE SHARE

First to test whether 4.0 F.S.I. can be supported, the "highest build" scenario was conducted first based on 2041 A.M. total traffic volumes at 4.0 F.S.I. using a 30% transit mode share.

The screenline performance results for east-west and north-south screenlines are shown in **Exhibit 4-25** and **Exhibit 4-26**, respectively. This scenario includes all the road improvements indicated in **Table 4-9**.

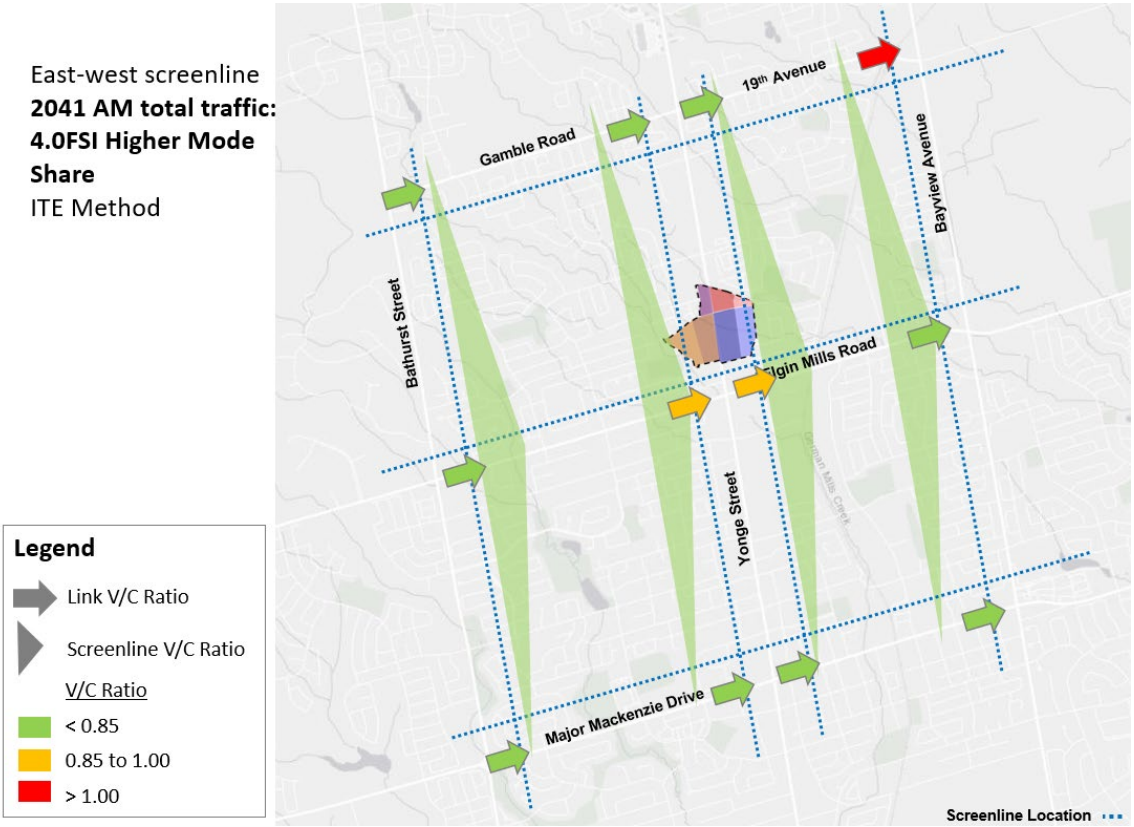


Exhibit 4-25: 2041 A.M. 4.0 F.S.I. East-West Screenline – Higher Mode Share

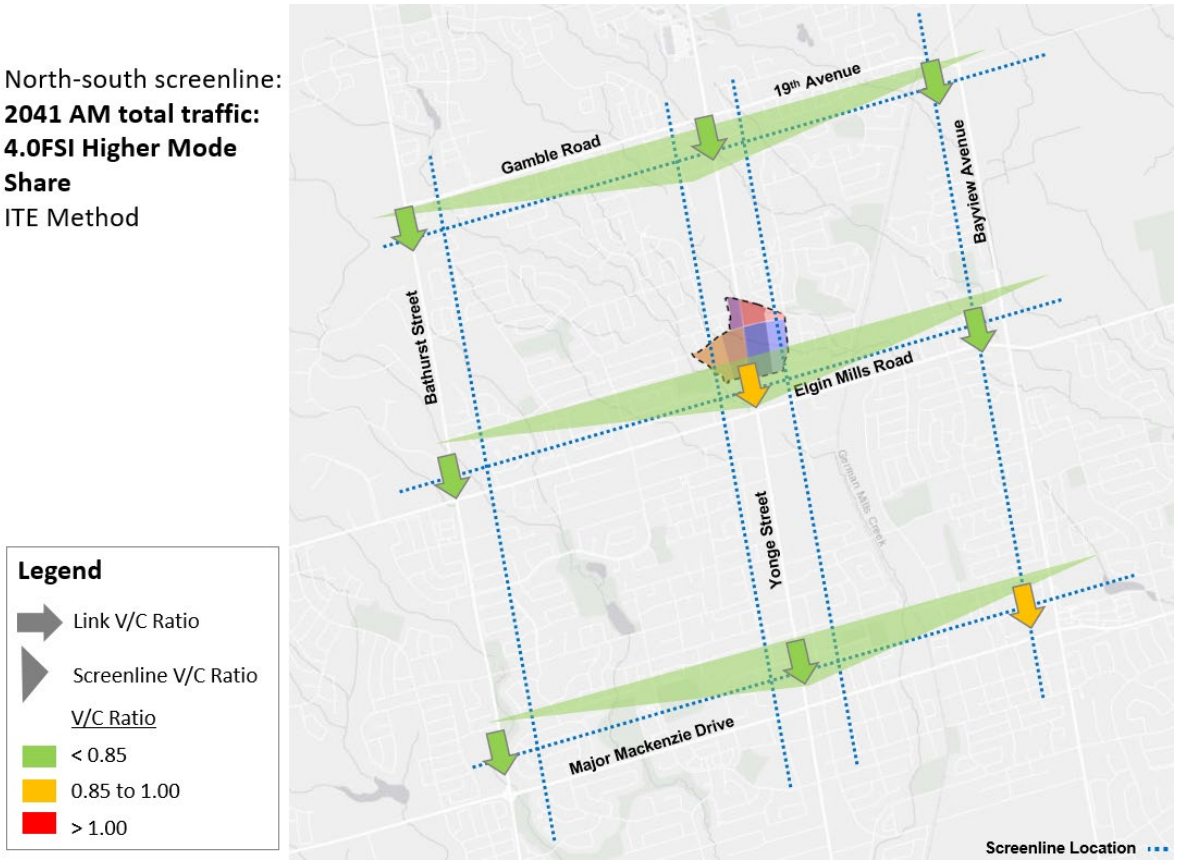


Exhibit 4-26: 2041 A.M. 4.0 F.S.I. North-South Screenline – Higher Mode Share

All screenlines will be operating below capacity, with the exception of the eastbound movement along 19th Avenue west of Bayview Avenue. The increase in volumes at this location is attributable to a variety of factors including the Kirby Road extension which would bring additional traffic from Vaughan towards Richmond Hill and Markham, as well as infill growth within Richmond Hill and northern York Region, resulting in traffic growth on 19th Avenue destined towards Highway 404.

Notwithstanding that the travel demand modelling indicates a density of 4.0 F.S.I. for the K.D.A. appears to be supportable based on the screenline analysis findings for the broader study area, and before testing other scenarios, future traffic operations analysis was conducted at the intersection level for the immediate K.D.A. study area, similar to methodology undertaken in the original B.A. Study.

4.7.6 Future Traffic Operations

4.7.6.1 INTERSECTION CAPACITY METHODOLOGY

The B.A. report assumed the following Synchro parameters for their analysis:

- The traffic operations analysis for signalized and unsignalized intersections was undertaken using *Synchro Version 9* software, adhering to the analysis methodology outlined in the *Highway Capacity Manual 2000*;
- Key performance indicators utilized for the signalized and unsignalized analyses were volume-to capacity (v/c) ratios, delay times, and level-of-service (L.O.S.);
- Input parameters for the analyses were based on data acquired from traffic surveys. Peak hour factors and heavy traffic percentage parameters were calculated based on the traffic data acquired at each of the intersections. Bus blockages were estimated based on transit service frequency during prevailing traffic volume peak hours; and,
- The default Synchro software saturation flow of 1,900 vehicles per hour per lane (vphpl) was been maintained as a conservative approach.

H.D.R. is in general agreement with the parameters used in the B.A. report. However, a saturation flow of 1,950 to 2,000 vphpl may be used for Regional roads and a default of 1,900 vphpl may be too conservative for the purposes of this analysis.

One aspect that B.A. did not consider under future conditions is the permitted u-turns along Yonge Street at signalized intersections due to the centre B.R.T. lanes restricting left-turns at unsignalized site accesses and intersections. As such, U-turns were considered in the future Synchro analysis.

4.7.6.2 SIGNAL TIMING

Signal timing plans were provided by the Region and City. Upon initial review of the signal timing plans entered in B.A.'s existing Synchro analysis scenarios, offsets were not entered and phasing numbers were not consistent with timing plans. However, this should not impact the results. Signal timing plans are provided in **Appendix C**.

4.7.6.3 2041 TRAFFIC OPERATIONS

The Synchro model developed by B.A. for analysis was used, and the intersection of Yonge Street and Major Mackenzie Drive was added as an external intersection for analysis. This includes the street network within the Yonge/Bernard K.D.A. outlined in **Section 4.1.1**.

The A.M. traffic conditions were evaluated at the intersection level using Synchro. The scenario analyzed includes the following assumptions:

- Maximum 4.0 F.S.I.
- Transit Mode Split (Bernard K.D.A.) 30%

- Transit Mode Split 30% along Yonge Street, 20% along Bathurst Street and Bayview Avenue
- Peak spreading to reduce global background traffic turning movements by 10%
- Road Improvements include Bathurst Road Widening, Kirby Road Extension (Dufferin Street to Bathurst Street), and all projects current identified in the 2020 10-Year Capital Program are implemented

4.7.6.3.1 2041 Background Traffic Conditions

The following steps were taken to obtain the intersection volumes for the 2041 A.M. background traffic conditions for Synchro analysis:

1. Extract total EMME turning movement volumes from the existing, and 2041 model runs
2. Extract Bernard K.D.A. site traffic volumes from the 2041 model runs using select zone assignment – maintain these as is since they match the trip generation
3. Calculate future background volumes by turning movement: Total EMME volumes minus Bernard site traffic volumes
4. Calculate growth by movement based on future background volume minus existing volumes in EMME (“difference method”)
5. Calculate appropriate future background volumes based on existing observed count plus growth obtained from EMME
6. Compare balanced volumes throughout the study area and undertake manual adjustments to ensure volumes are balanced, particularly on Yonge Street
7. Note exceptions and use % growth method (instead of difference method) or use EMME volume as-is (for new movement or new roadway link volume that does not exist today); for example, the Kirby Road extension to Gamble Road results in significant growth for the west approach

The following assumptions were made to the background traffic volumes:

- A transit mode split of 30% was applied to Yonge Street, and a 20% transit mode split was applied along Bathurst Street and Bayview Avenue in the southbound direction. The northbound volumes were reduced by 20% for Yonge Street, and 15% for Bayview Avenue and Bathurst Street, to account for the primary direction of transit travel in the AM (one-way GO train service).

- The volumes for the peak hour assumes 40% of the peak period travels within the one peak hour. If the roads are too congested during this time, peak spreading could occur where people choose to travel outside the peak hour. An even distribution would result in 33% of the traffic occurring during the peak hour (a 17.5% reduction in traffic during the peak hour). For this analysis, after all other adjustments were made to the background volumes, an additional 10% reduction was applied globally to the background volumes to account for peak spreading.

- Manual refinements for volume diversions were also used to address some of the capacity constraints that are not considered in the EMME model analysis. For example, where high volumes of left turning vehicles were generated at regional road intersections resulting in over capacity conditions, some of the forecast vehicles making a left-turn in the model were diverted to through movements, and carried through the study area network.

- Based on a link level comparison of the existing traffic conditions to the 2041 background traffic conditions, the growth can be equated to a 1.8% compounded annual growth rate, with an annual auto reduction rate of 0.5% up to 2021, then increased to a 1.7% annual auto reduction until 2041.

By using the York Region EMME model to develop the turning movement counts, the diversion of traffic due to the following road improvements outlined in the York Region T.M.P. were assumed to be in place for the 2041 scenario:

- Kirby Road Extension (Dufferin to Bathurst)

- Bathurst Road Widening (Major Mackenzie to Gamble)

- Elgin Mills Road Widening (Bathurst to Yonge)

These road improvements are shown in the lane configurations in **Exhibit 4-27**. Other infrastructure improvements including the Grade Separation at 19th Avenue, and Midblock Crossing at 404 between Elgin Mills and Major Mackenzie, have been excluded from the analysis as per the City's direction to test the scenario where these two improvements are removed and evaluate the impact to the road network.

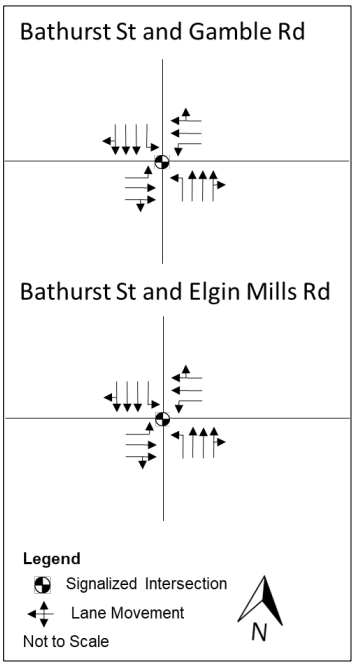


Exhibit 4-27: Lane Configuration Based on Road Improvements

4.7.6.3.2 Site Traffic Conditions

The turning movement count based on the trip generation for each of the 7 development zones were extracted from the EMME model. These volumes make up the site traffic shown in **Exhibit 4-28**. The location of driveways and distribution of traffic for the new public/private roads, and their access to the local street network were assumed to develop the movement of trips to and from the site.

4.7.6.3.3 2041 Total Traffic Conditions

The site traffic was added to the balanced background volumes to create the total volumes shown in **Exhibit 4-29**. A summary of the distribution of site traffic is shown in **Table 4-28**.

Table 4-28: Distribution of Site Traffic

Site Traffic	In	Out
North of Gamble Rd / 19th Ave	37%	16%
South of Elgin Mills Rd	26%	34%
East of Bayview Ave	25%	24%
West of Bathurst St	12%	26%

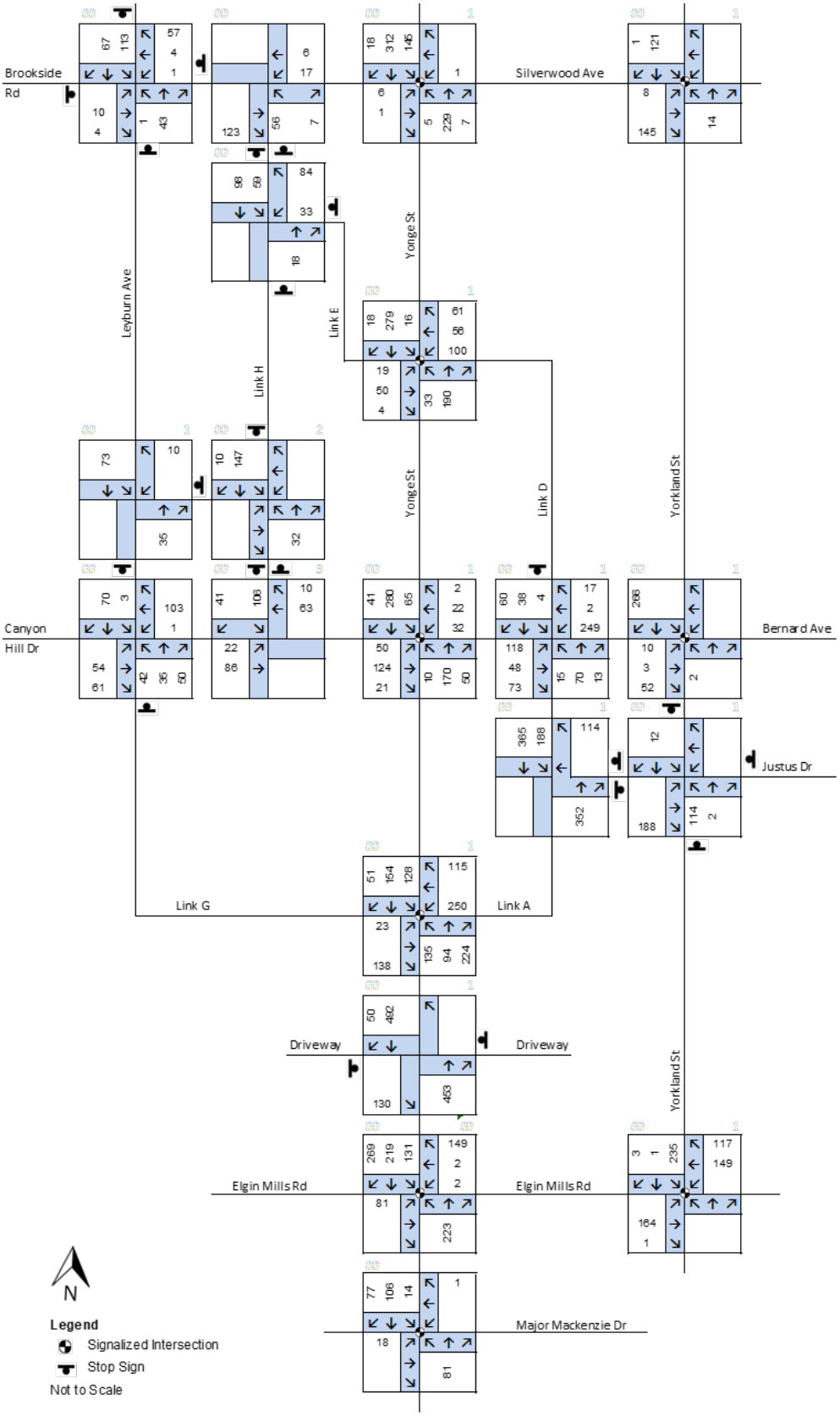


Exhibit 4-28: Yonge/Bernard K.D.A. (Site Traffic Volume)

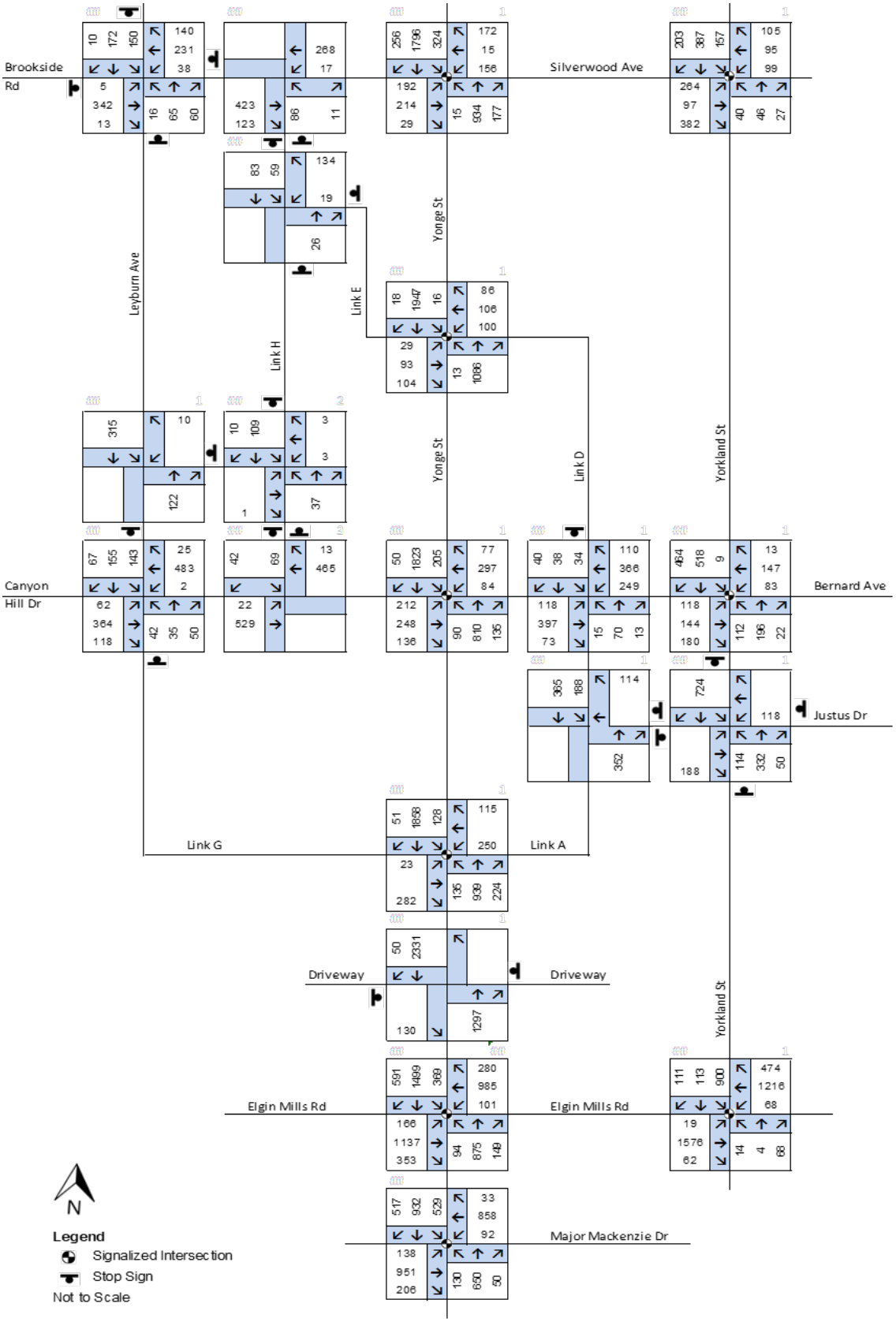


Exhibit 4-29: 2041 A.M. Total Traffic Volumes

Detailed Synchro reports are provided in **Appendix D**. A summary of the v/c ratios, LOS, delays, and 95th percentile queue lengths for the signalized intersections are shown in **Table 4-29**.

Table 4-29: Summary of Intersection Analysis – Synchro Results

Intersection and Movement		Background Conditions				Total Conditions			
		v/c	L.O.S.	Delay (s)	Q (95th) (m)	v/c	L.O.S.	Delay (s)	Q (95th) (m)
Yonge St & Brookside Rd/Silverwood Ave									
Eastbound	Left	0.87	E	74.3	91.9	0.90	F	82.6	102.3
	Through-Right	0.59	D	45.6	87.9	0.60	D	46.1	91.9
Westbound	Left	0.95	F	102.9	87.3	0.99	F	114.2	93.3
	Through-Right	0.16	D	39.2	23.4	0.16	D	39.4	24.3
Northbound	Left	0.29	E	70.9	8.9	0.30	E	66.6	9.6
	Through-Right	0.54	C	22.5	105.5	0.79	C	26.7	57.5
Southbound	Left	0.71	E	79.2	53.8	0.88	E	63.7	74.2
	Through-Right	0.84	A	7.6	286.5	1.01	B	18.7	290.1
Yorkland St & Silverwood Ave/Bernard Ave									
Eastbound	Left	0.70	C	26.6	59.4	0.78	C	33.4	73
	Through-Right	0.41	B	16.7	35	0.66	C	23.8	65
Westbound	Left	0.37	B	17.8	22.9	0.76	D	47.8	39.4
	Through-Right	0.27	B	14.9	25.3	0.29	B	16.4	27.3
Northbound	Left	0.24	B	13.3	8.6	0.36	B	16.9	9.8
	Through-Right	0.07	A	9.8	7.6	0.09	A	8.4	10.2
Southbound	Left	0.37	B	16.1	30.8	0.35	B	14.6	29.2
	Through-Right	0.70	C	22.3	84	0.84	C	27.6	119.5
Yonge St & Canyon Hill Dr/Bernard Ave									
Eastbound	Left	0.72	D	51.3	75.5	1.00	F	107.6	116
	Through-Right	0.25	D	35.7	30.8	0.41	D	38	54.2
Westbound	Left	0.25	D	36.2	24.3	0.49	D	40.7	39.2

Intersection and Movement		Background Conditions				Total Conditions			
		v/c	L.O.S.	Delay (s)	Q (95th) (m)	v/c	L.O.S.	Delay (s)	Q (95th) (m)
	Through-Right	0.37	D	37.2	54	0.40	D	37.9	58.7
Northbound	Left	0.65	F	90.7	49.8	0.89	F	118.6	57.7
	Through	0.41	A	9.8	9.8	0.55	C	21.3	81.2
	Right	0.07	A	4.9	0	0.15	B	13.2	6.9
Southbound	Left	0.68	E	73.8	62.8	0.74	E	71.9	77.7
	Through-Right	0.87	B	16	142.5	1.03	D	47.8	341.7
Yorkland St & Bernard Ave									
Eastbound	Left	0.28	B	17.5	24.6	0.33	B	0.33	27.9
	Through-Right	0.17	B	15.4	15.6	0.21	B	0.21	17.8
Westbound	Left	0.23	B	16.9	19.6	0.27	B	0.27	21
	Through-Right	0.12	B	15	14.3	0.13	B	0.13	15.1
Northbound	Left-Through-Right	0.32	B	12.8	24.1	0.38	B	0.38	25.8
Southbound	Left-Through-Right	0.49	B	11.3	39.5	0.58	B	0.58	51.4
Yonge St & Link G/Link A									
Eastbound	Left	-	-	-	-	0.08	D	40.2	12.7
	Through-Right	0.27	D	46.5	28.5	0.63	D	50.4	70
Westbound	Left	-	-	-	-	0.86	E	69.5	105.7
	Through-Right	-	-	-	-	0.08	D	40.5	0
Northbound	Left	-	-	-	-	0.83	E	75.2	59.1
	Through-Right	0.34	B	19.3	127.5	0.62	B	14.8	90.6
Southbound	Left	-	-	-	-	0.63	E	65.8	38.6
	Through-Right	0.66	A	2.6	27	0.95	B	19.9	86.8
Yonge St & Elgin Mills Rd									

Intersection and Movement		Background Conditions				Total Conditions			
		v/c	L.O.S.	Delay (s)	Q (95th) (m)	v/c	L.O.S.	Delay (s)	Q (95th) (m)
Eastbound	Left	0.51	C	34.7	25.6	0.98	F	97.3	72.9
	Through	1.08	F	96.4	223.2	1.02	E	77.5	215
	Right	0.51	D	39.3	78.6	0.50	D	37.7	78.1
Westbound	Left	0.57	E	56.9	30	0.58	E	58	26.1
	Through	0.97	D	47.8	176.3	0.92	D	41.7	169.4
	Right	0.12	D	47.7	22.8	0.34	D	37.2	44.1
Northbound	Left	0.82	F	96.5	57.5	0.82	F	96.5	57.5
	Through	0.55	D	37.6	100.1	0.83	D	50.9	142.8
	Right	0.10	C	30.8	17.5	0.10	C	34.3	17.7
Southbound	Left	0.76	E	62.1	81.6	1.03	F	109.4	136.5
	Through	1.04	D	51	283	0.98	D	52.1	241.5
	Right	-	-	-	-	0.75	D	40	86.3
Yorkland St & Elgin Mills Rd									
Eastbound	Left	0.12	B	13	1.5	0.16	B	19.5	2
	Through	0.77	B	15.6	50.4	1.01	D	36.1	84.7
	Right	0.04	A	1	0	0.04	C	21.2	0
Westbound	Left	1.08	F	155.5	43	0.55	C	31	8.9
	Through	0.70	C	29.9	187.2	0.80	C	30.5	210.2
	Right	0.33	C	31.5	84	0.50	C	28.7	119
Northbound	Left	0.11	E	56.7	11.4	0.11	E	56.7	11.4
	Through-Right	0.41	E	65.7	30.5	0.11	E	56.7	18.1
Southbound	Left	0.80	D	52.8	113.9	1.03	F	85.4	181.1
	Through	0.25	D	39.8	43	0.24	D	38.5	42.3
	Right	0.08	D	37.3	10.7	0.08	D	36.2	10.3
Yonge St & Link E/Link D									
Eastbound	Left	0.08	D	53.4	7.6	0.24	D	47.8	16.7
	Through-Right	0.16	D	54	17.2	0.64	E	55.3	66.7
Westbound	Left	-	-	-	-	0.87	F	98.1	47.3
	Through-Right	0.17	D	54.1	17.1	0.63	E	57.1	61.6
Northbound	Left	-	-	-	-	0.26	E	71.7	6.8
	Through-Right	0.33	A	1.7	38.9	0.47	A	8	52.6

Intersection and Movement		Background Conditions				Total Conditions			
		v/c	L.O.S.	Delay (s)	Q (95th) (m)	v/c	L.O.S.	Delay (s)	Q (95th) (m)
Southbound	Left	-	-	-	-	0.31	F	82.5	5.1
	Through-Right	0.61	A	2.3	69	0.85	A	4.6	197.2
Yonge Street & Major Mackenzie Drive									
Eastbound	Left	0.87	E	71.5	54.8	1.00	F	110.5	69.2
	Through	1.01	E	77.3	201.2	1.06	F	93.4	209.4
	Right	0.25	D	36.7	30.4	0.3	D	38.8	38.4
Westbound	Left	0.67	D	44.1	31.6	0.68	D	45.1	32.3
	Through-Right	0.94	E	62.8	174.9	0.99	E	75.5	188.5
Northbound	Left	0.91	F	83.3	59.6	0.98	F	110.4	63.5
	Through-Right	0.91	E	69.1	127.2	1	F	84.7	156.1
Southbound	Left	1.05	F	94.3	224.1	1.06	F	95.1	229.7
	Through-Right	0.96	D	53.3	222.7	1.05	E	74.9	287.3

Note: Q (95th) refers to the 95th percentile queue length

Based on the analysis, the following measures were included to accommodate the future total traffic conditions:

- An exclusive southbound right turning lane at Yonge Street and Elgin Mills Road,
- An advanced westbound left turn phase is recommended at Yorkland Street and Elgin Mills Road, and
- Optimization of the signal timing splits and network offsets along arterial roads.

Within the Bernard K.D.A., all movements will operate within capacity except for the following movements which will be operating with delays and constraints:

- Yonge Street and Brookside Road/Silverwood Avenue (Southbound Through) – v/c ratio 1.01, L.O.S. B
- Yonge Street and Canyon Hill Avenue/Bernard Avenue (Southbound Through) – v/c ratio 1.03, L.O.S. D
- Yonge Street and Elgin Mills Road (Southbound Left) – v/c ratio 1.03, L.O.S. F

- Yonge Street and Elgin Mills Road (Eastbound Through) – v/c ratio 1.02, L.O.S. E
- Yorkland Street and Elgin Mills Road (Southbound Left) – v/c ratio 1.03, L.O.S. F
- Yorkland Street and Elgin Mills Road (Eastbound Through) – v/c ratio 1.01, L.O.S. D

Only the Yonge Street and Elgin Mills Road (eastbound through movement), and Yorkland Street and Elgin Mills Road (southbound left movement) will be operating with delays and constraints. Compared to the future background traffic conditions, there could be a 9 second decrease in the eastbound approach delay for Yonge Street/Elgin Mills Road (based on optimizing splits), and an increase of 27 seconds in the southbound approach delay for the Yorkland Street /Elgin Mills Road. All other movements will operate at L.O.S. E, or better.

A summary of the v/c ratios, L.O.S., and delays for the unsignalized intersections are shown in **Table 4-30**.

Table 4-30: Summary of Intersection Analysis (Unsignalized Intersections) – Synchro Results

Intersection and Movement		Background Conditions			Total Conditions		
		v/c	L.O.S.	Delay (s)	v/c	L.O.S.	Delay (s)
Leyburn Ave/Rothbury Rd & Brookside Rd							
Eastbound	Left-Through-Right	0.62	C	16.9	0.92	F	53.0
Westbound	Left-Through-Right	0.60	C	16.4	1.01	F	70.9
Northbound	Left-Through-Right	0.19	B	10.7	0.41	C	18.2
Southbound	Left-Through-Right	0.31	B	12.2	0.87	E	46.2
Link G/Leyburn Ave & Canyon Hill Dr							
Eastbound	Left-Through	0.06	A	1.8	0.07	A	1.8
Westbound	Through-Right	0.26	-	0.0	0.00	A	0.1
Northbound	Left	0.00	A	0.0	0.28	E	35.2
	Through-Right	0.00	A	0.0	0.22	C	16.1
Southbound	Left	0.37	C	18.5	0.55	D	32.4
	Through-Right	0.36	C	17.1	0.66	D	31.9
Yorkland St & Justus Connection/Justus Dr							
Eastbound	Left-Through-Right	-	A	9.5	0.37	B	13.3
Westbound	Left-Through-Right	0.22	B	11.1	0.27	B	13.3
Northbound	Left-Through-Right	0.34	B	9.8	0.59	C	16.5
Southbound	Left-Through-Right	0.57	B	14.2	0.71	C	23
Yonge St & Driveway 2b/Driveway 3b							
Eastbound	Left-Through-Right	0.00	A	0.0	0.28	B	15.0
Westbound	Left-Through-Right	0.00	A	0.0	0.00	A	0.0
Northbound	Left-Through-Right	0.28	-	0.0	0.41	-	0.0
Southbound	Left-Through-Right	0.59	-	0.0	0.99	-	0.0
Link E & Brookside Rd							
Eastbound	Through-Right	0.27	-	0.0	0.35	-	0.0
Westbound	Left-Through	0.00	-	0.0	0.02	A	0.7
Northbound	Left-Right	0.08	B	14.7	0.31	C	20.3

Intersection and Movement		Background Conditions			Total Conditions		
		v/c	L.O.S.	Delay (s)	v/c	L.O.S.	Delay (s)
Link H & Link E							
Westbound	Left-Right	0.03	A	6.4	0.18	A	7.7
Northbound	Through-Right	0.01	A	7.0	0.03	A	7.6
Southbound	Left-Through	-	A	0.0	0.19	A	8.4
Abitibi St/Link H & Naughton Dr							
Eastbound	Left-Through-Right	0.00	-	0.0	0.00	-	0.0
Westbound	Left-Through-Right	0.00	A	3.6	0.00	A	3.6
Northbound	Left-Through-Right	0.10	A	9.1	0.05	A	9.3
Southbound	Left-Through-Right	0.10	A	9.1	0.14	A	9.7
Leyburn Ave & Naughton Dr							
Westbound	Left-Right	0.00	A	0.0	0.01	A	9.0
Northbound	Through-Right	0.06	-	0.0	0.08	-	0.0
Southbound	Left-Through	0.00	-	0.0	0.00	-	0.0
Canyon Hill Dr & Abitibi St							
Eastbound	Left	0.00	-	0.0	0.02	A	1.1
	Through	0.19	-	0.0	0.23	-	0.0
Westbound	Through	0.17	-	0.0	0.20	-	0.0
	Right	0.09	-	0.0	0.11	-	0.0
Southbound	Left-Right	0.02	B	12.5	0.26	C	15.6
Link A/Link D & Bernard Ave							
Eastbound	Left	0.00	-	0.0	0.13	A	9.0
	Through	0.16	-	0.0	0.17	-	0.0
	Right	0.08	-	0.0	0.13	-	0.0
Westbound	Left	0.00	-	0.0	0.26	A	9.7
	Through	0.16	-	0.0	0.16	-	0.0
	Right	0.12	-	0.0	0.15	-	0.0
Northbound	Left	0.00	A	0.0	0.35	F	120.9
	Through-Right	0.00	A	0.0	0.92	F	149.2
Southbound	Left	0.02	B	12.3	0.65	F	146.6
	Through-Right	0.00	A	0.0	0.58	F	59.2
Link A & Justus Connection							
Westbound	Left-Right	-	A	0.0	0.19	B	11.7
Northbound	Through-Right	-	-	0.0	0.23	-	0.0
Southbound	Left	-	-	0.0	0.17	A	8.7
	Through	-	-	0.0	0.23	-	0.0

Under total traffic conditions, all movements for unsignalized intersections will operate with a v/c ratio less than 1.00 with the exception of the eastbound movement at Brookside Road/Leyburn Avenue, which will operate at a v/c ratio of 1.01. Detailed Synchro reports for the unsignalized intersections are provided in **Appendix D**.

Additional delays at the major-major arterial intersections will be experienced by both background and K.D.A. traffic including:

- Yonge Street at Major Mackenzie Drive (S.B. delays) could increase from about 45 seconds today to about 70 seconds by 2041, and
- Yonge Street at Elgin Mills Road (E.B. delays) could increase from about 50 seconds today to about 80 seconds by 2041.

The proposed additional roads include a connection to Justus Drive, and the connection to Yonge Street from Bernard Avenue (Link D). It is recommended that these connections function as public streets allowing traffic to be distributed throughout the network. Should these connections be converted from a public road to a private road, it is recommended that these roads still function as a public street allowing the general public to use these roads (as drivers, cyclists, or pedestrians etc.).

Without the Justus public road connection, there would be an additional 158 vehicles using Yorkland Street directly south of Bernard Avenue from the Bernard site that would have to use Bernard Avenue to access Yorkland Street. All intersections still operate within capacity; however, vehicles from the development zones south of Bernard Avenue would have to travel further, and the residents along Yorkland Street south of Bernard Avenue would have more traffic along this section of the street. The configuration of this road is such that only local traffic (southeast of the Yonge Street /Bernard Avenue intersection) are likely to use this connection since the Justus connection is a two-way stop with Link A.

Sensitivity Analysis

To review the impacts of not recommending a traffic signal at Yonge Street at Link D/E, a sensitivity analysis where the intersection was changed to a right-in, right-out only access, and restricted turning movements at the proposed signalized intersection of Yonge Street & Link D/E were distributed between the surrounding intersections (Yonge Street/Brookside Road, and Yonge Street/Canyon Hill Avenue). The diversions made due to the network changes are shown in **Exhibit 4-30**.

A summary of the results is shown in **Table 4-31** with optimized signal timings, and the detailed Synchro reports for these two intersections are provided in **Appendix D.**

As expected, the surrounding intersections that will already be busy in the 2041 total scenario, will operate with higher delays when the proposed signalized intersection is removed. In particular, the v/c ratio would increase to 1.07 and 1.06 for conflicting movements (westbound left and southbound through-right movements, respectively).

Without the implementation of the signal, it would result in a disconnected pedestrian and cycling network where it will increase travel distance by up to 350m. The signal would provide crossing opportunities for pedestrians and cyclists between the northeast and northwest quadrants of the K.D.A. A complete active transportation network is essential for the development for the K.D.A. as it support a shift toward transit uses, walking, and cycling modes while reducing auto trips.

Similar to B.A.'s recommendation, it is recommended that the Yonge Street and Link D/E intersection should be signalized to allow for connection to Yonge Street, and reduce the impact at Yonge Street and Bernard Avenue. Based on the projected traffic volumes, it is recommended that the Yonge Street and Link D/E intersection be signalized. Details of the signal warrant analysis are provided in **Appendix E**.

It is also recommended that the Yorkland Street/Justus Drive intersection continue operating as an all-way stop since it did not meet the warrants for a signal based on the project volumes, and it is still operating within capacity. However, this intersection should be monitored and signal warrant analysis conducted to determine if or when traffic signals may be warranted. Details of the signal warrant analysis are provided in **Appendix E**.

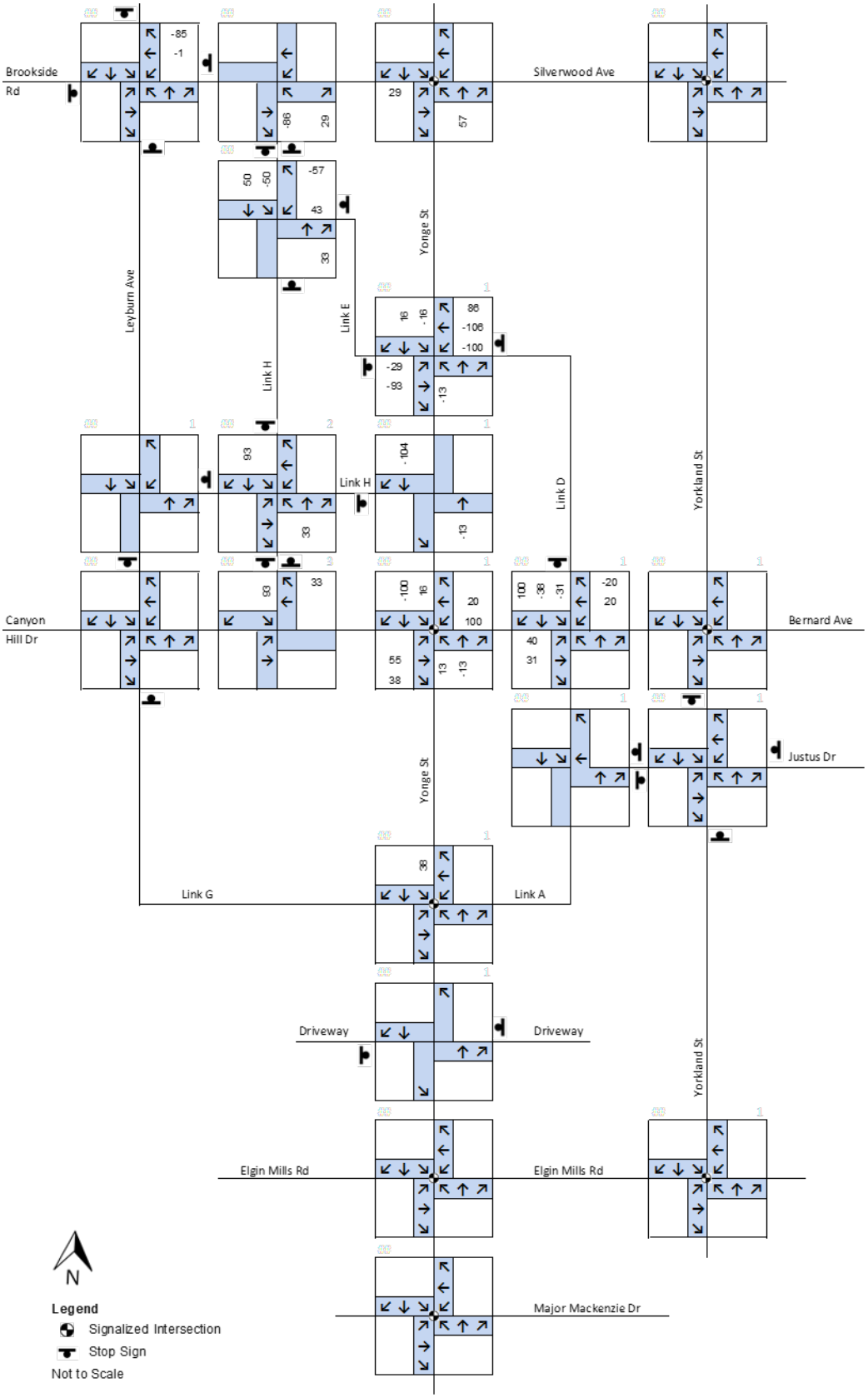


Exhibit 4-30: Diversions from Removing Signal at Yonge Street and Link D/E

Table 4-31: Synchro Results for Removing the Proposed Signal at Yonge Street and Link D/E

Intersection and Movement		Total Traffic Conditions (with Yonge & Link D/E intersection)				Removing Yonge & Link D/E Intersection			
		v/c	L.O.S.	Delay (s)	Q (95th) (m)	v/c	L.O.S.	Delay (s)	Q (95th) (m)
Yonge St & Brookside Rd/Silverwood Ave									
Eastbound	Left	0.90	F	83	102	0.96	F	92	116
	Through-Right	0.60	D	46	92	0.56	D	44	89
Westbound	Left	0.99	F	114	93	0.88	F	82	86
	Through-Right	0.16	D	39	24	0.16	D	38	23
Northbound	Left	0.30	E	67	10	0.30	E	70	11
	Through-Right	0.79	C	27	58	0.86	C	31	124
Southbound	Left	0.88	E	64	74	0.88	E	64	73
	Through-Right	1.01	B	19	290	1.03	C	28	291
Yonge St & Canyon Hill Dr/Bernard Ave									
Eastbound	Left	1.00	F	108	116	0.88	E	70	107
	Through-Right	0.41	D	38	54	0.46	D	35	65
Westbound	Left	0.49	D	41	39	1.07	F	131	108
	Through-Right	0.40	D	38	59	0.38	C	34	58
Northbound	Left	0.89	F	119	58	1.02	F	156	69
	Through	0.55	C	21	81	0.61	C	31	109
	Right	0.15	B	13	7	0.16	C	26	12
Southbound	Left	0.74	E	72	78	0.77	E	76	87
	Through-Right	1.03	D	48	342	1.06	E	61	334

Note: Q (95th) refers to the 95th percentile queue length

4.7.6.4 SUMMARY AND RECOMMENDATIONS FOR 4.0 F.S.I.

Based on the intersection operations findings for 2041, particularly at the Yonge/Elgin Mills intersection, the proposed local road network for the K.D.A. (as shown in **Section 4.7.1**) can accommodate up to a maximum of 4.0 F.S.I. However, downstream intersections including Yonge Street and Major Mackenzie Drive will continue to be busy during the peak periods.

The proposed local road network within the K.D.A. will be the same road network proposed in the original B.A. study with the following exceptions:

- Link A and the former Link B is proposed to be reconfigured and merged into a curvilinear road alignment (and renamed Link A – see **Exhibit 4-22**), which will be a direct road link between Yonge Street and Bernard Avenue.

- The east section of former Link A is also proposed to be realigned as a new public local road connecting between Link A and Justus Drive. The alignment of the new Link A and this Justus Drive road connection is recommended to minimize traffic infiltration of background and K.D.A. related trips from west of Yonge Street to Yorkland Street.

Based on the results of the Synchro analysis, the following specific measures are also recommended to accommodate 2041 total traffic conditions:

- Similar to B.A.'s recommendation, it is recommended that an exclusive southbound right turning lane at Yonge Street and Elgin Mills Road be constructed. Providing the southbound right turn lane will permit the southbound through movement to flow through the intersection without being impeded by right turning vehicles.

- Traffic signals are recommended at the Yonge Street / Link D / Link E intersection.

- Maintaining the all-way stop control at the Yorkland Street / Justus Drive / Link A intersection.

- An advanced westbound left turn phase is recommended at Yorkland Street and Elgin Mills Road.

- Optimizing signal timing splits throughout the study area and network offsets along Yonge Street.

The above findings in regard to the 4.0 F.S.I. and recommended collector and local road network within the K.D.A. are based on the following transportation improvements and transit mode splits by 2041:

- Implementation of the 10-year capital program on the arterial road network (which includes the proposed grade separation on Elgin Mills Road) and implementation of future road widening improvements on Gamble Road/19th Avenue, Bathurst Street, Elgin Mills Road, Leslie Street.

- The attainment of 30% transit mode split along the Yonge Street corridor by 2041 and 20% transit mode split along Bathurst Street and Bayview Avenue with frequent transit service routes.

4.7.7 Sensitivity Analysis for Potential Phasing Scenarios

Considering the number of transportation improvements and high transit mode splits required to support the 4.0 F.S.I. recommendation, as previously stated, two sensitivity/phasing scenarios were modelled and analyzed for 2041 using the EMME model. In addition, a 2031 analysis at 3.0 F.S.I. was also conducted for comparison for the broader study area. The scenarios are summarized below along with the differentiating factors, and the screenline performance results are documented in the following sections. Detailed screenline and link results are provided in **Appendix A**.

Table 4-32: Sensitivity / Phasing Scenarios Analyzed

Scenario	Transit mode split (KDA)	Transit mode split (Yonge / Bathurst and Bayview Corridor)	Infrastructure Improvements
1 - 2041	30%	30%/20%	2020 10 Yr Capital Program *& Bathurst Widening*
2 - 2041	17%	17%/11% (based on BA's transit mode split assumption)	2020 10 Yr Capital Program *& Bathurst Road Widening*
3 – 2041	30%	30%/20%	2020 10 Yr Capital Program
4 - 2031	17%	17%/11% (based on BA's transit mode split assumption)	2020 10 Yr Capital Program

4.7.7.1 SCENARIO 2 2041 4.0 F.S.I. – BASE MODE SHARE

As shown above, the first 2041 scenario assumes a 30% transit mode share for trips generated by the K.D.A. An additional scenario was analyzed for the 2041 horizon year with the assumption of the reduced 17% base transit mode share, reflecting a potential phasing scenario where the 30% transit mode share was not attained yet. East-west and north-south screenline performance for 2041 AM total traffic volumes are shown on the next page.

East-west screenline
2041 AM total traffic: 4.0FSI Base Mode Share
ITE Method

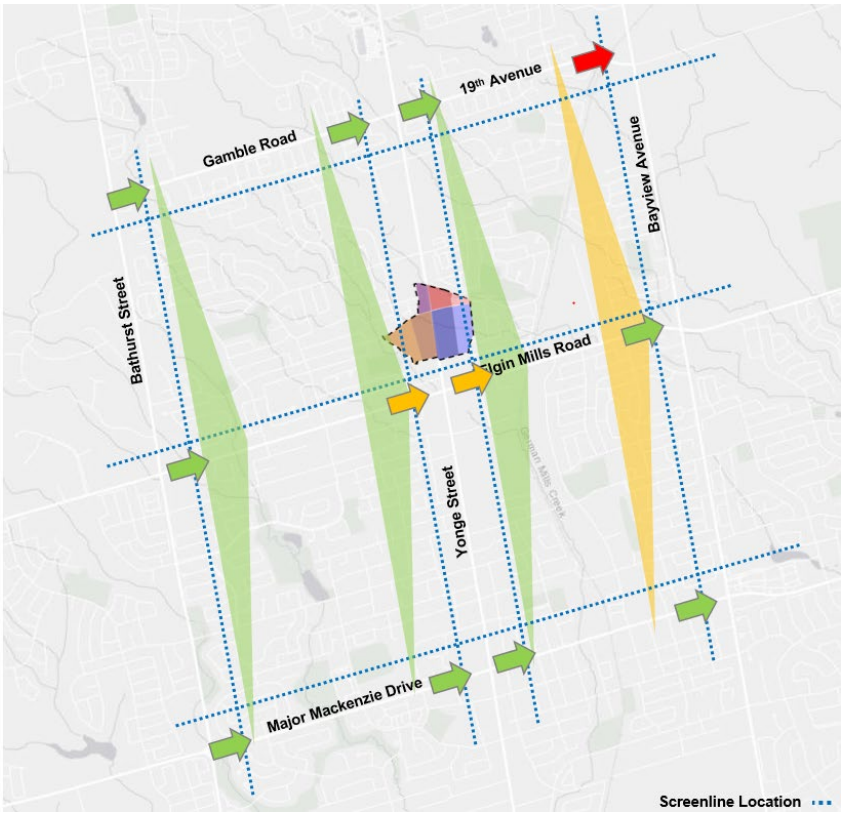


Exhibit 4-31: 2041 A.M. 4.0 F.S.I. East-West Screenline - Base Mode Share

North-south screenline
2041 AM total traffic: 4.0FSI Base Mode Share
ITE Method

Exhibit 4-32: 2041 A.M. 4.0 F.S.I. North-South Screenline - Base Mode Share

Using the existing 17% mode share for transit in the 2041 would result in increased congestion in the eastbound screenline west of Bayview Avenue. This is a result of additional auto volumes eastbound along Elgin Mills from all future development areas, which is likely attempting to access Highway 404. Increased congestion is also observed southbound along Bayview Avenue. Based on the increased congestion and comparing the v/c ratios in **Appendix A** with Scenario 1, the estimated impact to density was calculated to require a reduction by 5% to mitigate the congestion. This would be equivalent to a density of 3.8 F.S.I.

4.7.7.2 SCENARIO 3 - 2041 4.0 F.S.I. – HIGH MODE SHARE WITHOUT BATHURST WIDENING

This additional 2041 4.0 F.S.I. scenario was conducted to consider the network without the Bathurst Street widening from 4 to 6 lanes and the Highway 404 midblock crossing north of Elgin Mills Road. Results are shown below.

Exhibit 4-33: 2041 A.M. 4.0 F.S.I. East-West Screenline - Higher Mode Share without Road Improvements

Exhibit 4-34: 2041 A.M. 4.0 F.S.I. North-South Screenline - Higher Mode Share without Road Improvements

Without the widening on Bathurst Street, increased congestion is observed along the Bathurst Street corridor, with the southbound movement north of Elgin Mills Road now operating above capacity. The impact of the midblock crossing on Highway 404 north of Elgin Mills Road is not critical for the K.D.A.; the v/c ratios for the links within vicinity (Bayview Avenue, Elgin Mills Road, 19th Avenue) do not vary much with and without the improvement. As a result on the impact, the impact to density was determined to require a 10% reduction to the density of the K.D.A. to mitigate the impact, which would result in a resulting maximum density of 3.6 F.S.I.

4.7.7.3 2031 3.0 F.S.I. – BASE MODE SHARE

Lastly, the 2031 horizon year at the base 17% mode share was modelled to evaluate impacts if 2041 road improvements are not possible beyond the 10 year capital program. This includes the removal of the following projects:

- Bathurst Street widening from 4 to 6 lanes from Major Mackenzie Drive to Gamble Road;
- New midblock crossing at Highway 404 north of Elgin Mills Road;

- 19th Avenue Grade Separation west of Bayview Avenue; and
- Bayview Avenue widening from 4 to 6 lanes from Steeles Avenue to Major Mackenzie Drive.

East-west and north-south screenlines for 2031 AM total traffic volumes are shown below.

East-west screenline
2031 AM total traffic: 3.0FSI Base Mode Share
ITE Method

Exhibit 4-35: 2031 A.M. 4.0 F.S.I. East-West Screenline - Base Mode Share

North-south screenline
2031 AM total traffic:
3.0FSI Base Mode Share:
ITE Method

Exhibit 4-36: 2031 A.M. 3.0 F.S.I. North-South Screenline - Base Mode Share

Comparing the performance of 2041 4.0 F.S.I. and 2031 3.0 F.S.I., there are noticeable improvements for east-west screenlines from the reduced trips generated. However, 19th Avenue at Bayview will still operate at capacity (v/c ratio of 1.03 – see Appendix A). Southbound links and screenlines for all corridors (Bathurst Street, Yonge Street, and Bayview Avenue) south of Elgin Mills Road will also be approaching or operate at capacity from the lack of 2041 road widenings along Bathurst Street and Bayview Avenue.

Based on the above results, it appears that 3.0 F.S.I. would be the maximum supportable if additional road improvements beyond the 10 year capital program were not constructed, and if transit mode shares do not increase beyond 17%.

5. Future Transit Conditions

The following sections describe the future transit services that serve the Yonge/Bernard K.D.A. and connectivity to the local and regional transit network. A summary of existing transit ridership is also provided below.

5.1 Future Background Transit

The York Region model was used to determine the level of background transit demand passing through the study area. The 2041 transit network in the York Region model is based on 2016 existing conditions, with some committed projects including the Line 1 extension to Richmond Hill Centre and 15 minute peak service on the Richmond Hill GO Line. Local bus services, including Y.R.T. and VIVA, remains largely the same as in existing 2016 conditions. The only bus line added that passes through the Bernard terminal is a new Y.R.T. route operating primarily on Teston Road that begins at the Bernard terminal and ends at the intersection of Pine Valley Drive and Rutherford Road.

In 2041, during the A.M. Peak Period, there are a total of 5,900 local transit trips passing through the Bernard K.D.A. Of those trips, 2% of riders are exclusively on Y.R.T., 75% are exclusively on VIVA, and the remaining 23% use both Y.R.T. and VIVA. This implies that the majority of local transit usage in the area relies on VIVA, with most users of the Y.R.T. also using VIVA service, and a small minority only using Y.R.T.

5.2 Transit Trip Generation

Transit demand is also generated as part of the overall trip generation process described in this section. Based on trips destined to or originating from the Bernard K.D.A. zones in the York Region model, 12% had Y.R.T. and 88% had VIVA as the first or final leg of the trip. These splits were used to distribute the trips generated to and from the Bernard K.D.A. from I.T.E. to either Y.R.T. or VIVA. These results are summarized for each scenario in **Table 5-1**.

Table 5-1: Total Transit Trip Generation

TOTAL AM									
Scenario 1	Total Transit			VIVA			YRT		
	In	Out	Two-Way	In	Out	Two-Way	In	Out	Two-Way
3.0 F.S.I. 2031 Base Mode Share H.D.R. Trips	132	370	503	116	325	442	16	45	61
Scenario 2	Total Transit			VIVA			YRT		
	In	Out	Two-Way	In	Out	Two-Way	In	Out	Two-Way
4.0 F.S.I. 2041 Base Mode Share H.D.R. Trips	178	500	678	156	439	595	22	61	83
Scenario 3	Total Transit			VIVA			YRT		
	In	Out	Two-Way	In	Out	Two-Way	In	Out	Two-Way
4.0 F.S.I. 2041 Higher Mode Share H.D.R. Trips	381	725	1106	335	637	971	46	88	135

Based on Scenario 1, the results of the transit trip generation are comparable to B.A.'s results, with a total of 132 inbound and 370 outbound transit trips.

5.3 Future Transit Network Recommendations

As observed under existing conditions, the majority of trips utilize the VIVA Blue and VIVA Blue A buses. The implementation of the Yonge Street Rapidway will help accommodate the growth in transit ridership and provide faster, more frequent service. During public consultation, there were concerns raised regarding the utilization of the Yonge Street Rapidway, often being compared to the Highway 7 Rapidway. Based on discussion with York Region Transit (Y.R.T.) staff, *"In Spring 2018, Viva ridership along the Highway 7/Enterprise rapidway has increased approximately 18.5% compared to pre-construction operations in 2009".* This is indicative of the growth in ridership expected along Yonge Street.

Under existing conditions, it was noted that there were no boardings or alightings within the AM peak period for Route 240 – Mill Pond GO, which makes three (3) stops along the way to Richmond Hill GO Station. The lack of ridership could be due to the low frequency of the bus (every 30 minutes) as well the length of the bus ride to get to Richmond Hill GO Station (approximately 25 minutes). As transit demand increases, it is recommended to provide a direct, more frequent shuttle bus from Bernard Bus Terminal to Richmond Hill GO Station. This will provide residents a quicker option to get to Richmond Hill GO Station rather than driving, which will in turn reduce the number of vehicles on the road and demand for parking at the Richmond Hill GO Station.

6. Active Transportation Conditions

6.1 Pedestrians

6.1.1 Pedestrian Network

The existing sidewalk network within the study area is largely complete **Exhibit 6-1**, with the majority of sidewalks having a width of 1.5m.

Arterial and collector roads have sidewalks on both sides; however, local residential streets often have a sidewalk on one side only, as is the case with the following streets:

- Chantilly Crescent
- El Dorado Street
- Los Alamos Drive
- Gracedale Drive
- Naughton Drive
- Pickett Crescent
- Cooperage Crescent
- Oldhill Street / Elmpark Court
- Justus Drive
- Newmill Crescent
- Forestside Court
- Tamara Drive
- Squire Drive
- Coldstream Crescent
- Mandal Crescent
- Newmill Crescent

Streets missing sidewalks on both sides include:

- Leonard Street
- Shilo Court
- Squire Drive (between Yorkland Street and Price Street)
- Espby Court
- Rainey Court
- Stancroft Drive
- Abitibi Street
- Debonair Drive
- Burndean Court

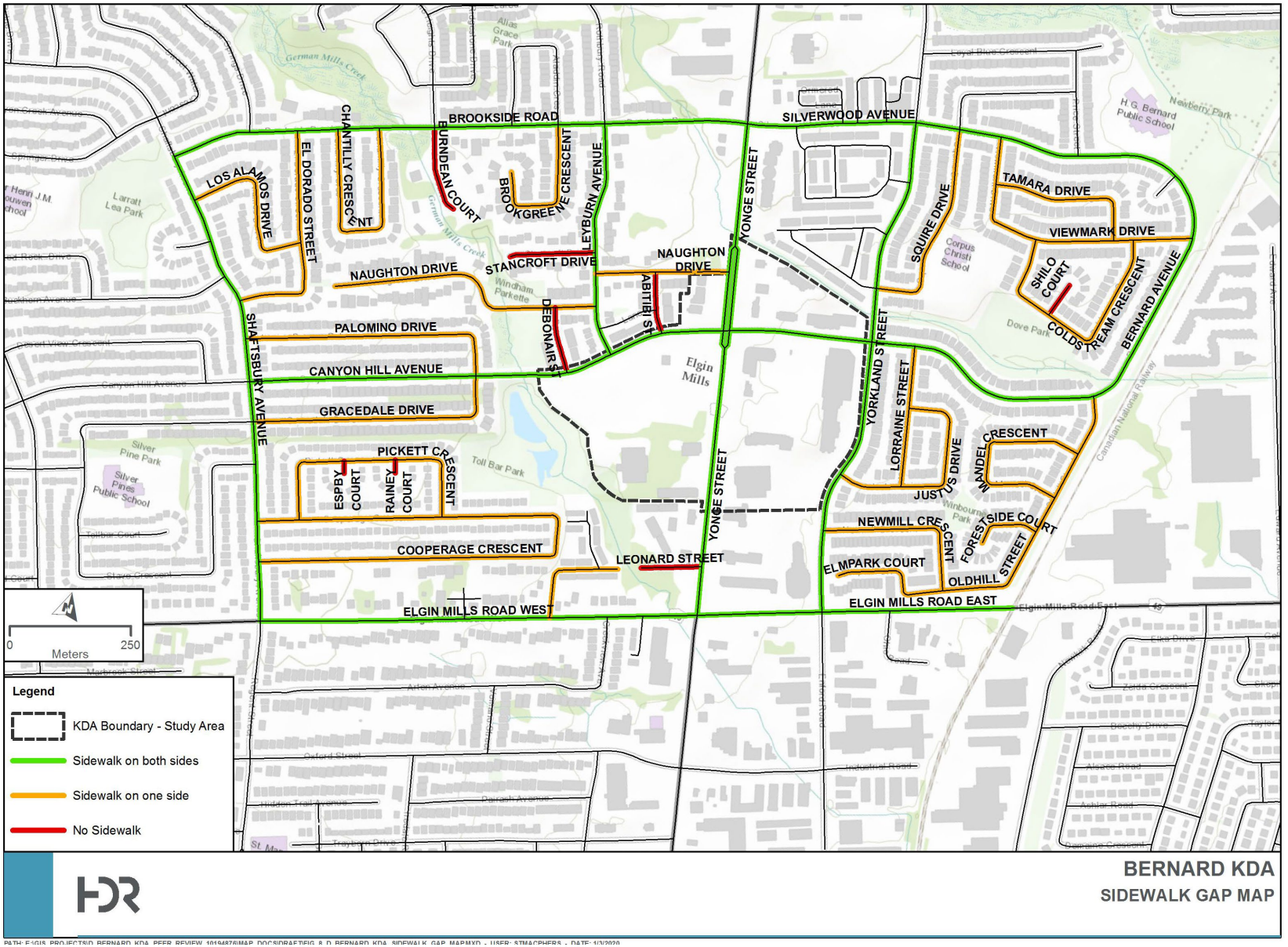


Exhibit 6-1: Existing Sidewalk Gaps

Pedestrian facilities on existing collector roads are present on each side of the street. Collector road with a wider right-of-way provides the opportunity for larger setbacks between cars and pedestrians through the introduction of landscaped buffers. These boulevards occasionally contain trees and provide added separation benefitting pedestrians, as displayed in **Exhibit 6-2**.

Source: Google Streetview
Exhibit 6-2: Pedestrian facilities along Shaftsbury Avenue (July 2018)

Yonge Street, the main arterial within the study area, is under construction to accommodate the future VIVAnext Yonge Street / Richmond Hill rapidway. Detail design drawings, provided by York Region, show a minimum of 2.0m sidewalks as well as improved streetscaping which includes large planters, landscaping, and seating.

Despite the availability of sidewalks on established streets, commercial uses along Yonge Street between Elgin Mills Road and Canyon Hill Avenue / Bernard Avenue are largely inaccessible to pedestrians. The stores are isolated behind surface parking lots with limited direct and protected pedestrian connections from the adjacent streets. Moreover, the retail plazas have several ingress and egress points for vehicles as illustrated in **Exhibit 6-3**. These driveways interrupt the sidewalks, especially on the east side on Yonge Street, disconnecting the pedestrian network and creating additional impediments to pedestrian movement.

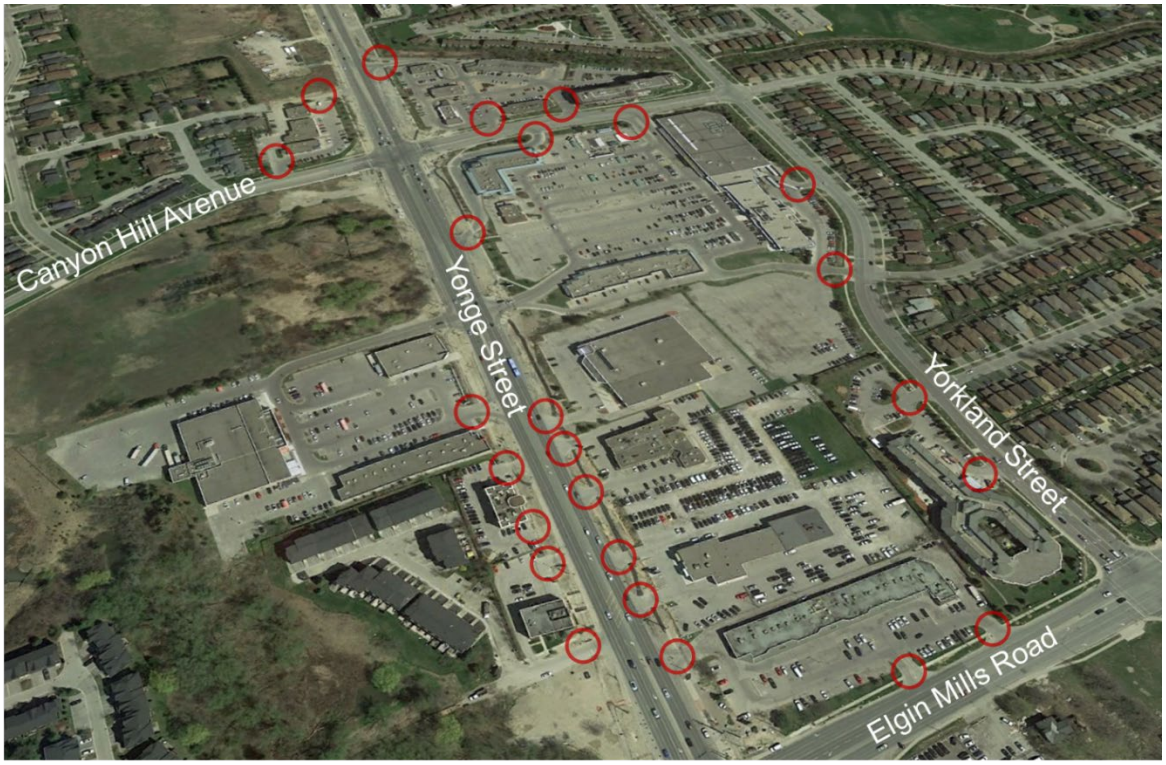


Exhibit 6-3: Unsignalized Access Points to Commercial Plazas in the study area

Protected intersection crossings for pedestrians are infrequent and are separated by large blocks that are unconducive to walking. Pedestrian crossings are sometimes delineated with road markings; however, these road markings are often faded as observed in **Exhibit 6-4**. Pedestrian crossings along Yonge Street may be improved upon the completion of the VIVA rapidway construction.

Source: Google Streetview

Exhibit 6-4: Crosswalk Conditions along Yonge Street (August 2018)

6.1.2 Walkshed Analysis

Exhibit 6-5 illustrates the radial and linear walkshed analysis for a distance of 800 metres from the Bernard Bus Terminal. Within the 800m radial walkshed, there are two transit stops located on Yonge Street at Brookside Road/Silverwood Avenue and at Elgin Mills Road, which serves the areas north and south of the 800m linear walkshed areas.

One major constraint for residents on the west side of Yonge Street is the natural feature that bisects the area, which prevents pedestrians from having more direct access to the Bernard Bus Terminal. However, local Y.R.T. bus stops are located along Shaftsbury Avenue, Silverwood Avenue, Canyon Hill Avenue, Bernard Avenue, and Yorkland Street, which serve the residents to the east and west of the Bernard Bus Terminal.

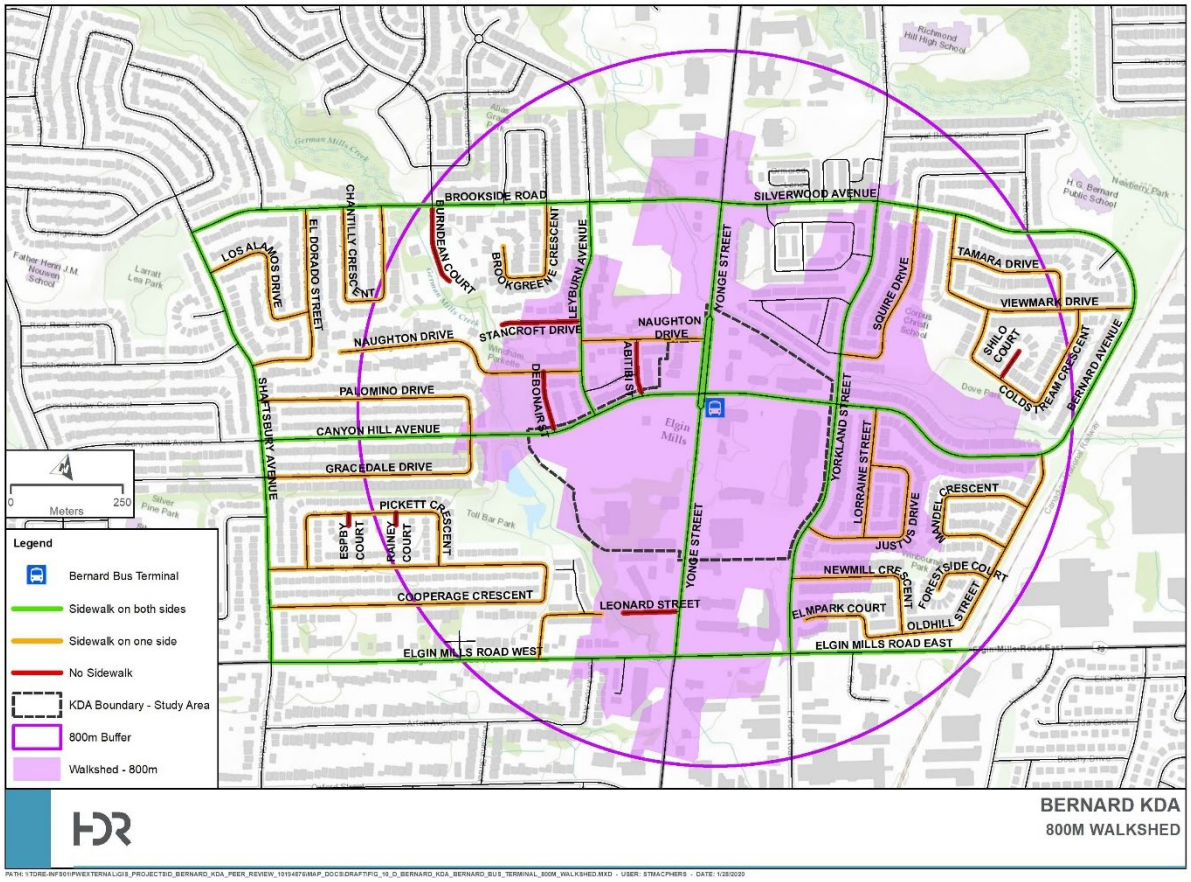


Exhibit 6-5: 800m Radial and Linear Walkshed Analysis

6.1.3 Pedestrian Level of Service

6.1.3.1 PEDESTRIAN LOS METHODOLOGY

The pedestrian level of service (P.L.O.S.) methodology is based on the York Region Transportation Mobility Plan (T.M.P.) and enhanced by the City of Ottawa's Multimodal Analysis Guideline. P.L.O.S. is calculated at the intersection and mid-block in recognition that a pedestrian's experience is determined by the conditions both between crossings and at the crossing itself.

The base criteria used to measure the performance or level of service are similar between the two guidelines, such as the width of active transportation facilities and their separation from the roadway curb. Compared to the York Region methodology, the Ottawa methodology incorporates additional considerations that help to better capture the nuances of different road typologies and their effect on user experience. When walking, factors such as traffic volumes on the adjacent roadways, on-street parking, and roadway vehicular speeds have an impact on a pedestrian's level of comfort and should not be neglected. At the intersection level, the Ottawa methodology offers a more detailed review of the user experience, including crossing distances, corner radii and signal phasing and timing features, to produce an intersection level of service for pedestrians. Overall, the York Region T.M.P. multi-modal level of service methodology is a good baseline from which to conduct an existing conditions review. Nevertheless, the Ottawa methodology sets a higher level of standard that is arguably more appropriate for urbanizing areas that aim to prioritize active transportation. For example, a 1.5m sidewalk with no buffer adjacent to a 70km/hr road receives a Level of Service "F" under the Ottawa M.M.L.O.S. methodology but a "C" under York Region's guidelines.

The segment P.L.O.S. assessment utilizes a look-up table approach based on cross-section and roadway characteristics (e.g., sidewalk and boulevard width, traffic volumes, presence of on-street parking, and posted speed). Higher segment scores are characterized by locations where lower vehicle speeds, lower volumes, wider sidewalks, and larger boulevards with ample separation from moving traffic are present. Lower segment scores are observed in locations with high vehicle speeds and volumes, narrow or non-existent sidewalks, and minimal separation from traffic.

Intersection P.L.O.S. uses the Pedestrian Exposure to Traffic at Signalized Intersections (P.E.T.S.I.) and assigns points based on a number of crossing characteristics (e.g., crossing distance, presence of a median, presence of a crossing refuge, turning restrictions, right hand turn characteristics, curb radii, etc.).

As the Bernard K.D.A. also contains unsignalized intersections, certain modifications and assumptions have been made to readapt the Ottawa methodology to unsignalized intersections in the study area. These revisions include:

- Understanding that stop and yield controlled approaches affect the pedestrian experience the same way a "permissive" signalized movement does, such as when a right-turn-on-red is allowed and a green is permissive. Because the turn is allowed based on driver judgment, pedestrians will feel less safe where a car is waiting to make the turn in their vicinity.
- Penalizing intersections that do not provide a curb separating pedestrians from turning vehicles. Visibility is an important factor in pedestrian safety.

The average score of each intersection approach is averaged to determine the overall intersection P.L.O.S. This is done to account for the influence of all approaches and provides a more nuanced assessment of conditions. The inputs for the P.L.O.S. is summarized in **Exhibit 6-6**.

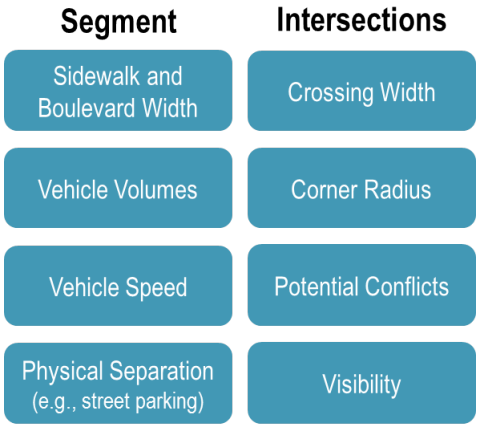


Exhibit 6-6: Inputs for Pedestrian L.O.S.

Scoring ranges as follows:

- **P.L.O.S. 'A' to 'C' –** Attractive to most pedestrians, including locations where lower speeds and volumes, wider sidewalks, and larger boulevards with ample separation from moving traffic are present. Crosswalks are provided on all four legs of the intersections and with shorter crossing distances at intersections. **Exhibit 6-7** illustrates an example a high quality pedestrian environment in the City of Richmond Hill. 3.0m wide pedestrian clearway on Yonge Street south of Arnold Crescent, and the presence of on street parking provides additional separation from incoming traffic, which warrants a P.L.O.S. 'A'.
- **P.L.O.S. 'D' to 'E'** – Undesirable conditions due to elements such as narrow sidewalks, lack of separation from traffic, longer crossing distances, etc. Streets

with narrow sidewalks and minimal separation from high volume, high speed roads receive P.L.O.S. scores between 'D' and 'E', as displayed in **Exhibit 6-7** for Major Mackenzie Drive, west of Yonge Street.

- **P.L.O.S. 'F' –** Inadequate conditions characteristic of locations without any pedestrian facilities or where no separation is provided adjacent to high speed and high volume traffic. No crosswalks provided and long crossing distances at intersections. The absence of sidewalks impedes accessibility on Arnold Crescent north of Major Mackenzie Drive as shown in **Exhibit 6-7** and justifies a P.L.O.S. 'F' for the street.

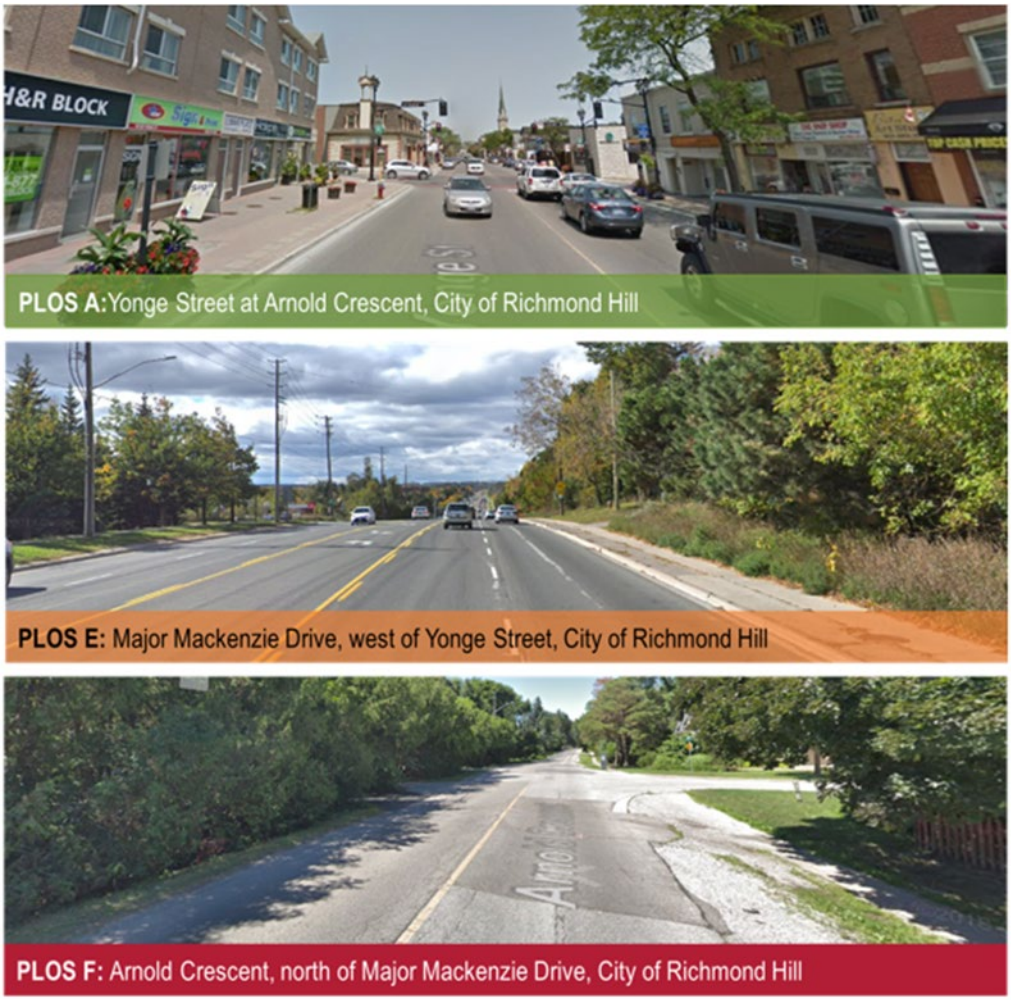


Exhibit 6-7: Examples of P.L.O.S.

6.1.3.2 PEDESTRIAN L.O.S. ANALYSIS

The segment and intersection P.L.O.S. analysis results are illustrated in **Exhibit 6-8**. Detailed analysis and tables can be found in **Appendix F**.

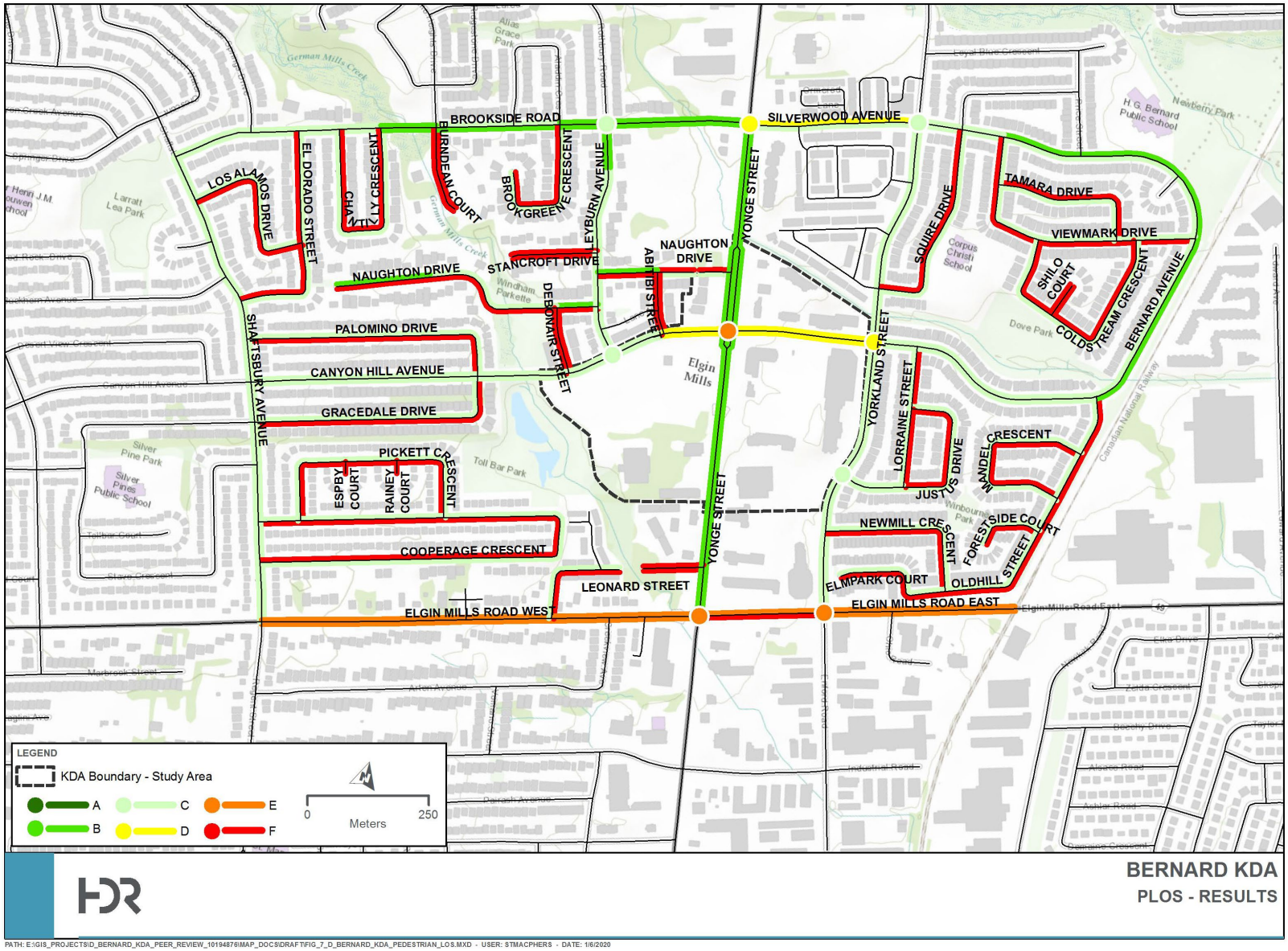


Exhibit 6-8: Existing Pedestrian Level of Service

Where new pedestrian facilities are being implemented as part of the Yonge Street VIVA Rapidway, the P.L.O.S. achieves higher scores. The wider 2.0m sidewalks, large planters, and bike lanes mitigate the effect of incoming traffic and improve the walking experience along Yonge Street, resulting in a P.L.O.S. of 'B'. The missing connections between the street and the retail plazas impact the pedestrian experience and should be noted, though they are not specifically captured in the P.L.O.S. analysis.

Where minimum 1.5m sidewalks are present, local residential streets receive an acceptable P.L.O.S. due to the low mandated speeds and lower vehicle (and pedestrian) traffic volumes, which make their narrow sidewalks contextually appropriate. However, residential cul-de-sacs are frequently missing sidewalks on at least one side, resulting in a P.L.O.S. score of 'F'.

Elsewhere in the study area, the P.L.O.S. results have room for improvement. Sidewalks along busier thoroughfares such as Elgin Mills Road and Canyon Hill Avenue / Bernard Avenue between Abitibi and Yorkland Street are too narrow and are not setback enough to compensate for the high speeds and volumes along the road. Depending on their characteristics, P.L.O.S. scores for these streets range between 'F' and 'D'. Plans to widen Elgin Mills Road (east of Yonge Street) to four lanes may worsen the P.L.O.S. if consideration to the pedestrian experience is not given.

The majority of intersections operate with a P.L.O.S. of 'D' or worse due to the wide cross-section of roads within the study area. Though the VIVAnext Yonge Street / Richmond Hill project has added median refuges and coloured crosswalk markings, it has also introduced more vehicle lanes for pedestrians to cross, offsetting potential benefits. Moreover, the large curb radii planned for Yonge Street intersections will facilitate quicker turns for vehicles, adversely impacting P.L.O.S. It is worth mentioning that it was understood that the VIVAnext Yonge Street / Richmond Hill rapidway will only allow protected left turns on the north and south approaches, which provides marginal improvement to the L.O.S. for pedestrians crossing the east and west legs of the Yonge Street intersections.

Intersections that perform better are associated mainly with those with narrower cross-sections and smaller corner radii. At best, these intersections receive a P.L.O.S. 'C' as is the case at Brookside Road and Rothbury Road, Yorkland Street and Silverwood Avenue, Yorkland Street and Justus Drive, and Canyon Hill Avenue and Leyburn Avenue.

6.1.4 Future Pedestrian Network Recommendations

Based on the future Road network as discussed in **Section 4.7.1**, and consistent with BAs recommendation, for new roads within the Yonge/Bernard K.D.A., it is

recommended to provide sidewalks on both sides with a minimum width of 2.0m. In locations where development is proposed in close proximity to the property line, it is recommended to provide 3.0m sidewalks to enhance pedestrian space and create a better relationship with the street.

Exhibit 6-9 illustrates the recommended future sidewalk network. Links A, E, G and Justus Connection are recommended to provide sidewalks on both sides. Abitibi Street is a local residential road with no sidewalks. In the future, Abitibi Street will be extended (Link H) to meet Link E. When Link H is constructed, it is recommended to improve Abitibi Street by providing a sidewalk on one side, while continuing the sidewalk along Link H in order to provide a continuous, and safe walking facility for pedestrians.

Through discussions with the City of Richmond Hill Staff, it is recommended to convert the Justus Connection to a private road to minimize traffic infiltration from west of Yonge Street to the residential area east of Yorkland Street. Although this connection is proposed to be a private road, it is recommended that the City ensures sidewalks continue on both sides to maintain continuous walking facilities for pedestrians.

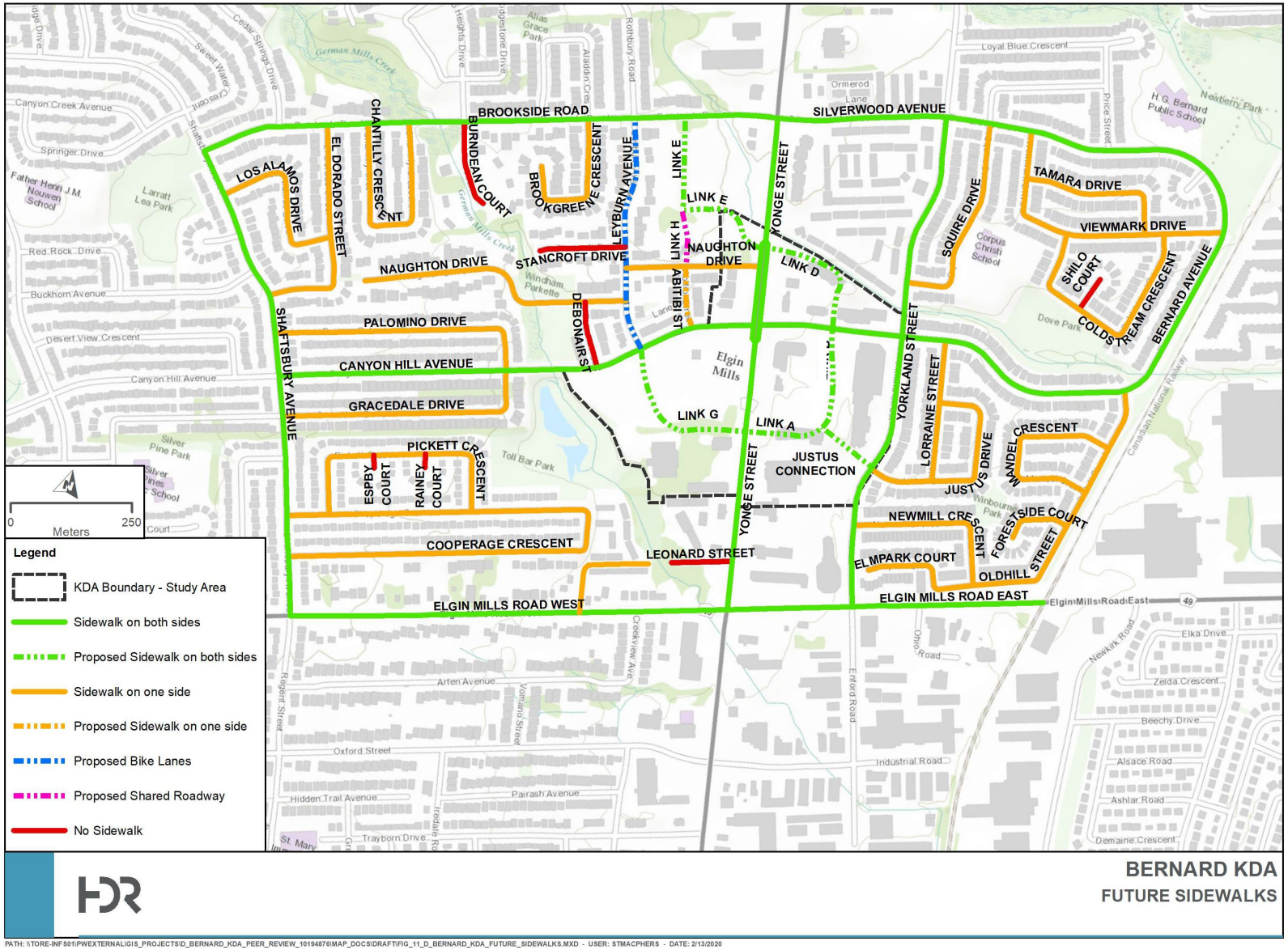
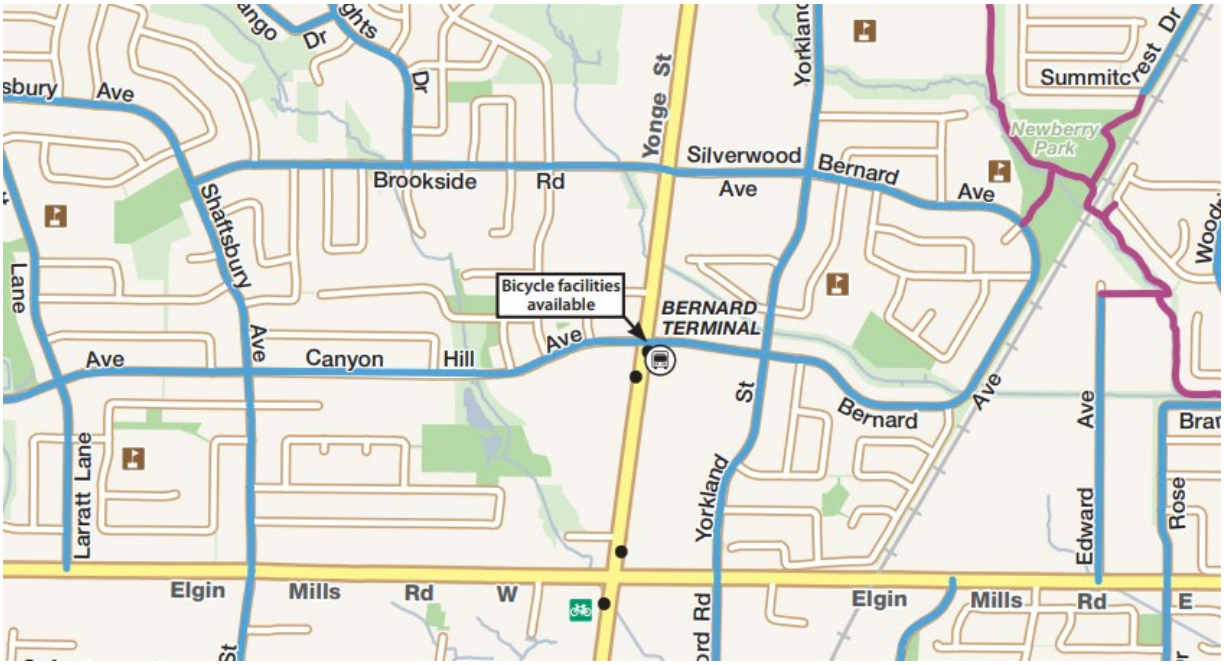


Exhibit 6-9: Future Sidewalk Network

6.2 Cyclists

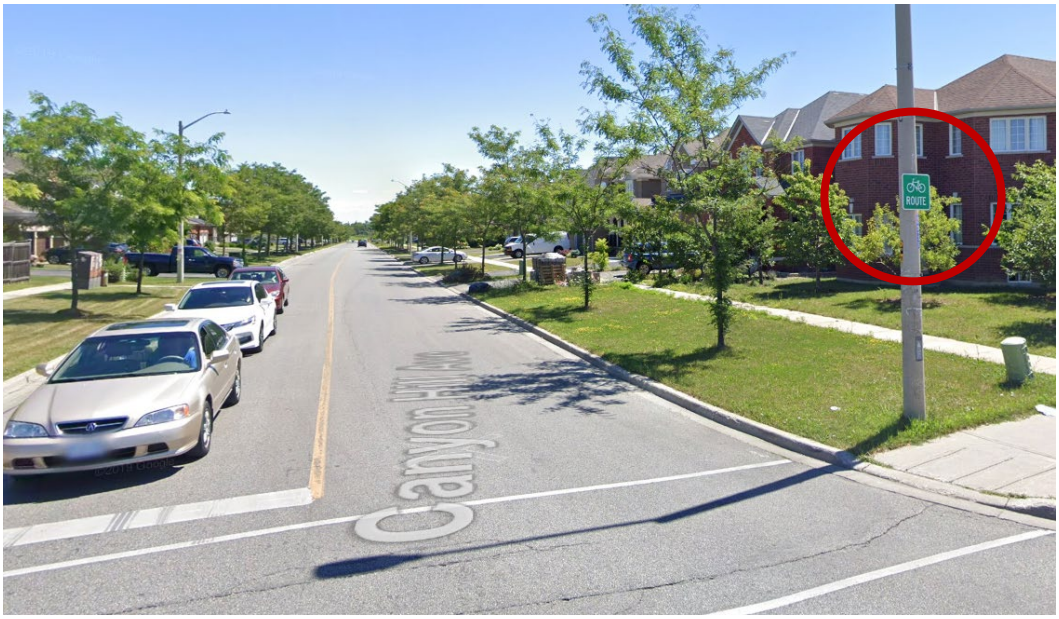
6.2.1 Cycling Network

There are no dedicated cycling facilities within the broader study area. Collector roads such as Shaftsbury Avenue, Canyon Hill Avenue, Bernard Avenue, Silverwood Avenue, Brookside Road and Yorkland Street are designated as shared roadways, as seen in **Exhibit 6-10**. However, no pavement markings or physical barriers provide protection to cyclists. Signs hung on light poles indicate that the streets are for shared use, per **Exhibit 6-11**. Three bike racks are available at the Bernard Bus Terminal to facilitate multi-modal trips.



Source: City of Richmond Hill Cycling Map

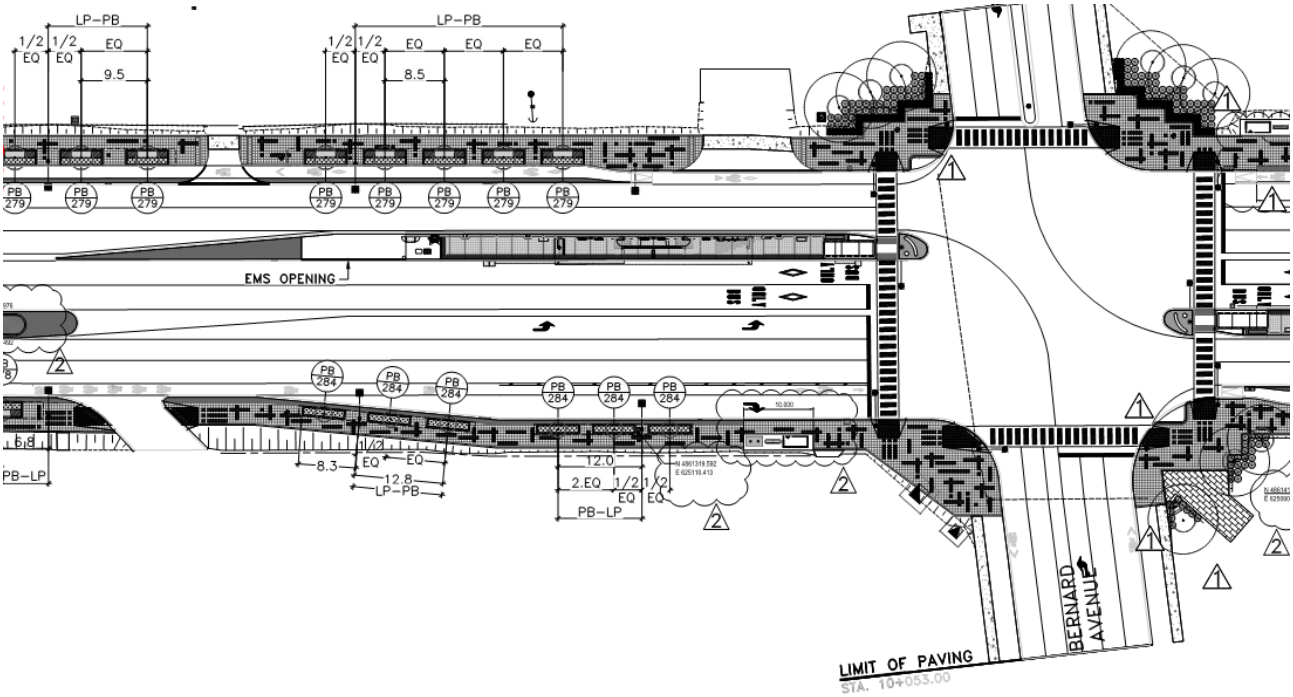
Exhibit 6-10: Existing Cycling Network surrounding the Bernard K.D.A.



Source: Google Streetview (July 2018)

Exhibit 6-11: Bike route sign indicating a shared roadway at Canyon Hill Avenue

The VIVAnext Yonge Street / Richmond Hill project will introduce raised cycle tracks on Yonge Street throughout the study area and is set for completion by late 2020. Although this is an improvement to existing conditions, some concerns related to the proposed design were noted. There are instances where the proposed cycle track merges and bends into Yonge Street vehicular traffic, which impacts the cycling experience at intersection approaches. For example, at Canyon Hill Avenue / Bernard Avenue, northbound cyclists will have to contend with right-turning vehicles and will be riding between vehicular lanes as they approach the intersection, as seen in **Exhibit 6-12**.



Source: Detail Design Drawing for VIVAnext Yonge Street / Richmond Hill, City of Richmond Hill

Exhibit 6-12: Bending-in of the cycle track at Yonge Street and Bernard Avenue

6.2.2 Bicycle Level of Service

6.2.2.1 BICYCLE L.O.S. METHODOLOGY

The methodology for the bicycle level of service (B.L.O.S.) is based on the York Region Transportation Mobility Plan (T.M.P.) and enhanced by the City of Ottawa's Multimodal Analysis Guideline. B.L.O.S. is calculated at the intersection and mid-block (segment) in recognition that a cyclist's experience is determined by the conditions both between crossings and at the crossing itself.

The base criteria in the York Region and Ottawa evaluation are similar; however, the B.L.O.S. analysis is more detailed under the Ottawa methodology, which considers not only the type and width of bikeway but also the adjacent road characteristics such as road and vehicular speeds. The differences between the Ottawa and York Region level of service approaches are most pronounced when reviewing the methodologies at the intersection level. The Ottawa methodology calls for a more involved list of inputs, including road-way characteristics such as the presence of turning lanes and turning speeds, lead to a more rigorous evaluation of conditions at intersections. The Ottawa methodology offers a more detailed review of the user experience, especially at the intersection level. Overall, the York Region Transportation Mobility Plan multi-modal

level of service methodology is a good baseline from which to conduct an existing conditions review.

Nevertheless, the Ottawa methodology sets a higher level of standard that is arguably more appropriate for urbanizing areas that aim to prioritize active transportation.

The segment B.L.O.S. evaluation utilizes a look-up table approach based on roadway characteristics and facility type and quality. The score is influenced by factors such as facility type, street width, operating speed, and parking characteristics.

For intersection B.L.O.S., a similar look-up table approach is used to evaluate the left and right-turning conditions for cyclists at the intersection. Intersection B.L.O.S. is affected by turning and operating speeds, dual turning lanes, and bike boxes. Other impediments to cyclists seeking to turn right or left (such as right-turn lane length and crossing distances) are also assessed. The average score of all approaches (north, south, west and east) is then used to determine the overall intersection B.L.O.S. The input of the B.L.O.S. is shown in **Exhibit 6-13.**

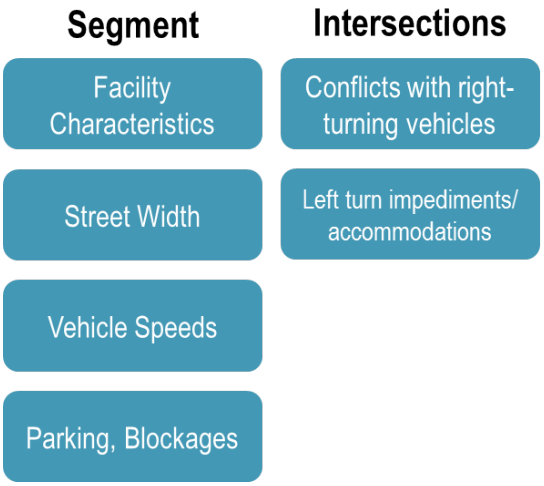


Exhibit 6-13: Inputs for Bicycle L.O.S.

Segment B.L.O.S. is the most sensitive to facility type, with physically separated bikeways such as cycle tracks, protected bike lanes and multi-use paths receiving a score of ‘A’ while cycling in mixed traffic conditions with varying operating speeds and street widths generally scoring lower – ‘D’ to ‘F’. The scoring ranges as follows:

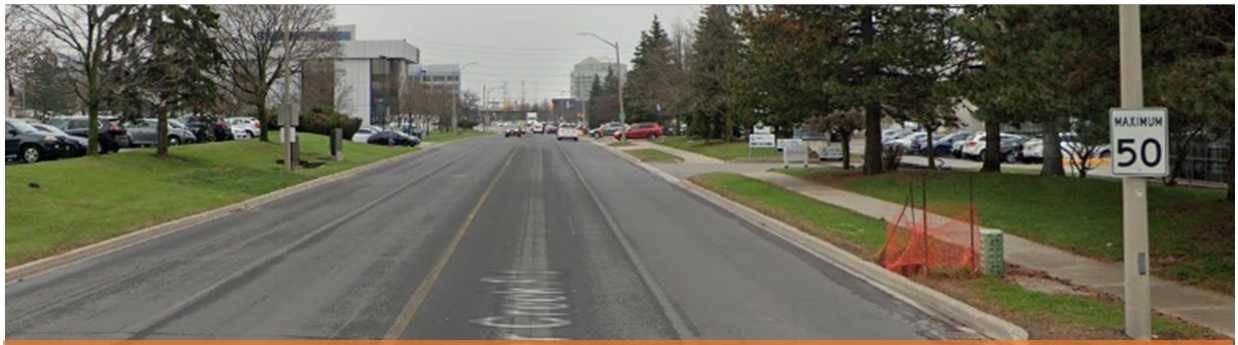
- **B.L.O.S. ‘A’ to ‘C’ –** Physically separated facilities such as cycle tracks, protected bike lanes, and multi-use paths (M.U.P.) are attractive to most cyclists. At intersections, continuous cycling facilities are provided and separated from vehicles and pedestrians. Local and residential streets with smaller cross-section and lower speeds are also acceptable as shared roadways. The Beaver Creek multi-use trail beginning at Mural Street depicted in **Exhibit 6-14** provides an

example of a facility type that receives a B.L.O.S. 'A' as it is physically separated from vehicles.

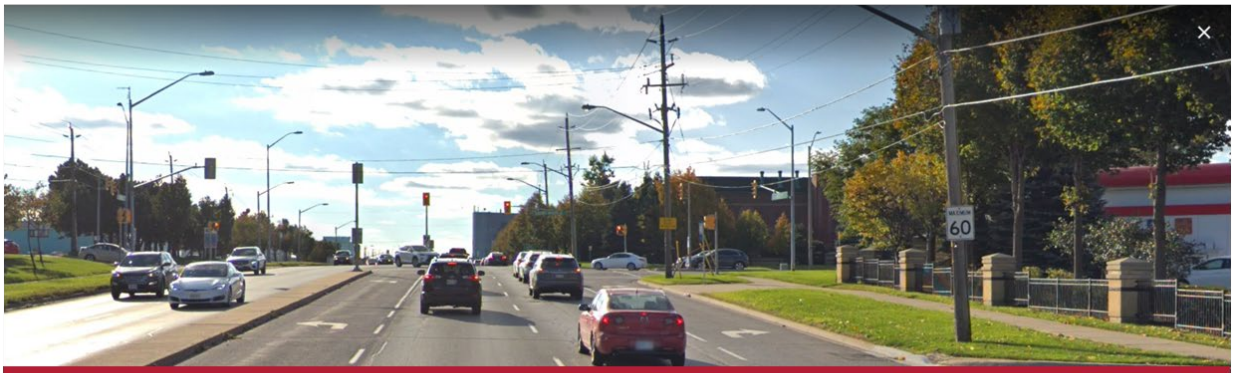
- **B.L.O.S. 'D' to 'E' –** Designated bike lanes adjacent to high speed traffic lanes or shared facilities on low volume, low speed streets with wide curb lanes provide some comfort, but the majority of potential cyclists typically will not cycle under these conditions. Greater conflicts at intersections with turning vehicles are experienced. An example of a B.L.O.S. 'E' can be observed in **Exhibit 6-14.** Cyclists on West Beaver Creek Road south of West Pearce Street have to ride in mixed traffic on a street with a 4-lane cross-section and posted vehicle speed of 50 km/hr.

- **B.L.O.S. 'F –** Non-separated, shared roadways with high traffic volumes and speeds, and no accommodations at intersections. Leslie Street north of Highway 7 shown in **Exhibit 6-14** displays the lowest B.L.O.S. possible due to the unsafe cycling conditions resulting from high volume, high speeds (60km/hr), and wide cross-section roadways.

BLOS A: Beaver Creek Multi-use Trail at Mural Street, City of Richmond Hill



BLOS E: West Beaver Creek Road at West Pearce Street, City of Richmond Hill



BLOS F: 16th Avenue, east of Cachet Woods Court, City of Markham

Exhibit 6-14: Example of Bicycle L.O.S.

6.2.2.2 BICYCLE L.O.S. ANALYSIS

The B.L.O.S. results of the study area are illustrated in **Exhibit 6-15**. It must be noted that the B.L.O.S. on Yonge Street is based on construction documents, reflecting conditions once the VIVAnext Yonge Street / Richmond Hill Rapidway construction is completed in late 2020.

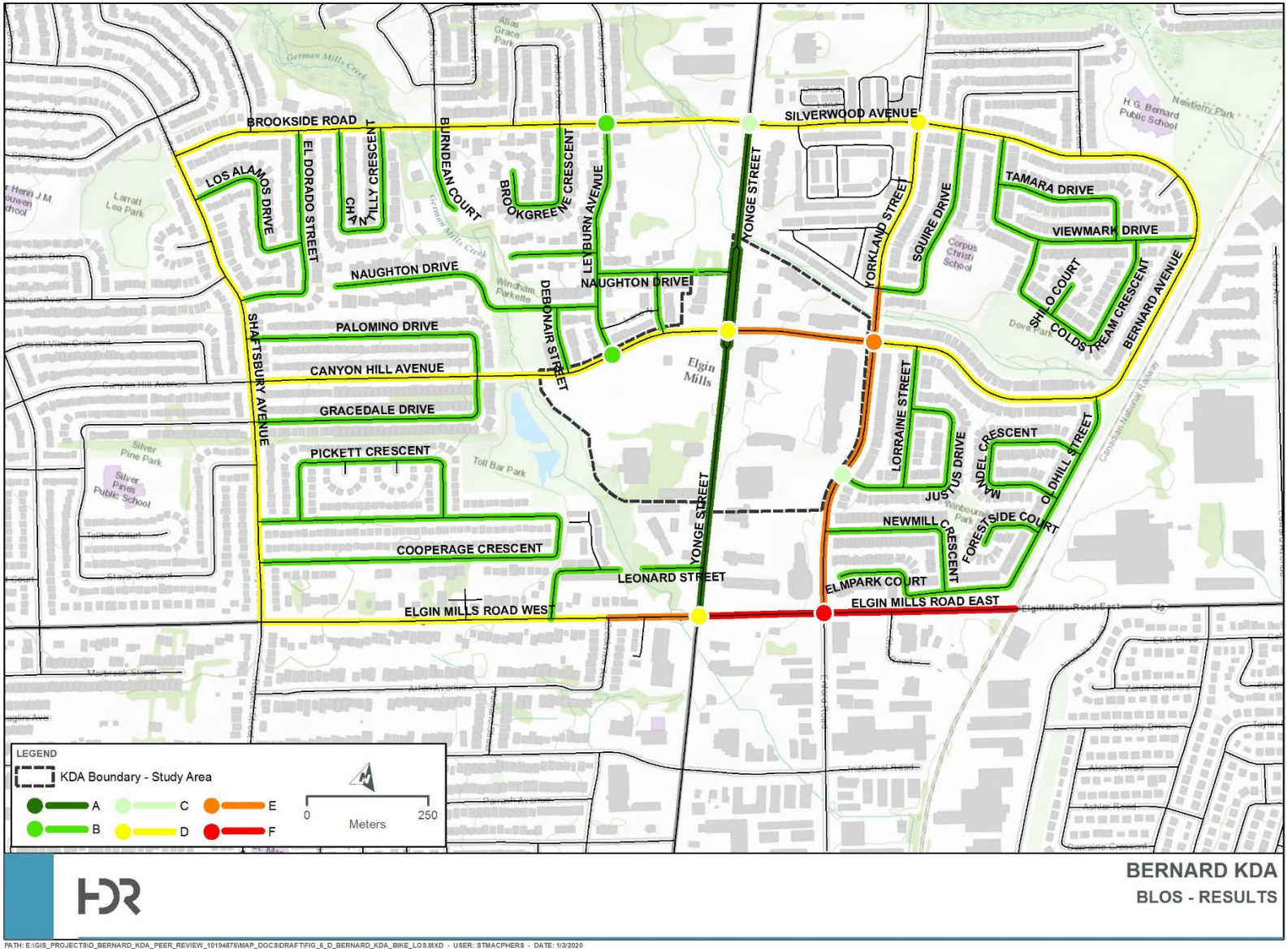


Exhibit 6-15: Existing Bicycle Level of Service

The scores vary widely across the study area. Where dedicated cycling facilities are underway, higher segment B.L.O.S. scores are achieved. Specifically for Yonge Street, where bike lanes of up to 2.0m wide are proposed and separation from the roadway by 0.6m concrete buffers will be provided, a higher segment B.L.O.S. score is warranted. These design choices help mitigate the adverse effects of wide roadways and high speeds on cyclists, thus improving B.L.O.S. At the intersection level, Yonge Street does not perform as well due to cyclists having to cross a high number of lanes when making a left-turn. Two-stage left-turn bike boxes can help increase cyclist visibility and facilitate safer crossing; however, no additional accommodation are provided for left-turning cyclists.

In locations with no cycling infrastructure, segment B.L.O.S. is determined by cross-sectional characteristics and operating conditions. Under these cycling conditions, the wider the road and the higher the vehicles speed, the worse the segment B.L.O.S. score. Therefore, Elgin Mills Road East witnesses a B.L.O.S. ‘F’ while local residential streets receive a B.L.O.S. ‘B’. Collector roads such as Shaftsbury Avenue, Bernard Avenue, and Canyon Hill Avenue receive a B.L.O.S. ‘D’ due to their two lane cross-sections and moderate speeds. The results are intuitive; biking in shared conditions along narrower streets with lower volumes is less dangerous, more pleasant, and more likely to occur than on busier and wider streets.

Only intersections in the immediate vicinity of the Bernard K.D.A. were assessed. The intersection at Yorkland Street and Elgin Mills Road performed the worst due to high turning and operating speeds, the prevalence of right-turn lanes on the intersection approaches, and the presence of dual left-turn lanes. Intersections at local streets perform better as they have less lanes for cyclists to cross when completing left-turns. They also do not typically have right-turn lanes that create a weaving hazard to cyclists riding in mixed traffic.

Detailed analysis can be found in **Appendix F**.

6.2.3 Future Cycling Network

Based on the existing B.L.O.S. analysis, there are a number of collector roads that are operating at B.L.O.S. ‘D’ and ‘E’, including Shaftsbury Avenue, Brookside Road, Silverwood Avenue, Bernard Avenue, Canyon Hill Avenue, and Yorkland Street. These roads are designated as shared roadways with signs hung on light poles to indicate that the roads are for shared use. There are no pavement markings or physical barriers to provide protection to cyclists.

With the development and construction of new collector and local roads within the Yonge/Bernard K.D.A., there are opportunities to implement safer cycling facilities to

promote active transportation. Knowing that the existing cycling facilities along the collector roads are operating poorly, it is recommended to implement new cycling facilities within the existing right-of-way (R.O.W.) of the collector roads identified above. Recommendations are supported by a best practices review of design guidelines including travel and parking lane widths and considerations at intersections.

6.2.3.1 METHODOLOGY TO IDENTIFY CYCLING FACILITIES ON EXISTING ROADWAYS

As described in **Section 6.2.1**, the existing network of on-street cycling facilities consists primarily of shared roadways. Providing dedicated space for cyclists will encourage cycling as a viable mode of transportation while also accommodating other new, sustainable mobility options. For example, beginning January 1, 2020 the Province has implemented a five year pilot program to allow electric scooters on Ontario roadways wherever bicycles are permitted. In order to determine an appropriate cycling facility to implement within an existing right-of-way, the following elements are considered:

1. Vehicular travel lane widths
2. Dedicated on-street parking lane widths
3. Cycling facility guidance
4. Cycling facility types and widths
5. Available pavement widths

Vehicular Travel Lanes

TAC Geometric Design Guide for Canadian Roads, *Chapter 4 – Cross Section Elements*, provides the recommended range of through lane widths for urban roadways and is summarized in **Table 6-1**.

Table 6-1: TAC Recommended Lane Widths

Roadway Type	Design Speed (km/h)	Practical Lower Limit	Recommended Lower Limit	Recommended Upper Limit	Practical Upper Limit
Urban Roadway	60 and less	2.7m	3.0m	3.7m	4.0m
	70 to 100	3.0m	3.3m	3.7m	4.0m
	110 and Higher	3.5m	3.7m	3.7m	4.0m

Source: Transportation Association of Canada Geometric Design Guide for Canadian Roads Manual 2017

Dedicated On-street Parking Lanes

Parking lanes are typically provided on urban roadways to clearly delineate space for parking, in order to maintain safe and convenient operations for vehicular traffic. On the residential collector roads in the City of Richmond Hill, on-street parking is typically allowed but designated spaces are not identified. With the implementation of dedicated cycling facilities it may be necessary to delineate where on-street parking is allowed.

With respect to parking lane widths, according to TAC, Chapter 4 – *Cross Section Elements*, the width of a parking lane should be generally 2.4m. Based on the National Association of City Transportation Officials (NACTO) and the City of Toronto Road Engineering Design Guidelines, on-street parking lane widths are recommended to be between 2.0m to 2.8m wide. Dedicated parking lanes should only be wider than 2.4m where there is a high volume of parked trucks or the horizontal alignment curve prevents vehicles from parking within a 2.4m wide parking lane.

In the low volume and speed residential applications in the City of Richmond Hill, a 2.0m minimum width is appropriate while a width of 2.4m is considered for higher volume roadways.

Cycling Facility Guidance

O.T.M. Book 18, *Cycling Facilities*, provides guidance in determining the preferred cycling facility for the different road types throughout the City as a function of vehicle travel speed and average annual daily traffic (A.A.D.T.) volumes. **Exhibit 6-16** illustrates the graph used to select the desired cycling facility and is based on vehicular travel speeds and Annual Average Daily Traffic (A.A.D.T.) volumes.

On the residential streets within the City posted at 40km/h to 50km/h, A.A.D.T. volumes less than 5,000 do not require dedicated cycling facilities, while A.A.D.T. volumes

greater than 5,000 should strongly consider dedicated cycling facilities. At speeds of 50km/h, dedicated cycling facilities remain appropriate, but at higher volumes, greater separation through buffer widths for example should be considered where space is available.

In general, separated cycling facilities are ideal in the creation of an “All Ages and Abilities” or A.A.A. cycling network, however space and cost considerations can be barriers to implementation. It is further noted that implementing lower-order facilities than recommended by O.T.M. Book 18 should be avoided; however, implementing higher-order facilities is encouraged if warranted based on the factors previously identified.

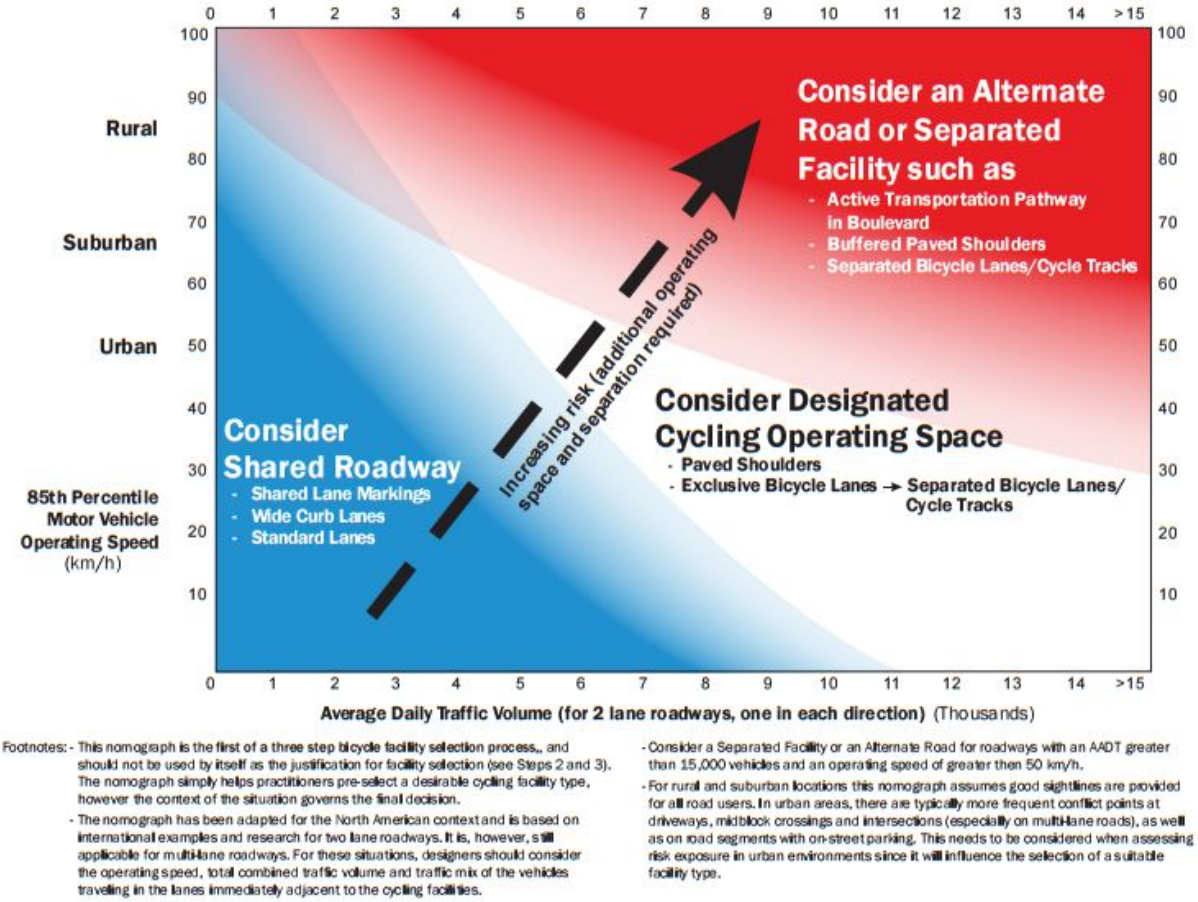


Exhibit 6-16: O.T.M. Book 18 Bicycle Infrastructure Nomograph

Cycling Facility Types and Widths

Bicycle Lanes

Bicycle lanes are on-road facilities designated by pavement markings and signage. Bicycle lanes are typically on the right side of the street between the vehicle travel lane

and curb or parking lane, and flow in the same direction of traffic. **Buffered bicycle lanes** offer an enhancement by using painted buffers to provide additional space between motor vehicles and cyclists.

Table 6-2, adopted from O.T.M. Book 18, illustrates minimum widths. Bicycle lanes immediately adjacent to parking should only be implemented if the desired width can be accommodated. Where space allows, bicycle lanes may be wider to provide additional comfort to cyclists.

Table 6-2: Bicycle Lane Width

Facility	Desired Width	Suggested Minimum
Curbside lanes	1.8m	1.5m
Lanes adjacent to parking	1.5m lane + 1m buffer	1.5 m lane + 0.5m buffer

Cycle Tracks

Cycle tracks are an exclusive bicycle facility adjacent to and at the same level as the roadway, but separated from motorized traffic by a physical buffer (e.g. planters, bollards, curbs, or a parking lane). They can be bi- or uni-directional, and designed to accommodate cyclists on one or both sides of the street. **Raised cycle tracks** are physically separated from motorized traffic by a height difference. They may be at the level of the adjacent sidewalk or at an intermediate level between the roadway and sidewalk. The desired width for a one-way raised cycle track is 2m, and the minimum 1.5m. , adopted from O.T.M. Book 18, illustrates minimum widths:

Table 6-3: Protected Bicycle Facility Width

Facility	Desired Width	Suggested Minimum
Flexible bollards	2.0m lane + 1.2m buffer	1.5m lane + 0.5m buffer
Planters / Concrete curb	2.0m lane + 1.2m buffer	1.8m lane + 0.5m buffer
On-street parking	1.8m lane + 1.2m buffer	1.5m lane + 0.8m buffer

Multi-Use Paths

Multi-use Paths (M.U.P.) are off-road facilities, fully separated from motorized traffic by a boulevard or paved surface, or passing through parks and other natural spaces. They often serve commuter and recreational functions. They are typically shared between pedestrians, cyclists, rollerbladers, and skateboarders. The desired width of a multi-use trail is 4.0m, and the minimum width is 3.0m.

Shared Lane Markings (Sharrows)

Sharrows are road markings that indicate a shared lane for bicycles and vehicles. It is a pavement marking that indicates a variety of uses to support a complete bikeway network; however, it is not a facility type. Sharrows are typically implemented to

reinforce the legitimacy of bicycle traffic on the street, recommend proper bicyclist positioning, and maybe configured to offer directional wayfinding guidance. They should not be considered a substitute for bike lanes, cycle tracks, or multi-use trails where these types of facilities are a warranted or space permits.

Urban Shoulder

An urban shoulder is a space, delineated by an edge line that a cyclist may ride in instead of riding in the vehicular shared lane where dedicated cycling facilities are not provided. An urban shoulder is not an alternative to a dedicated cycling facility and may be used for snow storage in the winter. Based on the City of Toronto Road Engineering Design Guidelines, the minimum width of an urban shoulder delineated by an edge line shall be 1.2m and may be as wide as 2.3m where space is available.

Available Pavement Width

A review of the available pavement width on each of the shared cycling routes identified in **Section 6.2.3** has been conducted to inform the recommendations to be considered for cycling facilities. The measured widths are identified in **Table 6-4**. Although Leyburn Avenue is operating at B.L.O.S. 'B', it has also been reviewed as it connects to Link G. It is noted that this information is based on Google Maps, and is provided for conceptual network planning only. Further study is required to confirm recommendations based on these available pavement widths.

Table 6-4: Existing Pavement Widths

Road with existing Shared Roadway Designation (City of Richmond Hill Cycling Map)	Available Pavement Width, Urban Cross-section
Shaftsbury Avenue	10.0m
Brookside Road	11.0m
Silverwood Avenue	10.0m
Bernard Avenue	9.0m
Canyon Hill Avenue	9.0m
Yorkland Street	14.0m
Leyburn Avenue	9.0m

6.2.4 Potential Cycling Facilities

The City of Richmond Hill has three (3) standard right-of-way drawings for residential roads (R-1A, R-2A, and R-1B).

Based on Richmond Hill's standard ROW drawings and available pavements width identified previously, recommendations for different cycling facility options are identified in **Table 6-5**. The options are intended to be applied within the existing pavement width,

and varying requirements for parking or cycling facility separation should be applied depending on the land use context.

Sample cross-sections illustrating some of these cycling facility options are provided in **Appendix G**.

Table 6-5: Recommended Cross-Section Options

Drawing #	Existing Condition	Cross-Section Element Options			
	Drawing Name	Pavement Width	Vehicle Lanes	On-Street Parking	Potential Cycling Facility
R-1A	Typical Street Cross-Section >18m R.O.W.	11.0m	3.0m	None	2.0m Bicycle Lane or raised cycle track, 0.5m buffer each side
			3.5m	2.0m, both sides	Sharrows / signed route
			2.7m	2.0m, one side	1.5m Bicycle Lane on each side, 0.6m buffer between parking and Bicycle lane
R-2A	Typical Street Cross-Section 18.0m R.O.W.	8.5m	4.25m	Not dedicated	Sharrows / signed route
			3.0m	Not dedicated – 1.25m urban shoulder	Not dedicated – 1.25m urban shoulder
			3.25m	2.0m, one side	Sharrows / signed route
R-1B	Typical Cross-Section with Joint Utility Trench 20m R.O.W. and greater	9.0m	3.0m	None	1.5m Bicycle Lane on each side
			4.5m	Not dedicated	Sharrows / signed route
Other None Standard Pavement Width	N/A	10.0m	3.0m	None	1.5m + 0.5m buffered Bicycle Lane on each side
			5.0m	Not dedicated	Sharrows / signed route

Drawing #	Existing Condition	Cross-Section Element Options			
	Drawing Name	Pavement Width	Vehicle Lanes	On-Street Parking	Potential Cycling Facility
		14.0m	2.7m (2 lanes in each direction)	None	1.5m Bicycle Lane on each side

6.2.5 Cycling Facility Recommendations

Based on available pavement width, a recommendations map identifies proposed cycling facilities on the bike routes throughout the City and is illustrated in **Exhibit 6-17**. As noted previously, these recommendations are based upon available pavement width information from Google Maps. Further study is required to confirm recommendations based on more detailed information about available pavement widths.

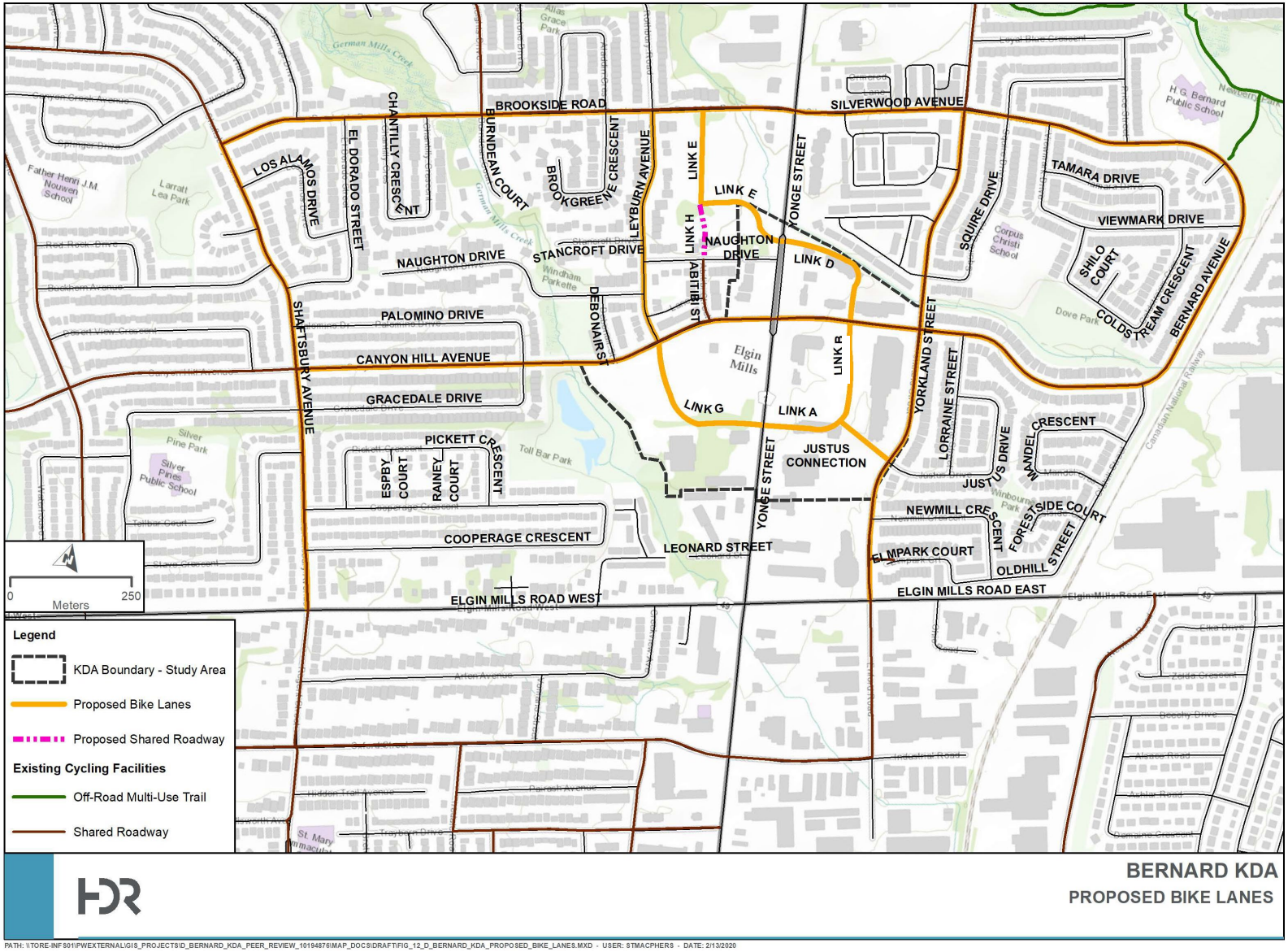


Exhibit 6-17: Recommended Future Cycling Network

7. Parking Strategy

H.D.R. is undertaking an update to the Draft Richmond Hill Parking Strategy that was prepared by H.D.R. in 2010. This study includes a city-wide review of parking and Transportation Demand Management (T.D.M.). Parking and T.D.M. for the Yonge/Bernard K.D.A. will be part of that study.

A comprehensive best practices review is being undertaken to compare parking requirements from the following municipalities, mostly concentrated in the Greater Toronto Area:

- City of Richmond Hill 2010 Parking Strategy
- Richmond Hill Yonge and Bernard Secondary Plan Zoning By-law 111-17
- City of Toronto (By-law 569-2013)
- City of Markham (By-law 28-97, 2004-196 for Markham Centre)
- Town of Newmarket (By-law 2010-40 & By-law 2019-06)
- City of Vaughan (By-law 1-88, Draft Comprehensive Zoning By-law)
- City of Mississauga (By-law 0225-2007)
- City of Brampton (By-law 270-2004)
- Town of Oakville (By-law 2014-014)
- City of Hamilton (By-law 05-200, 17-240)
- City of Vancouver (By-law 6059)

The parking rate comparison compares K.D.A. rates to rates from other municipalities which could be considered comparable to K.D.A.'s with respect to built-form, and transit accessibility and quality of service. The parking rates applied within K.D.A.'s are expected to already reflect a higher non-vehicle modal split.

7.1 Minimum Parking Rates

Based on the review, preliminary findings suggest that some of the existing rates for Key Development Areas can be reduced and/or blended. In particular, there are opportunities to reduce rates for retail uses, restaurants, financial institutions, and possibly offices. There may also be opportunities to convert all rates to floor area based

rates such as for medical offices which are currently practitioner-based, and to generate a new set of rates for affordable housing.

These recommendations are subject to change based on data collection and City input. Data collection will be performed to validate any changes to the rates proposed in the 2010 Parking Strategy. Preliminary recommendations are provided in tabular form in **Table 7-1** for residential apartment/condominiums, as well as in **Table 7-2** for non-residential land uses. No changes are being recommended for other non-apartment style residential uses such as townhouses.

Table 7-1: Residential Apartment/Condominium Parking Rates (K.D.A. Comparable Areas; unit based)

Unit-Type	Yonge and Bernard Key Development Area Secondary Plan Zoning By-law 111-17	Richmond Hill 2020 Preliminary Recommendations
Bachelor	0.80	0.70
1-Bedroom	0.90	0.80
2-Bedroom	1.00	0.90
3-Bedroom	1.20	1.00
Visitor	0.15	0.15

Table 7-2: Non-Residential Parking Rates (K.D.A. Comparable Areas)

Land Use	Yonge and Bernard Key Development Area Secondary Plan Zoning By-law 111-17	Richmond Hill 2020 Preliminary Recommendations
G.F.A.-BASED NON-RESIDENTIAL		
Office	2.00	2.80
Medical Office	Practitioner-Based	
Retail - Regional	3.00	
Retail - Neighbourhood	4.00	
Restaurant	3.00	
Financial Institution	4.60	
Veterinary Clinics	3.50	
Day Care / Day Nursery	Person-based	
Places of Assembly	4.80	4.25

Land Use	Yonge and Bernard Key Development Area Secondary Plan Zoning By-law 111-17	Richmond Hill 2020 Preliminary Recommendations
G.F.A.-BASED NON-RESIDENTIAL		
Arts & Cultural	5.00	
Social Services	5.00	
ROOM- or PRACTITIONER-BASED RATES (# spaces required per classroom, guest room, or per practitioner – exclusive of requirements for assembly areas unless otherwise shown)		
Elementary School	1.60	1.35
Secondary School	3.20	2.70
Post-Secondary School	3.20	2.70
Hotel/Model	0.75 parking spaces per room plus an additional 7.5 parking spaces per 100 square metres Gross Floor Area for areas dedicated for banquet rooms and similar uses, but excluding lobbies, hallways and similar area	0.65 parking spaces per room plus an additional 4.25 parking spaces per 100 square metres Gross Floor Area for areas dedicated for banquet rooms and similar uses, but excluding lobbies, hallways and similar area

These preliminary recommendations are based on a best practices review and reflect blended rates for some non-residential uses. Preliminary disaggregated or non-blended rates have also been developed for consideration. For the application of blended rates to be successful, they must be supported by guided development policies ensuring appropriate land use mixtures and formats.

Details of the parking requirement review including the Best Practices comparisons of rates from other municipalities can be found in **Appendix H.**

7.2 Maximum Parking Rates

The rates shown above are minimum parking requirements. Maximum parking requirements would also be established for all land uses. The maximum parking rates would generally be capped at 125% of the minimum parking requirements for all uses (25% higher than the minimum rate) with minor rounding. Exceptions would include Street and Block Townhouse Dwellings without a parking structure or any other use which does not have shared parking.

7.3 Parking Formula / Shared Parking

The shared parking formula is applicable to parking lots that share parking between multiple land uses. The formula takes advantage of how different land uses have varying parking demands throughout the day. For example, rather than total the individual minimum parking requirements of an office and residential visitor parking, a lower parking supply can be provided since office parking typically peaks during the day while residential visitor parking peaks during the evening. Shared parking can be applied when there are multiple uses on-site with different rates and peaking characteristics.

The shared parking percentages provided in the 2010 Parking Strategy were compared to those from other comparable Zoning By-laws and parking standards and are provided in **Appendix H.** The percentages presented in the 2010 Parking Strategy are comparable to other municipalities.

Within the Yonge/Bernard K.D.A., the use of shared parking reductions can be applied to parking lots that share parking supply between general office and residential visitor within the same site. The parking lot must be accessible to both uses 24 hours a day, 7 days a week. This shared parking supply must not separate or distinguish between general office and residential visitor parking in any physical manner.

The shared parking requirement is to be calculated as the maximum of the following:

- Office Parking Supply * 100% + Residential-Visitor Parking Supply * 20%, rounded up; or
- Office Parking Supply * 10% + Residential-Visitor Parking Supply * 100%, rounded up.

The methodology for applying the shared parking formula described in the 2010 Parking Strategy is similar to other municipalities. Each land use is provided an occupancy rate for various periods to reduce the parking. The following steps describe how to calculate the minimum parking requirements for a shared parking lot with multiple land uses:

1. For each parking period, calculate the minimum number of spaces for each land use by applying the associated occupancy rate to the minimum parking requirement;
2. Total the minimum number of parking spaces of each land use for each parking period;
3. The highest number of parking spaces required between each period is the minimum number of parking spaces required for the lot;

4. Parking for other uses (commercial, retail, etc.) would be required in addition to the above requirements for office and residential visitor.

7.4 Parking Reductions

Some Zoning By-laws and Standards offer the opportunity to reduce parking minimums for a development, beyond the reduced minimums already established for growth areas, by tying explicit reductions to particular measures. Opportunities to reduce parking minimums based on this approach has been established by and implemented by other nearby municipalities including the Town of Newmarket.

For application within the Yonge/Bernard K.D.A., the City may consider permitting reductions to the minimum parking requirement at residential apartment/condominiums for the provision of car-share spaces.

These car-share parking spaces must be located at the ground level in a preferentially located area (i.e. near entrances) similar to barrier-free parking, visible and accessible to the general public 24 hours a day, 7 days a week. These spaces will be publically owned. The developer will provide subsidized car-share memberships & subsidization of the service provider to encourage expansion to new areas for a minimum of 3-years. Car-share spaces will be implemented in a phased approach such that the total maximum number of spaces permitted would be allocated outright, but a fraction of those spaces would immediately be occupied and in service as car-share parking. The use of the spaces would be monitored yearly, and the remaining car-share spaces would only be converted to full time use as it is justified based on demand.

Required tenant parking may be reduced by up to 4 spaces for every dedicated car-share space. The limit on the parking space reduction is calculated to be the greater of:

- 4 * (total number of units / 125), rounded down to the nearest whole number; or
- 1 space.

Any other opportunities to provide parking reductions will be investigated and refined as part of the ongoing citywide Parking and T.D.M. Strategy Update.

7.5 Transportation Demand Management

The B.A. report recommended that the Town outline specific responsibilities associated with various stakeholders including York Region, the Town of Richmond Hill, private landowners and developers. The key T.D.M. focus areas that B.A. recommended include the following:

- Coordination & Communication
- Land Use & Built Form
- Transit Use
- Cycling Network & Facilities
- Pedestrian Network
- Parking Management
- Vehicle Ownership

Details of each focus area are discussed in B.A.'s report. These T.D.M. measures are broad and are described based on generalized level of commitment for each T.D.M. measure. These measures are generally appropriate and should be pursued within Bernard.

The goal of Transportation Demand Management (T.D.M.) is to reduce the amount of travel by decreasing the need to travel, shifting travel away from the single occupant vehicle, and peak period travel. The Secondary Plan facilitates T.D.M. by planning for appropriate *intensification* and a mix of uses that supports increased transit use. An improved pedestrian environment, pedestrian and cycling connections, and a system of parks and urban open spaces will encourage more people to walk or cycle to shops, services and transit stops. Municipal T.D.M. opportunities within the Bernard K.D.A. will be explored to provide further support for end of trip mobility options.

1. The City shall encourage and support implementing car-share facilities in the Bernard K.D.A.

2. The City shall encourage and support implementing bike-share facilities to offer opportunities for short distance trips to be made by employees or residents.

3. The City may introduce public bicycle parking within the enhanced streetscape.

4. The City may establish a system of thematic wayfinding signage for the Bernard K.D.A. to emphasize the proximity of destinations within each quadrant and serve as a branding opportunity.

5. *Development* shall be required to prepare and implement a T.D.M. Strategy to the City's satisfaction, which must incorporate, but shall not be limited to, any or all of the following:

    a. Cycling infrastructure and end-of-trip infrastructure such as secure bicycle storage and shower and change room facilities;

    b. Secure Public Bicycle Parking;

    c. Bicycle Maintenance Facilities;

d. Dedicated cycling routes internal to the site to and from key destinations;

e. Connections to existing municipal bicycle network;

f. Pedestrian amenities, such as treed sidewalks, benches and marked crossings;

g. Continuous pedestrian linkages to minimize pedestrian walking distances;

h. Functional building entrances oriented to locations where pedestrians, cyclists, and transit users arrive such as a street, park, urban square, or urban plaza;

i. Subsidized transit passes or pre-loaded transit cards for new residents and/or employees;

j. Pick-Up/Drop-Off Spaces;

k. Preferential carpool parking;

l. Varying hours of work to reduce peak hour loads;

m. Commitment to participate in residential or workplace T.D.M. program;

n. Commute Trip Reduction Programs;

o. Maximum parking rates;

p. Dedicated spaces to priority uses;

q. Unbundle parking spaces from lease agreements;

r. Transportation Marketing Services;

s. The T.D.M. Strategy may also include, but shall not be limited to, any or all of the following:

   i. Additional Long-Term Bicycle Parking (beyond minimum requirements);

   ii. Improved Access to Long-Term Bicycle Parking;

   iii. Enhanced Short-Term Bicycle Parking;

   iv. Public Bicycle Share Spaces;

   v. Shared Bicycle Fleet & subsidization of the service provider to encourage expansion to new areas;

vi. Weather protection along street frontages adjacent to transit stops;

vii. Shuttle Bus Service, provided and operated by the Development;

viii. Employer shuttles or vanpools supported by preferential parking;

ix. Electric vehicle charging stations or rough-ins;

x. Paid parking for non-residential uses;

xi. Other Innovative Strategies (i.e. valet, off-site parking, agreements, rented parking);

xii. Location of off-Street Parking / Overflow Parking Plan;

xiii. Technology that displays general transit information (e.g. Information to resident, employees and visitors about transit, rideshare and taxi services, bicycling facilities, and overflow parking options);

xiv. Technology that displays real-time transit information (e.g. next vehicle arrivals, current schedules, detours, etc.);

xv. Multimodal Wayfinding Signage;

xvi. Other measures that may be identified.

In addition to the Transportation Demand Measurements outlined above, direct reductions in parking supply and may be permitted through:

a. The provision of publicly accessible car-share parking spaces with implemented car-sharing programs, to the satisfaction of the City of Richmond Hill.

b. The consideration of shared parking supply between office and residential visitor uses situated in the same parking facility under one property owner.

Such reductions shall be permitted at the sole discretion of the City; upon the provision of a satisfactory Transportation Planning Study and Transportation Demand Management Strategy; and in accordance with rates and formulas prescribed in the City's most current Parking Strategy.

As part of the ongoing Parking and T.D.M. Strategy Update, T.D.M. Strategy recommendations will be developed for application across the City, including application within the Bernard K.D.A. These findings will continue to be refined and developed as part of the 2021 Parking and T.D.M. Strategy for New Developments project. The expected timing for completion of the Parking and T.D.M. study is early 2021.

The T.D.M. Strategy will outline minimum requirements and target thresholds for different land uses and strategy areas, will include a checklist or “toolbox” for developers, and will be structured in a way that allows T.D.M. measures to be directly tied to parking and the development application process, supported by monitoring and follow-up protocols.

7.5.1 Bicycle Parking

Bicycle parking requirements for the City as well as growth areas are being developed as part of the ongoing Parking and T.D.M. Strategy. However, minimum bicycle parking requirements are currently outlined within By-law 111-17 for both residential and non-residential uses along with specified dimensions. Two types of spaces are defined: bicycle parking spaces and visitor bicycle parking spaces. Furthermore, for non-residential uses, shower and change facilities are required to be provided and at a defined rate. The current approach outlined in By-law 111-17 will be carried forward. As mentioned in the preceding section, provision of bicycle parking beyond these minimum requirements can be considered a T.D.M. initiative and would count towards a developments T.D.M. Plan approval.

8. Changes to the Draft Report

Subsequent to the release of the draft report, the City of Richmond Hill consulted with City Council, the public, and other stakeholders to refine the assumptions and recommendations of the Yonge/Bernard Key Development Area Peer Review and Transportation Assessment Update Report.

One key change that the City has recommended is to change the boundary of the Yonge/Bernard K.D.A. The boundary identified in this report predates staff recommendations to increase the size of the K.D.A. so that it is bound by existing, planned, and/or approved streets. However, the increase in boundary has not impacted the conclusion of this report given that the maximum permitted density of development for the K.D.A. has been reduced from 4.0 F.S.I. to 3.8 F.S.I., which results in an estimated mix of residents and jobs that is less than what was originally assumed for the K.D.A. at the onset of the transportation analysis. **Exhibit 8-1** illustrates the updated K.D.A. boundary.

Exhibit 8-1: Updated Yonge/Bernard K.D.A. Boundary

The City considered all input and comments provided by the public and other stakeholders and has decided to provide the Justus Connection as a private road

instead of a public local road. **Exhibit 8-2** illustrates the revised recommended road network.

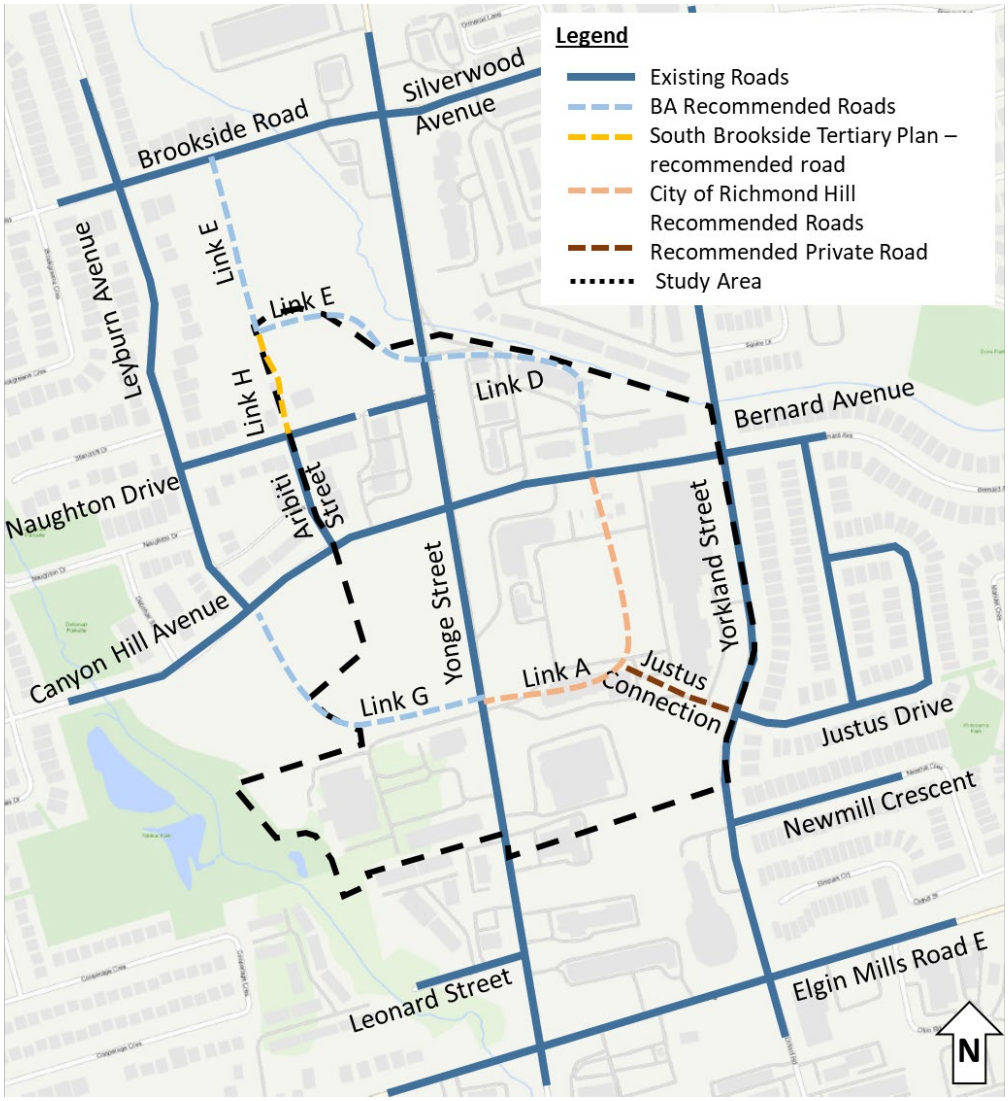


Exhibit 8-2: Updated Road Network Recommendations

Due to grading challenges and safety concerns, the City does not recommend providing cycling facilities along the Justus Connection. Instead, a cycling facility will be provided within the east-west linear park, located approximately mid-block between Justus Drive and Bernard Avenue. **Exhibit 8-3** illustrates the updated recommended cycling network and the location of proposed linear parks within the K.D.A. Sidewalks are still recommended to be provided on both sides of Justus Connection; however, the City may accept a reduced sidewalk width to as low as 1.5 metres and this will be determined during the development application process.

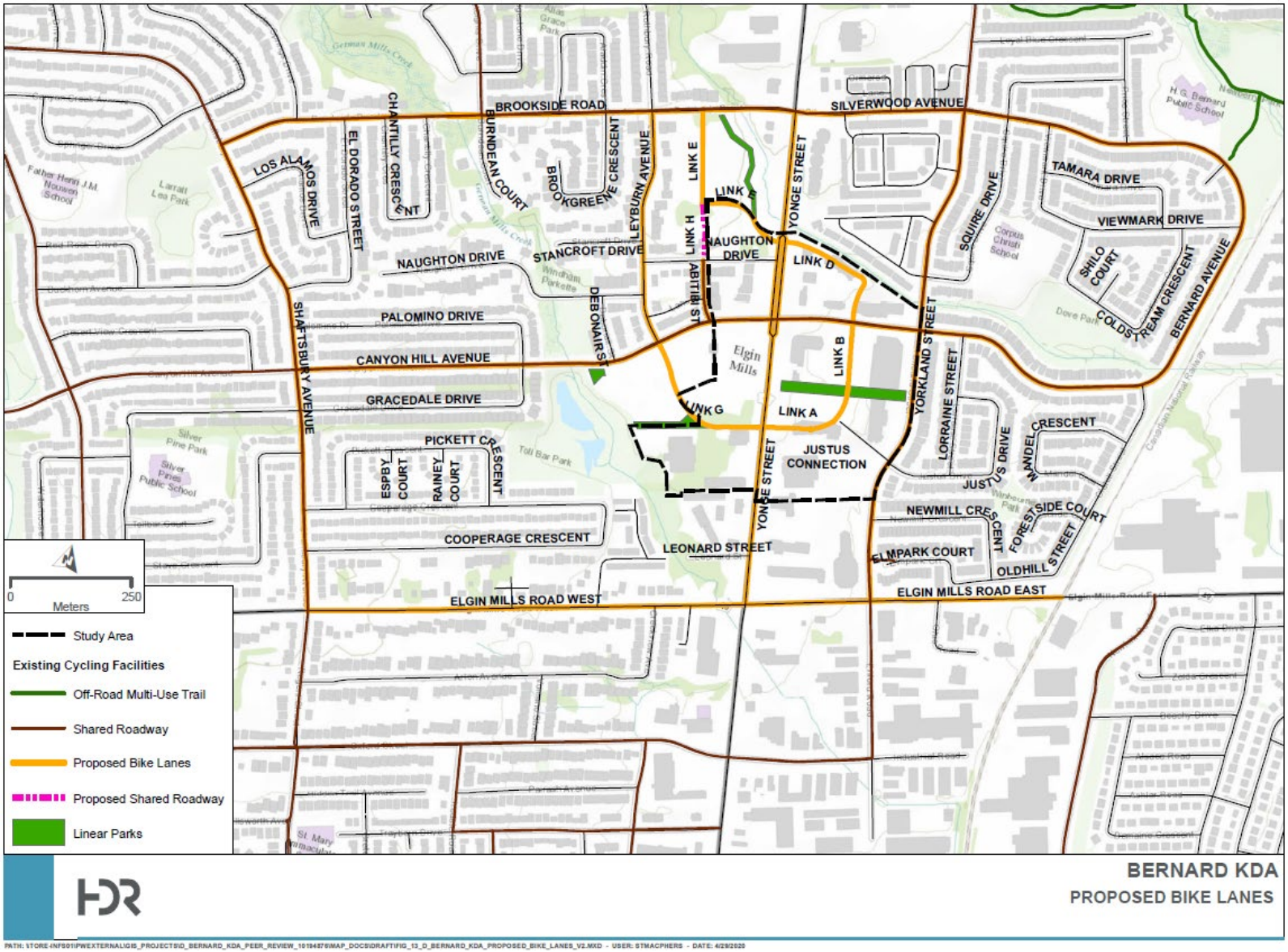


Exhibit 8-3: Updated Recommended Future Cycling Network

9. Conclusions and Recommendations

Based on the updated traffic analysis findings, below are the study conclusions and recommendations:

- The planned and proposed collector and local road network within and surrounding the Bernard K.D.A. will have sufficient capacity to accommodate an average density greater than 3.0 F.S.I. (up to 4.0 F.S.I.) for the Bernard K.D.A.
- However, the regional arterial network will be impacted by a proposed density of 4.0 F.S.I. at the major-major intersections surrounding the study area resulting in longer delays and queues.
- Based on these anticipated impacts, the development levels for the Bernard K.D.A. should be phased and monitored based on implementation of planned transportation improvements.
- The proposed collector and local road network within the K.D.A. will be the same road network proposed in the original B.A. study with the following exceptions:
    - Link A and the former Link B is proposed to be reconfigured and merged into a curvilinear road alignment (and renamed Link A – see **Exhibit 4-20**), which will be a direct road link between Yonge Street and Bernard Avenue.
    - The east section of former Link A is also proposed to be realigned as a new public local road connecting between Link A and Justus Drive. The alignment of the new Link A and this Justus Drive road connection is recommended to minimize traffic infiltration of background and K.D.A. related trips from west of Yonge Street to Yorkland Street.
    - A private road connection to Justus Drive is recommended to maintain the current access that exists for properties west of Yorkland Street. The existing all way stop control can continue to accommodate forecast traffic; however, we recommend monitoring to determine if or when new traffic signals may be warranted.
    - An active transportation corridor is also proposed adjacent to the Justus Drive connection to provide improved pedestrian cycling connections with the neighbourhood east of Yorkland Street.
    - If the proposed Justus Drive connection (that exists as a private driveway today) is not constructed for the K.D.A., there will be impacts to the Yorkland Street/Bernard Avenue intersection particularly to the N.B. left turn

movement. As well, it could lead to more traffic from the K.D.A. to pass through the already busy Yonge Street/Elgin Mills Road intersection. We recommend the private road connection opposite Justus Drive as the most appropriate location to serve the proposed K.D.A. block on the west side of Yorkland Street.

- The Justus connection as a private road shall maintain a continuous vehicular and pedestrian connection from Link A to Yorkland Street, with a provision of turn lanes at intersections. The road shall be designed to function and appear the same as a public road.

- The proposed lane configurations for the recommended road network would also be consistent with the previous B.A. recommendations including the need for a S.B. right turn lane on Yonge Street at Elgin Mills Road. The future road widening of Elgin Mills Road west of Yonge Street and Bathurst Street widening to six lanes from Gamble Road south to Major Mackenzie Drive will attract Bernard K.D.A. traffic to the west.

- The above findings in regard to the 4.0 F.S.I. and recommended collector and local road network within the K.D.A. are based on the following transportation improvements and travel demand conditions by 2041:

    - Implementation of the 10-year capital program on the arterial road network (which includes the proposed grade separation on Elgin Mills Road) and implementation of future road widening improvements on Gamble Road/19th Avenue, Bathurst Street, Elgin Mills Road, Leslie Street.

    - Implementation of VIVA B.R.T. service on Yonge Street and frequent bus transit service on Bathurst Street and Bayview Avenue.

    - Implementation of dedicated transit bus or micro shuttle service from the Bernard Terminal to the Richmond Hill GO Station.

    - The attainment of 30% transit mode split along the Yonge Street corridor by 2041 and 20% transit mode split along corridors with frequent transit service routes.

    - Implementation of travel demand management (T.D.M.) and K.D.A. specific parking strategies (reduced parking rates for developments that provide T.D.M. measures) that encourage the reduction of single-occupant vehicle ownership and trips.

  - Implementation of new active transportation links within the K.D.A. and connecting to the surrounding neighbourhood.
  - Implementation of shared mobility hub services integrated with the Bernard Terminal to promote improved transfers between transit and non-vehicular modes.
  - Peak spreading based on available capacity during the shoulder periods of the A.M. and P.M. peak hours.
  - Development of the recommended active transportation network.

- Notwithstanding that the proposed local road network can accommodate up to 4.0 F.S.I., the regional arterial network downsteam and upstream from the K.D.A. will continue to be busy during the peak periods.
- Additional delays at the major-major arterial intersections will be experienced by both background and K.D.A. traffic including at Yonge Street at Major Mackenzie Drive where S.B. delays during the A.M. peak hour could increase from about 45 seconds today to about 70 seconds by 2041.
- Two sensitivity phasing scenarios were conducted in this study using the model to determine what density can be supported if either the transit mode split or the Bathurst Street widening could not be achieved by 2041.
- **Table 9-1** below summarizes the impact on density based on the resulting screenline analyses from the 2041 model for four scenarios: the 4.0 F.S.I. scenario analyzed in this study, the two phasing scenarios, and original 3.0 F.S.I. scenario analyzed in the original B.A. study.

Table 9-1: Impact on Density

Scenario	Max F.S.I. (Based on Original K.D.A. Boundary)	Combined Population and jobs	Transit mode split (K.D.A.)	Transit mode split (Yonge / Bathurst and Bayview Corridor)	Infrastructure Improvements
1 – 2041	4.0	Up to 14,150 residents and jobs combined.	30%	30%/20%	2020 10 Yr Capital Program *& Bathurst Widening*
2 – 2041	3.8	Up to 13,400 residents and jobs combined.	17%	17%/11% (based on B.A.'s transit mode split assumption)	2020 10 Yr Capital Program *& Bathurst Road Widening*
3 – 2041	3.6	Up to 12,650 residents and jobs combined.	30%	30%/20%	2020 10 Yr Capital Program
4 – 2031	3.0	Under 10,400 residents and jobs combined.	17%	17%/11% (based on B.A.'s transit mode split assumption)	2020 10 Yr Capital Program

Based on the above results, Scenario 2 and 3, which incorporates higher transit mode split and the Bathurst Street widening, respectively, is required to permit development within the K.D.A. beyond 3.8 F.S.I. When **both** the higher transit mode split and the Bathurst Street widening improvements are attained, then development to 4.0 F.S.I. will be permitted.

Appendix A – Existing and Future Screenline Analysis Tables

City of Richmond Hill Yonge/Bernard Key Development Area Peer Review and Transportation Assessment Update

Bernard KDA AM Screenline Summary

0.85 < v/c < 1.0

v/c < 1.0

† Road Improvements (RI) removed include widening of Bathurst Street from 4 to 6 lanes between Major Mackenzie Drive and Gamble Road/19th Avenue, and Highway 404 Midblock crossing north of Elgin Mills Road

AM Peak Hour Traffic	2016 Existing										2031 Background				2031 3.0 FSI			
	AM Count Volume		Existing V/C		2016 Model Volume		Model / Observed		GEH		2031 Model Volume		2031 V/C		2031 Model Volume		2031 V/C	
E-W Screenlines	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB
West of Yonge Street																		
Gamble Road/ 19th Avenue	770	471	0.39	0.24	878	784	14%	66%	4	12	975	764	0.49	0.38	1,013	890	0.51	0.45
Brookside Road/ Silverwood Avenue	370	255	0.93	0.64	152	31	-59%	-88%	13	19	150	113	0.38	0.28	76	0	0.19	0.00
Canyon Hill Avenue/ Bernard Avenue	446	204	1.12	0.51	291	10	-35%	-95%	8	19	303	89	0.76	0.22	284	169	0.71	0.42
Elgin Mills Road	955	580	0.96	0.58	765	454	-20%	-22%	6	6	769	653	0.77	0.65	903	773	0.90	0.77
Major Mackenzie Drive	954	925	0.48	0.46	1,025	1,066	7%	15%	2	4	1,387	1,405	0.69	0.70	1,439	1,431	0.72	0.72
Total	**3,495**	**2,435**	**0.60**	**0.42**	**2,233**	**1,561**	**-36%**	**-36%**	**24**	**20**	**3,584**	**3,024**	**0.62**	**0.52**	**3,715**	**3,263**	**0.64**	**0.56**
East of Yonge Street																		
Gamble Road/ 19th Avenue	421	389	0.21	0.19	714	598	70%	54%	12	9	1,232	1,075	0.62	0.54	1,357	1,224	0.68	0.61
Brookside Road/ Silverwood Avenue	375	280	0.94	0.70	64	15	-83%	-95%	21	22	234	140	0.59	0.35	173	156	0.43	0.39
Canyon Hill Avenue/ Bernard Avenue	394	340	0.99	0.85	193	317	-51%	-7%	12	1	179	327	0.45	0.82	367	325	0.92	0.81
Elgin Mills Road	995	805	0.55	0.45	1,353	718	36%	-11%	10	3	1,678	1,053	0.84	0.53	1,685	1,031	0.84	0.52
Major Mackenzie Drive	947	908	0.47	0.45	1,200	1,078	27%	19%	8	5	1,328	1,136	0.66	0.57	1,359	1,180	0.68	0.59
Total	**3,132**	**2,722**	**0.47**	**0.41**	**2,810**	**2,128**	**-10%**	**-22%**	**6**	**12**	**4,651**	**3,731**	**0.68**	**0.55**	**4,941**	**3,916**	**0.73**	**0.58**
West of Bathurst Street																		
Gamble Road/ 19th Avenue																		
Elgin Mills Road/ Teston Road	549	767	0.55	0.77	216	773	-61%	1%	17	0	494	721	0.49	0.72	522	764	0.52	0.76
Major Mackenzie Drive	1,246	1,391	0.62	0.70	912	1,314	-27%	-6%	10	2	1,321	1,231	0.66	0.62	1,349	1,267	0.67	0.63
Total	**1,795**	**2,158**	**0.60**	**0.72**	**1,128**	**2,087**	**-37%**	**-3%**	**17**	**2**	**1,815**	**1,952**	**0.61**	**0.65**	**1,871**	**2,031**	**0.62**	**0.68**
East of Bathurst Street																		
Gamble Road/ 19th Avenue	221	491	0.11	0.25	545	827	147%	68%	17	13	666	775	0.33	0.39	741	892	0.37	0.45
Elgin Mills Road	659	765	0.66	0.77	227	330	-66%	-57%	21	19	325	438	0.33	0.44	320	473	0.32	0.47
Major Mackenzie Drive	1,407	1,272	0.70	0.64	1,080	1,243	-23%	-2%	9	1	1,336	1,431	0.67	0.72	1,400	1,463	0.70	0.73
Total	**2,287**	**2,528**	**0.46**	**0.51**	**1,852**	**2,400**	**-19%**	**-5%**	10	3	**2,327**	**2,644**	**0.47**	**0.53**	**2,461**	**2,828**	**0.49**	**0.57**
West of Bayview Avenue																		
Gamble Road/ 19th Avenue	1,056	493	1.06	0.49	1,043	659	-1%	34%	0	7	1,741	1,188	0.87	0.59	1,857	1,303	0.93	0.65
Elgin Mills Road	1,137	1,167	0.57	0.58	1,201	831	6%	-29%	2	11	1,173	1,147	0.59	0.57	1,315	1,242	0.66	0.62
Major Mackenzie Drive	1,045	1,070	0.52	0.54	1,323	1,017	27%	-5%	8	2	1,448	1,125	0.72	0.56	1,500	1,164	0.75	0.58
Total	**3,238**	**2,730**	**0.65**	**0.55**	**3,567**	**2,507**	**10%**	**-8%**	6	4	**4,361**	**3,460**	**0.73**	**0.58**	**4,671**	**3,709**	**0.78**	**0.62**
East of Bayview Avenue																		
Gamble Road/ 19th Avenue	719	240	0.72	0.24	864	449	20%	87%	5	11	1,629	862	0.81	0.43	1,711	923	0.86	0.46
Elgin Mills Road	1,780	1,181	0.89	0.59	1,336	997	-25%	-16%	11	6	1,684	1,587	0.84	0.79	1,755	1,732	0.88	0.87
Major Mackenzie Drive	1,140	1,124	0.57	0.56	1,664	1,156	46%	3%	14	1	1,786	1,209	0.89	0.60	1,810	1,216	0.91	0.61
Total	**3,639**	**2,545**	**0.73**	**0.51**	**3,864**	**2,602**	**6%**	**2%**	4	1	**5,099**	**3,658**	**0.85**	**0.61**	**5,276**	**3,871**	**0.88**	**0.65**

AM Peak Hour Traffic	2041 Background				2041 4.0 FSI Existing Mode Share				2041 4.0 FSI Higher Mode Share				†2041 4.0 FSI Higher Mode Share w/o RI				Capacity								
	2041 Model Volume		2041 V/C		2041 Model Volume		2041 V/C		2041 Model Volume		2041 V/C		2041 Model Volume		2041 V/C		2016			2031			2041		
E-W Screenlines	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	Lanes (One-Way)	Lane Capacity	Link Capacity	Lanes (One-Way)	Lane Capacity	Link Capacity	Lanes (One-Way)	Lane Capacity	Link Capacity
West of Yonge Street																									
Gamble Road/ 19th Avenue	1,428	1,459	0.71	0.73	1,469	1,500	0.73	0.75	1,479	1,505	0.74	0.75	1,525	1,466	0.76	0.73	2	1,000	2,000	2	1,000	2,000	2	1,000	2,000
Brookside Road/ Silverwood Avenue	17	82	0.04	0.21	103	247	0.26	0.62	100	245	0.25	0.61	106	276	0.27	0.69	1	400	400	1	400	400	1	400	400
Canyon Hill Avenue/ Bernard Avenue	183	137	0.46	0.34	330	152	0.83	0.38	333	154	0.83	0.39	334	160	0.84	0.40	1	400	400	1	400	400	1	400	400
Elgin Mills Road	1,487	1,343	0.74	0.67	1,723	1,503	0.86	0.75	1,719	1,568	0.86	0.78	1,684	1,484	0.84	0.74	1	1,000	1,000	1	1,000	1,000	2	1,000	2,000
Major Mackenzie Drive	1,507	1,294	0.75	0.65	1,601	1,381	0.80	0.69	1,579	1,396	0.79	0.70	1,542	1,392	0.77	0.70	2	1,000	2,000	2	1,000	2,000	2	1,000	2,000
Total	**4,622**	**4,315**	**0.68**	**0.63**	**5,226**	**4,783**	**0.77**	**0.70**	**5,210**	**4,868**	**0.77**	**0.72**	**5,191**	**4,778**	**0.76**	**0.70**	**7**	**3,800**	**5,800**	**7**	**3,800**	**5,800**	**8**	**3,800**	**6,800**
East of Yonge Street																									
Gamble Road/ 19th Avenue	1,445	1,469	0.72	0.73	1,630	1,608	0.82	0.80	1,583	1,594	0.79	0.80	1,599	1,586	0.80	0.79	2	1,000	2,000	2	1,000	2,000	2	1,000	2,000
Brookside Road/ Silverwood Avenue	121	59	0.30	0.15	226	137	0.57	0.34	201	117	0.50	0.29	283	183	0.71	0.46	1	400	400	1	400	400	1	400	400
Canyon Hill Avenue/ Bernard Avenue	3	111	0.01	0.28	400	395	1.00	0.99	386	375	0.97	0.94	421	381	1.05	0.95	1	400	400	1	400	400	1	400	400
Elgin Mills Road	1,841	1,300	0.92	0.65	1,959	1,349	0.98	0.67	1,931	1,356	0.97	0.68	1,956	1,371	0.98	0.69	2	1,000	1,800	2	1,000	2,000	2	1,000	2,000
Major Mackenzie Drive	1,483	1,144	0.74	0.57	1,502	1,248	0.75	0.62	1,514	1,230	0.76	0.62	1,467	1,213	0.73	0.61	2	1,000	2,000	2	1,000	2,000	2	1,000	2,000
Total	**4,893**	**4,083**	**0.72**	**0.60**	**5,717**	**4,737**	**0.84**	**0.70**	**5,615**	**4,672**	**0.83**	**0.69**	**5,726**	**4,734**	**0.84**	**0.70**	**8**	**3,800**	**6,600**	**8**	**3,800**	**6,800**	**8**	**3,800**	**6,800**
West of Bathurst Street																									
Gamble Road/ 19th Avenue	1,007	1,269	0.50	0.63	1,085	1,312	0.54	0.66	1,076	1,323	0.54	0.66	1,000	1,299	0.50	0.65							2	1,000	2,000
Elgin Mills Road/ Teston Road	1,085	1,401	0.54	0.70	1,199	1,537	0.60	0.77	1,188	1,552	0.59	0.78	1,143	1,499	0.57	0.75	1	1,000	1,000	1	1,000	1,000	2	1,000	2,000
Major Mackenzie Drive	1,240	1,050	0.62	0.53	1,256	1,044	0.63	0.52	1,256	1,044	0.63	0.52	1,386	1,080	0.69	0.54	2	1,000	2,000	2	1,000	2,000	2	1,000	2,000
Total	**3,332**	**3,720**	**0.56**	**0.62**	**3,540**	**3,893**	**0.59**	**0.65**	**2,444**	**2,596**	**0.41**	**0.43**	**3,529**	**3,878**	**0.59**	**0.65**	**3**	**2,000**	**3,000**	**3**	**2,000**	**3,000**	**4**	**3,000**	**6,000**
East of Bathurst Street																									
Gamble Road/ 19th Avenue	1,183	1,531	0.59	0.77	1,248	1,637	0.62	0.82	1,241	1,652	0.62	0.83	1,314	1,568	0.66	0.78	2	1,000	2,000	2	1,000	2,000	2	1,000	2,000
Elgin Mills Road	775	966	0.39	0.48	987	998	0.49	0.50	970	1,030	0.49	0.52	938	990	0.47	0.50	1	1,000	1,000	1	1,000	1,000	2	1,000	2,000
Major Mackenzie Drive	1,460	1,215	0.73	0.61	1,522	1,287	0.76	0.64	1,508	1,330	0.75	0.67	1,420	1,313	0.71	0.66	2	1,000	2,000	2	1,000	2,000	2	1,000	2,000
Total	**3,418**	**3,712**	**0.57**	**0.62**	**3,757**	**3,922**	**0.63**	**0.65**	**3,719**	**4,012**	**0.62**	**0.67**	**3,672**	**3,871**	**0.61**	**0.65**	**5**	**3,000**	**5,000**	**5**	**3,000**	**5,000**	**6**	**3,000**	**6,000**
West of Bayview Avenue																									
Gamble Road/ 19th Avenue	1,872	1,539	0.94	0.77	2,103	1,727	1.05	0.86	2,058	1,711	1.03	0.86	2,078	1,699	1.04	0.85	1	1,000	1,000	2	1,000	2,000	2	1,000	2,000
Elgin Mills Road	1,341	1,373	0.67	0.69	1,437	1,493	0.72	0.75	1,427	1,501	0.71	0.75	1,440	1,511	0.72	0.76	2	1,000	2,000	2	1,000	2,000	2	1,000	2,000
Major Mackenzie Drive	1,577	1,094	0.79	0.55	1,577	1,169	0.79	0.58	1,586	1,157	0.79	0.58	1,588	1,163	0.79	0.58	2	1,000	2,000	2	1,000	2,000	2	1,000	2,000
Total	**4,790**	**4,006**	**0.80**	**0.67**	**5,117**	**4,389**	**0.85**	**0.73**	**5,071**	**4,369**	**0.85**	**0.73**	**5,106**	**4,373**	**0.85**	**0.73**	**5**	**3,000**	**5,000**	**6**	**3,000**	**6,000**	**6**	**3,000**	**6,000**
East of Bayview Avenue																									
Gamble Road/ 19th Avenue	1,752	1,535	0.88	0.77	1,799	1,688	0.90	0.84	1,790	1,673	0.90	0.84	1,777	1,640	0.89	0.82	1	1,000	1,000	2	1000	2,000	2	1,000	2,000
Elgin Mills Road	1,697	1,772	0.85	0.89	2,019	2,022	1.01	1.01	2,000	1,995	1.00	1.00	1,971	1,993	0.99	1.00	2	1,000	2,000	2	1000	2,000	2	1,000	2,000
Major Mackenzie Drive	1,815	1,336	0.91	0.67	1,822	1,374	0.91	0.69	1,810	1,371	0.91	0.69	1,818	1,382	0.91	0.69	2	1,000	2,000	2	1000	2,000	2	1,000	2,000
Total	**5,264**	**4,643**	**0.88**	**0.77**	**5,640**	**5,084**	**0.94**	**0.85**	**5,600**	**5,039**	**0.93**	**0.84**	**5,566**	**5,039**	**0.93**	**0.84**	**5**	**3,000**	**5,000**	**6**	**3,000**	**6,000**	**6**	**3,000**	**6,000**

AM Peak Hour Traffic	2016 Existing										2031 Background				2031 3.0 FSI			
	AM Count Volume		Existing V/C		2016 Model Volume		Model / Observed		GEH		2031 Model Volume		2031 V/C		2031 Model Volume		2031 V/C	
N-S Screenlines	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB
North of Brookside Road/ Silverwood Avenue																		
Yonge Street	1,785	1,015	0.74	0.42	1,569	912	-12%	-10%	5	3	1,532	805	0.64	0.34	1,727	914	0.72	0.38
Total	**1,785**	**1,015**	**0.74**	**0.42**	**1,569**	**912**	**-12%**	**-10%**	**5**	**3**	**1,532**	**805**	**0.64**	**0.34**	**1,727**	**914**	**0.72**	**0.38**
South of Brookside Road/ Silverwood Avenue																		
Yonge Street	1,755	965	0.73	0.40	1,897	1,036	8%	7%	3	2	1,596	926	0.66	0.39	1,768	1,050	0.74	0.44
Total	**1,755**	**965**	**0.73**	**0.40**	**1,897**	**1,036**	**8%**	**7%**	**3**	**2**	**1,596**	**926**	**0.66**	**0.39**	**1,768**	**1,050**	**0.74**	**0.44**
North of Canyon Hill Avenue/ Bernard Avenue																		
Yonge Street	1,663	937	0.69	0.39	1,897	1,036	14%	11%	6	3	1,596	926	0.66	0.39	1,595	903	0.66	0.38
Total	**1,663**	**937**	**0.69**	**0.39**	**1,897**	**1,036**	**14%**	**11%**	**6**	**3**	**1,596**	**926**	**0.66**	**0.39**	**1,595**	**903**	**0.66**	**0.38**
South of Canyon Hill Avenue/ Bernard Avenue																		
Yonge Street	1,795	881	0.75	0.37	2,214	932	23%	6%	9	2	1,961	930	0.82	0.39	1,631	866	0.68	0.36
Total	**1,795**	**881**	**0.75**	**0.37**	**2,214**	**932**	**23%**	**6%**	**9**	**2**	**1,961**	**930**	**0.82**	**0.39**	**1,631**	**866**	**0.68**	**0.36**
North of Elgin Mills Road																		
Bathurst Street	2,042	1,099	0.85	0.46	2,393	822	17%	-25%	7	9	2,318	1,085	0.97	0.45	2,393	1,113	1.00	0.46
Yonge Street	1,685	970	0.70	0.40	2,214	932	31%	-4%	12	1	2,131	931	0.89	0.39	2,408	1,175	1.00	0.49
Bayview Avenue	1,637	716	0.68	0.30	968	454	-41%	-37%	19	11	1,556	863	0.65	0.36	1,628	864	0.68	0.36
Total	**5,364**	**2,785**	**0.75**	**0.39**	**5,575**	**2,208**	**4%**	**-21%**	**3**	**12**	**6,004**	**2,879**	**0.83**	**0.40**	**6,428**	**3,152**	**0.89**	**0.44**
South of Elgin Mills Road																		
Bathurst Street	1,864	1,033	0.78	0.43	1,877	743	1%	-28%	0	10	1,999	879	0.83	0.37	2,084	894	0.87	0.37
Yonge Street	1,630	730	0.68	0.30	1,627	668	0%	-8%	0	2	1,531	840	0.64	0.35	1,658	948	0.69	0.39
Bayview Avenue	1,202	910	0.50	0.38	1,221	677	2%	-26%	1	8	1,718	965	0.72	0.40	1,836	1,060	0.76	0.44
Total	**4,696**	**2,673**	**0.65**	**0.37**	**4,725**	**2,088**	**1%**	**-22%**	**0**	**12**	**5,247**	**2,684**	**0.73**	**0.37**	**5,577**	**2,902**	**0.77**	**0.40**
North of 19th Avenue/ Gamble Road																		
Bathurst Street	1,007	566	0.42	0.24	1,774	859	76%	52%	21	11	2,132	1,147	0.89	0.48	2,187	1,166	0.91	0.49
Yonge Street	1,547	951	0.64	0.40	1,707	1,045	10%	10%	4	3	1,615	906	0.67	0.38	1,810	991	0.75	0.41
Bayview Avenue	1,432	507	1.19	0.42	830	258	-42%	-49%	18	13	1,528	433	0.64	0.18	1,569	441	0.65	0.18
Total	**3,986**	**2,024**	**0.66**	**0.34**	**4,311**	**2,162**	**8%**	**7%**	**5**	**3**	**5,274**	**2,486**	**0.73**	**0.35**	**5,565**	**2,598**	**0.77**	**0.36**
South of 19th Avenue/ Gamble Road																		
Bathurst Street	1,375	664	0.57	0.28	1,952	755	42%	14%	14	3	2,133	1,039	0.89	0.43	2,218	1,047	0.92	0.44
Yonge Street	1,757	894	0.73	0.37	1,742	1,103	-1%	23%	0	7	1,673	910	0.70	0.38	1,881	1,073	0.78	0.45
Bayview Avenue	1,567	558	1.31	0.47	1,026	485	-35%	-13%	15	3	1,789	897	0.75	0.37	1,871	904	0.78	0.38
Total	**4,699**	**2,116**	**0.78**	**0.35**	**4,720**	**2,343**	**0%**	**11%**	**0**	**5**	**5,594**	**2,846**	**0.78**	**0.40**	**5,969**	**3,024**	**0.83**	**0.42**
North of Major Mackenzie Drive																		
Bathurst Street	1,745	965	0.73	0.40	2,095	775	20%	-20%	8	6	2,306	1,061	0.96	0.44	2,382	1,078	0.99	0.45
Yonge Street	1,418	637	0.59	0.27	1,418	654	0%	3%	-	1	1,540	766	0.64	0.32	1,637	793	0.68	0.33
Bayview Avenue	1,414	911	0.59	0.38	1,873	934	32%	3%	11	1	2,425	1,188	1.01	0.50	2,333	1,244	0.97	0.52
Total	**4,577**	**2,513**	**0.64**	**0.35**	**5,386**	**2,363**	**18%**	**-6%**	**11**	**3**	**6,270**	**3,015**	**0.87**	**0.42**	**6,351**	**3,115**	**0.88**	**0.43**
South of Major Mackenzie Drive																		
Bathurst Street	1,533	1,033	0.64	0.43	1,931	849	26%	-18%	10	6	2,546	1,115	0.71	0.31	2,593	1,144	0.72	0.32
Yonge Street	1,410	639	0.59	0.27	1,318	609	-7%	-5%	2	1	1,211	647	0.50	0.27	1,374	701	0.57	0.29
Bayview Avenue	1,407	945	0.59	0.39	1,634	897	16%	-5%	6	2	1,917	1,085	0.80	0.45	1,942	1,111	0.81	0.46
Total	**4,350**	**2,617**	**0.60**	**0.36**	**4,883**	**2,355**	**12%**	**-10%**	**8**	**5**	**5,673**	**2,847**	**0.68**	**0.34**	**5,908**	**2,956**	**0.70**	**0.35**

AM Peak Hour Traffic	2041 Background				2041 4.0 FSI Existing Mode Share				2041 4.0 FSI Higher Mode Share				†2041 4.0 FSI Higher Mode Share w/o RI				Capacity								
	2041 Model Volume		2041 V/C		2041 Model Volume		2041 V/C		2041 Model Volume		2041 V/C		2041 Model Volume		2041 V/C		2016			2031			2041		
N-S Screenlines	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	Lanes (One-Way)	Lane Capacity	Link Capacity	Lanes (One-Way)	Lane Capacity	Link Capacity	Lanes (One-Way)	Lane Capacity	Link Capacity
North of Brookside Road/ Silverwood Avenue																									
Yonge Street	1,451	894	0.60	0.37	1,934	1,168	0.81	0.49	1,905	1,157	0.79	0.48	1,744	981	0.73	0.41	2	1,200	2,400	2	1,200	2,400	2	1,200	2,400
Total	**1,451**	**894**	**0.60**	**0.37**	**1,934**	**1,168**	**0.81**	**0.49**	**1,905**	**1,157**	**0.79**	**0.48**	**1,744**	**981**	**0.73**	**0.41**	**2**	**1,200**	**2,400**	**2**	**1,200**	**2,400**	**2**	**1,200**	**2,400**
South of Brookside Road/ Silverwood Avenue																									
Yonge Street	1,492	1,105	0.62	0.46	1,805	1,273	0.75	0.53	1,786	1,267	0.74	0.53	1,828	1,245	0.76	0.52	2	1,200	2,400	2	1,200	2,400	2	1,200	2,400
Total	**1,492**	**1,105**	**0.62**	**0.46**	**1,805**	**1,273**	**0.75**	**0.53**	**1,786**	**1,267**	**0.74**	**0.53**	**1,828**	**1,245**	**0.76**	**0.52**	**2**	**1,200**	**2,400**	**2**	**1,200**	**2,400**	**2**	**1,200**	**2,400**
North of Canyon Hill Avenue/ Bernard Avenue																									
Yonge Street	1,448	994	0.60	0.41	1,605	1,111	0.67	0.46	1,599	1,160	0.67	0.48	1,624	1,128	0.68	0.47	2	1,200	2,400	2	1,200	2,400	2	1,200	2,400
Total	**1,448**	**994**	**0.60**	**0.41**	**1,605**	**1,111**	**0.67**	**0.46**	**1,599**	**1,160**	**0.67**	**0.48**	**1,624**	**1,128**	**0.68**	**0.47**	**2**	**1,200**	**2,400**	**2**	**1,200**	**2,400**	**2**	**1,200**	**2,400**
South of Canyon Hill Avenue/ Bernard Avenue																									
Yonge Street	1,422	815	0.59	0.34	1,573	905	0.66	0.38	1,514	907	0.63	0.38	1,595	965	0.66	0.40	2	1,200	2,400	2	1,200	2,400	2	1,200	2,400
Total	**1,422**	**815**	**0.59**	**0.34**	**1,573**	**905**	**0.66**	**0.38**	**1,514**	**907**	**0.63**	**0.38**	**1,595**	**965**	**0.66**	**0.40**	**2**	**1,200**	**2,400**	**2**	**1,200**	**2,400**	**2**	**1,200**	**2,400**
North of Elgin Mills Road																									
Bathurst Street	2,816	1,399	0.78	0.39	3,033	1,464	0.84	0.41	2,991	1,448	0.83	0.40	2,601	1,310	1.08	0.55	2	1,200	2,400	2	1,200	2,400	3	1,200	3,600
Yonge Street	1,942	828	0.81	0.34	2,361	1,392	0.98	0.58	2,276	1,348	0.95	0.56	2,385	1,361	0.99	0.57	2	1,200	2,400	2	1,200	2,400	2	1,200	2,400
Bayview Avenue	1,535	753	0.64	0.31	1,690	757	0.70	0.32	1,659	759	0.69	0.32	1,702	788	0.71	0.33	2	1,200	2,400	2	1,200	2,400	2	1,200	2,400
Total	**6,294**	**2,980**	**0.75**	**0.35**	**7,085**	**3,613**	**0.84**	**0.43**	**6,927**	**3,555**	**0.82**	**0.42**	**6,689**	**3,459**	**0.80**	**0.41**	**6**	**3,600**	**7,200**	**6**	**3,600**	**7,200**	**7**	**3,600**	**8,400**
South of Elgin Mills Road																									
Bathurst Street	2,465	1,173	0.68	0.33	2,605	1,363	0.72	0.38	2,578	1,339	0.72	0.37	2,111	1,124	0.88	0.47	2	1,200	2,400	2	1,200	2,400	3	1,200	3,600
Yonge Street	1,470	754	0.61	0.31	1,621	1,042	0.68	0.43	1,514	1,010	0.63	0.42	1,684	1,045	0.70	0.44	2	1,200	2,400	2	1,200	2,400	2	1,200	2,400
Bayview Avenue	1,810	1,024	0.75	0.43	1,899	1,059	0.79	0.44	1,843	1,061	0.77	0.44	1,906	1,080	0.79	0.45	2	1,200	2,400	2	1,200	2,400	2	1,200	2,400
Total	**5,746**	**2,951**	**0.68**	**0.35**	**6,126**	**3,464**	**0.73**	**0.41**	**5,936**	**3,410**	**0.71**	**0.41**	**5,702**	**3,249**	**0.68**	**0.39**	**6**	**3,600**	**7,200**	**6**	**3,600**	**7,200**	**7**	**3,600**	**8,400**
North of 19th Avenue/ Gamble Road																									
Bathurst Street	2,034	1,068	0.85	0.44	2,210	1,085	0.92	0.45	2,193	1,097	0.91	0.46	2,120	1,084	0.88	0.45	2	1,200	2,400	2	1,200	2,400	2	1200	2400
Yonge Street	1,427	848	0.59	0.35	1,830	1,014	0.76	0.42	1,787	1,014	0.74	0.42	1,776	978	0.74	0.41	2	1,200	2,400	2	1,200	2,400	2	1200	2400
Bayview Avenue	1,527	623	0.64	0.26	1,552	615	0.65	0.26	1,551	615	0.65	0.26	1,541	629	0.64	0.26	1	1,200	1,200	2	1,200	2,400	2	1200	2400
Total	**4,989**	**2,539**	**0.69**	**0.35**	**5,593**	**2,714**	**0.78**	**0.38**	**5,532**	**2,726**	**0.77**	**0.38**	**5,438**	**2,691**	**0.76**	**0.37**	**5**	**3,600**	**6,000**	**6**	**3,600**	**7,200**	**6**	**3,600**	**7,200**
South of 19th Avenue/ Gamble Road																									
Bathurst Street	2,500	1,449	0.69	0.40	2,744	1,457	0.76	0.40	2,718	1,459	0.76	0.41	2,310	1,319	0.96	0.55	2	1,200	2,400	2	1,200	2,400	3	1,200	3,600
Yonge Street	1,588	1,017	0.66	0.42	2,041	1,277	0.85	0.53	2,017	1,260	0.84	0.52	2,056	1,213	0.86	0.51	2	1,200	2,400	2	1,200	2,400	2	1,200	2,400
Bayview Avenue	1,844	811	0.77	0.34	2,046	831	0.85	0.35	2,015	835	0.84	0.35	2,037	871	0.85	0.36	1	1,200	1,200	2	1,200	2,400	2	1,200	2,400
Total	**5,933**	**3,277**	**0.71**	**0.39**	**6,832**	**3,565**	**0.81**	**0.42**	**6,751**	**3,554**	**0.80**	**0.42**	**6,404**	**3,403**	**0.76**	**0.41**	**5**	**3,600**	**6,000**	**6**	**3,600**	**7,200**	**7**	**3,600**	**8,400**
North of Major Mackenzie Drive																									
Bathurst Street	2,750	1,300	0.76	0.36	2,850	1,437	0.79	0.40	2,834	1,417	0.79	0.39	2,338	1,198	0.97	0.50	2	1,200	2,400	2	1,200	2,400	3	1,200	3,600
Yonge Street	1,424	701	0.59	0.29	1,547	778	0.64	0.32	1,490	779	0.62	0.32	1,576	796	0.66	0.33	2	1,200	2,400	2	1,200	2,400	2	1,200	2,400
Bayview Avenue	2,338	1,177	0.97	0.49	2,363	1,200	0.98	0.50	2,335	1,212	0.97	0.50	2,399	1,263	1.00	0.53	2	1,200	2,400	2	1,200	2,400	2	1,200	2,400
Total	**6,513**	**3,178**	**0.78**	**0.38**	**6,761**	**3,415**	**0.80**	**0.41**	**6,660**	**3,408**	**0.79**	**0.41**	**6,314**	**3,257**	**0.75**	**0.39**	**6**	**3,600**	**7,200**	**6**	**3,600**	**7,200**	**7**	**3,600**	**8,400**
South of Major Mackenzie Drive																									
Bathurst Street	2,650	1,255	0.74	0.35	2,712	1,323	0.75	0.37	2,767	1,316	0.77	0.37	2,662	1,323	0.74	0.37	2	1,200	2,400	3	1,200	3,600	3	1,200	3,600
Yonge Street	1,232	635	0.51	0.26	1,472	737	0.61	0.31	1,336	726	0.56	0.30	1,411	735	0.59	0.31	2	1,200	2,400	2	1,200	2,400	2	1,200	2,400
Bayview Avenue	2,455	1,290	0.68	0.36	2,471	1,347	0.69	0.37	2,455	1,342	0.68	0.37	2,471	1,347	0.69	0.37	2	1,200	2,400	2	1,200	2,400	3	1,200	3,600
Total	**6,338**	**3,180**	**0.66**	**0.33**	**6,656**	**3,407**	**0.69**	**0.35**	**6,559**	**3,384**	**0.68**	**0.35**	**6,545**	**3,405**	**0.68**	**0.35**	**6**	**3,600**	**7,200**	**7**	**3,600**	**8,400**	**8**	**3,600**	**9,600**

Appendix B – Proposed Development Density

City of Richmond Hill Yonge/Bernard Key Development Area Peer Review and Transportation Assessment Update

3 FSI - 2041 POPULATION AND JOBS YIELDS						
Quadrant	**RES UNITS MAX**	**RES UNITS MIN**	**PEOPLE MAX**	**PEOPLE MIN**	**JOBS MAX**	**JOBS MIN**
Northeast 1	427	373	811	709	255	223
Northeast 2	220	220	224	224	103	103
Northwest 1	376	329	714	624	225	197
Southeast 1	1,302	1,139	2,473	2,164	1,061	929
Southeast 2	594	446	1,129	847	194	146
Southwest 1	858	751	1,631	1,427	513	449
Southwest 2a	314	235	596	447	49	36
Southwest 2b	129	129	383	245	0	0
Total	**2,400**	**2,083**	**4,219**	**3,622**	**7,961**	**6,688**

4 FSI - 2041 POPULATION AND JOBS YIELDS						
Quadrant	**RES UNITS MAX**	**RES UNITS MIN**	**PEOPLE MAX**	**PEOPLE MIN**	**JOBS MAX**	**JOBS MIN**
Northeast 1	590	376	1,121	713	336	214
Northeast 2	220	220	224	224	103	103
Northwest 1	519	331	987	628	296	188
Southeast 1	1,801	1,146	3,421	2,177	1,411	898
Southeast 2	892	446	1,694	847	291	146
Southwest 1	1,187	755	2,255	1,435	676	430
Southwest 2a	471	235	894	447	73	36
Southwest 2b	129	129	383	245	0	0
Total	**5,809**	**3,637**	**10,980**	**6,717**	**3,187**	**2,016**

Appendix C – Signal Timing Plans

City of Richmond Hill Yonge/Bernard Key Development Area Peer Review and Transportation Assessment Update

07-Mar-2016

Regional Municipality of York
Centralized Traffic Control System
Timing Pattern Summary Report - Intersection

York Region

Intersection Name : **Elgin Mills Rd. - Enford Rd./ Yorkland Dr.**

Pattern Name	Mode	Cycle	Splits (sec)	offset	Max Green	Omits	Veh. Recall	Ped.Omits	Ped. Recalls	Spec. O/P
AM Peak	TBC	130	12 49 19 50 00 61 00 00	41	11111111	NNNNNNNN	XXXXXXXX	NNNN	NNNN	********
Free Plan	Free	0	00 00 00 00 00 00 00 00	0	11111111	NNNNNNNN	XXXXXXXX	NNNN	NNNN	********
Off Peak	TBC	120	12 48 19 41 00 60 00 00	0	11111111	NNNNNNNN	XXXXXXXX	NNNN	NNNN	********
PM Peak	TBC	120	12 48 19 41 00 60 00 00	44	11111111	NNNNNNNN	XXXXXXXX	NNNN	NNNN	********

- Implemented current pedestrian & vehicle clearances
- Implemented on Mar. 2, 2016.

08-Dec-2008

Regional Municipality of York
Centralized Traffic Control System
Controller Scheduler Summary Report - Intersection

Intersection Name : Elgin Mills Rd. - Enford Rd./ Yorkland Dr.

Weekly Plan : Elgin Mills at Enford Rd

Time of Day	Timing Pattern	MON	TUE	WED	THU	FRI	SAT	SUN
06:30	AM Peak	X	X	X	X	X	-	-
09:30	Off Peak	X	X	X	X	X	X	X
16:00	PM Peak	X	X	X	X	X	-	-
19:30	Off Peak	X	X	X	X	X	-	-
22:00	Free Plan	X	X	X	X	X	X	X

Annual Calendar: Elgin Mills at Enford Rd

Default Weekly Schedule : Elgin Mills at Enford Rd

Date	Schedule (If blank, use the default weekly schedule)

EPAC M40 PROGRAM LOG

Installation Date: **Januray 21, 2008** CTCS# **180**

Program Date: **March 3, 2016 DR**

Programmed by: **D.Rumble**

INTERSECTION NAME: **Elgin Mills Rd. (YR 49) & Enford Rd. / Yorkland St.**

Phasing:

1. **E/B Left Turn Arrow**
2. **WESTBOUND**
3. **NORTHBOUND Fully Protected**
4. **SOUTHBOUND Fully Protected**
5. **Not Used**
6. **EASTBOUND**
7. **Not Used**
8. **Not Used (Ghost Phase)**

UTILITIES ACCESS

CODE = **9999** CODES: Four Digits (0000 - 9999)

PHASE DATA - VEHICLE TIMINGS

	PHASE	1	2	3	4	5	6	7	8
Basic Times	Minimum Green	7	30	10	10	0	30	0	10
	Passage	3.0	0	3.0	3.0	0	0	0	3.0
	Maximum No. 1	7	30	10	19	0	30	0	19
	Maximum No. 2	7	30	10	19	0	30	0	19
	Yellow Change	3.0	4.5	4.0	4.0	0	4.5	0	4.0
	Red Clearance	1.0	3.0	3.5	3.5	0	3.0	0	3.5
Density Times	Seconds/Actuation	0	0	0	0	0	0	0	0
	Maximum Initial	0	0	0	0	0	0	0	0
	Time Before Reduction	0	0	0	0	0	0	0	0
	Cars Before Reduction	0	0	0	0	0	0	0	0
	Time To Reduce	0	0	0	0	0	0	0	0
	Minimum Gap	0	0	0	0	0	0	0	0

PHASE DATA - PEDESTRIAN & VEHICLE CONTROL

	PHASE	1	2	3	4	5	6	7	8
Pedestrian Times	Walk	0	7	0	7	0	7	0	7
	Pedestrian Clearance	0	26	0	25	0	26	0	25
Pedestrian Control	Flashing Walk	0	0	0	0	0	0	0	0
	Extended Ped Clear	0	0	0	0	0	0	0	0
	Actuated Rest In Walk	0	1	0	0	0	1	0	0
Vehicle Control	Non Lock Memory	1	0	1	1	0	0	0	1
	Dual Entry	0	1	0	0	0	1	0	0
	Last Car Passage	0	0	0	0	0	0	0	0
	Conditional Service	0	0	0	0	0	0	0	0
	No Simultaneous Gap	0	0	0	0	0	0	0	0

Pedestrian & Vehicle Control Entry: "1" = Yes & "0" = No

DATE: 06-11-12 TIME: 14:08

SOLO: SOLO INTERSECTIONS - OFFICE DIALING
LOCAL DATABASE ... For: #10 - YORKLAND STREET/SILVERWOOD AVE

PHASE DATA - VEHICLE TIMINGS

PHASE	1	2	3	4	5	6	7	8
MIN GRN:	0	15	0	12	0	15	0	12
PASSAGE:	0.0	4.0	0.0	4.0	0.0	4.0	0.0	4.0
MAX # 1:	0	32	0	31	0	32	0	31
MAX # 2:	0	32	0	31	0	32	0	31
YELLOW :	3.0	4.0	3.0	4.0	3.0	4.0	3.0	4.0
RED CLR:	0.0	2.0	0.0	2.0	0.0	2.0	0.0	2.0
SEC/ACT:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MAX INI:	0	0	0	0	0	0	0	0
TIM BEF:	0	0	0	0	0	0	0	0
CAR BEF:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TIME TO:	0	0	0	0	0	0	0	0
MIN GAP:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

PHASE DATA - PEDESTRIAN & VEHICLE CONTROL DATA

PHASE	1	2	3	4	5	6	7	8
WALK .:	0	8	0	8	0	8	0	8
PED CLR	0	18	0	17	0	18	0	17
PEDESTRIAN CONTROL								
FL WK :	0	0	0	0	0	0	0	0
EXT PCL:	0	0	0	0	0	0	0	0
ACT RIW:	0	0	0	0	0	0	0	0
VEHICLE CONTROL								
NL MEM :	1	1	1	1	1	1	1	1
2 ENTRY:	0	1	0	1	0	1	0	1
LC PASS:	0	0	0	0	0	0	0	0
CON SER:	0	0	0	0	0	0	0	0

Pedestrian & Vehicle Control Entry: '1' = Yes & '0' = No

PHASE DATA - GENERAL CONTROL DATA

PHASE	1	2	3	4	5	6	7	8
INITIAL:	0	3	0	1	0	3	0	1
NA RESP:	0	1	0	2	0	1	0	2
VEH REC:	0	3	0	3	0	3	0	3
PED REC:	0	0	0	0	0	0	0	0

Codes	0	1	2	3	4
INITIAL ..	NONE	INACTV	RED	YELLOW	GREEN
NA RESP ..	NONE	TO NA1	TO NA2	TO BOTH	---
VEH REC ..	NONE	1 CALL	MINI'M	MAXIMUM	SOFT
PED REC ..	NONE	1 CALL	RECALL	NON ACT	NA+

DATE: 06-11-12 TIME: 14:08

SOLO: SOLO INTERSECTIONS - OFFICE DIALING
LOCAL DATABASE ... For: #10 - YORKLAND STREET/SILVERWOOD AVE

PHASE DATA - SEQUENCE CONTROL DATA

PHASE	1	2	3	4	5	6	7	8
OMIT :	0	0	0	0	0	0	0	0
-YEL :	0	0	0	0	0	0	0	0

CODES.....0.....1 TO 8 (#-PHASE).....
OMIT .....: NONE Phase Is Omitted By #-Phase On.
-YEL .....: NONE Phase Yellow Is Omitted By #-Phase Yellow.

PHASE DATA - SPEC DETECTOR DATA

DETECTOR	1	2	3	4	5	6	7	8
STRETCH:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DELAY .:	0	0	0	0	0	0	0	0
SWITCH :	0	0	0	0	0	0	0	0

CODES:
Switch ...: 0-None #-Detector Is Switched To #-Ph When The
Phase Programmed Is Yel/Red & #-Ph Is Green.

DATE: 12-18-02 TIME: 15:22

SOLO: SOLO INTERSECTIONS - OFFICE DIALING
LOCAL DATABASE ... For: #09 - YORKLAND STREET/BERNARD AVENUE

PHASE DATA - VEHICLE TIMINGS

PHASE	1	2	3	4	5	6	7	8
MIN GRN:	0	15	0	12	0	15	0	12
PASSAGE:	0.0	4.0	0.0	4.0	0.0	4.0	0.0	4.0
MAX # 1:	0	33	0	30	0	33	0	30
MAX # 2:	0	33	0	30	0	33	0	30
YELLOW :	3.0	4.0	3.0	4.0	3.0	4.0	3.0	4.0
RED CLR:	0.0	2.0	0.0	2.0	0.0	2.0	0.0	2.0
SEC/ACT:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MAX INI:	0	0	0	0	0	0	0	0
TIM BEF:	0	0	0	0	0	0	0	0
CAR BEF:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TIME TO:	0	0	0	0	0	0	0	0
MIN GAP:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

PHASE DATA - PEDESTRIAN & VEHICLE CONTROL DATA

PHASE	1	2	3	4	5	6	7	8
WALK .:	0	8	0	8	0	8	0	8
PED CLR	0	19	0	16	0	19	0	16
PEDESTRIAN CONTROL								
FL WK :	0	0	0	0	0	0	0	0
EXT PCL:	0	0	0	0	0	0	0	0
ACT RIW:	0	0	0	0	0	0	0	0
VEHICLE CONTROL								
NL MEM :	1	1	1	1	1	1	1	1
2 ENTRY:	0	1	0	1	0	1	0	1
LC PASS:	0	0	0	0	0	0	0	0
CON SER:	0	0	0	0	0	0	0	0

Pedestrian & Vehicle Control Entry: '1' = Yes & '0' = No

PHASE DATA - GENERAL CONTROL DATA

PHASE	1	2	3	4	5	6	7	8
INITIAL:	0	3	0	1	0	3	0	1
NA RESP:	0	1	0	2	0	1	0	2
VEH REC:	0	3	0	3	0	3	0	3
PED REC:	0	0	0	0	0	0	0	0

Codes	0	1	2	3	4
INITIAL ..	NONE	INACTV	RED	YELLOW	GREEN
NA RESP ..	NONE	TO NA1	TO NA2	TO BOTH	---
VEH REC ..	NONE	1 CALL	MINI'M	MAXIMUM	SOFT
PED REC ..	NONE	1 CALL	RECALL	NON ACT	NA+

DATE: 12-18-02 TIME: 15:22

SOLO: SOLO INTERSECTIONS - OFFICE DIALING
LOCAL DATABASE ... For: #09 - YORKLAND STREET/BERNARD AVENUE

PHASE DATA - SEQUENCE CONTROL DATA

PHASE	1	2	3	4	5	6	7	8
OMIT :	0	0	0	0	0	0	0	0
-YEL :	0	0	0	0	0	0	0	0

CODES.....0.....1 TO 8 (#-PHASE).....
OMIT .....: NONE Phase Is Omitted By #-Phase On.
-YEL .....: NONE Phase Yellow Is Omitted By #-Phase Yellow.

PHASE DATA - SPEC DETECTOR DATA

DETECTOR	1	2	3	4	5	6	7	8
STRETCH:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DELAY .:	0	0	0	0	0	0	0	0
SWITCH :	0	0	0	0	0	0	0	0

CODES:
Switch ...: 0-None #-Detector Is Switched To #-Ph When The
Phase Programmed Is Yel/Red & #-Ph Is Green.

Regional Municipality of York
Centralized Traffic Control System
Timing Pattern Summary Report - Intersection

York Region

Intersection Name : **Yonge St. - Bernard Ave. / Canyon Hill Ave.**

Pattern Name	Mode	Cycle	Splits (sec)	offset	Max Green	Omits	Veh. Recall	Ped.Omits	Ped. Recalls	Spec. O/P
AM Peak	TBC	130	12 73 00 45 12 73 00 45	90	11111111	NNNNNNNN	XXXXXXXX	NNNN	NNNN	********
AM Special	TBC	130	12 68 00 50 12 68 00 50	90	11111111	NNNNNNNN	XXXXXXXX	NNNN	NNNN	********
Free Plan	Free	0	00 00 00 00 00 00 00 00	0	11111111	NNNNNNNN	XXXXXXXX	NNNN	NNNN	********
Off Peak	TBC	120	12 63 00 45 12 63 00 45	0	11111111	NNNNNNNN	XXXXXXXX	NNNN	NNNN	********
PM Peak	TBC	130	12 73 00 45 12 73 00 45	25	11111111	NNNNNNNN	XXXXXXXX	NNNN	NNNN	********

19-Sep-2013

Regional Municipality of York
Centralized Traffic Control System
Controller Scheduler Summary - Intersection

York Region

Intersection Name : Yonge St. - Bernard Ave. / Canyon Hill Ave.

Weekly Plan : Yonge at Bernard/Canyon

Time of Day	Timing Pattern	MON	TUE	WED	THU	FRI	SAT	SUN
06:00	AM Peak	X	X	X	X	X	-	-
07:45	AM Special	X	X	X	X	X	-	-
08:00	Off Peak	-	-	-	-	-	X	X
08:45	AM Peak	X	X	X	X	X	-	-
10:00	Off Peak	X	X	X	X	X	-	-
16:00	PM Peak	X	X	X	X	X	-	-
20:00	Off Peak	X	X	X	X	X	-	-
22:00	Free Plan	X	X	X	X	X	X	X

Annual Calendar: Yonge at Bernard/Canyon

Default Weekly Schedule : Yonge at Bernard/Canyon

Date	Schedule (If blank, use the default weekly schedule)

INTERSECTION NAME: **Yonge St.(YR 1) & Bernard / Canyon Hill**
PROGRAMMED BY: Dave Rumble
CONTOLLER SERIAL #:

CTCS #: 314
ADDRESS: 15
SECURITY CODE: 1000
PROGRAM DATE: Sept 12/13
INSTALLATION DATE: 31-Mar-05

MEMORY/RECALL/CNA (MM-2-2-1)

	1	2	3	4	5	6	7	8
MEMORY	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
EXT RECALL	OFF	ON	OFF	OFF	OFF	ON	OFF	OFF
MAX RECALL	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
PED RECALL	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
CNA I	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
CNA II	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
FL WALK	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
SOFT RECALL	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
WALK REST	OFF	ON	OFF	OFF	OFF	ON	OFF	OFF
COND PED	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
FWTPCL	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF

1 -	NBLT Arrow	5 -	SBLT Arrow
2 -	Southbound	6 -	Northbound
3 -	Not Used	7 -	Not Used
4 -	Eastbound	8 -	Westbound

PHASE TIMINGS (MM-2-2-2)

	1	2	3	4	5	6	7	8
MIN GREEN	7	26	0	10	7	26	0	10
PASSAGE	3.0	5.0	0	3.0	3.0	5.0	0	3.0
YELLOW	3.0	4.5	0	4.0	3.0	4.5	0	4.0
RED	1.0	3.0	0	4.0	1.0	3.0	0	4.0
MAX I	7	50	0	19	7	50	0	19
MAX II	7	50	0	42	20	50	0	42
WALK	0	7	0	7	0	7	0	7
PED CLEAR	0	26	0	29	0	26	0	29
S/A	0	2.0	0	0	0	2.0	0	0
TBR	0	0	0	0	0	0	0	0
TTR	0	0	0	0	0	0	0	0
MIN GAP	0	0	0	0	0	0	0	0
MAX VI	0	50	0	0	0	50	0	0
MAX EXT	0	0	0	0	0	0	0	0
AUTO MAX	0	0	0	0	0	0	0	0
AMR	0	0	0	0	0	0	0	0

Range: 0-9.9 or 127 except max times and auto max which are 0 -255 secs.

PHASES USED (MM-2-2-3-1)

PHASE	1	2	3	4	5	6	7	8
ON/OFF	ON	ON	OFF	ON	ON	ON	OFF	ON

SEQUENCE (MM-2-2-3-2)

2	1=Sequential, 2= Dual Ring, 3-7= Spec, 8=Lead/Lag

LEAD/LAG MODES (MM-2-2-3-2-PGDN....only if Seq = Lead/Lag)

PAIRS	1 AND 2	3 AND 4	5 AND 6	7 AND 8
CODE				

Codes: 1 = No Reversal, 2 = Always Reverse, 3 = Rev. by CSO or Clock

LEAD/LAG BARRIERS (MM-2-2-3-2-PGDN-PGDN...only if lead/lag

LEAD/LAG BARRIERS ARE:		ON/OFF

On = Barriers after easch ring 1 and 2 phase pair in a vertical column

SPECIAL INCOMPATIBILITIES (MM-2-2-3-3)

PHASE	1	2	3	4	5	6	7	8
INCOMPAT PH 1-8								
INCOMPAT PH 1-8								

INITILAIZE / FLASH (MM-2-2-4) 1 =RED, 2 = YEL., 3 = GRN

	INITILIZE	ENTER FL	EXIT FL
RING 1 PHASE	2	2	2
RING 2 PHASE	6	6	6
INTERVAL	1	1	1

NOTE: Enter flash interval is permanently set to 1 (RED)

POWER-UP RESTART TIMINGS (MM-2-2-4-PGDN)

MINIMUM FLASH		(0-9.9 or 127 SECONDS)
1ST ALL RED AFTER FLASH		(0-9.9 or 127 SECONDS)

NOTE: Blanks = 0, OFF, or controller default values

15-May-2013

Regional Municipality of York
Centralized Traffic Control System
Timing Pattern Summary Report - Intersection

York Region

Intersection Name : **Yonge St. - Brookside Rd. / Silverwood Ave.**

Pattern Name	Mode	Cycle	Splits (sec)	offset	Max Green	Omits	Veh. Recall	Ped.Omits	Ped. Recalls	Spec. O/P
AM Peak	TBC	130	12 78 00 40 00 90 00 40	65	11111111	NNNNNNNN	XXXXXXXX	NNNN	NNNN	********
Free Plan	Free	0	00 00 00 00 00 00 00 00	0	11111111	NNNNNNNN	XXXXXXXX	NNNN	NNNN	********
Off Peak	TBC	120	12 68 00 40 00 80 00 40	100	11111111	NNNNNNNN	XXXXXXXX	NNNN	NNNN	********
PM Peak	TBC	130	12 78 00 40 00 90 00 40	40	11111111	NNNNNNNN	XXXXXXXX	NNNN	NNNN	********

06-Aug-2013

Regional Municipality of York
Centralized Traffic Control System
Controller Scheduler Summary - Intersection

York Region

Intersection Name : Yonge St. - Brookside Rd. / Silverwood Ave.

Weekly Plan : Yonge at Brookside

Time of Day	Timing Pattern	MON	TUE	WED	THU	FRI	SAT	SUN
06:00	AM Peak	X	X	X	X	X	-	-
08:00	Off Peak	-	-	-	-	-	X	X
10:00	Off Peak	X	X	X	X	X	-	-
16:00	PM Peak	X	X	X	X	X	-	-
20:00	Off Peak	X	X	X	X	X	-	-
22:00	Free Plan	X	X	X	X	X	X	X

Annual Calendar: Yonge at Brookside

Default Weekly Schedule : Yonge at Brookside

Date	Schedule (If blank, use the default weekly schedule)

PEEK TRAFFIC

INTERSECTION NAME: **Yonge St. @ Brookside/Silverwood**
PROGRAMMED BY: T. Hanrahan
CONTOLLER SERIAL #:

CTCS #:
ADDRESS:
SECURITY CODE: **1000**
PROGRAM DATE: May 7, 2013
INSTALLATION DATE:

MEMORY/RECALL/CNA (MM-2-2-1)

	1	2	3	4	5	6	7	8
MEMORY	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
EXT RECALL	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
MAX RECALL	OFF	**ON**	OFF	OFF	OFF	**ON**	OFF	OFF
PED RECALL	OFF	**ON**	OFF	OFF	OFF	**ON**	OFF	OFF
CNA I	OFF	**ON**	OFF	OFF	OFF	**ON**	OFF	OFF
CNA II	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
FL WALK	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
SOFT RECALL	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
WALK REST	OFF	**ON**	OFF	OFF	OFF	**ON**	OFF	OFF
COND PED	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
FWTPCL	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF

1 -	**NBLT Arrow**	5 -	**Not Used**
2 -	**Southbound**	6 -	**Northbound**
3 -	**Not Used**	7 -	**Not Used**
4 -	**Eastbound**	8 -	**Westbound**

PHASE TIMINGS (MM-2-2-2)

	1	2	3	4	5	6	7	8
MIN GREEN	**7**	**30**	0	**10**	0	**30**	0	**10**
PASSAGE	**3.0**	0	0	**3.0**	0	0	0	**3.0**
YELLOW	**3.0**	**4.5**	0	**4.0**	0	**4.5**	0	**4.0**
RED	**1.0**	**2.5**	0	**4.0**	0	**2.5**	0	**4.0**
MAX I	**7**	**30**	0	**19**	0	**30**	0	**19**
MAX II	**7**	**50**	0	**30**	0	**50**	0	**30**
WALK	0	**7**	0	**7**	0	**7**	0	**7**
PED CLEAR	0	**21**	0	**23**	0	**21**	0	**23**
S/A	0	0	0	0	0	0	0	0
TBR	0	0	0	0	0	0	0	0
TTR	0	0	0	0	0	0	0	0
MIN GAP	0	0	0	0	0	0	0	0
MAX VI	0	0	0	0	0	0	0	0
MAX EXT	0	0	0	0	0	0	0	0
AUTO MAX	0	0	0	0	0	0	0	0
AMR	0	0	0	0	0	0	0	0

Range: 0-9.9 or 127 except max times and auto max which are 0 -255 secs.

PHASES USED (MM-2-2-3-1)

PHASE	1	2	3	4	5	6	7	8
ON/OFF	**ON**	**ON**	**OFF**	**ON**	**OFF**	**ON**	**OFF**	**ON**

SEQUENCE (MM-2-2-3-2)

2	1=Sequential, 2= Dual Ring, 3-7= Spec, 8=Lead/Lag

LEAD/LAG MODES (MM-2-2-3-2-PGDN....only if Seq = Lead/Lag)

PAIRS	1 AND 2	3 AND 4	5 AND 6	7 AND 8
CODE				

Codes: 1 = No Reversal, 2 = Always Reverse, 3 = Rev. by CSO or Clock

LEAD/LAG BARRIERS (MM-2-2-3-2-PGDN-PGDN...only if lead/lag

LEAD/LAG BARRIERS ARE:		ON/OFF

On = Barriers after easch ring 1 and 2 phase pair in a vertical column

SPECIAL INCOMPATIBILITIES (MM-2-2-3-3)

PHASE	1	2	3	4	5	6	7	8
INCOMPAT PH 1-8								
INCOMPAT PH 1-8								

INITILAIZE / FLASH (MM-2-2-4) 1 =RED, 2 = YEL., 3 = GRN

	INITILIZE	ENTER FL	EXIT FL
RING 1 PHASE	**2**	**2**	**2**
RING 2 PHASE	**6**	**6**	**6**
INTERVAL	**1**	**1**	**1**

NOTE: Enter flash interval is permanently set to 1 (RED)

POWER-UP RESTART TIMINGS (MM-2-2-4-PGDN)

MINIMUM FLASH		(0-9.9 or 127 SECONDS)
1ST ALL RED AFTER FLASH		(0-9.9 or 127 SECONDS)

NOTE: Blanks = 0, OFF, or controller default values

Regional Municipality of York
Centralized Traffic Control System
Timing Pattern Summary Report - Intersection

York Region

Intersection Name : **Yonge St. - Elgin Mills Rd.**

Pattern Name	Mode	Cycle	Splits (sec)	offset	Max Green	Omits	Veh. Recall	Ped.Omits	Ped. Recalls	Spec. O/P
AM Peak	TBC	130	12 60 12 46 12 60 12 46	30	11111111	NNNNNNNN	XXXXXXXX	NNNN	NNNN	********
Free Plan	Free	100	00 00 00 00 00 00 00 00	0	11111111	NNNNNNNN	XXXXXXXX	NNNN	NNNN	********
OFF Day	TBC	120	12 50 12 46 12 50 12 46	30	11111111	NNNNNNNN	XXXXXXXX	NNNN	NNNN	********
PM Peak	TBC	130	12 60 12 46 12 60 12 46	0	11111111	NNNNNNNN	XXXXXXXX	NNNN	NNNN	********

06-Aug-2013

Regional Municipality of York
Centralized Traffic Control System
Controller Scheduler Summary - Intersection

York Region

Intersection Name : Yonge St. - Elgin Mills Rd.

Weekly Plan : Yonge at Elgin Mills

Time of Day	Timing Pattern	MON	TUE	WED	THU	FRI	SAT	SUN
06:00	AM Peak	X	X	X	X	X	-	-
08:00	OFF Day	-	-	-	-	-	X	X
10:00	OFF Day	X	X	X	X	X	-	-
16:00	PM Peak	X	X	X	X	X	-	-
20:00	OFF Day	X	X	X	X	X	-	-
22:00	Free Plan	X	X	X	X	X	X	X

Annual Calendar: Yonge at Elgin Mills

Default Weekly Schedule : Yonge at Elgin Mills

Date	Schedule (If blank, use the default weekly schedule)

TRAFFIC CONTROL TECHNOLOGIES - LMD 9200

INTERSECTION NAME: **Yonge St. (YR 1) & Elgin Mills Rd. (YR 49)**
PROGRAMMED BY: D.Rumble
CONTOLLER SERIAL #:
INTERSECTION TELEPHONE (IF DIRECT DIAL):
SECTION:

INSTALLATION DATE:
PROGRAM DATE: 07/03/2013
SECURITY CODE: **1000**
ADDRESS: **14**

INTERVAL	PHASE (ON/OFF)							
	1	2	3	4	5	6	7	8
MEMORY	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
EXT RECALL	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
MAX RECALL	OFF	ON	OFF	OFF	OFF	ON	OFF	OFF
PED RECALL	OFF	ON	OFF	OFF	OFF	ON	OFF	OFF
CNA I	OFF	ON	OFF	OFF	OFF	ON	OFF	OFF
CNA II	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
FL WALK	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
SOFT RECALL	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
WALK REST	OFF	ON	OFF	OFF	OFF	ON	OFF	OFF
COND PED	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
FWTPCL	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF

1- N/B L.T. ARROW
2- SOUTHBOUND
3- W/B L.T. ARROW
4- EASTBOUND
5- S/B L.T. ARROW
6- NORTHBOUND
7- E/B L.T. ARROW
8- WESTBOUND

INTERVAL	PHASE TIMINGS							
	1	2	3	4	5	6	7	8
MIN GREEN	7	30	7	10	7	30	7	10
PASSAGE	3.0	0	3.0	3.0	3.0	0	3.0	3.0
YELLOW	3.0	4.5	3.0	4.5	3.0	4.5	3.0	4.5
RED	1.0	3.0	1.0	3.5	1.0	3.0	1.0	3.5
MAX I	7	30	7	40	7	30	7	40
MAX II	20	30	20	40	20	30	20	40
WALK	0	7	0	7	0	7	0	7
PED CLEAR	0	28	0	30	0	28	0	30
S/A	0	0	0	0	0	0	0	0
TBR	0	0	0	0	0	0	0	0
TTR	0	0	0	0	0	0	0	0
MIN GAP	0	0	0	0	0	0	0	0
MAX VI	0	0	0	0	0	0	0	0
MAX EXT	0	0	0	0	0	0	0	0
AUTO MAX	0	0	0	0	0	0	0	0
AMR	0	0	0	0	0	0	0	0

PHASES USED								
	1	2	3	4	5	6	7	8
ON/OFF	ON	ON	ON	ON	ON	ON	ON	ON
SEQUENCE	2	1 = SEQ, 2 = DUAL RING, 3-7 = LEAD/LAG						
LEAD/LAG CODES (ONLY USED IF "8" WAS ENTERED FOR SEQUENCE)								
PAIRS	1 AND 2		3 AND 4		5 AND 6		7 AND 8	
CODE								
LEAD/LAG CODE - 1= NO REV, 2 = ALWAYS REV, 3 = REV BY C/S/O OR CLOCK/INPUT								

INITIALIZE/FLASH				
	INITIALIZE	ENTER FLASH	EXIT FLASH	INTERVAL CODES:
RING 1 PHASE	2	2	2	1 = RED
RING 2 PHASE	6	6	6	2 = YELLOW
INTERVAL	1	1	1	3 = GREEN

POWER UP/RESTART TIMINGS		
MINIMUM FLASH		(0-127 SECONDS)
1ST ALL RED AFTER FLASH		(0-127 SECONDS)

15-May-2013

Regional Municipality of York
Centralized Traffic Control System
Timing Pattern Summary Report - Intersection

York Region

Intersection Name : **Yonge St. - Private Entrance LBS Development**

Pattern Name	Mode	Cycle	Splits (sec)	offset	Max Green	Omits	Veh. Recall	Ped.Omits	Ped. Recalls	Spec. O/P
AM Peak	TBC	130	12 79 00 39 00 91 00 39	85	11111111	NNNNNNNN	XXXXXXXX	NNNN	NNNN	********
Free Plan	Free	0	00 00 00 00 00 00 00 00	0	11111111	NNNNNNNN	XXXXXXXX	NNNN	NNNN	********
Off Peak	TBC	120	12 68 00 40 00 80 00 40	10	11111111	NNNNNNNN	XXXXXXXX	NNNN	NNNN	********
PM Peak	TBC	130	12 79 00 39 00 91 00 39	20	11111111	NNNNNNNN	XXXXXXXX	NNNN	NNNN	********

06-Aug-2013

Regional Municipality of York
Centralized Traffic Control System
Controller Scheduler Summary - Intersection

York Region

Intersection Name : Yonge St. - Private Entrance LBS Development

Weekly Plan : Yonge at LBS Dev.

Time of Day	Timing Pattern	MON	TUE	WED	THU	FRI	SAT	SUN
06:00	AM Peak	X	X	X	X	X	-	-
08:00	Off Peak	-	-	-	-	-	X	X
10:00	Off Peak	X	X	X	X	X	-	-
16:00	PM Peak	X	X	X	X	X	-	-
20:00	Off Peak	X	X	X	X	X	-	-
22:00	Free Plan	X	X	X	X	X	X	X

Annual Calendar: Yonge at LBS Dev.

Default Weekly Schedule : Yonge at LBS Dev.

Date	Schedule (If blank, use the default weekly schedule)

PEEK TRAFFIC

INTERSECTION NAME: **Yonge St. (YR 1) & Private Entrance LBS**
PROGRAMMED BY: T. Hanrahan
CONTOLLER SERIAL #:

CTCS #:
ADDRESS:
SECURITY CODE: **1000**
PROGRAM DATE: May 7/13
INSTALLATION DATE:

MEMORY/RECALL/CNA (MM-2-2-1)

	1	2	3	4	5	6	7	8
MEMORY	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
EXT RECALL	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
MAX RECALL	OFF	ON	OFF	OFF	OFF	ON	OFF	OFF
PED RECALL	OFF	ON	OFF	OFF	OFF	ON	OFF	OFF
CNA I	OFF	ON	OFF	OFF	OFF	ON	OFF	OFF
CNA II	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
FL WALK	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
SOFT RECALL	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
WALK REST	OFF	ON	OFF	OFF	OFF	ON	OFF	OFF
COND PED	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
FWTPCL	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF

1 -	~~Not Used~~ Not	5 -	Not used
2 -	Southbound	6 -	Northbound
3 -	Not Used	7 -	Not Used
4 -	Eastbound	8 -	Westbound

PHASE TIMINGS (MM-2-2-2)

	1	2	3	4	5	6	7	8
MIN GREEN	7	30	0	10	0	30	0	10
PASSAGE	3	0	0	3.0	0	0	0	3.0
YELLOW	3	4.5	0	3.5	0	4.5	0	4.0
RED	1	2.5	0	4.5	0	2.5	0	4.5
MAX I	7	30	0	40	0	30	0	40
MAX II	7	50	0	30	0	50	0	30
WALK	0	7	0	7	0	7	0	7
PED CLEAR	0	16	0	23	0	16	0	23
S/A	0	0	0	0	0	0	0	0
TBR	0	0	0	0	0	0	0	0
TTR	0	0	0	0	0	0	0	0
MIN GAP	0	0	0	0	0	0	0	0
MAX VI	0	0	0	0	0	0	0	0
MAX EXT	0	0	0	0	0	0	0	0
AUTO MAX	0	0	0	0	0	0	0	0
AMR	0	0	0	0	0	0	0	0

Range: 0-9.9 or 127 except max times and auto max which are 0 -255 secs.

PHASES USED (MM-2-2-3-1)

PHASE	1	2	3	4	5	6	7	8
ON/OFF	ON	ON	Off	ON	Off	ON	Off	ON

SEQUENCE (MM-2-2-3-2)

2	1=Sequential, 2= Dual Ring, 3-7= Spec, 8=Lead/Lag

LEAD/LAG MODES (MM-2-2-3-2-PGDN....only if Seq = Lead/Lag)

PAIRS	1 AND 2	3 AND 4	5 AND 6	7 AND 8
CODE				

Codes: 1 = No Reversal, 2 = Always Reverse, 3 = Rev. by CSO or Clock

LEAD/LAG BARRIERS (MM-2-2-3-2-PGDN-PGDN...only if lead/lag

LEAD/LAG BARRIERS ARE:		ON/OFF

On = Barriers after easch ring 1 and 2 phase pair in a vertical column

SPECIAL INCOMPATIBILITIES (MM-2-2-3-3)

PHASE	1	2	3	4	5	6	7	8
INCOMPAT PH 1-8								
INCOMPAT PH 1-8								

INITILAIZE / FLASH (MM-2-2-4) 1 =RED, 2 = YEL., 3 = GRN

	INITILIZE	ENTER FL	EXIT FL
RING 1 PHASE	2	2	2
RING 2 PHASE	6	6	6
INTERVAL	1	1	1

NOTE: Enter flash interval is permanently set to 1 (RED)

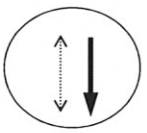
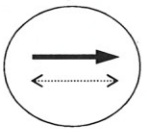
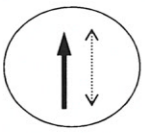
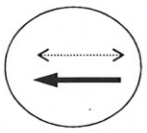
POWER-UP RESTART TIMINGS (MM-2-2-4-PGDN)

MINIMUM FLASH		(0-9.9 or 127 SECONDS)
1ST ALL RED AFTER FLASH		(0-9.9 or 127 SECONDS)

NOTE: Blanks = 0, OFF, or controller default values

LOCATION:	**Bayview Ave (YR 34) & 19th Ave (YR 29)**	*MUNICIPALITY:*	**Markham**
CTCS:	**531**	*COMPUTER SYSTEM:*	**Centracs**
MODE/COMMENT:	**SA with APS**	*CONTROLLER SET TYPE:*	**Econolite Cobalt / TS2 T1**
PREPARED/CHECKED BY:	**MQL**	*CONFLICT FLASH:*	**Red & Red**
PREPARATION DATE:	**June 13, 2019**	*DESIGN WALK SPEED:*	**1.0 m/s (FDW based on full crossing at 1.2 m/s)**
IMPLEMENTATION DATE:	**June 13, 2019**	*CHANNEL/DROP:*	

N

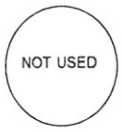
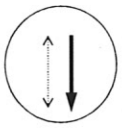
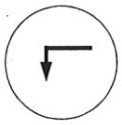
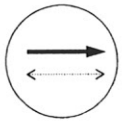
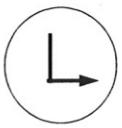
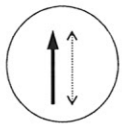
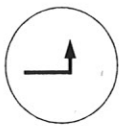
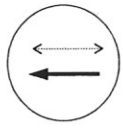
NEMA Phase (York)		AM 7:00-7:45 8:15-9:30 M-F	PM 14:30- 19:00 M-F	OFF 9:30-14:30 19:00-22:00 M-F 9:30-22:00 Sat & Sun	AM School 7:45-8:15 M-F	Free 22:00-7:00 M-F 22:00-9:30 Sat & Sun	Phase Mode (Fixed/Callable)	Remarks
	Local Plan	Pattern 1	Pattern 2	Pattern 3	Pattern 4	Free		
	System Plan	Plan 1	Plan 2	Plan 3	Plan 4	Plan 99		
1. N/B Left Turn Arrow 	WLK FDW MIN 7 EXT 3 MAX1 7 MAX2 0 AMB 3 ALR 1 SPLIT	12	12	12	12	0	Callable/Extendable by Setback Loop	Pedestrian Minimums: NSWK = 7 secs; NSFD = 16 secs EWWK = 7 secs; EWFD = 16 secs **Emergency vehicle pre-emption 3:** Serve NSG/NSDW min 20 secs and up to 100 secs if there are continuous emergency calls in NS direction.
2. Southbound  Bayview Ave (YR 34)	WLK 7 FDW 16 MIN 30 EXT 0 MAX1 30 MAX2 0 AMB 5.0 ALR 2.0 SPLIT	54	58	53	54	0	Fixed	EW phase is callable by vehicle or pedestrian actuation. If a vehicle call is received, the minimum EWG will be served. If ongoing vehicle demand exists on the stopbar loop, the EWG is capable of providing vehicle extensions up to the maximum green split during coordinated operation or serve MAX1 during Free operation. If a pedestrian call is received, the pedestrian minimum will be served. The EWWK & EWFD are only displayed on the pedestrian signal heads if a pedestrian call is received. Extension time is based on vehicle demand. Unused extension time is given to the NSG.
3. W/B Left Turn Arrow 	WLK FDW MIN 7 EXT 3 MAX1 7 MAX2 0 AMB 3 ALR 1 SPLIT	0	0	0	12	0	Callable/Extendable by Setback Loop	During coordinated operation, the signal constantly cycles through main street FDW to improve response time to side street vehicle and pedestrian demand.
4. Eastbound  19th Ave (YR 29)	WLK 7 FDW 16 MIN 10 EXT 6 MAX1 40 MAX2 0 AMB 5.0 ALR 2.0 SPLIT	54	50	45	42	0	Callable by stopbar loop and/or pushbutton; Extendable by stopbar loop.	During free plan, signal rests in NSWK and does not cycle through NSFD unless there is side street vehicle or pedestrian demand. NSFD reverts to NSWK if there is no side street demand at the end of the NSFD. **2019 arterial review**
5. NOT USED	WLK FDW MIN EXT MAX1 MAX2 AMB ALR SPLIT							
6. Northbound  Bayview Ave (YR 34)	WLK 7 FDW 16 MIN 30 EXT 0 MAX1 30 MAX2 0 AMB 5 ALR 2 SPLIT	66	70	65	66	0	Fixed	
7. NOT USED	WLK FDW MIN EXT MAX1 MAX2 AMB ALR SPLIT							
8. Westbound  19th Ave (YR 29)	WLK 7 FDW 16 MIN 10 EXT 6 MAX1 40 MAX2 0 AMB 5.0 ALR 2.0 SPLIT	54	50	45	54	0	Callable by stopbar loop and/or pushbutton; Extendable by stopbar loop.	
	CL OF VP	120 0 16	120 0 16	110 0 16	120 0 16	0 (FREE) 0 (FREE) 0 (FREE)		

LEGEND:

SA - Semi-Actuated signal
WLK - Walk time
FDW - Flashing Don't Walk time
MIN - Minimum green time
EXT - Extension time
MAX1 - Maximum green time 1
MAX2 - Maximum green time 2
AMB - Amber
ALR -All Red
CL - Cycle Length
OF - Offset
VP - Vehicle Permissive
NSWK - North/South Walk
EWWK - East/West Walk
NSG - North/South Green
EWG - East/West Green
NSFD - North/South Flashing Don't Walk
EWFD - East/West Flashing Don't Walk
TSP - Transit Priority
APS - Audible Pedestrian Signal
RLC - Red Light Camera

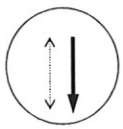
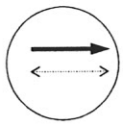
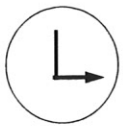
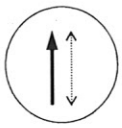
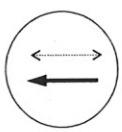
NOTES:

LOCATION:	Bathurst Street (YR 38[illegible] Elgin Mills Road (R49)	*MUNICIPALITY:*	Vaughan
CTCS:	168	*COMPUTER SYS:*	entracs
MODE/COMMENT:	SA	*CONTROLLER/CABINET T:*	econolite ASC3 / TS2T1
PREPARED/CHECKED BY:	M.L. /J.L.	*CONFLICT FLASH:*	Red & Red
PREPARATION DATE:	August 20, 2019	*DESIGN WALK SPEED:*	1.0 m/s (FDW based on full crossing at 1.2 m/s)
IMPLEMENTATION DATE:			

NEMA Phase (York)		AM 6:00-10:00 M-F	PM 16:00-19:00 M-F	OFF Peak 10:00-16:00; 19:00-22:00 M-F; 09:00-22:00 Sat. & Sun.	Free 22:00-6:00 M-F, and 22:00-9:00Sat. & Sun.	Phase Mode (Fixed/Callable)	Remarks
	Local Plan	Pattern 1	Pattern 2	Pattern 3	Pattern 99		
	System Plan	Plan 1	Plan 2	Plan 3	Plan 99		
1. N/B Left Turn Arrow  	WLK FDW MIN EXT MAX1 MAX2 AMB ALR SPLIT	0	0	0	0		**Emergency vehicle pre-emption 3:** Serve NSG/NSFD min 20 secs and up to 100 secs if there are continuous emergency calls in NS direction.
2. Southbound  Bathurst Street	WLK 7 FDW 25 MIN 30 EXT 0 MAX1 30 MAX2 0 AMB 5.0 ALR 3.0 SPLIT	84	78	64	0	Fixed	**Emergency vehicle pre-emption 4:** Serve EWG/EWFD min 20 secs and up to 100 secs if there are continuous emergency calls in EW direction.
3. W/B Left Turn Arrow 	WLK FDW MIN 7 EXT 3 MAX1 7 MAX2 0 AMB 3.0 ALR 1 SPLIT	12	12	12	0	Callable/Extendable by Stopbar Loop	
4. Eastbound  Elgin Mills Road	WLK 7 FDW 28 MIN 10 EXT 3 MAX1 25 MAX2 0 AMB 4.5 ALR 3.5 SPLIT	44	50	44	0	Callable by stopbar loop and/or pushbutton; Extendable by stopbar loop.	EW phase is callable by vehicle or pedestrian actuation. If a vehicle call is received, the minimum EWG will be served. If ongoing vehicle demand exists on the stopbar loop, the EWG is capable of providing vehicle extensions up to the maximum green split. If a pedestrian call is received, the pedestrian minimum will be served. The EWWK & EWFD are only displayed on the pedestrian signal heads if a pedestrian call is received. Extension time is based on vehicle demand. Unused extension time is given to the NSG.
5. S/B Left Turn Arrow 	WLK FDW MIN 7 EXT 3 MAX1 7 MAX2 0 AMB 3 ALR 1 SPLIT	12	12	12	0	Callable/Extendable by Stopbar Loop	During coordinated operation, the signal constantly cycles through main street FDW to improve response time to side street vehicle and pedestrian demand. During free plan, signal rests in NSWK and does not cycle through NSFD unless there is side street vehicle or pedestrian demand.
6. Northbound  Bathurst Street	WLK 7 FDW 25 MIN 30 EXT 0 MAX1 30 MAX2 0 AMB 5 ALR 3 SPLIT	72	66	52	0	Fixed	NSFD reverts to NSWK if there is no side street demand at the end of the NSFD.
7. E/B Left Turn Arrow 	WLK FDW MIN 7 EXT 3 MAX1 7 MAX2 0 AMB 3 ALR 1 SPLIT	12	12	12	0	Callable/Extendable by Stopbar Loop	**LEGEND:** SA - Semi-Actuated signal FA - Fully Actuated signal WLK - Walk time FDW - Flashing Don't Walk time MIN - Minimum green time EXT - Extension time MAX1 - Maximum green time 1 MAX2 - Maximum green time 2 AMB - Amber ALR -All Red CL - Cycle Length OF - Offset VP - Vehicle Permissive NSWK - North/South Walk EWWK - East/West Walk NSG - North/South Green EWG - East/West Green NSFD - North/South Flashing Don't Walk EWFD - East/West Flashing Don't Walk TSP - Transit Signal Priority APS - Audible Pedestrian Signal RLC - Red Light Camera
8. Westbound  Elgin Mills Road	WLK 7 FDW 28 MIN 10 EXT 6 MAX1 25 MAX2 0 AMB 4.5 ALR 3.5 SPLIT	44	50	44	0	Callable by stopbar loop and/or pushbutton; Extendable by stopbar loop.	
	CL OF VP	140 0 25	140 60 25	120 0 25	0 (FREE) 0 (FREE) 0 (FREE)		

NOTES:

LOCATION:	Bathurst Street (YR 38) & Gamble Road / Kirby Road (YR 29)	**MUNICIPALITY:**	Vaughan
CTCS:	534	**COMPUTER SYSTEM:**	Centracs
MODE/COMMENT:	SA	**CONTROLLER/CABINET TYPE:**	Econolite ASC3 / TS2T1
PREPARED/CHECKED BY:	M.L./J.L.	**CONFLICT FLASH:**	Red & Red
PREPARATION DATE:	Aug 20, 2019	**DESIGN WALK SPEED:**	1.0 m/s (FDW based on full crossing at 1.2 m/s)
IMPLEMENTATION DATE:			

NEMA Phase (York)		Free All Week	Phase Mode (Fixed/Callable)	Remarks
	Local Plan	Pattern 99		
	System Plan	Plan 99		
NOT USED	WLK FDW EXT MAX1 MAX2 AMB ALR SPLIT	 0		**Emergency vehicle pre-emption 3:** Serve NSG/NSFD min 20 secs and up to 100 secs if there are continuous emergency calls in NS direction. **Emergency vehicle pre-emption 4:** Serve EWG/EWFD min 20 secs and up to 100 secs if there are continuous emergency calls in EW direction.
2. Southbound  Bathurst Street	WLK 7 FDW 28 MIN 50 EXT 0 MAX1 50 MAX2 0 AMB 5.0 ALR 2.5 SPLIT	 0	Fixed	
NOT USED	WLK FDW MIN EXT MAX1 MAX2 AMB ALR SPLIT	 0		EW phase is callable by vehicle or pedestrian actuation. If a vehicle call is received, the minimum EWG will be served. If ongoing vehicle demand exists on the stopbar loop, the EWG is capable of providing vehicle extensions up to the maximum green split. If a pedestrian call is received, the pedestrian minimum will be served. The EWWK & EWFD are only displayed on the pedestrian signal heads if a pedestrian call is received. Extension time is based on vehicle demand. Unused extension time is given to the NSG.
4. Eastbound  Kirby Road	WLK 7 FDW 24 MIN 10 EXT 3 MAX1 40 MAX2 0 AMB 4.5 ALR 2.5 SPLIT	 0	Callable by stopbar loop and/or pushbutton; Extendable by stopbar loop. Split Phase	During coordinated operation, the signal constantly cycles through main street FDW to improve response time to side street vehicle and pedestrian demand.
5. S/B Left Turn Arrow 	WLK FDW MIN 7 EXT 3 MAX1 7 MAX2 0 AMB 3 ALR 1 SPLIT	 0	Callable/Extendable by Stopbar Loop	During free plan, signal rests in NSWK and does not cycle through NSFD unless there is side street vehicle or pedestrian demand. NSFD reverts to NSWK if there is no side street demand at the end of the NSFD.
6. Northbound  Bathurst Street	WLK 7 FDW 28 MIN 50 EXT 0 MAX1 50 MAX2 0 AMB 5 ALR 2.5 SPLIT	 0	Fixed	
NOT USED	WLK FDW MIN EXT MAX1 MAX2 AMB ALR SPLIT	 0		**LEGEND:** SA - Semi-Actuated signal FA - Fully -Actuated signal WLK - Walk time FDW - Flashing Don't Walk time MIN - Minimum green time EXT - Extension time MAX1 - Maximum green time 1 MAX2 - Maximum green time 2 AMB - Amber ALR -All Red CL - Cycle Length OF - Offset VP - Vehicle Permissive NSWK - North/South Walk EWWK - East/West Walk NSG - North/South Green EWG - East/West Green NSFD - North/South Flashing Don't Walk EWFD - East/West Flashing Don't Walk TSP - Transit Signal Priority APS - Audible Pedestrian Signal RLC - Red Light Camera
8. Westbound  Gamble Road	WLK 7 FDW 24 MIN 10 EXT 3 MAX1 40 MAX2 0 AMB 4.5 ALR 2.5 SPLIT	 0	Callable by stopbar loop and/or pushbutton; Extendable by stopbar loop. Split Phase	
	CL OF VP	0 (FREE) 0 (FREE) 0 (FREE)		

NOTES:

LOCATION:	Bayview Ave (YR 34) & Elgin Mills Rd (YR 48)	*MUNICIPALITY:*	Markham
CTCS:	151	*COMPUTER SYSTEM:*	Centracs
MODE/COMMENT:	SA	*CONT[illegible]R/CABINET TYPE:*	Econolite ASC/3-1000 / TS2T1
PREPARED/CHECKED BY:	MQL	*CONFLICT FLASH:*	Red & Red
PREPARATION DATE:	June 12, 2019	*DESIGN WALK SPEED:*	1.0 m/s (FDW based on full crossing at 1.2 m/s)
IMPLEMENTATION DATE:	June 12, 2019	*CHANNEL/DROP:*	

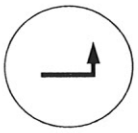
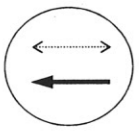
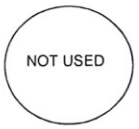
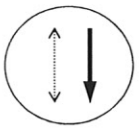
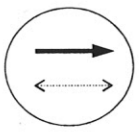
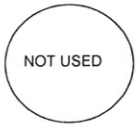
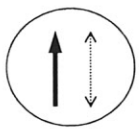
N

NEMA Phase (York)		AM 6:30-7:30 M-F	PM 16:00-19:30 M-F	OFF All Other Times	AM - Special 7:30-9:30 M-F	Free 22:00-6:30, M-F 22:00-9:30 Sat & Sun	Phase Mode (Fixed/Demanded/Callable)	Remarks
	Local Plan	Pattern 1	Pattern 2	Pattern 3		Pattern 99		
	System Plan	Plan 1	Plan 2	Plan 3	Plan 98	Plan 99		
1. E/B Left Turn Arrow	WLK						Callable/Extendable by Setback Loop	Pedestrian Minimums: EWWK = 7 sec., EWFD = 23 sec. NSWK = 7 sec., NSFD = 32 sec.
	FDW							
	MIN 7							**Emergency vehicle pre-emption 1:** Serve EWG/EWDW min 20 secs and up to 100 secs if there are continuous emergency calls in EW direction.
	EXT 3							
	MAX1 7							
	MAX2 10				USES MAX2			
	AMB 3							
	ALR 1							
	SPLIT	12	12	12	0	0		**Emergency vehicle pre-emption 2:** Serve NSG/NSDW min 20 secs and up to 100 secs if there are continuous emergency calls in NS direction.
2. Westbound	WLK 7						Fixed	
	FDW 23							
	MIN 30							
	EXT 0							
	MAX1 30							
	MAX2 45				USES MAX2			
	AMB 4.5							
Elgin Mills Rd (YR 49)	ALR 3.0							
	SPLIT	50	60	61	0	0		
3. N/B Left Turn Arrow	WLK						Callable/Extendable by Setback Loop	NS phase is callable by vehicle or pedestrian actuation. If a vehicle call is received, the minimum NSG is 10 seconds. If ongoing vehicle demand exists on the stopbar loop, the NSG is capable of providing vehicle extensions up to the maximum green split during coordinated operation or 19 secs during Free operation. If a pedestrian call is received, the pedestrian minimum will be served. The NSWK & NSFD are only displayed on the pedestrian signal heads if a pedestrian call is received. Extension time is based on vehicle demand. Unused extension time is given to the EWG.
	FDW							
	MIN 7							
	EXT 3							
	MAX1 7							
	MAX2 15				USES MAX2			
	AMB 3							
	ALR 1							
	SPLIT	15	12	18	0	0		
4. Southbound	WLK 7						Callable by stopbar loop and/or pushbutton; Extendable by stopbar loop.	During coordinated operation, the signal constantly cycles through main street FDW to improve response time to side street vehicle and pedestrian demand.
	FDW 32							
	MIN 10							
	EXT 3							
	MAX1 19							
	MAX2 20				USES MAX2			
	AMB 4.5							
Bayview Ave (YR 34)	ALR 3.5							
	SPLIT	63	56	49	0	0		
5. W/B Left Turn Arrow	WLK						Callable/Extendable by Setback Loop	During free plan, signal rests in EWWK and does not cycle through EWFD unless there is side street vehicle or pedestrian demand.
	FDW							
	MIN 7							
	EXT 3							
	MAX1 7							
	MAX2 10				USES MAX2			EWFD reverts to EWWK if there is no side street demand at the end of the EWFD.
	AMB 3							
	ALR 1							
	SPLIT	12	15	12	0	0		**New AM-Specail plan to address SBLT delay - 2019 arterial review**
6. Eastbound	WLK 7						Fixed	
	FDW 23							
	MIN 30							
	EXT 0							
	MAX1 30							
	MAX2 45				USES MAX2			
	AMB 4.5							
Elgin Mills Rd (YR 49)	ALR 3.0							
	SPLIT	50	57	61	0	0		
7. S/B Left Turn Arrow	WLK						Callable/Extendable by Setback Loop	**LEGEND:**
	FDW							
	MIN 7							SA - Semi-Actuated signal
	EXT 3							WLK - Walk time
	MAX1 7							FDW - Flashing Don't Walk time
	MAX2 35				USES MAX2			MIN - Minimum green time
	AMB 3							EXT - Extension time
	ALR 1							MAX1 - Maximum green time 1
	SPLIT	30	12	12	0	0		MAX2 - Maximum green time 2
8. Northbound	WLK 7						Callable by stopbar loop and/or pushbutton; Extendable by stopbar loop.	AMB - Amber
	FDW 32							ALR -All Red
	MIN 10							CL - Cycle Length
	EXT 3							OF - Offset
	MAX1 19							VP - Vehicle Permissive
	MAX2 20				USES MAX2			NSWK - North/South Walk
	AMB 4.5							EWWK - East/West Walk
Bayview Ave (YR 34)	ALR 3.5							NSG - North/South Green
	SPLIT	48	56	55	0	0		EWG - East/West Green
	CL	140	140	140	0 (FREE)	0 (FREE)		NSFD - North/South Flashing Don't Walk
	OF	50	0	0	0 (FREE)	0 (FREE)		EWFD - East/West Flashing Don't Walk
	VP	23	23	23	0 (FREE)	0 (FREE)		TSP - Transit Priority
								APS - Audible Pedestrian Signal

NOTES:

LOCATION:	Elgin Mills Rd (YR 49) & [illegible]kirk Rd / Private Access	*MUNICIPALITY:*	Town of Richmond Hill
CTCS:	179	*COMPUTER SYST[illegible]:*	[illegible]ntracs
MODE/COMMENT:	SA	*CONTROLLER/CABINET TY[illegible]:*	[illegible]conolite Cobalt / TS2T1
PREPARED/CHECKED BY:	JS	*CONFLICT FLASH:*	Red & Red
PREPARATION DATE:	February 11, 2019	*DESIGN WALK SPEED:*	1.0 m/s (FDW based on full crossing at 1.2 m/s)
IMPLEMENTATION DATE:	March 12, 2019	*CHANNEL/DROP:*	

N

NEMA Phase (York)		AM 6:30-9:30 M-F	PM 16:00-19:30 M-F	OFF 9:30-16:00 19:30-22:00 M-F 9:30-22:00 Sat & Sun	Free 22:00-6:30 M-F 22:00-9:30 Sat & Sun	Phase Mode (Fixed/Demanded/Callable)	Remarks
	Local Plan	Pattern 1	Pattern 2	Pattern 3	Pattern 99		
	System Plan	Plan 1	Plan 2	Plan 3	Plan 99		
1. E/B Left Turn Arrow 	WLK FDW MIN 7 EXT 3 MAX1 7 MAX2 0 AMB 3 ALR 1 SPLIT	12	12	12	0	Callable/Extendable by Setback Loop	Pedestrian Minimums: EWWK = 7 sec., EWFD = 18 sec. NSWK = 7 sec., NSFD = 21 sec.
2. Westbound  Elgin Mills Rd (YR 49)	WLK 7 FDW 18 MIN 30 EXT 0 MAX1 30 MAX2 0 AMB 4.5 ALR 2.5 SPLIT	82	68	62	0	Fixed	**Emergency vehicle pre-emption 3:** Serve EWG/EWDW min 20 secs and up to 100 secs if there are continuous emergency calls in EW direction. **Emergency vehicle pre-emption 4:** Serve NSG/NSDW min 20 secs and up to 100 secs if there are continuous emergency calls in NS direction.
3.  NOT USED	WLK FDW MIN EXT MAX1 MAX2 AMB ALR SPLIT						NS phase is callable by vehicle or pedestrian actuation. If a vehicle call is received, the minimum NSG is served. If ongoing vehicle demand exists on the stopbar loop, the NSG is capable of providing vehicle extensions up to the maximum green split during coordinated operation or serves MAX1 during Free operation. If a pedestrian call is received, the pedestrian minimum will be served. The NSWK & NSFD are only displayed on the pedestrian signal heads if a pedestrian call is received. Extension time is based on vehicle demand. Unused extension time is given to the EWG.
4. Southbound  Private Access	WLK 7 FDW 21 MIN 10 EXT 3 MAX1 19 MAX2 0 AMB 4.0 ALR 3.0 SPLIT	36	40	36	0	Callable by stopbar loop and/or pushbutton; Extendable by stopbar loop.	During coordinated operation, the signal constantly cycles through main street FDW to improve response time to side street vehicle and pedestrian demand.
5. W/B Left Turn Arrow 	WLK FDW MIN 7 EXT 3 MAX1 7 MAX2 0 AMB 3 ALR 1 SPLIT	18	12	12	0	Callable/Extendable by Setback Loop	During free plan, signal rests in EWWK and does not cycle through EWFD unless there is side street vehicle or pedestrian demand. EWFD reverts to EWWK if there is no side street demand at the end of the EWFD.
6. Eastbound  Elgin Mills Rd (YR 49)	WLK 7 FDW 18 MIN 30 EXT 0 MAX1 30 MAX2 0 AMB 4.5 ALR 2.5 SPLIT	76	68	62	0	Fixed	
7.  NOT USED	WLK FDW MIN EXT MAX1 MAX2 AMB ALR SPLIT						**LEGEND:** SA - Semi-Actuated signal WLK - Walk time FDW - Flashing Don't Walk time MIN - Minimum green time EXT - Extension time MAX1 - Maximum green time 1 MAX2 - Maximum green time 2 AMB - Amber ALR -All Red CL - Cycle Length OF - Offset VP - Vehicle Permissive NSWK - North/South Walk EWWK - East/West Walk NSG - North/South Green EWG - East/West Green NSFD - North/South Flashing Don't Walk EWFD - East/West Flashing Don't Walk TSP - Transit Priority APS - Audible Pedestrian Signal RLC - Red Light Camera
8. Northbound  Newkirk Rd	WLK 7 FDW 21 MIN 10 EXT 3 MAX1 19 MAX2 0 AMB 4.0 ALR 3.0 SPLIT	36	40	36	0	Callable by stopbar loop and/or pushbutton; Extendable by stopbar loop.	
	CL OF VP	130 91 18	120 21 18	110 108 18	0 (FREE) 0 (FREE) 0 (FREE)		

NOTES:

LOCATION:	**Major Mackenzie Dr (YR 25) & Bathurst ST (YR 38)**					*MUNICIPALITY:*	**Vaughan**	N
CTCS:	**117**					*COMPUTER SYSTEM:*	**Centracs**	
MODE/COMMENT:	**SA**					*CONTROLLER/CABINET TYPE:*	**Econolite Cobalt / TS2T1**	
PREPARED/CHECKED BY:	**MQL**					*CONFLICT FLASH:*	**Red & Red**	
PREPARATION DATE:	**March 23, 2015**					*DESIGN WALK SPEED:*	**1.0 m/s (FDW based on full crossing at 1.2 m/s)**	
IMPLEMENTATION DATE:						*CHANNEL/DROP:*		

NEMA Phase (York)		AM 8:00-10:00 M-F	PM 17:30-19:00 M-F	OFF 10:00-16:00, 19:00-22:00 M-F & 9:00-22:00 Sat& Sun	AM 2 6:00-8:00 M-F	PM 2 16:00-17:30 M-F	Free 22:00-6:00 M-F & 22:00-9:00 Sat& Sun	Phase Mode (Fixed/Demanded/Callable)	Remarks
	Local Plan	Pattern 1	Pattern 2	Pattern 3	Pattern 4	Pattern 5	Pattern 99		
	System Plan	Plan 1	Plan 2	Plan 3	Plan 4	Plan 5	Plan 99		
1. E/B Left Turn Arrow	WLK							Callable/Extendable by Setback Loop	Pedestrian Minimums: EWWK = 7 sec., EWFD = 24 sec. NSWK = 7 sec., NSFD = 27 sec.
	FDW								
	MIN 7								
	EXT 3								NS phase is callable by vehicle or pedestrian actuation. If a vehicle call is received, the minimum NSG is 30 seconds. If ongoing vehicle demand exists on the stopbar loop, the NSG is capable of providing vehicle extensions up to the maximum green split during coordinated operation or 30 secs during Free operation. If a pedestrian call is received, the pedestrian minimum will be served. The NSWK & NSFD are only displayed on the pedestrian signal heads if a pedestrian call is received. Extension time is based on vehicle demand. Unused extension time is given to the EWG.
	MAX1 20								
	MAX2 0								
	AMB 3								
	ALR 1								
	SPLIT	13	19	13	13	19	0		
2. Westbound	WLK 7							Fixed	
	FDW 24								
	MIN 31								
	EXT 0								
	MAX1 31								
	MAX2 0								
	AMB 4.5								
Major Mackenzie Dr	ALR 2.5								
	SPLIT	50	47	42	43	40	0		
3. N/B Left Turn Arrow	WLK							Callable/Extendable by Setback Loop	
	FDW								
	MIN 7								During coordinated operation, the signal constantly cycles through main street FDW to improve response time to side street vehicle and pedestrian demand.
	EXT 3								
	MAX1 20								
	MAX2 0								During free plan, signal rests in EWWK and does not cycle through EWFD unless there is side street vehicle or pedestrian demand.
	AMB 3								
	ALR 1								
	SPLIT	12	12	12	12	12	0		
4. Southbound	WLK 7							Callable by stopbar loop and/or pushbutton; Extendable by stopbar loop.	EWFD reverts to EWWK if there is no side street demand at the end of the EWFD.
	FDW 27								
	MIN 30								
	EXT 3								
	MAX1 30								
	MAX2 0								
	AMB 4.5								
	ALR 2.5								
Bathurst St	SPLIT	65	62	53	72	69	0		
5. W/B Left Turn Arrow	WLK							Callable/Extendable by Setback Loop	
	FDW								
	MIN 7								
	EXT 3								
	MAX1 20								
	MAX2 0								
	AMB 3								
	ALR 1								
	SPLIT	13	16	13	13	12	0		
6. Eastbound	WLK 7							Fixed	
	FDW 24								
	MIN 31								
	EXT 0								
	MAX1 31								
	MAX2 0								
	AMB 4.5								
	ALR 2.5								
Major Mackenzie Dr	SPLIT	50	50	42	43	47	0		
7. S/B Left Turn Arrow	WLK							Callable/Extendable by Setback Loop	
	FDW								
	MIN 7								
	EXT 3								
	MAX1 20								
	MAX2 0								
	AMB 3								
	ALR 1								
	SPLIT	12	12	12	12	12	0		
8. Northbound	WLK 7							Callable by stopbar loop and/or pushbutton; Extendable by stopbar loop.	
	FDW 27								
	MIN 30								
	EXT 3								
	MAX1 30								
	MAX2 0								
	AMB 4.5								
	ALR 2.5								
Bathurst St	SPLIT	65	62	53	72	69	0		
	CL	140	140	120	140	140	0 (FREE)		
	OF	45	0	0	45	0	0 (FREE)		
	VP	24	24	24	24	24	0 (FREE)		

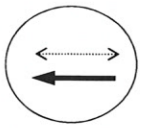
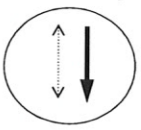
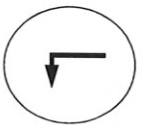
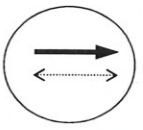
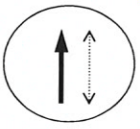
LEGEND:

SA - Semi-Actuated signal
WLK - Walk time
FDW - Flashing Don't Walk time
MIN - Minimum green time
EXT - Extension time
MAX1 - Maximum green time 1
MAX2 - Maximum green time 2
AMB - Amber
ALR -All Red
CL - Cycle Length
OF - Offset
VP - Vehicle Permissive
NSWK - North/South Walk
EWWK - East/West Walk
NSG - North/South Green
EWG - East/West Green
NSFD - North/South Flashing Don't Walk
EWFD - East/West Flashing Don't Walk
TSP - Transit Priority
APS - Audible Pedestrian Signal
RLC - Red Light Camera

NOTES:

LOCATION:	Major Mackenzie Dr (YR 25) & Bayview Ave (YR 34)	**MUNICIPALITY:**	Richmond Hill
CTCS:	109	**COMPUTER SYSTEM:**	Centracs
MODE/COMMENT:	SA	**CONTROLLER/CABINET TYPE:**	Econolite Cobalt / TS2T1
PREPARED/CHECKED BY:	JS	**CONFLICT FLASH:**	Red & Red
PREPARATION DATE:	September 24, 2019	**DESIGN WALK SPEED:**	1.0 m/s (FDW based on full crossing at 1.2 m/s)
IMPLEMENTATION DATE:	September 24, 2019	**CHANNEL/DROP:**	

N

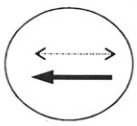
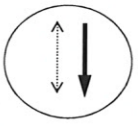
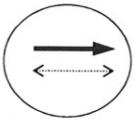
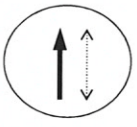
NEMA Phase (York)		AM 7:00-7:30 9:00-10:00 M-F	PM 15:00-16:00 18:00-19:30 M-F	OFF 10:00-15:00 19:30-23:00 M-F & 9:30-23:00 Sat & Sun	MAX 2 7:30-9:00 16:00-18:00 M-F	Free 23:00-7:00 M-F & 23:00-9:30 Sat & Sun	Phase Mode (Fixed/Demanded/Callable)	Remarks
	Local Plan	Pattern 1	Pattern 2	Pattern 3	Pattern 98	Pattern 99		
	System Plan	Plan 1	Plan 2	Plan 3	Plan 98	Plan 99		
1. E/B Left Turn Arrow 	WLK FDW MIN 7 EXT 3 MAX1 20 MAX2 20 AMB 3 ALR 1				USES MAX2		Callable/Extendable by Setback Loop	Pedestrian Minimums: EWWK = 7 sec., EWFD = 28 sec. NSWK = 7 sec., NSFD = 26 sec.
	SPLIT	12	12	12	0	0		
2. Westbound  Major Mackenzie Dr	WLK 7 FDW 28 MIN 15 EXT 6 MAX1 30 MAX2 60 AMB 4.5 ALR 3.0				USES MAX2		Ext. Recall	NS phase is callable by vehicle or pedestrian actuation. If a vehicle call is received, the minimum NSG is 15 seconds. If ongoing vehicle demand exists on the stopbar loop, the NSG is capable of providing vehicle extensions up to the maximum green split during coordinated operation or 40 secs during Free operation. If a pedestrian call is received, the pedestrian minimum will be served. The NSWK & NSFD are only displayed on the pedestrian signal heads if a pedestrian call is received. Extension time is based on vehicle demand. Unused extension time is given to the EWG.
	SPLIT	55	54	47	0	0		
3. N/B Left Turn Arrow 	WLK FDW MIN 7 EXT 3 MAX1 20 MAX2 20 AMB 3 ALR 1				USES MAX2		Callable/Extendable by Setback Loop	During coordinated operation, the signal constantly cycles through main street FDW to improve response time to side street vehicle and pedestrian demand.
	SPLIT	13	15	12	0	0		During free plan, signal rests in EWWK and does not cycle through EWFD unless there is side street vehicle or pedestrian demand.
4. Southbound  Bayview Ave	WLK 7 FDW 26 MIN 15 EXT 6 MAX1 40 MAX2 60 AMB 4.5 ALR 3.0				USES MAX2		Callable by stopbar loop and/or pushbutton; Extendable by stopbar loop.	EWFD reverts to EWWK if there is no side street demand at the end of the EWFD.
	SPLIT	60	59	49	0	0		**• Revised end time from 9:30 to 10:00 during AM peak** **• Revised MAX2 to run from 7:30 to 9:00**
5. W/B Left Turn Arrow 	WLK FDW MIN 7 EXT 3 MAX1 20 MAX2 20 AMB 3 ALR 1				USES MAX2		Callable/Extendable by Setback Loop	
	SPLIT	18	17	12	0	0		
6. Eastbound  Major Mackenzie Dr	WLK 7 FDW 28 MIN 15 EXT 6 MAX1 30 MAX2 60 AMB 4.5 ALR 3.0				USES MAX2		Ext. Recall	
	SPLIT	49	49	47	0	0		
7. S/B Left Turn Arrow 	WLK FDW MIN 7 EXT 3 MAX1 20 MAX2 20 AMB 3 ALR 1				USES MAX2		Callable/Extendable by Setback Loop	**LEGEND:** SA - Semi-Actuated signal WLK - Walk time FDW - Flashing Don't Walk time MIN - Minimum green time EXT - Extension time MAX1 - Maximum green time 1 MAX2 - Maximum green time 2 AMB - Amber ALR -All Red CL - Cycle Length OF - Offset VP - Vehicle Permissive NSWK - North/South Walk EWWK - East/West Walk NSG - North/South Green EWG - East/West Green NSFD - North/South Flashing Don't Walk EWFD - East/West Flashing Don't Walk TSP - Transit Priority APS - Audible Pedestrian Signal RLC - Red Light Camera
	SPLIT	15	15	12	0	0		
8. Northbound  Bayview Ave	WLK 7 FDW 26 MIN 15 EXT 6 MAX1 40 MAX2 60 AMB 4.5 ALR 3.0				USES MAX2		Callable by stopbar loop and/or pushbutton; Extendable by stopbar loop.	
	SPLIT	58	59	49	0	0		
	CL OF VP	140 55 28	140 103 28	120 16 28	0 (FREE) 0 (FREE) 0 (FREE)	0 (FREE) 0 (FREE) 0 (FREE)		

NOTES:

Temporary Construction Timings

LOCATION:	Major Mackenzie Dr (YR 25) & Bayview Ave (YR 34)
CTCS:	109
MODE/COMMENT:	SA
PREPARED/CHECKED BY:	JS
PREPARATION DATE:	October 2, 2019
IMPLEMENTATION DATE:	October 2, 2019
MUNICIPALITY:	Richmond Hill
COMPUTER SYSTEM:	Centracs
CONTROLLER/CABINET TYPE:	Econolite Cobalt / TS2T1
CONFLICT FLASH:	Red & Red
DESIGN WALK SPEED:	1.0 m/s (FDW based on full crossing at 1.2 m/s)
CHANNEL/DROP:	

N

NEMA Phase (York)		AM 7:00-7:30 9:00-10:00 M-F	PM 15:00-16:00 18:00-19:30 M-F	OFF 10:00-15:00 19:30-23:00 M-F & 9:30-23:00 Sat & Sun	MAX 2 7:30-9:00 16:00-18:00 M-F	Free 23:00-7:00 M-F & 23:00-9:30 Sat & Sun	Phase Mode (Fixed/Demanded/Callable)	Remarks
	Local Plan	Pattern 1	Pattern 2	Pattern 3	Pattern 98	Pattern 99		
	System Plan	Plan 1	Plan 2	Plan 3	Plan 98	Plan 99		
1. E/B Left Turn Arrow 	WLK						Callable/Extendable by Setback Loop	Pedestrian Minimums: EWWK = 7 sec., EWFD = 28 sec. NSWK = 7 sec., NSFD = 26 sec.
	FDW							
	MIN 7							
	EXT 3							
	MAX1 20							
	MAX2 20				USES MAX2			
	AMB 3							
	ALR 1							
	SPLIT	12	12	12	0	0		
2. Westbound 	WLK 7						Fixed	NS phase is callable by vehicle or pedestrian actuation. If a vehicle call is received, the minimum NSG is 15 seconds. If ongoing vehicle demand exists on the stopbar loop, the NSG is capable of providing vehicle extensions up to the maximum green split during coordinated operation or 40 secs during Free operation. If a pedestrian call is received, the pedestrian minimum will be served. The NSWK & NSFD are only displayed on the pedestrian signal heads if a pedestrian call is received. Extension time is based on vehicle demand. Unused extension time is given to the EWG.
	FDW 28							
	MIN 15							
	EXT 6							
	MAX1 30							
	MAX2 60				USES MAX2			
	AMB 4.5							
	ALR 3.0							
Major Mackenzie Dr	SPLIT	55	54	47	0	0		
3. N/B Left Turn Arrow 	WLK						Callable/Extendable by Setback Loop	During coordinated operation, the signal constantly cycles through main street FDW to improve response time to side street vehicle and pedestrian demand.
	FDW							
	MIN 7							
	EXT 3							
	MAX1 20							
	MAX2 20				USES MAX2			
	AMB 3							
	ALR 1							
	SPLIT	13	15	12	0	0		
4. Southbound 	WLK 7						Callable by stopbar loop and/or pushbutton; Extendable by stopbar loop.	During free plan, signal rests in EWWK and does not cycle through EWFD unless there is side street vehicle or pedestrian demand.
	FDW 26							
	MIN 15							
	EXT 6							
	MAX1 40							
	MAX2 60				USES MAX2			
	AMB 4.5							
	ALR 3.0							
Bayview Ave	SPLIT	60	59	49	0	0		
5. W/B Left Turn Arrow 	WLK						Callable/Extendable by Setback Loop	EWFD reverts to EWWK if there is no side street demand at the end of the EWFD.
	FDW							
	MIN 7							
	EXT 3							
	MAX1 20							
	MAX2 20				USES MAX2			
	AMB 3							
	ALR 1							
	SPLIT	18	17	12	0	0		
6. Eastbound 	WLK 7						Fixed	• Fixed for phases 2 & 6 • Ped recall for phases 2 & 6
	FDW 28							
	MIN 15							
	EXT 6							
	MAX1 30							
	MAX2 60				USES MAX2			
	AMB 4.5							
	ALR 3.0							
Major Mackenzie Dr	SPLIT	49	49	47	0	0		
7. S/B Left Turn Arrow 	WLK						Callable/Extendable by Setback Loop	
	FDW							
	MIN 7							
	EXT 3							
	MAX1 20							
	MAX2 20				USES MAX2			
	AMB 3							
	ALR 1							
	SPLIT	15	15	12	0	0		
8. Northbound 	WLK 7						Callable by stopbar loop and/or pushbutton; Extendable by stopbar loop.	
	FDW 26							
	MIN 15							
	EXT 6							
	MAX1 40							
	MAX2 60				USES MAX2			
	AMB 4.5							
	ALR 3.0							
Bayview Ave	SPLIT	58	59	49	0	0		
	CL	140	140	120	0 (FREE)	0 (FREE)		
	OF	55	103	16	0 (FREE)	0 (FREE)		
	VP	28	28	28	0 (FREE)	0 (FREE)		

LEGEND:

SA - Semi-Actuated signal
WLK - Walk time
FDW - Flashing Don't Walk time
MIN - Minimum green time
EXT - Extension time
MAX1 - Maximum green time 1
MAX2 - Maximum green time 2
AMB - Amber
ALR -All Red
CL - Cycle Length
OF - Offset
VP - Vehicle Permissive
NSWK - North/South Walk
EWWK - East/West Walk
NSG - North/South Green
EWG - East/West Green
NSFD - North/South Flashing Don't Walk
EWFD - East/West Flashing Don't Walk
TSP - Transit Priority
APS - Audible Pedestrian Signal
RLC - Red Light Camera

NOTES:

PEEK TRAFFIC

INTERSECTION NAME: **Yonge St. (YR 1) @ Gamble Rd./19th Ave. (YR 29)**
PROGRAMMED BY: T. Hanrahan
CONTOLLER SERIAL #:

CTCS #: 501
ADDRESS: 11
SECURITY CODE: **1000**
PROGRAM DATE: May 7/13
INSTALLATION DATE: 29-Mar-05

MEMORY/RECALL/CNA (MM-2-2-1)

	1	2	3	4	5	6	7	8
MEMORY	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
EXT RECALL	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
MAX RECALL	OFF	**ON**	OFF	OFF	OFF	**ON**	OFF	OFF
PED RECALL	OFF	**ON**	OFF	OFF	OFF	**ON**	OFF	OFF
CNA I	OFF	**ON**	OFF	OFF	OFF	**ON**	OFF	OFF
CNA II	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
FL WALK	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
SOFT RECALL	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
WALK REST	OFF	**ON**	OFF	OFF	OFF	**ON**	OFF	OFF
COND PED	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
FWTPCL	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF

1 -	**Northbound LT**	**5 -**	**Not Used**
2 -	**Southbound**	**6 -**	**Northbound**
3 -	**Westbound LT**	**7 -**	**Eastbound LT**
4 -	**Eastbound**	**8 -**	**Westbound**

PHASE TIMINGS (MM-2-2-2)

	1	2	3	4	5	6	7	8
MIN GREEN	**7**	**35**	**7**	**20**	0	**35**	**7**	**20**
PASSAGE	**3.0**	0	**3.0**	**3.0**	0	0	**3.0**	**3.0**
YELLOW	**3.0**	**4.5**	**3.0**	**4.5**	0	**4.5**	**3.0**	**4.5**
RED	**1.0**	**3.0**	**1.0**	**3.0**	0	**3.0**	**1.0**	**3.0**
MAX I	**7**	**35**	**7**	**20**	0	**35**	**7**	**20**
MAX II	**7**	**50**	**7**	**40**	0	**50**	**7**	**40**
WALK	0	**7**	0	**7**	0	**7**	0	**7**
PED CLEAR	0	**27**	0	**28**	0	**27**	0	**28**
S/A	0	0	0	0	0	0	0	0
TBR	0	0	0	0	0	0	0	0
TTR	0	0	0	0	0	0	0	0
MIN GAP	0	0	0	0	0	0	0	0
MAX VI	0	0	0	0	0	0	0	0
MAX EXT	0	0	0	0	0	0	0	0
AUTO MAX	0	0	0	0	0	0	0	0
AMR	0	0	0	0	0	0	0	0

Range: 0-9.9 or 127 except max times and auto max which are 0 -255 secs.

PHASES USED (MM-2-2-3-1)

PHASE	1	2	3	4	5	6	7	8
ON/OFF	**ON**	**ON**	**ON**	**ON**	**OFF**	**ON**	**ON**	**ON**

SEQUENCE (MM-2-2-3-2)

2	1=Sequential, 2= Dual Ring, 3-7= Spec, 8=Lead/Lag

LEAD/LAG MODES (MM-2-2-3-2-PGDN....only if Seq = Lead/Lag)

PAIRS	1 AND 2	3 AND 4	5 AND 6	7 AND 8
CODE				

Codes: 1 = No Reversal, 2 = Always Reverse, 3 = Rev. by CSO or Clock

LEAD/LAG BARRIERS (MM-2-2-3-2-PGDN-PGDN...only if lead/lag

LEAD/LAG BARRIERS ARE:		ON/OFF

On = Barriers after each ring 1 and 2 phase pair in a vertical column

SPECIAL INCOMPATIBILITIES (MM-2-2-3-3)

PHASE	1	2	3	4	5	6	7	8
INCOMPAT PH 1-8								
INCOMPAT PH 1-8								

INITILAIZE / FLASH (MM-2-2-4) 1 =RED, 2 = YEL., 3 = GRN

	INITILIZE	ENTER FL	EXIT FL
RING 1 PHASE	**2**	**2**	**2**
RING 2 PHASE	**6**	**6**	**6**
INTERVAL	**1**	**1**	**1**

NOTE: Enter flash interval is permanently set to 1 (RED)

POWER-UP RESTART TIMINGS (MM-2-2-4-PGDN)

MINIMUM FLASH		(0-9.9 or 127 SECONDS)
1ST ALL RED AFTER FLASH		(0-9.9 or 127 SECONDS)

NOTE: Blanks = 0, OFF, or controller default values

31-Oct-2017

Regional Municipality of York
Centralized Traffic Control System
Timing Pattern Summary Report - Intersection

York Region

Intersection Name : **Yonge St. - Gamble Road**

Pattern Name	Mode	Cycle	Splits (sec)	offset	Max Green	Omits	Veh. Recall	Ped.Omits	Ped. Recalls	Spec. O/P
AM Peak	TBC	130	12 62 12 44 00 74 12 44	10	11111111	NNNNNNNN	XXXXXXXX	NNNN	NNNN	********
Free Plan	Free	0	00 00 00 00 00 00 00 00	0	11111111	NNNNNNNN	XXXXXXXX	NNNN	NNNN	********
Off Peak	TBC	120	12 52 12 44 00 64 12 44	41	11111111	NNNNNNNN	XXXXXXXX	NNNN	NNNN	********
PM Peak	TBC	130	12 62 12 44 00 74 12 44	95	11111111	NNNNNNNN	XXXXXXXX	NNNN	NNNN	********

06-Aug-2013

Regional Municipality of York
Centralized Traffic Control System
Controller Scheduler Summary - Intersection

Intersection Name : **Yonge St. - Gamble Road**

Weekly Plan : **Yonge at Gamble**

Time of Day	Timing Pattern	MON	TUE	WED	THU	FRI	SAT	SUN
06:00	AM Peak	X	X	X	X	X	-	-
08:00	Off Peak	-	-	-	-	-	X	X
10:00	Off Peak	X	X	X	X	X	-	-
16:00	PM Peak	X	X	X	X	X	-	-
20:00	Off Peak	X	X	X	X	X	-	-
22:00	Free Plan	X	X	X	X	X	X	X

Annual Calendar: **Yonge at Gamble**

Default Weekly Schedule : **Yonge at Gamble**

Date	Schedule (If blank, use the default weekly schedule)

INTERSECTION NAME: **Yonge St. @ Major Mackenzie Dr.**
PROGRAMMED BY: T. Hanrahan
CONTOLLER SERIAL #:

CTCS #:
ADDRESS:
SECURITY CODE: **1000**
PROGRAM DATE: May 7/2013
INSTALLATION DATE:

MEMORY/RECALL/CNA (MM-2-2-1)

	1	2	3	4	5	6	7	8
MEMORY	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
EXT RECALL	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
MAX RECALL	OFF	**ON**	OFF	OFF	OFF	**ON**	OFF	OFF
PED RECALL	OFF	**ON**	OFF	OFF	OFF	**ON**	OFF	OFF
CNA I	OFF	**ON**	OFF	OFF	OFF	**ON**	OFF	OFF
CNA II	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
FL WALK	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
SOFT RECALL	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
WALK REST	OFF	**ON**	OFF	OFF	OFF	**ON**	OFF	OFF
COND PED	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
FWTPCL	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF

1 -	**NBLT Arrow**	**5 -**	**SBLT Arrow**
2 -	**Southbound**	**6 -**	**Northbound**
3 -	**WBLT Arrow**	**7 -**	**EBLT Arrow**
4 -	**Eastbound**	**8 -**	**Westbound**

PHASE TIMINGS (MM-2-2-2)

	1	2	3	4	5	6	7	8
MIN GREEN	**7**	**30**	**7**	**10**	**7**	**30**	**7**	**10**
PASSAGE	**3.0**	0	**3.0**	**3.0**	**3.0**	0	**3.0**	**3.0**
YELLOW	**3.0**	**4.0**	**3.0**	**4.0**	**3.0**	**4.0**	**3.0**	**4.0**
RED	**1.0**	**3.0**	**1.0**	**3.0**	**1.0**	**3.0**	**1.0**	**3.0**
MAX I	**7**	**30**	**7**	**19**	**7**	**30**	**7**	**19**
MAX II	**12**	**50**	**12**	**50**	**12**	**50**	**12**	**50**
WALK	0	**7**	0	**7**	0	**7**	0	**7**
PED CLEAR	0	**22**	0	**25**	0	**22**	0	**25**
S/A	0	0	0	0	0	0	0	0
TBR	0	0	0	0	0	0	0	0
TTR	0	0	0	0	0	0	0	0
MIN GAP	0	0	0	0	0	0	0	0
MAX VI	0	0	0	0	0	0	0	0
MAX EXT	0	0	0	0	0	0	0	0
AUTO MAX	0	0	0	0	0	0	0	0
AMR	0	0	0	0	0	0	0	0

Range: 0-9.9 or 127 except max times and auto max which are 0 -255 secs.

PHASES USED (MM-2-2-3-1)

PHASE	1	2	3	4	5	6	7	8
ON/OFF	**ON**	**ON**	**ON**	**ON**	**ON**	**ON**	**ON**	**ON**

SEQUENCE (MM-2-2-3-2)

2	1=Sequential, 2= Dual Ring, 3-7= Spec, 8=Lead/Lag

LEAD/LAG MODES (MM-2-2-3-2-PGDN....only if Seq = Lead/Lag)

PAIRS	1 AND 2	3 AND 4	5 AND 6	7 AND 8
CODE				

Codes: 1 = No Reversal, 2 = Always Reverse, 3 = Rev. by CSO or Clock

LEAD/LAG BARRIERS (MM-2-2-3-2-PGDN-PGDN...only if lead/lag

LEAD/LAG BARRIERS ARE:		ON/OFF

On = Barriers after easch ring 1 and 2 phase pair in a vertical column

SPECIAL INCOMPATIBILITIES (MM-2-2-3-3)

PHASE	1	2	3	4	5	6	7	8
INCOMPAT PH 1-8								
INCOMPAT PH 1-8								

INITILAIZE / FLASH (MM-2-2-4) 1 =RED, 2 = YEL., 3 = GRN

	INITILIZE	ENTER FL	EXIT FL
RING 1 PHASE	**2**	**2**	**2**
RING 2 PHASE	**6**	**6**	**6**
INTERVAL	**1**	**1**	**1**

NOTE: Enter flash interval is permanently set to 1 (RED)

POWER-UP RESTART TIMINGS (MM-2-2-4-PGDN)

MINIMUM FLASH		(0-9.9 or 127 SECONDS)
1ST ALL RED AFTER FLASH		(0-9.9 or 127 SECONDS)

NOTE: Blanks = 0, OFF, or controller default values

22-Apr-2014

Regional Municipality of York
Centralized Traffic Control System
Timing Pattern Summary Report - Intersection

Intersection Name : **Yonge St. - Major Mackenzie Dr.**

Pattern Name	Mode	Cycle	Splits (sec)	offset	Max Green	Omits	Veh. Recall	Ped.Omits	Ped. Recalls	Spec. O/P
AM Peak	TBC	140	12 61 12 55 12 61 12 55	0	11111111	NNNNNNNN	XXXXXXXX	NNNN	NNNN	********
Free Plan	Free	0	00 00 00 00 00 00 00 00	0	11111111	NNNNNNNN	XXXXXXXX	NNNN	NNNN	********
Off Peak	TBC	130	12 56 12 50 12 56 12 50	0	11111111	NNNNNNNN	XXXXXXXX	NNNN	NNNN	********
PM Peak	TBC	140	12 60 12 56 12 60 12 56	0	11111111	NNNNNNNN	XXXXXXXX	NNNN	NNNN	********

04-Sep-2013

Regional Municipality of York
Centralized Traffic Control System
Controller Scheduler Summary - Intersection

York Region

Intersection Name : **Yonge St. - Major Mackenzie Dr.**

Weekly Plan : **Yonge at Major Mack**

Time of Day	Timing Pattern	MON	TUE	WED	THU	FRI	SAT	SUN
06:00	AM Peak	X	X	X	X	X	-	-
08:00	Off Peak	-	-	-	-	-	X	X
10:00	Off Peak	X	X	X	X	X	-	-
16:00	PM Peak	X	X	X	X	X	-	-
20:00	Off Peak	X	X	X	X	X	-	-
22:00	Free Plan	X	X	X	X	X	X	X

Annual Calendar: **Yonge at Major Mack**

Default Weekly Schedule : **Yonge at Major Mack**

Date	Schedule (If blank, use the default weekly schedule)

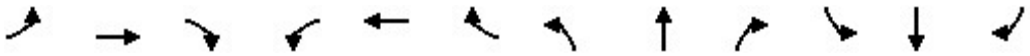
Appendix D – Synchro Reports

City of Richmond Hill Yonge/Bernard Key Development Area Peer Review and Transportation Assessment Update

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	120	951	206	92	858	31	130	569	50	514	827	440
Future Volume (vph)	120	951	206	92	858	31	130	569	50	514	827	440
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Total Lost time (s)	3.0	6.0	6.0	3.0	6.0		3.0	6.0		3.0	6.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.89	1.00	1.00		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.99		1.00	0.95	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1863	3619	1465	1845	3597		1792	3478		1861	3390	
Flt Permitted	0.09	1.00	1.00	0.09	1.00		0.12	1.00		0.11	1.00	
Satd. Flow (perm)	182	3619	1465	181	3597		236	3478		224	3390	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	141	1119	242	108	1009	36	153	669	59	605	973	518
RTOR Reduction (vph)	0	0	129	0	2	0	0	5	0	0	50	0
Lane Group Flow (vph)	141	1119	113	108	1043	0	153	723	0	605	1441	0
Confl. Peds. (#/hr)			78	78			7		54	54		7
Heavy Vehicles (%)	2%	5%	3%	3%	5%	8%	6%	7%	9%	2%	3%	10%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases	4		4	8			6			2		
Actuated Green, G (s)	49.0	42.0	42.0	49.0	42.0		39.0	31.0		73.0	61.0	
Effective Green, g (s)	51.0	43.0	43.0	51.0	43.0		41.0	32.0		74.0	62.0	
Actuated g/C Ratio	0.36	0.31	0.31	0.36	0.31		0.29	0.23		0.53	0.44	
Clearance Time (s)	4.0	7.0	7.0	4.0	7.0		4.0	7.0		4.0	7.0	
Vehicle Extension (s)	2.0	3.0	3.0	2.0	3.0		2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	162	1111	449	161	1104		169	794		574	1501	
v/s Ratio Prot	c0.05	c0.31		0.04	0.29		0.06	0.21		c0.29	0.42	
v/s Ratio Perm	0.27		0.08	0.21			0.21			c0.26		
v/c Ratio	0.87	1.01	0.25	0.67	0.94		0.91	0.91		1.05	0.96	
Uniform Delay, d1	36.0	48.5	36.4	35.8	47.3		41.3	52.6		41.7	37.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	35.5	28.8	0.3	8.3	15.5		42.0	16.5		52.6	15.5	
Delay (s)	71.5	77.3	36.7	44.1	62.8		83.3	69.1		94.3	53.3	
Level of Service	E	E	D	D	E		F	E		F	D	
Approach Delay (s)		70.2			61.1			71.5			65.1	
Approach LOS		E			E			E			E	

Intersection Summary			
HCM 2000 Control Delay	66.7	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.05		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	101.1%	ICU Level of Service	G
Analysis Period (min)	15		

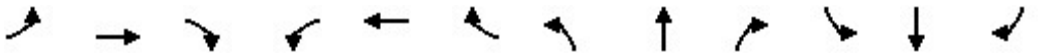
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	5	332	9	37	227	78	15	22	60	37	104	10
Future Volume (vph)	5	332	9	37	227	78	15	22	60	37	104	10
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Hourly flow rate (vph)	6	386	10	43	264	91	17	26	70	43	121	12

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	402	398	113	176
Volume Left (vph)	6	43	17	43
Volume Right (vph)	10	91	70	12
Hadj (s)	0.02	-0.05	-0.32	0.03
Departure Headway (s)	5.5	5.5	6.2	6.4
Degree Utilization, x	0.62	0.60	0.19	0.31
Capacity (veh/h)	622	630	476	493
Control Delay (s)	16.9	16.4	10.7	12.2
Approach Delay (s)	16.9	16.4	10.7	12.2
Approach LOS	C	C	B	B

Intersection Summary				
Delay	15.3			
Level of Service	C			
Intersection Capacity Utilization	59.9%	ICU Level of Service	B	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	186	213	28	155	15	172	9	705	170	179	1484	238
Future Volume (vph)	186	213	28	155	15	172	9	705	170	179	1484	238
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	2000	2000	2000	2000	2000	2000
Total Lost time (s)	7.0	7.0		7.0	7.0		3.0	6.0		3.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	0.95		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	0.97	1.00		0.96	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	0.86		1.00	0.97		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1750	1813		1664	1536		1863	3490		1863	3574	
Flt Permitted	0.52	1.00		0.42	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	963	1813		728	1536		1863	3490		1863	3574	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	200	229	30	167	16	185	10	758	183	192	1596	256
RTOR Reduction (vph)	0	4	0	0	140	0	0	15	0	0	8	0
Lane Group Flow (vph)	200	255	0	167	61	0	10	926	0	192	1844	0
Confl. Peds. (#/hr)	34		54	54		34	29		19	19		29
Confl. Bikes (#/hr)			1						1			2
Heavy Vehicles (%)	0%	2%	2%	4%	3%	1%	2%	4%	6%	2%	3%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	6	0	0	8
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	30.3	30.3		30.3	30.3		1.4	62.9		17.8	79.3	
Effective Green, g (s)	31.3	31.3		31.3	31.3		2.4	63.9		18.8	80.3	
Actuated g/C Ratio	0.24	0.24		0.24	0.24		0.02	0.49		0.14	0.62	
Clearance Time (s)	8.0	8.0		8.0	8.0		4.0	7.0		4.0	7.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	231	436		175	369		34	1715		269	2207	
v/s Ratio Prot		0.14			0.04		0.01	0.27		c0.10	c0.52	
v/s Ratio Perm	0.21			c0.23								
v/c Ratio	0.87	0.59		0.95	0.16		0.29	0.54		0.71	0.84	
Uniform Delay, d1	47.3	43.6		48.6	39.0		63.0	22.9		53.0	19.6	
Progression Factor	1.00	1.00		1.00	1.00		1.05	0.93		1.41	0.28	
Incremental Delay, d2	27.0	2.0		54.3	0.2		4.6	1.2		4.6	2.1	
Delay (s)	74.3	45.6		102.9	39.2		70.9	22.5		79.2	7.6	
Level of Service	E	D		F	D		E	C		E	A	
Approach Delay (s)		58.1			68.1			23.0			14.4	
Approach LOS		E			E			C			B	

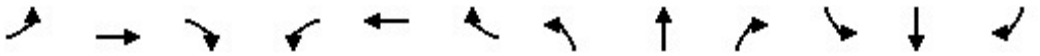
Intersection Summary			
HCM 2000 Control Delay	26.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	104.2%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	256	97	237	99	95	105	40	31	27	157	266	203
Future Volume (vph)	256	97	237	99	95	105	40	31	27	157	266	203
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.97		1.00	0.94		1.00	0.95		1.00	0.97	
Flpb, ped/bikes	0.94	1.00		0.99	1.00		0.99	1.00		0.92	1.00	
Frt	1.00	0.89		1.00	0.92		1.00	0.93		1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1671	1605		1746	1594		1662	1552		1533	1702	
Flt Permitted	0.58	1.00		0.41	1.00		0.26	1.00		0.71	1.00	
Satd. Flow (perm)	1022	1605		753	1594		460	1552		1149	1702	
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	305	115	282	118	113	125	48	37	32	187	317	242
RTOR Reduction (vph)	0	118	0	0	53	0	0	18	0	0	36	0
Lane Group Flow (vph)	305	279	0	118	185	0	48	51	0	187	523	0
Confl. Peds. (#/hr)	62		30	30		62	30		63	63		30
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	1%	5%	2%	2%	5%	2%	7%	4%	13%	8%	2%	1%
Bus Blockages (#/hr)	0	0	0	0	0	1	0	0	5	0	0	2
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	31.0	31.0		31.0	31.0		32.0	32.0		32.0	32.0	
Effective Green, g (s)	32.0	32.0		32.0	32.0		33.0	33.0		33.0	33.0	
Actuated g/C Ratio	0.43	0.43		0.43	0.43		0.44	0.44		0.44	0.44	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	436	684		321	680		202	682		505	748	
v/s Ratio Prot		0.17			0.12			0.03			c0.31	
v/s Ratio Perm	c0.30			0.16			0.10			0.16		
v/c Ratio	0.70	0.41		0.37	0.27		0.24	0.07		0.37	0.70	
Uniform Delay, d1	17.6	14.9		14.6	13.9		13.1	12.2		14.0	17.0	
Progression Factor	1.00	1.00		1.00	1.00		0.81	0.79		1.00	1.00	
Incremental Delay, d2	9.0	1.8		3.2	1.0		2.7	0.2		2.1	5.4	
Delay (s)	26.6	16.7		17.8	14.9		13.3	9.8		16.1	22.3	
Level of Service	C	B		B	B		B	A		B	C	
Approach Delay (s)		21.0			15.9			11.2			20.8	
Approach LOS		C			B			B			C	

Intersection Summary			
HCM 2000 Control Delay	19.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	80.8%	ICU Level of Service	D
Analysis Period (min)	15		

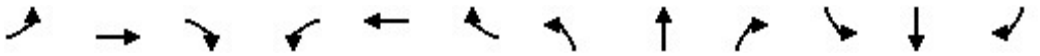
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	62	310	57	0	380	25	0	0	0	140	85	67
Future Volume (Veh/h)	62	310	57	0	380	25	0	0	0	140	85	67
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	67	337	62	0	413	27	0	0	0	152	92	73
Pedestrians		1			14			49			28	
Lane Width (m)		3.6			3.6			3.6			3.6	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		0			1			4			2	
Right turn flare (veh)												
Median type		TWLTL			None							
Median storage veh)		2										
Upstream signal (m)					245							
pX, platoon unblocked	0.89						0.89	0.89		0.89	0.89	0.89
vC, conflicting volume	468			448			1098	1019	431	970	1036	456
vC1, stage 1 conf vol							551	551		454	454	
vC2, stage 2 conf vol							546	468		516	582	
vCu, unblocked vol	336			448			1046	957	431	903	977	322
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	94			100			100	100	100	63	76	88
cM capacity (veh/h)	1069			1067			283	375	592	416	384	620

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	466	440	0	0	152	165
Volume Left	67	0	0	0	152	0
Volume Right	62	27	0	0	0	73
cSH	1069	1700	1700	1700	416	462
Volume to Capacity	0.06	0.26	0.00	0.00	0.37	0.36
Queue Length 95th (m)	1.6	0.0	0.0	0.0	13.2	12.8
Control Delay (s)	1.8	0.0	0.0	0.0	18.5	17.1
Lane LOS	A		A	A	C	C
Approach Delay (s)	1.8	0.0	0.0		17.8	
Approach LOS			A		C	

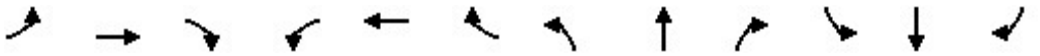
Intersection Summary				
Average Delay	5.3			
Intersection Capacity Utilization	69.8%	ICU Level of Service		C
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	162	147	135	53	275	75	79	659	85	140	1522	10
Future Volume (vph)	162	147	135	53	275	75	79	659	85	140	1522	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	2000	2000	2000	2000	2000	2000
Total Lost time (s)	7.0	7.0		7.0	7.0		3.0	6.5	6.5	3.0	6.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes	1.00	0.86		1.00	0.98		1.00	1.00	0.81	1.00	1.00	
Flpb, ped/bikes	0.95	1.00		0.82	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.93		1.00	0.97		1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1695	2850		1350	3297		1759	3654	1260	1827	3682	
Flt Permitted	0.47	1.00		0.54	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	836	2850		767	3297		1759	3654	1260	1827	3682	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	172	156	144	56	293	80	84	701	90	149	1619	11
RTOR Reduction (vph)	0	94	0	0	19	0	0	0	48	0	0	0
Lane Group Flow (vph)	172	206	0	56	354	0	84	701	42	149	1630	0
Confl. Peds. (#/hr)	85		255	255		85	110		150	150		110
Confl. Bikes (#/hr)			2			1						
Heavy Vehicles (%)	1%	3%	0%	10%	3%	6%	8%	4%	5%	4%	3%	4%
Bus Blockages (#/hr)	0	0	6	0	0	3	0	0	11	0	0	3
Turn Type	Perm	NA		Perm	NA		Prot	NA	Perm	Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8					2			
Actuated Green, G (s)	36.4	36.4		36.4	36.4		8.6	59.4	59.4	14.7	65.5	
Effective Green, g (s)	37.4	37.4		37.4	37.4		9.6	60.4	60.4	15.7	66.5	
Actuated g/C Ratio	0.29	0.29		0.29	0.29		0.07	0.46	0.46	0.12	0.51	
Clearance Time (s)	8.0	8.0		8.0	8.0		4.0	7.5	7.5	4.0	7.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	240	819		220	948		129	1697	585	220	1883	
v/s Ratio Prot		0.07			0.11		0.05	0.19		c0.08	c0.44	
v/s Ratio Perm	c0.21			0.07					0.03			
v/c Ratio	0.72	0.25		0.25	0.37		0.65	0.41	0.07	0.68	0.87	
Uniform Delay, d1	41.5	35.6		35.6	36.9		58.6	23.1	19.3	54.7	27.8	
Progression Factor	1.00	1.00		1.00	1.00		1.36	0.39	0.24	1.23	0.41	
Incremental Delay, d2	9.8	0.2		0.6	0.2		10.7	0.7	0.2	6.6	4.7	
Delay (s)	51.3	35.7		36.2	37.2		90.7	9.8	4.9	73.8	16.0	
Level of Service	D	D		D	D		F	A	A	E	B	
Approach Delay (s)		41.4			37.1			17.1			20.8	
Approach LOS		D			D			B			C	

Intersection Summary			
HCM 2000 Control Delay	24.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	16.5
Intersection Capacity Utilization	104.9%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group



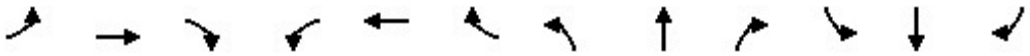
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	108	141	129	83	147	13	90	196	22	9	518	198
Future Volume (vph)	108	141	129	83	147	13	90	196	22	9	518	198
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0			5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			0.95			0.95	
Frpb, ped/bikes	1.00	0.98		1.00	1.00			1.00			0.99	
Flpb, ped/bikes	0.98	1.00		0.98	1.00			1.00			1.00	
Frt	1.00	0.93		1.00	0.99			0.99			0.96	
Flt Protected	0.95	1.00		0.95	1.00			0.99			1.00	
Satd. Flow (prot)	1641	3229		1694	3491			3407			3346	
Flt Permitted	0.64	1.00		0.57	1.00			0.62			0.95	
Satd. Flow (perm)	1105	3229		1014	3491			2158			3180	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	120	157	143	92	163	14	100	218	24	10	576	220
RTOR Reduction (vph)	0	88	0	0	9	0	0	7	0	0	52	0
Lane Group Flow (vph)	120	212	0	92	168	0	0	335	0	0	754	0
Confl. Peds. (#/hr)	15		39	39		15	47		24	24		47
Heavy Vehicles (%)	8%	0%	3%	4%	2%	0%	2%	3%	4%	0%	2%	2%
Bus Blockages (#/hr)	0	0	4	0	0	1	0	0	0	0	0	6
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	28.0	28.0		28.0	28.0			35.0			35.0	
Effective Green, g (s)	29.0	29.0		29.0	29.0			36.0			36.0	
Actuated g/C Ratio	0.39	0.39		0.39	0.39			0.48			0.48	
Clearance Time (s)	6.0	6.0		6.0	6.0			6.0			6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	427	1248		392	1349			1035			1526	
v/s Ratio Prot		0.07			0.05							
v/s Ratio Perm	c0.11			0.09				0.16			c0.24	
v/c Ratio	0.28	0.17		0.23	0.12			0.32			0.49	
Uniform Delay, d1	15.8	15.1		15.5	14.8			12.0			13.3	
Progression Factor	1.00	1.00		1.00	1.00			1.00			0.77	
Incremental Delay, d2	1.6	0.3		1.4	0.2			0.8			1.0	
Delay (s)	17.5	15.4		16.9	15.0			12.8			11.3	
Level of Service	B	B		B	B			B			B	
Approach Delay (s)		16.0			15.7			12.8			11.3	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	13.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	91.7%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	143	0	0	0	0	864	0	0	1704	0
Future Volume (vph)	0	0	143	0	0	0	0	864	0	0	1704	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	2000	2000	2000	2000	2000	2000
Total Lost time (s)			7.0					6.0			6.0	
Lane Util. Factor			1.00					0.95			0.95	
Frpb, ped/bikes			0.98					1.00			1.00	
Flpb, ped/bikes			1.00					1.00			1.00	
Frt			0.85					1.00			1.00	
Flt Protected			1.00					1.00			1.00	
Satd. Flow (prot)			1232					3619			3689	
Flt Permitted			1.00					1.00			1.00	
Satd. Flow (perm)			1232					3619			3689	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	0	0	146	0	0	0	0	882	0	0	1739	0
RTOR Reduction (vph)	0	0	87	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	59	0	0	0	0	882	0	0	1739	0
Confl. Peds. (#/hr)	51		3	3		51	65		29	29		65
Heavy Vehicles (%)	0%	0%	29%	5%	0%	0%	10%	5%	2%	3%	3%	0%
Turn Type	Perm		Perm	Perm			Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)			22.5					92.5			92.5	
Effective Green, g (s)			23.5					93.5			93.5	
Actuated g/C Ratio			0.18					0.72			0.72	
Clearance Time (s)			8.0					7.0			7.0	
Vehicle Extension (s)			3.0					3.0			3.0	
Lane Grp Cap (vph)			222					2602			2653	
v/s Ratio Prot								0.24			c0.47	
v/s Ratio Perm			c0.05									
v/c Ratio			0.27					0.34			0.66	
Uniform Delay, d1			45.8					6.8			9.7	
Progression Factor			1.00					2.80			0.19	
Incremental Delay, d2			0.6					0.3			0.7	
Delay (s)			46.5					19.3			2.6	
Level of Service			D					B			A	
Approach Delay (s)		46.5			0.0			19.3			2.6	
Approach LOS		D			A			B			A	

Intersection Summary			
HCM 2000 Control Delay	10.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	16.5
Intersection Capacity Utilization	78.0%	ICU Level of Service	D
Analysis Period (min)	15		

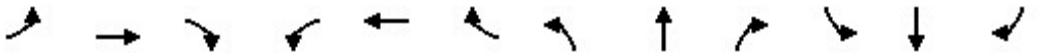
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	0	0	0	118	0	0	0	310	50	0	713	0
Future Volume (vph)	0	0	0	118	0	0	0	310	50	0	713	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	0	0	0	126	0	0	0	330	53	0	759	0

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	0	126	165	218	380	380
Volume Left (vph)	0	126	0	0	0	0
Volume Right (vph)	0	0	0	53	0	0
Hadj (s)	0.00	0.23	0.05	-0.13	0.03	0.03
Departure Headway (s)	6.5	6.3	5.9	5.7	5.4	5.4
Degree Utilization, x	0.00	0.22	0.27	0.34	0.57	0.57
Capacity (veh/h)	507	526	593	613	652	654
Control Delay (s)	9.5	11.1	9.8	10.4	14.2	14.2
Approach Delay (s)	0.0	11.1	10.1		14.2	
Approach LOS	A	B	B		B	

Intersection Summary				
Delay	12.6			
Level of Service	B			
Intersection Capacity Utilization	34.0%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	0	0	0	0	864	0	0	1839	0
Future Volume (Veh/h)	0	0	0	0	0	0	0	864	0	0	1839	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	0	0	0	939	0	0	1999	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)								250			113	
pX, platoon unblocked	0.80	0.80	0.73	0.80	0.80	0.85	0.73			0.85		
vC, conflicting volume	2468	2938	1000	1938	2938	470	1999			939		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1518	2103	254	856	2103	37	1626			587		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	100	100	100	100			100		
cM capacity (veh/h)	66	41	543	201	41	877	288			841		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	0	0	470	470	1000	1000
Volume Left	0	0	0	0	0	0
Volume Right	0	0	0	0	0	0
cSH	1700	1700	1700	1700	1700	1700
Volume to Capacity	0.00	0.00	0.28	0.28	0.59	0.59
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Lane LOS	A	A				
Approach Delay (s)	0.0	0.0	0.0		0.0	
Approach LOS	A	A				

Intersection Summary				
Average Delay	0.0			
Intersection Capacity Utilization	51.6%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	86	1137	353	99	983	151	94	652	149	238	1280	322
Future Volume (vph)	86	1137	353	99	983	151	94	652	149	238	1280	322
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Total Lost time (s)	3.0	7.0	7.0	3.0	7.0	7.0	3.0	6.5	6.5	3.0	6.5	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.97	1.00	1.00	0.97	1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1809	3619	1584	1845	3486	1536	1863	3654	1630	1863	3510	
Flt Permitted	0.11	1.00	1.00	0.11	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	200	3619	1584	204	3486	1536	1863	3654	1630	1863	3510	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	86	1137	353	99	983	151	94	652	149	238	1280	322
RTOR Reduction (vph)	0	0	115	0	0	98	0	0	96	0	17	0
Lane Group Flow (vph)	86	1137	238	99	983	53	94	652	53	238	1585	0
Confl. Peds. (#/hr)	18		16	16		18	15		18	18		15
Heavy Vehicles (%)	5%	5%	3%	3%	9%	6%	2%	4%	1%	2%	4%	6%
Bus Blockages (#/hr)	0	0	3	0	0	3	0	0	0	0	0	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Prot	NA	Perm	Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8			2			
Actuated Green, G (s)	44.0	37.0	37.0	44.0	37.0	37.0	7.0	41.5	41.5	21.0	55.5	
Effective Green, g (s)	46.0	38.0	38.0	46.0	38.0	38.0	8.0	42.5	42.5	22.0	56.5	
Actuated g/C Ratio	0.35	0.29	0.29	0.35	0.29	0.29	0.06	0.33	0.33	0.17	0.43	
Clearance Time (s)	4.0	8.0	8.0	4.0	8.0	8.0	4.0	7.5	7.5	4.0	7.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	169	1057	463	173	1018	448	114	1194	532	315	1525	
v/s Ratio Prot	0.03	c0.31		c0.04	0.28		c0.05	0.18		0.13	c0.45	
v/s Ratio Perm	0.15		0.15	0.17		0.03			0.03			
v/c Ratio	0.51	1.08	0.51	0.57	0.97	0.12	0.82	0.55	0.10	0.76	1.04	
Uniform Delay, d1	32.3	46.0	38.3	33.4	45.4	33.7	60.3	35.8	30.4	51.4	36.8	
Progression Factor	1.00	1.00	1.00	1.60	0.68	1.41	1.00	1.00	1.00	1.05	0.53	
Incremental Delay, d2	2.4	50.4	1.0	3.5	17.1	0.1	36.2	1.8	0.4	8.1	31.7	
Delay (s)	34.7	96.4	39.3	56.9	47.8	47.7	96.5	37.6	30.8	62.1	51.0	
Level of Service	C	F	D	E	D	D	F	D	C	E	D	
Approach Delay (s)		80.3			48.5			42.7			52.5	
Approach LOS		F			D			D			D	

Intersection Summary			
HCM 2000 Control Delay	57.9	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	19.5
Intersection Capacity Utilization	103.5%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	1412	61	68	1087	337	14	4	68	665	113	108
Future Volume (vph)	19	1412	61	68	1087	337	14	4	68	665	113	108
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	6.5	6.5	6.5	6.5	6.5	6.5	6.5		6.5	6.5	6.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		0.97	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.86		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1792	3725	1445	1827	3519	1577	1583	1557		3433	1881	1496
Flt Permitted	0.13	1.00	1.00	0.07	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	238	3725	1445	144	3519	1577	1583	1557		3433	1881	1496
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	20	1471	64	71	1132	351	15	4	71	693	118	112
RTOR Reduction (vph)	0	0	31	0	0	111	0	21	0	0	0	84
Lane Group Flow (vph)	20	1471	33	71	1132	240	15	54	0	693	118	29
Confl. Peds. (#/hr)	8		2	2		8	5					5
Heavy Vehicles (%)	6%	2%	13%	4%	8%	3%	14%	0%	5%	2%	1%	6%
Bus Blockages (#/hr)	0	0	4	0	0	6	0	0	0	0	0	0
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	custom	NA		Split	NA	Perm
Protected Phases	5	2			6		8	8		4	4	
Permitted Phases	2		2	6		6	8					4
Actuated Green, G (s)	65.5	65.5	65.5	58.7	58.7	58.7	10.0	10.0		32.0	32.0	32.0
Effective Green, g (s)	66.5	66.5	66.5	59.7	59.7	59.7	11.0	11.0		33.0	33.0	33.0
Actuated g/C Ratio	0.51	0.51	0.51	0.46	0.46	0.46	0.08	0.08		0.25	0.25	0.25
Clearance Time (s)	4.0	7.5	7.5	7.5	7.5	7.5	7.5	7.5		7.5	7.5	7.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	167	1905	739	66	1616	724	133	131		871	477	379
v/s Ratio Prot	0.00	c0.39			0.32		0.01	c0.03		c0.20	0.06	
v/s Ratio Perm	0.06		0.02	c0.49		0.15						0.02
v/c Ratio	0.12	0.77	0.04	1.08	0.70	0.33	0.11	0.41		0.80	0.25	0.08
Uniform Delay, d1	19.6	25.6	15.9	35.1	28.0	22.4	55.0	56.4		45.3	38.6	36.9
Progression Factor	0.65	0.56	0.06	1.00	0.99	1.36	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.1	1.3	0.0	120.3	2.0	1.0	1.7	9.3		7.4	1.2	0.4
Delay (s)	13.0	15.6	1.0	155.5	29.9	31.5	56.7	65.7		52.8	39.8	37.3
Level of Service	B	B	A	F	C	C	E	E		D	D	D
Approach Delay (s)		14.9			36.0			64.2			49.2	
Approach LOS		B			D			E			D	

Intersection Summary			
HCM 2000 Control Delay	31.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	22.5
Intersection Capacity Utilization	95.4%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	423	0	0	262	25	4
Future Volume (Veh/h)	423	0	0	262	25	4
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	460	0	0	285	27	4
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)				152		
pX, platoon unblocked						
vC, conflicting volume			460		745	460
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			460		745	460
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		93	99
cM capacity (veh/h)			1101		382	601

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	460	285	31
Volume Left	0	0	27
Volume Right	0	0	4
cSH	1700	1101	400
Volume to Capacity	0.27	0.00	0.08
Queue Length 95th (m)	0.0	0.0	2.0
Control Delay (s)	0.0	0.0	14.7
Lane LOS			B
Approach Delay (s)	0.0	0.0	14.7
Approach LOS			B

Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	32.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	0	25	8	0	0	0
Future Volume (vph)	0	25	8	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	27	9	0	0	0

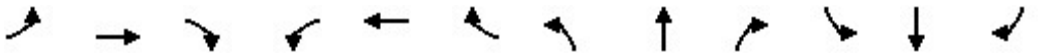
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	27	9	0
Volume Left (vph)	0	0	0
Volume Right (vph)	27	0	0
Hadj (s)	-0.57	0.03	0.00
Departure Headway (s)	3.4	4.0	4.0
Degree Utilization, x	0.03	0.01	0.00
Capacity (veh/h)	1062	885	900
Control Delay (s)	6.4	7.0	7.0
Approach Delay (s)	6.4	7.0	0.0
Approach LOS	A	A	A

Intersection Summary			
Delay	6.6		
Level of Service	A		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	20	40	0	25	25	0	896	0	0	1667	0
Future Volume (vph)	10	20	40	0	25	25	0	896	0	0	1667	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	2000	2000	2000	2000	2000	2000
Total Lost time (s)	7.0	7.0			7.0			6.0			6.0	
Lane Util. Factor	1.00	1.00			1.00			0.95			0.95	
Frpb, ped/bikes	1.00	0.97			0.99			1.00			1.00	
Flpb, ped/bikes	1.00	1.00			1.00			1.00			1.00	
Frt	1.00	0.90			0.93			1.00			1.00	
Flt Protected	0.95	1.00			1.00			1.00			1.00	
Satd. Flow (prot)	1761	1626			1708			3725			3725	
Flt Permitted	0.72	1.00			1.00			1.00			1.00	
Satd. Flow (perm)	1338	1626			1708			3725			3725	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	11	22	43	0	27	27	0	974	0	0	1812	0
RTOR Reduction (vph)	0	39	0	0	24	0	0	0	0	0	0	0
Lane Group Flow (vph)	11	26	0	0	30	0	0	974	0	0	1812	0
Confl. Peds. (#/hr)	4		27	27		4	58		14	14		58
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	12.0	12.0			12.0			103.0			103.0	
Effective Green, g (s)	13.0	13.0			13.0			104.0			104.0	
Actuated g/C Ratio	0.10	0.10			0.10			0.80			0.80	
Clearance Time (s)	8.0	8.0			8.0			7.0			7.0	
Vehicle Extension (s)	3.0	3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)	133	162			170			2980			2980	
v/s Ratio Prot		0.02			c0.02			0.26			c0.49	
v/s Ratio Perm	0.01											
v/c Ratio	0.08	0.16			0.17			0.33			0.61	
Uniform Delay, d1	53.1	53.5			53.6			3.5			5.1	
Progression Factor	1.00	1.00			1.00			0.40			0.36	
Incremental Delay, d2	0.3	0.5			0.5			0.3			0.5	
Delay (s)	53.4	54.0			54.1			1.7			2.3	
Level of Service	D	D			D			A			A	
Approach Delay (s)		53.9			54.1			1.7			2.3	
Approach LOS		D			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	4.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	72.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	1	3	0	3	0	5	0	0	5	0
Future Volume (Veh/h)	0	0	1	3	0	3	0	5	0	0	5	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	1	3	0	3	0	5	0	0	5	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	3			1			10	10	0	10	8	2
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	3			1			10	10	0	10	8	2
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	99	100	100	99	100
cM capacity (veh/h)	1619			1622			1002	884	1084	1002	885	1083

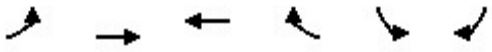
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	1	6	5	5
Volume Left	0	3	0	0
Volume Right	1	3	0	0
cSH	1619	1622	884	885
Volume to Capacity	0.00	0.00	0.01	0.01
Queue Length 95th (m)	0.0	0.0	0.1	0.1
Control Delay (s)	0.0	3.6	9.1	9.1
Lane LOS		A	A	A
Approach Delay (s)	0.0	3.6	9.1	9.1
Approach LOS			A	A

Intersection Summary			
Average Delay	6.6		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	87	0	0	243
Future Volume (Veh/h)	0	0	87	0	0	243
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	95	0	0	264
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	359	95			95	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	359	95			95	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	640	962			1499	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	0	95	264
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	1700	1499
Volume to Capacity	0.00	0.06	0.00
Queue Length 95th (m)	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0
Lane LOS	A		
Approach Delay (s)	0.0	0.0	0.0
Approach LOS	A		

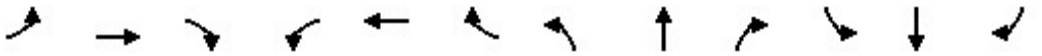
Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	16.1%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	443	402	3	6	1
Future Volume (Veh/h)	0	443	402	3	6	1
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	482	437	3	7	1
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)			131			
pX, platoon unblocked	0.94				0.94	0.94
vC, conflicting volume	440				680	220
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	266				522	31
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				98	100
cM capacity (veh/h)	1213				454	970

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	161	321	291	149	8
Volume Left	0	0	0	0	7
Volume Right	0	0	0	3	1
cSH	1213	1700	1700	1700	486
Volume to Capacity	0.00	0.19	0.17	0.09	0.02
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.4
Control Delay (s)	0.0	0.0	0.0	0.0	12.5
Lane LOS					B
Approach Delay (s)	0.0		0.0		12.5
Approach LOS					B

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	22.2%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	372	0	0	364	73	0	0	0	8	0	0
Future Volume (Veh/h)	0	372	0	0	364	73	0	0	0	8	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	404	0	0	396	79	0	0	0	9	0	0
Pedestrians		46			15			6			15	
Lane Width (m)		3.6			3.6			3.6			3.6	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		4			1			1			1	
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (m)		158			145							
pX, platoon unblocked												
vC, conflicting volume	490			410			654	900	223	668	860	298
vC1, stage 1 conf vol							410	410		450	450	
vC2, stage 2 conf vol							244	490		217	410	
vCu, unblocked vol	490			410			654	900	223	668	860	298
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	98	100	100
cM capacity (veh/h)	1056			1140			520	455	767	506	468	663

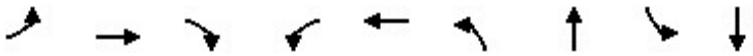
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1	SB 2
Volume Total	0	269	135	0	264	211	0	0	9	0
Volume Left	0	0	0	0	0	0	0	0	9	0
Volume Right	0	0	0	0	0	79	0	0	0	0
cSH	1700	1700	1700	1700	1700	1700	1700	1700	506	1700
Volume to Capacity	0.00	0.16	0.08	0.00	0.16	0.12	0.00	0.00	0.02	0.00
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.3	0.0
Lane LOS							A	A	B	A
Approach Delay (s)	0.0			0.0			0.0		12.3	
Approach LOS							A		B	

Intersection Summary				
Average Delay	0.1			
Intersection Capacity Utilization	31.5%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	0	0	0
Future Volume (Veh/h)	0	0	0	0	0	0
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			180			
pX, platoon unblocked						
vC, conflicting volume	0	0			0	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0	0			0	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	1023	1085			1623	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	0	0	0	0
Volume Left	0	0	0	0
Volume Right	0	0	0	0
cSH	1700	1700	1700	1700
Volume to Capacity	0.00	0.00	0.00	0.00
Queue Length 95th (m)	0.0	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0	0.0
Lane LOS	A			
Approach Delay (s)	0.0	0.0	0.0	
Approach LOS	A			

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	0.0%	ICU Level of Service	A
Analysis Period (min)	15		

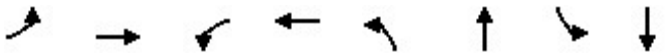


Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	141	1119	242	108	1045	153	728	605	1491
v/c Ratio	0.85	1.01	0.42	0.66	0.94	0.88	0.91	1.05	0.96
Control Delay	68.7	76.7	12.2	46.2	63.9	76.6	68.6	89.0	51.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	68.7	76.7	12.2	46.2	63.9	76.6	68.6	89.0	51.0
Queue Length 50th (m)	26.1	~174.1	11.8	19.6	156.4	25.9	108.8	~172.5	209.5
Queue Length 95th (m)	#54.8	#201.2	30.4	#31.6	#174.9	#59.6	#127.2	#224.1	222.7
Internal Link Dist (m)		154.6			157.9		144.0		150.9
Turn Bay Length (m)	46.0		110.0	46.0		73.0		43.0	
Base Capacity (vph)	166	1111	578	164	1106	174	799	578	1551
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.85	1.01	0.42	0.66	0.94	0.88	0.91	1.05	0.96

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

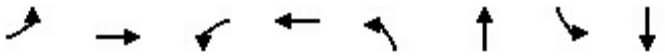
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	200	259	167	201	10	941	192	1852
v/c Ratio	0.87	0.59	0.95	0.39	0.09	0.54	0.72	0.80
Control Delay	79.6	48.1	105.4	9.2	62.4	23.1	82.4	7.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	79.6	48.1	105.4	9.2	62.4	23.1	82.4	7.7
Queue Length 50th (m)	50.5	59.2	43.3	3.2	2.4	73.4	49.5	28.0
Queue Length 95th (m)	#91.9	87.9	#87.3	23.4	m8.9	105.5	m53.8	m286.5
Internal Link Dist (m)		128.1		327.9		232.8		987.0
Turn Bay Length (m)	45.0		55.0		80.0		95.0	
Base Capacity (vph)	251	478	190	538	114	1731	315	2302
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.80	0.54	0.88	0.37	0.09	0.54	0.61	0.80

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	305	397	118	238	48	69	187	559
v/c Ratio	0.70	0.50	0.37	0.32	0.24	0.10	0.37	0.71
Control Delay	28.2	9.6	18.8	9.9	14.2	6.5	16.8	21.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.2	9.6	18.8	9.9	14.2	6.5	16.8	21.1
Queue Length 50th (m)	35.8	17.9	11.5	13.1	3.7	0.3	17.9	57.6
Queue Length 95th (m)	59.4	35.0	22.9	25.3	8.6	7.6	30.8	84.0
Internal Link Dist (m)		327.9		205.7		447.9		451.2
Turn Bay Length (m)	60.0		40.0		85.0		85.0	
Base Capacity (vph)	436	801	321	733	202	700	505	785
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.70	0.50	0.37	0.32	0.24	0.10	0.37	0.71

Intersection Summary

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	172	300	56	373	84	701	90	149	1630
v/c Ratio	0.72	0.33	0.25	0.39	0.65	0.41	0.14	0.68	0.87
Control Delay	59.5	20.9	39.2	35.6	100.9	10.0	1.0	80.0	16.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0
Total Delay	59.5	20.9	39.2	35.6	100.9	10.0	1.0	80.0	17.3
Queue Length 50th (m)	41.9	18.1	11.7	39.4	24.3	20.9	0.0	39.2	66.1
Queue Length 95th (m)	#75.5	30.8	24.3	54.0	#49.8	9.8	0.0	62.8	142.5
Internal Link Dist (m)		107.4		134.4		200.7			150.6
Turn Bay Length (m)	90.0		135.0		90.0		60.0	90.0	
Base Capacity (vph)	244	926	224	982	131	1698	644	252	1892
Starvation Cap Reductn	0	0	0	0	0	0	0	0	92
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.70	0.32	0.25	0.38	0.64	0.41	0.14	0.59	0.91

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	120	300	92	177	342	806
v/c Ratio	0.28	0.22	0.23	0.13	0.33	0.51
Control Delay	18.1	8.4	17.6	14.0	12.6	10.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.1	8.4	17.6	14.0	12.6	10.2
Queue Length 50th (m)	12.0	7.7	9.0	8.0	14.9	34.4
Queue Length 95th (m)	24.6	15.6	19.6	14.3	24.1	39.5
Internal Link Dist (m)		121.1		62.0	258.7	447.9
Turn Bay Length (m)	130.0		40.0			
Base Capacity (vph)	427	1335	392	1358	1042	1578
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.28	0.22	0.23	0.13	0.33	0.51

Intersection Summary

Lane Group	EBR	NBT	SBT
Lane Group Flow (vph)	146	882	1739
v/c Ratio	0.47	0.34	0.66
Control Delay	18.7	22.5	3.0
Queue Delay	0.0	0.0	0.1
Total Delay	18.7	22.5	3.1
Queue Length 50th (m)	8.5	87.3	23.2
Queue Length 95th (m)	28.5	127.5	27.0
Internal Link Dist (m)		89.0	200.7
Turn Bay Length (m)	35.0		
Base Capacity (vph)	378	2602	2653
Starvation Cap Reductn	0	0	198
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.39	0.34	0.71

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	86	1137	353	99	983	151	94	652	149	238	1602
v/c Ratio	0.49	1.08	0.61	0.55	0.97	0.28	0.82	0.55	0.24	0.76	1.04
Control Delay	33.9	94.0	25.9	48.4	49.5	11.0	107.0	38.6	6.9	66.5	52.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.9	94.0	25.9	48.4	49.5	11.0	107.0	38.6	6.9	66.5	52.1
Queue Length 50th (m)	14.3	~179.3	44.2	10.5	34.5	0.2	25.5	76.3	1.1	52.9	~244.0
Queue Length 95th (m)	25.6	#223.2	78.6	m30.0	#176.3	m22.8	#57.5	100.1	17.5	81.6	#283.0
Internal Link Dist (m)		287.5			231.8			307.3			225.7
Turn Bay Length (m)	300.0		65.0	112.0		55.0	95.0		45.0	65.0	
Base Capacity (vph)	175	1057	577	179	1018	546	114	1195	629	372	1542
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.49	1.08	0.61	0.55	0.97	0.28	0.82	0.55	0.24	0.64	1.04

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

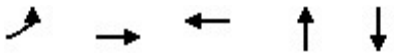
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	20	1471	64	71	1132	351	15	75	693	118	113
v/c Ratio	0.09	0.77	0.08	1.04	0.67	0.41	0.11	0.49	0.80	0.25	0.24
Control Delay	9.5	15.8	0.1	146.2	28.9	13.9	57.2	51.8	53.2	40.3	5.1
Queue Delay	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.5	15.9	0.1	146.2	28.9	13.9	57.2	51.8	53.2	40.3	5.1
Queue Length 50th (m)	1.1	48.8	0.0	19.4	132.5	45.2	3.8	13.5	90.5	25.5	0.0
Queue Length 95th (m)	m1.5	m50.4	m0.0	m#43.0	187.2	84.0	11.4	30.5	113.9	43.0	10.7
Internal Link Dist (m)		231.8			544.7			130.5		267.5	
Turn Bay Length (m)	105.0		45.0	230.0		50.0	35.0		40.0		75.0
Base Capacity (vph)	223	1905	788	68	1681	861	133	152	871	477	479
Starvation Cap Reductn	0	54	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.09	0.79	0.08	1.04	0.67	0.41	0.11	0.49	0.80	0.25	0.24

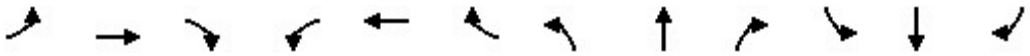
Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.



Lane Group	EBL	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	11	65	54	974	1812
v/c Ratio	0.07	0.29	0.24	0.32	0.59
Control Delay	47.8	23.8	30.6	2.0	2.8
Queue Delay	0.0	0.0	0.0	0.1	0.1
Total Delay	47.8	23.8	30.6	2.2	2.9
Queue Length 50th (m)	2.8	5.6	6.9	5.9	14.1
Queue Length 95th (m)	7.6	17.2	17.1	38.9	69.0
Internal Link Dist (m)		190.7	151.9	150.6	232.8
Turn Bay Length (m)	20.0				
Base Capacity (vph)	319	420	427	3060	3060
Starvation Cap Reductn	0	0	0	834	207
Spillback Cap Reductn	0	0	0	0	79
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.03	0.15	0.13	0.44	0.64

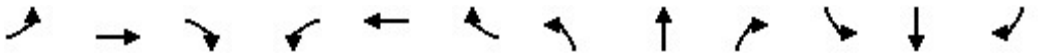
Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	5	342	13	38	231	140	16	65	60	150	172	10
Future Volume (vph)	5	342	13	38	231	140	16	65	60	150	172	10
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Hourly flow rate (vph)	6	398	15	44	269	163	19	76	70	174	200	12

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	419	476	165	386
Volume Left (vph)	6	44	19	174
Volume Right (vph)	15	163	70	12
Hadj (s)	0.02	-0.12	-0.22	0.09
Departure Headway (s)	7.9	7.6	9.0	8.2
Degree Utilization, x	0.92	1.01	0.41	0.87
Capacity (veh/h)	459	476	374	386
Control Delay (s)	53.0	70.9	18.2	46.2
Approach Delay (s)	53.0	70.9	18.2	46.2
Approach LOS	F	F	C	E

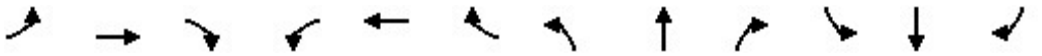
Intersection Summary				
Delay	53.1			
Level of Service	F			
Intersection Capacity Utilization	81.7%	ICU Level of Service	D	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	138	951	206	92	858	33	130	650	50	529	932	517
Future Volume (vph)	138	951	206	92	858	33	130	650	50	529	932	517
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Total Lost time (s)	3.0	6.0	6.0	3.0	6.0		3.0	6.0		3.0	6.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.89	1.00	1.00		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.99		1.00	0.95	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1863	3619	1465	1845	3595		1792	3486		1863	3383	
Flt Permitted	0.10	1.00	1.00	0.10	1.00		0.12	1.00		0.11	1.00	
Satd. Flow (perm)	191	3619	1465	189	3595		229	3486		218	3383	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	162	1119	242	108	1009	39	153	765	59	622	1096	608
RTOR Reduction (vph)	0	0	113	0	2	0	0	4	0	0	54	0
Lane Group Flow (vph)	162	1119	129	108	1046	0	153	820	0	622	1650	0
Confl. Peds. (#/hr)			78	78			7		54	54		7
Heavy Vehicles (%)	2%	5%	3%	3%	5%	8%	6%	7%	9%	2%	3%	10%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases	4		4	8			6			2		
Actuated Green, G (s)	47.0	40.0	40.0	47.0	40.0		39.0	32.0		75.0	64.0	
Effective Green, g (s)	49.0	41.0	41.0	49.0	41.0		41.0	33.0		76.0	65.0	
Actuated g/C Ratio	0.35	0.29	0.29	0.35	0.29		0.29	0.24		0.54	0.46	
Clearance Time (s)	4.0	7.0	7.0	4.0	7.0		4.0	7.0		4.0	7.0	
Vehicle Extension (s)	2.0	3.0	3.0	2.0	3.0		2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	162	1059	429	160	1052		156	821		588	1570	
v/s Ratio Prot	c0.06	c0.31		0.04	0.29		0.06	0.24		c0.30	0.49	
v/s Ratio Perm	0.29		0.09	0.20			0.23			c0.27		
v/c Ratio	1.00	1.06	0.30	0.68	0.99		0.98	1.00		1.06	1.05	
Uniform Delay, d1	39.7	49.5	38.4	36.6	49.4		44.5	53.5		41.7	37.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	70.7	43.9	0.4	8.5	26.2		65.9	31.2		53.3	37.4	
Delay (s)	110.5	93.4	38.8	45.1	75.5		110.4	84.7		95.1	74.9	
Level of Service	F	F	D	D	E		F	F		F	E	
Approach Delay (s)		86.5			72.7			88.7			80.3	
Approach LOS		F			E			F			F	

Intersection Summary			
HCM 2000 Control Delay	81.8	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.07		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	101.9%	ICU Level of Service	G
Analysis Period (min)	15		

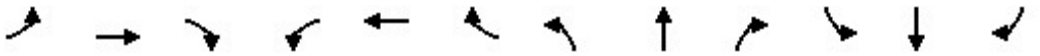
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	192	214	29	156	15	172	15	934	177	324	1796	256
Future Volume (vph)	192	214	29	156	15	172	15	934	177	324	1796	256
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	2000	2000	2000	2000	2000	2000
Total Lost time (s)	7.0	7.0		7.0	7.0		3.0	6.0		3.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	0.95		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	0.97	1.00		0.96	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	0.86		1.00	0.98		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1750	1812		1665	1536		1863	3520		1863	3585	
Flt Permitted	0.52	1.00		0.41	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	959	1812		717	1536		1863	3520		1863	3585	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	206	230	31	168	16	185	16	1004	190	348	1931	275
RTOR Reduction (vph)	0	4	0	0	141	0	0	12	0	0	8	0
Lane Group Flow (vph)	206	257	0	168	60	0	16	1182	0	348	2198	0
Confl. Peds. (#/hr)	34		54	54		34	29		19	19		29
Confl. Bikes (#/hr)			1						1			2
Heavy Vehicles (%)	0%	2%	2%	4%	3%	1%	2%	4%	6%	2%	3%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	6	0	0	8
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	30.0	30.0		30.0	30.0		2.8	54.5		26.5	78.2	
Effective Green, g (s)	31.0	31.0		31.0	31.0		3.8	55.5		27.5	79.2	
Actuated g/C Ratio	0.24	0.24		0.24	0.24		0.03	0.43		0.21	0.61	
Clearance Time (s)	8.0	8.0		8.0	8.0		4.0	7.0		4.0	7.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	228	432		170	366		54	1502		394	2184	
v/s Ratio Prot		0.14			0.04		0.01	0.34		c0.19	c0.61	
v/s Ratio Perm	0.21			c0.23								
v/c Ratio	0.90	0.60		0.99	0.16		0.30	0.79		0.88	1.01	
Uniform Delay, d1	48.0	43.9		49.3	39.2		61.8	32.1		49.7	25.4	
Progression Factor	1.00	1.00		1.00	1.00		1.03	0.71		1.23	0.45	
Incremental Delay, d2	34.6	2.2		64.9	0.2		2.8	3.9		2.4	7.4	
Delay (s)	82.6	46.1		114.2	39.4		66.6	26.8		63.7	18.7	
Level of Service	F	D		F	D		E	C		E	B	
Approach Delay (s)		62.2			73.5			27.3			24.9	
Approach LOS		E			E			C			C	

Intersection Summary			
HCM 2000 Control Delay	33.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	113.2%	ICU Level of Service	H
Analysis Period (min)	15		

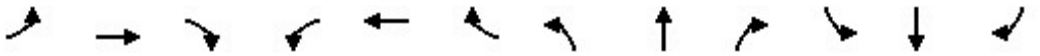
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	264	97	382	99	95	105	40	46	27	157	387	203
Future Volume (vph)	264	97	382	99	95	105	40	46	27	157	387	203
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.97		1.00	0.94		1.00	0.96		1.00	0.98	
Flpb, ped/bikes	0.94	1.00		0.99	1.00		0.99	1.00		0.92	1.00	
Frt	1.00	0.88		1.00	0.92		1.00	0.94		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1672	1579		1755	1594		1670	1606		1537	1734	
Flt Permitted	0.57	1.00		0.21	1.00		0.16	1.00		0.70	1.00	
Satd. Flow (perm)	1008	1579		392	1594		287	1606		1133	1734	
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	314	115	455	118	113	125	48	55	32	187	461	242
RTOR Reduction (vph)	0	152	0	0	53	0	0	17	0	0	25	0
Lane Group Flow (vph)	314	418	0	118	185	0	48	70	0	187	678	0
Confl. Peds. (#/hr)	62		30	30		62	30		63	63		30
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	1%	5%	2%	2%	5%	2%	7%	4%	13%	8%	2%	1%
Bus Blockages (#/hr)	0	0	0	0	0	1	0	0	5	0	0	2
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	29.0	29.0		29.0	29.0		34.0	34.0		34.0	34.0	
Effective Green, g (s)	30.0	30.0		30.0	30.0		35.0	35.0		35.0	35.0	
Actuated g/C Ratio	0.40	0.40		0.40	0.40		0.47	0.47		0.47	0.47	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	403	631		156	637		133	749		528	809	
v/s Ratio Prot		0.26			0.12			0.04			c0.39	
v/s Ratio Perm	c0.31			0.30			0.17			0.17		
v/c Ratio	0.78	0.66		0.76	0.29		0.36	0.09		0.35	0.84	
Uniform Delay, d1	19.6	18.4		19.4	15.3		12.8	11.2		12.8	17.5	
Progression Factor	1.00	1.00		1.00	1.00		0.76	0.73		1.00	1.00	
Incremental Delay, d2	13.8	5.4		28.4	1.2		7.1	0.2		1.9	10.1	
Delay (s)	33.4	23.8		47.8	16.4		16.9	8.4		14.6	27.6	
Level of Service	C	C		D	B		B	A		B	C	
Approach Delay (s)		27.2			26.8			11.4			24.9	
Approach LOS		C			C			B			C	

Intersection Summary			
HCM 2000 Control Delay	25.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	87.0%	ICU Level of Service	E
Analysis Period (min)	15		

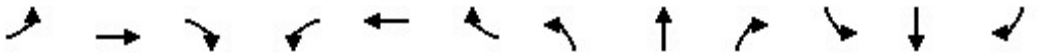
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	62	364	118	2	483	25	42	35	50	143	155	67
Future Volume (Veh/h)	62	364	118	2	483	25	42	35	50	143	155	67
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	67	396	128	2	525	27	46	38	54	155	168	73
Pedestrians		1			14			49			28	
Lane Width (m)		3.6			3.6			3.6			3.6	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		0			1			4			2	
Right turn flare (veh)												
Median type		TWLTL			None							
Median storage veh)		2										
Upstream signal (m)					245							
pX, platoon unblocked	0.88						0.88	0.88		0.88	0.88	0.88
vC, conflicting volume	580			573			1344	1227	523	1252	1278	568
vC1, stage 1 conf vol							643	643		570	570	
vC2, stage 2 conf vol							700	584		681	707	
vCu, unblocked vol	452			573			1322	1189	523	1217	1247	438
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	93			100			72	88	90	45	48	86
cM capacity (veh/h)	960			959			164	319	525	282	323	528

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	591	554	46	92	155	241
Volume Left	67	2	46	0	155	0
Volume Right	128	27	0	54	0	73
cSH	960	959	164	414	282	366
Volume to Capacity	0.07	0.00	0.28	0.22	0.55	0.66
Queue Length 95th (m)	1.8	0.1	8.7	6.7	24.6	36.0
Control Delay (s)	1.8	0.1	35.2	16.1	32.4	31.9
Lane LOS	A	A	E	C	D	D
Approach Delay (s)	1.8	0.1	22.5		32.1	
Approach LOS			C		D	

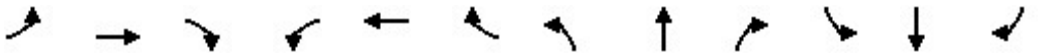
Intersection Summary				
Average Delay	10.1			
Intersection Capacity Utilization	87.6%	ICU Level of Service		E
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	212	248	136	84	297	77	90	810	135	205	1823	50
Future Volume (vph)	212	248	136	84	297	77	90	810	135	205	1823	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	2000	2000	2000	2000	2000	2000
Total Lost time (s)	7.0	7.0		7.0	7.0		3.0	6.5	6.5	3.0	6.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes	1.00	0.90		1.00	0.98		1.00	1.00	0.81	1.00	1.00	
Flpb, ped/bikes	0.95	1.00		0.86	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.95		1.00	0.97		1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1699	3016		1404	3305		1759	3654	1260	1827	3660	
Flt Permitted	0.44	1.00		0.43	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	794	3016		641	3305		1759	3654	1260	1827	3660	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	226	264	145	89	316	82	96	862	144	218	1939	53
RTOR Reduction (vph)	0	57	0	0	18	0	0	0	62	0	1	0
Lane Group Flow (vph)	226	352	0	89	380	0	96	862	82	218	1991	0
Confl. Peds. (#/hr)	85		255	255		85	110		150	150		110
Confl. Bikes (#/hr)			2			1						
Heavy Vehicles (%)	1%	3%	0%	10%	3%	6%	8%	4%	5%	4%	3%	4%
Bus Blockages (#/hr)	0	0	6	0	0	3	0	0	11	0	0	3
Turn Type	Perm	NA		Perm	NA		Prot	NA	Perm	Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8					2			
Actuated Green, G (s)	36.0	36.0		36.0	36.0		7.0	54.6	54.6	19.9	67.5	
Effective Green, g (s)	37.0	37.0		37.0	37.0		8.0	55.6	55.6	20.9	68.5	
Actuated g/C Ratio	0.28	0.28		0.28	0.28		0.06	0.43	0.43	0.16	0.53	
Clearance Time (s)	8.0	8.0		8.0	8.0		4.0	7.5	7.5	4.0	7.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	225	858		182	940		108	1562	538	293	1928	
v/s Ratio Prot		0.12			0.12		c0.05	0.24		0.12	c0.54	
v/s Ratio Perm	c0.28			0.14					0.06			
v/c Ratio	1.00	0.41		0.49	0.40		0.89	0.55	0.15	0.74	1.03	
Uniform Delay, d1	46.5	37.7		38.6	37.6		60.6	27.9	22.8	52.0	30.8	
Progression Factor	1.00	1.00		1.00	1.00		1.20	0.72	0.55	1.27	0.75	
Incremental Delay, d2	61.1	0.3		2.1	0.3		46.3	1.2	0.5	5.8	24.7	
Delay (s)	107.6	38.0		40.7	37.9		118.8	21.3	13.1	71.9	47.8	
Level of Service	F	D		D	D		F	C	B	E	D	
Approach Delay (s)		62.8			38.4			28.7			50.2	
Approach LOS		E			D			C			D	

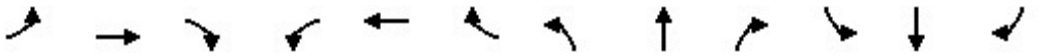
Intersection Summary			
HCM 2000 Control Delay	45.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	16.5
Intersection Capacity Utilization	116.5%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	118	144	180	83	147	13	112	196	22	9	518	464
Future Volume (vph)	118	144	180	83	147	13	112	196	22	9	518	464
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0			5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			0.95			0.95	
Frpb, ped/bikes	1.00	0.97		1.00	1.00			1.00			0.98	
Flpb, ped/bikes	0.98	1.00		0.98	1.00			1.00			1.00	
Frt	1.00	0.92		1.00	0.99			0.99			0.93	
Flt Protected	0.95	1.00		0.95	1.00			0.98			1.00	
Satd. Flow (prot)	1641	3168		1698	3491			3407			3212	
Flt Permitted	0.64	1.00		0.52	1.00			0.53			0.95	
Satd. Flow (perm)	1105	3168		936	3491			1842			3056	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	131	160	200	92	163	14	124	218	24	10	576	516
RTOR Reduction (vph)	0	123	0	0	8	0	0	7	0	0	212	0
Lane Group Flow (vph)	131	237	0	92	169	0	0	359	0	0	890	0
Confl. Peds. (#/hr)	15		39	39		15	47		24	24		47
Heavy Vehicles (%)	8%	0%	3%	4%	2%	0%	2%	3%	4%	0%	2%	2%
Bus Blockages (#/hr)	0	0	4	0	0	1	0	0	0	0	0	6
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	26.0	26.0		26.0	26.0			37.0			37.0	
Effective Green, g (s)	27.0	27.0		27.0	27.0			38.0			38.0	
Actuated g/C Ratio	0.36	0.36		0.36	0.36			0.51			0.51	
Clearance Time (s)	6.0	6.0		6.0	6.0			6.0			6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	397	1140		336	1256			933			1548	
v/s Ratio Prot		0.07			0.05							
v/s Ratio Perm	c0.12			0.10				0.19			c0.29	
v/c Ratio	0.33	0.21		0.27	0.13			0.38			0.58	
Uniform Delay, d1	17.4	16.6		17.0	16.1			11.3			12.9	
Progression Factor	1.00	1.00		1.00	1.00			1.00			0.83	
Incremental Delay, d2	2.2	0.4		2.0	0.2			1.2			1.0	
Delay (s)	19.6	17.0		19.0	16.4			12.5			11.8	
Level of Service	B	B		B	B			B			B	
Approach Delay (s)		17.7			17.3			12.5			11.8	
Approach LOS		B			B			B			B	

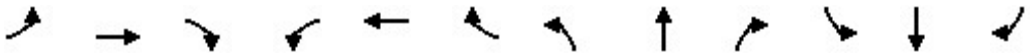
Intersection Summary			
HCM 2000 Control Delay	13.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	100.4%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	23	0	282	250	0	115	135	939	224	128	1858	51
Future Volume (vph)	23	0	282	250	0	115	135	939	224	128	1858	51
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	2000	2000	2000	2000	2000	2000
Total Lost time (s)	7.0		7.0	7.5	7.5		3.0	6.0		3.0	6.0	
Lane Util. Factor	1.00		1.00	1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00		0.98	1.00	0.92		1.00	0.98		1.00	0.99	
Flpb, ped/bikes	0.94		1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00		0.85	1.00	0.85		1.00	0.97		1.00	1.00	
Flt Protected	0.95		1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1703		1232	1712	1491		1727	3465		1845	3658	
Flt Permitted	0.68		1.00	0.76	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1222		1232	1365	1491		1727	3465		1845	3658	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	23	0	288	255	0	117	138	958	229	131	1896	52
RTOR Reduction (vph)	0	0	116	0	91	0	0	15	0	0	1	0
Lane Group Flow (vph)	23	0	172	255	26	0	138	1172	0	131	1947	0
Confl. Peds. (#/hr)	51		3	3		51	65		29	29		65
Heavy Vehicles (%)	0%	0%	29%	5%	0%	0%	10%	5%	2%	3%	3%	0%
Turn Type	Perm		Perm	Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)	27.9		27.9	27.4	27.4		11.6	69.5		13.6	71.5	
Effective Green, g (s)	28.9		28.9	28.4	28.4		12.6	70.5		14.6	72.5	
Actuated g/C Ratio	0.22		0.22	0.22	0.22		0.10	0.54		0.11	0.56	
Clearance Time (s)	8.0		8.0	8.5	8.5		4.0	7.0		4.0	7.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	271		273	298	325		167	1879		207	2040	
v/s Ratio Prot					0.02		c0.08	0.34		0.07	c0.53	
v/s Ratio Perm	0.02		0.14	c0.19								
v/c Ratio	0.08		0.63	0.86	0.08		0.83	0.62		0.63	0.95	
Uniform Delay, d1	40.1		45.7	48.8	40.4		57.6	20.6		55.1	27.2	
Progression Factor	1.00		1.00	1.04	1.00		0.96	0.67		1.16	0.57	
Incremental Delay, d2	0.1		4.7	20.6	0.1		19.7	1.1		1.8	4.3	
Delay (s)	40.2		50.4	71.4	40.5		75.2	14.8		65.8	19.9	
Level of Service	D		D	E	D		E	B		E	B	
Approach Delay (s)		49.6			61.7			21.1			22.8	
Approach LOS		D			E			C			C	

Intersection Summary			
HCM 2000 Control Delay	27.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	16.5
Intersection Capacity Utilization	99.9%	ICU Level of Service	F
Analysis Period (min)	15		

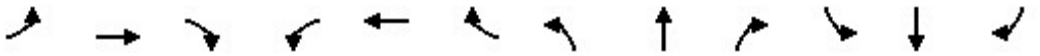
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	0	0	188	118	0	0	114	332	50	0	724	0
Future Volume (vph)	0	0	188	118	0	0	114	332	50	0	724	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	0	0	200	126	0	0	121	353	53	0	770	0

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	200	126	298	230	385	385
Volume Left (vph)	0	126	121	0	0	0
Volume Right (vph)	200	0	0	53	0	0
Hadj (s)	-0.57	0.23	0.23	-0.12	0.03	0.03
Departure Headway (s)	6.6	7.6	7.1	6.8	6.6	6.6
Degree Utilization, x	0.37	0.27	0.59	0.43	0.71	0.71
Capacity (veh/h)	500	432	484	514	533	528
Control Delay (s)	13.3	13.3	18.7	13.7	23.0	23.0
Approach Delay (s)	13.3	13.3	16.5		23.0	
Approach LOS	B	B	C		C	

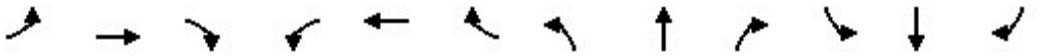
Intersection Summary				
Delay	19.0			
Level of Service	C			
Intersection Capacity Utilization	66.8%	ICU Level of Service	C	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	130	0	0	0	0	1297	0	0	2331	50
Future Volume (Veh/h)	0	0	130	0	0	0	0	1297	0	0	2331	50
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	141	0	0	0	0	1410	0	0	2534	54
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)								250			113	
pX, platoon unblocked	0.58	0.58	0.46	0.58	0.58	0.77	0.46			0.77		
vC, conflicting volume	3266	3971	1294	2818	3998	705	2588			1410		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1684	2907	0	907	2954	28	2110			941		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	72	100	100	100	100			100		
cM capacity (veh/h)	35	9	502	96	8	803	119			559		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	141	0	705	705	1689	899
Volume Left	0	0	0	0	0	0
Volume Right	141	0	0	0	0	54
cSH	502	1700	1700	1700	1700	1700
Volume to Capacity	0.28	0.00	0.41	0.41	0.99	0.53
Queue Length 95th (m)	9.1	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	15.0	0.0	0.0	0.0	0.0	0.0
Lane LOS	B	A				
Approach Delay (s)	15.0	0.0	0.0		0.0	
Approach LOS	B	A				

Intersection Summary				
Average Delay	0.5			
Intersection Capacity Utilization	77.4%	ICU Level of Service	D	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	166	1137	353	101	985	280	94	875	149	369	1499	591
Future Volume (vph)	166	1137	353	101	985	280	94	875	149	369	1499	591
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Total Lost time (s)	3.0	7.0	7.0	3.0	7.0	7.0	3.0	6.5	6.5	3.0	6.5	6.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.97	1.00	1.00	0.97	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1809	3619	1584	1845	3486	1536	1863	3654	1630	1863	3654	1558
Flt Permitted	0.10	1.00	1.00	0.10	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	190	3619	1584	194	3486	1536	1863	3654	1630	1863	3654	1558
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	166	1137	353	101	985	280	94	875	149	369	1499	591
RTOR Reduction (vph)	0	0	109	0	0	118	0	0	102	0	0	100
Lane Group Flow (vph)	166	1137	244	101	985	162	94	875	47	369	1499	491
Confl. Peds. (#/hr)	18		16	16		18	15		18	18		15
Heavy Vehicles (%)	5%	5%	3%	3%	9%	6%	2%	4%	1%	2%	4%	6%
Bus Blockages (#/hr)	0	0	3	0	0	3	0	0	0	0	0	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8			2			6
Actuated Green, G (s)	46.0	39.0	39.0	46.0	39.0	39.0	7.0	36.5	36.5	24.0	53.5	53.5
Effective Green, g (s)	48.0	40.0	40.0	48.0	40.0	40.0	8.0	37.5	37.5	25.0	54.5	54.5
Actuated g/C Ratio	0.37	0.31	0.31	0.37	0.31	0.31	0.06	0.29	0.29	0.19	0.42	0.42
Clearance Time (s)	4.0	8.0	8.0	4.0	8.0	8.0	4.0	7.5	7.5	4.0	7.5	7.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	169	1113	487	173	1072	472	114	1054	470	358	1531	653
v/s Ratio Prot	c0.06	c0.31		0.04	0.28		0.05	0.24		c0.20	c0.41	
v/s Ratio Perm	0.30		0.15	0.18		0.11			0.03			0.32
v/c Ratio	0.98	1.02	0.50	0.58	0.92	0.34	0.82	0.83	0.10	1.03	0.98	0.75
Uniform Delay, d1	33.6	45.0	36.8	32.6	43.4	34.8	60.3	43.3	33.9	52.5	37.2	32.0
Progression Factor	1.00	1.00	1.00	1.67	0.76	1.06	1.00	1.00	1.00	1.25	1.05	1.11
Incremental Delay, d2	63.6	32.5	0.8	3.4	8.9	0.3	36.2	7.6	0.4	43.8	13.0	4.5
Delay (s)	97.3	77.5	37.7	58.0	41.7	37.2	96.5	50.9	34.3	109.4	52.0	40.0
Level of Service	F	E	D	E	D	D	F	D	C	F	D	D
Approach Delay (s)		71.0			42.0			52.5			57.8	
Approach LOS		E			D			D			E	

Intersection Summary			
HCM 2000 Control Delay	56.9	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.03		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	19.5
Intersection Capacity Utilization	103.3%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	1576	62	68	1216	474	14	4	68	900	113	111
Future Volume (vph)	19	1576	62	68	1216	474	14	4	68	900	113	111
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	6.5	6.5	3.5	6.5	6.5	6.5	6.5		6.5	6.5	6.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		0.97	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.86		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1792	3725	1445	1827	3519	1577	1583	1557		3433	1881	1496
Flt Permitted	0.09	1.00	1.00	0.07	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	164	3725	1445	132	3519	1577	1583	1557		3433	1881	1496
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	20	1642	65	71	1267	494	15	4	71	938	118	116
RTOR Reduction (vph)	0	0	37	0	0	140	0	60	0	0	0	85
Lane Group Flow (vph)	20	1642	28	71	1267	354	15	15	0	938	118	31
Confl. Peds. (#/hr)	8		2	2		8	5					5
Heavy Vehicles (%)	6%	2%	13%	4%	8%	3%	14%	0%	5%	2%	1%	6%
Bus Blockages (#/hr)	0	0	4	0	0	6	0	0	0	0	0	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	custom	NA		Split	NA	Perm
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases	2		2	6		6	8					4
Actuated Green, G (s)	58.3	55.5	55.5	61.2	57.2	57.2	10.0	10.0		33.5	33.5	33.5
Effective Green, g (s)	60.3	56.5	56.5	63.2	58.2	58.2	11.0	11.0		34.5	34.5	34.5
Actuated g/C Ratio	0.46	0.43	0.43	0.49	0.45	0.45	0.08	0.08		0.27	0.27	0.27
Clearance Time (s)	4.0	7.5	7.5	4.5	7.5	7.5	7.5	7.5		7.5	7.5	7.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	123	1618	628	129	1575	706	133	131		911	499	397
v/s Ratio Prot	0.00	c0.44		c0.02	0.36		c0.01	0.01		c0.27	0.06	
v/s Ratio Perm	0.07		0.02	0.25		0.22						0.02
v/c Ratio	0.16	1.01	0.04	0.55	0.80	0.50	0.11	0.11		1.03	0.24	0.08
Uniform Delay, d1	23.6	36.8	21.2	29.6	31.0	25.6	55.0	55.0		47.8	37.4	35.8
Progression Factor	0.81	0.50	1.00	0.94	0.89	1.06	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.2	17.8	0.1	3.3	3.0	1.7	1.7	1.7		37.7	1.1	0.4
Delay (s)	19.5	36.1	21.2	31.0	30.5	28.7	56.7	56.7		85.4	38.5	36.2
Level of Service	B	D	C	C	C	C	E	E		F	D	D
Approach Delay (s)		35.3			30.1			56.7			75.8	
Approach LOS		D			C			E			E	

Intersection Summary			
HCM 2000 Control Delay	43.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	23.0
Intersection Capacity Utilization	92.1%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	423	123	17	268	86	11
Future Volume (Veh/h)	423	123	17	268	86	11
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	460	134	18	291	93	12
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)				152		
pX, platoon unblocked						
vC, conflicting volume			594		854	527
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			594		854	527
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		71	98
cM capacity (veh/h)			982		323	551

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	594	309	105
Volume Left	0	18	93
Volume Right	134	0	12
cSH	1700	982	339
Volume to Capacity	0.35	0.02	0.31
Queue Length 95th (m)	0.0	0.4	10.3
Control Delay (s)	0.0	0.7	20.3
Lane LOS		A	C
Approach Delay (s)	0.0	0.7	20.3
Approach LOS			C

Intersection Summary			
Average Delay	2.3		
Intersection Capacity Utilization	41.8%	ICU Level of Service	A
Analysis Period (min)	15		

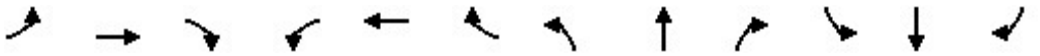
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	19	134	26	0	59	83
Future Volume (vph)	19	134	26	0	59	83
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	21	146	28	0	64	90

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	167	28	154
Volume Left (vph)	21	0	64
Volume Right (vph)	146	0	0
Hadj (s)	-0.47	0.03	0.12
Departure Headway (s)	3.9	4.5	4.4
Degree Utilization, x	0.18	0.03	0.19
Capacity (veh/h)	894	765	780
Control Delay (s)	7.7	7.6	8.4
Approach Delay (s)	7.7	7.6	8.4
Approach LOS	A	A	A

Intersection Summary			
Delay	8.0		
Level of Service	A		
Intersection Capacity Utilization	30.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	29	93	104	100	106	86	13	1086	0	16	1947	18
Future Volume (vph)	29	93	104	100	106	86	13	1086	0	16	1947	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	2000	2000	2000	2000	2000	2000
Total Lost time (s)	7.0	7.0		7.0	7.0		3.0	6.0		3.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.98		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		0.98	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.92		1.00	0.93		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1764	1673		1729	1725		1863	3725		1863	3715	
Flt Permitted	0.42	1.00		0.41	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	786	1673		743	1725		1863	3725		1863	3715	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	32	101	113	109	115	93	14	1180	0	17	2116	20
RTOR Reduction (vph)	0	34	0	0	24	0	0	0	0	0	0	0
Lane Group Flow (vph)	32	180	0	109	184	0	14	1180	0	17	2136	0
Confl. Peds. (#/hr)	4		27	27		4	58		14	14		58
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	20.9	20.9		20.9	20.9		2.8	87.2		2.9	87.3	
Effective Green, g (s)	21.9	21.9		21.9	21.9		3.8	88.2		3.9	88.3	
Actuated g/C Ratio	0.17	0.17		0.17	0.17		0.03	0.68		0.03	0.68	
Clearance Time (s)	8.0	8.0		8.0	8.0		4.0	7.0		4.0	7.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	132	281		125	290		54	2527		55	2523	
v/s Ratio Prot		0.11			0.11		0.01	0.32		c0.01	c0.57	
v/s Ratio Perm	0.04			c0.15								
v/c Ratio	0.24	0.64		0.87	0.63		0.26	0.47		0.31	0.85	
Uniform Delay, d1	46.9	50.4		52.7	50.3		61.7	9.8		61.7	15.7	
Progression Factor	1.00	1.00		1.03	1.05		1.13	0.76		1.32	0.22	
Incremental Delay, d2	1.0	4.9		43.8	4.4		2.0	0.5		1.0	1.2	
Delay (s)	47.8	55.3		98.1	57.1		71.9	8.0		82.5	4.6	
Level of Service	D	E		F	E		E	A		F	A	
Approach Delay (s)		54.3			71.2			8.8			5.2	
Approach LOS		D			E			A			A	

Intersection Summary			
HCM 2000 Control Delay	14.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	96.7%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	1	3	0	3	0	37	0	0	109	10
Future Volume (Veh/h)	0	0	1	3	0	3	0	37	0	0	109	10
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	1	3	0	3	0	40	0	0	118	11
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	3			1			78	10	0	28	8	2
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	3			1			78	10	0	28	8	2
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	95	100	100	87	99
cM capacity (veh/h)	1619			1622			808	884	1084	946	885	1083

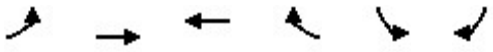
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	1	6	40	129
Volume Left	0	3	0	0
Volume Right	1	3	0	11
cSH	1619	1622	884	899
Volume to Capacity	0.00	0.00	0.05	0.14
Queue Length 95th (m)	0.0	0.0	1.1	4.0
Control Delay (s)	0.0	3.6	9.3	9.7
Lane LOS		A	A	A
Approach Delay (s)	0.0	3.6	9.3	9.7
Approach LOS			A	A

Intersection Summary				
Average Delay	9.3			
Intersection Capacity Utilization	16.3%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	10	122	0	0	315
Future Volume (Veh/h)	0	10	122	0	0	315
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	11	133	0	0	342
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	475	133			133	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	475	133			133	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	99			100	
cM capacity (veh/h)	548	916			1452	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	11	133	342
Volume Left	0	0	0
Volume Right	11	0	0
cSH	916	1700	1452
Volume to Capacity	0.01	0.08	0.00
Queue Length 95th (m)	0.3	0.0	0.0
Control Delay (s)	9.0	0.0	0.0
Lane LOS	A		
Approach Delay (s)	9.0	0.0	0.0
Approach LOS	A		

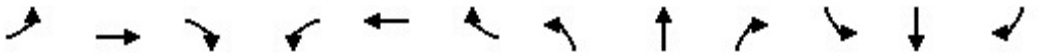
Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	26.6%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	22	529	465	13	69	42
Future Volume (Veh/h)	22	529	465	13	69	42
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	24	575	505	14	75	46
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)			131			
pX, platoon unblocked	0.93				0.93	0.93
vC, conflicting volume	519				848	260
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	326				680	46
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				79	95
cM capacity (veh/h)	1142				349	940

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	216	383	337	182	121
Volume Left	24	0	0	0	75
Volume Right	0	0	0	14	46
cSH	1142	1700	1700	1700	459
Volume to Capacity	0.02	0.23	0.20	0.11	0.26
Queue Length 95th (m)	0.5	0.0	0.0	0.0	8.4
Control Delay (s)	1.1	0.0	0.0	0.0	15.6
Lane LOS	A				C
Approach Delay (s)	0.4		0.0		15.6
Approach LOS					C

Intersection Summary			
Average Delay	1.7		
Intersection Capacity Utilization	43.8%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	118	397	73	249	366	110	15	70	13	34	38	40
Future Volume (Veh/h)	118	397	73	249	366	110	15	70	13	34	38	40
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	128	432	79	271	398	120	16	76	14	37	41	43
Pedestrians		46			15			6			15	
Lane Width (m)		3.6			3.6			3.6			3.6	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		4			1			1			1	
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (m)		158			145							
pX, platoon unblocked												
vC, conflicting volume	533			517			1584	1808	276	1554	1788	320
vC1, stage 1 conf vol							734	734		1015	1015	
vC2, stage 2 conf vol							850	1075		539	773	
vCu, unblocked vol	533			517			1584	1808	276	1554	1788	320
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	87			74			65	10	98	35	49	93
cM capacity (veh/h)	1018			1040			46	84	708	57	80	642

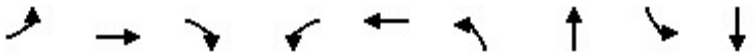
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1	SB 2
Volume Total	128	288	223	271	265	253	16	90	37	84
Volume Left	128	0	0	271	0	0	16	0	37	0
Volume Right	0	0	79	0	0	120	0	14	0	43
cSH	1018	1700	1700	1040	1700	1700	46	98	57	145
Volume to Capacity	0.13	0.17	0.13	0.26	0.16	0.15	0.35	0.92	0.65	0.58
Queue Length 95th (m)	3.4	0.0	0.0	8.4	0.0	0.0	9.7	42.8	21.5	23.7
Control Delay (s)	9.0	0.0	0.0	9.7	0.0	0.0	120.9	149.2	146.6	59.2
Lane LOS	A			A			F	F	F	F
Approach Delay (s)	1.8			3.3			144.9		86.0	
Approach LOS							F		F	

Intersection Summary				
Average Delay	17.9			
Intersection Capacity Utilization	49.5%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	114	352	0	188	365
Future Volume (Veh/h)	0	114	352	0	188	365
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	124	383	0	204	397
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			165			
pX, platoon unblocked						
vC, conflicting volume	1188	383			383	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1188	383			383	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	81			83	
cM capacity (veh/h)	172	664			1175	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	124	383	204	397
Volume Left	0	0	204	0
Volume Right	124	0	0	0
cSH	664	1700	1175	1700
Volume to Capacity	0.19	0.23	0.17	0.23
Queue Length 95th (m)	5.5	0.0	5.0	0.0
Control Delay (s)	11.7	0.0	8.7	0.0
Lane LOS	B		A	
Approach Delay (s)	11.7	0.0	3.0	
Approach LOS	B			

Intersection Summary			
Average Delay	2.9		
Intersection Capacity Utilization	46.0%	ICU Level of Service	A
Analysis Period (min)	15		

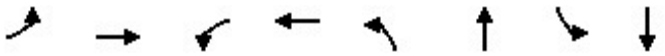


Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	162	1119	242	108	1048	153	824	622	1704
v/c Ratio	0.98	1.06	0.45	0.65	0.99	0.95	1.00	1.05	1.05
Control Delay	96.6	91.0	16.5	47.2	75.3	94.1	83.8	88.9	71.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	96.6	91.0	16.5	47.2	75.3	94.1	83.8	88.9	71.2
Queue Length 50th (m)	31.2	~187.4	18.0	20.1	160.5	26.3	126.7	~178.2	~275.4
Queue Length 95th (m)	#69.2	#209.4	38.4	#32.3	#188.5	#63.5	#156.1	#229.7	#287.3
Internal Link Dist (m)		154.6			157.9		144.0		2076.1
Turn Bay Length (m)	46.0		110.0	46.0		73.0		43.0	
Base Capacity (vph)	166	1059	542	165	1054	161	825	593	1623
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.98	1.06	0.45	0.65	0.99	0.95	1.00	1.05	1.05

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

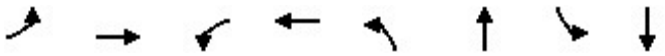
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	206	261	168	201	16	1194	348	2206
v/c Ratio	0.90	0.60	0.99	0.40	0.14	0.79	0.89	0.98
Control Delay	87.7	49.8	115.7	9.6	62.5	26.9	63.9	15.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.1
Total Delay	87.7	49.8	115.7	9.6	62.5	26.9	63.9	24.4
Queue Length 50th (m)	54.2	61.8	45.3	3.3	4.3	100.7	78.4	41.8
Queue Length 95th (m)	#102.3	91.9	#93.3	24.3	m9.6	57.7	m74.2	m290.1
Internal Link Dist (m)		128.1		327.9		232.8		987.0
Turn Bay Length (m)	45.0		55.0		80.0		95.0	
Base Capacity (vph)	228	435	170	507	114	1515	415	2257
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	90
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.90	0.60	0.99	0.40	0.14	0.79	0.84	1.02

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	314	570	118	238	48	87	187	703
v/c Ratio	0.78	0.73	0.76	0.34	0.36	0.11	0.35	0.84
Control Delay	35.8	16.5	53.0	11.3	18.6	6.1	15.2	28.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.8	16.5	53.0	11.3	18.6	6.1	15.2	28.0
Queue Length 50th (m)	39.5	37.6	14.7	14.4	4.0	4.3	16.9	82.5
Queue Length 95th (m)	#73.0	65.0	#39.4	27.3	9.8	10.2	29.2	#119.5
Internal Link Dist (m)		327.9		205.7		447.9		451.2
Turn Bay Length (m)	60.0		40.0		85.0		85.0	
Base Capacity (vph)	403	784	156	690	133	766	529	834
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.78	0.73	0.76	0.34	0.36	0.11	0.35	0.84

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	226	409	89	398	96	862	144	218	1992
v/c Ratio	1.00	0.45	0.49	0.42	0.89	0.55	0.24	0.74	1.03
Control Delay	107.8	32.0	49.5	36.8	124.0	21.9	5.1	74.9	48.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	27.2
Total Delay	107.8	32.0	49.5	36.8	124.0	21.9	5.1	74.9	75.8
Queue Length 50th (m)	~61.1	38.1	20.0	43.0	27.3	69.1	4.2	56.9	~300.1
Queue Length 95th (m)	#116.0	54.2	39.2	58.7	m#57.8	80.4	6.8	m77.7	#341.7
Internal Link Dist (m)		107.4		134.4		200.7			150.6
Turn Bay Length (m)	90.0		135.0		90.0		60.0	90.0	
Base Capacity (vph)	225	915	182	958	108	1561	600	351	1929
Starvation Cap Reductn	0	0	0	0	0	0	0	0	128
Spillback Cap Reductn	0	0	0	0	0	0	0	0	73
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.00	0.45	0.49	0.42	0.89	0.55	0.24	0.62	1.11

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

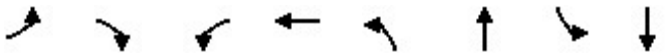
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	131	360	92	177	366	1102
v/c Ratio	0.33	0.28	0.27	0.14	0.39	0.63
Control Delay	20.4	8.4	19.9	15.3	12.4	7.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.4	8.4	19.9	15.3	12.4	7.6
Queue Length 50th (m)	13.9	8.7	9.5	8.4	15.8	32.4
Queue Length 95th (m)	27.9	17.8	21.0	15.1	25.8	m51.4
Internal Link Dist (m)		121.1		62.0	258.7	447.9
Turn Bay Length (m)	130.0		40.0			
Base Capacity (vph)	397	1264	336	1264	940	1760
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.33	0.28	0.27	0.14	0.39	0.63

Intersection Summary

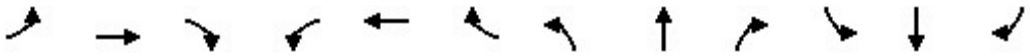
m Volume for 95th percentile queue is metered by upstream signal.



Lane Group	EBL	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	23	288	255	117	138	1187	131	1948
v/c Ratio	0.08	0.74	0.86	0.23	0.83	0.63	0.63	0.96
Control Delay	39.1	33.9	76.1	1.1	81.9	15.3	67.8	21.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.6
Total Delay	39.1	33.9	76.1	1.1	81.9	15.3	67.8	25.8
Queue Length 50th (m)	4.8	34.7	65.3	0.0	38.4	59.3	37.6	88.0
Queue Length 95th (m)	12.7	70.0	#105.9	m0.0	m#59.1	m90.6	m38.6	m86.8
Internal Link Dist (m)				140.7		89.0		200.7
Turn Bay Length (m)	35.0	35.0	45.0		100.0		80.0	
Base Capacity (vph)	301	415	330	537	167	1892	241	2039
Starvation Cap Reductn	0	0	0	0	0	0	0	73
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.08	0.69	0.77	0.22	0.83	0.63	0.54	0.99

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	166	1137	353	101	985	280	94	875	149	369	1499	591
v/c Ratio	0.95	1.02	0.59	0.56	0.92	0.47	0.82	0.83	0.26	1.03	0.98	0.78
Control Delay	84.2	76.8	25.1	47.5	43.5	16.7	107.0	51.3	7.3	105.9	52.1	30.4
Queue Delay	0.0	29.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	84.2	106.6	25.1	47.5	43.5	16.7	107.0	51.3	7.3	105.9	52.1	30.4
Queue Length 50th (m)	28.0	~171.1	44.4	11.7	46.7	10.2	25.5	116.4	1.2	~109.4	182.5	73.0
Queue Length 95th (m)	#72.9	#215.0	78.1	m26.1	#169.4	m44.1	#57.5	142.8	17.7	m#136.5	m#241.5	m86.3
Internal Link Dist (m)		2148.8			231.8			2076.1			225.7	
Turn Bay Length (m)	300.0		65.0	112.0		55.0	95.0		45.0	65.0		40.0
Base Capacity (vph)	175	1113	596	179	1072	590	114	1054	571	358	1531	753
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	123	0	0	0	0	0	0	4	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.95	1.15	0.59	0.56	0.92	0.47	0.82	0.83	0.26	1.03	0.98	0.78

Intersection Summary

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95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	20	1642	65	71	1267	494	15	75	938	118	116
v/c Ratio	0.11	1.00	0.09	0.49	0.77	0.57	0.11	0.39	1.03	0.24	0.23
Control Delay	12.6	33.7	0.1	23.3	29.4	14.9	57.2	22.3	84.3	39.0	4.8
Queue Delay	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.6	34.0	0.1	23.3	29.4	14.9	57.2	22.3	84.3	39.0	4.8
Queue Length 50th (m)	1.6	~84.4	0.0	9.2	160.1	76.4	3.8	2.3	~139.3	25.0	0.0
Queue Length 95th (m)	m2.0	m#84.7	m0.0	m8.9	210.2	119.0	11.4	18.1	#181.1	42.3	10.3
Internal Link Dist (m)		231.8			544.7			130.5		267.5	
Turn Bay Length (m)	105.0		45.0	230.0		50.0	35.0		40.0		75.0
Base Capacity (vph)	184	1644	714	145	1640	870	133	192	911	499	498
Starvation Cap Reductn	0	2	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.11	1.00	0.09	0.49	0.77	0.57	0.11	0.39	1.03	0.24	0.23

Intersection Summary

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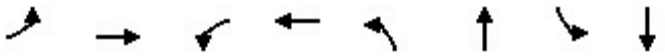
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

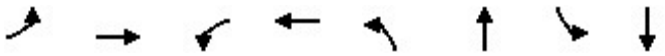


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	32	214	109	208	14	1180	17	2136
v/c Ratio	0.24	0.68	0.88	0.66	0.12	0.45	0.15	0.82
Control Delay	48.3	50.7	106.0	54.4	67.5	8.5	77.6	6.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.8
Total Delay	48.3	50.7	106.0	54.4	67.5	8.6	77.6	12.8
Queue Length 50th (m)	7.6	44.3	27.6	44.1	3.8	47.0	4.8	31.1
Queue Length 95th (m)	16.7	66.7	m#47.3	61.6	m6.8	m52.6	m5.1	m#197.2
Internal Link Dist (m)		190.7		151.9		150.6		232.8
Turn Bay Length (m)	20.0		20.0		35.0		65.0	
Base Capacity (vph)	187	430	176	433	114	2597	115	2592
Starvation Cap Reductn	0	0	0	0	0	209	0	142
Spillback Cap Reductn	0	4	0	0	0	0	0	425
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.17	0.50	0.62	0.48	0.12	0.49	0.15	0.99

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	238	261	168	201	16	1256	348	2206
v/c Ratio	0.96	0.56	0.88	0.38	0.14	0.86	0.89	1.00
Control Delay	94.4	46.4	87.2	9.0	65.8	31.9	64.4	19.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	94.4	46.4	87.2	9.0	65.8	31.9	64.4	19.9
Queue Length 50th (m)	62.9	59.8	43.3	3.2	4.6	94.7	78.4	319.1
Queue Length 95th (m)	#115.7	88.8	#86.2	23.4	m11.3	#123.9	m73.1	m291.4
Internal Link Dist (m)		128.1		327.9		232.8		987.0
Turn Bay Length (m)	45.0		55.0		80.0		95.0	
Base Capacity (vph)	256	477	196	538	114	1458	415	2199
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.93	0.55	0.86	0.37	0.14	0.86	0.84	1.00

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
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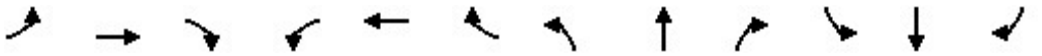
m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	221	214	29	156	15	172	15	991	177	324	1796	256
Future Volume (vph)	221	214	29	156	15	172	15	991	177	324	1796	256
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	2000	2000	2000	2000	2000	2000
Total Lost time (s)	7.0	7.0		7.0	7.0		3.0	6.0		3.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	0.95		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	0.97	1.00		0.96	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	0.86		1.00	0.98		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1750	1812		1664	1536		1863	3526		1863	3585	
Flt Permitted	0.53	1.00		0.43	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	981	1812		749	1536		1863	3526		1863	3585	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	238	230	31	168	16	185	16	1066	190	348	1931	275
RTOR Reduction (vph)	0	4	0	0	138	0	0	11	0	0	8	0
Lane Group Flow (vph)	238	257	0	168	63	0	16	1245	0	348	2198	0
Confl. Peds. (#/hr)	34		54	54		34	29		19	19		29
Confl. Bikes (#/hr)			1						1			2
Heavy Vehicles (%)	0%	2%	2%	4%	3%	1%	2%	4%	6%	2%	3%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	6	0	0	8
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	32.1	32.1		32.1	32.1		2.8	52.4		26.5	76.1	
Effective Green, g (s)	33.1	33.1		33.1	33.1		3.8	53.4		27.5	77.1	
Actuated g/C Ratio	0.25	0.25		0.25	0.25		0.03	0.41		0.21	0.59	
Clearance Time (s)	8.0	8.0		8.0	8.0		4.0	7.0		4.0	7.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	249	461		190	391		54	1448		394	2126	
v/s Ratio Prot		0.14			0.04		0.01	0.35		c0.19	c0.61	
v/s Ratio Perm	c0.24			0.22								
v/c Ratio	0.96	0.56		0.88	0.16		0.30	0.86		0.88	1.03	
Uniform Delay, d1	47.7	42.1		46.6	37.7		61.8	34.9		49.7	26.5	
Progression Factor	1.00	1.00		1.00	1.00		1.09	0.71		1.24	0.41	
Incremental Delay, d2	44.5	1.5		35.0	0.2		2.9	6.5		2.4	17.3	
Delay (s)	92.2	43.6		81.6	37.9		70.2	31.3		64.3	28.2	
Level of Service	F	D		F	D		E	C		E	C	
Approach Delay (s)		66.8			57.8			31.8			33.1	
Approach LOS		E			E			C			C	

Intersection Summary			
HCM 2000 Control Delay	38.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	114.8%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	226	507	196	419	110	848	144	235	1887
v/c Ratio	0.88	0.49	1.08	0.39	1.02	0.61	0.26	0.77	1.06
Control Delay	75.6	30.5	131.0	33.2	151.9	31.9	9.3	79.7	61.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18.6
Total Delay	75.6	30.5	131.0	33.2	151.9	31.9	9.3	79.7	80.0
Queue Length 50th (m)	57.6	47.1	~58.6	43.1	~32.3	93.0	7.6	65.9	~289.3
Queue Length 95th (m)	#107.4	64.7	#108.5	58.4	m#69.0	109.0	12.5	m87.3	#333.5
Internal Link Dist (m)		107.4		134.4		200.7			150.6
Turn Bay Length (m)	90.0		135.0		90.0		60.0	90.0	
Base Capacity (vph)	256	1031	182	1087	108	1400	550	351	1788
Starvation Cap Reductn	0	0	0	0	0	0	0	0	106
Spillback Cap Reductn	0	0	0	0	0	0	0	0	72
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.88	0.49	1.08	0.39	1.02	0.61	0.26	0.67	1.12

Intersection Summary

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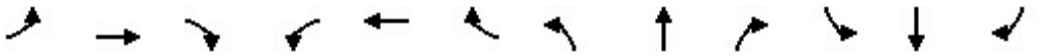


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	212	303	174	184	317	77	103	797	135	221	1723	51
Future Volume (vph)	212	303	174	184	317	77	103	797	135	221	1723	51
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	2000	2000	2000	2000	2000	2000
Total Lost time (s)	7.0	7.0		7.0	7.0		3.0	6.5	6.5	3.0	6.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes	1.00	0.90		1.00	0.98		1.00	1.00	0.81	1.00	1.00	
Flpb, ped/bikes	0.95	1.00		0.88	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.95		1.00	0.97		1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1702	3002		1443	3315		1759	3654	1260	1827	3658	
Flt Permitted	0.44	1.00		0.37	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	794	3002		567	3315		1759	3654	1260	1827	3658	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	226	322	185	196	337	82	110	848	144	235	1833	54
RTOR Reduction (vph)	0	62	0	0	16	0	0	0	67	0	2	0
Lane Group Flow (vph)	226	445	0	196	403	0	110	848	77	235	1885	0
Confl. Peds. (#/hr)	85		255	255		85	110		150	150		110
Confl. Bikes (#/hr)			2			1						
Heavy Vehicles (%)	1%	3%	0%	10%	3%	6%	8%	4%	5%	4%	3%	4%
Bus Blockages (#/hr)	0	0	6	0	0	3	0	0	11	0	0	3
Turn Type	Perm	NA		Perm	NA		Prot	NA	Perm	Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8					2			
Actuated Green, G (s)	41.0	41.0		41.0	41.0		7.0	48.8	48.8	20.7	62.5	
Effective Green, g (s)	42.0	42.0		42.0	42.0		8.0	49.8	49.8	21.7	63.5	
Actuated g/C Ratio	0.32	0.32		0.32	0.32		0.06	0.38	0.38	0.17	0.49	
Clearance Time (s)	8.0	8.0		8.0	8.0		4.0	7.5	7.5	4.0	7.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	256	969		183	1071		108	1399	482	304	1786	
v/s Ratio Prot		0.15			0.12		c0.06	0.23		0.13	c0.52	
v/s Ratio Perm	0.28			c0.35					0.06			
v/c Ratio	0.88	0.46		1.07	0.38		1.02	0.61	0.16	0.77	1.06	
Uniform Delay, d1	41.7	35.0		44.0	33.9		61.0	32.2	26.3	51.8	33.2	
Progression Factor	1.00	1.00		1.00	1.00		1.19	0.91	0.95	1.31	0.80	
Incremental Delay, d2	28.0	0.3		86.7	0.2		83.4	1.6	0.6	8.1	34.5	
Delay (s)	69.6	35.3		130.7	34.1		156.1	31.1	25.5	76.0	61.0	
Level of Service	E	D		F	C		F	C	C	E	E	
Approach Delay (s)		45.9			64.9			42.8			62.7	
Approach LOS		D			E			D			E	

Intersection Summary			
HCM 2000 Control Delay	55.5	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.06		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	16.5
Intersection Capacity Utilization	113.9%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Appendix E – Signal Warrant Analysis

City of Richmond Hill Yonge/Bernard Key Development Area Peer Review and Transportation Assessment Update

TRAFFIC SIGNAL WARRANT ANALYSIS FORM FOR INTERSECTION CONTROL

OTM Book 12 Justification 7 Projected Volumes (March 2012)

Major Street: **Yonge St**
Minor Street: **Link D/E**

New intersection? Y or N: **Y**
' T ' intersection? Y or N: **N**

WARRANT 1 - MINIMUM VEHICULAR VOLUME

100% SATISFIED	YES	X	NO	
80% SATISFIED	YES	X	NO	

	MINIMUM REQUIREMENTS (80% SHOWN IN BRACKETS)				PERCENTAGE WARRANT									
APPROACH LANES	1		2 OR MORE		HOUR ENDING									
FLOW CONDITION	RURAL	URBAN	RURAL	URBAN	AHV									
				X										
1A. ALL APPROACHES	720 (576)	1080 (864)	900 (720)	1350 (1080)	1,801								TOTAL ACROSS	
100% FULFILLED					100								100	
80% FULFILLED					0								0	SECTIONAL
ACTUAL % IF BELOW 80% VALUE													0	PERCENT
												TOTAL	100	**100**

	MINIMUM REQUIREMENTS (80% SHOWN IN BRACKETS)				PERCENTAGE WARRANT									
APPROACH LANES	1		2 OR MORE		HOUR ENDING									
FLOW CONDITION	RURAL	URBAN	RURAL	URBAN	AHV									
				X										
1B. MINOR STREET BOTH APPROACHES	180 (144)	255 (204)	180 (144)	255 (204)	260								TOTAL ACROSS	
100% FULFILLED					100								100	
80% FULFILLED					0								0	SECTIONAL
ACTUAL % IF BELOW 80% VALUE													0	PERCENT
												TOTAL	100	**100**

WARRANT 2 - DELAY TO CROSS TRAFFIC

100% SATISFIED	YES		NO	X
80% SATISFIED	YES		NO	X

	MINIMUM REQUIREMENTS (80% SHOWN IN BRACKETS)				PERCENTAGE WARRANT									
APPROACH LANES	1		2 OR MORE		HOUR ENDING									
FLOW CONDITION	RURAL	URBAN	RURAL	URBAN	AHV									
				X										
A. MAJOR STREET BOTH APPROACHES	720 (576)	1080 (864)	900 (720)	1350 (1080)	1,541								TOTAL ACROSS	
100% FULFILLED					100								100	
80% FULFILLED					0								0	SECTIONAL
ACTUAL % IF BELOW 80% VALUE													0	PERCENT
												TOTAL	100	**100**

	MINIMUM REQUIREMENTS (80% SHOWN IN BRACKETS)				PERCENTAGE WARRANT									
APPROACH LANES	1		2 OR MORE		HOUR ENDING									
FLOW CONDITION	RURAL	URBAN	RURAL	URBAN	AHV									
				X										
B. TRAFFIC CROSSING MAJOR STREET	75 (60)	112.5 (90)	180 (144)	255 (204)	120								TOTAL ACROSS	
100% FULFILLED					0								0	
80% FULFILLED					0								0	SECTIONAL
ACTUAL % IF BELOW 80% VALUE					47%								47	PERCENT
												TOTAL	47	**47**

WARRANT 4 - COMBINATION WARRANT

Used if neither Justification 1 or 2 met 100%

SATISFIED	YES		NO	X

REQUIREMENT	WARRANT SATISFIED 80% OR MORE		Yes	No
Two Warrants Satisfied 80%	Warrant 1 - Minimum Vehicular Volume		X	
	Warrant 2 - Delay to Cross Traffic			X

FULFILLED	
Yes	No
	X

CONCLUSION: TRAFFIC SIGNALS WARRANTED? **YES** X **NO**

TRAFFIC SIGNAL WARRANT ANALYSIS FORM FOR INTERSECTION CONTROL

OTM Book 12 Justification 7 Projected Volumes (March 2012)

Major Street: **Yorkland St** — New intersection? Y or N: **N**
Minor Street: **Justus Dr** — ' T ' intersection? Y or N: **N**

WARRANT 1 - MINIMUM VEHICULAR VOLUME

100% SATISFIED YES [ ] NO [X]
80% SATISFIED YES [ ] NO [X]

	MINIMUM REQUIREMENTS (80% SHOWN IN BRACKETS)				PERCENTAGE WARRANT									
APPROACH LANES	1		2 OR MORE		HOUR ENDING									
FLOW CONDITION	RURAL	URBAN	RURAL	URBAN	AHV									
				X										
1A. ALL APPROACHES	576 (461)	864 (691)	720 (576)	1080 (864)	763								TOTAL ACROSS	
	100% FULFILLED				0								0	
	80% FULFILLED				0								0	SECTIONAL
	ACTUAL % IF BELOW 80% VALUE				71%								71	PERCENT
												TOTAL	71	**71**

	MINIMUM REQUIREMENTS (80% SHOWN IN BRACKETS)				PERCENTAGE WARRANT									
APPROACH LANES	1		2 OR MORE		HOUR ENDING									
FLOW CONDITION	RURAL	URBAN	RURAL	URBAN	AHV									
				X										
1B. MINOR STREET BOTH APPROACHES	144 (115)	204 (163)	144 (115)	204 (163)	153								TOTAL ACROSS	
	100% FULFILLED				0								0	
	80% FULFILLED				0								0	SECTIONAL
	ACTUAL % IF BELOW 80% VALUE				75%								75	PERCENT
												TOTAL	75	**75**

WARRANT 2 - DELAY TO CROSS TRAFFIC

100% SATISFIED YES [ ] NO [X]
80% SATISFIED YES [ ] NO [X]

	MINIMUM REQUIREMENTS (80% SHOWN IN BRACKETS)				PERCENTAGE WARRANT									
APPROACH LANES	1		2 OR MORE		HOUR ENDING									
FLOW CONDITION	RURAL	URBAN	RURAL	URBAN	AHV									
				X										
A. MAJOR STREET BOTH APPROACHES	576 (461)	864 (691)	720 (576)	1080 (864)	610								TOTAL ACROSS	
	100% FULFILLED				0								0	
	80% FULFILLED				0								0	SECTIONAL
	ACTUAL % IF BELOW 80% VALUE				56%								56	PERCENT
												TOTAL	56	**56**

	MINIMUM REQUIREMENTS (80% SHOWN IN BRACKETS)				PERCENTAGE WARRANT									
APPROACH LANES	1		2 OR MORE		HOUR ENDING									
FLOW CONDITION	RURAL	URBAN	RURAL	URBAN	AHV									
				X										
B. TRAFFIC CROSSING MAJOR STREET	60 (48)	90 (72)	144 (115)	204 (163)	62								TOTAL ACROSS	
	100% FULFILLED				0								0	
	80% FULFILLED				0								0	SECTIONAL
	ACTUAL % IF BELOW 80% VALUE				30%								30	PERCENT
												TOTAL	30	**30**

WARRANT 4 - COMBINATION WARRANT

Used if neither Justification 1 or 2 met 100%

SATISFIED YES [ ] NO [X]

REQUIREMENT	WARRANT SATISFIED 80% OR MORE	Yes	No
Two Warrants Satisfied 80%	Warrant 1 - Minimum Vehicular Volume		X
	Warrant 2 - Delay to Cross Traffic		X

FULFILLED	
Yes	No
	X

CONCLUSION: TRAFFIC SIGNALS WARRANTED? **YES** [ ] **NO** [X]

Appendix F – Multi-Modal Level of Service

City of Richmond Hill Yonge/Bernard Key Development Area Peer Review and Transportation Assessment Update

Intersection PLOS - Results

Notes:
1. It was assumed that vivaNext rapidway intersections will have exclusive left-turn signal phasing along Yonge Street (which impacts East and West approach LOS). Other turning movements are expected to be retained as existing.
2. For unsignalized intersections, stop and yield controlled approaches affect the pedestrian experience the same way a "permissive" signalized movement does, such as when a right-turn-on-red is allowed and a green is permissive. Because the turn is allowed based on driver judgment, pedestrians will feel less safe where a car is waiting to make the turn in their vicinity.
3. Intersections PLOS scores were adjusted on an individual basis to better capture the conditions within the specific context.

Unsignalized

Intersection		Brookside Rd & Rothbury Rd / Leyburn Ave								
		NORTH		SOUTH		EAST		WEST		
Pedestrian	Lanes	2	105	2	105	2	105	2	105	
	Median	No		No		No		No		
	Island Refuge	No	-4	No	-4	No	-4	No	-4	
	Conflicting Left Turn	Permissive	-7	Permissive	-7	Permissive	-7	Permissive	-7	
	Conflicting Right Turn	Permissive or yield control	-5	Permissive or yield control	-5	Permissive or yield control	-5	Permissive or yield control	-5	
	RTOR	RTOR allowed	-3	RTOR allowed	-3	RTOR allowed	-3	RTOR allowed	-3	
	Ped Leading Interval	No	-2	No	-2	No	-2	No	-2	
	Corner Radius (largest)	> 5m to 10m	-5	> 5m to 10m	-5	> 5m to 10m	-5	> 5m to 10m	-5	
	Crosswalk Type	No marking	-10	No marking	-10	No marking	-10	No marking	-10	improvement in marking can improve PLOS from B to C
	LEVEL OF SERVICE	C (69)	69	C (69)	69	C (69)	69	C (69)	69	69
		C								
	Adjusted LOS based on average approach	C								no adjustment necessary

Signalized

Intersection		Yorkland St & Silverwood Ave / Bernard Ave N								
		NORTH		SOUTH		EAST		WEST		
		Selection		Selection	Point	Selection	Point	Selection	Point	
Pedestrian	Lanes	3	100	3	100	3	100	3	100	
	Median	No		No		No		No		
	Island Refuge	No	-4	No	-4	No	-4	No	-4	
	Conflicting Left Turn	Permissive	-7	Permissive	-7	Permissive	-7	Permissive	-7	
	Conflicting Right Turn	Permissive or yield control	-5	Permissive or yield control	-5	Permissive or yield control	-5	Permissive or yield control	-5	
	RTOR	RTOR allowed	-3	RTOR allowed	-3	RTOR allowed	-3	RTOR allowed	-3	
	Ped Leading Interval	Yes	0	Yes	0	Yes	0	Yes	0	
	Corner Radius (largest)	> 10m to 15m	-6	> 10m to 15m	-6	> 10m to 15m	-6	> 10m to 15m	-6	
	Crosswalk Type	Standard transverse markings	-7	Standard transverse markings	-7	Standard transverse markings	-7	Standard transverse markings	-7	improvement in marking can improve PLOS from B to C
	LEVEL OF SERVICE	C (68)	68	C (68)	68	C (68)	68	C (68)	68	68
		C								
	Adjusted LOS based on average approach	C								no adjustment necessary

Signalized

Intersection		Yorkland St & Bernard Ave								
		NORTH		SOUTH		EAST		WEST		
		Selection		Selection	Point	Selection	Point	Selection	Point	
Pedestrian	Lanes	4	95	4	95	5	75	5	75	
	Median	No		No		Yes		Yes		
	Island Refuge	No	-4	No	-4	No	-4	No	-4	
	Conflicting Left Turn	Permissive	-7	Permissive	-7	Permissive	-7	Permissive	-7	
	Conflicting Right Turn	Permissive or yield control	-5	Permissive or yield control	-5	Permissive or yield control	-5	Permissive or yield control	-5	
	RTOR	RTOR allowed	-3	RTOR allowed	-3	RTOR allowed	-3	RTOR allowed	-3	
	Ped Leading Interval	Yes	0	Yes	0	Yes	0	Yes	0	
	Corner Radius (largest)	> 10m to 15m	-6	> 10m to 15m	-6	> 10m to 15m	-6	> 10m to 15m	-6	
	Crosswalk Type	Standard transverse markings	-7	Standard transverse markings	-7	Standard transverse markings	-7	Standard transverse markings	-7	
	LEVEL OF SERVICE	C (63)	63	C (63)	63	E (43)	43	E (43)	43	53
		E								
	Adjusted LOS based on average approach	D								no adjustment necessary

Unsignalized

Intersection		Yorkland St & Justus Dr								
		NORTH		SOUTH		EAST		WEST		
		Selection		Selection	Point	Selection	Point	Selection	Point	
Pedestrian	Lanes	4	95	4	95	2	105	2	105	
	Median	No		No		No		No		
	Island Refuge	No	-4	No	-4	No	-4	No	-4	
	Conflicting Left Turn	Permissive	-7	Permissive	-7	Permissive	-7	Permissive	-7	
	Conflicting Right Turn	Permissive or yield control	-5	Permissive or yield control	-5	Permissive or yield control	-5	Permissive or yield control	-5	
	RTOR	RTOR allowed	-3	RTOR allowed	-3	RTOR allowed	-3	RTOR allowed	-3	
	Ped Leading Interval	No	-2	No	-2	No	-2	No	-2	
	Corner Radius (largest)	> 5m to 10m	-5	> 5m to 10m	-5	> 5m to 10m	-5	> 5m to 10m	-5	
	Crosswalk Type	Standard transverse markings	-7	Standard transverse markings	-7	Standard transverse markings	-7	Standard transverse markings	-7	
	LEVEL OF SERVICE	C (62)	62	C (62)	62	C (72)	72	C (72)	72	67
		C								
	Adjusted LOS based on average approach	C								

Signalized

Intersection		Yonge Street and Brookside Road / Silverwood Ave								
		NORTH		SOUTH		EAST		WEST		
		Selection		Selection	Point	Selection	Point	Selection	Point	
Pedestrian	Lanes	7	55	7	55	3	100	3	100	
	Median	Yes		Yes		No		No		
	Island Refuge	No	-4	No	-4	No	-4	No	-4	
	Conflicting Left Turn	Permissive	-7	Permissive	-7	Protected	0	Protected	0	
	Conflicting Right Turn	Permissive or yield control	-5	Permissive or yield control	-5	Permissive or yield control	-5	Permissive or yield control	-5	
	RTOR	RTOR allowed	-3	RTOR allowed	-3	RTOR allowed	-3	RTOR allowed	-3	
	Ped Leading Interval	Yes	0	Yes	0	Yes	0	Yes	0	
	Corner Radius (largest)	> 5m to 10m	-5	> 5m to 10m	-5	> 5m to 10m	-5	> 5m to 10m	-5	
	Crosswalk Type	Textured/coloured pavement	-4	Textured/coloured pavement	-4	Textured/coloured pavement	-4	Textured/coloured pavement	-4	
	LEVEL OF SERVICE	F (27)	27	F (27)	27	B (79)	79	B (79)	79	53
		F								
	Adjusted LOS based on average approach	D								

Intersection		Yonge Street and Canyon Hill Ave / Bernard Ave								
		NORTH		SOUTH		EAST		WEST		
		Selection		Selection	Point	Selection	Point	Selection	Point	
Pedestrian	Lanes	7	55	8	40	5	72	5	75	
	Median	Yes		Yes		No		Yes		
	Island Refuge	Yes	0	Yes	0	No	-4	No	-4	
	Conflicting Left Turn	Permissive	-7	Permissive	-7	Protected	0	Protected	0	
	Conflicting Right Turn	Permissive or yield control	-5	Permissive or yield control	-5	Permissive or yield control	-5	Permissive or yield control	-5	
	RTOR	RTOR allowed	-3	RTOR allowed	-3	RTOR allowed	-3	RTOR allowed	-3	
	Ped Leading Interval	Yes	0	Yes	0	Yes	0	Yes	0	
	Corner Radius (largest)	> 5m to 10m	-5	> 5m to 10m	-5	> 5m to 10m	-5	> 5m to 10m	-5	
	Crosswalk Type	Textured/coloured pavement	-4	Textured/coloured pavement	-4	Textured/coloured pavement	-4	Textured/coloured pavement	-4	
	LEVEL OF SERVICE	E (31)	31	F (16)	16	D (51)	51	D (54)	54	38
		F								
	Adjusted LOS based on average approach	E								

Intersection		Yonge Street and Elgin Mills Rd								
		NORTH		SOUTH		EAST		WEST		
		Selection		Selection	Point	Selection	Point	Selection	Point	
Pedestrian	Lanes	7	55	8	40	6	65	6	65	
	Median	Yes		Yes		Yes		Yes		
	Island Refuge	Yes	0	Yes	0	No	-4	No	-4	
	Conflicting Left Turn	Protected/permissive	-5	Protected/permissive	-5	Protected	0	Protected	0	
	Conflicting Right Turn	Permissive or yield control	-5	Permissive or yield control	-5	Permissive or yield control	-5	Permissive or yield control	-5	
	RTOR	RTOR allowed	-3	RTOR allowed	-3	RTOR allowed	-3	RTOR allowed	-3	
	Ped Leading Interval	Yes	0	Yes	0	Yes	0	Yes	0	
	Corner Radius (largest)	> 10m to 15m	-6	> 10m to 15m	-6	> 10m to 15m	-6	> 10m to 15m	-6	
	Crosswalk Type	Textured/coloured pavement	-4	Textured/coloured pavement	-4	Textured/coloured pavement	-4	Textured/coloured pavement	-4	
	LEVEL OF SERVICE	E (32)	32	F (17)	17	E (43)	43	E (43)	43	33.75
		F								
	Adjusted LOS based on average approach	E								

Segment PLOS - Results

Note: AADTs were estimated based on existing TMCs.

Brookside Road

	From	Shaftsbury Ave	Eldorado St	Chantilly Crescent (east)	Burndean Ct	Alladin Crescent / Brookgreen Crescent
	To	Eldorado St	Chantilly Crescent (east)	Burndean Ct	Alladin Crescent / Brookgreen Crescent	Yonge St
Segment PLOS		**Segment 1**	**Segment 2**	**Segment 3**	**Segment 4**	**Segment 5**
North Side	Sidewalk Width (m)	1.5	1.5	1.8	1.5	1.8
	Boulevard Width (m)	3.5 to 4	0 to 0.5	0	0.5 to 2	0
	AADT	<3000	<3000	<3000	<3000	<3000
	Presence of on-street parking or other equivalent barrier **	No	No	No	No	No
	Operating Speed (km/h)	50	50	50	50	50
	LOS	**C**	**C**	**B**	**C**	**B**
South Side	Sidewalk Width	1.5	1.5	1.8	1.8	1.8
	Boulevard Width	3.5 to 4	3 to 4	0	0	0
	AADT	<3000	<3000	<3000	<3000	<3001
	Presence of on-street parking or other equivalent barrier **	No	No	No	No	No
	Operating Speed (km/h)	50	50	50	50	50
	LOS	**C**	**C**	**B**	**B**	**B**

** A boulevard width of >= 4.5m is considered here to be an 'equivalent barrier'; this does not necessarily reflect the presence of parking or an actual barrier

Silverwood Avenue

	From	Yonge St
	To	Yorkland St
Segment PLOS		**Segment 1**
North Side	Sidewalk Width (m)	1.5
	Boulevard Width (m)	3
	AADT	<3000
	Presence of on-street parking or other equivalent barrier **	No
	Operating Speed (km/h)	50
	LOS	**D**
South Side	Sidewalk Width	1.5
	Boulevard Width	>4.5
	AADT	<3000
	Presence of on-street parking or other equivalent barrier **	No
	Operating Speed (km/h)	50
	LOS	**C**

Chantilly Crescent

	From	Brookside Road (east)
	To	Brookside Road (east)
Segment PLOS		**Segment 1**
East-North-West	Sidewalk Width (m)	0
	Boulevard Width (m)	0
	AADT	<3000
	Presence of on-street parking or other equivalent barrier **	Yes
	Operating Speed (km/h)	50
	LOS	**F**
West -South-East (outside)	Sidewalk Width	1.5
	Boulevard Width	2 to 3
	AADT	<3000
	Presence of on-street parking or other equivalent barrier **	Yes
	Operating Speed (km/h)	50
	LOS	**C**

Leybrun Avenue

	From	Brookside Rd	90m south of Brookside	Naughton Dr (South)
	To	90m south of Brookside	Naughton Dr (South)	Canyon Hill Ave
Segment PLOS		**Segment 1**	**Segment 2**	**Segment 3**
East Side	Sidewalk Width (m)	1.8	1.5	1.5
	Boulevard Width (m)	0	0.5 to 2	3 to 4
	AADT	<3000	<3000	<3000
	Presence of on-street parking or other equivalent barrier **	No	No	No
	Operating Speed (km/h)	50	50	50
	LOS	**B**	**C**	**C**
West Side	Sidewalk Width	1.8	1.5	1.5
	Boulevard Width	0	0.5 to 2	3 to 4
	AADT	<3000	<3000	<3000
	Presence of on-street parking or other equivalent barrier **	No	No	No
	Operating Speed (km/h)	50	50	50
	LOS	**B**	**C**	**C**

Bernard Street

	From	Yorkland St	Viewmark Dr
	To	Viewmark Dr	Oldhill St
Segment PLOS		**Segment 1**	**Segment 2**
North Side / East Side	Sidewalk Width (m)	1.5	1.8
	Boulevard Width (m)	3 to 4	0
	AADT	<3000	<3000
	Presence of on-street parking or other equivalent barrier **	No	No
	Operating Speed (km/h)	50	50
	LOS	**C**	**B**
South Side / West Side	Sidewalk Width	1.5	1.5
	Boulevard Width	3 to 4	2 to 3
	AADT	<3000	<3000
	Presence of on-street parking or other equivalent barrier **	No	No
	Operating Speed (km/h)	50	50
	LOS	**C**	**C**

** A boulevard width of >= 4.5m is considered here to be an 'equivalent barrier'; this does not necessarily reflect the presence of parking or an actual barrier

El Dorado Street

	From	Brookside Rd
	To	Shaftsbury Ave
Segment PLOS		**Segment 1**
North Side / West Side	Sidewalk Width (m)	0
	Boulevard Width (m)	0
	AADT	<3000
	Presence of on-street parking or other equivalent barrier **	Yes
	Operating Speed (km/h)	50
	LOS	**F**
South Side / East Side	Sidewalk Width	1.5
	Boulevard Width	2.5 to 3.5
	AADT	<3000
	Presence of on-street parking or other equivalent barrier **	Yes
	Operating Speed (km/h)	50
	LOS	**C**

Los Alamos Drive

	From	Shaftsbury Ave
	To	El Dorado
Segment PLOS		**Segment 1**
North Side / East Side	Sidewalk Width (m)	1.5
	Boulevard Width (m)	3 to 4
	AADT	<3000
	Presence of on-street parking or other equivalent barrier **	Yes
	Operating Speed (km/h)	50
	LOS	**C**
South Side / West Side	Sidewalk Width	0
	Boulevard Width	0
	AADT	<3000
	Presence of on-street parking or other equivalent barrier **	Yes
	Operating Speed (km/h)	50
	LOS	**F**

Burndean Court

	From	Brookside Rd
	To	Cul-de-sac
Segment PLOS		**Segment 1**
East Side	Sidewalk Width (m)	0
	Boulevard Width (m)	0
	AADT	<3000
	Presence of on-street parking or other equivalent barrier **	Yes
	Operating Speed (km/h)	50
	LOS	**F**
West Side	Sidewalk Width	0
	Boulevard Width	0
	AADT	<3000
	Presence of on-street parking or other equivalent barrier **	Yes
	Operating Speed (km/h)	50
	LOS	**F**

** A boulevard width of >= 4.5m is considered here to be an 'equivalent barrier'; this does not necessarily reflect t** A boulevard width of >= 4.5m is considered here to be an 'equivalent barrier'; this does not necessarily reflect the presence of parking or an actual barrier

Stancroft Drive

	From	Leyburn Ave
	To	Cul-de-sac
Segment PLOS		**Segment 1**
North Side	Sidewalk Width (m)	0
	Boulevard Width (m)	0
	AADT	<3000
	Presence of on-street parking or other equivalent barrier **	No
	Operating Speed (km/h)	50
	LOS	**F**
South Side	Sidewalk Width	0
	Boulevard Width	0
	AADT	<3000
	Presence of on-street parking or other equivalent barrier **	No
	Operating Speed (km/h)	50
	LOS	**F**

Abitibi Stt and Debonair Drive

	From	Canyon Hill Ave
	To	Naughton Dr
Segment PLOS		**Segment 1**
East Side	Sidewalk Width (m)	0
	Boulevard Width (m)	0
	AADT	<3000
	Presence of on-street parking or other equivalent barrier **	Yes
	Operating Speed (km/h)	50
	LOS	**F**
West Side	Sidewalk Width	0
	Boulevard Width	0
	AADT	<3000
	Presence of on-street parking or other equivalent barrier **	Yes
	Operating Speed (km/h)	50
	LOS	**F**

Palomino Drive

	From	Shaftbury Ave
	To	Canyon Hill Ave
Segment PLOS		**Segment 1**
North Side	Sidewalk Width (m)	1.5
	Boulevard Width (m)	3
	AADT	<3000
	Presence of on-street parking or other equivalent barrier **	Yes
	Operating Speed (km/h)	50
	LOS	**C**
South Side	Sidewalk Width	0
	Boulevard Width	0
	AADT	<3000
	Presence of on-street parking or other equivalent barrier **	Yes
	Operating Speed (km/h)	50
	LOS	**F**

Canyon Hill Avenue / Bernard Avenue

	From	Shaftsbury Ave	Abitibi St	Yonge St	Yorkland St
	To	Abitibi St	Yonge St	Yorkland St	Oldhill St
Segment PLOS		**Segment 1**	**Segment 2**	**Segment 3**	**Segment 4**
North Side	Sidewalk Width (m)	1.5	1.5	1.5	1.5
	Boulevard Width (m)	5	2.5	2.5 to 3	2.5 to 3
	AADT	>3000	>3000	>3000	<3000
	Presence of on-street parking or other equivalent barrier **	No	No	No	No
	Operating Speed (km/h)	50	50	50	50
	LOS	**C**	**D**	**D**	**C**
South Side	Sidewalk Width (m)	1.5	1.7	1.5	1.5
	Boulevard Width (m)	5	0	2.5 to 3	2.5 to 3
	AADT	>3000	>3000	>3000	<3000
	Presence of on-street parking or other equivalent barrier **	No	No	No	No
	Operating Speed (km/h)	50	50	50	50
	LOS	**C**	**D**	**D**	**C**

** A boulevard width of >= 4.5m is considered here to be an 'equivalent barrier'; this does not necessarily reflect the presence of parking or an actual barrier

Gracedale Drive

	From	Shaftbury Ave
	To	Canyon Hill Ave
Segment PLOS		**Segment 1**
North Side / West Side	Sidewalk Width (m)	1.5
	Boulevard Width (m)	3
	AADT	<3000
	Presence of on-street parking or other equivalent barrier **	Yes
	Operating Speed (km/h)	50
	LOS	**C**
South Side / East Side	Sidewalk Width	0
	Boulevard Width	0
	AADT	<3000
	Presence of on-street parking or other equivalent barrier **	Yes
	Operating Speed (km/h)	50
	LOS	**F**

Naughton Drive

	From	Western Cul-de-Sac	300m east	Leyburn Ave	Abitibi St
	To	300m east	Leyburn Ave	Abitibi St	Yonge Street
Segment PLOS		**Segment 1**	**Segment 2**	**Segment 3**	**Segment 4**
North Side	Sidewalk Width (m)	1.8	1.5	1.8	0
	Boulevard Width (m)	0	0.5 to 2	0	0
	AADT	<3000	<3000	<3000	
	Presence of on-street parking or other equivalent barrier **	Yes	Yes	Yes	No
	Operating Speed (km/h)	50	50	50	50
	LOS	**B**	**C**	**B**	**F**
South Side	Sidewalk Width	0	0	0	1.5
	Boulevard Width	0	0	0	>2
	AADT	<3000	<3000	<3000	<3000
	Presence of on-street parking or other equivalent barrier **	Yes	Yes	Yes	No
	Operating Speed (km/h)	50	50	50	50
	LOS	**F**	**F**	**F**	**C**

Espby Court and Rainey Court

	From	Pickett Crescent
	To	Pickett Crescent
Segment PLOS		**Segment 1**
Outside Perimeter (West-North-East)	Sidewalk Wid	0
	Boulevard W	0
	AADT	<3000
	Presence of on-street parking or other equivalent barrier **	Yes
	Operating Sp	50
	LOS	**F**
Inner Perimeter (East-South-West)	Sidewalk Wid	0
	Boulevard W	0
	AADT	<3000
	Presence of on-street parking or other equivalent barrier **	Yes
	Operating Sp	50
	LOS	**F**

Pickett Crescent

	From	Cooperage Crescent (W)
	To	Cooperage Crescent E
Segment PLOS		**Segment 1**
Outside Perimeter (West-North-East)	Sidewalk Width (m)	1.5
	Boulevard Width (m)	3
	AADT	<3000
	Presence of on-street parking or other equivalent barrier **	Yes
	Operating Speed (km/h)	50
	LOS	**C**
Inner Perimeter (East-South-West)	Sidewalk Width	0
	Boulevard Width	0
	AADT	<3000
	Presence of on-street parking or other equivalent barrier **	Yes
	Operating Speed (km/h)	50
	LOS	**F**

** A boulevard width of >= 4.5m is considered here to be an 'equivalent barrier'; this does not necessarily reflect the presence of parking or an actual barrier

Cooperage Crescent

	From	Shaftsbury Ave (North)
	To	Shaftsbury Crescent (South)
Segment PLOS		**Segment 1**
North Side / West Side	Sidewalk Width (m)	1.5
	Boulevard Width (m)	3 to 4
	AADT	<3000
	Presence of on-street parking or other equivalent barrier **	Yes
	Operating Speed (km/h)	50
	LOS	**C**
South Side / East Side	Sidewalk Width	0
	Boulevard Width	0
	AADT	<3000
	Presence of on-street parking or other equivalent barrier **	Yes
	Operating Speed (km/h)	50
	LOS	**F**

Elgin Mills Road

	From	Shaftsbury St	Yonge Street	Yorkland St	Ohio Road
	To	Yonge Street	Yorkland St	Ohio Road	Railway overpass
Segment PLOS		**Segment 1**	**Segment 2**	**Segment 3**	**Segment 4**
North Side	Sidewalk Width (m)	1.5	1.5	1.5	1.5
	Boulevard Width (m)	1 to 1.5	0.5 to 2	0.5 to 2	4.5
	AADT	>3000	>3000	>3000	>3000
	Presence of on-street parking or other equivalent barrier **	No	No	No	No
	Operating Speed (km/h)	50	60	60	60
	LOS	**E**	**E**	**E**	**D**
South Side	Sidewalk Width	1.5	1.5	1.5	1.5
	Boulevard Width	1 to 1.5	0	1 to 1.5	0.5 to 2
	AADT	>3000	>3000	>3000	>3000
	Presence of on-street parking or other equivalent barrier **	No	No	No	No
	Operating Speed (km/h)	50	60	60	60
	LOS	**E**	**F**	**E**	**E**

** A boulevard width of >= 4.5m is considered here to be an 'equivalent barrier'; this does not necessarily reflect the presence of parking or an actual barrier

Yorkland Street

	From	Silverwood Ave / Bernard Ave
	To	Elgin Mills Rd
Segment PLOS		**Segment 1**
East Side	Sidewalk Width (m)	1.5
	Boulevard Width (m)	4.6 to 5.2
	AADT	>3000
	Presence of on-street parking or other equivalent barrier **	Yes
	Operating Speed (km/h)	50
	LOS	**C**
West Side	Sidewalk Width (m)	1.5
	Boulevard Width (m)	4.6 to 5.2
	AADT	>3000
	Presence of on-street parking or other equivalent barrier **	Yes
	Operating Speed (km/h)	50
	LOS	**C**

Oldhill Street / Elmpark Court

	From	Silverwood Ave / Bernard Ave
	To	Elgin Mills Rd
Segment PLOS		**Segment 1**
East Side / South Side	Sidewalk Width (m)	0
	Boulevard Width (m)	0
	AADT	<3000
	Presence of on-street parking or other equivalent barrier **	Yes
	Operating Speed (km/h)	50
	LOS	**F**
West Side / North Side	Sidewalk Width (m)	1.5
	Boulevard Width (m)	2.8
	AADT	<3000
	Presence of on-street parking or other equivalent barrier **	Yes
	Operating Speed (km/h)	50
	LOS	**C**

Justus Drive

	From	Lorraine St
	To	Yorkland St
Segment PLOS		**Segment 1**
Outside Perimeter (North-East-South)	Sidewalk Width (m)	1.5
	Boulevard Width (m)	2.5-3
	AADT	<3000
	Presence of on-street parking or other equivalent barrier **	Yes
	Operating Speed (km/h)	50
	LOS	**C**
Inner Perimeter (north-west-north)	Sidewalk Width (m)	0
	Boulevard Width (m)	0
	AADT	<3000
	Presence of on-street parking or other equivalent barrier **	Yes
	Operating Speed (km/h)	50
	LOS	**F**

Brookgreen Crescent

	From	Brookside Road
	To	end of street
Segment PLOS		**Segment 1**
East Side	Sidewalk Width (m)	1.5
	Boulevard Width (m)	3
	AADT	<3000
	Presence of on-street parking or other equivalent barrier **	Yes
	Operating Speed (km/h)	50
	LOS	**C**
West Side	Sidewalk Width (m)	0
	Boulevard Width (m)	0
	AADT	<3000
	Presence of on-street parking or other equivalent barrier **	Yes
	Operating Speed (km/h)	50
	LOS	**F**

Forestside Court

	From	Old Hill St
	To	Cul-de-sac
Segment PLOS		**Segment 1**
North Side	Sidewalk Width (m)	1.5
	Boulevard Width (m)	2.5-3
	AADT	<3000
	Presence of on-street parking or other equivalent barrier **	Yes
	Operating Speed (km/h)	50
	LOS	**C**
South Side	Sidewalk Width (m)	0
	Boulevard Width (m)	0
	AADT	<3000
	Presence of on-street parking or other equivalent barrier **	Yes
	Operating Speed (km/h)	50
	LOS	**F**

Lorraine Street

	From	Lorraine St
	To	Yorkland St
Segment PLOS		**Segment 1**
East Side	Sidewalk Width (m)	0
	Boulevard Width (m)	0
	AADT	<3000
	Presence of on-street parking or other equivalent barrier **	Yes
	Operating Speed (km/h)	50
	LOS	**F**
West Side	Sidewalk Width (m)	1.5
	Boulevard Width (m)	2 to 3
	AADT	<3000
	Presence of on-street parking or other equivalent barrier **	Yes
	Operating Speed (km/h)	50
	LOS	**C**

Squire Drive

	From	Yorkland St
	To	Bernard Ave
Segment PLOS		**Segment 1**
West	Sidewalk Width (m)	0
	Boulevard Width (m)	0
	AADT	<3000
	Presence of on-street parking or other equivalent barrier **	No
	Operating Speed (km/h)	50
	LOS	**F**
East	Sidewalk Width (m)	1.5
	Boulevard Width (m)	2 to 3
	AADT	<3000
	Presence of on-street parking or other equivalent barrier **	Yes
	Operating Speed (km/h)	40
	LOS	**C**

Viewmark Drive

	From	Bernard Ave
	To	Bernard Ave
Segment PLOS		**Segment 1**
East Side / North Side	Sidewalk Width (m)	1.5
	Boulevard Width (m)	2 to 3
	AADT	<3000
	Presence of on-street parking or other equivalent barrier **	Yes
	Operating Speed (km/h)	50
	LOS	**C**
West Side / South Side	Sidewalk Width (m)	0
	Boulevard Width (m)	0
	AADT	<3000
	Presence of on-street parking or other equivalent barrier **	Yes
	Operating Speed (km/h)	50
	LOS	**F**

Tamara Drive

	From	Viewmark Dr
	To	Viewmark Dr
Segment PLOS		**Segment 1**
East Side / North Side	Sidewalk Width (m)	0
	Boulevard Width (m)	0
	AADT	<3000
	Presence of on-street parking or other equivalent barrier **	Yes
	Operating Speed (km/h)	50
	LOS	**F**
West Side / South Side	Sidewalk Width (m)	1.5
	Boulevard Width (m)	2 to 3
	AADT	<3000
	Presence of on-street parking or other equivalent barrier **	Yes
	Operating Speed (km/h)	50
	LOS	**C**

Coldstream Crescent

	From	Bathurst Street
	To	Promenade Circle
Segment PLOS		**Segment 1**
Inner Perimeter (East-North-West)	Sidewalk Width (m)	0
	Boulevard Width (m)	0
	AADT	<3000
	Presence of on-street parking or other equivalent barrier **	Yes
	Operating Speed (km/h)	50
	LOS	**F**
Outer Perimeter (West-South-East)	Sidewalk Width (m)	1.5
	Boulevard Width (m)	3
	AADT	<3000
	Presence of on-street parking or other equivalent barrier **	Yes
	Operating Speed (km/h)	50
	LOS	**C**

Shilo Court

	From	Silverwood Ave / Bernard Ave
	To	Elgin Mills Rd
Segment PLOS		**Segment 1**
East Side	Sidewalk Width (m)	0
	Boulevard Width (m)	0
	AADT	<3000
	Presence of on-street parking or other equivalent barrier **	Yes
	Operating Speed (km/h)	50
	LOS	**F**
West Side	Sidewalk Width (m)	0
	Boulevard Width (m)	0
	AADT	<3000
	Presence of on-street parking or other equivalent barrier **	Yes
	Operating Speed (km/h)	50
	LOS	**F**

Mandel Crescent

	From	Oldhil Street
	To	Old Hill Street
Segment PLOS		**Segment 1**
Inner Perimeter (south-east-north)	Sidewalk Width (m)	0
	Boulevard Width (m)	0
	AADT	<3000
	Presence of on-street parking or other equivalent barrier **	Yes
	Operating Speed (km/h)	50
	LOS	**F**
Outer Perimeter (north-west-south)	Sidewalk Width (m)	1.5
	Boulevard Width (m)	2 to 3
	AADT	<3000
	Presence of on-street parking or other equivalent barrier **	Yes
	Operating Speed (km/h)	50
	LOS	**C**

Leonard Street

	From	Yonge Street	Cooperage Crt
	To	Cooperage Crt	Elgin Mills Rd
Segment PLOS		**Segment 1**	**Segment 2**
North Side / West Side	Sidewalk Width (m)	0	1.5
	Boulevard Width (m)	0	3 to 3.5
	AADT	<3000	<3000
	Presence of on-street parking or other equivalent barrier **	Yes	Yes
	Operating Speed (km/h)	50	50
	LOS	**F**	**C**
South Side / East Side	Sidewalk Width (m)	0	0
	Boulevard Width (m)	0	0
	AADT	<3000	<3000
	Presence of on-street parking or other equivalent barrier **	Yes	Yes
	Operating Speed (km/h)	50	50
	LOS	**F**	**F**

Shaftsbury Avenue

	From	Brookside Rd
	To	Elgin Mills Rd
Segment PLOS		**Segment 1**
East Side	Sidewalk Width (m)	1.5
	Boulevard Width (m)	4.5 to 5
	AADT	<3000
	Presence of on-street parking or other equivalent barrier **	No
	Operating Speed (km/h)	50
	LOS	**C**
West Side	Sidewalk Width (m)	1.5
	Boulevard Width (m)	4.5 to 5
	AADT	<3000
	Presence of on-street parking or other equivalent barrier **	No
	Operating Speed (km/h)	50
	LOS	**C**

Yonge Street

	From	Elgin Mills Rd
	To	Brookside Rd
Segment PLOS		**Segment 1**
East Side	Sidewalk Width (m)	2
	Boulevard Width (m)	4.5 to 5
	AADT	>3000
	Presence of on-street parking or other equivalent barrier **	No
	Operating Speed (km/h)	60
	LOS	**B**
West Side	Sidewalk Width (m)	2
	Boulevard Width (m)	4.5 to 5
	AADT	>3000
	Presence of on-street parking or other equivalent barrier **	No
	Operating Speed (km/h)	60
	LOS	**B**

As per the VIVA project detailed design drawings

Newmill Crescent

	From	Yorland St
	To	Old hill St
Segment PLOS		**Segment 1**
North Side / East Side	Sidewalk Width (m)	1.5
	Boulevard Width (m)	2 to 3
	AADT	<3000
	Presence of on-street parking or other equivalent barrier **	Yes
	Operating Speed (km/h)	50
	LOS	**C**
South Side / West Side	Sidewalk Width (m)	0
	Boulevard Width (m)	0
	AADT	<3000
	Presence of on-street parking or other equivalent barrier **	Yes
	Operating Speed (km/h)	50
	LOS	**F**

INTERSECTION BLOS - RESULTS

Score	Letter Grade
5	A
4	B
3	C
2	D
1	E
0	F

V (MPH)	B	F	R (FT)
10	0	0.38	18
15	0	0.32	47
20	0	0.27	99
25	0	0.22	174

NOTES

Signalized T-intersections are bumped up because there are less movements impacting cyclists
If radius is larger than 14 m, then turning speed > 25km/hr
Any intersections with RT > 50m and more than 2 lanes to cross turning --> BLOS F
Operating speed is assumed to be the posted speed limit. Where not posted, speed is assumed to be the maximum 50km/hr, to be conservative

Intersection		*Brookside Rd & Rothbury Rd / Leyburn Ave*			
		NORTH	SOUTH	EAST	WEST
BLOS	Right turn lane length	None	None	None	None
	Turning Speed (based on curb radii)	=<25km/h	=<25km/h	=<25km/h	=<25km/h
	Dual right-turn lanes?	No	No	No	No
	Right Turn LOS	C	C	C	C
	Operating Speed	50 km/h	50 km/h	40 km/h	40 km/h
	Number of Lanes Crossed	None	None	None	None
	Two-stage, left-turn bike box?	No	No	No	No
	Dual left-turn lanes (share or exclusive)?	No	No	No	No
	Left Turn LOS	B	B	B	B
	Overall Approach LOS (average)	B/C	B/C	B/C	B/C
	LEVEL OF SERVICE	**B**			

0
round up due to local streets with low volumes

Intersection		*Yorkland St & Silverwood Ave / Bernard Ave*			
		NORTH	SOUTH	EAST	WEST
BLOS	Right turn lane length	None	None	None	None
	Turning Speed (based on curb radii)	=<25km/h	=<25km/h	=<25km/h	=<25km/h
	Dual right-turn lanes?	No	No	No	No
	Right Turn LOS	C	C	C	C
	Operating Speed	50 km/h	50 km/h	50 km/h	50 km/h
	Number of Lanes Crossed	1 lane	1 lane	1 lane	1 lane
	Two-stage, left-turn bike box?	No	No	No	No
	Dual left-turn lanes (share or exclusive)?	No	No	No	No
	Left Turn LOS	D	D	D	D
	Overall Approach LOS (average)	C/D	C/D	C/D	C/D
	LEVEL OF SERVICE	**D**			

Intersection		*Yorkland St & Bernard Ave*			
		NORTH	SOUTH	EAST	WEST
BLOS	Right turn lane length	None	None	None	None
	Turning Speed (based on curb radii)	>25km/h	>25km/h	>25km/h	>25km/h
	Dual right-turn lanes?	No	No	No	No
	Right Turn LOS	D	D	D	D
	Operating Speed	50 km/h	50 km/h	50 km/h	50 km/h
	Number of Lanes Crossed	1 lane	1 lane	2 or more	2 or more
	Two-stage, left-turn bike box?	No	No	No	No
	Dual left-turn lanes (share or exclusive)?	No	No	No	No
	Left Turn LOS	D	D	F	F
	Overall Approach LOS (average)	D	D	E	E
	LEVEL OF SERVICE	**E**			

Intersection		*Yorkland St & Justus Dr*			
		NORTH	SOUTH	EAST	WEST
BLOS	Right turn lane length	None	None	None	None
	Turning Speed (based on curb radii)	=<25km/h	=<25km/h	=<25km/h	=<25km/h
	Dual right-turn lanes?	No	No	No	No
	Right Turn LOS	C	C	C	C
	Operating Speed	50 km/h	50 km/h	50 km/h	50 km/h
	Number of Lanes Crossed	1 lane	1 lane	None	None
	Two-stage, left-turn bike box?	No	No	No	No
	Dual left-turn lanes (share or exclusive)?	No	No	No	No
	Left Turn LOS	D	D	B	B
	Overall Approach LOS (average)	D/E	D/E	B/C	B/C
	LEVEL OF SERVICE	**C**			

round up

Intersection		*Yorkland St / Enford Rd & Elgin Mills Rd*			
		NORTH	SOUTH	EAST	WEST
BLOS	Right turn lane length	>50m	None	>50m	>50m
	Turning Speed (based on curb radii)	>25km/h	>25km/h	>25km/h	>25km/h
	Dual right-turn lanes?	No	No	No	No
	Right Turn LOS	F	F	F	F
	Operating Speed	50 km/h	50 km/h	60 km/h	60 km/h
	Number of Lanes Crossed	2 or more	1 lane	2 or more	2 or more
	Two-stage, left-turn bike box?	No	No	No	No
	Dual left-turn lanes (share or exclusive)?	Yes	No	No	No
	Left Turn LOS	F	D	F	F
	Overall Approach LOS (average)	F	E	F	F
	LEVEL OF SERVICE	**F**			

Intersection		*Canyon Hill Ave & Leyburn Ave*			
		NORTH	SOUTH	EAST	WEST
BLOS	Right turn lane length	None		None	
	Turning Speed (based on curb radii)	=<25km/h		=<25km/h	
	Dual right-turn lanes?	No		No	
	Right Turn LOS	C		C	
	Operating Speed	50 km/h			50 km/h
	Number of Lanes Crossed	None			None
	Two-stage, left-turn bike box?	No			No
	Dual left-turn lanes (share or exclusive)?	No			No
	Left Turn LOS	B			B
	Overall Approach LOS (average)	B/C		C	B
	LEVEL OF SERVICE	**B**			

3.5

raised bike lanes present on Yonge

Intersection		*Yonge St & Elgin Mills Rd*			
		NORTH	SOUTH	EAST	WEST
BLOS	Right turn lane length			>50m	>50m
	Turning Speed (based on curb radii)			>25km/h	>25km/h
	Dual right-turn lanes?			No	No
	Right Turn LOS	A	A	F	F
	Operating Speed	60 km/h	60 km/h	50 km/h	50 km/h
	Number of Lanes Crossed			2 or more	2 or more
	Two-stage, left-turn bike box?	Yes	Yes	No	No
	Dual left-turn lanes (share or exclusive)?			No	No
	Left Turn LOS	B	B	F	F
	Overall Approach LOS (average)	A/B	A/B	F	F
	LEVEL OF SERVICE	**D**			

raised bike lanes present on Yonge Street. However, there is a pocket bike lane on the south approach due to the proposed right-turn lane

Intersection		*Yonge St & Canyon Hill Ave / Bernard Ave*			
		NORTH	SOUTH	EAST	WEST
BLOS	Right turn lane length		>50m	None	None
	Turning Speed (based on curb radii)		=<25km/h	>25km/h	>25km/h
	Dual right-turn lanes?		No	No	No
	Right Turn LOS	A	D	D	D
	Operating Speed	60 km/h	60 km/h	50 km/h	50 km/h
	Number of Lanes Crossed			2 or more	2 or more
	Two-stage, left-turn bike box?	Yes	Yes	No	No
	Dual left-turn lanes (share or exclusive)?			No	No
	Left Turn LOS	B	B	F	F
	Overall Approach LOS (average)	A/B	C	E	E
	LEVEL OF SERVICE	**D**			

2.375

raised bike lanes present on Yonge

Intersection		*Yonge St & Brookside Rd / Silvewood Ave*			
		NORTH	SOUTH	EAST	WEST
BLOS	Right turn lane length			None	None
	Turning Speed (based on curb radii)			=<25km/h	=<25km/h
	Dual right-turn lanes?			No	No
	Right Turn LOS	A	A	C	C
	Operating Speed	60 km/h	60 km/h	50 km/h	50 km/h
	Number of Lanes Crossed			1 lane	1 lane
	Two-stage, left-turn bike box?	Yes	Yes	No	No
	Dual left-turn lanes (share or exclusive)?			No	No
	Left Turn LOS	B	B	D	D
	Overall Approach LOS (average)	A/B	A/B	C/D	C/D
	LEVEL OF SERVICE	**C**			

Segment BLOS - Results

* Bike Facility Type
1 = Physically separated bikeway
2 = Bike Lanes not adjacent to parking
3 = Bike Lanes adjacent to parking
4 = Mixed Traffic

Table 3.2 Minimum Design Speed of Different Road Classes as per TAC Guide

Road Classification	Minimum Design Speed, km/h	Vaughan Existing Design Speed	Recommendation Design Speed
Locals	30-50	50	60 (10 km/hr above the posted speed limit)
Collectors	50-80	50	80 (20 km/hr above the posted speed limit)
Minor Arterial	50-70	60	80 (20 km/hr above the posted speed limit)

**For mixed traffic, report traffic lanes in both directions. All else report in the direction of travel.

Raised bike lanes: part of the vivaNext rapidway project on Yonge Street are bike lanes at the same level as sidewalks, separated from oncoming traffic by a curb

Local / Residential Streets

Los Alamos Drive, El Dorado St, Chantilly Crt, Burndean Ct, Brookegreene Crt, Stancroft Dr, Leyburn Ave, Naughton Dr, Abitibi St, Debonair St, Leyburn Ave, Palomino Drive, Gracedale Dr, Pickett Crt, Cooperage Crt, Leonard St, Viewmark Dr, Tamara Dr, Colstream Crt, Oldhill St, Elmpark St, Newmill Crt, Justus Dr, Lorraine St, Mandel Crt, Squire Dr, Shilo Ct, Forestside Ct

Bikeway Type*	4
No. Travel Lanes**	2
Bike Lane width (if applicable)	n/a
Operating Speed (kph)	50
Bike Lane Blockage (if applicable)	NA
segment BLOS	**B**

2 lane Collector Roads

Bernard Ave (Yorkland St to Lorraine Dr), Silverwood Ave (Yonge St to Yorkland), Brookside Rd (Yonge St to Shaftsbury Ave), Shaftsbury Ave (Brookside Rd to Elgin Mills Rd), Yorkland St (Silverwood Ave to Squire Dr), Canyon Hill Ave (Yonge St to Shaftsbury Ave)

Bikeway Type*	4
No. Travel Lanes**	2
Bike Lane width (if applicable)	n/a
Operating Speed (kph)	50
Marked Centreline	Yes
Bike Lane Blockage (if applicable)	NA
segment BLOS	**D**

3 lane Roads

Elgin Mills Road (Shaftsbury Ave to Creekview Ave)

Bikeway Type*	4
No. Travel Lanes**	3
Bike Lane width (if applicable)	n/a
Operating Speed (kph)	50
Bike Lane Blockage (if applicable)	NA
segment BLOS	**D**

4-5 lane Roads

Yorkland St (Squire Drive to Elgin Mills Rd), Bernard Ave (Yonge Street to Yorkland St), Elgin Mills Rd (Creekview Ave to Yonge St)

Bikeway Type*	4
No. Travel Lanes**	4 to 5
Bike Lane width (if applicable)	n/a
Operating Speed (kph)	50
Bike Lane Blockage (if applicable)	NA
segment BLOS	**E**

High speed, 4-5 lane Roads

Elgin Mills (Yonge to rail overpass)

Bikeway Type*	4
No. Travel Lanes**	4 to 5
Bike Lane width (if applicable)	n/a
Operating Speed (kph)	60
Bike Lane Blockage (if applicable)	NA
segment BLOS	**F**

Yonge Street (Silverwood Ave to Elgin Mills Rd)

Bikeway Type*	1
segment BLOS	**A**

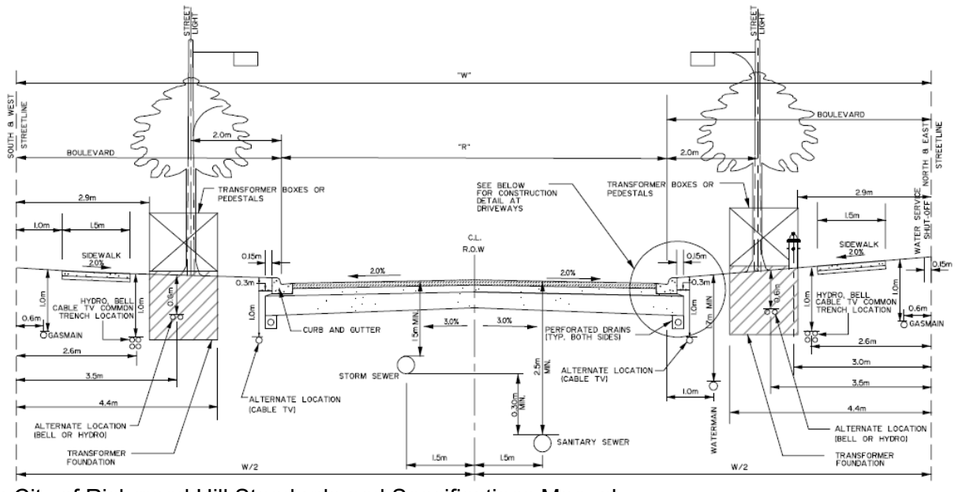
http://www.vivanext.com/PDFs/Y/2/FactSheet_YongeStreetRichmondHill.pdf

Appendix G – Potential Cycling Facility Cross-Sections

City of Richmond Hill Yonge/Bernard Key Development Area Peer Review and Transportation Assessment Update

Typical Residential Right-of-Way

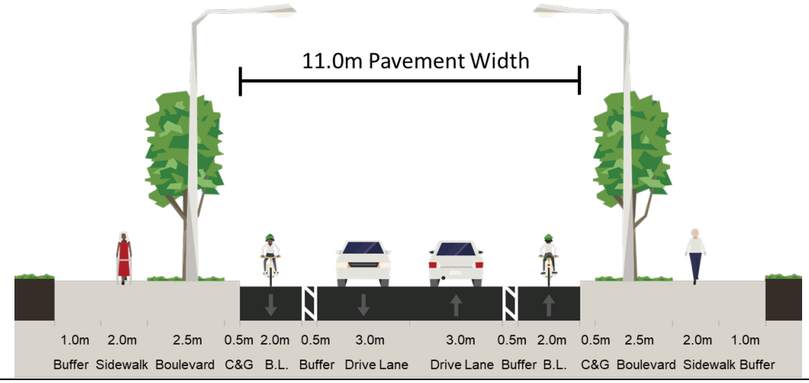
R-1A - Typical Street Cross-Section >18m R.O.W.



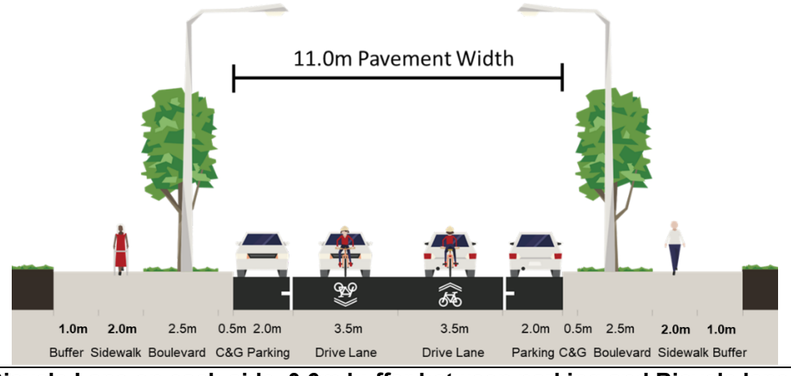
Source: City of Richmond Hill Standards and Specifications Manual

Cycling Facility Options

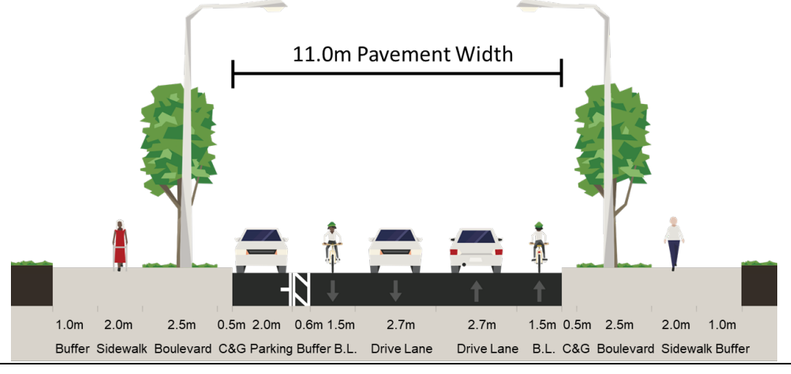
Option 1: 2.0m Bicycle Lane or raised cycle track, 0.5m buffer each side



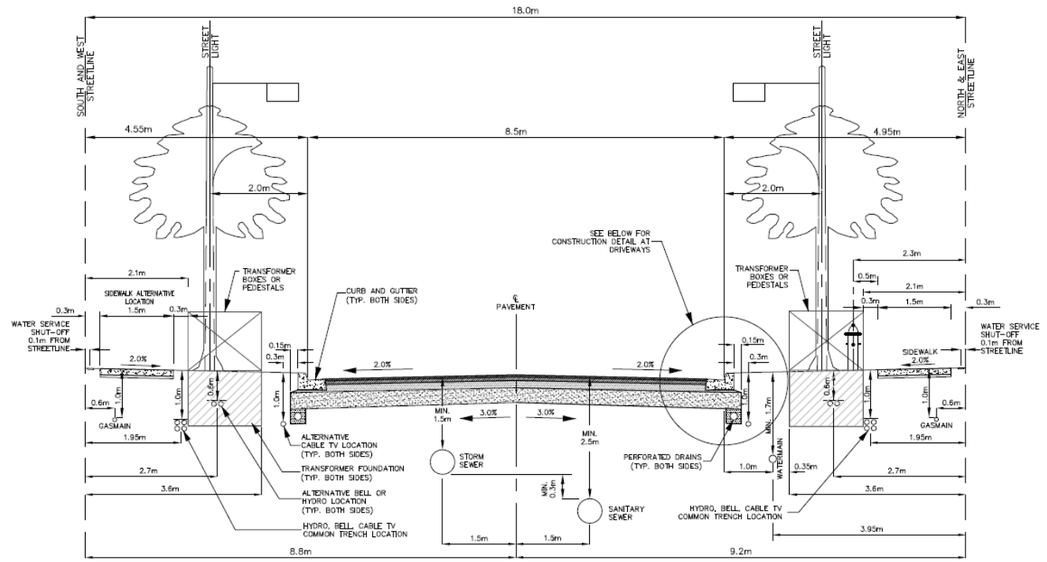
Option 2: Sharrows / signed route with On-Street Parking



Option 3: 1.5m Bicycle Lane on each side, 0.6m buffer between parking and Bicycle lane

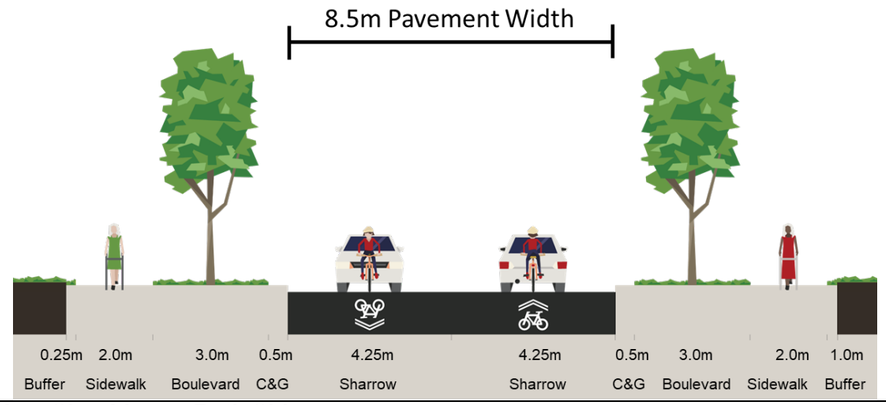


R-2A Typical Street Cross-Section 18.0m R.O.W.

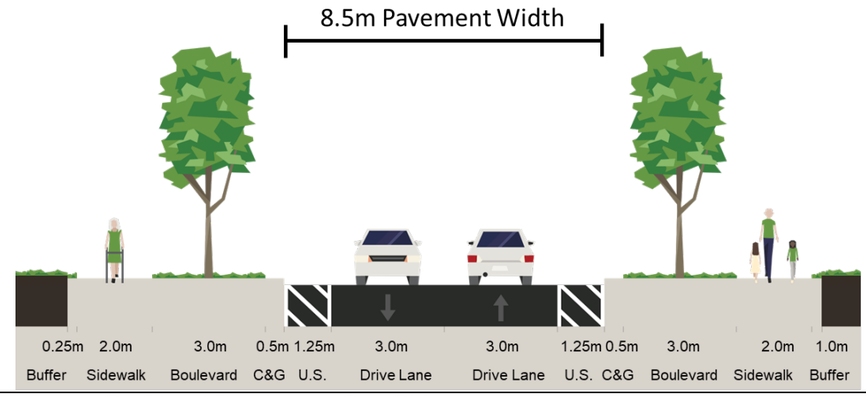


Source: City of Richmond Hill Standards and Specifications Manual

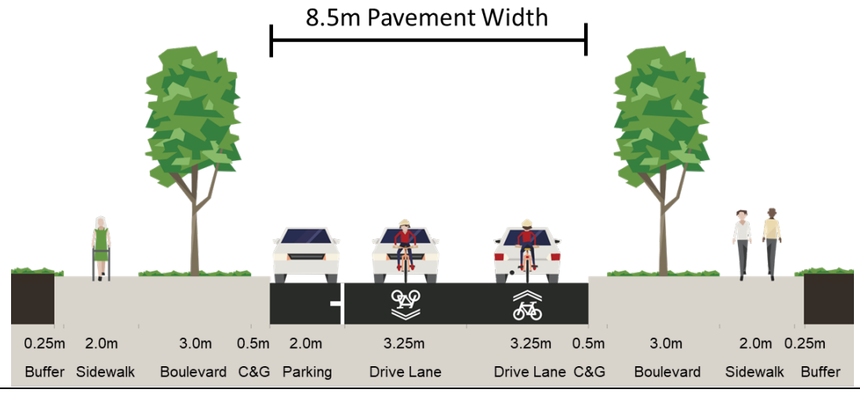
Option 1: Sharrow / Signed Route



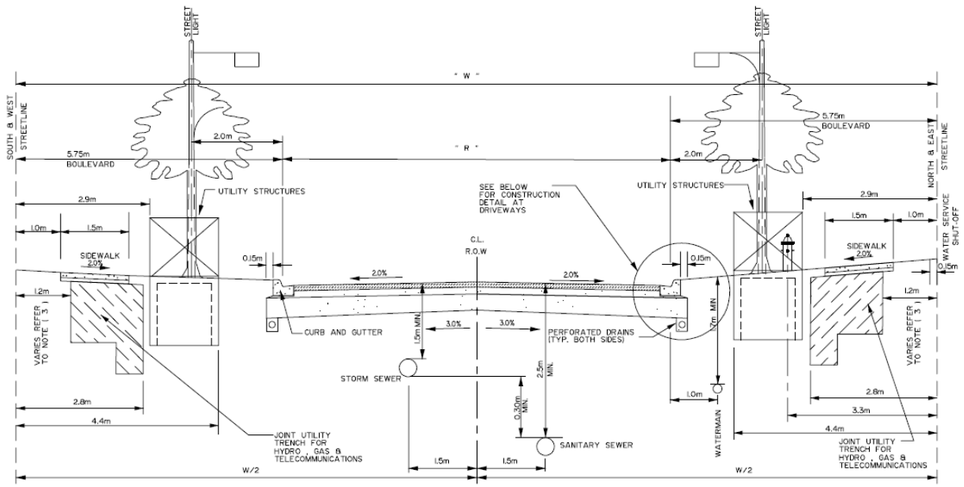
Option 2: Urban Shoulder on Both Sides



Option 3: Sharrows + On-Street Parking on One Side

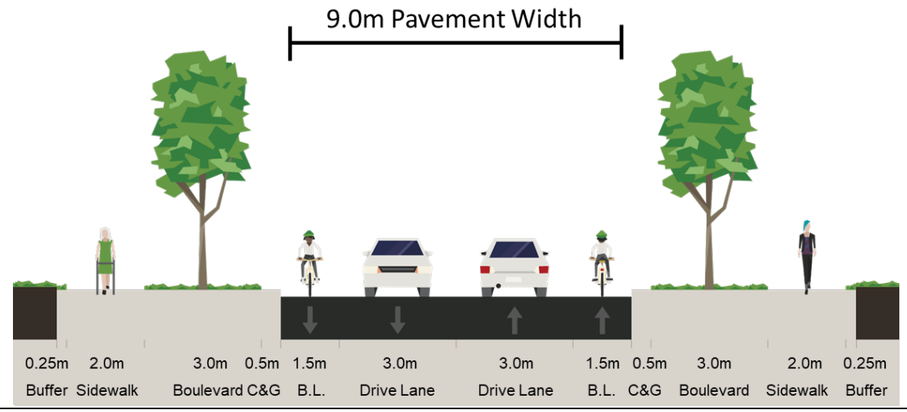


R-1B Typical Cross-Section with Joint Utility Trench 20m R.O.W. and greater

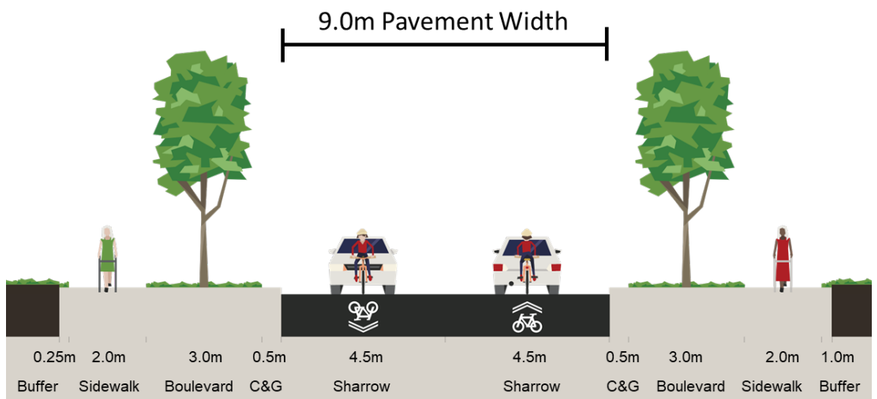


Source: City of Richmond Hill Standards and Specifications Manual

Option 1: 1.5m Bicycle Lane on Both Sides



Option 2: Sharrows / signed route



Appendix H – Parking Analysis

City of Richmond Hill Yonge/Bernard Key Development Area Peer Review and Transportation Assessment Update

Table 1: Residential Parking Rates (KDA Comparable Areas; unit based)

Unit-Type	Toronto "PA 2/3"	Newmarket "Urban Centre"	Vaughan "MMU,HMU, CMU, EMU"	Markham "Markham Centre"	Richmond Hill 2010	Richmond Hill 2020 Disaggregated
UNIT-BASED RESIDENTIAL CONDOMINIUM/APARTMENT						
Bachelor	0.60 if ≤ 45 sm; 1.00 if > 45 sm	0.70	0.70	0.80	0.75	**0.70**
1-Bedroom	0.70	0.80	0.70	0.80	0.85	**0.80**
2-Bedroom	0.90	1.00	0.90	0.80	1.00	**0.90**
3-Bedroom	1.00	1.20	1.00	0.80	1.20	**1.00**
Visitor	0.10	0.15	0.15	0.20	0.15	**0.15**
OTHER UNIT-BASED RESIDENTIAL USES						
i) Street Townhouse Dwelling, Rear Lane Townhouse Dwelling, Back to Back Dwelling and Quadruplex Dwelling with Frontage on a street						**1.00**
ii) Block Townhouse Dwelling, Stacked Townhouse Dwelling, Rear Lane Townhouse Dwelling, Back To Back Dwelling or a Quadruplex Dwelling with an attached garage or detached garage accessed by a lane						**1.00**
iii) Stacked Townhouse with a parking structure						**1.00**
Visitor parking for ii) and iii) above						**0.15**
Senior Citizen Dwelling, Long Term Care Facility						**0.33**

Table 2: Non-Residential Parking Rates (KDA Comparable Areas)

Land Use	Toronto "PA 2/3"	Newmarket "Urban Centre"	Vaughan "MMU,HMU, CMU, EMU"	Markham "Markham Centre"	Yonge and Bernard Key Development Area Secondary Plan Zoning By-law 111-17	Richmond Hill 2020 Preliminary Recommendations Blended	Richmond Hill 2020 Preliminary Recommendations Disaggregated
GFA-BASED NON-RESIDENTIAL							
Office	1.00	2.00	2.00	2.70	2.00	**2.8**	**1.70**
Medical Office	1.50	2.86	3.00	2.70	5.40		**2.80**
Retail – Regional *(greater than 10,000 SM GFA)*	1.00	2.50	2.00	2.70	3.00		**2.55**
Retail – Neighbourhood *(equal to or less than 10,000 SM GFA)*	1.00	2.50	2.00	2.70	4.00		**2.25**
Restaurant	0	2.00	2.70	2.70	3.00		**2.55**
Financial Institution	2.00	2.50	2.00	2.70	4.60		**2.25**
Veterinary Clinics	0.40	3.70	2.00	-	3.50		**3.00**
Day Care / Day Nursery	0.40	Room based	3.00	0	Greater of 1 parking space per 7 children or 0.7 parking spaces per employee		**3.00**
Places of Assembly	5.50	11.11	2.00	2.70	4.80	**4.25**	**4.10**
Arts & Cultural	-	-	2.00	-	5.00		**4.25**

Land Use	Toronto "PA 2/3"	Newmarket "Urban Centre"	Vaughan "MMU,HMU, CMU, EMU"	Markham "Markham Centre"	Yonge and Bernard Key Development Area Secondary Plan Zoning By-law 111-17	Richmond Hill 2020 Preliminary Recommendations Blended	Richmond Hill 2020 Preliminary Recommendations Disaggregated
Social Services	-	-	2.00	-	5.00		**4.25**
ROOM- or PRACTITIONER-BASED RATES*							
Primary School	0.50	1.00	1.00	1.00	1.60	**1.35**	**1.35**
Secondary School	0.50	1.50	1.00	4.00	3.20	**2.70**	**2.70**
Post-Secondary School	0.10	GFA based	1.00	GFA based	3.20	**2.70**	**2.70**
Hotel/Model	GFA based	0.50	0.50	0.80	0.75 parking spaces per room plus an additional 7.5 parking spaces per 100 square metres Gross Floor Area for areas dedicated for banquet rooms and similar uses, but excluding lobbies, hallways and similar area	0.65 parking spaces per room plus an additional 4.25 parking spaces per 100 square metres Gross Floor Area for areas dedicated for banquet rooms and similar uses, but excluding lobbies, hallways and similar area	0.65 parking spaces per room plus an additional 4.25 parking spaces per 100 square metres Gross Floor Area for areas dedicated for banquet rooms and similar uses, but excluding lobbies, hallways and similar area

** # spaces required per classroom, guest room, or per practitioner – exclusive of requirements for assembly areas unless otherwise shown*

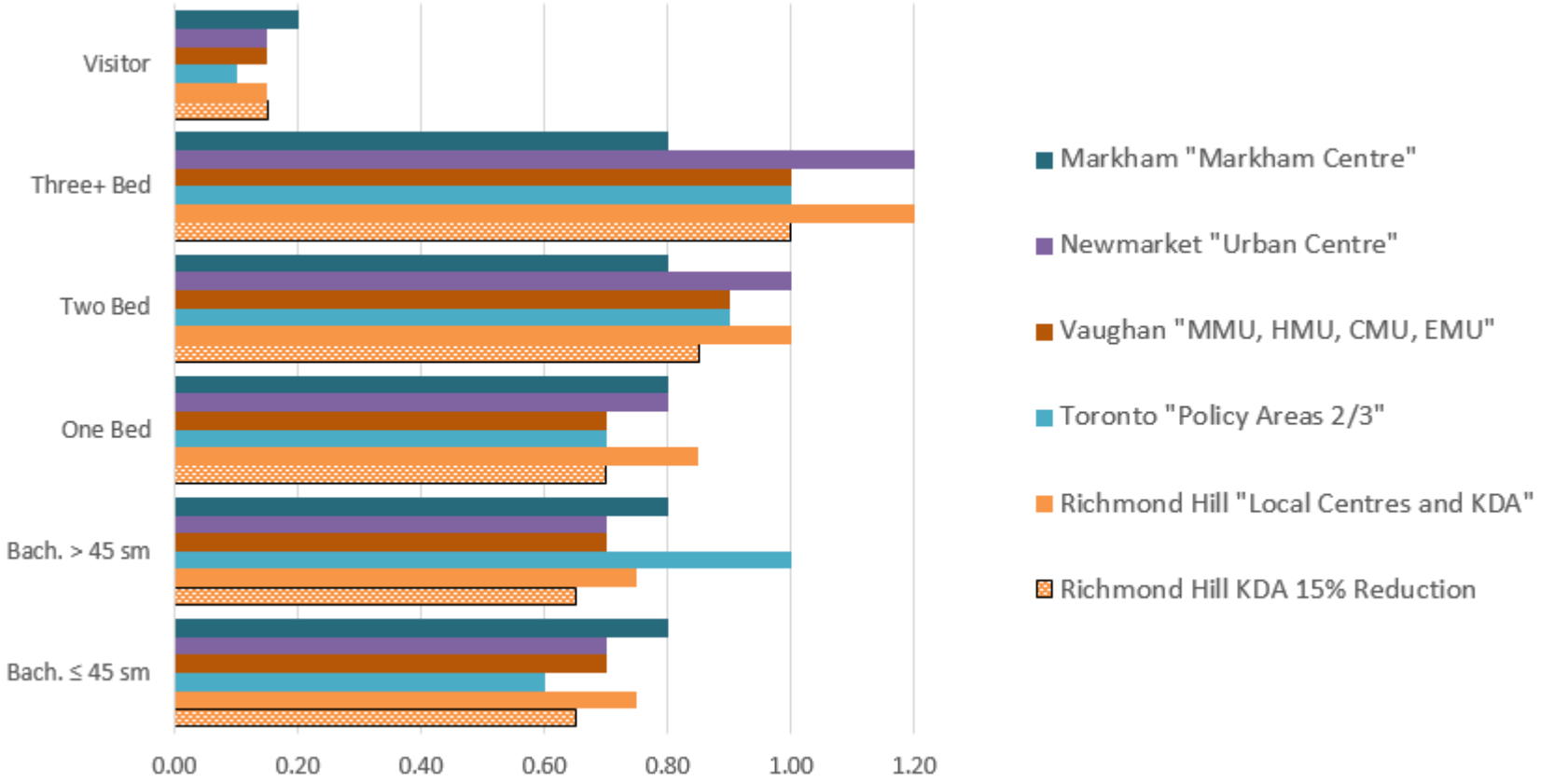


Exhibit 8-1: Residential Apartment/Condominium Parking Rates (KDA Comparable Areas)

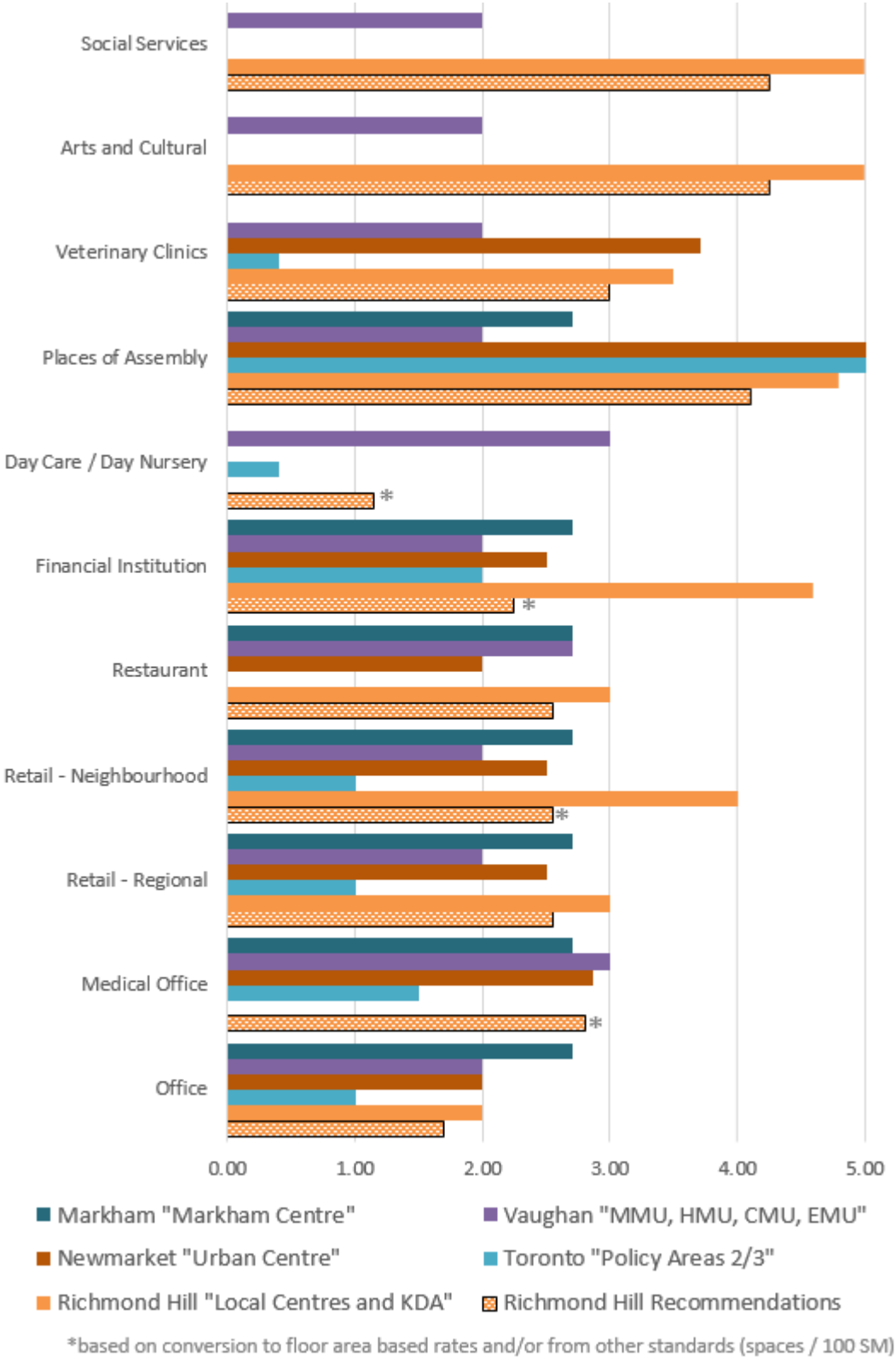


Exhibit 8-2: Non-Residential Parking Rates (KDA Comparable Areas; Floor Area Based)

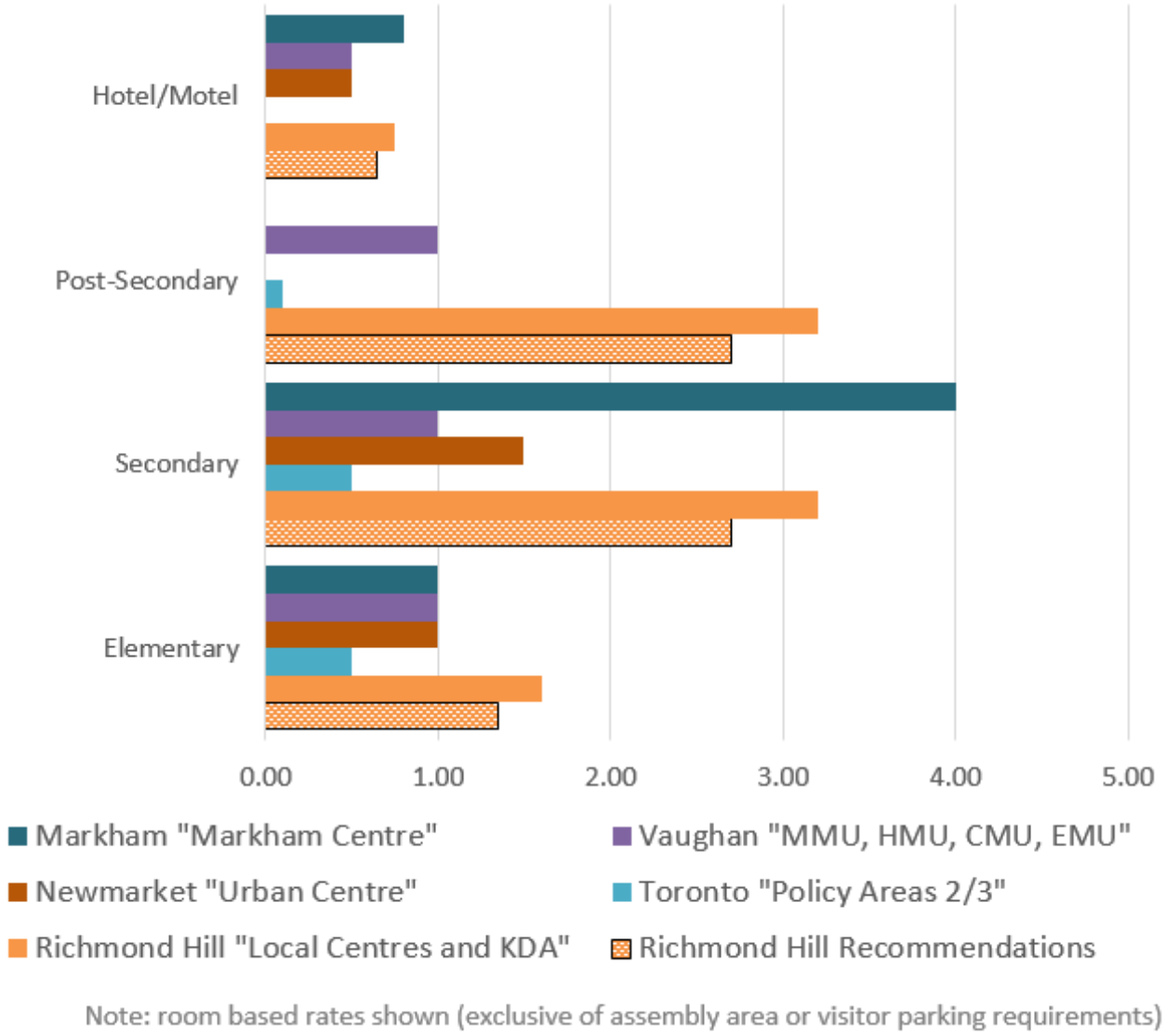


Exhibit 8-3: Non-Residential Parking Rates (KDA Comparable Areas; Non-Floor Area Based)

Shared Parking Best Practices Review

WEEKDAY Shared Parking (Percentage of Peak Parking Demand)															
Land Use	Town of Richmond Hill Parking Strategy	City of Markham By-law 28-97	Markham Centre By-law 2004-196	City of Newmarket By-law 2010-40	City of Toronto By-law 569-2013	City of Mississauga By-law 0225-2007	City of Brampton By-law 270-2004	City of Vaughan By-law 1-88 Corporate Centre Zone	City of Vaughan By-law 1-88	City of Vaughan Draft Review of Parking Standards	City of Vaughan Draft By-Law	City of Ottawa By-law 2008-250	AVERAGE	MIN	MAX
MORNING Occupancy Rate															
Business Office	100%	100%		100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	-	-
Medical Office	100%			100%	100%	100%	100%	100%		100%		100%	100%	-	-
Retail Store	80%	50%		80%	20%	80%	80%	65%	65%	65%	65%	75%	66%	20%	80%
Restaurant / Eating Establishment	30%			20%	100%	20%	20%	20%	20%	20%	20%	30%	30%	20%	100%
Overnight Accommodation / Hotel		80%		70%	80%	70%				70%			74%	70%	80%
Residential - Resident				90%	100%	90%	80%	80%			100%		90%	80%	100%
Residential - Visitor	20%			20%	10%	20%	80%	80%	80%	80%	100%	50%	54%	10%	100%
Library					25%		30%						28%	25%	30%
Entertainment	0%												0%	-	-
Theatre / Cinema		0%			25%		0%		10%	10%		40%	14%	0%	40%
Assembly Hall		10%			25%				70%				35%	10%	70%
Banquet Hall		20%			25%				70%				38%	20%	70%
Commercial Fitness Centre		25%			25%								25%	-	-
Industrial Use		100%			100%								100%	-	-
Recreational Establishment		25%			25%								25%	-	-
Bank / Financial					20%				65%			80%	55%	20%	80%
Institutional / Education					100%				100%	100%			100%	-	-

LEGEND			
Higher %	Mid Range %	Lower %	No Difference

WEEKDAY Shared Parking (Percentage of Peak Parking Demand)															
Land Use	Town of Richmond Hill Parking Strategy	City of Markham By-law 28-97	Markham Centre By-law 2004-196	City of Newmarket By-law 2010-40	City of Toronto By-law 569-2013	City of Mississauga By-law 0225-2007	City of Brampton By-law 270-2004	City of Vaughan By-law 1-88 Corporate Centre Zone	City of Vaughan By-law 1-88	City of Vaughan Draft Review of Parking Standards	City of Vaughan Draft By-Law	City of Ottawa By-law 2008-250	AVERAGE	MIN	MAX
NOON Occupancy Rate															
Business Office	90%			90%		90%		90%	90%	90%	90%	90%	90%	-	-
Medical Office	90%			90%		90%		90%		90%		90%	90%	-	-
Retail Store	95%			90%		90%		90%	90%	90%	90%	80%	89%	80%	95%
Restaurant / Eating Establishment	100%			100%		100%		100%	100%	100%	100%	90%	99%	90%	100%
Overnight Accommodation / Hotel				70%		70%				70%			70%	-	-
Residential - Resident				65%		65%		55%			100%		71%	55%	100%
Residential - Visitor	20%			20%		20%		55%	55%	55%	55%	50%	41%	20%	55%
Library													-	-	-
Entertainment	20%												20%	-	-
Theatre / Cinema									40%	40%		40%	40%	-	-
Assembly Hall									70%				70%	-	-
Banquet Hall									70%				70%	-	-
Commercial Fitness Centre													-	-	-
Industrial Use													-	-	-
Recreational Establishment													-	-	-
Bank / Financial									90%			100%	95%	90%	100%
Institutional / Education									100%	100%			100%	-	-

LEGEND			
Higher %	Mid Range %	Lower %	No Difference

WEEKDAY Shared Parking (Percentage of Peak Parking Demand)															
Land Use	Town of Richmond Hill Parking Strategy	City of Markham By-law 28-97	Markham Centre By-law 2004-196	City of Newmarket By-law 2010-40	City of Toronto By-law 569-2013	City of Mississauga By-law 0225-2007	City of Brampton By-law 270-2004	City of Vaughan By-law 1-88 Corporate Centre Zone	City of Vaughan By-law 1-88	City of Vaughan Draft Review of Parking Standards	City of Vaughan Draft By-Law	City of Ottawa By-law 2008-250	AVERAGE	MIN	MAX
AFTERNOON Occupancy Rate															
Business Office	100%	95%		95%	60%	95%	95%	95%	95%	95%	95%	100%	93%	60%	100%
Medical Office	100%			95%	100%	95%	95%	95%		95%		100%	97%	95%	100%
Retail Store	90%	100%		90%	100%	90%	100%	80%	80%	80%	80%	85%	89%	80%	100%
Restaurant / Eating Establishment	50%			30%	100%	30%	60%	30%	30%	30%	30%	60%	45%	30%	100%
Overnight Accommodation / Hotel		75%		70%	75%	70%				70%			72%	70%	75%
Residential - Resident				90%	100%	90%	80%	80%			100%		90%	80%	100%
Residential - Visitor	60%			60%	35%	60%	80%	80%	80%	80%	80%	75%	69%	35%	80%
Library					100%		30%						65%	30%	100%
Entertainment	60%												60%	-	-
Theatre / Cinema		50%			50%		0%		40%	40%		60%	40%	0%	60%
Assembly Hall		25%			50%				70%				48%	25%	70%
Banquet Hall		50%			50%				70%				57%	50%	70%
Commercial Fitness Centre		80%			100%								90%	80%	100%
Industrial Use		95%			100%								98%	95%	100%
Recreational Establishment		80%			100%								90%	80%	100%
Bank / Financial					100%				80%			100%	93%	80%	100%
Institutional / Education					100%				100%	100%			100%	-	-

LEGEND			
Higher %	Mid Range %	Lower %	No Difference

WEEKDAY Shared Parking (Percentage of Peak Parking Demand)															
Land Use	Town of Richmond Hill Parking Strategy	City of Markham By-law 28-97	Markham Centre By-law 2004-196	City of Newmarket By-law 2010-40	City of Toronto By-law 569-2013	City of Mississauga By-law 0225-2007	City of Brampton By-law 270-2004	City of Vaughan By-law 1-88 Corporate Centre Zone	City of Vaughan By-law 1-88	City of Vaughan Draft Review of Parking Standards	City of Vaughan Draft By-Law	City of Ottawa By-law 2008-250	AVERAGE	MIN	MAX
EVENING Occupancy Rate															
Business Office	10%	10%		10%	0%	10%	15%	10%	10%	10%	10%	15%	10%	0%	15%
Medical Office	10%			10%	50%	10%	15%	10%		10%		15%	16%	10%	50%
Retail Store	90%	100%		90%	100%	90%	50%	100%	100%	100%	100%	75%	90%	50%	100%
Restaurant / Eating Establishment	100%			100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	-	-
Overnight Accommodation / Hotel		100%		100%	100%	100%				100%			100%	-	-
Residential - Resident				100%	100%	100%	100%	100%			100%		100%	-	-
Residential - Visitor	100%			100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	-	-
Library					100%		100%						100%	-	-
Entertainment	100%												100%	-	-
Theatre / Cinema		100%			100%		100%		80%	80%		85%	91%	80%	100%
Assembly Hall		100%			100%				100%				100%	-	-
Banquet Hall		100%			100%				100%				100%	-	-
Commercial Fitness Centre		100%			100%								100%	-	-
Industrial Use		10%			0%								5%	0%	10%
Recreational Establishment		100%			100%								100%	-	-
Bank / Financial					50%				100%			10%	53%	10%	100%
Institutional / Education					50%				20%	20%			30%	20%	50%

LEGEND			
Higher %	Mid Range %	Lower %	No Difference

SATURDAY Shared Parking (Percentage of Peak Parking Demand)															
Land Use	Town of Richmond Hill Parking Strategy	City of Markham By-law 28-97	Markham Centre By-law 2004-196	City of Newmarket By-law 2010-40	City of Toronto By-law 569-2013	City of Mississauga By-law 0225-2007	City of Brampton By-law 270-2004	City of Vaughan By-law 1-88 Corporate Centre Zone	City of Vaughan By-law 1-88	City of Vaughan Draft Review of Parking Standards	City of Vaughan Draft By-Law	City of Ottawa By-law 2008-250	AVERAGE	MIN	MAX
MORNING Occupancy Rate															
Business Office				10%		10%		10%	10%	10%	10%	20%	11%	10%	20%
Medical Office				10%		10%		10%		10%		20%	12%	10%	20%
Retail Store				80%		80%		80%	80%	80%	80%	60%	77%	60%	80%
Restaurant / Eating Establishment				20%		20%		20%	20%	20%	20%	30%	21%	20%	30%
Overnight Accommodation / Hotel				70%		70%				70%			70%	-	-
Residential - Resident				90%		90%		100%			100%		95%	90%	100%
Residential - Visitor				20%		20%		100%	100%	100%	100%	100%	77%	20%	100%
Library													-	-	-
Entertainment													-	-	-
Theatre / Cinema									10%	10%		40%	20%	10%	40%
Assembly Hall									70%				70%	-	-
Banquet Hall									70%				70%	-	-
Commercial Fitness Centre													-	-	-
Industrial Use													-	-	-
Recreational Establishment													-	-	-
Bank / Financial									80%			80%	80%	-	-
Institutional / Education									10%	10%			10%	-	-

LEGEND			
Higher %	Mid Range %	Lower %	No Difference

SATURDAY Shared Parking (Percentage of Peak Parking Demand)															
Land Use	Town of Richmond Hill Parking Strategy	City of Markham By-law 28-97	Markham Centre By-law 2004-196	City of Newmarket By-law 2010-40	City of Toronto By-law 569-2013	City of Mississauga By-law 0225-2007	City of Brampton By-law 270-2004	City of Vaughan By-law 1-88 Corporate Centre Zone	City of Vaughan By-law 1-88	City of Vaughan Draft Review of Parking Standards	City of Vaughan Draft By-Law	City of Ottawa By-law 2008-250	AVERAGE	MIN	MAX
NOON Occupancy Rate															
Business Office				10%		10%		10%	10%	10%	10%	20%	11%	10%	20%
Medical Office				10%		10%		10%		10%		20%	12%	10%	20%
Retail Store				100%		100%		85%	85%	85%	85%	90%	90%	85%	100%
Restaurant / Eating Establishment				100%		100%		100%	100%	100%	100%	80%	97%	80%	100%
Overnight Accommodation / Hotel				70%		70%				70%			70%	-	-
Residential - Resident				65%		65%		100%			100%		83%	65%	100%
Residential - Visitor				20%		20%		100%	100%	100%	100%	100%	77%	20%	100%
Library													-	-	-
Entertainment													-	-	-
Theatre / Cinema									50%	50%		70%	57%	50%	70%
Assembly Hall									70%				70%	-	-
Banquet Hall									70%				70%	-	-
Commercial Fitness Centre													-	-	-
Industrial Use													-	-	-
Recreational Establishment													-	-	-
Bank / Financial									85%			100%	93%	85%	100%
Institutional / Education									10%	10%			10%	-	-

LEGEND			
Higher %	Mid Range %	Lower %	No Difference

SATURDAY Shared Parking (Percentage of Peak Parking Demand)															
Land Use	Town of Richmond Hill Parking Strategy	City of Markham By-law 28-97	Markham Centre By-law 2004-196	City of Newmarket By-law 2010-40	City of Toronto By-law 569-2013	City of Mississauga By-law 0225-2007	City of Brampton By-law 270-2004	City of Vaughan By-law 1-88 Corporate Centre Zone	City of Vaughan By-law 1-88	City of Vaughan Draft Review of Parking Standards	City of Vaughan Draft By-Law	City of Ottawa By-law 2008-250	AVERAGE	MIN	MAX
AFTERNOON Occupancy Rate															
Business Office				10%		10%		10%	10%	10%	10%	10%	10%	-	-
Medical Office				10%		10%		10%		10%		10%	10%	-	-
Retail Store				100%		100%		100%	100%	100%	100%	100%	100%	-	-
Restaurant / Eating Establishment				50%		50%		50%	50%	50%	50%	50%	50%	-	-
Overnight Accommodation / Hotel				70%		70%				70%			70%	-	-
Residential - Resident				90%		90%		100%			100%		95%	90%	100%
Residential - Visitor				60%		60%		100%	100%	100%	100%	100%	89%	60%	100%
Library													-	-	-
Entertainment													-	-	-
Theatre / Cinema									80%	80%		80%	80%	-	-
Assembly Hall									70%				70%	-	-
Banquet Hall									70%				70%	-	-
Commercial Fitness Centre													-	-	-
Industrial Use													-	-	-
Recreational Establishment													-	-	-
Bank / Financial									100%			60%	80%	60%	100%
Institutional / Education									10%	10%			10%	-	-

LEGEND			
Higher %	Mid Range %	Lower %	No Difference

SATURDAY Shared Parking (Percentage of Peak Parking Demand)															
Land Use	Town of Richmond Hill Parking Strategy	City of Markham By-law 28-97	Markham Centre By-law 2004-196	City of Newmarket By-law 2010-40	City of Toronto By-law 569-2013	City of Mississauga By-law 0225-2007	City of Brampton By-law 270-2004	City of Vaughan By-law 1-88 Corporate Centre Zone	City of Vaughan By-law 1-88	City of Vaughan Draft Review of Parking Standards	City of Vaughan Draft By-Law	City of Ottawa By-law 2008-250	AVERAGE	MIN	MAX
EVENING Occupancy Rate															
Business Office				10%		10%		10%	10%	10%	10%	5%	9%	5%	10%
Medical Office				10%		10%		10%		10%		5%	9%	5%	10%
Retail Store				70%		70%		40%	40%	40%	40%	50%	50%	40%	70%
Restaurant / Eating Establishment				100%		100%		100%	100%	100%	100%	100%	100%	-	-
Overnight Accommodation / Hotel				100%		100%				100%			100%	-	-
Residential - Resident				100%		100%		100%			100%		100%	-	-
Residential - Visitor				100%		100%		100%	100%	100%	100%	100%	100%	-	-
Library													-	-	-
Entertainment													-	-	-
Theatre / Cinema									80%	100%		100%	93%	80%	100%
Assembly Hall									100%				100%	-	-
Banquet Hall									100%				100%	-	-
Commercial Fitness Centre													-	-	-
Industrial Use													-	-	-
Recreational Establishment													-	-	-
Bank / Financial									40%			10%	25%	10%	40%
Institutional / Education									10%	10%			10%	-	-

LEGEND			
Higher %	Mid Range %	Lower %	No Difference