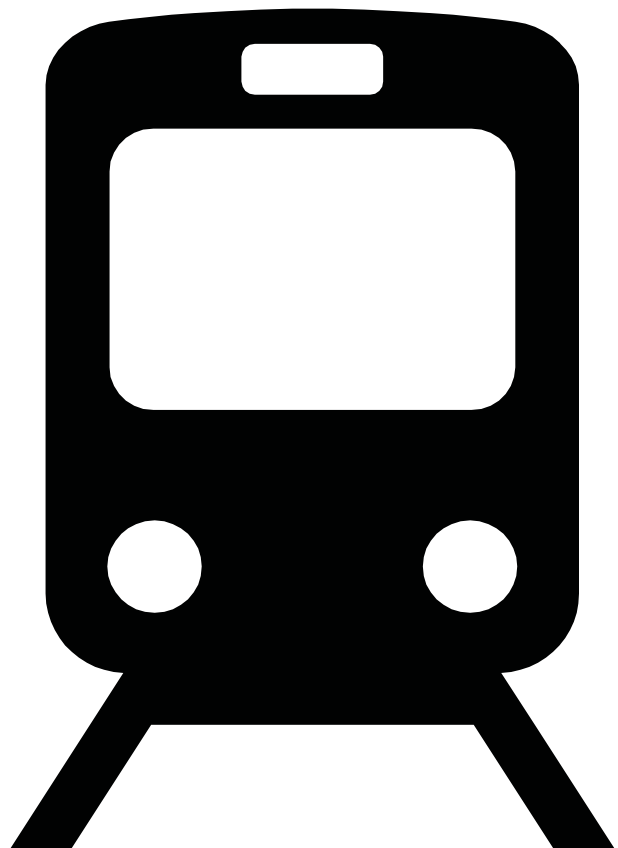

YONGE NORTH SUBWAY EXTENSION

ENVIRONMENTAL PROJECT REPORT ADDENDUM

Final Transportation Existing
Conditions and Impact Assessment
Report

April 14, 2022





	Name, Title	Signature/Date
On behalf of Metrolinx IO:		
On behalf of Metrolinx IO:		
On behalf of Metrolinx IO:		

Yonge North Subway Extension (YNSE) Environmental Project Report Addendum

Transportation Existing Conditions & Impact Assessment Report

FOR
CONTRACTING AUTHORITY METROLINX IO

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PART A – YNSE EPR ADDENDUM EXISTING CONDITIONS REPORT

TABLE OF CONTENTS

E.1	Executive Summary	1
E.1.1	Study Purpose	1
E.1.2	Summary of Potential Impacts, Mitigation Measures & Monitoring Activities	1
	Potential Effects	1
	Mitigation Measures	2
A 1.0	Introduction	3
A 1.1	Initial Business Case	4
A 1.2	Background	4
A 1.2.1	2009 EPR	4
A 1.2.2	2014 EPR Addendum	5
A 1.3	Study Purpose – Current EPR Addendum	6
A 1.4	Report Purpose	6
A 2.0	Update to the Project Description	7
A 2.1	Summary of Design Changes	7
A 2.2	EPR Addendum Study Area	15
A 2.3	Study Area Segments	15
	Segment 1 – Finch Station to Clark Station (Below Grade)	17
	Segment 2 – Clark Station to Portal/Launch Shaft (Below Grade)	17
	Segment 3 – Portal/Launch Shaft to Moonlight Lane (Above Grade)	17
A 3.0	Existing Conditions	18
A 3.1	Purpose	18
A 3.2	Methodology	18
A 3.3	Review of Background Information	19
A 3.4	Data Gap Analysis	21
A 3.5	Desktop Data Collection	21
A 3.6	Segment 1 – Finch Station to Clark Station	22
A 3.6.1	Road Network	22
A 3.6.2	Traffic	22
A 3.6.3	Transit Services	30

A 3.6.4	Pedestrian and Cycling Network	31
A 3.6.5	Rail Network.....	32
A 3.7	Segment 2 – Clark Station to Portal/Launch Shaft.....	32
A 3.7.1	Road Network	32
A 3.7.2	Traffic	32
A 3.7.3	Transit Services	35
A 3.7.4	Pedestrian and Cycling Network	35
A 3.7.5	Rail Network.....	35
A 3.8	Segment 3 – Portal/Launch Shaft to Moonlight Lane.....	35
A 3.8.1	Road Network	35
A 3.8.2	Traffic	36
A 3.8.3	Transit Services	41
A 3.8.4	Pedestrian and Cycling Network	41
A 3.8.5	Rail Network.....	41

LIST OF FIGURES

Figure A 1-1 Ontario's Rapid Transit Expansion Plan (Source: Infrastructure Ontario- 2019).....	3
Figure A 1-2 Finch Station to Richmond Hill Centre – 2009 YNSE EPR Scope	5
Figure A 1-3 Proposed Train Storage Facility Location - 2014 EPR Addendum	6
Figure A 2-1 YNSE EPR Addendum Study Area Key Plan Map	16
Figure A 3-1 TTC System Map north of Finch Avenue along Yonge Street	30
Figure A 3-2 YRT System Map throughout the 3 Segments along Yonge Street	31

LIST OF TABLES

Table A 2-1 Summary of YNSE Design Components, Changes & Rationale.....	8
Table A 3-1 Study Intersections per Station	18
Table A 3-2 Study Intersections Signal Timing Plans – Implementation Year & Computer System	19
Table A 3-3 Count Dates - Intersection TMCs	20
Table A 3-4 Finch Station – Intersection Capacity Analyses – Existing AM.....	23
Table A 3-5 Finch Station – Intersection Capacity Analyses – Existing PM.....	24
Table A 3-6 Cummer Station – Intersection Capacity Analyses – Existing AM	24
Table A 3-7 Cummer Station – Intersection Capacity Analyses – Existing PM.....	25
Table A 3-8 Steeles Station – Intersection Capacity Analyses – Existing AM.....	26
Table A 3-9 Steeles Station – Intersection Capacity Analyses – Existing PM.....	27
Table A 3-10 Clark station – Intersection Capacity Analyses - Existing AM	28
Table A 3-11 Clark Station – Intersection Capacity Analyses – Existing PM	29
Table A 3-12 Royal Orchard Station – Intersection Capacity Analyses – Existing AM	33
Table A 3-13 Royal Orchard Station – Intersection Capacity Analyses – Existing PM	34
Table A 3-14 Bridge Station – Intersection Capacity Analyses – Existing AM.....	37
Table A 3-15 Bridge Station – Intersection Capacity Analyses – Existing PM.....	38
Table A 3-16 High Tech Station – Intersection Capacity Analyses – Existing AM	39
Table A 3-17 High Tech Station – Intersection Capacity Analyses – Existing PM	40

APPENDICES

- Appendix A: Transportation Impact Assessment Buffer
- Appendix B: Existing Conditions Tabulated Synchro Outputs
- Appendix C: Existing Conditions Synchro Reports
- Appendix D: Existing Conditions Unbalanced, Existing Conditions Balanced Volumes
- Appendix E: Glossary of Terms

REFERENCES AND SUPPORTING DOCUMENTS

Reference	Title
2009 EPR	Yonge Subway Extension - Finch Station to Richmond Hill Centre Transit Project Assessment- Environmental Project Report (2009)
2014 EPR Addendum	Yonge Subway Extension - Finch Station to Richmond Hill Centre Transit Project Assessment - Environmental Project Report Addendum (2014)
City of Toronto Synchro Guidelines	Guidelines for Using Synchro 11 (including SimTraffic 11)
York Region TIS Guidelines	Transportation Impact study (TIS) Guidelines for Development Applications – York Region
City of Toronto Speed Bylaws	Toronto Municipal Code Chapter 950-700

ACRONYMS, ABBREVIATIONS & MEASUREMENT UNITS

Term	Definition
407 ETR	407 Express Toll Route
EEB	Emergency Exit Building
EPR	Environmental Project Report
GO Transit	Government of Ontario transit
HCM	Highway Capacity Manual
HOV Lanes	High Occupancy Vehicle Lane
IBC	Initial Business Case
LOS	Level of Service
MECB	Minister of Environment, Conservation & Parks
MX	Metrolinx
TIA	Traffic Impact Assessment
TMC	Turning Movement Count
TPAP	Transit Project Assessment Process
TSF	Train Storage Facility
TTC	Toronto Transit Commission
V/C	Volume to capacity ratio
YNSE	Yonge North Subway Extension
YRT	York Region Transit
TCS	Traffic Control Signal
EBR	Eastbound Right Turn Movement

Term	Definition
EBT	Eastbound Through Movement
EBL	Eastbound Left Turn Movement
NBR	Northbound Right Turn Movement
NBT	Northbound Through Movement
NBL	Northbound Left Turn Movement
WBR	Westbound Right Turn Movement
WBT	Westbound Through Movement
WBL	Westbound Left Turn Movement
SBR	Southbound Right Turn Movement
SBT	Southbound Through Movement
SBL	Southbound Left Turn Movement

GLOSSARY OF TERMS

Term	Definition
Turning Movement Count (TMC)	TMC indicates the directional volume of road user (auto, truck, bus, pedestrian and bike) passing through an intersection over a given period of time.
Volume to Capacity Ratio (v/c)	The volume to capacity ratio (v/c) measures the level of congestion of a road or on approaches to an intersection by dividing the volume of traffic by the capacity of the roadway.
Highway Capacity Manual (HCM)	Highway Capacity Manual (HCM) is a publication of Transportation Research Board (TRB) which contains concepts, guidelines and procedures for study of the quality of services and operations of various transportation facilities (e.g. highways, arterials, signalized/unsignalized intersections).
Level of Service (LOS)	LOS is a qualitative measure which implies a qualitative measure of traffic flow at an intersection. LOS ranges from A to F and is dependent upon vehicle delay at intersection approaches.
Intersection Capacity Analysis	The analysis which evaluates the sufficiency of intersection operations under its associated traffic demand.

E.1 Executive Summary

Metrolinx and Infrastructure Ontario are undertaking an Addendum to the Environmental Project Report (EPR) for the Yonge North Subway Extension (YNSE). This study is following the requirements of the Transit Project Assessment Process (TPAP) under O. Reg. 231/08 and will address a change to the subway extension alignment, stations, and associated facilities.

Previous studies followed the TPAP for the YNSE. An EPR was completed by the Regional Municipality of York (York Region), York Region Rapid Transit Corporation, the City of Toronto and the Toronto Transit Commission in 2009 for the new subway extension. A further addendum to the EPR was prepared in 2014 to assess the potential environmental impacts associated with the identified Train Storage Facility (TSF) location that would accommodate up to 14 trains within the vicinity of the Richmond Hill Centre.

E.1.1 Study Purpose

As part of the YNSE EPR Addendum process, this Existing Conditions and Impact Assessment Report has been prepared to document the current existing conditions within the Study Area, to undertake an assessment of the potential impacts associated with the currently proposed YNSE Project, and to identify mitigation and monitoring measures, as appropriate.

E.1.2 Summary of Potential Impacts, Mitigation Measures & Monitoring Activities

Potential Effects

- *Construction Phase:*
 - Potential for temporary road lane, sidewalk, or bike lane closures.
 - Potential re-alignment of road, sidewalk, or bike lanes in the area.
 - Potential for access restrictions to local bus routes.
 - Potential disruptions to rail services (e.g., CN Freight services) in the impacted area.
 - Potential changes to special traffic lanes (e.g., removal of HOV lanes).
 - Potential implementation of turn prohibitions at intersections.
 - Potential changes to on-street parking regulations in the area.
 - Potential changes to transit services schedules and routes.
- *Operational Phase:*
 - Minimal short-term impacts associated with maintenance activities (e.g., temporary lane/sidewalk closures) may occur.
 - Potential for modifications to the local transportation network, such as adjustments to transit service schedules.

Mitigation Measures

- *Construction Phase:*
 - Traffic Control and Management Plan(s) will be developed prior to construction.
 - Access to nearby land uses will be maintained to the extent possible. Potentially affected residents, tenants and business owners will be notified of upcoming construction work and potential traffic impacts.
 - In the event closures of sidewalks or bike lanes are necessary, safe alternative paths will be provided.
 - Consult with rail operators with current service along the rail corridor (i.e., Canadian National Railway) to assess how track closures, if necessary, would impact their service and co-ordinate temporary schedules to accommodate all rail services on the open tracks.
 - Ensure public is notified of the changes to turn prohibitions at intersections via additional signage.
 - Ensure public is notified of changes to curbside lane regulations (e.g., parking, HOV lanes) via additional signage.
 - Ensure that the public is notified in advance of any potential public transit service disruptions.
- *Operational Phase:*
 - Provide signage and detours in advance of temporary lane/sidewalk closures during maintenance activities, as required.
 - Consult with local transit agencies regarding the potential changes to the local transportation network.

A 1.0 Introduction

In 2009, the Regional Municipality of York, York Region Rapid Transit Corporation, the City of Toronto and the Toronto Transit Commission completed an Environmental Project Report (EPR) in accordance with the Transit Project Assessment Process (TPAP), to assess the potential environmental impacts of the proposed Yonge North Subway Extension (YNSE) Project. The study area was defined as Finch Avenue in the City of Toronto to Richmond Hill Centre Terminal at Highway 7 in the City of Richmond Hill, York Region. Notice to Proceed was given by the then Minister of Environment and Climate Change (now the Minister of Environment, Conservation & Parks [MECP]) and Statement of Completion was issued in April 2009.

In 2014, an EPR Addendum was carried out by the York Region Rapid Transit Corporation, in partnership with the Regional Municipality of York, Toronto Transit Commission (TTC), and the City of Toronto to assess the potential environmental impacts associated with the identified Train Storage Facility (TSF) location that would accommodate up to 14 trains within the vicinity of the Richmond Hill Centre. This EPR Addendum was completed in November 2014.

Subsequently in April 2019, the Government of Ontario announced a \$28.5 billion expansion to Ontario's transit network. This rapid transit project plan includes four key initiatives including: the Ontario Line, the Scarborough Subway Extension, Eglinton Crosstown West Extension, and the YNSE (**Figure A 1-1**). The YNSE is an extension of TTC's Line 1 north from Finch Station to Richmond Hill.

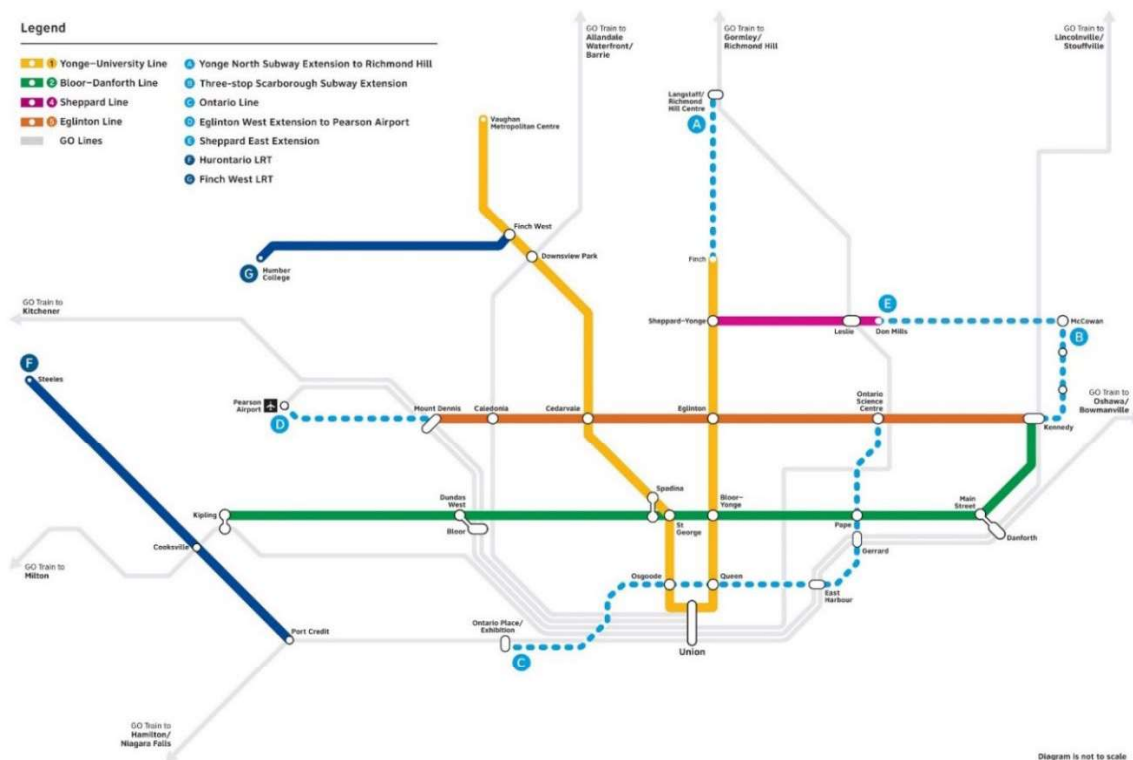


Figure A 1-1 Ontario's Rapid Transit Expansion Plan (Source: Infrastructure Ontario- 2019)

A 1.1 Initial Business Case

Metrolinx published the Yonge North Subway Extension Initial Business Case (IBC) and accompanying supplementary analysis on March 18, 2021. The IBC demonstrates how the Yonge North Subway Extension will significantly reduce travel times, grow the number of people who use public transit and serve the heart of major growth centres in Toronto and York Region. The scope and key objectives of the IBC were as follows:

- Document the details of the Project, as contemplated at the time it was brought under the management of Metrolinx;
- Compare alternative alignments of the extension with a Business-As-Usual scenario;
- Investigate and evaluate options that might have additional transit benefits and/or reduced capital or operating costs; and
- Evaluate the performance of stations.

The Yonge North Subway Extension will bring higher-order rapid transit closer to a large number of residents and jobs in the intensification areas along the corridor, while providing a seamless connection between those areas. The business case introduces innovative design options in order to deliver the most benefits possible within the funding envelope of \$5.6 billion.

The IBC generally provides recommendations for next steps in the Metrolinx Business Case process. The IBC notes:

- The Yonge North Subway Extension is one of four priority transit projects announced by the Government of Ontario, along with the Scarborough Subway Extension, the Ontario Line and the Eglinton Crosstown West Extension. The Ontario Line will provide relief to Line 1 by helping to spread demand across the transit network as it grows. The Yonge North Subway Extension will not come online until the Ontario Line goes into service.
- The extension will bring rapid transit closer to residents' destinations in the northern portions of Toronto and across York Region. The IBC highlights the need to prioritize access for bus passengers while focusing on walk-in access at each of the contemplated subway stations.
- Next steps will include refining the design of the selected alternative engineering to maximize benefits and address risks, developing a Preliminary Design Business Case, seeking required Environmental Assessment Act approvals and proceeding toward delivery.

A 1.2 Background

A 1.2.1 2009 EPR

The *Yonge Subway Extension - Finch Station to Richmond Hill Centre Transit Project Assessment-Environmental Project Report* (2009) included the assessment of approximately 6.8km of subway alignment via twin-bored tunnel, six (6) subway stations, associated track work, one (1) major bus terminal, one (1) bus loop, four (4) traction power substations, six (6) emergency exit buildings (EEBs) and one (1) bridge structure. **Figure A 1-2** provides a key map depicting the 2009 EPR scope (the red section of the proposed alignment is located in the City of the Toronto; the blue section is located in York Region).



Figure A 1-2 Finch Station to Richmond Hill Centre – 2009 YNSE EPR Scope

A 1.2.2 2014 EPR Addendum

Subsequent to the 2009 EPR, an EPR Addendum was undertaken in 2014 to assess the potential environmental impacts associated with the following design changes:

- Extension of the subway alignment to approximately 1 km north of the previously approved Richmond Hill Centre Station;
- Underground Train Storage Facility (TSF) for 14 trains (**Figure A 1-3**) north of the previously approved Richmond Hill Centre Station; and
- Two (2) Emergency Exit Buildings associated with the TSF.

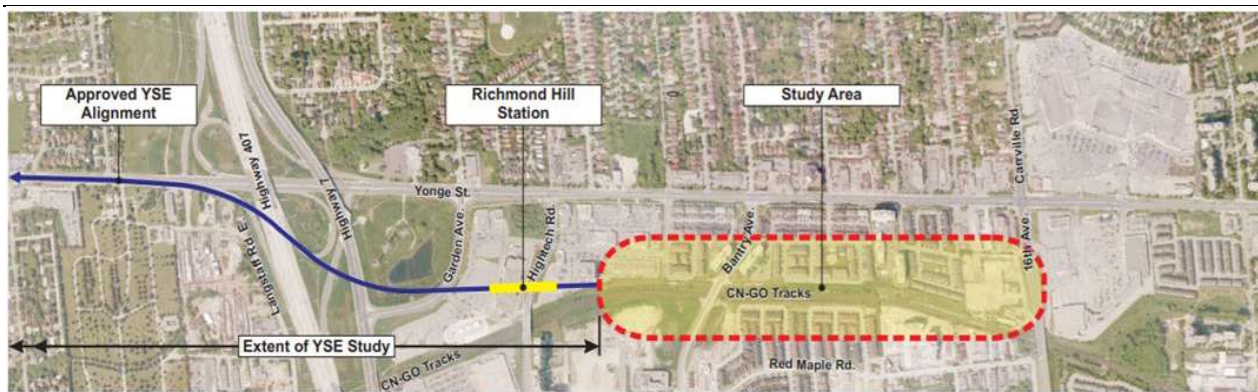


Figure A 1-3 Proposed Train Storage Facility Location - 2014 EPR Addendum

A 1.3 Study Purpose – Current EPR Addendum

Since the completion of the 2009 EPR and 2014 EPR Addendum, further changes to the proposed YNSE Project have been identified that will result in modifications to the plans presented in the previously approved 2009 EPR and 2014 EPR Addendum.

In accordance with Section 15, O. Reg. 231/08, Metrolinx has determined that the changes to the Project (as described in Section 2 of the YNSE EPR Addendum document and within Section 2.0 below) are Significant and therefore necessitate completion of an EPR Addendum to: evaluate and document the updates to the Project description, update existing conditions, carry out associated environmental impact assessment studies, identify mitigation and monitoring requirements, and undertake public, stakeholder and Indigenous Nations consultation.

Furthermore, as per Section 16, O. Reg. 231/08, since the construction of the Project has not commenced within 10 years of the issuance of the Statement of Completion (originally issued in 2009), Metrolinx is required to re-examine existing conditions as well as potential environmental impacts and mitigation measures documented in the previously approved EPR to ensure they are still valid and subsequently carry out additional environmental studies as appropriate.

A 1.4 Report Purpose

This report entails a review and update to existing conditions within the current EPR Addendum Study Area (contained within **Part A**) as well as an assessment of potential impacts and proposed mitigation measures and monitoring activities (contained within **Part B**) based on the currently proposed YNSE project components.

With this in mind, the purpose of this Transportation Existing Conditions and Impact Assessment Report is two-fold:

- **Part A** – provides a detailed description and summary of transportation existing conditions within the EPR Addendum Study Area;
- **Part B** – provides a description of the potential impacts associated with the proposed YNSE project and associated mitigation and monitoring measures.

A 2.0 Update to the Project Description

A 2.1 Summary of Design Changes

This section provides a detailed description of the changes to the YNSE Project since completion of the 2009 EPR and 2014 EPR Addendum. **Table A 2-1** provides a high-level schematic depicting the 2009 EPR project components, 2014 EPR Addendum project components, and currently proposed YNSE project components for comparison purposes. In addition, detailed mapping of the project design elements is contained in **Appendix A**.

Table A 2-1 Summary of YNSE Design Components, Changes & Rationale

Project Component	2009 EPR	2014 EPR Addendum	Current EPR Addendum	Rationale for Change
1. Proposed Subway Horizontal Alignment	Approximately 6.8 km underground subway alignment from the existing Finch Station to the proposed Richmond Hill Centre Station (in the vicinity of Highway 7 and Yonge St. in the City of Richmond Hill). From Finch Station to just south of the Holy Cross Catholic Cemetery, the alignment follows Yonge St. underground. North of the Holy Cross Catholic Cemetery, the subway alignment swings slightly eastward, crossing the northwest corner of the Langstaff development lands. The alignment then turns northward under Highway 407/Highway 7. North of the Richmond Hill Centre Station, the alignment terminates at the end of subway tail tracks in the transit corridor on the west side of the CN Bala Richmond Hill GO Line.	Extension of the subway alignment by approximately 1 km from previous terminus at Richmond Hill Centre Station to 16th Ave. in the City of Richmond Hill.	The proposed YNSE subway alignment is approximately 9.5 km in total commencing at the existing Finch Station in the City of Toronto northward to just beyond the limit of the proposed TSF (at Moonlight Lane) in the City of Richmond Hill. The proposed revenue portion of the alignment is approximately 8 km in length, while the remaining trackwork services the TSF. The proposed below grade portion of the subway alignment is approximately 6.5 km, beginning at Finch Station and extending to the proposed tunnel portal structure just south of Langstaff Road. Between Finch Station and Royal Orchard Blvd, the underground alignment is proposed to run under Yonge Street. It then curves to reach Bay Thorn Drive and continue to the east, before turning northwards where the alignment generally follows the existing CN Rail ROW until the proposed portal structure (just south of Langstaff Road) where the subway alignment emerges to at grade. The proposed at grade portion of the subway alignment is approximately 3 km in length beginning just south of Langstaff Road (from the proposed portal structure), with tracks located within and adjacent to the CN rail corridor ROW and terminating just beyond the limit of the proposed TSF (at Moonlight Lane) in the City of Richmond Hill. The at grade subway alignment generally follows the existing CN rail corridor ROW; however, the westernmost subway track is situated immediately outside the CN Rail ROW boundary for the majority of the at grade segment.	While the YNSE was previously envisioned to terminate just north of Highway 7, the area to the north was identified by Metrolinx as an area where refinement could enhance Project benefits and reduce capital costs. The proposed alignment that forms the basis for this EPR Addendum specifically addresses the challenges and opportunities of serving these areas and their future residents and employees.
2. Proposed Subway Vertical Profile	Below grade vertical profile design with a crossing above grade (bridge) over the East Don River. Proposed station and alignment depths were not presented within the 2009 EPR.	N/A	The subway alignment vertical profile was designed to reduce the depth of the stations along the route, except at the potential Royal Orchard Station, which is located approximately 500 m north of the deep East Don River Valley. The depth of the station platform at this location ranges from approximately 40 to 50 m below the existing ground surface, to account for tunneling south of the station below the East Don River.	The current YNSE vertical profile changes from below grade to at grade south of Langstaff Road, thereby eliminating the above grade (bridge) crossing over the Don River. The currently proposed profile reduces the depth of the stations along the route (except at Royal Orchard Station), while meeting applicable tunnel grade requirements (e.g., TTC Design Manual DM-0204-04).
3. Tunnels	Approximately 6.8 km underground tunneled alignment from the existing Finch Station to the proposed Richmond Hill Centre Station in the vicinity of Highway 7 and Yonge St. in the City of Richmond Hill. For the purposes of determining the potential environmental effects of the Transit Project,	The underground Train Storage Facility assessed in the 2014 EPR Addendum would be located adjacent to the CN Rail corridor, beginning approximately 100m north of the Richmond Hill Centre Station. Cut and cover construction methodology was assumed for this work, during which the ground surface is opened (cut) a	The proposed conceptual design involves the construction of tunnels for the underground alignment portion of the current YNSE alignment with the following key parameters: - Approximately 6 kms of twin 5.6 m internal diameter TBM tunnels - Twin tunnels run from Finch Transition Box Structure to proposed portal location	There is no change to the need for tunneling as part of the project. The currently proposed YNSE alignment still entails the construction of approximately 6 kms of tunnels; whereas the approximate length of tunnelling in the 2009 EPR was 6.8 km.

Project Component	2009 EPR	2014 EPR Addendum	Current EPR Addendum	Rationale for Change
	the following approach was assumed within the 2009 EPR: - Richmond Hill Centre Station and surrounding area would provide sufficient space for the southbound launch of the TBM and as well as storage of tunnel liners and other tunnelling materials and equipment; and - Existing surface parking in the southwest quadrant of the Yonge Street / Steeles Avenue intersection could also provide sufficient space for the southbound launch of the TBM and storage of tunnel liners; and other tunnelling materials and equipment. The 2009 EPR identified the East Don River crossing as the TBM extracting shaft location (one at each end of the crossing). Cummer / Drewry Station was also identified as a potential location to remove the TBM in the 2009 EPR. The 2009 EPR assumed a twin-bored tunnelling method for the entire running structure from Finch Station to the Richmond Hill Centre Station, with the exception of the section between the existing Finch Station tail tracks and Cummer/Drewry Station and the approaches to the proposed East Don River bridge.	sufficient depth to construct the subway tunnel structure.	- Reference YNSE Alignment assumes all tunneling undertaken using two (2) TBMs - Launched at the North Portal Launch Shaft, located immediately west of CN/GO rail tracks and south of Langstaff Road - Both TBM's are to be removed at the Finch Transition Box Structure where the extraction shaft is to be located	
4. Finch Station Modifications	N/A	N/A	Modifications to existing Finch Station as follows: - Upgrading existing tail track to support future revenue service; - Construction of the Finch Transition Box Structure, which is an underground structure that provides the transition between the existing Finch Station tail track structure and the new YNSE twin tunnels; - Upgrading operational and support systems (e.g., signal upgrades) within the existing tail track area; - Upgrade to the existing electrical and communication back-of-house room at the station; - Upgrade to the existing Hendon Avenue Traction Power Substation located approximately 130 m west of the station; and - An approximately 130 m long underground duct bank extending westerly along Hendon Avenue from the existing Finch Station.	Modifications to the existing Finch Station and nearby/associated facilities such as the existing Hendon Avenue Traction Power Substation are required to enable YNSE project implementation and future revenue service beyond Finch Station.

Project Component	2009 EPR	2014 EPR Addendum	Current EPR Addendum	Rationale for Change
5. Stations	Total of six (6) below grade stations proposed. Cummer / Drewry Station: - Location: Yonge St. & Cummer / Drewry Ave., approximately 800 m north of Finch Station. - Station components: below grade station box, concourse, bicycle facilities, ventilation shaft, Bus loop located at Drewry Ave. Four (4) pedestrian entrances: - Main entrances located at the Northeast and southwest quadrants of the intersection of Cummer Ave. and Yonge St. - Southeast corner of Cummer Ave./ Drewry Ave. and Yonge St. - East side of Yonge St at the north end of the station box. Steeles Ave. Station and bus terminal - Location: Yonge St and Steeles Ave, approx. 1.2 km north of Cummer/ Drewry Ave. - Station components: below grade station box, concourse, bicycle facilities, ventilation shaft. - five (5) pedestrian entrances: - Two (2) street entrances located north of the station box on each side of Yonge St. - Two (2) street entrances located south of the station box on each side of Yonge St. - One (1) entrance from median located on Steeles Ave. - Underground bus terminal below Steeles Ave West. - Passenger Pick-up and Drop-Off (PPUDO)	No new or modified stations were proposed.	Total of Four (4) below grade stations and two (2) at grade stations are proposed, as follows: - Cummer Station (below grade) - Steeles Station (below grade) and bus terminal - Clark Station (below grade) and bus terminal - Royal Orchard Station (below grade) - Bridge Station and bus terminal (at grade) - High Tech Station (at grade) Specific infrastructure associated with each proposed station is further detailed within the rows below. Potential Cummer Station (below grade) Location: Slight shift to the southwest. The proposed station is an in-line underground station located at the intersection of Cummer/ Drewry Avenue and Yonge Street and includes a bus loop on Drewry Ave. west of Yonge St. with associated bus operators' facilities. Station components include: - A below grade, two-level station box with one central platform at track level and a public concourse level above - Up to two (2) at-grade pedestrian entrances (locations to be determined as part of further design development) - Up to two (2) Fire Fighter's Access Shafts (FFA) - Secured bicycle storage Steeles Station (below grade) and bus terminal Location: Yonge St. at the intersection with Steeles Ave, shifted south from 2009 EPR. Station components changes include: - Three (3) pedestrian entrances (locations to be determined as part of further design development): - One (1) FFA - Secured bicycle storage - At grade bus terminal at the southwest quadrant of Yonge St and Steeles Ave - Potential road modifications to accommodate curbside bus platforms located at the Yonge St. and Steeles Ave. intersection	Two stations, Bridge and High Tech Stations, are proposed at grade due to change in proposed subway alignment (i.e., at grade). The current station alignment maximizes the benefits of the subway extension while achieving the lowest cost for the acceptable Project scope. Of all considered alignments, the currently proposed route is the only one that provides the opportunity for one Neighbourhood Station to be included in the Project scope while maintaining costs within the funding envelope. The proposed location shift is primarily to avoid utility conflicts. The reduced number of station entrances minimizes potential property impacts while maintaining access and circulation in a way that accommodates future ridership requirements. The bus terminal at Steeles Station is proposed to be an at grade terminal to avoid conflicts with the existing York Durham Sanitary Sewer. The reduced number of station entrances minimizes potential property impacts while maintaining access and circulation in a way that accommodates future ridership requirements.

Project Component	2009 EPR	2014 EPR Addendum	Current EPR Addendum	Rationale for Change
	Below grade bus terminal with three (3) bus access ramps and a bus platform for 25 buses.	No new stations were proposed.	Clark Ave. Station - Location: Yonge St. and Clark Ave approximately 1 km north of Steeles Ave. - Station components: below grade station box, concourse, bicycle facilities, ventilation shaft. - Five (5) Pedestrian entrances: - One (1) main entrance southwest corner of Clark Ave. and Yonge St. - One (1) main entrance northeast corner of Clark Ave. and Yonge St. - One (1) north end of the station and on the west side of Yonge St. - One (1) entrance at the east side of Yonge St.	The reduced number of station entrances minimizes potential property impacts while maintaining access and circulation in a way that accommodates future ridership requirements. The addition of a bus terminal further enhances transit system integration and improves transfers between transit modes.
	Royal Orchard Station - Location: intersection of Yonge St. and Royal Orchard Blvd., approximately 800 m north of Centre St. - Station components: below grade station box, concourse, bicycle facilities, ventilation shaft. - two (2) pedestrian entrances: - one (1) main entrance northeast corner of Royal Orchard Blvd. and Yonge St. - one (1) entrance located southwest corner of Yonge St. and Thornhill Ave.			
	Langstaff / Longbridge Station - Location: between Longbridge Road and Langstaff Road, approximately 1km north of Royal Orchard Boulevard. - Station components: below grade station box, concourse, bicycle facilities, ventilation shaft. - PPUDO - Commuter parking - Two (2) pedestrian entrances: - One (1) on Hydro One property currently hosting a 230/500 kV transmission line south of Highway 407 and west of Yonge Street.			
			Potential Royal Orchard Station (below grade) Location: Yonge Street, south of Royal Orchard Blvd. Station components changes include: - Up to two (2) pedestrian entrances (locations to be determined as part of further design development) - A deeper station box due to proximity to the East Don River Valley topographic depression. This change eliminates the need for the Don River above grade crossing. - Secured bicycle storage	Change to station location and depth as a result of changes in subway horizontal alignment and vertical profile. See rationale for alignment and profile change above.
			Bridge Station and bus terminal (at grade) Location: west of the CN Rail Corridor and north of Highway 407 and Highway 7. Station components changes include: - Three (3) pedestrian entrances (locations to be determined as part of further design development) - Bus terminal - Passenger and service emergency exit - Secured bicycle storage	The change in station location is in response to changes in the subway horizontal alignment and vertical profile discussed above. The reduction in number of station entrances minimizes potential property impacts while maintaining access and circulation in a way that accommodates future ridership requirements.

Project Component	2009 EPR	2014 EPR Addendum	Current EPR Addendum	Rationale for Change
6. Proposed Emergency Exit Buildings (EEBs)	One (1) located at the southeast corner of Yonge St. and Langstaff Road East	Richmond Hill Centre Station – Transit Hub - Location: east of Yonge St. traversing High Tech Road, west of the CN rail corridor and north of Highway 7, approximately 1 km north of Royal Orchard Boulevard. - Station components: below grade station box, concourse, bicycle facilities, ventilation shaft. - Two (2) pedestrian entrances: - One (1) located at northeast corner of the station box - One (1) located at the southeast corner of the station box - Bus terminal - PPUDO - Transit Hub	High Tech Station (at grade) Location: east of Yonge St. traversing High Tech Road, west of the CN rail corridor, and north of Highway 407 and Highway 7 and adjacent to Richmond Hill Centre Terminal. Station components changes include: - Two (2) pedestrian entrances (locations to be determined as part of further design development) - Secured bicycle storage - A revised PPUDO design to accommodate the revised station configuration	The change in station location is in response to changes in the subway horizontal alignment and vertical profile discussed above. Similar to the previously envisioned Richmond Hill Centre Station, the currently proposed High Tech Station will accommodate transfers to GO train and GO bus services, as well as local transit, and will improve subway access to the Richmond Hill Centre and Langstaff Gateway development areas.
	Six (6) Emergency Exit Buildings (EEBs): - EEB 1: Private property on the east side of Yonge St. between Centre Ave. and Newton Drive; - EEB 2: Private property on the west side of Yonge St. between Doncaster Ave. and the CN rail corridor; - EEB 3: Within municipal right-of-way on the west side of Yonge St. opposite Arnold Ave.; - EEB 4: Within municipal right-of-way on the east side of Yonge St. between Centre St. and the proposed East Don River Bridge; - EEB 5: Private property on the east side of Yonge St. between Uplands Ave. and Kirk Drive; and - EEB 6: Within municipal right-of-way on the north side of Highway 7 west of Garden Ave.	Two (2) additional EEBs: - EEB 7: Located at the proposed TSF parking lot, east of Coburg Crescent. - EEB 8: Located west of the proposed alignment, south of Coburg Crescent.	Seven (7) EEBs (precise locations to be determined as part of further design development): - EEB-1: located approximately between the existing Finch Station and the potential Cummer Station - EEB-2: located approximately between the potential Cummer Station and the confirmed Steeles Station - EEB-3: located approximately between the confirmed Steeles Station and the confirmed Clark Station - EEB-4: located approximately between the confirmed Clark Station and the potential Royal Orchard Station - EEB-5: located approximately in the vicinity of the potential Royal Orchard Station - EEB-6: located approximately north of Royal Orchard Station in the vicinity of Bay Thorn Drive - EEB-7: located approximately north of the potential Royal Orchard Station and south of the portal structure	The TTC Design Manual requires EEBs to be located such that the distance from any underground location to an EEB is not greater than 381 m – i.e., the spacing between EEBs or between EEBs and the closest station platform or portal entrance must be 762 m or less. Applying this standard to the currently proposed design has identified the need for a total of seven (7) EEBs.
7. Traction Power Substations (TPSSs)	Traction Power is provided by a live third rail that provides electric power through a conductor placed alongside the rail. In order to give the voltage a boost at regular intervals along the subway alignment, electrical substations (i.e., Traction Power Substations (TPSSs)) are required. Traction power requirements dictate that TPSSs are not	N/A	Seven (7) TPSSs at the following locations: - Three (3) TPSS in the approximate vicinity of Cummer, Steeles, and Clark Stations. - One (1) TPSS in the approximate vicinity of the potential Royal Orchard Station - One (1) TPSS in the approximate vicinity of Bridge Station.	The currently proposed subway alignment requires additional power compared to the alignment as presented in 2009 EPR due to its extended length (an approximate 6.8 km subway extension was assessed in 2009 compared to the approximate 9.5 km extension currently proposed). This has resulted in the need for additional TPSS facilities. The current EPR Addendum assess a total of seven (7) TPSSs locations.

Project Component	2009 EPR	2014 EPR Addendum	Current EPR Addendum	Rationale for Change
	spaced more than 2.5 km from one another; however, a 2 km separation between TPSS is more typical. Four (4) TPSSs locations were included within the 2009 EPR in the vicinity of Steeles Station, Clark Station, Royal Orchard Station and Richmond Hill Centre Station.		- One (1) TPSS standalone building integrated with EEB-4 between the confirmed Clark Station and the potential Royal Orchard Station - One (1) TPSS at the Train Storage Facility (TSF), immediately south of 16th Ave.	
8. Proposed Portal Structure	N/A	N/A	The tunnel portal structure will be located south of Langstaff Road, west of the CN corridor ROW. This concrete structure serves as entrance/exit to and from the subway tunnel, where the alignment transitions between below and at grade.	This structure is required to allow for the below-grade to at-grade transition of the subway alignment.
9. Proposed Launch Shaft	For the purposes of determining the potential environmental effects of the Transit Project, the following approach was assumed within the 2009 EPR: Richmond Hill Centre Station and surrounding area would provide sufficient space for the southbound launch of the TBM and as well as storage of tunnel liners and other tunnelling materials and equipment Existing surface parking in the southwest quadrant of the Yonge Street/Steeles Avenue intersection were also identified as providing sufficient space for the southbound launch of the TBM and storage of tunnel liners.	N/A	The current launch shaft location corresponds to a parcel of land west of the existing CN tracks and proposed portal structure, between Holy Cross Cemetery and Langstaff Road. A construction staging area/worksites will also be prepared for the assembly of the TBM at this location. The launch shaft structure is expected to be approximately 130 m in length.	The currently proposed location of the launch shaft reduces potential property impacts by using vacant industrial properties near the CN Rail ROW, south of Langstaff Rd. and has sufficient space to meet the functional needs of TBM operations.
10. Proposed Extraction Shaft	The 2009 EPR identified the East Don River crossing as the TBM extraction shaft location (one at each end of the crossing). Cummer/Drewry Station was also identified as a potential location to remove the TBM in the 2009 EPR.	N/A	The proposed extraction shaft for the TBM operations will be located within the boundaries of the Finch Transition Box Structure that will connect the existing Finch tail track with the new YNSE alignment running north.	A new extraction shaft location is required since an at grade crossing of the East Don River is no longer proposed. There is sufficient space at the Finch Transition Box Structure to permit the removal of the TBM.
11. Proposed Modifications to Bridges/ Structures/ Culverts	- East Don River crossing above-grade for both Subway and Roadway. Includes replacement of an existing culvert. - Proposed modifications to twin-box culvert located north of Highway 7 near Richmond Hill Centre Station.	N/A	- Design, construction, maintenance and removal of a temporary pedestrian bridge across the subway and CN rail corridors to replace the existing pedestrian bridge connecting Richmond Hill Centre (bus) Terminal and Langstaff GO Station. - Demolition of the pedestrian overpass bridge at Richmond Hill Centre will occur once bus operations are shifted to Bridge Station. - Crossing of East Down River is now below-grade, meaning a new structure at this location is no longer required. - Langstaff Road East grade separation.	To provide for continuous access across the rail corridor and subway alignment, the existing pedestrian bridge at Richmond Hill Centre Terminal is proposed to be replaced with a temporary pedestrian bridge. Temporary pedestrian bridge will be in place until Bridge Station is complete, with the Bridge Station providing access across the corridor. A new structure to carry the subway over the East Don River is no longer required now that the subway is below grade at this location.

Project Component	2009 EPR	2014 EPR Addendum	Current EPR Addendum	Rationale for Change
12. Proposed Train Storage Facility (TSF)	N/A	Underground Train Storage Facility (TSF): - Capacity: 14 trains; two (2) trains stored at Richmond Hill Centre Station and the remaining 12 trains stored at the TSF - Location: north of the Richmond Hill Centre Station - Maintenance building for staff access to the proposed TSF east of Coburg Crescent, and associated 25-30 space employee parking lot - A combined maintenance operators' facility and Electrical Service Building - A ventilation shaft - A drop shaft (a type of maintenance shaft)	- Replacement of the existing culvert conveying German Mills Creek north of 16th Avenue. - A number of drainage culverts along the at grade portions of the alignment may be impacted (modified or replaced) to enable implementation of the Project. Any such culverts will be identified and addressed during future phases of design.	The existing culverts conveying German Mills Creek needs to be replaced to accommodate the tail tracks for the proposed TSF. The current configuration for the proposed TSF was selected because it avoids reconstruction of overhead bridges (High Tech, Bantry, and 16th Avenue), promotes the consolidation of buildings to minimize impacts to City of Richmond Hill property, accommodates a future multi-use trail to be completed by the municipality, and because it meets functional TTC requirements. A drop shaft is no longer necessary now that the TSF is at grade.

A 2.2 EPR Addendum Study Area

The YNSE EPR Addendum Study Area generally encompasses the proposed project components (i.e., subway alignment, Stations, Train Storage Facility, launch and extraction shafts, and related ancillary components) and extends approximately 9 kms in length, commencing at the existing Finch Station along the existing Line 1 Yonge–University in the City of Toronto, and extends northerly through the City of Vaughan (to the west) and City of Markham (to the east), to Moonlight Lane (just north of the proposed TSF) in the City of Richmond Hill, York Region.

With reference to the more detailed project mapping found in Appendix A, the defined Study Area reflects the proposed location of the YNSE infrastructure components as well as a buffer zone that accounts for the area that may be potentially impacted by future project design refinements and/or modifications. Such design changes (if applicable) will be further defined and confirmed as part of the subsequent detailed design stage of the Project.

A 2.3 Study Area Segments

For reporting purposes and to better characterize the findings of the various environmental and technical studies, the EPR Addendum Study Area was further sub-divided into three (3) geographic segments (**Figure A 2-1**).

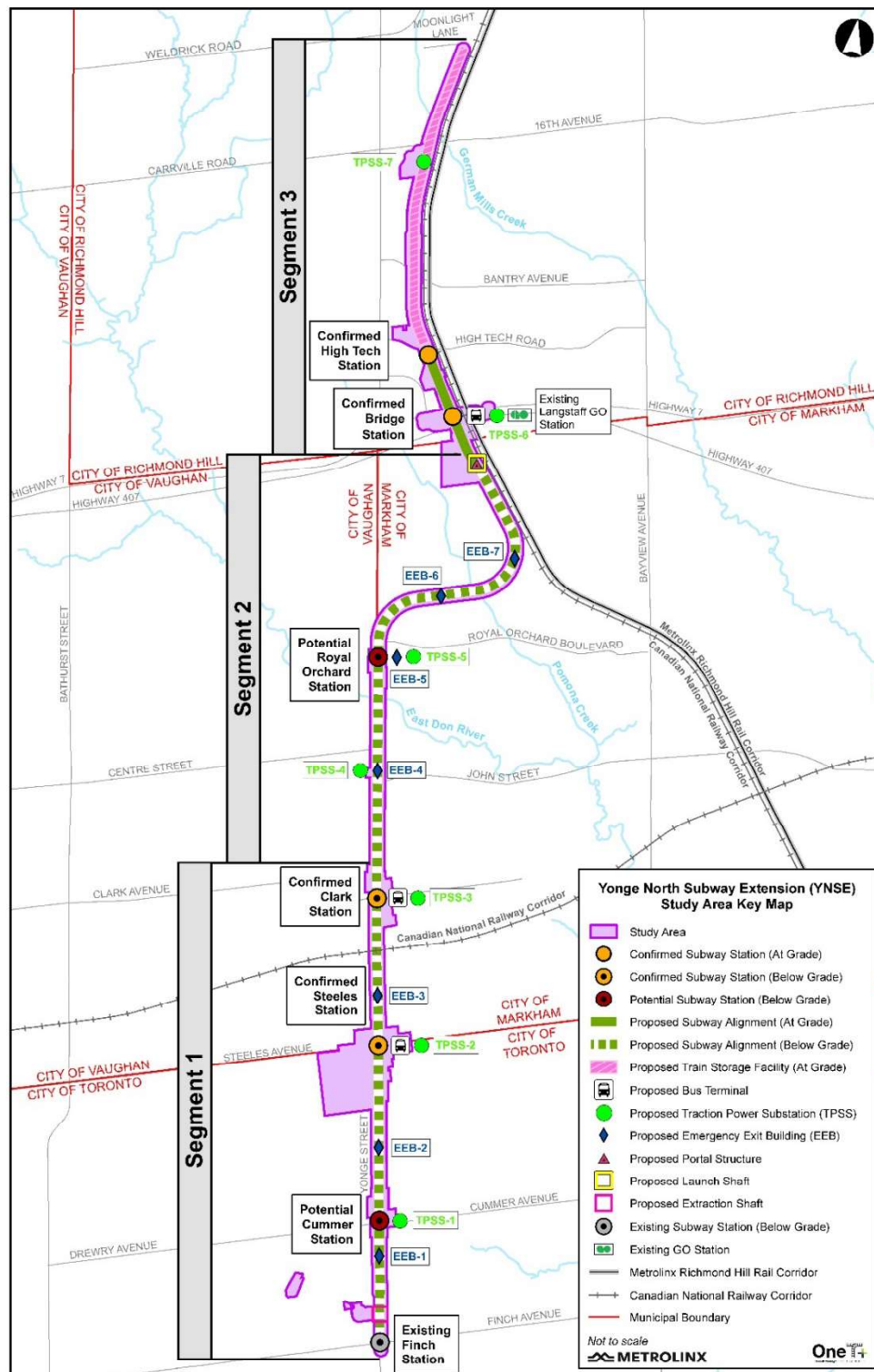


Figure A 2-1 YNSE EPR Addendum Study Area Key Plan Map

Segment 1 – Finch Station to Clark Station (Below Grade)

Segment 1 starts at the existing Finch Station and extends northward to the proposed Clark Station. It should be noted that this segment is inclusive of the proposed Clark Station and the proposed Cummer Station, Cummer Station Bus Loop, Steeles Station, and Steeles Station Bus Terminal. The entirety of this segment will be below grade. At Steeles Avenue, the Project Study Area crosses the boundary between the City of Toronto and York Region, for which Yonge Street serves as a boundary between the City of Vaughan to the west and the City of Markham to the east.

Segment 2 – Clark Station to Portal/Launch Shaft (Below Grade)

Segment 2 starts immediately beyond the limits of the proposed Clark Station and extends northward to the proposed portal structure and launch shaft location, located south of Langstaff Road East within the City of Markham. This segment is inclusive of the entirety of the proposed portal and launch shaft footprint area, extending north to the proposed Bridge Station and west from the CN rail corridor towards Ruggles Avenue. It also includes the proposed Royal Orchard Station. This segment runs below grade until it reaches the tunnel portal, where it emerges to the surface. Segment 2 ends immediately north of Langstaff Road East, south of Highway 407 in the City of Richmond Hill within York Region.

Segment 3 – Portal/Launch Shaft to Moonlight Lane (Above Grade)

Segment 3 starts immediately beyond the limits of the proposed portal and launch shaft location, near the proposed Bridge Station, and extends northward to Moonlight Lane which marks the northernmost Study Area limit. This segment, located within the City of Richmond Hill, includes the proposed High Tech Station and proposed TSF. The entirety of Segment 3 is planned to be at grade.

A 3.0 Existing Conditions

A 3.1 Purpose

The purpose of Part A of this report is to provide a detailed description of the traffic existing conditions within the YSNE EPR Addendum Study Area. The findings and existing conditions data have been organized into the three (3) Study Area segments accordingly for reporting purposes.

A 3.2 Methodology

The criteria for evaluating the impacts associated with this project included study of potential effects on all transportation modes within the defined boundaries of the impact assessment.

Considering the proposed extension alignment runs along Yonge Street, the defined Study Area buffer around each proposed station was comprised of 3 signalized intersections, including the immediate station traffic signal on Yonge Street and its two N-S neighboring traffic signals. The following section provides an overview of the methodology followed to collect and document traffic existing conditions within the Study Area.

In order to gain insight into the existing traffic conditions within the Study Area, intersection capacity analysis was conducted at signalized intersections associated with each proposed station respectively (**Table A 3-1**). These analyses were completed by development of Synchro models at study intersections. The City of Toronto Guidelines for using Synchro 11 were followed for Synchro intersection capacity analysis using Highway Capacity Manual (HCM) 2000. York Region's Transportation Impact Study Guidelines were also reviewed and followed for this analysis.

Table A 3-1 Study Intersections per Station

STATIONS	INTERSECTIONS (SOUTH TO NORTH)	STUDY AREA SEGMENT
Finch	- Yonge Street and Kempford Boulevard - Yonge Street and Finch Avenue - Yonge Street and Hendon Avenue/Bishop Avenue	1
Cummer	- Yonge Street and Turnberry Court - Yonge Street and Cummer Avenue/Drewry Avenue - Yonge Street and Patricia Avenue	
Steeles	- Yonge Street and Athabaska Avenue - Yonge Street and Steeles Avenue - Yonge Street and Meadowview Avenue	
Clark	- Yonge Street and Glen Cameron Road - Yonge Street and Clark Avenue - Yonge Street and Elgin Street/Arnold Avenue	
Royal Orchard	- Yonge Street and Centre Street/Thornhill Summit Drive - Yonge Street and Royal Orchard Boulevard - Yonge Street and Uplands Avenue	2

STATIONS	INTERSECTIONS (SOUTH TO NORTH)	STUDY AREA SEGMENT
Bridge	- Yonge Street and Highway 407 E Ramp/Langstaff Road East - Yonge Street and highway 407 W Ramp - Yonge Street and Highway 7 Ramp/Garden Avenue	3
High Tech	- Yonge Street and High Tech Road - Yonge Street and Westwood Lane/Beresford Drive - Yonge Street and Scott Drive/Bantry Avenue	

Volume to capacity (v/c) ratio and level of service (LOS) were the two (2) Measures of Effectiveness that were used to assess intersection capacity.

The following thresholds were set to identify critical movements at signals:

- Movements with V/C ratio of 0.85 or above; and
- Movements with Level of Service ("LOS") as "E" or worse.

A 3.3 Review of Background Information

Background Information including the required data for traffic analysis were provided by the City of Toronto and York Region. These data included morning and afternoon peak hour Turning Movement Counts (TMC) and Signal Timing Plans for most of the study intersections.

In addition, Yonge Subway Extension Environmental Project Report (EPR) (2009) was also used to gather the necessary background information about the history of the project and lessons learned from the work completed back then.

Signal timing plan implementation years and computer systems are listed in **Table A 3-2**.

Table A 3-2 Study Intersections Signal Timing Plans – Implementation Year & Computer System

INTERSECTIONS (SOUTH TO NORTH)	YEAR	COMPUTER SYSTEM
Yonge Street and Kempford Boulevard	2019	UTC/SCOOT
Yonge Street and Finch Avenue	2020	UTC/SCOOT
Yonge Street and Hendon Avenue/Bishop Avenue	2020	UTC/SCOOT
Yonge Street and Turnberry Court	2009	UTC/SCOOT
Yonge Street and Cummer Avenue/Drewry Avenue	2018	UTC/SCOOT
Yonge Street and Patricia Avenue	2010	UTC/SCOOT
Yonge Street and Athabaska Avenue	2020	UTC/SCOOT
Yonge Street and Steeles Avenue	2019	UTC/SCOOT
Yonge Street and Meadowview Avenue	2019	Centrac
Yonge Street and Glen Cameron Road	2019	Centrac
Yonge Street and Clark Avenue	2020	Centrac
Yonge Street and Elgin Street/Arnold Avenue	2019	Centrac

INTERSECTIONS (SOUTH TO NORTH)	YEAR	COMPUTER SYSTEM
Yonge Street and Centre Street/Thornhill Summit Drive	2019	Centracs
Yonge Street and Royal Orchard Boulevard	2016	Centracs
Yonge Street and Uplands Avenue	2016	Centracs
Yonge Street and Highway 407 E Ramp/Langstaff Road East	2016	Centracs
Yonge Street and highway 407 W Ramp	2016	Centracs
Yonge Street and Highway 7 Ramp/Garden Avenue	2020	Not Available
Yonge Street and High Tech Road	2020	Not Available
Yonge Street and Westwood Lane/Beresford Drive	2020	Not Available
Yonge Street and Scott Drive/Bantry Avenue	2020	Not Available

TMC dates are listed in **Table A 3-3**. There were few locations with TMC older than 2017 (two years older than existing conditions - 2019). Traffic counts were not conducted for signals with older counts as part of this study. The steps to update and prepare these data for the analyses is discussed in Data Gap Analysis section.

Table A 3-3 Count Dates - Intersection TMCs

INTERSECTIONS (SOUTH TO NORTH)	COUNT DATE
Yonge Street and Kempford Boulevard	2017
Yonge Street and Finch Avenue	2019
Yonge Street and Hendon Avenue/Bishop Avenue	2017
Yonge Street and Turnberry Court ¹	-
Yonge Street and Cummer Avenue/Drewry Avenue	2019
Yonge Street and Patricia Avenue	2019
Yonge Street and Athabaska Avenue	2019
Yonge Street and Steeles Avenue	2019
Yonge Street and Meadowview Avenue	2020
Yonge Street and Glen Cameron Road	2011
Yonge Street and Clark Avenue	2020
Yonge Street and Elgin Street/Arnold Avenue	2011
Yonge Street and Centre Street/Thornhill Summit Drive	2011
Yonge Street and Royal Orchard Boulevard	2011
Yonge Street and Uplands Avenue	2011
Yonge Street and Highway 407 E Ramp/Langstaff Road East	2016

¹ TMC data for Yonge Street and Turnberry Court intersection (i.e. the adjacent intersection to Yonge Street and Cummer Avenue) was not available.- see Section A 3.4

INTERSECTIONS (SOUTH TO NORTH)	COUNT DATE
Yonge Street and Highway 407 W Ramp	2018
Yonge Street and Highway 7 Ramp/Garden Avenue	2019
Yonge Street and High Tech Road	2018
Yonge Street and Westwood Lane/Beresford Drive	2018
Yonge Street and Scott Drive/Bantry Avenue	2018

A 3.4 Data Gap Analysis

A review of available background information (e.g., previously completed studies and/or reports) was undertaken to identify data gaps. These data gaps reflected the latest data provided by stakeholders and identified areas where data was non-existent from previous studies, and/or new data needed to be collected, and/or existing available data required review and updating or augmenting. The results of the data gap analysis were as follows:

There were few locations within York Region which TMC data were not received. These data were collected from another study completed by IBI Group in 2018 (i.e. VivaNext Yonge Street Rapidway). The missing TMC data points were between Langstaff Avenue and Scott Drive/Bantry Avenue on Yonge Street and were used in the analyses as they were all representative of counts from 2018.

TMC data from 2011 were processed and updated to reflect existing (2019) conditions. As part of this process, a growth rate was determined using York Region 2016 Emme model link assignments and compared against the available 2031 link assignments. This comparison showed an average annual growth of 1.9% which is also in consistency with the 2% growth rate recommended in York Region's Transportation Impact Study Guidelines.

TMC data for Yonge Street and Turnberry Court intersection (i.e. the adjacent intersection to Yonge Street and Cummer Avenue) was not provided. This intersection is excluded from Cummer Station analysis as it is a minor intersection on Yonge Street providing access to a condo apartment and is distant to Cummer Avenue/Yonge Street intersection.

Once the missing TMC data are prepared, and industry-standard approach to volume balancing was employed to balance the link volumes along Yonge Street. The balancing was carried out as per the instructions in the City of Toronto Guidelines for Using Synchro 11.

A 3.5 Desktop Data Collection

Data was collected from the following sources and considered as appropriate as part of documenting existing conditions within the Study Area:

- Google Map Street View: used to collect roadway speed limits, intersection lane configuration as well as right-turn-red signs for York Region.
- Google Map Aerial View: used to collect lane configuration details (e.g. storage lane length, lane width confirmation).
- City of Toronto Interactive Map: covers the latest road conditions within the boundaries of the City. This map was used to view road geometry and lane configuration (including signal detector locations) details for the Study Areas within the City.

- City of Toronto Traffic Bylaws: used to collect and confirm roadway speed limits, as well as right-turn-on-red signs at signals within the City boundaries.
- York Region Interactive Map: used to collect data on the overall road network layout and configuration as well as some details associated with the existing bus operations (e.g. Bus Stop locations).
- TTC System Map: illustrates TTC bus routes within the study area.
- YRT System Map: illustrates YRT (including VIVA) bus routes within the study area.

A 3.6 Segment 1 – Finch Station to Clark Station

The land use between Finch Avenue and Steeles Avenue along Yonge Street is comprised of high residential and office buildings as well as mixed retail facilities. There are key transit facilities including the TTC Finch Bus Terminal, the GO Bus Terminal at Yonge Street/Bishop Avenue/Hendon Avenue and the TTC commuter parking within the Hydro corridor at Bishop Avenue/Hendon Avenue. There exists also the Centrepont Mall in the southwest corner of Yonge Street and Steeles Avenue as well as multiple strip malls. North of Steeles Avenue on Yonge Street is primarily commercial and low-density residential uses. There exists a commercial and high-rise residential complex at northeast corner of Yonge Street and Doncaster Avenue (*World on Yonge*).

This segment includes four (4) of the future proposed stations: Finch Station, Cummer Station, Steeles Station and Clark Station.

A 3.6.1 Road Network

Yonge Street is the primary north-south arterial roadway running through this segment from Finch station in the City of Toronto to Clark station in City of Markham of York Regional Municipality. Within this segment, the City of Toronto's jurisdiction is from Finch Avenue to Steeles Avenue. This segment of the corridor consists of three (3) regular general-purpose lanes between Finch Avenue and Hendon Avenue and two (2) general purpose lanes plus one (1) HOV lane per direction and one (1) centre two-way left turn lane between Hendon Avenue and Steeles avenue. Yonge Street from Steeles Avenue to Clark Avenue is an arterial under the jurisdiction of York Region. North of Steeles Avenue, Yonge Street consists of two (2) regular general-purpose lanes, one (1) HOV lane and one (1) centre two-way left turn lane in the north and south directions that extend to Clark Avenue.

Major east-west arterial and collector roadways within this segment are Finch Avenue, Hendon Avenue/Bishop Avenue, Cummer Avenue/Drewry Avenue, Steeles Avenue, Doncaster Avenue and Clark Avenue.

A 3.6.2 Traffic

Intersection capacity analysis using HCM 2000 were completed for the proposed stations within this segment as explained in the Methodology Section.

Summary of Synchro results per station are presented in **Table A 3-4** through **Table A 3-11**. These results include all critical turning movements with LOS E or F and V/C of greater than 0.85. Movements with LOS "F" or V/C as one (1).

Table A 3-4 Finch Station – Intersection Capacity Analyses – Existing AM

Intersection	Intersection LOS	Intersection Delay	Intersection V/C Ratio	Critical Movement						
				Movement	LOS	Delay (s)	V/C Ratio	50th Percentile Queue (m)	95th Percentile Queue (m)	Storage Capacity (m)
Hendon Ave / Yonge St	C	30	0.83	EBL	F	81.1	0.87	26.6	61.6	-
				WBT	E	69.9	0.93	81.1	137.2	-
				EBL	F	105.6	1.00	24.0	67.5	55
Finch Ave / Yonge St	D	43.8	0.91	WBL	E	60.1	0.86	25.3	52.2	37
				WBT	E	57.4	0.93	126.9	168.2	-
				NBL	E	65.4	0.89	26.1	66.6	56
Kempford Blvd / Yonge St	A	6.3	0.42	NBL	A	9.8	0.33	2.1	16.8	14

During AM peak period, Finch Avenue and Yonge Street intersection operates with v/c of 0.91. The EBL movement is at capacity and experiences LOS F and long delays due to high turning movement demand, and also high westbound through demand which leads to a lack of gaps between westbound vehicles. The westbound left movements 95th queue extends beyond the storage lane and spills onto the through lanes. The northbound left and westbound through movements also operate near capacity with LOS E. At the Hendon Avenue and Yonge Street intersection the eastbound left operates at a LOS F, due to long delays associated with this movement. The westbound through performs poorly, operating at a LOS E.

Table A 3-5 Finch Station – Intersection Capacity Analyses – Existing PM

Intersection	Intersection LOS	Intersection Delay	Intersection V/C Ratio	Critical Movement						
				Movement	LOS	Delay (s)	V/C Ratio	50th Percentile Queue (m)	95th Percentile Queue (m)	Storage Capacity (m)
Finch Ave / Yonge St	D	38.1	0.85	EBL	E	75.8	0.94	25.3	65.8	55

During PM peak period, Finch Avenue and Yonge Street intersection operates with v/c of 0.85. Similar to AM peak, the eastbound left is a critical movement with LOS E and v/c of 0.94. The 95th queue length for this movement extends beyond its storage lane and impact the adjacent lanes in the approach at times.

Table A 3-6 Cummer Station – Intersection Capacity Analyses – Existing AM

Intersection	Intersection LOS	Intersection Delay	Intersection V/C Ratio	Critical Movement						
				Movement	LOS	Delay (s)	V/C Ratio	50th Percentile Queue (m)	95th Percentile Queue (m)	Storage Capacity (m)
Cummer Ave / Yonge St	C	31.7	0.83	EBL	D	35.3	0.29	13.7	27.0	25
				SBT	C	32.5	0.91	81.6	101.0	-

During AM peak, Cummer Avenue / Yonge Street intersection operate with an overall acceptable LOS and v/c. The southbound through movement operates at v/c of 0.91 which is due to a high demand, however the signal is able to serve the demand with LOS of C and acceptable delay.

Table A 3-7 Cummer Station – Intersection Capacity Analyses – Existing PM

Intersection	Intersection LOS	Intersection Delay	Intersection V/C Ratio	Critical Movement						
				Movement	LOS	Delay (s)	V/C Ratio	50th Percentile Queue (m)	95th Percentile Queue (m)	Storage Capacity (m)
Cummer Ave / Yonge St	C	31.1	0.78	EBL	D	36.2	0.34	15.1	29.3	25
				NBL	D	40.7	0.82	17.2	52.5	47

During PM peak period, Cummer Avenue / Yonge Street intersection operates with LOS C similar to AM Peak period. Northbound being the dominant traffic direction at this intersection (based on counts), northbound left movement has high a demand which creates queue spill back onto the through lanes.

Table A 3-8 Steeles Station – Intersection Capacity Analyses – Existing AM

Intersection	Intersection LOS	Intersection Delay	Intersection V/C Ratio	Critical Movement						
				Movement	LOS	Delay (s)	V/C Ratio	50th Percentile Queue (m)	95th Percentile Queue (m)	Storage Capacity (m)
Meadowview Ave / Yonge St	C	22	0.73	WBL	E	61.9	0.81	57.1	81.0	100
Steeles Ave / Yonge St	E	55.4	0.99	EBL	E	74.6	0.93	33.3	77.6	117
				EBT	E	70.7	0.98	124.8	168.9	-
				WBL	E	74.3	0.91	27.7	68.0	165
				WBT	D	51.9	0.87	101.7	120.1	-
				NBL	E	67.1	0.87	26.4	62.4	75
				SBL	D	36.6	0.78	27.7	55.3	40
				SBT	E	62.7	1.00	214.8	257.3	-

During AM peak period, the westbound left movement at Meadowview Avenue / Yonge Street experiences a high turning demand and operates at LOS E. The left turn queues are long but are contained within the left turn lane storage space. Steeles Avenue / Yonge Street intersection operates almost at capacity with LOS E. Multiple movements are among critical movements in this intersection among which are all left turns. The southbound through movement experiences high demand and operates at capacity. The southbound left queue also extends beyond its storage lane and further aggravates the through lane operation.

Table A 3-9 Steeles Station – Intersection Capacity Analyses – Existing PM

Intersection	Intersection LOS	Intersection Delay	Intersection V/C Ratio	Critical Movement						
				Movement	LOS	Delay (s)	V/C Ratio	50th Percentile Queue (m)	95th Percentile Queue (m)	Storage Capacity (m)
Meadowview Ave / Yonge St	C	29.3	0.78	WBL	E	69.6	0.88	74.7	114.2	100
Steeles Ave / Yonge St	E	59.5	0.98	EBL	E	72.4	0.93	43.0	89.9	117
				EBT	E	64.0	0.96	138.8	184.6	-
				WBL	E	66.7	0.89	34.9	75.0	165
				WBT	E	59.9	0.95	112.6	143.8	-
				NBL	E	55.2	0.82	23.3	54.7	75
				NBT	E	65.2	0.99	172.1	220.0	-
Athabaska Ave / Yonge St	B	17.9	0.69	SBL	E	67.9	0.89	34.2	75.1	40
				SBT	D	53.8	0.93	145.6	191.0	-
				EBL	D	43.7	0.55	30.0	51.8	43

During PM peak period, Steeles Avenue / Yonge Street intersection operates near capacity with LOS E. Similar movements to AM peak period operate at critical conditions, however no movements are over-capacity. At the Athabaska Avenue / Yonge Street intersection, the eastbound left movement is at critical conditions, which is due to high demand leaving the parking on the west. Similar to AM peak period, Meadowview Avenue / Yonge Street intersection experiences long queues and LOS E for the westbound left movement, as a result of high demand at this intersection.

Table A 3-10 Clark station – Intersection Capacity Analyses - Existing AM

Intersection	Intersection LOS	Intersection Delay	Intersection V/C Ratio	Critical Movement						
				Movement	LOS	Delay (s)	V/C Ratio	50th Percentile Queue (m)	95th Percentile Queue (m)	Storage Capacity (m)
Arnold Ave/ Yonge St	B	14.1	0.68	EBL	E	55.8	0.54	15.9	29.7	35
				WBT	E	58.8	0.67	43.0	63.6	-
				SBL	B	13.7	0.54	14.4	43.1	34
Clark Ave/ Yonge St	D	43.8	0.94	EBL	F	106.8	0.93	58.6	106.1	78
				WBL	E	56.6	0.45	21.6	38.2	-
				WBT	E	65.6	0.72	64.7	92.8	-
				NBL	F	115.8	0.99	31.1	78.1	47
				SBT	D	45.6	0.93	246.1	306.8	-

During AM Peak period, Clark Avenue / Yonge Street intersection as the main signal of future Clark station, operates near capacity (v/c of 0.94) and LOS D. The eastbound left and northbound left movements at this intersection operate near capacity with LOS F, and their queues expend beyond the storage lane and impacts the through movements at those approaches.

Table A 3-11 Clark Station – Intersection Capacity Analyses – Existing PM

Intersection	Intersection LOS	Intersection Delay	Intersection V/C Ratio	Critical Movement						
				Movement	LOS	Delay (s)	V/C Ratio	50th Percentile Queue (m)	95th Percentile Queue (m)	Storage Capacity (m)
Arnold Ave/ Yonge St	B	10.2	0.65	WBT	E	57.7	0.56	29.1	46.8	-
				SBL	C	28.0	0.67	9.1	50.3	34
Clark Ave/ Yonge St	D	37.8	0.93	EBL	F	106.5	0.96	66.2	118.3	78
				WBT	E	58.0	0.68	60.2	88.2	-
				NBL	E	78.8	0.94	49.0	101.2	47
Glen Cameron Rd / Yonge St	B	17.2	0.86	WBT	E	55.7	0.65	40.2	56.8	-
				SBL	E	74.9	0.89	23.9	69.0	46

During PM peak period, Clark Avenue and Yonge Street intersection operates with similar LOS and v/c to AM peak period. Similar to AM peak, the eastbound left movement operates near capacity with LOS F and long queues, which extends beyond the storage lane capacity. At Arnold Avenue/Yonge Street the westbound through operates at a LOS E. At the Glen Cameron Road/Yonge Street signals movements that experience delay and poor performance are the westbound through and southbound left, both operating at a LOS E.

A 3.6.3 Transit Services

Toronto Transit Commission (TTC), York Region Transit (YRT) and Government of Ontario Transit (GO Transit) are the three transit agencies which operate in this segment. Existing TTC, YRT and GO Transit network within this segment along Yonge Street are shown in **Figure A 3-1** and **Figure A 3-2**. Within this segment TTC operates bus routes between Finch Avenue and Steeles Avenue. YRT is the primary transit agency that serves this segment with VIVA, Express and YRT local service. GO transit also operates bus service on Yonge Street within this segment. It should be noted that there are HOV lanes along Yonge Street within this segment which give priority to buses during peak periods. There exist no dedicated transit lanes on the roadway for on-surface transit services within this segment, and buses operate in mixed lanes with other vehicles. Consequently, it is expected for transit units' operations to be similar to other vehicles on the roadway as presented in **Section 3.6.2**.

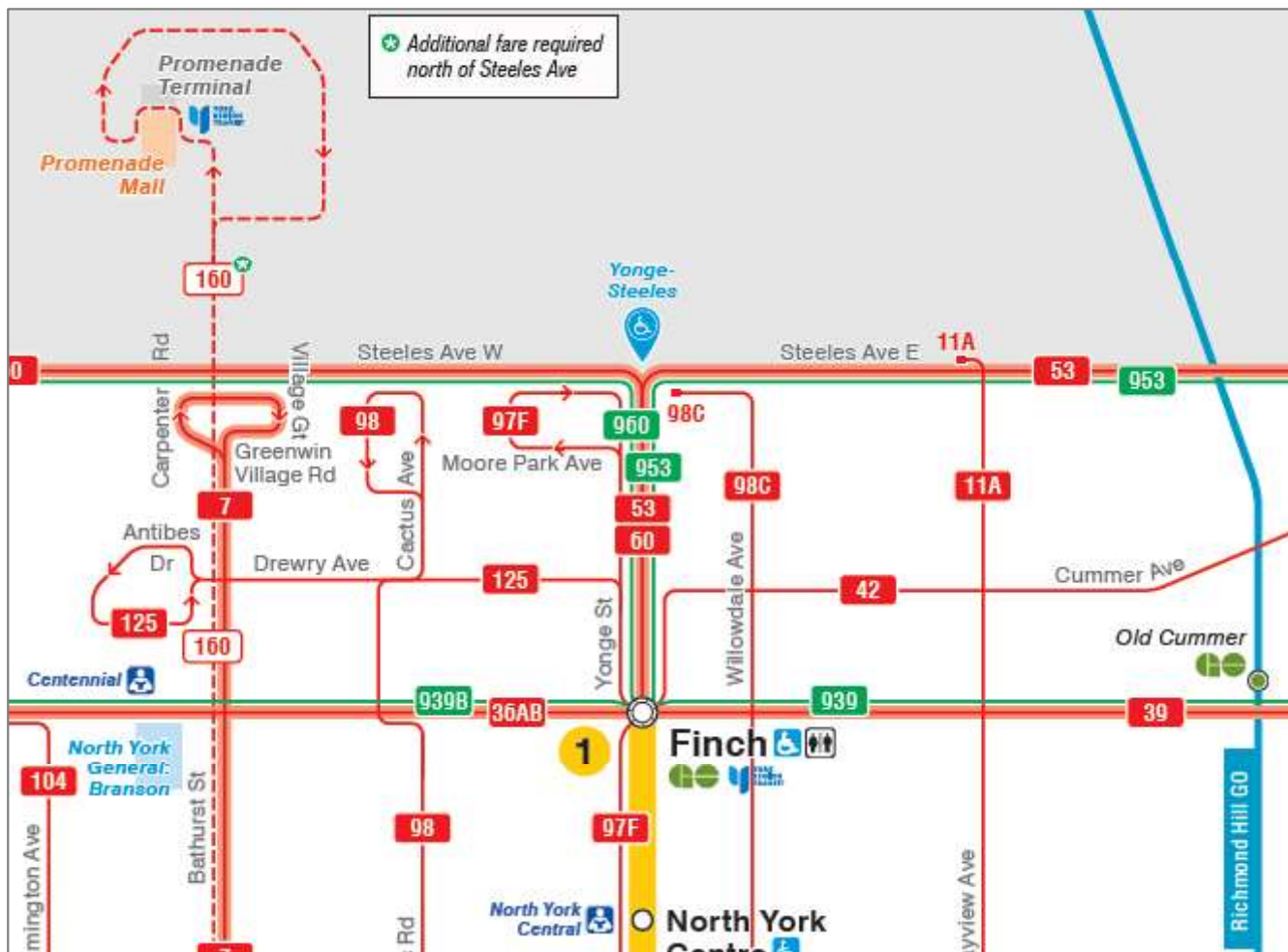


Figure A 3-1 TTC System Map north of Finch Avenue along Yonge Street

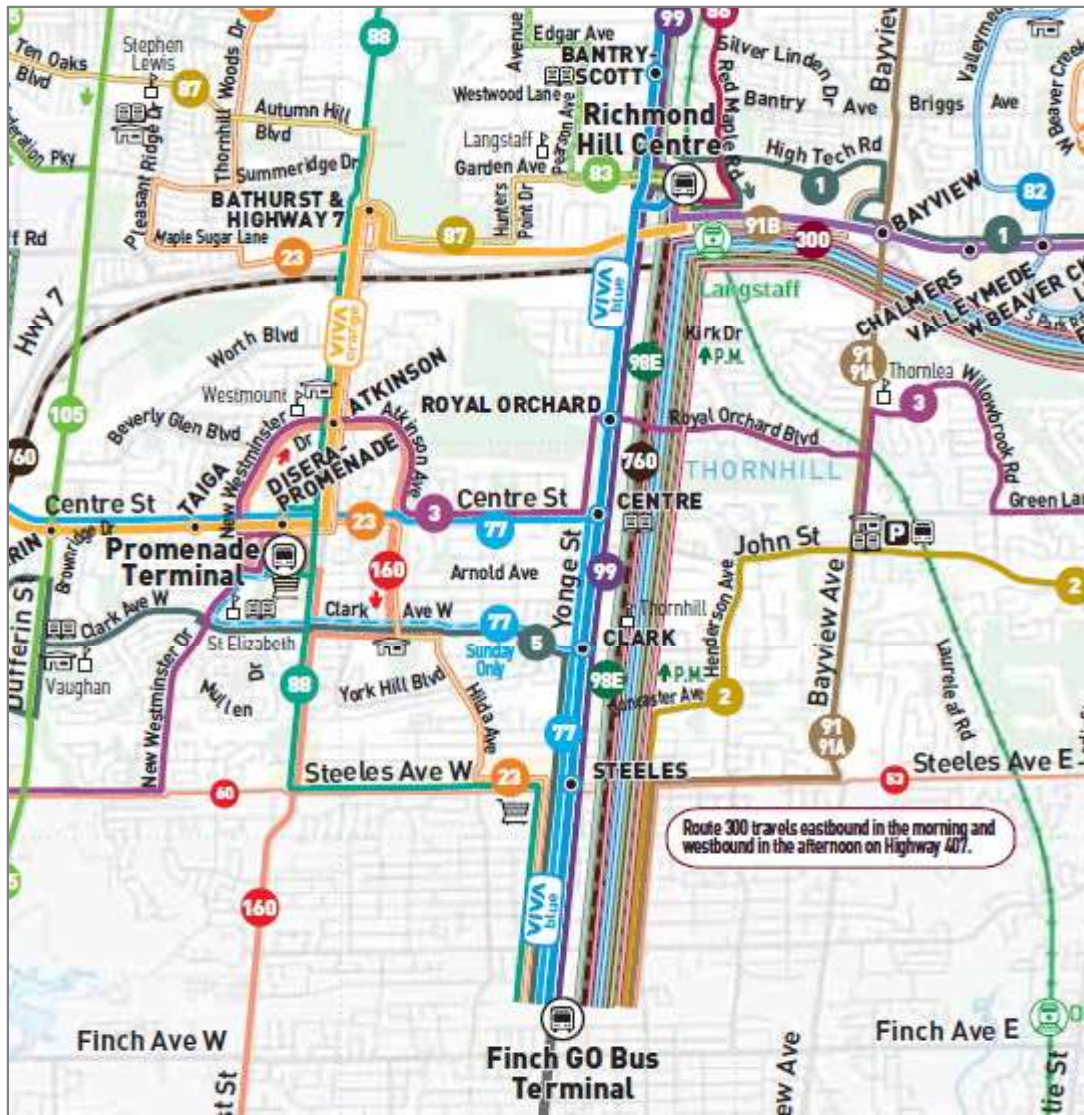


Figure A 3-2 YRT System Map throughout the 3 Segments along Yonge Street

A 3.6.4 Pedestrian and Cycling Network

Cyclists traffic on Yonge Street is very limited and they use general purpose lanes mixed with other modes of traffic. Sidewalks along Yonge Street provide sufficient width and capacity for pedestrian flow. Pedestrian activity along Yonge Street varies considerably depending on the adjacent land use. Higher pedestrian activity is currently observed between Finch Avenue and Steeles Avenue as a result of higher residential and business densities.

Pedestrian activity is facilitated by pedestrian crossings at signalized intersections, which maintains network continuity. Pedestrian and cyclist operations are accommodated by signals at signalized intersections with dedicated signal heads for pedestrians. An additional pedestrian feature at signals in operation south of Steeles is a leading pedestrian interval that starts the pedestrian walk display in advance of the corresponding through green display. This feature gives pedestrians a “head start” over motorists.

A 3.6.5 Rail Network

Rail network within this segment in the proximity of Yonge Street is limited to east-west route that crosses Yonge Street at a separated grade south of Clark Avenue.

A 3.7 Segment 2 – Clark Station to Portal/Launch Shaft

North of Clark Avenue along Yonge Street (i.e. The Thornhill Heritage Conservation District) consists of a wide variety of low-density commercial and residential uses. The Toronto Ladies' Gold Course and the Thornhill Country Club are located north of the heritage district adjacent to the East Don River. Few high-rise residential towers are also located in proximity to Royal Orchard Boulevard Area. North of Royal Orchard Boulevard to Highway 407 land use is comprised of low-density commercial and residential uses. Holy Cross Catholic Cemetery is located on the southeast corner of Yonge Street and Langstaff Road.

A 3.7.1 Road Network

Within this segment, Yonge Street runs for approximately three (3) kilometres from Clark Avenue to Langstaff Road with two (2) regular general-purpose traffic lanes and a centre two-way left turn lane. Major east-west arterial and collector roadways within this segment are John Street, Centre Street and Royal Orchard Boulevard.

A 3.7.2 Traffic

Intersection capacity analysis using HCM 2000 was completed for the only proposed station within this segment (i.e. Royal Orchard station) as explained in the Methodology Section.

Summary of Synchro results per station are presented in **Table A 3-12** through **Table A 3-13**. These results include all critical turning movements with LOS E or F and V/C of greater than 0.85. Movements with LOS "F" or V/C as one (1) or higher are highlighted in grey. Tabulated Synchro outputs including all intersection movements are presented in **Appendix B**. Detailed Synchro reports are provided in **Appendix C**.

Table A 3-12 Royal Orchard Station – Intersection Capacity Analyses – Existing AM

Intersection	Intersection LOS	Intersection Delay	Intersection V/C Ratio	Critical Movement						
				Movement	LOS	Delay (s)	V/C Ratio	50th Percentile Queue (m)	95th Percentile Queue (m)	Storage Capacity (m)
Royal Orchard Blvd / Yonge St	C	23.8	0.83	WBL	E	69.2	0.90	66.5	95.5	26
Centre St / Yonge St	C	34.3	0.96	EBL	F	80.8	0.94	79.8	134.9	-
				EBT	E	56.4	0.82	81.4	135.1	-
				NBL	F	108.4	1.00	36.5	86.4	46
				SBT	C	31.7	0.98	289.2	339.1	-

Centre Street is an important east-west access to Yonge Street as there exists no major east-west arterials north of Centre Street up to Highway 7/407 ETR. During the AM Peak period, this intersection operates near capacity with LOS C and shows two critical left-turn movements of eastbound left and northbound left with LOS F and long queues that could potentially impact other movements of the same approach.

Table A 3-13 Royal Orchard Station – Intersection Capacity Analyses – Existing PM

Intersection	Intersection LOS	Intersection Delay	Intersection V/C Ratio	Critical Movement						
				Movement	LOS	Delay (s)	V/C Ratio	50th Percentile Queue (m)	95th Percentile Queue (m)	Storage Capacity (m)
Uplands Ave / Yonge St	A	8.3	0.81	SBL	F	97.7	0.88	6.4	27.8	42
Royal Orchard Blvd / Yonge St	B	17.7	0.88	EBT	E	55.5	0.12	4.8	10.8	-
				WBL	D	50.5	0.63	36.2	46.7	26
				NBT	B	15.3	0.94	71.1	403.9	-
Centre St / Yonge St	D	50.5	0.99	EBL	F	84.8	0.96	84.0	142.0	-
				WBL	F	80.6	0.81	18.8	48.1	28
				NBL	F	164.4	1.20	65.2	120.4	46
				NBT	C	27.6	0.91	233.9	276.8	-
				SBL	F	120.1	0.89	13.7	26.2	46
				SBT	E	57.3	0.99	223.5	267.6	-
				SBR	C	25.1	0.27	34.1	61.4	30

During PM peak period, the southbound left movement at Uplands Avenue and Yonge Street suffers from long delays due to lack of gaps between northbound through vehicles. Similar to AM Peak, Centre Street / Yonge Street intersection operates near capacity with LOS D. All left-turn movements at this intersection operate at critical conditions with LOS F, while the northbound left operates over capacity. The southbound left movement at Uplands Avenue / Yonge Street experience long delays and operate with LOS F due to high conflicting demand with the northbound through movement, and not protected left turn phase for this movement. Queue length for this movement is contained within storage lane.

A 3.7.3 Transit Services

York Region Transit (YRT) is the transit agencies which operates in this segment. Existing YRT Transit network within this segment along Yonge Street are shown in **Figure A 3-2**. Within this segment, YRT operates VIVA, Express and YRT local service. There exist no dedicated transit lanes on the roadway for on-surface transit services within this segment, and buses operate in mixed lanes with other vehicles. Consequently, it is expected for transit units' operations to be similar to other vehicles on the roadway as presented in **Section 3.7.2**.

A 3.7.4 Pedestrian and Cycling Network

There are no dedicated bike lanes in the proximity of Yonge Street within this segment. Pedestrian activity is also very limited within this segment due to the low-density commercial and residential land use along Yonge Street throughout this segment. Both pedestrians and cyclists are expected to operate at an acceptable level of service. Sidewalks along Yonge Street provide sufficient width and capacity and pedestrian activity is facilitated by pedestrian crossings at signalized intersections, which provide network continuity. Pedestrian and cyclist operations are accommodated by signals at signalized intersections with dedicated signal heads for pedestrians.

A 3.7.5 Rail Network

Currently, there is no existing rail network within this segment.

A 3.8 Segment 3 – Portal/Launch Shaft to Moonlight Lane

The southern limits of this segment align with the City of Richmond Hill limits and it falls within the City of Richmond Hill jurisdiction. The land use along Yonge Street in this segment (North of Highway 407 to High Tech Road) is primarily comprised of low-density residential on the west and low-density commercial and entertainment uses on the east side of Yonge Street.

A key transit station (i.e. Richmond Hill Centre) is also located in proximity to Yonge Street at Highway 7 ramp and Garden Avenue.

A 3.8.1 Road Network

Through the Yonge Street and Highway 407 interchange, Yonge Street operates as a 3 lanes facility with a centre two-way left-turn lane to High Tech Road where it narrows to two (2) lanes. Major east-west arterial and collector roadways within this segment are High Tech Road and Bantry Avenue. Highway 407 and Highway 7 runs east-west within this segment and connect to Yonge Street via their ramps.

A 3.8.2 Traffic

Intersection capacity analysis using HCM 2000 was completed for the proposed stations within this segment as explained in **Section A 3.2**).

Summary of Synchro results per station are presented in **Table A 3-14** through **Table A 3-17**. These results include all critical turning movements with LOS E or F and V/C of greater than 0.85. Movements with LOS “F” or V/C as 1 or higher are highlighted in grey. Tabulated Synchro outputs including all intersection movements are presented in **Appendix B**. Detailed Synchro reports are provided in **Appendix C**.

A separate scope of work to study the transportation operations and needs around Bridge and High Tech stations has been defined and is underway. Under this scope of work, the area will be modelled in a multi-resolution platform and will undergo more comprehensive and meticulous evaluations of all modes of transportation in the area. The following presents a subset of the analytics that can be completed at this time.

Table A 3-14 Bridge Station – Intersection Capacity Analyses – Existing AM

Intersection	Intersection LOS	Intersection Delay	Intersection V/C Ratio	Critical Movement						
				Movement	LOS	Delay (s)	V/C Ratio	50th Percentile Queue (m)	95th Percentile Queue (m)	Storage Capacity (m)
Garden Ave / Yonge St	F	92.2	0.98	EBL	D	53.0	0.46	40.0	61.6	20
				EBT	E	63.3	0.49	43.8	68.3	-
				EBR	E	58.8	0.15	0.0	21.1	31
				WBL	F	124.6	0.99	49.1	81.7	85
				WBT	E	60.2	0.29	22.8	40.4	-
				WBR	E	61.3	0.35	21.5	38.9	-
				NBL	F	113.2	0.9	49.6	94.1	85
				SBL	F	169.1	1.11	82.9	139.8	150
				SBT	F	124.7	1.15	241.6	423.3	-
407ETR WB off-Ramp / Yonge St	B	12.2	0.6	WBR	E	58.6	0.63	34.7	56.8	-
Langstaff Rd E – 407ETR EB off-ramp / Yonge St	B	16.7	0.6	EBR	E	58.6	0.67	37.5	62.2	-
				WBL	E	60.3	0.32	8.1	18.5	-
				WBR	E	58.5	0.05	0.0	8.2	-

During AM Peak period, Garden Avenue / Yonge Street intersection Operates near capacity with LOS F. The three highlighted left turn movements (westbound left, northbound left and southbound left) at Garden Avenue and Yonge Street are protected left-turns phases. These left-turns are over or near capacity and experience poor Level of Service during AM peak due to long delays. Southbound is the predominant traffic direction on Yonge Street at this signal and makes southbound movement over capacity and operates at critical conditions due to high demand. The two 407 ETR ramp terminals on Yonge Street operate with an acceptable LOS and v/c ratio. No capacity issues were observed at these two signals however there were movements on 407 ramps and Langstaff Road which experience long delays and operate with LOS E.

Table A 3-15 Bridge Station – Intersection Capacity Analyses – Existing PM

Intersection	Intersection LOS	Intersection Delay	Intersection V/C Ratio	Critical Movement						
				Movement	LOS	Delay (s)	V/C Ratio	50th Percentile Queue (m)	95th Percentile Queue (m)	Storage Capacity (m)
Garden Ave / Yonge St	F	95.4	1.05	EBL	E	56.9	0.21	13.1	24.1	20
				EBT	E	63.8	0.18	9.6	20.1	-
				EBR	E	62.3	0.04	-	-	31
				WBL	F	135.6	1.07	91.5	128	85
				WBT	E	58.9	0.25	18.8	34.2	-
				WBR	E	73.2	0.71	50.5	76.9	-
				NBL	F	129.6	0.99	68.7	124.5	85
				NBT	F	120	1.15	256.4	467.5	-
	SBL	F	158.6	1.06	67.1	120.5	150			
407ETR WB off-Ramp / Yonge st	B	15.7	0.69	WBR	E	57.6	0.79	78.6	104.4	-
407ETR EB off-ramp / Yonge St	C	32.6	0.75	EBR	E	59.2	0.79	68.9	99.0	-
				WBL	E	58.8	0.52	22.9	40.3	-

During the PM peak period, Garden Avenue and Yonge Street intersection operates over-capacity with LOS F. Similar to AM peak the three protected left-turn phases (westbound left, northbound left and southbound left) at Garden Avenue and Yonge Street signal operate at or near capacity with LOS F due to long delays. Contrary to the AM Peak, northbound is the predominant traffic direction during PM peak which causes the northbound through movement to operate over-capacity with LOS F.

The two 407 ETR ramp terminals on Yonge Street operate with an acceptable LOS and v/c ratio. No capacity issues were observed at these two signals, however there are movements on the 407 ramps and Langstaff Road which experience long delays and operate with LOS E.

Table A 3-16 High Tech Station – Intersection Capacity Analyses – Existing AM

Intersection	Intersection LOS	Intersection Delay	Intersection V/C Ratio	Critical Movement						
				Movement	LOS	Delay (s)	V/C Ratio	50th Percentile Queue (m)	95th Percentile Queue (m)	Storage Capacity (m)
Scott Dr / Yonge St	C	31.9	0.84	WBL	E	70.6	0.75	38.0	58.2	140
				NBL	E	68.4	0.50	12.4	26.2	75
				SBL	E	65.7	0.68	40.0	61.0	75
				SBT	C	25.9	0.85	224.5	358.8	-
Westwood Ln / Yonge St	C	26.5	0.8	EBL	E	55.7	0.34	16.2	26.2	15
				WBL	E	58.2	0.51	25.3	37.2	30
				NBL	F	93.5	0.61	29.3	42.9	70
				SBT	C	29.6	0.89	182.4	417.6	-
High Tech Rd / Yonge St	D	36.1	0.84	EBT	E	68.0	0.03	0.3	2.3	-
				WBL	E	59.3	0.76	57.4	72.3	53

During the AM peak period, there are multiple critical movements among the intersections within the Study Area of this station. Queues at all of these critical movements are contained within the storage lane except for the westbound left movement at High Tech Road and Yonge Street intersection, which extends beyond the storage capacity. The northbound left movement at Westwood Lane and Yonge Street intersection operates as a protected left-turn phase and consequently experiences long delays and poor LOS.

Table A 3-17 High Tech Station – Intersection Capacity Analyses – Existing PM

Intersection	Intersection LOS	Intersection Delay	Intersection V/C Ratio	Critical Movement						
				Movement	LOS	Delay (s)	V/C Ratio	50th Percentile Queue (m)	95th Percentile Queue (m)	Storage Capacity (m)
Scott Dr / Yonge St	C	34.9	0.82	WBT	E	60.1	0.69	54.8	80.4	-
				NBL	E	67.5	0.67	35.5	37.1	75
				NBT	C	33.9	0.89	284.0	370.5	-
				SBL	E	65.4	0.66	36.9	57.3	75
Westwood Ln / Yonge St	C	32.2	0.82	EBL	E	72.7	0.63	13.7	24.8	15
				WBL	E	56.3	0.41	21.3	32.3	30
				WBT	E	58.6	0.55	33.2	52.6	-
				NBL	E	75.4	0.69	39.2	32.9	70
High Tech Rd / Yonge St	D	52	0.97	NBT	C	24.5	0.86	318.1	400.7	-
				EBT	E	67.6	0.00	-	-	-
				WBL	E	60.1	0.73	50.1	63.6	53
				NBT	E	68.3	1.05	283	452.2	-
				SBL	F	91.3	0.96	81.3	133.6	80

During the PM peak period, similar to AM peak period, there are multiple critical movements among the intersections within the Study Area of this station. Queues at all of these critical movements are contained within the storage lane except for the southbound left and westbound left movement at High Tech Road and Yonge Street intersection, which extends beyond the storage capacity. The northbound through movement at High Tech Road / Yonge Street intersection is over-capacity due to high demand and operates at LOS E. The southbound left movement at High Tech Road and Yonge Street has a high demand and operates as a protected only left-turn, which consequently results in long delays and poor LOS.

A 3.8.3 Transit Services

York Region Transit (YRT) and Government of Ontario Transit (GO Transit) are the two transit agencies which operate in this segment. Existing YRT and GO Transit network within this segment along Yonge Street are shown in **Figure A 3-2**. YRT is the primary transit agency that serves this segment with VIVA, Express and YRT local service. GO transit also operates GO Train Richmond Hill line throughout this segment and has a stop at Langstaff GO station. It should be noted that Yonge Street Rapidway, which opened for service in December 2020 extends from Richmond Hill Centre to the northern limit of this segment. The Rapidway provides a dedicated bus rapid transit corridor, allowing for provision of significantly improved transit performance along Yonge Street north of Richmond Hill Centre, and providing a rapid transit connection with the proposed northern terminus of the YNSE.

A 3.8.4 Pedestrian and Cycling Network

There are no dedicated bike lanes in the proximity of Yonge Street within this segment. Pedestrian activity is also very limited within this segment due to the low-density commercial and residential land use along Yonge Street throughout this segment. Both pedestrians and cyclists are expected to operate at an acceptable level of service. Sidewalks along Yonge Street provide sufficient width and capacity, and pedestrian activity is facilitated by pedestrian crossings at signalized intersections, which provides network continuity. Pedestrian and cyclist operations are accommodated by signals at signalized intersections with dedicated signal heads for pedestrians.

A 3.8.5 Rail Network

The north-south GO Transit Richmond Hill line moves closer to Yonge Street within this segment and runs through it.

PART B - YNSE EPR ADDENDUM IMPACT ASSESSEMENT REPORT**TABLE OF CONTENTS**

B 1.0 Purpose	1
B 2.0 Methodology.....	1
B 2.1 Impact Assessment Criteria	1
B 2.2 Methodology	1
B 3.0 Impact Assessment	2
B 3.1 Segment 1 – Finch Station to Clark Station.....	2
B 3.1.1 Road Network	2
B 3.1.2 Transit Network	2
B 3.1.3 Pedestrian and Cycling Network.....	3
B 3.1.5 Rail Network.....	4
B 3.2 Segment 2 – Clark Station to Portal/Launch Shaft.....	4
B 3.2.1 Road Network	4
B 3.2.2 Transit Network	4
B 3.2.3 Pedestrian and Cycling Network.....	5
B 3.2.4 Rail Network.....	6
B 3.3 Segment 3 – Portal/Launch Shaft to Moonlight Lane.....	6
B 3.3.1 Road Network	6
B 3.3.2 Transit Network	6
B 3.3.3 Pedestrian and Cycling Network.....	7
B 3.3.4 Rail Network.....	8
B 4.0 Summary of Potential Impacts, Mitigation Measures and Monitoring Activities.....	8
B 5.0 Permits and Approvals	10
B 6.0 Future Work	10

LIST OF TABLES

Table B 2-1 Characterization of Potential Impacts	1
Table B 4-1 Summary of Transportation & Traffic Mitigation Measures and Monitoring Requirements	9

B 1.0 Purpose

The purpose of this section is to document the transportation impact assessment that was carried out as part of the Yonge North Subway Extension (YNSE) EPR Addendum, including identification of potential effects, and a description of proposed mitigation measures and monitoring activities.

B 2.0 Methodology

B 2.1 Impact Assessment Criteria

The criteria for evaluating the impacts associated with this project included study of potential effects on all transportation modes within the defined boundaries of the impact assessment.

B 2.2 Methodology

A four-step process was followed to assess potential impacts associated with the Project and to identify mitigation measures and monitoring activities (as required):

- **Step 1** – Identify potential impacts resulting from the construction of the Project;
- **Step 2** – Establish mitigation measures to eliminate or reduce potential adverse effects, as well as monitoring activities to verify and validate that mitigation measures are functioning effectively;
- **Step 3** – Carry out consultation with stakeholders/regulatory authorities; update impact assessment results and/or proposed mitigation and monitoring measures as appropriate; and
- **Step 4** – Document impact assessment results.

For the purposes of differentiating the various types of potential environmental impacts associated with the Project, impacts were characterized and grouped as follows:

Table B 2-1 Characterization of Potential Impacts

Construction Impacts	Potential temporary effects (e.g., disruption/disturbance) on existing Study Area features or receptors due to construction activities associated with the Project (e.g., construction of new tracks, tunnelling, storage facility, bridge modifications, etc.).
Operations and Maintenance Impacts	Potential permanent effects on existing Study Area features (i.e., displacement or removal) or receptors due to operations and/or maintenance activities associated with the Project (e.g., operation of the new subway system/trains, operation of train storage facility, etc.).

B 3.0 Impact Assessment

Transportation impact assessment results are described in **Sections B 3.1** through **B 3.3**. While these sections include descriptions of the potential impacts, mitigation measures and monitoring activities where construction and operation of the various individual Project components are discussed, the potential impacts, mitigation measures and monitoring activities are collated in **Table B 4-1**.

B 3.1 Segment 1 – Finch Station to Clark Station

B 3.1.1 Road Network

B 3.1.1.1 Potential Impacts

Construction Phase:

The proposed alignment in this segment is below-grade and it will not directly impact the road network alignment. There could potentially be road modifications to accommodate associated infrastructure and buildings (e.g., pedestrian entrance buildings) within this segment. Potential changes to road geometry and configuration throughout the construction period (e.g., potential re-alignment of road lanes in the area) may result in travel time delays and/or detours.

Operation Phase:

Minimal short-term impacts associated with maintenance activities (e.g., temporary lane closure) may occur.

B 3.1.1.2 Mitigation Measures and Monitoring Activities

Construction Phase:

Traffic and transportation management plan(s) will be developed prior to and implemented during construction. Construction-related major road modifications should be assessed through a supplementary traffic study as part of the traffic management plan(s) for these Project activities.

Operation Phase:

No impacts associated with Project operations are anticipated in this segment.

B 3.1.2 Transit Network

B 3.1.2.1 Potential Impacts

Construction Phase:

Transit network within this segment may potentially be impacted by the Project. The changes may potentially include adjustments to bus routes, schedules, and stops.

Operation Phase:

There may be potential for modifications to the local transportation network, such as adjustments to transit service schedules.

Upon start of the operations of the new line, it is expected to see a mode shift towards transit (subway and bus) in the area as the new stations and extended subways line brings more utility to transit riders and offers a sustainable mode of transportation. Moreover, transit facilities and services are expected to be integrated to allow for riders to transfer between the YNSE and bus services.

B 3.1.2.2 Mitigation Measures and Monitoring Activities

Construction Phase:

Re-routing of transit routes in such a way that minimizes the construction impacts and serves the transit users with an acceptable level of service is a feasible mitigation measure for transit services.

Local transit agencies will be consulted with to establish a suitable mitigation strategy to be implemented, if impacts to transit network are anticipated. The public will be notified in advance of any potential public transit service access restrictions and/or changes to service schedules and routes.

Operation Phase:

Consult with local transit agencies is recommended regarding the potential changes to the local transportation network.

B 3.1.3 Pedestrian and Cycling Network

B 3.1.3.1 Potential Impacts

Construction Phase:

Construction impacts associated with the pedestrian and cycling network include potential for temporary road lane, sidewalk, or bike lane closures and/or re-alignment.

Operation Phase:

No impacts associated with Project operations are anticipated. With the extension of the subway line, addition of the new stations and mode shift, it is expected to see an increase in active transportation (pedestrian and cycling) demand and associated facilities (e.g. bike lanes and multi-use paths) in the area (permanent impact).

It should be noted that off-street cycling lanes on Yonge Street are included in York Region Streetscape Master Plan Study (South Yonge Street Corridor) and will be part of the future permanent changes to the cycling network in the area.

B 3.1.3.2 Mitigation Measures and Monitoring Activities

Construction Phase:

All construction work will be carried out in a manner to ensure the interference with pedestrians and cyclists is minimal and will include fencing and lighting as required to provide a safe environment. In the event that the closure of sidewalk or bike lane is necessary, safe alternative path(s) will be provided.

B 3.1.5 Rail Network

B 3.1.5.1 Potential Impacts

Construction and Operation Phase:

The rail network throughout Segment 1 is not expected to be impacted as the proposed YNSE alignment runs underground and does not conflict with the existing surface track near Yonge Street and Clark Avenue intersection.

B 3.1.5.2 Mitigation Measures and Monitoring Activities

Construction and Operation Phase:

No rail network mitigation measures and monitoring activities have been proposed in Segment 1 as part of this report.

B 3.2 Segment 2 – Clark Station to Portal/Launch Shaft

B 3.2.1 Road Network

B 3.2.1.1 Potential Impacts

Construction Phase:

Traffic and transportation management plan(s) will be developed prior to and implemented during construction. Construction-related major road modifications should be assessed through a supplementary traffic study as part of the traffic management plan(s) for these Project activities.

Operation Phase:

Minimal short-term impacts associated with maintenance activities (e.g., temporary lane closure) may occur.

B 3.2.1.2 Mitigation Measures and Monitoring Activities

Construction Phase:

Traffic and transportation management plan(s) will be developed prior to and implemented during construction. Construction-related major road modifications should be assessed through a supplementary traffic study as part of the traffic management plan(s) for these Project activities.

B 3.2.2 Transit Network

B 3.2.2.1 Potential Impacts

Construction Phase:

Transit services within this segment can potentially be impacted by the Project. The changes can potentially include adjustments to bus routes, schedules, stops.

Operation Phase:

There may be potential for modifications to the local transportation network, such as adjustments to transit service schedules.

Notably, transit facilities and services are expected to be integrated to allow for riders to transfer between the YNSE and bus services.

Upon start of the operations of the new line, it is expected to see a mode shift towards transit (subway and bus) in the area as the new stations and extended subways line brings more utility to transit riders and offers a sustainable mode of transportation.

B 3.2.2.2 Mitigation Measures and Monitoring Activities

Construction Phase:

Re-routing of transit routes in such a way that minimizes the construction impacts and serves the transit users with an acceptable level of service is a feasible mitigation measure for transit services. The public will be notified in advance of any potential public transit service access restrictions and/or changes to service schedules and routes.

Local transit agencies will be consulted with to establish a suitable mitigation strategy to be implemented, if impacts to transit services are anticipated.

Operation Phase:

Consult with local transit agencies is recommended regarding the potential changes to the local transportation network.

B 3.2.3 Pedestrian and Cycling Network

B 3.2.3.1 Potential Impacts

Construction Phase:

Construction impacts associated with the pedestrian and cycling network include potential for temporary road lane, sidewalk, or bike lane closures and/or re-alignment.

Operation Phase:

No impacts associated with Project operations are anticipated. With the extension of the subway line, addition of the new stations and mode shift, it is expected to see an increase in active transportation (pedestrian and cycling) demand and associated facilities (e.g. bike lanes and multi-use paths) in the area (permanent impact).

It should be noted that off-street cycling lanes on Yonge Street are included in York Region Streetscape Master Plan Study (South Yonge Street Corridor) and will be part of the future permanent changes to the cycling network in the area.

B 3.2.3.2 Mitigation Measures and Monitoring Activities

Construction Phase:

All construction work will be carried out in a manner to ensure the interference with pedestrians and cyclists is minimal and will include fencing and lighting as required. In the event a temporary construction-related closure of sidewalk or bike lane is necessary, measures and steps will be taken to provide for alternative path(s).

B 3.2.4 Rail Network

B 3.2.4.1 Potential Impacts

Construction and Operation Phase:

Currently there exists no rail network throughout Segment 2 to be impacted.

B 3.2.4.2 Mitigation Measures and Monitoring Activities

Construction and Operation Phase:

No mitigation measures and monitoring activities have been proposed for Segment 2 as part of this report.

B 3.3 Segment 3 – Portal/Launch Shaft to Moonlight Lane

B 3.3.1 Road Network

B 3.3.1.1 Potential Impacts

Construction Phase:

The proposed alignment in this segment is below-grade and it will not directly impact the road network alignment. There could potentially be road modifications to accommodate associated infrastructure and buildings (e.g., pedestrian entrance buildings) within this segment. Potential changes to road geometry and configuration throughout the construction period (e.g., potential re-alignment of road lanes in the area) may result in travel time delays and/or detours.

Operation Phase:

Minimal short-term impacts associated with maintenance activities (e.g., temporary lane) may occur.

B 3.3.1.2 Mitigation Measures and Monitoring Activities

Construction Phase:

Traffic and transportation management plan(s) will be developed prior to and implemented during construction. Construction-related major road modifications should be assessed through a supplementary traffic study as part of the traffic management plan(s) for these Project activities.

Operation Phase:

Signage and detours will be provided in advance of temporary lane closures during maintenance activities, as required.

B 3.3.2 Transit Network

B 3.3.2.1 Potential Impacts

Construction Phase:

Transit within this segment can potentially be impacted by the Project. The changes can potentially include adjustments to bus routes, schedules, stops.

Operation Phase:

There may be potential for modifications to the local transportation network, such as adjustments to transit service schedules.

Notably, transit facilities and services are expected to be integrated to allow for riders to transfer between the YNSE and bus services. Upon start of the operations of the new line, it is expected to see a mode shift towards transit (subway and bus) in the area as the new stations and extended subways line brings more utility to transit riders and offers a sustainable mode of transportation.

B 3.3.2.2 Mitigation Measures and Monitoring Activities*Construction Phase:*

Re-routing of transit routes in such a way that minimizes the construction impacts and serves the transit users with an acceptable level of service is a feasible mitigation measure for transit services.

Local transit agencies will be consulted with to establish a suitable mitigation strategy to be implemented, if impacts to transit network are anticipated. The public will be notified in advance of any potential public transit service access restrictions and/or changes to service schedules and routes.

Operation Phase:

Local transit agencies will be consulted with to establish a suitable mitigation strategy to be implemented, if modifications to transit services are anticipated.

B 3.3.3 Pedestrian and Cycling Network**B 3.3.3.1 Potential Impacts***Construction Phase:*

Construction impacts associated with the pedestrian and cycling network include potential for temporary road lane, sidewalk, or bike lane closures and/or re-alignment.

Operation Phase:

Minimal short-term impacts associated with maintenance activities (e.g., temporary lane/sidewalk closures) may occur. With the extension of the subway line, addition of the new stations and mode shift, it is expected to see an increase in active transportation (pedestrian and cycling) demand and associated facilities (e.g. bike lanes and multi-use paths) in the area (permanent impact).

It should be noted that off-street cycling lanes on Yonge Street are included in York Region Streetscape Master Plan Study (South Yonge Street Corridor) and will be part of the future permanent changes to the cycling network in the area.

B 3.3.3.3 Mitigation Measures and Monitoring Activities*Construction Phase:*

All construction work will be carried out in a manner to ensure the interference with pedestrians and cyclists is minimal and will include fencing and lighting as required. In the event a temporary construction-related closure of sidewalk or bike lane is necessary, measures and steps will be taken to provide for alternative paths(s).

Operation Phase:

Signage and detours will be provided in advance of temporary lane/sidewalk closures during maintenance activities, as required.

B 3.3.4 Rail Network**B 3.3.4.1 Potential Impacts***Construction Phase:*

Potential disruptions to rail services (e.g., CN Freight services) through Segment 3 may occur.

Operation Phase:

No impacts associated with Project operations are anticipated.

B 3.3.4.2 Mitigation Measures and Monitoring Activities*Construction Phase:*

Consultation with rail operators with current service along the rail corridor (i.e., Canadian National Railway) to assess how track closures, if necessary to implement, would impact their service and co-ordinate temporary schedules to accommodate all rail services on the open tracks.

B 4.0 Summary of Potential Impacts, Mitigation Measures and Monitoring Activities

The following table summarizes the components assessed, potential traffic and transportation effects, mitigation measures and monitoring activities.

Table B 4-1 Summary of Transportation & Traffic Mitigation Measures and Monitoring Requirements

Project Phase	Environmental Components	Potential Impacts	Mitigation Measures	Monitoring Activities
CONSTRUCTION	Road Network and Pedestrian/Cycling Network	- Potential for temporary road lane, sidewalk, or bike lane closures. - Potential re-alignment of road, sidewalk, or bike lanes in the area. - Potential changes to special traffic lanes (e.g., removal of HOV lanes). - Potential implementation of turn prohibitions at intersections. - Potential changes to on-street parking regulations in the area.	- Traffic Control and Management Plan(s) will be developed prior to construction. - Access to nearby land uses will be maintained to the extent possible. Potentially affected residents, tenants and business owners will be notified of upcoming construction work and potential traffic impacts. - In the event closures of sidewalks or bike lanes are necessary, safe alternative paths and required signage will be provided. - Ensure public is notified of the changes to turn prohibitions at intersections via additional signage. - Ensure public is notified of changes to curbside lane regulations (e.g., parking, HOV lanes) via additional signage. - Ensure that access to existing parks, community recreation centers and trails (including multi-use paths) is maintained.	The effectiveness of the transit and traffic management plan(s) will be monitored throughout the construction period and adjustments will be made based on actual field observations, as needed.
		- Potential for access restrictions to local bus routes. - Potential changes to transit services schedules and routes.	Ensure that the public is notified in advance of any potential public transit service access restrictions and/or changes to service schedules and routes.	The effectiveness of the transit and traffic management plan(s) will be monitored throughout the construction period and adjustments will be made based on actual field observations, as needed.
		Potential disruptions to rail services (e.g., CN Freight services) in the impacted area.	Consult with rail operators with current service along the rail corridor (i.e., Canadian National Railway) to assess how track closures, if necessary, would impact their service and co-ordinate temporary schedules to accommodate all rail services on the open tracks.	The effectiveness of the transit and traffic management plan(s) will be monitored throughout the construction period. Adjustments to the construction staging plans and transit and traffic management plan(s) will be made based on actual field observations, as needed.
OPERATION	Road Network	Minimal short-term impacts associated with maintenance activities (e.g., temporary lane/sidewalk closures) may occur.	Provide signage and detours in advance of temporary lane/sidewalk closures during maintenance activities, as required.	No monitoring is required during operations, beyond transit/transportation agencies regular operational/maintenance monitoring.
	Transit Network	Potential for modifications to the local transportation network, such as adjustments to transit service schedules.	Consult with local transit agencies regarding the potential changes to the local transportation network	

B 5.0 Permits and Approvals

Provincial permits and approvals may include easements and agreements from the Ontario Ministry of Transportation for work within the right-of-way.

Metrolinx will coordinate with the municipalities for transportation-related permits and approvals (e.g., street occupation permits, road cut permits and right-of-way construction permits) prior to construction, as required.

Other permits and approvals may include easements and agreements from CN for work within the right-of-way.

B 6.0 Future Work

A supplementary study in the area of future Bridge and High Tech stations is underway that will determine the potential temporary (construction period) and permanent impacts to traffic, as well as identify mitigation measures, following finalization of geometrical designs in that area. The reason for the supplementary study is that this area is expected to see major demand growth as result of future residential/business developments, the addition of the planned parking building (by others), its proximity to Highway 7 and 407ETR, and addition of the two stations (i.e. Bridge and High Tech).

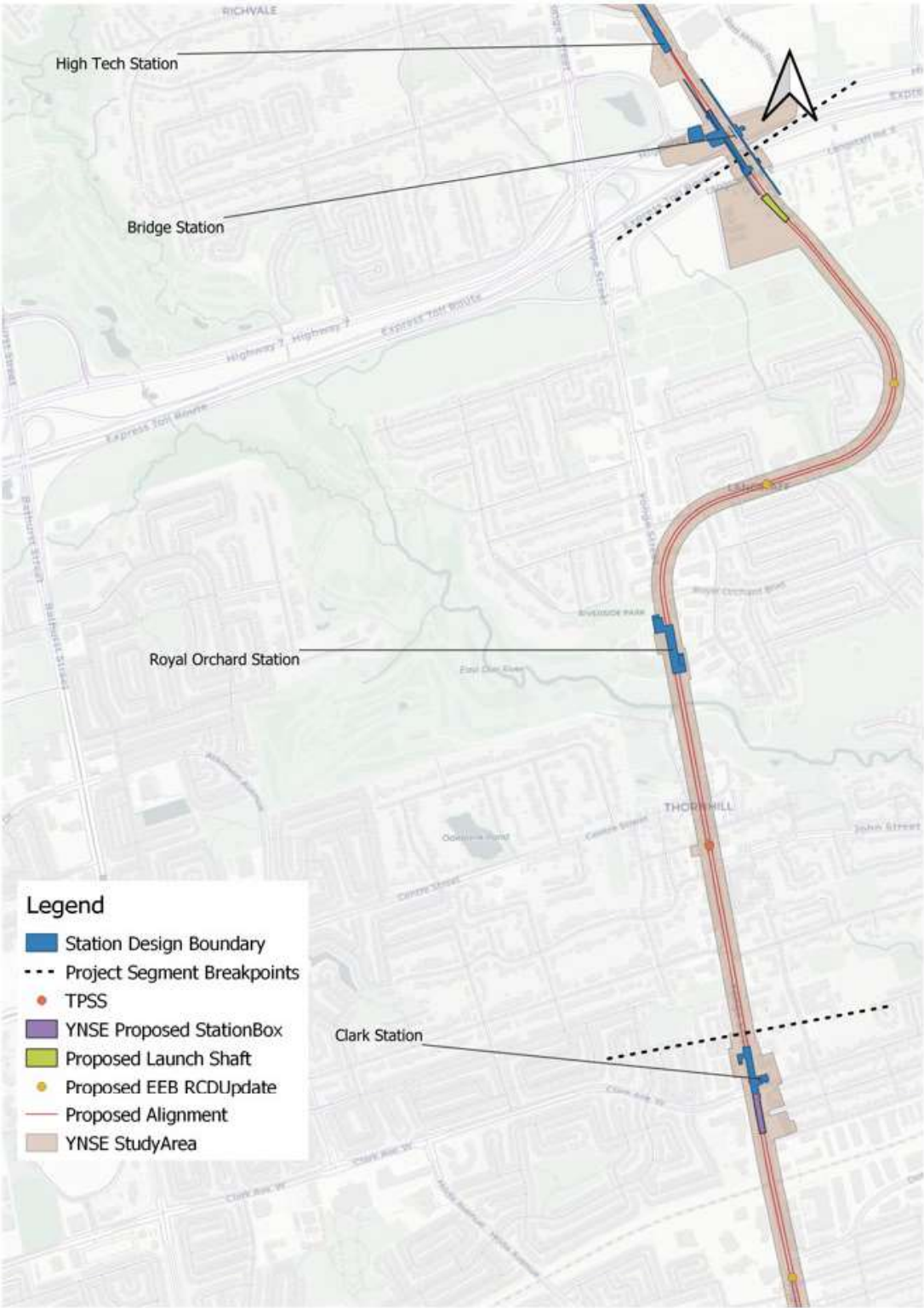
This study is intended to evaluate the traffic operations during temporary construction staging and future conditions for different station options and updates the transportation needs around Bridge and High Tech stations. An area-wide multi-resolution model will be developed to study the area through a more comprehensive and meticulous evaluation of all modes of transportation. This model will help in assessment of different station options and determination of mitigation measures and strategies in support of traffic and transit operations. These mitigation measures are expected to range from geometry improvements to utilization of traffic control technologies (e.g. transit signal priority).

Appendix A

Overall Study Area









Appendix B

AM	Finch - Existing Conditions																			
	TCS	Intersecti on	Intersecti on LOS	Intersecti on Delay	Intersecti on V/C Ratio	Critical Movement					Movemen t	LOS	Delay (s)	V/C Ratio	50th Percentile Queue (m)	95th Percentile Queue (m)	Storage Capacity (m)			
PM	1151	Hendon Ave	C	32.4	0.83	EBL	D	43.7	0.76	48.2	71.5	-	-	-	-	-	-			
						EBT	D	35.5	0.62	77.5	109.9	-	-	-	-	-	-			
						WBT	D	44.1	0.62	38.8	63.3	-	-	-	-	-	-			
						WBR	D	36.2	0.23	0.0	21.9	-	-	-	-	-	-			
						NBL	C	21.2	0.14	2.6	6.8	24	24	-	-	-	-			
						NBT	C	33.2	0.69	97.2	125.2	-	-	-	-	-	-			
						SBL	D	45.7	0.81	29.9	55.8	61	61	-	-	-	-			
						SBT	C	25.4	0.66	113.1	139.5	-	-	-	-	-	-			
	128	Finch Ave	D	38.1	0.85	SBR	B	18.2	0.19	1.4	14.2	-	-	-	-	-	-			
						EBL	E	75.8	0.94	25.3	65.8	55	55	-	-	-	-			
						EBT	D	39.5	0.78	98.5	123.5	-	-	-	-	-	-			
						WBL	C	31.0	0.66	17.3	31.0	37	37	-	-	-	-			
						WBT	D	40.0	0.79	99.6	124.8	-	-	-	-	-	-			
						NBL	D	42.9	0.81	20.3	53.4	56	56	-	-	-	-			
						NBT	C	33.1	0.67	82.0	98.0	-	-	-	-	-	-			
						SBL	C	32.9	0.72	17.2	37.3	47	47	-	-	-	-			
1101	Kemford Blvd	B	11.5	0.32	SBT	D	35.4	0.74	88.7	106.4	-	-	-	-	-	-				
					EBL	C	32.7	0.12	8.5	18.1	43	43	-	-	-	-				
					EBR	C	31.8	0.03	0.0	8.5	-	-	-	-	-	-				
					NBL	B	12.1	0.25	4.7	12.0	14	14	-	-	-	-				
					NBT	B	10.8	0.40	50.0	59.0	-	-	-	-	-	-				
					SBT	B	10.6	0.39	46.0	54.7	-	-	-	-	-	-				

AM	Cummer - Existing Conditions										
	PM										
TCS	Intersecti on	Intersecti on LOS	Intersecti on Delay	Intersecti on V/C Ratio	Critical Movement					Intersecti on	TCS
					Movemen t	LOS	Delay (s)	V/C Ratio	50th Percentile Queue (m)	95th Percentile Queue (m)	Storage Capacity (m)
856	Patricia Avenue	A	5.3	0.47	EBL	D	44.2	0.22	10.8	22.0	35
					EBR	D	43.0	0.09	2.6	11.5	-
					NBL	A	4.7	0.24	0.9	1.4	23
					NBT	A	1.5	0.39	13.6	15.1	-
					SBT	A	6.1	0.52	76.0	87.8	-
					EBL	D	35.3	0.29	13.7	27.0	25
					EBT	D	48.1	0.75	63.8	103.2	-
129	Cummer Avenue	C	31.7	0.83	WBL	C	33.8	0.64	25.3	41.0	63
					WBT	C	30.9	0.52	54.4	81.1	-
					NBL	D	38.3	0.73	11.2	37.7	47
					NBT	C	26.5	0.68	89.2	110.1	-
					SBL	B	17.8	0.28	4.8	10.3	50
					SBT	C	32.5	0.91	81.6	101.0	-
					EBL	D	36.2	0.34	15.1	29.3	25
856	Patricia Avenue	A	4.5	0.42	EBT	D	44.5	0.70	66.9	98.7	-
					WBL	C	28.5	0.47	17.3	29.9	63
					WBT	C	32.1	0.56	64.3	93.5	-
					NBL	D	40.7	0.82	17.2	52.5	47
					NBT	C	32.8	0.83	124.0	149.7	-
					SBL	D	40.7	0.61	17.2	35.5	50
					SBT	C	23.9	0.69	60.2	67.7	-

AM	Steeles - Existing Conditions											PM
	TCS	Intersecti on	Intersecti on LOS	Intersecti on Delay	Intersecti on V/C Ratio	Critical Movement					Storage Capacity (m)	
						Movemen t	LOS	Delay (s)	V/C Ratio	50th Percentile Queue (m)		
319	Meadow ew Ave	C	22	0.73	EBT	D	38.3	0.04	2.4	6.5	-	
					WBL	E	61.9	0.81	57.1	81.0	100	
					WBT	D	38.8	0.09	7.8	15.7	-	
					WBR	D	38.2	0.02	-	-	-	
					NBL	B	14.7	0.31	4.1	10.3	53	
					NBT	B	14.1	0.43	62.4	90.5	-	
					NBR	B	10.9	0.11	0.0	10.1	-	
					SBL	A	9.4	0.11	2.7	7.6	42	
					SBT	C	21.2	0.74	143.8	205.3	-	
					SBR	B	10.8	0.04	0.0	3.4	-	
					EBL	E	74.6	0.93	33.3	77.6	117	
					EBT	E	70.7	0.98	124.8	168.9	-	
					EBR	D	48.1	0.58	19.5	60.6	-	
					WBL	E	74.3	0.91	27.7	68.0	165	
					WBT	D	51.9	0.87	101.7	120.1	-	
					131	Steeles Ave	E	55.4	0.99	NBL	E	67.1
NBT	D	38.8	0.75	105.6						130.7	-	
NBR	C	27.3	0.15	0.0						14.3	-	
SBL	D	36.6	0.78	27.7						55.3	40	
SBT	E	62.7	1.00	214.8						257.3	-	
SBR	C	29.8	0.29	11.0						30.4	-	
EBL	D	46.3	0.28	10.9						22.6	43	
EBR	D	43.5	0.01	-						-	-	
1381	Athabaska Ave	B	16.4	0.71	WBT	D	44.7	0.17	9.4	16.9	-	
					NBL	B	15.4	0.30	3.1	6.9	25	
					NBT	A	8.3	0.51	78.7	96.3	-	
					NBR	A	4.7	0.00	-	-	-	
					SBL	A	8.1	0.09	2.5	7.1	30	
					SBT	B	19.4	0.83	216.4	280.4	-	
					SBR	A	7.3	0.05	0.0	3.0	-	

AM	Clark - Existing Conditions										
	TCS	Intersecti on	Intersecti on LOS	Intersecti on Delay	Intersecti on V/C Ratio	Critical Movement					
						Movemen t	LOS	Delay (s)	V/C Ratio	50th Percentile Queue (m)	95th Percentile Queue (m)
310	Arnold	B	14.1	0.68	EBL	E	55.8	0.54	15.9	29.7	35
					EBT	D	54.3	0.57	36.7	55.6	-
					WBL	D	51.2	0.34	11.4	22.9	-
					WBT	E	58.8	0.67	43.0	63.6	-
					NBL	B	13.3	0.32	2.2	10.6	42
					NBT	A	6.4	0.45	52.4	78.4	-
					NBR	A	4.0	0.02	0.0	2.8	52
					SBL	B	13.7	0.54	14.4	43.1	34
					SBT	A	9.5	0.69	111.2	163.7	-
					EBL	F	106.8	0.93	58.6	106.1	78
					EBT	D	38.1	0.35	49.1	70.3	-
					EBR	D	55.0	0.80	96.9	135.1	-
317	Clark	D	43.8	0.94	WBL	E	56.6	0.45	21.6	38.2	-
					WBT	E	65.6	0.72	64.7	92.8	-
					NBL	F	115.8	0.99	31.1	78.1	47
					NBT	B	17.3	0.40	67.9	80.5	-
					SBL	C	21.3	0.12	3.1	9.1	98
					SBT	D	45.6	0.93	246.1	306.8	-
					SBR	B	14.3	0.12	0.0	11.0	250
					EBT	D	52.0	0.33	14.2	22.5	-
					EBR	D	49.0	0.03	0.0	6.8	-
					WBT	D	52.8	0.40	17.0	30.7	-
					NBL	B	11.1	0.19	1.6	10.1	46
					NBT	A	9.3	0.39	43.2	91.9	-
321	Glen Cameron	B	10.2	0.5	SBL	A	4.8	0.34	4.0	16.9	46
					SBT	A	6.1	0.50	48.5	123.0	-
					SBR	A	3.5	0.01	-	-	30
Clark - Existing Conditions											
PM											
AM	Clark - Existing Conditions										
	TCS	Intersecti on	Intersecti on LOS	Intersecti on Delay	Intersecti on V/C Ratio	Critical Movement					
						Movemen t	LOS	Delay (s)	V/C Ratio	50th Percentile Queue (m)	95th Percentile Queue (m)
310	Arnold	B	10.2	0.65	EBL	D	52.6	0.19	5.4	13.7	35
					EBT	D	53.7	0.33	17.3	30.9	-
					WBL	D	52.9	0.24	8.8	18.9	-
					WBT	E	57.7	0.56	29.1	46.8	-
					NBL	A	6.7	0.26	2.9	9.6	42
					NBT	A	6.9	0.63	83.8	123.1	-
					NBR	A	3.1	0.04	0.7	4.0	52
					SBL	C	28.0	0.67	9.1	50.3	34
					SBT	A	5.8	0.53	62.5	92.4	-
					EBL	F	106.5	0.96	66.2	118.3	78
					EBT	C	34.3	0.37	49.0	71.3	-
					EBR	D	37.2	0.53	55.6	82.4	-
317	Clark	D	37.8	0.93	WBL	D	48.9	0.22	10.0	21.2	-
					WBT	E	58.0	0.68	60.2	88.2	-
					NBL	E	78.8	0.94	49.0	101.2	47
					NBT	C	22.4	0.65	133.9	150.4	-
					SBL	D	48.3	0.44	6.0	20.8	98
					SBT	D	39.3	0.79	160.4	190.6	-
					SBR	B	15.0	0.14	0.0	11.7	250
					EBT	D	46.7	0.19	10.6	18.7	-
					EBR	D	45.0	0.03	0.0	3.5	-
					WBT	E	55.7	0.65	40.2	56.8	-
					NBL	B	13.0	0.25	4.8	17.3	46
					NBT	B	15.7	0.67	119.3	190.5	-
321	Glen Cameron	B	17.2	0.86	SBL	E	74.9	0.89	23.9	69.0	46
					SBT	A	6.7	0.39	43.0	79.7	-
					SBR	A	4.7	0.02	0.0	3.3	30

Royal Orchard - Existing Conditions												
AM	TCS	Intersecti on	Intersecti on LOS	Intersecti on Delay	Intersecti on V/C Ratio	Critical Movement						PM
						Movemen t	LOS	Delay (s)	V/C Ratio	50th Percentile Queue (m)	95th Percentile Queue (m)	
3	3	Uplands Ave	A	8.3	0.81	EBT	D	50.3	0.16	6.4	14.6	-
						WBT	D	53.7	0.46	23.2	34.8	-
						NBL	A	2.1	0.24	0.1	0.2	37
						NBT	A	4.4	0.81	3.4	93.8	-
						NBR	A	3.3	0.01	-	-	23
						SBL	F	97.7	0.88	6.4	27.8	42
						SBT	A	7.5	0.63	77.8	177.6	-
						EBT	E	55.5	0.12	4.8	10.8	-
						WBL	D	50.5	0.63	36.2	46.7	26
						WBR	D	43.1	0.06	0.0	11.4	-
						NBL	A	6.8	0.12	0.9	1.6	35
						NBT	B	15.3	0.94	71.1	403.9	-
6	6	Royal Orchard Bvd	B	17.7	0.88	NBR	A	4.7	0.20	2.3	6.0	65
						SBL	D	37.4	0.45	6.6	20.3	31
						SBT	B	17.1	0.61	107.5	248.2	-
						EBL	F	84.8	0.96	84.0	142.0	-
						EBT	D	48.9	0.73	67.5	107.7	-
						WBL	F	80.6	0.81	18.8	48.1	28
						WBT	D	35.9	0.15	13.1	25.9	-
						NBL	F	164.4	1.20	65.2	120.4	46
						NBT	C	27.6	0.91	233.9	276.8	-
						NBR	A	9.2	0.06	2.6	8.0	21
						SBL	F	120.1	0.89	13.7	26.2	46
						SBT	E	57.3	0.99	223.5	267.6	-
9	9	Centre St	D	50.5	0.99	SBR	C	25.1	0.27	34.1	61.4	30

AM	Bridge - Existing Conditions											PM
	TCS	Intersecti on	Intersecti on LOS	Intersecti on Delay	Intersecti on V/C Ratio	Movemen t	LOS	Delay (s)	V/C Ratio	50th Percentile Queue (m)	95th Percentile Queue (m)	
1	1	Garden	F	92.2	0.98	EBL	D	53.0	0.46	40.0	61.6	20
						EBT	E	63.3	0.49	43.8	68.3	-
						EBR	E	58.8	0.15	0.0	21.1	31
						WBL	F	124.6	0.99	49.1	81.7	85
						WBT	E	60.2	0.29	22.8	40.4	-
						WBR	E	61.3	0.35	21.5	38.9	-
						NBL	F	113.2	0.90	49.6	94.1	85
						NBT	D	41.6	0.62	96.7	163.6	-
						NBR	C	34.9	0.23	0.0	26.6	165
						SBL	F	169.1	1.11	82.9	139.8	150
						SBT	F	124.7	1.15	241.6	423.3	-
						WBL	D	52.9	0.48	27.4	37.9	-
						WBR	E	58.6	0.63	34.7	56.8	-
						NBT	B	10.1	0.37	43.5	148.0	-
						SBT	A	6.5	0.60	82.7	122.6	-
						256	407WB	B	12.2	0.6	EBL	D
EBT	D	50.5	0.39	25.5	38.8						-	
EBR	E	58.6	0.67	37.5	62.2						-	
WBL	E	60.3	0.32	8.1	18.5						-	
WBR	E	58.5	0.05	0.0	8.2						-	
NBT	B	14.4	0.51	88.3	142.1						-	
SBL	A	4.9	0.30	2.1	8.5						66	
SBT	A	7.9	0.58	112.4	176.2						-	
256	256	407WB	B	15.7	0.69	EBL	D	53.0	0.21	13.1	24.1	20
						EBT	E	63.8	0.18	9.6	20.1	-
						EBR	E	62.3	0.04	-	-	31
						WBL	F	135.6	1.07	91.5	128.0	85
						WBT	E	58.9	0.25	18.8	34.2	-
						WBR	E	73.2	0.71	50.5	76.9	-
						NBL	F	129.6	0.99	68.7	124.5	85
						NBT	F	120.0	1.15	256.4	467.5	-
						NBR	C	31.2	0.14	0.0	5.3	165
						SBL	F	158.6	1.06	67.1	120.5	150
						SBT	D	40.6	0.65	101.6	196.1	-
						WBL	D	41.4	0.31	28.9	37.7	-
						WBR	E	57.6	0.79	78.6	104.4	-
						NBT	B	11.3	0.66	186.1	239.2	-
						SBT	A	9.7	0.43	62.4	88.4	-
						313	313	Langstaff	C	32.6	0.75	EBL
EBT	D	48.8	0.61	59.1	81.6							-
EBR	E	59.2	0.79	68.9	99.0							-
WBL	E	58.8	0.52	22.9	40.3							-
WBR	D	54.6	0.06	0.0	15.2							-
NBT	C	27.7	0.79	177.5	249.8							-
SBL	D	37.7	0.36	8.9	20.5							66
SBT	C	25.2	0.47	122.7	152.2							-

AM	High Tech - Existing Conditions											PM						
	TCS	Intersecti on	Intersecti on LOS	Intersecti on Delay	Intersecti on V/C Ratio	Critical Movement					Critical Movement							
						Movemen t	LOS	Delay (s)	V/C Ratio	50th Percentile Queue (m)	95th Percentile Queue (m)		Storage Capacity (m)	Movemen t	LOS	Delay (s)	V/C Ratio	50th Percentile Queue (m)
8	Scott Drive	C	31.9	0.84	EBL	D	49.0	0.19	7.6	16.3	45	EBL	D	53.8	0.40	9.0	19.6	45
					EBT	D	52.4	0.48	43.0	61.3	-	EBT	D	50.0	0.28	23.3	37.3	-
					WBL	E	70.6	0.75	38.0	58.2	140	WBL	D	50.1	0.27	15.3	26.8	140
					WBT	D	52.5	0.49	40.1	59.0	-	WBT	E	60.1	0.69	54.8	80.4	-
					NBL	E	68.4	0.50	12.4	26.2	75	NBL	E	67.5	0.67	35.5	37.1	75
					NBT	C	24.1	0.52	155.4	180.0	-	NBT	C	33.9	0.89	284.0	370.5	-
					SBL	E	65.7	0.68	40.0	61.0	75	SBL	E	65.4	0.66	36.9	57.3	75
					SBT	C	25.9	0.85	224.5	358.8	-	SBT	C	21.3	0.61	115.0	182.2	-
3	Westwoo d Lane	C	26.5	0.8	EBL	E	55.7	0.34	16.2	26.2	15	EBL	E	72.7	0.63	13.7	24.8	15
					EBT	D	53.4	0.14	7.2	19.5	-	EBT	D	52.4	0.07	4.5	11.5	-
					WBL	E	58.2	0.51	25.3	37.2	30	WBL	E	56.3	0.41	21.3	32.3	30
					WBT	D	52.9	0.10	5.0	15.3	-	WBT	E	58.6	0.55	33.2	52.6	-
					NBL	F	93.5	0.61	29.3	42.9	70	NBL	E	75.4	0.69	39.2	32.9	70
					NBT	A	5.4	0.46	104.2	201.9	-	NBT	C	24.5	0.86	318.1	400.7	-
					SBL	D	49.3	0.58	20.5	26.9	85	SBL	D	49.3	0.68	40.2	64.9	85
					SBT	C	29.6	0.89	182.4	417.6	-	SBT	C	29.0	0.59	124.0	225.3	-
2	High Tech Road	D	36.1	0.84	EBT	E	68.0	0.03	0.3	2.3	-	EBT	E	67.6	0.00	-	-	-
					WBL	E	59.3	0.76	57.4	72.3	53	WBL	E	60.1	0.73	50.1	63.6	53
					WBT	D	45.8	0.06	-	-	-	WBT	D	49.0	0.13	-	-	-
					NBT	C	33.0	0.71	127.5	222.6	-	NBT	E	68.3	1.05	283.0	452.2	-
					NBR	C	25.6	0.34	19.6	60.6	-	NBR	C	26.1	0.48	44.1	101.1	-
					SBL	D	49.0	0.75	50.7	64.3	80	SBL	F	91.3	0.96	81.3	133.6	80
					SBT	C	33.3	0.83	257.1	353.6	-	SBT	C	20.4	0.47	76.3	198.9	-

Appendix C

Existing Conditions

Queues
128: Yonge Street & Finch Avenue

AM Peak Period - Existing
AM Peak Period - Existing

								
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	150	808	160	998	166	1117	98	1533
v/c Ratio	0.99	0.78	0.84	0.93	0.89	0.58	0.48	0.82
Control Delay	101.2	44.2	61.8	57.2	69.6	29.1	23.6	36.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	101.2	44.2	61.8	57.2	69.6	29.1	23.6	36.0
Queue Length 50th (m)	24.0	94.8	25.3	126.9	26.1	76.6	12.2	119.8
Queue Length 95th (m)	#67.5	119.0	#52.2	#168.2	#66.6	91.3	21.6	140.0
Internal Link Dist (m)		176.1		210.1		291.9		197.0
Turn Bay Length (m)	55.0		37.0		56.0		47.0	
Base Capacity (vph)	151	1042	190	1069	187	1922	209	1871
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	0.99	0.78	0.84	0.93	0.89	0.58	0.47	0.82

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

128: Yonge Street & Finch Avenue

AM Peak Period - Existing

AM Peak Period - Existing

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	135	625	103	144	810	88	149	910	95	88	1125	269
Future Volume (vph)	135	625	103	144	810	88	149	910	95	88	1125	269
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0
Total Lost time (s)	3.0	5.3		3.0	5.3		1.0	4.8		3.0	4.8	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.91		1.00	0.91	
Frpb, ped/bikes	1.00	0.98		1.00	0.98		1.00	0.96		1.00	0.93	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		0.99	1.00	
Frt	1.00	0.98		1.00	0.99		1.00	0.99		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1572	3168		1555	3262		1651	4491		1533	4354	
Flt Permitted	0.10	1.00		0.17	1.00		0.08	1.00		0.17	1.00	
Satd. Flow (perm)	159	3168		276	3262		133	4491		272	4354	
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	0.95
Adj. Flow (vph)	150	694	114	160	900	98	166	1011	106	98	1250	283
RTOR Reduction (vph)	0	10	0	0	7	0	0	10	0	0	28	0
Lane Group Flow (vph)	150	798	0	160	991	0	166	1107	0	98	1505	0
Confl. Peds. (#/hr)	181		112	112		181	579		696	696		579
Confl. Bikes (#/hr)		1			1			1				
Heavy Vehicles (%)	7%	8%	10%	8%	6%	3%	2%	8%	10%	9%	7%	4%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	47.7	40.7		47.7	40.7		60.5	53.5		59.9	53.2	
Effective Green, g (s)	49.7	41.7		49.7	41.7		66.5	54.5		61.9	54.2	
Actuated g/C Ratio	0.39	0.33		0.39	0.33		0.52	0.43		0.48	0.42	
Clearance Time (s)	4.0	6.3		4.0	6.3		4.0	5.8		4.0	5.8	
Vehicle Extension (s)	2.0	3.0		2.0	3.0		2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	150	1032		187	1062		187	1912		207	1843	
v/s Ratio Prot	c0.06	0.25		0.05	0.30		c0.07	0.25		0.03	c0.35	
v/s Ratio Perm	c0.33			0.28			0.39			0.20		
v/c Ratio	1.00	0.77		0.86	0.93		0.89	0.58		0.47	0.82	
Uniform Delay, d1	32.1	38.9		31.3	41.8		30.2	28.0		19.7	32.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	73.5	5.6		28.8	15.6		35.2	1.3		0.6	4.1	
Delay (s)	105.6	44.5		60.1	57.4		65.4	29.3		20.3	36.7	
Level of Service	F	D		E	E		E	C		C	D	
Approach Delay (s)		54.1			57.8			34.0			35.7	
Approach LOS		D			E			C			D	
Intersection Summary												
HCM 2000 Control Delay			43.8			HCM 2000 Level of Service				D		
HCM 2000 Volume to Capacity ratio			0.91									
Actuated Cycle Length (s)			128.0			Sum of lost time (s)				16.1		
Intersection Capacity Utilization			91.0%			ICU Level of Service				F		
Analysis Period (min)			15									

c Critical Lane Group

Queues
1101: Yonge Street & Kempford Boulevard

AM Peak Period - Existing
AM Peak Period - Existing

					
Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	53	63	52	1122	1669
v/c Ratio	0.21	0.26	0.33	0.29	0.44
Control Delay	39.1	30.6	15.6	5.9	7.0
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	39.1	30.6	15.6	5.9	7.0
Queue Length 50th (m)	10.2	8.6	2.1	15.6	27.1
Queue Length 95th (m)	19.7	19.2	16.8	49.6	83.8
Internal Link Dist (m)	172.7			232.3	291.9
Turn Bay Length (m)	43.0		14.0		
Base Capacity (vph)	474	444	160	3868	3809
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.11	0.14	0.33	0.29	0.44
Intersection Summary					

HCM Signalized Intersection Capacity Analysis

1101: Yonge Street & Kempford Boulevard

AM Peak Period - Existing

AM Peak Period - Existing

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	48	57	47	1010	1448	57
Future Volume (vph)	48	57	47	1010	1448	57
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.0	3.0	3.0	3.5	3.5	3.0
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	1.00	1.00	0.91	0.91	
Frpb, ped/bikes	1.00	0.97	1.00	1.00	0.99	
Flpb, ped/bikes	0.94	1.00	0.98	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	0.99	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1582	1436	1590	4932	4855	
Flt Permitted	0.95	1.00	0.12	1.00	1.00	
Satd. Flow (perm)	1582	1436	204	4932	4855	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.95
Adj. Flow (vph)	53	63	52	1122	1609	60
RTOR Reduction (vph)	0	15	0	0	2	0
Lane Group Flow (vph)	53	48	52	1122	1667	0
Confl. Peds. (#/hr)	58	16	160			160
Heavy Vehicles (%)	0%	2%	4%	4%	4%	9%
Turn Type	Perm	Perm	Perm	NA	NA	
Protected Phases				2	6	
Permitted Phases	4	4	2			
Actuated Green, G (s)	15.2	15.2	84.4	84.4	84.4	
Effective Green, g (s)	16.2	16.2	85.4	85.4	85.4	
Actuated g/C Ratio	0.15	0.15	0.77	0.77	0.77	
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	229	208	156	3774	3715	
v/s Ratio Prot				0.23	c0.34	
v/s Ratio Perm	c0.03	0.03	0.25			
v/c Ratio	0.23	0.23	0.33	0.30	0.45	
Uniform Delay, d1	42.2	42.2	4.1	4.0	4.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.5	0.6	5.7	0.2	0.4	
Delay (s)	42.7	42.7	9.8	4.2	5.1	
Level of Service	D	D	A	A	A	
Approach Delay (s)	42.7			4.4	5.1	
Approach LOS	D			A	A	
Intersection Summary						
HCM 2000 Control Delay			6.3		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.42			
Actuated Cycle Length (s)			111.6		Sum of lost time (s)	11.0
Intersection Capacity Utilization			61.8%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

Queues

1151: Yonge Street & Hendon Avenue/Bishop Avenue

AM Peak Period - Existing

AM Peak Period - Existing



Lane Group	EBL	EBT	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	119	225	355	323	70	1309	182	1390	274
v/c Ratio	0.87	0.46	0.92	0.58	0.36	0.58	0.76	0.71	0.38
Control Delay	90.8	35.2	73.2	9.9	15.3	25.0	36.8	22.8	7.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	90.8	35.2	73.2	9.9	15.3	25.0	36.8	22.8	7.9
Queue Length 50th (m)	26.6	38.9	81.1	4.2	5.7	79.1	19.3	125.6	12.7
Queue Length 95th (m)	#61.6	62.6	#137.2	30.6	11.1	107.0	43.5	156.2	31.5
Internal Link Dist (m)		196.3	176.1			197.0		167.0	
Turn Bay Length (m)					24.0		61.0		
Base Capacity (vph)	138	488	386	557	232	2240	311	1951	715
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	0.86	0.46	0.92	0.58	0.30	0.58	0.59	0.71	0.38

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

1151: Yonge Street & Hendon Avenue/Bishop Avenue

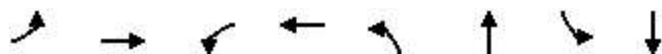
AM Peak Period - Existing

AM Peak Period - Existing

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	107	129	74	60	259	291	63	1122	56	164	1251	247
Future Volume (vph)	107	129	74	60	259	291	63	1122	56	164	1251	247
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0
Total Lost time (s)	6.0	6.0			6.0	6.0	3.0	5.0		3.0	5.0	5.0
Lane Util. Factor	1.00	1.00			1.00	1.00	1.00	0.91		1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.95			1.00	0.80	1.00	0.98		1.00	1.00	0.76
Flpb, ped/bikes	0.91	1.00			0.99	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.95			1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00			0.99	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1538	1663			1756	1212	1634	4702		1236	3500	1153
Flt Permitted	0.30	1.00			0.77	1.00	0.12	1.00		0.13	1.00	1.00
Satd. Flow (perm)	489	1663			1363	1212	200	4702		169	3500	1153
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)	119	143	82	67	288	323	70	1247	62	182	1390	274
RTOR Reduction (vph)	0	17	0	0	0	215	0	4	0	0	0	73
Lane Group Flow (vph)	119	208	0	0	355	108	70	1305	0	182	1390	201
Confl. Peds. (#/hr)	166		105	105		166	158		261	261		158
Confl. Bikes (#/hr)						2		2			1	1
Heavy Vehicles (%)	0%	0%	5%	15%	2%	0%	3%	7%	0%	36%	2%	0%
Turn Type	Perm	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4			8		8	6			2		2
Actuated Green, G (s)	32.8	32.8			32.8	32.8	61.2	56.1		74.2	65.1	65.1
Effective Green, g (s)	33.8	33.8			33.8	33.8	63.2	57.1		75.2	66.1	66.1
Actuated g/C Ratio	0.28	0.28			0.28	0.28	0.53	0.48		0.63	0.55	0.55
Clearance Time (s)	7.0	7.0			7.0	7.0	4.0	6.0		4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0			3.0	3.0	2.0	3.0		2.0	3.0	3.0
Lane Grp Cap (vph)	137	468			383	341	178	2237		240	1927	635
v/s Ratio Prot		0.12					0.02	0.28		0.10	0.40	
v/s Ratio Perm	0.24				0.26	0.09	0.19			0.38		0.17
v/c Ratio	0.87	0.44			0.93	0.32	0.39	0.58		0.76	0.72	0.32
Uniform Delay, d1	41.0	35.4			41.9	34.0	16.8	22.8		17.7	20.1	14.7
Progression Factor	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	40.1	0.7			28.0	0.5	0.5	1.1		11.5	2.4	1.3
Delay (s)	81.1	36.1			69.9	34.5	17.3	23.9		29.2	22.5	16.0
Level of Service	F	D			E	C	B	C		C	C	B
Approach Delay (s)		51.7			53.1			23.6			22.2	
Approach LOS		D			D			C			C	
Intersection Summary												
HCM 2000 Control Delay			30.0									
HCM 2000 Volume to Capacity ratio			0.83									
Actuated Cycle Length (s)			120.0									
Intersection Capacity Utilization			110.4%									
Analysis Period (min)			15									
c Critical Lane Group												

Queues
128: Yonge Street & Finch Avenue

PM Peak Period - Existing
PM Peak Period - Existing



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	183	908	130	915	157	1172	133	1244
v/c Ratio	0.94	0.78	0.66	0.79	0.81	0.67	0.72	0.74
Control Delay	75.7	39.6	36.3	40.0	51.7	32.8	40.7	34.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	75.7	39.6	36.3	40.0	51.7	32.8	40.7	34.4
Queue Length 50th (m)	25.3	98.5	17.3	99.6	20.3	82.0	17.2	88.7
Queue Length 95th (m)	#65.8	123.5	#31.0	124.8	#53.4	98.0	#37.3	106.4
Internal Link Dist (m)		176.1		210.1		291.9		197.0
Turn Bay Length (m)	55.0		37.0		56.0		47.0	
Base Capacity (vph)	194	1164	199	1162	193	1748	188	1670
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	0.94	0.78	0.65	0.79	0.81	0.67	0.71	0.74

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

128: Yonge Street & Finch Avenue

PM Peak Period - Existing

PM Peak Period - Existing

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	165	769	94	117	783	86	141	984	129	120	966	216
Future Volume (vph)	165	769	94	117	783	86	141	984	129	120	966	216
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0
Total Lost time (s)	3.0	5.3		3.0	5.3		2.0	4.8		3.0	4.8	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.91		1.00	0.91	
Frpb, ped/bikes	1.00	0.96		1.00	0.97		1.00	0.95		1.00	0.92	
Flpb, ped/bikes	0.99	1.00		0.99	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	0.99		1.00	0.98		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1611	3235		1625	3248		1583	4589		1567	4353	
Flt Permitted	0.14	1.00		0.15	1.00		0.12	1.00		0.14	1.00	
Satd. Flow (perm)	244	3235		256	3248		196	4589		224	4353	
Peak-hour factor, PHF	0.90	0.95	0.95	0.90	0.95	0.95	0.90	0.95	0.95	0.90	0.95	0.95
Adj. Flow (vph)	183	809	99	130	824	91	157	1036	136	133	1017	227
RTOR Reduction (vph)	0	8	0	0	7	0	0	14	0	0	30	0
Lane Group Flow (vph)	183	900	0	130	908	0	157	1158	0	133	1214	0
Confl. Peds. (#/hr)	340		404	404		340	863		681	681		863
Confl. Bikes (#/hr)		1			1	2		1				1
Heavy Vehicles (%)	4%	5%	2%	3%	5%	4%	6%	5%	3%	7%	6%	3%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	48.9	41.9		48.5	41.7		51.4	44.4		51.0	44.2	
Effective Green, g (s)	50.9	42.9		50.5	42.7		55.4	45.4		53.0	45.2	
Actuated g/C Ratio	0.42	0.36		0.42	0.36		0.46	0.38		0.44	0.38	
Clearance Time (s)	4.0	6.3		4.0	6.3		4.0	5.8		4.0	5.8	
Vehicle Extension (s)	2.0	3.0		2.0	3.0		2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	194	1156		196	1155		194	1736		186	1639	
v/s Ratio Prot	c0.06	0.28		0.04	0.28		c0.06	0.25		0.05	c0.28	
v/s Ratio Perm	c0.34			0.24			0.31			0.27		
v/c Ratio	0.94	0.78		0.66	0.79		0.81	0.67		0.72	0.74	
Uniform Delay, d1	27.9	34.3		24.6	34.6		22.5	31.0		22.6	32.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	47.9	5.2		6.4	5.4		20.4	2.1		10.3	3.1	
Delay (s)	75.8	39.5		31.0	40.0		42.9	33.1		32.9	35.4	
Level of Service	E	D		C	D		D	C		C	D	
Approach Delay (s)		45.6			38.9			34.2			35.2	
Approach LOS		D			D			C			D	
Intersection Summary												
HCM 2000 Control Delay			38.1			HCM 2000 Level of Service				D		
HCM 2000 Volume to Capacity ratio			0.85									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)				16.1		
Intersection Capacity Utilization			88.7%			ICU Level of Service				E		
Analysis Period (min)			15									
c Critical Lane Group												

Queues
1101: Yonge Street & Kempford Boulevard

PM Peak Period - Existing
PM Peak Period - Existing



Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	48	42	50	1299	1223
v/c Ratio	0.12	0.10	0.25	0.40	0.39
Control Delay	33.7	10.3	13.1	10.8	10.6
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	33.7	10.3	13.1	10.8	10.6
Queue Length 50th (m)	8.5	0.0	4.7	50.0	46.0
Queue Length 95th (m)	18.1	8.5	12.0	59.0	54.7
Internal Link Dist (m)	172.7			232.3	291.9
Turn Bay Length (m)	43.0		14.0		
Base Capacity (vph)	410	423	201	3226	3143
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.12	0.10	0.25	0.40	0.39
Intersection Summary					

HCM Signalized Intersection Capacity Analysis

1101: Yonge Street & Kempford Boulevard

PM Peak Period - Existing

PM Peak Period - Existing



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	43	40	45	1234	1104	58
Future Volume (vph)	43	40	45	1234	1104	58
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.0	3.0	3.0	3.5	3.5	3.0
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	1.00	1.00	0.91	0.91	
Frpb, ped/bikes	1.00	0.95	1.00	1.00	0.99	
Flpb, ped/bikes	0.89	1.00	0.97	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	0.99	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1491	1430	1564	5029	4890	
Flt Permitted	0.95	1.00	0.19	1.00	1.00	
Satd. Flow (perm)	1491	1430	315	5029	4890	
Peak-hour factor, PHF	0.90	0.95	0.90	0.95	0.95	0.95
Adj. Flow (vph)	48	42	50	1299	1162	61
RTOR Reduction (vph)	0	30	0	0	5	0
Lane Group Flow (vph)	48	12	50	1299	1218	0
Confl. Peds. (#/hr)	102	34	151			151
Confl. Bikes (#/hr)		2				
Heavy Vehicles (%)	0%	0%	4%	2%	3%	0%
Turn Type	Perm	Perm	Perm	NA	NA	
Protected Phases				2	6	
Permitted Phases	4	4	2			
Actuated Green, G (s)	32.0	32.0	76.0	76.0	76.0	
Effective Green, g (s)	33.0	33.0	77.0	77.0	77.0	
Actuated g/C Ratio	0.28	0.28	0.64	0.64	0.64	
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	410	393	202	3226	3137	
v/s Ratio Prot				0.26	0.25	
v/s Ratio Perm	0.03	0.01	0.16			
v/c Ratio	0.12	0.03	0.25	0.40	0.39	
Uniform Delay, d1	32.6	31.8	9.2	10.4	10.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.1	0.0	2.9	0.4	0.4	
Delay (s)	32.7	31.8	12.1	10.8	10.6	
Level of Service	C	C	B	B	B	
Approach Delay (s)	32.3			10.8	10.6	
Approach LOS	C			B	B	
Intersection Summary						
HCM 2000 Control Delay			11.5	HCM 2000 Level of Service		B
HCM 2000 Volume to Capacity ratio			0.32			
Actuated Cycle Length (s)			120.0	Sum of lost time (s)		11.0
Intersection Capacity Utilization			65.7%	ICU Level of Service		C
Analysis Period (min)			15			
c Critical Lane Group						

Queues
1151: Yonge Street & Hendon Avenue/Bishop Avenue

PM Peak Period - Existing
PM Peak Period - Existing



Lane Group	EBL	EBT	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	267	393	179	271	26	1315	198	1159	183
v/c Ratio	0.74	0.63	0.62	0.52	0.12	0.70	0.80	0.64	0.30
Control Delay	44.3	37.7	50.7	8.1	14.3	34.3	48.7	25.2	4.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.3	37.7	50.7	8.1	14.3	34.3	48.7	25.2	4.6
Queue Length 50th (m)	48.2	77.5	38.8	0.0	2.6	97.2	29.9	113.1	1.4
Queue Length 95th (m)	#71.5	109.9	63.3	21.9	6.8	125.2	55.8	139.5	14.2
Internal Link Dist (m)		196.3	176.1			197.0		167.0	
Turn Bay Length (m)					24.0		61.0		
Base Capacity (vph)	363	636	298	524	255	1890	307	1804	615
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	0.74	0.62	0.60	0.52	0.10	0.70	0.64	0.64	0.30

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

1151: Yonge Street & Hendon Avenue/Bishop Avenue

PM Peak Period - Existing

PM Peak Period - Existing

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	240	289	85	57	110	257	23	1184	66	178	1101	174
Future Volume (vph)	240	289	85	57	110	257	23	1184	66	178	1101	174
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0
Total Lost time (s)	3.0	6.0			6.0	6.0	3.0	5.0		3.0	5.0	5.0
Lane Util. Factor	1.00	1.00			1.00	1.00	1.00	0.91		1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.96			1.00	0.83	1.00	0.98		1.00	1.00	0.69
Flpb, ped/bikes	0.95	1.00			0.97	1.00	0.99	1.00		1.00	1.00	1.00
Frt	1.00	0.97			1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00			0.98	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1592	1745			1630	1202	1676	4710		1359	3535	1040
Flt Permitted	0.52	1.00			0.66	1.00	0.17	1.00		0.10	1.00	1.00
Satd. Flow (perm)	867	1745			1098	1202	301	4710		147	3535	1040
Peak-hour factor, PHF	0.90	0.95	0.95	0.90	0.95	0.95	0.90	0.95	0.95	0.90	0.95	0.95
Adj. Flow (vph)	267	304	89	63	116	271	26	1246	69	198	1159	183
RTOR Reduction (vph)	0	8	0	0	0	199	0	4	0	0	0	86
Lane Group Flow (vph)	267	385	0	0	179	72	26	1311	0	198	1159	97
Confl. Peds. (#/hr)	137		139	139		137	210		511	511		210
Confl. Bikes (#/hr)						2		2	3		1	4
Heavy Vehicles (%)	0%	0%	0%	28%	0%	4%	0%	6%	2%	24%	1%	0%
Turn Type	pm+pt	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	7	4			8		1	6		5	2	
Permitted Phases	4			8		8	6			2		2
Actuated Green, G (s)	43.2	43.2			32.2	32.2	52.7	49.1		68.8	61.2	61.2
Effective Green, g (s)	44.2	44.2			33.2	33.2	54.7	50.1		69.8	62.2	62.2
Actuated g/C Ratio	0.35	0.35			0.27	0.27	0.44	0.40		0.56	0.50	0.50
Clearance Time (s)	4.0	7.0			7.0	7.0	4.0	6.0		4.0	6.0	6.0
Vehicle Extension (s)	2.0	3.0			3.0	3.0	2.0	3.0		2.0	3.0	3.0
Lane Grp Cap (vph)	352	617			291	319	182	1887		244	1759	517
v/s Ratio Prot	c0.05	0.22					0.01	0.28		c0.11	0.33	
v/s Ratio Perm	c0.22				0.16	0.06	0.06			c0.34		0.09
v/c Ratio	0.76	0.62			0.62	0.23	0.14	0.69		0.81	0.66	0.19
Uniform Delay, d1	35.6	33.5			40.3	35.9	21.0	31.1		28.3	23.5	17.4
Progression Factor	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	8.1	2.0			3.8	0.4	0.1	2.1		17.3	2.0	0.8
Delay (s)	43.7	35.5			44.1	36.2	21.2	33.2		45.7	25.4	18.2
Level of Service	D	D			D	D	C	C		D	C	B
Approach Delay (s)		38.8			39.4			33.0			27.2	
Approach LOS		D			D			C			C	
Intersection Summary												
HCM 2000 Control Delay			32.4									
HCM 2000 Volume to Capacity ratio			0.83									
Actuated Cycle Length (s)			125.0									
Intersection Capacity Utilization			104.2%									
Analysis Period (min)			15									
c Critical Lane Group												

Queues
9: Yonge Street & Parking Access/Turnberry Court

AM Peak Period - Existing
AM Peak Period - Existing

Lane Group
Lane Group Flow (vph)
v/c Ratio
Control Delay
Queue Delay
Total Delay
Queue Length 50th (m)
Queue Length 95th (m)
Internal Link Dist (m)
Turn Bay Length (m)
Base Capacity (vph)
Starvation Cap Reductn
Spillback Cap Reductn
Storage Cap Reductn
Reduced v/c Ratio
Intersection Summary

HCM Signalized Intersection Capacity Analysis

9: Yonge Street & Parking Access/Turnberry Court

AM Peak Period - Existing

AM Peak Period - Existing

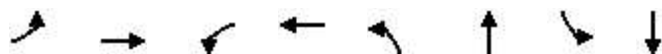
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations								  			  	
Traffic Volume (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Future Volume (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0
Total Lost time (s)												
Lane Util. Factor												
Frt												
Flt Protected												
Satd. Flow (prot)												
Flt Permitted												
Satd. Flow (perm)												
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	0.92
Adj. Flow (vph)	0	0	0	0	0	0	0	0	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Turn Type	Perm			pm+pt			pm+pt			Perm		
Protected Phases	4			8			5			2		
Permitted Phases	4		4	8			2			6		6
Actuated Green, G (s)												
Effective Green, g (s)												
Actuated g/C Ratio												
Clearance Time (s)												
Vehicle Extension (s)												
Lane Grp Cap (vph)												
v/s Ratio Prot												
v/s Ratio Perm												
v/c Ratio												
Uniform Delay, d1												
Progression Factor												
Incremental Delay, d2												
Delay (s)												
Level of Service												
Approach Delay (s)	0.0			0.0			0.0			0.0		
Approach LOS	A			A			A			A		
Intersection Summary												
HCM 2000 Control Delay	0.0			HCM 2000 Level of Service			A					
HCM 2000 Volume to Capacity ratio	0.00											
Actuated Cycle Length (s)	120.0			Sum of lost time (s)			15.0					
Intersection Capacity Utilization	0.0%			ICU Level of Service			A					
Analysis Period (min)	15											
c Critical Lane Group												

Queues

AM Peak Period - Existing

129: Yonge Street & Drewry Avenue/Cummer Avenue

AM Peak Period - Existing



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	73	322	158	306	102	1379	47	1886
v/c Ratio	0.29	0.77	0.62	0.52	0.72	0.67	0.25	0.91
Control Delay	38.4	49.5	37.8	32.7	49.7	26.2	15.6	33.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.4	49.5	37.8	32.7	49.7	26.2	15.6	33.1
Queue Length 50th (m)	13.7	63.8	25.3	54.4	11.2	89.2	4.8	81.6
Queue Length 95th (m)	27.0	#103.2	41.0	81.1	#37.7	110.1	m10.3	#101.0
Internal Link Dist (m)		204.4		194.6		289.0		340.6
Turn Bay Length (m)	25.0		63.0		47.0		50.0	
Base Capacity (vph)	256	427	254	593	148	2052	209	2064
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	0.29	0.75	0.62	0.52	0.69	0.67	0.22	0.91

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.

HCM Signalized Intersection Capacity Analysis

129: Yonge Street & Drewry Avenue/Cummer Avenue

AM Peak Period - Existing

AM Peak Period - Existing

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	66	164	126	142	221	54	92	1083	158	42	1640	58
Future Volume (vph)	66	164	126	142	221	54	92	1083	158	42	1640	58
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0
Total Lost time (s)	6.0	6.0		3.0	6.0		3.0	5.0		3.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.91		1.00	0.91	
Frpb, ped/bikes	1.00	0.94		1.00	0.98		1.00	0.97		1.00	0.98	
Flpb, ped/bikes	1.00	1.00		0.98	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.93		1.00	0.97		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1546	1469		1520	1598		1337	4259		1529	4567	
Flt Permitted	0.57	1.00		0.31	1.00		0.07	1.00		0.13	1.00	
Satd. Flow (perm)	934	1469		494	1598		99	4259		202	4567	
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)	73	182	140	158	246	60	102	1203	176	47	1822	64
RTOR Reduction (vph)	0	23	0	0	8	0	0	15	0	0	3	0
Lane Group Flow (vph)	73	299	0	158	298	0	102	1364	0	47	1883	0
Confl. Peds. (#/hr)			112	112		79	160		85	85		160
Confl. Bikes (#/hr)			1			1			1			
Heavy Vehicles (%)	9%	11%	14%	9%	13%	7%	26%	15%	9%	10%	10%	9%
Turn Type	Perm	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	31.4	31.4		42.4	42.4		63.0	55.6		58.2	53.2	
Effective Green, g (s)	32.4	32.4		43.4	43.4		65.0	56.6		60.2	54.2	
Actuated g/C Ratio	0.27	0.27		0.36	0.36		0.54	0.47		0.50	0.45	
Clearance Time (s)	7.0	7.0		4.0	7.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		2.0	3.0		2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	252	396		247	577		140	2008		167	2062	
v/s Ratio Prot		c0.20		c0.04	0.19		c0.05	0.32		0.01	c0.41	
v/s Ratio Perm	0.08			0.19			0.34			0.13		
v/c Ratio	0.29	0.75		0.64	0.52		0.73	0.68		0.28	0.91	
Uniform Delay, d1	34.7	40.1		29.9	30.1		23.5	24.6		16.9	30.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.04	0.83	
Incremental Delay, d2	0.6	7.9		4.0	0.8		14.8	1.9		0.3	6.9	
Delay (s)	35.3	48.1		33.8	30.9		38.3	26.5		17.8	32.5	
Level of Service	D	D		C	C		D	C		B	C	
Approach Delay (s)		45.7			31.9			27.3			32.1	
Approach LOS		D			C			C			C	
Intersection Summary												
HCM 2000 Control Delay			31.7			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.83									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			17.0			
Intersection Capacity Utilization			107.5%			ICU Level of Service			G			
Analysis Period (min)			15									

c Critical Lane Group

Queues
856: Yonge Street & Patricia Avenue

AM Peak Period - Existing
AM Peak Period - Existing



Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	58	39	30	1380	1851
v/c Ratio	0.21	0.17	0.23	0.39	0.51
Control Delay	40.4	20.1	5.6	1.9	7.7
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	40.4	20.1	5.6	1.9	7.7
Queue Length 50th (m)	10.8	2.6	0.9	13.6	76.0
Queue Length 95th (m)	22.0	11.5	m1.4	15.1	87.8
Internal Link Dist (m)	208.2			340.6	167.9
Turn Bay Length (m)	35.0		23.0		
Base Capacity (vph)	400	330	128	3570	3628
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.14	0.12	0.23	0.39	0.51

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

856: Yonge Street & Patricia Avenue

AM Peak Period - Existing

AM Peak Period - Existing

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	52	35	27	1242	1646	20
Future Volume (vph)	52	35	27	1242	1646	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.0	3.0	3.0	3.5	3.5	3.0
Total Lost time (s)	4.0	4.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	1.00	1.00	0.91	0.91	
Frpb, ped/bikes	1.00	0.92	1.00	1.00	1.00	
Flpb, ped/bikes	0.99	1.00	1.00	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	1.00	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1603	1244	1615	4580	4654	
Flt Permitted	0.95	1.00	0.10	1.00	1.00	
Satd. Flow (perm)	1603	1244	164	4580	4654	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.92
Adj. Flow (vph)	58	39	30	1380	1829	22
RTOR Reduction (vph)	0	21	0	0	1	0
Lane Group Flow (vph)	58	18	30	1380	1850	0
Confl. Peds. (#/hr)	8	56	28			28
Confl. Bikes (#/hr)		1				
Heavy Vehicles (%)	4%	11%	4%	12%	10%	5%
Turn Type	Perm	Perm	Perm	NA	NA	
Protected Phases				2	6	
Permitted Phases	4	4	2			
Actuated Green, G (s)	18.4	18.4	90.6	90.6	90.6	
Effective Green, g (s)	19.4	19.4	91.6	91.6	91.6	
Actuated g/C Ratio	0.16	0.16	0.76	0.76	0.76	
Clearance Time (s)	5.0	5.0	6.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	259	201	125	3496	3552	
v/s Ratio Prot				0.30	c0.40	
v/s Ratio Perm	c0.04	0.01	0.18			
v/c Ratio	0.22	0.09	0.24	0.39	0.52	
Uniform Delay, d1	43.8	42.8	4.1	4.8	5.6	
Progression Factor	1.00	1.00	0.26	0.26	1.00	
Incremental Delay, d2	0.4	0.2	3.6	0.3	0.5	
Delay (s)	44.2	43.0	4.7	1.5	6.1	
Level of Service	D	D	A	A	A	
Approach Delay (s)	43.7			1.6	6.1	
Approach LOS	D			A	A	
Intersection Summary						
HCM 2000 Control Delay			5.3	HCM 2000 Level of Service		A
HCM 2000 Volume to Capacity ratio			0.47			
Actuated Cycle Length (s)			120.0	Sum of lost time (s)		10.0
Intersection Capacity Utilization			60.5%	ICU Level of Service		B
Analysis Period (min)			15			
c Critical Lane Group						

Queues
9: Yonge Street & Parking Access/Turnberry Court

PM Peak Period - Existing
PM Peak Period - Existing

Lane Group
Lane Group Flow (vph)
v/c Ratio
Control Delay
Queue Delay
Total Delay
Queue Length 50th (m)
Queue Length 95th (m)
Internal Link Dist (m)
Turn Bay Length (m)
Base Capacity (vph)
Starvation Cap Reductn
Spillback Cap Reductn
Storage Cap Reductn
Reduced v/c Ratio
Intersection Summary

HCM Signalized Intersection Capacity Analysis

9: Yonge Street & Parking Access/Turnberry Court

PM Peak Period - Existing

PM Peak Period - Existing

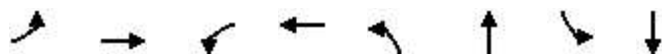
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations								  			  	
Traffic Volume (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Future Volume (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0
Total Lost time (s)												
Lane Util. Factor												
Frt												
Flt Protected												
Satd. Flow (prot)												
Flt Permitted												
Satd. Flow (perm)												
Peak-hour factor, PHF	0.90	0.95	0.90	0.90	0.95	0.95	0.90	0.95	0.95	0.90	0.95	0.90
Adj. Flow (vph)	0	0	0	0	0	0	0	0	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Turn Type	Perm			pm+pt			pm+pt			Perm		
Protected Phases	4			8			5			2		
Permitted Phases	4		4	8			2			6		6
Actuated Green, G (s)												
Effective Green, g (s)												
Actuated g/C Ratio												
Clearance Time (s)												
Vehicle Extension (s)												
Lane Grp Cap (vph)												
v/s Ratio Prot												
v/s Ratio Perm												
v/c Ratio												
Uniform Delay, d1												
Progression Factor												
Incremental Delay, d2												
Delay (s)												
Level of Service												
Approach Delay (s)	0.0			0.0			0.0			0.0		
Approach LOS	A			A			A			A		
Intersection Summary												
HCM 2000 Control Delay	0.0			HCM 2000 Level of Service			A					
HCM 2000 Volume to Capacity ratio	0.00											
Actuated Cycle Length (s)	120.0			Sum of lost time (s)			15.0					
Intersection Capacity Utilization	0.0%			ICU Level of Service			A					
Analysis Period (min)	15											
c Critical Lane Group												

Queues

PM Peak Period - Existing

129: Yonge Street & Drewry Avenue/Cummer Avenue

PM Peak Period - Existing



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	79	332	112	355	159	1695	104	1425
v/c Ratio	0.34	0.72	0.46	0.57	0.80	0.83	0.60	0.69
Control Delay	40.3	46.8	30.9	33.9	47.6	33.0	45.7	24.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.3	46.8	30.9	33.9	47.6	33.0	45.7	24.1
Queue Length 50th (m)	15.1	66.9	17.3	64.3	17.2	124.0	17.2	60.2
Queue Length 95th (m)	29.3	98.7	29.9	93.5	#52.5	149.7	35.5	67.7
Internal Link Dist (m)		204.4		194.6		289.0		340.6
Turn Bay Length (m)	25.0		63.0		47.0		50.0	
Base Capacity (vph)	236	474	248	636	200	2032	187	2055
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	0.33	0.70	0.45	0.56	0.80	0.83	0.56	0.69

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

129: Yonge Street & Drewry Avenue/Cummer Avenue

PM Peak Period - Existing

PM Peak Period - Existing

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	71	209	106	101	259	78	143	1456	154	94	1269	85
Future Volume (vph)	71	209	106	101	259	78	143	1456	154	94	1269	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0
Total Lost time (s)	6.0	6.0		3.0	6.0		3.0	5.0		3.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.91		1.00	0.91	
Frpb, ped/bikes	1.00	0.97		1.00	0.98		1.00	0.96		1.00	0.97	
Flpb, ped/bikes	0.96	1.00		0.99	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.95		1.00	0.97		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1595	1672		1531	1713		1589	4416		1685	4543	
Flt Permitted	0.51	1.00		0.29	1.00		0.10	1.00		0.07	1.00	
Satd. Flow (perm)	861	1672		472	1713		172	4416		131	4543	
Peak-hour factor, PHF	0.90	0.95	0.95	0.90	0.95	0.95	0.90	0.95	0.95	0.90	0.95	0.95
Adj. Flow (vph)	79	220	112	112	273	82	159	1533	162	104	1336	89
RTOR Reduction (vph)	0	15	0	0	9	0	0	10	0	0	6	0
Lane Group Flow (vph)	79	317	0	112	346	0	159	1685	0	104	1419	0
Confl. Peds. (#/hr)	64		71	71		64	163		142	142		163
Confl. Bikes (#/hr)			1			1			1			3
Heavy Vehicles (%)	1%	2%	6%	9%	4%	3%	6%	10%	9%	0%	9%	1%
Turn Type	Perm	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	31.3	31.3		42.1	42.1		61.7	53.9		60.1	53.1	
Effective Green, g (s)	32.3	32.3		43.1	43.1		63.7	54.9		62.1	54.1	
Actuated g/C Ratio	0.27	0.27		0.36	0.36		0.53	0.46		0.52	0.45	
Clearance Time (s)	7.0	7.0		4.0	7.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		2.0	3.0		2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	231	450		238	615		195	2020		171	2048	
v/s Ratio Prot		c0.19		0.03	c0.20		c0.06	c0.38		0.04	0.31	
v/s Ratio Perm	0.09			0.14			0.37			0.27		
v/c Ratio	0.34	0.70		0.47	0.56		0.82	0.83		0.61	0.69	
Uniform Delay, d1	35.3	39.5		27.9	30.9		19.4	28.6		20.3	26.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.81	0.84	
Incremental Delay, d2	0.9	4.9		0.5	1.2		21.3	4.2		3.8	1.8	
Delay (s)	36.2	44.5		28.5	32.1		40.7	32.8		40.7	23.9	
Level of Service	D	D		C	C		D	C		D	C	
Approach Delay (s)		42.9			31.2			33.5			25.1	
Approach LOS		D			C			C			C	
Intersection Summary												
HCM 2000 Control Delay			31.1			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.78									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			17.0			
Intersection Capacity Utilization			106.6%			ICU Level of Service			G			
Analysis Period (min)			15									

c Critical Lane Group

Queues
856: Yonge Street & Patricia Avenue

PM Peak Period - Existing
PM Peak Period - Existing

					
Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	60	41	48	1648	1561
v/c Ratio	0.23	0.16	0.27	0.45	0.42
Control Delay	40.9	14.6	3.9	1.5	6.8
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	40.9	14.6	3.9	1.5	6.8
Queue Length 50th (m)	11.2	0.9	1.0	13.6	57.4
Queue Length 95th (m)	22.7	9.9	m1.3	14.9	66.9
Internal Link Dist (m)	208.2			340.6	167.9
Turn Bay Length (m)	35.0		23.0		
Base Capacity (vph)	381	358	176	3700	3681
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.16	0.11	0.27	0.45	0.42

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

856: Yonge Street & Patricia Avenue

PM Peak Period - Existing

PM Peak Period - Existing

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	54	37	43	1566	1449	34
Future Volume (vph)	54	37	43	1566	1449	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.0	3.0	3.0	3.5	3.5	3.0
Total Lost time (s)	4.0	4.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	1.00	1.00	0.91	0.91	
Frpb, ped/bikes	1.00	0.90	1.00	1.00	1.00	
Flpb, ped/bikes	0.96	1.00	0.98	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	1.00	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1524	1324	1550	4749	4721	
Flt Permitted	0.95	1.00	0.14	1.00	1.00	
Satd. Flow (perm)	1524	1324	226	4749	4721	
Peak-hour factor, PHF	0.90	0.90	0.90	0.95	0.95	0.95
Adj. Flow (vph)	60	41	48	1648	1525	36
RTOR Reduction (vph)	0	30	0	0	1	0
Lane Group Flow (vph)	60	11	48	1648	1560	0
Confl. Peds. (#/hr)	32	66	88			88
Heavy Vehicles (%)	6%	3%	7%	8%	8%	0%
Turn Type	Perm	Perm	Perm	NA	NA	
Protected Phases				2	6	
Permitted Phases	4	4	2			
Actuated Green, G (s)	18.5	18.5	90.5	90.5	90.5	
Effective Green, g (s)	19.5	19.5	91.5	91.5	91.5	
Actuated g/C Ratio	0.16	0.16	0.76	0.76	0.76	
Clearance Time (s)	5.0	5.0	6.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	247	215	172	3621	3599	
v/s Ratio Prot				c0.35	0.33	
v/s Ratio Perm	c0.04	0.01	0.21			
v/c Ratio	0.24	0.05	0.28	0.46	0.43	
Uniform Delay, d1	43.8	42.4	4.3	5.2	5.1	
Progression Factor	1.00	1.00	0.20	0.19	1.00	
Incremental Delay, d2	0.5	0.1	2.3	0.2	0.4	
Delay (s)	44.3	42.5	3.2	1.2	5.4	
Level of Service	D	D	A	A	A	
Approach Delay (s)	43.6			1.3	5.4	
Approach LOS	D			A	A	
Intersection Summary						
HCM 2000 Control Delay			4.5	HCM 2000 Level of Service		A
HCM 2000 Volume to Capacity ratio			0.42			
Actuated Cycle Length (s)			120.0	Sum of lost time (s)		10.0
Intersection Capacity Utilization			64.6%	ICU Level of Service		C
Analysis Period (min)			15			
c Critical Lane Group						

Queues
131: Yonge Street & Steeles Avenue

AM Peak Period - Existing
AM Peak Period - Existing

											
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	188	944	327	159	1161	158	911	151	208	1519	168
v/c Ratio	0.91	0.98	0.74	0.90	0.87	0.86	0.74	0.33	0.77	1.00	0.39
Control Delay	75.5	70.5	23.0	77.6	51.8	67.7	39.4	6.2	38.5	62.9	14.9
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	75.5	70.5	23.0	77.6	51.8	67.7	39.4	6.2	38.5	62.9	14.9
Queue Length 50th (m)	33.3	124.8	19.5	27.7	101.7	26.4	105.6	0.0	27.7	~214.8	11.0
Queue Length 95th (m)	#77.6	#168.9	60.6	#68.0	120.1	#62.4	130.7	14.3	#55.3	#257.3	30.4
Internal Link Dist (m)	176.1				210.1	261.0				396.9	
Turn Bay Length (m)	117.0			165.0	75.0				40.0		
Base Capacity (vph)	206	962	440	179	1333	197	1223	463	284	1514	428
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	0.91	0.98	0.74	0.89	0.87	0.80	0.74	0.33	0.73	1.00	0.39

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.

HCM Signalized Intersection Capacity Analysis

131: Yonge Street & Steeles Avenue

AM Peak Period - Existing

AM Peak Period - Existing

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	169	850	294	143	981	64	142	820	136	187	1367	151
Future Volume (vph)	169	850	294	143	981	64	142	820	136	187	1367	151
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	2200	1900
Lane Width	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0
Total Lost time (s)	3.0	6.0	6.0	3.0	6.0		3.0	6.0	6.0	3.0	4.0	6.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.91		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.71	1.00	0.99		1.00	1.00	0.79	1.00	1.00	0.69
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	0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1515	3400	951	1323	4718		1370	3245	980	1613	3863	968
Flt Permitted	0.11	1.00	1.00	0.11	1.00		0.08	1.00	1.00	0.16	1.00	1.00
Satd. Flow (perm)	176	3400	951	155	4718		120	3245	980	278	3863	968
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)	188	944	327	159	1090	71	158	911	151	208	1519	168
RTOR Reduction (vph)	0	0	172	0	6	0	0	0	94	0	0	64
Lane Group Flow (vph)	188	944	155	159	1155	0	158	911	57	208	1519	104
Confl. Peds. (#/hr)	164		256	256		164	269		166	166		269
Confl. Bikes (#/hr)		1										
Heavy Vehicles (%)	11%	5%	13%	27%	6%	14%	23%	10%	21%	4%	7%	7%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8			2		2	6		6
Actuated Green, G (s)	47.2	35.2	35.2	46.8	35.0		59.0	47.2	47.2	59.0	47.2	47.2
Effective Green, g (s)	49.2	36.2	36.2	48.8	36.0		61.0	48.2	48.2	61.0	50.2	48.2
Actuated g/C Ratio	0.38	0.28	0.28	0.38	0.28		0.48	0.38	0.38	0.48	0.39	0.38
Clearance Time (s)	4.0	7.0	7.0	4.0	7.0		4.0	7.0	7.0	4.0	7.0	7.0
Vehicle Extension (s)	2.0	3.0	3.0	2.0	3.0		2.0	3.0	3.0	2.0	3.0	3.0
Lane Grp Cap (vph)	203	961	268	175	1326		182	1221	369	265	1515	364
v/s Ratio Prot	c0.09	c0.28		0.09	0.24		c0.09	0.28		0.08	c0.39	
v/s Ratio Perm	0.26		0.16	0.25			0.33		0.06	0.29		0.11
v/c Ratio	0.93	0.98	0.58	0.91	0.87		0.87	0.75	0.15	0.78	1.00	0.29
Uniform Delay, d1	32.6	45.6	39.4	32.6	43.8		35.3	34.6	26.4	23.5	38.9	27.9
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	42.0	25.1	8.8	41.7	8.1		31.7	4.2	0.9	13.1	23.8	2.0
Delay (s)	74.6	70.7	48.1	74.3	51.9		67.1	38.8	27.3	36.6	62.7	29.8
Level of Service	E	E	D	E	D		E	D	C	D	E	C
Approach Delay (s)		66.1			54.6			41.0			56.9	
Approach LOS		E			D			D			E	
Intersection Summary												
HCM 2000 Control Delay			55.4			HCM 2000 Level of Service			E			
HCM 2000 Volume to Capacity ratio			0.99									
Actuated Cycle Length (s)			128.0			Sum of lost time (s)			18.0			
Intersection Capacity Utilization			94.0%			ICU Level of Service			F			
Analysis Period (min)			15									
c Critical Lane Group												

Queues

AM Peak Period - Existing

319: Yonge Street & Auto Complex Entrance/Meadowview Avenue

AM Peak Period - Existing



Lane Group	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	38	236	39	28	54	867	150	36	1514	49
v/c Ratio	0.06	0.81	0.09	0.08	0.28	0.42	0.17	0.10	0.73	0.06
Control Delay	24.6	67.0	36.0	0.5	11.7	15.2	2.8	8.7	23.0	1.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.6	67.0	36.0	0.5	11.7	15.2	2.8	8.7	23.0	1.7
Queue Length 50th (m)	2.4	57.1	7.8	0.0	4.1	62.4	0.0	2.7	143.8	0.0
Queue Length 95th (m)	6.5	81.0	15.7	0.0	10.3	90.5	10.1	7.6	205.3	3.4
Internal Link Dist (m)	203.8		176.1			396.9			167.0	
Turn Bay Length (m)		100.0			53.0			42.0		
Base Capacity (vph)	882	375	570	420	215	2053	884	398	2074	846
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.04	0.63	0.07	0.07	0.25	0.42	0.17	0.09	0.73	0.06
Intersection Summary										

HCM Signalized Intersection Capacity Analysis

319: Yonge Street & Auto Complex Entrance/Meadowview Avenue

AM Peak Period - Existing

AM Peak Period - Existing

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↔		↔	↔	↔	↔	↔↔	↔	↔	↔↔	↔
Traffic Volume (vph)	11	11	13	212	35	25	49	780	135	32	1363	44
Future Volume (vph)	11	11	13	212	35	25	49	780	135	32	1363	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0
Total Lost time (s)		6.5		6.5	6.5	6.5	3.0	6.0	6.0	3.0	6.0	6.0
Lane Util. Factor		0.95		1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes		0.99		1.00	1.00	0.98	1.00	1.00	0.92	1.00	1.00	0.94
Flpb, ped/bikes		1.00		0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.94		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.98		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		3185		1608	1879	1231	1685	3305	1331	1582	3433	1354
Flt Permitted		0.89		0.73	1.00	1.00	0.09	1.00	1.00	0.29	1.00	1.00
Satd. Flow (perm)		2871		1237	1879	1231	162	3305	1331	476	3433	1354
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)	12	12	14	236	39	28	54	867	150	36	1514	49
RTOR Reduction (vph)	0	11	0	0	0	21	0	0	59	0	0	20
Lane Group Flow (vph)	0	27	0	236	39	7	54	867	91	36	1514	29
Confl. Peds. (#/hr)	8		17	17		8	23		60	60		23
Confl. Bikes (#/hr)		1						2			1	
Heavy Vehicles (%)	0%	9%	0%	3%	0%	20%	0%	8%	4%	6%	4%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	10
Turn Type	Perm	NA		Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4			8		8	6		6	2		2
Actuated Green, G (s)		29.7		29.7	29.7	29.7	83.2	78.2	78.2	80.4	76.8	76.8
Effective Green, g (s)		30.7		30.7	30.7	30.7	85.2	79.2	79.2	82.4	77.8	77.8
Actuated g/C Ratio		0.24		0.24	0.24	0.24	0.66	0.61	0.61	0.63	0.60	0.60
Clearance Time (s)		7.5		7.5	7.5	7.5	4.0	7.0	7.0	4.0	7.0	7.0
Vehicle Extension (s)		3.0		3.0	3.0	3.0	2.0	3.0	3.0	2.0	3.0	3.0
Lane Grp Cap (vph)		677		292	443	290	176	2013	810	340	2054	810
v/s Ratio Prot					0.02		c0.01	0.26		0.00	c0.44	
v/s Ratio Perm		0.01		c0.19		0.01	0.19		0.07	0.06		0.02
v/c Ratio		0.04		0.81	0.09	0.02	0.31	0.43	0.11	0.11	0.74	0.04
Uniform Delay, d1		38.3		46.9	38.7	38.1	14.3	13.5	10.7	9.3	18.8	10.7
Progression Factor		1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.0		15.0	0.1	0.0	0.4	0.7	0.3	0.1	2.4	0.1
Delay (s)		38.3		61.9	38.8	38.2	14.7	14.1	10.9	9.4	21.2	10.8
Level of Service		D		E	D	D	B	B	B	A	C	B
Approach Delay (s)		38.3			56.7			13.7			20.6	
Approach LOS		D			E			B			C	
Intersection Summary												
HCM 2000 Control Delay			22.0									
HCM 2000 Volume to Capacity ratio			0.73									
Actuated Cycle Length (s)			130.0							15.5		
Intersection Capacity Utilization			72.5%									
Analysis Period (min)			15									
c Critical Lane Group												

AM Peak Period - Existing

Synchro 11 Report
Page 4

Queues
1381: Yonge Street & Mall Entrance/Athabaska Avenue

AM Peak Period - Existing
AM Peak Period - Existing



Lane Group	EBL	EBR	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	53	14	97	39	1171	4	23	1810	57
v/c Ratio	0.27	0.05	0.17	0.24	0.51	0.00	0.09	0.81	0.07
Control Delay	45.2	0.3	38.2	10.2	10.1	0.0	12.7	22.7	1.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.2	0.3	38.2	10.2	10.1	0.0	12.7	22.7	1.3
Queue Length 50th (m)	10.9	0.0	9.4	3.1	78.7	0.0	2.5	216.4	0.0
Queue Length 95th (m)	22.6	0.0	16.9	6.9	96.3	0.0	7.1	#280.4	3.0
Internal Link Dist (m)			256.6		72.5			261.0	
Turn Bay Length (m)	43.0			25.0			30.0		
Base Capacity (vph)	280	371	813	177	2292	1029	266	2222	832
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	0.19	0.04	0.12	0.22	0.51	0.00	0.09	0.81	0.07

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

1381: Yonge Street & Mall Entrance/Athabaska Avenue

AM Peak Period - Existing

AM Peak Period - Existing

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	48	0	13	16	63	8	35	1054	4	21	1629	51
Future Volume (vph)	48	0	13	16	63	8	35	1054	4	21	1629	51
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0
Total Lost time (s)	5.6		5.6		5.6		3.0	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00		1.00		0.95		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00		0.94		1.00		1.00	1.00	0.93	1.00	1.00	0.96
Flpb, ped/bikes	0.96		1.00		0.99		1.00	1.00	1.00	0.99	1.00	1.00
Frt	1.00		0.85		0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95		1.00		0.99		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1590		1310		3329		1636	3159	1404	1668	3275	1189
Flt Permitted	0.69		1.00		0.99		0.06	1.00	1.00	0.22	1.00	1.00
Satd. Flow (perm)	1157		1310		3329		102	3159	1404	394	3275	1189
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)	53	0	14	18	70	9	39	1171	4	23	1810	57
RTOR Reduction (vph)	0	0	12	0	7	0	0	0	1	0	0	19
Lane Group Flow (vph)	53	0	2	0	90	0	39	1171	3	23	1810	38
Confl. Peds. (#/hr)	32		38	38		32	18		31	31		18
Confl. Bikes (#/hr)					1							
Heavy Vehicles (%)	2%	0%	8%	6%	3%	0%	3%	13%	0%	0%	9%	8%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	27
Turn Type	Perm		Perm	Perm	NA		pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases					8		5	2			6	
Permitted Phases	4		4	8			2		2	6		6
Actuated Green, G (s)	19.4		19.4		19.4		89.0	89.0	89.0	81.6	81.6	81.6
Effective Green, g (s)	20.4		20.4		20.4		90.0	90.0	90.0	82.6	82.6	82.6
Actuated g/C Ratio	0.16		0.16		0.16		0.72	0.72	0.72	0.67	0.67	0.67
Clearance Time (s)	6.6		6.6		6.6		4.0	5.5	5.5	5.5	5.5	5.5
Vehicle Extension (s)	3.0		3.0		3.0		2.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	190		215		546		128	2289	1017	262	2178	790
v/s Ratio Prot							0.01	c0.37			c0.55	
v/s Ratio Perm	c0.05		0.00		0.03		0.21		0.00	0.06		0.03
v/c Ratio	0.28		0.01		0.17		0.30	0.51	0.00	0.09	0.83	0.05
Uniform Delay, d1	45.5		43.5		44.6		14.9	7.5	4.7	7.4	15.6	7.2
Progression Factor	1.00		1.00		1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.8		0.0		0.1		0.5	0.8	0.0	0.7	3.9	0.1
Delay (s)	46.3		43.5		44.7		15.4	8.3	4.7	8.1	19.4	7.3
Level of Service	D		D		D		B	A	A	A	B	A
Approach Delay (s)		45.7			44.7			8.5			18.9	
Approach LOS		D			D			A			B	
Intersection Summary												
HCM 2000 Control Delay			16.4				HCM 2000 Level of Service			B		
HCM 2000 Volume to Capacity ratio			0.71									
Actuated Cycle Length (s)			124.2				Sum of lost time (s)			16.1		
Intersection Capacity Utilization			93.8%				ICU Level of Service			F		
Analysis Period (min)			15									
c Critical Lane Group												

AM Peak Period - Existing

Synchro 11 Report
Page 6

Queues
131: Yonge Street & Steeles Avenue

PM Peak Period - Existing
PM Peak Period - Existing

											
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	232	1048	271	199	1280	149	1279	69	197	1121	188
v/c Ratio	0.92	0.96	0.67	0.88	0.95	0.81	0.99	0.21	0.88	0.93	0.46
Control Delay	71.6	64.4	19.1	66.0	58.1	59.2	65.3	3.3	65.8	54.4	12.1
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	71.6	64.4	19.1	66.0	58.1	59.2	65.3	3.3	65.8	54.4	12.1
Queue Length 50th (m)	43.0	138.8	11.9	34.9	112.6	23.3	~172.1	0.0	34.2	145.6	6.6
Queue Length 95th (m)	#89.9	#184.6	46.7	#75.0	#143.8	#54.7	#220.0	4.3	#75.1	#191.0	27.9
Internal Link Dist (m)	176.1			210.1			261.0			396.9	
Turn Bay Length (m)	117.0			165.0			75.0			40.0	
Base Capacity (vph)	260	1087	406	241	1348	203	1287	329	233	1201	407
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	0.89	0.96	0.67	0.83	0.95	0.73	0.99	0.21	0.85	0.93	0.46

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.

HCM Signalized Intersection Capacity Analysis

131: Yonge Street & Steeles Avenue

PM Peak Period - Existing

PM Peak Period - Existing

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	209	996	257	179	944	272	134	1215	66	177	1065	179
Future Volume (vph)	209	996	257	179	944	272	134	1215	66	177	1065	179
Ideal Flow (vphpl)	1900	2000	1900	1900	1900	1900	1900	2100	1900	1900	1900	1900
Lane Width	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0
Total Lost time (s)	3.0	5.0	6.0	3.0	6.0		3.0	6.0	6.0	3.0	6.0	6.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.91		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.69	1.00	0.95		1.00	1.00	0.69	1.00	1.00	0.68
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	0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1634	3648	883	1501	4576		1404	3688	752	1620	3368	871
Flt Permitted	0.11	1.00	1.00	0.11	1.00		0.09	1.00	1.00	0.09	1.00	1.00
Satd. Flow (perm)	185	3648	883	173	4576		132	3688	752	149	3368	871
Peak-hour factor, PHF	0.90	0.95	0.95	0.90	0.95	0.95	0.90	0.95	0.95	0.90	0.95	0.95
Adj. Flow (vph)	232	1048	271	199	994	286	149	1279	69	197	1121	188
RTOR Reduction (vph)	0	0	150	0	41	0	0	0	45	0	0	96
Lane Group Flow (vph)	232	1048	121	199	1239	0	149	1279	24	197	1121	92
Confl. Peds. (#/hr)	185		286	286		185	297		244	244		297
Confl. Bikes (#/hr)		1			1			1				
Heavy Vehicles (%)	3%	3%	18%	12%	3%	4%	20%	7%	39%	4%	6%	6%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	25
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8			2		2	6		6
Actuated Green, G (s)	50.6	36.2	36.2	49.4	35.6		55.0	43.7	43.7	57.0	44.7	44.7
Effective Green, g (s)	52.6	38.2	37.2	51.4	36.6		57.0	44.7	44.7	59.0	45.7	45.7
Actuated g/C Ratio	0.41	0.30	0.29	0.40	0.29		0.45	0.35	0.35	0.46	0.36	0.36
Clearance Time (s)	4.0	7.0	7.0	4.0	7.0		4.0	7.0	7.0	4.0	7.0	7.0
Vehicle Extension (s)	2.0	3.0	3.0	2.0	3.0		2.0	3.0	3.0	2.0	3.0	3.0
Lane Grp Cap (vph)	250	1088	256	223	1308		181	1287	262	221	1202	310
v/s Ratio Prot	c0.11	c0.29		0.10	0.27		0.08	c0.35		c0.09	0.33	
v/s Ratio Perm	0.27		0.14	0.26			0.29		0.03	0.32		0.11
v/c Ratio	0.93	0.96	0.47	0.89	0.95		0.82	0.99	0.09	0.89	0.93	0.30
Uniform Delay, d1	35.3	44.2	37.3	34.5	44.8		31.2	41.5	28.0	35.7	39.7	29.6
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	37.1	19.8	6.2	32.2	15.1		24.0	23.6	0.7	32.3	14.1	2.4
Delay (s)	72.4	64.0	43.5	66.7	59.9		55.2	65.2	28.7	67.9	53.8	32.0
Level of Service	E	E	D	E	E		E	E	C	E	D	C
Approach Delay (s)		61.6			60.8			62.5			52.9	
Approach LOS		E			E			E			D	
Intersection Summary												
HCM 2000 Control Delay			59.5			HCM 2000 Level of Service			E			
HCM 2000 Volume to Capacity ratio			0.98									
Actuated Cycle Length (s)			128.0			Sum of lost time (s)			18.0			
Intersection Capacity Utilization			97.6%			ICU Level of Service			F			
Analysis Period (min)			15									
c Critical Lane Group												

PM Peak Period - Existing

Synchro 11 Report
Page 2

Queues

PM Peak Period - Existing

319: Yonge Street & Auto Complex Entrance/Meadowview Avenue

PM Peak Period - Existing



Lane Group	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	182	290	26	66	53	1403	226	72	1074	32
v/c Ratio	0.21	0.88	0.05	0.14	0.20	0.75	0.28	0.40	0.57	0.04
Control Delay	22.3	72.8	31.3	7.5	13.7	29.9	7.1	18.6	24.4	0.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.3	72.8	31.3	7.5	13.7	29.9	7.1	18.6	24.4	0.5
Queue Length 50th (m)	12.3	74.7	5.0	0.0	5.6	160.9	8.4	7.7	106.6	0.0
Queue Length 95th (m)	20.6	#114.2	11.4	10.2	12.3	210.5	25.7	15.6	140.0	0.7
Internal Link Dist (m)	203.8		176.1			396.9			167.0	
Turn Bay Length (m)		100.0			53.0			42.0		
Base Capacity (vph)	1011	380	664	537	287	1883	814	194	1873	774
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.18	0.76	0.04	0.12	0.18	0.75	0.28	0.37	0.57	0.04

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

319: Yonge Street & Auto Complex Entrance/Meadowview Avenue

PM Peak Period - Existing

PM Peak Period - Existing

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	55	55	60	261	25	63	48	1333	215	65	1020	30
Future Volume (vph)	55	55	60	261	25	63	48	1333	215	65	1020	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0
Total Lost time (s)		6.5		6.5	6.5	6.5	3.0	6.0	6.0	3.0	6.0	6.0
Lane Util. Factor		0.95		1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes		0.99		1.00	1.00	0.96	1.00	1.00	0.92	1.00	1.00	0.93
Flpb, ped/bikes		0.99		0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.95		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.98		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		3209		1605	1879	1399	1683	3466	1362	1652	3433	1364
Flt Permitted		0.84		0.64	1.00	1.00	0.18	1.00	1.00	0.09	1.00	1.00
Satd. Flow (perm)		2746		1076	1879	1399	326	3466	1362	160	3433	1364
Peak-hour factor, PHF	0.90	0.95	0.95	0.90	0.95	0.95	0.90	0.95	0.95	0.90	0.95	0.95
Adj. Flow (vph)	61	58	63	290	26	66	53	1403	226	72	1074	32
RTOR Reduction (vph)	0	44	0	0	0	46	0	0	76	0	0	15
Lane Group Flow (vph)	0	138	0	290	26	20	53	1403	150	72	1074	17
Confl. Peds. (#/hr)	29		21	21		29	23		53	53		23
Confl. Bikes (#/hr)								2			1	
Heavy Vehicles (%)	2%	0%	2%	3%	0%	3%	0%	3%	2%	2%	4%	3%
Turn Type	Perm	NA		Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4			8		8	6		6	2		2
Actuated Green, G (s)		41.8		41.8	41.8	41.8	79.4	74.3	74.3	80.0	74.6	74.6
Effective Green, g (s)		42.8		42.8	42.8	42.8	81.4	75.3	75.3	82.0	75.6	75.6
Actuated g/C Ratio		0.31		0.31	0.31	0.31	0.58	0.54	0.54	0.59	0.54	0.54
Clearance Time (s)		7.5		7.5	7.5	7.5	4.0	7.0	7.0	4.0	7.0	7.0
Vehicle Extension (s)		3.0		3.0	3.0	3.0	2.0	3.0	3.0	2.0	3.0	3.0
Lane Grp Cap (vph)		839		328	574	427	248	1864	732	161	1853	736
v/s Ratio Prot					0.01		0.01	c0.40		c0.02	0.31	
v/s Ratio Perm		0.05		c0.27		0.01	0.11		0.11	0.24		0.01
v/c Ratio		0.16		0.88	0.05	0.05	0.21	0.75	0.21	0.45	0.58	0.02
Uniform Delay, d1		35.5		46.2	34.2	34.2	14.8	25.1	16.8	19.6	21.6	15.0
Progression Factor		1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.1		23.4	0.0	0.0	0.2	2.9	0.6	0.7	1.3	0.1
Delay (s)		35.6		69.6	34.2	34.3	15.0	28.0	17.4	20.3	22.9	15.1
Level of Service		D		E	C	C	B	C	B	C	C	B
Approach Delay (s)		35.6			61.1			26.2			22.5	
Approach LOS		D			E			C			C	
Intersection Summary												
HCM 2000 Control Delay			29.3									
HCM 2000 Volume to Capacity ratio			0.78									
Actuated Cycle Length (s)			140.0									
Intersection Capacity Utilization			92.7%									
Analysis Period (min)			15									
c Critical Lane Group												

PM Peak Period - Existing

Synchro 11 Report
Page 4

Queues
1381: Yonge Street & Mall Entrance/Athabaska Avenue

PM Peak Period - Existing
PM Peak Period - Existing



Lane Group	EBL	EBR	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	141	58	88	102	1301	18	49	1407	62
v/c Ratio	0.56	0.16	0.12	0.48	0.59	0.02	0.28	0.72	0.09
Control Delay	50.8	6.9	30.5	13.9	11.8	0.1	17.6	20.3	1.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.8	6.9	30.5	13.9	11.8	0.1	17.6	20.3	1.5
Queue Length 50th (m)	30.0	0.0	7.1	7.3	79.8	0.0	5.4	118.4	0.0
Queue Length 95th (m)	51.8	7.8	14.0	13.1	98.8	0.2	14.3	148.7	3.6
Internal Link Dist (m)			256.6		72.5			261.0	
Turn Bay Length (m)	43.0			25.0			30.0		
Base Capacity (vph)	256	368	738	220	2208	745	174	1952	725
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	0.55	0.16	0.12	0.46	0.59	0.02	0.28	0.72	0.09
Intersection Summary									

HCM Signalized Intersection Capacity Analysis

1381: Yonge Street & Mall Entrance/Athabaska Avenue

PM Peak Period - Existing

PM Peak Period - Existing

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	127	0	55	21	47	15	92	1236	17	44	1337	59
Future Volume (vph)	127	0	55	21	47	15	92	1236	17	44	1337	59
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0
Total Lost time (s)	5.6		5.6		5.6		3.0	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00		1.00		0.95		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00		0.89		0.98		1.00	1.00	0.76	1.00	1.00	0.80
Flpb, ped/bikes	0.89		1.00		0.97		1.00	1.00	1.00	0.97	1.00	1.00
Frt	1.00		0.85		0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95		1.00		0.99		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1467		1313		3035		1620	3245	1087	1501	3275	1174
Flt Permitted	0.70		1.00		0.99		0.11	1.00	1.00	0.19	1.00	1.00
Satd. Flow (perm)	1076		1313		3035		183	3245	1087	293	3275	1174
Peak-hour factor, PHF	0.90	0.95	0.95	0.90	0.95	0.95	0.90	0.95	0.95	0.90	0.95	0.95
Adj. Flow (vph)	141	0	58	23	49	16	102	1301	18	49	1407	62
RTOR Reduction (vph)	0	0	44	0	12	0	0	0	6	0	0	25
Lane Group Flow (vph)	141	0	14	0	76	0	102	1301	12	49	1407	37
Confl. Peds. (#/hr)	96		77	77		96	103		124	124		103
Confl. Bikes (#/hr)		1			1							
Heavy Vehicles (%)	2%	0%	2%	10%	6%	7%	4%	10%	6%	9%	9%	3%
Turn Type	Perm		Perm	Perm	NA		pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases					8		5	2			6	
Permitted Phases	4		4	8			2		2	6		6
Actuated Green, G (s)	28.1		28.1		28.1		82.5	82.5	82.5	72.1	72.1	72.1
Effective Green, g (s)	29.1		29.1		29.1		83.5	83.5	83.5	73.1	73.1	73.1
Actuated g/C Ratio	0.24		0.24		0.24		0.68	0.68	0.68	0.60	0.60	0.60
Clearance Time (s)	6.6		6.6		6.6		4.0	5.5	5.5	5.5	5.5	5.5
Vehicle Extension (s)	3.0		3.0		3.0		2.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	255		311		719		211	2208	739	174	1951	699
v/s Ratio Prot							0.03	c0.40			c0.43	
v/s Ratio Perm	c0.13		0.01		0.02		0.30		0.01	0.17		0.03
v/c Ratio	0.55		0.04		0.11		0.48	0.59	0.02	0.28	0.72	0.05
Uniform Delay, d1	41.1		36.1		36.6		13.2	10.5	6.3	12.0	17.6	10.4
Progression Factor	1.00		1.00		1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.6		0.1		0.1		0.6	1.2	0.0	4.0	2.3	0.1
Delay (s)	43.7		36.1		36.7		13.9	11.6	6.4	16.1	19.9	10.5
Level of Service	D		D		D		B	B	A	B	B	B
Approach Delay (s)		41.5			36.7			11.7			19.4	
Approach LOS		D			D			B			B	
Intersection Summary												
HCM 2000 Control Delay			17.9				HCM 2000 Level of Service			B		
HCM 2000 Volume to Capacity ratio			0.69									
Actuated Cycle Length (s)			122.7				Sum of lost time (s)			16.1		
Intersection Capacity Utilization			94.9%				ICU Level of Service			F		
Analysis Period (min)			15									
c Critical Lane Group												

Queues

310: Yonge Street & Arnold Avenue/Elgin Street

AM Peak Period - Existing

AM Peak Period - Existing



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	66	152	49	175	31	1211	36	156	1876
v/c Ratio	0.54	0.57	0.34	0.67	0.32	0.45	0.03	0.55	0.69
Control Delay	66.5	59.1	54.5	64.4	16.9	6.9	1.6	16.4	10.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	66.5	59.1	54.5	64.4	16.9	6.9	1.6	16.4	10.3
Queue Length 50th (m)	15.9	36.7	11.4	43.0	2.2	52.4	0.0	14.4	111.2
Queue Length 95th (m)	29.7	55.6	22.9	63.6	10.6	78.4	2.8	43.1	163.7
Internal Link Dist (m)		214.8		157.0		56.5			267.7
Turn Bay Length (m)	35.0				42.0		52.0	34.0	
Base Capacity (vph)	196	429	232	419	97	2683	1142	286	2727
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	0.34	0.35	0.21	0.42	0.32	0.45	0.03	0.55	0.69
Intersection Summary									

HCM Signalized Intersection Capacity Analysis

310: Yonge Street & Arnold Avenue/Elgin Street

AM Peak Period - Existing

AM Peak Period - Existing

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	59	94	43	44	68	89	28	1090	32	140	1639	51
Future Volume (vph)	59	94	43	44	68	89	28	1090	32	140	1639	51
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0
Total Lost time (s)	6.5	6.5		6.5	6.5		6.0	6.0	6.0	6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	
Frt	1.00	0.95		1.00	0.92		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)	1722	1831		1773	1790		1556	3545	1497	1756	3599	
Flt Permitted	0.46	1.00		0.53	1.00		0.08	1.00	1.00	0.21	1.00	
Satd. Flow (perm)	838	1831		992	1790		130	3545	1497	380	3599	
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	0.92
Adj. Flow (vph)	66	104	48	49	76	99	31	1211	36	156	1821	55
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	9	0	1	0
Lane Group Flow (vph)	66	152	0	49	175	0	31	1211	27	156	1875	0
Heavy Vehicles (%)	3%	1%	7%	0%	0%	2%	14%	6%	6%	1%	4%	2%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	18.1	18.1		18.1	18.1		97.4	97.4	97.4	97.4	97.4	
Effective Green, g (s)	19.1	19.1		19.1	19.1		98.4	98.4	98.4	98.4	98.4	
Actuated g/C Ratio	0.15	0.15		0.15	0.15		0.76	0.76	0.76	0.76	0.76	
Clearance Time (s)	7.5	7.5		7.5	7.5		7.0	7.0	7.0	7.0	7.0	
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)	123	269		145	262		98	2683	1133	287	2724	
v/s Ratio Prot		0.08			c0.10			0.34			c0.52	
v/s Ratio Perm	0.08			0.05			0.24		0.02	0.41		
v/c Ratio	0.54	0.57		0.34	0.67		0.32	0.45	0.02	0.54	0.69	
Uniform Delay, d1	51.4	51.6		49.8	52.5		5.0	5.8	3.9	6.5	8.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	4.4	2.7		1.4	6.3		8.3	0.6	0.0	7.2	1.4	
Delay (s)	55.8	54.3		51.2	58.8		13.3	6.4	4.0	13.7	9.5	
Level of Service	E	D		D	E		B	A	A	B	A	
Approach Delay (s)		54.8			57.1			6.5			9.8	
Approach LOS		D			E			A			A	
Intersection Summary												
HCM 2000 Control Delay			14.1				HCM 2000 Level of Service			B		
HCM 2000 Volume to Capacity ratio			0.68									
Actuated Cycle Length (s)			130.0				Sum of lost time (s)			12.5		
Intersection Capacity Utilization			107.3%				ICU Level of Service			G		
Analysis Period (min)			15									
c Critical Lane Group												

Queues
317: Yonge Street & Clark Avenue

AM Peak Period - Existing

AM Peak Period - Existing

										
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	196	228	374	83	236	150	1124	19	1620	178
v/c Ratio	0.93	0.35	0.80	0.45	0.72	0.97	0.40	0.12	0.93	0.19
Control Delay	109.8	38.6	58.8	61.6	70.1	101.9	17.9	24.8	46.4	2.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	109.8	38.6	58.8	61.6	70.1	101.9	17.9	24.8	46.4	2.6
Queue Length 50th (m)	58.6	49.1	96.9	21.6	64.7	31.1	67.9	3.1	246.1	0.0
Queue Length 95th (m)	#106.1	70.3	135.1	38.2	92.8	#78.1	80.5	9.1	#306.8	11.0
Internal Link Dist (m)	202.9				194.6		172.6		187.5	
Turn Bay Length (m)	78.0						47.0		98.0	
Base Capacity (vph)	211	717	518	221	394	154	2834	155	1735	920
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.93	0.32	0.72	0.38	0.60	0.97	0.40	0.12	0.93	0.19

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

317: Yonge Street & Clark Avenue

AM Peak Period - Existing

AM Peak Period - Existing

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	176	205	337	75	193	20	135	960	51	17	1458	160
Future Volume (vph)	176	205	337	75	193	20	135	960	51	17	1458	160
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0
Total Lost time (s)	4.0	6.5	6.5	6.5	6.5		2.0	6.0		6.0	6.0	6.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.91		1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.94	1.00	0.99		1.00	0.99		1.00	1.00	0.93
Flpb, ped/bikes	1.00	1.00	1.00	0.96	1.00		1.00	1.00		0.98	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1673	1939	1402	1579	1822		1612	4854		1230	3448	1450
Flt Permitted	0.95	1.00	1.00	0.62	1.00		0.05	1.00		0.24	1.00	1.00
Satd. Flow (perm)	1673	1939	1402	1024	1822		86	4854		310	3448	1450
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)	196	228	374	83	214	22	150	1067	57	19	1620	178
RTOR Reduction (vph)	0	0	0	0	0	0	0	3	0	0	0	74
Lane Group Flow (vph)	196	228	374	83	236	0	150	1121	0	19	1620	104
Confl. Peds. (#/hr)	66		35	35		66	42		46	46		42
Heavy Vehicles (%)	6%	2%	6%	8%	5%	15%	10%	10%	4%	41%	9%	2%
Turn Type	Prot	NA	Perm	Perm	NA		pm+pt	NA		Perm	NA	custom
Protected Phases	7	4			8		1	6			2	
Permitted Phases			4	8			6			2		6
Actuated Green, G (s)	18.0	49.0	49.0	26.0	26.0		86.5	86.5		74.5	74.5	86.5
Effective Green, g (s)	19.0	50.0	50.0	27.0	27.0		88.5	87.5		75.5	75.5	87.5
Actuated g/C Ratio	0.13	0.33	0.33	0.18	0.18		0.59	0.58		0.50	0.50	0.58
Clearance Time (s)	5.0	7.5	7.5	7.5	7.5		4.0	7.0		7.0	7.0	7.0
Vehicle Extension (s)	2.5	3.0	3.0	3.0	3.0		2.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	211	646	467	184	327		152	2831		156	1735	845
v/s Ratio Prot	c0.12	0.12			0.13		c0.07	0.23			c0.47	
v/s Ratio Perm			c0.27	0.08			0.51			0.06		0.07
v/c Ratio	0.93	0.35	0.80	0.45	0.72		0.99	0.40		0.12	0.93	0.12
Uniform Delay, d1	64.8	37.8	45.5	54.9	58.0		47.5	16.9		19.7	34.9	14.0
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	42.0	0.3	9.5	1.8	7.6		68.3	0.4		1.6	10.7	0.3
Delay (s)	106.8	38.1	55.0	56.6	65.6		115.8	17.3		21.3	45.6	14.3
Level of Service	F	D	D	E	E		F	B		C	D	B
Approach Delay (s)		62.9			63.3			28.9			42.3	
Approach LOS		E			E			C			D	
Intersection Summary												
HCM 2000 Control Delay			43.8				HCM 2000 Level of Service			D		
HCM 2000 Volume to Capacity ratio			0.94									
Actuated Cycle Length (s)			150.0				Sum of lost time (s)			21.5		
Intersection Capacity Utilization			106.5%				ICU Level of Service			G		
Analysis Period (min)			15									
c Critical Lane Group												

Queues
321: Yonge Street & Glen Cameron Road

AM Peak Period - Existing
AM Peak Period - Existing

	→	↘	←	↙	↑	↗	↓	↘
Lane Group	EBT	EBR	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	58	52	138	22	1359	108	1997	12
v/c Ratio	0.33	0.20	0.54	0.19	0.39	0.33	0.50	0.01
Control Delay	52.5	7.0	32.4	16.8	10.6	7.2	7.4	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0
Total Delay	52.5	7.0	32.4	16.8	10.6	7.2	7.8	0.0
Queue Length 50th (m)	14.2	0.0	17.0	1.6	43.2	4.0	48.5	0.0
Queue Length 95th (m)	22.5	6.8	30.7	10.1	91.9	16.9	123.0	0.0
Internal Link Dist (m)	157.3		216.7		102.2		172.6	
Turn Bay Length (m)				46.0		46.0		30.0
Base Capacity (vph)	391	506	481	115	3444	337	3993	1191
Starvation Cap Reductn	0	0	0	0	0	0	1222	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	0.15	0.10	0.29	0.19	0.39	0.32	0.72	0.01
Intersection Summary								

HCM Signalized Intersection Capacity Analysis

321: Yonge Street & Glen Cameron Road

AM Peak Period - Existing

AM Peak Period - Existing

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	28	24	47	40	5	79	20	1152	71	97	1797	11
Future Volume (vph)	28	24	47	40	5	79	20	1152	71	97	1797	11
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0
Total Lost time (s)		6.5	6.5		6.5		6.0	6.0		3.0	6.0	6.0
Lane Util. Factor		1.00	1.00		1.00		1.00	0.91		1.00	0.91	1.00
Frpb, ped/bikes		1.00	0.98		0.98		1.00	1.00		1.00	1.00	0.97
Flpb, ped/bikes		0.99	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frt		1.00	0.85		0.91		1.00	0.99		1.00	1.00	0.85
Flt Protected		0.97	1.00		0.98		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1913	1551		1651		1772	5039		1756	5192	1538
Flt Permitted		0.67	1.00		0.87		0.09	1.00		0.16	1.00	1.00
Satd. Flow (perm)		1321	1551		1462		171	5039		300	5192	1538
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	0.92
Adj. Flow (vph)	31	27	52	44	6	88	22	1280	79	108	1997	12
RTOR Reduction (vph)	0	0	45	0	60	0	0	3	0	0	0	3
Lane Group Flow (vph)	0	58	7	0	78	0	22	1356	0	108	1997	9
Confl. Peds. (#/hr)	16		10	10		16	5		2	2		5
Heavy Vehicles (%)	0%	0%	0%	5%	0%	6%	0%	6%	7%	1%	4%	0%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		pm+pt	NA	Perm
Protected Phases		4			8			2		1	6	
Permitted Phases	4		4	8			2		6			6
Actuated Green, G (s)		16.5	16.5		16.5		87.8	87.8		99.0	99.0	99.0
Effective Green, g (s)		17.5	17.5		17.5		88.8	88.8		100.0	100.0	100.0
Actuated g/C Ratio		0.13	0.13		0.13		0.68	0.68		0.77	0.77	0.77
Clearance Time (s)		7.5	7.5		7.5		7.0	7.0		4.0	7.0	7.0
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0		2.0	3.0	3.0
Lane Grp Cap (vph)		177	208		196		116	3442		322	3993	1183
v/s Ratio Prot								0.27		0.02	c0.38	
v/s Ratio Perm		0.04	0.00		c0.05		0.13			0.24		0.01
v/c Ratio		0.33	0.03		0.40		0.19	0.39		0.34	0.50	0.01
Uniform Delay, d1		50.9	48.9		51.4		7.5	8.9		4.6	5.6	3.5
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		1.1	0.1		1.3		3.6	0.3		0.2	0.5	0.0
Delay (s)		52.0	49.0		52.8		11.1	9.3		4.8	6.1	3.5
Level of Service		D	D		D		B	A		A	A	A
Approach Delay (s)		50.6			52.8			9.3			6.0	
Approach LOS		D			D			A			A	
Intersection Summary												
HCM 2000 Control Delay			10.2				HCM 2000 Level of Service			B		
HCM 2000 Volume to Capacity ratio			0.50									
Actuated Cycle Length (s)			130.0				Sum of lost time (s)			15.5		
Intersection Capacity Utilization			94.4%				ICU Level of Service			F		
Analysis Period (min)			15									
c Critical Lane Group												

Queues
310: Yonge Street & Arnold Avenue/Elgin Street

PM Peak Period - Existing
PM Peak Period - Existing



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	23	72	37	118	52	1782	54	96	1528
v/c Ratio	0.19	0.33	0.24	0.56	0.25	0.63	0.04	0.67	0.53
Control Delay	53.9	55.9	54.5	64.1	8.0	7.4	1.7	34.5	6.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	53.9	55.9	54.5	64.1	8.0	7.4	1.7	34.5	6.2
Queue Length 50th (m)	5.4	17.3	8.8	29.1	2.9	83.8	0.7	9.1	62.5
Queue Length 95th (m)	13.7	30.9	18.9	46.8	9.6	123.1	4.0	#50.3	92.4
Internal Link Dist (m)		214.8		157.0		56.5			267.7
Turn Bay Length (m)	35.0				42.0		52.0	34.0	
Base Capacity (vph)	243	432	310	422	204	2843	1256	143	2859
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	0.09	0.17	0.12	0.28	0.25	0.63	0.04	0.67	0.53

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

310: Yonge Street & Arnold Avenue/Elgin Street

PM Peak Period - Existing

PM Peak Period - Existing

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	21	38	30	33	52	60	47	1693	51	86	1405	47
Future Volume (vph)	21	38	30	33	52	60	47	1693	51	86	1405	47
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0
Total Lost time (s)	6.5	6.5		6.5	6.5		6.0	6.0	6.0	6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	
Frt	1.00	0.93		1.00	0.92		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)	1612	1846		1773	1800		1739	3613	1587	1756	3634	
Flt Permitted	0.61	1.00		0.71	1.00		0.14	1.00	1.00	0.10	1.00	
Satd. Flow (perm)	1038	1846		1326	1800		259	3613	1587	184	3634	
Peak-hour factor, PHF	0.90	0.95	0.95	0.90	0.95	0.95	0.90	0.95	0.95	0.90	0.95	0.95
Adj. Flow (vph)	23	40	32	37	55	63	52	1782	54	96	1479	49
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	8	0	1	0
Lane Group Flow (vph)	23	72	0	37	118	0	52	1782	46	96	1527	0
Heavy Vehicles (%)	10%	0%	0%	0%	0%	2%	2%	4%	0%	1%	3%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	14.2	14.2		14.2	14.2		101.3	101.3	101.3	101.3	101.3	
Effective Green, g (s)	15.2	15.2		15.2	15.2		102.3	102.3	102.3	102.3	102.3	
Actuated g/C Ratio	0.12	0.12		0.12	0.12		0.79	0.79	0.79	0.79	0.79	
Clearance Time (s)	7.5	7.5		7.5	7.5		7.0	7.0	7.0	7.0	7.0	
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)	121	215		155	210		203	2843	1248	144	2859	
v/s Ratio Prot		0.04			c0.07			0.49			0.42	
v/s Ratio Perm	0.02			0.03			0.20		0.03	c0.52		
v/c Ratio	0.19	0.33		0.24	0.56		0.26	0.63	0.04	0.67	0.53	
Uniform Delay, d1	51.8	52.8		52.1	54.3		3.7	5.8	3.0	6.2	5.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.8	0.9		0.8	3.4		3.0	1.1	0.1	21.8	0.7	
Delay (s)	52.6	53.7		52.9	57.7		6.7	6.9	3.1	28.0	5.8	
Level of Service	D	D		D	E		A	A	A	C	A	
Approach Delay (s)		53.4			56.5			6.8			7.1	
Approach LOS		D			E			A			A	
Intersection Summary												
HCM 2000 Control Delay		10.2			HCM 2000 Level of Service			B				
HCM 2000 Volume to Capacity ratio		0.65										
Actuated Cycle Length (s)		130.0			Sum of lost time (s)			12.5				
Intersection Capacity Utilization		86.7%			ICU Level of Service			E				
Analysis Period (min)		15										

c Critical Lane Group

Queues

317: Yonge Street & Clark Avenue

PM Peak Period - Existing

PM Peak Period - Existing

										
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	237	252	268	44	242	243	1831	29	1205	200
v/c Ratio	0.96	0.37	0.53	0.22	0.67	0.93	0.65	0.44	0.79	0.22
Control Delay	107.8	34.8	39.5	48.8	61.9	73.4	23.3	56.5	40.8	2.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0
Total Delay	107.8	34.8	39.5	48.8	61.9	73.4	24.1	56.5	40.8	2.7
Queue Length 50th (m)	66.2	49.0	55.6	10.0	60.2	49.0	133.9	6.0	160.4	0.0
Queue Length 95th (m)	#118.3	71.3	82.4	21.2	88.2	#101.2	150.4	#20.8	190.6	11.7
Internal Link Dist (m)	202.9				194.6		172.6		187.5	
Turn Bay Length (m)	78.0					47.0			98.0	250.0
Base Capacity (vph)	246	761	574	244	447	262	2833	66	1517	907
Starvation Cap Reductn	0	0	0	0	0	0	593	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.96	0.33	0.47	0.18	0.54	0.93	0.82	0.44	0.79	0.22

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

317: Yonge Street & Clark Avenue

PM Peak Period - Existing

PM Peak Period - Existing

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	213	239	255	40	205	25	219	1695	45	26	1145	180
Future Volume (vph)	213	239	255	40	205	25	219	1695	45	26	1145	180
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0
Total Lost time (s)	3.0	6.5	6.5	6.5	6.5		3.0	6.0		6.0	6.0	6.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.91		1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.94	1.00	0.99		1.00	1.00		1.00	1.00	0.94
Flpb, ped/bikes	1.00	1.00	1.00	0.97	1.00		1.00	1.00		0.99	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.98		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1722	1920	1448	1662	1925		1705	5061		1629	3579	1463
Flt Permitted	0.95	1.00	1.00	0.60	1.00		0.08	1.00		0.09	1.00	1.00
Satd. Flow (perm)	1722	1920	1448	1055	1925		145	5061		157	3579	1463
Peak-hour factor, PHF	0.90	0.95	0.95	0.90	0.95	0.95	0.90	0.95	0.95	0.90	0.95	0.90
Adj. Flow (vph)	237	252	268	44	216	26	243	1784	47	29	1205	200
RTOR Reduction (vph)	0	0	0	0	0	0	0	2	0	0	0	88
Lane Group Flow (vph)	237	252	268	44	242	0	243	1829	0	29	1205	112
Confl. Peds. (#/hr)	63		35	35		63	38		58	58		38
Heavy Vehicles (%)	3%	3%	3%	3%	0%	0%	4%	6%	2%	8%	5%	2%
Turn Type	Prot	NA	Perm	Perm	NA		pm+pt	NA		Perm	NA	custom
Protected Phases	7	4			8		1	6			2	
Permitted Phases			4	8			6			2		6
Actuated Green, G (s)	18.0	48.1	48.1	25.1	25.1		77.4	77.4		58.4	58.4	77.4
Effective Green, g (s)	20.0	49.1	49.1	26.1	26.1		78.4	78.4		59.4	59.4	78.4
Actuated g/C Ratio	0.14	0.35	0.35	0.19	0.19		0.56	0.56		0.42	0.42	0.56
Clearance Time (s)	5.0	7.5	7.5	7.5	7.5		4.0	7.0		7.0	7.0	7.0
Vehicle Extension (s)	2.5	3.0	3.0	3.0	3.0		2.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	246	673	507	196	358		259	2834		66	1518	819
v/s Ratio Prot	c0.14	0.13			c0.13		c0.11	0.36			0.34	
v/s Ratio Perm			0.19	0.04			c0.42			0.18		0.08
v/c Ratio	0.96	0.37	0.53	0.22	0.68		0.94	0.65		0.44	0.79	0.14
Uniform Delay, d1	59.6	34.0	36.2	48.4	53.0		40.2	21.2		28.5	35.0	14.7
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	46.9	0.4	1.0	0.6	5.0		38.6	1.1		19.8	4.4	0.3
Delay (s)	106.5	34.3	37.2	48.9	58.0		78.8	22.4		48.3	39.3	15.0
Level of Service	F	C	D	D	E		E	C		D	D	B
Approach Delay (s)		58.0			56.6			29.0			36.1	
Approach LOS		E			E			C			D	
Intersection Summary												
HCM 2000 Control Delay			37.8				HCM 2000 Level of Service			D		
HCM 2000 Volume to Capacity ratio			0.93									
Actuated Cycle Length (s)			140.0				Sum of lost time (s)			21.5		
Intersection Capacity Utilization			113.1%				ICU Level of Service			H		
Analysis Period (min)			15									
c Critical Lane Group												

Queues
321: Yonge Street & Glen Cameron Road

PM Peak Period - Existing
PM Peak Period - Existing

								
Lane Group	EBT	EBR	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	47	41	204	49	2263	158	1481	32
v/c Ratio	0.19	0.13	0.69	0.25	0.67	0.88	0.38	0.03
Control Delay	44.3	3.6	50.6	17.5	17.2	73.0	7.7	2.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.3	3.6	50.6	17.5	17.2	73.0	7.7	2.2
Queue Length 50th (m)	10.6	0.0	40.2	4.8	119.3	23.9	43.0	0.0
Queue Length 95th (m)	18.7	3.5	56.8	17.3	190.5	#69.0	79.7	3.3
Internal Link Dist (m)	157.3		216.7		102.2		172.6	
Turn Bay Length (m)				46.0		46.0		30.0
Base Capacity (vph)	427	507	487	193	3370	182	3848	1136
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	0.11	0.08	0.42	0.25	0.67	0.87	0.38	0.03

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

321: Yonge Street & Glen Cameron Road

PM Peak Period - Existing

PM Peak Period - Existing

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations								  			  	
Traffic Volume (vph)	20	24	39	64	27	100	44	2010	140	142	1407	30
Future Volume (vph)	20	24	39	64	27	100	44	2010	140	142	1407	30
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0
Total Lost time (s)		6.5	6.5		6.5		6.0	6.0		3.0	6.0	6.0
Lane Util. Factor		1.00	1.00		1.00		1.00	0.91		1.00	0.91	1.00
Frpb, ped/bikes		1.00	0.98		0.99		1.00	1.00		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
Frt		1.00	0.85		0.93		1.00	0.99		1.00	1.00	0.85
Flt Protected		0.98	1.00		0.98		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1925	1556		1753		1736	5234		1773	5242	1534
Flt Permitted		0.73	1.00		0.87		0.17	1.00		0.05	1.00	1.00
Satd. Flow (perm)		1445	1556		1544		302	5234		86	5242	1534
Peak-hour factor, PHF	0.90	0.95	0.95	0.90	0.95	0.95	0.90	0.95	0.95	0.90	0.95	0.95
Adj. Flow (vph)	22	25	41	71	28	105	49	2116	147	158	1481	32
RTOR Reduction (vph)	0	0	34	0	35	0	0	4	0	0	0	9
Lane Group Flow (vph)	0	47	7	0	169	0	49	2259	0	158	1481	23
Confl. Peds. (#/hr)	13		7	7		13	6		2	2		6
Heavy Vehicles (%)	0%	0%	0%	0%	4%	2%	2%	2%	2%	0%	3%	0%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		pm+pt	NA	Perm
Protected Phases		4			8			2		1	6	
Permitted Phases	4		4	8			2		6			6
Actuated Green, G (s)		21.1	21.1		21.1		82.6	82.6		94.4	94.4	94.4
Effective Green, g (s)		22.1	22.1		22.1		83.6	83.6		95.4	95.4	95.4
Actuated g/C Ratio		0.17	0.17		0.17		0.64	0.64		0.73	0.73	0.73
Clearance Time (s)		7.5	7.5		7.5		7.0	7.0		4.0	7.0	7.0
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0		2.0	3.0	3.0
Lane Grp Cap (vph)		245	264		262		194	3365		177	3846	1125
v/s Ratio Prot								0.43		c0.06	0.28	
v/s Ratio Perm		0.03	0.00		c0.11		0.16			c0.59		0.02
v/c Ratio		0.19	0.03		0.65		0.25	0.67		0.89	0.39	0.02
Uniform Delay, d1		46.3	45.0		50.3		9.9	14.6		36.9	6.4	4.7
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		0.4	0.0		5.4		3.1	1.1		38.0	0.3	0.0
Delay (s)		46.7	45.0		55.7		13.0	15.7		74.9	6.7	4.7
Level of Service		D	D		E		B	B		E	A	A
Approach Delay (s)		45.9			55.7			15.6			13.1	
Approach LOS		D			E			B			B	
Intersection Summary												
HCM 2000 Control Delay			17.2									
HCM 2000 Volume to Capacity ratio			0.86									
Actuated Cycle Length (s)			130.0							15.5		
Intersection Capacity Utilization			88.4%									
Analysis Period (min)			15									
c Critical Lane Group												

Queues

AM Peak Period - Existing

3: Yonge Street & Uplands Avenue/Access

AM Peak Period - Existing



Lane Group	EBT	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	99	29	30	1800	7	31	2098
v/c Ratio	0.48	0.13	0.37	0.64	0.01	0.23	0.75
Control Delay	42.4	15.0	32.3	16.9	1.3	11.1	11.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	42.4	15.0	32.3	16.9	1.3	11.1	11.4
Queue Length 50th (m)	17.3	0.0	4.9	171.4	0.0	1.5	105.4
Queue Length 95th (m)	29.6	7.7	m8.6	202.7	m0.0	9.8	258.3
Internal Link Dist (m)	199.0	75.0		460.0			267.7
Turn Bay Length (m)			37.0		23.0	42.0	
Base Capacity (vph)	401	429	82	2816	1184	137	2811
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.25	0.07	0.37	0.64	0.01	0.23	0.75

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

3: Yonge Street & Uplands Avenue/Access

AM Peak Period - Existing

AM Peak Period - Existing

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	56	0	33	8	0	18	27	1620	6	28	1869	19
Future Volume (vph)	56	0	33	8	0	18	27	1620	6	28	1869	19
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0
Total Lost time (s)		6.5			6.5		5.5	5.5	6.5	5.5	5.5	
Lane Util. Factor		1.00			1.00		1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes		0.99			0.99		1.00	1.00	0.96	1.00	1.00	
Flpb, ped/bikes		0.99			1.00		1.00	1.00	1.00	1.00	1.00	
Frt		0.95			0.91		1.00	1.00	0.85	1.00	1.00	
Flt Protected		0.97			0.98		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1753			1667		1773	3613	1523	1773	3607	
Flt Permitted		0.79			0.91		0.06	1.00	1.00	0.09	1.00	
Satd. Flow (perm)		1432			1537		106	3613	1523	176	3607	
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	0.92
Adj. Flow (vph)	62	0	37	9	0	20	30	1800	7	31	2077	21
RTOR Reduction (vph)	0	25	0	0	25	0	0	0	2	0	0	0
Lane Group Flow (vph)	0	74	0	0	4	0	30	1800	5	31	2098	0
Confl. Peds. (#/hr)	7		3	3		7			7			
Heavy Vehicles (%)	2%	0%	4%	14%	0%	0%	0%	4%	0%	0%	4%	6%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)		15.6			15.6		100.4	100.4	100.4	100.4	100.4	
Effective Green, g (s)		16.6			16.6		101.4	101.4	100.4	101.4	101.4	
Actuated g/C Ratio		0.13			0.13		0.78	0.78	0.77	0.78	0.78	
Clearance Time (s)		7.5			7.5		6.5	6.5	6.5	6.5	6.5	
Vehicle Extension (s)		3.0			3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		182			196		82	2818	1176	137	2813	
v/s Ratio Prot								0.50			c0.58	
v/s Ratio Perm		c0.05			0.00		0.28		0.00	0.18		
v/c Ratio		0.40			0.02		0.37	0.64	0.00	0.23	0.75	
Uniform Delay, d1		52.2			49.6		4.4	6.3	3.4	3.8	7.5	
Progression Factor		1.00			1.00		2.04	2.06	1.00	1.00	1.00	
Incremental Delay, d2		1.5			0.0		9.3	0.9	0.0	3.8	1.8	
Delay (s)		53.6			49.6		18.3	13.7	3.4	7.6	9.4	
Level of Service		D			D		B	B	A	A	A	
Approach Delay (s)		53.6			49.6			13.8			9.3	
Approach LOS		D			D			B			A	
Intersection Summary												
HCM 2000 Control Delay		12.7										
HCM 2000 Volume to Capacity ratio		0.70										
Actuated Cycle Length (s)		130.0										
Intersection Capacity Utilization		75.5%										
Analysis Period (min)		15										
c Critical Lane Group												

Queues

AM Peak Period - Existing

6: Yonge Street & Access/Royal Orchard Boulevard

AM Peak Period - Existing

								
Lane Group	EBT	WBL	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	2	331	161	8	1576	149	39	1890
v/c Ratio	0.01	0.89	0.36	0.12	0.73	0.16	0.21	0.78
Control Delay	33.0	67.4	10.2	27.4	28.0	8.3	9.2	14.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.0	67.4	10.2	27.4	28.0	8.3	9.2	14.9
Queue Length 50th (m)	0.2	66.5	4.6	1.4	205.3	14.4	1.8	215.5
Queue Length 95th (m)	2.4	95.5	20.5	m2.0	m236.4	m23.8	m3.5	108.4
Internal Link Dist (m)	84.2				723.1			460.0
Turn Bay Length (m)		26.0		35.0		65.0	31.0	
Base Capacity (vph)	418	374	582	64	2170	935	202	2433
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	0.00	0.89	0.28	0.13	0.73	0.16	0.19	0.78

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

6: Yonge Street & Access/Royal Orchard Boulevard

AM Peak Period - Existing

AM Peak Period - Existing

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1	1	298	0	145	7	1418	134	35	1699	2
Future Volume (vph)	0	1	1	298	0	145	7	1418	134	35	1699	2
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0
Total Lost time (s)		6.0		1.0		6.0	6.0	6.0	6.0	3.0	6.0	
Lane Util. Factor		1.00		1.00		1.00	1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes		0.95		1.00		0.96	1.00	1.00	0.94	1.00	1.00	
Flpb, ped/bikes		1.00		0.94		1.00	1.00	1.00	1.00	1.00	1.00	
Frt		0.93		1.00		0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected		1.00		0.95		1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1753		1632		1488	1773	3545	1463	1722	3578	
Flt Permitted		1.00		0.72		1.00	0.06	1.00	1.00	0.07	1.00	
Satd. Flow (perm)		1753		1239		1488	105	3545	1463	132	3578	
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)	0	1	1	331	0	161	8	1576	149	39	1888	2
RTOR Reduction (vph)	0	1	0	0	0	101	0	0	42	0	0	0
Lane Group Flow (vph)	0	1	0	331	0	60	8	1576	107	39	1890	0
Confl. Peds. (#/hr)	24		66	66		24	21		18			21
Heavy Vehicles (%)	0%	0%	0%	2%	0%	2%	0%	6%	2%	3%	5%	0%
Turn Type		NA		pm+pt		Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4		3				2		1	6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)		17.4		31.4		31.4	75.0	75.0	75.0	84.6	84.6	
Effective Green, g (s)		18.4		34.4		32.4	76.0	76.0	76.0	85.6	85.6	
Actuated g/C Ratio		0.14		0.26		0.25	0.58	0.58	0.58	0.66	0.66	
Clearance Time (s)		7.0		4.0		7.0	7.0	7.0	7.0	4.0	7.0	
Vehicle Extension (s)		3.0		2.0		3.0	3.0	3.0	3.0	2.0	3.0	
Lane Grp Cap (vph)		248		367		370	61	2072	855	167	2355	
v/s Ratio Prot		0.00		c0.09				0.44		0.01	c0.53	
v/s Ratio Perm				0.15		0.04	0.08		0.07	0.14		
v/c Ratio		0.00		0.90		0.16	0.13	0.76	0.13	0.23	0.80	
Uniform Delay, d1		47.9		45.2		38.2	12.1	20.2	12.1	16.0	16.1	
Progression Factor		1.00		1.00		1.00	1.21	1.19	1.30	0.81	0.72	
Incremental Delay, d2		0.0		24.0		0.2	3.0	1.9	0.2	0.2	2.0	
Delay (s)		47.9		69.2		38.4	17.7	26.0	16.0	13.2	13.6	
Level of Service		D		E		D	B	C	B	B	B	
Approach Delay (s)		47.9			59.1			25.1			13.6	
Approach LOS		D			E			C			B	
Intersection Summary												
HCM 2000 Control Delay			23.8			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.83									
Actuated Cycle Length (s)			130.0			Sum of lost time (s)			16.0			
Intersection Capacity Utilization			92.8%			ICU Level of Service			F			
Analysis Period (min)			15									
c Critical Lane Group												

Queues

AM Peak Period - Existing

9: Yonge Street & Centre Street/Thornhill Summit Dr

AM Peak Period - Existing



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	320	443	37	43	201	1538	32	12	2163	221
v/c Ratio	0.94	0.85	0.54	0.08	0.99	0.67	0.03	0.10	0.98	0.27
Control Delay	83.3	49.0	70.5	26.2	94.3	17.0	2.8	9.3	32.8	5.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	83.3	49.0	70.5	26.2	94.3	17.0	2.8	9.3	32.8	5.4
Queue Length 50th (m)	79.8	81.4	8.0	5.5	36.5	125.8	0.0	0.7	289.2	4.0
Queue Length 95th (m)	#134.9	#135.1	#24.2	14.7	#86.4	149.3	3.6	m0.9	#339.1	m7.8
Internal Link Dist (m)		122.8		75.5		388.8			723.1	
Turn Bay Length (m)			28.0		46.0		21.0	46.0		30.0
Base Capacity (vph)	348	532	71	522	204	2283	930	121	2199	828
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.92	0.83	0.52	0.08	0.99	0.67	0.03	0.10	0.98	0.27

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.

HCM Signalized Intersection Capacity Analysis

9: Yonge Street & Centre Street/Thornhill Summit Dr

AM Peak Period - Existing

AM Peak Period - Existing

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	288	19	380	33	26	13	181	1384	29	11	1947	203
Future Volume (vph)	288	19	380	33	26	13	181	1384	29	11	1947	203
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2200	2000
Lane Width	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0
Total Lost time (s)	6.0	6.0		6.0	6.0		1.0	6.0	6.0	6.0	5.0	6.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.97		1.00	0.98		1.00	1.00	0.91	1.00	1.00	0.95
Flpb, ped/bikes	0.96	1.00		0.99	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.86		1.00	0.95		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1642	1616		1694	1850		1722	3579	1439	1773	3975	1462
Flt Permitted	0.73	1.00		0.14	1.00		0.05	1.00	1.00	0.12	1.00	1.00
Satd. Flow (perm)	1260	1616		258	1850		98	3579	1439	222	3975	1462
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	0.92
Adj. Flow (vph)	320	21	422	37	29	14	201	1538	32	12	2163	221
RTOR Reduction (vph)	0	86	0	0	10	0	0	0	12	0	0	30
Lane Group Flow (vph)	320	358	0	37	33	0	201	1538	20	12	2163	191
Confl. Peds. (#/hr)	34		16	16		34	13		31			13
Heavy Vehicles (%)	4%	0%	2%	4%	0%	0%	3%	5%	0%	0%	4%	3%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	34.0	34.0		34.0	34.0		82.0	82.0	82.0	70.0	70.0	70.0
Effective Green, g (s)	35.0	35.0		35.0	35.0		85.0	83.0	83.0	71.0	72.0	71.0
Actuated g/C Ratio	0.27	0.27		0.27	0.27		0.65	0.64	0.64	0.55	0.55	0.55
Clearance Time (s)	7.0	7.0		7.0	7.0		4.0	7.0	7.0	7.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		2.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	339	435		69	498		201	2285	918	121	2201	798
v/s Ratio Prot		0.22			0.02		c0.08	0.43			c0.54	
v/s Ratio Perm	c0.25			0.14			0.57		0.01	0.05		0.13
v/c Ratio	0.94	0.82		0.54	0.07		1.00	0.67	0.02	0.10	0.98	0.24
Uniform Delay, d1	46.5	44.6		40.6	35.3		44.9	14.9	8.6	14.2	28.4	15.4
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	0.52	0.69	0.44
Incremental Delay, d2	34.3	11.8		7.8	0.1		63.5	1.6	0.0	1.1	12.1	0.5
Delay (s)	80.8	56.4		48.4	35.4		108.4	16.5	8.7	8.4	31.7	7.2
Level of Service	F	E		D	D		F	B	A	A	C	A
Approach Delay (s)		66.6			41.4			26.8			29.3	
Approach LOS		E			D			C			C	
Intersection Summary												
HCM 2000 Control Delay			34.3				HCM 2000 Level of Service			C		
HCM 2000 Volume to Capacity ratio			0.96									
Actuated Cycle Length (s)			130.0				Sum of lost time (s)			12.0		
Intersection Capacity Utilization			103.9%				ICU Level of Service			G		
Analysis Period (min)			15									
c Critical Lane Group												

Queues

PM Peak Period - Existing

3: Yonge Street & Uplands Avenue/Access

PM Peak Period - Existing



Lane Group	EBT	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	41	101	33	2298	12	50	1777
v/c Ratio	0.21	0.48	0.24	0.81	0.01	0.86	0.63
Control Delay	35.7	53.8	2.3	6.0	0.0	109.0	9.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.7	53.8	2.3	6.0	0.0	109.0	9.0
Queue Length 50th (m)	6.4	23.2	0.1	3.4	0.0	6.4	77.8
Queue Length 95th (m)	14.6	34.8	m0.2	#93.8	m0.0	#27.8	177.6
Internal Link Dist (m)	199.0	75.0		460.0			267.7
Turn Bay Length (m)			37.0		23.0	42.0	
Base Capacity (vph)	377	416	140	2825	1048	58	2821
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.11	0.24	0.24	0.81	0.01	0.86	0.63

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.

HCM Signalized Intersection Capacity Analysis

3: Yonge Street & Uplands Avenue/Access

PM Peak Period - Existing

PM Peak Period - Existing

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	23	1	13	30	6	59	30	2183	11	45	1677	11
Future Volume (vph)	23	1	13	30	6	59	30	2183	11	45	1677	11
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0
Total Lost time (s)		6.5			6.5			5.5	5.5	5.5	5.5	
Lane Util. Factor		1.00			1.00			1.00	0.95	1.00	1.00	0.95
Frpb, ped/bikes		1.00			0.99			1.00	1.00	0.94	1.00	1.00
Flpb, ped/bikes		1.00			1.00			1.00	1.00	1.00	1.00	1.00
Frt		0.95			0.92			1.00	1.00	0.85	1.00	1.00
Flt Protected		0.97			0.98			0.95	1.00	1.00	0.95	1.00
Satd. Flow (prot)		1813			1742			1773	3648	1343	1773	3643
Flt Permitted		0.74			0.88			0.10	1.00	1.00	0.04	1.00
Satd. Flow (perm)		1385			1549			180	3648	1343	74	3643
Peak-hour factor, PHF	0.90	0.95	0.95	0.90	0.95	0.95	0.90	0.95	0.95	0.90	0.95	0.95
Adj. Flow (vph)	26	1	14	33	6	62	33	2298	12	50	1765	12
RTOR Reduction (vph)	0	12	0	0	6	0	0	0	3	0	0	0
Lane Group Flow (vph)	0	29	0	0	95	0	33	2298	9	50	1777	0
Confl. Peds. (#/hr)	6		2	2		6	3		14	14		3
Heavy Vehicles (%)	0%	0%	0%	0%	20%	0%	0%	3%	11%	0%	3%	6%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2			6
Actuated Green, G (s)		16.3			16.3		99.7	99.7	99.7	99.7	99.7	
Effective Green, g (s)		17.3			17.3		100.7	100.7	100.7	100.7	100.7	
Actuated g/C Ratio		0.13			0.13		0.77	0.77	0.77	0.77	0.77	
Clearance Time (s)		7.5			7.5		6.5	6.5	6.5	6.5	6.5	
Vehicle Extension (s)		3.0			3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		184			206		139	2825	1040	57	2821	
v/s Ratio Prot								0.63				0.49
v/s Ratio Perm		0.02			0.06		0.18		0.01	0.67		
v/c Ratio		0.16			0.46		0.24	0.81	0.01	0.88	0.63	
Uniform Delay, d1		49.9			52.0		4.0	8.9	3.3	10.3	6.4	
Progression Factor		1.00			1.00		0.05	0.34	1.00	1.00	1.00	
Incremental Delay, d2		0.4			1.6		2.0	1.3	0.0	87.4	1.1	
Delay (s)		50.3			53.7		2.1	4.4	3.3	97.7	7.5	
Level of Service		D			D		A	A	A	F	A	
Approach Delay (s)		50.3			53.7			4.4			10.0	
Approach LOS		D			D			A			A	
Intersection Summary												
HCM 2000 Control Delay		8.3										
HCM 2000 Volume to Capacity ratio		0.81										
Actuated Cycle Length (s)		130.0										
Intersection Capacity Utilization		79.0%										
Analysis Period (min)		15										
c Critical Lane Group												

Queues
6: Yonge Street & Access/Royal Orchard Boulevard

PM Peak Period - Existing
PM Peak Period - Existing

								
Lane Group	EBT	WBL	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	20	159	84	17	2206	220	67	1574
v/c Ratio	0.09	0.62	0.26	0.11	0.90	0.22	0.39	0.59
Control Delay	48.8	55.5	9.2	10.4	15.3	3.3	19.0	18.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	48.8	55.5	9.2	10.4	15.3	3.3	19.0	18.5
Queue Length 50th (m)	4.8	36.2	0.0	0.9	71.1	2.3	6.6	107.5
Queue Length 95th (m)	10.8	46.7	11.4	m1.6 m#	403.9	m6.0	m20.3	248.2
Internal Link Dist (m)	84.2				723.1			460.0
Turn Bay Length (m)		26.0		35.0		65.0	31.0	
Base Capacity (vph)	471	255	557	151	2443	983	182	2668
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	0.04	0.62	0.15	0.11	0.90	0.22	0.37	0.59
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.								

HCM Signalized Intersection Capacity Analysis

6: Yonge Street & Access/Royal Orchard Boulevard

PM Peak Period - Existing

PM Peak Period - Existing

														
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR		
Lane Configurations														
Traffic Volume (vph)	0	19	0	143	0	80	15	2096	209	62	1493	2		
Future Volume (vph)	0	19	0	143	0	80	15	2096	209	62	1493	2		
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000		
Lane Width	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0		
Total Lost time (s)		6.0		3.0		6.0	6.0	6.0	6.0	3.0	6.0			
Lane Util. Factor		1.00		1.00		1.00	1.00	0.95	1.00	1.00	0.95			
Frpb, ped/bikes		1.00		1.00		0.96	1.00	1.00	0.90	1.00	1.00			
Flpb, ped/bikes		1.00		0.98		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			
Flt Protected		1.00		0.95		1.00	0.95	1.00	1.00	0.95	1.00			
Satd. Flow (prot)		1978		1691		1515	1638	3648	1419	1773	3613			
Flt Permitted		1.00		0.58		1.00	0.13	1.00	1.00	0.05	1.00			
Satd. Flow (perm)		1978		1037		1515	225	3648	1419	86	3613			
Peak-hour factor, PHF	0.90	0.95	0.95	0.90	0.95	0.95	0.90	0.95	0.95	0.92	0.95	0.95		
Adj. Flow (vph)	0	20	0	159	0	84	17	2206	220	67	1572	2		
RTOR Reduction (vph)	0	0	0	0	0	68	0	0	36	0	0	0		
Lane Group Flow (vph)	0	20	0	159	0	16	17	2206	184	67	1574	0		
Confl. Peds. (#/hr)	18		26	26		18	13		35	35		13		
Heavy Vehicles (%)	0%	0%	0%	3%	0%	1%	8%	3%	1%	0%	4%	0%		
Turn Type		NA		pm+pt		Perm	Perm	NA	Perm	pm+pt	NA			
Protected Phases		4		3				2		1	6			
Permitted Phases	4			8		8	2		2	6				
Actuated Green, G (s)		9.8		23.8		23.8	82.5	82.5	82.5	92.2	92.2			
Effective Green, g (s)		10.8		24.8		24.8	83.5	83.5	83.5	93.2	93.2			
Actuated g/C Ratio		0.08		0.19		0.19	0.64	0.64	0.64	0.72	0.72			
Clearance Time (s)		7.0		4.0		7.0	7.0	7.0	7.0	4.0	7.0			
Vehicle Extension (s)		3.0		2.0		3.0	3.0	3.0	3.0	2.0	3.0			
Lane Grp Cap (vph)		164		253		289	144	2343	911	148	2590			
v/s Ratio Prot		0.01		c0.05				c0.60		0.02	c0.44			
v/s Ratio Perm				c0.07		0.01	0.08		0.13	0.30				
v/c Ratio		0.12		0.63		0.06	0.12	0.94	0.20	0.45	0.61			
Uniform Delay, d1		55.2		47.0		43.0	9.0	21.0	9.6	32.2	9.2			
Progression Factor		1.00		1.00		1.00	0.68	0.52	0.47	1.14	1.76			
Incremental Delay, d2		0.3		3.5		0.1	0.7	4.4	0.2	0.6	0.8			
Delay (s)		55.5		50.5		43.1	6.8	15.3	4.7	37.4	17.1			
Level of Service		E		D		D	A	B	A	D	B			
Approach Delay (s)		55.5			48.0			14.2			17.9			
Approach LOS		E			D			B			B			
Intersection Summary														
HCM 2000 Control Delay			17.7									HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio			0.88											
Actuated Cycle Length (s)			130.0								18.0			
Intersection Capacity Utilization			103.0%										ICU Level of Service	G
Analysis Period (min)			15											
c Critical Lane Group														

Queues

PM Peak Period - Existing

9: Yonge Street & Centre Street/Thornhill Summit Dr

PM Peak Period - Existing



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	333	410	79	78	278	2111	63	51	1557	261
v/c Ratio	0.96	0.78	0.81	0.16	1.18	0.91	0.07	0.89	0.99	0.30
Control Delay	86.4	40.3	95.6	32.1	146.9	28.3	5.2	124.9	56.9	16.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	86.4	40.3	95.6	32.1	146.9	28.3	5.2	124.9	56.9	16.4
Queue Length 50th (m)	84.0	67.5	18.8	13.1	~65.2	233.9	2.6	13.7	~223.5	34.1
Queue Length 95th (m)	#142.0	107.7	#48.1	25.9	#120.4	276.8	8.0	m#26.2	#267.6	61.4
Internal Link Dist (m)		122.8		75.5		388.8			723.1	
Turn Bay Length (m)			28.0		46.0		21.0	46.0		30.0
Base Capacity (vph)	350	532	99	486	235	2312	902	57	1565	860
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.95	0.77	0.80	0.16	1.18	0.91	0.07	0.89	0.99	0.30

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.

HCM Signalized Intersection Capacity Analysis

9: Yonge Street & Centre Street/Thornhill Summit Dr

PM Peak Period - Existing

PM Peak Period - Existing

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	300	33	356	71	26	48	250	2005	60	46	1479	248
Future Volume (vph)	300	33	356	71	26	48	250	2005	60	46	1479	248
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2200	2000	2000	2000	2000	2000
Lane Width	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0
Total Lost time (s)	6.0	6.0		6.0	6.0		1.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.94		1.00	0.97		1.00	1.00	0.92	1.00	1.00	0.96
Flpb, ped/bikes	0.97	1.00		0.98	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.86		1.00	0.90		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1703	1576		1688	1732		1894	3648	1405	1773	2891	1510
Flt Permitted	0.71	1.00		0.20	1.00		0.06	1.00	1.00	0.06	1.00	1.00
Satd. Flow (perm)	1266	1576		358	1732		127	3648	1405	106	2891	1510
Peak-hour factor, PHF	0.90	0.95	0.95	0.90	0.95	0.95	0.90	0.95	0.95	0.90	0.95	0.95
Adj. Flow (vph)	333	35	375	79	27	51	278	2111	63	51	1557	261
RTOR Reduction (vph)	0	96	0	0	7	0	0	0	12	0	0	44
Lane Group Flow (vph)	333	314	0	79	71	0	278	2111	51	51	1557	217
Confl. Peds. (#/hr)	29		44	44		29	8		25	25		8
Heavy Vehicles (%)	1%	4%	2%	3%	0%	0%	3%	3%	4%	0%	30%	1%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	34.6	34.6		34.6	34.6		81.4	81.4	81.4	69.4	69.4	69.4
Effective Green, g (s)	35.6	35.6		35.6	35.6		84.4	82.4	82.4	70.4	70.4	70.4
Actuated g/C Ratio	0.27	0.27		0.27	0.27		0.65	0.63	0.63	0.54	0.54	0.54
Clearance Time (s)	7.0	7.0		7.0	7.0		4.0	7.0	7.0	7.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		2.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	346	431		98	474		231	2312	890	57	1565	817
v/s Ratio Prot		0.20			0.04		c0.10	0.58			c0.54	
v/s Ratio Perm	c0.26			0.22			0.68		0.04	0.48		0.14
v/c Ratio	0.96	0.73		0.81	0.15		1.20	0.91	0.06	0.89	0.99	0.27
Uniform Delay, d1	46.5	42.8		44.0	35.7		39.2	20.7	9.0	26.5	29.6	16.0
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.42	1.27	1.53
Incremental Delay, d2	38.2	6.1		36.6	0.1		125.3	6.9	0.1	82.6	19.7	0.7
Delay (s)	84.8	48.9		80.6	35.9		164.4	27.6	9.2	120.1	57.3	25.1
Level of Service	F	D		F	D		F	C	A	F	E	C
Approach Delay (s)		65.0			58.4			42.7			54.5	
Approach LOS		E			E			D			D	
Intersection Summary												
HCM 2000 Control Delay			50.5				HCM 2000 Level of Service			D		
HCM 2000 Volume to Capacity ratio			0.99									
Actuated Cycle Length (s)			130.0				Sum of lost time (s)			13.0		
Intersection Capacity Utilization			134.2%				ICU Level of Service			H		
Analysis Period (min)			15									
c Critical Lane Group												

Queues

AM Peak Period - Existing

1: Yonge St & Garden Ave/HWY 7 Ramp

AM Peak Period - Existing

											
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	151	141	229	280	76	71	147	1239	311	218	2271
v/c Ratio	0.46	0.49	0.52	0.99	0.29	0.35	0.90	0.51	0.40	1.11	0.95
Control Delay	51.3	68.5	9.7	123.2	62.9	65.8	117.6	33.6	5.3	159.6	50.0
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	51.3	68.5	9.7	123.2	62.9	65.8	117.6	33.6	5.3	159.6	50.0
Queue Length 50th (m)	40.0	43.8	0.0	49.1	22.8	21.5	49.6	96.7	0.0	~82.9	241.6
Queue Length 95th (m)	61.6	68.3	21.1	#81.7	40.4	38.9	#94.1	163.6	26.6	#139.8	#423.3
Internal Link Dist (m)		329.9			224.0			289.0			205.2
Turn Bay Length (m)	20.0		31.0	85.0			85.0		165.0	150.0	
Base Capacity (vph)	333	317	466	282	293	223	164	2434	777	196	2382
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	0.45	0.44	0.49	0.99	0.26	0.32	0.90	0.51	0.40	1.11	0.95

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.

HCM Signalized Intersection Capacity Analysis

1: Yonge St & Garden Ave/HWY 7 Ramp

AM Peak Period - Existing

AM Peak Period - Existing

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	136	127	206	252	68	64	132	1115	280	196	1900	144
Future Volume (vph)	136	127	206	252	68	64	132	1115	280	196	1900	144
Ideal Flow (vphpl)	2000	2000	2000	2200	2000	2000	2000	2000	2000	2300	2000	2000
Lane Width	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0
Total Lost time (s)	7.5	7.5	7.5	6.5	7.5	7.5	5.0	7.0	7.0	3.0	7.0	
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.91	1.00	1.00	0.91	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.95	1.00	1.00	0.98	1.00	1.00	
Flpb, ped/bikes	0.98	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	0.99	
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)	1716	1848	1546	3349	1705	1303	1756	5293	1326	1854	5175	
Flt Permitted	0.71	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1278	1848	1546	3349	1705	1303	1756	5293	1326	1854	5175	
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)	151	141	229	280	76	71	147	1239	311	218	2111	160
RTOR Reduction (vph)	0	0	194	0	0	0	0	0	193	0	4	0
Lane Group Flow (vph)	151	141	35	280	76	71	147	1239	118	218	2267	0
Confl. Peds. (#/hr)	19		2	2		19	1		1	1		1
Heavy Vehicles (%)	1%	7%	1%	13%	16%	16%	1%	2%	17%	10%	3%	4%
Turn Type	pm+pt	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases	4		4			8			6			
Actuated Green, G (s)	34.9	23.7	23.7	11.5	24.0	24.0	14.0	59.8	59.8	14.0	59.8	
Effective Green, g (s)	36.9	24.7	24.7	13.5	25.0	25.0	15.0	60.8	60.8	17.0	60.8	
Actuated g/C Ratio	0.23	0.15	0.15	0.08	0.16	0.16	0.09	0.38	0.38	0.11	0.38	
Clearance Time (s)	8.5	8.5	8.5	8.5	8.5	8.5	6.0	8.0	8.0	6.0	8.0	
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)	328	285	238	282	266	203	164	2011	503	196	1966	
v/s Ratio Prot	0.04	c0.08		c0.08	0.04		0.08	0.23		c0.12	c0.44	
v/s Ratio Perm	0.07		0.02			0.05			0.09			
v/c Ratio	0.46	0.49	0.15	0.99	0.29	0.35	0.90	0.62	0.23	1.11	1.15	
Uniform Delay, d1	51.9	61.9	58.5	73.2	59.6	60.2	71.7	40.2	33.8	71.5	49.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.0	1.4	0.3	51.4	0.6	1.0	41.4	1.4	1.1	97.6	75.1	
Delay (s)	53.0	63.3	58.8	124.6	60.2	61.3	113.2	41.6	34.9	169.1	124.7	
Level of Service	D	E	E	F	E	E	F	D	C	F	F	
Approach Delay (s)		58.3			102.6			46.5			128.6	
Approach LOS		E			F			D			F	
Intersection Summary												
HCM 2000 Control Delay			92.2									
HCM 2000 Volume to Capacity ratio			0.98									
Actuated Cycle Length (s)			160.0									
Intersection Capacity Utilization			94.9%									
Analysis Period (min)			15									
c Critical Lane Group												

Queues

256: Yonge St & Highway407 WB Off Ramp

AM Peak Period - Existing

AM Peak Period - Existing



Lane Group	WBL	WBR	NBT	SBT
Lane Group Flow (vph)	210	176	1477	2436
v/c Ratio	0.48	0.68	0.37	0.60
Control Delay	54.7	52.8	11.0	7.1
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	54.7	52.8	11.0	7.1
Queue Length 50th (m)	27.4	34.7	43.5	82.7
Queue Length 95th (m)	37.9	56.8	148.0	122.6
Internal Link Dist (m)	423.5		424.5	289.0
Turn Bay Length (m)				
Base Capacity (vph)	992	529	3982	4059
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.21	0.33	0.37	0.60
Intersection Summary				

HCM Signalized Intersection Capacity Analysis 256: Yonge St & Highway407 WB Off Ramp

AM Peak Period - Existing

AM Peak Period - Existing

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	189	158	1329	0	0	2192
Future Volume (vph)	189	158	1329	0	0	2192
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000
Lane Width	3.0	3.5	3.5	3.0	3.0	3.5
Total Lost time (s)	5.0	5.0	6.0			6.0
Lane Util. Factor	0.97	1.00	0.91			0.91
Frt	1.00	0.85	1.00			1.00
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	3308	1664	5094			5192
Flt Permitted	0.95	1.00	1.00			1.00
Satd. Flow (perm)	3308	1664	5094			5192
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	210	176	1477	0	0	2436
RTOR Reduction (vph)	0	37	0	0	0	0
Lane Group Flow (vph)	210	139	1477	0	0	2436
Heavy Vehicles (%)	4%	1%	6%	0%	0%	4%
Turn Type	Prot	Perm	NA			NA
Protected Phases	8		2			6
Permitted Phases		8				
Actuated Green, G (s)	16.4	16.4	100.6			100.6
Effective Green, g (s)	17.4	17.4	101.6			101.6
Actuated g/C Ratio	0.13	0.13	0.78			0.78
Clearance Time (s)	6.0	6.0	7.0			7.0
Vehicle Extension (s)	3.0	3.0	3.0			3.0
Lane Grp Cap (vph)	442	222	3981			4057
v/s Ratio Prot	0.06		0.29			c0.47
v/s Ratio Perm		c0.08				
v/c Ratio	0.48	0.63	0.37			0.60
Uniform Delay, d1	52.1	53.2	4.4			5.8
Progression Factor	1.00	1.00	2.27			1.00
Incremental Delay, d2	0.8	5.4	0.2			0.7
Delay (s)	52.9	58.6	10.1			6.5
Level of Service	D	E	B			A
Approach Delay (s)	55.5		10.1			6.5
Approach LOS	E		B			A
Intersection Summary						
HCM 2000 Control Delay			12.2		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.60			
Actuated Cycle Length (s)			130.0		Sum of lost time (s)	11.0
Intersection Capacity Utilization			57.7%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

Queues

AM Peak Period - Existing

313: Yonge St & Highway 407 EB off Ramp/Langstaff Road E

AM Peak Period - Existing



Lane Group	EBL	EBT	EBR	WBL	WBR	NBT	SBL	SBT
Lane Group Flow (vph)	99	98	287	31	74	1655	63	2129
v/c Ratio	0.39	0.39	0.78	0.28	0.40	0.50	0.27	0.57
Control Delay	51.3	51.1	38.9	63.1	11.0	16.6	6.9	9.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.3	51.1	38.9	63.1	11.0	16.6	6.9	9.3
Queue Length 50th (m)	25.8	25.5	37.5	8.1	0.0	88.3	2.1	112.4
Queue Length 95th (m)	39.0	38.8	62.2	18.5	8.2	142.1	m8.5	176.2
Internal Link Dist (m)		225.0				206.6		424.5
Turn Bay Length (m)							66.0	
Base Capacity (vph)	470	471	556	177	245	3326	240	3733
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	0.21	0.21	0.52	0.18	0.30	0.50	0.26	0.57

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

313: Yonge St & Highway 407 EB off Ramp/Langstaff Road E

AM Peak Period - Existing

AM Peak Period - Existing

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	168	9	258	28	0	67	0	1463	26	57	1916	0
Future Volume (vph)	168	9	258	28	0	67	0	1463	26	57	1916	0
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width	3.5	3.5	3.5	3.0	3.5	3.0	3.6	3.6	3.6	3.0	3.5	3.5
Total Lost time (s)	3.0	3.0	3.0	3.0		4.0		6.0		3.0	5.0	
Lane Util. Factor	0.95	0.95	1.00	1.00		1.00		0.91		1.00	0.91	
Frpb, ped/bikes	1.00	1.00	1.00	1.00		1.00		1.00		1.00	1.00	
Flpb, ped/bikes	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		0.85		1.00		1.00	1.00	
Flt Protected	0.95	0.96	1.00	0.95		1.00		1.00		0.95	1.00	
Satd. Flow (prot)	1653	1657	1586	1542		1442		5288		1739	5293	
Flt Permitted	0.95	0.96	1.00	0.95		1.00		1.00		0.10	1.00	
Satd. Flow (perm)	1653	1657	1586	1542		1442		5288		185	5293	
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)	187	10	287	31	0	74	0	1626	29	63	2129	0
RTOR Reduction (vph)	0	0	124	0	0	70	0	1	0	0	0	0
Lane Group Flow (vph)	99	98	163	31	0	4	0	1654	0	63	2129	0
Confl. Peds. (#/hr)	1		2	2		1			3	3		
Heavy Vehicles (%)	8%	13%	6%	15%	0%	10%	0%	3%	0%	2%	2%	0%
Turn Type	Split	NA	Prot	Prot		Prot		NA		pm+pt	NA	
Protected Phases	4	4	4	3		3		2		1	6	
Permitted Phases										6		
Actuated Green, G (s)	19.0	19.0	19.0	7.1		7.1		79.2		89.9	89.9	
Effective Green, g (s)	20.0	20.0	20.0	8.1		7.1		80.2		90.9	90.9	
Actuated g/C Ratio	0.15	0.15	0.15	0.06		0.05		0.62		0.70	0.70	
Clearance Time (s)	4.0	4.0	4.0	4.0		4.0		7.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0		3.0		2.0	3.0	
Lane Grp Cap (vph)	254	254	244	96		78		3262		209	3701	
v/s Ratio Prot	0.06	0.06	c0.10	c0.02		0.00		0.31		0.02	c0.40	
v/s Ratio Perm										0.19		
v/c Ratio	0.39	0.39	0.67	0.32		0.05		0.51		0.30	0.58	
Uniform Delay, d1	49.5	49.5	51.9	58.3		58.3		13.9		8.7	9.8	
Progression Factor	1.00	1.00	1.00	1.00		1.00		1.00		0.54	0.74	
Incremental Delay, d2	1.0	1.0	6.7	2.0		0.3		0.6		0.2	0.5	
Delay (s)	50.5	50.5	58.6	60.3		58.5		14.4		4.9	7.9	
Level of Service	D	D	E	E		E		B		A	A	
Approach Delay (s)		55.3			59.1			14.4			7.8	
Approach LOS		E			E			B			A	
Intersection Summary												
HCM 2000 Control Delay			16.7									
HCM 2000 Volume to Capacity ratio			0.60									
Actuated Cycle Length (s)			130.0							16.0		
Intersection Capacity Utilization			65.8%									
Analysis Period (min)			15									
c Critical Lane Group												

Queues

PM Peak Period - Existing

1: Yonge St & Garden Ave/HWY 7 Ramp

PM Peak Period - Existing

											
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	51	32	60	427	63	156	202	2439	188	183	1326
v/c Ratio	0.20	0.17	0.15	1.07	0.25	0.71	0.99	0.93	0.23	1.06	0.53
Control Delay	46.2	60.7	0.8	128.1	60.9	81.2	128.7	44.9	1.9	151.9	31.9
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	46.2	60.7	0.8	128.1	60.9	81.2	128.7	44.9	1.9	151.9	31.9
Queue Length 50th (m)	13.1	9.6	0.0	~91.5	18.8	50.5	68.7	256.4	0.0	~67.1	101.6
Queue Length 95th (m)	24.1	20.1	0.0	#128.0	34.2	76.9	#124.5	#467.5	5.3	#120.5	#196.1
Internal Link Dist (m)	329.9			224.0			289.0			205.2	
Turn Bay Length (m)	20.0		31.0	85.0			85.0		165.0	150.0	
Base Capacity (vph)	284	248	457	400	271	234	205	2613	802	172	2514
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	0.18	0.13	0.13	1.07	0.23	0.67	0.99	0.93	0.23	1.06	0.53

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.

HCM Signalized Intersection Capacity Analysis

1: Yonge St & Garden Ave/HWY 7 Ramp

PM Peak Period - Existing

PM Peak Period - Existing

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	46	30	57	384	60	148	182	2317	179	165	1192	67
Future Volume (vph)	46	30	57	384	60	148	182	2317	179	165	1192	67
Ideal Flow (vphpl)	2000	2000	2000	2300	2000	2000	2200	2000	2000	2200	2000	2000
Lane Width	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0
Total Lost time (s)	7.5	7.5	7.5	5.5	7.5	7.5	3.0	7.0	7.0	4.0	7.0	
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.91	1.00	1.00	0.91	
Frpb, ped/bikes	1.00	1.00	0.96	1.00	1.00	0.94	1.00	1.00	0.98	1.00	1.00	
Flpb, ped/bikes	0.97	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	0.99	
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)	1681	1444	1496	3768	1582	1364	1931	5346	1385	1726	5139	
Flt Permitted	0.72	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1267	1444	1496	3768	1582	1364	1931	5346	1385	1726	5139	
Peak-hour factor, PHF	0.90	0.95	0.95	0.90	0.95	0.95	0.90	0.95	0.95	0.90	0.95	0.95
Adj. Flow (vph)	51	32	60	427	63	156	202	2439	188	183	1255	71
RTOR Reduction (vph)	0	0	53	0	0	0	0	0	113	0	3	0
Lane Group Flow (vph)	51	32	7	427	63	156	202	2439	75	183	1323	0
Confl. Peds. (#/hr)	27		14	14		27	1		1	1		1
Heavy Vehicles (%)	2%	37%	2%	5%	25%	9%	1%	1%	12%	13%	4%	6%
Turn Type	pm+pt	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases	4		4			8			6			
Actuated Green, G (s)	25.6	18.3	18.3	14.0	25.0	25.0	14.0	62.7	62.7	14.0	62.7	
Effective Green, g (s)	27.6	19.3	19.3	17.0	26.0	26.0	17.0	63.7	63.7	16.0	63.7	
Actuated g/C Ratio	0.17	0.12	0.12	0.11	0.16	0.16	0.11	0.40	0.40	0.10	0.40	
Clearance Time (s)	8.5	8.5	8.5	8.5	8.5	8.5	6.0	8.0	8.0	6.0	8.0	
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)	240	174	180	400	257	221	205	2128	551	172	2045	
v/s Ratio Prot	0.01	0.02		c0.11	0.04		0.10	c0.46		c0.11	0.26	
v/s Ratio Perm	0.03		0.00			c0.11			0.05			
v/c Ratio	0.21	0.18	0.04	1.07	0.25	0.71	0.99	1.15	0.14	1.06	0.65	
Uniform Delay, d1	56.5	63.3	62.2	71.5	58.4	63.4	71.4	48.1	30.6	72.0	39.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.4	0.5	0.1	64.1	0.5	9.8	58.2	71.8	0.5	86.6	1.6	
Delay (s)	56.9	63.8	62.3	135.6	58.9	73.2	129.6	120.0	31.2	158.6	40.6	
Level of Service	E		E	F	E	E	F	F	C	F	D	
Approach Delay (s)		60.7			113.1			114.8			54.9	
Approach LOS		E			F			F			D	
Intersection Summary												
HCM 2000 Control Delay			95.4									
HCM 2000 Volume to Capacity ratio			1.05									
Actuated Cycle Length (s)			160.0									
Intersection Capacity Utilization			87.2%									
Analysis Period (min)			15									
c Critical Lane Group												

Queues

256: Yonge St & Highway407 WB Off Ramp

PM Peak Period - Existing

PM Peak Period - Existing



Lane Group	WBL	WBR	NBT	SBT
Lane Group Flow (vph)	251	313	2364	1526
v/c Ratio	0.31	0.80	0.66	0.43
Control Delay	41.0	60.8	12.2	10.4
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	41.0	60.8	12.2	10.4
Queue Length 50th (m)	28.9	78.6	186.1	62.4
Queue Length 95th (m)	37.7	104.4	239.2	88.4
Internal Link Dist (m)	423.5		424.5	289.0
Turn Bay Length (m)				
Base Capacity (vph)	1032	502	3608	3573
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.24	0.62	0.66	0.43
Intersection Summary				

HCM Signalized Intersection Capacity Analysis
256: Yonge St & Highway407 WB Off Ramp

PM Peak Period - Existing

PM Peak Period - Existing

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	226	282	2246	0	0	1450
Future Volume (vph)	226	282	2246	0	0	1450
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000
Lane Width	3.0	3.5	3.5	3.0	3.0	3.5
Total Lost time (s)	5.0	5.0	6.0			6.0
Lane Util. Factor	0.97	1.00	0.91			0.91
Frpb, ped/bikes	1.00	1.00	1.00			1.00
Flpb, ped/bikes	1.00	1.00	1.00			1.00
Frt	1.00	0.85	1.00			1.00
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	3440	1664	5293			5242
Flt Permitted	0.95	1.00	1.00			1.00
Satd. Flow (perm)	3440	1664	5293			5242
Peak-hour factor, PHF	0.90	0.90	0.95	0.95	0.90	0.95
Adj. Flow (vph)	251	313	2364	0	0	1526
RTOR Reduction (vph)	0	4	0	0	0	0
Lane Group Flow (vph)	251	309	2364	0	0	1526
Confl. Peds. (#/hr)	4			3		
Heavy Vehicles (%)	0%	1%	2%	0%	0%	3%
Turn Type	Prot	Perm	NA			NA
Protected Phases	8		2			6
Permitted Phases		8				
Actuated Green, G (s)	29.4	29.4	87.6			87.6
Effective Green, g (s)	30.4	30.4	88.6			88.6
Actuated g/C Ratio	0.23	0.23	0.68			0.68
Clearance Time (s)	6.0	6.0	7.0			7.0
Vehicle Extension (s)	3.0	3.0	3.0			3.0
Lane Grp Cap (vph)	804	389	3607			3572
v/s Ratio Prot	0.07		c0.45			0.29
v/s Ratio Perm		c0.19				
v/c Ratio	0.31	0.79	0.66			0.43
Uniform Delay, d1	41.2	46.9	11.9			9.3
Progression Factor	1.00	1.00	0.90			1.00
Incremental Delay, d2	0.2	10.7	0.6			0.4
Delay (s)	41.4	57.6	11.3			9.7
Level of Service	D	E	B			A
Approach Delay (s)	50.4		11.3			9.7
Approach LOS	D		B			A
Intersection Summary						
HCM 2000 Control Delay			15.7		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.69			
Actuated Cycle Length (s)			130.0		Sum of lost time (s)	11.0
Intersection Capacity Utilization			67.0%		ICU Level of Service	C
Analysis Period (min)			15			
c Critical Lane Group						

Queues

PM Peak Period - Existing

313: Yonge St & Highway 407 EB off Ramp/Langstaff Road E

PM Peak Period - Existing



Lane Group	EBL	EBT	EBR	WBL	WBR	NBT	SBL	SBT
Lane Group Flow (vph)	229	231	362	88	95	2184	53	1514
v/c Ratio	0.61	0.61	0.83	0.52	0.41	0.78	0.32	0.47
Control Delay	52.0	51.9	50.3	66.7	14.5	29.5	26.9	27.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.0	51.9	50.3	66.7	14.5	29.5	26.9	27.7
Queue Length 50th (m)	58.7	59.1	68.9	22.9	0.0	177.5	8.9	122.7
Queue Length 95th (m)	81.0	81.6	99.0	40.3	15.2	#249.8	20.5	152.2
Internal Link Dist (m)		225.0				206.6		424.5
Turn Bay Length (m)							66.0	
Base Capacity (vph)	498	502	545	204	261	2800	180	3201
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	0.46	0.46	0.66	0.43	0.36	0.78	0.29	0.47

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

313: Yonge St & Highway 407 EB off Ramp/Langstaff Road E

PM Peak Period - Existing

PM Peak Period - Existing

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	396	19	344	79	0	90	0	2042	33	48	1438	0
Future Volume (vph)	396	19	344	79	0	90	0	2042	33	48	1438	0
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width	3.5	3.5	3.5	3.0	3.5	3.0	3.6	3.6	3.6	3.0	3.5	3.5
Total Lost time (s)	3.0	3.0	3.0	3.0		4.0		6.0		3.0	5.0	
Lane Util. Factor	0.95	0.95	1.00	1.00		1.00		0.91		1.00	0.91	
Frpb, ped/bikes	1.00	1.00	1.00	1.00		1.00		1.00		1.00	1.00	
Flpb, ped/bikes	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		0.85		1.00		1.00	1.00	
Flt Protected	0.95	0.96	1.00	0.95		1.00		1.00		0.95	1.00	
Satd. Flow (prot)	1750	1765	1664	1773		1587		5289		1773	5293	
Flt Permitted	0.95	0.96	1.00	0.95		1.00		1.00		0.06	1.00	
Satd. Flow (perm)	1750	1765	1664	1773		1587		5289		104	5293	
Peak-hour factor, PHF	0.90	0.95	0.95	0.90	0.95	0.95	0.90	0.95	0.95	0.90	0.95	0.92
Adj. Flow (vph)	440	20	362	88	0	95	0	2149	35	53	1514	0
RTOR Reduction (vph)	0	0	79	0	0	87	0	1	0	0	0	0
Lane Group Flow (vph)	229	231	283	88	0	8	0	2183	0	53	1514	0
Confl. Peds. (#/hr)	2		2	2		2			1	1		
Heavy Vehicles (%)	2%	0%	1%	0%	0%	0%	0%	3%	0%	0%	2%	0%
Turn Type	Split	NA	Prot	Prot		Prot		NA		pm+pt	NA	
Protected Phases	4	4	4	3		3		2		1	6	
Permitted Phases										6		
Actuated Green, G (s)	27.0	27.0	27.0	11.4		11.4		66.9		77.6	77.6	
Effective Green, g (s)	28.0	28.0	28.0	12.4		11.4		67.9		78.6	78.6	
Actuated g/C Ratio	0.22	0.22	0.22	0.10		0.09		0.52		0.60	0.60	
Clearance Time (s)	4.0	4.0	4.0	4.0		4.0		7.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0		3.0		2.0	3.0	
Lane Grp Cap (vph)	376	380	358	169		139		2762		148	3200	
v/s Ratio Prot	0.13	0.13	c0.17	c0.05		0.01		c0.41		0.02	c0.29	
v/s Ratio Perm										0.20		
v/c Ratio	0.61	0.61	0.79	0.52		0.06		0.79		0.36	0.47	
Uniform Delay, d1	46.1	46.0	48.2	56.0		54.4		25.3		20.7	14.2	
Progression Factor	1.00	1.00	1.00	1.00		1.00		1.00		1.80	1.74	
Incremental Delay, d2	2.8	2.7	11.0	2.9		0.2		2.4		0.5	0.5	
Delay (s)	48.8	48.8	59.2	58.8		54.6		27.7		37.7	25.2	
Level of Service	D	D	E	E		D		C		D	C	
Approach Delay (s)		53.4			56.6			27.7			25.7	
Approach LOS		D			E			C			C	
Intersection Summary												
HCM 2000 Control Delay			32.6									
HCM 2000 Volume to Capacity ratio			0.75									
Actuated Cycle Length (s)			130.0							16.0		
Intersection Capacity Utilization			67.3%									
Analysis Period (min)			15									
c Critical Lane Group												

Queues

AM Peak Period - Existing

2: Yonge St & Private Access/High Tech Rd

AM Peak Period - Existing



Lane Group	EBT	WBL	WBT	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	1	399	93	1198	348	196	1986
v/c Ratio	0.01	0.76	0.13	0.65	0.41	0.75	0.78
Control Delay	63.0	62.4	0.4	30.3	11.4	52.5	28.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	63.0	62.4	0.4	30.3	11.4	52.5	28.4
Queue Length 50th (m)	0.3	57.4	0.0	127.5	19.6	50.7	257.1
Queue Length 95th (m)	2.3	72.3	0.0	#222.6	60.6	m64.3	#353.6
Internal Link Dist (m)	4.5		556.6	100.7			298.7
Turn Bay Length (m)		53.0				80.0	
Base Capacity (vph)	247	641	763	1834	847	310	2541
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.00	0.62	0.12	0.65	0.41	0.63	0.78

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.

HCM Signalized Intersection Capacity Analysis

2: Yonge St & Private Access/High Tech Rd

AM Peak Period - Existing

AM Peak Period - Existing

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	0	1	0	359	0	84	0	1078	313	8	168	1784
Future Volume (vph)	0	1	0	359	0	84	0	1078	313	8	168	1784
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.0	3.5
Total Lost time (s)		6.5		6.5	6.5			6.5	6.5		5.0	6.5
Lane Util. Factor		1.00		0.97	1.00			0.95	1.00		1.00	0.95
Frpb, ped/bikes		1.00		1.00	0.97			1.00	0.98		1.00	1.00
Flpb, ped/bikes		1.00		1.00	1.00			1.00	1.00		1.00	1.00
Frt		1.00		1.00	0.85			1.00	0.85		1.00	1.00
Flt Protected		1.00		0.95	1.00			1.00	1.00		0.95	1.00
Satd. Flow (prot)		1978		3365	1529			3648	1470		1739	3683
Flt Permitted		1.00		0.76	1.00			1.00	1.00		0.95	1.00
Satd. Flow (perm)		1978		2682	1529			3648	1470		1739	3683
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)	0	1	0	399	0	93	0	1198	348	9	187	1982
RTOR Reduction (vph)	0	0	0	0	75	0	0	0	117	0	0	0
Lane Group Flow (vph)	0	1	0	399	18	0	0	1198	231	0	196	1986
Confl. Peds. (#/hr)	11		1	1		11			4		4	
Heavy Vehicles (%)	0%	0%	0%	2%	0%	7%	0%	3%	6%	2%	2%	2%
Turn Type		NA		Perm	NA			NA	Perm	Prot	Prot	NA
Protected Phases		7			8			2		1	1	6
Permitted Phases	7			8				2				
Actuated Green, G (s)		1.4		26.5	26.5			63.4	63.4		20.2	89.6
Effective Green, g (s)		2.4		27.5	27.5			64.4	64.4		21.2	90.6
Actuated g/C Ratio		0.02		0.20	0.20			0.46	0.46		0.15	0.65
Clearance Time (s)		7.5		7.5	7.5			7.5	7.5		6.0	7.5
Vehicle Extension (s)		3.0		3.0	3.0			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		33		526	300			1678	676		263	2383
v/s Ratio Prot		c0.00			0.01			0.33			0.11	c0.54
v/s Ratio Perm				c0.15					0.16			
v/c Ratio		0.03		0.76	0.06			0.71	0.34		0.75	0.83
Uniform Delay, d1		67.7		53.1	45.7			30.4	24.2		56.8	18.9
Progression Factor		1.00		1.00	1.00			1.00	1.00		0.76	1.66
Incremental Delay, d2		0.4		6.2	0.1			2.6	1.4		6.0	1.9
Delay (s)		68.0		59.3	45.8			33.0	25.6		49.0	33.3
Level of Service		E		E	D			C	C		D	C
Approach Delay (s)		68.0			56.8			31.3				34.7
Approach LOS		E			E			C				C
Intersection Summary												
HCM 2000 Control Delay			36.1			HCM 2000 Level of Service			D			
HCM 2000 Volume to Capacity ratio			0.84									
Actuated Cycle Length (s)			140.0			Sum of lost time (s)			25.5			
Intersection Capacity Utilization			77.1%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

2: Yonge St & Private Access/High Tech Rd

AM Peak Period - Existing

AM Peak Period - Existing

Movement	SBR
Lane Configurations	
Traffic Volume (vph)	4
Future Volume (vph)	4
Ideal Flow (vphpl)	2000
Lane Width	3.0
Total Lost time (s)	
Lane Util. Factor	
Frpb, ped/bikes	
Flpb, ped/bikes	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Peak-hour factor, PHF	0.90
Adj. Flow (vph)	4
RTOR Reduction (vph)	0
Lane Group Flow (vph)	0
Confl. Peds. (#/hr)	
Heavy Vehicles (%)	0%
Turn Type	
Protected Phases	
Permitted Phases	
Actuated Green, G (s)	
Effective Green, g (s)	
Actuated g/C Ratio	
Clearance Time (s)	
Vehicle Extension (s)	
Lane Grp Cap (vph)	
v/s Ratio Prot	
v/s Ratio Perm	
v/c Ratio	
Uniform Delay, d1	
Progression Factor	
Incremental Delay, d2	
Delay (s)	
Level of Service	
Approach Delay (s)	
Approach LOS	
Intersection Summary	

Queues
3: Yonge St & Westwood Lane/Beresford Dr

AM Peak Period - Existing
AM Peak Period - Existing



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	59	81	90	51	107	1113	72	2055
v/c Ratio	0.34	0.28	0.51	0.19	0.61	0.45	0.51	0.89
Control Delay	56.5	21.9	63.3	23.6	100.7	6.3	52.7	31.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.3
Total Delay	56.5	21.9	63.3	23.6	100.7	6.3	52.7	33.3
Queue Length 50th (m)	16.2	7.2	25.3	5.0	29.3	104.2	20.5	182.4
Queue Length 95th (m)	26.2	19.5	37.2	15.3	m42.9	201.9	m26.9	#417.6
Internal Link Dist (m)		433.3		127.7		298.7		195.6
Turn Bay Length (m)	15.0		30.0		70.0		85.0	
Base Capacity (vph)	349	516	355	511	313	2449	310	2318
Starvation Cap Reductn	0	0	0	0	0	0	0	155
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	0.17	0.16	0.25	0.10	0.34	0.45	0.23	0.95

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.

HCM Signalized Intersection Capacity Analysis

3: Yonge St & Westwood Lane/Beresford Dr

AM Peak Period - Existing

AM Peak Period - Existing

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Traffic Volume (vph)	53	24	49	81	17	29	45	51	984	18	5	59
Future Volume (vph)	53	24	49	81	17	29	45	51	984	18	5	59
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.0	3.5	3.0	3.0	3.0
Total Lost time (s)	6.5	6.5		6.5	6.5			5.0	6.0			5.0
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	0.95			1.00
Frpb, ped/bikes	1.00	0.99		1.00	0.99			1.00	1.00			1.00
Flpb, ped/bikes	1.00	1.00		0.99	1.00			1.00	1.00			1.00
Frt	1.00	0.90		1.00	0.91			1.00	1.00			1.00
Flt Protected	0.95	1.00		0.95	1.00			0.95	1.00			0.95
Satd. Flow (prot)	1668	1734		1745	1774			1757	3638			1739
Flt Permitted	0.72	1.00		0.70	1.00			0.95	1.00			0.95
Satd. Flow (perm)	1270	1734		1294	1774			1757	3638			1739
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)	59	27	54	90	19	32	50	57	1093	20	6	66
RTOR Reduction (vph)	0	47	0	0	28	0	0	0	1	0	0	0
Lane Group Flow (vph)	59	34	0	90	23	0	0	107	1112	0	0	72
Confl. Peds. (#/hr)	3		6	6		3		3		7		7
Heavy Vehicles (%)	6%	0%	2%	1%	0%	0%	2%	0%	3%	0%	2%	2%
Turn Type	Perm	NA		Perm	NA		Prot	Prot	NA		Prot	Prot
Protected Phases		4			8		5	5	2		1	1
Permitted Phases	4			8								
Actuated Green, G (s)	18.3	18.3		18.3	18.3			13.0	92.1			9.1
Effective Green, g (s)	19.3	19.3		19.3	19.3			14.0	93.1			10.1
Actuated g/C Ratio	0.14	0.14		0.14	0.14			0.10	0.66			0.07
Clearance Time (s)	7.5	7.5		7.5	7.5			6.0	7.0			6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			2.0	3.0			2.0
Lane Grp Cap (vph)	175	239		178	244			175	2419			125
v/s Ratio Prot		0.02			0.01			c0.06	c0.31			0.04
v/s Ratio Perm	0.05			c0.07								
v/c Ratio	0.34	0.14		0.51	0.10			0.61	0.46			0.58
Uniform Delay, d1	54.6	53.1		55.9	52.7			60.4	11.3			62.9
Progression Factor	1.00	1.00		1.00	1.00			1.49	0.43			0.75
Incremental Delay, d2	1.1	0.3		2.3	0.2			3.5	0.5			2.3
Delay (s)	55.7	53.4		58.2	52.9			93.5	5.4			49.3
Level of Service	E	D		E	D			F	A			D
Approach Delay (s)		54.4			56.3				13.1			
Approach LOS		D			E				B			
Intersection Summary												
HCM 2000 Control Delay			26.5			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.80									
Actuated Cycle Length (s)			140.0			Sum of lost time (s)			18.5			
Intersection Capacity Utilization			82.3%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

3: Yonge St & Westwood Lane/Beresford Dr

AM Peak Period - Existing

AM Peak Period - Existing



Movement	SBT	SBR
Lane Configurations	↑↑	→
Traffic Volume (vph)	1821	29
Future Volume (vph)	1821	29
Ideal Flow (vphpl)	2000	2000
Lane Width	3.5	3.0
Total Lost time (s)	6.0	
Lane Util. Factor	0.95	
Frpb, ped/bikes	1.00	
Flpb, ped/bikes	1.00	
Frt	1.00	
Flt Protected	1.00	
Satd. Flow (prot)	3638	
Flt Permitted	1.00	
Satd. Flow (perm)	3638	
Peak-hour factor, PHF	0.90	0.90
Adj. Flow (vph)	2023	32
RTOR Reduction (vph)	0	0
Lane Group Flow (vph)	2055	0
Confl. Peds. (#/hr)		3
Heavy Vehicles (%)	3%	3%
Turn Type	NA	
Protected Phases	6	
Permitted Phases		
Actuated Green, G (s)	88.2	
Effective Green, g (s)	89.2	
Actuated g/C Ratio	0.64	
Clearance Time (s)	7.0	
Vehicle Extension (s)	3.0	
Lane Grp Cap (vph)	2317	
v/s Ratio Prot	c0.56	
v/s Ratio Perm		
v/c Ratio	0.89	
Uniform Delay, d1	21.2	
Progression Factor	1.24	
Incremental Delay, d2	3.3	
Delay (s)	29.6	
Level of Service	C	
Approach Delay (s)	30.3	
Approach LOS	C	
Intersection Summary		

Queues
8: Yonge St & Scott Drive/Bantry Avenue

AM Peak Period - Existing
AM Peak Period - Existing

								
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	30	170	134	172	55	1036	141	1939
v/c Ratio	0.19	0.50	0.75	0.52	0.43	0.51	0.68	0.84
Control Delay	47.4	51.5	77.7	48.4	74.5	26.9	74.7	27.8
Queue Delay	0.0	1.2	8.3	0.0	0.0	0.3	0.0	0.5
Total Delay	47.4	52.7	86.0	48.4	74.5	27.2	74.7	28.3
Queue Length 50th (m)	7.6	43.0	38.0	40.1	12.4	155.4	40.0	224.5
Queue Length 95th (m)	16.3	61.3	58.2	59.0	26.2	180.0	61.0	#358.8
Internal Link Dist (m)		210.7		229.5		195.6		200.3
Turn Bay Length (m)	45.0		140.0		75.0		75.0	
Base Capacity (vph)	222	486	254	465	314	2012	310	2305
Starvation Cap Reductn	0	0	0	0	0	401	0	0
Spillback Cap Reductn	0	160	84	0	0	0	0	104
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.14	0.52	0.79	0.37	0.18	0.64	0.45	0.88

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

8: Yonge St & Scott Drive/Bantry Avenue

AM Peak Period - Existing

AM Peak Period - Existing

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Traffic Volume (vph)	27	118	35	121	94	61	17	32	890	42	16	111
Future Volume (vph)	27	118	35	121	94	61	17	32	890	42	16	111
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.0	3.5	3.0	3.0	3.0
Total Lost time (s)	7.5	7.5		7.5	7.5			5.0	6.5			5.0
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	0.95			1.00
Frpb, ped/bikes	1.00	1.00		1.00	0.97			1.00	1.00			1.00
Flpb, ped/bikes	0.95	1.00		0.99	1.00			1.00	1.00			1.00
Frt	1.00	0.97		1.00	0.94			1.00	0.99			1.00
Flt Protected	0.95	1.00		0.95	1.00			0.95	1.00			0.95
Satd. Flow (prot)	1524	1835		1729	1721			1761	3577			1739
Flt Permitted	0.53	1.00		0.54	1.00			0.95	1.00			0.95
Satd. Flow (perm)	854	1835		978	1721			1761	3577			1739
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)	30	131	39	134	104	68	19	36	989	47	18	123
RTOR Reduction (vph)	0	8	0	0	19	0	0	0	2	0	0	0
Lane Group Flow (vph)	30	162	0	134	153	0	0	55	1034	0	0	141
Confl. Peds. (#/hr)	51		6	6		51		7		7		7
Heavy Vehicles (%)	11%	2%	9%	2%	3%	8%	2%	0%	4%	7%	2%	2%
Turn Type	Perm	NA		Perm	NA		Prot	Prot	NA		Prot	Prot
Protected Phases		4			8		5	5	2		1	1
Permitted Phases	4			8								
Actuated Green, G (s)	24.6	24.6		24.6	24.6			7.9	77.6			15.8
Effective Green, g (s)	25.6	25.6		25.6	25.6			8.9	78.6			16.8
Actuated g/C Ratio	0.18	0.18		0.18	0.18			0.06	0.56			0.12
Clearance Time (s)	8.5	8.5		8.5	8.5			6.0	7.5			6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			2.0	3.0			2.0
Lane Grp Cap (vph)	156	335		178	314			111	2008			208
v/s Ratio Prot		0.09			0.09			0.03	0.29			c0.08
v/s Ratio Perm	0.04			c0.14								
v/c Ratio	0.19	0.48		0.75	0.49			0.50	0.52			0.68
Uniform Delay, d1	48.4	51.3		54.2	51.3			63.4	18.9			59.0
Progression Factor	1.00	1.00		1.00	1.00			1.06	1.23			1.00
Incremental Delay, d2	0.6	1.1		16.4	1.2			1.2	0.9			6.7
Delay (s)	49.0	52.4		70.6	52.5			68.4	24.1			65.7
Level of Service	D	D		E	D			E	C			E
Approach Delay (s)		51.9			60.4				26.3			
Approach LOS		D			E				C			
Intersection Summary												
HCM 2000 Control Delay			31.9			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.84									
Actuated Cycle Length (s)			140.0			Sum of lost time (s)			20.0			
Intersection Capacity Utilization			107.1%			ICU Level of Service			G			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis 8: Yonge St & Scott Drive/Bantry Avenue

AM Peak Period - Existing

AM Peak Period - Existing

	↓	↙
Movement	SBT	SBR
Lane Configurations	↑↑	↔
Traffic Volume (vph)	1727	18
Future Volume (vph)	1727	18
Ideal Flow (vphpl)	2000	2000
Lane Width	3.5	3.0
Total Lost time (s)	6.5	
Lane Util. Factor	0.95	
Frpb, ped/bikes	1.00	
Flpb, ped/bikes	1.00	
Frt	1.00	
Flt Protected	1.00	
Satd. Flow (prot)	3678	
Flt Permitted	1.00	
Satd. Flow (perm)	3678	
Peak-hour factor, PHF	0.90	0.90
Adj. Flow (vph)	1919	20
RTOR Reduction (vph)	0	0
Lane Group Flow (vph)	1939	0
Confl. Peds. (#/hr)		7
Heavy Vehicles (%)	2%	0%
Turn Type	NA	
Protected Phases	6	
Permitted Phases		
Actuated Green, G (s)	85.5	
Effective Green, g (s)	86.5	
Actuated g/C Ratio	0.62	
Clearance Time (s)	7.5	
Vehicle Extension (s)	3.0	
Lane Grp Cap (vph)	2272	
v/s Ratio Prot	c0.53	
v/s Ratio Perm		
v/c Ratio	0.85	
Uniform Delay, d1	21.6	
Progression Factor	1.00	
Incremental Delay, d2	4.3	
Delay (s)	25.9	
Level of Service	C	
Approach Delay (s)	28.6	
Approach LOS	C	
Intersection Summary		

Queues

2: Yonge St & Private Access/High Tech Rd

PM Peak Period - Existing

PM Peak Period - Existing



Lane Group	EBT	WBL	WBT	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	2	348	211	2105	427	263	1124
v/c Ratio	0.01	0.73	0.32	0.96	0.50	0.96	0.44
Control Delay	0.0	63.4	1.2	43.4	16.4	93.3	18.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	0.0	63.4	1.2	43.4	16.4	93.3	18.1
Queue Length 50th (m)	0.0	50.1	0.0	283.0	44.1	81.3	76.3
Queue Length 95th (m)	0.0	63.6	0.0	#452.2	101.1	#133.6	198.9
Internal Link Dist (m)	4.5		556.6	100.7			298.7
Turn Bay Length (m)		53.0				80.0	
Base Capacity (vph)	350	653	740	2187	857	275	2567
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.01	0.53	0.29	0.96	0.50	0.96	0.44

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

2: Yonge St & Private Access/High Tech Rd

PM Peak Period - Existing

PM Peak Period - Existing

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	1	0	1	313	0	200	0	2000	406	4	233	1063
Future Volume (vph)	1	0	1	313	0	200	0	2000	406	4	233	1063
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2200	2000	2000	2000	2000
Lane Width	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.0	3.5
Total Lost time (s)		6.5		6.5	6.5			5.5	6.5		3.0	6.5
Lane Util. Factor		1.00		0.97	1.00			0.95	1.00		1.00	0.95
Frpb, ped/bikes		0.98		1.00	0.98			1.00	0.98		1.00	1.00
Flpb, ped/bikes		1.00		1.00	1.00			1.00	1.00		1.00	1.00
Frt		0.93		1.00	0.85			1.00	0.85		1.00	1.00
Flt Protected		0.98		0.95	1.00			1.00	1.00		0.95	1.00
Satd. Flow (prot)		1753		3425	1631			4053	1470		1756	3611
Flt Permitted		1.00		0.76	1.00			1.00	1.00		0.95	1.00
Satd. Flow (perm)		1796		2727	1631			4053	1470		1756	3611
Peak-hour factor, PHF	0.90	0.95	0.95	0.90	0.95	0.95	0.90	0.95	0.95	0.90	0.90	0.95
Adj. Flow (vph)	1	0	1	348	0	211	0	2105	427	4	259	1119
RTOR Reduction (vph)	0	2	0	0	174	0	0	0	82	0	0	0
Lane Group Flow (vph)	0	0	0	348	37	0	0	2105	345	0	263	1124
Confl. Peds. (#/hr)	6		2	2		6			4		4	
Heavy Vehicles (%)	0%	0%	0%	0%	0%	1%	0%	2%	6%	2%	1%	4%
Turn Type	Perm	NA		Perm	NA			NA	Perm	Prot	Prot	NA
Protected Phases		7			8			2		1	1	6
Permitted Phases	7			8				2				
Actuated Green, G (s)		1.4		23.5	23.5			67.6	67.6		19.0	92.6
Effective Green, g (s)		2.4		24.5	24.5			69.6	68.6		22.0	93.6
Actuated g/C Ratio		0.02		0.18	0.18			0.50	0.49		0.16	0.67
Clearance Time (s)		7.5		7.5	7.5			7.5	7.5		6.0	7.5
Vehicle Extension (s)		3.0		3.0	3.0			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		30		477	285			2014	720		275	2414
v/s Ratio Prot					0.02			c0.52			c0.15	0.31
v/s Ratio Perm		c0.00		c0.13					0.24			
v/c Ratio		0.00		0.73	0.13			1.05	0.48		0.96	0.47
Uniform Delay, d1		67.6		54.6	48.7			35.2	23.8		58.5	11.2
Progression Factor		1.00		1.00	1.00			1.00	1.00		0.91	1.78
Incremental Delay, d2		0.0		5.5	0.2			33.1	2.3		37.7	0.5
Delay (s)		67.6		60.1	49.0			68.3	26.1		91.3	20.4
Level of Service		E		E	D			E	C		F	C
Approach Delay (s)		67.6			55.9			61.1				33.8
Approach LOS		E			E			E				C
Intersection Summary												
HCM 2000 Control Delay			52.0			HCM 2000 Level of Service			D			
HCM 2000 Volume to Capacity ratio			0.97									
Actuated Cycle Length (s)			140.0			Sum of lost time (s)			24.5			
Intersection Capacity Utilization			90.5%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

2: Yonge St & Private Access/High Tech Rd

PM Peak Period - Existing

PM Peak Period - Existing

Movement	SBR
Lane Configurations	
Traffic Volume (vph)	5
Future Volume (vph)	5
Ideal Flow (vphpl)	2000
Lane Width	3.0
Total Lost time (s)	
Lane Util. Factor	
Frpb, ped/bikes	
Flpb, ped/bikes	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Peak-hour factor, PHF	0.95
Adj. Flow (vph)	5
RTOR Reduction (vph)	0
Lane Group Flow (vph)	0
Confl. Peds. (#/hr)	
Heavy Vehicles (%)	0%
Turn Type	
Protected Phases	
Permitted Phases	
Actuated Green, G (s)	
Effective Green, g (s)	
Actuated g/C Ratio	
Clearance Time (s)	
Vehicle Extension (s)	
Lane Grp Cap (vph)	
v/s Ratio Prot	
v/s Ratio Perm	
v/c Ratio	
Uniform Delay, d1	
Progression Factor	
Incremental Delay, d2	
Delay (s)	
Level of Service	
Approach Delay (s)	
Approach LOS	
Intersection Summary	

Queues
3: Yonge St & Westwood Lane/Beresford Dr

PM Peak Period - Existing
PM Peak Period - Existing



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	48	25	77	221	154	1972	140	1305
v/c Ratio	0.64	0.10	0.41	0.67	0.70	0.86	0.68	0.59
Control Delay	88.6	35.9	58.4	38.2	78.6	26.4	57.3	33.7
Queue Delay	0.3	0.0	0.0	0.2	0.0	47.1	0.0	0.5
Total Delay	88.9	35.9	58.4	38.4	78.6	73.5	57.3	34.2
Queue Length 50th (m)	13.7	4.5	21.3	33.2	39.2	318.1	40.2	124.0
Queue Length 95th (m)	24.8	11.5	32.3	52.6	m32.9m#400.7		64.9	225.3
Internal Link Dist (m)		433.3		127.7		298.7		195.6
Turn Bay Length (m)	15.0		30.0		70.0		85.0	
Base Capacity (vph)	149	500	374	546	313	2281	307	2214
Starvation Cap Reductn	0	0	0	0	0	0	0	445
Spillback Cap Reductn	9	0	0	52	0	744	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.34	0.05	0.21	0.45	0.49	1.28	0.46	0.74

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.

HCM Signalized Intersection Capacity Analysis

3: Yonge St & Westwood Lane/Beresford Dr

PM Peak Period - Existing

PM Peak Period - Existing

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Traffic Volume (vph)	43	16	8	69	53	157	64	75	1838	35	6	120
Future Volume (vph)	43	16	8	69	53	157	64	75	1838	35	6	120
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.0	3.5	3.0	3.0	3.0
Total Lost time (s)	6.5	6.5		6.5	6.5			5.0	6.0			5.0
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	0.95			1.00
Frpb, ped/bikes	1.00	0.99		1.00	0.98			1.00	1.00			1.00
Flpb, ped/bikes	0.99	1.00		0.99	1.00			1.00	1.00			1.00
Frt	1.00	0.95		1.00	0.89			1.00	1.00			1.00
Flt Protected	0.95	1.00		0.95	1.00			0.95	1.00			0.95
Satd. Flow (prot)	1763	1798		1744	1711			1757	3707			1723
Flt Permitted	0.29	1.00		0.74	1.00			0.95	1.00			0.95
Satd. Flow (perm)	543	1798		1360	1711			1757	3707			1723
Peak-hour factor, PHF	0.90	0.95	0.95	0.90	0.95	0.95	0.90	0.90	0.95	0.95	0.90	0.90
Adj. Flow (vph)	48	17	8	77	56	165	71	83	1935	37	7	133
RTOR Reduction (vph)	0	7	0	0	90	0	0	0	1	0	0	0
Lane Group Flow (vph)	48	18	0	77	131	0	0	154	1971	0	0	140
Confl. Peds. (#/hr)	8		6	6		8		2		3		3
Heavy Vehicles (%)	0%	6%	0%	1%	4%	0%	2%	0%	1%	3%	2%	3%
Turn Type	Perm	NA		Perm	NA		Prot	Prot	NA		Prot	Prot
Protected Phases		4			8		5	5	2		1	1
Permitted Phases	4			8								
Actuated Green, G (s)	18.6	18.6		18.6	18.6			16.7	85.1			15.8
Effective Green, g (s)	19.6	19.6		19.6	19.6			17.7	86.1			16.8
Actuated g/C Ratio	0.14	0.14		0.14	0.14			0.13	0.61			0.12
Clearance Time (s)	7.5	7.5		7.5	7.5			6.0	7.0			6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			2.0	3.0			2.0
Lane Grp Cap (vph)	76	251		190	239			222	2279			206
v/s Ratio Prot		0.01			0.08			c0.09	c0.53			0.08
v/s Ratio Perm	c0.09			0.06								
v/c Ratio	0.63	0.07		0.41	0.55			0.69	0.86			0.68
Uniform Delay, d1	56.8	52.3		54.9	56.1			58.6	22.2			59.0
Progression Factor	1.00	1.00		1.00	1.00			1.23	1.01			0.74
Incremental Delay, d2	15.9	0.1		1.4	2.5			3.2	2.0			5.9
Delay (s)	72.7	52.4		56.3	58.6			75.4	24.5			49.3
Level of Service	E	D		E	E			E	C			D
Approach Delay (s)		65.7			58.0				28.2			
Approach LOS		E			E				C			
Intersection Summary												
HCM 2000 Control Delay			32.2			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.82									
Actuated Cycle Length (s)			140.0			Sum of lost time (s)			18.5			
Intersection Capacity Utilization			100.9%			ICU Level of Service			G			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

3: Yonge St & Westwood Lane/Beresford Dr

PM Peak Period - Existing

PM Peak Period - Existing



Movement	SBT	SBR
Lane Configurations	↑↑	→
Traffic Volume (vph)	1216	24
Future Volume (vph)	1216	24
Ideal Flow (vphpl)	2000	2000
Lane Width	3.5	3.0
Total Lost time (s)	6.0	
Lane Util. Factor	0.95	
Frpb, ped/bikes	1.00	
Flpb, ped/bikes	1.00	
Frt	1.00	
Flt Protected	1.00	
Satd. Flow (prot)	3635	
Flt Permitted	1.00	
Satd. Flow (perm)	3635	
Peak-hour factor, PHF	0.95	0.95
Adj. Flow (vph)	1280	25
RTOR Reduction (vph)	1	0
Lane Group Flow (vph)	1304	0
Confl. Peds. (#/hr)		2
Heavy Vehicles (%)	3%	4%
Turn Type	NA	
Protected Phases	6	
Permitted Phases		
Actuated Green, G (s)	84.2	
Effective Green, g (s)	85.2	
Actuated g/C Ratio	0.61	
Clearance Time (s)	7.0	
Vehicle Extension (s)	3.0	
Lane Grp Cap (vph)	2212	
v/s Ratio Prot	0.36	
v/s Ratio Perm		
v/c Ratio	0.59	
Uniform Delay, d1	16.7	
Progression Factor	1.67	
Incremental Delay, d2	1.0	
Delay (s)	29.0	
Level of Service	C	
Approach Delay (s)	31.0	
Approach LOS	C	
Intersection Summary		

Queues
8: Yonge St & Scott Drive/Bantry Avenue

PM Peak Period - Existing
PM Peak Period - Existing



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	34	99	59	283	137	1827	130	1228
v/c Ratio	0.40	0.29	0.26	0.75	0.67	0.89	0.66	0.61
Control Delay	60.9	44.7	49.2	47.5	72.3	35.6	74.7	24.0
Queue Delay	0.0	0.4	0.6	0.0	1.3	46.6	0.0	0.0
Total Delay	60.9	45.2	49.7	47.5	73.6	82.1	74.7	24.0
Queue Length 50th (m)	9.0	23.3	15.3	54.8	35.5	284.0	36.9	115.0
Queue Length 95th (m)	19.6	37.3	26.8	80.4	m37.1	#370.5	57.3	182.2
Internal Link Dist (m)		210.7		229.5		195.6		200.3
Turn Bay Length (m)	45.0		140.0		75.0		75.0	
Base Capacity (vph)	124	482	322	505	315	2061	310	2022
Starvation Cap Reductn	0	0	0	0	0	496	0	0
Spillback Cap Reductn	0	159	107	0	65	0	0	40
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.27	0.31	0.27	0.56	0.55	1.17	0.42	0.62

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.

HCM Signalized Intersection Capacity Analysis

8: Yonge St & Scott Drive/Bantry Avenue

PM Peak Period - Existing

PM Peak Period - Existing

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Traffic Volume (vph)	31	75	19	53	73	196	30	94	1632	104	16	101
Future Volume (vph)	31	75	19	53	73	196	30	94	1632	104	16	101
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width	3.0	3.5	3.0	3.0	3.5	3.0	3.0	3.0	3.5	3.0	3.0	3.0
Total Lost time (s)	7.5	7.5		7.5	7.5			5.0	6.5			5.0
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	0.95			1.00
Frpb, ped/bikes	1.00	1.00		1.00	0.96			1.00	1.00			1.00
Flpb, ped/bikes	0.97	1.00		0.99	1.00			1.00	1.00			1.00
Frt	1.00	0.97		1.00	0.89			1.00	0.99			1.00
Flt Protected	0.95	1.00		0.95	1.00			0.95	1.00			0.95
Satd. Flow (prot)	1727	1826		1694	1674			1765	3610			1739
Flt Permitted	0.26	1.00		0.69	1.00			0.95	1.00			0.95
Satd. Flow (perm)	477	1826		1236	1674			1765	3610			1739
Peak-hour factor, PHF	0.90	0.95	0.95	0.90	0.95	0.95	0.90	0.90	0.95	0.95	0.90	0.90
Adj. Flow (vph)	34	79	20	59	77	206	33	104	1718	109	18	112
RTOR Reduction (vph)	0	7	0	0	76	0	0	0	3	0	0	0
Lane Group Flow (vph)	34	92	0	59	207	0	0	137	1824	0	0	130
Confl. Peds. (#/hr)	39		6	6		39		13		6		6
Heavy Vehicles (%)	0%	3%	11%	4%	0%	1%	2%	0%	3%	2%	2%	2%
Turn Type	Perm	NA		Perm	NA		Prot	Prot	NA		Prot	Prot
Protected Phases		4			8		5	5	2		1	1
Permitted Phases	4			8								
Actuated Green, G (s)	24.2	24.2		24.2	24.2			15.3	78.9			14.9
Effective Green, g (s)	25.2	25.2		25.2	25.2			16.3	79.9			15.9
Actuated g/C Ratio	0.18	0.18		0.18	0.18			0.12	0.57			0.11
Clearance Time (s)	8.5	8.5		8.5	8.5			6.0	7.5			6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			2.0	3.0			2.0
Lane Grp Cap (vph)	85	328		222	301			205	2060			197
v/s Ratio Prot		0.05			c0.12			c0.08	c0.51			0.07
v/s Ratio Perm	0.07			0.05								
v/c Ratio	0.40	0.28		0.27	0.69			0.67	0.89			0.66
Uniform Delay, d1	50.7	49.6		49.4	53.7			59.3	26.1			59.5
Progression Factor	1.00	1.00		1.00	1.00			1.08	1.17			1.00
Incremental Delay, d2	3.1	0.5		0.6	6.4			3.5	3.5			6.0
Delay (s)	53.8	50.0		50.1	60.1			67.5	33.9			65.4
Level of Service	D	D		D	E			E	C			E
Approach Delay (s)		51.0			58.4				36.2			
Approach LOS		D			E				D			
Intersection Summary												
HCM 2000 Control Delay			34.9			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.82									
Actuated Cycle Length (s)			140.0			Sum of lost time (s)			20.0			
Intersection Capacity Utilization			93.4%			ICU Level of Service			F			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis 8: Yonge St & Scott Drive/Bantry Avenue

PM Peak Period - Existing

PM Peak Period - Existing

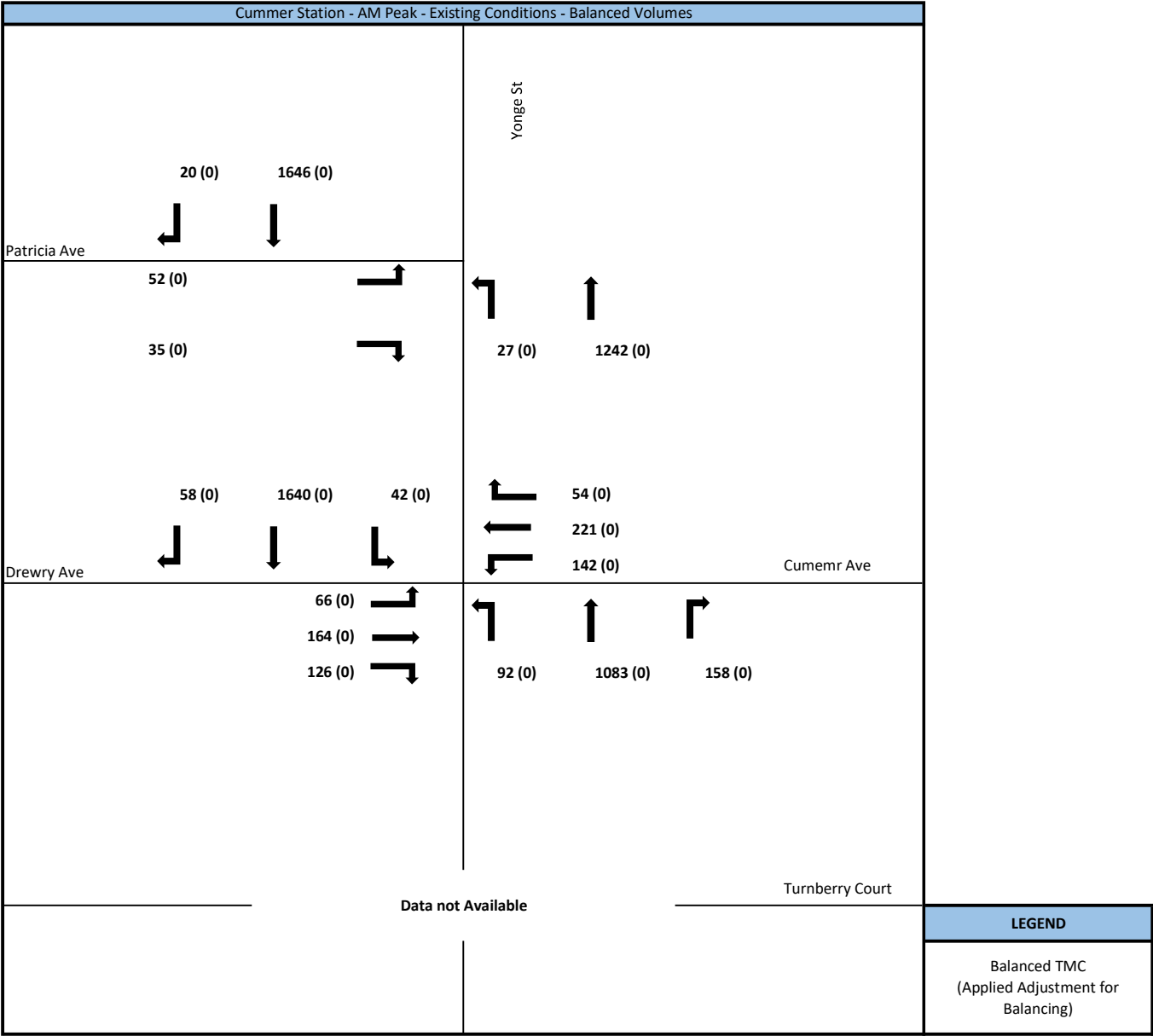
	↓	↙
Movement	SBT	SBR
Lane Configurations	↑↑	↔
Traffic Volume (vph)	1133	33
Future Volume (vph)	1133	33
Ideal Flow (vphpl)	2000	2000
Lane Width	3.5	3.0
Total Lost time (s)	6.5	
Lane Util. Factor	0.95	
Frpb, ped/bikes	1.00	
Flpb, ped/bikes	1.00	
Frt	1.00	
Flt Protected	1.00	
Satd. Flow (prot)	3562	
Flt Permitted	1.00	
Satd. Flow (perm)	3562	
Peak-hour factor, PHF	0.95	0.95
Adj. Flow (vph)	1193	35
RTOR Reduction (vph)	1	0
Lane Group Flow (vph)	1227	0
Confl. Peds. (#/hr)		13
Heavy Vehicles (%)	5%	3%
Turn Type	NA	
Protected Phases	6	
Permitted Phases		
Actuated Green, G (s)	78.5	
Effective Green, g (s)	79.5	
Actuated g/C Ratio	0.57	
Clearance Time (s)	7.5	
Vehicle Extension (s)	3.0	
Lane Grp Cap (vph)	2022	
v/s Ratio Prot	0.34	
v/s Ratio Perm		
v/c Ratio	0.61	
Uniform Delay, d1	19.9	
Progression Factor	1.00	
Incremental Delay, d2	1.4	
Delay (s)	21.3	
Level of Service	C	
Approach Delay (s)	25.5	
Approach LOS	C	
Intersection Summary		

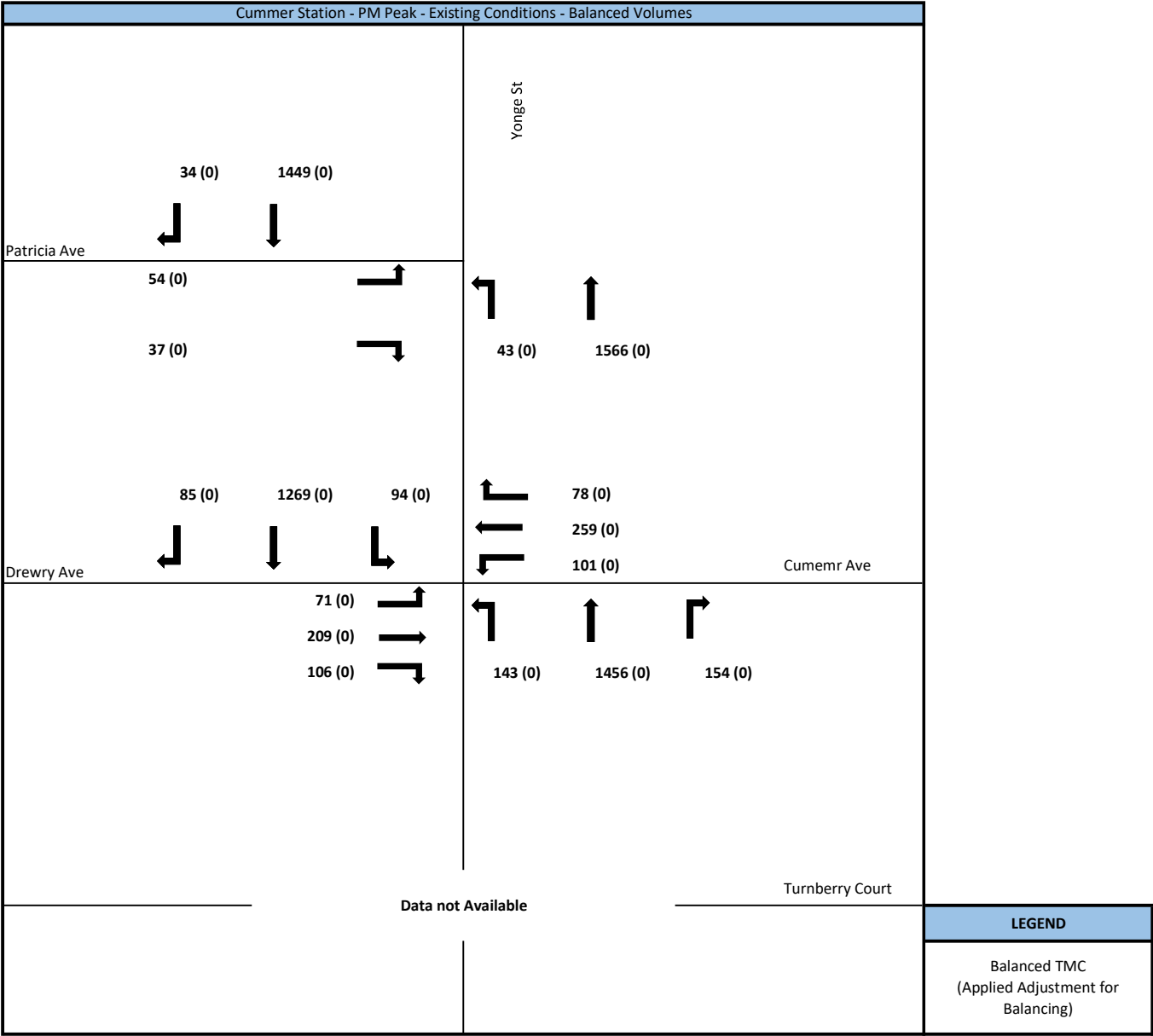
Appendix D

Existing Balanced Volumes

Finch Station - AM Peak - Existing Conditions - Balanced Volumes				
Hendon Ave	247 (0)	1251 (0)	164 (0)	Yonge St
	↓	↓	↓	↑
Finch Ave West	269 (0)	1125 (50)	88 (0)	291 (0)
	↓	↓	↓	259 (0)
Kempford Blvd	57 (0)	1448 (0)		60 (0)
	↓	↓		
	48 (0)	57 (0)		Bishop Ave
	↓	↓		↑
				63 (0)
				1122 (0)
				56 (0)
				88 (0)
				810 (0)
				144 (0)
				149 (-8)
				910 (107)
				95 (0)
				47 (0)
				1010 (29)
				LEGEND
				Balanced TMC (Applied Adjustment for Balancing)

Finch Station - PM Peak - Existing Conditions - Balanced Volumes				
Hendon Ave	174 (0)	1101 (0)	178 (0)	Yonge St 257 (0) 110 (0) 57 (0)
				
Finch Ave West		240 (0)		23 (0) 1184 (0) 66 (0)
		289 (0)		
Finch Ave West	216 (0)	966 (0)	120 (0)	86 (0) 783 (0) 117 (0)
				
Kempford Blvd		165 (0)		141 (0) 984 (0) 129 (0)
		769 (0)		
Kempford Blvd	58 (0)	1104 (0)		45 (0) 1234 (0)
				
				43 (0) 40 (0)
				 
				45 (0) 1234 (0)
				LEGEND Balanced TMC (Applied Adjustment for Balancing)





Steeles Station - AM Peak - Existing Conditions - Unbalanced Volumes				
Plaza Access	44 (0)	1363 (0)	32 (0)	Yonge St
				 25 (0)  35 (0)  212 (0)
Steeles Ave West	11 (0)	11 (0)	13 (0)	Meadowview Ave
				 49 (0)  780 (0)  135 (0)
Steeles Ave West	151 (0)	1367 (0)	187 (0)	Steeles Ave East
				 64 (0)  981 (0)  143 (0)
Plaza Access	169 (0)	850 (0)	294 (0)	Athabaska Ave
				 142 (0)  820 (0)  136 (0)
Plaza Access	51 (0)	1629 (0)	21 (0)	
				 8 (0)  63 (0)  16 (0)
	48 (0)	0 (0)	13 (0)	
				 35 (0)  1054 (0)  4 (0)
				LEGEND
				Balanced TMC (Applied Adjustment for Balancing)

Steeles Station - PM Peak - Existing Conditions - Balanced Volumes				
Plaza Access	30 (0)	1020 (0)	65 (0)	Yonge St
				  
				63 (0) 25 (0) 261 (0)
Steeles Ave West		55 (0)		Meadowview Ave
		55 (0)		
		60 (0)		48 (0) 1333 (0) 215 (0)
Steeles Ave West	179 (0)	1065 (0)	177 (0)	Steeles Ave East
				
				272 (0) 944 (0) 179 (0)
Plaza Access		209 (0)		Athabaska Ave
		996 (0)		
		257 (0)		134 (0) 1215 (0) 66 (0)
Plaza Access	59 (0)	1337 (0)	44 (0)	
				
				15 (0) 47 (0) 21 (0)
		127 (0)		
		0 (0)		
		55 (0)		92 (0) 1236 (0) 17 (0)
				LEGEND
				Balanced TMC (Applied Adjustment for Balancing)

Clark Station - AM Peak - Existing Conditions - Unbalanced Volumes				
Arnold ave	51 (0)	1639 (0)	140 (0)	Yonge St
				 89 (0)  68 (0)  44 (0)
Clark Ave west		59 (0)		Elgin St
		94 (0)		
		43 (0)		
Clark Ave west	160 (0)	1458 (0)	17 (0)	Clark Ave East
				
Glen Cameron Rd		176 (0)		
		205 (0)		
		337 (0)		
Glen Cameron Rd	11 (0)	1797 (0)	97 (0)	
				
		28 (0)		
		24 (0)		
		47 (0)		
				 20 (0)  1152 (0)  71 (0)
				LEGEND Balanced TMC (Applied Adjustment for Balancing)

Clark Station - PM Peak - Existing Conditions - Balanced Volumes				
Arnold ave	47 (0)	1405 (0)	86 (0)	Yonge St
				  
				60 (0) 52 (0) 33 (0)
Clark Ave west		21 (0)		Elgin St
		38 (0)		
		30 (0)		
Clark Ave west	180 (0)	1145 (20)	26 (0)	Clark Ave East
				
				  
				25 (0) 205 (0) 40 (0)
Glen Cameron Rd		213 (0)		
		239 (0)		
		255 (0)		
Glen Cameron Rd	30 (0)	1407 (0)	142 (0)	
				
				  
				100 (0) 27 (0) 64 (0)
		20 (0)		
		24 (0)		
		39 (0)		
				  
				44 (0) 2010 (0) 140 (0)
LEGEND				
Balanced TMC (Applied Adjustment for Balancing)				

Royal Orchard Station - AM Peak - Existing Conditions - Balanced Volumes				
Uplands Ave	19 (3)	1869 (26)	28 (4)	Yonge St 18 (3) 0 (3) 8 (3) Plaza Access
				
Royal Orchard Blvd		56 (3)		27 (4) 1620 (92) 6 (1) 145 (3) 0 (3) 298 (3)
		0 (3)		
		33 (3)		
	2 (0)	1699 (249)	35 (5)	7 (1) 1418 (250) 134 (20) 13 (3) 26 (3) 33 (3)
				
Centre St		0 (3)		181 (-35) 1384 (203) 29 (4)
		1 (3)		
		1 (3)		
	203 (30)	1947 (285)	11 (2)	LEGEND Balanced TMC (Applied Adjustment for Balancing)
				
		288 (3)		
		19 (3)		
		380 (3)		

Royal Orchard Station - PM Peak - Existing Conditions - Balanced Volumes					
Uplands Ave	11 (2)	1677 (160)	45 (7)	  	 59 (3)  6 (3)  30 (3)
					Plaza Access
Royal Orchard Blvd		23 (3)	  	 30 (4)  2183 (320)  11 (2)	
	2 (0)	1493 (424)	62 (9)	 80 (3)  0 (3)  143 (3)	
Centre St		0 (3)	  	 15 (2)  2096 (307)  209 (31)	
	248 (36)	1479 (98)	46 (7)	 48 (3)  26 (3)  71 (3)	Thornhill Summit Dr
		300 (3)	  	 250 (22)  2005 (294)  60 (9)	
		33 (3)	  		
		356 (3)	  		
					LEGEND Balanced TMC (Applied Adjustment for Balancing)

Bridge Station - AM Peak - Existing Conditions - Balanced Volumes				
Garden Ave	144 (0)	1900 (166)	196 (0)	Yonge St
				 64 (0)  68 (0)  252 (0)
407 EB off-Ramp		136 (0)		Hwy 7 Connector
		127 (0)		
		206 (0)		132 (0)
	2192 (-310)			1115 (0)
				280 (0)
				158 (0)
				189 (0)
				407 WB off-Ramp
				1329 (0)
	1916 (261)	57 (3)		67 (0)
				28 (0)
				Langstaff Rd East
	168 (0)			1463 (85)
	9 (0)			26 (2)
	258 (0)			
LEGEND				
Balanced TMC (Applied Adjustment for Balancing)				

Bridge Station - PM Peak - Existing Conditions - Balanced Volumes				
Garden Ave	67 (0)	1192 (150)	165 (0)	Yonge St 148 (0) 60 (0) 384 (0)
				Hwy 7 Connector
407 EB off-Ramp	46 (0)	30 (0)	57 (0)	182 (0) 2317 (400) 179 (0)
	1450 (0)			282 (0) 226 (0) 407 WB off-Ramp
407 EB off-Ramp	1438 (83)	48 (3)		2246 (0) 90 (0) 79 (0)
				Langstaff Rd East
	396 (0)	19 (0)	344 (0)	2042 (221) 33 (2)
				LEGEND
				Balanced TMC (Applied Adjustment for Balancing)

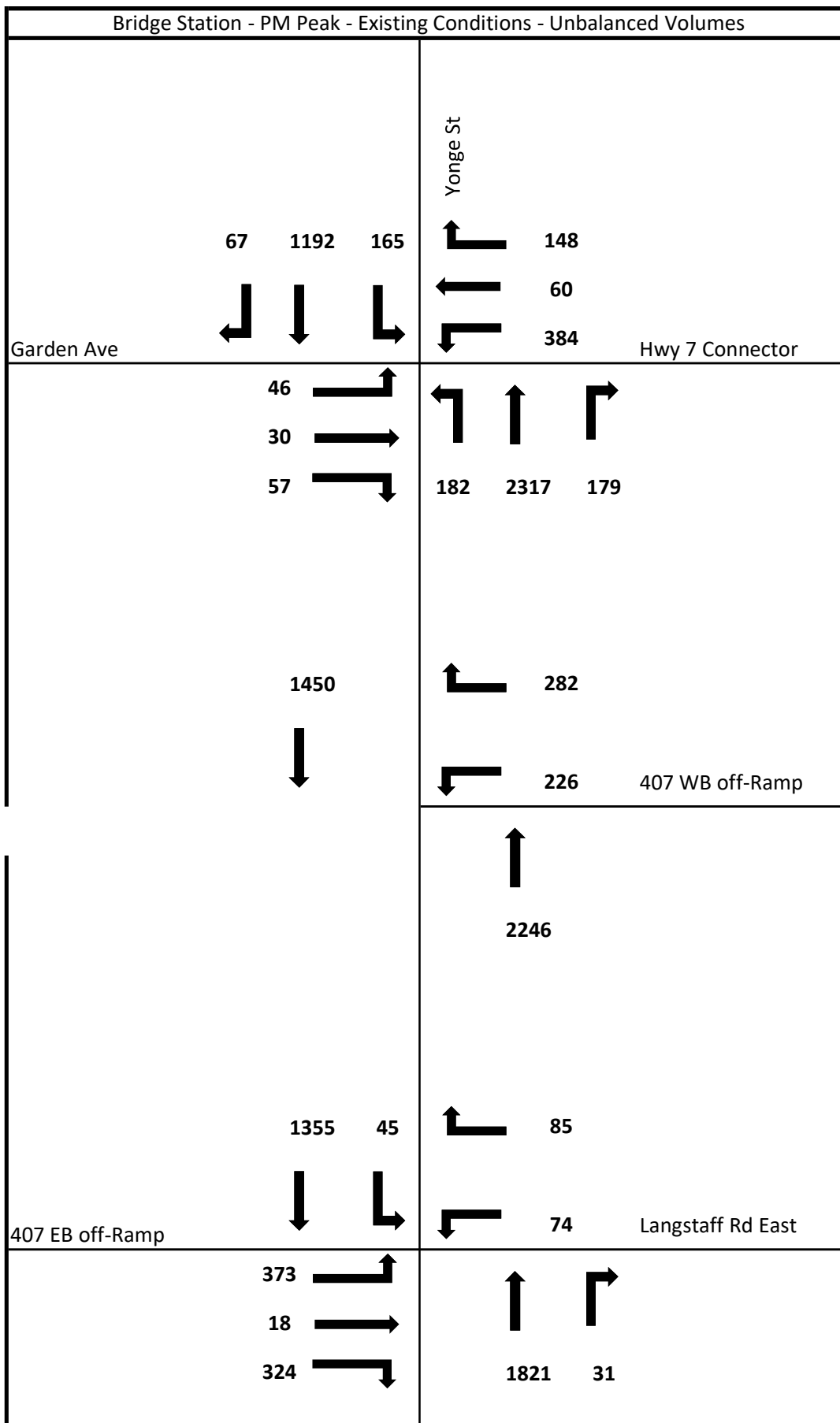
High Tech Station - AM Peak - Existing Conditions - Balanced Volumes				
Scott Dr	18 (0)	1727 (0)	111 (0)	Yonge St
				  
Westwood Ln	27 (0)	118 (0)	35 (0)	Bantry Ave
				  
8790 Yonge st Access	29 (0)	1821 (0)	59 (0)	Beresford Dr
				  
	53 (0)	24 (0)	49 (0)	High Tech Rd
				  
	4 (0)	1784 (200)	168 (0)	
				  
	0 (0)	1 (0)	0 (0)	
				 
				LEGEND
				Balanced TMC (Applied Adjustment for Balancing)

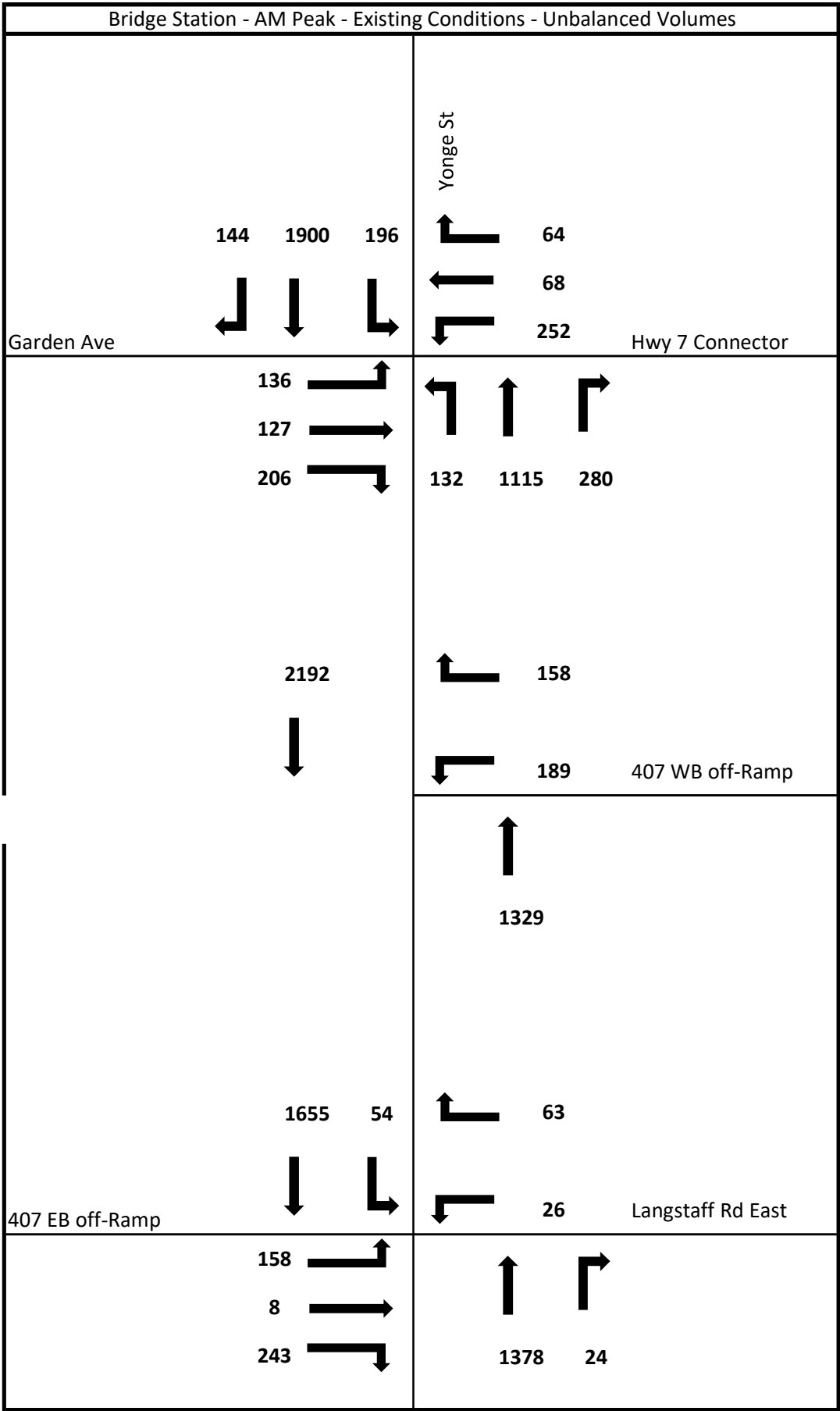
High Tech Station - PM Peak - Existing Conditions - Balanced Volumes				
Scott Dr	33 (0)	1133 (0)	101 (0)	Yonge St
				  
				196 (0) 73 (0) 53 (0)
Westwood Ln		31 (0)		Bantry Ave
		75 (0)		
		19 (0)		
Westwood Ln	24 (0)	1216 (0)	120 (0)	Yonge St
				  
				157 (0) 53 (0) 69 (0)
8790 Yonge st Access		43 (0)		Beresford Dr
		16 (0)		
		8 (0)		
8790 Yonge st Access	5 (0)	1063 (200)	233 (0)	Yonge St
				  
				200 (0) 0 (0) 313 (0)
		1 (0)		High Tech Rd
		0 (0)		
		1 (0)		
				 
				2000 (0) 406 (0)
				LEGEND
				Balanced TMC (Applied Adjustment for Balancing)

Existing Unbalanced Volumes

High Tech Station - PM Peak - Existing Conditions - Unbalanced Volumes			
Scott Dr	33	1133	101
			
Westwood Ln	31		
			
8790 Yonge st Access	24	1216	120
			
	43		
			
	5	863	233
			
	1		
			
	0		
			
	1		
Yonge St			
196			
73			
53			
Bantry Ave			
94			
1322			
104			
157			
53			
69			
Beresford Dr			
200			
0			
313			
High Tech Rd			
2000			
406			

High Tech Station - AM Peak - Existing Conditions - Unbalanced Volumes			
Scott Dr	18	1727	111
			
Westwood Ln	27		
			
8790 Yonge st Access	4	1584	168
			
	0		
			
	1		
			
	0		
			
Yonge St			
Bantry Ave			
Beresford Dr			
High Tech Rd			





Royal Orchard Station - PM Peak - Existing Conditions - Unbalanced Volumes				
Uplands Ave	9	1517	38	Yonge St 50 5 26 Plaza Access
				
Royal Orchard Blvd	20		   26 1863 9	
	1			
	11		   68 1 122	
	2			
Royal Orchard Blvd	1069		   13 1789 178	
	53			
	0		   41 22 61 Thornhill Summit Dr	
	16			
	0		   256 28 304	
	212			
Centre St	1381		   228 1711 51	
	39			
	256			
	28			
	304			

Royal Orchard Station - AM Peak - Existing Conditions - Unbalanced Volumes					
Uplands Ave	16	1843	24	Yonge St	
					15
					0
					7
				Plaza Access	
Royal Orchard Blvd	48				
	0				
	28				
				23	1528
				5	
Royal Orchard Blvd	2	1450	30		124
					1
					254
Centre St	0				
	1				
	1				
				6	1168
				114	
Centre St	173	1662	9		11
					22
					28
				Thornhill Summit Dr	
	246				
	16				
	324				
				216	1181
				25	

Clark Station - PM Peak - Existing Conditions - Unbalanced Volumes

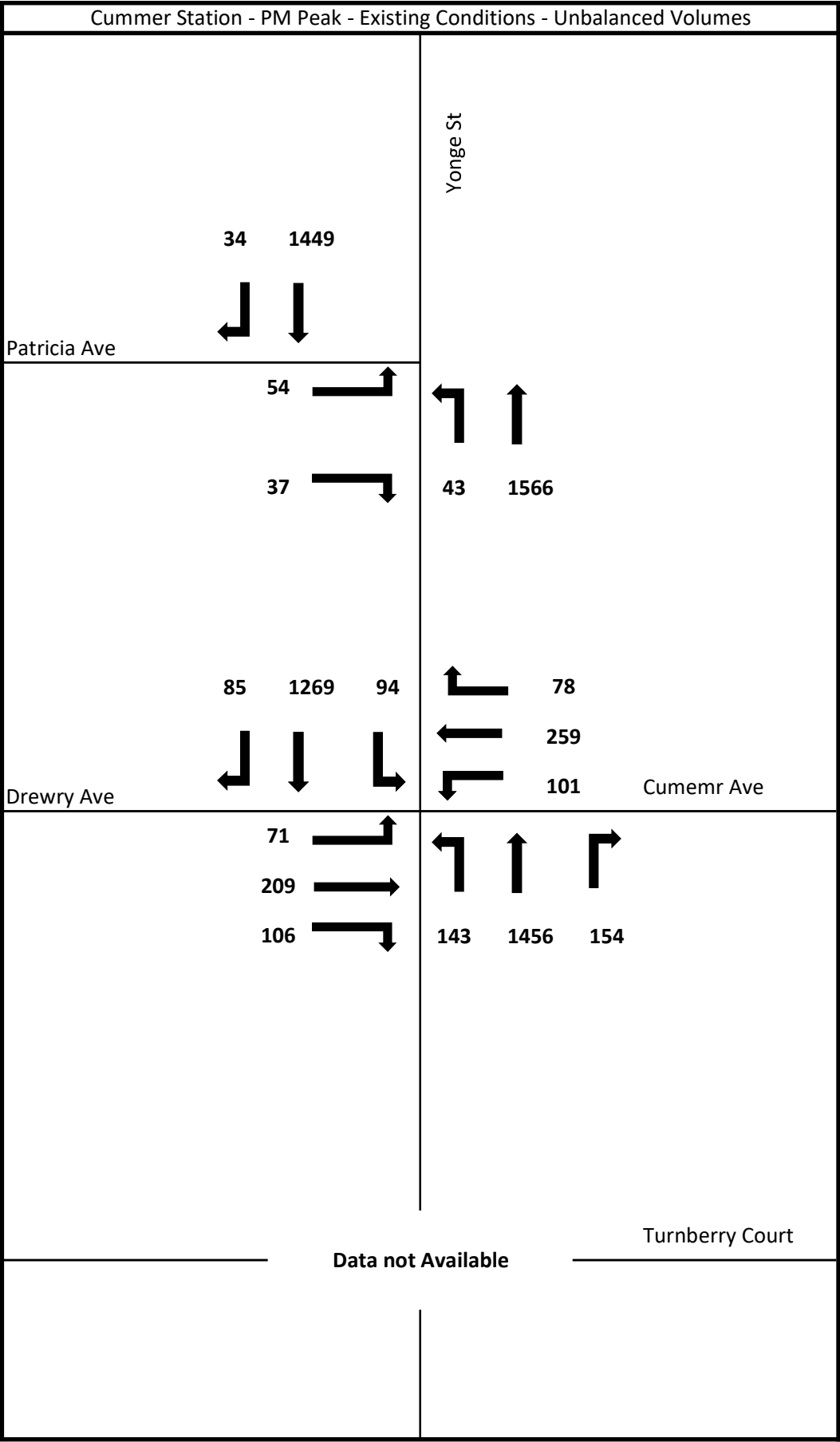
47 1405 86  Arnold ave	Yonge St  60 52 33 Elgin St
21  38  30  180 1125 26  Clark Ave west	   47 1693 51  25 205 40 Clark Ave East
213  239  255  30 1407 142  Glen Cameron Rd	   219 1427 45  100 27 64
20  24  39 	   44 2010 140

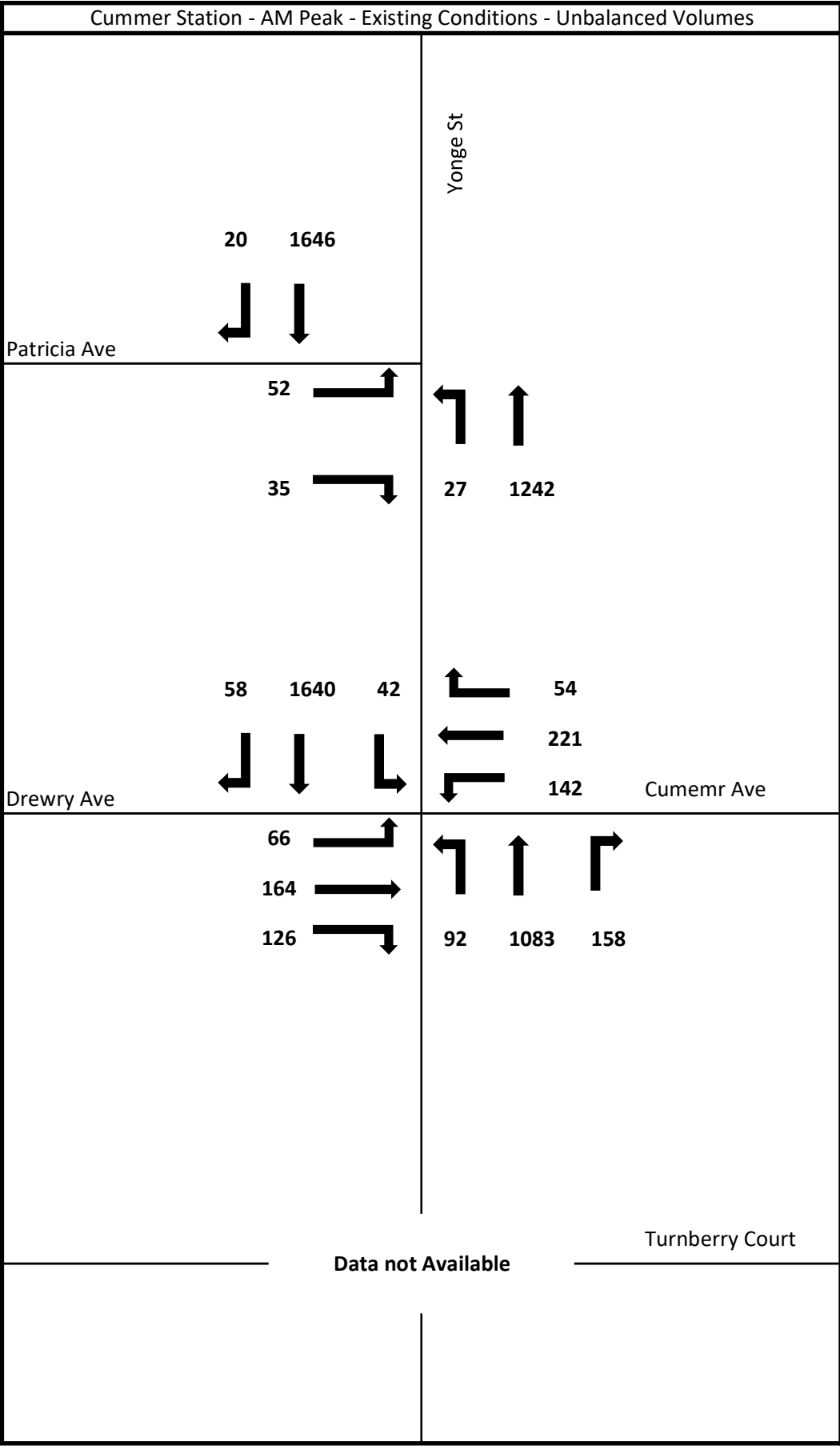
Clark Station - AM Peak - Existing Conditions - Unbalanced Volumes

Arnold ave 51 1639 140 ← ↓ ↓	Yonge St 89 68 44 Elgin St
Clark Ave west 59 94 43 ← ↓ ↓	28 1090 32 20 193 75 Clark Ave East
Glen Cameron Rd 176 205 337 ← ↓ ↓	135 784 51 79 5 40
28 24 47 ← ↓ ↓	20 1152 71

Steeles Station - PM Peak - Existing Conditions - Unbalanced Volumes					
			Yonge St		
Plaza Access	30	1020	65	63	
				25	
				261	Meadowview Ave
	55				
	55				
	60			48	1333 215
Steeles Ave West	179	1065	177	272	
				944	
				179	Steeles Ave East
	209				
	996				
	257			134	1215 66
Plaza Access	59	1337	44	15	
				47	
				21	Athabaska Ave
	127				
	2				
	55			92	1236 17

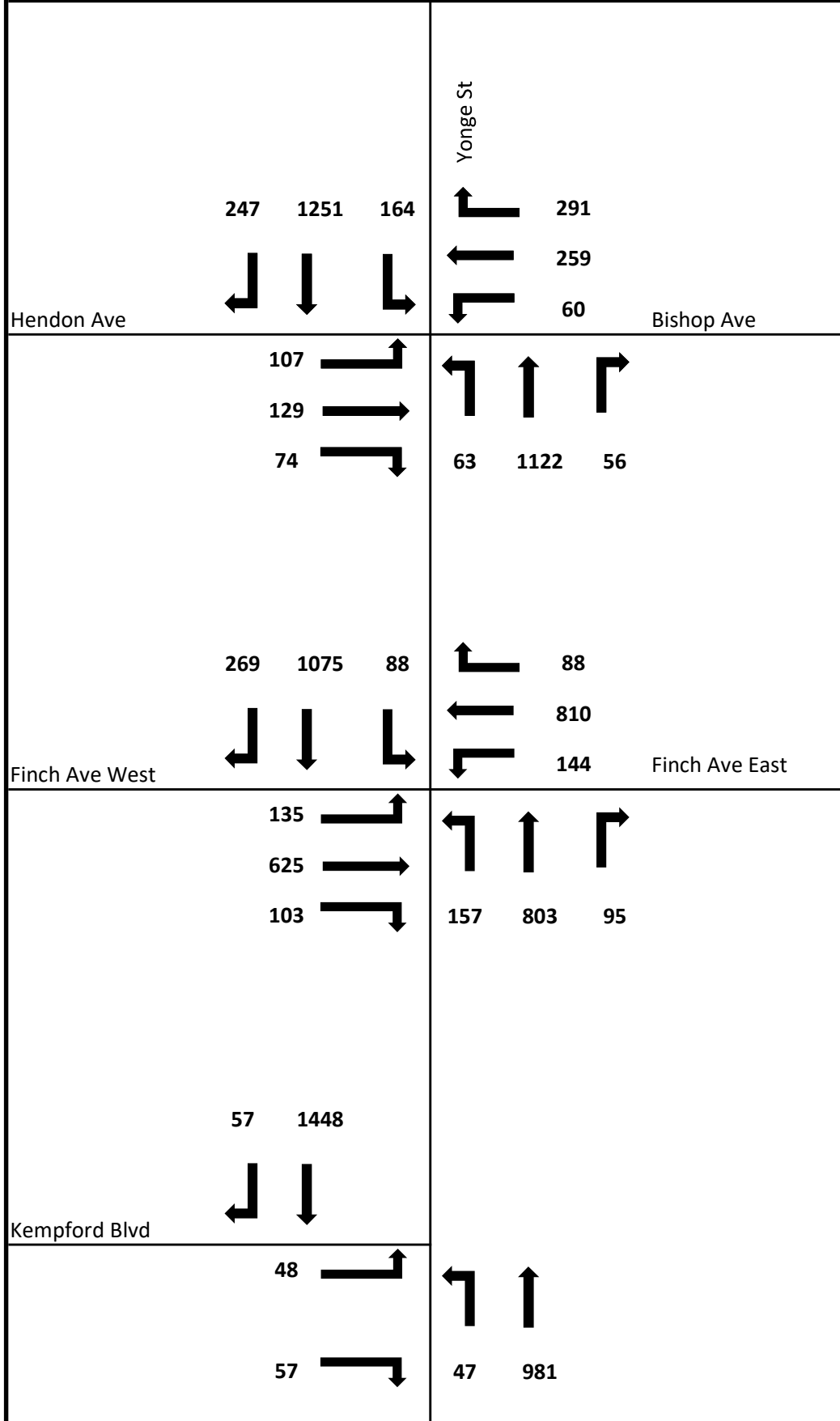
Steeles Station - AM Peak - Existing Conditions - Unbalanced Volumes					
			Yonge St		
Plaza Access	44	1363	32		25
					35
					212
			Meadowview Ave		
	11				
	11				
	13		49	780	135
Steeles Ave West	151	1367	187		64
					981
					143
			Steeles Ave East		
	169				
	850				
	294		142	820	136
Plaza Access	51	1629	21		8
					63
					16
			Athabaska Ave		
	48				
	0				
	13		35	1054	4





Finch Station - PM Peak - Existing Conditions - Unbalanced Volumes			
Hendon Ave	174	1101	178
			
Finch Ave West	240		
	289		
Kempford Blvd	85		
	216	966	120
			
	58	1104	
			
	43		
	40		
Yonge St			
Bishop Ave		257	
		110	
Finch Ave East		57	
		23	
		1184	
		86	
		783	
		117	
		141	
		984	
		45	
		1234	

Finch Station - AM Peak - Existing Conditions - Unbalanced Volumes



Appendix E

Term	Definition
Actuated Cycle Length	It is the average cycle length for an actuated signal. It is measured in seconds.
Actuated traffic signal	This system controls the signal through automatically moving vehicles. The actuated signal timing is completely influenced by traffic volumes, and it is detected through sensors/detectors at the approach(s).
Adjusted Flow	Future volume modified by the peak hour factor and growth factor. It is measured in vehicle per hour (vph)
AM/PM peak hour	AM peak hour is the time period in the morning (AM) with the highest measured volume of traffic. PM peak hour is the time period in the afternoon (PM) with the highest measured volume of traffic.
Base Capacity	Base capacity is the capacity of the lane group if unimpeded. The maximum number of vehicles that can pass a given point on a lane or a roadway for one hour, under the ideal roadway and traffic conditions that can possibly be attained. It is measured in vehicle per hour (vph)
Clearance Time	The amber and all-red period for vehicles on the road and flashing don't walk for pedestrians represents the clearance time. It is measured in seconds.
Conflicting Bikes	The hourly number of bikes that conflict with right-or-left turning traffic
Conflicting Pedestrians	The hourly number of pedestrians that conflict with right-or-left turning traffic
Control Delay	The amount of additional travel time experienced by a user attributable to a control device (i.e. traffic signal or stop sign). It is measured in seconds.
Effective Green	The time during which a given traffic movement or set of movements may proceed at a traffic signal. It is measured in seconds.
Flpb, ped/bikes	Pedestrian/bicycle adjustment factor for left-turn movements
Flt	Adjustment factor for left turns in the lane group
Frpb, ped/bikes	Pedestrian/bicycle adjustment factor for right-turn movements
Frt	Adjustment factor for right turns in the lane group
Future Volume	Represents the AM/PM peak hourly traffic volume per movement for future conditions after application of growth rate. (In this analysis, traffic growth procedure is kept outside of Synchro, hence "Traffic Volume" and "Future Traffic Volume" are similar). It is measured in vehicle per hour (vph)
HCM 2000	HCM (Highway capacity Manual) 2000 is the principal resource for the analysis of capacity and level service of transportation facilities.
HCM 2000 Control Delay	Represents the control delay calculated as per HCM 2000 standards and methodology. It is measured in seconds
HCM 2000 Volume to Capacity Ratio	Represents the volume to capacity ratio calculated as per HCM 2000 standards and methodology.
Heavy Vehicles (%)	This ratio represents the percent of heavy vehicles among the total vehicles on an approach or turning movement.
Highway Capacity Manual (HCM)	Highway Capacity Manual (HCM) is a publication of Transportation Research Board (TRB) which contains concepts, guidelines and procedures

Term	Definition																		
	for study of the quality of services and operations of various transportation facilities (e.g. highways, arterials, signalized/unsignalized intersections).																		
ICU level of service	The ICU level of service gives insight into how an intersection is functioning and how much extra capacity is available to handle traffic fluctuations and incidents. <table> <tr> <th>ICU</th><th>Level of Service</th></tr> <tr> <td><55%</td><td>A</td></tr> <tr> <td>55% to 64%</td><td>B</td></tr> <tr> <td>64% to 73%</td><td>C</td></tr> <tr> <td>73% to 82%</td><td>D</td></tr> <tr> <td>82% to 91%</td><td>E</td></tr> <tr> <td>91% to 100%</td><td>F</td></tr> <tr> <td>100% to 109%</td><td>G</td></tr> <tr> <td>>109%</td><td>H</td></tr> </table>	ICU	Level of Service	<55%	A	55% to 64%	B	64% to 73%	C	73% to 82%	D	82% to 91%	E	91% to 100%	F	100% to 109%	G	>109%	H
ICU	Level of Service																		
<55%	A																		
55% to 64%	B																		
64% to 73%	C																		
73% to 82%	D																		
82% to 91%	E																		
91% to 100%	F																		
100% to 109%	G																		
>109%	H																		
Ideal Flow	“Ideal Flow” or “Ideal Saturated Flow” is a performance measure of intersection operation. It is an indication of the potential capacity of an intersection when operating under ideal' conditions. It is measured in vehicle per hour per lane (vphpl)																		
Internal Link Dist	The link distances are the distance from intersection center point to center point. It is measured in meter.																		
Intersection (total) Delay	Intersection delay is the additional travel time experienced by a vehicle after it enters the intersection and before it reaches free-flow speed. Intersection (Total) delay includes a control delay plus queue delay. It is measured in seconds.																		
Intersection Capacity Analysis	The analysis which evaluates the sufficiency of intersection operations under its associated traffic demand.																		
Intersection Capacity Utilization (ICU)%	This ratio is calculated based on “Intersection Capacity Utilization 2003” method and determines the percentage of the cycle length at a signal, required to serve all movements.																		
Lane Group	Lane group is a set of lanes established at an intersection approach for separate capacity and level-of-service analysis. Lane groups are defined by one or more lanes that accommodate traffic with a common stop-line and a capacity that is shared by all vehicles.																		
Lane Group Flow (vph)	The hourly average number of vehicles on a lane group. It is measured in vehicle per hour (vph)																		
Lane Utility Factor	This factor adjusts the saturated flow rate when there are two or more lanes on an approach to an intersection. This adjustment accounts for the unequal use of lanes.																		
Level of Service (LOS)	LOS is a qualitative measure which implies a qualitative measure of traffic flow at an intersection. LOS ranges from A to F and is dependent upon vehicle delay at intersection approaches. LOS categories are determined based on the following delay thresholds:																		

Term	Definition														
	<table border="1"> <thead> <tr> <th>Control Delay Per Vehicle (s)</th><th>LOS</th></tr> </thead> <tbody> <tr> <td>≤10</td><td>A</td></tr> <tr> <td>10 to 20</td><td>B</td></tr> <tr> <td>20 to 35</td><td>C</td></tr> <tr> <td>35 to 55</td><td>D</td></tr> <tr> <td>55 to 80</td><td>E</td></tr> <tr> <td>>80</td><td>F</td></tr> </tbody> </table>	Control Delay Per Vehicle (s)	LOS	≤10	A	10 to 20	B	20 to 35	C	35 to 55	D	55 to 80	E	>80	F
Control Delay Per Vehicle (s)	LOS														
≤10	A														
10 to 20	B														
20 to 35	C														
35 to 55	D														
55 to 80	E														
>80	F														
Peak-hour factor (PHF)	It is a factor (between 0 and 1) that the traffic volumes are divided by to determine the traffic flow rate during the busiest 15 minute period during the peak hour.														
Permissive movement/phase (Turn Type: Pm)	Permissive movement/phase requires drivers to yield to the conflicting vehicle and pedestrian traffic streams before completing the run.														
Progression Factor	This factor shows the changes in signal delay before/after coordination of signals along a corridor.														
Protected movement/phase (Turn Type: Pt)	Protected movement/phase assigns the right of way to drivers completing their movement at the intersection.														
Protected-Permissive phase (Turn Type: Pt+Pm)	A combination of the permissive and protected modes. Drivers have the right of way during the protected phase and they can also complete the movement (e.g. left turn) “permissively” when the conflicting streams allow.														
Queue Delay	Queue delay represents the effect of queues and blocking on short links and short turning bays. It is measured in seconds.														
Queue Length (50 th percentile and 95 th percentile)	The 50th percentile queue is the maximum back of queue under typical conditions and the 95th percentile queue is the maximum back of queue with 95th percentile traffic volumes (more conservative). Queue is measured in metre.														
Reduced v/c Ratio	Modified volume to capacity ratio with adjustments to the base capacity														
RTOR Reduction	This parameter adjusts the traffic flow in a lane group and captures the effect of right-turn-on-red movements. It is measured in vehicle per hour (vph)														
Saturated Flow	Assuming that an intersection’s approach signal was to stay green for an entire hour, and the traffic was as dense as could reasonably be expected. The number of vehicles that would pass through the intersection during that hour is the saturated flow rate. It is measured in vehicle per hour (vph)														
Signal Cycle Length	The total time required to service all competing traffic movements at a signalized intersection. It is measured in seconds.														
Signal phase (sec)	a phase is defined as a controller timing unit associated with the control of one or more movements. Each phase at an intersection has a set of timing, possibly containing vehicle and pedestrian timing.														
Spillback Capacity Reduction	Reduction to the base capacity caused by a short downstream link becoming filled up. It is measured in vehicle per hour (vph)														

Term	Definition
Starvation Capacity Reduction	Reduction to the base capacity due to starvation. Starvation is the congestion caused by a short upstream link in conjunction with poor/no coordination. It is measured in vehicle per hour (vph)
Storage Capacity Reduction	Reduction to the base capacity caused when turn pockets cannot accommodate queue lengths. It is measured in vehicle per hour (vph)
Storage Lane Capacity	Storage lane is a dedicated lane specified for a turning movement. Its capacity is measured in metre.
Total Lost time	The portion of time at the beginning of each green period and a portion of each yellow change plus red clearance period that is not usable by vehicles. It is measured in seconds
Traffic Volume	Represents the AM/PM peak hourly traffic volume per movement. It is measured in vehicle per hour (vph)
Turn/movement Type	Turn/movement types can be protected, permissive or protected-permissive.
Turning Movement Count (TMC)	TMC indicates the directional volume of road user (auto, truck, bus, pedestrian and bike) passing through an intersection over a given period of time.
Unbalanced vs. Balanced Network of Volumes:	In order to conduct traffic analyses along a corridor, turning movement volumes at adjacent intersections are used. The turning movement counts at these intersections are not collected on the same day, hence their total receiving and generating volumes along the corridor for each direction might slightly differ. The unbalanced network of volumes represents these raw volume data at adjacent intersections and exposes the level of imbalance between them. A standard balancing exercise is conducted to balance these raw data and come up with a balanced network of volumes.
v/s Ratio – permissive	It is a ratio that determines the volume to saturated flow rate ratio for permissive movements.
v/s Ratio – protected	It is a ratio that determines the volume to saturated flow rate ratio for protected movements.
Vehicle Extension	It is the time that is added to the green phase time, every time a vehicle crosses over a loop detector at intersection approaches with actuated phase. It is measured in seconds.
Volume to Capacity Ratio (v/c)	The volume to capacity ratio (v/c) measures the level of congestion of a road or on approaches to an intersection by dividing the volume of traffic by the capacity of the roadway.