Ontario Line

Integrated Transit Oriented Communities – Queen-Spadina

Draft Transportation Impact Assessment Study

Issued for Rezoning

North Site: 378 QUEEN STREET WEST,
165-177 SPADINA AVENUE
TORONTO, ONTARIO, M5V 2A2

South Site: 443-455 QUEEN STREET WEST
TORONTO, ONTARIO, M5V 2B1

Contract RFS-2019-NAFC-110

PO 214244

HDR Project 10206938

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1 Introduction

HDR Corporation was retained by Metrolinx to undertake a Transportation Impact Study (TIS) and Parking Assessment for a proposed mixed-use Transit Oriented Community (TOC) development to be located on the future Ontario Line Queen-Spadina Station site.

The subject properties are contained within the properties directly on the north-east and south-west quadrants of the study intersection in Queen Street West at Spadina Avenue, and both existing buildings are occupied with banks.

The proposed redevelopment consists of two sites:

- **North Site:** 378 Queen Street West, 165-177 Spadina Avenue
  - 95 residential units
  - 562 SM of GFA will be dedicated to the transit lobby at the ground level
- **South Site:** 443-455 Queen Street West
  - 122 residential units
  - 1,914 SM GFA of retail space
  - 669 SM of GFA will be dedicated to the transit lobby at the ground level

The sites will be highly transit-oriented given the direct access to Ontario Line and the inherent mixed-use nature of the area, which includes employment use and other commercial-retail and services that will support the residential component. Considering the nature of the development, vehicular parking is not proposed, and the site will leverage the transit availability in the area, as well as the expanded future transit availability with the construction of Ontario Line. In addition to being in close vicinity of a new higher order transit service, the sites (both buildings) will have direct internal access to the transit station.

This traffic impact study report is an interim progress report that includes draft documentation of the following components.

- Existing traffic conditions
- Background traffic conditions
- Proposed TOC trip generation
- Future total traffic conditions with the TOC & Future Queen-Spadina Station
- Parking assessment
- Loading assessment
- Preliminary findings and next steps

The North Site is located at the northeast corner of Queen Street West and Spadina Avenue and the South Site is located at the southwest corner of Queen Street West and Spadina Avenue, as shown in **Figure 1**.

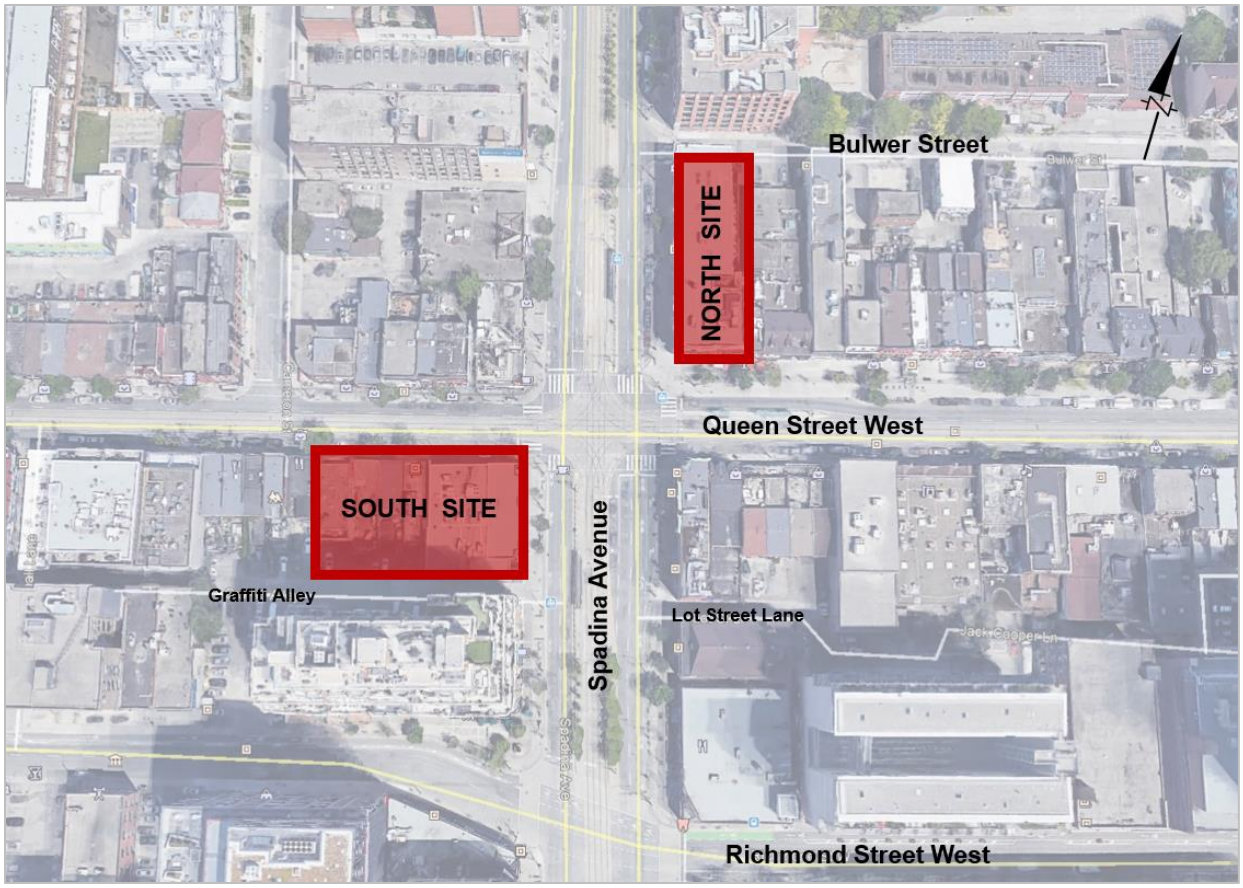


Figure 1: Study Area and Site Context

1.1 Scope of Work

The scope of work has been prepared in accordance with the **City of Toronto Guidelines for the Preparation of Transportation Impact Studies** (2013), and is as follows:

Study Area	• Area surrounding Queen Street West and Spadina Avenue
Analysis Scenarios	• Existing 2020 Traffic Conditions • Future 2030 Background Traffic Conditions (10-year Horizon) *Includes 0.5% annual background traffic growth, the future Queen-Spadina Station traffic, plus other new development traffic in the vicinity of the site* • Future 2030 Total Traffic Conditions (10-year Horizon) *Includes future background traffic volumes plus traffic resulting from the proposed development*
Analysis Time Periods	The following time periods were analyzed as they represent peak trip generation times for residential developments: • Weekday AM peak hour between 7:00am and 9:00am • Weekday PM peak hour between 3:00pm and 6:00pm
Study Area Intersections for Analysis	The following intersections were analyzed for capacity, level of service, and delays: • Queen Street West and Spadina Avenue

Parking and Loading Review	A parking and loading assessment was undertaken for the proposed development using the City of Toronto Zoning By-law 569-2013 as the basis of the assessment, and in the context of the site as a transit-oriented community. A Transportation Demand Management (TDM) Plan has been developed to further support the proposed parking supply and to ensure a wholesome approach to transportation management that addresses the needs of all modes and achieves planning goals of encouraging multi-modal decision making through the provision of alternative and sustainable modes of travel, and reducing single-occupant vehicle use.
Multi-Modal Level of Service (MMLOS)	Multi-Modal Level of Service (MMLOS) for the Queen-Spadina TOC development has been reviewed under separate cover, in the report **Ontario Line Queen-Spadina Station Transportation Impact Study (Ontario Line Technical Advisor, April 13, 2021)**, which was submitted as part of a Site Plan Review package for the proposed station – referred herein as the "Station SPR". The Station SPR study assessed the 2041 horizon year, which is 11 years beyond the horizon year assessed in this report. While the station related pedestrian traffic may continue to grow, the TOC related pedestrian traffic will remain relatively constant based on the ultimate development of the site, and the presence of the proposed station. An MMLOS analysis for the 2041 horizon year is included in that assessment and incorporates site traffic generated by the proposed TOC development and for all modes of travel. The MMLOS assessment in the Station SPR is based on the City of Ottawa MMLOS Method for analysis of the surrounding pedestrian and cycling infrastructure, as well as a pedestrian analysis based on Fruin Level of Service methodology for sidewalks and transit waiting areas within the study area. This TOC report does not duplicate the SPR analysis findings but includes a high level overview of the surrounding bicycle and pedestrian infrastructure. Please refer to the Station SPR report for detailed 2041 horizon year MMLOS assessment and Fruin level of service analysis of the study area, which includes the Queen-Spadina TOC development.

1.2 Intersection Operations and Analysis Methodology

Intersection operations were assessed for the study area intersection using the software program Synchro Traffic Signal Coordination Software Version 10, which employs methodology from the **Highway Capacity Manual** (HCM 2000) published by the Transportation Research Board National Research Council. Synchro can analyze both signalized and unsignalized intersections in a road corridor or network, taking into account the spacing, interaction, queues and operations between intersections.

The signalized and unsignalized intersection analysis considers three separate measures of performance:

- The capacity of all intersection movements, represented by the volume to capacity (v/c) ratio;
- The level of service (LOS) for all intersection turning movements as well as for the overall intersection. The overall intersection LOS is based on the average control delay per vehicle (weighted) for the various movements through the intersection; and,
- The forecasted queue lengths (50^{th} and 95^{th} percentile queue lengths).

LOS is an indicator of how long a vehicle must wait to complete a movement and is represented by a letter between 'A' and 'F'', with 'F' being the longest delay. The volume to capacity (v/c) ratio is a measure of the degree of capacity utilized at an intersection. HCM definitions are summarized in **Table 1**.

Table 1: Highway Capacity Manual Level of Service Definitions

Level of Service (LOS)	Signalized Control Delay per Vehicle (s)	Unsignalized Control Delay per Vehicle (s)	Description
A	≤ 10	≤ 10	Ideal
B	> 10 and ≤ 20	> 10 and ≤ 15	Acceptable
C	> 20 and ≤ 35	> 15 and ≤ 25	Acceptable
D	> 35 and ≤ 55	> 25 and ≤ 35	Somewhat undesirable
E	> 55 and ≤ 80	> 35 and ≤ 50	Undesirable
F	> 80	> 50	Poor

The analysis undertaken in this study also follows the **City of Toronto Guidelines for Using Synchro 9 (Including SimTraffic 9[1])** (March 18, 2016), City of Toronto **'Guidelines for the Preparation of Transportation Impact Studies**', and City of Toronto **'Traffic Signal Operations Policies and Strategies**' (May 2015)[2].

[1] https://www.toronto.ca/wp-content/uploads/2017/11/99bc-0_2016-04-28_Guidelines-for-Using-Synchro-9-Including-SimTraffic-9_Final-a.pdf
[2] https://www.toronto.ca/wp-content/uploads/2017/11/91d6-0_2015-11-13_Traffic-Signal-Operations-Policies-and-Strategies_Final-a.pdf

2 Existing Conditions

2.1 Site Context

As shown in **Figure 1**, the study sites are bound by Bulwer Street to the north and Richmond Street West to the south, with Queen Street West running east-west and Spadina Avenue running north-south between the two sites.

The site is situated in an area with good surface transit service along both Queen Street West and Spadina Avenue in the form of surface transit streetcars. Streetcars along Spadina Avenue operate in a dedicated right-of-way. The nearest existing subway station is Osgood Station, approximately 800 metres to the east, and the future Queen-Spadina station will be located under both sites, with direct access. Spadina Subway station is located 2 kilometres to the north and directly served by streetcars along Spadina Avenue. The sites are currently occupied by banks, a shoe store, and a salon. The area is generally mixed-use and there are many amenities in the area that will support both residential and employment uses within this mixed-use downtown city-centre core, urbanized environment.

2.2 Existing Road Network

The existing study intersection is shown in **Figure 2**, including existing traffic controls and lane configurations. Both study roadways are under the jurisdiction of the City of Toronto.

The site is well-served by the surrounding road network with direct access to all bounding streets. The existing road network is described below:

Queen Street W	Queen Street is a two-way east-west major arterial street with a speed limit of 40 km/h. It has a four-lane cross section, with sidewalks on both sides of the street. There is on-street parking available adjacent to westbound traffic along the east leg of the study area intersection. There is a westbound streetcar stop directly in front of the North Site within a roadway median, on the east leg of the intersection, while the eastbound streetcar stop is located on the sidewalk directly in front of the South Site.
Spadina Avenue	Spadina Avenue is a two-way north-south major arterial street with a speed limit of 40 km/h. It has a four-lane cross section with additional turn lanes at the study area intersection. Streetcars operate in a dedicated right-of-way and passenger waiting areas are also located within the median and in the form of far-side stops. There are bicycle sharrows on the roadway in both directions along Spadina Avenue, indicating to drivers that they must share the road with cyclists and scooters. On-street paid parallel parking is provided along Spadina Avenue north of Queen Street.
Bulwer Street	Bulwer Avenue is an east-west local roadway that runs directly to the north of the North Site and provides access to the rear of the buildings facing Queen Street. Bulwer Street also provides primary access to some buildings on the north side of the street, such as Ogden Jr Public School.
Graffiti Alley	Graffiti Alley is an alley way that runs east-west to the south of the South Site and provides access to the rear of the buildings facing Queen Street and Richmond Street West.

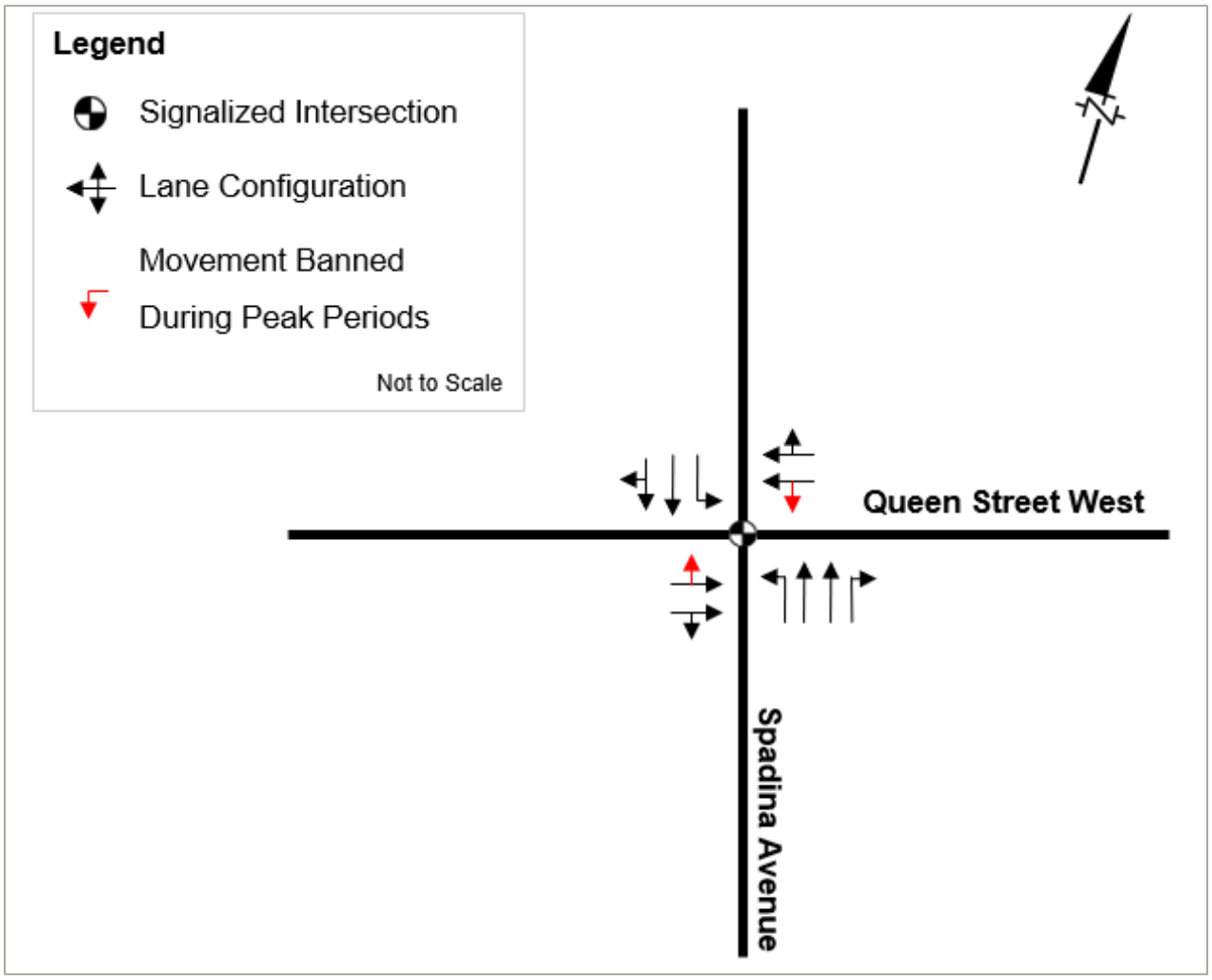


Figure 2: Existing Lane Configuration and Traffic Control

2.3 Existing Transit Services

The TTC operates streetcar services along both streets in the study area intersection. The surface transit routes provide direct access to the Toronto Subway System, Line 1 (Yonge-University-Spadina) at Osgood Station, as well as Line 2 (Bloor) at Spadina Station. Existing transit services are summarized in **Table 2**, and an excerpt from the TTC system map is also shown in **Figure 3**.

Regional Rail service is proved by GO Transit and can be accessed from Union Station, which is approximately 1.7 kilometres walking distance to the south-east, or alternatively accessible via subway directly, with connections from streetcars. Union Station is also the terminal stop for the Union-Pearson (UP) Express rail, which provides a 15-minute travel time from downtown to Pearson Airport. The UP Express also has intermediate stops at Bloor Street and Weston Road.

Table 2: Transit Service Summary

Route #	Route Name	Route Description	Peak Hour Headways	Nearest Stops & Walking Distance
145	Downtown / Humber Bay Express	Express route to downtown not available due to COVID	N/A	Richmond & Spadina (90m)
301	Queen	Night route that operates between Neville Park Loop and Long Branch Loop	30 minutes	Queen & Spadina (0m)
501	Queen	Operates between Neville Park Loop and Long Branch Loop	<10 minutes	Queen & Spadina (0m)
510	Spadina	Operates between Spadina Station and Union Station	<10 minutes	Queen & Spadina (0m)
GO	Barrie Line	Operates between Union Station and Allandale Waterfront	30 minutes	Union Station (1.7 km)
	Stouffville Line	Operates between Union Station and Lincolnville	30 minutes	
	Lakeshore East Line	Operates between Union Station and Bowmanville		
	Lakeshore West Line	Operates between Union Station and Niagara Falls		
	Richmond Hill Line	Operates between Union Station and Bloomington		
	Kitchener Line	Operates between Union Station and Kitchener		
	Milton Line	Operates between Union Station and Milton Yard		
UPE	Union Pearson Express	Operates between Union Station and Pearson Station	15 minutes	Union Station (1.7 km)

Note: Some express routes may have variable headways greater than 10 minutes. Express routes skip minor stops.

Overall, there is good transit network availability in the broader study area.

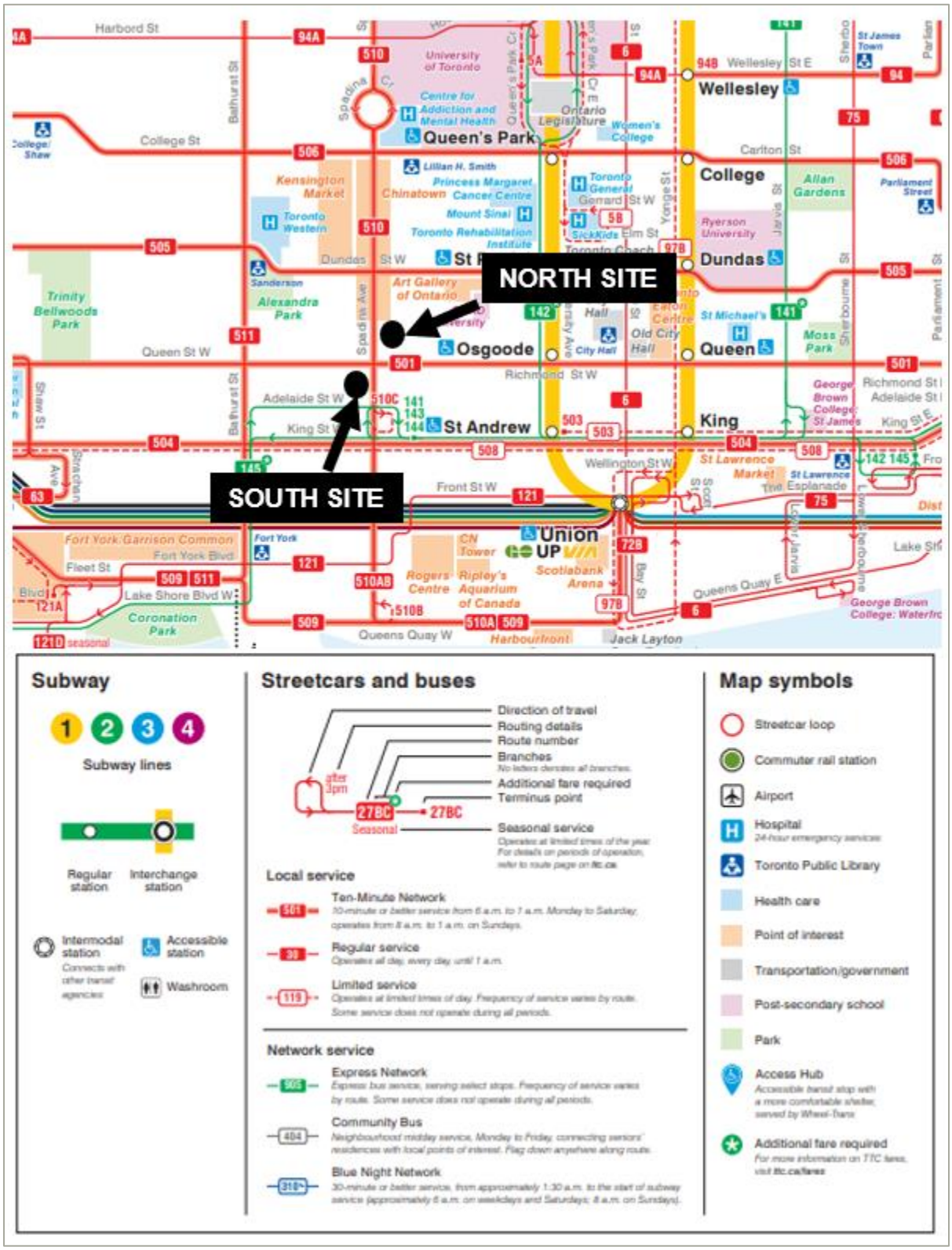


Figure 3: Existing Transit Services

2.4 Existing Cycling and Pedestrian Facilities

The site has good pedestrian connectivity in terms of sidewalks, paths, and pedestrian crossings. Both Queen Street West and Spadina Avenue have sidewalks on both sides. Ladder crosswalks are also provided on all legs of the signalized study area intersection. Crossing of Spadina Avenue can be done in two-stages since the streetcars have a right-of-way in the middle of Spadina Avenue.

There are shared bicycle lane markings ("sharrows") in the northbound and southbound directions along Spadina Avenue. Bicycle lanes are not provided directly on Queen Street, but there are separated bicycle lanes on Richmond Street West in the westbound direction (Richmond Street is one-way only) and there are separated bicycle lanes in the eastbound direction on Adelaide Street (Adelaide Street is one-way only). Overall, this does provide the site with good bicycle infrastructure access. Bicycle lanes on Richmond Street and Adelaide Street are shown in **Figure 4**.

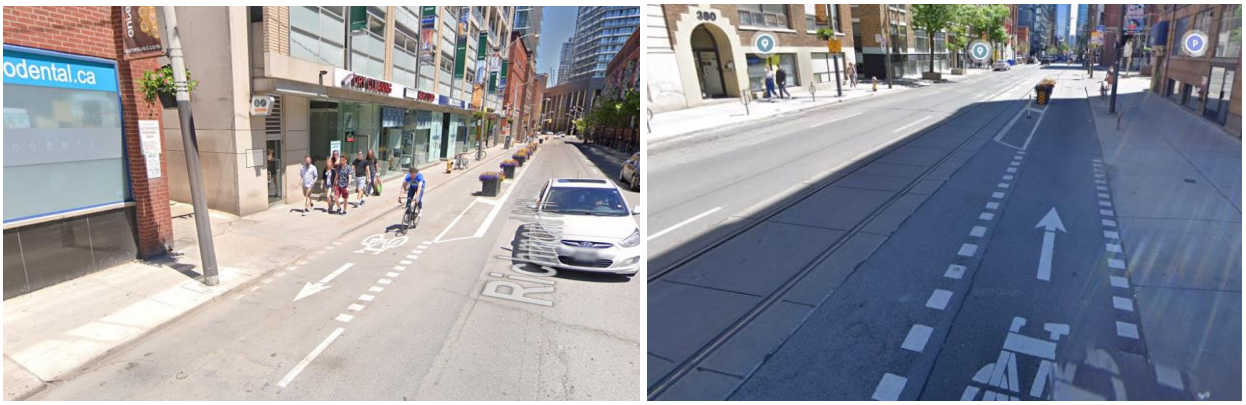


Figure 4: Bicycle lanes on Richmond Street (left) and Adelaide Street (right)

The existing active transportation network is depicted in **Figure 6**. Generally, the sidewalks in the study area are 1.8m wide or wider, but due to objects such as power poles, traffic signals, waste bins and street trees, the clear pedestrian zone is narrower in various locations, as illustrated in **Figure 5**. Bicycle parking in the form of parking racks or "rings" are provided by the City along Queen Street and Spadina Avenue, within the boulevard, on the sidewalk.

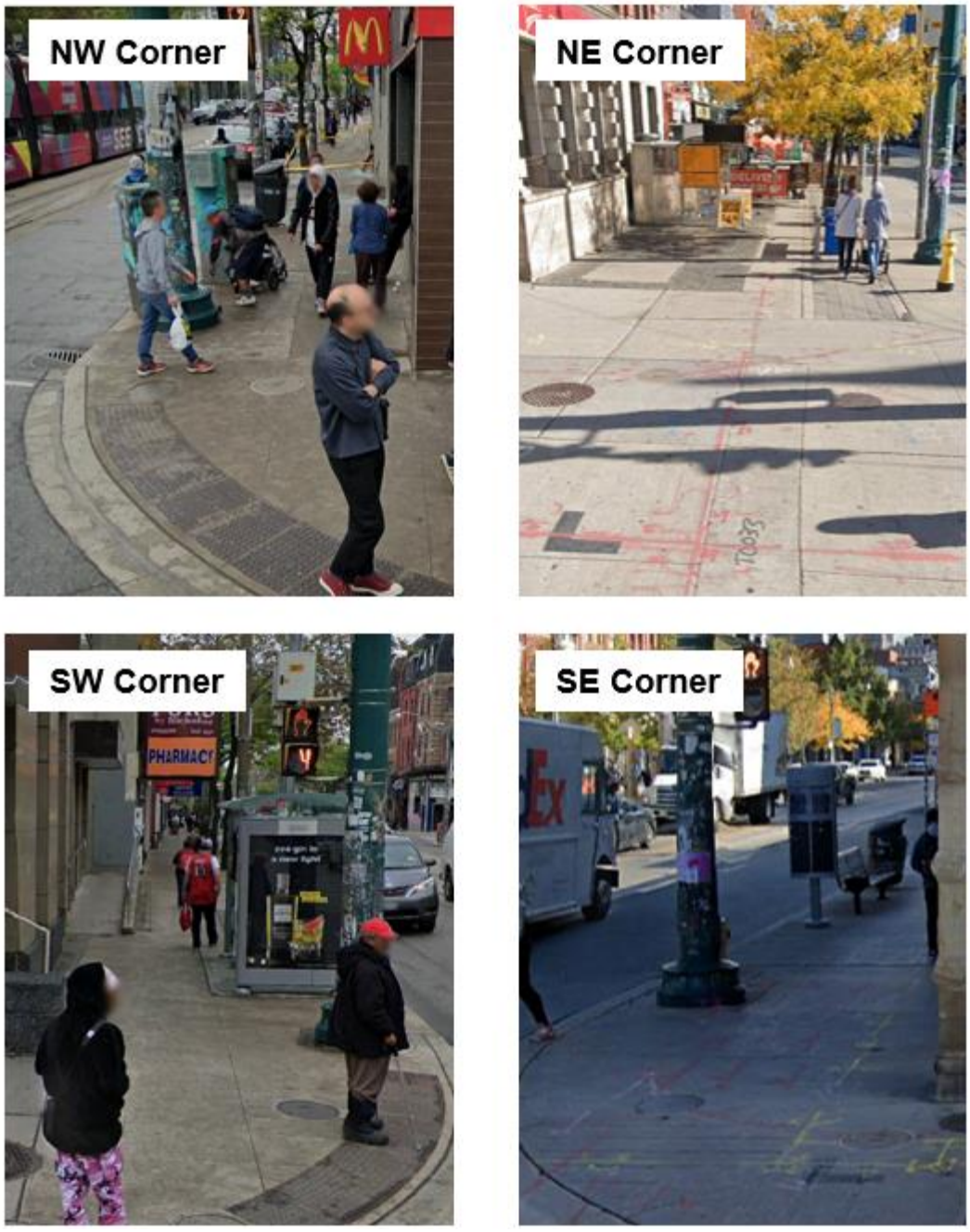


Figure 5: Pedestrian Realm at Queen Street and Spadina Avenue (all 4 quadrants)

Figure 6: Active Transportation Network

2.5 Active Transportation MMLOS Analysis

A multi-modal infrastructure analysis was completed for the area within 400m of the proposed TOC. The assessment was completed using the City of Ottawa's Multi-Modal Level of Service (MMLOS) Methodology[3]. **Figure 7** and **Figure 8** show the MMLOS for walking and cycling. Due to the scope of this study and data availability, the following items are noted:

- Existing facility widths were estimated based on aerial photography (Google) for segments;
- Intersection delays for pedestrians were estimated based on estimated cycle lengths and walk times; and,
- Transit LOS for intersections was not calculated as intersection operation and delay were not assessed for the intersections.

[3] Multi-Modal Level of Service (MMLOS) Guidelines, City of Ottawa, https://app05.ottawa.ca/sirepub/cache/2/csqkiwq23jjanozog31sq3r1/31504601272021034735933.PDF

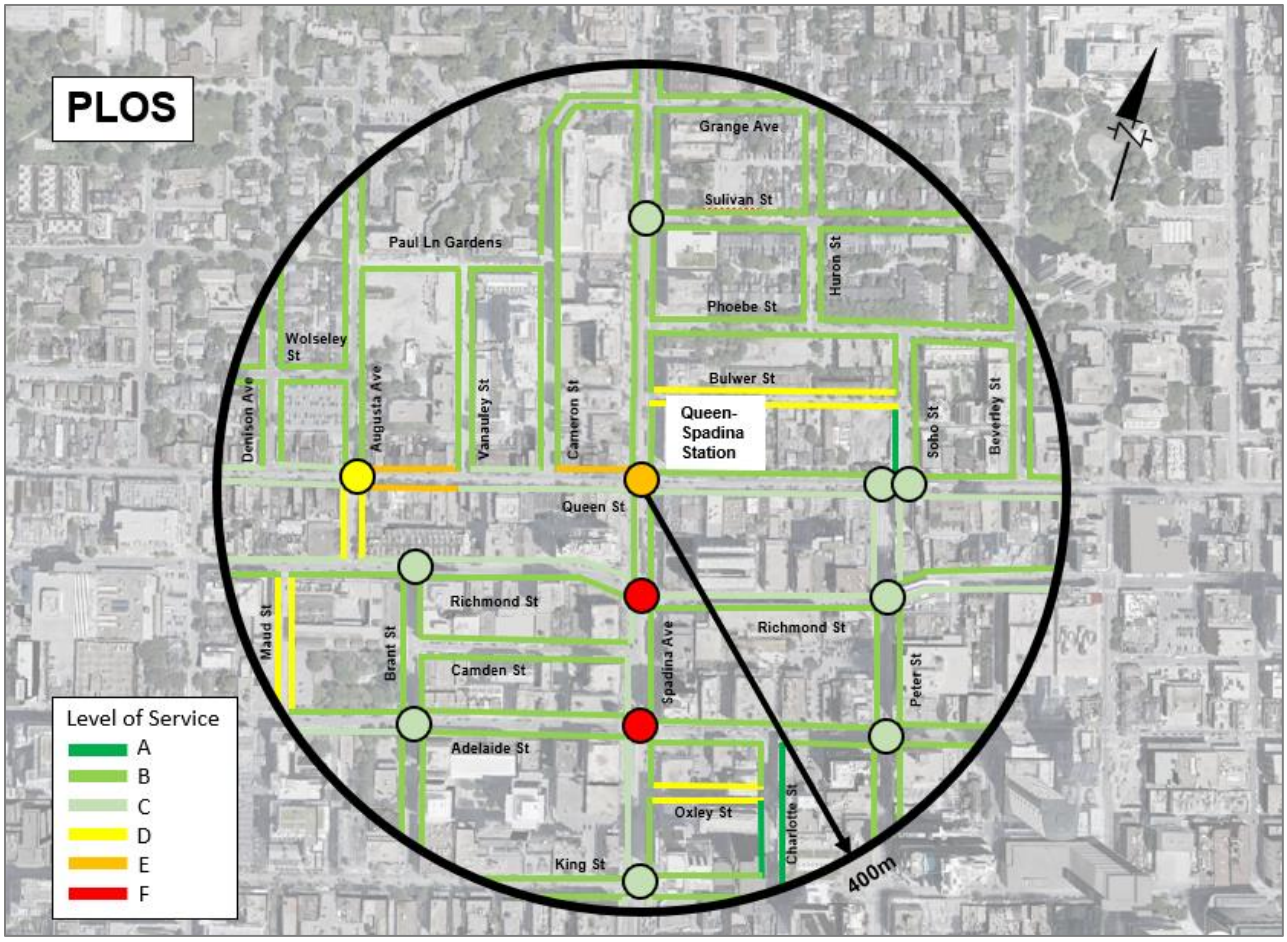


Figure 7: Pedestrian Level of Service Analysis (PLOS)

The pedestrian network within 400m of the proposed TOC is generally complete, with no significant gaps. Level of Service is generally 'D' or better, except for a few portions of Queen Street, primarily due to narrow sidewalks, no boulevards or on-street parking, and high traffic volumes in the curbside lane.

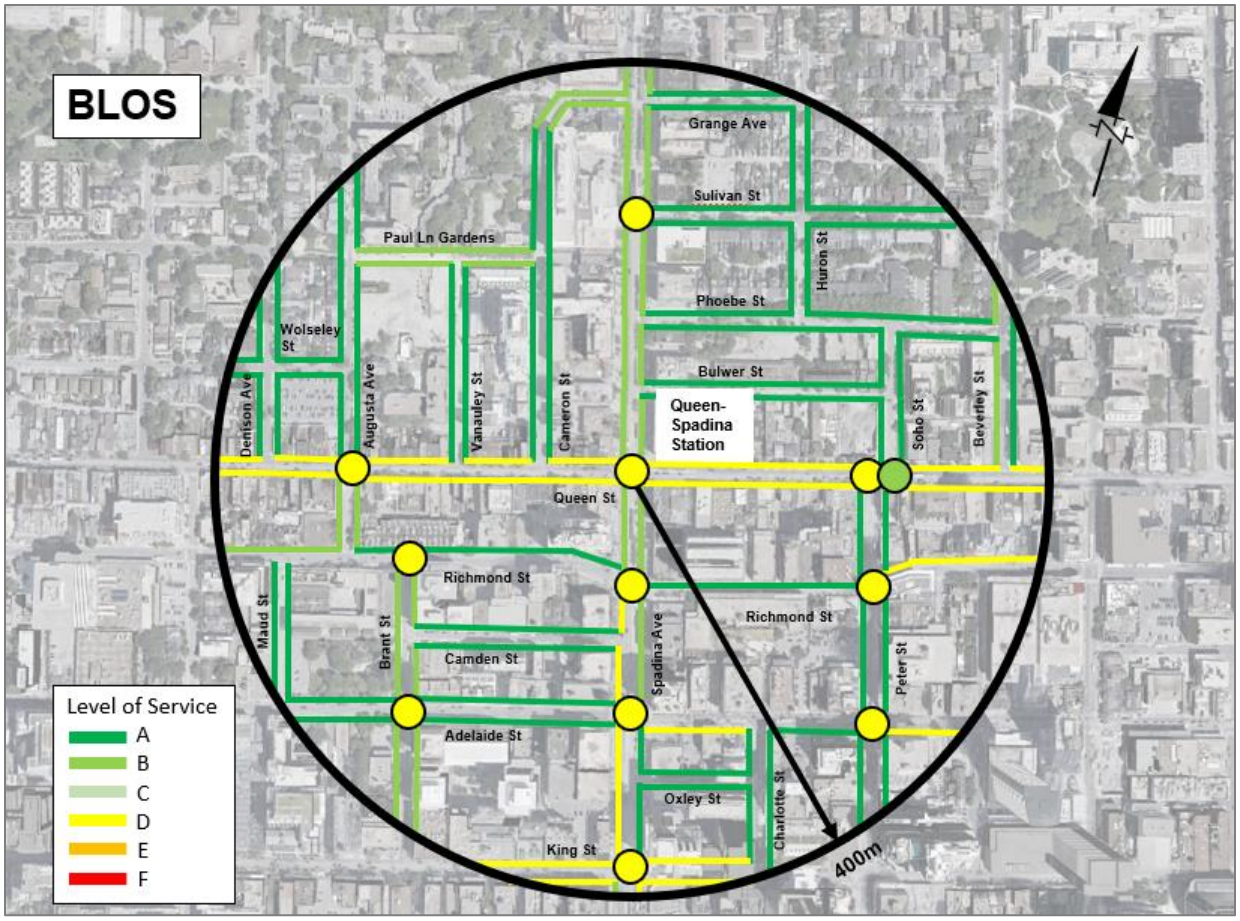


Figure 8: Bicycle Level of Service Analysis (BLOS)

The cycling network within 400m of the proposed TOC is somewhat limited with dedicated facilities provided on portions of Denison Avenue, Wolseley Street, Beverley Street, Peter Street, Richmond Street, and Adelaide. Overall, all roadways have LOS 'D' or better.

2.6 Existing Traffic Volumes

HDR used counts from the City of Toronto Traffic Count Database for the intersection of Queen Street West and Spadina Avenue. The counts were taken on September 16th, 2016. To be conservative, counts were grown by an annual growth factor of 0.5% to reach existing 2020 volumes. Peak hour volumes were used for analysis. **Appendix A** shows the existing traffic volumes at the study area intersection.

The impact of streetcars were incorporated into the analysis by reducing the Queen Street ideal saturated flow rates from the default 1,900 vehicles per hour (vphpl) to 1,250, based on the impact that streetcars were found to have on existing capacity/operations near the proposed Queen Street Ontario Line Station. This effectively reduces the capacity of the lanes by 33% and is considered a conservative estimate of the actual traffic capacity loss associated with the streetcar. Additionally, the lost time was adjusted from the default value of -1 second to -2 seconds to account for higher volume of streetcars and slower acceleration. These adjustments should result in a reasonable representation of the capacity at the study intersection.

2.7 Existing Traffic Operations

Based on the existing traffic volumes shown in **Appendix A** and the existing road network illustrated in **Figure 2**, intersection operations were assessed using the Synchro 9 traffic analysis software. Existing signal timings are provided in **Appendix B**.

Table 3 summarizes the level-of-service (LOS), volume/capacity ratio (v/c ratio), and 95th percentile queue for each movement under existing conditions using HCM 2000. Detailed Synchro results and reports for all study area intersections are provided in **Appendix C**.

Table 3: Existing Conditions – Summary of Traffic Analysis Results

Intersection and Movement		Lanes	Storage (m)	AM Peak Hour			PM Peak Hour		
				LOS	v/c	95th Q (m)	LOS	v/c	95th Q (m)
Queen St & Spadina Ave		-	-	**D**	**0.86**	-	**C**	**0.81**	-
Eastbound	Left-Thru + Thru-Right	1	-	**F**	**1.12**	127	C	0.62	44
Westbound	Left-Thru + Thru-Right	1	-	C	0.59	45	C	0.77	65
Northbound	Left	1	20	E	0.63	**22**	E	0.68	**29**
	Through	2	-	C	0.66	82	C	0.71	88
	Right	1	20	C	0.17	7	B	0.16	0
Southbound	Left	1	20	D	0.61	**27**	D	0.47	17
	Through-Right	1	-	C	0.54	66	C	0.45	46

Note: LOS = level of service; v/c = volume to capacity ratio; Critical movements are highlighted in **red** as defined by the City's TIS Guidelines. Movements approaching critical operations are highlighted **yellow**. 95th percentile queue values highlighted in **blue** indicated that the queue extends past the available storage length.

Under existing traffic conditions, the signalized study intersection operates at an acceptable level of service, reaching level 'D' and 'C' during the AM and PM peak hours, respectively. Most movements operate at a level of service 'D' or better with the exception of the eastbound approach during the AM peak hour (LOS 'F') and the northbound left-turn during both peak periods (LOS 'E'). Additionally, the eastbound approach is operating at capacity during the AM peak hour. The northbound left-turn queue as well as the southbound left-turn queue may occasionally be exceeding available storage by 1 vehicle, which may result in temporary delays to vehicles in the adjacent through-lanes.

Critical movements are defined as shared through/turning movements with v/c ratios greater than 0.85, or exclusive turning movements with v/c ratios greater than 1.00 based on the City's TIS guidelines. Level of service 'E' requires monitoring, and level of service 'F' is unacceptable. The critical movements under existing conditions at Queen Street and Spadina Avenue are:

- AM Peak Hour
  - Eastbound Approach: v/c ratio of 1.12, LOS F
  - Northbound Left-turn: v/c ratio of 0.63; LOS E
- PM Peak Hour
  - Northbound Left-Turn: v/c ratio of 0.68, LOS E

3 Background Traffic Conditions

3.1 Planned Roadway Improvements

Based on the City of Toronto's Ongoing Infrastructure & Construction Projects[4] , there are no planned network changes proposed within the study area. The assumed 2030 future road network lane configurations are shown in **Figure 2**.

3.2 Background Traffic Volumes

Background traffic volumes are comprised of existing traffic volumes plus general background traffic growth, plus traffic associated with nearby developments and the Ontario Line Queen-Spadina Station.

3.2.1 Background Developments

As part of the analysis, nearby background developments of the study were reviewed and accounted for in the traffic forecasting process. As shown in **Figure 9**, a total of 29 development applications were found within a 250 metre radius of the study sites.

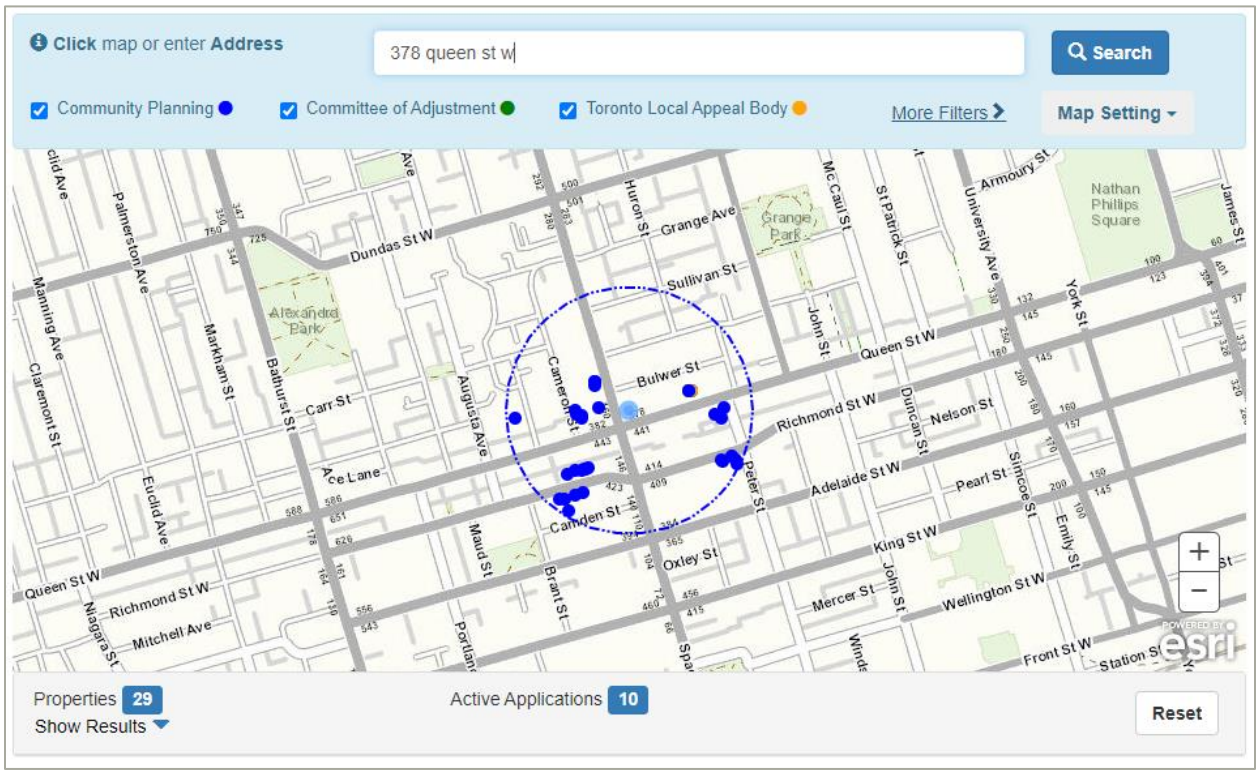


Figure 9: Adjacent Background Developments for Consideration

Of these applications, only six had completed TIS reports available in the supporting documentation. The TIS for each of these adjacent developments reported insignificant trip generation, or anticipated that the new use would generate less traffic than the existing uses.

[4] https://www.toronto.ca/community-people/get-involved/public-consultations/infrastructure-projects/

These studies did not provide any trip assignment figures and therefore, none of these developments were actively used in the background traffic volume analysis.

3.2.2 General Background Growth

A review of the historical traffic counts from various sources, including previous transportation studies, revealed that the magnitude of traffic volumes within the study area has been relatively stable, despite variations in traffic patterns. There may also be some movements that have experienced negative growth. A growth rate of 0.5% was applied to all movements to assess the worst-case growth conditions of all movements in the study area. However, this growth rate is not sustainable and, in our opinion, will overestimate future background traffic volumes for some traffic movements. General background traffic volumes are reported in **Appendix A.**

3.2.3 Ontario Line Queen-Spadina Station Pedestrian Traffic

The Queen-Spadina Station has been included as a layer of background growth, and walking and transit trips to/from the station were generated. A transfer trip matrix, shown in **Appendix D**, was used to assign pedestrian trips throughout the intersection. The generated pedestrian volumes used from this matrix were adjusted to the 2030 horizon year using a 1% per annum growth rate from 2080 to 2030.

The pedestrian trips were assigned based on the anticipated origins and destinations from the broader area, partly influenced by rooftops and densities. Due to the streetcar stop locations, as well as the Ontario Line lobby locations, not all trips coming to and from the Queen-Spadina station need to cross any legs of the intersection to complete their trip, so there was a portion of generated trips not distributed within the intersection. The pedestrian trips along each leg of the intersection are summarized in **Table 4**.

Table 4: Queen-Spadina Station Pedestrian Trip Distribution

Peak Hour	Total Trips Produced To/From Station	Pedestrian Trip Assigned To				Total Pedestrians Crossing at Queen and Spadina	% Trips not Crossing at Queen and Spadina
		North Leg	East Leg	South Leg	West Leg		
AM/PM	6,805	1,423	1,274	1,274	1,423	5,395	21%

The total 2030 background growth volumes, including the general background growth plus the Ontario Line Station trips, are shown in **Appendix A.**

3.3 Background Traffic Operations

Table 5 summarizes the LOS, v/c ratio, and 95th percentile queue for movements under future background conditions based on the forecast traffic volumes shown in **Appendix A**. Detailed Synchro results and reports for the study area intersection are provided in **Appendix C**. Signal timings were optimized under future background conditions by optimizing splits only using the Synchro algorithm. The cycle left was maintained at the minimum of 102 seconds, per the timing cards.

Table 5: 2030 Background Conditions – Summary of Traffic Analysis Results

Intersection and Movement		Lanes	Storage (m)	AM Peak Hour			PM Peak Hour		
				LOS	v/c	95th Q (m)	LOS	v/c	95th Q (m)
Queen St & Spadina Ave		-	-	**D**	**0.92**	-	**C**	**0.86**	-
Eastbound	Left-Thru + Thru-Right	1	-	D	**0.98**	122	C	0.67	49
Westbound	Left-Thru + Thru-Right	1	-	C	0.53	42	D	0.85	74
Northbound	Left	1	20	D	0.58	**24**	D	0.56	**27**
	Through	2	-	D	**0.92**	111	C	0.73	93
	Right	1	20	C	0.24	10	B	0.17	1
Southbound	Left	1	20	E	0.70	**32**	D	0.57	18
	Through-Right	1	-	D	0.80	85	C	0.50	52

Note: LOS = level of service; v/c = volume to capacity ratio; Critical movements are highlighted in **red** as defined by the City's TIS Guidelines. Movements approaching critical operations are highlighted **yellow**. 95th percentile queue values highlighted in **blue** indicated that the queue extends past the available storage length.

Under future background traffic conditions, the signalized study intersection operates at an acceptable level of service, reaching level 'D' and 'C' during the AM and PM peak hours, respectively, and continue to operate with residual capacity overall.

Most movements operate at a level of service 'D' or better with the exception of the southbound left-turn during the AM peak hour (LOS 'E'). Additionally, the eastbound approach and the northbound through movement will be approaching capacity during the AM peak hour. The northbound left-turn queue as well as the southbound left-turn queue may occasionally be exceeding available storage by 1 vehicle, which may result in temporary delays to vehicles in the adjacent through-lanes. Improvements from existing conditions are a result of split optimization.

Critical movements are defined as shared through/turning movements with v/c ratios greater than 0.85, or exclusive turning movements with v/c ratios greater than 1.00 based on the City's TIS guidelines. Level of service 'E' requires monitoring, and level of service 'F' is unacceptable. The critical movements under existing conditions at Queen Street and Spadina Avenue are:

- AM Peak Hour
    - Eastbound Approach: v/c ratio of 0.98, LOS D
    - Northbound Through: v/c ratio of 0.92; LOS D
    - Southbound left-turn: v/c ratio of 0.70; LOS E

4 Proposed TOC Development

4.1 Conceptual Site Plan

The site statistics are shown in **Table 6** and the concept plan for both sites is shown in **Figure 10**. The site traffic projections and the traffic analysis are based on slightly different development statistics, which generally represents higher unit numbers. The net impact is slightly higher trip generation due to the higher number of units assumed for the north side within the analysis. Transit GFA was not used for trip generation – rather, the transfer matrix discussed in **Section 3.2.3** was used directly.

Table 6: North Site – Site Plan Statistics

Proposal	Residential Units	Retail Size	Transit
Development Concept Plan Statistics			
North Site	95 units	-	562 m^2 GFA
South Site	122 units	1914 m^2 GFA	669 m^2 GFA
Analysis Statistics			
North Site	104 units	46 m^2 GFA	602 m^2 GFA
South Site	122 units	1571 m^2 GFA	928 m^2 GFA

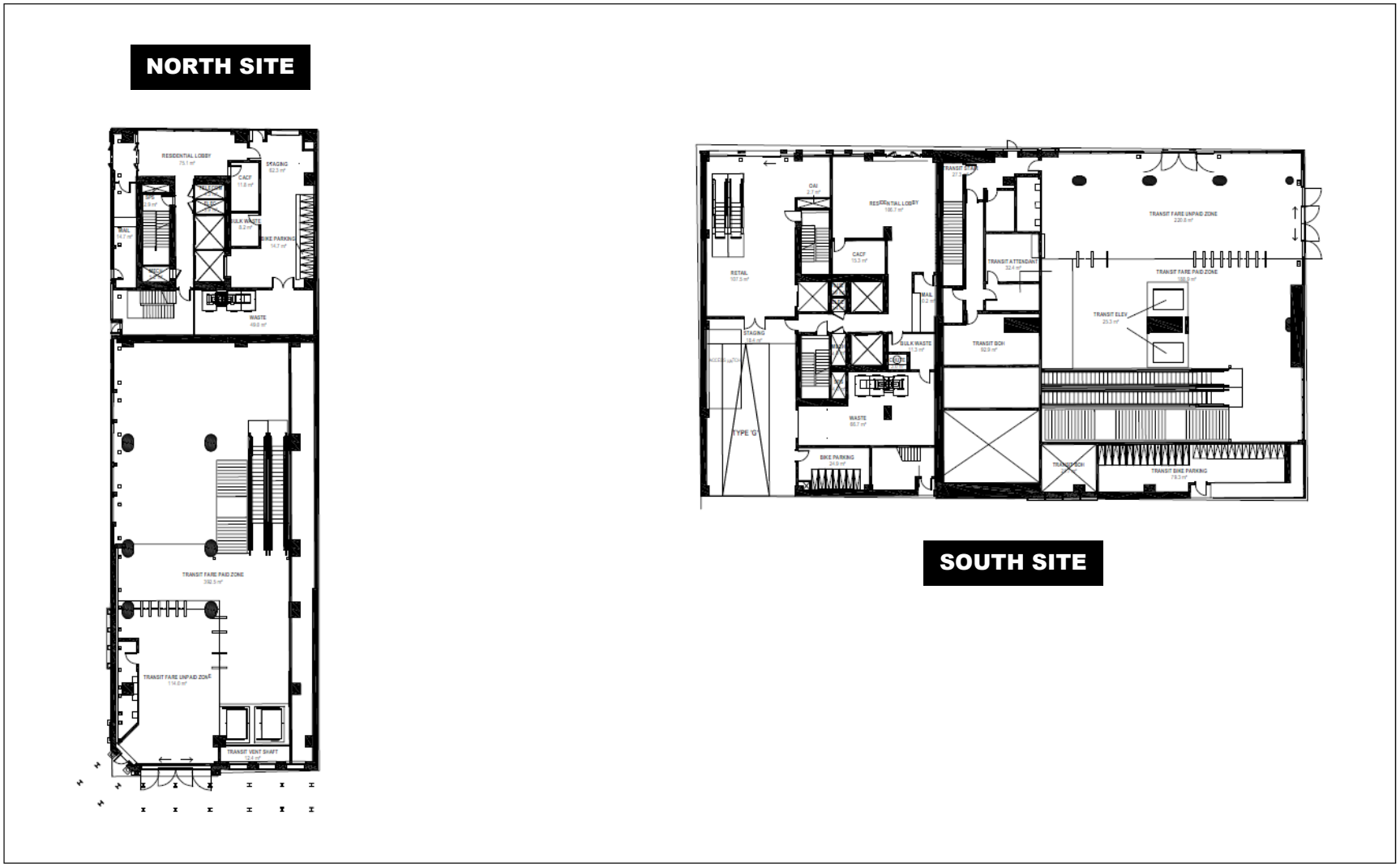


Figure 10: Conceptual Site Plan – Level 01 of North and South Sites (May 21, 2021)

4.2 Site Trip Generation

4.2.1 Mode Splits

The 2016 Transportation Tomorrow Survey (TTS) was used to inform the mode split assumptions for the development using existing information for nearby uses. The TTS is a survey of households within the Greater Golden Horseshoe including the Greater Toronto Area that summarizes travel patterns and other related transportation information that can be used to aid in planning, such as mode splits. The 2016 TTS divides geographical areas into 'zones' for the purposes of determining trip patterns from one zone to another.

The mode split for the area was obtained through a review of TTS (2006) Zones 65-67, 76-78, 90-91, which are the zones surrounding the subject site. The existing mode splits are reported in **Table 7**.

As the AM Outbound and PM Inbound were very similar and make up the largest share of total trips that will be generated by the TOC, the average of AM outbound and PM inbound mode splits were used for all trips.

Additionally, it is assumed that there will be no auto driver trips (0% auto drive mode share) since the proposed sites will have no available parking. The Auto Driver trips were shifted to other mode shares using the proportional share of other modes from existing conditions. The proposed mode splits are summarized in **Table 8**.

Table 7: Existing Mode Splits (2016 Transportation Tomorrow Survey)

Mode	Existing (TTS)			
	AM (In)	AM (Out)	PM (In)	PM (Out)
Transit	54%	22%	26%	50%
Walking	15%	44%	38%	17%
Cycling	7%	7%	6%	7%
Auto Passenger / Taxi / Rideshare	4%	7%	8%	5%
Auto Driver	20%	22%	22%	20%
Total	100%	100%	100%	100%

Should future residents decide to own a vehicle, they will have to park their vehicle at a nearby public or private parking lot.

Table 8: Modified and Proposed Mode Splits (2016 Transportation Tomorrow Survey)

Mode	Modified (TTS)				Proposed
	AM (In)	AM (Out)	PM (In)	PM (Out)	AM (Out) / PM (In)
Transit	68%	28%	33%	63%	30%
Walking	19%	56%	49%	22%	52%
Cycling	9%	9%	8%	9%	8%
Auto Passenger / Taxi / Rideshare	4%	8%	10%	6%	9%
Auto Driver	0%	0%	0%	0%	0%
Total	100%	100%	100%	100%	100%

4.2.2 Person-Trip Generation

Trips were generated for the proposed development using the information provided in the Institute of Transportation Engineers (ITE) Trip Generation Informational Report (10th edition). Trip generation rates for Land Use 222 (Multifamily Housing – High-Rise) and Land Use 814 (Variety Store) were used.

The land use assumes dense multi-use conditions for Land Use 222, and general urban/suburban conditions were used for the ancillary retail component since a dense multi-use category was not available.

Table 9 shows the ITE trip generation rates used for each site's land use, and it includes estimated person trips per vehicle trip. The purpose of generating person trips rather than vehicle trips was to be able to assign pedestrian, cycling and transit trips to the study network. It is assumed that there will be an increase in the rideshare mode, which includes services like Uber, Lyft as well as taxi service. **Table 10** and **Table 11** show the resulting trip generation by mode for the North and South Sites, respectively.

Table 9: ITE Trip Generation Rates

Land Use	ITE LUC	Peak Hour	ITE Average Vehicle Trip Rate	Equation*	Entering	Exiting	Person Trips per Vehicle Trip
Residential	222 Multi-family High Rise	AM	0.21	Ln(T) = 0.84 Ln(X) - 0.65	12%	88%	2.81
		PM	0.19	Ln(T) = 0.81 Ln(X) - 0.60	70%	30%	2.17
Retail	814 Variety Store	AM	4.52	N/A	62%	38%	N/A
		PM	7.42	N/A	48%	52%	N/A

Note: * The trip generation equation was only used for Residential Land Use, for all other land uses, the total person trips were calculated by multiplying the ITE vehicle trip rate by the person trips per vehicle value to get total person trips

Table 9: North Site Person Trip Generation by Mode

Land Use	AM Peak Hour			PM Peak Hour		
	Total	In	Out	Total	In	Out
Residential – LUC 230 Multifamily High Rise						
Total	**73**	**9**	**64**	**51**	**36**	**15**
Transit	22	3	19	16	11	5
Walking	38	5	33	27	19	8
Cycling	6	1	5	4	3	1
Auto Passenger	7	1	6	5	3	1
Auto Driver	0	0	0	0	0	0
Retail – LUC 814 Variety Store						
Total	**2**	**1**	**1**	**4**	**2**	**2**
Transit	1	0	0	2	1	1
Walking	1	1	0	2	1	1
Cycling	0	0	0	0	0	0
Auto Passenger	0	0	0	0	0	0
Auto Driver	0	0	0	0	0	0
Site Total						
Total	**75**	**10**	**65**	**55**	**38**	**17**
Transit	23	3	20	17	11	5
Walking	39	5	34	29	20	9
Cycling	6	1	5	5	3	1
Auto Passenger	7	1	6	5	3	2
Auto Driver	0	0	0	0	0	0

Table 10: South Site Person Trip Generation by Mode

Land Use	AM Peak Hour			PM Peak Hour		
	Total	In	Out	Total	In	Out
Residential – LUC 230 Multifamily High Rise						
Total	**83**	**10**	**73**	**58**	**41**	**17**
Transit	25	3	22	18	12	5
Walking	43	5	38	30	21	9
Cycling	7	1	6	5	3	1
Auto Passenger	8	1	7	5	4	2
Auto Driver	0	0	0	0	0	0
Retail – LUC 814 Variety Store						
Total	**76**	**47**	**29**	**125**	**60**	**65**
Transit	23	14	9	38	18	20
Walking	40	25	15	65	31	34
Cycling	6	4	2	10	5	5
Auto Passenger	7	4	3	12	6	6
Auto Driver	0	0	0	0	0	0
Site Total						
Total	**159**	**57**	**102**	**184**	**101**	**83**
Transit	48	17	32	56	31	25
Walking	83	30	53	96	53	43
Cycling	13	5	8	15	8	7
Auto Passenger	15	5	9	17	9	8
Auto Driver	0	0	0	0	0	0

4.3 Site Traffic Distribution and Assignment

Future trip distribution was estimated using the information from the 2016 TTS. The trip distribution for the site was based on the existing distribution to TTS zones (TTS 2006 Zones 65-67, 76-78, 90-91). Trips were distributed based on each mode of transportation for AM Inbound, AM Outbound, PM Inbound, and PM Outbound trips. These mode distributions are shown in **Table 11**.

Table 11: Assumed Person Trip Distribution – North and South Sites

Mode	Time Period / Direction	Direction				
		North	East	South	West	Total
Walk	AM (In)	9%	9%	44%	37%	100%
	AM (Out)	10%	70%	12%	8%	100%
	PM (In)	5%	63%	12%	20%	100%
	PM (Out)	5%	29%	32%	34%	100%
Cycle	AM (In)	29%	31%	3%	37%	100%
	AM (Out)	28%	36%	0%	36%	100%
	PM (In)	19%	54%	0%	27%	100%
	PM (Out)	21%	43%	5%	31%	100%
Transit (Walk)	AM (In)	37%	35%	0%	27%	100%
	AM (Out)	35%	50%	0%	15%	100%
	PM (In)	42%	35%	3%	19%	100%
	PM (Out)	38%	35%	0%	25%	100%
Auto	AM (In)	42%	24%	0%	34%	100%
	AM (Out)	31%	22%	0%	48%	100%
	PM (In)	34%	10%	13%	43%	100%
	PM (Out)	42%	26%	0%	32%	100%

The transit trips were further divided into predicted Ontario Line trips and surface-level transit trips. Since both sites have direct access to the Ontario Line station, these transit walking trips were not assigned to the surface-level pedestrian network and crosswalks at the intersection of Queen Street West and Spadina Avenue as they will not need to exit the building and cross at the intersection to access Ontario Line.

For simplicity, 75% of transit walking trips were assigned to the Ontario Line station and 25% of the transit walking trips were assigned to surface-level transit. All vehicle trips (pick-up/drop-off and rideshare) were assigned as pass-by trips such that they reflected an inbound and outbound trip that would pick-up or drop-off along Spadina Avenue or Queen Street directly. These trips were assigned according to existing traffic patterns.

It should also be noted that some of the walk-in transit trips to and from Ontario Line will include trips from the TOC. This overlap has not been accounted for as this will result in a slightly conservative estimate of future pedestrian trips due to the double counting of TOC trips. However, the TOC trips account for only up to 100 two-way trips during any of the peak periods, and are marginal compared to the total number of pedestrian trips generated by Ontario Line.

The total new site trips and total traffic volumes, comprised of the future background traffic plus site volumes, are shown in **Appendix A**.

5 Future Total Traffic Conditions with TOC

Table 12 summarizes the future total traffic operations at the study area intersection. Although little to no residential vehicle trips will be generated by the TOC, it was still important to assess the key study area intersection as there will be increased pedestrian traffic crossing all approaches of the intersection. Signal timing split optimization was performed to the model and there were no geometric improvements assumed. Synchro results and reports for the intersection are provided in **Appendix C.**

Table 12: 2030 Total Traffic Conditions – Summary of Traffic Analysis results

Intersection and Movement		Lanes	Storage (m)	AM Peak Hour			PM Peak Hour		
				LOS	v/c	95th Q (m)	LOS	v/c	95th Q (m)
Queen St & Spadina Ave		-	-	**D**	**0.93**	-	**C**	**0.88**	-
Eastbound	Left-Thru + Thru-Right	1	-	D	**0.96**	122	C	0.69	49
Westbound	Left-Thru + Thru-Right	1	-	C	0.53	43	D	0.86	74
Northbound	Left	1	20	D	0.58	**24**	**E**	0.73	**32**
	Through	2	-	E	**0.96**	115	C	0.74	93
	Right	1	20	C	0.24	10	B	0.17	1
Southbound	Left	1	20	E	0.70	**32**	D	0.56	18
	Through-Right	1	-	D	0.84	89	C	0.48	49

Note: LOS = level of service; v/c = volume to capacity ratio; Critical movements are highlighted in **red** as defined by the City's TIS Guidelines. Movements approaching critical operations are highlighted **yellow**. 95th percentile queue values highlighted in **blue** indicated that the queue extends past the available storage length.

Consistent with 2030 background conditions, under future total traffic conditions, the signalized study intersection operates at an acceptable level of service, reaching level 'D' and 'C' during the AM and PM peak hours, respectively, and continue to operate with residual capacity overall.

Most movements operate at a level of service 'D' or better with the exception of the northbound through movement and the southbound left-turn during the AM peak hour (LOS 'E'), as well as the northbound left-turn during the PM peak hour. Additionally, the eastbound approach and the northbound through movement will be approaching capacity during the AM peak hour. The northbound left-turn queue as well as the southbound left-turn queue may occasionally be exceeding available storage by 1 vehicle, which may result in temporary delays to vehicles in the adjacent through-lanes. Improvements from background conditions are a result of split optimization.

Critical movements are defined as shared through/turning movements with v/c ratios greater than 0.85, or exclusive turning movements with v/c ratios greater than 1.00 based on the City's TIS guidelines. Level of service 'E' requires monitoring, and level of service 'F' is unacceptable.

The critical movements under existing conditions at Queen Street and Spadina Avenue are:

- AM Peak Hour
    - Eastbound Approach: v/c ratio of 0.96, LOS D
    - Northbound Through: v/c ratio of 0.96; LOS E
    - Southbound left-turn: v/c ratio of 0.70; LOS E
- PM Peak Hour
    - Northbound Left-turn: v/c of 0.73; LOS E

The impact of the TOC development on the adjacent intersection operations is marginal when comparing to background conditions. The TOC will have minimal impacts on the surrounding road network from a vehicular operations perspective as a result of the very low vehicle trip activity generated by the developments. Pedestrian activity and trips generated by the TOC will be marginal compared to the pedestrian traffic generated by Ontario Line and have also been accounted for in the traffic analysis, since pedestrians on the crosswalk can cause delays to vehicular traffic, particularly for right-turns. The pedestrian activity is not expected to impact the left-turn operations due to the east-west left-turn prohibitions and accommodation in protected north-south phases.

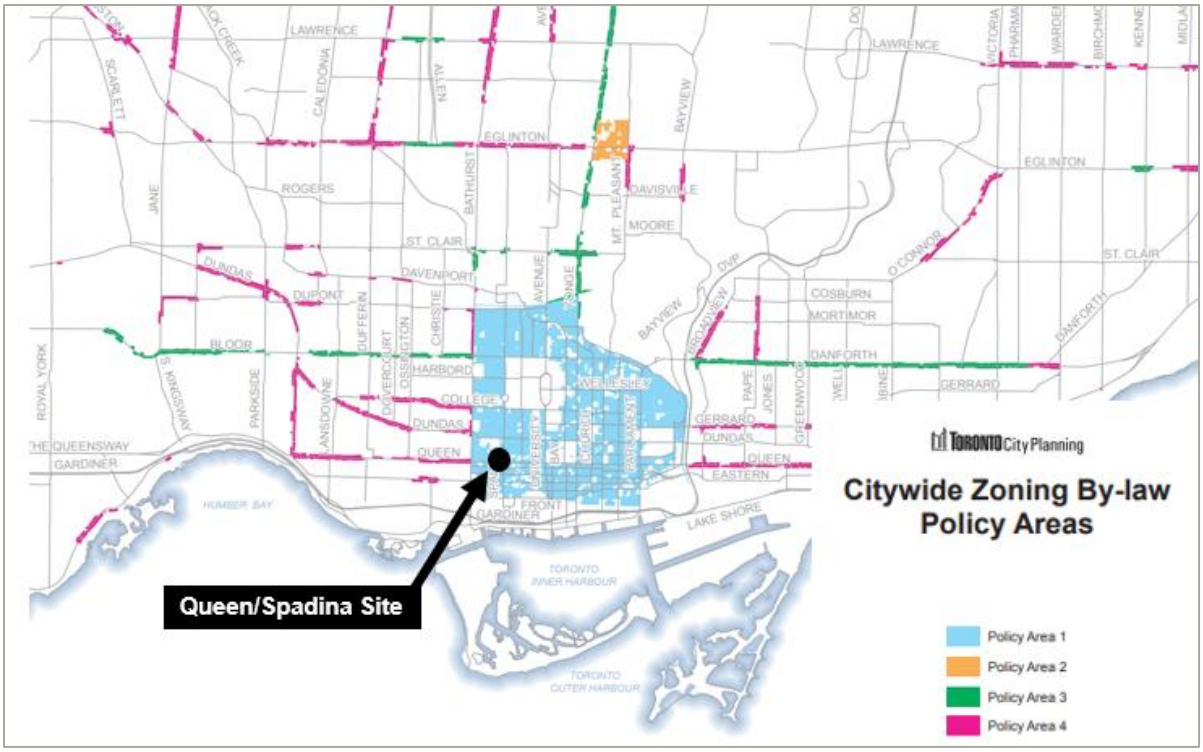
6 Parking and Loading Assessment

This section of the report reviews the proposed parking supply and the requirements of the new City-wide Zoning By-law 569-2013, as amended (Office Consolidation) Version Date: May 1, 2020. The by-law includes specific requirements for parking (bicycle and vehicle) as well as loading.

6.1 Policy Area Designations and Parking Requirements

The current city-wide Zoning By-law 569-2013 is typically applied to new developments throughout the City. The By-law includes multiple sets of vehicle parking rates with diminishing requirements for some areas that have better transit accessibility. Queen and Spadina TOC site falls under Policy Area 1, as shown in **Figure 11**, and this area has some of the lowest rates which reflects transit accessibility and the mixed-use nature of the downtown city centre core.

According to By-law No. 569-2013, within Bicycle Zone 1, if bicycle parking is provided in excess of the required minimums, then the minimum vehicle parking requirements can be reduced by 1 vehicle space for every 5 bicycle parking spaces provided beyond the minimum, to a maximum of 20% of the required minimum vehicle parking. The subject site is located in Bicycle Zone 1, which is defined as the area of the City bounded by the Humber River on the west, Lawrence Avenue on the north, Victoria Park Avenue on the east and Lake Ontario on the south.



Source: https://www.toronto.ca/wp-content/uploads/2017/10/96e8-City-Planning-Zoning-city-wide-Policy-Areas-zone-map.pdf

Figure 11: City of Toronto Policy Areas

6.2 Vehicle Parking Requirements

Vehicle parking requirements were reviewed using By-law 569-2013, and the requirements are shown in **Table 13** and **Table 14** for the North and South Sites, respectively.

Table 13: Vehicle Parking Zoning By-law Requirements – North Site

Building	Land Use	Size (Unit or sm)	By-law No. 569-2013 (PA1)	
			Rate	# Spaces Req.
North Site	Bachelor	46 units	0.3 / unit	13
	1-bed	24 units	0.5 / unit	12
	2-bed	12 units	0.8 / unit	9
	3-bed	13 units	1.0 / unit	13
	Visitors	95 units	0.1 / unit	9
Bicycle Parking Reduction [1]			53 extra spaces = 11 space reduction	
Total Required			-	**45**
Total Proposed			-	**0**
Difference			-	**- 45**

Note: 1) In PA1 the vehicle parking spaces required on a lot may be reduced at a rate of 1 vehicle parking space for each 5 bicycle parking spaces provided in excess of the minimum number of bicycle parking spaces required by Chapter 230 if the reduction of vehicle parking space is not greater than 20% of the total minimum vehicle parking spaces required.

Table 14: Vehicle Parking Zoning By-law Requirements – South Site

Building	Land Use	Size (Unit or sm)	By-law No. 569-2013 (PA1)	
			Rate	# Spaces Req.
South Site	Bachelor	17 units	0.3 / unit	5
	1-bed	74 units	0.5 / unit	37
	2-bed	20 units	0.8 / unit	16
	3-bed	11 units	1.0 / unit	11
	Visitors	122 units	0.1 / unit	12
	Retail	1914 SM	1.0 / 100SM	19
Bicycle Parking Reduction [1]			66 extra spaces = 14 space reduction	
Total Required			-	**86**
Total Proposed			-	**0**
Difference			-	**- 86**

Note: 1) In PA1 the vehicle parking spaces required on a lot may be reduced at a rate of 1 vehicle parking space for each 5 bicycle parking spaces provided in excess of the minimum number of bicycle parking spaces required by Chapter 230 if the reduction of vehicle parking space is not greater than 20% of the total minimum vehicle parking spaces required.

The sites will not have on-site dedicated vehicle parking. However, considering the urban trends, downtown location and access to transit, it is neither practical nor reasonable to provide the number of parking spaces required by the prevailing Zoning By-law for the proposed development. In recent years, City Council has acknowledged this and has adopted lower standards for approval for new developments in downtown. These actions have been bolstered by Ontario's New Five-Year Climate Change Action Plan and numerous other initiatives by the City of Toronto.

There has also been a steep decline in residential parking demand and vehicle ownership in the downtown Toronto area. There have been developments constructed with 'zero' parking across North America, including downtown Toronto, where transit access is very high. This area is well served by transit, both sites will have direct internal access to the Queen-Spadina Ontario Line station, and will also be well served by both streetcar routes on Queen and Spadina. Also, a very high transit-dependency is the fundamental characteristic of Transit Oriented Developments/Communities, as they promote reduced auto-dependency.

6.3 Vehicle Ownership Rates in the Surrounding Area

A review of auto-ownership rates in the immediate area was performed using the same Transportation Tomorrow Survey zones discussed in **Section 4.2.1**. The average auto-ownership rate is 0.56 vehicles per household for apartment units and 0.59 vehicles per unit for regular homes. The lowest auto-ownership rate was 0.33 vehicles per apartment unit in zone 67 which is the zone north of Queen Street and east of Spadina Avenue. Overall, this does indicate that there are some areas where less than, or approximately half of the units have a vehicle.

6.4 Zero Parking / Elimination of Parking Minimums

6.4.1 Elimination of Parking Minimums: Toronto

The City already allows for the elimination of parking minimums for some land uses within Policy Area 1 as per Zoning By-law 5690-2013, when the interior floor area of all the uses does not exceed 1.0 times the area of the lot. This acknowledges that some uses cannot provide parking, and more importantly, can be sustained without any on-site parking. Although residential land uses are not included, the By-law does acknowledge that some people will either rely on public parking to visit the use, or will be a walk-in trip without any vehicle.

Recently, the Chief Planner and Executive Director of City Planning put out a Report for Action dated January 5, 2021. The Report is entitled Proposed Review of Parking Requirements for New Development[5]. The report essentially outlines the rationale and support for the elimination of parking minimum. The report provides examples of some of City Council's recent decisions which recognize that the current automobile parking standards represent a barrier to the City achieving its housing vision. For example:

- *"In relation to the Queen Street West Planning Study - Bathurst Street to Roncesvalles Avenue, Council removed automobile parking requirements for various forms of development within the study area in order to facilitate the conservation of heritage buildings, and to support Public Realm, Built Form and Transportation objectives. (URL: http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2020.TE14.5)*
- *In 2018, City Council requested City Planning to report on exempting low rise apartment buildings from parking requirements in some cases, and other potential incentives to promote purpose-built rentals in Neighbourhoods-designated areas (URL: http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2018.PG27.5)."*

The report makes the following recommendations regarding the elimination of parking minimums:

- ***A shift in focus from minimums to maximums** will further support and encourage land- and cost-efficient forms of development which do not include extensive automobile parking.*
- ***Limiting the supply of automobile parking and increasing the supply of bicycle parking** will encourage transportation alternatives to automobiles and support the City's policies related to reducing automobile dependence.*
- ***Removing automobile parking minimums** or reducing the number of land uses for which parking rates are specified may simplify the zoning requirements, allowing for easier understanding and application.*
- *Consideration of replacing minimum automobile parking requirements with parking supply guidelines;*
- ***Identification of other mobility infrastructure required if automobile parking requirements are reduced or removed and mechanisms to pay for it;***

[5] https://www.toronto.ca/legdocs/mmis/2021/ph/bgrd/backgroundfile-159784.pdf

- *Development of **new parking policy area boundaries** to better reflect areas with good alternatives to automobile travel, **such as high-quality transit service**;*
- ***Development of an approach to adjust parking requirements without a zoning by-law amendment as new transit infrastructure enters service;***
- *Identification of land uses and areas where the existing ZBL parking standards should be adjusted to meet the intent of the Official Plan by:*
    - ***Reducing or eliminating automobile parking minimums; • Reducing or introducing automobile parking maximums; or***
    - ***Increasing bicycle parking minimums;***

The subject development is a perfect candidate for the elimination of parking minimums, since it achieves many of the goals listed above and meets many of the prerequisites for consideration. The site will be within walking distance to many employment uses within downtown including the central business and financial districts. In addition, there will be direct transit access to Ontario Line and surface transit along the King Street transitway. The sites excellent transit access will make it a perfect location to implement a no parking, truly transit-oriented community. With ample bicycle parking and access to surface cycling routes, the site will also be able to support a zero-vehicle culture by supporting other active modes of transportation.

6.4.1.1 EXAMPLES OF NEAR-ZERO VEHICLE PARKING CONDOMINIUMS IN TORONTO

An existing condominium at 426 University Avenue in the City of Toronto just south of St Patrick subway station on the Yonge-University-Spadina subway line (Dundas Street at University Avenue) – referred to as "RCMI" due to it being integrated with the heritage façade of the Royal Canadian Military Institute – was built and began occupancy in 2014[6].

The condominium building is 42 storeys tall and has 315 units, mostly comprised of one-bedroom and bachelor units. The building is equipped with 4 vehicle stacker parking spaces, plus one regular parking space. This allows for parking of up to 9 vehicles, all of which are dedicated car-share parking spaces. The building therefore relies entirely on use of car-sharing, as well as the available surrounding public parking supply for any overflow demand or visitor demand. The building also has 315 bicycle parking spaces which is one space for each unit. This demonstrates the ability for a building to rely on car-share and public parking. Comparatively, the proposed TOC building will have even better (direct) transit access, will have more bicycle parking (on a spaces per unit basis), and will also have car-share available in the surrounding area but not directly in the TOC. Overall, the transportation option availability for the subject TOC is similar but more heavily weighted towards transit and cycling reliance.

6.4.2 Elimination of Parking Minimums: Brampton

Brampton City Council has also recently passed a vote to enable Open Option Parking city-wide effective July 2, 2020[7]. This means that developers can determine how much parking is required for a development based on market expectations. This allows the market to control the parking needs and to be more flexible to infrastructure changes. This also allows for reduced

[6] https://www.toronto.ca/legdocs/mmis/2009/te/bgrd/backgroundfile-21943.pdf

[7] https://www.edmonton.ca/city_government/urban_planning_and_design/comprehensive-parking-review.aspx

construction and unit costs when parking is not provided, which is considered in the market assessment when determining if and how much parking would be provided.

6.5 Public Parking

There is available public parking located directly adjacent to both buildings, or within 200 metres walking distance. These parking lots can be used by guests or visitors. Examples of nearby parking lots are summarized below.

- **300 Queen Street W** – Underground Parking east of North Site, accessible from Soho Street
- **186 Spadina Avenue** – surface and underground parking, north-west or intersection, accessible from Cameron Street

In addition to the public parking lots which will be able to accommodate long-term visitors, there will also be available on-street parking which will be better suited for short-term visitors.

6.6 Vehicular Parking Supply

The total proposed vehicular parking supply for both sites is zero spaces. The site will be heavily reliant on transit services and the proximity of amenities and jobs in the downtown core, which would lead to active transportation and transit trips.

If there will be vehicles owned by future residents of the TOC development, these vehicles will be utilizing nearby parking lots and may also enter rental or sublet agreements with nearby private parking space owners to use those nearby space. This will allow for an otherwise underutilized parking space to be used.

Parking requirements from the City Zoning By-law were reviewed, despite the proposal to not provide any on-site parking.

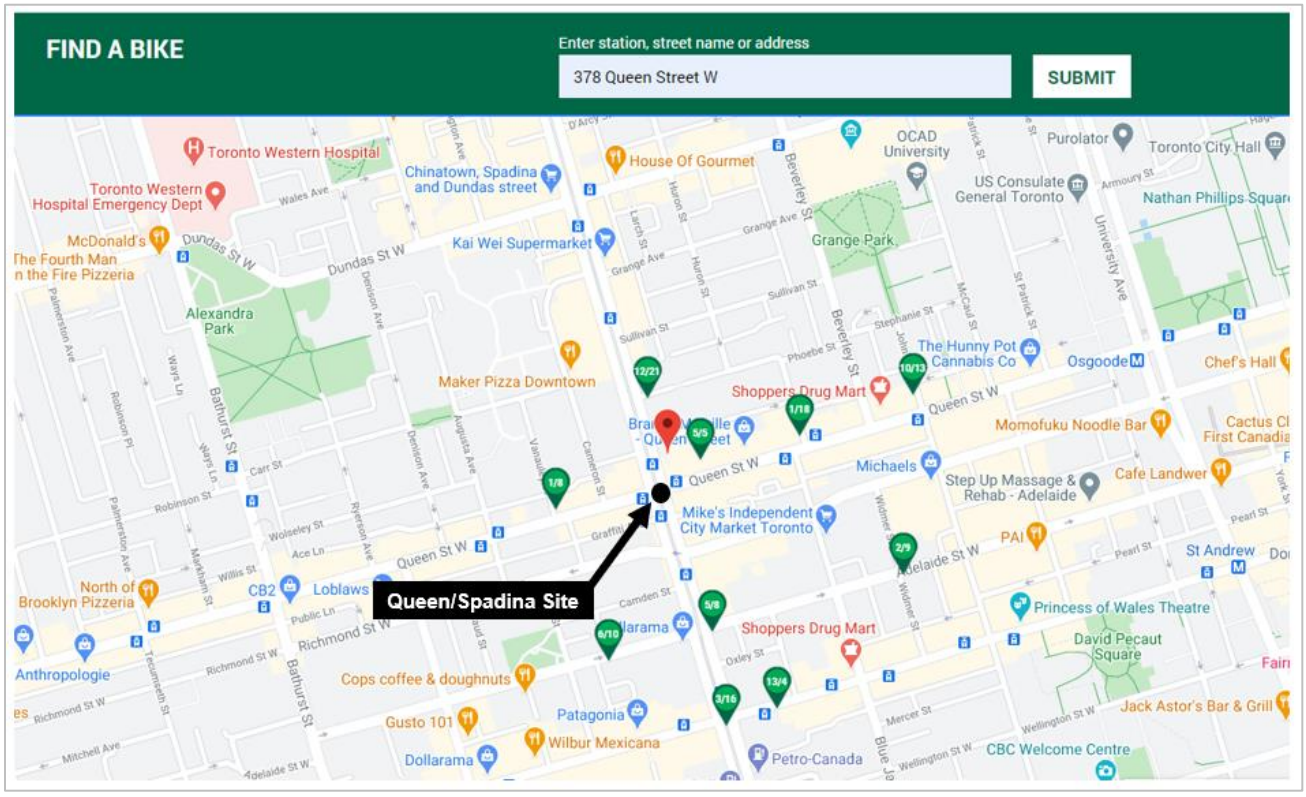
6.7 Bicycle Parking Supply

Bicycle parking for the site will be provided in the form of short-term and long-term bicycle parking spaces. Short-term bicycle parking will be provided at-grade (internally or weather protected if outdoors) as well as underground, and will serve residential visitors, commercial patrons, and residents who are making short stops at home. Long-term bicycle parking will be located on the underground parking levels under each building. The bicycle parking supply is summarized in **Table 15** for both sites.

There are several bike share locations within 400 metres walking distance from the sites for a total number of 53 bike shares available, as shown in **Figure 12**. These bikeshare spaces will be available to residents and visitors. Available bicycles will be usable by residents or visitors leaving the sites, while empty spaces will be available for residents and visitors returning back. As a result, all of the bikeshare spaces are considered available to the residents.

Table 15: Bicycle Parking Supply

Area	Bicycle Parking Space Type							
	Residence Long Term	Residential Short Term	Non-residential Long Term	Non-residential Short Term	Transit Long Term	Transit Short Term	Bike Share	Total
North Site	84	12	0	0	0	0	53	**149**
South Site	114	14	4	4	39	0	53	**228**



Source: https://bikesharetoronto.com/system-map/

Figure 12: Bike share locations within 400 metres walking distance of sites.

6.8 Bicycle Parking Requirements

Bicycle parking requirements were reviewed for By-law 569-2013. Bicycle parking requirements for the North and South Sites are summarized in **Table 16** and

Table 17, respectively.

There will be 112 surplus long-term bicycle parking spaces, compared to the Zoning By-law requirement. Between the two buildings, there will be 7 additional short-term parking spaces. In addition to the provided parking on-site, there will be bike-share parking in the near vicinity that is not counted towards the parking supply.

Table 16: Bicycle Parking Zoning By-law Requirements – North Site

Land Use		Unit or per 100 sm	By-law No. 569-2013			
			Long Term		Short Term	
			Rate	# Required	Rate	# Required
North Site	Residential	95 units	0.9	86	0.1	10
Total Required			-	86	-	10
Proposed			-	137	-	12
Surplus			-	**+ 51**	-	**+ 2**

Table 17: Bicycle Parking Zoning By-law Requirements – South Site

Land Use		Unit or per 100 sm	By-law No. 569-2013			
			Long Term		Short Term	
			Rate	# Required	Rate	# Required
South Site	Residential	122 units	0.9	110	0.1	13
	Retail	1914 SM [1]	0.2	0	0.3	0
Total Required			-	110	-	13
Proposed			-	171	-	18
Surplus			-	**+ 61**	-	**+ 5**

Note: 1) According to By-law 569-2013, if a bicycle parking space is required for uses on a lot, other than a dwelling unit, and the total interior floor area of all such uses on that lot is 2000 square metres or less, then no bicycle parking space is required.

6.9 Loading Space Requirements

Loading space requirements of Zoning By-law 569-2013 were also reviewed for the proposed site. The loading space requirements as per the By-law, and loading spaces provided, are shown in **Table 18** and **Table 19** for the North and South Sites, respectively.

Table 18: Loading Spaces Required Based on By-Law Rates – North Site

Building	Land Use Type	Unit or sm	Loading space required and provided
North Site	Residential	95 units	1 Type 'G'
	Total Required		**1 Type 'G'**
	Total Provided		**1 Type 'G'**

Table 19: Loading Spaces Required Based on By-Law Rates – South Site

Building	Land Use Type	Unit or sm	Loading space required and provided
South Site	Residential	122 units	1 Type 'G'
	Retail	1914 SM	1 Type 'B'
	Total Required		**1 Type 'G'; 1 Type 'B'**
	Total Provided		**1 Type 'G'; 0 Type 'B'**

The dimensions of the proposed loading spaces meet the By-law requirements, with the dimensions of each type listed below.

Type 'G'

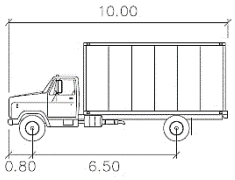
- Minimum Length: 13.0 metres
- Minimum Width: 4.0 metres
- Minimum Clearance: 6.1 metres

The north building will be equipped with an external loading area on Bulwer Street. Refuse will need to be wheeled out into the alley for collection by the front-end loader trucks. Similarly, delivery or moving trucks will need to park on Bulwer Street. There are already examples of loading areas feeding directly onto Bulwer Street, where the truck park perpendicular to the loading area. Passenger vehicles will be able to maneuver passed the parked refuse collection and loading trucks when they are in layby on Bulwer Street. The refuse area will have the same functional dimensional area and vertical clearance as the Type 'G' loading space, but will not be demarcated.

The south site will also be equipped with one Type G loading space which will be able to accommodate the vehicle types anticipated to enter the building loading area. A secondary Type 'B' will not be provided due to limited space. The building property manager will need to coordinate the use of the loading area so that there are no overlaps of refuse collection and moving/loading. The loading area will need to be fully accessible for refuse collection during the schedules days and times.

6.9.1 Loading Swept Path Analysis

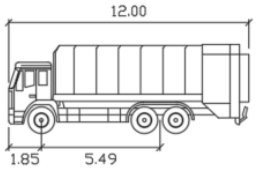
The loading areas were tested using AutoTURN software (AutoCAD-assisted software) to check the loading space accessibility for anticipated design vehicles entering the site, and for each of the building loading areas. The largest vehicles anticipated to enter the site are a delivery or moving vehicle, as well as a front-end loader refuse collection truck.



MSU

	meters
Width	: 2.60
Track	: 2.60
Lock to Lock Time	: 6.0
Steering Angle	: 40.2

The swept path analysis at the southwest corner is shown in **Figure 11** and **Figure 12** for the delivery truck and refuse collection truck, respectively. The swept path analysis at the northeast corner is shown in **Figure 13** and **Figure 14** for the delivery truck and refuse collection truck, respectively. For the delivery truck, a Medium Single Unit ("MSU") design vehicle was tested, while for refuse collection accessibility, a City of Toronto "Front End Loader" design vehicle was used. The design vehicles and dimensions are shown to the right.



Front End Loader

	meters
Width	: 2.40
Track	: 2.40
Lock to Lock Time	6.0
Steering Angle	: 27.1

The anticipated design vehicles will be able to navigate to the proposed loading area, load or unload as needed, and then exit the site without conflicting with any obstructions. The developer and property manager will need to ensure that the trucks accessing the site are of comparable size to the design vehicles or smaller to access the loading area.

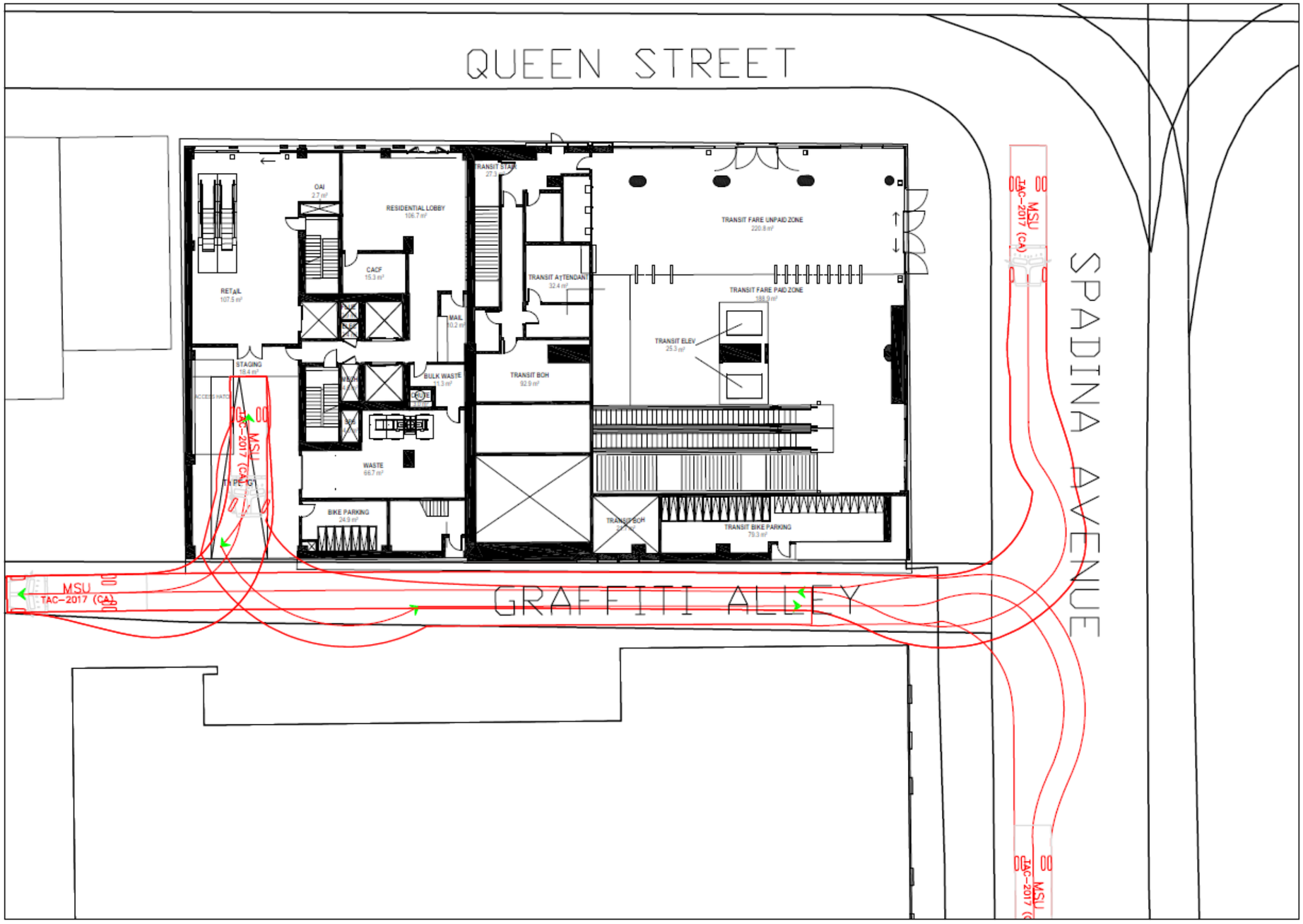


Figure 13: Loading Swept Path Analysis Medium Single Unit Truck (Southwest Corner)

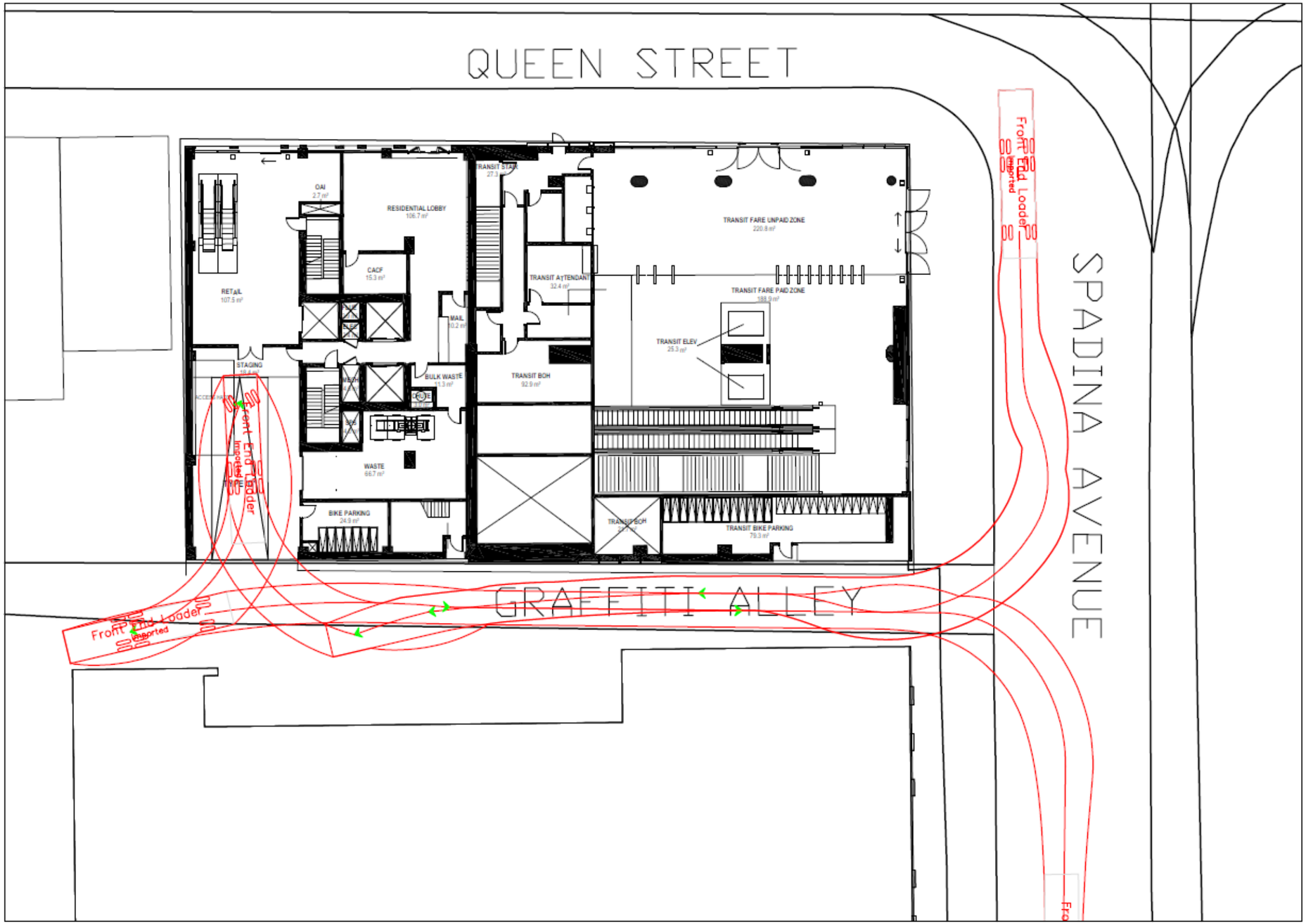


Figure 14: Refuse Swept Path Analysis Front End Loader Refuse Truck (Southwest Corner)

Figure 15: Loading Swept Path Analysis Medium Single Unit Truck (Northeast Corner)

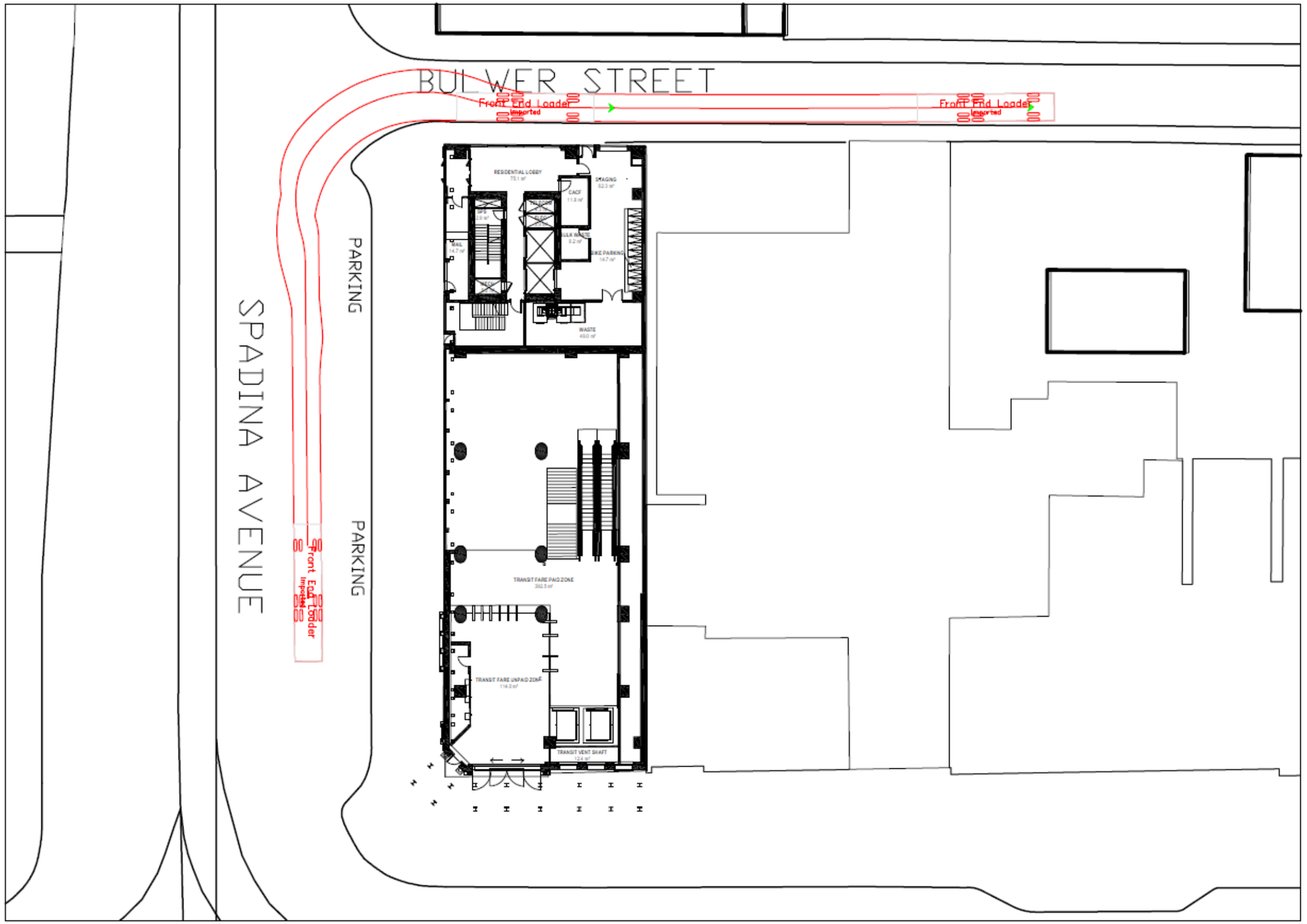


Figure 16: Refuse Swept Path Analysis Front End Loader Refuse Truck (Northeast Corner)

6.10 Transit Demand Management ('TDM')

Transportation Demand Management (TDM) measures are methods employed to reduce the traffic impacts of a development through the reduction of Single-Occupant Vehicle (SOV) trips as well as the encouragement of more sustainable forms of travel and more efficient use of the transportation network for all modes of travel.

TDM measures can be 'hard measures', such as infrastructure like bicycle parking, or can be 'soft measures' such as policies that allow for working-from-home or flex hours. TDM measures must also be tied to the surrounding transportation network context of the development. For example, bicycle parking will be ineffective if there is no surrounding bicycle infrastructure like bicycle lanes, multi-use paths, or a lack of bicycle parking at the ultimate destination. For this reason, successful TDM implementation requires a united effort and coordination between the City and developers.

Hard measures are physically infrastructure improvements that encourage alternative modes of travel and mode shifts away from single-occupant vehicles. This can include the provision of bicycle parking or enhanced pedestrian and cyclist facilities on-site including shower and change facilities for employment uses.

Soft measures are programs or policies, such as unbundling or condo units to parking spaces, work-from-home policies, transit subsidies, carpooling assistance etcetera. In many cases, hard and soft measures work together and provide mutual benefit. For instance, transit pass subsidies are soft measures, but when paired with hard measures like improved waiting areas, they can have a greater impact on mode choice.

The Toronto Green Standard (Version 3) requires measures that will support a 15% or greater reduction in single-occupancy vehicle (SOV) trips.

For the subject site, the general context of the area as a downtown city centre-core, mixed-use environment with excellent transit access and future direct transit access to the Ontario Line, will have an impact on the potential TDM measures. In fact, the inherent nature of the area and the presence of the Ontario Line and streetcar surface transit routes along both roadways adjacent to the development will make this location an excellent candidate to benefit from TDM initiatives.

The mixed-use nature of downtown allows for synergy and mixed-use interactions between the proposed residential towers, as well as the ancillary retail at the ground floor, and the surrounding retail-commercial and services that are in the area. Additionally, due to the location near the City's central business district, there is an expectation that many of the residents will work within the general area and will not rely on transit to make their daily trips. Rather, these residents will walk or cycle. The mixed-use, and walkable nature of the area will in itself help to reduce vehicle trips by encouraging walking and linked trips.

Regardless of the ability for the development to leverage TDM initiatives, the strongest TDM measure will be the fact that both residential towers will not have any vehicular parking provided. Therefore, any vehicle trips generated by the development will be pick-up/drop-off or taxi/rideshare trips. The occupancy of the buildings will be market-driven, meaning that residents who decide to purchase units in this building will want to be car-free and many will live and work in close proximity, thus relying on transit, walking, and cycling to get around.

Since the ancillary commercial will primarily serve the surrounding area and the residential condos above, the TDM plan will be geared towards adapting the residential component.

6.10.1 Local and Regional Transit Accessibility

As already discussed, there is excellent transit coverage within the vicinity of the site even without the construction of Ontario Line. TTC surface transit is provided in the form of streetcars along Spadina Avenue (in separated right-of-way and dedicated signals at intersections) and Queen Street (in mixed traffic). Additionally, both of these streetcar routes provide direct access to the Toronto subway system along Line 1 (easterly to University Avenue) and Line 2 (northerly to Bloor Street). Transit stops are located directly at the intersection of Spadina Avenue and Queen Street, and all stops are within 100 metres walking distance from each building.

Spadina subway station is located 2.0 kilometres to the north (approximately 30 minute walk), and Osgood Station 795 metres to the east (approximately a 10 minute walk). With Ontario Line, subway access will be directly accessible by residents from within the building. Residents will not need to leave the building to access the Ontario Line. Ontario Line riders will be able to transfer at Osgood Station (Queen Street and University Avenue) as well as at Queen Station (Queen Street and Yonge Street).

The study area already has a fairly high non-vehicle modal split at 79% non-auto drive and this is expected to increase in general due to the increase in transit availability. The site itself will further benefit and leverage this proximity and access.

6.10.2 Transit Pass Subsidies

Residents and tenants of the buildings will be given transit pass subsidies that will further encourage the use of transit as a primary mode, and will attract those who wish to rely on transit and will utilize the transit passes. The subsidies can be provided in the form of reduced cost passes, or can be provided in the form of subsidies to residents.

6.10.3 Real-Time Transit Information

Real-time transit service updates will be provided in the lobby area of each residential tower. The real-time displays will include arrival time for the nearest transit stops for each of the primary transit services expected to serve the development. The real-time displays will allow residents to time leaving their buildings to reduce the amount of time standing at each transit stop, thus making transit more attractive.

6.10.4 Pedestrian and Cycling Connections

Both buildings will be directly fronting both Spadina Avenue as well as Queen Street and will have direct access to these streets. There will also be secondary accesses to Graffiti Alley and Bulwer Street. Internally, the residential component of the condo towers will have access to the transit station lobby area, and there will be no need for residents to leave the building if they are destined to Ontario Line.

Cycling infrastructure in the form of "sharrows" is provided along Spadina Avenue, which will help bring cyclists to Richmond Street which is one-way in the westbound direction and equipped with dedicated cycling lanes that are separated from vehicle travel lanes with barriers

where possible. Similarly, cyclists may travel to the south to Adelaide Street which is a one-way street in the eastbound direction and also has separated dedicated cycling lanes. The City's broader cycling network can be accessed from these roadways.

Bicycles are also allowed on the TTC subway system outside of peak periods. Residents will be able to bring their bicycles on the subway and use them to complete the last leg of their trips, if it is conducive to their needs.

6.10.5 Bicycle Parking

The building will be equipped with long-term bicycle parking that will be available to all residents. Long-term bicycle parking ensures that residents are encouraged to own bicycles in the first place by providing them with easily accessible, secure and sheltered bicycle parking. Short-term bicycle parking will be provided for visitors. The short-term bicycle parking will be placed in safe, well lit, accessible areas at ground level. This will encourage visitors to feel cycling is a viable option.

As per the City of Toronto By-law 569-2013, in Policy Area 1 (PA1), the total minimum number of vehicle parking spaces required on a lot may be reduced at a rate of 1 vehicle parking space for each 5 bicycle parking spaces provided in excess of the minimum number of bicycle parking spaces, if the reduction of vehicle parking space is not greater than 20% of the total minimum vehicle parking spaces required. The By-law acknowledges that improved bicycle infrastructure and access will make cycling a more viable mode and will encourage a shift in mode share as well as a reduction in auto-ownership. The By-law also has a limit on the reduction to 20% of the total required supply which suggests that there may be diminishing returns, and this is to ensure the reduction is not overstated.

Bikeshare is also available within the general area. There are 10 bikeshare stations within 400 metres walking distance (as discussed in Section 6), which amounts to a total bike share availability of 112 spaces. These will also be available for use by residents and visitors if they use the bikeshare services. Bikeshare spaces are considered usable if they are occupied or empty, as they can be used by residents or visitors when leaving the site (bicycle is available) or when returning (there is a free "dock").

With the above taken into considerations, the site would achieve the 20% reduction allowed by the By-law. However, given the environment, it is plausible that multiple residents in a unit will cycle, and will need the additional bicycle parking, thus resulting in a greater shift from SOV.

6.10.6 Unbundled Resident Parking

Bundling parking spaces with unit sales, whether intended or not intended, results in the building being marketed to drivers and vehicle owners. For those who do not own vehicles and do not wish to own a parking space, these hidden costs are forced on them and at the very least result in unwanted effort required to rent out and seek a renter for the parking space in an effort to recuperate lost money.

Therefore, unbundling further benefits the developer as well as the community because the building will automatically be marketed to and attract those who do not drive as a primary form

of transportation. This theoretically reduces parking requirements for the building, reduces the amount of congestion on the surrounding road network, and allows for more efficient site design and use of the transportation network.

Unbundled parking could lead to a potential 10% to the residential parking rates.[8] Therefore, removing vehicle parking altogether is likely to have an even greater impact on the tenantry, as owning a vehicle and parking on site will not be viable. The building will be marketed and will find most interest from those who do not and have no interest in owning vehicles.

6.10.7 Car-Share Services

Car-share services are an effective way to reduce auto dependency and parking needs for both residential and non-residential developments, by providing vehicles that can be used by residents and tenants on an as-needed basis. The result is that the development will attract those who do not own vehicles and typically rely on alternative forms of transportation, thus reducing the number of parking spaces required on site and attracting residents and tenants that will generally produce fewer vehicle trips, but will still occasionally require a vehicle.

For some development proposals, the City of Toronto has accepted proposals that suggest that for each car-share parking space provided on site, the development will be able to reduce the parking supply by 3 parking spaces. This is another example of the City accepting TDM measures to reduce the parking supply.

Since there is no vehicle parking on site, carshare will not be directly available. However, there are carshare services in the vicinity of the site and within a 400 metre walking distance in all directions. Options include Zipcar and Maven Car Sharing. The availability of carshare will allow occasional drivers access to vehicles.

6.10.8 Summary of Transportation Demand Management

The following summarizes the measures that will support a 15% or greater reduction in single occupancy vehicle (SOV) trips as required by the Toronto Green Standard (Version 3):

- **Direct access to Ontario Line** from within the building;
- Transit passes or subsidies provided to all residents of the building including the commercial-retail components;
- Proximity to surface transit routes along Queen Street and Spadina Avenue;
- Real-time transit information;
- Location in a mixed-use city centre core environment to promote walking trips;
- Proximity to carshare services; and,
- Unbundled resident parking due to no vehicle parking provision.

[8] https://www.vtpi.org/park_man.pdf

7 Preliminary Findings and Next Steps

7.1 Traffic Forecasts

The Ontario Line Queen-Spadina Station is estimated to add 5,395 walking and transit trips to the intersection. The proposed developments (North and South Sites) will add a combined total of 234 and 238 total all modes trips for the AM and PM peak hours, respectively, with a majority of these trips being pedestrian and surface transit trips destined to/from the station. The TOC's contribution to total traffic volumes is presented in **Table 20**.

Table 20: Queen-Spadina TOC Transportation Contribution at Queen / Spadina Intersection

Period	Pedestrian Volumes	Traffic Volume	Bicycle Volumes
AM Peak Hour	1.4%	0.8%	4.8%
PM Peak Hour	1.2%	0.9%	4.2%

The TOC will contribute less than 0.9% to total vehicle traffic volumes at the intersection under 2030 total traffic conditions. Comparatively, the TOC will generate many more pedestrian and bicycle trips as a proportion of the total intersection volume which includes pedestrians on the crosswalks and cyclists riding within the curb lane. Up to 1.4% of total pedestrian traffic will be TOC related, and up to 4.8% of total cyclist traffic will be TOC related.

The station contribution of total traffic volumes at the study intersection is summarized in **Table 21**. The station itself will account for approximately 55% to 70% of all the pedestrian traffic at the study intersection. Crosswalks will accommodate as many as 2,600 people per hour. The total hourly intersection pedestrian crossing volume will be in the range of 8,000 to 10,000 people.

Table 21: Queen-Spadina Station Transportation Contribution at Queen / Spadina Intersection

Period	Pedestrian Volumes
AM Peak Hour	69.8%
PM Peak Hour	55.3%

7.2 Traffic Capacity and Operations

Despite some congestion during the AM peak hour, the study intersection of Queen Street West at Spadina Avenue is operating with residual capacity. The eastbound approach may be experiencing multi-cycle queues.

Under future background and future total traffic conditions, the study intersection will continue to operate with residual capacity, during both peak hours. Some movements will be approach capacity during the AM peak hour, and includes the eastbound approach and the northbound through movement. The traffic analysis demonstrates that the TOC will have a marginal impact on traffic operations, and that the majority of operational impacts are a result of pedestrian crosswalk demand generated by Ontario Line.

7.2.1 Recommended Mitigation Measures

Based on the anticipated large volume of added pedestrians to the network due to the Ontario Line Queen-Spadina Station, the sidewalks and crosswalks at the intersection of Queen Street West and Spadina Avenue may require improvements to increase the capacity. There are no recommendations for roadway improvements related to vehicular operations. The majority of activity generated under future conditions will be in the form of active transportation trips, primarily pedestrian walking trips, and the TOC will only contribute a very small component compared to the large number of pedestrian trips expected to be generated by the new station.

Detailed impacts and potential mitigation measures have been explored through the report **Ontario Line Queen-Spadina Station Transportation Impact Study (Ontario Line Technical Advisor, April 13, 2021)**. Due to the large number of pedestrian trips generated by the station, the Station SPR study includes a multi-modal level of service analysis following the City of Ottawa MMLOS methodology, which focuses on available infrastructure, as well as the Fruin pedestrian level of service analysis methodology, through static calculations at the sidewalks and transit waiting areas, to determine potential hotspots. The analysis in the Station SPR was performed using 2041 station transfer volumes, and therefore is indicative of the potential impacts from the continuing growth of pedestrians related to the station. The pedestrian traffic generated by the TOC will be using the station however, that pedestrian traffic will remain relatively constant after 100% occupancy, and a minor component of the overall station demand.

Some options for localized improvements were discussed for consideration, such as increasing sidewalk widths or increasing sidewalk areas by removing street furniture, as well as widening crosswalk widths or providing "intersection bulbs" where feasible. However, in light of the existing urban context and constraints in the study area, there were limited opportunities for infrastructure improvements and substantial mitigation measures. Additional recommendations included the need for monitoring pedestrian demand levels after the station is open and operating.

7.3 Transit

In addition to vehicular trips, transit demand was generated using the person trips method. Transit demand generated by the subject development was distributed onto the surrounding

transit network, and to the future Ontario Line Queen-Spadina Station and has accounted for future passenger transfers between Ontario Line and existing surface transit, as well as walk-in trips to Ontario Line, under future background traffic conditions.

7.4 Parking

The vehicular parking requirements based on By-law 569-2013 are 45 and 86 for the North and South Sites, respectively but both sites propose zero parking spaces for residents and visitors. However, in a location with extensive transit and active-transportation options, this should be adequate for the location. The buildings will be marketed to those who do not own vehicles and wish to rely on other alternative modes of travel. Furthermore, this offers a great opportunity for the City to explore the elimination of parking minimums in an urban, transit-oriented environment.

There are public parking lots located within 200 metres walking distance. These public parking lots may be used by long-term visitors, and short-term visitors will also be able to use on-street parking. Residents who do wish to own vehicles can also use the nearby public parking, and can rent their own private parking spaces from nearby lots or from other condominium owners who have spaces but do not use them. There are several websites that provide listings of available rental and sublet agreements of privately owned parking spaces. This will always remain an option for residents and allows for efficient use of the existing supply that may otherwise be underutilized.

The bicycle parking requirements based on By-law 569-2013 are 96 and 123 for the North and South Sites, respectively. The bicycle parking provided at both sites is in surplus compared to the requirement and is intended to further encourage a higher cycling mode share.

7.5 Loading

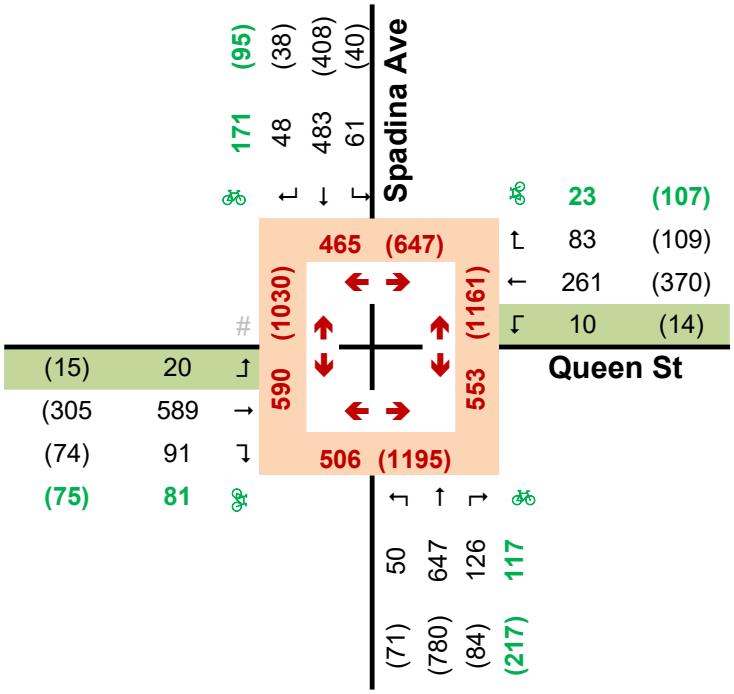
Application of Zoning By-laws 569-2013 requires a Type 'G' loading space at the North Site and both a 'Type G' and Type 'B' loading space at the South Site. The proposed loading areas will meet the dimensional criteria of Type 'G' loading spaces in terms of accessibility and function. For the north site, loading will be performed on Bulwer Street but will not obstruct the flow of traffic since vehicles will be able to maneuver around the parked trucks.

The south site will have one Type 'G' loading space within the building and this space is anticipated to serve both the residential and non-residential components of the TOC. For the south site, the building manager will need to coordinate so that the loading area is fully accessible to refuse collection during the scheduled dates and times for refuse pickup.

Appendix A: Volume Diagrams

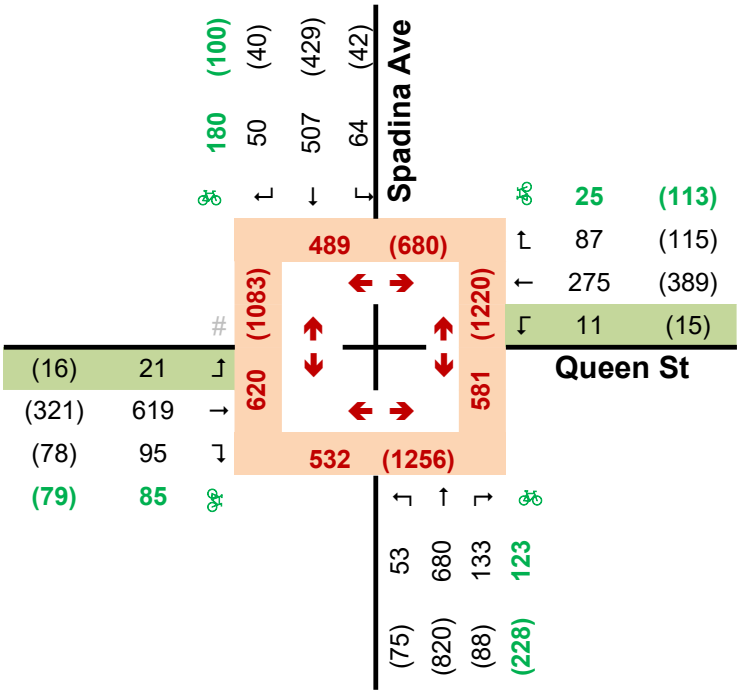
EXISTING VOLUMES

Legend			
xx	A.M. Peak Hour Traffic Volumes	(xx)	P.M. Peak Hour Traffic Volumes
xx	A.M. Peak Hour Pedestrian Volumes	(xx)	P.M. Peak Hour Pedestrian Volumes
xx	A.M. Peak Hour Conflicting Bike Volumes	(xx)	P.M. Peak Hour Conflicting Bike Volumes
	Transit Only Movements	← ##	(##)



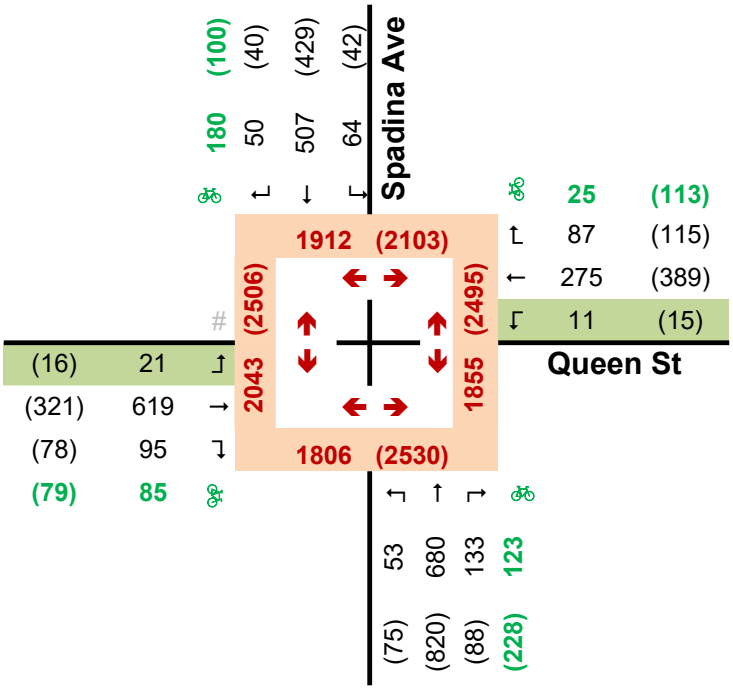
2030 GENERAL BACKGROUND VOLUMES

Legend			
xx	A.M. Peak Hour Traffic Volumes	(xx)	P.M. Peak Hour Traffic Volumes
xx	A.M. Peak Hour Pedestrian Volumes	(xx)	P.M. Peak Hour Pedestrian Volumes
xx	A.M. Peak Hour Conflicting Bike Volumes	(xx)	P.M. Peak Hour Conflicting Bike Volumes
	Transit Only Movements	← ##	(##)



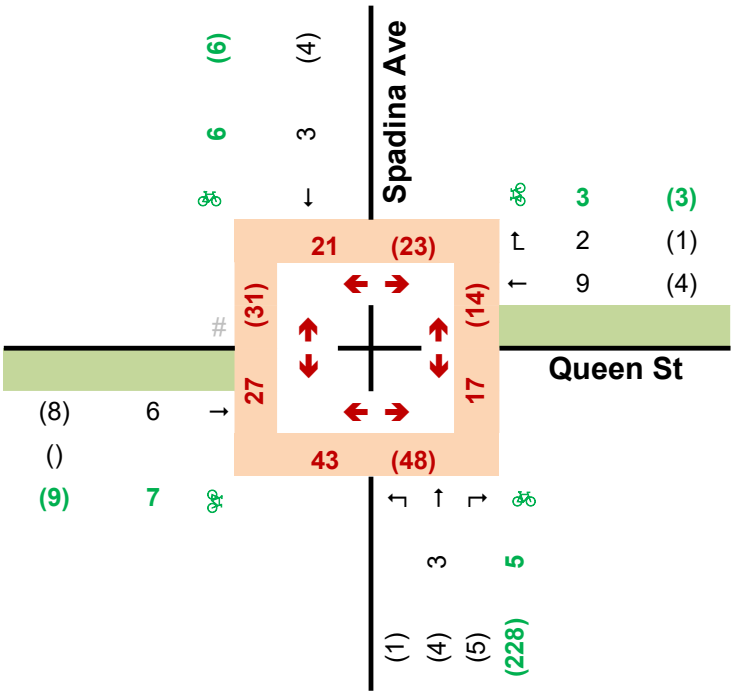
2030 TOTAL BACKGROUND VOLUMES

Legend			
xx	A.M. Peak Hour Traffic Volumes	(xx)	P.M. Peak Hour Traffic Volumes
xx	A.M. Peak Hour Pedestrian Volumes	(xx)	P.M. Peak Hour Pedestrian Volumes
xx	A.M. Peak Hour Conflicting Bike Volumes	(xx)	P.M. Peak Hour Conflicting Bike Volumes
Transit Only Movements	← ##	(##)	



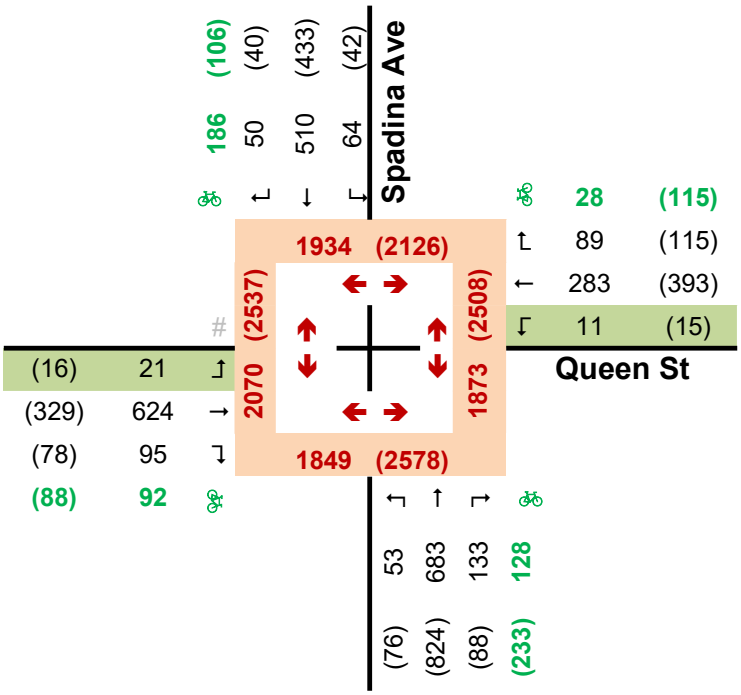
SITE TRIP VOLUMES

Legend			
xx	A.M. Peak Hour Traffic Volumes	(xx)	P.M. Peak Hour Traffic Volumes
xx	A.M. Peak Hour Pedestrian Volumes	(xx)	P.M. Peak Hour Pedestrian Volumes
xx	A.M. Peak Hour Conflicting Bike Volumes	(xx)	P.M. Peak Hour Conflicting Bike Volumes
	Transit Only Movements	← ##	(##)



2030 TOTAL TRAFFIC VOLUMES

Legend			
xx	A.M. Peak Hour Traffic Volumes	(xx)	P.M. Peak Hour Traffic Volumes
xx	A.M. Peak Hour Pedestrian Volumes	(xx)	P.M. Peak Hour Pedestrian Volumes
xx	A.M. Peak Hour Conflicting Bike Volumes	(xx)	P.M. Peak Hour Conflicting Bike Volumes
	Transit Only Movements	← ##	(##)



Appendix B: Existing Signal Timings

LOCATION:	**Spadina Ave & Queen St W**	*DISTRICT:*	**Toronto & East York**
MODE/COMMENT:	**FXT with LBO Signs**	*COMPUTER SYSTEM:*	**TransSuite**
TCS:	**276**	*CONTROLLER/CABINET TYPE:*	**Peek ATC-1000 / TS2T1**
PREPARED BY / DATE:	**Masoud Ramezani July 10, 2019**	*CONFLICT FLASH:*	**Red & Red**
CHECKED BY / DATE:		*DESIGN WALK SPEED:*	**1.0 m/s (FDW based on full crossing at 1.2 m/s)**
IMPLEMENTATION DATE:	**September 4, 2019**	*CHANNEL/DROP:*	
		CONTROLLER FIRMWARE:	**3.018.1.2976**

N

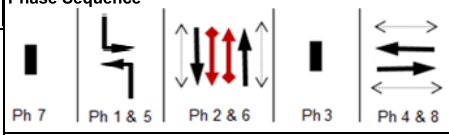
NEMA Phase		OFF All Other Times	AM 06:30-09:30 M-F	PM 15:30-18:30 M-F	NGHT 23:00-06:30 Daily	WKND 10:00-18:00 Sat & Sun	Phase Mode (Fixed/Demanded or Callable)
	Local Plan	Pattern 1	Pattern 2	Pattern 3	Pattern 4	Pattern 5	
	Split Table	Split 1	Split 2	Split 3	Split 4	Split 5	
1	WLK FDW MIN 7 MAX1 7 AMB 3 ALR 3 SPLIT	7	7	7	7	7	Callable at all times by stopbar loop Fully Protected
Spadina Ave 2	WLK 7 FDW 14 MIN 21 MAX1 30 AMB 3 ALR 3 SPLIT	30	30	30	30	30	Fixed NBTGA (O/L A) Parent phase 2
3	WLK FDW MIN 7 MAX1 7 AMB 3 ALR 3 SPLIT	7	7	7	7	7	NSTB (O/L C) Parent PH's 3&7 Callable by NS turning streetcar via interrogator
Queen St W 4	WLK 7 FDW 26 MIN 33 MAX1 33 AMB 3 ALR 4 SPLIT	33	33	33	33	33	Fixed
5	WLK FDW MIN 7 MAX1 7 AMB 3 ALR 3 SPLIT	7	7	7	7	7	Callable at all times by stopbar loop Fully Protected
Spadina Ave 6	WLK 7 FDW 14 MIN 21 MAX1 30 AMB 3 ALR 3 SPLIT	30	30	30	30	30	Fixed SBTGA (O/L B) Parent phase 6
7	WLK FDW MIN 7 MAX1 7 AMB 3 ALR 3 SPLIT	7	7	7	7	7	NSTB (O/L C) Parent PH's 3&7 Callable by NS turning streetcar via interrogator
Queen St W 8	WLK 7 FDW 26 MIN 33 MAX1 33 AMB 3 ALR 4 SPLIT	33	33	33	33	33	Fixed
	CL OF	0 FREE	0 FREE	0 FREE	0 FREE	0 FREE	

Pedestrian Minimums:
EWWK = 7 sec, EWFD = 26 sec
NSWK = 7 sec, NSFD = 14 sec

RING STRUCTURE

1	2	3	4	
5	6		8	7

Phase Sequence



Signal operates FREE (Uncoordinated) at all times. Split values are used as green times for phases.

NS Transit Bar Phase callable at two points within the cycle, however the 1st opportunity in a cycle will not be called if the phase was served at the end of the previous cycle (i.e. Script #1 omits Phase 3 in a cycle after Phase 7 was

Overlap A & B are only displayed when no NSLA are active.

NSLAs are fully protected with stopbar loops.

GPS time clock is used to activate/deactivate LBO Signs.

Public Holidays	2019 & 2020 Schedules
1: New Years Day	January 01, 19 & 20
2: Family Day	February 18, 19
3: Good Friday	April 19, 19
4: Easter Mondy	April 22, 19
5: Victoria Day	May 20, 19
6: Canada Day	July 01, 19
7: Civic/Provincial Day	August 05, 19
8: Labour Day	September 02, 19
9: Thanksgiving Day	October 14, 19
10: Remembrance Day	November 11, 2019
11: Christmas Day	December 25, 19
12: Boxing Day	December 26, 19

NOTES: EWLT restrictions from 7:00AM-10:00AM, M-F; 3:00PM-7:00PM, M-F; public holidays excepted; TTC vehicles excepted.

Appendix C: Synchro Report

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	Ø9
Lane Configurations										
Traffic Volume (vph)	20	589	10	261	50	647	126	61	483	
Future Volume (vph)	20	589	10	261	50	647	126	61	483	
Lane Group Flow (vph)	0	722	0	365	52	667	130	63	547	
Turn Type	Perm	NA	Perm	NA	Prot	NA	Perm	Prot	NA	
Protected Phases		4		8	5	2		1	6	9
Permitted Phases	4		8				2			
Detector Phase	4	4	8	8	5	2	2	1	6	
Switch Phase										
Minimum Initial (s)	33.0	33.0	33.0	33.0	6.0	21.0	21.0	6.0	21.0	7.0
Minimum Split (s)	40.0	40.0	40.0	40.0	12.0	27.0	27.0	12.0	27.0	13.0
Total Split (s)	40.0	40.0	40.0	40.0	13.0	36.0	36.0	13.0	36.0	13.0
Total Split (%)	39.2%	39.2%	39.2%	39.2%	12.7%	35.3%	35.3%	12.7%	35.3%	13%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	4.0	4.0	4.0	4.0	3.0	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)		-2.0		-2.0	-1.0	-1.0	-1.0	-1.0	-1.0	
Total Lost Time (s)		5.0		5.0	5.0	5.0	5.0	5.0	5.0	
Lead/Lag					Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?										
Recall Mode	Max	Max	Max	Max	None	Max	Max	None	Max	None
Act Effct Green (s)		35.3		35.3	7.8	31.3	31.3	7.8	33.9	
Actuated g/C Ratio		0.40		0.40	0.09	0.35	0.35	0.09	0.38	
v/c Ratio		1.04		0.57	0.37	0.63	0.35	0.46	0.50	
Control Delay		72.7		24.0	48.9	28.8	4.5	52.3	24.7	
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay		72.7		24.0	48.9	28.8	4.5	52.3	24.7	
LOS		E		C	D	C	A	D	C	
Approach Delay		72.7		24.0		26.3			27.5	
Approach LOS		E		C		C			C	
Queue Length 50th (m)		~70.1		21.9	8.5	49.5	0.0	10.4	38.4	
Queue Length 95th (m)		#127.1		44.6	22.0	82.3	6.7	#27.0	65.8	
Internal Link Dist (m)		253.3		201.6		86.4			81.9	
Turn Bay Length (m)					20.0		20.0	20.0		
Base Capacity (vph)		697		645	145	1054	374	142	1085	
Starvation Cap Reductn		0		0	0	0	0	0	0	
Spillback Cap Reductn		0		0	0	0	0	0	0	
Storage Cap Reductn		0		0	0	0	0	0	0	
Reduced v/c Ratio		1.04		0.57	0.36	0.63	0.35	0.44	0.50	

Intersection Summary	
Cycle Length: 102	
Actuated Cycle Length: 89	
Natural Cycle: 95	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.04	
Intersection Signal Delay: 39.4	Intersection LOS: D
Intersection Capacity Utilization 95.9%	ICU Level of Service F
Analysis Period (min) 15	

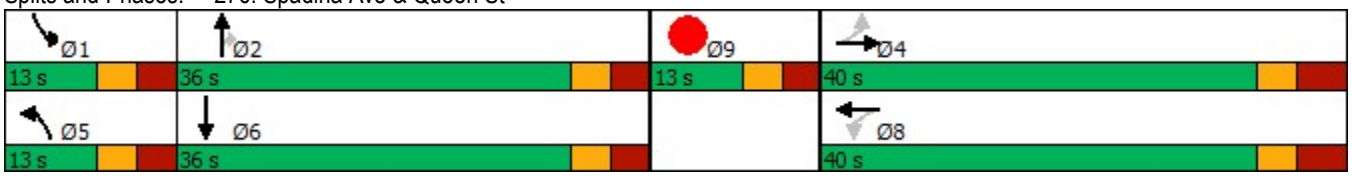
~ Volume exceeds capacity, queue is theoretically infinite.

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: 276: Spadina Ave & Queen St



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	589	91	10	261	83	50	647	126	61	483	48
Future Volume (vph)	20	589	91	10	261	83	50	647	126	61	483	48
Ideal Flow (vphpl)	1250	1250	1250	1250	1250	1250	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0		5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor		0.95			0.95		1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes		0.95			0.91		1.00	1.00	0.60	1.00	0.96	
Flpb, ped/bikes		0.99			1.00		1.00	1.00	1.00	1.00	1.00	
Frt		0.98			0.96		1.00	1.00	0.85	1.00	0.99	
Flt Protected		1.00			1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1851			1678		1606	3003	761	1575	2838	
Flt Permitted		0.94			0.93		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1734			1562		1606	3003	761	1575	2838	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	21	607	94	10	269	86	52	667	130	63	498	49
RTOR Reduction (vph)	0	11	0	0	28	0	0	0	86	0	6	0
Lane Group Flow (vph)	0	711	0	0	337	0	52	667	44	63	541	0
Confl. Peds. (#/hr)	465		506	506		465	590		553	553		590
Confl. Bikes (#/hr)			117			171			23			81
Heavy Vehicles (%)	0%	4%	3%	91%	9%	5%	0%	7%	13%	2%	8%	2%
Bus Blockages (#/hr)	10	10	10	9	0	0	0	0	0	0	0	0
Parking (#/hr)						0						
Turn Type	Perm	NA		Perm	NA		Prot	NA	Perm	Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8					2			
Actuated Green, G (s)		33.3			33.3		4.0	31.5	31.5	5.4	32.9	
Effective Green, g (s)		35.3			35.3		5.0	32.5	32.5	6.4	33.9	
Actuated g/C Ratio		0.37			0.37		0.05	0.34	0.34	0.07	0.35	
Clearance Time (s)		7.0			7.0		6.0	6.0	6.0	6.0	6.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		634			571		83	1012	256	104	998	
v/s Ratio Prot							0.03	c0.22		c0.04	0.19	
v/s Ratio Perm		c0.41			0.22				0.06			
v/c Ratio		1.12			0.59		0.63	0.66	0.17	0.61	0.54	
Uniform Delay, d1		30.6			24.7		44.8	27.2	22.5	43.8	25.0	
Progression Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		73.8			4.4		13.8	3.4	1.4	9.6	2.1	
Delay (s)		104.3			29.1		58.6	30.6	23.9	53.4	27.1	
Level of Service		F			C		E	C	C	D	C	
Approach Delay (s)		104.3			29.1			31.3			29.8	
Approach LOS		F			C			C			C	

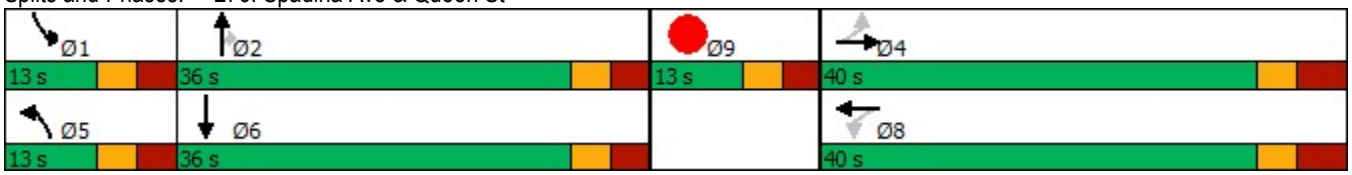
Intersection Summary			
HCM 2000 Control Delay	51.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	96.4	Sum of lost time (s)	21.0
Intersection Capacity Utilization	95.9%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	Ø9
Lane Configurations										
Traffic Volume (vph)	15	305	14	370	71	780	84	40	408	
Future Volume (vph)	15	305	14	370	71	780	84	40	408	
Lane Group Flow (vph)	0	419	0	525	76	830	89	43	474	
Turn Type	Perm	NA	Perm	NA	Prot	NA	Perm	Prot	NA	
Protected Phases		4		8	5	2		1	6	9
Permitted Phases	4		8				2			
Detector Phase	4	4	8	8	5	2	2	1	6	
Switch Phase										
Minimum Initial (s)	33.0	33.0	33.0	33.0	6.0	21.0	21.0	6.0	21.0	7.0
Minimum Split (s)	40.0	40.0	40.0	40.0	12.0	28.4	28.4	12.0	28.4	13.0
Total Split (s)	40.0	40.0	40.0	40.0	13.0	36.0	36.0	13.0	36.0	13.0
Total Split (%)	39.2%	39.2%	39.2%	39.2%	12.7%	35.3%	35.3%	12.7%	35.3%	13%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	4.0	4.0	4.0	4.0	3.0	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)		-2.0		-2.0	-1.0	-1.0	-1.0	-1.0	-1.0	
Total Lost Time (s)		5.0		5.0	5.0	5.0	5.0	5.0	5.0	
Lead/Lag					Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?										
Recall Mode	Max	Max	Max	Max	None	Max	Max	None	Max	None
Act Effct Green (s)		35.1		35.1	7.9	33.6	33.6	7.8	31.1	
Actuated g/C Ratio		0.41		0.41	0.09	0.39	0.39	0.09	0.36	
v/c Ratio		0.62		0.76	0.54	0.69	0.28	0.30	0.46	
Control Delay		24.6		29.9	54.2	26.9	2.1	43.8	23.2	
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay		24.6		29.9	54.2	26.9	2.1	43.8	23.2	
LOS		C		C	D	C	A	D	C	
Approach Delay		24.6		29.9		26.7			24.9	
Approach LOS		C		C		C			C	
Queue Length 50th (m)		27.7		37.6	12.7	65.6	0.0	7.0	32.0	
Queue Length 95th (m)		44.2		#64.7	#28.9	87.8	0.0	17.1	46.0	
Internal Link Dist (m)		253.3		201.6		86.4			81.9	
Turn Bay Length (m)					15.0		15.0	15.0		
Base Capacity (vph)		674		691	143	1202	322	149	1039	
Starvation Cap Reductn		0		0	0	0	0	0	0	
Spillback Cap Reductn		0		0	0	0	0	0	0	
Storage Cap Reductn		0		0	0	0	0	0	0	
Reduced v/c Ratio		0.62		0.76	0.53	0.69	0.28	0.29	0.46	

Intersection Summary	
Cycle Length: 102	
Actuated Cycle Length: 86.4	
Natural Cycle: 95	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.76	
Intersection Signal Delay: 26.7	Intersection LOS: C
Intersection Capacity Utilization 84.6%	ICU Level of Service E
Analysis Period (min) 15	
# 95th percentile volume exceeds capacity, queue may be longer.	

Queue shown is maximum after two cycles.

Splits and Phases: 276: Spadina Ave & Queen St



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	305	74	14	370	109	71	780	84	40	408	38
Future Volume (vph)	15	305	74	14	370	109	71	780	84	40	408	38
Ideal Flow (vphpl)	1250	1250	1250	1250	1250	1250	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0		5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor		0.95			0.95		1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes		0.91			0.92		1.00	1.00	0.46	1.00	0.96	
Flpb, ped/bikes		0.99			0.99		1.00	1.00	1.00	1.00	1.00	
Frt		0.97			0.97		1.00	1.00	0.85	1.00	0.99	
Flt Protected		1.00			1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1753			1757		1545	3089	566	1606	2877	
Flt Permitted		0.93			0.94		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1626			1648		1545	3089	566	1606	2877	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	16	324	79	15	394	116	76	830	89	43	434	40
RTOR Reduction (vph)	0	18	0	0	24	0	0	0	55	0	6	0
Lane Group Flow (vph)	0	401	0	0	501	0	76	830	34	43	468	0
Confl. Peds. (#/hr)	647		1195	1195		647	1030		1161	1161		1030
Confl. Bikes (#/hr)			217			95			109			75
Heavy Vehicles (%)	0%	3%	8%	70%	4%	4%	4%	4%	16%	0%	6%	0%
Bus Blockages (#/hr)	10	10	10	11	0	0	0	0	0	0	0	0
Parking (#/hr)						0						
Turn Type	Perm	NA		Perm	NA		Prot	NA	Perm	Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8					2			
Actuated Green, G (s)		33.1			33.1		5.4	32.6	32.6	4.1	31.3	
Effective Green, g (s)		35.1			35.1		6.4	33.6	33.6	5.1	32.3	
Actuated g/C Ratio		0.40			0.40		0.07	0.38	0.38	0.06	0.36	
Clearance Time (s)		7.0			7.0		6.0	6.0	6.0	6.0	6.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		642			651		111	1168	214	92	1046	
v/s Ratio Prot							c0.05	c0.27		0.03	0.16	
v/s Ratio Perm		0.25			c0.30				0.06			
v/c Ratio		0.62			0.77		0.68	0.71	0.16	0.47	0.45	
Uniform Delay, d1		21.6			23.3		40.2	23.5	18.2	40.5	21.5	
Progression Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		4.5			8.6		16.1	3.7	1.6	3.7	1.4	
Delay (s)		26.1			31.9		56.3	27.1	19.8	44.3	22.8	
Level of Service		C			C		E	C	B	D	C	
Approach Delay (s)		26.1			31.9			28.7			24.6	
Approach LOS		C			C			C			C	

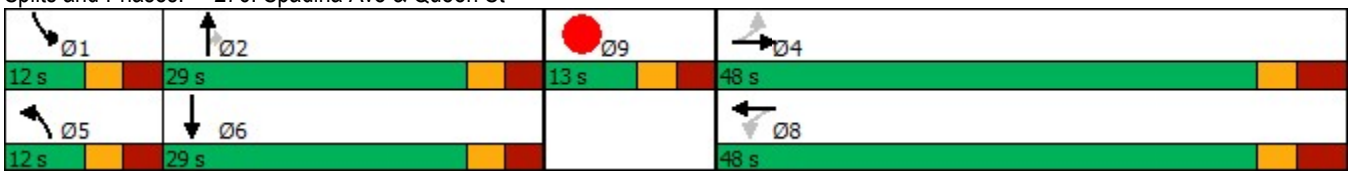
Intersection Summary			
HCM 2000 Control Delay	28.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	88.8	Sum of lost time (s)	21.0
Intersection Capacity Utilization	84.6%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

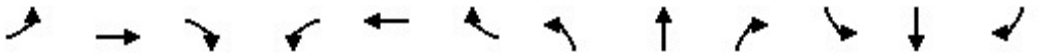
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	Ø9
Lane Configurations										
Traffic Volume (vph)	21	619	11	275	53	680	133	64	507	
Future Volume (vph)	21	619	11	275	53	680	133	64	507	
Lane Group Flow (vph)	0	758	0	385	55	701	137	66	575	
Turn Type	Perm	NA	Perm	NA	Prot	NA	Perm	Prot	NA	
Protected Phases		4		8	5	2		1	6	9
Permitted Phases	4		8				2			
Detector Phase	4	4	8	8	5	2	2	1	6	
Switch Phase										
Minimum Initial (s)	33.0	33.0	33.0	33.0	6.0	21.0	21.0	6.0	21.0	7.0
Minimum Split (s)	40.0	40.0	40.0	40.0	12.0	27.0	27.0	12.0	27.0	13.0
Total Split (s)	48.0	48.0	48.0	48.0	12.0	29.0	29.0	12.0	29.0	13.0
Total Split (%)	47.1%	47.1%	47.1%	47.1%	11.8%	28.4%	28.4%	11.8%	28.4%	13%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	4.0	4.0	4.0	4.0	3.0	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)		-2.0		-2.0	-1.0	-1.0	-1.0	-1.0	-1.0	
Total Lost Time (s)		5.0		5.0	5.0	5.0	5.0	5.0	5.0	
Lead/Lag					Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?										
Recall Mode	Max	Max	Max	Max	None	Max	Max	None	Max	None
Act Effct Green (s)		43.3		43.3	7.1	24.2	24.2	7.1	24.2	
Actuated g/C Ratio		0.49		0.49	0.08	0.27	0.27	0.08	0.27	
v/c Ratio		0.91		0.52	0.43	0.86	0.49	0.53	0.75	
Control Delay		39.9		18.1	53.1	44.6	8.9	58.8	37.9	
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay		39.9		18.1	53.1	44.6	8.9	58.8	37.9	
LOS		D		B	D	D	A	E	D	
Approach Delay		39.9		18.1		39.7			40.1	
Approach LOS		D		B		D			D	
Queue Length 50th (m)		59.3		19.7	9.2	59.9	0.0	11.0	46.5	
Queue Length 95th (m)		#122.1		42.0	#24.4	#111.2	10.1	#31.9	#85.3	
Internal Link Dist (m)		253.3		201.6		86.4			81.9	
Turn Bay Length (m)					20.0		20.0	20.0		
Base Capacity (vph)		829		747	127	814	282	124	766	
Starvation Cap Reductn		0		0	0	0	0	0	0	
Spillback Cap Reductn		0		0	0	0	0	0	0	
Storage Cap Reductn		0		0	0	0	0	0	0	
Reduced v/c Ratio		0.91		0.52	0.43	0.86	0.49	0.53	0.75	

Intersection Summary	
Cycle Length: 102	
Actuated Cycle Length: 89.2	
Natural Cycle: 105	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.91	
Intersection Signal Delay: 36.7	Intersection LOS: D
Intersection Capacity Utilization 100.4%	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: 276: Spadina Ave & Queen St





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	21	619	95	11	275	87	53	680	133	64	507	50
Future Volume (vph)	21	619	95	11	275	87	53	680	133	64	507	50
Ideal Flow (vphpl)	1250	1250	1250	1250	1250	1250	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0		5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor		0.95			0.95		1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes		0.93			0.87		1.00	1.00	0.46	1.00	0.95	
Flpb, ped/bikes		0.99			1.00		1.00	1.00	1.00	1.00	1.00	
Frt		0.98			0.96		1.00	1.00	0.85	1.00	0.99	
Flt Protected		1.00			1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1800			1600		1606	3003	581	1575	2803	
Flt Permitted		0.94			0.93		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1686			1487		1606	3003	581	1575	2803	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	22	638	98	11	284	90	55	701	137	66	523	52
RTOR Reduction (vph)	0	11	0	0	27	0	0	0	102	0	7	0
Lane Group Flow (vph)	0	747	0	0	358	0	55	701	35	66	568	0
Confl. Peds. (#/hr)	1912		1806	1806		1912	2043		1855	1855		2043
Confl. Bikes (#/hr)			123			180			25			85
Heavy Vehicles (%)	0%	4%	3%	91%	9%	5%	0%	7%	13%	2%	8%	2%
Bus Blockages (#/hr)	10	10	10	9	0	0	0	0	0	0	0	0
Parking (#/hr)						0						
Turn Type	Perm	NA		Perm	NA		Prot	NA	Perm	Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8					2			
Actuated Green, G (s)		41.3			41.3		4.7	23.2	23.2	4.7	23.2	
Effective Green, g (s)		43.3			43.3		5.7	24.2	24.2	5.7	24.2	
Actuated g/C Ratio		0.45			0.45		0.06	0.25	0.25	0.06	0.25	
Clearance Time (s)		7.0			7.0		6.0	6.0	6.0	6.0	6.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		765			674		95	761	147	94	711	
v/s Ratio Prot							0.03	c0.23		c0.04	0.20	
v/s Ratio Perm		c0.44			0.24				0.06			
v/c Ratio		0.98			0.53		0.58	0.92	0.24	0.70	0.80	
Uniform Delay, d1		25.6			18.7		43.7	34.7	28.3	44.0	33.3	
Progression Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		27.3			3.0		8.3	18.2	3.8	21.1	9.1	
Delay (s)		52.9			21.7		52.0	52.9	32.0	65.1	42.4	
Level of Service		D			C		D	D	C	E	D	
Approach Delay (s)		52.9			21.7			49.7			44.8	
Approach LOS		D			C			D			D	

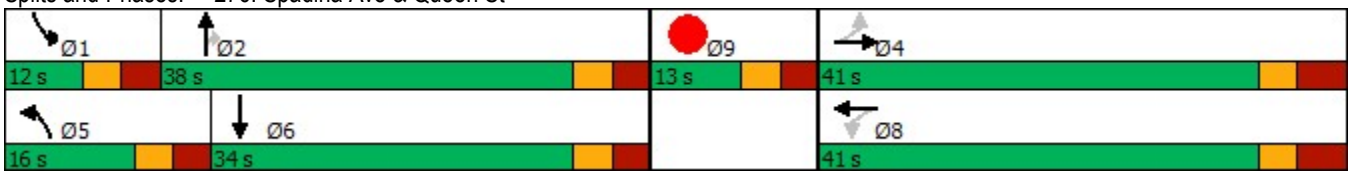
Intersection Summary			
HCM 2000 Control Delay	45.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	95.4	Sum of lost time (s)	21.0
Intersection Capacity Utilization	100.4%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

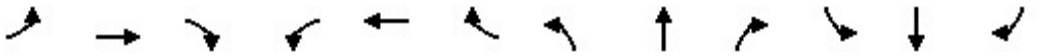
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	Ø9
Lane Configurations										
Traffic Volume (vph)	16	321	15	389	75	820	88	42	429	
Future Volume (vph)	16	321	15	389	75	820	88	42	429	
Lane Group Flow (vph)	0	441	0	552	80	872	94	45	499	
Turn Type	Perm	NA	Perm	NA	Prot	NA	Perm	Prot	NA	
Protected Phases		4		8	5	2		1	6	9
Permitted Phases	4		8				2			
Detector Phase	4	4	8	8	5	2	2	1	6	
Switch Phase										
Minimum Initial (s)	33.0	33.0	33.0	33.0	6.0	21.0	21.0	6.0	21.0	7.0
Minimum Split (s)	40.0	40.0	40.0	40.0	12.0	28.4	28.4	12.0	28.4	13.0
Total Split (s)	41.0	41.0	41.0	41.0	16.0	38.0	38.0	12.0	34.0	13.0
Total Split (%)	39.4%	39.4%	39.4%	39.4%	15.4%	36.5%	36.5%	11.5%	32.7%	13%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	4.0	4.0	4.0	4.0	3.0	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)		-2.0		-2.0	-1.0	-1.0	-1.0	-1.0	-1.0	
Total Lost Time (s)		5.0		5.0	5.0	5.0	5.0	5.0	5.0	
Lead/Lag					Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?										
Recall Mode	Max	Max	Max	Max	None	Max	Max	None	Max	None
Act Effct Green (s)		36.1		36.1	9.9	35.2	35.2	7.0	30.0	
Actuated g/C Ratio		0.41		0.41	0.11	0.40	0.40	0.08	0.34	
v/c Ratio		0.66		0.83	0.47	0.71	0.29	0.35	0.51	
Control Delay		26.3		35.3	46.7	27.2	2.4	48.0	26.2	
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay		26.3		35.3	46.7	27.2	2.4	48.0	26.2	
LOS		C		D	D	C	A	D	C	
Approach Delay		26.3		35.3		26.5			28.0	
Approach LOS		C		D		C			C	
Queue Length 50th (m)		30.7		42.7	13.2	70.3	0.0	7.6	36.8	
Queue Length 95th (m)		48.5		#74.0	27.1	93.3	0.8	18.1	52.2	
Internal Link Dist (m)		253.3		201.6		86.4			81.9	
Turn Bay Length (m)					15.0		15.0	15.0		
Base Capacity (vph)		667		665	192	1230	323	127	978	
Starvation Cap Reductn		0		0	0	0	0	0	0	
Spillback Cap Reductn		0		0	0	0	0	0	0	
Storage Cap Reductn		0		0	0	0	0	0	0	
Reduced v/c Ratio		0.66		0.83	0.42	0.71	0.29	0.35	0.51	

Intersection Summary	
Cycle Length: 104	
Actuated Cycle Length: 88.3	
Natural Cycle: 95	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.83	
Intersection Signal Delay: 28.6	Intersection LOS: C
Intersection Capacity Utilization 89.5%	ICU Level of Service E
Analysis Period (min) 15	
# 95th percentile volume exceeds capacity, queue may be longer.	

Queue shown is maximum after two cycles.

Splits and Phases: 276: Spadina Ave & Queen St





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	16	321	78	15	389	115	75	820	88	42	429	40
Future Volume (vph)	16	321	78	15	389	115	75	820	88	42	429	40
Ideal Flow (vphpl)	1250	1250	1250	1250	1250	1250	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0		5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor		0.95			0.95		1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes		0.90			0.88		1.00	1.00	0.45	1.00	0.95	
Flpb, ped/bikes		0.99			0.99		1.00	1.00	1.00	1.00	1.00	
Frt		0.97			0.97		1.00	1.00	0.85	1.00	0.99	
Flt Protected		1.00			1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1718			1680		1545	3089	560	1606	2865	
Flt Permitted		0.92			0.94		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1589			1574		1545	3089	560	1606	2865	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	17	341	83	16	414	122	80	872	94	45	456	43
RTOR Reduction (vph)	0	17	0	0	23	0	0	0	58	0	6	0
Lane Group Flow (vph)	0	424	0	0	529	0	80	872	36	45	493	0
Confl. Peds. (#/hr)	2103		2530	2530		2103	2506		2495	2495		2506
Confl. Bikes (#/hr)			228			100			113			79
Heavy Vehicles (%)	0%	3%	8%	70%	4%	4%	4%	4%	16%	0%	6%	0%
Bus Blockages (#/hr)	10	10	10	11	0	0	0	0	0	0	0	0
Parking (#/hr)						0						
Turn Type	Perm	NA		Perm	NA		Prot	NA	Perm	Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8					2			
Actuated Green, G (s)		34.1			34.1		7.5	34.2	34.2	3.5	30.2	
Effective Green, g (s)		36.1			36.1		8.5	35.2	35.2	4.5	31.2	
Actuated g/C Ratio		0.40			0.40		0.09	0.39	0.39	0.05	0.34	
Clearance Time (s)		7.0			7.0		6.0	6.0	6.0	6.0	6.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		631			625		144	1197	217	79	984	
v/s Ratio Prot							c0.05	c0.28		0.03	0.17	
v/s Ratio Perm		0.27			c0.34				0.07			
v/c Ratio		0.67			0.85		0.56	0.73	0.17	0.57	0.50	
Uniform Delay, d1		22.5			24.8		39.3	23.7	18.2	42.2	23.6	
Progression Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		5.6			13.3		4.6	3.9	1.7	9.1	1.8	
Delay (s)		28.1			38.2		43.9	27.6	19.9	51.3	25.5	
Level of Service		C			D		D	C	B	D	C	
Approach Delay (s)		28.1			38.2			28.2			27.6	
Approach LOS		C			D			C			C	

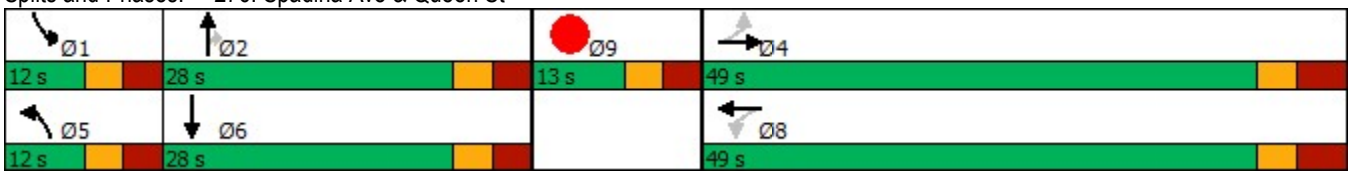
Intersection Summary			
HCM 2000 Control Delay	30.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	90.8	Sum of lost time (s)	21.0
Intersection Capacity Utilization	89.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	Ø9
Lane Configurations										
Traffic Volume (vph)	21	624	11	283	53	683	133	64	510	
Future Volume (vph)	21	624	11	283	53	683	133	64	510	
Lane Group Flow (vph)	0	763	0	395	55	704	137	66	578	
Turn Type	Perm	NA	Perm	NA	Prot	NA	Perm	Prot	NA	
Protected Phases		4		8	5	2		1	6	9
Permitted Phases	4		8				2			
Detector Phase	4	4	8	8	5	2	2	1	6	
Switch Phase										
Minimum Initial (s)	33.0	33.0	33.0	33.0	6.0	21.0	21.0	6.0	21.0	7.0
Minimum Split (s)	40.0	40.0	40.0	40.0	12.0	27.0	27.0	12.0	27.0	13.0
Total Split (s)	49.0	49.0	49.0	49.0	12.0	28.0	28.0	12.0	28.0	13.0
Total Split (%)	48.0%	48.0%	48.0%	48.0%	11.8%	27.5%	27.5%	11.8%	27.5%	13%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	4.0	4.0	4.0	4.0	3.0	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)		-2.0		-2.0	-1.0	-1.0	-1.0	-1.0	-1.0	
Total Lost Time (s)		5.0		5.0	5.0	5.0	5.0	5.0	5.0	
Lead/Lag					Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?										
Recall Mode	Max	Max	Max	Max	None	Max	Max	None	Max	None
Act Effct Green (s)		44.3		44.3	7.1	23.2	23.2	7.1	23.2	
Actuated g/C Ratio		0.50		0.50	0.08	0.26	0.26	0.08	0.26	
v/c Ratio		0.90		0.52	0.43	0.90	0.49	0.53	0.79	
Control Delay		37.2		17.6	53.1	49.8	9.3	58.8	40.6	
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay		37.2		17.6	53.1	49.8	9.3	58.8	40.6	
LOS		D		B	D	D	A	E	D	
Approach Delay		37.2		17.6		43.8			42.5	
Approach LOS		D		B		D			D	
Queue Length 50th (m)		58.5		20.0	9.2	61.3	0.0	11.0	47.7	
Queue Length 95th (m)		#121.6		42.6	#24.4	#115.1	10.3	#31.9	#89.4	
Internal Link Dist (m)		253.3		201.6		86.4			81.9	
Turn Bay Length (m)					20.0		20.0	20.0		
Base Capacity (vph)		849		765	127	780	277	124	735	
Starvation Cap Reductn		0		0	0	0	0	0	0	
Spillback Cap Reductn		0		0	0	0	0	0	0	
Storage Cap Reductn		0		0	0	0	0	0	0	
Reduced v/c Ratio		0.90		0.52	0.43	0.90	0.49	0.53	0.79	

Intersection Summary	
Cycle Length: 102	
Actuated Cycle Length: 89.2	
Natural Cycle: 95	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.90	
Intersection Signal Delay: 37.8	Intersection LOS: D
Intersection Capacity Utilization 100.7%	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: 276: Spadina Ave & Queen St



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	21	624	95	11	283	89	53	683	133	64	510	50
Future Volume (vph)	21	624	95	11	283	89	53	683	133	64	510	50
Ideal Flow (vphpl)	1250	1250	1250	1250	1250	1250	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0		5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor		0.95			0.95		1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes		0.93			0.87		1.00	1.00	0.46	1.00	0.95	
Flpb, ped/bikes		0.99			1.00		1.00	1.00	1.00	1.00	1.00	
Frt		0.98			0.97		1.00	1.00	0.85	1.00	0.99	
Flt Protected		1.00			1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1802			1602		1606	3003	580	1575	2804	
Flt Permitted		0.93			0.93		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1687			1490		1606	3003	580	1575	2804	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	22	643	98	11	292	92	55	704	137	66	526	52
RTOR Reduction (vph)	0	11	0	0	26	0	0	0	104	0	7	0
Lane Group Flow (vph)	0	752	0	0	369	0	55	704	33	66	571	0
Confl. Peds. (#/hr)	1934		1849	1849		1934	2070		1873	1873		2070
Confl. Bikes (#/hr)			128			186			28			92
Heavy Vehicles (%)	0%	4%	3%	91%	9%	5%	0%	7%	13%	2%	8%	2%
Bus Blockages (#/hr)	10	10	10	9	0	0	0	0	0	0	0	0
Parking (#/hr)						0						
Turn Type	Perm	NA		Perm	NA		Prot	NA	Perm	Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8					2			
Actuated Green, G (s)		42.3			42.3		4.7	22.2	22.2	4.7	22.2	
Effective Green, g (s)		44.3			44.3		5.7	23.2	23.2	5.7	23.2	
Actuated g/C Ratio		0.46			0.46		0.06	0.24	0.24	0.06	0.24	
Clearance Time (s)		7.0			7.0		6.0	6.0	6.0	6.0	6.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		783			691		95	730	141	94	681	
v/s Ratio Prot							0.03	c0.23		c0.04	0.20	
v/s Ratio Perm		c0.45			0.25				0.06			
v/c Ratio		0.96			0.53		0.58	0.96	0.24	0.70	0.84	
Uniform Delay, d1		24.7			18.2		43.7	35.7	29.0	44.0	34.3	
Progression Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		23.9			2.9		8.3	25.7	3.9	21.1	11.8	
Delay (s)		48.6			21.1		52.0	61.4	32.9	65.1	46.1	
Level of Service		D			C		D	E	C	E	D	
Approach Delay (s)		48.6			21.1			56.4			48.1	
Approach LOS		D			C			E			D	

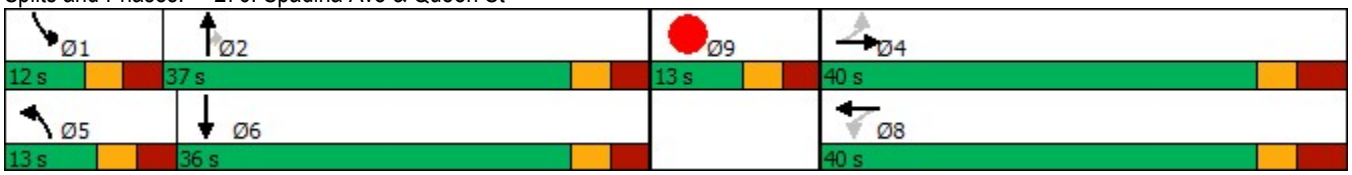
Intersection Summary			
HCM 2000 Control Delay	47.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	95.4	Sum of lost time (s)	21.0
Intersection Capacity Utilization	100.7%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	Ø9
Lane Configurations										
Traffic Volume (vph)	16	329	15	393	76	824	88	42	433	
Future Volume (vph)	16	329	15	393	76	824	88	42	433	
Lane Group Flow (vph)	0	450	0	556	81	877	94	45	504	
Turn Type	Perm	NA	Perm	NA	Prot	NA	Perm	Prot	NA	
Protected Phases		4		8	5	2		1	6	9
Permitted Phases	4		8				2			
Detector Phase	4	4	8	8	5	2	2	1	6	
Switch Phase										
Minimum Initial (s)	33.0	33.0	33.0	33.0	6.0	21.0	21.0	6.0	21.0	7.0
Minimum Split (s)	40.0	40.0	40.0	40.0	12.0	28.4	28.4	12.0	28.4	13.0
Total Split (s)	40.0	40.0	40.0	40.0	13.0	37.0	37.0	12.0	36.0	13.0
Total Split (%)	39.2%	39.2%	39.2%	39.2%	12.7%	36.3%	36.3%	11.8%	35.3%	13%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	4.0	4.0	4.0	4.0	3.0	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)		-2.0		-2.0	-1.0	-1.0	-1.0	-1.0	-1.0	
Total Lost Time (s)		5.0		5.0	5.0	5.0	5.0	5.0	5.0	
Lead/Lag					Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?										
Recall Mode	Max	Max	Max	Max	None	Max	Max	None	Max	None
Act Effct Green (s)		35.1		35.1	7.9	34.4	34.4	7.0	31.3	
Actuated g/C Ratio		0.41		0.41	0.09	0.40	0.40	0.08	0.36	
v/c Ratio		0.68		0.84	0.57	0.71	0.29	0.35	0.48	
Control Delay		26.7		36.2	56.3	27.0	2.3	46.7	23.6	
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay		26.7		36.2	56.3	27.0	2.3	46.7	23.6	
LOS		C		D	E	C	A	D	C	
Approach Delay		26.7		36.2		27.1			25.5	
Approach LOS		C		D		C			C	
Queue Length 50th (m)		31.0		42.3	13.5	69.4	0.0	7.4	34.5	
Queue Length 95th (m)		49.2		#74.0	#31.8	92.6	0.5	17.8	49.2	
Internal Link Dist (m)		253.3		201.6		86.4			81.9	
Turn Bay Length (m)					15.0		15.0	15.0		
Base Capacity (vph)		663		661	142	1228	325	130	1042	
Starvation Cap Reductn		0		0	0	0	0	0	0	
Spillback Cap Reductn		0		0	0	0	0	0	0	
Storage Cap Reductn		0		0	0	0	0	0	0	
Reduced v/c Ratio		0.68		0.84	0.57	0.71	0.29	0.35	0.48	

Intersection Summary	
Cycle Length: 102	
Actuated Cycle Length: 86.6	
Natural Cycle: 95	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.84	
Intersection Signal Delay: 28.6	Intersection LOS: C
Intersection Capacity Utilization 89.7%	ICU Level of Service E
Analysis Period (min) 15	
# 95th percentile volume exceeds capacity, queue may be longer.	

Queue shown is maximum after two cycles.

Splits and Phases: 276: Spadina Ave & Queen St



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	16	329	78	15	393	115	76	824	88	42	433	40
Future Volume (vph)	16	329	78	15	393	115	76	824	88	42	433	40
Ideal Flow (vphpl)	1250	1250	1250	1250	1250	1250	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0		5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor		0.95			0.95		1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes		0.90			0.88		1.00	1.00	0.45	1.00	0.95	
Flpb, ped/bikes		0.99			0.99		1.00	1.00	1.00	1.00	1.00	
Frt		0.97			0.97		1.00	1.00	0.85	1.00	0.99	
Flt Protected		1.00			1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1724			1683		1545	3089	560	1606	2867	
Flt Permitted		0.92			0.94		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1594			1576		1545	3089	560	1606	2867	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	17	350	83	16	418	122	81	877	94	45	461	43
RTOR Reduction (vph)	0	18	0	0	23	0	0	0	58	0	6	0
Lane Group Flow (vph)	0	432	0	0	533	0	81	877	36	45	498	0
Confl. Peds. (#/hr)	2126		2578	2578		2126	2537		2508	2508		2537
Confl. Bikes (#/hr)			233			106			115			88
Heavy Vehicles (%)	0%	3%	8%	70%	4%	4%	4%	4%	16%	0%	6%	0%
Bus Blockages (#/hr)	10	10	10	11	0	0	0	0	0	0	0	0
Parking (#/hr)						0						
Turn Type	Perm	NA		Perm	NA		Prot	NA	Perm	Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8					2			
Actuated Green, G (s)		33.1			33.1		5.4	33.4	33.4	3.5	31.5	
Effective Green, g (s)		35.1			35.1		6.4	34.4	34.4	4.5	32.5	
Actuated g/C Ratio		0.39			0.39		0.07	0.39	0.39	0.05	0.37	
Clearance Time (s)		7.0			7.0		6.0	6.0	6.0	6.0	6.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		628			621		111	1193	216	81	1046	
v/s Ratio Prot							c0.05	c0.28		0.03	0.17	
v/s Ratio Perm		0.27			c0.34				0.06			
v/c Ratio		0.69			0.86		0.73	0.74	0.17	0.56	0.48	
Uniform Delay, d1		22.4			24.7		40.5	23.4	17.9	41.3	21.7	
Progression Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		6.1			14.3		21.2	4.0	1.7	8.0	1.6	
Delay (s)		28.5			39.0		61.6	27.4	19.6	49.3	23.3	
Level of Service		C			D		E	C	B	D	C	
Approach Delay (s)		28.5			39.0			29.4			25.4	
Approach LOS		C			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	30.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	89.0	Sum of lost time (s)	21.0
Intersection Capacity Utilization	89.7%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Appendix D: Transfer Trip Matrix

Peak AM Surface Transfer Matrix

From/To	OL EB/NB	OL WB/SB	OL walk egress	LT EB	LT WB	LT SB	LT NB	LT Walk Egress / Transfer	Total
OL EB/NB	-	-	895	269	-	90	537	-	1,791
OL WB/SB	-	-	1,343	-	179	90	1,074	-	2,686
OL walk access	627	179	-	-	-	-	-	-	806
LT EB	448	-	-	-	-	-	-	90	537
LT WB	-	90	-	-	-	-	-	-	90
LT SB	90	-	-	-	-	-	-	-	90
LT NB	358	179	-	-	-	-	-	90	627
LT Walk Access / Transfer	-	-	-	-	90	-	90	-	179
Total	1,522	448	2,238	269	269	179	1,701	179	6,805

Peak PM Surface Transfer Matrix

From/To	OL EB/NB	OL WB/SB	OL walk egress	LT EB	LT WB	LT SB	LT NB	LT Walk Egress / Transfer	Total
OL EB/NB	-	-	627	448	-	90	358	-	1,522
OL WB/SB	-	-	179	-	90	-	179	-	448
OL walk access	895	1,343	-	-	-	-	-	-	2,238
LT EB	269	-	-	-	-	-	-	-	269
LT WB	-	179	-	-	-	-	-	90	269
LT SB	90	90	-	-	-	-	-	-	179
LT NB	537	1,074	-	-	-	-	-	90	1,701
LT Walk Access / Transfer	-	-	-	90	-	-	90	-	179
Total	1,791	2,686	806	537	90	90	627	179	6,805