



SHINING HILL ESTATE COLLECTION, INC.

**Shining Hill Estates, Phase 3,
Town of Aurora**

Transportation Mobility Plan

DRAFT



March 12, 2021

Shining Hill Estate Collection Inc.
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Attention: Mr. Paul Bailey

**Shining Hill Estates, Phase 3, Town of Aurora
Transportation Mobility Plan**

Dear Mr. Bailey:

Please find enclosed a copy of our draft Transportation Mobility Plan prepared for Phase 3 of the Shining Hill Estates development in Aurora.

Should you have any questions or wish to discuss our findings, please contact me at (416) 229-4647, extension 2373, or at bhooton@dillon.ca.

Yours sincerely,

DILLON CONSULTING LIMITED

A handwritten signature in black ink that reads "Brent Hooton".

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1.0

Introduction

1.1

Purpose

Dillon Consulting Limited (Dillon) has been retained by Shining Hill Estate Collection, Inc. to prepare a transportation mobility plan (TMP) for Phase 3 of the proposed Shining Hill Estates development. The Phase 3 lands are within the town of Aurora, north of St. John’s Sideroad opposite Willow Farm Lane. The development includes 88 detached residential lots, a medium density block anticipated to include approximately 200 units, and the repurposing of an existing residence for use as a private girls’ school (St. Anne’s School).

1.2

Background

In 2019, Dillon prepared a TMP¹ for the overall Shining Hill Estates concept plan, which straddles the boundary of the towns of Newmarket and Aurora and would form much of the remaining undeveloped lands between Bathurst Street and Yonge Street, from St. John’s Sideroad approximately 1.4 km northerly. A preliminary concept plan prepared by Malone Given Parsons Ltd. (MGP) envisioned approximately 3,500 residential units, a service commercial block, a school, and an open space / natural heritage system including a potential trail network. Access to the ultimate development area is proposed to Bathurst Street, St. John’s Sideroad and Yonge Street (via Street “A”, now known as Bennington Road, being constructed for Phase 1).

Phase 1 is located on the west side of Yonge Street south of Joe Persechini Drive and is currently under construction. Phase 2 is located on the north side of St. John’s Sideroad east of Cliff Trail and is currently in the approval stage. Dillon has previously prepared traffic reports for both of these phases.

Since that time, the development concept plan has changed slightly, and the applicant is seeking Official Plan designation and Draft Plan of Subdivision approval for Phase 3, located within the town of Aurora.

Appendix A contains the updated overall concept plan and the proposed Draft Plan of Subdivision. **Figure 1** illustrates the location of the site in relation to the surrounding road network and the remainder of the development lands.

¹ Shining Hill Estates, Phase 3, Towns of Newmarket and Aurora, Transportation Mobility Plan, October 2019. At that time, the remainder of the overall development was referred to as “Phase 3”. The current subarea is now being referred to as Phase 3, and in this report the remainder of the development lands are being referred to as the “overall development”.

Figure 1: Site Location



1.3

Scope of Analysis

The study area consists of the following intersections:

- Bathurst Street at St. John's Sideroad;
- St. John's Sideroad at Willow Farm Lane and the proposed north/south collector road; and
- Yonge Street at St. John's Sideroad.

Analyses have been prepared for the AM and PM peak hours of a typical weekday.

Two horizon years have been assessed:

- A 2023 horizon year, reflecting the proposed build-out year; and
- A 2028 horizon year, or five years following build-out.

2.0

Existing Conditions

2.1

Existing Road Network

The road network in the study area is affected by two features:

- The original concession road network resulting in east-west and north-south arterials at relatively consistent 2-kilometre spacing; and
- The historic town centres and surrounding older residential areas of Newmarket and Aurora, located near Main Street and Water Street, and near Yonge Street and Wellington Street, respectively.

North-south travel in the study area is via Yonge Street and Bathurst Street. More broadly, Bayview Avenue is also available as the next concession road east of Yonge Street. In the study area, both Bathurst Street and Yonge Street are arterial roads with four-lane cross-sections; Bathurst Street has a 70 km/h speed limit, while Yonge Street has a 60 km/h speed limit. However, while Bathurst Street has relatively consistent characteristics through Newmarket and Aurora, Yonge Street has varying characteristics and functions, serving as a suburban arterial with a primary traffic movement function through Newmarket and northern Aurora but a historic main street function within central Aurora. In a similar fashion, Bayview Avenue is a predominantly suburban arterial with a primary traffic movement function through Aurora and southern York Region, but in central Newmarket it becomes Prospect Street, a two-lane primary collector road through an older residential area east of the town centre. As such, while all three streets serve north-south travel through York Region, Bathurst Street is the only north-south arterial offering a continuous high-capacity route through both towns.

Yonge Street is also currently in transition, with investments in transit service and infrastructure that are intended to change the characteristics of the street to a more urban context that supports transit and active transportation rather than focusing on traffic movement.

East-west travel in the study area is via St. John's Sideroad (18th Sideroad west of Bathurst Street), an arterial road under the jurisdiction of York Region. It has a four-lane urban cross-section through the eastern part of Aurora (east of Yonge Street), but a two-lane rural cross-section west of Yonge Street. It has a 60 km/h posted speed limit, except for the section between Yonge Street and Industrial Parkway, which is posted at 50 km/h.

The local and collector road network in the developed areas surrounding the subject lands are characterized by a hierarchical and curvilinear street network that is typical for a suburban environment. The primary street of relevance to the subject development is Willow Farm Lane, a collector road that begins at St. John's Sideroad roughly 450 metres west of Yonge Street and then curves westerly and continues through the residential subdivision south of St. John's Sideroad. It has a two-lane cross-section and a posted speed limit of 40 km/h. It intersects with St. John's Sideroad at a two-way stop

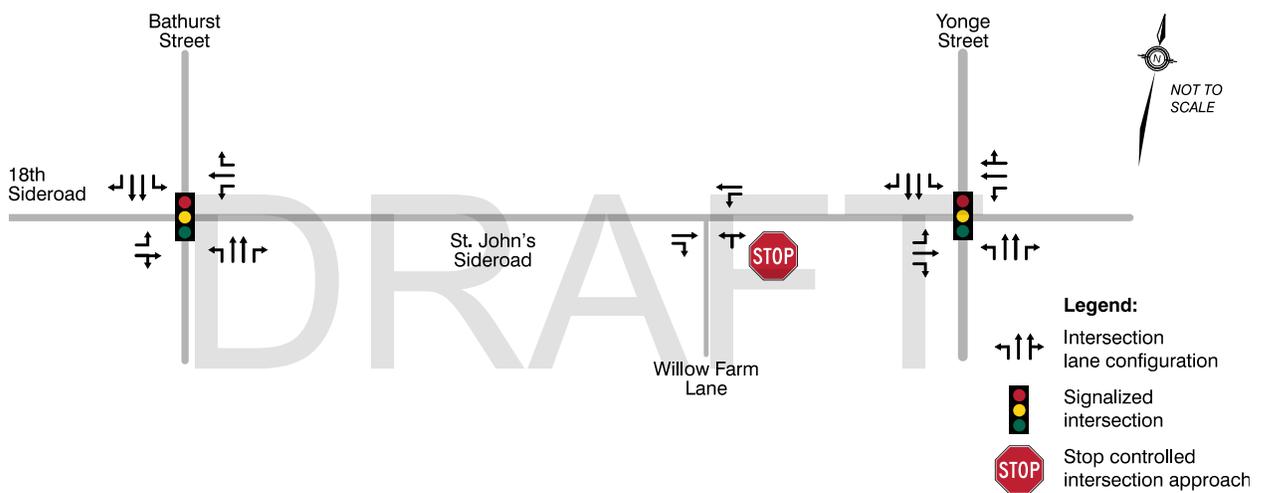
controlled intersection. While it is not anticipated to be used by site traffic, it is relevant in that the site's proposed north-south collector would intersect with St. John's Sideroad opposite Willow Farm Lane.

Northern York Region is served by two north-south 400-series provincial highways:

- Highway 400 is roughly 7 km west of Bathurst Street. Access from the study area is via 18th Sideroad / Lloydtown-Aurora Road (the westerly continuation of St. John's Sideroad).
- Highway 404 is roughly 5 km east of Yonge Street. St. John's Sideroad crosses Highway 404 but does not currently interchange with it. Access from the study area is either via Mulock Drive (2 km north of St. John's Sideroad) or via Wellington Street (2 km south of St. John's Sideroad).

Figure 2 illustrates the existing traffic control and lane configuration at the primary intersections within the study area.

Figure 2: Existing Intersection Geometry and Traffic Control



2.2 Existing Active Transportation Infrastructure

Much of the surrounding area is rural or has been developed with limited development at very low densities, and the on-street active transportation infrastructure is limited.

- Yonge Street:
 - North of Joe Persechini Drive, sidewalks exist on both sides of the road.
 - South of Joe Persechini Drive, a sidewalk extends 350 metres southerly on the east side of the street to the entrance to the Nokiidaa Trail. A sidewalk will also be built on the west side through this section (to the future Bennington Road) as part of the development of Phase 1.
 - Between Bennington Road and St. John's Sideroad, no sidewalks exist other than a 150-metre section on the east side between St. John's Sideroad and the Hadley Grange driveway. There are paved shoulders that could be used by cyclists, although they are not signed or marked as cycling facilities.

- South of St. John's Sideroad, a sidewalk exists on the west side of the road.
- Bathurst Street:
 - No sidewalks or bicycle facilities exist within the study area.
- St. John's Sideroad:
 - No sidewalks or bicycle facilities west of Yonge Street, other than a sidewalk on the south side of the bridge over Tannery Creek, immediately west of Yonge Street.
 - East of Yonge Street, a sidewalk exists on the south side of the road, and a sidewalk and bicycle path exist on the north side of the street.

All signalized intersections in the study area have crosswalks and pedestrian signals.

Beyond the study area, there is an extensive network of off-street bicycle paths and trails in the subdivisions to the north, south and east.

2.3 Existing Transit Network

2.3.1 York Region Transit (YRT) / VIVA

Local transit service in the study area is provided by York Region Transit (YRT).² **Figure 3** illustrates the bus routes operating within the study area.

Three different routes operate along Yonge Street through the study area:

- **VIVA Blue** is a limited-stop bus rapid transit (BRT) route that operates along Yonge Street between Davis Drive in Newmarket and Finch subway station in Toronto. It generally operates with frequent service and with limited, dedicated stops. Dedicated median lanes ("rapidways") are currently under construction along portions of the route in Newmarket and Richmond Hill, including through part of the study area (through the intersection with Mulock Drive). The only stop within the vicinity of the subject lands is at Joe Persechini Drive.
- The VIVA BRT service is supplemented by local service on two routes following Yonge Street through Newmarket and Aurora: **98 Yonge** and **96 Keele-Yonge**. Both of these routes operate less frequently but stop at additional locations not served by VIVA. In the vicinity of the site, this includes the stops on Yonge Street at St. John's Sideroad. 98 Yonge operates 7 days per week along Yonge Street between Green Line and Finch subway station. 96 Yonge-Keele operates weekdays only; it also follows Yonge Street through Newmarket and Aurora but then turns westerly to Keele Street, which it follows to York University.

² At the time of this report, YRT is operating a modified route network and service plan due to reduced ridership during the ongoing COVID-19 pandemic. Some routes, including 31 Aurora North, are temporarily suspended, while others are operating at reduced headways. The descriptions and schedule information shown in this report refer to conditions that existed prior to the beginning of the pandemic in March 2020.

Local service in north Aurora is provided by **31 Aurora North**. This route operates in a clockwise loop predominantly through the northwest part of Aurora, with a stop at Yonge Street and St. John's Sideroad. It operates during weekday peak periods only.

Table 1 lists the operating hours and scheduled headway (interval between buses) on each of the routes listed above. To provide additional context related to typical transit service conditions in northern York Region, and recognizing the network effect of transit service, the operating periods and headways are also listed for other routes operating in Aurora. Most routes operate at infrequent headways of 30 minutes or greater, and service is limited on Sundays. Most routes also operate at irregular headways (e.g., 41 minutes) that result in buses arriving at different times each hour, rather than clockface headways that allow for consistent schedules from one hour to the next (e.g., at 17 and 47 minutes past each hour).

Figure 3: YRT/VIVA Network in Study Area

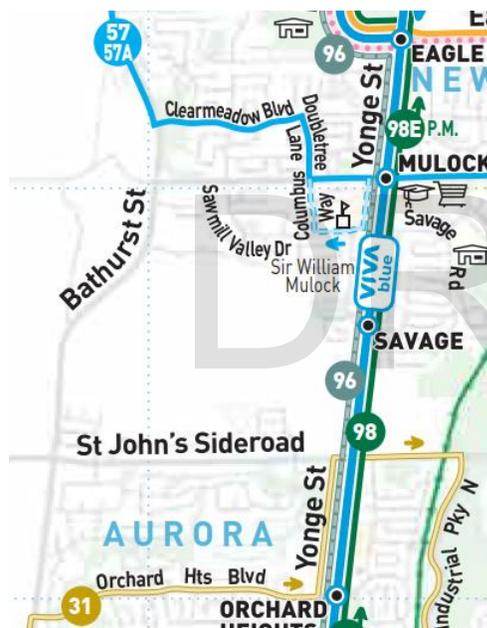


Table 1: Existing Transit Headways

Route	Scheduled headway (minutes)														
	Weekday					Saturday					Sunday				
	AM	Mid	PM	Eve.	Late	Early	Morn.	Aft.	Eve.	Late	Early	Morn.	Aft.	Eve.	Late
Routes within the study area:															
VIVA Blue	7.5	9	7.5	7.5	18	16	9	9	9	19	—	10.5	10.5	10.5	22
98 Yonge	37	52	39	39	36	39	39	50	42	47	40	40	45	44	47
96 Keele-Yonge	32	32	25	27	32	—	—	—	—	—	—	—	—	—	—
31 Aurora North	35	—	35	—	—	—	—	—	—	—	—	—	—	—	—
Other routes in Aurora:															
32 Aurora South	30	60	29	—	—	—	—	—	—	—	—	—	—	—	—
33 Wellington	53	73	53	53	—	66	66	66	66	—	—	—	—	—	—
33A Wellington	30	71	30	30	—	66	66	66	66	—	—	—	—	—	—
222 Aurora-Newmarket GO Shuttle	30*	—	30*	—	—	—	—	—	—	—	—	—	—	—	—

*AM peak hour: southbound only; PM peak hour: northbound only

2.3.2 GO Transit

Commuter rail service to Toronto is provided via the Barrie GO line. The closest GO station to the subject site is the Aurora GO station, approximately 2 km south of St. John's Sideroad. The station is located on the south side of Wellington Street, 625 metres east of Yonge Street. It has a parking supply of 1,382 spaces (including 847 spaces in a parking garage), as well as a kiss-and-ride lot.

Under typical (pre-COVID) conditions, trains operate about every 15 to 30 minutes toward Toronto during the AM peak period, hourly during the morning and early afternoon, and hourly during the early evening. On the return trip from Toronto, trains operate hourly during the midday and early evening, and about every half hour during the PM peak period. There is also hourly train service in both directions on weekends. At times when trains are not operating, service is provided by GO buses that stop at the Aurora GO station.

2.4 Existing Traffic Volumes

Existing traffic volumes were carried forward from the 2019 TMP prepared by Dillon for the overall Shining Hill development area. This was in part to maintain consistency with previous analysis, and in part due to atypical traffic conditions resulting from the ongoing COVID-19 pandemic.

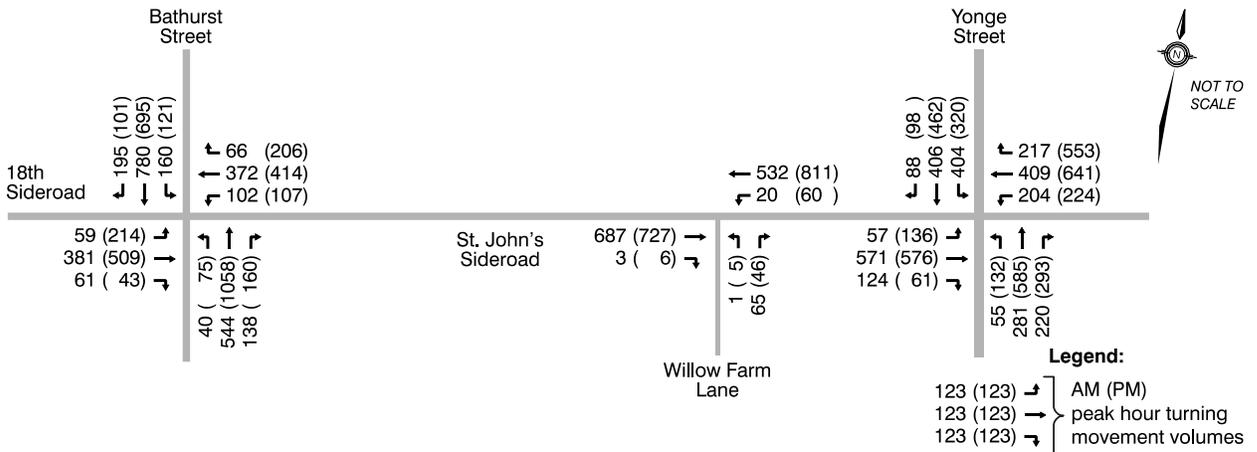
For the 2019 study, turning movement counts were undertaken on Wednesday, July 31, 2019 at the following intersections:

- Bathurst Street and St. John's Sideroad;
- St. John's Sideroad and Willow Farm Lane; and
- Yonge Street and St. John's Sideroad.

The surveys were undertaken for Dillon by Horizon Data Services Limited (HDSL) and were conducted from 7:00–9:00 AM and from 4:00–6:00 PM. The detailed count data are provided in **Appendix B**.

Figure 4 illustrates the peak hour traffic volumes surveyed at each intersection.

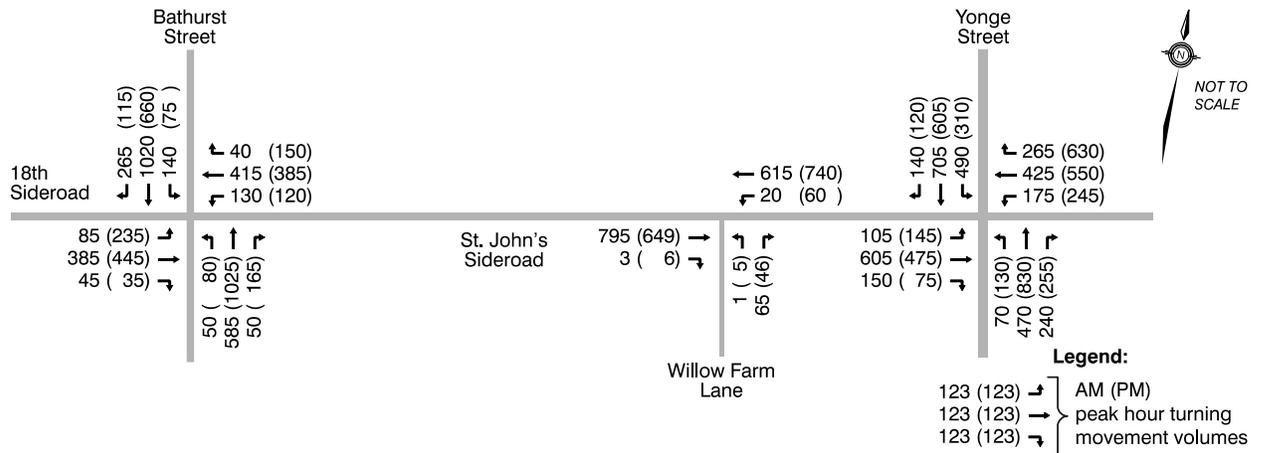
Figure 4: Existing Traffic Volumes (Surveyed)



The traffic volumes at the St. John's Sideroad intersections with Bathurst Street and with Yonge Street were compared against historical turning movement count data collected by Dillon in December 2015 and May / June 2017 as part of the applications for Phases 1 and 2. It was observed that the July 2019 data were understated on Bathurst Street and Yonge Street, and to a lesser extent on St. John's Sideroad, during the AM peak hour. Volumes on Yonge Street also appeared to be understated during the PM peak hour. It is possible that the 2019 volumes were understated due to the different months when the counts were undertaken (July vs. December, May and June); it is also possible that the traffic volume on Yonge Street reflected upstream constraints due to construction that was being undertaken at that time for the Yonge North VIVA rapidway. In the 2019 TMP, for analysis purposes the 2017 counts were used, and the volumes were increased to reflect two years of background traffic growth (using the same rates and method as documented in **Section 3.2.1**). For consistency with the 2019 study, these volumes were carried forward and used in the current study.

Figure 5 illustrates the existing peak hour traffic volumes after making the adjustments noted above.

Figure 5: Existing Traffic Volumes (Adjusted)



2.5 Existing Pedestrian Activity

Pedestrian volumes were recorded as part of the July 2019 traffic surveys referenced in **Section 2.4**. **Table 2** lists the number of pedestrians observed in each crosswalk during the AM and PM peak hours. Pedestrian activity at the intersections in the study area was observed to be negligible. At Yonge Street and St. John’s Sideroad, one pedestrian crossing was observed approximately every three to five traffic signal cycles. No pedestrians were observed at the other two intersections.

Table 2: Existing Pedestrian Crossing Activity

Intersection	AM peak hour					PM peak hour				
	North leg	South leg	West leg	East leg	Total	North leg	South leg	West leg	East leg	Total
Bathurst Street at St. John’s Sideroad	0	0	0	0	0	0	0	0	0	0
Yonge Street at St. John’s Sideroad	0	2	4	0	6	2	3	5	1	11
St. John’s Sideroad at Willow Farm Lane	0	0	0	0	0	0	0	0	0	0

2.6 Existing Cycling Activity

Cyclists were counted as part of the July 2019 traffic surveys referenced in **Section 2.4**. The number of cyclists observed was minimal. Over the full four-hour survey period, the following numbers of cyclists were observed in total at each intersection:

- 7 cyclists at Bathurst Street and St. John’s Sideroad;
- 6 cyclists at Yonge Street and St. John’s Sideroad; and
- 1 cyclist at St. John’s Sideroad and Willow Farm Lane.

2.7

Existing Modal Split

The existing modal split in the surrounding area was determined from data in the 2016 Transportation Tomorrow Survey (TTS) database. The modal split was calculated for home-based trips made by residents in Newmarket and Aurora, and reflects both inbound and outbound trips during the three-hour AM and PM peak periods. **Table 3** presents the unadjusted modal split results as extracted from the TTS database.

Table 3: Existing Modal Split (Unadjusted)

Primary travel mode:	AM peak hour		PM peak hour	
	In	Out	In	Out
Auto driver	85%	66%	74%	68%
Auto passenger	7%	13%	12%	27%
Taxi passenger	1%	0%	0%	0%
Local transit	2%	4%	3%	0%
GO rail + local transit	0%	1%	2%	0%
GO rail only	0%	3%	3%	0%
School bus	0%	4%	1%	0%
Walking	5%	7%	5%	3%
Cycling	2%	1%	0%	1%

Note: Numbers may not add to 100% due to rounding.

A closer examination of the transit component of the TTS results indicates that the transit modal split is overstated when the point of reference is the “home” end of the trip:

- “GO rail” trips are largely made by transit, but the “home” end of the trip may involve use of a private vehicle to travel to and from the train station.
- For “Joint GO rail and local transit” trips, the “local transit” component does not necessarily refer to the “home” end of the trip; it can also refer to park-and-ride / kiss-and-ride trips where the rider transferred to the TTC subway after arriving at Union Station.
- “Local transit” trips similarly do not necessarily indicate use of YRT or VIVA services. This category is also used for trips where the rider drove to (or was dropped off at) a subway station in Toronto and completed the rest of their trip on transit, but began their trip in a private vehicle.

The TTS transit database, which uses the same data set as the main TTS database, was referenced for outbound AM peak period trips to determine the access mode to transit (to determine the proportion of GO trips involving a private vehicle) and to determine the correlation between first and second links on transit trips (to determine how many transit trips begin locally on a YRT or VIVA bus vs. how many start at a remote point on a TTC bus or subway line). The following was observed for outbound trips during the AM peak period:

- GO rail passengers access the GO station via the following modes:
 - 55% – auto driver (park-and-ride)
 - 17% – auto passenger (kiss-and-ride)
 - 14% – walking
 - 12% – transfer from YRT
 - 2% – bicycle
- Although 6% of trips are identified as being on “local transit,” only 70% of these trips begin locally on YRT/VIVA while the remaining 30% are passengers that board the TTC subway at Union Station or at an outlying station with park-and-ride facilities.

Table 4 presents the existing modal split as experienced at the “home” end of the trip.

Table 4: Existing Modal Split (“Home” End of Trip)

Primary travel mode:	AM peak hour		PM peak hour	
	In	Out	In	Out
Auto driver	85%	68%	76%	68%
Auto passenger	7%	14%	13%	27%
Taxi passenger	1%	0%	0%	0%
Local transit	2%	5%	4%	0%
School bus	0%	4%	1%	0%
Walking	5%	8%	5%	3%
Cycling	2%	1%	0%	1%

Note: Numbers may not add to 100% due to rounding.

3.0 Future Background Conditions

This section identifies changes to the transportation network that are proposed in the broader study area, and establishes the magnitude of traffic growth under future background conditions (i.e., traffic volumes that are forecasted without the proposed development in place).

Two future horizon years have been assessed:

- 2023, corresponding to the estimated build-out year; and
- 2028, corresponding to five years following build-out.

3.1 Future Transportation Network Changes

The following sections list changes that are planned to the transportation network in and around the study area, and identify how those changes were reflected in the future background analyses.

3.1.1 St. John's Sideroad Widening

In their most recent Transportation Master Plan, the Region of York identified the widening of St. John's Sideroad to a 4-lane cross-section between Bathurst Street and Yonge Street. The Transportation Master Plan tentatively identified this widening for the period between 2027 and 2031. This widening is also reflected in the Region's long-range transportation model (and therefore the model's growth forecasts, which formed the basis of the growth rates derived in **Section 3.2.1**, reflect the availability of this added capacity). It is anticipated that this project would also include the road's conversion from a rural to an urban cross-section including curb and gutter along with active transportation facilities. However, this widening is unfunded and unscheduled, and is not part of the Region's 10-year capital program. Further, an environmental assessment still needs to be undertaken to confirm the need for roadway modifications and to establish a preferred design / cross-section and a preferred means for undertaking the modifications (e.g., widen symmetrically; widen on north or south side).

Given that the project has been identified but not funded or programmed, the baseline future background analyses have been undertaken assuming the existing road cross-section, with the expectation that the planned widening could be considered as mitigation.

3.1.2 St. John's Sideroad / Highway 404 Interchange

The Region's Transportation Master Plan also identifies the future construction of an interchange at Highway 404 and St. John's Sideroad. Although the Region is protecting for this interchange in terms of property and policy measures (e.g., access management), there is similarly no funding or schedule associated with an interchange and it is not being actively pursued. As such, the trip distribution for site traffic has assumed that an interchange is not present.

3.1.3 Mulock GO Station

Metrolinx is planning for the construction of a new GO station on the south side of Mulock Drive. Current concepts for the station envision an unspecified number of parking spaces; kiss-and-ride facilities; and a bus loop. Access is envisioned from Mulock Drive and from Bayview Avenue via existing and proposed local streets connecting to those roadways. The new Mulock GO station may be an alternative to the Aurora GO station for Phase 3 residents and has been considered as such in the trip distribution of resident trips.

3.2 Background Traffic Growth

Future background traffic volumes are calculated by applying a background growth rate to traffic volumes on major roadways in the study area, and adding site-specific traffic volumes generated by developments in the study area.

3.2.1 General Background Growth

Background traffic growth rates were derived from the Region's long-range transportation model. The Region provided AM peak hour model runs for the 2016, 2021, 2031 and 2041 horizon years. From the model results, the following annual growth rates were estimated during the AM peak hour:

- Bathurst Street: 0.5% northbound / 2.0% southbound
- Yonge Street: 0.5% northbound / 1.0% southbound
- St. John's Sideroad: 2.0% eastbound / 1.0% westbound

The growth rates listed above were applied to midblock volumes upstream and downstream from the major arterial intersections, and then the calculated approach and departure growth was distributed proportionally between the individual intersection turning movements.

The Region's model reflects AM peak hour conditions. For PM peak hour conditions, the AM peak hour growth rates were reversed (e.g., the AM peak hour's northbound growth rate was applied to the southbound direction during the PM peak hour).

3.2.2 Background Development Traffic

Active development applications in the towns of Newmarket and Aurora, within a radius of approximately 2.5 km of the site (or just over one concession), were reviewed to determine the potential to affect traffic volumes at the study area intersections. (Developments beyond this distance would have more opportunity to disperse before reaching the study area and would therefore have lower impact, and were assumed to be captured as part of the general background growth rates.) The following developments were considered:

- Phases 1 and 2 of the Shining Hill Estates development;
- A proposed townhouse development on the northeast corner of Yonge Street and St. John’s Sideroad; and
- Several residential developments in the downtown area of Aurora.

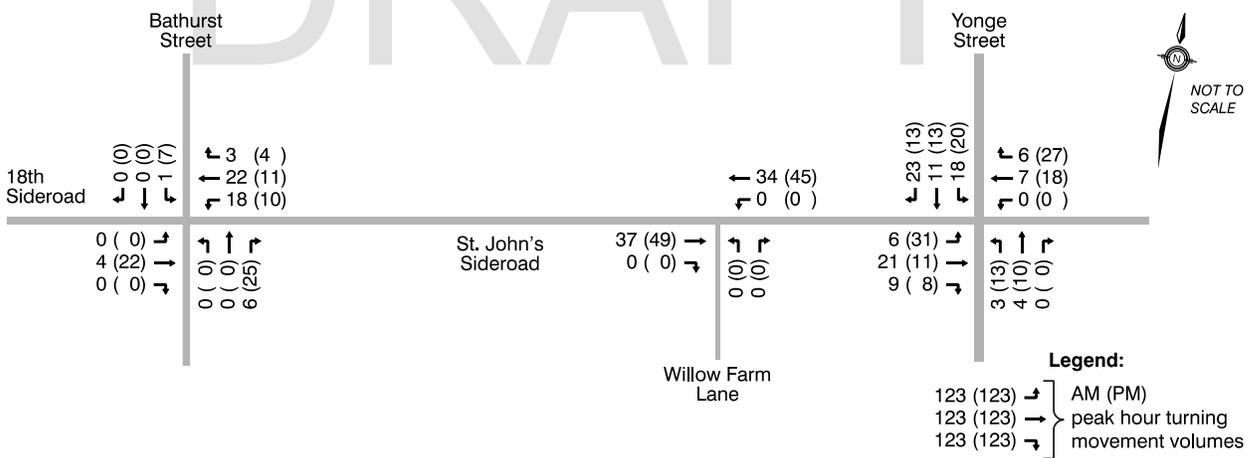
3.2.2.1 Shining Hill Estates, Phases 1 and 2

Phase 1 of the Shining Hill Estates development is located southwest of Yonge Street and Joe Persechini Drive and consists of 174 detached, semi-detached and townhouse units. These units were not present while the traffic surveys were undertaken and therefore have been added to the existing traffic volumes.

Phase 2 is located on the north side of St. John’s Sideroad, and is planned to consist of 90 detached residential units on a network of private roadways. A single unsignalized full-movement access to St. John’s Sideroad is planned approximately 750 metres west of Willow Farm Lane. It will not have a vehicular connection to the remainder of the Shining Hill Estates collector road network.

Traffic projections for Phase 1 were most recently documented in a February 2018 letter report. Traffic projections for Phase 2 were most recently documented in a May 2019 letter report. **Figure 6** illustrates the traffic volumes associated with Phases 1 and 2 of the Shining Hill Estates development. These volumes were carried forward for the Phase 3 background analyses.

Figure 6: Background Development Traffic (Shining Hill Estates Phases 1 and 2)



3.2.2.2 Proposed Townhouse Development, Yonge Street and St. John’s Sideroad

A 68-unit townhouse development is proposed on the northeast corner of Yonge Street and St. John’s Sideroad. Access would be via two existing full-movement accesses leading to Hadley Grange seniors apartment complex. The volume of traffic generated by this development was estimated using trip generation rates published by the Institute of Transportation Engineers (ITE) in the *Trip Generation Manual* (10th edition). Trips were generated using ITE land use code 220 (“Multifamily Housing (Low-

Rise)”). The development is anticipated to generate 31 trips during the AM peak hour and 38 trips during the PM peak hour; **Table 5** presents how these volumes were calculated.

Table 5: Background Development Trip Generation (Yonge Street and St. John’s Sideroad Townhouses)

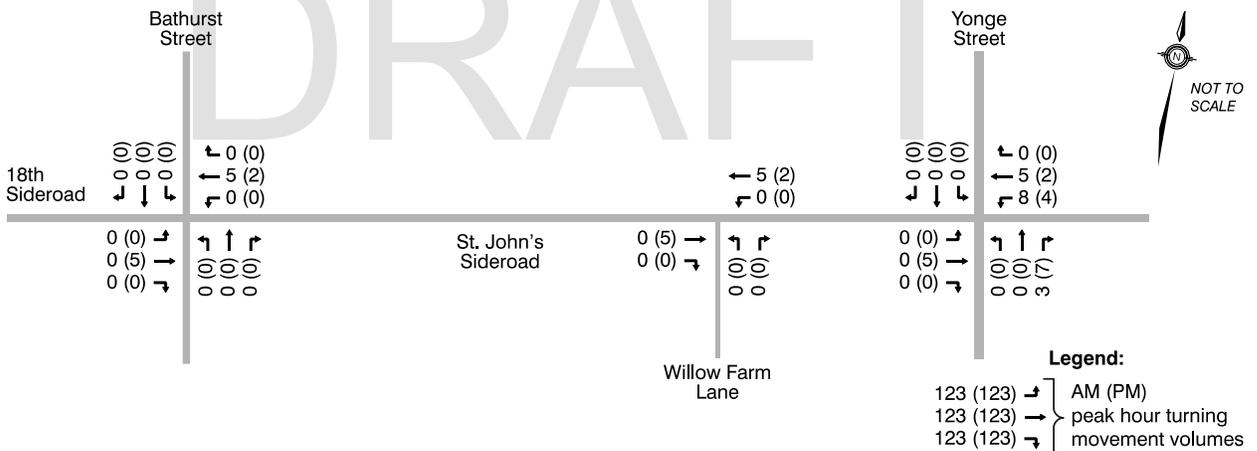
	AM peak hour			PM peak hour		
	In	Out	Total	In	Out	Total
Trip generation rate (per unit)	23%	77%	0.46	63%	37%	0.56
Trips generated (68 units)	7	24	31	24	14	38

Trips were distributed using the same directional distribution used for the subject site (see **Section 4.3**).

Trips were assigned logically to the two driveways. Only west- and south-oriented trips were assumed to travel through the Yonge Street and St. John’s Sideroad intersection; north- and east-oriented trips were assumed to use the accesses north and east of the intersection, respectively.

Figure 7 illustrates the expected study area traffic volumes associated with the proposed residential development at Yonge Street and St. John’s Sideroad.

Figure 7: Background Development Traffic (Yonge Street and St. John’s Sideroad Townhouses)



3.2.2.3 Downtown Aurora Residential Development

Numerous development applications are currently active for residential development in the area of downtown Aurora. While most of these are relatively minor in size, collectively they add to approximately 900 units, broken down approximately as follows:

- 11 single detached units;
- 483 townhouse units; and
- 406 apartment/condominium units.

The volume of traffic generated by these developments was estimated using trip generation rates from the *Trip Generation Manual* (10th edition). Trips were generated using ITE land use codes 210 (“Single-Family Detached Housing”), 220 (“Multifamily Housing (Low-Rise)”) and 221 (“Multifamily Housing (Mid-Rise)”). All developments combined are anticipated to generate 376 trips during the AM peak hour and 460 trips during the PM peak hour;

Table 6 presents how these volumes were calculated.

Table 6: Background Development Trip Generation (Downtown Aurora)

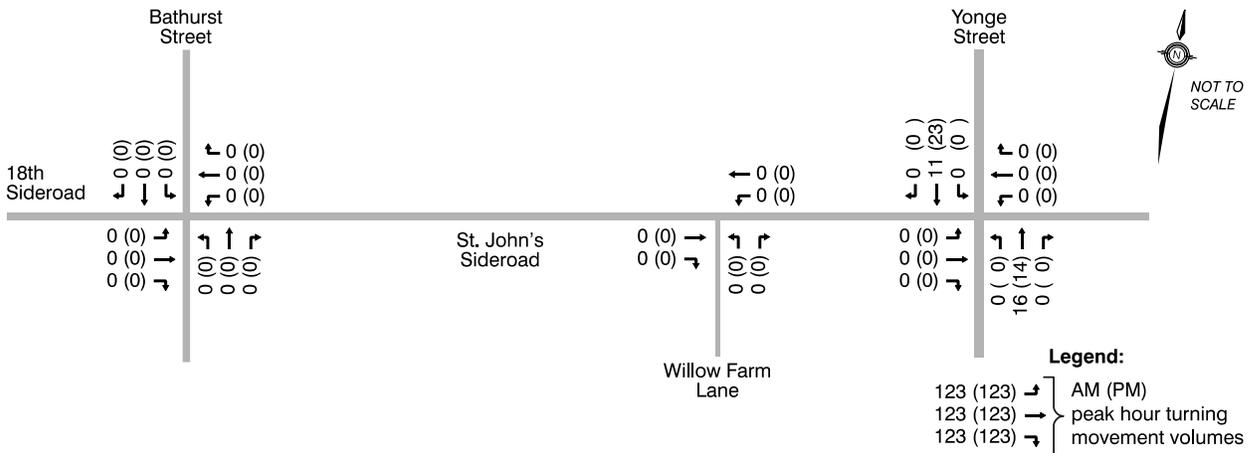
	AM peak hour			PM peak hour		
	In	Out	Total	In	Out	Total
Single detached homes:						
Trip generation rate (per unit)	25%	75%	0.74	63%	37%	0.99
Trips generated (11 units)	2	6	8	7	4	11
Townhouses:						
Trip generation rate (per unit)	23%	77%	0.46	63%	37%	0.56
Trips generated (483 units)	51	171	222	170	100	270
Apartments/condominiums:						
Trip generation rate (per unit)	26%	74%	0.36	61%	39%	0.44
Trips generated (406 units)	38	108	146	109	70	179
Total trips:	91	285	376	286	174	460

There is a VIVA stop at Wellington Street in downtown Aurora, and a variety of complementary non-residential uses that could attract some walking trips. Notwithstanding, to be conservative a modal split adjustment was not applied.

Trips were distributed using the same directional distribution used for the subject site (see **Section 4.3**). It was assumed that 50% of north-oriented trips would travel north-south along Yonge Street through the study area; all other trips were assumed to not enter the study area.

Figure 8 illustrates the expected study area traffic volumes associated with the proposed residential developments in the downtown Aurora area.

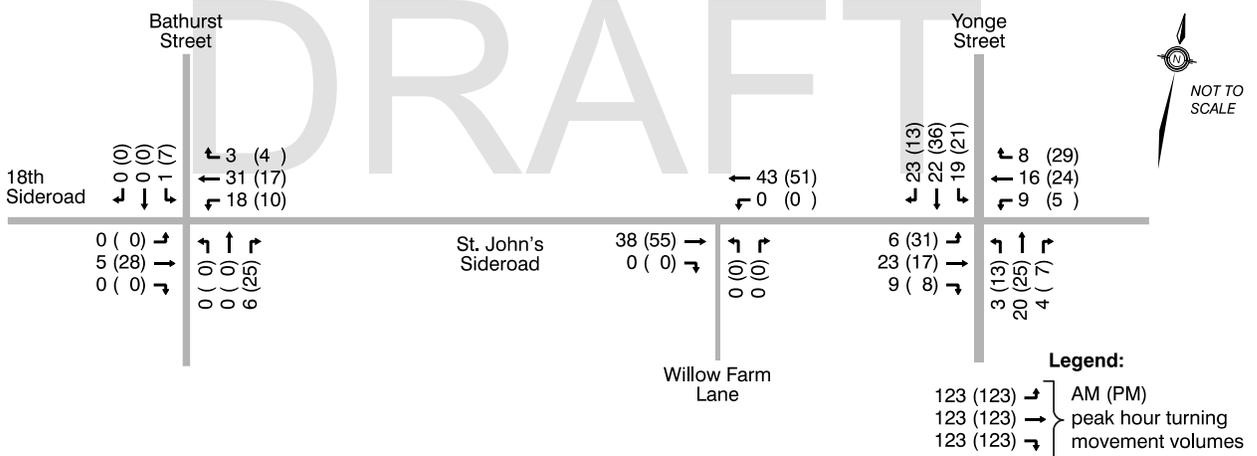
Figure 8: Background Development Traffic (Downtown Aurora)



3.2.2.4 Summary of Background Development Traffic

Figure 9 presents the total volume of background development traffic assigned through the study area road network.

Figure 9: Combined Background Development Traffic



3.3 Future Background Traffic Volumes

Future background traffic volumes were calculated by applying the background growth rates to existing volumes up to the 2023 and 2028 horizons, and adding traffic generated by the identified background developments. The resulting future background traffic volumes are presented in **Figure 10** (2023 horizon) and **Figure 11** (2028 horizon).

Figure 10: Future Background Traffic Volumes (2023)

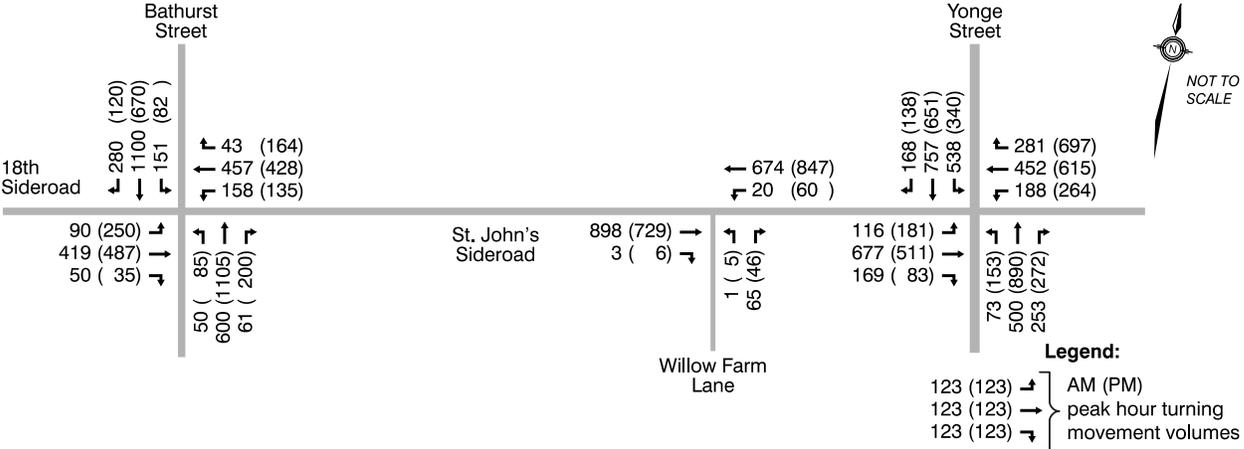
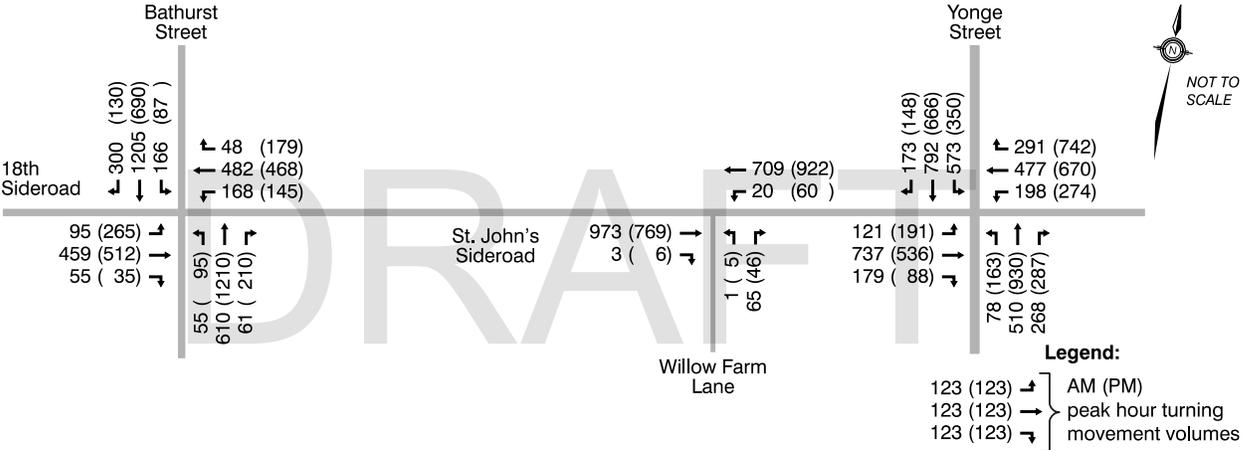


Figure 11: Future Background Traffic Volumes (2028)



4.0

Total Future Traffic Volumes

4.1

Proposed Development

Phase 3 of the Shining Hill Estates development is within the town of Aurora, north of St. John's Sideroad opposite Willow Farm Lane. The development is proposed to include 88 detached residential lots, a medium density block anticipated to include approximately 200 units, and the repurposing of an existing residence for use as a private girls' school (St. Anne's School).

Access to Phase 3 will be via a new north-south collector road (Street "A") extending northerly from the existing intersection of St. John's Sideroad and Willow Farm Lane. In the interim, it will end at the Newmarket / Aurora boundary at the north end of the Phase 3 area. In the longer term, Street "A" is planned to be extended farther to the north and connect to a new east-west collector extending between Bathurst Street and Yonge Street (Bennington Road, being constructed as part of Phase 1).

4.2

Site Trip Generation

This section primarily addresses automobile trip generation. Multi-modal trip generation is addressed in **Section 7.1**.

4.2.1

Residential Units

Trips generated by the residential units were estimated based on trip generation rates published by ITE in the *Trip Generation Manual*, 10th edition. Trip generation rates were referenced for the following land use codes:

- 210 – Single-Family Detached Housing (used for trips generated by the proposed single-family units);
- 221 – Multi-Family Housing (Mid-Rise) (used for trips generated by the proposed apartment units).

Table 7 presents the trip generation calculations applied to the residential portion of the development.

Table 7: Site Trip Generation (Residential Units)

	AM peak hour			PM peak hour		
	In	Out	Total	In	Out	Total
Single detached homes:						
Trip generation rate (per unit)	25%	75%	0.74	63%	37%	0.99
Trips generated (88 units)	17	49	66	55	32	87
Apartments/condominiums:						
Trip generation rate (per unit)	26%	74%	0.36	61%	39%	0.44
Trips generated (200 units)	19	53	72	54	34	88
Total trips:	36	102	138	109	66	175

4.2.2

St. Anne's School

Trips generated by St. Anne's School were estimated from first principles. Trips were generated separately for students (pick-up/drop-off trips) and for staff.

At the five-year horizon, the school anticipates to have a population of 500, comprised of approximately 435 students and 65 staff (i.e., 6.75 students per staff member). Enrolment will be lower in the first year: currently estimated at approximately 100 students, which would correspond to 15 staff assuming the same ratio.

Given the nature of the school, most students will reside outside walking distance from the school, and most will be picked up and dropped off by a parent (or guardian). This will generate one inbound and one outbound trip per student, both in the morning and in the afternoon.

The school does not anticipate offering busing in the first year, but expects to operate one to two school buses by the fifth year, which they anticipate could attract between 40 and 80 students. For analysis purposes, approximately 15% of students have been assumed to ride the school bus.

The remaining vehicle pick-up and drop-off demand will be offset by three factors:

- Families with more than one girl enrolled at the school will arrive with multiple students per vehicle;
- Given the relationship between the two schools, some families may also have sons enrolled at St. Andrew's College and would therefore already be traveling in the study area; and
- In future years, the school proposes to offer school busing (for an additional fee).

For analysis purposes, it has been assumed that, on average:

- One-third of families have two girls enrolled at the school, resulting in a 25% reduction in the auto trips; and
- One-third of families have a son enrolled at St. Andrew's College, resulting in some of these trips being offset by duplication with trips being made under background conditions. A volume of traffic equivalent to one-third of the PU/DO vehicle demand was assumed to be removed from the broader study area.

Each staff member is anticipated to generate one inbound trip before school and one outbound trip after school.

Before school, it has been assumed that all trips will occur during the AM peak hour of traffic on the adjacent road network. After school, trips are expected to be more dispersed, with individual pick-up times depending on parents' work schedules and any participation in after-school extra-curricular activities. Based on an hourly distribution profile of trips to/from charter schools, published by ITE as a supplement to the Trip Generation Manual, approximately 25% of school trips have been assumed to

occur during the PM peak hour of traffic on the adjacent road network (i.e., the PM peak hour trips reflect 25% of the inverted AM peak hour trips).

Table 8: Site Trip Generation (School)

	2023						2028					
	AM peak hour			PM peak hour			AM peak hour			PM peak hour		
	In	Out	Total	In	Out	Total	In	Out	In	Out	In	Out
Student pick-up / drop-off (100 students in 2023; 435 students in 2028)												
Unadjusted trips	100	100	200	25	25	50	435	435	870	109	109	218
Siblings traveling together	-25	-25	-50	-6	-6	-12	-109	-109	-218	-27	-27	-54
Total families	75	75	150	19	19	38	326	326	652	82	82	164
15% via school bus (2028 only)	0	0	0	0	0	0	-49	-49	-98	-12	-12	-24
Adjusted trips (gross)	75	75	150	19	19	38	277	277	554	70	70	140
Reduction in SAC trips	-25	-25	-50	-6	-6	-12	-92	-92	-184	-23	-23	-46
Net vehicle trips	50	50	100	13	13	26	185	185	370	47	47	94
Staff (15 staff in 2023; 65 staff in 2028)												
Total trips	15	0	15	0	4	4	65	0	65	0	16	16
Total trips (gross):	90	75	165	19	23	42	342	277	619	70	86	156
Total trips (net):	65	50	115	13	17	30	250	185	435	47	63	110

4.2.3

Total Site Trips

Table 9 presents the total number of trips anticipated to be generated by Phase 3 at the 2023 and 2028 horizons.

Table 9: Total Site Trip Generation

	AM peak hour			PM peak hour		
	In	Out	Total	In	Out	Total
2023 horizon:						
Residential units	36	102	138	109	66	175
St. Anne's School (gross)	90	75	165	19	23	42
Reduction in SAC trips	-25	-25	-50	-6	-6	-12
Total (gross)	126	177	303	128	89	217
Total (net)	101	152	253	122	83	205
2028 horizon:						
Residential units	36	102	138	109	66	175
St. Anne's School	342	277	619	70	86	156
Reduction in SAC trips	-92	-92	-184	-23	-23	-46
Total (gross)	378	379	757	179	152	331
Total (net)	286	287	573	156	129	285

In 2023, the site is expected to generate approximately 303 vehicle trips during the AM peak hour and 217 vehicle trips during the PM peak hour.

By 2028, with increased enrolment at the school, the trip generation is expected to increase to approximately 757 vehicle trips during the AM peak hour and 331 vehicle trips during the PM peak hour.

After accounting for the double-counting of trips currently made to St. Andrew's College that will eventually be made to both schools, the net number of new trips made by the site is expected to be:

- 253 net new vehicle trips during the AM peak hour and 205 net new vehicle trips during the PM peak hour in 2023; and
- 573 net new vehicle trips during the AM peak hour and 285 net new vehicle trips during the PM peak hour in 2028.

4.3 Site Traffic Distribution and Assignment

4.3.1 Residential Trips

The same residential trip distribution was applied as in the 2019 report for the overall development. This trip distribution is based on origin-destination data from the 2016 Transportation Tomorrow Survey (TTS). The TTS data reflect inbound and outbound home-based auto driver trips made by residents of western Newmarket and Aurora during the AM and PM peak periods.

- In the 2019 analyses, the TTS auto driver trips were discounted to reflect local travel for which the trip purpose was listed as "facilitate passenger"; from the location of these trips, it appears that many of these are trips made to drop off or pick up children from school. The full development is planned to include a public elementary school in the Newmarket section north of Phase 3, and at full build-out of the development this trip purpose will be served locally within the subject lands. However, for the purpose of this analysis students will attend schools elsewhere in Aurora and the "facilitate passenger" trips were assigned to/from the south via Yonge Street.
- Conversely, the TTS auto driver trip distribution was adjusted to also reflect the auto driver or passenger component of GO train trips (i.e., a trip categorized in the TTS database as primarily involving GO rail would be experienced in the local area as an auto trip).

4.3.2 School Trips (Pick-Up/Drop-Off)

Morning drop-offs and evening pick-ups of students were distributed differently for the "home" end of the trip (carrying students) and the "return" trip (without student passengers).

The "home" end was distributed based on an estimated catchment area for students. School staff advise that they anticipate to attract students from a broad area of the northern GTA, including from Newmarket, Aurora, King, Stouffville, Markham, Richmond Hill, Thornhill, Vaughan and Caledon.

For the "return" trip, a blended distribution was developed based on some parents/guardians traveling to/from home, and other parents/guardians traveling to/from their workplace. For the workplace component, a distribution was estimated from TTS data showing the place of work for Aurora residents

commuting by automobile (or driving to a GO station), weighted to favour trips to workplaces within a range of roughly 30 to 45 minutes. (This is intended to reflect that some parents will already have driven for some time from homes outside Newmarket/Aurora, and that the “return” trip will be in addition to this.)

For the PU/DO trips involving both schools, it was assumed that parents would be slightly more likely to stop at St. Anne’s School before stopping at St. Andrew’s College (due to the added delay in making the northbound left turn at Yonge Street and St. John’s Sideroad). The “Yonge south” component of the trip distribution for both “home” and “return” trips reflects this trip chaining between the two schools.

The trip chaining will displace existing trips that are currently made to/from St. Andrew’s College. A directional distribution was estimated for these displaced trips, based broadly on the distribution for St. Anne’s School but with adjustments to reflect the location of St. Andrew’s College related to the study area (i.e., some displaced trips will be external only and will not travel through the study area).

4.3.3 School Trips (Staff)

The distribution of trips made by school staff was carried forward from the 2019 study, where staff trips generated by the public elementary school were assumed to be relatively evenly distributed between the cardinal directions.

4.3.4 Trip Distribution Summary

Based on the foregoing sections, **Table 10** presents the trip distribution applied to residential and school PU/DO and staff trips.

Table 10: Trip Distribution

To/from:	Residential trips				School PU/DO trips				School staff	Displaced St. Andrew’s trips
	AM peak hour		PM peak hour		AM peak hour		PM peak hour			
	In	Out	In	All	In	Out	In	Out	All	All
West via 18 th Sideroad	7%	22%	22%	12%	17.5%	15%	15%	15%	20%	20%
North via Bathurst Street	15%	4%	9%	9%	10%	10%	10%	10%	15%	10%
South via Bathurst Street	10%	14%	19%	3%	15%	10%	12.5%	12.5%	15%	0%
South via Willow Farm Lane	0%	0%	0%	0%	5%	5%	5%	5%	0%	0%
North via Yonge Street	11%	21%	12%	24%	7.5%	7.5%	10%	5%	25%	10%
South via Yonge Street	39%	20%	12%	26%	17.5%	27.5%	17.5%	27.5%	10%	0%
East via St. John’s Sideroad	18%	19%	26%	26%	27.5%	25%	30%	25%	15%	20%

The resulting site trips are illustrated in the following figures:

- **Figure 12** illustrates the trips generated by the proposed residential units;
- **Figure 13** illustrates the trips generated by the school at the 2023 horizon (including displaced St. Andrew's College trips);
- **Figure 14** illustrates the trips generated by the school at the 2028 horizon (including displaced St. Andrew's College trips);
- **Figure 15** illustrates the total site trips generated at the 2023 horizon; and
- **Figure 16** illustrates the total site trips generated at the 2023 horizon.

Figure 12: Site Trips (Residential Component)

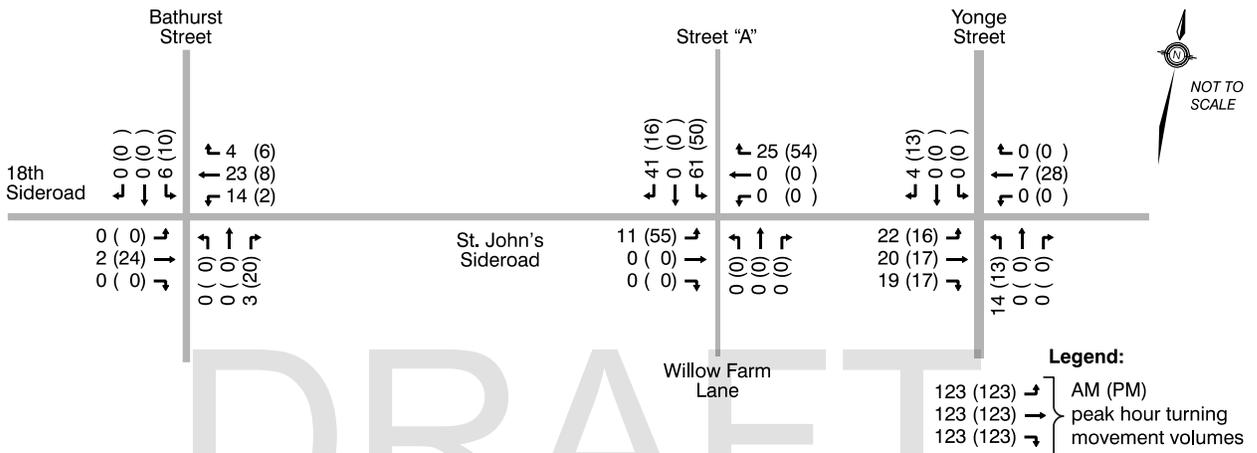


Figure 13: Site Trips (St. Anne's School, 2023 Horizon)

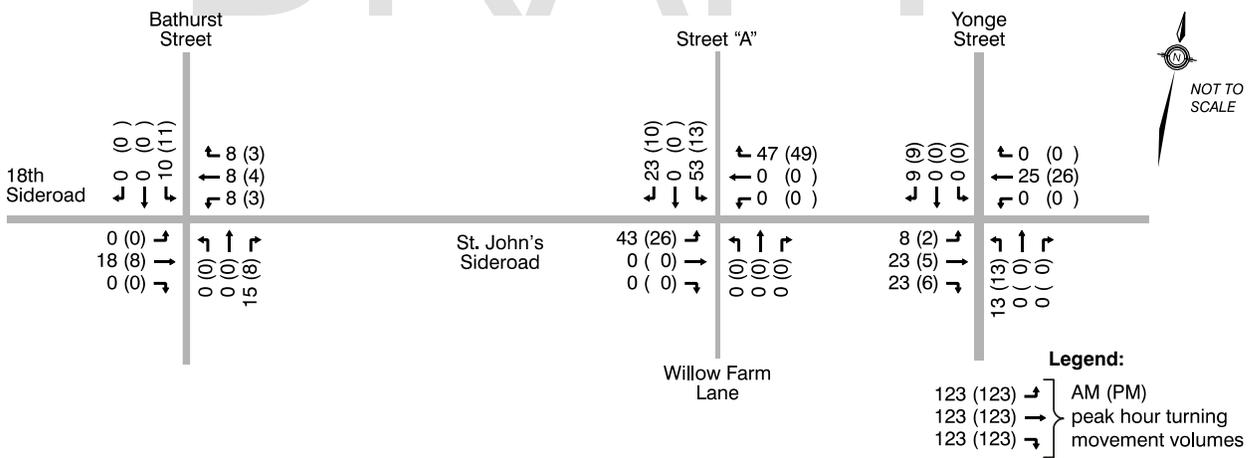


Figure 14: Site Trips (St. Anne’s School, 2028 Horizon)

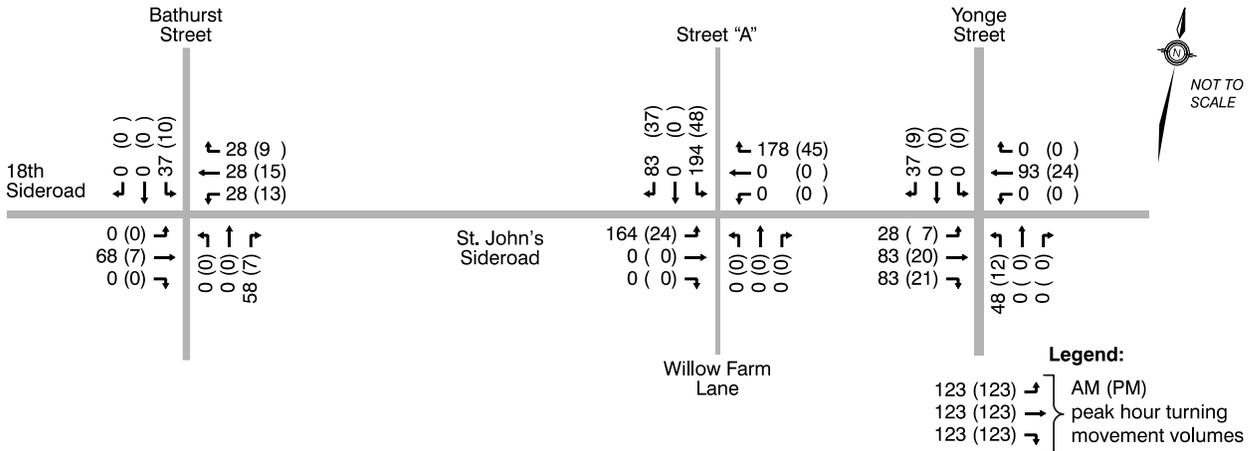


Figure 15: Total Site Trips (2023 Horizon)

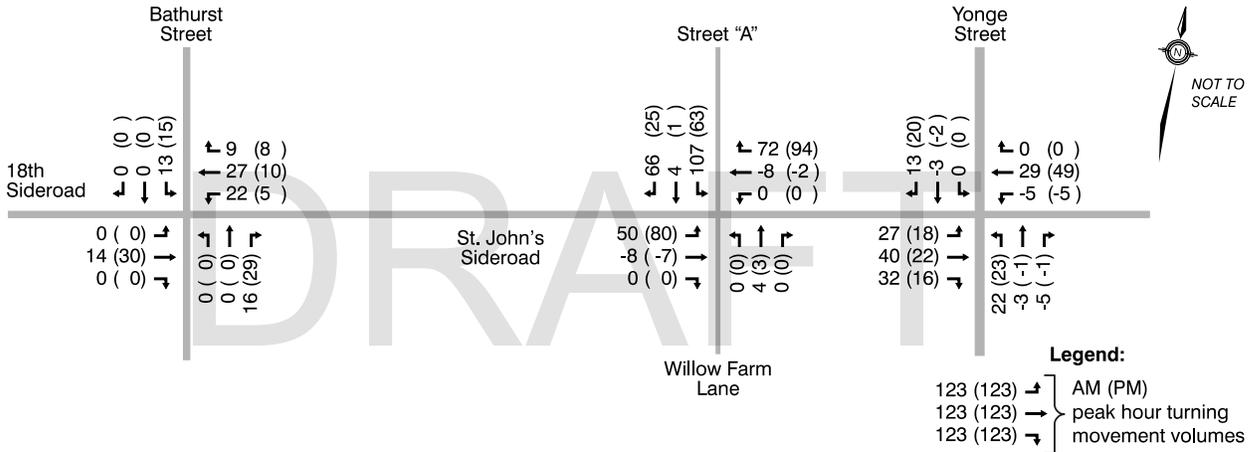
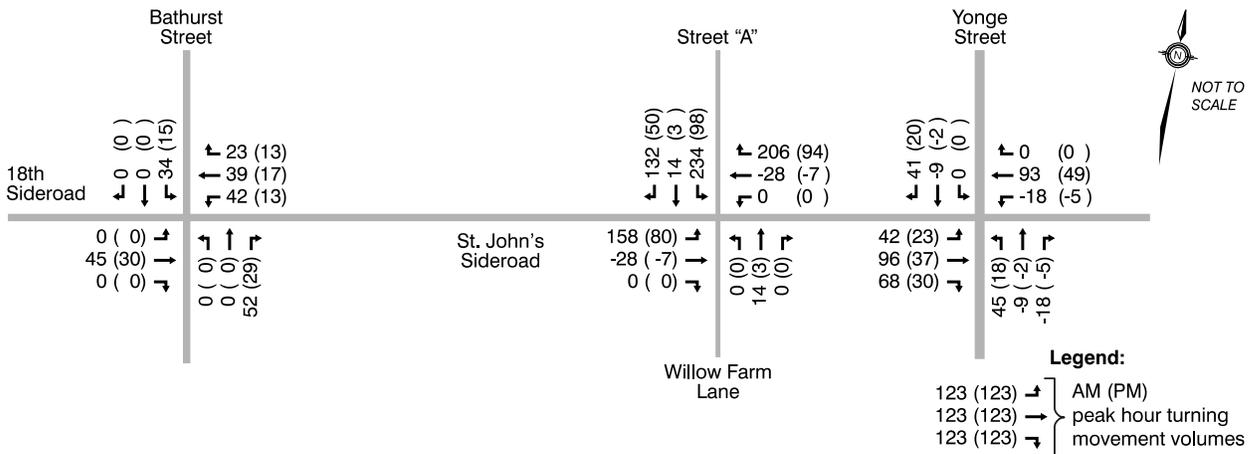


Figure 16: Total Site Trips (2028 Horizon)



4.4 Total Future Traffic Volumes

Total future traffic volumes represent conditions anticipated with the proposed development in place, and are calculated by adding the site traffic volumes to the projected future background traffic volumes. **Figure 17** and **Figure 18** illustrate total future traffic volumes at the 2023 and 2028 horizons, respectively.

Figure 17: Total Future Traffic Volumes (2023 Horizon)

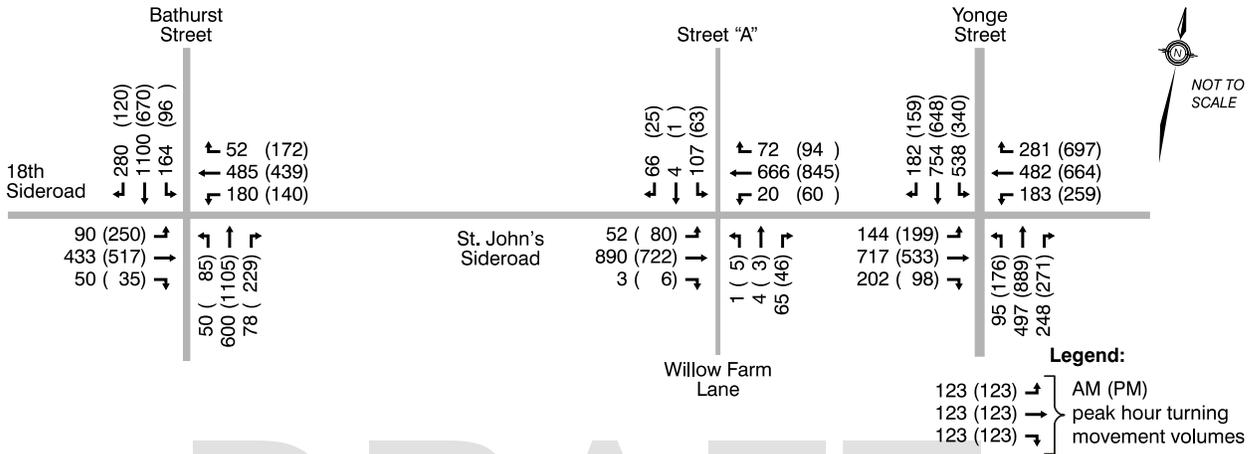
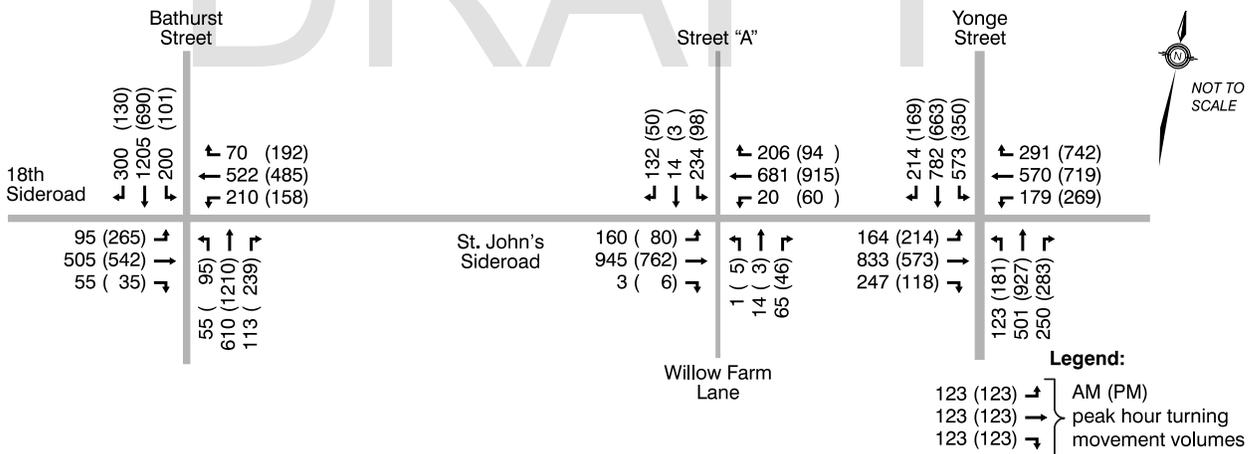


Figure 18: Total Future Traffic Volumes (2028 Horizon)



5.0

Intersection Operations

Intersection operational analyses were completed for each of the four main arterial intersections using Trafficware’s Synchro software (version 10). The analyses generally reflect the existing lane configurations at each intersection and current traffic signal timings obtained from the Region of York.

At signalized intersections, the volume-to-capacity (v/c) ratio, average vehicular delay, level of service and 95th percentile queue were noted for each individual movement, and the average delay and level of service were noted for the intersection as a whole. At unsignalized (stop-controlled) intersections, the v/c ratio, delay, level of service and 95th percentile queue were noted for any stop-controlled movements. Level of service definitions are provided in **Appendix D**. Synchro analysis worksheets reports are provided in **Appendix E**.

At each intersection, critical movements were identified. The Region of York’s Transportation Mobility Plan guidelines indicate that an individual movement or lane group is considered to be “critical” when its v/c ratio exceeds 0.85, or when its level of service is E or F.

Multi-modal levels of service are addressed in **Section 7.0**.

5.1

Yonge Street and St. John’s Sideroad

5.1.1

Existing Configuration

At Yonge Street and St. John’s Sideroad, two adjustments were made to better calibrate the analysis results with observations made in the field.

- The left turn saturated flow rate during the advance southbound left turn phase was increased. The unadjusted analyses resulted in a calculated capacity of 9 vehicles per cycle during the protected phase. Operations of the left turn movement were observed and videotaped over several cycles during the AM peak period, and the southbound advance phase was regularly observed to accommodate 12 vehicles per cycle. The protected saturation flow rate was increased by 28% to match observed conditions.
- The eastbound approach has two through lanes (one of which is shared with the right turn movement). However, the capacity of the eastbound approach is reduced because the second lane is only developed roughly 60 metres upstream from the stop bar. Both lanes of capacity are usable for the first 16 seconds of eastbound green, corresponding to eight vehicles discharging from both lanes. After this part of the eastbound queue is served, however, the eastbound approach is only fed by a single lane and the capacity during the remaining green interval is only half utilized. The eastbound lane utilization factor was reduced to 0.75 to better represent the existing eastbound capacity. This resulted in the eastbound through movement reaching capacity during the AM peak

hour, with a queue nearly reaching Willow Farm Lane, which matches conditions observed in the field during the AM peak hour.

Table 11 summarizes the operations at Yonge Street and St. John's Sideroad under each traffic volume scenario.

Table 11: Intersection Operations, Yonge Street and St. John's Sideroad

Scenario:	Movement	AM peak hour				PM peak hour			
		v/c	LOS	Delay (s/veh)	95 th %ile queue (m)	v/c	LOS	Delay (s/veh)	95 th %ile queue (m)
Existing	EB left	0.50	C	28.8	31	0.78	D	49.5	54
	EB through	1.01	E	76.6	207	0.64	D	37.5	104
	WB left	0.96	F	84.0	85	0.92	E	61.9	83
	WB through	0.80	D	51.3	160	0.95	E	65.2	208
	WB right	0.44	A	6.7	24	0.91	D	37.8	170
	NB left	0.50	D	54.1	36	0.66	E	55.2	60
	NB through	0.62	D	46.2	85	0.88	D	52.5	147
	NB right	0.48	B	16.0	44	0.41	A	6.4	22
	SB left	1.10	F	95.2	193	1.07	F	103	133
	SB through	0.50	C	26.2	95	0.41	C	24.4	73
	SB right	0.21	A	3.7	12	0.18	A	4.2	12
	Overall	—	D	50.6	—	—	D	46.3	—
2023 future background	EB left	0.60	C	33.8	34	0.97	F	85.7	79
	EB through	1.13	F	113	246	0.68	D	38.3	115
	WB left	1.03	F	102	94	1.05	F	93.7	100
	WB through	0.85	E	55.6	184	1.03	F	84.1	245
	WB right	0.46	A	8.1	30	1.00	E	58.1	213
	NB left	0.55	E	58.0	38	0.84	E	75.8	78
	NB through	0.66	D	47.4	91	0.97	E	65.6	165
	NB right	0.51	B	19.4	52	0.45	A	9.2	31
	SB left	1.24	F	148	222	1.18	F	141	151
	SB through	0.54	B	12.8	38	0.45	C	25.4	79
	SB right	0.24	A	0.8	0	0.20	A	4.1	12
	Overall	—	E	64.4	—	—	E	61.1	—
2023 total future	EB left	0.84	E	59.7	63	1.07	F	111	90
	EB through	1.23	F	151	283	0.72	D	39.7	123
	WB left	1.00	F	95.9	95	1.10	F	110.7	101
	WB through	0.91	E	63.0	207	1.11	F	109.6	273
	WB right	0.48	A	9.5	35	1.01	E	59.3	215
	NB left	0.72	E	71.5	60	0.96	F	98.7	93
	NB through	0.65	D	47.2	91	0.97	E	65.4	165
	NB right	0.50	C	19.4	54	0.45	A	9.8	32
	SB left	1.23	F	147.6	219	1.18	F	141	151
	SB through	0.54	B	15.8	48	0.45	C	25.4	79
	SB right	0.26	A	0.9	0	0.23	A	3.9	13
	Overall	—	E	75.0	—	—	E	67.5	—

Table 11: Intersection Operations, Yonge Street and St. John's Sideroad (cont'd)

Scenario:	Movement	AM peak hour				PM peak hour			
		v/c	LOS	Delay (s/veh)	95 th %ile queue (m)	v/c	LOS	Delay (s/veh)	95 th %ile queue (m)
2028 future background	EB left	0.69	D	41.8	38	1.03	F	99.1	85
	EB through	1.22	F	148	276	0.71	D	39.5	122
	WB left	1.08	F	118	101	1.14	F	126	108
	WB through	0.90	E	61.2	200	1.12	F	113	278
	WB right	0.48	A	9.2	35	1.07	E	78.5	241
	NB left	0.62	E	63.0	44	0.91	F	88.7	86
	NB through	0.67	D	47.8	93	1.01	E	75.4	177
	NB right	0.55	C	22.8	60	0.48	B	11.4	38
	SB left	1.33	F	188	248	1.21	F	153	157
	SB through	0.56	B	13.7	42	0.46	C	25.6	81
	SB right	0.25	A	0.8	0	0.22	A	4.0	13
	Overall	—	F	79.5	—	—	E	73.5	—
2028 total future	EB left	1.09	F	124	87	1.15	F	137	100
	EB through	1.44	F	239	347	0.79	D	42.9	138
	WB left	0.98	F	89.4	87	1.27	F	175	121
	WB through	1.07	F	100	262	1.21	F	144	305
	WB right	0.51	B	13.5	47	1.07	F	79.7	243
	NB left	0.96	F	113	80	1.01	F	111	98
	NB through	0.66	D	47.4	91	1.01	E	74.7	176
	NB right	0.51	C	21.4	55	0.48	B	12.1	40
	SB left	1.32	F	183.5	242	1.21	F	153	157
	SB through	0.56	B	16.1	49	0.46	C	25.6	81
	SB right	0.30	A	1.0	0W	0.24	A	3.9	13
	Overall	—	F	109	—	—	F	83.1	—

The intersection of Yonge Street and St. John's Sideroad currently operates at a reasonable overall level of service (LOS D) during both peak hours. However, there are several movements identified as being critical from a capacity perspective:

- During the AM peak hour, the southbound and westbound left turns, and the eastbound through movement, are at or near capacity.
- During the PM peak hour, the southbound left turn is at capacity, all westbound movements are near capacity, and the northbound through movement is just above the critical threshold.

Most of the movements listed above are also critical from a level of service perspective.

As part of the previous 2019 study, Region staff specifically expressed interest in the queues on the eastbound approach during the AM peak hour. The 95th percentile queue was calculated at 207 metres in the eastbound through lanes. However, this reflects a queue distributed between two lanes, with a combined total of 415 metres of queued vehicles. The available storage length in the outside lane is only approximately 60 to 65 metres, resulting in a 350-metre queue in the inside lane. This queue would extend approximately to the start of the westbound left turn taper for Willow Farm Lane. This calculation matches queue lengths observed during a site visit during the AM peak period in September 2019.

At the 2023 horizon, the overall level of service is anticipated to change to LOS E both under background conditions and with the development of the site. Several individual movements are expected to be at or above capacity, including most movements during the PM peak hour; as well, many movements are expected to operate at LOS E or F (whether due to capacity constraints or due to the long traffic signal cycle). Site traffic will contribute to some of these critical movements — particularly the eastbound through and left turn movements during the AM peak hour, and the eastbound left turn and westbound through movement during the PM peak hour — although most of these movements are already expected to be constrained without development of the site. The net impact of site traffic is projected to be an overall increase in delay of approximately 6 to 10 seconds per vehicle.

At the 2028 horizon, the overall level of service is anticipated to have reached LOS F during the AM peak hour under background conditions, and during the PM peak hour with development of the site. Many individual movements will continue to be critical at this horizon. In particular, the eastbound through movement and southbound left turn movement are both expected to be significantly above capacity during the AM peak hour (particularly with the addition of school drop-off traffic), as are the southbound left turn and westbound approach during the PM peak hour.

As noted in **Section 3.1.1**, the Region of York's most recent Transportation Master Plan recommended the widening of St. John's Sideroad to four lanes between Bathurst and Yonge Street and tentatively identified this widening to occur between 2027 and 2031. This widening is also reflected in the Region's long-range transportation model (and therefore the model's growth forecasts, which formed the basis of the growth rates derived in **Section 3.2.1**, reflect the availability of this added capacity). Given that this widening is unfunded and unscheduled within the Region's 10-year capital program, and that an environmental assessment still needs to be undertaken for the project, it has been assumed that mitigation will consist of adjustments to the traffic signals as a temporary measure until such time as the planned road widening can be completed.

5.1.2

Potential Mitigation

Traffic signal timing adjustments were tested to mitigate the anticipated capacity constraints under the projected future background and total future volumes. The following changes were applied:

- The pedestrian phases were changed to remove pedestrian recall on the east leg, so that pedestrians will need to press the pushbutton to call a walk signal. This will enable the northbound through phase interval to be reduced during the AM peak period and provide additional green time to the southbound left turn phase. While normally removing pedestrian recall would not be preferred, in this case the number of pedestrian crossings is very low (0 pedestrians observed in the east crosswalk during the AM peak hour; 1 pedestrian observed during the PM peak hour) and therefore the number of pedestrians affected would be minimal.
- A northbound left turn phase was added in the 2028 total future scenario during the AM and PM peak hours.
- Green times were adjusted on individual phases in conjunction with the other two changes noted above.

The future background and total future volumes at both horizon years were analyzed under these revised timings. **Table 12** presents the results.

Given the magnitude of the constraints anticipated under the existing timings, the proposed adjustments would have a relatively modest effect, with the overall level of service generally remaining unchanged. The timing and phasing adjustments would result in increased capacity on the southbound left turn, particularly during the AM peak hour when the opposing northbound through volume is lower. Overall, however, there would still be numerous critical movements at the intersection under both background and total future conditions. Any more significant mitigation would require measures such as the Region's planned road widening west of the intersection.

Table 12: Mitigated Intersection Operations, Yonge Street and St. John's Sideroad

Scenario:	Movement	AM peak hour				PM peak hour			
		v/c	LOS	Delay (s/veh)	95 th %ile queue (m)	v/c	LOS	Delay (s/veh)	95 th %ile queue (m)
2023 future background	EB left	0.67	D	41.5	38	1.14	F	139	86
	EB through	1.13	F	113	246	0.73	D	42.5	119
	WB left	1.18	F	151	101	1.08	F	104	102
	WB through	0.87	E	59.3	188	1.03	F	84.1	245
	WB right	0.47	A	8.5	31	0.99	E	55.0	210
	NB left	0.70	E	79.5	47	0.81	E	70.9	77
	NB through	0.83	E	61.1	99	0.94	E	59.6	161
	NB right	0.61	C	27.3	62	0.46	B	12.6	40
	SB left	1.04	F	80.9	210	1.12	F	118.4	147
	SB through	0.52	B	13.0	40	0.43	C	23.9	77
	SB right	0.24	A	0.8	1	0.20	A	3.8	12
	Overall	—	E	61.1	—	—	E	60.8	—
2023 total future	EB left	0.92	E	71.7	51	1.15	F	141	96
	EB through	1.17	F	124	270	0.78	D	43.1	137
	WB left	1.25	F	179	102	1.01	F	83.3	101
	WB through	0.89	E	59.3	200	1.09	F	100.1	269
	WB right	0.47	A	9.0	33	0.99	E	54.8	212
	NB left	0.91	F	112	65	0.96	F	98.7	93
	NB through	0.82	E	60.7	97	0.97	E	65.4	165
	NB right	0.62	C	30.0	65	0.46	B	12.0	38
	SB left	1.07	F	90.4	210	1.18	F	141	151
	SB through	0.53	B	16.0	50	0.45	C	25.4	79
	SB right	0.25	A	1.0	1	0.23	A	3.9	13
	Overall	—	E	68.8	—	—	E	65.9	—
2028 future background	EB left	0.76	D	50.8	45	1.20	F	160	93
	EB through	1.16	F	125	268	0.77	D	44.1	127
	WB left	1.35	F	216	112	1.12	F	115	112
	WB through	0.88	E	58.1	196	1.10	F	103	273
	WB right	0.48	A	8.7	33	1.06	E	73.6	240
	NB left	0.78	F	90.7	52	0.88	F	82.0	84
	NB through	0.85	E	62.4	105	0.98	E	67.7	173
	NB right	0.68	D	34.8	74	0.49	B	14.8	48
	SB left	1.15	F	118	241	1.21	F	154	158
	SB through	0.56	B	14.2	45	0.45	C	24.8	80
	SB right	0.25	A	0.8	1	0.21	A	3.9	13
	Overall	—	E	72.9	—	—	E	72.3	—
2028 total future	EB left	1.10	F	118	72	1.24	F	171	105
	EB through	1.23	F	146	315	0.86	D	48.6	154
	WB left	1.22	F	168	99	1.10	F	113	117
	WB through	0.98	E	72.8	248	1.15	F	121	297
	WB right	0.47	B	11.1	42	1.12	F	98.7	265
	NB left	0.70	E	46.1	40	0.69	D	36.9	48
	NB through	0.83	E	61.2	99	1.01	E	74.7	176
	NB right	0.62	C	29.0	64	0.47	B	11.1	37
	SB left	1.33	F	199	267	1.28	F	181	162
	SB through	0.75	D	49.0	124	0.63	D	38.4	99
	SB right	0.36	B	13.9	26	0.30	A	5.8	16
	Overall	—	F	95.3	—	—	F	82.5	—

5.2

Bathurst Street and St. John's Sideroad

5.2.1

Existing Configuration

Table 13 summarizes the operations at Bathurst Street and St. John's Sideroad under each traffic volume scenario.

Table 13: Intersection Operations, Bathurst Street and St. John's Sideroad

Scenario:	Movement	AM peak hour				PM peak hour			
		v/c	LOS	Delay (s/veh)	95 th %ile queue (m)	v/c	LOS	Delay (s/veh)	95 th %ile queue (m)
Existing	EB left	0.29	B	19.0	22	0.74	D	35.5	61
	EB through	0.62	C	26.9	114	0.65	C	30.4	128
	WB left	0.54	D	40.8	50	0.61	D	49.9	47
	WB through	0.84	D	49.3	157	0.86	E	57.0	136
	WB right	0.08	A	0.3	0	0.31	B	11.0	22
	NB left	0.44	D	41.4	22	0.32	C	30.5	28
	NB through	0.55	C	29.7	75	0.81	D	36.9	146
	NB right	0.09	A	0.3	0	0.25	A	8.6	22
	SB left	0.44	C	20.6	31	0.43	C	22.6	18
	SB through	0.72	C	26.4	126	0.45	C	21.3	72
	SB right	0.33	A	4.7	19	0.10	A	3.9	8
	Overall	—	C	27.9	—	—	C	32.0	—
2023 future background	EB left	0.34	C	20.4	23	0.88	D	51.8	85
	EB through	0.65	C	28.6	127	0.70	C	32.2	142
	WB left	0.71	D	52.6	74	0.79	E	68.4	65
	WB through	0.87	D	53.5	180	0.92	E	64.9	159
	WB right	0.08	A	0.3	0	0.33	B	12.9	27
	NB left	0.58	E	56.0	28	0.35	C	31.4	30
	NB through	0.56	C	30.4	77	0.87	D	41.4	172
	NB right	0.11	A	0.4	1	0.29	A	9.7	27
	SB left	0.50	C	22.5	33	0.49	C	25.3	19
	SB through	0.79	C	29.4	141	0.46	C	21.9	73
	SB right	0.35	A	5.4	23	0.16	A	3.6	10
	Overall	—	C	30.7	—	—	D	36.3	—
2023 total future	EB left	0.37	C	23.2	22	0.93	E	64.0	89
	EB through	0.67	C	29.4	133	0.75	D	35.1	154
	WB left	0.84	E	67.8	90	0.96	F	106	75
	WB through	0.93	E	60.7	196	0.94	E	69.6	165
	WB right	0.10	A	0.3	0	0.35	B	13.2	28
	NB left	0.58	E	56.6	28	0.36	C	31.8	30
	NB through	0.56	C	30.4	77	0.90	D	44.3	172
	NB right	0.14	A	2.0	4	0.34	A	9.7	30
	SB left	0.55	C	24.0	36	0.58	C	30.8	25
	SB through	0.79	C	29.4	141	0.45	C	21.8	73
	SB right	0.35	A	5.4	23	0.15	A	3.6	10
	Overall	—	C	32.8	—	—	D	40.2	—

Table 13: Intersection Operations, Bathurst Street and St. John's Sideroad (cont'd)

Scenario:	Movement	AM peak hour				PM peak hour			
		v/c	LOS	Delay (s/veh)	95 th %ile queue (m)	v/c	LOS	Delay (s/veh)	95 th %ile queue (m)
2028 future background	EB left	0.42	C	23.9	24	1.01	F	84.6	104
	EB through	0.74	C	33.9	144	0.72	C	33.1	152
	WB left	0.99	F	105	91	0.90	F	90.3	76
	WB through	0.96	E	69.9	194	0.97	E	73.9	182
	WB right	0.09	A	0.3	0	0.35	B	14.4	31
	NB left	0.74	F	84.4	37	0.40	C	33.0	34
	NB through	0.53	C	29.2	79	0.96	D	53.0	200
	NB right	0.10	A	0.3	1	0.31	B	11.1	31
	SB left	0.54	C	23.0	37	0.54	C	27.5	21
	SB through	0.82	C	30.7	161	0.47	C	22.6	75
	SB right	0.37	A	6.4	29	0.17	A	3.6	11
	Overall	—	D	36.8	—	—	D	44.4	—
2028 total future	EB left	0.43	C	24.1	24	1.03	F	90.9	104
	EB through	0.81	D	37.9	163	0.78	D	36.6	165
	WB left	1.52	F	300	124	1.20	F	180	91
	WB through	1.04	F	88.9	216	1.02	F	88.0	196
	WB right	0.13	A	1.8	3	0.38	B	15.2	35
	NB left	0.74	E	84.4	37	0.41	C	33.5	34
	NB through	0.53	C	29.2	79	0.99	E	58.2	200
	NB right	0.18	A	5.0	12	0.36	B	11.1	34
	SB left	0.65	C	27.8	44	0.62	D	33.2	33
	SB through	0.82	C	30.7	161	0.46	C	22.3	75
	SB right	0.37	A	6.4	29	0.17	A	3.5	11
	Overall	—	E	50.9	—	—	D	51.8	—

The intersection of Bathurst Street and St. John's Sideroad currently operates at a reasonable overall level of service (LOS C) during both peak hours. No critical movements are identified during the AM peak hour. During the PM peak hour, the westbound through movement is just over the critical capacity threshold and with delays just over the critical level of service threshold.

At the 2023 horizon, the intersection is expected to continue operating at a reasonable overall level of service (LOS C to D). By 2028, the overall level of service is expected to remain at LOS D in most scenarios; however, the increase in school drop-off traffic is expected to result in a poor level of service (LOS E) during the AM peak hour. Several critical movements are identified from a capacity or level of service perspective, but the only movement anticipated to significantly exceed capacity is the westbound left turn under 2028 total future volumes. This movement does not have an advance left turn phase and is expected to attract a high volume of traffic leaving the school.

Similar to the intersection at Yonge Street, the Region's planned widening of St. John's Sideroad would be expected to increase capacity; however, recognizing the uncertainty as to timing, it was been assumed that mitigation will consist of adjustments to the traffic signals as a temporary measure until such time as the planned road widening can be completed.

5.2.2 Potential Mitigation

Traffic signal timing and phasing adjustments were tested to mitigate the anticipated capacity constraints under the projected future background and total future volumes. The following changes were made:

- During the AM peak hour, the existing eastbound left turn phase was deactivated and replaced with an advance westbound left turn phase, reflecting the higher demand on the westbound left turn phase in the morning.
- During the PM peak hour, the existing eastbound left turn phase was retained. The new westbound left turn phase was assumed to be deactivated during the PM peak hour, except that it would be activated under 2028 total future conditions.
- Maximum green times on the north-south and/or east-west phases were increased (in 5-second increments) in some cases.

The future background and total future volumes at both horizon years were analyzed under these revised timings. **Table 14** presents the results.

While several critical movements would remain, the proposed traffic signal timing and phasing changes would enable the majority of movements to operate at or below capacity. An exception is the eastbound left turn, which would exceed capacity by 10% to 12% during the PM peak hour under both background and total conditions in 2028.

It is noted that the southbound left turn advance phase is operating below capacity. This is an indication that there may be fewer than 3 vehicles queued at the start of green during some cycles. With setback detection in the left turn lanes, the left turn phase would be skipped if fewer than 3 vehicles are queued, which would reduce the length of those cycles and increase the capacity available to other movements at the intersection. Synchro does not account for the effect that setback stop bars have on the proportion of cycles where the left turn phase is skipped. Therefore, the v/c ratios on the other movements may be lower than shown in **Table 14** after accounting for shorter cycles when the southbound left turn phase is skipped.

Table 14: Mitigated Intersection Operations, Bathurst Street and St. John's Sideroad

Scenario:	Movement	AM peak hour				PM peak hour			
		v/c	LOS	Delay (s/veh)	95 th %ile queue (m)	v/c	LOS	Delay (s/veh)	95 th %ile queue (m)
2023 future background	EB left	0.39	C	34.5	34	0.91	E	58.2	81
	EB through	0.90	E	55.3	173	0.70	C	32.1	142
	WB left	0.75	D	41.4	53	0.80	E	69.0	64
	WB through	0.65	C	29.2	126	0.87	E	55.6	146
	WB right	0.06	A	0.9	2	0.32	B	11.4	25
	NB left	0.55	D	51.0	24	0.35	C	32.2	31
	NB through	0.56	C	29.4	72	0.87	D	41.4	180
	NB right	0.10	A	0.3	0	0.30	B	10.7	29
	SB left	0.50	C	21.0	31	0.49	C	25.8	20
	SB through	0.78	C	28.2	129	0.46	C	22.2	76
	SB right	0.36	A	6.8	26	0.16	A	3.9	11
	Overall	—	C	30.4	—	—	D	35.7	—
2023 total future	EB left	0.43	D	36.3	35	0.95	E	67.5	84
	EB through	0.92	E	57.7	181	0.74	D	34.6	153
	WB left	0.88	E	60.5	69	0.95	F	102	73
	WB through	0.68	C	30.4	137	0.88	E	56.8	152
	WB right	0.08	A	1.9	4	0.33	B	11.7	26
	NB left	0.56	D	52.3	24	0.36	C	33.0	31
	NB through	0.56	C	29.6	72	0.90	D	45.2	180
	NB right	0.13	A	1.6	4	0.34	B	10.9	32
	SB left	0.55	C	22.6	33	0.58	D	31.6	28
	SB through	0.79	C	28.5	129	0.45	C	22.5	76
	SB right	0.37	A	7.7	30	0.16	A	3.8	11
	Overall	—	C	32.2	—	—	D	39.2	—
2028 future background	EB left	0.44	D	37.8	36	1.09	F	110	114
	EB through	0.94	E	62.2	190	0.73	D	36.3	162
	WB left	0.94	E	76.3	68	0.97	F	108	81
	WB through	0.67	C	31.3	134	0.95	E	71.7	185
	WB right	0.07	A	1.7	3	0.35	B	15.7	34
	NB left	0.82	F	102	38	0.39	C	34.1	36
	NB through	0.54	C	30.6	79	0.95	D	51.9	210
	NB right	0.10	A	0.3	1	0.31	B	12.3	34
	SB left	0.56	C	24.6	37	0.58	C	32.8	24
	SB through	0.85	C	33.2	161	0.45	C	23.4	81
	SB right	0.38	A	7.8	33	0.16	A	3.6	11
	Overall	—	D	36.2	—	—	D	47.0	—
2028 total future	EB left	0.46	D	42.2	40	1.12	F	123	118
	EB through	1.01	F	80.9	235	1.00	E	79.3	229
	WB left	1.00	F	92.3	100	0.97	F	89.6	71
	WB through	0.68	C	32.3	158	0.97	E	75.3	195
	WB right	0.10	A	5.0	9	0.37	B	16.3	36
	NB left	0.97	F	152	44	0.39	C	34.3	36
	NB through	0.53	C	34.8	88	0.95	D	53.0	210
	NB right	0.19	A	5.5	13	0.35	B	12.4	38
	SB left	0.73	D	39.0	52	0.67	D	40.4	35
	SB through	0.87	D	40.0	184	0.46	C	23.6	81
	SB right	0.39	A	9.6	38	0.17	A	3.6	11
	Overall	—	D	44.4	—	—	D	54.0	—

5.3

St. John's Sideroad at Willow Farm Lane / Street "A"

5.3.1

Existing Two-Way Stop Control

The intersection of St. John's Sideroad and Willow Farm Lane was initially analyzed under the existing two-way stop control. For the total future scenarios, dedicated lanes were assumed for the eastbound left turn, westbound right turn, and southbound left turn movements. **Table 15** presents the results of the intersection analyses under two-way stop control.

Table 15: Intersection Operations, St. John's Sideroad and Willow Farm Lane

Scenario:	Movement	AM peak hour				PM peak hour			
		v/c	LOS	Delay (s/veh)	95 th %ile queue (m)	v/c	LOS	Delay (s/veh)	95 th %ile queue (m)
Existing	NB approach	0.19	C	17.3	6	0.18	C	19.1	5
2023 future background	NB approach	0.23	C	20.4	7	0.22	C	22.8	7
2028 future background	NB approach	0.26	C	22.7	8	0.25	D	25.5	8
2023 total future	NB approach	0.30	D	26.1	10	0.42	E	47.4	15
	SB left	>2.00	F	>200	[N/A]	>2.00	F	>200	[N/A]
	SB right	0.22	B	18.3	6	0.11	C	20.5	3
2028 total future	NB approach	0.86	F	133	39	0.56	F	74.7	21
	SB left	>2.00	F	>200	[N/A]	>2.00	F	>200	[N/A]
	SB right	0.72	F	55.3	38	0.28	D	28.6	9

Under existing and future background volumes, the northbound approach operates at a reasonable level of service (LOS C to D) and within capacity.

With the introduction of site traffic, the northbound level of service will continue to be reasonable during the AM peak hour, but will decrease to LOS E to F during the PM peak hour.

Under two-way stop control, the southbound left turn from Street "A" is anticipated to be significantly over capacity with few gaps available.

5.3.2

Potential Mitigation

Recognizing the poor level of service under total future volumes with the existing two-way stop control in place, the total future volumes were tested under traffic signal control. The traffic signals were assumed to be coordinated with the Yonge Street and St. John's Sideroad intersection. At the 2023 horizon the intersection was tested with a half cycle (60 seconds during the AM peak hour; 65 seconds during the PM peak hour); at the 2028 horizon the half cycle was maintained during the PM peak hour but the cycle length was increased to match the signals at Yonge Street (120 seconds) during the AM

peak hour. An eastbound advance left turn phase was included at the 2028 horizon. Vehicular and pedestrian clearance intervals were assumed.

The results of the signalized intersection operational analyses are presented in **Table 16**.

Table 16: Signalized Intersection Operations, St. John’s Sideroad and Willow Farm Lane

Scenario:	Movement	AM peak hour				PM peak hour			
		v/c	LOS	Delay (s/veh)	95 th %ile queue (m)	v/c	LOS	Delay (s/veh)	95 th %ile queue (m)
2023 total future	EB left	0.14	A	6.7	8	0.31	A	9.3	15
	EB through	0.71	B	13.5	176	0.55	A	7.5	93
	EB right	0.00	A	0.0	0	0.01	A	0.0	0
	WB left	0.09	A	1.8	1	0.16	A	2.1	2
	WB through	0.56	A	5.8	166	0.67	A	9.3	179
	WB right	0.07	A	0.2	1	0.09	A	0.2	0
	NB approach	0.23	A	8.7	9	0.23	A	10.8	9
	SB left	0.51	C	31.7	26	0.36	C	27.6	17
	SB through	0.22	A	8.5	0	0.11	B	1.2	2
	Overall	—	B	10.7	—	—	A	8.6	—
2028 total future	EB left	0.44	B	9.1	20	0.58	A	30.8	31
	EB through	0.75	B	16.3	211	0.65	A	11.7	126
	EB right	0.00	A	0.0	0	0.01	A	0.0	0
	WB left	0.10	A	5.2	2	0.23	A	5.5	5
	WB through	0.64	A	6.4	49	0.82	A	16.0	199
	WB right	0.21	A	0.3	0	0.10	A	1.2	1
	NB approach	0.22	B	15.0	18	0.19	B	9.4	9
	SB left	0.95	F	96.7	120	0.48	E	28.5	23
	SB through	0.35	B	11.4	23	0.18	B	9.2	8
	Overall	—	B	19.0	—	—	B	14.2	—

With the installation of traffic signals, the intersection is expected to operate at a reasonable overall level of service (LOS A to B). At the 2023 horizon, all movements are expected to operate at LOS C or better. At the 2028 horizon, the southbound left turn is expected to operate a poor level of service (LOS E to F); the change in level of service from 2023 reflects higher southbound traffic volumes, as well as the change in cycle length from a half cycle to a full cycle during the AM peak hour.

5.4 Additional Mitigation

The mitigation described in the preceding sections assumes limited roadway modifications. Further capacity can be expected following the completion of the planned St. John’s Sideroad widening. Further opportunities for mitigation of operating conditions are identified below.

5.4.1 Extension of Collector Road Network

In the fullness of time, Street “A” is planned to extend northerly to an east-west collector road (“Bennington Road”) extending from Bathurst Street to Yonge Street. The extended collector road

network will form part of future submissions for subsequent development phases. Once this additional connectivity is in place, there will be alternate routes available for site trips (particularly pick-up and drop-off trips) to enter and exit the site, decreasing pressure on St. John's Sideroad.

5.4.2 Additional Capacity for Strategic Movements

Certain movements are expected to experience particularly high volumes. One such pair of movements is the southbound left turn and westbound right turn pair at Yonge Street and St. John's Sideroad. The high volumes on these complementary movements reflects the discontinuity in the north-south arterial network through Newmarket and Aurora (i.e., Yonge Street becomes more constrained south of St. John's Sideroad; Bayview Avenue becomes more constrained north of Mulock Drive). While the Region currently prefers not to introduce new dual left turn lanes, in particular due to considerations related to urban design, pedestrian conditions and intersection footprint, this intersection may be a location where a dual left turn lane or alternative unconventional higher-capacity treatment may be desirable to accommodate a strategic movement pair and/or to encourage diversion of traffic away from more traffic-sensitive areas. It would be appropriate to consider alternative treatments as part of a future EA assessing alternatives for the St. John's Sideroad corridor. Such a venue would allow proper comparison of different considerations and priorities (e.g., traffic capacity; impact on other travel modes; urban design; environmental impact; property and cost implications, etc.).

5.4.3 Transportation Demand Management

Given that the majority of traffic in Phase 3 will be generated by the school, transportation demand management measures in the short term will be primarily associated with the school.

The school plans to operate a busing service, using one or two buses, and tentatively expects approximately 40 to 80 students to use this service. The traffic projections used in this report are based on approximately 15% of students riding to and from school on the bus.

Traffic projections are also affected by the proportion of families with more than one student attending the school (i.e., more than one student per drop-off). To some extent, this will also be applicable to families with a girl attending St. Anne's School and a boy attending St. Andrew's College, although the TDM effect would be primarily felt at a more regional level.

Traffic volumes may also be dependent on activities that require students to arrive early or leave late. The projections assume that afternoon pick-ups will be dispersed due to extra-curricular activities and varying work schedules, but that morning drop-offs will all occur within a peak hour.

To mitigate the effect of school traffic on the road network, the school should consider measures that would:

- Encourage and maximize the use of the school bus service;
- Incentivize attendance by more than one student per family; and

- Enable the morning drop-off peak to be further spread out (e.g., scheduling staggered entry for junior and senior students; offering extracurricular activities during the morning before school).

Given the distance of Phase 3 from existing transit service, the current lack of other amenities within walking distance, and the relative small size of the residential component compared to future phases, other TDM measures will be less applicable from the outset but should be considered as further development phases are carried forward:

- Introduction of a new VIVA stop at Bennington Road or St. John's Sideroad.
- Creation of a new transit route traveling through the site and offering connections to VIVA and other destinations within the surrounding area, provided that the level of service (particularly service frequency, but also the directness of the route and the span of service) is high enough to be attractive to potential riders).
- Creation of a YRT GO shuttle linking residents to the Aurora or future Mulock GO station.
- Provision of an extensive trail and pathway network within the site, generally as envisioned in the concept plan, with connections to other existing trails outside the site.
- Provision of pedestrian and cyclist crossing opportunities along collector roads at regular intervals and at strategic locations (e.g., at trail crossings).
- Consideration of means of providing complementary land uses within the site, particularly in proximity to the higher-density residential areas, to allow daily activities to be undertaken within walking distance and without requiring travel by vehicle on the surrounding road network.

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6.0 Site Access Considerations

6.1 Site Access to St. John's Sideroad

The following sections document design considerations related to the proposed site access to St. John's Sideroad opposite Willow Farm Lane.

6.1.1 Traffic Signal Warrants

As noted in **Section 5.3.1**, the Street "A" site access to St. John's Sideroad is expected to significantly exceed capacity during the AM and PM peak hours when pick-up and drop-off activity is occurring at the school. Because the need for traffic signals is heavily affected by school traffic, which is concentrated into short periods, an 8-hour traffic signal warrant is not expected to be met. Ontario Traffic Manual (OTM) Book 12 identifies a four-hour warrant (Justification 4) for such locations where a side street does not have prolonged demand throughout the day but experiences significant surges over a shorter period of time. For urban conditions where a 2-lane major street carries more than 1,100 vehicles per hour, Justification 4 considers traffic signals to be warranted when the higher-volume minor approach exceeds 80 vehicles per hour. Given that the school traffic during the PM peak hour is expected to comprise approximately 25% of the total PM peak period traffic, it was assumed that the AM peak hour would be reflective of one of the four hours, and the PM peak hour would be reflective of the remaining four hours.

The projected volumes were compared against the Justification 4 minor approach threshold:

- In 2023, the southbound AM peak hour volume is expected to be 177 vehicles, including 107 left turns, which would exceed the Justification 4 threshold.
- In 2023, the southbound PM peak hour volume is expected to be 89 vehicles, including 63 left turns. The overall volume would exceed the Justification 4 threshold, while the left turns alone are approaching the threshold.
- Further growth in enrolment at the school would result in additional traffic that would be sufficient to meet the Justification 4 threshold during the PM peak hour.

It is recommended that traffic signals be installed, considering the poor operations anticipated under two-way stop control, and considering that even if the justification is not initially met in 2023, it would be met soon thereafter as enrolment in the school grows.

6.1.2 Intersection Configuration

The intersection of St. John's Sideroad and Willow Farm Lane currently operates under two-way stop control. There is a short (approximately 15 metres) westbound left turn lane on St. John's Sideroad, in addition to an eastbound right turn taper.

It is anticipated that the construction of the new northerly leg for Street “A” will occur prior to other widening on St. John’s Sideroad, and will therefore require an interim configuration. It is recommended that the intersection be modified as follows:

- Widening of the east leg of the intersection to accommodate a westbound right turn lane.
- Widening of the west leg of the intersection to convert the existing runout lane to a left turn lane.
- Construction of a left turn lane and a shared through/right turn lane on the southbound approach.

Under traffic signal control, the analysis of 2028 total future operations during the AM peak hour identified a 95th percentile queue length of 20 metres in the eastbound left turn lane, and 120 metres in the southbound left turn lane. Left and right turn lane dimensions should be as per Region of York standards.

6.1.3 Longer-Term Considerations

In the longer term, three factors will affect traffic volumes and intersection design:

- The completion of the collector road network to the north will disperse traffic destined to and from the school rather than focusing it on a single access point.
- The reduction in school traffic will be offset by an increase in traffic destined to additional development in the Newmarket section of the development. The 2019 analyses for the overall development projected approximately 340 to 400 vehicles per hour in the peak direction on Street “A” north of St. John’s Sideroad; this included traffic from the proposed Phase 3 residential units but did not include St. Anne’s School.
- The St. John’s Sideroad widening will provide additional east-west capacity and provide more flexibility in setting signal timings.

It is expected that the lane configuration for the widened intersection would be identified as part of the planning stage for the St. John’s Sideroad widening.

6.2 Access to St. Anne’s School

Access to St. Anne’s School is still under negotiation between the school and the applicant. In the long term, the primary vehicular access to the site is intended to be from Street “A” on the north side of the school parcel. However, in the interim Street “A” will terminate at the municipal boundary and alternate access arrangements will be required. Possible alternatives include a connection to Street “B” through Block 53; a connection to Street “B”, Lane “A” or St. John’s Sideroad that makes use of some or all of the existing driveway; or a temporary connection through part of Block 91 (the neighbourhood park).

Depending on which access scenario is selected, there will be revisions to the Plan of Subdivision to reflect impacts to residential lots. There may also be further changes in the future to the Plan of Subdivision once Street “A” is extended farther to the north, enabling the school to be accessed directly from Street “A”.

- If interim access is proposed through Block 53, it is possible that this access may be maintained as a permanent access; if so, it is recommended that the internal vehicular circulation within the school site be configured so that pick-up and drop-off activity be required to enter and exit the site via Street “A” on the north side of the site, and that the access through Block 53 be maintained for visitors and ceremonial functions only.
- If interim access is proposed via other blocks, it is recommended that the access be removed once access is available directly from Street “A”, enabling those blocks to be released.

The existing driveway leading to the future school building intersects with St. John’s Sideroad approximately 140 metres west of Willow Farm Lane. In the event that interim school access is via the full length of the existing driveway, additional analysis will be required to identify geometric and traffic control requirements and impacts.

6.3 Internal Roadway Configuration

The 2019 report recommended the application of alternative roadway cross-sections as a means of traffic calming. It was recommended that the roadway cross-section and surrounding urban form (e.g., distance between building faces; landscaping) be compact in nature so that the streets in the neighbourhood are designed to encourage low driving speeds and so that the major internal roadways are not perceived as being barriers.

The following policies and standards are proposed for application when preparing roadway designs within Phase 3:

- Collector roads will be designed with a pavement width of 7.0 metres, measured from curb to curb. This width accommodates one 3.5-metre travel lane in each direction, which is adequate to accommodate projected traffic volumes and is wide enough to accommodate the vehicles expected to use these streets (including buses, emergency vehicles and single-unit trucks).
- Local streets will be designed with a pavement width of 6.0 metres, measured from curb to curb. This width accommodates one 3.0-metre travel lane in each direction, which is sufficient for low traffic volumes and is consistent with driveway widths specified in the Ontario Building Code for fire routes on private property.
- Where a parking lane is provided, the pavement width will be increased by 2.0 metres. Parking lanes will be defined by curb extensions such that they are only provided where a relatively continuous parking lane can be provided, and will be terminated with curb extensions where parking is not or cannot be provided (including at approaches to intersections), and where parking is not reasonably anticipated to be used.
- Additional pavement width will not be provided for bicycle lanes. Instead, bicycle facilities will be provided off-street within the right-of-way.

- Opportunities should be considered for cross-sections and building forms that reduce the right-of-way width and/or the optical width of the street by bringing building faces closer to the sidewalk and through placement of street trees. This would apply both to local streets and to collector roads.
- Traffic capacity will not be a governing consideration, other than to ensure that traffic entering from Regional roads does not affect operations of through traffic on those roads. To the extent that traffic volumes increase friction, they have a positive impact on reducing travel speeds.
- Additional pavement width will not be provided for auxiliary turn lanes or two-way left turn lanes (other than auxiliary lanes that may be provided at intersections with arterial roads).
- To reduce vehicle turning speeds and reduce pedestrian crossing distances, intersection corner radii will be the minimum that will accommodate the largest vehicle that would typically be expected within the subdivision (e.g., a single-unit truck).
- The corner radii will assume that these occasional large vehicles will be able to use as much of the roadway as necessary when completing a turn, subject to the likelihood that that part of the roadway would not normally be expected to be occupied by a vehicle for extended periods (e.g., parked cars; higher-volume stop or signal controlled intersection approaches).
- Sidewalks will be provided on both sides of all collector roads and both sides of all local streets. Sidewalks on local streets may be positioned directly adjacent to the curb (or formed with monolithic curb and gutter) to reduce the perceived width of the street.
- Bicycle paths will be provided adjacent to all collector roads in the form of separate dedicated or multi-use paths generally adjacent to the road and within the right-of-way. Bicycle travel elsewhere will be in mixed traffic on local streets, or on off-street trails and paths.
- Pedestrian crossings will be provided at regular intervals and strategic locations along collector roads (e.g., trail crossings). These may be in the form of all-way stop controlled intersections (if warranted), pedestrian crossovers, pedestrian refuge islands or reduced roadway width with curb extensions.

These principles are proposed to apply to the new local and collector roads in Phase 3, except as follows:

- Sidewalks are only proposed on one side of local streets; and
- Curb extensions are not proposed on Street “C”, since this will be a short cul-de-sac where there will be less need for traffic calming features than on other streets.

The widths listed above would result in the following pavement widths on Streets “A” and “B”:

- Street “A”: 7.0 metres curb to curb, increasing to 9.0 metres where on-street parking bays are provided.
- Street “B”: 6.0 metres curb to curb, increasing to 8.0 metres where on-street parking bays are provided.

As engineering plans progress, consideration may be given to a pedestrian crossing of Street “A” in the vicinity of the neighbourhood park north of Street “B” at a location to be determined.

These principles and standards are intended to be consistent with recent industry guidelines (e.g., “complete street” guidelines published by various municipalities; NACTO publications addressing urban streets and bikeways) that aim to rebalance the use of streets in urban areas. In addition to serving as a traffic management measure, narrower cross-sections will also reduce roadway footprint and would be more compatible with crossings of environmentally sensitive areas.

The north-south collector is planned to ultimately extend into Newmarket, which has a different standard collector road cross-section from the Town of Aurora. The same cross-section is proposed to be continuous across the municipal boundary and extend as far as the future east-west collector in Newmarket.

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7.0

Non-Auto Travel Modes

7.1

Multi-Modal Trip Generation

Table 4 in **Section 2.7** documents the existing modal split for home-based trips made by Newmarket and Aurora residents during the AM and PM peak periods, calculated using data from the 2016 Transportation Tomorrow Survey (TTS).

The estimated number of multi-modal trips generated by the residential component of site was calculated as follows:

- The number of vehicle trips generated by the site were converted to person trips by dividing by the auto driver modal split from the 2016 TTS.
- The person trips were then divided into the various other modes by applying the modal splits identified from the 2016 TTS.

The results are presented in **Table 17**.

Table 17: Non-Auto Site Trip Generation (Residential Component)

Travel mode	AM peak hour					PM peak hour				
	Modal split		Trips generated			Modal split		Trips generated		
	In	Out	In	Out	Total	In	Out	In	Out	Total
Auto driver	85%	68%	36	102	138	76%	68%	109	66	175
Person trips	100%	100%	42	150	192	100%	100%	143	97	240
Auto passenger	7%	14%	3	21	24	13%	27%	19	26	45
Local transit	2%	5%	1	8	9	4%	0%	6	0	6
School bus	0%	4%	0	6	6	1%	0%	1	0	1
Walk*	5%	8%	2	12	14	5%	3%	7	3	10
Bicycle / other*	2%	1%	1	2	3	0%	1%	0	1	1

*Does not include walking or cycling trips to transit stops.

The results in **Table 17** do not include GO rail trips, because the modal splits in the table reflect the mode used for trips to/from the GO station. As shown in **Table 3** (see **Section 2.7**), the projected GO rail riders are equivalent 4% of outbound trips during the AM peak hour, and 5% of inbound person trips during the PM peak hour. This represents the following number of riders:

- 6 outbound trips during the AM peak hour; and
- 7 inbound trips during the PM peak hour.

As calculated in **Section 4.3.2**, the following number of students are anticipated to travel by a non-single-passenger mode by 2028:

- Local carpoolers (i.e., resulting in a vehicle trip reduction entering and exiting the site due to siblings traveling together to St. Anne’s School):
 - AM peak hour: 109 students
 - PM peak hour: 27 students
- Regional carpoolers (i.e., resulting in a vehicle trip reduction at a regional level due to siblings traveling together to St. Anne’s School and St. Andrew’s College):
 - AM peak hour: 109 students
 - PM peak hour: 27 students
- School bus riders:
 - AM peak hour: 65 students (49 families)
 - PM peak hour: 16 students (12 families)

7.2 Transit Considerations

7.2.1 Transit Levels of Service

The transit level of service assessment considered three different factors that influence riders’ perception of transit service:

- The walking distance from the subject site to the closest transit stop (how long will it take to get to the stop);
- The average headway between successive vehicles (how long will riders wait for the next vehicle); and
- Delays and v/c ratios on intersection approaches used by transit vehicles (congestion and delays experienced by riders while on the bus).

The level of service criteria applied to the analyses have been taken from the Region’s TMP guidelines, and are outlined in **Table 18**.

Table 18: Transit Level of Service Criteria

Level of Service	Access to transit stops	Transit headway	Intersection delay	Intersection v/c
A	90% within ≤200 m	≤5 minutes	≤10 s/veh	0 to 0.60
B	90% within ≤500m and 70% within ≤200	>5-10 minutes	>10-20 s/veh	0.61 to 0.70
C	90% within ≤500m and 50% within ≤200m	>10-15 minutes	>20-35 s/veh	0.71 to 0.80
D	100% within ≤600m	>15-20 minutes	>35-55 s/veh	0.81 to 0.90
E	100% within ≤800m	>20-30 minutes	>55-80 s/veh	0.91 to 1.00
F	100% >800m	>30 minutes	>80 s/veh	>1.00

7.2.1.1 Existing Accessibility to Transit Service

YRT has a target that 90% of residents in urban areas should reside within a 500-metre walk of a transit stop. (The target does not specify the level of service provided at that stop — frequency, span, etc. — only the presence of some level of transit service.) This target was compared against the concept plan assuming the existing network is in place.

The closest transit stop is at Yonge Street and St. John’s Sideroad, roughly 450 metres east of Street “A”. YRT local routes serve this stop. The majority of the proposed units are beyond 500 metres from this stop.

The majority of residential lots are within 800 metres of a transit stop, except for approximately 14 lots in the northwest part of Street “B”. Given that there are units that are more than 800 metres from transit, the site is currently at LOS F from a transit access perspective.

The closest VIVA stop is at Joe Persechini Drive / Savage Road, approximately 900 metres north of St. John’s Sideroad. There is no VIVA stop at St. John’s Sideroad because the surrounding area is predominantly rural and low-density suburban with few transit trip generators within walking distance of that intersection, and because there are no intersecting transit routes that could generate transferring activity. There is a gap of nearly 2 kilometres between the stops at Savage Road in Newmarket and at Orchard Heights Boulevard in Aurora. Therefore, VIVA service will be outside walking distance from the proposed development.

7.2.1.2 Transit Headway

Table 19 lists the scheduled headway (interval between successive buses) for the routes closest to the site during the AM and PM peak periods, and during off-peak times, and the associated level of service for each route. The Yonge Street VIVA route is not included since there is not a stop in the vicinity of the site.

Two local routes operate along Yonge Street and therefore the average combined headway is lower than for each individual route. However, this does not affect the level of service because they operate at different headways and therefore the waiting time is governed by the route with the shortest headway rather than the average of the two.

Table 19: Existing Transit Level of Service (Scheduled Headway)

Route	AM peak period		Weekday midday		PM peak period		Saturday	
	Headway	LOS	Headway	LOS	Headway	LOS	Headway	LOS
98 Yonge	37	F	52	F	39	F	39-50	F
96 Keele-Yonge	32	F	32	F	25	E	—	F
31 Aurora North	35	F	—	F	35	F	—	F

With the exception of Route 96 (Keele-Yonge) during the PM peak period, all local routes operate at headways wider than 30 minutes, corresponding to LOS F conditions.

7.2.1.3 Intersection Approach

Table 20 lists the average delay and v/c ratios for intersection approaches and turning movements where buses operate in mixed traffic, and the corresponding level of service. The delays and v/c ratios were obtained from the Synchro analyses.

Table 20: Transit Level of Service (Intersection Approaches), Yonge Street at St. John's Sideroad

Movement	Scenario	AM peak hour				PM peak hour			
		Delay		v/c ratio		Delay		v/c ratio	
		s/veh	LOS	v/c	LOS	s/veh	LOS	v/c	LOS
NB through	Existing	46.2	D	0.62	B	52.5	D	0.88	D
	2023 future background	61.1	E	0.83	D	59.6	E	0.94	E
	2023 total future	60.7	E	0.82	D	65.4	E	0.97	E
	2028 future background	62.4	E	0.85	D	67.7	E	0.98	E
	2028 total future	61.2	E	0.83	D	74.7	E	1.01	F
SB through	Existing	26.2	C	0.50	A	24.4	C	0.41	A
	2023 future background	13.0	B	0.52	A	23.9	C	0.43	A
	2023 total future	16.0	B	0.53	A	25.4	C	0.45	A
	2028 future background	14.2	B	0.56	A	24.8	C	0.45	A
	2028 total future	49.0	D	0.75	C	38.4	D	0.63	B

In terms of delay, the northbound approach is currently at LOS D during the AM and PM peak hours, and is expected to be at LOS E under all future horizons. The increase in delay reflects the recommended signal timing adjustments to mitigate conditions on the southbound left turn. The southbound approach is currently at LOS C; the level of service is expected to improve to LOS B during the AM peak hour and remain at LOS C during the PM peak hour under all scenarios except the 2028 total future scenario, when the level of service is expected to decrease to LOS D during the AM and PM peak hours.

In terms of v/c, during the AM peak hour the northbound approach is currently at LOS B and is expected to be at LOS D under the future scenarios, and during the PM peak hour it is currently at LOS B and is expected to be at LOS E to F under the future scenarios. The southbound approach is currently at LOS A and is expected to be at LOS A under most future scenarios, except the 2028 total future scenario, when it is expected to be at LOS B to C.

7.2.2 Potential Longer-Term Measures

7.2.2.1 Potential Longer-Term Service Expansion

Increasing the accessibility of more areas of the site to a variety of transit routes serving a variety of areas, and making those services more attractive, would help make transit more useful for more

residents within the site and for a wider range of trips, which would potentially impact the non-auto modal split within the site and reduce the number of single-occupant vehicle trips made by residents.

As the remainder of the Shining Hill Estates development is built out, the completed collector road network will provide an opportunity for a new or extended transit route to provide service through the community. The 2019 report identified a variety of potential routes within the subdivision. Service could be provided through the modification of Route 31 (Aurora North), or the creation of a new east-west grid route generally along St. John's Sideroad extending easterly and southerly to the State Farm Way / First Commerce Drive area. Creation of a new route would also enable service to be provided to other areas in northeast Aurora that are outside YRT's area of coverage.

7.2.2.2 New VIVA Stop

With a substantial increase in development in the currently undeveloped area between Newmarket and Aurora, it would be appropriate to consider an additional VIVA stop in north Aurora / south Newmarket. St. John's Sideroad would be appropriate from the perspective of stop spacing to the north and south. However, Bennington Road might result in more accessible service in terms of number of residents within walking distance of the stop. Stop location could also be influenced by the ultimate route for local transit service (if any) within the overall development lands, so that transfer activity between the two routes can be accommodated. Given the distance between Phase 3 and Yonge Street, an additional VIVA stop would be of less benefit for Phase 3 but should be considered as future phases are developed.

7.3 Active Transportation

7.3.1 External Active Transportation Facilities

St. John's Sideroad currently has a rural cross-section with no pedestrian or cycling facilities. The bridge crossing Tannery Creek immediately west of Yonge Street has a sidewalk on the south side, but not on the north side. The planned widening of St. John's Sideroad would also include the urbanization of the cross-section and provision of active transportation facilities. The type, configuration and location of active transportation facilities would be determined as part of the development of alternative roadway cross-sections as part of a future environmental assessment.

7.3.2 Internal Active Transportation Facilities

The surrounding neighbourhoods in Newmarket and Aurora both feature an extensive off-street trail network. A trail network is also proposed as part of the overall Shining Hill Estates development, with connections to existing trails to the north and east. The potential off-street trail network is shown in the overall concept plan (see **Appendix A**). In addition, alternative collector road cross-sections have been recommended (see **Section 6.3**) that include provision for off-street cycle paths within the right-of-way, which would offer more direct routes for utilitarian cycling.

On Street “A”, a sidewalk will be provided on one side and a multi-use trail will be provided on the other side. Local streets are currently proposed to have a sidewalk on one side.

7.3.3 Pedestrian Levels of Service

The level of service of the pedestrian environment has been determined for facilities along midblock road segments and for intersection crossings.

- For pedestrian facilities **along road segments**, the level of service relates to the type and width of facility and the separation distance from vehicle traffic. The Region’s level of service criteria for midblock segments are listed in **Table 21**.
- For pedestrian crossings **at intersections**, the Region’s level of service criteria primarily relate to the same criteria as midblock segments (i.e., type and width of facility; separation distance from vehicle traffic). These criteria are less applicable to pedestrian conditions at intersections, where the primary factors affecting the ease of crossing the intersection are delay time and exposure to traffic (crossing distance). **Table 21** lists the level of service criteria that have been applied instead for pedestrian crossings at intersections, which are based on thresholds applied by the City of Ottawa in their *Multi-Modal Level of Service Guidelines*.

Table 21: Pedestrian Level of Service Criteria

Level of service	Segment	Intersection (Delay)	Intersection (Exposure)
A	≥2.0 m sidewalk with minimum 3.5 m buffer including planting and edge zone; or ≥3.0 m multi-use path	< 10 s per intersection leg	3 lanes crossed or fewer
B	≥1.5 m sidewalk with minimum 1.0 m buffer including edge zone; or <3.0 m multi-use path	≥ 10 to 20 s	4 lanes crossed
C	≥1.5 m curb-faced sidewalk (no buffer)	> 20 to 30 s	5 lanes crossed
D	<1.5 m sidewalk	> 30 to 40 s	6 lanes crossed
E	Paved shoulder or no sidewalk provision	> 40 to 60 s	7 lanes crossed
F	No sidewalk provision	> 60 s	8 lanes crossed or more

7.3.3.1 Segment Level of Service

Table 22 documents the existing pedestrian level of service along road segments. All levels of service reflect existing facilities, except Street “A” reflects the proposed cross-section.

Table 22: Pedestrian Level of Service (Segments)

Street	Segment	Level of service			
		West side	East side	North side	South side
Bathurst Street	North of St. John's Sideroad	F	F	—	—
Bathurst Street	South of St. John's Sideroad	F	F	—	—
Street "A"	North of St. John's Sideroad	B	A	—	—
Willow Farm Lane	South of St. John's Sideroad	F	B	—	—
Yonge Street	North of St. John's Sideroad	E	E	—	—
Yonge Street	South of St. John's Sideroad	B	F	—	—
18 th Sideroad	West of Bathurst Street	—	—	F	F
St. John's Sideroad	Bathurst Street to Yonge Street	—	—	F	F
St. John's Sideroad	East of Yonge Street	—	—	A	B

Most regional roads in the vicinity do not have sidewalks and therefore offer LOS E to F conditions. Existing and planned local streets are at LOS B on at least one side of the street.

7.3.3.2

Intersection Delays

Table 23 documents the crossing delays and associated level of service at the intersection of Yonge Street and St. John's Sideroad under the various volume scenarios. **Table 24** presents the same information at Bathurst Street and St. John's Sideroad. Crossing delays vary depending on the actuated green times for conflicting phases. In all cases the effective walk interval has been assumed to extend 4 seconds into the flashing don't walk interval, reflecting pedestrians that begin their crossing after the walk interval has ended (as observed to occur during traffic surveys at other intersections experiencing higher pedestrian volumes).

Table 23: Pedestrian Level of Service (Intersection Delay), Yonge Street at St. John's Sideroad

Peak hour	Scenario	Average crossing delay (s/ped)				Level of service			
		West side	East side	North side	South side	West side	East side	North side	South side
AM	Existing	32	53	50	52	D	E	E	E
	2023 future background	31	60	51	52	D	E	E	E
	2023 total future	32	60	49	50	D	E	E	E
	2028 future background	32	60	49	50	D	E	E	E
	2028 total future	44	60	47	46	E	E	E	E
PM	Existing	33	47	48	48	D	E	E	E
	2023 future background	32	47	47	50	D	E	E	E
	2023 total future	33	48	46	50	D	E	E	E
	2028 future background	33	47	46	50	D	E	E	E
	2028 total future	45	48	45	50	E	E	E	E

Table 24: Pedestrian Level of Service (Intersection Delay), Bathurst Street at St. John's Sideroad

Peak hour	Scenario	Average crossing delay (s/ped)				Level of service			
		West side	East side	North side	South side	West side	East side	North side	South side
AM	Existing	21	30	34	n/a	C	C	D	—
	2023 future background	27	36	31	n/a	C	D	D	—
	2023 total future	28	37	31	n/a	C	D	D	—
	2028 future background	28	37	32	n/a	C	D	D	—
	2028 total future	32	40	32	n/a	D	E	D	—
PM	Existing	28	34	46	n/a	C	D	E	—
	2023 future background	28	34	44	n/a	C	D	E	—
	2023 total future	28	36	45	n/a	C	D	E	—
	2028 future background	28	36	47	n/a	C	D	E	—
	2028 total future	29	37	47	n/a	C	D	E	—

From the perspective of crossing delay, crossings at Yonge Street and St. John's Sideroad are at LOS E in all directions, except that the west crosswalk is at LOS D. Introducing a northbound left turn phase under 2028 total future conditions would change this crosswalk to LOS E as well.

At Bathurst Street and St. John's Sideroad, the west and east crosswalks are at LOS C to D during the AM and PM peak hours, and the north crosswalk is at LOS D during the AM peak hour and LOS E during the PM peak hour. Site traffic is not expected to affect the level of service, except that a minor increase in delay will cause the west and crosswalks to change from LOS C/D to LOS D/E during the AM peak hour in 2028.

Table 25 documents the crossing delays and associated level of service at the intersection of St. John's Sideroad and Willow Farm Lane / Street "A" under the total future scenarios, assuming the installation of traffic signals and assuming the signal timings applied in the intersection analyses. Delays are expected to correspond to LOS A to B crossing the north and south legs; LOS D crossing the east and west legs in 2023; LOS C crossing St. John's Sideroad during the 2028 AM peak hour; and LOS E crossing St. John's Sideroad during the 2028 PM peak hour (the poorer level of service corresponding to doubling the cycle length to match the adjacent signals at Yonge Street).

Table 25: Pedestrian Level of Service (Intersection Delay), St. John's Sideroad at Willow Farm Lane / Street "A"

Peak hour	Scenario	Average crossing delay (s/ped)				Level of service			
		West side	East side	North side	South side	West side	East side	North side	South side
AM	2023 total future	32	32	4	4	D	D	A	A
	2028 total future	50	50	11	7	E	E	B	A
PM	2023 total future	31	32	3	3	D	D	A	A
	2028 total future	30	30	5	5	C	C	A	A

7.3.3.3 Intersection Exposure

Table 26 presents the number of lanes crossed by pedestrians at each intersection and the corresponding level of service. The St. John's Sideroad intersections at Bathurst Street and Yonge Street reflect existing conditions; the intersection at Willow Farm Lane reflects total future conditions.

Table 26: Pedestrian Level of Service (Intersection Exposure)

St. John's Sideroad at:	Number of lanes crossed				Level of service			
	West side	East side	North side	South side	West side	East side	North side	South side
Bathurst Street	3	4	6	—	A	B	D	—
Willow Farm Lane / Street "A"	4	4	3	2	B	B	A	A
Yonge Street	5	5	6	6	C	C	D	D

The level of service crossing Bathurst Street and Yonge Street is LOS D; the level of service crossing St. John's Sideroad at Yonge Street is LOS C; and all other existing or planned crossings are LOS A to B.

7.3.4 Cycling Levels of Traffic Stress

Although the Region's TMP guidelines have level of service criteria for bicycle facilities, the assessment in this report has been based instead on Level of Traffic Stress (LTS) criteria developed in 2012 by Maaza Mekuria, Peter Furth and Hilary Nixon in a research report published by the Mineta Transportation Institute.³ Whereas the Region's LOS criteria assign a level of service based on the presence (or lack) of a dedicated bicycle facility, its physical relation to traffic lanes, and its width, the LTS criteria instead categorize the cycling network according to the type of cyclist that would feel comfortable riding on each section, based on factors such as traffic volume and speed in addition to the type and design of cycling facility. Furth describes the LTS categories as follows:⁴

- **LTS 1:** Strong separation from all except low speed, low volume traffic. Simple crossings. Suitable for children.
- **LTS 2:** Except in low speed / low volume traffic situations, cyclists have their own place to ride that keeps them from having to interact with traffic except at formal crossings. Physical separation from higher speed and multilane traffic. Crossings that are easy for an adult to negotiate. Corresponds to design criteria for Dutch bicycle route facilities. A level of traffic stress that most adults can tolerate, particularly those sometimes classified as "interested but concerned."
- **LTS 3:** Involves interaction with moderate speed or multilane traffic, or close proximity to higher speed traffic. A level of traffic stress acceptable to those classified as "enthused and confident."
- **LTS 4:** Involves interaction with higher speed traffic or close proximity to high speed traffic. A level of stress acceptable only to those classified as "strong and fearless."

³ Mekuria, M., Furth, P., & Nixon, H. (2012). *Low-stress bicycling and network connectivity* (MTI report 11-19). San Jose: Mineta Transportation Institute. Accessed at <https://transweb.sjsu.edu/sites/default/files/1005-low-stress-bicycling-network-connectivity.pdf>

⁴ <http://www.northeastern.edu/peter.furth/research/level-of-traffic-stress/>

On-road facilities are categorized based on factors such as the number of travel lanes on the adjacent road, the speed and volume of traffic, the presence and width of bicycle lanes, and the degree of separation from traffic. **Appendix D** presents the LTS criteria for on-road facilities (adapted to use metric units).⁵ **Table 27** lists the ratings of existing LTS for each roadway segment in the study area and the underlying factors influencing those LTS ratings.

Table 27: Existing Level of Traffic Stress for Cyclists

Street / section	Cycling context	Number of lanes	Approx. AADT	Approx. travel speed	LTS
Bathurst Street north of St. John's Sideroad	Mixed traffic	2 thru lanes per direction	22,600 veh/day	72 km/h	LTS 4
Bathurst Street south of St. John's Sideroad	Mixed traffic	2 thru lanes per direction	20,850 veh/day	72 km/h	LTS 4
Willow Farm Lane south of St. John's Sideroad	Mixed traffic	Unlaned 2-way street (no centreline)	1,150 veh/day	48 km/h	LTS 2
Yonge Street north of St. John's Sideroad	Paved shoulders (buffered NB)	2 thru lanes per direction	26,400 veh/day	64 km/h	LTS 3
Yonge Street south of St. John's Sideroad	Mixed traffic	2 thru lanes per direction	21,400 veh/day	64 km/h	LTS 4
18 th Sideroad west of Bathurst Street	Mixed traffic	1 thru lane per direction	13,000 veh/day	64 km/h	LTS 4
St. John's Sideroad west of Willow Farm Lane	Mixed traffic	1 thru lane per direction	14,000 veh/day	64 km/h	LTS 4
St. John's Sideroad east of Willow Farm Lane	Mixed traffic	1 thru lane per direction	14,950 veh/day	64 km/h	LTS 4
St. John's Sideroad east of Yonge Street	Multi-use trail (north side)	2 thru lanes per direction	24,650 veh/day	56 km/h	LTS 1

Under current conditions:

- Cyclists comfortable using LTS 1 or 2 facilities would be able to cycle on Willow Farm Lane, and on St. John's Sideroad east of Yonge Street.
- Cyclists comfortable using up to LTS 3 facilities would also be able to cycle on Yonge Street north of St. John's Sideroad.
- Only cyclists comfortable using LTS 4 facilities would be willing to cycle on any other road segments in the study area.

These levels of traffic stress are not expected to change due to future volume increases.

Street "A" is proposed to have an off-street multi-use trail on one side and will serve a wide range of cyclists.

⁵ <http://www.northeastern.edu/peter.furth/wp-content/uploads/2014/05/LTS-Tables1.pdf>

8.0

Summary

This Transportation Mobility Plan has been prepared as part of the application for Phase 3 of the Shining Hill Estates development within the town of Aurora. The site is located north of St. John's Sideroad opposite Willow Farm Lane, west of Yonge Street. Phase 3 is proposed to include 88 detached residential units and a medium-density block estimated to accommodate approximately 200 residential units. It would also include the opening of St. Anne's School, an all-girls private school, within an existing building on the site; enrolment is expected to start at approximately 100 students in the first year of operations, and increase to approximately 435 students by the fifth year.

Phase 3 forms the southerly part of a concept plan developed by Malone Given Parsons Inc. (MGP) that envisions approximately 3,500 residential units, in addition to a school, a small service commercial block, and an extensive natural heritage / open space network with an associated trail system. Two collector roads would provide access from the surrounding arterial roads: an east-west collector (Bennington Road) extending between Bathurst Street and Yonge Street, and a north-south collector extending between Bennington Road and St. John's Sideroad. A prior TMP report was prepared by Dillon in 2019 examining the overall development at a high level.

Access to Phase 3 from the regional road network would be via the north-south collector (Street "A") planned for the overall development; it would extend northerly from the St. John's Sideroad and Willow Farm Lane intersection as far as the Newmarket/Aurora boundary, where it would temporarily terminate pending the further expansion of development on the Newmarket side of the boundary. Street "A" would be extended farther to the north as part of subsequent development phases.

Access to the school from Street "A" is still under negotiation. The school site will not have direct frontage to Street "A" until the street is extended northerly into Newmarket, and other access arrangements will be required in the interim. One potential scenario involves access to Street "B" through Block 53, which may be maintained as a permanent access; if so, it is recommended that the internal vehicular circulation within the school site be configured so that pick-up and drop-off activity be required to enter and exit the site via Street "A" on the north side of the site, and that the access through Block 53 be maintained for visitors and ceremonial functions only.

Trips were generated at a 2023 horizon (build-out year) and a 2028 horizon (five years following build-out).

- In 2023, the site is expected to generate approximately 303 vehicle trips during the AM peak hour and 217 vehicle trips during the PM peak hour.
- By 2028, with increased enrolment at the school, the trip generation is expected to increase to approximately 757 vehicle trips during the AM peak hour and 331 vehicle trips during the PM peak hour.

Because of the relationship between existing St. Andrew's College and the new St. Anne's School, it is anticipated that some parents of girls attending the new school will already have sons attending St. Andrew's College and will drop both children off at the same time. Because the pick-up and drop-off trips to St. Andrew's College would already be traveling on the broader study area road network, they will offset some of the trips generated by the school. After accounting for this trip chaining, the site will generate a lower net number of new trips:

- In 2023, the site is expected to generate approximately 253 net new vehicle trips during the AM peak hour and 205 net new vehicle trips during the PM peak hour.
- By 2028, with increased enrolment at the school, the trip generation is expected to increase to approximately 573 net new vehicle trips during the AM peak hour and 285 net new vehicle trips during the PM peak hour.

Traffic conditions at study area intersections are affected by St. John's Sideroad, a two-lane road with a rural cross-section. East of Yonge Street it widens to a four-lane urban cross-section. The Region's Transportation Master Plan recommended that St. John's Sideroad be widened to four lanes between Bathurst Street and Yonge Street sometime between 2027 and 2031, but the widening is not currently scheduled in the Region's 10-year capital plan and an EA has not been undertaken. The existing roadway is near capacity and is expected to reach capacity on many intersection movements under future background conditions; projected site traffic is expected to further affect intersection operations. Some interim mitigation has been identified in the form of adjustments to traffic signal timings and phasing at the signalized intersections at Bathurst Street and at Yonge Street; in particular, a westbound left turn phase is recommended at Bathurst Street and St. John's Sideroad.

The Street "A" access to St. John's Sideroad is expected to require traffic signals to accommodate pick-up and drop-off traffic at the school. Traffic signals are expected to be justified (or nearly justified) based on the 4-hour warrant (Justification 4) in OTM Book 12. At the intersection with St. John's Sideroad, an eastbound left turn lane, a westbound right turn lane, and a southbound right turn lane are recommended.

Given the existing largely rural nature of the area, there is no active transportation infrastructure on St. John's Sideroad, and transit service is outside walking distance of most residents. The widening of St. John's Sideroad would be expected to include conversion to an urban cross-section with sidewalks (or multi-use trails to accommodate cycling). Also in the longer term, the continued expansion of the development area to the north would include a continuous collector road network that would enable the expansion of local transit service into the area.

The eventual northerly extension of Street "A", and internal connections west to Bathurst Street and east to Yonge Street, will disperse school traffic and reduce pressure on St. John's Sideroad, although some of this effect will be offset by additional traffic generated by future development in the area to the north.

Transportation demand management measures were considered to reduce the traffic impact of the proposed development. Given that the majority of traffic in Phase 3 will be generated by the school, TDM measures in the short term will be primarily associated with the school. To mitigate the effect of school traffic on the road network, the school should consider measures that would:

- Encourage and maximize the use of its planned school bus service (to reduce the number of students being dropped off by private vehicle);
- Incentivize attendance by more than one student per family (to increase the average vehicle occupancy for pick-up and drop-off trips); and
- Enable the morning drop-off peak to be further spread out (e.g., scheduling staggered entry for junior and senior students; offering extracurricular activities during the morning before school).

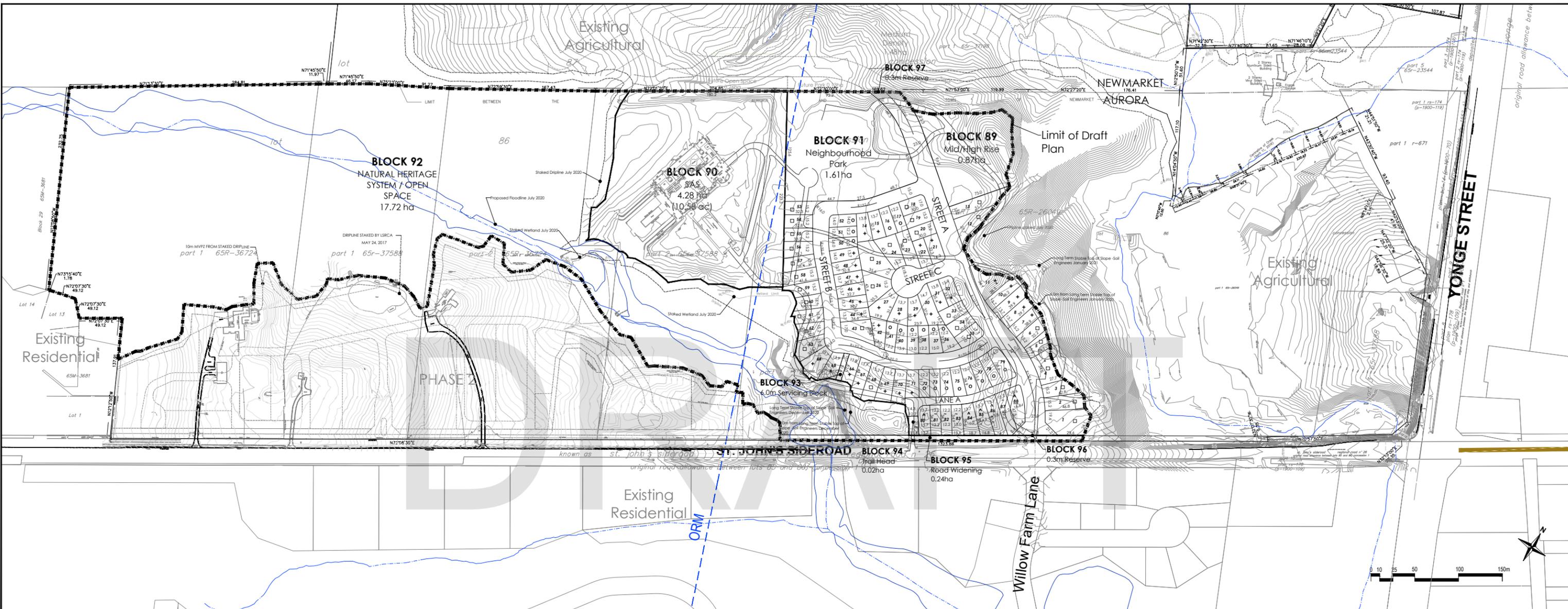
DRAFT

Appendix A

Proposed Draft Plan of Subdivision and Overall Concept Plan

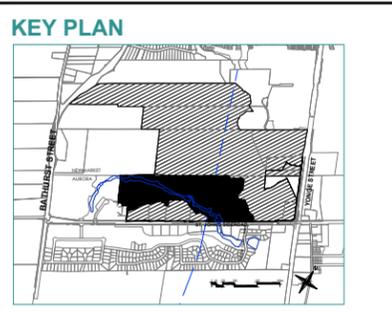
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DRAFT



DRAFT PLAN OF SUBDIVISION

Part of Lot 86, Concession 1
Town of Aurora
Regional Municipality of York



SUBJECT PROPERTY
 OTHER LANDS OWNED BY APPLICANT

LOT / BLOCK	LAND USE	UNITS	AREA
1-79	Single Detached Min. 15.24m	□ 31	2.01
	Single Detached Min. 13.70m	+ 29	1.59
	Single Detached Min. 12.20m	○ 19	0.83
80-88	Lane Access Single Detached Min. 13.70m	▲ 5	0.30
	Lane Access Single Detached Min. 12.20m	~ 4	0.19
89	Mid / High Rise Residential		0.87
90	Saint Anne's School		4.28
91	Neighbourhood Park		1.61
92	Natural Heritage / Open Space		17.72
93	Servicing Block		0.02
94	Trail Head		0.02
95	Road Widening		0.24
96-97	0.3m Reserves		0.01
Street A	23.0m Right of Way 436m		1.02
Street B-C	18.0m Right of Way 420m		0.81
Street B	15.0m Right of Way 108m		0.16
Lane A	9.2m Right of Way 141m		0.14
TOTAL		88	31.79

OWNER'S AUTHORIZATION

I hereby authorize Malone Given Parsons Ltd. to prepare and submit this Draft Plan of Subdivision to the Town of Aurora.

Angelo DeGasperi Date

SURVEYOR'S CERTIFICATE

I hereby certify that the boundaries of the lands to be subdivided and their relationship to the adjacent lands are correctly shown.

Neil A. LeGrow Date

ADDITIONAL INFORMATION

AS REQUIRED UNDER SECTION 51(17) OF THE PLANNING ACT, CHAPTER P.13(R.S.O. 1990).

(a),(e),(f),(g),(j),(l) - As shown of the Draft Plan.
 (b),(c) - As shown on the Draft and Key Plan.
 (d) - Land to be used in accordance with the Schedule of Land Use.
 (l) - Soil is clay loam and sandy loam.
 (h),(k) - Full municipal services to be provided.

Prepared by:

MGP Malone Given Parsons.

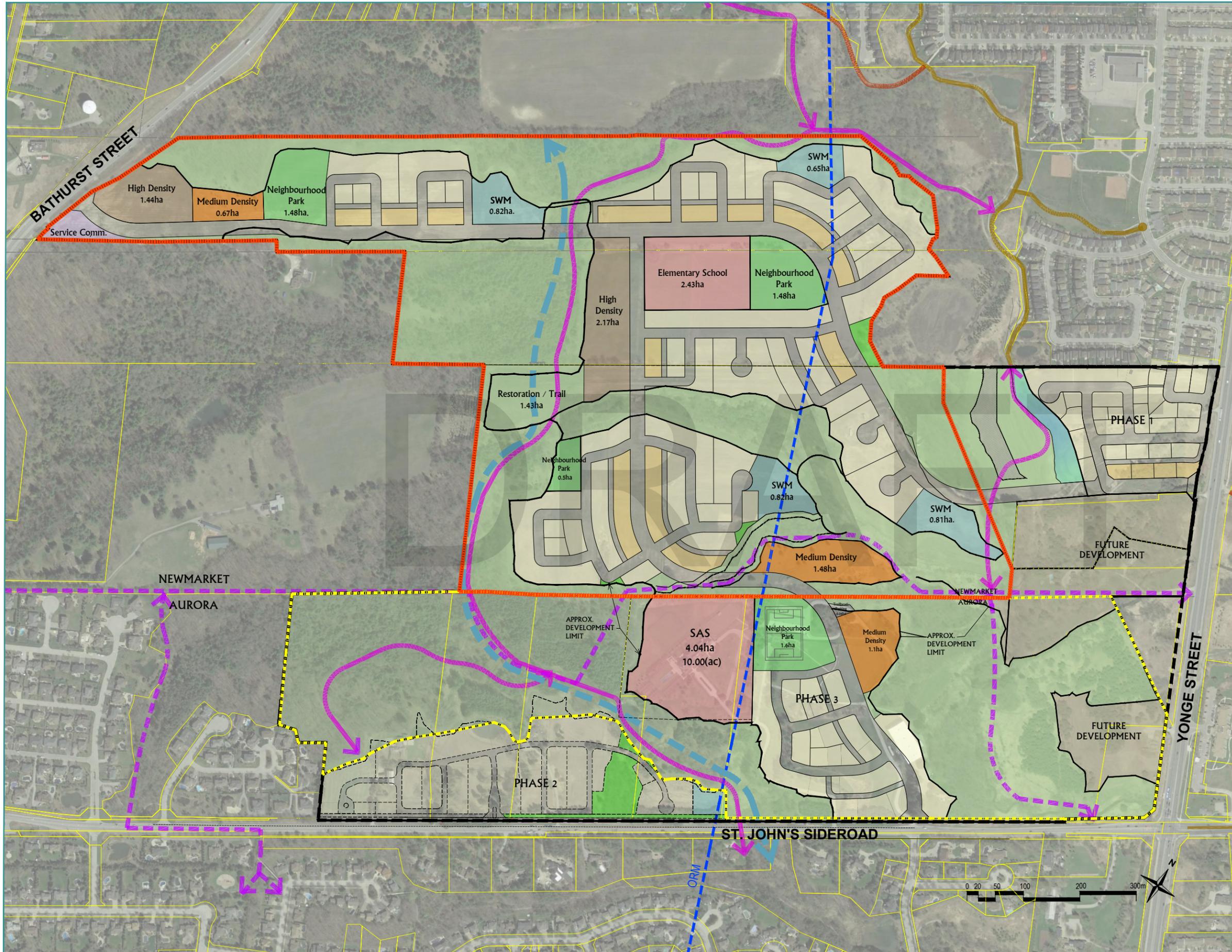
140 Renfrew Drive, Suite 201
Markham, Ontario, L3R 6B3
Tel: (905) 513-0170
www.mgp.ca

Prepared for:

SHINING HILL ESTATE COLLECTION INC.

Date: March 2, 2021	Project No.: 15-2374

SHINING HILL ESTATE COLLECTION INC.



LAND USE AREAS

	Area	
	Newmarket	Aurora
Low Density	16.20	4.33
Low Medium Lane	3.72	0
Medium Density	2.13	1.12
High Density	3.61	0
Service Commercial	0.45	0
School	2.43	4.29
Neighbourhood Park	3.26	1.60
SWM	3.26	0
Vista's	0.33	0.11
Restoration/Trail	1.43	0
NHS	31.80	31.78
Road	11.9	2.73
TOTAL	82.92	50.00

TRAIL SYSTEM

- Existing Paved Trail
- Existing Mixed Surface Trail
- Planned / Proposed Trail System
- Potential Trail Linkages through Site
- Potential Wildlife Corridor
- Oak Ridges Moraine Boundary

Development limits are preliminary

Date: January 13, 2020

Prepared for:
SHINING HILL ESTATE COLLECTION INC.

MGP Malone
Given
Parsons

140 Renfrew Drive, Suite 201 | Markham, ON | L3R 6B3
905 523 0270 | mgp.ca

Appendix B

Traffic Survey Data

DRAFT

DRAFT

Horizon Data Services Ltd

318 Simonston Blvd
Thornhill, ON L3T 4T5

"we always count...never estimated"

File Name : Bathurst St at St John's Sideroad
Site Code : 00000000
Start Date : 7/31/2019
Page No : 1

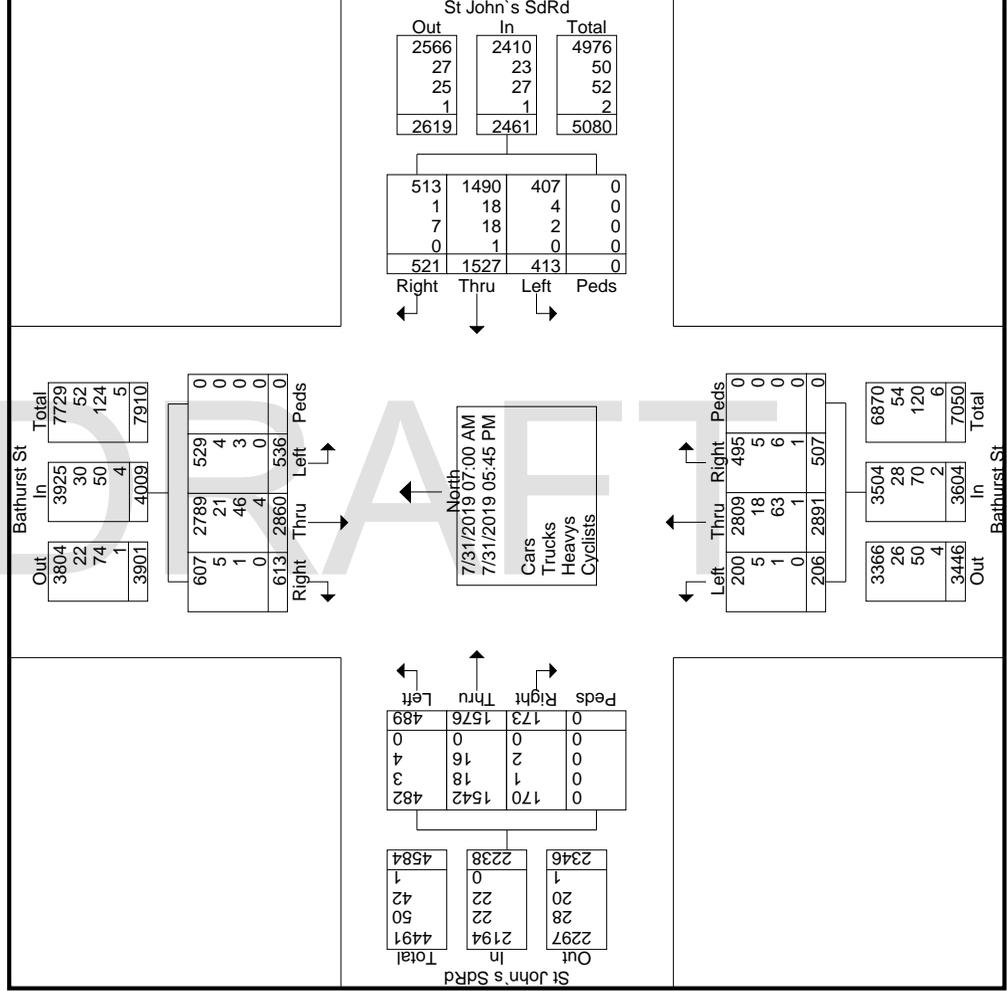
Start Time	Groups Printed- Cars - Trucks - Heavys - Cyclists																				
	Bathurst St From North				St John's SdRd From East				Bathurst St From South				St John's SdRd From West								
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:00 AM	61	186	19	0	266	17	99	31	0	147	10	56	7	0	73	9	54	13	0	76	562
07:15 AM	58	184	31	0	273	12	103	21	0	136	9	81	11	0	101	8	67	11	0	86	596
07:30 AM	63	195	49	0	307	10	89	25	0	124	21	100	9	0	130	9	66	12	0	87	648
07:45 AM	55	212	51	0	318	14	96	25	0	135	33	132	7	0	172	10	91	9	0	110	735
Total	237	777	150	0	1164	53	387	102	0	542	73	369	34	0	476	36	278	45	0	359	2541
08:00 AM	59	194	30	0	283	15	102	28	0	145	28	118	12	0	158	15	94	9	0	118	704
08:15 AM	49	205	52	0	306	15	108	23	0	146	29	125	10	0	164	10	95	12	0	117	733
08:30 AM	51	166	33	0	250	18	75	25	0	118	36	157	7	0	200	22	90	19	0	131	699
08:45 AM	36	215	45	0	296	18	87	26	0	131	45	144	11	0	200	14	102	19	0	135	762
Total	195	780	160	0	1135	66	372	102	0	540	138	544	40	0	722	61	381	59	0	501	2898
04:00 PM	20	154	21	0	195	56	74	23	0	153	28	218	7	0	253	10	92	38	0	140	741
04:15 PM	22	160	26	0	208	41	106	27	0	174	37	208	15	0	260	8	105	43	0	156	798
04:30 PM	28	159	28	0	215	58	108	25	0	191	40	254	15	0	309	10	74	41	0	125	840
04:45 PM	25	193	33	0	251	53	102	32	0	187	41	255	10	0	306	12	138	57	0	207	951
Total	95	666	108	0	869	208	390	107	0	705	146	935	47	0	1128	40	409	179	0	628	3330
05:00 PM	22	176	28	0	226	51	107	20	0	178	39	274	20	0	333	15	123	50	0	188	925
05:15 PM	27	195	35	0	257	64	99	30	0	193	30	288	26	0	344	7	108	51	0	166	960
05:30 PM	27	131	25	0	183	38	106	25	0	169	50	241	19	0	310	9	140	56	0	205	867
05:45 PM	10	135	30	0	175	41	66	27	0	134	31	240	20	0	291	5	137	49	0	191	791
Total	86	637	118	0	841	194	378	102	0	674	150	1043	85	0	1278	36	508	206	0	750	3543
Grand Total	613	2860	536	0	4009	521	1527	413	0	2461	507	2891	206	0	3604	173	1576	489	0	2238	12312
Apprch %	15.3	71.3	13.4	0	21.2	4.2	62	16.8	0	14.1	80.2	5.7	5.7	0	29.3	7.7	70.4	21.8	0	18.2	12033
Total %	5	23.2	4.4	0	32.6	4.2	12.4	3.4	0	20	4.1	23.5	1.7	0	29.3	1.4	12.8	4	0	18.2	97.7
% Cars	607	2789	529	0	3925	513	1490	407	0	2410	495	2809	200	0	3504	170	1542	482	0	2194	12033
% Trucks	5	21	4	0	30	1	18	4	0	23	5	18	5	0	28	1	18	3	0	22	103
% Heavys	0.8	0.7	0.7	0	0.7	0.2	1.2	1	0	0.9	1	0.6	2.4	0	0.8	0.6	1.1	0.6	0	1	0.8
% Cyclists	1	46	3	0	50	7	18	2	0	27	6	63	1	0	70	2	16	4	0	22	169
% Heavys	0.2	1.6	0.6	0	1.2	1.3	1.2	0.5	0	1.1	1.2	2.2	0.5	0	1.9	1.2	1	0.8	0	1	1.4
% Cyclists	0	4	0	0	4	0	0	0	0	1	1	1	0	0	2	0	0	0	0	0	7
% Cyclists	0	0.1	0	0	0.1	0	0.1	0	0	0	0.2	0	0	0	0.1	0	0	0	0	0	0.1

Horizon Data Services Ltd

318 Simonston Blvd
Thornhill, ON L3T 4T5

"we always count...never estimated"

File Name : Bathurst St at St John's Sideroad
Site Code : 00000000
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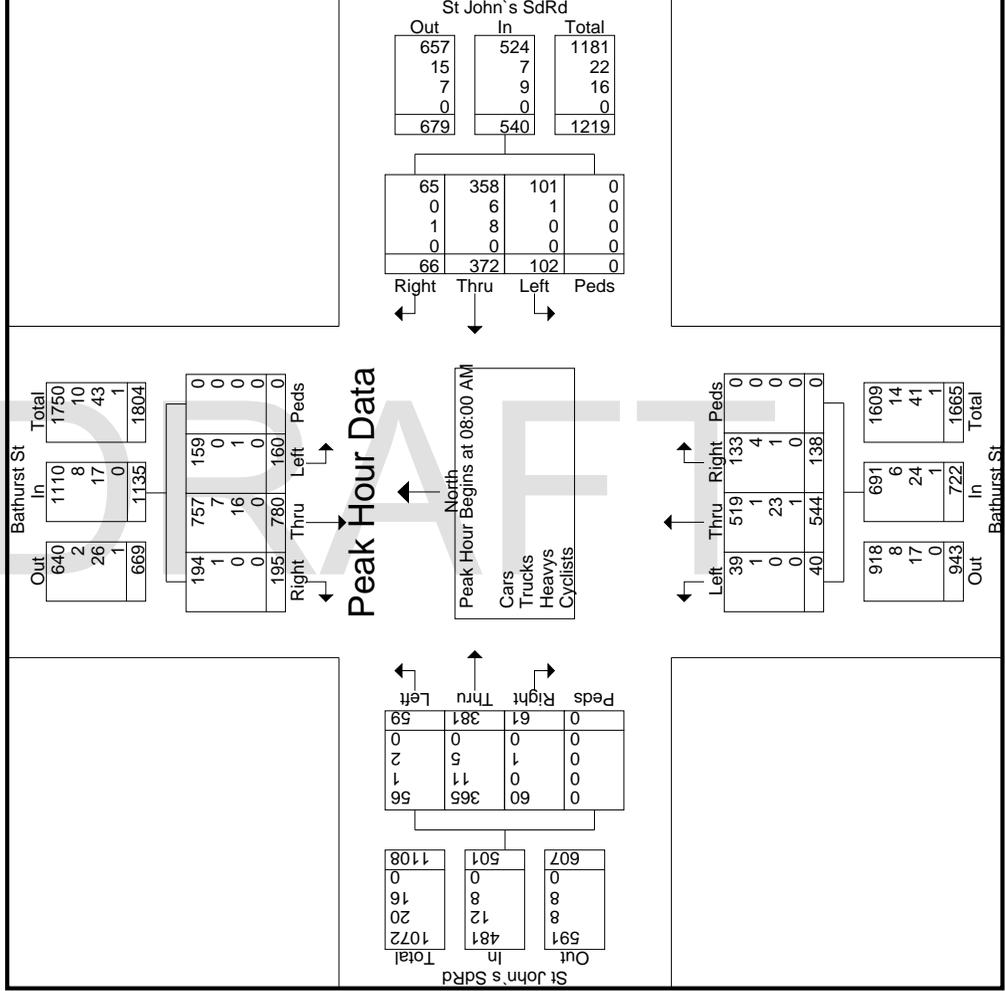
Start Time	Bathurst St From North				St John's SdRd From East				Bathurst St From South				St John's SdRd From West								
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 08:00 AM																					
08:00 AM	59	194	30	0	283	15	102	28	118	12	118	12	118	0	158	15	94	9	0	118	704
08:15 AM	49	205	52	0	306	15	108	23	125	10	125	10	125	0	164	10	95	12	0	117	733
08:30 AM	51	166	33	0	250	18	75	25	118	7	157	7	131	0	200	22	90	19	0	131	699
08:45 AM	36	215	45	0	296	18	87	26	144	11	144	11	131	0	200	14	102	19	0	135	762
Total Volume	195	780	160	0	1135	66	372	102	540	40	722	40	722	0	722	61	381	59	0	501	2898
% App. Total	17.2	68.7	14.1	0	100.0	12.2	68.9	18.9	0	5.5	0	5.5	0	0	100.0	12.2	76	11.8	0	501	2898
PHF	.826	.907	.769	.000	.927	.917	.861	.911	.000	.833	.000	.833	.000	.903	.693	.934	.776	.000	.928	.928	.951
Cars	194	757	159	0	1110	65	358	101	524	39	691	39	691	0	691	60	365	56	0	481	2806
% Cars	99.5	97.1	99.4	0	97.8	98.5	96.2	99.0	97.0	97.5	95.7	97.5	95.7	0	95.7	98.4	95.8	94.9	0	96.0	96.8
Trucks	1	7	0	0	8	0	6	1	4	1	6	1	6	0	6	0	11	1	0	12	33
% Trucks	0.5	0.9	0	0	0.7	0	1.6	1.0	1.3	2.5	0.8	2.5	0.8	0	0.8	0	2.9	1.7	0	2.4	1.1
Heavys	0	16	1	0	17	1	8	0	9	0	24	0	24	0	24	1	5	2	0	8	58
% Heavys	0	2.1	0.6	0	1.5	1.5	2.2	0	1.7	0	3.3	0	3.3	0	3.3	1.6	1.3	3.4	0	1.6	2.0
Cyclists	0	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	0	0	0	0	1
% Cyclists	0	0	0	0	0	0	0	0	0	0	0.1	0	0.1	0	0.1	0	0	0	0	0	0.0

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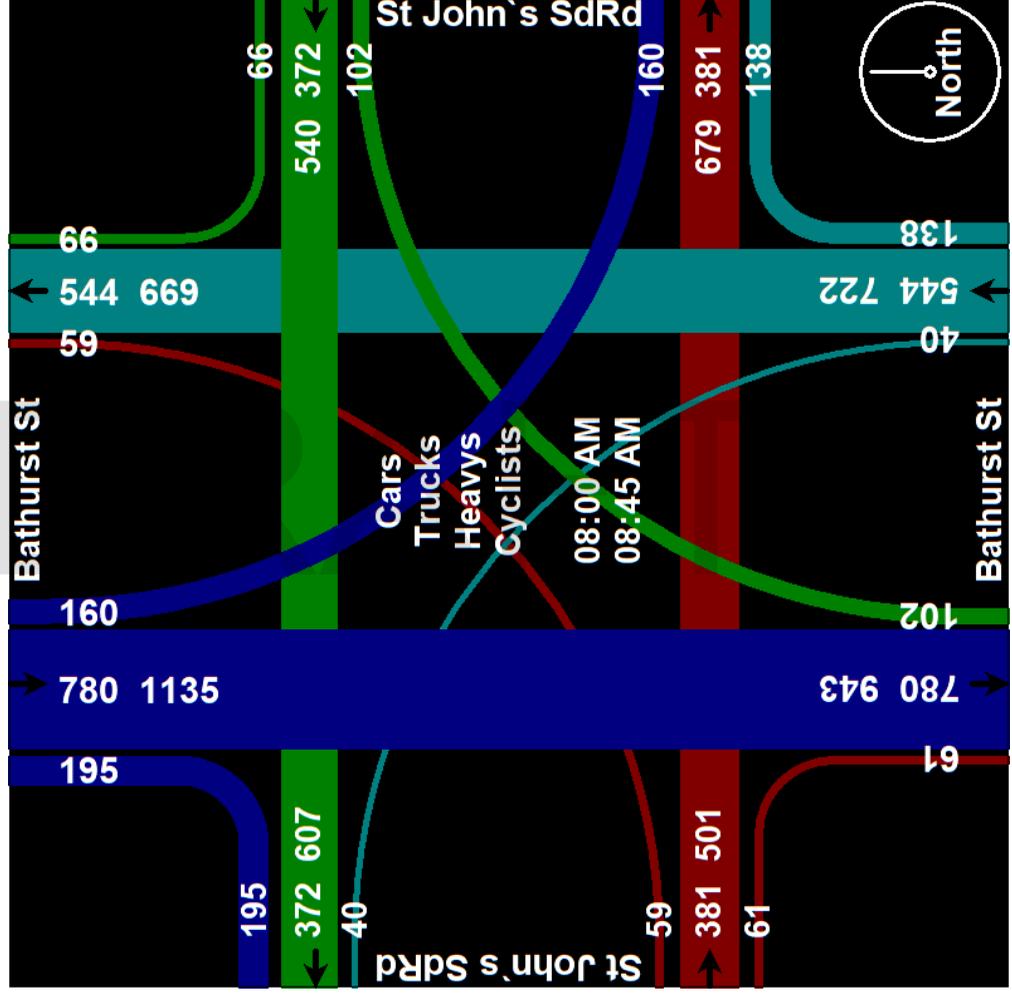


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Site Code : 00000000
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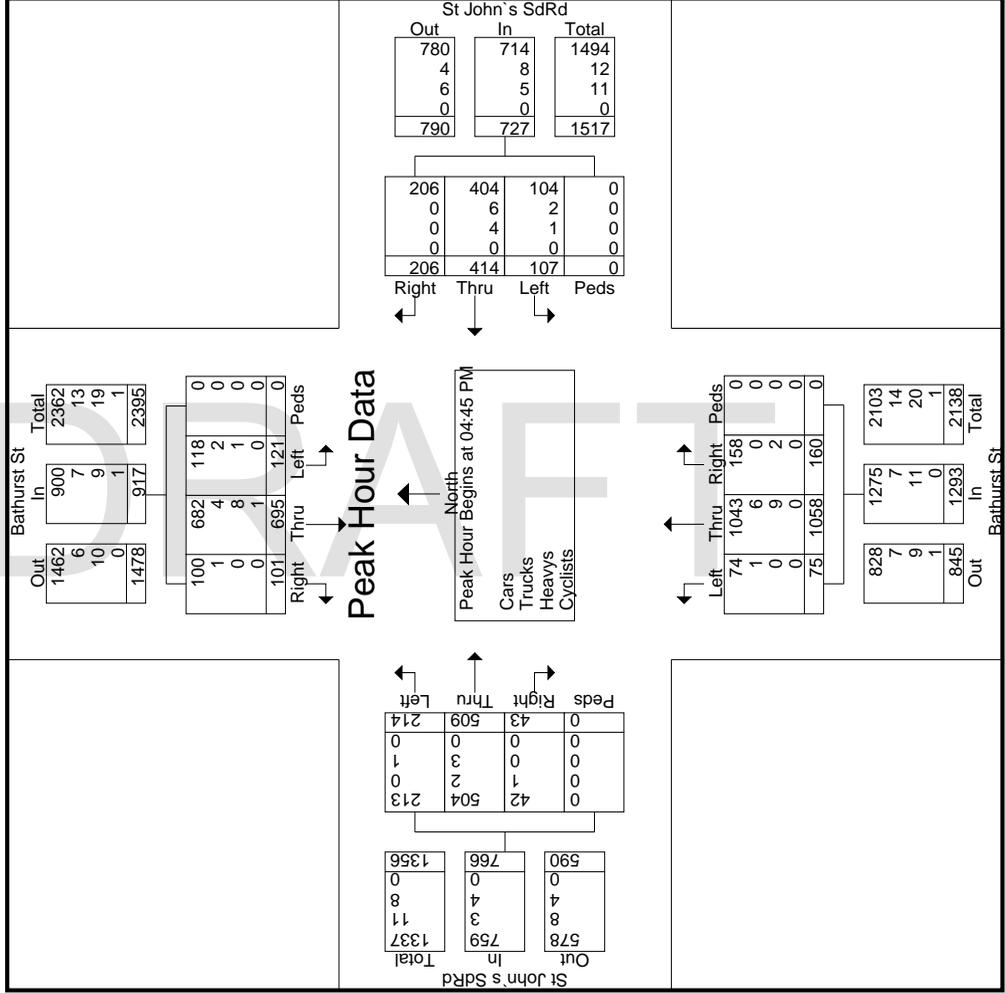


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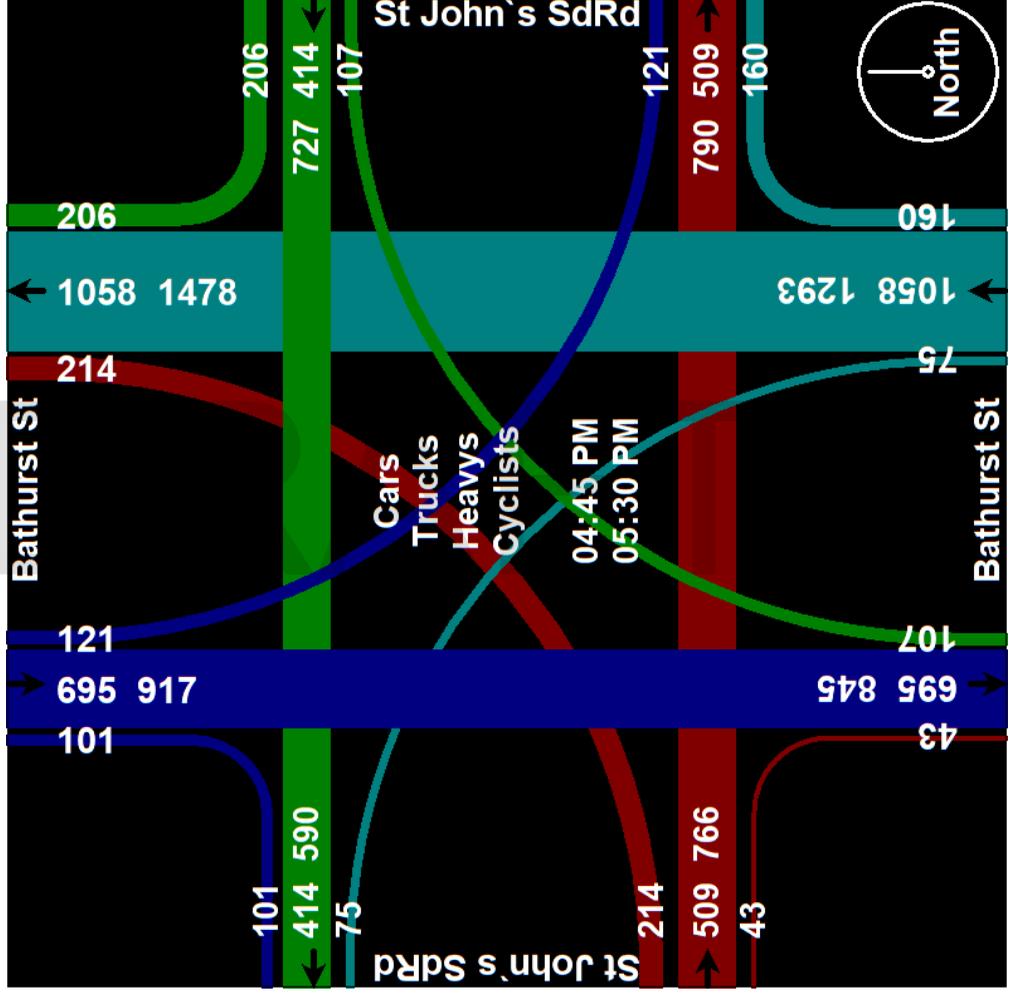


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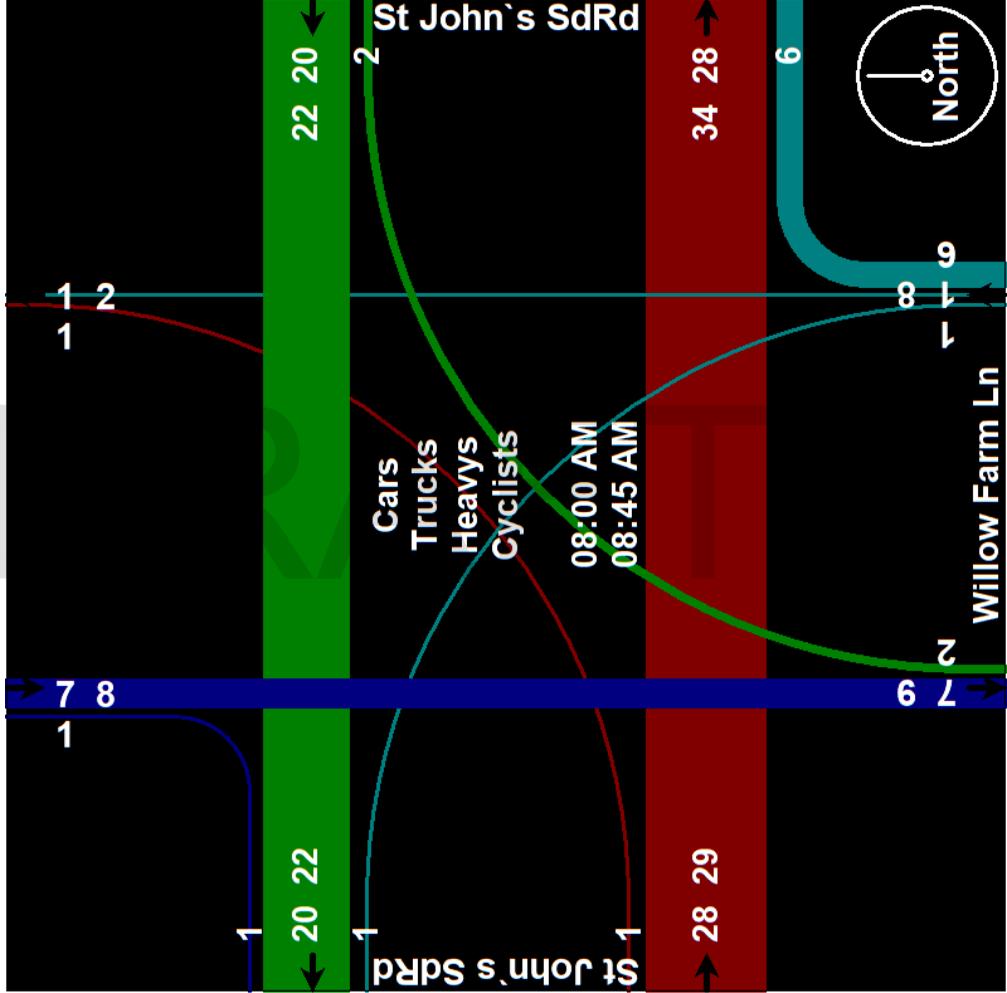


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File Name : Willow Farm Ln at St John's Sideroad
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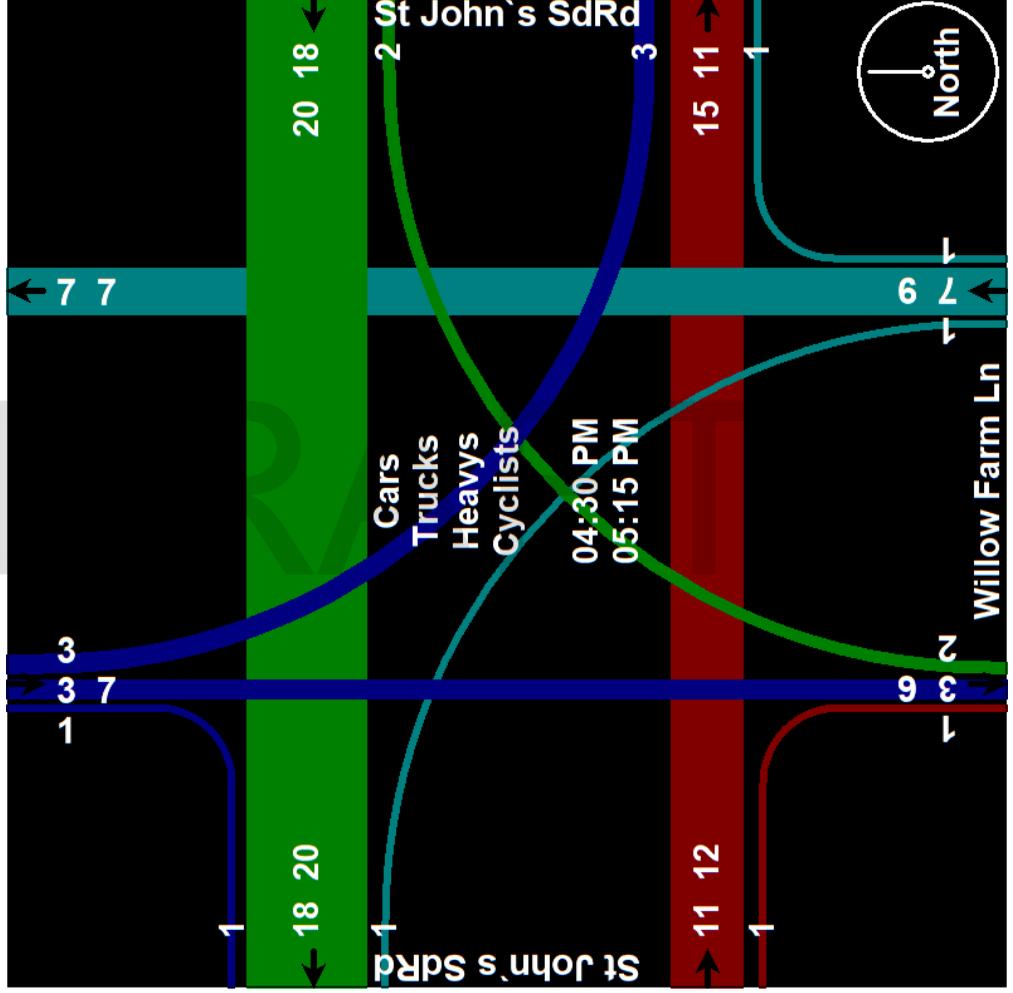


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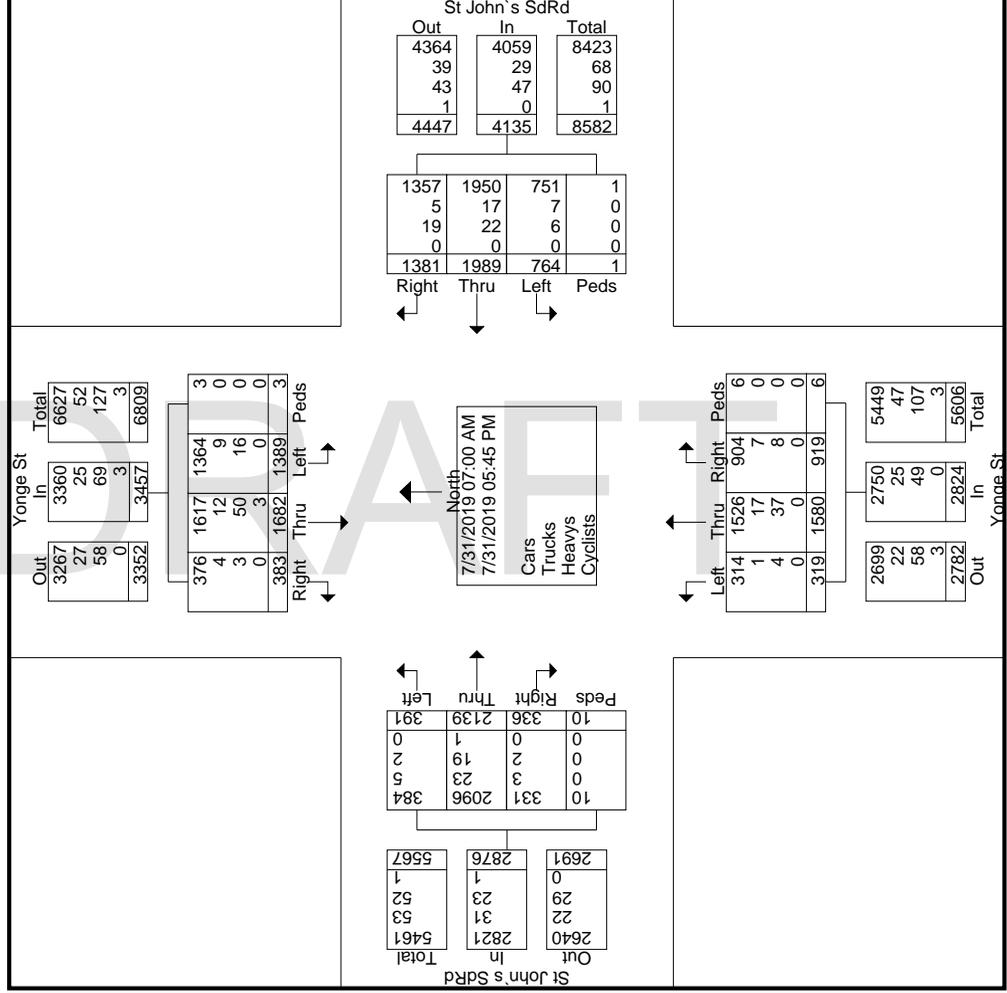


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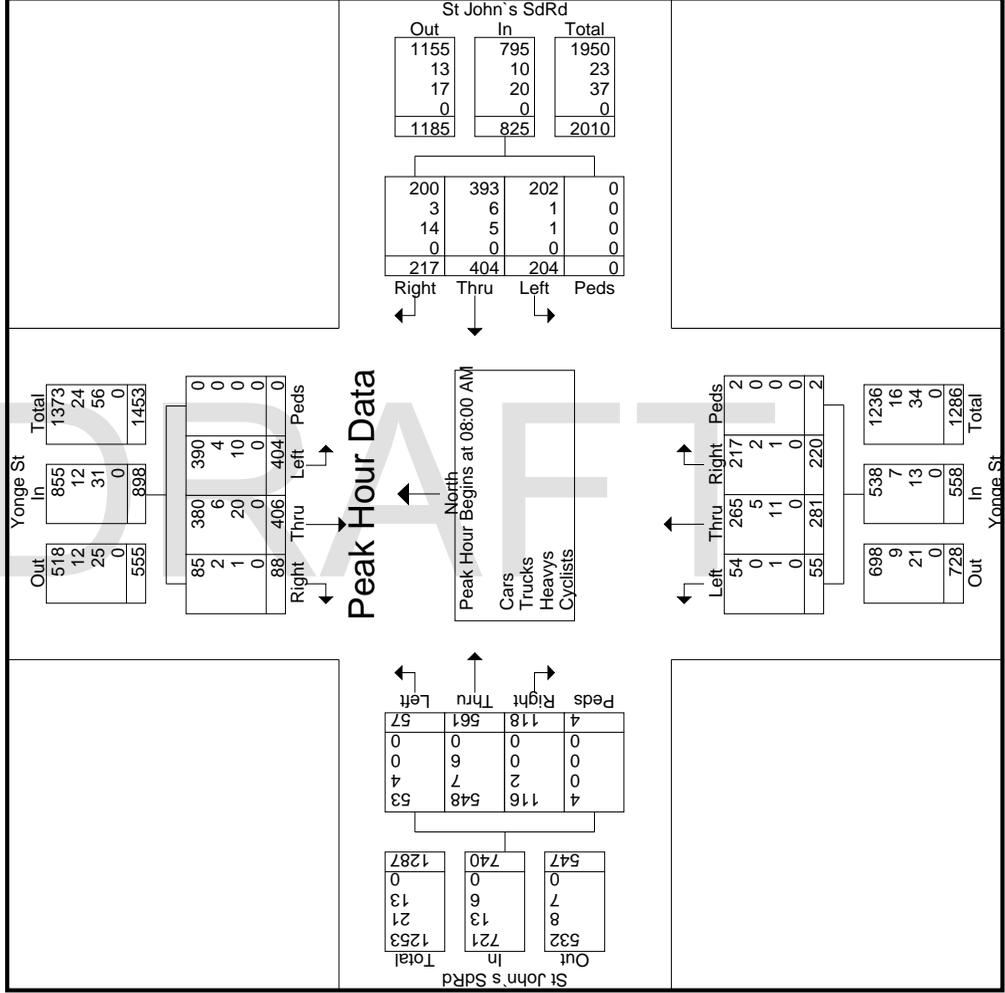


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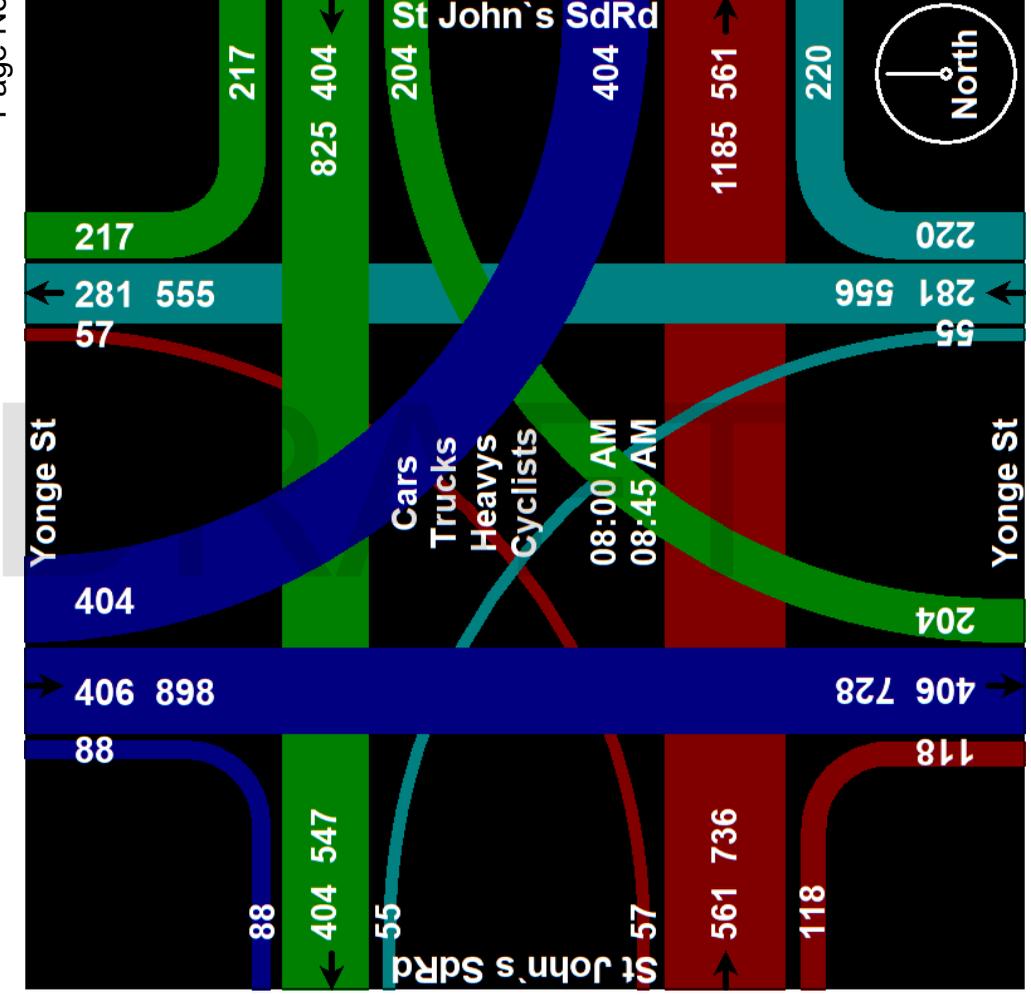


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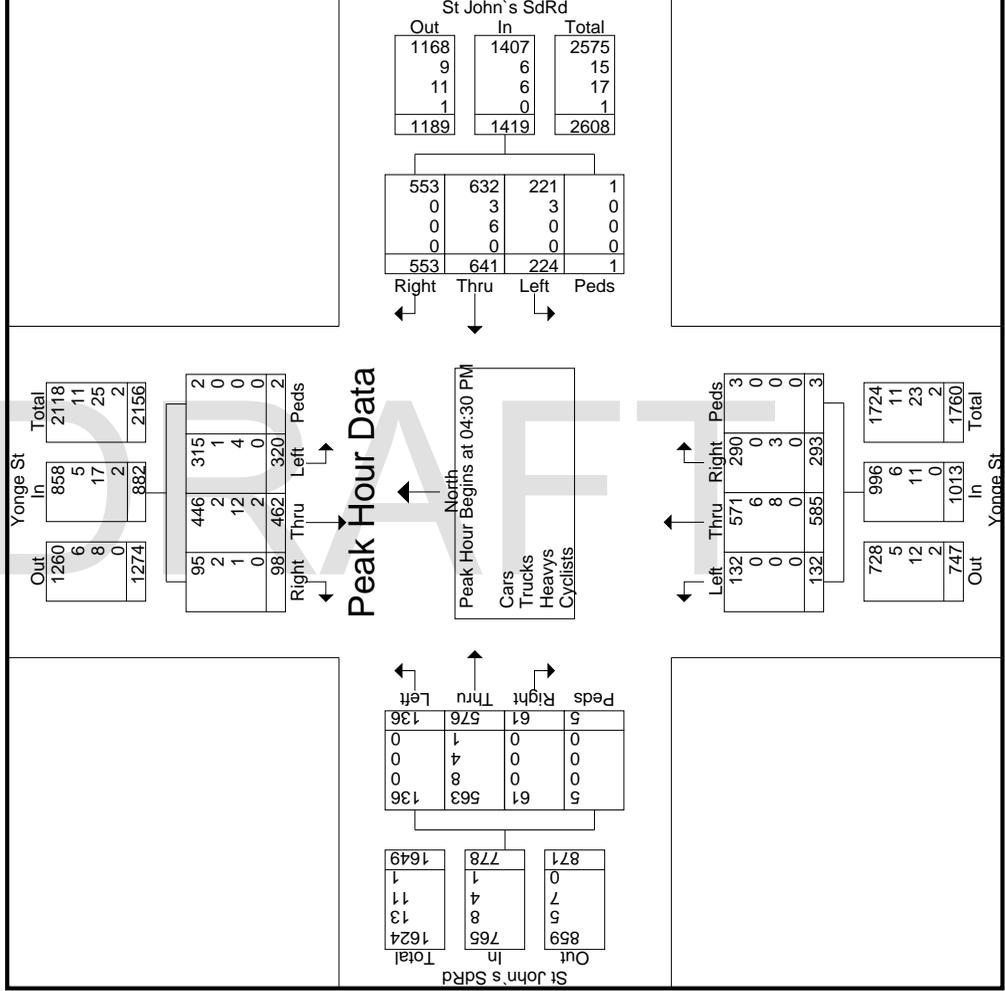
Start Time	Yonge St From North					St John's SdRd From East					Yonge St From South					St John's SdRd From West					
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
	Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1 Peak Hour for Entire Intersection Begins at 04:30 PM																				
04:30 PM	23	105	74	2	204	135	170	56	1	362	67	144	41	1	253	21	119	22	3	165	984
04:45 PM	27	112	84	0	223	140	160	54	0	354	62	130	27	0	219	10	177	37	0	224	1020
05:00 PM	26	111	77	0	214	122	133	56	0	311	85	158	33	0	276	13	143	47	2	205	1006
05:15 PM	22	134	85	0	241	156	178	58	0	392	79	153	31	2	265	17	137	30	0	184	1082
Total Volume	98	462	320	2	882	553	641	224	1	1419	293	585	132	3	1013	61	576	136	5	778	4092
% App. Total	11.1	52.4	36.3	0.2		39	45.2	15.8	0.1		28.9	57.7	13	0.3		7.8	74	17.5	0.6		
PHF	.907	.862	.941	.250	.915	.886	.900	.966	.250	.905	.862	.926	.805	.375	.918	.726	.814	.723	.417	.868	.945
Cars	95	446	315	2	858	553	632	221	1	1407	290	571	132	3	996	61	563	136	5	765	4026
% Cars	96.9	96.5	98.4	100	97.3	100	98.6	98.7	100	99.2	99.0	97.6	100	100	98.3	100	97.7	100	100	98.3	98.4
Trucks	2	2	1	0	5	0	3	3	0	6	0	6	0	0	6	0	8	0	0	8	25
% Trucks	2.0	0.4	0.3	0	0.6	0	0.5	1.3	0	0.4	0	1.0	0	0	0.6	0	1.4	0	0	1.0	0.6
Heavys	1	12	4	0	17	0	6	0	0	6	3	8	0	0	11	0	4	0	0	4	38
% Heavys	1.0	2.6	1.3	0	1.9	0	0.9	0	0	0.4	1.0	1.4	0	0	1.1	0	0.7	0	0	0.5	0.9
Cyclists	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	3
% Cyclists	0	0.4	0	0	0.2	0	0	0	0	0	0	0	0	0	0	0	0.2	0	0	0.1	0.1

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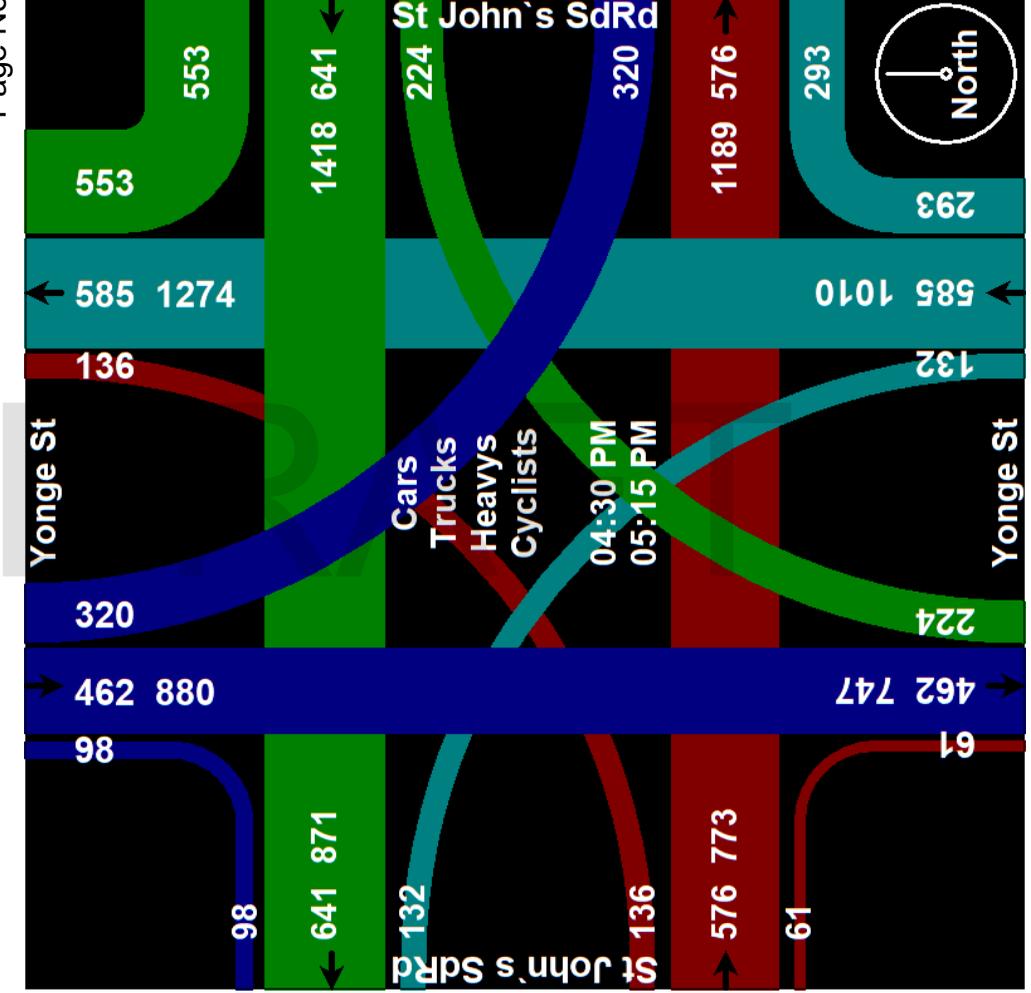


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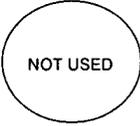
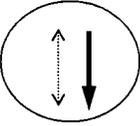
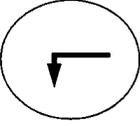
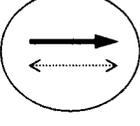
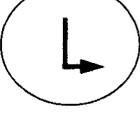
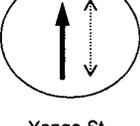
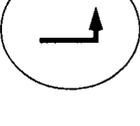


Appendix C

Traffic Signal Timings

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LOCATION: Yonge St (YR 1) & S		r's Sdrd			MUNICIPALITY: Aurora	
CTCS: 303					COMPU /STEM: Centracs	N ↑
MODE/COMMENT: SA					CONTROLLER/CA. / TYPE: Econolite Cobalt / TS2T1	
PREPARED/CHECKED BY: AM					CONFLICT FLASH: Red & Red	
PREPARATION DATE: April 18, 2018					DESIGN WALK SPEED: 1.0 m/s (FDW based on full crossing at 1.2 m/s)	
IMPLEMENTATION DATE: April 18, 2018					CHANNEL/DROP:	
NEMA Phase (York)		AM 7:00-9:00 M-F	PM 16:00-19:00 M-F	Free 9:00-16:00 19:00-7:00 M-F, 24 hrs Sat & Sun	Phase Mode (Fixed/Demanded/Callable)	Remarks
	Local Plan	Pattern 1	Pattern 2	Pattern 99		
	System Plan	Plan 1	Plan 2	Plan 99		
1.	 NOT USED	WLK FDW MIN EXT MAX1 MAX2 AMB ALR SPLIT				Pedestrian Minimums: NSWK = 7 sec., NSFD = 25 sec. EWWWK = 7 sec., EWFD = 30 sec. Emergency vehicle pre-emption 3: Serve SBG/NSDW min 20 secs and up to 100 secs if there are continuous emergency calls in SB direction.
2. Southbound	 Yonge St	WLK 7 FDW 25 MIN 32 EXT 0 MAX1 32 MAX2 0 AMB 4.5 ALR 3.0 SPLIT	67	59	0	Emergency vehicle pre-emption 4: Serve NBG/NSDW min 20 secs and up to 100 secs if there are continuous emergency calls in NB direction. Emergency vehicle pre-emption 5: Serve EWG/NSDW min 20 secs and up to 100 secs if there are continuous emergency calls in EW direction.
3. W/B Left Turn Arrow		WLK FDW MIN 7 EXT 3 MAX1 7 MAX2 0 AMB 3.0 ALR 1.0 SPLIT	15	13		Callable/Extendable by Setback Loop EW phase is callable by vehicle or pedestrian actuation. If a vehicle call is received, the minimum EWG is 10 seconds. If ongoing vehicle demand exists on the stopbar loop, the EWG is capable of providing vehicle extensions up to the maximum green split during coordinated operation or 25 secs during Free operation. If a pedestrian call is received, the pedestrian minimum will be served. The EWWWK & EWFD are only displayed on the pedestrian signal heads if a pedestrian call is received. Extension time is based on vehicle demand. Unused extension time is given to the NSG.
4. Eastbound	 St John's Sdrd	WLK 7 FDW 30 MIN 10 EXT 3 MAX1 25 MAX2 0 AMB 4.5 ALR 3.5 SPLIT	48	48	0	Callable by stopbar loop and/or pushbutton; Extendable by stopbar loop.
5. S/B Left Turn Arrow		WLK FDW MIN 7 EXT 3 MAX1 20 MAX2 0 AMB 3.0 ALR 1.0 SPLIT	26	18		Callable/Extendable by Setback Loop During coordinated operation, the signal constantly cycles through main street FDW to improve response time to side street vehicle and pedestrian demand. During free plan, signal rests in NSWK and does not cycle through NSFD unless there is side street vehicle or pedestrian demand.
6. Northbound	 Yonge St	WLK 7 FDW 25 MIN 32 EXT 0 MAX1 32 MAX2 0 AMB 4.5 ALR 3.0 SPLIT	41	41	0	Fixed NSFD reverts to NSWK if there is no side street demand at the end of the NSFD.
7. E/B Left Turn Arrow		WLK FDW MIN 7 EXT 3 MAX1 7 MAX2 0 AMB 3.0 ALR 1.0 SPLIT	13	13		Callable/Extendable by Setback Loop LEGEND: SA - Semi-Actuated signal WLK - Walk time FDW - Flashing Don't Walk time MIN - Minimum green time EXT - Extension time MAX1 - Maximum green time 1 MAX2 - Maximum green time 2 AMB - Amber ALR - All Red CL - Cycle Length OF - Offset VP - Vehicle Permissive NSWK - North/South Walk EWWWK - East/West Walk NSG - North/South Green EWG - East/West Green NSFD - North/South Flashing Don't Walk EWFD - East/West Flashing Don't Walk TSP - Transit Priority APS - Audible Pedestrian Signal RLC - Red Light Camera
8. Westbound	 St John's Sdrd	WLK 7 FDW 30 MIN 10 EXT 3 MAX1 25 MAX2 0 AMB 4.5 ALR 3.5 SPLIT	50	48	0	Callable by stopbar loop and/or pushbutton; Extendable by stopbar loop.
		CL OF VP	130 35 25	120 39 25	0 (FREE) 0 (FREE) 0 (FREE)	

NOTES:

Appendix D

Level of Service Definitions

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LEVEL OF SERVICE¹

Level of Service (LOS) is defined as a qualitative measure describing operational conditions within a traffic stream, and their perception by motorists and/or passengers. This concept was introduced in the 1965 *Highway Capacity Manual* as a criteria for interrupted flow conditions. The 2000 *Highway Capacity Manual* changed the basis for measuring Level of Service at intersections to control delay².

Six Levels of Service are defined with LOS A representing the best operating conditions, and LOS F the worst (briefly described below). It should be noted that there is often significant variability in the amount of delay experienced by individual drivers.

- LOS A:** This Level of Service describes the highest quality of traffic flow and is referred to as free flow. The approach appears open, turning movements are easily made and drivers have freedom of operation. Control delay is less than 10 seconds/vehicle.
- LOS B:** This Level of Service is referred to as a stable flow. Drivers feel somewhat restricted and occasionally may have to wait to complete the minor movement. Control delay is 10-15 seconds/vehicle for unsignalized intersections and 10-20 seconds/vehicle for signalized intersections.
- LOS C:** At this level, the operation is stable. Drivers feel more restricted and may have to wait, with queues developing for short periods. Control delay is 15-25 seconds/vehicle at unsignalized intersections and 20-35 seconds/vehicle at signalized intersections.
- LOS D:** At this level, traffic is approaching unstable flow. The motorist experiences increasing restriction and instability of flow. There are substantial delays to approaching vehicles during short peaks within the peak period, but there are enough gaps to lower demand to permit occasional clearance of developing queues and prevent excessive back-ups. Control delay is 25-35 seconds/vehicle at unsignalized intersections and 35-55 seconds/vehicle at signalized intersections.
- LOS E:** At this level capacity occurs. Long queues of vehicles exist and delays to vehicles may extend. Control delay is 35-50 seconds/vehicle at unsignalized intersections and 55-80 seconds/vehicle at signalized intersections.
- LOS F:** At this Level of Service, the intersection has failed. Capacity of the intersection has been exceeded. Control delay exceeds 50 seconds/vehicle at unsignalized intersections and exceeds 80 seconds/vehicle at signalized intersections.

¹

Transportation Research Board: Highway Capacity Manual 1965, 2000

²

Control delay is defined as the component of delay that results when a control signal causes a lane group to reduce speed or to stop; it is measured by comparison with the uncontrolled condition.

Level of Traffic Stress Criteria for Road Segments, version 2.0, June, 2017 (converted to metric units)

Mixed traffic criteria

Number of lanes	Effective ADT*	Prevailing Speed						
		≤32 km/h	40 km/h	48 km/h	56 km/h	64 km/h	72 km/h	80+ km/h
Unlaned 2-way street (no centerline)	0-750	LTS 1	LTS 1	LTS 2	LTS 2	LTS 3	LTS 3	LTS 3
	751-1500	LTS 1	LTS 1	LTS 2	LTS 3	LTS 3	LTS 3	LTS 4
	1501-3000	LTS 2	LTS 2	LTS 2	LTS 3	LTS 4	LTS 4	LTS 4
	3000+	LTS 2	LTS 3	LTS 3	LTS 3	LTS 4	LTS 4	LTS 4
1 thru lane per direction (1-way, 1-lane street or 2-way street with centerline)	0-750	LTS 1	LTS 1	LTS 2	LTS 2	LTS 3	LTS 3	LTS 3
	751-1500	LTS 2	LTS 2	LTS 2	LTS 3	LTS 3	LTS 3	LTS 4
	1501-3000	LTS 2	LTS 3	LTS 3	LTS 3	LTS 4	LTS 4	LTS 4
	3000+	LTS 3	LTS 3	LTS 3	LTS 3	LTS 4	LTS 4	LTS 4
2 thru lanes per direction	0-8000	LTS 3	LTS 3	LTS 3	LTS 3	LTS 4	LTS 4	LTS 4
	8001+	LTS 3	LTS 3	LTS 4				
3+ thru lanes per direction	any ADT	LTS 3	LTS 3	LTS 4				

* Effective ADT = ADT for two-way roads; Effective ADT = 1.5*ADT for one-way roads

Bike lanes and shoulders not adjacent to a parking lane

Number of lanes	Bike lane width	Prevailing Speed					
		≤40 km/h	48 km/h	56 km/h	64 km/h	72 km/h	80+ km/h
1 thru lane per direction, or unlaned	1.8+ m	LTS 1	LTS 2	LTS 2	LTS 3	LTS 3	LTS 3
	1.2 or 1.5 m	LTS 2	LTS 2	LTS 2	LTS 3	LTS 3	LTS 4
2 thru lanes per direction	1.8+ m	LTS 2	LTS 2	LTS 2	LTS 3	LTS 3	LTS 3
	1.2 or 1.5 m	LTS 2	LTS 2	LTS 2	LTS 3	LTS 3	LTS 4
3+ lanes per direction	any width	LTS 3	LTS 3	LTS 3	LTS 4	LTS 4	LTS 4

- Notes
1. If bike lane / shoulder is frequently blocked, use mixed traffic criteria.
 2. Qualifying bike lane / shoulder should extend at least 1.2 m from a curb at least 1.0 m from a pavement edge or discontinuous gutter pan seam
 3. Bike lane width includes any marked buffer next to the bike lane.

Bike lanes alongside a parking lane

Number of lanes	Bike lane reach = Bike + Pkg lane width	Prevailing Speed		
		≤40 km/h	48 km/h	56 km/h
1 lane per direction	4.6+ m	LTS 1	LTS 2	LTS 3
	3.7-4.3 m	LTS 2	LTS 2	LTS 3
2 lanes per direction (2-way)	4.6+ m	LTS 2	LTS 3	LTS 3
2-3 lanes per direction (1-way)		LTS 2	LTS 3	LTS 3
other multilane		LTS 3	LTS 3	LTS 3

- Notes
1. If bike lane is frequently blocked, use mixed traffic criteria.
 2. Qualifying bike lane must have reach (bike lane width + parking lane width) ≥ 3.7 m
 3. Bike lane width includes any marked buffer next to the bike lane.

Appendix E

Synchro Analysis Worksheets

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Lanes, Volumes, Timings
210: Yonge Street & St. John's Sideroad

AM peak hour
Existing conditions

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	105	605	150	175	425	265	70	470	240	490	705	140
Future Volume (vph)	105	605	150	175	425	265	70	470	240	490	705	140
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.2	3.6	3.7	3.2	3.6	3.7	3.0	3.4	4.0	3.0	3.7	3.3
Storage Length (m)	65.0		50.0	70.0		0.0	35.0		100.0	115.0		230.0
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	*0.75	0.95	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor		1.00		1.00			1.00					0.97
Frt		0.970				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1612	2703	0	1708	1845	1512	1652	3330	1670	*2068	3444	1516
Flt Permitted	0.228			0.095			0.352			0.284		
Satd. Flow (perm)	387	2703	0	171	1845	1512	610	3330	1670	484	3444	1473
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		17				281			186			157
Link Speed (k/h)		60			60			60			60	
Link Distance (m)		448.3			341.9			505.9			2054.7	
Travel Time (s)		26.9			20.5			30.4			123.3	
Confl. Peds. (#/hr)			2	2			4					4
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles (%)	7%	2%	2%	1%	3%	8%	2%	6%	1%	4%	6%	3%
Adj. Flow (vph)	118	680	169	197	478	298	79	528	270	551	792	157
Shared Lane Traffic (%)												
Lane Group Flow (vph)	118	849	0	197	478	298	79	528	270	551	792	157
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8			6		5	2	
Permitted Phases	4			8		8	6		6	2		2
Detector Phase	7	4		3	8	8	6	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	11.0	45.0		11.0	45.0	45.0	39.5	39.5	39.5	11.0	39.5	39.5
Total Split (s)	13.0	48.0		15.0	50.0	50.0	41.0	41.0	41.0	26.0	67.0	67.0
Total Split (%)	10.0%	36.9%		11.5%	38.5%	38.5%	31.5%	31.5%	31.5%	20.0%	51.5%	51.5%
Maximum Green (s)	9.0	40.0		11.0	42.0	42.0	33.5	33.5	33.5	22.0	59.5	59.5
Yellow Time (s)	3.0	4.5		3.0	4.5	4.5	4.5	4.5	4.5	3.0	4.5	4.5
All-Red Time (s)	1.0	3.5		1.0	3.5	3.5	3.0	3.0	3.0	1.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	8.0		4.0	8.0	8.0	7.5	7.5	7.5	4.0	7.5	7.5
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes		
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
Recall Mode	None	None		None	None	None	C-Max	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)		7.0			7.0	7.0	7.0	7.0	7.0		7.0	7.0
Flash Dont Walk (s)		30.0			30.0	30.0	25.0	25.0	25.0		25.0	25.0
Pedestrian Calls (#/hr)		0			0	0	5	5	5		5	5
Act Effct Green (s)	52.7	40.0		57.3	42.3	42.3	33.5	33.5	33.5	63.0	59.5	59.5
Actuated g/C Ratio	0.41	0.31		0.44	0.33	0.33	0.26	0.26	0.26	0.48	0.46	0.46

Lanes, Volumes, Timings
 210: Yonge Street & St. John's Sideroad

AM peak hour
 Existing conditions

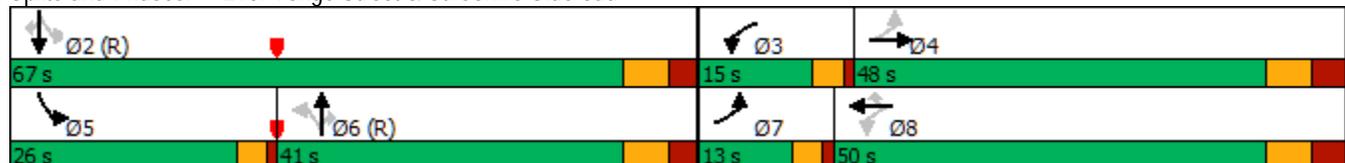


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.50	1.01		0.96	0.80	0.44	0.50	0.62	0.48	1.10	0.50	0.21
Control Delay	28.8	76.6		84.0	51.3	6.7	54.1	46.2	16.0	95.2	26.2	3.7
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.8	76.6		84.0	51.3	6.7	54.1	46.2	16.0	95.2	26.2	3.7
LOS	C	E		F	D	A	D	D	B	F	C	A
Approach Delay		70.8			44.3			37.6			49.2	
Approach LOS		E			D			D			D	
Queue Length 50th (m)	18.4	~152.4		36.2	117.6	3.1	18.2	66.4	17.8	~124.2	77.5	0.0
Queue Length 95th (m)	30.9	#207.0		#84.9	159.7	23.9	36.2	85.0	43.5	#192.5	94.9	12.0
Internal Link Dist (m)		424.3			317.9			481.9			2030.7	
Turn Bay Length (m)	65.0			70.0			35.0		100.0	115.0		230.0
Base Capacity (vph)	242	843		205	600	681	157	858	568	502	1576	759
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.49	1.01		0.96	0.80	0.44	0.50	0.62	0.48	1.10	0.50	0.21

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 35 (27%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green
 Natural Cycle: 120
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.10
 Intersection Signal Delay: 50.6
 Intersection Capacity Utilization 91.6%
 Analysis Period (min) 15
 * User Entered Value
 ~ 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.

Splits and Phases: 210: Yonge Street & St. John's Sideroad



Lanes, Volumes, Timings
 220: Bathurst Street & 18th Sideroad/St. John's Sideroad

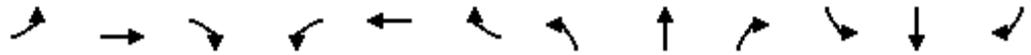
AM peak hour
 Existing conditions



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	85	385	45	130	415	40	50	585	50	140	1020	265
Future Volume (vph)	85	385	45	130	415	40	50	585	50	140	1020	265
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.0	3.5	3.7	3.2	3.7	4.0	3.1	3.3	3.7
Storage Length (m)	30.0		0.0	50.0		50.0	60.0		60.0	60.0		60.0
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor		1.00										
Frt		0.984				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1738	1819	0	1668	1807	1601	1675	3510	1622	1688	3388	1617
Flt Permitted	0.212			0.500			0.215			0.287		
Satd. Flow (perm)	388	1819	0	878	1807	1601	379	3510	1622	510	3388	1617
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		6				122			122			248
Link Speed (k/h)		60			60			70			70	
Link Distance (m)		129.9			1758.6			451.2			794.7	
Travel Time (s)		7.8			105.5			23.2			40.9	
Confl. Bikes (#/hr)			1									
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	5%	4%	2%	1%	4%	2%	3%	4%	4%	1%	3%	1%
Adj. Flow (vph)	89	405	47	137	437	42	53	616	53	147	1074	279
Shared Lane Traffic (%)												
Lane Group Flow (vph)	89	452	0	137	437	42	53	616	53	147	1074	279
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4			8			6		5	2	
Permitted Phases	4			8		8	6		6	2		2
Detector Phase	7	4		8	8	8	6	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	7.0	10.0		10.0	10.0	10.0	20.0	20.0	20.0	7.0	20.0	20.0
Minimum Split (s)	11.0	17.5		38.5	38.5	38.5	36.5	36.5	36.5	11.0	36.5	36.5
Total Split (s)	16.0	37.5		37.5	37.5	37.5	47.5	47.5	47.5	11.0	47.5	47.5
Total Split (%)	14.3%	33.5%		33.5%	33.5%	33.5%	42.4%	42.4%	42.4%	9.8%	42.4%	42.4%
Maximum Green (s)	12.0	30.0		30.0	30.0	30.0	40.0	40.0	40.0	7.0	40.0	40.0
Yellow Time (s)	3.0	4.5		4.5	4.5	4.5	5.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	1.0	3.0		3.0	3.0	3.0	2.5	2.5	2.5	1.0	2.5	2.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	7.5		7.5	7.5	7.5	7.5	7.5	7.5	4.0	7.5	7.5
Lead/Lag	Lead			Lag	Lag	Lag	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes	Yes	Yes	Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	6.0	6.0	6.0	3.0	6.0	6.0
Recall Mode	None	None		None	None	None	Min	Min	Min	None	Min	Min
Walk Time (s)				7.0	7.0	7.0	7.0	7.0	7.0		7.0	7.0
Flash Dont Walk (s)				24.0	24.0	24.0	22.0	22.0	22.0		22.0	22.0
Pedestrian Calls (#/hr)				0	0	0	0	0	0		0	0
Act Effct Green (s)	41.2	37.6		27.2	27.2	27.2	29.9	29.9	29.9	44.9	41.3	41.3
Actuated g/C Ratio	0.44	0.40		0.29	0.29	0.29	0.32	0.32	0.32	0.48	0.44	0.44

Lanes, Volumes, Timings
 220: Bathurst Street & 18th Sideroad/St. John's Sideroad

AM peak hour
 Existing conditions



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.29	0.62		0.54	0.84	0.08	0.44	0.55	0.09	0.44	0.72	0.33
Control Delay	19.0	26.9		40.8	49.3	0.3	41.4	29.7	0.3	20.6	26.4	4.7
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	19.0	26.9		40.8	49.3	0.3	41.4	29.7	0.3	20.6	26.4	4.7
LOS	B	C		D	D	A	D	C	A	C	C	A
Approach Delay		25.6			44.0			28.4			21.8	
Approach LOS		C			D			C			C	
Queue Length 50th (m)	9.5	64.6		22.5	79.7	0.0	8.7	55.2	0.0	17.4	96.1	3.7
Queue Length 95th (m)	22.0	113.7		49.9	#157.0	0.0	22.4	75.1	0.0	31.1	126.3	19.3
Internal Link Dist (m)		105.9			1734.6			427.2			770.7	
Turn Bay Length (m)	30.0			50.0		50.0	60.0		60.0	60.0		60.0
Base Capacity (vph)	347	921		289	594	608	166	1540	780	332	1895	1013
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	0.26	0.49		0.47	0.74	0.07	0.32	0.40	0.07	0.44	0.57	0.28

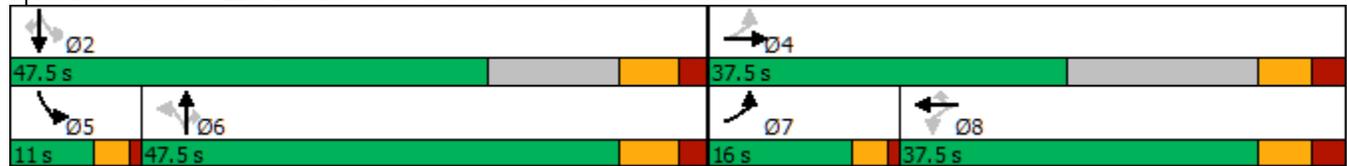
Intersection Summary

Area Type: Other
 Cycle Length: 112
 Actuated Cycle Length: 94.4
 Natural Cycle: 100
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.84
 Intersection Signal Delay: 27.9
 Intersection Capacity Utilization 101.2%
 Analysis Period (min) 15

Intersection LOS: C
 ICU Level of Service G

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

Splits and Phases: 220: Bathurst Street & 18th Sideroad/St. John's Sideroad



HCM Unsignalized Intersection Capacity Analysis
 330: Willow Farm Lane & St. John's Sideroad

AM peak hour
 Existing conditions



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↗	↖	↑		
Traffic Volume (veh/h)	795	5	20	615	0	65
Future Volume (Veh/h)	795	5	20	615	0	65
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	846	5	21	654	0	69
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			851		1542	846
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			851		1542	846
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		100	81
cM capacity (veh/h)			775		125	362
Direction, Lane #	EB 1	EB 2	WB 1	WB 2		
Volume Total	846	5	21	654		
Volume Left	0	0	21	0		
Volume Right	0	5	0	0		
cSH	1700	1700	775	1700		
Volume to Capacity	0.50	0.00	0.03	0.38		
Queue Length 95th (m)	0.0	0.0	0.7	0.0		
Control Delay (s)	0.0	0.0	9.8	0.0		
Lane LOS					A	
Approach Delay (s)	0.0		0.3			
Approach LOS						
Intersection Summary						
Average Delay			Err			
Intersection Capacity Utilization			Err%	ICU Level of Service	H	
Analysis Period (min)			15			

Lanes, Volumes, Timings
210: Yonge Street & St. John's Sideroad

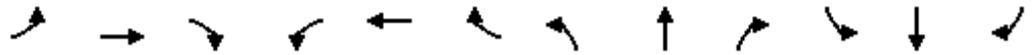
AM peak hour
2023 future background



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	116	677	169	188	452	281	73	500	253	538	757	168
Future Volume (vph)	116	677	169	188	452	281	73	500	253	538	757	168
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.2	3.6	3.7	3.2	3.6	3.7	3.0	3.4	4.0	3.0	3.7	3.3
Storage Length (m)	65.0		50.0	70.0		0.0	35.0		100.0	115.0		230.0
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	*0.75	0.95	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor		1.00					1.00					0.97
Frt		0.970				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1612	2703	0	1708	1845	1512	1652	3330	1670	*2068	3444	1516
Flt Permitted	0.187			0.095			0.332			0.259		
Satd. Flow (perm)	317	2703	0	171	1845	1512	576	3330	1670	442	3444	1473
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		17				280			171			189
Link Speed (k/h)		60			60			60			60	
Link Distance (m)		448.3			341.9			505.9			2054.7	
Travel Time (s)		26.9			20.5			30.4			123.3	
Confl. Peds. (#/hr)			2	2			4					4
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles (%)	7%	2%	2%	1%	3%	8%	2%	6%	1%	4%	6%	3%
Adj. Flow (vph)	130	761	190	211	508	316	82	562	284	604	851	189
Shared Lane Traffic (%)												
Lane Group Flow (vph)	130	951	0	211	508	316	82	562	284	604	851	189
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8			6		5	2	
Permitted Phases	4			8		8	6		6	2		2
Detector Phase	7	4		3	8	8	6	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	11.0	45.0		11.0	45.0	45.0	39.5	39.5	39.5	11.0	39.5	39.5
Total Split (s)	13.0	48.0		15.0	50.0	50.0	41.0	41.0	41.0	26.0	67.0	67.0
Total Split (%)	10.0%	36.9%		11.5%	38.5%	38.5%	31.5%	31.5%	31.5%	20.0%	51.5%	51.5%
Maximum Green (s)	9.0	40.0		11.0	42.0	42.0	33.5	33.5	33.5	22.0	59.5	59.5
Yellow Time (s)	3.0	4.5		3.0	4.5	4.5	4.5	4.5	4.5	3.0	4.5	4.5
All-Red Time (s)	1.0	3.5		1.0	3.5	3.5	3.0	3.0	3.0	1.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	8.0		4.0	8.0	8.0	7.5	7.5	7.5	4.0	7.5	7.5
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes		Yes								
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
Recall Mode	None	None		None	None	None	C-Max	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)		7.0			7.0	7.0	7.0	7.0	7.0		7.0	7.0
Flash Dont Walk (s)		30.0			30.0	30.0	25.0	25.0	25.0		25.0	25.0
Pedestrian Calls (#/hr)		0			0	0	5	5	5		5	5
Act Effct Green (s)	52.8	40.0		57.2	42.2	42.2	33.5	33.5	33.5	63.0	59.5	59.5
Actuated g/C Ratio	0.41	0.31		0.44	0.32	0.32	0.26	0.26	0.26	0.48	0.46	0.46

Lanes, Volumes, Timings
210: Yonge Street & St. John's Sideroad

AM peak hour
2023 future background

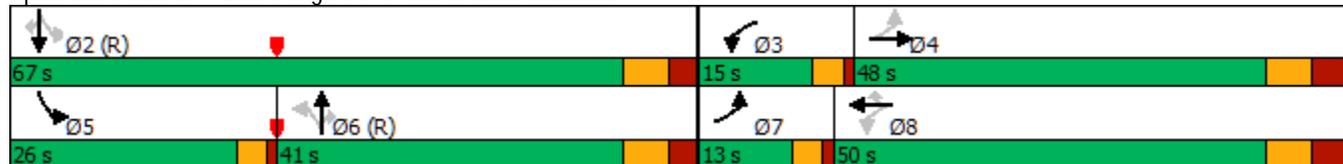


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.60	1.13		1.03	0.85	0.46	0.55	0.66	0.51	1.24	0.54	0.24
Control Delay	34.2	113.2		101.9	55.6	8.1	58.0	47.4	19.4	148.0	12.8	0.8
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.2	113.2		101.9	55.6	8.1	58.0	47.4	19.4	148.0	12.8	0.8
LOS	C	F		F	E	A	E	D	B	F	B	A
Approach Delay		103.7			50.5			39.7				61.1
Approach LOS		F			D			D				E
Queue Length 50th (m)	20.5	~196.0		~43.4	127.8	6.7	19.3	71.5	24.6	~155.0	31.8	0.0
Queue Length 95th (m)	33.8	#246.4		#94.0	#183.7	29.7	37.9	90.9	52.3m#	221.5	m37.5	m0.0
Internal Link Dist (m)		424.3			317.9			481.9				2030.7
Turn Bay Length (m)	65.0			70.0			35.0		100.0	115.0		230.0
Base Capacity (vph)	218	843		205	599	680	148	858	557	489	1576	776
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	0.60	1.13		1.03	0.85	0.46	0.55	0.66	0.51	1.24	0.54	0.24

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 35 (27%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.24
 Intersection Signal Delay: 64.4
 Intersection Capacity Utilization 98.2%
 Analysis Period (min) 15
 * User Entered Value
 ~ 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.

Splits and Phases: 210: Yonge Street & St. John's Sideroad



Lanes, Volumes, Timings
 220: Bathurst Street & 18th Sideroad/St. John's Sideroad

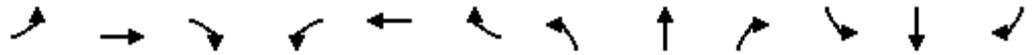
AM peak hour
 2023 future background



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗	↗	↖	↗	↗	↖	↗	↗
Traffic Volume (vph)	90	419	50	158	457	43	50	600	61	151	1100	280
Future Volume (vph)	90	419	50	158	457	43	50	600	61	151	1100	280
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.0	3.5	3.7	3.2	3.7	4.0	3.1	3.3	3.7
Storage Length (m)	30.0		0.0	50.0		50.0	60.0		60.0	60.0		60.0
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor		1.00										
Frt		0.984				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1738	1819	0	1668	1807	1601	1675	3510	1622	1688	3388	1617
Flt Permitted	0.175			0.439			0.164			0.275		
Satd. Flow (perm)	320	1819	0	771	1807	1601	289	3510	1622	489	3388	1617
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		7				122			122			243
Link Speed (k/h)		60			60			70				70
Link Distance (m)		129.9			1758.6			451.2			794.7	
Travel Time (s)		7.8			105.5			23.2			40.9	
Confl. Bikes (#/hr)			1									
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	5%	4%	2%	1%	4%	2%	3%	4%	4%	1%	3%	1%
Adj. Flow (vph)	95	441	53	166	481	45	53	632	64	159	1158	295
Shared Lane Traffic (%)												
Lane Group Flow (vph)	95	494	0	166	481	45	53	632	64	159	1158	295
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4			8			6		5	2	
Permitted Phases	4			8		8	6		6	2		2
Detector Phase	7	4		8	8	8	6	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	7.0	10.0		10.0	10.0	10.0	20.0	20.0	20.0	7.0	20.0	20.0
Minimum Split (s)	11.0	17.5		38.5	38.5	38.5	36.5	36.5	36.5	11.0	36.5	36.5
Total Split (s)	16.0	37.5		37.5	37.5	37.5	47.5	47.5	47.5	11.0	47.5	47.5
Total Split (%)	14.3%	33.5%		33.5%	33.5%	33.5%	42.4%	42.4%	42.4%	9.8%	42.4%	42.4%
Maximum Green (s)	12.0	30.0		30.0	30.0	30.0	40.0	40.0	40.0	7.0	40.0	40.0
Yellow Time (s)	3.0	4.5		4.5	4.5	4.5	5.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	1.0	3.0		3.0	3.0	3.0	2.5	2.5	2.5	1.0	2.5	2.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	7.5		7.5	7.5	7.5	7.5	7.5	7.5	4.0	7.5	7.5
Lead/Lag	Lead			Lag	Lag	Lag	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes	Yes	Yes	Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	6.0	6.0	6.0	3.0	6.0	6.0
Recall Mode	None	None		None	None	None	Min	Min	Min	None	Min	Min
Walk Time (s)				7.0	7.0	7.0	7.0	7.0	7.0		7.0	7.0
Flash Dont Walk (s)				24.0	24.0	24.0	22.0	22.0	22.0		22.0	22.0
Pedestrian Calls (#/hr)				0	0	0	0	0	0		0	0
Act Effect Green (s)	44.5	41.0		30.2	30.2	30.2	31.8	31.8	31.8	46.5	43.0	43.0
Actuated g/C Ratio	0.45	0.41		0.30	0.30	0.30	0.32	0.32	0.32	0.47	0.43	0.43

Lanes, Volumes, Timings
 220: Bathurst Street & 18th Sideroad/St. John's Sideroad

AM peak hour
 2023 future background



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.34	0.65		0.71	0.87	0.08	0.58	0.56	0.11	0.50	0.79	0.35
Control Delay	20.4	28.6		52.6	53.5	0.3	56.0	30.4	0.4	22.5	29.4	5.4
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	20.4	28.6		52.6	53.5	0.3	56.0	30.4	0.4	22.5	29.4	5.4
LOS	C	C		D	D	A	E	C	A	C	C	A
Approach Delay		27.3			49.8			29.6			24.3	
Approach LOS		C			D			C			C	
Queue Length 50th (m)	10.2	72.8		29.3	90.7	0.0	9.1	57.1	0.0	19.0	107.6	6.3
Queue Length 95th (m)	23.2	127.2		#73.8	#180.1	0.0	#27.6	77.3	0.5	33.4	140.6	23.1
Internal Link Dist (m)		105.9			1734.6			427.2			770.7	
Turn Bay Length (m)	30.0			50.0		50.0	60.0		60.0	60.0		60.0
Base Capacity (vph)	317	860		236	554	576	118	1436	736	315	1768	960
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	0.30	0.57		0.70	0.87	0.08	0.45	0.44	0.09	0.50	0.65	0.31

Intersection Summary

Area Type: Other
 Cycle Length: 112
 Actuated Cycle Length: 99.2
 Natural Cycle: 100
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.87
 Intersection Signal Delay: 30.7
 Intersection Capacity Utilization 105.9%
 Analysis Period (min) 15

Intersection LOS: C
 ICU Level of Service G

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

Splits and Phases: 220: Bathurst Street & 18th Sideroad/St. John's Sideroad



HCM Unsignalized Intersection Capacity Analysis
330: Willow Farm Lane & St. John's Sideroad

AM peak hour
2023 future background



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↗	↖	↑	↘	↙
Traffic Volume (veh/h)	898	3	20	674	1	65
Future Volume (Veh/h)	898	3	20	674	1	65
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	955	3	21	717	1	69
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			958		1714	955
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			958		1714	955
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		99	78
cM capacity (veh/h)			706		97	313
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	955	3	21	717	70	
Volume Left	0	0	21	0	1	
Volume Right	0	3	0	0	69	
cSH	1700	1700	706	1700	304	
Volume to Capacity	0.56	0.00	0.03	0.42	0.23	
Queue Length 95th (m)	0.0	0.0	0.7	0.0	7.0	
Control Delay (s)	0.0	0.0	10.3	0.0	20.4	
Lane LOS	B			C		
Approach Delay (s)	0.0		0.3		20.4	
Approach LOS						C
Intersection Summary						
Average Delay			0.9			
Intersection Capacity Utilization			58.0%	ICU Level of Service	B	
Analysis Period (min)			15			

Lanes, Volumes, Timings
210: Yonge Street & St. John's Sideroad

AM peak hour
2028 future background



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	121	737	179	198	477	291	78	510	268	573	792	173
Future Volume (vph)	121	737	179	198	477	291	78	510	268	573	792	173
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.2	3.6	3.7	3.2	3.6	3.7	3.0	3.4	4.0	3.0	3.7	3.3
Storage Length (m)	65.0		50.0	70.0		0.0	35.0		100.0	115.0		230.0
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	*0.75	0.95	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor		1.00					1.00					0.97
Frt		0.971				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1612	2706	0	1708	1845	1512	1652	3330	1670	*2068	3444	1516
Flt Permitted	0.149			0.095			0.320			0.251		
Satd. Flow (perm)	253	2706	0	171	1845	1512	555	3330	1670	428	3444	1473
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		17				275			162			194
Link Speed (k/h)		60			60			60				60
Link Distance (m)		448.3			341.9			505.9				2054.7
Travel Time (s)		26.9			20.5			30.4				123.3
Confl. Peds. (#/hr)			2	2			4					4
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles (%)	7%	2%	2%	1%	3%	8%	2%	6%	1%	4%	6%	3%
Adj. Flow (vph)	136	828	201	222	536	327	88	573	301	644	890	194
Shared Lane Traffic (%)												
Lane Group Flow (vph)	136	1029	0	222	536	327	88	573	301	644	890	194
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8			6		5	2	
Permitted Phases	4			8		8	6		6	2		2
Detector Phase	7	4		3	8	8	6	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	11.0	45.0		11.0	45.0	45.0	39.5	39.5	39.5	11.0	39.5	39.5
Total Split (s)	13.0	48.0		15.0	50.0	50.0	41.0	41.0	41.0	26.0	67.0	67.0
Total Split (%)	10.0%	36.9%		11.5%	38.5%	38.5%	31.5%	31.5%	31.5%	20.0%	51.5%	51.5%
Maximum Green (s)	9.0	40.0		11.0	42.0	42.0	33.5	33.5	33.5	22.0	59.5	59.5
Yellow Time (s)	3.0	4.5		3.0	4.5	4.5	4.5	4.5	4.5	3.0	4.5	4.5
All-Red Time (s)	1.0	3.5		1.0	3.5	3.5	3.0	3.0	3.0	1.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	8.0		4.0	8.0	8.0	7.5	7.5	7.5	4.0	7.5	7.5
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes		Yes								
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
Recall Mode	None	None		None	None	None	C-Max	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)		7.0			7.0	7.0	7.0	7.0	7.0		7.0	7.0
Flash Dont Walk (s)		30.0			30.0	30.0	25.0	25.0	25.0		25.0	25.0
Pedestrian Calls (#/hr)		0			0	0	5	5	5		5	5
Act Effct Green (s)	52.9	40.0		57.1	42.1	42.1	33.5	33.5	33.5	63.0	59.5	59.5
Actuated g/C Ratio	0.41	0.31		0.44	0.32	0.32	0.26	0.26	0.26	0.48	0.46	0.46

Lanes, Volumes, Timings
210: Yonge Street & St. John's Sideroad

AM peak hour
2028 future background

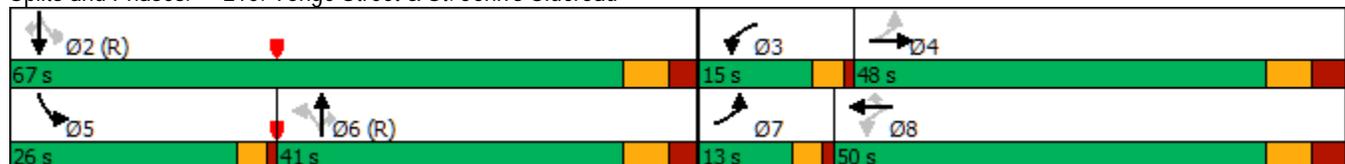


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.69	1.22		1.08	0.90	0.48	0.62	0.67	0.55	1.33	0.56	0.25
Control Delay	41.8	147.8		117.7	61.2	9.2	63.0	47.8	22.8	187.8	13.7	0.8
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.8	147.8		117.7	61.2	9.2	63.0	47.8	22.8	187.8	13.7	0.8
LOS	D	F		F	E	A	E	D	C	F	B	A
Approach Delay		135.4			57.1			41.3			77.2	
Approach LOS		F			E			D			E	
Queue Length 50th (m)	21.5	~225.4		~49.6	137.8	9.8	21.0	73.3	31.4	~180.2	35.7	0.0
Queue Length 95th (m)	#38.2	#276.2		#100.8	#200.0	34.7	#44.0	92.8	60.4m	#248.4	m41.9	m0.0
Internal Link Dist (m)		424.3			317.9			481.9			2030.7	
Turn Bay Length (m)	65.0			70.0			35.0		100.0	115.0		230.0
Base Capacity (vph)	197	844		205	597	675	143	858	550	484	1576	779
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	0.69	1.22		1.08	0.90	0.48	0.62	0.67	0.55	1.33	0.56	0.25

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 35 (27%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.33
 Intersection Signal Delay: 79.5
 Intersection Capacity Utilization 102.8%
 Analysis Period (min) 15
 * User Entered Value
 ~ 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.

Splits and Phases: 210: Yonge Street & St. John's Sideroad



Lanes, Volumes, Timings
 220: Bathurst Street & 18th Sideroad/St. John's Sideroad

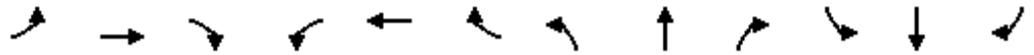
AM peak hour
 2028 future background



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗	↗	↖	↗	↗	↖	↗	↗
Traffic Volume (vph)	95	459	55	168	482	48	55	610	61	166	1205	300
Future Volume (vph)	95	459	55	168	482	48	55	610	61	166	1205	300
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.0	3.5	3.7	3.2	3.7	4.0	3.1	3.3	3.7
Storage Length (m)	30.0		0.0	50.0		50.0	60.0		60.0	60.0		60.0
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor		1.00										
Frt		0.984				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1738	1819	0	1668	1807	1601	1675	3510	1622	1688	3388	1617
Flt Permitted	0.121			0.351			0.127			0.283		
Satd. Flow (perm)	221	1819	0	616	1807	1601	224	3510	1622	503	3388	1617
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		7				122			122			238
Link Speed (k/h)		60			60			70				70
Link Distance (m)		129.9			1758.6			451.2			794.7	
Travel Time (s)		7.8			105.5			23.2			40.9	
Confl. Bikes (#/hr)			1									
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	5%	4%	2%	1%	4%	2%	3%	4%	4%	1%	3%	1%
Adj. Flow (vph)	100	483	58	177	507	51	58	642	64	175	1268	316
Shared Lane Traffic (%)												
Lane Group Flow (vph)	100	541	0	177	507	51	58	642	64	175	1268	316
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4			8			6		5	2	
Permitted Phases	4			8		8	6		6	2		2
Detector Phase	7	4		8	8	8	6	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	7.0	10.0		10.0	10.0	10.0	20.0	20.0	20.0	7.0	20.0	20.0
Minimum Split (s)	11.0	17.5		38.5	38.5	38.5	36.5	36.5	36.5	11.0	36.5	36.5
Total Split (s)	16.0	37.5		37.5	37.5	37.5	47.5	47.5	47.5	11.0	47.5	47.5
Total Split (%)	14.3%	33.5%		33.5%	33.5%	33.5%	42.4%	42.4%	42.4%	9.8%	42.4%	42.4%
Maximum Green (s)	12.0	30.0		30.0	30.0	30.0	40.0	40.0	40.0	7.0	40.0	40.0
Yellow Time (s)	3.0	4.5		4.5	4.5	4.5	5.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	1.0	3.0		3.0	3.0	3.0	2.5	2.5	2.5	1.0	2.5	2.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	7.5		7.5	7.5	7.5	7.5	7.5	7.5	4.0	7.5	7.5
Lead/Lag	Lead			Lag	Lag	Lag	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes	Yes	Yes	Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	6.0	6.0	6.0	3.0	6.0	6.0
Recall Mode	None	None		None	None	None	Min	Min	Min	None	Min	Min
Walk Time (s)				7.0	7.0	7.0	7.0	7.0	7.0		7.0	7.0
Flash Dont Walk (s)				24.0	24.0	24.0	22.0	22.0	22.0		22.0	22.0
Pedestrian Calls (#/hr)				0	0	0	0	0	0		0	0
Act Effct Green (s)	45.0	41.4		30.3	30.3	30.3	36.2	36.2	36.2	50.9	47.3	47.3
Actuated g/C Ratio	0.43	0.40		0.29	0.29	0.29	0.35	0.35	0.35	0.49	0.46	0.46

Lanes, Volumes, Timings
 220: Bathurst Street & 18th Sideroad/St. John's Sideroad

AM peak hour
 2028 future background



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.42	0.74		0.99	0.96	0.09	0.74	0.53	0.10	0.54	0.82	0.37
Control Delay	23.9	33.9		105.3	69.9	0.3	84.4	29.2	0.3	23.0	30.7	6.4
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	23.9	33.9		105.3	69.9	0.3	84.4	29.2	0.3	23.0	30.7	6.4
LOS	C	C		F	E	A	F	C	A	C	C	A
Approach Delay		32.4			73.6			31.0			25.6	
Approach LOS		C			E			C			C	
Queue Length 50th (m)	13.3	101.2		-43.9	-123.0	0.0	11.2	58.8	0.0	21.5	126.0	9.7
Queue Length 95th (m)	24.3	143.9		#90.5	#193.5	0.0	#36.5	78.7	0.5	36.5	161.1	28.5
Internal Link Dist (m)		105.9			1734.6			427.2			770.7	
Turn Bay Length (m)	30.0			50.0		50.0	60.0		60.0	60.0		60.0
Base Capacity (vph)	272	818		179	527	553	87	1365	705	326	1680	922
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	0.37	0.66		0.99	0.96	0.09	0.67	0.47	0.09	0.54	0.75	0.34

Intersection Summary

Area Type: Other
 Cycle Length: 112
 Actuated Cycle Length: 103.9
 Natural Cycle: 100
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.99
 Intersection Signal Delay: 36.8
 Intersection Capacity Utilization 111.8%
 Analysis Period (min) 15

Intersection LOS: D
 ICU Level of Service H

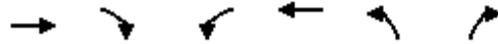
- ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 220: Bathurst Street & 18th Sideroad/St. John's Sideroad



HCM Unsignalized Intersection Capacity Analysis
 330: Willow Farm Lane & St. John's Sideroad

AM peak hour
 2028 future background



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↗	↖	↑	↗	↖
Traffic Volume (veh/h)	973	3	20	709	1	65
Future Volume (Veh/h)	973	3	20	709	1	65
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	1035	3	21	754	1	69
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			1038		1831	1035
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1038		1831	1035
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		99	75
cM capacity (veh/h)			658		82	282
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	1035	3	21	754	70	
Volume Left	0	0	21	0	1	
Volume Right	0	3	0	0	69	
cSH	1700	1700	658	1700	272	
Volume to Capacity	0.61	0.00	0.03	0.44	0.26	
Queue Length 95th (m)	0.0	0.0	0.8	0.0	8.0	
Control Delay (s)	0.0	0.0	10.6	0.0	22.7	
Lane LOS	B			C		
Approach Delay (s)	0.0		0.3		22.7	
Approach LOS						C
Intersection Summary						
Average Delay			1.0			
Intersection Capacity Utilization			62.0%	ICU Level of Service	B	
Analysis Period (min)			15			

Lanes, Volumes, Timings
210: Yonge Street & St. John's Sideroad

AM peak hour
2023 total future

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	144	717	202	183	482	281	95	497	248	538	754	182
Future Volume (vph)	144	717	202	183	482	281	95	497	248	538	754	182
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.2	3.6	3.7	3.2	3.6	3.7	3.0	3.4	4.0	3.0	3.7	3.3
Storage Length (m)	65.0		50.0	70.0		0.0	35.0		100.0	115.0		230.0
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	*0.75	0.95	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor		1.00					1.00					0.97
Frt		0.967				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1612	2694	0	1708	1845	1512	1652	3330	1670	*2068	3444	1516
Flt Permitted	0.140			0.095			0.334			0.262		
Satd. Flow (perm)	238	2694	0	171	1845	1512	579	3330	1670	447	3444	1473
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		20				262			167			204
Link Speed (k/h)		60			60			60			60	
Link Distance (m)		448.3			341.9			505.9			608.7	
Travel Time (s)		26.9			20.5			30.4			36.5	
Confl. Peds. (#/hr)			2	2			4					4
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles (%)	7%	2%	2%	1%	3%	8%	2%	6%	1%	4%	6%	3%
Adj. Flow (vph)	162	806	227	206	542	316	107	558	279	604	847	204
Shared Lane Traffic (%)												
Lane Group Flow (vph)	162	1033	0	206	542	316	107	558	279	604	847	204
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8			6		5	2	
Permitted Phases	4			8		8	6		6	2		2
Detector Phase	7	4		3	8	8	6	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	11.0	45.0		11.0	45.0	45.0	39.5	39.5	39.5	11.0	39.5	39.5
Total Split (s)	13.0	48.0		15.0	50.0	50.0	41.0	41.0	41.0	26.0	67.0	67.0
Total Split (%)	10.0%	36.9%		11.5%	38.5%	38.5%	31.5%	31.5%	31.5%	20.0%	51.5%	51.5%
Maximum Green (s)	9.0	40.0		11.0	42.0	42.0	33.5	33.5	33.5	22.0	59.5	59.5
Yellow Time (s)	3.0	4.5		3.0	4.5	4.5	4.5	4.5	4.5	3.0	4.5	4.5
All-Red Time (s)	1.0	3.5		1.0	3.5	3.5	3.0	3.0	3.0	1.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	8.0		4.0	8.0	8.0	7.5	7.5	7.5	4.0	7.5	7.5
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes		
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
Recall Mode	None	None		None	None	None	C-Max	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)		7.0			7.0	7.0	7.0	7.0	7.0		7.0	7.0
Flash Dont Walk (s)		30.0			30.0	30.0	25.0	25.0	25.0		25.0	25.0
Pedestrian Calls (#/hr)		0			0	0	5	5	5		5	5
Act Effct Green (s)	53.0	40.0		57.0	42.0	42.0	33.5	33.5	33.5	63.0	59.5	59.5
Actuated g/C Ratio	0.41	0.31		0.44	0.32	0.32	0.26	0.26	0.26	0.48	0.46	0.46

Lanes, Volumes, Timings
 210: Yonge Street & St. John's Sideroad

AM peak hour
 2023 total future

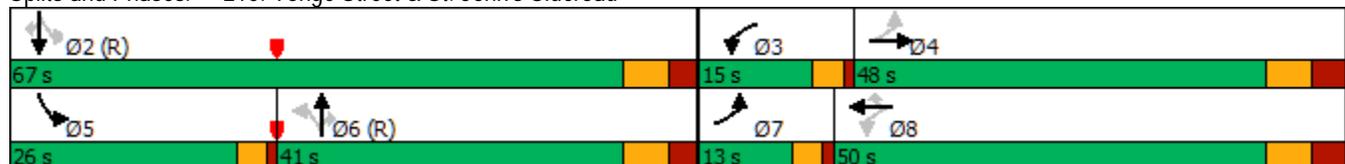


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.84	1.23		1.00	0.91	0.48	0.72	0.65	0.50	1.23	0.54	0.26
Control Delay	59.7	150.8		95.9	63.0	9.5	71.5	47.2	19.4	147.6	15.8	0.9
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	59.7	150.8		95.9	63.0	9.5	71.5	47.2	19.4	147.6	15.8	0.9
LOS	E	F		F	E	A	E	D	B	F	B	A
Approach Delay		138.4			53.5			41.8			62.1	
Approach LOS		F			D			D			E	
Queue Length 50th (m)	26.0	~226.8		~39.3	139.9	10.2	26.4	71.0	24.4	~155.8	41.2	0.0
Queue Length 95th (m)	#58.9	#277.7		#90.6	#203.9	34.6	#56.3	90.1	51.7m	#216.8	m47.2	m0.0
Internal Link Dist (m)		424.3			317.9			481.9			584.7	
Turn Bay Length (m)	65.0			70.0			35.0		100.0	115.0		230.0
Base Capacity (vph)	192	842		205	596	665	149	858	554	490	1576	784
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	0.84	1.23		1.00	0.91	0.48	0.72	0.65	0.50	1.23	0.54	0.26

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 35 (27%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.23
 Intersection Signal Delay: 75.0 Intersection LOS: E
 Intersection Capacity Utilization 99.9% ICU Level of Service F
 Analysis Period (min) 15
 * User Entered Value
 ~ 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.

Splits and Phases: 210: Yonge Street & St. John's Sideroad



Lanes, Volumes, Timings
 220: Bathurst Street & 18th Sideroad/St. John's Sideroad

AM peak hour
 2023 total future



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	90	433	50	180	485	52	50	600	78	164	1100	280
Future Volume (vph)	90	433	50	180	485	52	50	600	78	164	1100	280
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.0	3.5	3.7	3.2	3.7	4.0	3.1	3.3	3.7
Storage Length (m)	30.0		0.0	50.0		50.0	60.0		60.0	60.0		60.0
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor		1.00										
Frt		0.984				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1738	1819	0	1668	1807	1601	1675	3510	1622	1688	3388	1617
Flt Permitted	0.140			0.419			0.163			0.275		
Satd. Flow (perm)	256	1819	0	736	1807	1601	287	3510	1622	489	3388	1617
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		6				122			122			243
Link Speed (k/h)		60			60			70			70	
Link Distance (m)		129.9			1758.6			451.2			794.7	
Travel Time (s)		7.8			105.5			23.2			40.9	
Confl. Bikes (#/hr)			1									
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	5%	4%	2%	1%	4%	2%	3%	4%	4%	1%	3%	1%
Adj. Flow (vph)	95	456	53	189	511	55	53	632	82	173	1158	295
Shared Lane Traffic (%)												
Lane Group Flow (vph)	95	509	0	189	511	55	53	632	82	173	1158	295
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4			8			6		5	2	
Permitted Phases	4			8		8	6		6	2		2
Detector Phase	7	4		8	8	8	6	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	7.0	10.0		10.0	10.0	10.0	20.0	20.0	20.0	7.0	20.0	20.0
Minimum Split (s)	11.0	17.5		38.5	38.5	38.5	36.5	36.5	36.5	11.0	36.5	36.5
Total Split (s)	16.0	37.5		37.5	37.5	37.5	47.5	47.5	47.5	11.0	47.5	47.5
Total Split (%)	14.3%	33.5%		33.5%	33.5%	33.5%	42.4%	42.4%	42.4%	9.8%	42.4%	42.4%
Maximum Green (s)	12.0	30.0		30.0	30.0	30.0	40.0	40.0	40.0	7.0	40.0	40.0
Yellow Time (s)	3.0	4.5		4.5	4.5	4.5	5.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	1.0	3.0		3.0	3.0	3.0	2.5	2.5	2.5	1.0	2.5	2.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	7.5		7.5	7.5	7.5	7.5	7.5	7.5	4.0	7.5	7.5
Lead/Lag	Lead			Lag	Lag	Lag	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes	Yes	Yes	Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	6.0	6.0	6.0	3.0	6.0	6.0
Recall Mode	None	None		None	None	None	Min	Min	Min	None	Min	Min
Walk Time (s)				7.0	7.0	7.0	7.0	7.0	7.0		7.0	7.0
Flash Dont Walk (s)				24.0	24.0	24.0	22.0	22.0	22.0		22.0	22.0
Pedestrian Calls (#/hr)				0	0	0	0	0	0		0	0
Act Effect Green (s)	44.8	41.3		30.5	30.5	30.5	32.0	32.0	32.0	46.7	43.2	43.2
Actuated g/C Ratio	0.45	0.41		0.31	0.31	0.31	0.32	0.32	0.32	0.47	0.43	0.43

Lanes, Volumes, Timings
 220: Bathurst Street & 18th Sideroad/St. John's Sideroad

AM peak hour
 2023 total future



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.37	0.67		0.84	0.93	0.10	0.58	0.56	0.14	0.55	0.79	0.35
Control Delay	21.3	29.4		67.8	60.7	0.3	56.6	30.4	2.0	24.0	29.4	5.4
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	21.3	29.4		67.8	60.7	0.3	56.6	30.4	2.0	24.0	29.4	5.4
LOS	C	C		E	E	A	E	C	A	C	C	A
Approach Delay		28.1			58.1			29.2			24.5	
Approach LOS		C			E			C			C	
Queue Length 50th (m)	10.2	76.0		35.2	98.6	0.0	9.2	57.1	0.0	20.9	107.6	6.3
Queue Length 95th (m)	23.2	132.5		#89.5	#195.9	0.0	#27.7	77.3	4.0	36.2	140.6	23.1
Internal Link Dist (m)		105.9			1734.6			427.2			770.7	
Turn Bay Length (m)	30.0			50.0		50.0	60.0		60.0	60.0		60.0
Base Capacity (vph)	296	855		225	552	574	116	1430	733	314	1759	956
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	0.32	0.60		0.84	0.93	0.10	0.46	0.44	0.11	0.55	0.66	0.31

Intersection Summary

Area Type: Other

Cycle Length: 112

Actuated Cycle Length: 99.7

Natural Cycle: 100

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.93

Intersection Signal Delay: 32.8

Intersection LOS: C

Intersection Capacity Utilization 107.9%

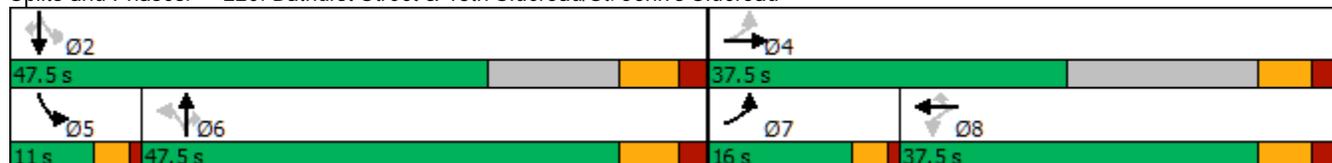
ICU Level of Service G

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 220: Bathurst Street & 18th Sideroad/St. John's Sideroad



HCM Unsignalized Intersection Capacity Analysis
 330: Willow Farm Lane/Street "A" & St. John's Sideroad

AM peak hour
 2023 total future

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (veh/h)	52	890	3	20	666	72	1	4	65	107	4	66	
Future Volume (Veh/h)	52	890	3	20	666	72	1	4	65	107	4	66	
Sign Control	Free			Free			Stop			Stop			
Grade	0%			0%			0%			0%			
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	
Hourly flow rate (vph)	55	947	3	21	709	77	1	4	69	114	4	70	
Pedestrians													
Lane Width (m)													
Walking Speed (m/s)													
Percent Blockage													
Right turn flare (veh)													
Median type	None			None									
Median storage (veh)													
Upstream signal (m)													
pX, platoon unblocked													
vC, conflicting volume	786			950			1880			1885			947
vC1, stage 1 conf vol													
vC2, stage 2 conf vol													
vCu, unblocked vol	786			950			1880			1885			947
tC, single (s)	4.1			4.1			7.1			6.5			6.2
tC, 2 stage (s)													
tF (s)	2.2			2.2			3.5			4.0			3.3
p0 queue free %	93			97			98			94			78
cM capacity (veh/h)	842			711			41			65			317
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1	SB 2				
Volume Total	55	947	3	21	709	77	74	114	74				
Volume Left	55	0	0	21	0	0	1	114	0				
Volume Right	0	0	3	0	0	77	69	0	70				
cSH	842	1700	1700	711	1700	1700	244	38	343				
Volume to Capacity	0.07	0.56	0.00	0.03	0.42	0.05	0.30	2.99	0.22				
Queue Length 95th (m)	1.7	0.0	0.0	0.7	0.0	0.0	9.9	102.5	6.4				
Control Delay (s)	9.6	0.0	0.0	10.2	0.0	0.0	26.1	1119.2	18.3				
Lane LOS	A			B			D			F			
Approach Delay (s)	0.5			0.3			26.1			685.9			
Approach LOS							D			F			
Intersection Summary													
Average Delay				63.5									
Intersection Capacity Utilization				66.1%			ICU Level of Service			C			
Analysis Period (min)				15									

Lanes, Volumes, Timings
210: Yonge Street & St. John's Sideroad

AM peak hour
2028 total future

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	164	833	247	179	570	291	123	501	250	573	782	214
Future Volume (vph)	164	833	247	179	570	291	123	501	250	573	782	214
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.2	3.6	3.7	3.2	3.6	3.7	3.0	3.4	4.0	3.0	3.7	3.3
Storage Length (m)	65.0		50.0	70.0		0.0	35.0		100.0	115.0		230.0
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	*0.75	0.95	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor		1.00					1.00					0.97
Frt		0.966				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1612	2690	0	1708	1845	1512	1652	3330	1670	*2068	3444	1516
Flt Permitted	0.100			0.095			0.323			0.258		
Satd. Flow (perm)	170	2690	0	171	1845	1512	560	3330	1670	440	3444	1473
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		21				230			156			240
Link Speed (k/h)		60			60			60			60	
Link Distance (m)		448.3			341.9			505.9			608.7	
Travel Time (s)		26.9			20.5			30.4			36.5	
Confl. Peds. (#/hr)			2	2			4					4
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles (%)	7%	2%	2%	1%	3%	8%	2%	6%	1%	4%	6%	3%
Adj. Flow (vph)	184	936	278	201	640	327	138	563	281	644	879	240
Shared Lane Traffic (%)												
Lane Group Flow (vph)	184	1214	0	201	640	327	138	563	281	644	879	240
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8			6		5	2	
Permitted Phases	4			8		8	6		6	2		2
Detector Phase	7	4		3	8	8	6	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	11.0	45.0		11.0	45.0	45.0	39.5	39.5	39.5	11.0	39.5	39.5
Total Split (s)	13.0	48.0		15.0	50.0	50.0	41.0	41.0	41.0	26.0	67.0	67.0
Total Split (%)	10.0%	36.9%		11.5%	38.5%	38.5%	31.5%	31.5%	31.5%	20.0%	51.5%	51.5%
Maximum Green (s)	9.0	40.0		11.0	42.0	42.0	33.5	33.5	33.5	22.0	59.5	59.5
Yellow Time (s)	3.0	4.5		3.0	4.5	4.5	4.5	4.5	4.5	3.0	4.5	4.5
All-Red Time (s)	1.0	3.5		1.0	3.5	3.5	3.0	3.0	3.0	1.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	8.0		4.0	8.0	8.0	7.5	7.5	7.5	4.0	7.5	7.5
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes		
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
Recall Mode	None	None		None	None	None	C-Max	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)		7.0			7.0	7.0	7.0	7.0	7.0		7.0	7.0
Flash Dont Walk (s)		30.0			30.0	30.0	25.0	25.0	25.0		25.0	25.0
Pedestrian Calls (#/hr)		0			0	0	5	5	5		5	5
Act Effct Green (s)	53.0	40.0		57.0	42.0	42.0	33.5	33.5	33.5	63.0	59.5	59.5
Actuated g/C Ratio	0.41	0.31		0.44	0.32	0.32	0.26	0.26	0.26	0.48	0.46	0.46

Lanes, Volumes, Timings
210: Yonge Street & St. John's Sideroad

AM peak hour
2028 total future

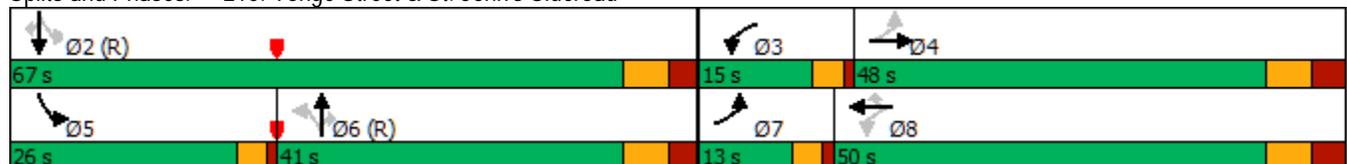


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	1.09	1.44		0.98	1.07	0.51	0.96	0.66	0.51	1.32	0.56	0.30
Control Delay	124.3	239.4		89.4	100.3	13.5	113.1	47.4	21.4	183.5	16.1	1.0
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	124.3	239.4		89.4	100.3	13.5	113.1	47.4	21.4	183.5	16.1	1.0
LOS	F	F		F	F	B	F	D	C	F	B	A
Approach Delay		224.3			74.1			49.2			75.2	
Approach LOS		F			E			D			E	
Queue Length 50th (m)	-39.2	-295.5		37.4	-191.6	18.9	36.9	71.7	27.7	-180.1	44.1	0.0
Queue Length 95th (m)	#87.0	#346.7		#87.2	#261.6	47.0	#79.5	91.1	55.4m	#241.5	m49.1	m0.0
Internal Link Dist (m)		424.3			317.9			481.9			584.7	
Turn Bay Length (m)	65.0			70.0			35.0		100.0	115.0		230.0
Base Capacity (vph)	169	842		205	596	644	144	858	546	488	1576	804
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	1.09	1.44		0.98	1.07	0.51	0.96	0.66	0.51	1.32	0.56	0.30

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 35 (27%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green
 Natural Cycle: 140
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.44
 Intersection Signal Delay: 109.4
 Intersection Capacity Utilization 106.1%
 Analysis Period (min) 15
 * User Entered Value
 ~ 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.

Splits and Phases: 210: Yonge Street & St. John's Sideroad



Lanes, Volumes, Timings
 220: Bathurst Street & 18th Sideroad/St. John's Sideroad

AM peak hour
 2028 total future



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗	↗	↖	↗	↗	↖	↗	↖
Traffic Volume (vph)	95	505	55	210	522	70	55	610	113	200	1205	300
Future Volume (vph)	95	505	55	210	522	70	55	610	113	200	1205	300
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.0	3.5	3.7	3.2	3.7	4.0	3.1	3.3	3.7
Storage Length (m)	30.0		0.0	50.0		50.0	60.0		60.0	60.0		60.0
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor		1.00										
Frt		0.985				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1738	1821	0	1668	1807	1601	1675	3510	1622	1688	3388	1617
Flt Permitted	0.117			0.283			0.127			0.283		
Satd. Flow (perm)	214	1821	0	497	1807	1601	224	3510	1622	503	3388	1617
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		6				122			122			238
Link Speed (k/h)		60			60			70				70
Link Distance (m)		129.9			1758.6			451.2				794.7
Travel Time (s)		7.8			105.5			23.2				40.9
Confl. Bikes (#/hr)			1									
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	5%	4%	2%	1%	4%	2%	3%	4%	4%	1%	3%	1%
Adj. Flow (vph)	100	532	58	221	549	74	58	642	119	211	1268	316
Shared Lane Traffic (%)												
Lane Group Flow (vph)	100	590	0	221	549	74	58	642	119	211	1268	316
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4			8			6		5	2	
Permitted Phases	4			8		8	6		6	2		2
Detector Phase	7	4		8	8	8	6	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	7.0	10.0		10.0	10.0	10.0	20.0	20.0	20.0	7.0	20.0	20.0
Minimum Split (s)	11.0	17.5		38.5	38.5	38.5	36.5	36.5	36.5	11.0	36.5	36.5
Total Split (s)	16.0	37.5		37.5	37.5	37.5	47.5	47.5	47.5	11.0	47.5	47.5
Total Split (%)	14.3%	33.5%		33.5%	33.5%	33.5%	42.4%	42.4%	42.4%	9.8%	42.4%	42.4%
Maximum Green (s)	12.0	30.0		30.0	30.0	30.0	40.0	40.0	40.0	7.0	40.0	40.0
Yellow Time (s)	3.0	4.5		4.5	4.5	4.5	5.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	1.0	3.0		3.0	3.0	3.0	2.5	2.5	2.5	1.0	2.5	2.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	7.5		7.5	7.5	7.5	7.5	7.5	7.5	4.0	7.5	7.5
Lead/Lag	Lead			Lag	Lag	Lag	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes	Yes	Yes	Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	6.0	6.0	6.0	3.0	6.0	6.0
Recall Mode	None	None		None	None	None	Min	Min	Min	None	Min	Min
Walk Time (s)				7.0	7.0	7.0	7.0	7.0	7.0		7.0	7.0
Flash Dont Walk (s)				24.0	24.0	24.0	22.0	22.0	22.0		22.0	22.0
Pedestrian Calls (#/hr)				0	0	0	0	0	0		0	0
Act Effect Green (s)	45.0	41.4		30.3	30.3	30.3	36.2	36.2	36.2	50.9	47.3	47.3
Actuated g/C Ratio	0.43	0.40		0.29	0.29	0.29	0.35	0.35	0.35	0.49	0.46	0.46

Lanes, Volumes, Timings
 220: Bathurst Street & 18th Sideroad/St. John's Sideroad

AM peak hour
 2028 total future



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.43	0.81		1.52	1.04	0.13	0.74	0.53	0.18	0.65	0.82	0.37
Control Delay	24.1	37.9		299.7	88.9	1.8	84.4	29.2	5.0	27.8	30.7	6.4
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	24.1	37.9		299.7	88.9	1.8	84.4	29.2	5.0	27.8	30.7	6.4
LOS	C	D		F	F	A	F	C	A	C	C	A
Approach Delay		35.9			136.5			29.6			26.1	
Approach LOS		D			F			C			C	
Queue Length 50th (m)	13.3	115.1		-72.3	-142.9	0.0	11.2	58.8	0.0	26.6	126.0	9.7
Queue Length 95th (m)	24.3	163.0		#123.6	#215.6	2.9	#36.5	78.7	11.9	43.7	161.1	28.5
Internal Link Dist (m)		105.9			1734.6			427.2			770.7	
Turn Bay Length (m)	30.0			50.0		50.0	60.0		60.0	60.0		60.0
Base Capacity (vph)	270	818		145	527	553	87	1365	705	326	1681	922
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	0.37	0.72		1.52	1.04	0.13	0.67	0.47	0.17	0.65	0.75	0.34

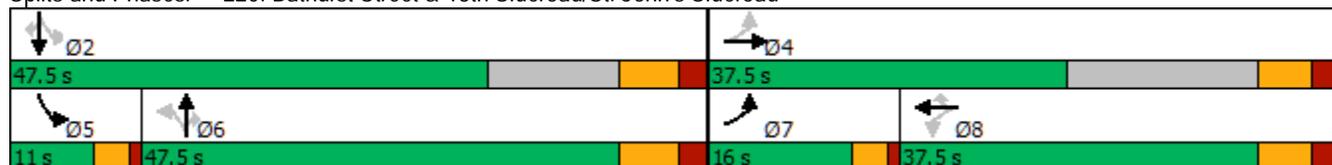
Intersection Summary

Area Type: Other
 Cycle Length: 112
 Actuated Cycle Length: 103.9
 Natural Cycle: 110
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 1.52
 Intersection Signal Delay: 50.9
 Intersection Capacity Utilization 116.5%
 Analysis Period (min) 15

Intersection LOS: D
 ICU Level of Service H

- ~ 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.

Splits and Phases: 220: Bathurst Street & 18th Sideroad/St. John's Sideroad



HCM Unsignalized Intersection Capacity Analysis
 330: Willow Farm Lane/Collector Road & St. John's Sideroad

AM peak hour
 2028 total future

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	160	945	3	20	681	206	1	14	65	234	14	132
Future Volume (Veh/h)	160	945	3	20	681	206	1	14	65	234	14	132
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	170	1005	3	21	724	219	1	15	69	249	15	140
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	943			1008			2258	2330	1005	2188	2114	724
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	943			1008			2258	2330	1005	2188	2114	724
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	77			97			91	46	76	0	61	67
cM capacity (veh/h)	736			676			11	28	293	12	38	429
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1	SB 2			
Volume Total	170	1005	3	21	724	219	85	249	155			
Volume Left	170	0	0	21	0	0	1	249	0			
Volume Right	0	0	3	0	0	219	69	0	140			
cSH	736	1700	1700	676	1700	1700	99	12	216			
Volume to Capacity	0.23	0.59	0.00	0.03	0.43	0.13	0.86	20.69	0.72			
Queue Length 95th (m)	7.1	0.0	0.0	0.8	0.0	0.0	38.8	Err	37.7			
Control Delay (s)	11.4	0.0	0.0	10.5	0.0	0.0	133.0	Err	55.3			
Lane LOS	B			B			F	F	F			
Approach Delay (s)	1.6			0.2			133.0	6184.0				
Approach LOS							F	F				
Intersection Summary												
Average Delay			954.7									
Intersection Capacity Utilization			82.7%			ICU Level of Service			E			
Analysis Period (min)			15									

Lanes, Volumes, Timings
210: Yonge Street & St. John's Sideroad

PM peak hour
Existing conditions



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	145	475	75	245	550	630	130	830	255	310	605	120
Future Volume (vph)	145	475	75	245	550	630	130	830	255	310	605	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.2	3.6	3.7	3.2	3.6	3.7	3.0	3.4	4.0	3.0	3.7	3.3
Storage Length (m)	65.0		50.0	70.0		0.0	35.0		100.0	115.0		230.0
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	*0.75	0.95	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	1.00	1.00		1.00		0.98	1.00		0.99	1.00		0.97
Frt		0.980				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1725	2740	0	1708	1881	1633	1685	3461	1670	*2068	3544	1516
Flt Permitted	0.103			0.238			0.410			0.107		
Satd. Flow (perm)	187	2740	0	427	1881	1608	724	3461	1648	186	3544	1470
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		12				309			262			126
Link Speed (k/h)		60			60			60				60
Link Distance (m)		448.3			341.9			505.9			2054.7	
Travel Time (s)		26.9			20.5			30.4			123.3	
Confl. Peds. (#/hr)	2		3	3		2	5		1	1		5
Confl. Bikes (#/hr)						2						1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	2%	0%	1%	1%	0%	0%	2%	1%	2%	3%	3%
Adj. Flow (vph)	153	500	79	258	579	663	137	874	268	326	637	126
Shared Lane Traffic (%)												
Lane Group Flow (vph)	153	579	0	258	579	663	137	874	268	326	637	126
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8			6		5	2	
Permitted Phases	4			8		8	6		6	2		2
Detector Phase	7	4		3	8	8	6	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	11.0	45.0		11.0	45.0	45.0	39.5	39.5	39.5	11.0	39.5	39.5
Total Split (s)	13.0	48.0		13.0	48.0	48.0	41.0	41.0	41.0	18.0	59.0	59.0
Total Split (%)	10.8%	40.0%		10.8%	40.0%	40.0%	34.2%	34.2%	34.2%	15.0%	49.2%	49.2%
Maximum Green (s)	9.0	40.0		9.0	40.0	40.0	33.5	33.5	33.5	14.0	51.5	51.5
Yellow Time (s)	3.0	4.5		3.0	4.5	4.5	4.5	4.5	4.5	3.0	4.5	4.5
All-Red Time (s)	1.0	3.5		1.0	3.5	3.5	3.0	3.0	3.0	1.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	8.0		4.0	8.0	8.0	7.5	7.5	7.5	4.0	7.5	7.5
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes		Yes								
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
Recall Mode	None	None		None	None	None	C-Max	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)		7.0			7.0	7.0	7.0	7.0	7.0		7.0	7.0
Flash Dont Walk (s)		30.0			30.0	30.0	25.0	25.0	25.0		25.0	25.0
Pedestrian Calls (#/hr)		5			5	5	5	5	5		5	5
Act Effect Green (s)	52.0	39.0		52.0	39.0	39.0	34.5	34.5	34.5	56.0	52.5	52.5

Lanes, Volumes, Timings
 210: Yonge Street & St. John's Sideroad

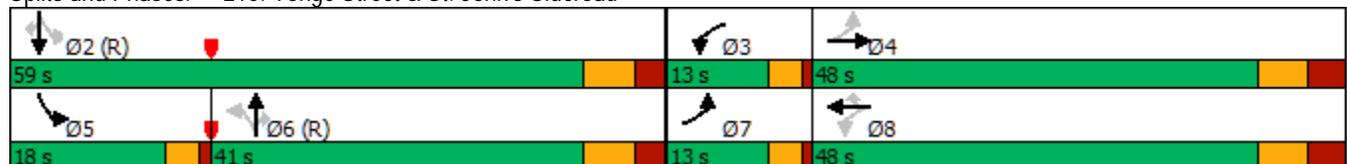
PM peak hour
 Existing conditions

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Actuated g/C Ratio	0.43	0.32		0.43	0.32	0.32	0.29	0.29	0.29	0.47	0.44	0.44
v/c Ratio	0.78	0.64		0.92	0.95	0.91	0.66	0.88	0.41	1.07	0.41	0.18
Control Delay	49.5	37.5		61.9	65.2	37.8	55.2	52.5	6.4	103.4	24.4	4.2
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	49.5	37.5		61.9	65.2	37.8	55.2	52.5	6.4	103.4	24.4	4.2
LOS	D	D		E	E	D	E	D	A	F	C	A
Approach Delay		40.0			52.5			43.1			45.7	
Approach LOS		D			D			D			D	
Queue Length 50th (m)	21.3	78.6		38.5	137.5	92.1	30.2	110.1	1.1	~72.8	56.8	0.0
Queue Length 95th (m)	#53.8	104.4		#82.5	#207.6	#170.0	#60.3	#147.3	21.5	#132.6	72.8	11.5
Internal Link Dist (m)		424.3			317.9			481.9			2030.7	
Turn Bay Length (m)	65.0			70.0			35.0		100.0	115.0		230.0
Base Capacity (vph)	196	921		281	627	742	208	994	659	306	1548	713
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	0.78	0.63		0.92	0.92	0.89	0.66	0.88	0.41	1.07	0.41	0.18

Intersection Summary

Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 39 (33%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green
 Natural Cycle: 110
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.07
 Intersection Signal Delay: 46.3 Intersection LOS: D
 Intersection Capacity Utilization 100.5% ICU Level of Service G
 Analysis Period (min) 15
 * User Entered Value
 ~ 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.

Splits and Phases: 210: Yonge Street & St. John's Sideroad



Lanes, Volumes, Timings
 220: Bathurst Street & 18th Sideroad/St. John's Sideroad

PM peak hour
 Existing conditions



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	235	445	35	120	385	150	80	1025	165	75	660	75
Future Volume (vph)	235	445	35	120	385	150	80	1025	165	75	660	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.0	3.5	3.7	3.2	3.7	4.0	3.1	3.3	3.7
Storage Length (m)	30.0		0.0	50.0		50.0	60.0		60.0	60.0		60.0
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor							0.99					
Frt		0.989				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1807	1880	0	1636	1842	1633	1708	3579	1670	1655	3421	1617
Flt Permitted	0.198			0.470			0.390			0.098		
Satd. Flow (perm)	377	1880	0	809	1842	1612	701	3579	1670	171	3421	1617
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		4				124			130			83
Link Speed (k/h)		60			60			70				70
Link Distance (m)		129.9			1758.6			451.2				794.7
Travel Time (s)		7.8			105.5			23.2				40.9
Confl. Bikes (#/hr)							1					
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	1%	1%	2%	3%	2%	0%	1%	2%	1%	3%	2%	1%
Adj. Flow (vph)	245	464	36	125	401	156	83	1068	172	78	688	78
Shared Lane Traffic (%)												
Lane Group Flow (vph)	245	500	0	125	401	156	83	1068	172	78	688	78
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4			8			6		5	2	
Permitted Phases	4			8		8	6		6	2		2
Detector Phase	7	4		8	8	8	6	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	7.0	10.0		10.0	10.0	10.0	20.0	20.0	20.0	7.0	20.0	20.0
Minimum Split (s)	11.0	17.5		38.5	38.5	38.5	36.5	36.5	36.5	11.0	36.5	36.5
Total Split (s)	16.0	37.5		37.5	37.5	37.5	47.5	47.5	47.5	11.0	47.5	47.5
Total Split (%)	14.3%	33.5%		33.5%	33.5%	33.5%	42.4%	42.4%	42.4%	9.8%	42.4%	42.4%
Maximum Green (s)	12.0	30.0		30.0	30.0	30.0	40.0	40.0	40.0	7.0	40.0	40.0
Yellow Time (s)	3.0	4.5		4.5	4.5	4.5	5.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	1.0	3.0		3.0	3.0	3.0	2.5	2.5	2.5	1.0	2.5	2.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	7.5		7.5	7.5	7.5	7.5	7.5	7.5	4.0	7.5	7.5
Lead/Lag	Lead			Lag	Lag	Lag	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes	Yes	Yes	Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	6.0	6.0	6.0	3.0	6.0	6.0
Recall Mode	None	None		None	None	None	Min	Min	Min	None	Min	Min
Walk Time (s)				7.0	7.0	7.0	7.0	7.0	7.0		7.0	7.0
Flash Dont Walk (s)				24.0	24.0	24.0	22.0	22.0	22.0		22.0	22.0
Pedestrian Calls (#/hr)				0	0	0	0	0	0		0	0
Act Effect Green (s)	46.1	42.5		26.4	26.4	26.4	38.2	38.2	38.2	50.1	46.5	46.5
Actuated g/C Ratio	0.44	0.41		0.25	0.25	0.25	0.37	0.37	0.37	0.48	0.45	0.45

Lanes, Volumes, Timings
 220: Bathurst Street & 18th Sideroad/St. John's Sideroad

PM peak hour
 Existing conditions



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.74	0.65		0.61	0.86	0.31	0.32	0.81	0.25	0.43	0.45	0.10
Control Delay	35.5	30.4		49.9	57.0	11.0	30.5	36.9	8.6	22.6	21.3	3.9
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	35.5	30.4		49.9	57.0	11.0	30.5	36.9	8.6	22.6	21.3	3.9
LOS	D	C		D	E	B	C	D	A	C	C	A
Approach Delay		32.0			45.2			32.9			19.8	
Approach LOS		C			D			C			B	
Queue Length 50th (m)	35.7	90.0		25.0	86.6	5.5	13.8	117.6	6.3	9.4	55.4	0.0
Queue Length 95th (m)	#60.8	127.8		46.7	#135.6	22.1	28.3	145.7	21.6	18.0	71.6	7.8
Internal Link Dist (m)		105.9			1734.6			427.2			770.7	
Turn Bay Length (m)	30.0			50.0		50.0	60.0		60.0	60.0		60.0
Base Capacity (vph)	334	849		237	541	561	274	1401	733	183	1708	849
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	0.73	0.59		0.53	0.74	0.28	0.30	0.76	0.23	0.43	0.40	0.09

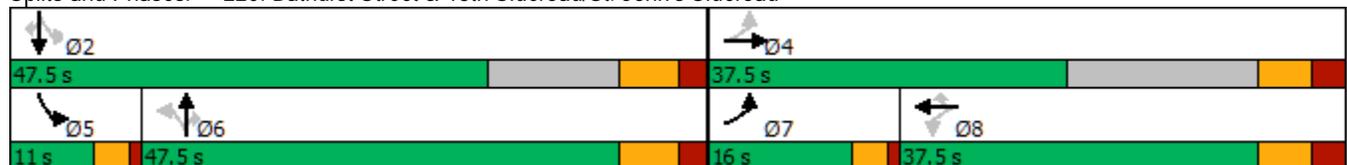
Intersection Summary

Area Type: Other
 Cycle Length: 112
 Actuated Cycle Length: 104.3
 Natural Cycle: 100
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.86
 Intersection Signal Delay: 32.0
 Intersection Capacity Utilization 93.8%
 Analysis Period (min) 15

Intersection LOS: C
 ICU Level of Service F

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

Splits and Phases: 220: Bathurst Street & 18th Sideroad/St. John's Sideroad



HCM Unsignalized Intersection Capacity Analysis
 330: Willow Farm Lane & St. John's Sideroad

PM peak hour
 Existing conditions



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↗	↖	↑		
Traffic Volume (veh/h)	650	5	60	740	5	45
Future Volume (Veh/h)	650	5	60	740	5	45
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	730	6	67	831	6	51
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			736		1695	730
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			736		1695	730
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			92		94	88
cM capacity (veh/h)			879		95	426
Direction, Lane #	EB 1	EB 2	WB 1	WB 2		
Volume Total	730	6	67	831		
Volume Left	0	0	67	0		
Volume Right	0	6	0	0		
cSH	1700	1700	879	1700		
Volume to Capacity	0.43	0.00	0.08	0.49		
Queue Length 95th (m)	0.0	0.0	2.0	0.0		
Control Delay (s)	0.0	0.0	9.4	0.0		
Lane LOS	A					
Approach Delay (s)	0.0		0.7			
Approach LOS						
Intersection Summary						
Average Delay			Err			
Intersection Capacity Utilization			Err%	ICU Level of Service	H	
Analysis Period (min)			15			

Lanes, Volumes, Timings
210: Yonge Street & St. John's Sideroad

PM peak hour
2023 future background



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	181	511	83	264	615	697	153	890	272	340	651	138
Future Volume (vph)	181	511	83	264	615	697	153	890	272	340	651	138
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.2	3.6	3.7	3.2	3.6	3.7	3.0	3.4	4.0	3.0	3.7	3.3
Storage Length (m)	65.0		50.0	70.0		0.0	35.0		100.0	115.0		230.0
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	*0.75	0.95	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	1.00	1.00		1.00		0.98	1.00		0.99	1.00		0.97
Frt		0.979				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1725	2737	0	1708	1881	1633	1685	3461	1670	*2068	3544	1516
Flt Permitted	0.100			0.210			0.391			0.107		
Satd. Flow (perm)	181	2737	0	377	1881	1608	691	3461	1648	186	3544	1470
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		12				295			245			145
Link Speed (k/h)		60			60			60				60
Link Distance (m)		448.3			341.9			505.9			2054.7	
Travel Time (s)		26.9			20.5			30.4			123.3	
Confl. Peds. (#/hr)	2		3	3		2	5		1	1		5
Confl. Bikes (#/hr)						2						1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	2%	0%	1%	1%	0%	0%	2%	1%	2%	3%	3%
Adj. Flow (vph)	191	538	87	278	647	734	161	937	286	358	685	145
Shared Lane Traffic (%)												
Lane Group Flow (vph)	191	625	0	278	647	734	161	937	286	358	685	145
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8			6		5	2	
Permitted Phases	4			8		8	6		6	2		2
Detector Phase	7	4		3	8	8	6	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	11.0	45.0		11.0	45.0	45.0	39.5	39.5	39.5	11.0	39.5	39.5
Total Split (s)	13.0	48.0		13.0	48.0	48.0	41.0	41.0	41.0	18.0	59.0	59.0
Total Split (%)	10.8%	40.0%		10.8%	40.0%	40.0%	34.2%	34.2%	34.2%	15.0%	49.2%	49.2%
Maximum Green (s)	9.0	40.0		9.0	40.0	40.0	33.5	33.5	33.5	14.0	51.5	51.5
Yellow Time (s)	3.0	4.5		3.0	4.5	4.5	4.5	4.5	4.5	3.0	4.5	4.5
All-Red Time (s)	1.0	3.5		1.0	3.5	3.5	3.0	3.0	3.0	1.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	8.0		4.0	8.0	8.0	7.5	7.5	7.5	4.0	7.5	7.5
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes		Yes								
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
Recall Mode	None	None		None	None	None	C-Max	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)		7.0			7.0	7.0	7.0	7.0	7.0		7.0	7.0
Flash Dont Walk (s)		30.0			30.0	30.0	25.0	25.0	25.0		25.0	25.0
Pedestrian Calls (#/hr)		5			5	5	5	5	5		5	5
Act Effect Green (s)	53.0	40.0		53.0	40.0	40.0	33.5	33.5	33.5	55.0	51.5	51.5

Lanes, Volumes, Timings
210: Yonge Street & St. John's Sideroad

PM peak hour
2023 future background

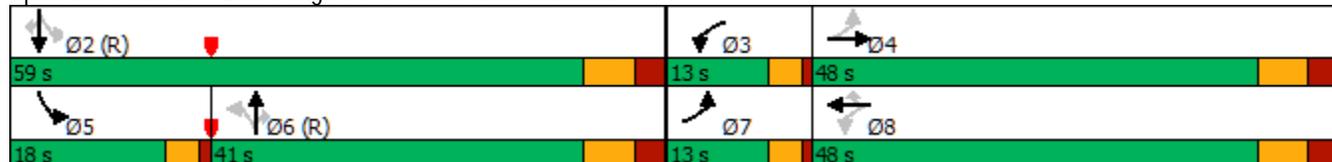


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Actuated g/C Ratio	0.44	0.33		0.44	0.33	0.33	0.28	0.28	0.28	0.46	0.43	0.43
v/c Ratio	0.98	0.68		1.05	1.03	1.00	0.84	0.97	0.45	1.18	0.45	0.20
Control Delay	87.2	38.3		93.7	84.1	58.5	75.8	65.6	9.2	140.8	25.4	4.1
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	87.2	38.3		93.7	84.1	58.5	75.8	65.6	9.2	140.8	25.4	4.1
LOS	F	D		F	F	E	E	E	A	F	C	A
Approach Delay		49.7			74.4			55.2				57.6
Approach LOS		D			E			E				E
Queue Length 50th (m)	30.2	86.9		-45.5	-172.0	-126.3	37.6	121.0	7.5	-89.6	62.1	0.0
Queue Length 95th (m)	#79.1	114.4		#100.0	#244.8	#213.8	#78.2	#165.3	30.8	#150.9	79.1	12.2
Internal Link Dist (m)		424.3			317.9			481.9				2030.7
Turn Bay Length (m)	65.0			70.0			35.0		100.0	115.0		230.0
Base Capacity (vph)	195	920		266	627	732	192	966	636	304	1520	713
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	0.98	0.68		1.05	1.03	1.00	0.84	0.97	0.45	1.18	0.45	0.20

Intersection Summary

Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 39 (33%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green
 Natural Cycle: 120
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.18
 Intersection Signal Delay: 61.2
 Intersection LOS: E
 Intersection Capacity Utilization 107.5%
 ICU Level of Service G
 Analysis Period (min) 15
 * User Entered Value
 ~ 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.

Splits and Phases: 210: Yonge Street & St. John's Sideroad



Lanes, Volumes, Timings
 220: Bathurst Street & 18th Sideroad/St. John's Sideroad

PM peak hour
 2023 future background



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	250	487	35	135	428	164	85	1105	200	82	670	120
Future Volume (vph)	250	487	35	135	428	164	85	1105	200	82	670	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.0	3.5	3.7	3.2	3.7	4.0	3.1	3.3	3.7
Storage Length (m)	30.0		0.0	50.0		50.0	60.0		60.0	60.0		60.0
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor							0.99					
Frt		0.990				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1807	1882	0	1636	1842	1633	1708	3579	1670	1655	3421	1617
Flt Permitted	0.148			0.396			0.386			0.092		
Satd. Flow (perm)	282	1882	0	682	1842	1612	694	3579	1670	160	3421	1617
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		4				122			146			125
Link Speed (k/h)		60			60			70				70
Link Distance (m)		129.9			1758.6			451.2				794.7
Travel Time (s)		7.8			105.5			23.2				40.9
Confl. Bikes (#/hr)							1					
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	1%	1%	2%	3%	2%	0%	1%	2%	1%	3%	2%	1%
Adj. Flow (vph)	260	507	36	141	446	171	89	1151	208	85	698	125
Shared Lane Traffic (%)												
Lane Group Flow (vph)	260	543	0	141	446	171	89	1151	208	85	698	125
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4			8			6		5	2	
Permitted Phases	4			8		8	6		6	2		2
Detector Phase	7	4		8	8	8	6	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	7.0	10.0		10.0	10.0	10.0	20.0	20.0	20.0	7.0	20.0	20.0
Minimum Split (s)	11.0	17.5		38.5	38.5	38.5	36.5	36.5	36.5	11.0	36.5	36.5
Total Split (s)	16.0	37.5		37.5	37.5	37.5	47.5	47.5	47.5	11.0	47.5	47.5
Total Split (%)	14.3%	33.5%		33.5%	33.5%	33.5%	42.4%	42.4%	42.4%	9.8%	42.4%	42.4%
Maximum Green (s)	12.0	30.0		30.0	30.0	30.0	40.0	40.0	40.0	7.0	40.0	40.0
Yellow Time (s)	3.0	4.5		4.5	4.5	4.5	5.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	1.0	3.0		3.0	3.0	3.0	2.5	2.5	2.5	1.0	2.5	2.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	7.5		7.5	7.5	7.5	7.5	7.5	7.5	4.0	7.5	7.5
Lead/Lag	Lead			Lag	Lag	Lag	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes	Yes	Yes	Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	6.0	6.0	6.0	3.0	6.0	6.0
Recall Mode	None	None		None	None	None	Min	Min	Min	None	Min	Min
Walk Time (s)				7.0	7.0	7.0	7.0	7.0	7.0		7.0	7.0
Flash Dont Walk (s)				24.0	24.0	24.0	22.0	22.0	22.0		22.0	22.0
Pedestrian Calls (#/hr)				0	0	0	0	0	0		0	0
Act Effect Green (s)	48.0	44.5		28.4	28.4	28.4	39.6	39.6	39.6	51.6	48.1	48.1
Actuated g/C Ratio	0.45	0.41		0.26	0.26	0.26	0.37	0.37	0.37	0.48	0.45	0.45

Lanes, Volumes, Timings
 220: Bathurst Street & 18th Sideroad/St. John's Sideroad

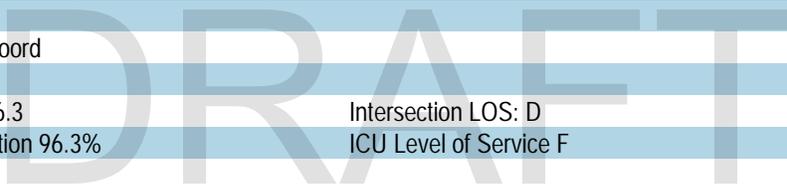
PM peak hour
 2023 future background



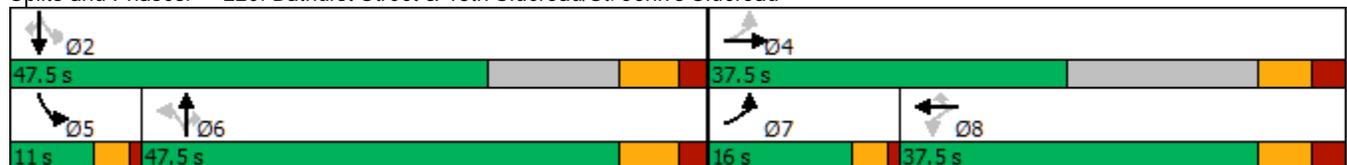
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.88	0.70		0.79	0.92	0.33	0.35	0.87	0.29	0.49	0.46	0.16
Control Delay	51.8	32.2		68.4	64.9	12.9	31.4	41.4	9.7	25.3	21.9	3.6
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.8	32.2		68.4	64.9	12.9	31.4	41.4	9.7	25.3	21.9	3.6
LOS	D	C		E	E	B	C	D	A	C	C	A
Approach Delay		38.5			53.8			36.2			19.7	
Approach LOS		D			D			D			B	
Queue Length 50th (m)	38.2	101.0		30.0	99.4	8.6	15.0	131.0	9.5	10.3	56.4	0.0
Queue Length 95th (m)	#85.3	142.4		#65.2	#159.6	26.7	30.2	#172.1	27.0	19.4	72.7	10.4
Internal Link Dist (m)		105.9			1734.6			427.2			770.7	
Turn Bay Length (m)	30.0			50.0		50.0	60.0		60.0	60.0		60.0
Base Capacity (vph)	297	811		191	516	540	259	1338	716	174	1631	836
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	0.88	0.67		0.74	0.86	0.32	0.34	0.86	0.29	0.49	0.43	0.15

Intersection Summary

Area Type: Other
 Cycle Length: 112
 Actuated Cycle Length: 107.7
 Natural Cycle: 100
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.92
 Intersection Signal Delay: 36.3
 Intersection Capacity Utilization 96.3%
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.



Splits and Phases: 220: Bathurst Street & 18th Sideroad/St. John's Sideroad



HCM Unsignalized Intersection Capacity Analysis
 330: Willow Farm Lane & St. John's Sideroad

PM peak hour
 2023 future background



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↗	↖	↑	↘	↙
Traffic Volume (veh/h)	729	6	60	847	5	46
Future Volume (Veh/h)	729	6	60	847	5	46
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	819	7	67	952	6	52
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			826		1905	819
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			826		1905	819
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			92		91	86
cM capacity (veh/h)			813		70	379
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	819	7	67	952	58	
Volume Left	0	0	67	0	6	
Volume Right	0	7	0	0	52	
cSH	1700	1700	813	1700	260	
Volume to Capacity	0.48	0.00	0.08	0.56	0.22	
Queue Length 95th (m)	0.0	0.0	2.1	0.0	6.7	
Control Delay (s)	0.0	0.0	9.8	0.0	22.8	
Lane LOS	A			C		
Approach Delay (s)	0.0		0.6	22.8		
Approach LOS				C		
Intersection Summary						
Average Delay			1.0			
Intersection Capacity Utilization			55.0%	ICU Level of Service		B
Analysis Period (min)			15			

Lanes, Volumes, Timings
210: Yonge Street & St. John's Sideroad

PM peak hour
2028 future background



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗	↗	↖	↗	↗	↖	↗	↗
Traffic Volume (vph)	191	536	88	274	670	742	163	930	287	350	666	148
Future Volume (vph)	191	536	88	274	670	742	163	930	287	350	666	148
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.2	3.6	3.7	3.2	3.6	3.7	3.0	3.4	4.0	3.0	3.7	3.3
Storage Length (m)	65.0		50.0	70.0		0.0	35.0		100.0	115.0		230.0
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	*0.75	0.95	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor		1.00		1.00		0.98	1.00		0.99	1.00		0.97
Frt		0.979				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1725	2737	0	1708	1881	1633	1685	3461	1670	*2068	3544	1516
Flt Permitted	0.100			0.188			0.385			0.107		
Satd. Flow (perm)	182	2737	0	338	1881	1608	680	3461	1648	186	3544	1470
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		12				292			236			156
Link Speed (k/h)		60			60			60				60
Link Distance (m)		448.3			341.9			505.9			2054.7	
Travel Time (s)		26.9			20.5			30.4			123.3	
Confl. Peds. (#/hr)	2		3	3		2	5		1	1		5
Confl. Bikes (#/hr)						2						1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	2%	0%	1%	1%	0%	0%	2%	1%	2%	3%	3%
Adj. Flow (vph)	201	564	93	288	705	781	172	979	302	368	701	156
Shared Lane Traffic (%)												
Lane Group Flow (vph)	201	657	0	288	705	781	172	979	302	368	701	156
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8			6		5	2	
Permitted Phases	4			8		8	6		6	2		2
Detector Phase	7	4		3	8	8	6	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	11.0	45.0		11.0	45.0	45.0	39.5	39.5	39.5	11.0	39.5	39.5
Total Split (s)	13.0	48.0		13.0	48.0	48.0	41.0	41.0	41.0	18.0	59.0	59.0
Total Split (%)	10.8%	40.0%		10.8%	40.0%	40.0%	34.2%	34.2%	34.2%	15.0%	49.2%	49.2%
Maximum Green (s)	9.0	40.0		9.0	40.0	40.0	33.5	33.5	33.5	14.0	51.5	51.5
Yellow Time (s)	3.0	4.5		3.0	4.5	4.5	4.5	4.5	4.5	3.0	4.5	4.5
All-Red Time (s)	1.0	3.5		1.0	3.5	3.5	3.0	3.0	3.0	1.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	8.0		4.0	8.0	8.0	7.5	7.5	7.5	4.0	7.5	7.5
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes		Yes								
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
Recall Mode	None	None		None	None	None	C-Max	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)		7.0			7.0	7.0	7.0	7.0	7.0		7.0	7.0
Flash Dont Walk (s)		30.0			30.0	30.0	25.0	25.0	25.0		25.0	25.0
Pedestrian Calls (#/hr)		5			5	5	5	5	5		5	5
Act Effect Green (s)	53.0	40.0		53.0	40.0	40.0	33.5	33.5	33.5	55.0	51.5	51.5

Lanes, Volumes, Timings
210: Yonge Street & St. John's Sideroad

PM peak hour
2028 future background

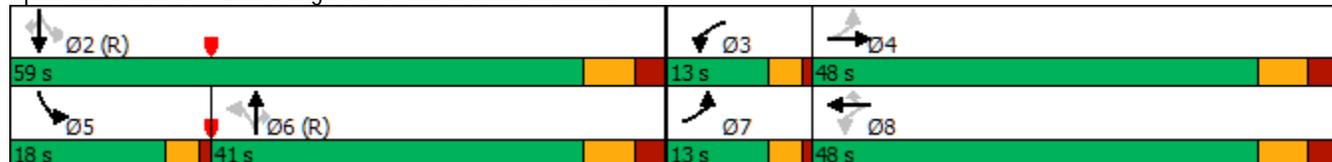


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Actuated g/C Ratio	0.44	0.33		0.44	0.33	0.33	0.28	0.28	0.28	0.46	0.43	0.43
v/c Ratio	1.03	0.71		1.14	1.12	1.07	0.91	1.01	0.48	1.21	0.46	0.22
Control Delay	99.1	39.5		126.1	112.9	78.5	88.7	75.4	11.4	153.0	25.6	4.0
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	99.1	39.5		126.1	112.9	78.5	88.7	75.4	11.4	153.0	25.6	4.0
LOS	F	D		F	F	E	F	E	B	F	C	A
Approach Delay		53.5			99.9			63.7			61.1	
Approach LOS		D			F			E			E	
Queue Length 50th (m)	-35.4	92.9		-50.4	-201.9	-162.9	41.2	-131.0	12.3	-94.8	63.8	0.0
Queue Length 95th (m)	#85.2	121.7		#108.0	#276.7	#241.1	#85.7	#176.9	38.0	#157.2	81.2	12.7
Internal Link Dist (m)		424.3			317.9			481.9			2030.7	
Turn Bay Length (m)	65.0			70.0			35.0		100.0	115.0		230.0
Base Capacity (vph)	196	920		252	627	730	189	966	630	304	1520	719
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	1.03	0.71		1.14	1.12	1.07	0.91	1.01	0.48	1.21	0.46	0.22

Intersection Summary

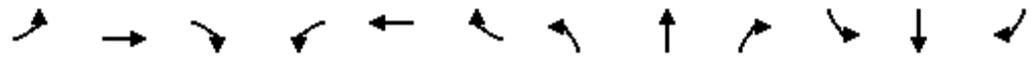
Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 39 (33%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green
 Natural Cycle: 130
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.21
 Intersection Signal Delay: 73.5
 Intersection LOS: E
 Intersection Capacity Utilization 111.5%
 ICU Level of Service H
 Analysis Period (min) 15
 * User Entered Value
 ~ 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.

Splits and Phases: 210: Yonge Street & St. John's Sideroad



Lanes, Volumes, Timings
 220: Bathurst Street & 18th Sideroad/St. John's Sideroad

PM peak hour
 2028 future background



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	265	512	35	145	468	179	95	1210	210	87	690	130
Future Volume (vph)	265	512	35	145	468	179	95	1210	210	87	690	130
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.0	3.5	3.7	3.2	3.7	4.0	3.1	3.3	3.7
Storage Length (m)	30.0		0.0	50.0		50.0	60.0		60.0	60.0		60.0
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor							0.99					
Frt		0.991				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1807	1884	0	1636	1842	1633	1708	3579	1670	1655	3421	1617
Flt Permitted	0.117			0.355			0.378			0.091		
Satd. Flow (perm)	223	1884	0	611	1842	1612	679	3579	1670	159	3421	1617
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		4				122			140			135
Link Speed (k/h)		60			60			70				70
Link Distance (m)		129.9			1758.6			451.2			794.7	
Travel Time (s)		7.8			105.5			23.2			40.9	
Confl. Bikes (#/hr)							1					
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	1%	1%	2%	3%	2%	0%	1%	2%	1%	3%	2%	1%
Adj. Flow (vph)	276	533	36	151	488	186	99	1260	219	91	719	135
Shared Lane Traffic (%)												
Lane Group Flow (vph)	276	569	0	151	488	186	99	1260	219	91	719	135
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4			8			6		5	2	
Permitted Phases	4			8		8	6		6	2		2
Detector Phase	7	4		8	8	8	6	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	7.0	10.0		10.0	10.0	10.0	20.0	20.0	20.0	7.0	20.0	20.0
Minimum Split (s)	11.0	17.5		38.5	38.5	38.5	36.5	36.5	36.5	11.0	36.5	36.5
Total Split (s)	16.0	37.5		37.5	37.5	37.5	47.5	47.5	47.5	11.0	47.5	47.5
Total Split (%)	14.3%	33.5%		33.5%	33.5%	33.5%	42.4%	42.4%	42.4%	9.8%	42.4%	42.4%
Maximum Green (s)	12.0	30.0		30.0	30.0	30.0	40.0	40.0	40.0	7.0	40.0	40.0
Yellow Time (s)	3.0	4.5		4.5	4.5	4.5	5.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	1.0	3.0		3.0	3.0	3.0	2.5	2.5	2.5	1.0	2.5	2.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	7.5		7.5	7.5	7.5	7.5	7.5	7.5	4.0	7.5	7.5
Lead/Lag	Lead			Lag	Lag	Lag	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes	Yes	Yes	Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	6.0	6.0	6.0	3.0	6.0	6.0
Recall Mode	None	None		None	None	None	Min	Min	Min	None	Min	Min
Walk Time (s)				7.0	7.0	7.0	7.0	7.0	7.0		7.0	7.0
Flash Dont Walk (s)				24.0	24.0	24.0	22.0	22.0	22.0		22.0	22.0
Pedestrian Calls (#/hr)				0	0	0	0	0	0		0	0
Act Effct Green (s)	49.6	46.1		30.1	30.1	30.1	40.1	40.1	40.1	52.2	48.7	48.7
Actuated g/C Ratio	0.45	0.42		0.27	0.27	0.27	0.37	0.37	0.37	0.48	0.44	0.44

Lanes, Volumes, Timings
 220: Bathurst Street & 18th Sideroad/St. John's Sideroad

PM peak hour
 2028 future background



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	1.01	0.72		0.90	0.97	0.35	0.40	0.96	0.31	0.54	0.47	0.17
Control Delay	84.6	33.1		90.3	73.9	14.4	33.0	53.0	11.1	27.5	22.6	3.6
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	84.6	33.1		90.3	73.9	14.4	33.0	53.0	11.1	27.5	22.6	3.6
LOS	F	C		F	E	B	C	D	B	C	C	A
Approach Delay		49.9			63.5			45.9			20.4	
Approach LOS		D			E			D			C	
Queue Length 50th (m)	-49.6	107.8		33.9	112.2	11.3	17.0	150.2	12.2	11.0	58.5	0.0
Queue Length 95th (m)	#104.4	151.7		#75.5	#181.7	30.8	34.1	#200.4	30.6	20.9	75.3	10.8
Internal Link Dist (m)		105.9			1734.6			427.2			770.7	
Turn Bay Length (m)	30.0			50.0		50.0	60.0		60.0	60.0		60.0
Base Capacity (vph)	274	793		167	504	530	247	1306	698	170	1591	824
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	1.01	0.72		0.90	0.97	0.35	0.40	0.96	0.31	0.54	0.45	0.16

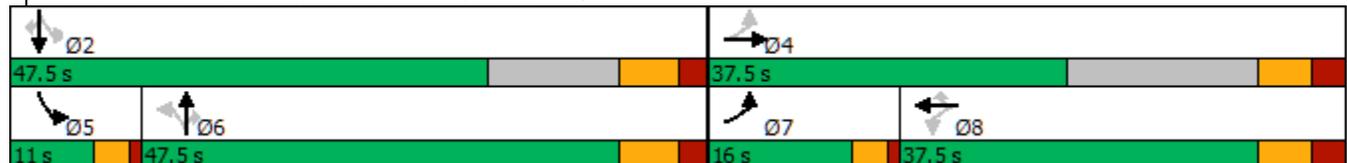
Intersection Summary

Area Type: Other
 Cycle Length: 112
 Actuated Cycle Length: 109.8
 Natural Cycle: 110
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 1.01
 Intersection Signal Delay: 44.4
 Intersection Capacity Utilization 98.8%
 Analysis Period (min) 15
 Intersection LOS: D
 ICU Level of Service F

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

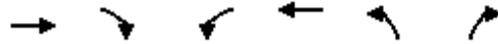
95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 220: Bathurst Street & 18th Sideroad/St. John's Sideroad



HCM Unsignalized Intersection Capacity Analysis
 330: Willow Farm Lane & St. John's Sideroad

PM peak hour
 2028 future background



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↗	↖	↑	↘	↙
Traffic Volume (veh/h)	769	6	60	922	5	46
Future Volume (Veh/h)	769	6	60	922	5	46
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	864	7	67	1036	6	52
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			871		2034	864
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			871		2034	864
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			91		90	85
cM capacity (veh/h)			783		58	357
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	864	7	67	1036	58	
Volume Left	0	0	67	0	6	
Volume Right	0	7	0	0	52	
cSH	1700	1700	783	1700	233	
Volume to Capacity	0.51	0.00	0.09	0.61	0.25	
Queue Length 95th (m)	0.0	0.0	2.2	0.0	7.6	
Control Delay (s)	0.0	0.0	10.0	0.0	25.5	
Lane LOS	B			D		
Approach Delay (s)	0.0		0.6		25.5	
Approach LOS						D
Intersection Summary						
Average Delay			1.1			
Intersection Capacity Utilization			58.5%	ICU Level of Service	B	
Analysis Period (min)			15			

Lanes, Volumes, Timings
210: Yonge Street & St. John's Sideroad

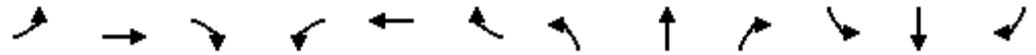
PM peak hour
2023 total future



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	199	533	98	259	664	697	176	889	271	340	648	159
Future Volume (vph)	199	533	98	259	664	697	176	889	271	340	648	159
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.2	3.6	3.7	3.2	3.6	3.7	3.0	3.4	4.0	3.0	3.7	3.3
Storage Length (m)	65.0		50.0	70.0		0.0	35.0		100.0	115.0		230.0
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	*0.75	0.95	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor		1.00		1.00		0.98	1.00		0.99	1.00		0.97
Frt		0.977				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1725	2732	0	1708	1881	1633	1685	3461	1670	*2068	3544	1516
Flt Permitted	0.100			0.184			0.392			0.107		
Satd. Flow (perm)	182	2732	0	330	1881	1608	693	3461	1648	186	3544	1470
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		14				292			238			167
Link Speed (k/h)		60			60			60				60
Link Distance (m)		448.3			341.9			505.9				608.7
Travel Time (s)		26.9			20.5			30.4				36.5
Confl. Peds. (#/hr)	2		3	3		2	5		1	1		5
Confl. Bikes (#/hr)						2						1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	2%	0%	1%	1%	0%	0%	2%	1%	2%	3%	3%
Adj. Flow (vph)	209	561	103	273	699	734	185	936	285	358	682	167
Shared Lane Traffic (%)												
Lane Group Flow (vph)	209	664	0	273	699	734	185	936	285	358	682	167
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8			6		5	2	
Permitted Phases	4			8		8	6		6	2		2
Detector Phase	7	4		3	8	8	6	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	11.0	45.0		11.0	45.0	45.0	39.5	39.5	39.5	11.0	39.5	39.5
Total Split (s)	13.0	48.0		13.0	48.0	48.0	41.0	41.0	41.0	18.0	59.0	59.0
Total Split (%)	10.8%	40.0%		10.8%	40.0%	40.0%	34.2%	34.2%	34.2%	15.0%	49.2%	49.2%
Maximum Green (s)	9.0	40.0		9.0	40.0	40.0	33.5	33.5	33.5	14.0	51.5	51.5
Yellow Time (s)	3.0	4.5		3.0	4.5	4.5	4.5	4.5	4.5	3.0	4.5	4.5
All-Red Time (s)	1.0	3.5		1.0	3.5	3.5	3.0	3.0	3.0	1.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	8.0		4.0	8.0	8.0	7.5	7.5	7.5	4.0	7.5	7.5
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes		Yes								
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
Recall Mode	None	None		None	None	None	C-Max	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)		7.0			7.0	7.0	7.0	7.0	7.0		7.0	7.0
Flash Dont Walk (s)		30.0			30.0	30.0	25.0	25.0	25.0		25.0	25.0
Pedestrian Calls (#/hr)		5			5	5	5	5	5		5	5
Act Effect Green (s)	53.0	40.0		53.0	40.0	40.0	33.5	33.5	33.5	55.0	51.5	51.5

Lanes, Volumes, Timings
210: Yonge Street & St. John's Sideroad

PM peak hour
2023 total future

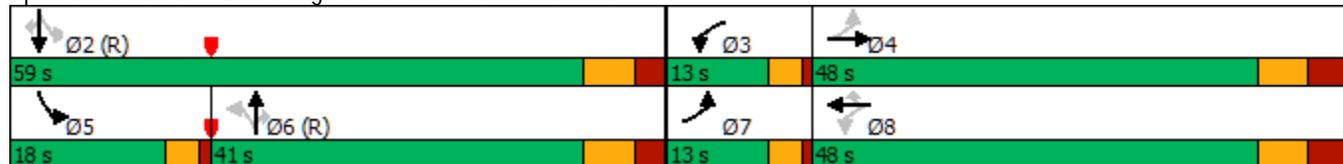


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Actuated g/C Ratio	0.44	0.33		0.44	0.33	0.33	0.28	0.28	0.28	0.46	0.43	0.43
v/c Ratio	1.07	0.72		1.10	1.11	1.01	0.96	0.97	0.45	1.18	0.45	0.23
Control Delay	110.6	39.7		110.7	109.6	59.3	98.7	65.4	9.8	140.8	25.4	3.9
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	110.6	39.7		110.7	109.6	59.3	98.7	65.4	9.8	140.8	25.4	3.9
LOS	F	D		F	F	E	F	E	A	F	C	A
Approach Delay		56.7			88.2			58.5			56.7	
Approach LOS		E			F			E			E	
Queue Length 50th (m)	-39.6	94.0		-44.4	-198.8	-128.3	45.2	120.7	8.7	-89.6	61.7	0.0
Queue Length 95th (m)	#89.9	122.9		#100.6	#273.1	#214.9	#93.0	#165.0	32.3	#150.9	78.5	13.0
Internal Link Dist (m)		424.3			317.9			481.9			584.7	
Turn Bay Length (m)	65.0			70.0			35.0		100.0	115.0		230.0
Base Capacity (vph)	196	920		249	627	730	193	966	631	304	1520	726
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	1.07	0.72		1.10	1.11	1.01	0.96	0.97	0.45	1.18	0.45	0.23

Intersection Summary

Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 39 (33%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green
 Natural Cycle: 120
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.18
 Intersection Signal Delay: 67.5
 Intersection LOS: E
 Intersection Capacity Utilization 111.1%
 ICU Level of Service H
 Analysis Period (min) 15
 * User Entered Value
 ~ 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.

Splits and Phases: 210: Yonge Street & St. John's Sideroad



Lanes, Volumes, Timings
 220: Bathurst Street & 18th Sideroad/St. John's Sideroad

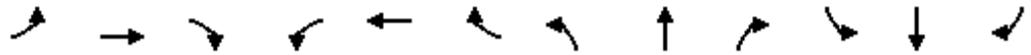
PM peak hour
 2023 total future



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	250	517	35	140	439	172	85	1105	229	96	670	120
Future Volume (vph)	250	517	35	140	439	172	85	1105	229	96	670	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.0	3.5	3.7	3.2	3.7	4.0	3.1	3.3	3.7
Storage Length (m)	30.0		0.0	50.0		50.0	60.0		60.0	60.0		60.0
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor							0.99					
Frt		0.991				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1807	1884	0	1636	1842	1633	1708	3579	1670	1655	3421	1617
Flt Permitted	0.135			0.334			0.386			0.091		
Satd. Flow (perm)	257	1884	0	575	1842	1612	694	3579	1670	159	3421	1617
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		4				125			168			125
Link Speed (k/h)		60			60			70				70
Link Distance (m)		129.9			1758.6			451.2			794.7	
Travel Time (s)		7.8			105.5			23.2			40.9	
Confl. Bikes (#/hr)							1					
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	1%	1%	2%	3%	2%	0%	1%	2%	1%	3%	2%	1%
Adj. Flow (vph)	260	539	36	146	457	179	89	1151	239	100	698	125
Shared Lane Traffic (%)												
Lane Group Flow (vph)	260	575	0	146	457	179	89	1151	239	100	698	125
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4			8			6		5	2	
Permitted Phases	4			8		8	6		6	2		2
Detector Phase	7	4		8	8	8	6	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	7.0	10.0		10.0	10.0	10.0	20.0	20.0	20.0	7.0	20.0	20.0
Minimum Split (s)	11.0	17.5		38.5	38.5	38.5	36.5	36.5	36.5	11.0	36.5	36.5
Total Split (s)	16.0	37.5		37.5	37.5	37.5	47.5	47.5	47.5	11.0	47.5	47.5
Total Split (%)	14.3%	33.5%		33.5%	33.5%	33.5%	42.4%	42.4%	42.4%	9.8%	42.4%	42.4%
Maximum Green (s)	12.0	30.0		30.0	30.0	30.0	40.0	40.0	40.0	7.0	40.0	40.0
Yellow Time (s)	3.0	4.5		4.5	4.5	4.5	5.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	1.0	3.0		3.0	3.0	3.0	2.5	2.5	2.5	1.0	2.5	2.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	7.5		7.5	7.5	7.5	7.5	7.5	7.5	4.0	7.5	7.5
Lead/Lag	Lead			Lag	Lag	Lag	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes	Yes	Yes	Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	6.0	6.0	6.0	3.0	6.0	6.0
Recall Mode	None	None		None	None	None	Min	Min	Min	None	Min	Min
Walk Time (s)				7.0	7.0	7.0	7.0	7.0	7.0		7.0	7.0
Flash Dont Walk (s)				24.0	24.0	24.0	22.0	22.0	22.0		22.0	22.0
Pedestrian Calls (#/hr)				0	0	0	0	0	0		0	0
Act Effct Green (s)	48.9	45.4		29.4	29.4	29.4	40.0	40.0	40.0	54.5	51.0	51.0
Actuated g/C Ratio	0.44	0.41		0.26	0.26	0.26	0.36	0.36	0.36	0.49	0.46	0.46

Lanes, Volumes, Timings
 220: Bathurst Street & 18th Sideroad/St. John's Sideroad

PM peak hour
 2023 total future



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.93	0.75		0.96	0.94	0.35	0.36	0.90	0.34	0.58	0.45	0.15
Control Delay	64.0	35.1		106.4	69.6	13.2	31.7	44.3	9.7	30.8	21.8	3.6
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	64.0	35.1		106.4	69.6	13.2	31.7	44.3	9.7	30.8	21.8	3.6
LOS	E	D		F	E	B	C	D	A	C	C	A
Approach Delay		44.1			63.5			37.9			20.3	
Approach LOS		D			E			D			C	
Queue Length 50th (m)	38.4	109.5		33.1	102.6	9.5	15.0	131.0	10.9	12.2	56.4	0.0
Queue Length 95th (m)	#89.4	154.2		#74.9	#164.9	28.4	30.2	#172.1	29.9	#24.9	72.7	10.4
Internal Link Dist (m)		105.9			1734.6			427.2			770.7	
Turn Bay Length (m)	30.0			50.0		50.0	60.0		60.0	60.0		60.0
Base Capacity (vph)	279	780		155	496	525	248	1285	707	171	1566	808
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	0.93	0.74		0.94	0.92	0.34	0.36	0.90	0.34	0.58	0.45	0.15

Intersection Summary

Area Type: Other
 Cycle Length: 112
 Actuated Cycle Length: 111.4
 Natural Cycle: 100
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.96
 Intersection Signal Delay: 40.2
 Intersection Capacity Utilization 97.9%
 Analysis Period (min) 15

Intersection LOS: D
 ICU Level of Service F

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

Splits and Phases: 220: Bathurst Street & 18th Sideroad/St. John's Sideroad



HCM Unsignalized Intersection Capacity Analysis
 330: Willow Farm Lane/Collector Road & St. John's Sideroad

PM peak hour
 2023 total future

																		
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR						
Lane Configurations																		
Traffic Volume (veh/h)	80	722	6	60	845	94	5	3	46	63	1	25						
Future Volume (Veh/h)	80	722	6	60	845	94	5	3	46	63	1	25						
Sign Control		Free			Free			Stop			Stop							
Grade		0%			0%			0%			0%							
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89						
Hourly flow rate (vph)	90	811	7	67	949	106	6	3	52	71	1	28						
Pedestrians																		
Lane Width (m)																		
Walking Speed (m/s)																		
Percent Blockage																		
Right turn flare (veh)																		
Median type	None					None												
Median storage (veh)																		
Upstream signal (m)																		
pX, platoon unblocked																		
vC, conflicting volume	1055			818			2102		2180		811		2128		2081		949	
vC1, stage 1 conf vol																		
vC2, stage 2 conf vol																		
vCu, unblocked vol	1055			818			2102		2180		811		2128		2081		949	
tC, single (s)	4.1			4.1			7.1		6.5		6.2		7.1		6.5		6.2	
tC, 2 stage (s)																		
tF (s)	2.2			2.2			3.5		4.0		3.3		3.5		4.0		3.3	
p0 queue free %	87			92			79		92		86		0		98		91	
cM capacity (veh/h)	668			819			29		37		383		25		43		319	
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1	SB 2									
Volume Total	90	811	7	67	949	106	61	71	29									
Volume Left	90	0	0	67	0	0	6	71	0									
Volume Right	0	0	7	0	0	106	52	0	28									
cSH	668	1700	1700	819	1700	1700	144	25	261									
Volume to Capacity	0.13	0.48	0.00	0.08	0.56	0.06	0.42	2.83	0.11									
Queue Length 95th (m)	3.7	0.0	0.0	2.1	0.0	0.0	15.0	70.2	3.0									
Control Delay (s)	11.2	0.0	0.0	9.8	0.0	0.0	47.4	1154.2	20.5									
Lane LOS	B			A			E		F		C							
Approach Delay (s)	1.1			0.6			47.4		825.5									
Approach LOS							E		F									
Intersection Summary																		
Average Delay				39.8														
Intersection Capacity Utilization				69.1%					ICU Level of Service			C						
Analysis Period (min)				15														

Lanes, Volumes, Timings
210: Yonge Street & St. John's Sideroad

PM peak hour
2028 total future



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	214	573	118	269	719	742	181	927	283	350	663	169
Future Volume (vph)	214	573	118	269	719	742	181	927	283	350	663	169
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.2	3.6	3.7	3.2	3.6	3.7	3.0	3.4	4.0	3.0	3.7	3.3
Storage Length (m)	65.0		50.0	70.0		0.0	35.0		100.0	115.0		230.0
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	*0.75	0.95	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor		1.00		1.00		0.98	1.00		0.99	1.00		0.97
Frt		0.974				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1725	2724	0	1708	1881	1633	1685	3461	1670	*2068	3544	1516
Flt Permitted	0.100			0.144			0.386			0.107		
Satd. Flow (perm)	182	2724	0	259	1881	1608	682	3461	1648	186	3544	1470
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		15				288			226			178
Link Speed (k/h)		60			60			60				60
Link Distance (m)		448.3			341.9			505.9				608.7
Travel Time (s)		26.9			20.5			30.4				36.5
Confl. Peds. (#/hr)	2		3	3		2	5		1	1		5
Confl. Bikes (#/hr)						2						1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	2%	0%	1%	1%	0%	0%	2%	1%	2%	3%	3%
Adj. Flow (vph)	225	603	124	283	757	781	191	976	298	368	698	178
Shared Lane Traffic (%)												
Lane Group Flow (vph)	225	727	0	283	757	781	191	976	298	368	698	178
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8			6		5	2	
Permitted Phases	4			8		8	6		6	2		2
Detector Phase	7	4		3	8	8	6	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	11.0	45.0		11.0	45.0	45.0	39.5	39.5	39.5	11.0	39.5	39.5
Total Split (s)	13.0	48.0		13.0	48.0	48.0	41.0	41.0	41.0	18.0	59.0	59.0
Total Split (%)	10.8%	40.0%		10.8%	40.0%	40.0%	34.2%	34.2%	34.2%	15.0%	49.2%	49.2%
Maximum Green (s)	9.0	40.0		9.0	40.0	40.0	33.5	33.5	33.5	14.0	51.5	51.5
Yellow Time (s)	3.0	4.5		3.0	4.5	4.5	4.5	4.5	4.5	3.0	4.5	4.5
All-Red Time (s)	1.0	3.5		1.0	3.5	3.5	3.0	3.0	3.0	1.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	8.0		4.0	8.0	8.0	7.5	7.5	7.5	4.0	7.5	7.5
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes		Yes								
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
Recall Mode	None	None		None	None	None	C-Max	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)		7.0			7.0	7.0	7.0	7.0	7.0		7.0	7.0
Flash Dont Walk (s)		30.0			30.0	30.0	25.0	25.0	25.0		25.0	25.0
Pedestrian Calls (#/hr)		5			5	5	5	5	5		5	5
Act Effect Green (s)	53.0	40.0		53.0	40.0	40.0	33.5	33.5	33.5	55.0	51.5	51.5

Lanes, Volumes, Timings
210: Yonge Street & St. John's Sideroad

PM peak hour
2028 total future

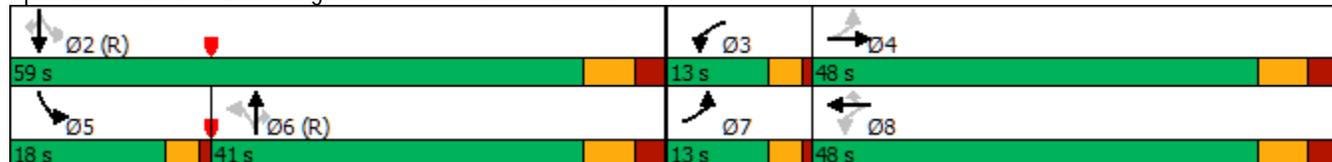


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Actuated g/C Ratio	0.44	0.33		0.44	0.33	0.33	0.28	0.28	0.28	0.46	0.43	0.43
v/c Ratio	1.15	0.79		1.27	1.21	1.07	1.01	1.01	0.48	1.21	0.46	0.24
Control Delay	136.9	42.9		175.3	143.8	79.7	110.9	74.7	12.1	153.0	25.6	3.9
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	136.9	42.9		175.3	143.8	79.7	110.9	74.7	12.1	153.0	25.6	3.9
LOS	F	D		F	F	E	F	E	B	F	C	A
Approach Delay		65.1			121.2			66.7			60.2	
Approach LOS		E			F			E			E	
Queue Length 50th (m)	-48.0	106.3		-63.7	-228.8	-164.4	-47.7	-129.8	13.5	-94.8	63.5	0.0
Queue Length 95th (m)	#99.9	138.2		#120.8	#305.1	#242.5	#97.4	#175.8	39.5	#157.2	80.7	13.3
Internal Link Dist (m)		424.3			317.9			481.9			584.7	
Turn Bay Length (m)	65.0			70.0			35.0		100.0	115.0		230.0
Base Capacity (vph)	196	918		223	627	728	190	966	622	304	1520	732
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	1.15	0.79		1.27	1.21	1.07	1.01	1.01	0.48	1.21	0.46	0.24

Intersection Summary

Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 39 (33%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.27
 Intersection Signal Delay: 83.1
 Intersection LOS: F
 Intersection Capacity Utilization 115.3%
 ICU Level of Service H
 Analysis Period (min) 15
 * User Entered Value
 ~ 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.

Splits and Phases: 210: Yonge Street & St. John's Sideroad



Lanes, Volumes, Timings
 220: Bathurst Street & 18th Sideroad/St. John's Sideroad

PM peak hour
 2028 total future



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	265	542	35	158	485	192	95	1210	239	101	690	130
Future Volume (vph)	265	542	35	158	485	192	95	1210	239	101	690	130
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.0	3.5	3.7	3.2	3.7	4.0	3.1	3.3	3.7
Storage Length (m)	30.0		0.0	50.0		50.0	60.0		60.0	60.0		60.0
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor						0.99						
Frt		0.991				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1807	1884	0	1636	1842	1633	1708	3579	1670	1655	3421	1617
Flt Permitted	0.118			0.298			0.378			0.091		
Satd. Flow (perm)	224	1884	0	513	1842	1612	679	3579	1670	159	3421	1617
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		3				126			160			135
Link Speed (k/h)		60			60			70				70
Link Distance (m)		129.9			1758.6			451.2				794.7
Travel Time (s)		7.8			105.5			23.2				40.9
Confl. Bikes (#/hr)							1					
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	1%	1%	2%	3%	2%	0%	1%	2%	1%	3%	2%	1%
Adj. Flow (vph)	276	565	36	165	505	200	99	1260	249	105	719	135
Shared Lane Traffic (%)												
Lane Group Flow (vph)	276	601	0	165	505	200	99	1260	249	105	719	135
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4			8			6		5	2	
Permitted Phases	4			8		8	6		6	2		2
Detector Phase	7	4		8	8	8	6	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	7.0	10.0		10.0	10.0	10.0	20.0	20.0	20.0	7.0	20.0	20.0
Minimum Split (s)	11.0	17.5		38.5	38.5	38.5	36.5	36.5	36.5	11.0	36.5	36.5
Total Split (s)	16.0	37.5		37.5	37.5	37.5	47.5	47.5	47.5	11.0	47.5	47.5
Total Split (%)	14.3%	33.5%		33.5%	33.5%	33.5%	42.4%	42.4%	42.4%	9.8%	42.4%	42.4%
Maximum Green (s)	12.0	30.0		30.0	30.0	30.0	40.0	40.0	40.0	7.0	40.0	40.0
Yellow Time (s)	3.0	4.5		4.5	4.5	4.5	5.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	1.0	3.0		3.0	3.0	3.0	2.5	2.5	2.5	1.0	2.5	2.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	7.5		7.5	7.5	7.5	7.5	7.5	7.5	4.0	7.5	7.5
Lead/Lag	Lead			Lag	Lag	Lag	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes	Yes	Yes	Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	6.0	6.0	6.0	3.0	6.0	6.0
Recall Mode	None	None		None	None	None	Min	Min	Min	None	Min	Min
Walk Time (s)				7.0	7.0	7.0	7.0	7.0	7.0		7.0	7.0
Flash Dont Walk (s)				24.0	24.0	24.0	22.0	22.0	22.0		22.0	22.0
Pedestrian Calls (#/hr)				0	0	0	0	0	0		0	0
Act Effct Green (s)	49.5	46.0		30.0	30.0	30.0	40.0	40.0	40.0	54.5	51.0	51.0
Actuated g/C Ratio	0.44	0.41		0.27	0.27	0.27	0.36	0.36	0.36	0.49	0.46	0.46

Lanes, Volumes, Timings
 220: Bathurst Street & 18th Sideroad/St. John's Sideroad

PM peak hour
 2028 total future



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	1.03	0.78		1.20	1.02	0.38	0.41	0.99	0.36	0.62	0.46	0.17
Control Delay	90.9	36.6		179.6	88.0	15.2	33.5	58.2	11.1	33.2	22.3	3.5
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	90.9	36.6		179.6	88.0	15.2	33.5	58.2	11.1	33.2	22.3	3.5
LOS	F	D		F	F	B	C	E	B	C	C	A
Approach Delay		53.7			88.6			49.4			20.8	
Approach LOS		D			F			D			C	
Queue Length 50th (m)	-49.4	117.0		-46.2	-124.0	13.1	17.0	150.2	13.8	12.8	58.5	0.0
Queue Length 95th (m)	#104.2	164.3		#90.4	#190.8	33.9	34.1	#200.4	33.9	#29.2	75.3	10.8
Internal Link Dist (m)		105.9			1734.6			427.2			770.7	
Turn Bay Length (m)	30.0			50.0		50.0	60.0		60.0	60.0		60.0
Base Capacity (vph)	268	775		137	493	524	242	1278	699	170	1557	809
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	1.03	0.78		1.20	1.02	0.38	0.41	0.99	0.36	0.62	0.46	0.17

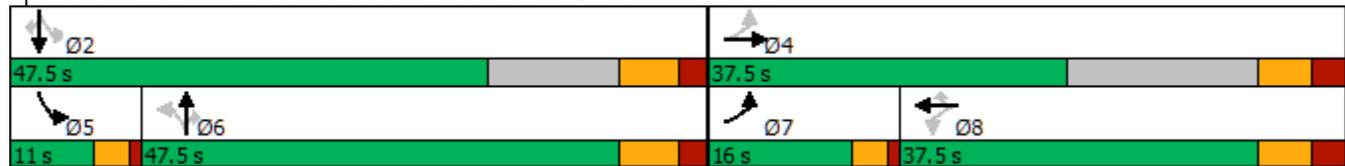
Intersection Summary

Area Type: Other
 Cycle Length: 112
 Actuated Cycle Length: 112
 Natural Cycle: 130
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 1.20
 Intersection Signal Delay: 51.8
 Intersection Capacity Utilization 100.8%
 Analysis Period (min) 15
 Intersection LOS: D
 ICU Level of Service G

~ 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.

Splits and Phases: 220: Bathurst Street & 18th Sideroad/St. John's Sideroad



HCM Unsignalized Intersection Capacity Analysis
 330: Willow Farm Lane/Collector Road & St. John's Sideroad

PM peak hour
 2028 total future

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	80	762	6	60	915	94	5	3	46	98	3	50
Future Volume (Veh/h)	80	762	6	60	915	94	5	3	46	98	3	50
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	90	856	7	67	1028	106	6	3	52	110	3	56
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type												
		None			None							
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1134			863			2256	2304	856	2252	2205	1028
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1134			863			2256	2304	856	2252	2205	1028
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	86			91			68	90	86	0	91	80
cM capacity (veh/h)	623			788			19	31	360	20	35	287
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1	SB 2			
Volume Total	90	856	7	67	1028	106	61	110	59			
Volume Left	90	0	0	67	0	0	6	110	0			
Volume Right	0	0	7	0	0	106	52	0	56			
cSH	623	1700	1700	788	1700	1700	108	20	210			
Volume to Capacity	0.14	0.50	0.00	0.09	0.60	0.06	0.56	5.57	0.28			
Queue Length 95th (m)	4.0	0.0	0.0	2.2	0.0	0.0	21.4	Err	8.8			
Control Delay (s)	11.7	0.0	0.0	10.0	0.0	0.0	74.7	Err	28.6			
Lane LOS	B			A			F	F	D			
Approach Delay (s)	1.1			0.6			74.7	6518.2				
Approach LOS							F	F				
Intersection Summary												
Average Delay			464.7									
Intersection Capacity Utilization			74.7%			ICU Level of Service			D			
Analysis Period (min)			15									

Lanes, Volumes, Timings
210: Yonge Street & St. John's Sideroad

AM peak hour
2023 future background; with mitigation



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	116	677	169	188	452	281	73	500	253	538	757	168
Future Volume (vph)	116	677	169	188	452	281	73	500	253	538	757	168
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.2	3.6	3.7	3.2	3.6	3.7	3.0	3.4	4.0	3.0	3.7	3.3
Storage Length (m)	65.0		50.0	70.0		0.0	35.0		100.0	115.0		230.0
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	*0.75	0.95	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor		1.00					1.00					0.97
Frt		0.970				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1612	2703	0	1708	1845	1512	1652	3330	1670	*2068	3444	1516
Flt Permitted	0.167			0.098			0.332			0.197		
Satd. Flow (perm)	283	2703	0	176	1845	1512	576	3330	1670	336	3444	1473
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		17				277			154			189
Link Speed (k/h)		60			60			60				60
Link Distance (m)		448.3			341.9			505.9				2054.7
Travel Time (s)		26.9			20.5			30.4				123.3
Confl. Peds. (#/hr)			2	2			4					4
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles (%)	7%	2%	2%	1%	3%	8%	2%	6%	1%	4%	6%	3%
Adj. Flow (vph)	130	761	190	211	508	316	82	562	284	604	851	189
Shared Lane Traffic (%)												
Lane Group Flow (vph)	130	951	0	211	508	316	82	562	284	604	851	189
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8			6		5	2	
Permitted Phases	4			8		8	6		6	2		2
Detector Phase	7	4		3	8	8	6	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	11.0	45.0		11.0	45.0	45.0	39.5	39.5	39.5	11.0	39.5	39.5
Total Split (s)	12.0	48.0		13.0	49.0	49.0	34.0	34.0	34.0	35.0	69.0	69.0
Total Split (%)	9.2%	36.9%		10.0%	37.7%	37.7%	26.2%	26.2%	26.2%	26.9%	53.1%	53.1%
Maximum Green (s)	8.0	40.0		9.0	41.0	41.0	26.5	26.5	26.5	31.0	61.5	61.5
Yellow Time (s)	3.0	4.5		3.0	4.5	4.5	4.5	4.5	4.5	3.0	4.5	4.5
All-Red Time (s)	1.0	3.5		1.0	3.5	3.5	3.0	3.0	3.0	1.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	8.0		4.0	8.0	8.0	7.5	7.5	7.5	4.0	7.5	7.5
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes		Yes								
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
Recall Mode	None	None		None	None	None	C-Max	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)		7.0			7.0	7.0	7.0	7.0	7.0		7.0	7.0
Flash Dont Walk (s)		30.0			30.0	30.0	25.0	25.0	25.0		25.0	25.0
Pedestrian Calls (#/hr)		0			0	0	5	5	5		5	5
Act Effect Green (s)	52.0	40.0		54.0	41.0	41.0	26.5	26.5	26.5	65.0	61.5	61.5
Actuated g/C Ratio	0.40	0.31		0.42	0.32	0.32	0.20	0.20	0.20	0.50	0.47	0.47

Lanes, Volumes, Timings
 210: Yonge Street & St. John's Sideroad

AM peak hour
 2023 future background; with mitigation

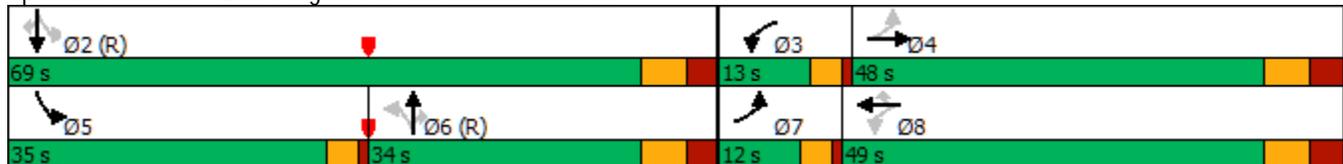


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.67	1.13		1.18	0.87	0.47	0.70	0.83	0.61	1.04	0.52	0.24
Control Delay	41.5	113.2		151.7	59.3	8.5	79.5	61.1	27.3	80.9	13.0	0.8
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.5	113.2		151.7	59.3	8.5	79.5	61.1	27.3	80.9	13.0	0.8
LOS	D	F		F	E	A	E	E	C	F	B	A
Approach Delay		104.6			62.7			52.4			36.6	
Approach LOS		F			E			D			D	
Queue Length 50th (m)	21.1	~196.0		-50.7	129.4	7.4	20.7	77.1	31.5	~143.4	34.3	0.1
Queue Length 95th (m)	#37.6	#246.4		#101.4	#187.7	30.9	#46.7	#98.8	61.8m#210.0	m40.1	m0.6	
Internal Link Dist (m)		424.3			317.9			481.9			2030.7	
Turn Bay Length (m)	65.0			70.0			35.0		100.0	115.0		230.0
Base Capacity (vph)	194	843		179	581	666	117	678	463	581	1629	796
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	0.67	1.13		1.18	0.87	0.47	0.70	0.83	0.61	1.04	0.52	0.24

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 35 (27%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.18
 Intersection Signal Delay: 61.1
 Intersection Capacity Utilization 98.2%
 Analysis Period (min) 15
 * User Entered Value
 ~ 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.

Splits and Phases: 210: Yonge Street & St. John's Sideroad



Lanes, Volumes, Timings

AM peak hour

220: Bathurst Street & 18th Sideroad/St. John's Sideroad

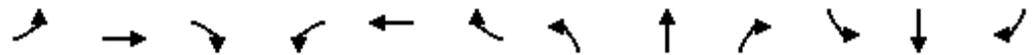
2023 future background; with mitigation



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	90	419	50	158	457	43	50	600	61	151	1100	280
Future Volume (vph)	90	419	50	158	457	43	50	600	61	151	1100	280
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.0	3.5	3.7	3.2	3.7	4.0	3.1	3.3	3.7
Storage Length (m)	30.0		0.0	50.0		50.0	60.0		60.0	60.0		60.0
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor		1.00										
Frt		0.984				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1738	1819	0	1668	1807	1601	1675	3510	1622	1688	3388	1617
Flt Permitted	0.445			0.157			0.169			0.279		
Satd. Flow (perm)	814	1819	0	276	1807	1601	298	3510	1622	496	3388	1617
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		6				87			127			211
Link Speed (k/h)		60			60			70				70
Link Distance (m)		129.9			1758.6			451.2				794.7
Travel Time (s)		7.8			105.5			23.2				40.9
Confl. Bikes (#/hr)			1									
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	5%	4%	2%	1%	4%	2%	3%	4%	4%	1%	3%	1%
Adj. Flow (vph)	95	441	53	166	481	45	53	632	64	159	1158	295
Shared Lane Traffic (%)												
Lane Group Flow (vph)	95	494	0	166	481	45	53	632	64	159	1158	295
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases		4		3	8			6		5	2	
Permitted Phases	4			8		8	6		6	2		2
Detector Phase	4	4		3	8	8	6	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	10.0	10.0		7.0	10.0	10.0	20.0	20.0	20.0	7.0	20.0	20.0
Minimum Split (s)	17.5	17.5		11.0	38.5	38.5	36.5	36.5	36.5	11.0	36.5	36.5
Total Split (s)	37.5	37.5		11.0	37.5	37.5	47.5	47.5	47.5	11.0	47.5	47.5
Total Split (%)	35.0%	35.0%		10.3%	35.0%	35.0%	44.4%	44.4%	44.4%	10.3%	44.4%	44.4%
Maximum Green (s)	30.0	30.0		7.0	30.0	30.0	40.0	40.0	40.0	7.0	40.0	40.0
Yellow Time (s)	4.5	4.5		3.0	4.5	4.5	5.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	3.0	3.0		1.0	3.0	3.0	2.5	2.5	2.5	1.0	2.5	2.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.5	7.5		4.0	7.5	7.5	7.5	7.5	7.5	4.0	7.5	7.5
Lead/Lag	Lag	Lag		Lead			Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes		Yes			Yes	Yes	Yes	Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	6.0	6.0	6.0	3.0	6.0	6.0
Recall Mode	None	None		None	None	None	Min	Min	Min	None	Min	Min
Walk Time (s)				7.0	7.0	7.0	7.0	7.0	7.0		7.0	7.0
Flash Dont Walk (s)				24.0	24.0	22.0	22.0	22.0			22.0	22.0
Pedestrian Calls (#/hr)				0	0	0	0	0			0	0
Act Effct Green (s)	29.3	29.3		43.9	40.4	40.4	31.8	31.8	31.8	46.4	42.9	42.9
Actuated g/C Ratio	0.30	0.30		0.45	0.41	0.41	0.32	0.32	0.32	0.47	0.44	0.44

Lanes, Volumes, Timings
 220: Bathurst Street & 18th Sideroad/St. John's Sideroad

AM peak hour
 2023 future background; with mitigation



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.39	0.90		0.75	0.65	0.06	0.55	0.56	0.10	0.50	0.78	0.36
Control Delay	34.5	55.3		41.4	29.1	0.9	51.0	29.4	0.3	21.0	28.2	6.7
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	34.5	55.3		41.4	29.1	0.9	51.0	29.4	0.3	21.0	28.2	6.7
LOS	C	E		D	C	A	D	C	A	C	C	A
Approach Delay		52.0			30.2			28.5			23.5	
Approach LOS		D			C			C			C	
Queue Length 50th (m)	14.3	89.3		18.7	71.3	0.0	8.7	55.0	0.0	18.1	102.8	9.9
Queue Length 95th (m)	33.7	#173.1		#52.5	126.2	1.5	23.7	72.2	0.0	30.5	128.8	26.4
Internal Link Dist (m)		105.9			1734.6			427.2			770.7	
Turn Bay Length (m)	30.0			50.0		50.0	60.0		60.0	60.0		60.0
Base Capacity (vph)	249	561		222	756	720	121	1433	737	319	1763	942
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	0.38	0.88		0.75	0.64	0.06	0.44	0.44	0.09	0.50	0.66	0.31

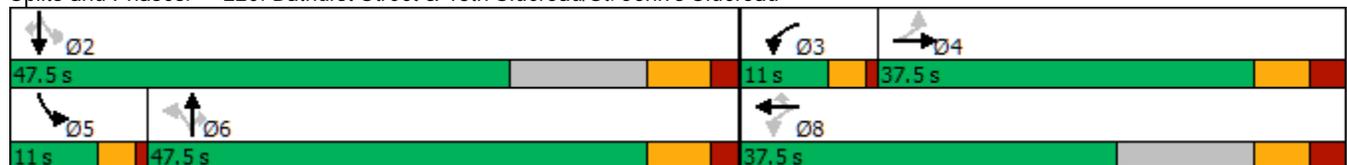
Intersection Summary

Area Type: Other
 Cycle Length: 107
 Actuated Cycle Length: 98.3
 Natural Cycle: 90
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.90
 Intersection Signal Delay: 30.4
 Intersection Capacity Utilization 104.5%
 Analysis Period (min) 15

Intersection LOS: C
 ICU Level of Service G

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

Splits and Phases: 220: Bathurst Street & 18th Sideroad/St. John's Sideroad



Lanes, Volumes, Timings
210: Yonge Street & St. John's Sideroad

AM peak hour
2028 future background; with mitigation



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	121	737	179	198	477	291	78	510	268	573	792	173
Future Volume (vph)	121	737	179	198	477	291	78	510	268	573	792	173
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.2	3.6	3.7	3.2	3.6	3.7	3.0	3.4	4.0	3.0	3.7	3.3
Storage Length (m)	65.0		50.0	70.0		0.0	35.0		100.0	115.0		230.0
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	*0.75	0.95	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor		1.00					1.00					0.97
Frt		0.971				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1612	2706	0	1708	1845	1512	1652	3330	1670	*2068	3444	1516
Flt Permitted	0.156			0.093			0.320			0.188		
Satd. Flow (perm)	265	2706	0	167	1845	1512	555	3330	1670	321	3444	1473
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		17				278			132			194
Link Speed (k/h)		60			60			60				60
Link Distance (m)		448.3			341.9			505.9				2054.7
Travel Time (s)		26.9			20.5			30.4				123.3
Confl. Peds. (#/hr)			2	2			4					4
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles (%)	7%	2%	2%	1%	3%	8%	2%	6%	1%	4%	6%	3%
Adj. Flow (vph)	136	828	201	222	536	327	88	573	301	644	890	194
Shared Lane Traffic (%)												
Lane Group Flow (vph)	136	1029	0	222	536	327	88	573	301	644	890	194
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8			6		5	2	
Permitted Phases	4			8		8	6		6	2		2
Detector Phase	7	4		3	8	8	6	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	11.0	45.0		11.0	45.0	45.0	39.5	39.5	39.5	11.0	39.5	39.5
Total Split (s)	11.0	50.0		12.0	51.0	51.0	34.0	34.0	34.0	34.0	68.0	68.0
Total Split (%)	8.5%	38.5%		9.2%	39.2%	39.2%	26.2%	26.2%	26.2%	26.2%	52.3%	52.3%
Maximum Green (s)	7.0	42.0		8.0	43.0	43.0	26.5	26.5	26.5	30.0	60.5	60.5
Yellow Time (s)	3.0	4.5		3.0	4.5	4.5	4.5	4.5	4.5	3.0	4.5	4.5
All-Red Time (s)	1.0	3.5		1.0	3.5	3.5	3.0	3.0	3.0	1.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	8.0		4.0	8.0	8.0	7.5	7.5	7.5	4.0	7.5	7.5
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes		Yes								
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
Recall Mode	None	None		None	None	None	C-Max	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)		7.0			7.0	7.0	7.0	7.0	7.0		7.0	7.0
Flash Dont Walk (s)		30.0			30.0	30.0	25.0	25.0	25.0		25.0	25.0
Pedestrian Calls (#/hr)		0			0	0	5	5	5		5	5
Act Effct Green (s)	53.0	42.0		55.0	43.0	43.0	26.5	26.5	26.5	64.0	60.5	60.5
Actuated g/C Ratio	0.41	0.32		0.42	0.33	0.33	0.20	0.20	0.20	0.49	0.47	0.47

Lanes, Volumes, Timings
210: Yonge Street & St. John's Sideroad

AM peak hour
2028 future background; with mitigation

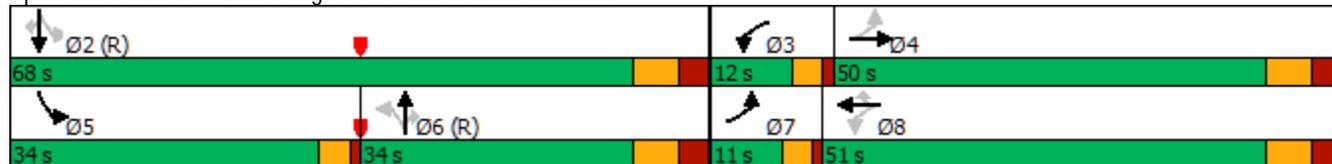


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.76	1.16		1.35	0.88	0.48	0.78	0.85	0.68	1.15	0.56	0.25
Control Delay	50.8	124.7		216.0	58.1	8.7	90.7	62.4	34.8	118.2	14.2	0.8
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.8	124.7		216.0	58.1	8.7	90.7	62.4	34.8	118.2	14.2	0.8
LOS	D	F		F	E	A	F	E	C	F	B	A
Approach Delay		116.1			75.5			56.3			51.5	
Approach LOS		F			E			E			D	
Queue Length 50th (m)	21.8	~217.5		~61.1	136.1	9.1	22.7	79.0	42.5	~172.9	38.6	0.1
Queue Length 95th (m)	#44.9	#268.3		#112.3	#196.0	33.4	#52.4	#104.5	74.4m	#241.1	m44.9	m0.6
Internal Link Dist (m)		424.3			317.9			481.9			2030.7	
Turn Bay Length (m)	65.0			70.0			35.0		100.0	115.0		230.0
Base Capacity (vph)	180	885		165	610	686	113	678	445	561	1602	789
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	0.76	1.16		1.35	0.88	0.48	0.78	0.85	0.68	1.15	0.56	0.25

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 35 (27%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.35
 Intersection Signal Delay: 72.9
 Intersection Capacity Utilization 102.8%
 Analysis Period (min) 15
 * User Entered Value
 ~ 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.

Splits and Phases: 210: Yonge Street & St. John's Sideroad



Lanes, Volumes, Timings

AM peak hour

220: Bathurst Street & 18th Sideroad/St. John's Sideroad

2028 future background; with mitigation



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	95	459	55	168	482	48	55	610	61	166	1205	300
Future Volume (vph)	95	459	55	168	482	48	55	610	61	166	1205	300
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.0	3.5	3.7	3.2	3.7	4.0	3.1	3.3	3.7
Storage Length (m)	30.0		0.0	50.0		50.0	60.0		60.0	60.0		60.0
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor		1.00										
Frt		0.984				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1738	1819	0	1668	1807	1601	1675	3510	1622	1688	3388	1617
Flt Permitted	0.393			0.118			0.119			0.278		
Satd. Flow (perm)	719	1819	0	207	1807	1601	210	3510	1622	494	3388	1617
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		6				83			122			217
Link Speed (k/h)		60			60			70				70
Link Distance (m)		129.9			1758.6			451.2				794.7
Travel Time (s)		7.8			105.5			23.2				40.9
Confl. Bikes (#/hr)			1									
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	5%	4%	2%	1%	4%	2%	3%	4%	4%	1%	3%	1%
Adj. Flow (vph)	100	483	58	177	507	51	58	642	64	175	1268	316
Shared Lane Traffic (%)												
Lane Group Flow (vph)	100	541	0	177	507	51	58	642	64	175	1268	316
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases		4		3	8			6		5	2	
Permitted Phases	4			8		8	6		6	2		2
Detector Phase	4	4		3	8	8	6	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	10.0	10.0		7.0	10.0	10.0	20.0	20.0	20.0	7.0	20.0	20.0
Minimum Split (s)	17.5	17.5		11.0	38.5	38.5	36.5	36.5	36.5	11.0	36.5	36.5
Total Split (s)	42.5	42.5		11.0	42.5	42.5	47.5	47.5	47.5	11.0	47.5	47.5
Total Split (%)	37.9%	37.9%		9.8%	37.9%	37.9%	42.4%	42.4%	42.4%	9.8%	42.4%	42.4%
Maximum Green (s)	35.0	35.0		7.0	35.0	35.0	40.0	40.0	40.0	7.0	40.0	40.0
Yellow Time (s)	4.5	4.5		3.0	4.5	4.5	5.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	3.0	3.0		1.0	3.0	3.0	2.5	2.5	2.5	1.0	2.5	2.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.5	7.5		4.0	7.5	7.5	7.5	7.5	7.5	4.0	7.5	7.5
Lead/Lag	Lag	Lag		Lead			Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes		Yes			Yes	Yes	Yes	Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	6.0	6.0	6.0	3.0	6.0	6.0
Recall Mode	None	None		None	None	None	Min	Min	Min	None	Min	Min
Walk Time (s)				7.0	7.0	7.0	7.0	7.0	7.0		7.0	7.0
Flash Dont Walk (s)				24.0	24.0	22.0	22.0	22.0			22.0	22.0
Pedestrian Calls (#/hr)				0	0	0	0	0	0		0	0
Act Effct Green (s)	33.6	33.6		48.2	44.7	44.7	36.3	36.3	36.3	50.9	47.3	47.3
Actuated g/C Ratio	0.31	0.31		0.45	0.42	0.42	0.34	0.34	0.34	0.48	0.44	0.44

Lanes, Volumes, Timings
 220: Bathurst Street & 18th Sideroad/St. John's Sideroad

AM peak hour
 2028 future background; with mitigation



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.44	0.94		0.94	0.67	0.07	0.82	0.54	0.10	0.56	0.85	0.38
Control Delay	37.8	62.2		76.3	31.3	1.7	101.8	30.6	0.3	24.6	33.2	7.6
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	37.8	62.2		76.3	31.3	1.7	101.8	30.6	0.3	24.6	33.2	7.6
LOS	D	E		E	C	A	F	C	A	C	C	A
Approach Delay		58.4			40.1			33.5			27.8	
Approach LOS		E			D			C			C	
Queue Length 50th (m)	18.3	120.1		24.9	94.0	0.0	11.8	60.7	0.0	22.3	130.4	12.9
Queue Length 95th (m)	36.2	#190.0		#67.5	133.8	3.1	#37.7	78.7	0.5	36.5	161.1	32.3
Internal Link Dist (m)		105.9			1734.6			427.2			770.7	
Turn Bay Length (m)	30.0			50.0		50.0	60.0		60.0	60.0		60.0
Base Capacity (vph)	235	600		188	779	737	78	1316	684	313	1619	886
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	0.43	0.90		0.94	0.65	0.07	0.74	0.49	0.09	0.56	0.78	0.36

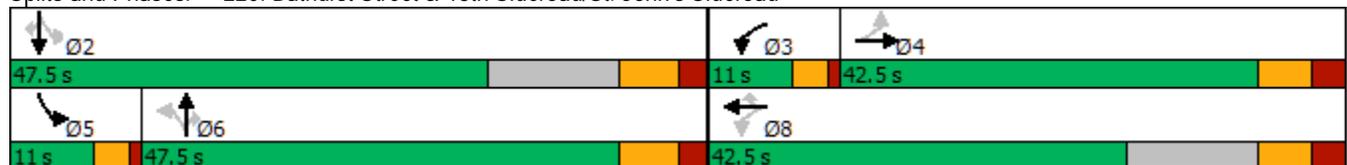
Intersection Summary

Area Type: Other
 Cycle Length: 112
 Actuated Cycle Length: 107.1
 Natural Cycle: 90
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.94
 Intersection Signal Delay: 36.2
 Intersection Capacity Utilization 108.9%
 Analysis Period (min) 15

Intersection LOS: D
 ICU Level of Service G

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

Splits and Phases: 220: Bathurst Street & 18th Sideroad/St. John's Sideroad



Lanes, Volumes, Timings
210: Yonge Street & St. John's Sideroad

AM peak hour
2023 total future; with mitigation

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	144	717	202	183	482	281	95	497	248	538	754	182
Future Volume (vph)	144	717	202	183	482	281	95	497	248	538	754	182
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.2	3.6	3.7	3.2	3.6	3.7	3.0	3.4	4.0	3.0	3.7	3.3
Storage Length (m)	65.0		50.0	70.0		0.0	35.0		100.0	115.0		230.0
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	*0.75	0.95	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor		1.00					1.00					0.98
Frt		0.967				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1612	2694	0	1708	1845	1512	1652	3330	1670	*2068	3444	1516
Flt Permitted	0.149			0.093			0.334			0.201		
Satd. Flow (perm)	253	2694	0	167	1845	1512	580	3330	1670	343	3444	1490
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		20				265			138			204
Link Speed (k/h)		60			60			60			60	
Link Distance (m)		448.3			341.9			505.9			608.7	
Travel Time (s)		26.9			20.5			30.4			36.5	
Confl. Peds. (#/hr)			2	2			4					4
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles (%)	7%	2%	2%	1%	3%	8%	2%	6%	1%	4%	6%	3%
Adj. Flow (vph)	162	806	227	206	542	316	107	558	279	604	847	204
Shared Lane Traffic (%)												
Lane Group Flow (vph)	162	1033	0	206	542	316	107	558	279	604	847	204
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8			6		5	2	
Permitted Phases	4			8		8	6		6	2		2
Detector Phase	7	4		3	8	8	6	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	11.0	45.0		11.0	45.0	45.0	39.5	39.5	39.5	11.0	39.5	39.5
Total Split (s)	11.0	50.0		12.0	51.0	51.0	34.0	34.0	34.0	34.0	68.0	68.0
Total Split (%)	8.5%	38.5%		9.2%	39.2%	39.2%	26.2%	26.2%	26.2%	26.2%	52.3%	52.3%
Maximum Green (s)	7.0	42.0		8.0	43.0	43.0	26.5	26.5	26.5	30.0	60.5	60.5
Yellow Time (s)	3.0	4.5		3.0	4.5	4.5	4.5	4.5	4.5	3.0	4.5	4.5
All-Red Time (s)	1.0	3.5		1.0	3.5	3.5	3.0	3.0	3.0	1.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	8.0		4.0	8.0	8.0	7.5	7.5	7.5	4.0	7.5	7.5
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes		
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
Recall Mode	None	None		None	None	None	C-Max	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)		7.0			7.0	7.0	7.0	7.0	7.0		7.0	7.0
Flash Dont Walk (s)		30.0			30.0	30.0	25.0	25.0	25.0		25.0	25.0
Pedestrian Calls (#/hr)		0			0	0	5	5	5		5	5
Act Effct Green (s)	53.0	42.0		55.0	43.0	43.0	26.5	26.5	26.5	64.0	60.5	60.5
Actuated g/C Ratio	0.41	0.32		0.42	0.33	0.33	0.20	0.20	0.20	0.49	0.47	0.47

Lanes, Volumes, Timings
210: Yonge Street & St. John's Sideroad

AM peak hour
2023 total future; with mitigation

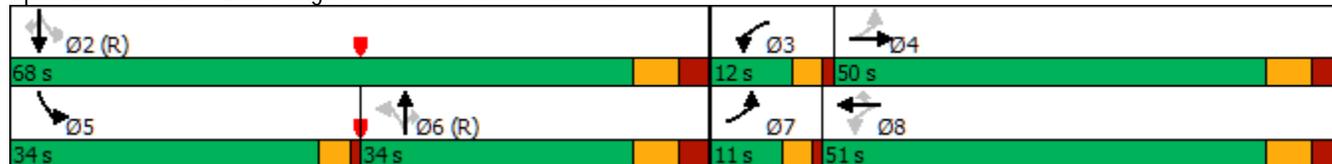


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.92	1.17		1.25	0.89	0.47	0.91	0.82	0.62	1.07	0.53	0.25
Control Delay	71.7	124.3		178.7	59.3	9.0	112.2	60.7	30.0	90.4	16.0	1.0
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	71.7	124.3		178.7	59.3	9.0	112.2	60.7	30.0	90.4	16.0	1.0
LOS	E	F		F	E	A	F	E	C	F	B	A
Approach Delay		117.2			67.5			57.5				41.3
Approach LOS		F			E			E				D
Queue Length 50th (m)	24.0	~219.0		~52.0	138.1	9.5	28.5	76.4	34.5	~148.7	43.5	0.3
Queue Length 95th (m)	m#51.4	#269.8		#102.0	#199.9	33.3	#64.9	97.1	64.6m#209.7	m49.9	m0.7	
Internal Link Dist (m)		424.3			317.9			481.9			584.7	
Turn Bay Length (m)	65.0			70.0			35.0		100.0	115.0		230.0
Base Capacity (vph)	176	883		165	610	677	118	678	450	566	1602	802
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	0.92	1.17		1.25	0.89	0.47	0.91	0.82	0.62	1.07	0.53	0.25

Intersection Summary

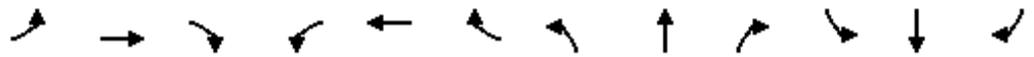
Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 35 (27%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.25
 Intersection Signal Delay: 68.8
 Intersection Capacity Utilization 99.9%
 Analysis Period (min) 15
 * User Entered Value
 ~ 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.

Splits and Phases: 210: Yonge Street & St. John's Sideroad



Lanes, Volumes, Timings
 220: Bathurst Street & 18th Sideroad/St. John's Sideroad

AM peak hour
 2023 total future; with mitigation



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	90	433	50	180	485	52	50	600	78	164	1100	280
Future Volume (vph)	90	433	50	180	485	52	50	600	78	164	1100	280
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.0	3.5	3.7	3.2	3.7	4.0	3.1	3.3	3.7
Storage Length (m)	30.0		0.0	50.0		50.0	60.0		60.0	60.0		60.0
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor		1.00										
Frt		0.984				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1738	1819	0	1668	1807	1601	1675	3510	1622	1688	3388	1617
Flt Permitted	0.404			0.145			0.167			0.278		
Satd. Flow (perm)	739	1819	0	255	1807	1601	294	3510	1622	494	3388	1617
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		5				87			127			190
Link Speed (k/h)		60			60			70				70
Link Distance (m)		129.9			1758.6			451.2				794.7
Travel Time (s)		7.8			105.5			23.2				40.9
Confl. Bikes (#/hr)			1									
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	5%	4%	2%	1%	4%	2%	3%	4%	4%	1%	3%	1%
Adj. Flow (vph)	95	456	53	189	511	55	53	632	82	173	1158	295
Shared Lane Traffic (%)												
Lane Group Flow (vph)	95	509	0	189	511	55	53	632	82	173	1158	295
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases		4		3	8			6		5	2	
Permitted Phases	4			8		8	6		6	2		2
Detector Phase	4	4		3	8	8	6	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	10.0	10.0		7.0	10.0	10.0	20.0	20.0	20.0	7.0	20.0	20.0
Minimum Split (s)	17.5	17.5		11.0	38.5	38.5	36.5	36.5	36.5	11.0	36.5	36.5
Total Split (s)	37.5	37.5		11.0	37.5	37.5	47.5	47.5	47.5	11.0	47.5	47.5
Total Split (%)	35.0%	35.0%		10.3%	35.0%	35.0%	44.4%	44.4%	44.4%	10.3%	44.4%	44.4%
Maximum Green (s)	30.0	30.0		7.0	30.0	30.0	40.0	40.0	40.0	7.0	40.0	40.0
Yellow Time (s)	4.5	4.5		3.0	4.5	4.5	5.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	3.0	3.0		1.0	3.0	3.0	2.5	2.5	2.5	1.0	2.5	2.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.5	7.5		4.0	7.5	7.5	7.5	7.5	7.5	4.0	7.5	7.5
Lead/Lag	Lag	Lag		Lead			Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes		Yes			Yes	Yes	Yes	Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	6.0	6.0	6.0	3.0	6.0	6.0
Recall Mode	None	None		None	None	None	Min	Min	Min	None	Min	Min
Walk Time (s)				7.0	7.0	7.0	7.0	7.0	7.0		7.0	7.0
Flash Dont Walk (s)				24.0	24.0	22.0	22.0	22.0			22.0	22.0
Pedestrian Calls (#/hr)				0	0	0	0	0			0	0
Act Effct Green (s)	30.1	30.1		44.6	41.1	41.1	32.1	32.1	32.1	46.7	43.2	43.2
Actuated g/C Ratio	0.30	0.30		0.45	0.41	0.41	0.32	0.32	0.32	0.47	0.44	0.44

Lanes, Volumes, Timings
 220: Bathurst Street & 18th Sideroad/St. John's Sideroad

AM peak hour
 2023 total future; with mitigation

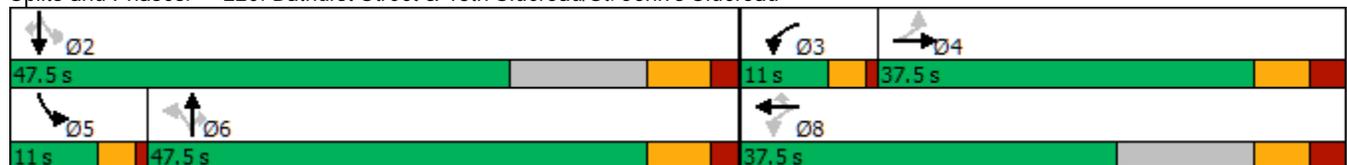
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.43	0.92		0.88	0.68	0.08	0.56	0.56	0.13	0.55	0.79	0.36
Control Delay	36.3	57.7		60.5	30.4	1.9	52.3	29.6	1.6	22.6	28.5	7.7
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.3	57.7		60.5	30.4	1.9	52.3	29.6	1.6	22.6	28.5	7.7
LOS	D	E		E	C	A	D	C	A	C	C	A
Approach Delay		54.4			35.9			28.2			24.1	
Approach LOS		D			D			C			C	
Queue Length 50th (m)	14.5	93.2		21.6	77.6	0.0	8.8	55.0	0.0	19.9	102.8	12.5
Queue Length 95th (m)	34.6	#181.4		#66.0	136.9	3.5	#23.9	72.2	3.3	33.1	128.8	29.9
Internal Link Dist (m)		105.9			1734.6			427.2			770.7	
Turn Bay Length (m)	30.0			50.0		50.0	60.0		60.0	60.0		60.0
Base Capacity (vph)	223	554		214	747	713	118	1417	730	316	1744	925
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	0.43	0.92		0.88	0.68	0.08	0.45	0.45	0.11	0.55	0.66	0.32

Intersection Summary

Area Type: Other
 Cycle Length: 107
 Actuated Cycle Length: 99.3
 Natural Cycle: 90
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.92
 Intersection Signal Delay: 32.2
 Intersection LOS: C
 Intersection Capacity Utilization 105.9%
 ICU Level of Service G
 Analysis Period (min) 15

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

Splits and Phases: 220: Bathurst Street & 18th Sideroad/St. John's Sideroad



Lanes, Volumes, Timings
 330: Willow Farm Lane/Street "A" & St. John's Sideroad

AM peak hour
 2023 total future; with mitigation



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	52	890	3	20	666	72	1	4	65	107	4	66
Future Volume (vph)	52	890	3	20	666	72	1	4	65	107	4	66
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.0	3.7	3.7	3.4	3.3	3.3	3.7	3.7	3.7	3.7	3.7	3.7
Storage Length (m)	15.0		15.0	30.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		1	1		1	0		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Fr _t			0.850			0.850		0.874			0.858	
Fl _t Protected	0.950			0.950				0.999		0.950		
Satd. Flow (prot)	1685	1883	1633	1681	1801	1561	0	1647	0	1825	1648	0
Fl _t Permitted	0.323			0.187				0.995		0.709		
Satd. Flow (perm)	573	1883	1633	331	1801	1561	0	1640	0	1362	1648	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			50			77		69			70	
Link Speed (k/h)		60			60			40			50	
Link Distance (m)		1758.6			448.3			195.4			116.6	
Travel Time (s)		105.5			26.9			17.6			8.4	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	0%	2%	0%	5%	2%	0%	0%	0%	2%	0%	0%	0%
Adj. Flow (vph)	55	947	3	21	709	77	1	4	69	114	4	70
Shared Lane Traffic (%)												
Lane Group Flow (vph)	55	947	3	21	709	77	0	74	0	114	74	0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			8				4
Permitted Phases	2		2	6		6	8			4		
Detector Phase	2	2	2	6	6	6	8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Minimum Split (s)	24.0	24.0	24.0	24.0	24.0	24.0	27.0	27.0		27.0	27.0	
Total Split (s)	38.0	38.0	38.0	38.0	38.0	38.0	27.0	27.0		27.0	27.0	
Total Split (%)	58.5%	58.5%	58.5%	58.5%	58.5%	58.5%	41.5%	41.5%		41.5%	41.5%	
Maximum Green (s)	32.0	32.0	32.0	32.0	32.0	32.0	21.0	21.0		21.0	21.0	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	3.0	3.0		3.0	3.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	3.0	3.0		3.0	3.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0		6.0		6.0	6.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	None	None		None	None	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	9.0	9.0	9.0	9.0	9.0	9.0	14.0	14.0		14.0	14.0	
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0		0	0	
Act Effct Green (s)	45.9	45.9	45.9	45.9	45.9	45.9		10.6		10.7	10.7	
Actuated g/C Ratio	0.71	0.71	0.71	0.71	0.71	0.71		0.16		0.16	0.16	
v/c Ratio	0.14	0.71	0.00	0.09	0.56	0.07		0.23		0.51	0.22	
Control Delay	6.7	13.5	0.0	1.8	5.8	0.2		8.7		31.7	8.5	

Lanes, Volumes, Timings
 330: Willow Farm Lane/Street "A" & St. John's Sideroad

AM peak hour
 2023 total future; with mitigation

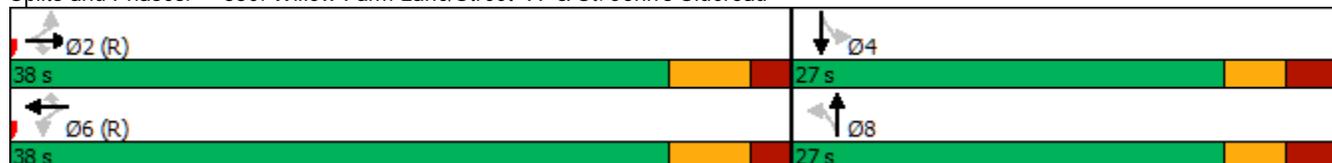


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0	0.0	
Total Delay	6.7	13.5	0.0	1.8	5.8	0.2		8.7		31.7	8.5	
LOS	A	B	A	A	A	A		A		C	A	
Approach Delay		13.0			5.1			8.7			22.6	
Approach LOS		B			A			A			C	
Queue Length 50th (m)	2.3	70.8	0.0	0.2	5.9	0.0		0.6		13.4	0.4	
Queue Length 95th (m)	8.1	#176.1	0.0	m0.6	m166.3	m0.5		9.4		25.5	9.3	
Internal Link Dist (m)		1734.6			424.3			171.4			92.6	
Turn Bay Length (m)	15.0		15.0	30.0								
Base Capacity (vph)	404	1328	1167	233	1270	1124		576		440	579	
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	0.14	0.71	0.00	0.09	0.56	0.07		0.13		0.26	0.13	

Intersection Summary

Area Type: Other
 Cycle Length: 65
 Actuated Cycle Length: 65
 Offset: 55 (85%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
 Natural Cycle: 75
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.71
 Intersection Signal Delay: 10.7
 Intersection Capacity Utilization 69.4%
 Analysis Period (min) 15
 # 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.

Splits and Phases: 330: Willow Farm Lane/Street "A" & St. John's Sideroad



Lanes, Volumes, Timings
210: Yonge Street & St. John's Sideroad

AM peak hour
2028 total future; with mitigation

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	164	833	247	179	570	291	123	501	250	573	782	214
Future Volume (vph)	164	833	247	179	570	291	123	501	250	573	782	214
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.2	3.6	3.7	3.2	3.6	3.7	3.0	3.4	4.0	3.0	3.7	3.3
Storage Length (m)	65.0		50.0	70.0		0.0	35.0		100.0	115.0		230.0
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	*0.75	0.95	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor		1.00					1.00					0.98
Frt		0.966				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1612	2690	0	1708	1845	1512	1652	3330	1670	*2068	3444	1516
Flt Permitted	0.085			0.087			0.273			0.197		
Satd. Flow (perm)	144	2690	0	156	1845	1512	474	3330	1670	336	3444	1490
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		23				241			144			240
Link Speed (k/h)		60			60			60				60
Link Distance (m)		448.3			341.9			505.9				608.7
Travel Time (s)		26.9			20.5			30.4				36.5
Confl. Peds. (#/hr)			2	2			4					4
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles (%)	7%	2%	2%	1%	3%	8%	2%	6%	1%	4%	6%	3%
Adj. Flow (vph)	184	936	278	201	640	327	138	563	281	644	879	240
Shared Lane Traffic (%)												
Lane Group Flow (vph)	184	1214	0	201	640	327	138	563	281	644	879	240
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases	4			8		8	6		6	2		2
Detector Phase	7	4		3	8	8	1	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	11.0	45.0		11.0	45.0	45.0	11.0	39.5	39.5	11.0	39.5	39.5
Total Split (s)	13.0	55.0		12.0	54.0	54.0	11.0	34.0	34.0	29.0	52.0	52.0
Total Split (%)	10.0%	42.3%		9.2%	41.5%	41.5%	8.5%	26.2%	26.2%	22.3%	40.0%	40.0%
Maximum Green (s)	9.0	47.0		8.0	46.0	46.0	7.0	26.5	26.5	25.0	44.5	44.5
Yellow Time (s)	3.0	4.5		3.0	4.5	4.5	3.0	4.5	4.5	3.0	4.5	4.5
All-Red Time (s)	1.0	3.5		1.0	3.5	3.5	1.0	3.0	3.0	1.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	8.0		4.0	8.0	8.0	4.0	7.5	7.5	4.0	7.5	7.5
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
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
Recall Mode	None	None		None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)		7.0			7.0	7.0		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		30.0			30.0	30.0		25.0	25.0		25.0	25.0
Pedestrian Calls (#/hr)		0			0	0		5	5		5	5
Act Effect Green (s)	60.0	47.0		58.0	46.0	46.0	37.0	26.5	26.5	59.0	44.5	44.5
Actuated g/C Ratio	0.46	0.36		0.45	0.35	0.35	0.28	0.20	0.20	0.45	0.34	0.34

Lanes, Volumes, Timings
210: Yonge Street & St. John's Sideroad

AM peak hour
2028 total future; with mitigation

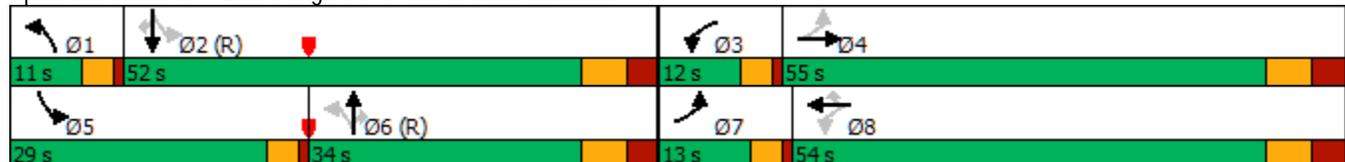


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	1.10	1.23		1.22	0.98	0.47	0.70	0.83	0.62	1.33	0.75	0.36
Control Delay	117.8	145.9		168.1	72.8	11.1	46.1	61.2	29.0	199.1	49.0	13.9
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	117.8	145.9		168.1	72.8	11.1	46.1	61.2	29.0	199.1	49.0	13.9
LOS	F	F		F	E	B	D	E	C	F	D	B
Approach Delay		142.2			71.9			49.9			99.0	
Approach LOS		F			E			D			F	
Queue Length 50th (m)	-39.9	-264.8		-49.3	170.0	15.8	21.8	77.2	33.4	-204.5	100.5	11.3
Queue Length 95th (m)	m#71.6	m#314.6		#98.9	#245.7	41.7	#40.3	#99.2	63.5	m#267.0	m124.3	m26.4
Internal Link Dist (m)		424.3			317.9			481.9			584.7	
Turn Bay Length (m)	65.0			70.0			35.0		100.0	115.0		230.0
Base Capacity (vph)	168	987		165	652	690	198	678	455	485	1178	667
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	1.10	1.23		1.22	0.98	0.47	0.70	0.83	0.62	1.33	0.75	0.36

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 0 (0%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.33
 Intersection Signal Delay: 95.3
 Intersection Capacity Utilization 106.1%
 Analysis Period (min) 15
 * User Entered Value
 ~ 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.

Splits and Phases: 210: Yonge Street & St. John's Sideroad



Lanes, Volumes, Timings
 220: Bathurst Street & 18th Sideroad/St. John's Sideroad

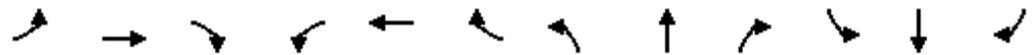
AM peak hour
 2028 total future; with mitigation



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗	↗	↖	↗↗	↗	↖	↗↗	↖
Traffic Volume (vph)	95	505	55	210	522	70	55	610	113	200	1205	300
Future Volume (vph)	95	505	55	210	522	70	55	610	113	200	1205	300
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.0	3.5	3.7	3.2	3.7	4.0	3.1	3.3	3.7
Storage Length (m)	30.0		0.0	50.0		50.0	60.0		60.0	60.0		60.0
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor		1.00										
Frt		0.985				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1738	1821	0	1668	1807	1601	1675	3510	1622	1688	3388	1617
Flt Permitted	0.383			0.091			0.099			0.273		
Satd. Flow (perm)	701	1821	0	160	1807	1601	175	3510	1622	485	3388	1617
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		5				73			119			204
Link Speed (k/h)		60			60			70				70
Link Distance (m)		129.9			1758.6			451.2			794.7	
Travel Time (s)		7.8			105.5			23.2			40.9	
Confl. Bikes (#/hr)			1									
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	5%	4%	2%	1%	4%	2%	3%	4%	4%	1%	3%	1%
Adj. Flow (vph)	100	532	58	221	549	74	58	642	119	211	1268	316
Shared Lane Traffic (%)												
Lane Group Flow (vph)	100	590	0	221	549	74	58	642	119	211	1268	316
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases		4		3	8			6		5	2	
Permitted Phases	4			8		8	6		6	2		2
Detector Phase	4	4		3	8	8	6	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	10.0	10.0		7.0	10.0	10.0	20.0	20.0	20.0	7.0	20.0	20.0
Minimum Split (s)	17.5	17.5		11.0	38.5	38.5	36.5	36.5	36.5	11.0	36.5	36.5
Total Split (s)	47.5	47.5		16.0	47.5	47.5	52.5	52.5	52.5	11.0	52.5	52.5
Total Split (%)	37.4%	37.4%		12.6%	37.4%	37.4%	41.3%	41.3%	41.3%	8.7%	41.3%	41.3%
Maximum Green (s)	40.0	40.0		12.0	40.0	40.0	45.0	45.0	45.0	7.0	45.0	45.0
Yellow Time (s)	4.5	4.5		3.0	4.5	4.5	5.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	3.0	3.0		1.0	3.0	3.0	2.5	2.5	2.5	1.0	2.5	2.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.5	7.5		4.0	7.5	7.5	7.5	7.5	7.5	4.0	7.5	7.5
Lead/Lag	Lag	Lag		Lead			Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes		Yes			Yes	Yes	Yes	Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	6.0	6.0	6.0	3.0	6.0	6.0
Recall Mode	None	None		None	None	None	Min	Min	Min	None	Min	Min
Walk Time (s)				7.0	7.0	7.0	7.0	7.0	7.0		7.0	7.0
Flash Dont Walk (s)				24.0	24.0	22.0	22.0	22.0	22.0		22.0	22.0
Pedestrian Calls (#/hr)				0	0	0	0	0	0		0	0
Act Effct Green (s)	40.1	40.1		59.6	56.1	56.1	42.7	42.7	42.7	57.2	53.7	53.7
Actuated g/C Ratio	0.32	0.32		0.48	0.45	0.45	0.34	0.34	0.34	0.46	0.43	0.43

Lanes, Volumes, Timings
 220: Bathurst Street & 18th Sideroad/St. John's Sideroad

AM peak hour
 2028 total future; with mitigation



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.45	1.01		1.00	0.68	0.10	0.97	0.54	0.19	0.73	0.87	0.39
Control Delay	42.2	80.9		92.3	32.9	5.0	151.9	34.8	5.5	39.0	40.0	9.6
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	42.2	80.9		92.3	32.9	5.0	151.9	34.8	5.5	39.0	40.0	9.6
LOS	D	F		F	C	A	F	C	A	D	D	A
Approach Delay		75.3			46.0			38.8			34.5	
Approach LOS		E			D			D			C	
Queue Length 50th (m)	21.0	~164.0		-43.4	113.9	0.2	14.7	69.8	0.0	33.0	154.1	17.4
Queue Length 95th (m)	40.1	#238.0		#97.4	157.2	9.2	#44.9	88.8	13.3	#53.9	186.3	39.6
Internal Link Dist (m)		105.9			1734.6			427.2			770.7	
Turn Bay Length (m)	30.0			50.0		50.0	60.0		60.0	60.0		60.0
Base Capacity (vph)	224	587		221	811	759	63	1267	661	289	1521	839
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	1.01		1.00	0.68	0.10	0.92	0.51	0.18	0.73	0.83	0.38

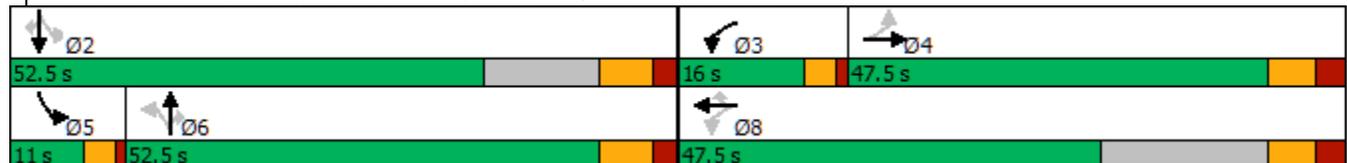
Intersection Summary

Area Type: Other
 Cycle Length: 127
 Actuated Cycle Length: 124.8
 Natural Cycle: 100
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 1.01
 Intersection Signal Delay: 44.5
 Intersection Capacity Utilization 113.6%
 Analysis Period (min) 15
 Intersection LOS: D
 ICU Level of Service H

~ 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.

Splits and Phases: 220: Bathurst Street & 18th Sideroad/St. John's Sideroad



Lanes, Volumes, Timings
 330: Willow Farm Lane/Street "A" & St. John's Sideroad

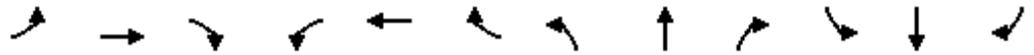
AM peak hour
 2028 total future; with mitigation



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	160	945	3	20	681	206	1	14	65	234	14	132
Future Volume (vph)	160	945	3	20	681	206	1	14	65	234	14	132
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.0	3.7	3.7	3.4	3.3	3.3	3.7	3.7	3.7	3.7	3.7	3.7
Storage Length (m)	15.0		15.0	30.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		1	1		1	0		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Fr _t			0.850			0.850		0.890			0.865	
Fl _t Protected	0.950			0.950				0.999		0.950		
Satd. Flow (prot)	1685	1883	1633	1681	1801	1561	0	1681	0	1825	1662	0
Fl _t Permitted	0.250			0.187				0.998		0.692		
Satd. Flow (perm)	443	1883	1633	331	1801	1561	0	1679	0	1329	1662	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			25			219		69			140	
Link Speed (k/h)		60			60			40			50	
Link Distance (m)		1758.6			448.3			195.4			116.6	
Travel Time (s)		105.5			26.9			17.6			8.4	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	0%	2%	0%	5%	2%	0%	0%	0%	2%	0%	0%	0%
Adj. Flow (vph)	170	1005	3	21	724	219	1	15	69	249	15	140
Shared Lane Traffic (%)												
Lane Group Flow (vph)	170	1005	3	21	724	219	0	85	0	249	155	0
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2			6			8				4
Permitted Phases	2		2	6		6	8			4		
Detector Phase	5	2	2	6	6	6	8	8		4	4	
Switch Phase												
Minimum Initial (s)	7.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Minimum Split (s)	11.0	24.0	24.0	24.0	24.0	24.0	27.0	27.0		27.0	27.0	
Total Split (s)	11.0	98.0	98.0	87.0	87.0	87.0	32.0	32.0		32.0	32.0	
Total Split (%)	8.5%	75.4%	75.4%	66.9%	66.9%	66.9%	24.6%	24.6%		24.6%	24.6%	
Maximum Green (s)	7.0	92.0	92.0	81.0	81.0	81.0	26.0	26.0		26.0	26.0	
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0	4.0	3.0	3.0		3.0	3.0	
All-Red Time (s)	1.0	2.0	2.0	2.0	2.0	2.0	3.0	3.0		3.0	3.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0	0.0	
Total Lost Time (s)	4.0	6.0	6.0	6.0	6.0	6.0		6.0		6.0	6.0	
Lead/Lag	Lead			Lag	Lag	Lag						
Lead-Lag Optimize?	Yes			Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max	C-Max	C-Max	C-Max	C-Max	None	None		None	None	
Walk Time (s)		7.0	7.0	7.0	7.0	7.0	7.0	7.0		7.0	7.0	
Flash Dont Walk (s)		9.0	9.0	9.0	9.0	9.0	14.0	14.0		14.0	14.0	
Pedestrian Calls (#/hr)		0	0	0	0	0	0	0		0	0	
Act Effct Green (s)	94.4	92.4	92.4	81.4	81.4	81.4		25.6		25.6	25.6	
Actuated g/C Ratio	0.73	0.71	0.71	0.63	0.63	0.63		0.20		0.20	0.20	
v/c Ratio	0.44	0.75	0.00	0.10	0.64	0.21		0.22		0.95	0.35	
Control Delay	9.1	16.3	0.0	5.2	6.4	0.3		15.0		96.7	11.4	

Lanes, Volumes, Timings
 330: Willow Farm Lane/Street "A" & St. John's Sideroad

AM peak hour
 2028 total future; with mitigation

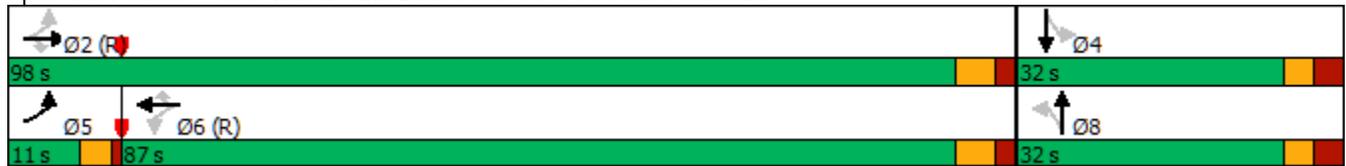


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0	0.0	
Total Delay	9.1	16.3	0.0	5.2	6.4	0.3		15.0		96.7	11.4	
LOS	A	B	A	A	A	A		B		F	B	
Approach Delay		15.2			5.0			15.0			64.0	
Approach LOS		B			A			B			E	
Queue Length 50th (m)	12.6	153.3	0.0	0.8	30.7	0.0		3.5		66.7	3.3	
Queue Length 95th (m)	20.0	210.9	0.0	m1.7	m49.0	m0.3		18.3		#119.9	22.5	
Internal Link Dist (m)		1734.6			424.3			171.4			92.6	
Turn Bay Length (m)	15.0		15.0	30.0								
Base Capacity (vph)	388	1338	1167	207	1127	1059		391		265	444	
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	0.44	0.75	0.00	0.10	0.64	0.21		0.22		0.94	0.35	

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 57 (44%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
 Natural Cycle: 80
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.95
 Intersection Signal Delay: 19.0
 Intersection Capacity Utilization 88.5%
 Analysis Period (min) 15
 # 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.

Splits and Phases: 330: Willow Farm Lane/Street "A" & St. John's Sideroad



Lanes, Volumes, Timings
210: Yonge Street & St. John's Sideroad

PM peak hour
2023 future background; with mitigation



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	181	511	83	264	615	697	153	890	272	340	651	138
Future Volume (vph)	181	511	83	264	615	697	153	890	272	340	651	138
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.2	3.6	3.7	3.2	3.6	3.7	3.0	3.4	4.0	3.0	3.7	3.3
Storage Length (m)	65.0		50.0	70.0		0.0	35.0		100.0	115.0		230.0
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	*0.75	0.95	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	1.00	1.00		1.00		0.98	1.00		0.99	1.00		0.97
Frt		0.979				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1725	2737	0	1708	1881	1633	1685	3461	1670	*2068	3544	1516
Flt Permitted	0.108			0.176			0.391			0.104		
Satd. Flow (perm)	196	2737	0	316	1881	1608	691	3461	1648	181	3544	1470
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		11				307			208			145
Link Speed (k/h)		60			60			60				60
Link Distance (m)		448.3			341.9			505.9			2054.7	
Travel Time (s)		26.9			20.5			30.4			123.3	
Confl. Peds. (#/hr)	2		3	3		2	5		1	1		5
Confl. Bikes (#/hr)						2						1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	2%	0%	1%	1%	0%	0%	2%	1%	2%	3%	3%
Adj. Flow (vph)	191	538	87	278	647	734	161	937	286	358	685	145
Shared Lane Traffic (%)												
Lane Group Flow (vph)	191	625	0	278	647	734	161	937	286	358	685	145
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8			6		5	2	
Permitted Phases	4			8		8	6		6	2		2
Detector Phase	7	4		3	8	8	6	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	11.0	45.0		11.0	45.0	45.0	39.5	39.5	39.5	11.0	39.5	39.5
Total Split (s)	11.0	45.0		14.0	48.0	48.0	42.0	42.0	42.0	19.0	61.0	61.0
Total Split (%)	9.2%	37.5%		11.7%	40.0%	40.0%	35.0%	35.0%	35.0%	15.8%	50.8%	50.8%
Maximum Green (s)	7.0	37.0		10.0	40.0	40.0	34.5	34.5	34.5	15.0	53.5	53.5
Yellow Time (s)	3.0	4.5		3.0	4.5	4.5	4.5	4.5	4.5	3.0	4.5	4.5
All-Red Time (s)	1.0	3.5		1.0	3.5	3.5	3.0	3.0	3.0	1.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	8.0		4.0	8.0	8.0	7.5	7.5	7.5	4.0	7.5	7.5
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes		Yes								
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
Recall Mode	None	None		None	None	None	C-Max	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)		7.0			7.0	7.0	7.0	7.0	7.0		7.0	7.0
Flash Dont Walk (s)		30.0			30.0	30.0	25.0	25.0	25.0		25.0	25.0
Pedestrian Calls (#/hr)		5			5	5	5	5	5		5	5
Act Efect Green (s)	48.0	37.0		54.0	40.0	40.0	34.5	34.5	34.5	57.0	53.5	53.5

Lanes, Volumes, Timings
210: Yonge Street & St. John's Sideroad

PM peak hour
2023 future background; with mitigation

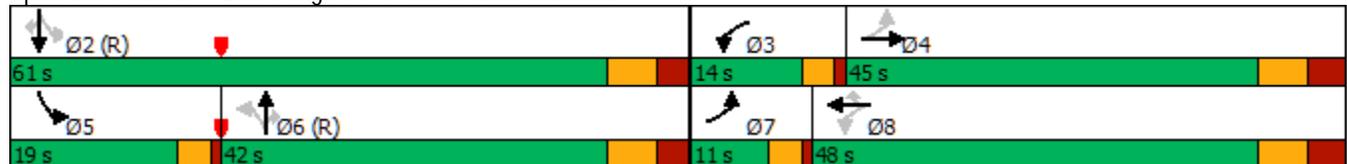


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Actuated g/C Ratio	0.40	0.31		0.45	0.33	0.33	0.29	0.29	0.29	0.48	0.45	0.45
v/c Ratio	1.14	0.73		1.08	1.03	0.99	0.81	0.94	0.46	1.12	0.43	0.20
Control Delay	139.0	42.5		104.0	84.1	55.0	70.9	59.6	12.6	118.4	23.9	3.8
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	139.0	42.5		104.0	84.1	55.0	70.9	59.6	12.6	118.4	23.9	3.8
LOS	F	D		F	F	D	E	E	B	F	C	A
Approach Delay		65.1			74.6			51.2			49.9	
Approach LOS		E			E			D			D	
Queue Length 50th (m)	-37.2	90.6		-46.0	-172.0	121.7	37.1	119.5	14.5	-85.1	60.1	0.0
Queue Length 95th (m)	#86.4	119.2		#102.2	#244.8	#209.5	#76.7	#161.3	39.6	#146.5	76.6	11.8
Internal Link Dist (m)		424.3			317.9			481.9			2030.7	
Turn Bay Length (m)	65.0			70.0			35.0		100.0	115.0		230.0
Base Capacity (vph)	167	851		258	627	740	198	995	622	321	1580	735
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	1.14	0.73		1.08	1.03	0.99	0.81	0.94	0.46	1.12	0.43	0.20

Intersection Summary

Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 39 (33%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green
 Natural Cycle: 120
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.14
 Intersection Signal Delay: 60.8
 Intersection LOS: E
 Intersection Capacity Utilization 107.5%
 ICU Level of Service G
 Analysis Period (min) 15
 * User Entered Value
 ~ 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.

Splits and Phases: 210: Yonge Street & St. John's Sideroad



Lanes, Volumes, Timings
 220: Bathurst Street & 18th Sideroad/St. John's Sideroad

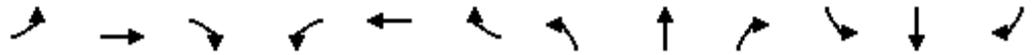
PM peak hour
 2023 future background; with mitigation



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	250	487	35	135	428	164	85	1105	200	82	670	120
Future Volume (vph)	250	487	35	135	428	164	85	1105	200	82	670	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.0	3.5	3.7	3.2	3.7	4.0	3.1	3.3	3.7
Storage Length (m)	30.0		0.0	50.0		50.0	60.0		60.0	60.0		60.0
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor							0.99					
Frt		0.990				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1807	1882	0	1636	1842	1633	1708	3579	1670	1655	3421	1617
Flt Permitted	0.175			0.368			0.386			0.092		
Satd. Flow (perm)	333	1882	0	634	1842	1612	694	3579	1670	160	3421	1617
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		4				125			140			125
Link Speed (k/h)		60			60			70				70
Link Distance (m)		129.9			1758.6			451.2			794.7	
Travel Time (s)		7.8			105.5			23.2			40.9	
Confl. Bikes (#/hr)							1					
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	1%	1%	2%	3%	2%	0%	1%	2%	1%	3%	2%	1%
Adj. Flow (vph)	260	507	36	141	446	171	89	1151	208	85	698	125
Shared Lane Traffic (%)												
Lane Group Flow (vph)	260	543	0	141	446	171	89	1151	208	85	698	125
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4			8			6		5	2	
Permitted Phases	4			8		8	6		6	2		2
Detector Phase	7	4		8	8	8	6	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	7.0	10.0		10.0	10.0	10.0	20.0	20.0	20.0	7.0	20.0	20.0
Minimum Split (s)	11.0	17.5		38.5	38.5	38.5	36.5	36.5	36.5	11.0	36.5	36.5
Total Split (s)	14.0	42.5		42.5	42.5	42.5	47.5	47.5	47.5	11.0	47.5	47.5
Total Split (%)	12.2%	37.0%		37.0%	37.0%	37.0%	41.3%	41.3%	41.3%	9.6%	41.3%	41.3%
Maximum Green (s)	10.0	35.0		35.0	35.0	35.0	40.0	40.0	40.0	7.0	40.0	40.0
Yellow Time (s)	3.0	4.5		4.5	4.5	4.5	5.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	1.0	3.0		3.0	3.0	3.0	2.5	2.5	2.5	1.0	2.5	2.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	7.5		7.5	7.5	7.5	7.5	7.5	7.5	4.0	7.5	7.5
Lead/Lag	Lead			Lag	Lag	Lag	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes	Yes	Yes	Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	6.0	6.0	6.0	3.0	6.0	6.0
Recall Mode	None	None		None	None	None	Min	Min	Min	None	Min	Min
Walk Time (s)				7.0	7.0	7.0	7.0	7.0	7.0		7.0	7.0
Flash Dont Walk (s)				24.0	24.0	24.0	22.0	22.0	22.0		22.0	22.0
Pedestrian Calls (#/hr)				0	0	0	0	0	0		0	0
Act Effct Green (s)	47.7	44.1		29.9	29.9	29.9	39.7	39.7	39.7	51.6	48.1	48.1
Actuated g/C Ratio	0.44	0.41		0.28	0.28	0.28	0.37	0.37	0.37	0.48	0.45	0.45

Lanes, Volumes, Timings
 220: Bathurst Street & 18th Sideroad/St. John's Sideroad

PM peak hour
 2023 future background; with mitigation

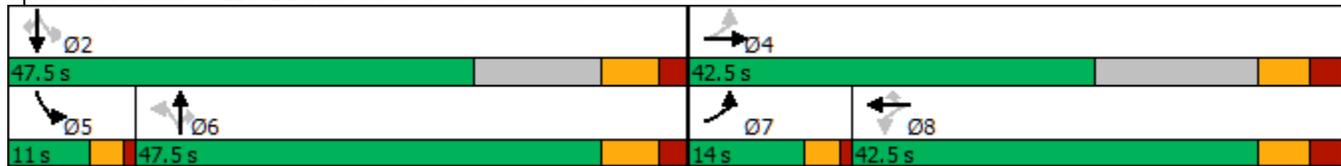


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.91	0.70		0.80	0.87	0.32	0.35	0.87	0.30	0.49	0.46	0.16
Control Delay	58.2	32.1		69.0	55.6	11.4	32.2	41.4	10.7	25.8	22.2	3.9
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	58.2	32.1		69.0	55.6	11.4	32.2	41.4	10.7	25.8	22.2	3.9
LOS	E	C		E	E	B	C	D	B	C	C	A
Approach Delay		40.6			48.1			36.4			20.0	
Approach LOS		D			D			D			C	
Queue Length 50th (m)	38.2	101.0		29.8	96.8	7.8	15.4	134.1	10.7	10.6	58.1	0.0
Queue Length 95th (m)	#81.3	141.6		#63.4	#146.0	25.0	31.4	#180.4	29.1	20.4	76.4	10.9
Internal Link Dist (m)		105.9			1734.6			427.2			770.7	
Turn Bay Length (m)	30.0			50.0		50.0	60.0		60.0	60.0		60.0
Base Capacity (vph)	286	871		208	607	615	261	1349	717	175	1644	842
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	0.62		0.68	0.73	0.28	0.34	0.85	0.29	0.49	0.42	0.15

Intersection Summary

Area Type: Other
 Cycle Length: 115
 Actuated Cycle Length: 107.4
 Natural Cycle: 100
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.91
 Intersection Signal Delay: 35.7
 Intersection Capacity Utilization 96.3%
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 220: Bathurst Street & 18th Sideroad/St. John's Sideroad



Lanes, Volumes, Timings
210: Yonge Street & St. John's Sideroad

PM peak hour
2028 future background; with mitigation



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	191	536	88	274	670	742	163	930	287	350	666	148
Future Volume (vph)	191	536	88	274	670	742	163	930	287	350	666	148
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.2	3.6	3.7	3.2	3.6	3.7	3.0	3.4	4.0	3.0	3.7	3.3
Storage Length (m)	65.0		50.0	70.0		0.0	35.0		100.0	115.0		230.0
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	*0.75	0.95	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	1.00	1.00		1.00		0.98	1.00		0.99	1.00		0.97
Frt		0.979				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1725	2737	0	1708	1881	1633	1685	3461	1670	*2068	3544	1516
Flt Permitted	0.108			0.151			0.385			0.104		
Satd. Flow (perm)	196	2737	0	271	1881	1608	680	3461	1648	181	3544	1470
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		12				290			200			156
Link Speed (k/h)		60			60			60				60
Link Distance (m)		448.3			341.9			505.9			2054.7	
Travel Time (s)		26.9			20.5			30.4			123.3	
Confl. Peds. (#/hr)	2		3	3		2	5		1	1		5
Confl. Bikes (#/hr)						2						1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	2%	0%	1%	1%	0%	0%	2%	1%	2%	3%	3%
Adj. Flow (vph)	201	564	93	288	705	781	172	979	302	368	701	156
Shared Lane Traffic (%)												
Lane Group Flow (vph)	201	657	0	288	705	781	172	979	302	368	701	156
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8			6		5	2	
Permitted Phases	4			8		8	6		6	2		2
Detector Phase	7	4		3	8	8	6	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	11.0	45.0		11.0	45.0	45.0	39.5	39.5	39.5	11.0	39.5	39.5
Total Split (s)	11.0	45.0		15.0	49.0	49.0	42.0	42.0	42.0	18.0	60.0	60.0
Total Split (%)	9.2%	37.5%		12.5%	40.8%	40.8%	35.0%	35.0%	35.0%	15.0%	50.0%	50.0%
Maximum Green (s)	7.0	37.0		11.0	41.0	41.0	34.5	34.5	34.5	14.0	52.5	52.5
Yellow Time (s)	3.0	4.5		3.0	4.5	4.5	4.5	4.5	4.5	3.0	4.5	4.5
All-Red Time (s)	1.0	3.5		1.0	3.5	3.5	3.0	3.0	3.0	1.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	8.0		4.0	8.0	8.0	7.5	7.5	7.5	4.0	7.5	7.5
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes		Yes								
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
Recall Mode	None	None		None	None	None	C-Max	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)		7.0			7.0	7.0	7.0	7.0	7.0		7.0	7.0
Flash Dont Walk (s)		30.0			30.0	30.0	25.0	25.0	25.0		25.0	25.0
Pedestrian Calls (#/hr)		5			5	5	5	5	5		5	5
Act Efect Green (s)	48.0	37.0		56.0	41.0	41.0	34.5	34.5	34.5	56.0	52.5	52.5

Lanes, Volumes, Timings
210: Yonge Street & St. John's Sideroad

PM peak hour
2028 future background; with mitigation

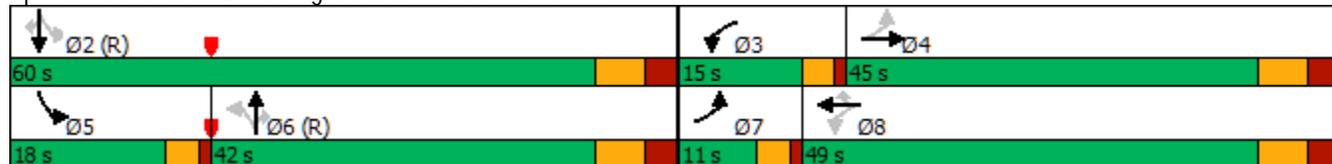


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Actuated g/C Ratio	0.40	0.31		0.47	0.34	0.34	0.29	0.29	0.29	0.47	0.44	0.44
v/c Ratio	1.20	0.77		1.12	1.10	1.06	0.88	0.98	0.49	1.21	0.45	0.21
Control Delay	160.0	44.1		115.3	103.1	73.6	82.0	67.7	14.8	153.1	24.8	3.9
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	160.0	44.1		115.3	103.1	73.6	82.0	67.7	14.8	153.1	24.8	3.9
LOS	F	D		F	F	E	F	E	B	F	C	A
Approach Delay		71.3			92.1			58.4			60.7	
Approach LOS		E			F			E			E	
Queue Length 50th (m)	-42.9	96.6		-55.1	-197.9	-161.4	40.7	127.0	19.2	-94.9	62.8	0.0
Queue Length 95th (m)	#92.7	126.8		#112.3	#272.7	#239.5	#84.2	#173.0	46.7	#157.3	79.8	12.5
Internal Link Dist (m)		424.3			317.9			481.9			2030.7	
Turn Bay Length (m)	65.0			70.0			35.0		100.0	115.0		230.0
Base Capacity (vph)	167	852		258	642	740	195	995	616	304	1550	730
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	1.20	0.77		1.12	1.10	1.06	0.88	0.98	0.49	1.21	0.45	0.21

Intersection Summary

Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 39 (33%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green
 Natural Cycle: 130
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.21
 Intersection Signal Delay: 72.3
 Intersection LOS: E
 Intersection Capacity Utilization 111.5%
 ICU Level of Service H
 Analysis Period (min) 15
 * User Entered Value
 ~ 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.

Splits and Phases: 210: Yonge Street & St. John's Sideroad



Lanes, Volumes, Timings
 220: Bathurst Street & 18th Sideroad/St. John's Sideroad

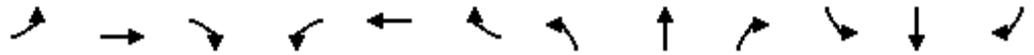
PM peak hour
 2028 future background; with mitigation



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	265	512	35	145	468	179	95	1210	210	87	690	130
Future Volume (vph)	265	512	35	145	468	179	95	1210	210	87	690	130
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.0	3.5	3.7	3.2	3.7	4.0	3.1	3.3	3.7
Storage Length (m)	30.0		0.0	50.0		50.0	60.0		60.0	60.0		60.0
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor						0.99						
Frt		0.991				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1807	1884	0	1636	1842	1633	1708	3579	1670	1655	3421	1617
Flt Permitted	0.115			0.326			0.378			0.082		
Satd. Flow (perm)	219	1884	0	561	1842	1612	679	3579	1670	143	3421	1617
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		3				114			131			135
Link Speed (k/h)		60			60			70				70
Link Distance (m)		129.9			1758.6			451.2				794.7
Travel Time (s)		7.8			105.5			23.2				40.9
Confl. Bikes (#/hr)						1						
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	1%	1%	2%	3%	2%	0%	1%	2%	1%	3%	2%	1%
Adj. Flow (vph)	276	533	36	151	488	186	99	1260	219	91	719	135
Shared Lane Traffic (%)												
Lane Group Flow (vph)	276	569	0	151	488	186	99	1260	219	91	719	135
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4			8			6		5	2	
Permitted Phases	4			8		8	6		6	2		2
Detector Phase	7	4		8	8	8	6	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	7.0	10.0		10.0	10.0	10.0	20.0	20.0	20.0	7.0	20.0	20.0
Minimum Split (s)	11.0	17.5		38.5	38.5	38.5	36.5	36.5	36.5	11.0	36.5	36.5
Total Split (s)	16.0	42.5		42.5	42.5	42.5	52.5	52.5	52.5	11.0	52.5	52.5
Total Split (%)	13.1%	34.8%		34.8%	34.8%	34.8%	43.0%	43.0%	43.0%	9.0%	43.0%	43.0%
Maximum Green (s)	12.0	35.0		35.0	35.0	35.0	45.0	45.0	45.0	7.0	45.0	45.0
Yellow Time (s)	3.0	4.5		4.5	4.5	4.5	5.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	1.0	3.0		3.0	3.0	3.0	2.5	2.5	2.5	1.0	2.5	2.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	7.5		7.5	7.5	7.5	7.5	7.5	7.5	4.0	7.5	7.5
Lead/Lag	Lead			Lag	Lag	Lag	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes	Yes	Yes	Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	6.0	6.0	6.0	3.0	6.0	6.0
Recall Mode	None	None		None	None	None	Min	Min	Min	None	Min	Min
Walk Time (s)				7.0	7.0	7.0	7.0	7.0	7.0		7.0	7.0
Flash Dont Walk (s)				24.0	24.0	24.0	22.0	22.0	22.0		22.0	22.0
Pedestrian Calls (#/hr)				0	0	0	0	0	0		0	0
Act Effect Green (s)	53.3	49.8		33.8	33.8	33.8	45.0	45.0	45.0	59.5	56.0	56.0
Actuated g/C Ratio	0.44	0.41		0.28	0.28	0.28	0.37	0.37	0.37	0.49	0.46	0.46

Lanes, Volumes, Timings
 220: Bathurst Street & 18th Sideroad/St. John's Sideroad

PM peak hour
 2028 future background; with mitigation



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	1.09	0.73		0.97	0.95	0.35	0.39	0.95	0.31	0.58	0.45	0.16
Control Delay	109.7	36.3		108.3	71.7	15.7	34.1	51.9	12.3	32.8	23.4	3.6
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	109.7	36.3		108.3	71.7	15.7	34.1	51.9	12.3	32.8	23.4	3.6
LOS	F	D		F	E	B	C	D	B	C	C	A
Approach Delay		60.3			65.8			45.3			21.5	
Approach LOS		E			E			D			C	
Queue Length 50th (m)	~57.7	117.1		37.2	119.6	13.6	18.3	161.5	14.7	12.1	63.8	0.0
Queue Length 95th (m)	#114.2	161.5		#81.1	#185.1	33.6	35.5	#209.5	33.9	#24.3	81.0	11.2
Internal Link Dist (m)		105.9			1734.6			427.2			770.7	
Turn Bay Length (m)	30.0			50.0		50.0	60.0		60.0	60.0		60.0
Base Capacity (vph)	254	797		162	533	547	252	1333	704	158	1586	822
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	1.09	0.71		0.93	0.92	0.34	0.39	0.95	0.31	0.58	0.45	0.16

Intersection Summary

Area Type: Other
 Cycle Length: 122
 Actuated Cycle Length: 120.8
 Natural Cycle: 110
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 1.09
 Intersection Signal Delay: 47.0
 Intersection Capacity Utilization 98.8%
 Analysis Period (min) 15
 Intersection LOS: D
 ICU Level of Service F

~ 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.

Splits and Phases: 220: Bathurst Street & 18th Sideroad/St. John's Sideroad



Lanes, Volumes, Timings
210: Yonge Street & St. John's Sideroad

PM peak hour
2023 total future; with mitigation



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	199	533	98	259	664	697	176	889	271	340	648	159
Future Volume (vph)	199	533	98	259	664	697	176	889	271	340	648	159
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.2	3.6	3.7	3.2	3.6	3.7	3.0	3.4	4.0	3.0	3.7	3.3
Storage Length (m)	65.0		50.0	70.0		0.0	35.0		100.0	115.0		230.0
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	*0.75	0.95	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	1.00	1.00		1.00		0.98	1.00		0.99	1.00		0.98
Frt		0.977				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1725	2732	0	1708	1881	1633	1685	3461	1670	*2068	3544	1516
Flt Permitted	0.108			0.147			0.392			0.107		
Satd. Flow (perm)	196	2732	0	264	1881	1608	694	3461	1648	186	3544	1488
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		13				293			217			167
Link Speed (k/h)		60			60			60				60
Link Distance (m)		448.3			341.9			505.9				608.7
Travel Time (s)		26.9			20.5			30.4				36.5
Confl. Peds. (#/hr)	2		3	3		2	5		1	1		5
Confl. Bikes (#/hr)						2						1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	2%	0%	1%	1%	0%	0%	2%	1%	2%	3%	3%
Adj. Flow (vph)	209	561	103	273	699	734	185	936	285	358	682	167
Shared Lane Traffic (%)												
Lane Group Flow (vph)	209	664	0	273	699	734	185	936	285	358	682	167
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8			6		5	2	
Permitted Phases	4			8		8	6		6	2		2
Detector Phase	7	4		3	8	8	6	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	11.0	45.0		11.0	45.0	45.0	39.5	39.5	39.5	11.0	39.5	39.5
Total Split (s)	12.0	45.0		16.0	49.0	49.0	41.0	41.0	41.0	18.0	59.0	59.0
Total Split (%)	10.0%	37.5%		13.3%	40.8%	40.8%	34.2%	34.2%	34.2%	15.0%	49.2%	49.2%
Maximum Green (s)	8.0	37.0		12.0	41.0	41.0	33.5	33.5	33.5	14.0	51.5	51.5
Yellow Time (s)	3.0	4.5		3.0	4.5	4.5	4.5	4.5	4.5	3.0	4.5	4.5
All-Red Time (s)	1.0	3.5		1.0	3.5	3.5	3.0	3.0	3.0	1.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	8.0		4.0	8.0	8.0	7.5	7.5	7.5	4.0	7.5	7.5
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes		Yes								
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
Recall Mode	None	None		None	None	None	C-Max	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)		7.0			7.0	7.0	7.0	7.0	7.0		7.0	7.0
Flash Dont Walk (s)		30.0			30.0	30.0	25.0	25.0	25.0		25.0	25.0
Pedestrian Calls (#/hr)		5			5	5	5	5	5		5	5
Act Efect Green (s)	49.0	37.0		57.0	41.0	41.0	33.5	33.5	33.5	55.0	51.5	51.5

Lanes, Volumes, Timings
210: Yonge Street & St. John's Sideroad

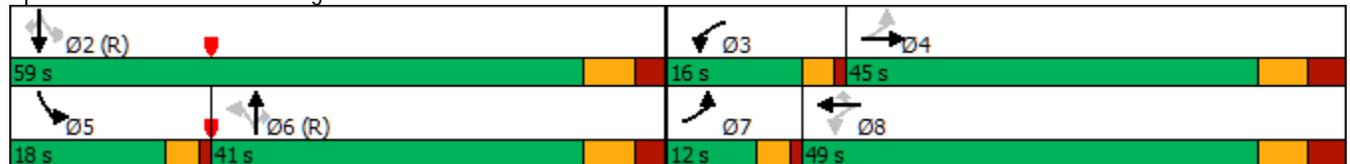
PM peak hour
2023 total future; with mitigation

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Actuated g/C Ratio	0.41	0.31		0.48	0.34	0.34	0.28	0.28	0.28	0.46	0.43	0.43
v/c Ratio	1.15	0.78		1.01	1.09	0.99	0.96	0.97	0.46	1.18	0.45	0.23
Control Delay	141.2	43.1		83.3	100.1	54.8	98.7	65.4	12.0	140.8	25.4	3.9
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	141.2	43.1		83.3	100.1	54.8	98.7	65.4	12.0	140.8	25.4	3.9
LOS	F	D		F	F	D	F	E	B	F	C	A
Approach Delay		66.6			77.9			58.9			56.7	
Approach LOS		E			E			E			E	
Queue Length 50th (m)	-42.5	104.8		-43.3	-194.8	124.5	45.1	120.7	12.7	-89.6	61.7	0.0
Queue Length 95th (m)	#96.0	137.1		#101.0	#269.1	#212.2	#92.9	#165.0	37.6	#150.9	78.5	13.0
Internal Link Dist (m)		424.3			317.9			481.9			584.7	
Turn Bay Length (m)	65.0			70.0			35.0		100.0	115.0		230.0
Base Capacity (vph)	181	851		269	642	742	193	966	616	304	1520	733
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	1.15	0.78		1.01	1.09	0.99	0.96	0.97	0.46	1.18	0.45	0.23

Intersection Summary

Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 39 (33%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green
 Natural Cycle: 120
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.18
 Intersection Signal Delay: 65.9
 Intersection LOS: E
 Intersection Capacity Utilization 111.1%
 ICU Level of Service H
 Analysis Period (min) 15
 * User Entered Value
 ~ 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.

Splits and Phases: 210: Yonge Street & St. John's Sideroad



Lanes, Volumes, Timings
 220: Bathurst Street & 18th Sideroad/St. John's Sideroad

PM peak hour
 2023 total future; with mitigation

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	250	517	35	140	439	172	85	1105	229	96	670	120
Future Volume (vph)	250	517	35	140	439	172	85	1105	229	96	670	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.0	3.5	3.7	3.2	3.7	4.0	3.1	3.3	3.7
Storage Length (m)	30.0		0.0	50.0		50.0	60.0		60.0	60.0		60.0
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor						0.99						
Frt		0.991				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1807	1884	0	1636	1842	1633	1708	3579	1670	1655	3421	1617
Flt Permitted	0.168			0.314			0.386			0.091		
Satd. Flow (perm)	320	1884	0	541	1842	1612	694	3579	1670	159	3421	1617
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		4				128			161			125
Link Speed (k/h)		60			60			70				70
Link Distance (m)		129.9			1758.6			451.2			794.7	
Travel Time (s)		7.8			105.5			23.2			40.9	
Confl. Bikes (#/hr)							1					
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	1%	1%	2%	3%	2%	0%	1%	2%	1%	3%	2%	1%
Adj. Flow (vph)	260	539	36	146	457	179	89	1151	239	100	698	125
Shared Lane Traffic (%)												
Lane Group Flow (vph)	260	575	0	146	457	179	89	1151	239	100	698	125
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4			8			6		5	2	
Permitted Phases	4			8		8	6		6	2		2
Detector Phase	7	4		8	8	8	6	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	7.0	10.0		10.0	10.0	10.0	20.0	20.0	20.0	7.0	20.0	20.0
Minimum Split (s)	11.0	17.5		38.5	38.5	38.5	36.5	36.5	36.5	11.0	36.5	36.5
Total Split (s)	14.0	42.5		42.5	42.5	42.5	47.5	47.5	47.5	11.0	47.5	47.5
Total Split (%)	12.2%	37.0%		37.0%	37.0%	37.0%	41.3%	41.3%	41.3%	9.6%	41.3%	41.3%
Maximum Green (s)	10.0	35.0		35.0	35.0	35.0	40.0	40.0	40.0	7.0	40.0	40.0
Yellow Time (s)	3.0	4.5		4.5	4.5	4.5	5.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	1.0	3.0		3.0	3.0	3.0	2.5	2.5	2.5	1.0	2.5	2.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	7.5		7.5	7.5	7.5	7.5	7.5	7.5	4.0	7.5	7.5
Lead/Lag	Lead			Lag	Lag	Lag	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes	Yes	Yes	Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	6.0	6.0	6.0	3.0	6.0	6.0
Recall Mode	None	None		None	None	None	Min	Min	Min	None	Min	Min
Walk Time (s)				7.0	7.0	7.0	7.0	7.0	7.0		7.0	7.0
Flash Dont Walk (s)				24.0	24.0	24.0	22.0	22.0	22.0		22.0	22.0
Pedestrian Calls (#/hr)				0	0	0	0	0	0		0	0
Act Effct Green (s)	49.3	45.8		31.7	31.7	31.7	40.1	40.1	40.1	54.6	51.1	51.1
Actuated g/C Ratio	0.44	0.41		0.28	0.28	0.28	0.36	0.36	0.36	0.49	0.46	0.46

Lanes, Volumes, Timings
 220: Bathurst Street & 18th Sideroad/St. John's Sideroad

PM peak hour
 2023 total future; with mitigation



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.95	0.74		0.95	0.88	0.33	0.36	0.90	0.34	0.58	0.45	0.16
Control Delay	67.5	34.6		102.8	56.8	11.7	33.0	45.2	10.9	31.6	22.5	3.8
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	67.5	34.6		102.8	56.8	11.7	33.0	45.2	10.9	31.6	22.5	3.8
LOS	E	C		F	E	B	C	D	B	C	C	A
Approach Delay		44.9			55.1			38.9			20.9	
Approach LOS		D			E			D			C	
Queue Length 50th (m)	38.2	109.5		32.9	100.0	8.7	15.7	137.0	12.5	12.9	59.5	0.0
Queue Length 95th (m)	#83.8	153.2		#73.4	#152.4	26.4	31.4	#180.4	32.4	#27.6	76.4	10.9
Internal Link Dist (m)		105.9			1734.6			427.2			770.7	
Turn Bay Length (m)	30.0			50.0		50.0	60.0		60.0	60.0		60.0
Base Capacity (vph)	274	828		169	577	592	248	1281	701	171	1562	806
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	0.95	0.69		0.86	0.79	0.30	0.36	0.90	0.34	0.58	0.45	0.16

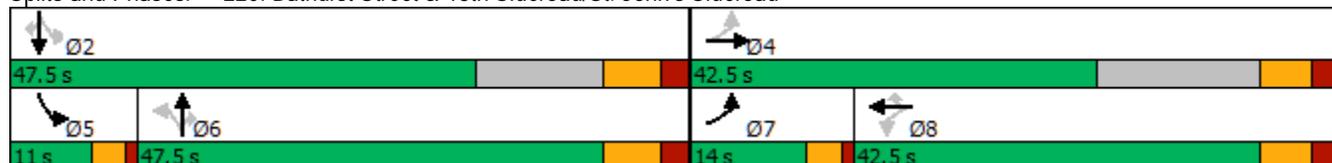
Intersection Summary

Area Type: Other
 Cycle Length: 115
 Actuated Cycle Length: 111.9
 Natural Cycle: 100
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.95
 Intersection Signal Delay: 39.2
 Intersection Capacity Utilization 97.9%
 Analysis Period (min) 15

Intersection LOS: D
 ICU Level of Service F

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

Splits and Phases: 220: Bathurst Street & 18th Sideroad/St. John's Sideroad



Lanes, Volumes, Timings
330: Willow Farm Lane/Street "A" & St. John's Sideroad

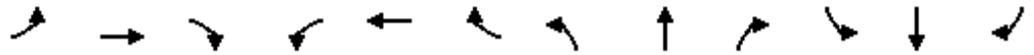
PM peak hour
2023 total future; with mitigation



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	80	722	6	60	845	94	5	3	46	63	1	25
Future Volume (vph)	80	722	6	60	845	94	5	3	46	63	1	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.0	3.7	3.7	3.4	3.3	3.3	3.7	3.7	3.7	3.7	3.7	3.7
Storage Length (m)	15.0		15.0	30.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		1	1		1	0		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Fr _t			0.850			0.850		0.885			0.855	
Fl _t Protected	0.950			0.950				0.995		0.950		
Satd. Flow (prot)	1685	1902	1633	1765	1818	1561	0	1692	0	1825	1643	0
Fl _t Permitted	0.209			0.284				0.960		0.717		
Satd. Flow (perm)	371	1902	1633	528	1818	1561	0	1632	0	1377	1643	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			55			106		52				28
Link Speed (k/h)		60			60			40				50
Link Distance (m)		1758.6			448.3			195.4				116.6
Travel Time (s)		105.5			26.9			17.6				8.4
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles (%)	0%	1%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	90	811	7	67	949	106	6	3	52	71	1	28
Shared Lane Traffic (%)												
Lane Group Flow (vph)	90	811	7	67	949	106	0	61	0	71	29	0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			8				4
Permitted Phases	2		2	6		6	8			4		
Detector Phase	2	2	2	6	6	6	8	8		4		4
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0		5.0
Minimum Split (s)	24.0	24.0	24.0	24.0	24.0	24.0	27.0	27.0		27.0		27.0
Total Split (s)	33.0	33.0	33.0	33.0	33.0	33.0	27.0	27.0		27.0		27.0
Total Split (%)	55.0%	55.0%	55.0%	55.0%	55.0%	55.0%	45.0%	45.0%		45.0%		45.0%
Maximum Green (s)	27.0	27.0	27.0	27.0	27.0	27.0	21.0	21.0		21.0		21.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	3.0	3.0		3.0		3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	3.0	3.0		3.0		3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0		0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0		6.0		6.0		6.0
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0		3.0
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	None	None		None		None
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0		7.0		7.0
Flash Dont Walk (s)	9.0	9.0	9.0	9.0	9.0	9.0	14.0	14.0		14.0		14.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0		0		0
Act Effct Green (s)	46.7	46.7	46.7	46.7	46.7	46.7		8.3		8.6		8.6
Actuated g/C Ratio	0.78	0.78	0.78	0.78	0.78	0.78		0.14		0.14		0.14
v/c Ratio	0.31	0.55	0.01	0.16	0.67	0.09		0.23		0.36		0.11
Control Delay	9.3	7.5	0.0	2.1	9.3	0.2		10.8		27.6		10.2

Lanes, Volumes, Timings
 330: Willow Farm Lane/Street "A" & St. John's Sideroad

PM peak hour
 2023 total future; with mitigation

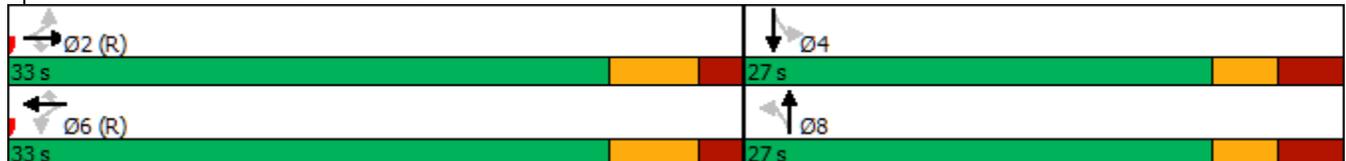


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0	0.0	
Total Delay	9.3	7.5	0.0	2.1	9.3	0.2		10.8		27.6	10.2	
LOS	A	A	A	A	A	A		B		C	B	
Approach Delay		7.6			8.0			10.8			22.6	
Approach LOS		A			A			B			C	
Queue Length 50th (m)	3.8	45.3	0.0	1.0	35.5	0.0		0.9		7.6	0.1	
Queue Length 95th (m)	15.3	93.0	0.0	m1.8	m178.8	m0.0		9.0		16.7	5.7	
Internal Link Dist (m)		1734.6			424.3			171.4			92.6	
Turn Bay Length (m)	15.0		15.0	30.0								
Base Capacity (vph)	289	1481	1284	411	1416	1239		605		481	593	
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	0.31	0.55	0.01	0.16	0.67	0.09		0.10		0.15	0.05	

Intersection Summary

Area Type: Other
 Cycle Length: 60
 Actuated Cycle Length: 60
 Offset: 11 (18%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
 Natural Cycle: 80
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.67
 Intersection Signal Delay: 8.6
 Intersection Capacity Utilization 74.1%
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 330: Willow Farm Lane/Street "A" & St. John's Sideroad



Lanes, Volumes, Timings
210: Yonge Street & St. John's Sideroad

PM peak hour
2028 total future; with mitigation



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	214	573	118	269	719	742	181	927	283	350	663	169
Future Volume (vph)	214	573	118	269	719	742	181	927	283	350	663	169
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.2	3.6	3.7	3.2	3.6	3.7	3.0	3.4	4.0	3.0	3.7	3.3
Storage Length (m)	65.0		50.0	70.0		0.0	35.0		100.0	115.0		230.0
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	*0.75	0.95	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	1.00	1.00		1.00		0.98	1.00		0.99	1.00		0.98
Frt		0.974				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1725	2724	0	1708	1881	1633	1685	3461	1670	*2068	3544	1516
Flt Permitted	0.108			0.109			0.275			0.107		
Satd. Flow (perm)	196	2724	0	196	1881	1608	487	3461	1648	186	3544	1488
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		15				210			236			178
Link Speed (k/h)		60			60			60			60	
Link Distance (m)		448.3			341.9			505.9			608.7	
Travel Time (s)		26.9			20.5			30.4			36.5	
Confl. Peds. (#/hr)	2		3	3		2	5		1	1		5
Confl. Bikes (#/hr)						2						1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	2%	0%	1%	1%	0%	0%	2%	1%	2%	3%	3%
Adj. Flow (vph)	225	603	124	283	757	781	191	976	298	368	698	178
Shared Lane Traffic (%)												
Lane Group Flow (vph)	225	727	0	283	757	781	191	976	298	368	698	178
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases	4			8		8	6		6	2		2
Detector Phase	7	4		3	8	8	1	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	11.0	45.0		11.0	45.0	45.0	11.0	39.5	39.5	11.0	39.5	39.5
Total Split (s)	12.0	45.0		17.0	50.0	50.0	13.0	41.0	41.0	17.0	45.0	45.0
Total Split (%)	10.0%	37.5%		14.2%	41.7%	41.7%	10.8%	34.2%	34.2%	14.2%	37.5%	37.5%
Maximum Green (s)	8.0	37.0		13.0	42.0	42.0	9.0	33.5	33.5	13.0	37.5	37.5
Yellow Time (s)	3.0	4.5		3.0	4.5	4.5	3.0	4.5	4.5	3.0	4.5	4.5
All-Red Time (s)	1.0	3.5		1.0	3.5	3.5	1.0	3.0	3.0	1.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	8.0		4.0	8.0	8.0	4.0	7.5	7.5	4.0	7.5	7.5
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes								
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
Recall Mode	None	None		None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)		7.0			7.0	7.0		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		30.0			30.0	30.0		25.0	25.0		25.0	25.0
Pedestrian Calls (#/hr)		5			5	5		5	5		5	5
Act Efect Green (s)	49.0	37.0		58.0	42.0	42.0	46.0	33.5	33.5	54.0	37.5	37.5

Lanes, Volumes, Timings
210: Yonge Street & St. John's Sideroad

PM peak hour
2028 total future; with mitigation

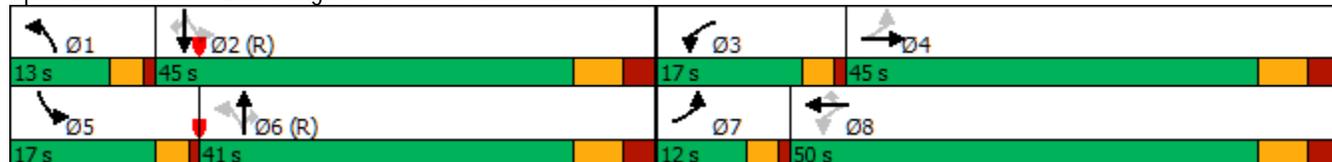


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Actuated g/C Ratio	0.41	0.31		0.48	0.35	0.35	0.38	0.28	0.28	0.45	0.31	0.31
v/c Ratio	1.24	0.86		1.10	1.15	1.12	0.69	1.01	0.47	1.28	0.63	0.30
Control Delay	170.6	48.6		113.0	120.8	98.7	36.9	74.7	11.1	181.3	38.4	5.8
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	170.6	48.6		113.0	120.8	98.7	36.9	74.7	11.1	181.3	38.4	5.8
LOS	F	D		F	F	F	D	E	B	F	D	A
Approach Delay		77.4			110.1			56.8			76.0	
Approach LOS		E			F			E			E	
Queue Length 50th (m)	-49.9	119.8		-59.9	-220.7	-186.8	28.7	-129.8	11.5	-99.4	77.7	0.0
Queue Length 95th (m)	#104.6	#154.0		#117.1	#297.0	#265.0	#47.7	#175.8	36.9	#161.8	98.8	16.3
Internal Link Dist (m)		424.3			317.9			481.9			584.7	
Turn Bay Length (m)	65.0			70.0			35.0		100.0	115.0		230.0
Base Capacity (vph)	181	850		258	658	699	276	966	630	287	1107	587
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	1.24	0.86		1.10	1.15	1.12	0.69	1.01	0.47	1.28	0.63	0.30

Intersection Summary

Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 0 (0%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.28
 Intersection Signal Delay: 82.5
 Intersection LOS: F
 Intersection Capacity Utilization 115.3%
 ICU Level of Service H
 Analysis Period (min) 15
 * User Entered Value
 ~ 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.

Splits and Phases: 210: Yonge Street & St. John's Sideroad



Lanes, Volumes, Timings
 220: Bathurst Street & 18th Sideroad/St. John's Sideroad

PM peak hour
 2028 total future; with mitigation



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	265	542	35	158	485	192	95	1210	239	101	690	130
Future Volume (vph)	265	542	35	158	485	192	95	1210	239	101	690	130
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.0	3.5	3.7	3.2	3.7	4.0	3.1	3.3	3.7
Storage Length (m)	30.0		0.0	50.0		50.0	60.0		60.0	60.0		60.0
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor						0.99						
Frt		0.991				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1807	1884	0	1636	1842	1633	1708	3579	1670	1655	3421	1617
Flt Permitted	0.104			0.116			0.378			0.082		
Satd. Flow (perm)	198	1884	0	200	1842	1612	679	3579	1670	143	3421	1617
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		3				119			149			135
Link Speed (k/h)		60			60			70				70
Link Distance (m)		129.9			1758.6			451.2				794.7
Travel Time (s)		7.8			105.5			23.2				40.9
Confl. Bikes (#/hr)						1						
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	1%	1%	2%	3%	2%	0%	1%	2%	1%	3%	2%	1%
Adj. Flow (vph)	276	565	36	165	505	200	99	1260	249	105	719	135
Shared Lane Traffic (%)												
Lane Group Flow (vph)	276	601	0	165	505	200	99	1260	249	105	719	135
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8			6		5	2	
Permitted Phases	4			8		8	6		6	2		2
Detector Phase	7	4		3	8	8	6	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	7.0	10.0		7.0	10.0	10.0	20.0	20.0	20.0	7.0	20.0	20.0
Minimum Split (s)	11.0	17.5		11.0	38.5	38.5	36.5	36.5	36.5	11.0	36.5	36.5
Total Split (s)	16.0	42.5		12.0	42.5	42.5	52.5	52.5	52.5	11.0	52.5	52.5
Total Split (%)	13.1%	34.8%		9.8%	34.8%	34.8%	43.0%	43.0%	43.0%	9.0%	43.0%	43.0%
Maximum Green (s)	12.0	35.0		8.0	35.0	35.0	45.0	45.0	45.0	7.0	45.0	45.0
Yellow Time (s)	3.0	4.5		3.0	4.5	4.5	5.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	1.0	3.0		1.0	3.0	3.0	2.5	2.5	2.5	1.0	2.5	2.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	7.5		4.0	7.5	7.5	7.5	7.5	7.5	4.0	7.5	7.5
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	6.0	6.0	6.0	3.0	6.0	6.0
Recall Mode	None	None		None	None	None	Min	Min	Min	None	Min	Min
Walk Time (s)					7.0	7.0	7.0	7.0	7.0		7.0	7.0
Flash Dont Walk (s)					24.0	24.0	22.0	22.0	22.0		22.0	22.0
Pedestrian Calls (#/hr)					0	0	0	0	0		0	0
Act Effct Green (s)	54.0	38.5		46.0	34.5	34.5	45.0	45.0	45.0	59.5	56.0	56.0
Actuated g/C Ratio	0.44	0.32		0.38	0.28	0.28	0.37	0.37	0.37	0.49	0.46	0.46

Lanes, Volumes, Timings
 220: Bathurst Street & 18th Sideroad/St. John's Sideroad

PM peak hour
 2028 total future; with mitigation



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	1.12	1.00		0.97	0.97	0.37	0.39	0.95	0.35	0.67	0.46	0.17
Control Delay	123.2	79.3		89.6	75.3	16.3	34.3	53.0	12.4	40.4	23.6	3.6
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	123.2	79.3		89.6	75.3	16.3	34.3	53.0	12.4	40.4	23.6	3.6
LOS	F	E		F	E	B	C	D	B	D	C	A
Approach Delay		93.1			64.5			45.6			22.6	
Approach LOS		F			E			D			C	
Queue Length 50th (m)	-61.6	150.2		25.1	125.3	15.3	18.3	161.5	16.8	14.1	63.8	0.0
Queue Length 95th (m)	#118.2	#229.3		#71.1	#194.6	36.4	35.5	#209.5	37.8	#35.3	81.0	11.2
Internal Link Dist (m)		105.9			1734.6			427.2			770.7	
Turn Bay Length (m)	30.0			50.0		50.0	60.0		60.0	60.0		60.0
Base Capacity (vph)	246	606		170	530	549	251	1325	712	157	1577	818
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	1.12	0.99		0.97	0.95	0.36	0.39	0.95	0.35	0.67	0.46	0.17

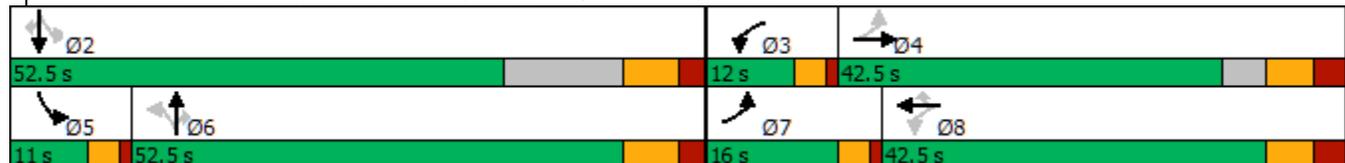
Intersection Summary

Area Type: Other
 Cycle Length: 122
 Actuated Cycle Length: 121.5
 Natural Cycle: 120
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 1.12
 Intersection Signal Delay: 54.0
 Intersection Capacity Utilization 98.7%
 Analysis Period (min) 15
 Intersection LOS: D
 ICU Level of Service F

~ 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.

Splits and Phases: 220: Bathurst Street & 18th Sideroad/St. John's Sideroad



Lanes, Volumes, Timings
 330: Willow Farm Lane/Street "A" & St. John's Sideroad

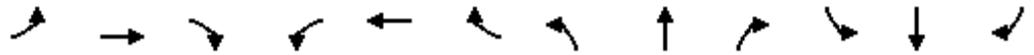
PM peak hour
 2028 total future; with mitigation



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	80	762	6	60	915	94	5	3	46	98	3	50
Future Volume (vph)	80	762	6	60	915	94	5	3	46	98	3	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.0	3.7	3.7	3.4	3.3	3.3	3.7	3.7	3.7	3.7	3.7	3.7
Storage Length (m)	15.0		15.0	30.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		1	1		1	0		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Fr _t			0.850			0.850		0.885			0.858	
Fl _t Protected	0.950			0.950				0.995		0.950		
Satd. Flow (prot)	1685	1902	1633	1765	1818	1561	0	1692	0	1825	1648	0
Fl _t Permitted	0.128			0.230				0.963		0.717		
Satd. Flow (perm)	227	1902	1633	427	1818	1561	0	1637	0	1377	1648	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			55			106		52			51	
Link Speed (k/h)		60			60			40			50	
Link Distance (m)		1758.6			448.3			195.4			116.6	
Travel Time (s)		105.5			26.9			17.6			8.4	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles (%)	0%	1%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	90	856	7	67	1028	106	6	3	52	110	3	56
Shared Lane Traffic (%)												
Lane Group Flow (vph)	90	856	7	67	1028	106	0	61	0	110	59	0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			8				4
Permitted Phases	2		2	6		6	8			4		
Detector Phase	2	2	2	6	6	6	8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Minimum Split (s)	24.0	24.0	24.0	24.0	24.0	24.0	27.0	27.0		27.0	27.0	
Total Split (s)	33.0	33.0	33.0	33.0	33.0	33.0	27.0	27.0		27.0	27.0	
Total Split (%)	55.0%	55.0%	55.0%	55.0%	55.0%	55.0%	45.0%	45.0%		45.0%	45.0%	
Maximum Green (s)	27.0	27.0	27.0	27.0	27.0	27.0	21.0	21.0		21.0	21.0	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	3.0	3.0		3.0	3.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	3.0	3.0		3.0	3.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0		6.0		6.0	6.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	None	None		None	None	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	9.0	9.0	9.0	9.0	9.0	9.0	14.0	14.0		14.0	14.0	
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0		0	0	
Act Effct Green (s)	41.4	41.4	41.4	41.4	41.4	41.4		10.1		10.1	10.1	
Actuated g/C Ratio	0.69	0.69	0.69	0.69	0.69	0.69		0.17		0.17	0.17	
v/c Ratio	0.58	0.65	0.01	0.23	0.82	0.10		0.19		0.48	0.18	
Control Delay	30.8	11.7	0.0	5.5	16.0	1.2		9.4		28.5	9.2	

Lanes, Volumes, Timings
 330: Willow Farm Lane/Street "A" & St. John's Sideroad

PM peak hour
 2028 total future; with mitigation



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0	0.0	
Total Delay	30.8	11.7	0.0	5.5	16.0	1.2		9.4		28.5	9.2	
LOS	C	B	A	A	B	A		A		C	A	
Approach Delay		13.4			14.1			9.4			21.7	
Approach LOS		B			B			A			C	
Queue Length 50th (m)	5.4	55.7	0.0	3.6	106.1	0.5		0.9		11.7	0.8	
Queue Length 95th (m)	#31.1	#126.0	0.0	m4.8	m199.0	m0.6		8.5		22.7	8.3	
Internal Link Dist (m)		1734.6			424.3			171.4			92.6	
Turn Bay Length (m)	15.0		15.0	30.0								
Base Capacity (vph)	156	1313	1145	294	1255	1111		606		481	609	
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	0.58	0.65	0.01	0.23	0.82	0.10		0.10		0.23	0.10	

Intersection Summary

Area Type: Other
 Cycle Length: 60
 Actuated Cycle Length: 60
 Offset: 27 (45%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.82
 Intersection Signal Delay: 14.2
 Intersection Capacity Utilization 79.7%
 Analysis Period (min) 15
 # 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.

Splits and Phases: 330: Willow Farm Lane/Street "A" & St. John's Sideroad

