2294-2300 Queensway Drive, City of Burlington, Traffic Brief

Paradigm Transportation Solutions Limited

September 2019

Project No.: 190350

ptsl.com

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17 September 2019
Project: 190350

Tasha Mazza, MBA, President
Waggy Inc.
69 Markland St
Hamilton, ON L8P 2J8

Dear Ms. Mazza:

RE: TRAFFIC BRIEF – 2294-2300 QUEENSWAY DRIVE, CITY OF BURLINGTON

Paradigm Transportation Solutions Limited (Paradigm) is pleased to submit this Traffic Brief outlining the potential traffic impacts of the proposed development of 2294-2300 Queensway Drive in the City of Burlington.

This study has been carried out in general accordance with the Halton Region[1] and the Ministry of Transportation, Ontario (MTO) Transportation Impact Study guidelines[2]. **Appendix A** contains the pre-study consultation material with City of Burlington and MTO staff.

Site Description

The subject site is located at 2294-2300 Queensway Drive in the City of Burlington. The property owner is proposing to develop the site to include 25 townhouse units (17 regular townhouse units and 8 back-to-back townhouse units). Vehicle access is proposed by a single private driveway to Queensway Drive located approximately 95 metres west of Cleta Street on the south side of Queensway Drive.

The site's total parking supply is proposed as 58 spaces (2.32 spaces per unit). Each townhouse unit is provided with 2 parking spaces (2.00 spaces per unit. Contained in a garage & driveway). Visitor parking is accommodated by 8 parking spaces (0.32 spaces per unit). The site's parking supply is noted to exceed the recommended parking rates outlined in the City of Burlington's City-Wide Parking Standards Review report[3].

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[1] Transportation Impact Study Guidelines, Halton Region. January 2015
[2] Transportation Impact Study Guideline, Ministry of Transportation, Ontario. September 2014
[3] Burlington City-Wide Parking Standards Review, July 21, 2017 completed by IBI Group.
Townhouse Units O = 2.00 spaces/unit + V = 0.25 spaces/unit

The site is anticipated to be build out and occupied by Year 2021. **Figure 1 (attached)** illustrates the site plan.

Site Traffic Forecast

Trip generation estimates for the subject site were calculated using rates published by the Institute of Transportation Engineers (ITE) Trip Generation[4]. Land use Code 220 (Multifamily Housing (Low-Rise)) was used to estimate the sites trip generation. **Table 1** summarizes the estimated trip generation.

The subject site is estimated to generate approximately 13 AM peak hour trips and approximately 17 PM Peak hour trips.

TABLE 1: ESTIMATED TRIP GENERATION

ITE Land Use Code	Number of Units	AM Peak Hour				PM Peak Hour			
		Rate	In	Out	Total	Rate	In	Out	Total
220 - Multifamily Housing (Low-Rise)	25	FC[1]	3	10	**13**	FC[2]	11	6	**17**
Total Trip Generation			**3**	**10**	**13**		**11**	**6**	**17**

FC[1] Ln(T) = 0.95 Ln(X) - 0.51 FC[2] Ln(T) = 0.89 Ln(X) - 0.02

The trip distribution for the subject site has been estimated based on a review of the existing travel patterns along Queensway Drive, as documented in the existing count data. **Table 2** summarizes the trip distribution utilized in this study.

TABLE 2: ESTIMATED DISTRIBUTION

Origin/Destination	AM Peak Hour		PM Peak Hour	
	In	Out	In	Out
East via Queensway Drive	40%	60%	70%	30%
West via Queensway Drive	60%	40%	30%	70%
Total	**100%**	**100%**	**100%**	**100%**

Traffic Forecast

Traffic forecast have been developed for three planning horizons. The horizons include the assumed opening date of the development (Year 2021), and 5 and 10 years beyond the opening date. Analysis periods assessed include the weekday AM and PM peak hours. The likely future traffic volumes near the subject site are estimated to consist of:

- Existing traffic volumes established by a Turning Movement Count (TMC) conducted in June 2019 across the site's frontage to Queensway Drive. **Appendix B** contains the mid-block existing count data;

[4] Trip Generation Manual 10th Edition Institute of Transportation Engineers Washington DC

- Increased non-site traffic; and
  - A generalized background traffic growth rate of 1% per annum, identified by review agency staff in pre-study consultation; and
  - Traffic generated by the proposed development of 2477 Queensway Drive[5].
- Traffic generated by the subject site.

The study area intersection assessed in this study includes the proposed site driveway intersection with Queensway Drive. **Appendix C** contains the detailed traffic forecast figures for the three planning horizon years assessed. Queensway Drive is an east/west minor arterial[6] roadway with one travel lane in both directions with a posted speed limit of 50 km/h. Queensway Drive operates with a continuous westbound left-turn lane from Brenda Crescent to Glenwood School Drive. An on-street bike lane in the westbound direction is provided. The eastbound direction is a mixed-use facility with sharrow pavement markings.

Intersection Operations

The operations of the site driveway intersection with Queensway Drive was evaluated using the existing lane configurations and the forecast total traffic volumes. The site driveway approach is assumed to operate under stop control. **Table 3** summarizes the operational conditions for the total traffic conditions for the three planning horizons assessed.

From an intersection capacity perspective, no operational issues are forecast to occur at the proposed site driveway intersection with Queensway Drive. Mainline delays for eastbound and westbound vehicles are estimated to be in the LOS A range (less than 10 seconds per vehicle) with v/c ratios of less than 0.70. The driveway approach is forecast to operate in the LOS C-D range (less than 35 seconds per vehicle) with v/c ratios of less than 0.10. No queuing issues are forecast to occur on the Queensway Drive approaches to the site driveway intersection. Similarly, the on-site queuing of vehicles waiting to enter Queensway Drive is forecast to be minimal.

No geometric or traffic control improvements are recommended to support the development of the subject site.

Appendix D-F contains the detailed Synchro reports.

[5] 2477 Queensway Burlington – Traffic Brief. AECOM, November 23, 2017.
[6] Burlington Official Plan Schedule J Classification of Transportation Facilities South Of No. 1 Side Road

TABLE 3: TOTAL TRAFFIC OPERATIONS (OPENING DATE, 5-YEAR AND 10 YEAR HORIZONS)

Horizon Year	Intersection	Control Type	Analysis Period	MOE	Direction / Movement / Approach									
					Eastbound			Westbound			Northbound			
					Through	Right	Approach	Left	Through	Approach	Left	Right	Approach	Overall
Total Traffic Opening Date	Queensway Drive & Site Driveway	TWSC	AM Peak Hour	LOS	A	>	**A**	A	A	**A**	<	B	**B**	**A**
				Delay	0	>	**0**	9	0	**0**	<	15	**15**	**0**
				V/C	0.35	>		0	0.22		<	0.03		
				Q	0	>		0	0		<	1		
			PM Peak Hour	LOS	A	>	**A**	A	A	**A**	<	C	**C**	**A**
				Delay	0	>	**0**	8	0	**0**	<	23	**23**	**0**
				V/C	0.24	>		0.01	0.58		<	0.03		
				Q	0	>		0	0		<	1		
Total Traffic 5-Year Horizon	Queensway Drive & Site Driveway	TWSC	AM Peak Hour	LOS	A	>	**A**	A	A	**A**	<	C	**C**	**A**
				Delay	0	>	**0**	9	0	**0**	<	15	**15**	**0**
				V/C	0.36	>		0	0.23		<	0.03		
				Q	0	>		0	0		<	1		
			PM Peak Hour	LOS	A	>	**A**	A	A	**A**	<	C	**C**	**A**
				Delay	0	>	**0**	8	0	**0**	<	25	**25**	**0**
				V/C	0.25	>		0.01	0.61		<	0.03		
				Q	0	>		0	0		<	1		
Total Traffic 10-Year Horizon	Queensway Drive & Site Driveway	TWSC	AM Peak Hour	LOS	A	>	**A**	A	A	**A**	<	C	**C**	**A**
				Delay	0	>	**0**	9	0	**0**	<	16	**16**	**0**
				V/C	0.38	>		0	0.24		<	0.03		
				Q	0	>		0	0		<	1		
			PM Peak Hour	LOS	A	>	**A**	A	A	**A**	<	D	**D**	**A**
				Delay	0	>	**0**	8	0	**0**	<	27	**27**	**0**
				V/C	0.26	>		0.01	0.64		<	0.03		
				Q	0	>		0	0		<	1		

MOE - Measure of Effectiveness
LOS - Level of Service
Delay - Average Delay per Vehicle in Seconds
V/C - Volume to Capacity Ratio
Q - 95th Percentile Queue Length
TWSC - Two-Way Stop Control
< - Shared Left-turn
> - Shared Right-turn

Transportation Demand Management

Transportation Demand Management (TDM) manages the demands placed on transportation infrastructure. It is the use of policies, programs, infrastructure improvements, and/or services to influence travel behaviour. The proposed TDM measures include:

- Walkways are provided throughout the development in the form of concrete sidewalks proposed along the west side of the internal street. A direct sidewalk connection is proposed to Queensway Drive;
- The development is located in an area that is serviced by four existing public transit routes, Burlington Transit Route 6, 25, 80 and 81. Transit stops are located



approximately 150 metres in both directions east and west of the subject site (2-minute walk). Additionally, the Burlington GO Station is located approximately 1 kilometre west of the subject site (11-minute walk);

- Existing cycling infrastructure (bike lanes and marked bike routes) are present across the site's frontage to Queensway Drive;
- Bicycle Storage is provided in accordance with the Zoning By-law and Official Plan Policies. Long-term and short-term bicycle parking can be accommodated within the planned internal garages for each proposed townhouse unit;
- An Electric Vehicle (EV) charging station is proposed within the visitor parking supply; and
- All townhouse units are designed as EV conversion ready.

By integrating TDM into the development, travel behaviour for future residents can be influenced to better support transit and active transportation.

Conclusions and Recommendations

Based on the investigations carried out, it is concluded that:

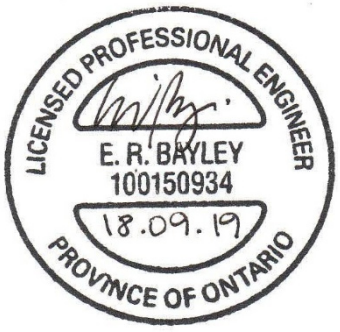
- The subject site is located at 2294 and 2300 Queensway Drive in the City of Burlington. The development proposal includes 25 townhouse units. Vehicle access is proposed by a single private driveway to Queensway Drive. The site's total parking supply is proposed as 58 spaces (2.32 spaces per unit).
- The subject site is estimated to generate approximately 13 AM peak hour trips and 17 PM peak hour trips;
- No capacity issues at the intersection of Queensway Drive and the Site Driveway are forecast to occur following the development of the subject site for the three horizon years assessed. Queue on Queensway Drive is not anticipated to impact the normal operations of the roadway;
- Transportation Demand Management (TDM) measures are provided to residents to support a range of mobility choices other than the private automobile; and
- No geometric or traffic control improvements are recommended to support the development of the subject site from a transportation perspective.

We trust that the foregoing information will meet your requirements. Please do not hesitate to contact us if we can be of further assistance.

Yours very truly,

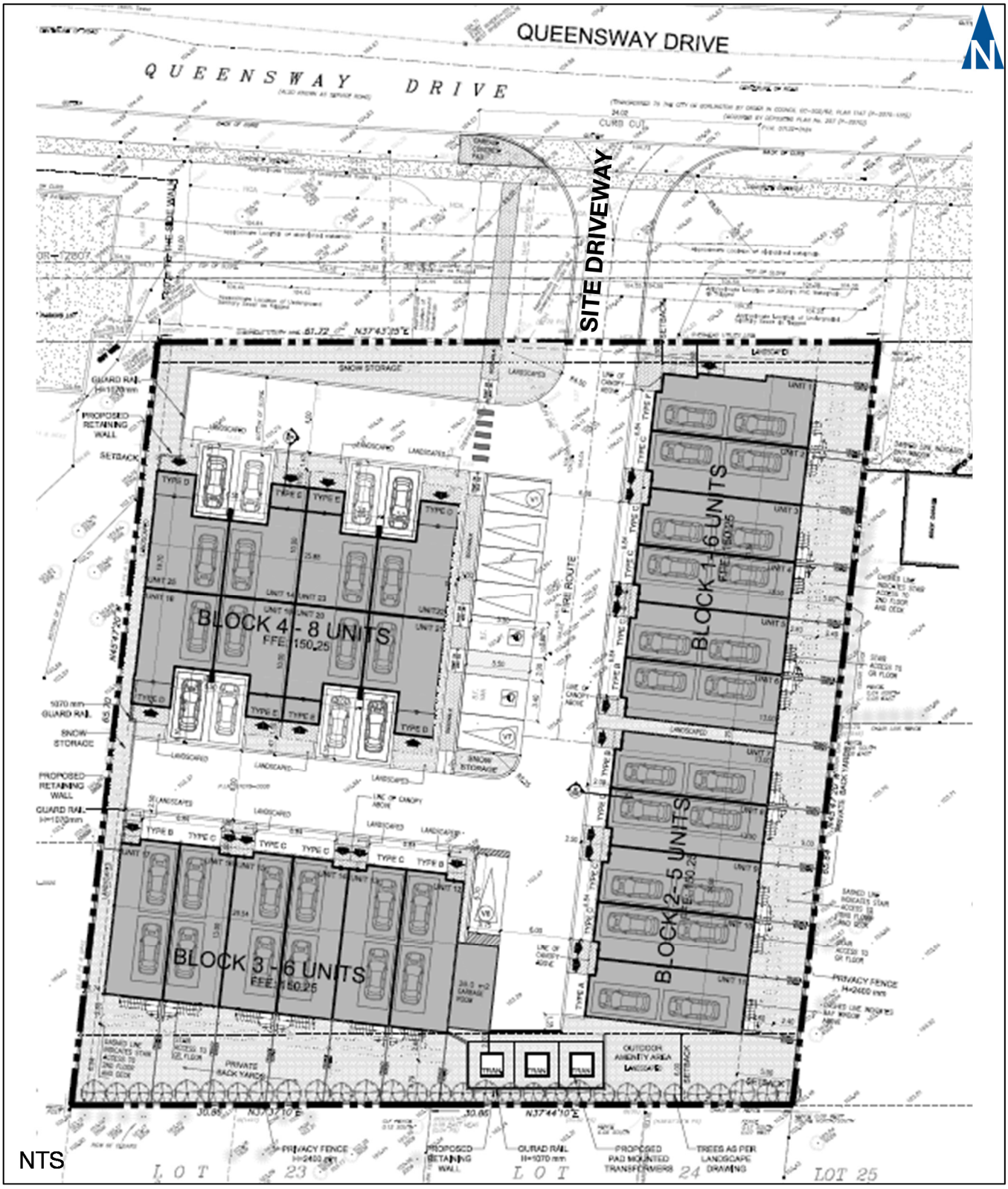
PARADIGM TRANSPORTATION SOLUTIONS LIMITED

Paradigm Transportation Solutions Limited



Scott Catton, Dipl.T., C.E.T. MITE
Senior Project Manager

Stew Elkins, B.E.S., MITE
Vice President and CRO



paradigm TRANSPORTATION SOLUTIONS LIMITED

Site Plan

2294 & 2300 Queensway Drive, Burlington
190350

Figure 1

Appendix A

Pre-study Consultation Comments



Scott Catton

From: Lucas, Steve <Steve.Lucas@burlington.ca>
Sent: Monday, 27 May, 2019 02:16 PM
To: Scott Catton
Cc: Edgcumbe, Kaylan
Subject: RE: 190350 (2294-2300 Queensway Dr, Burlington, TIA Brief)

Hello Scott,

With regards to the two items you required Kaylan's input on:

- Appropriate growth rate for background traffic:
  - We will require 1% background traffic growth rate, or which ever is higher between the MTO and Region (if any differences).
- Development Applications to Consider:
  - https://www.burlington.ca/en/services-for-you/2477-Queensway-Dr.asp

If you have any additional comments or questions, please don't hesitate to contact me at the undersigned.

Thank you,

Steve Lucas
City of Burlington | Transportation Planning Technologist
t: 905.335.7671 ext.7691 | e: steve.lucas@burlington.ca

From: Scott Catton <scatton@ptsl.com>
Sent: Thursday, May 23, 2019 11:35 AM
To: Edgcumbe, Kaylan <Kaylan.Edgcumbe@burlington.ca>; Polus, Asia (MTO) <Asia.Polus@ontario.ca>
Cc: Andrew Brown <abrown@ptsl.com>; Tasha Mazza <tasha@goldcourtdevelopments.com>
Subject: 190350 (2294-2300 Queensway Dr, Burlington, TIA Brief)

Good morning Kaylan & Asia,
We've been retained to prepare the traffic study for the proposed development of 2294-2300 Queensway Drive in the City of Burlington. The property owner is proposing to develop the site to include 24 townhouse units. Access is proposed by a single driveway connection to Queensway Drive located approximately 95 metres west of Cleta Street on the south side of Queensway Drive.

The site's parking supply is designed to match the recommended parking ratios for townhouse units as outlined in the City of Burlington's City-Wide Parking Standards Review report. A total parking supply of 54 spaces (2.25 spaces per unit) is proposed (48 occupant spaces and 6 visitor spaces). Build-out is estimated to occur by Year 2021.

In assessing the transportation impacts, we intend to analyze the proposed site driveway connection to Queensway Drive. The study will generally follow the Halton Region and Ministry of Transportation, Ontario (MTO) Transportation Impact Study guidelines.

Our proposed Terms of Reference for the study and the site concept plan can be found attached. Would you kindly review and provide comment at your earliest convenience?

Kaylan, can you provide input for the following items?

- An appropriate generalized growth rate for background traffic
- Are there any specific development applications in the area that we should include in the traffic forecast?

Thanks very much.

Scott Catton, Dipl. T., C.E.T., MITE
Senior Project Manager



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5A-150 Pinebush Road, Cambridge, ON N1R 8J8
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w: www.ptsl.com

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Scott Catton

From: White, Mark J. (MTO) <Mark.J.White@ontario.ca>
Sent: Thursday, 30 May, 2019 02:33 PM
To: Scott Catton; Polus, Asia (MTO)
Cc: Kaylan.Edgcumbe@burlington.ca
Subject: RE: 190350 (2294-2300 Queensway Dr, Burlington, TIA Brief)

Categories: Comments

RE: Pre-consultation for Site Plan Application
2294-2300 Queensway Drive
Burlington

Good afternoon Scott,

Further to your e-mail regarding the above noted property the ministry has reviewed all information provided and the following outlines our comments.
Please accept these comments as "preliminary", as the ministry reserves the right to provide formal comments, once the full-size plans and required reports are submitted for our review.

Traffic

- The ministry has no comments or concerns regarding the proposed Traffic Brief Terms of Reference.

Highway Engineering

- Earlier this year (January 15th), Highway Engineering had noted that the City of Burlington had requested the proponent to set aside a separate 7.5 m-wide block of private lands adjacent to Queensway Drive. This 7.5 m block is shown on the plan circulated today, but it was not supposed to contain any site-critical features. The revised plan shows the four townhouses in the northwestern corner of the property sharing a (site-critical) common driveway which is entirely located within the 7.5 m block.
- Written confirmation from the City that they will accept this common driveway treatment is required. If the City accepts this treatment, then Highway Engineering does not have any other outstanding concerns with respect to this development proposal. If the City does not accept the common driveway treatment, revised site plans will need to be recirculated to Highway Engineering for further review and comment.
- Although it is not a requirement for MTO approval, I'd like to point out to the proponent (as a courtesy) that it will likely be very difficult for vehicles in certain units to back out of the driveways. I'd suggest that they use AutoTurn or a similar software application to check the vehicle turning requirements.

Please note the MTO will require drainage and photometric lighting plans to be submitted before final approval is given. These should be submitted via the municipality for distribution.

General Site Plan comments:

The subject site is within MTO's Permit Control Area for the QEW and as such MTO Site Plan Approval and an MTO Building and Land Use Permit will be required prior to any construction activities on the site.

As part of the review and approval process the applicant will be required to submit copies of a detailed Site Plan (x3), SWMR, Site Servicing and Grading Plans prepared by a Licensed Professional Engineer.

Please note that ministry requires all drainage submissions to be also provided electronically.

Regarding acceptable electronic transfer of files to MTO, the following applies:
- Format - PDF
- Currently electronic files can be sent in:

a) on CD/DVD or USB drive
b) Using an FTP (File Transfer Protocol) website,

Using E-mail, if the file is small enough, it can be e-mailed. (Zipped documents are acceptable)

All plans and reports must be stamped and signed and circulated to the MTO through municipal site plan application process for a formal review and comments.

If it is anticipated that some additional lights will be installed at the site the proponent will be required to submit two (2) copies of the Photometric Lighting Plan (in LUX units) for MTO review and approval. The plan must illustrate proposed lighting and any light spillage on the QEW ROW.

- The Applicant should be advised that they cannot apply for the MTO Permit until the Site Plan has been approved by MTO and the Municipality.

- MTO Sign Permits will be required for any new signage visible from QEW.

- Applicant must apply online through the link below once clearance letter is issued:
  https://www.hcms.mto.gov.on.ca/

If you have any further questions please contact me.

Thanks,

Mark White
Corridor Management Officer
Ministry of Transportation | Central Region
159 Sir William Hearst Ave. 7th Floor,
Toronto, ON M3M 0B7
P: (416) 235-5382 | F: (416) 235-4267 | Mark.j.white@ontario.ca

---

From: Scott Catton <scatton@ptsl.com>
Sent: May 23, 2019 3:40 PM
To: Polus, Asia (MTO) <Asia.Polus@ontario.ca>; White, Mark J. (MTO) <Mark.J.White@ontario.ca>
Subject: RE: 190350 (2294-2300 Queensway Dr, Burlington, TIA Brief)

Thanks Asia.

Mark, in your review of the TOR for the townhouse development…if you have any questions please let me know.

Thanks very much.

Scott Catton, Dipl. T., C.E.T., MITE
Senior Project Manager

Paradigm Transportation Solutions Limited
5A-150 Pinebush Road, Cambridge, ON N1R 8J8
p: 905.381.2229 x302
e: scatton@ptsl.com
w: www.ptsl.com

From: Polus, Asia (MTO) <Asia.Polus@ontario.ca>
Sent: Thursday, 23 May, 2019 11:51
To: Scott Catton <scatton@ptsl.com>
Cc: White, Mark J. (MTO) <Mark.J.White@ontario.ca>
Subject: RE: 190350 (2294-2300 Queensway Dr, Burlington, TIA Brief)

Hi Scott,

I have received your proposed Terms of Reference for the study as well the site concept plan. These documents have to be reviewed by MTO's Traffic Office and we will contact you as soon as possible.

Please note that the contact person for this area is Mark White, the Corridor Management Officer included in this e-mail, and he can be reached at 416-235-5382.

Best Regards

W. Asia Polus
Corridor Management Planner

Ministry of Transportation
Central Region, Highway Corridor Management Section
159 Sir William Hearst Ave. 7th Floor
Toronto, ON M3M 0B7
Tel. 416 - 235-3991
Fax 416 - 235-4267

From: Scott Catton <scatton@ptsl.com>
Sent: May-23-19 11:35 AM
To: Edgcumbe, Kaylan <Kaylan.Edgcumbe@burlington.ca>; Polus, Asia (MTO) <Asia.Polus@ontario.ca>
Cc: Andrew Brown <abrown@ptsl.com>; Tasha Mazza <tasha@goldcourtdevelopments.com>
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Scott Catton, Dipl. T., C.E.T., MITE
Senior Project Manager

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Appendix B

Existing Mid-Block Traffic Counts



Project #: 190350 **Date: 11-Jun-19** **Initials: SG**

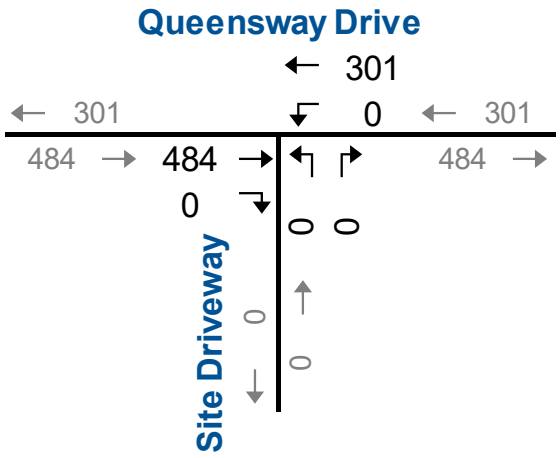
Queensway Drive between Cleta Street & Brenda Crescent, Burlington, Ontario										
Time Start	Cars		Trucks/Buses		Bikes		Total			60 Min. Sum
	Eastbound	Westbound	Eastbound	Westbound	Eastbound	Westbound	Eastbound	Westbound	Two Way	
7:15 AM	55	37	3	5	1	0	59	42	101	
7:30 AM	72	53	6	2	0	0	78	55	133	
7:45 AM	103	59	2	3	1	0	106	62	168	
8:00 AM	124	93	5	4	0	0	129	97	226	628
8:15 AM	113	59	2	9	0	0	115	68	183	710
8:30 AM	130	64	4	6	0	1	134	71	205	782
8:45 AM	99	61	6	4	1	0	106	65	171	785
9:00 AM	99	66	3	8	0	1	102	75	177	736
9:15 AM	92	57	11	2	0	0	103	59	162	715
9:30 AM	69	54	8	5	0	0	77	59	136	646
9:45 AM	73	62	3	6	2	0	78	68	146	621
10:00 AM	68	69	7	6	0	0	75	75	150	594
AM Peak Hour	**466**	**277**	**17**	**23**	**1**	**1**	**484**	**301**	**785**	**PHF**
HV%							**4%**	**8%**	**5%**	**0.87**
4:15 PM	52	192	2	2	0	1	54	195	249	
4:30 PM	86	180	1	4	0	3	87	187	274	
4:45 PM	49	196	3	3	1	0	53	199	252	
5:00 PM	93	230	2	6	0	1	95	237	332	1107
5:15 PM	70	238	7	4	1	1	78	243	321	1179
5:30 PM	88	228	3	5	0	1	91	234	325	1230
5:45 PM	96	205	2	5	1	1	99	211	310	1288
6:00 PM	96	200	2	5	1	3	99	208	307	1263
6:15 PM	113	181	3	7	0	1	116	189	305	1247
6:30 PM	90	164	3	4	0	0	93	168	261	1183
6:45 PM	60	125	2	3	1	1	63	129	192	1065
7:00 PM	69	129	7	2	0	0	76	131	207	965
PM Peak Hour	**347**	**901**	**14**	**20**	**2**	**4**	**363**	**925**	**1288**	**PHF**
HV%							**4%**	**2%**	**3%**	**0.97**

Appendix C

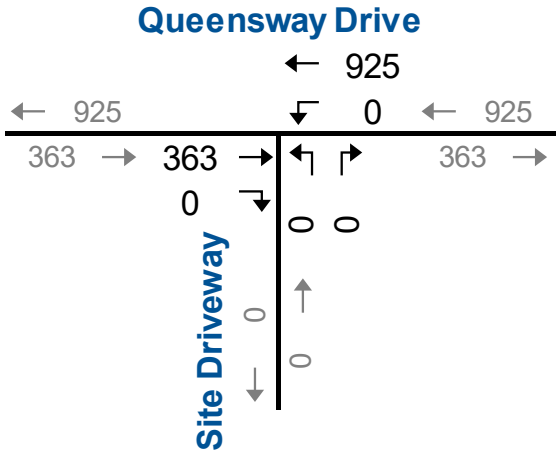
Detailed Traffic Forecasts



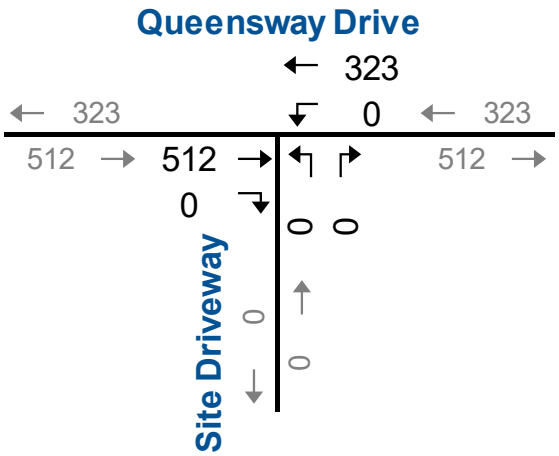
AM Peak Hour



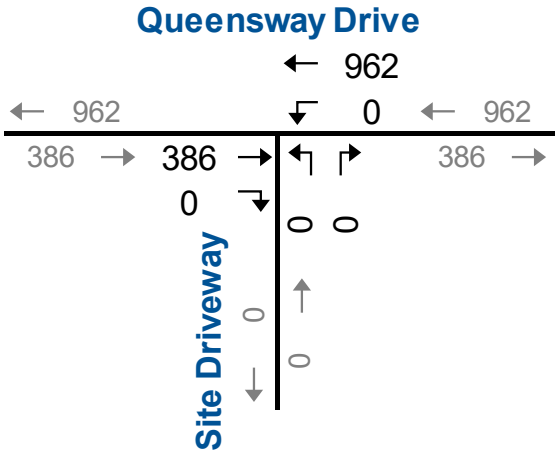
PM Peak Hour



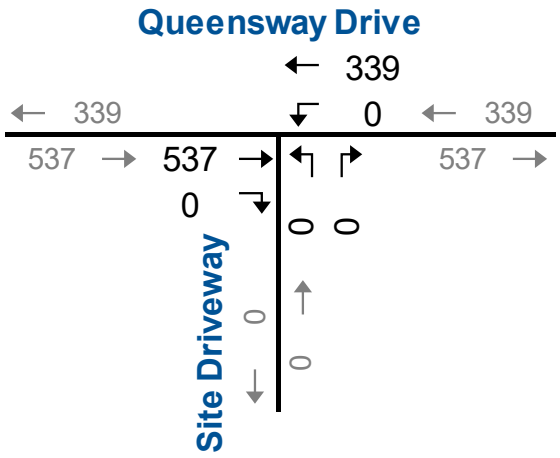
AM Peak Hour



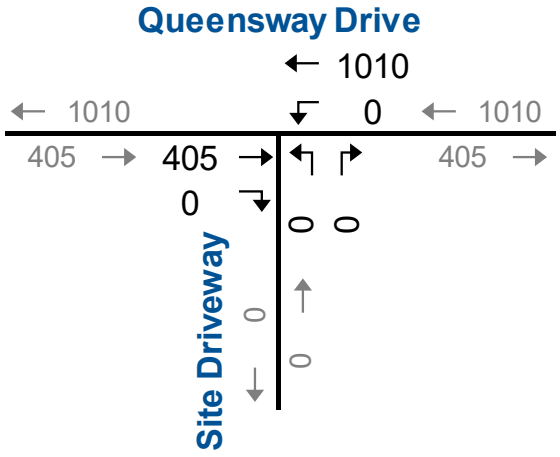
PM Peak Hour



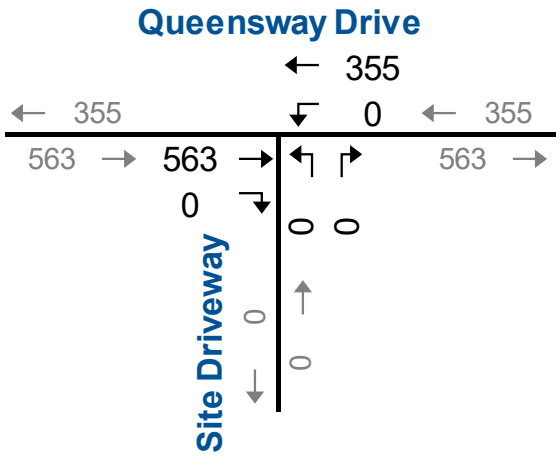
AM Peak Hour



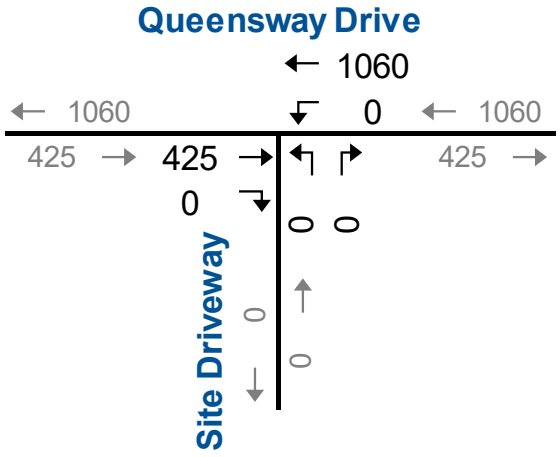
PM Peak Hour



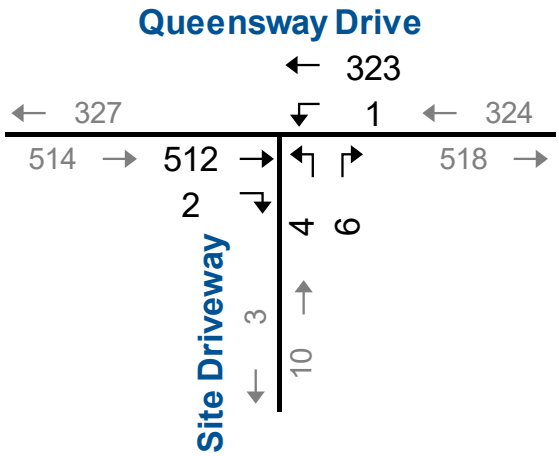
AM Peak Hour



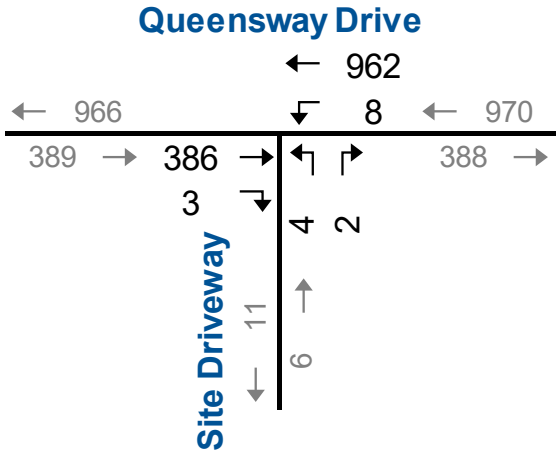
PM Peak Hour



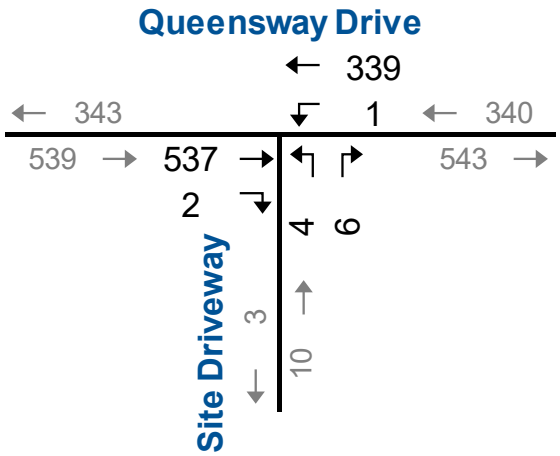
AM Peak Hour



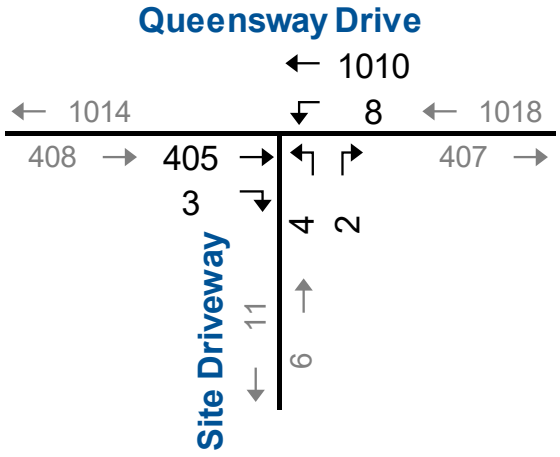
PM Peak Hour



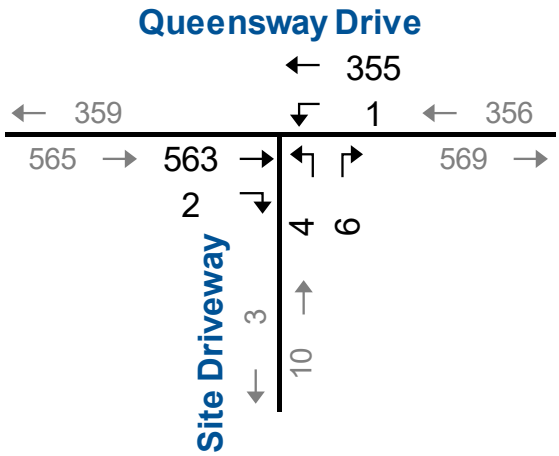
AM Peak Hour



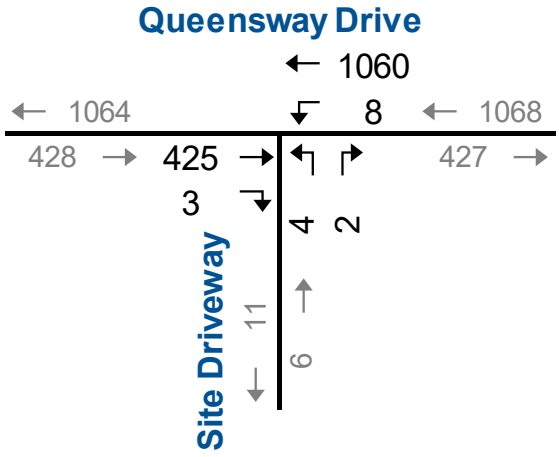
PM Peak Hour



AM Peak Hour



PM Peak Hour



Appendix D

Total Traffic Operations - Year 2021





Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	512	2	1	323	4	6
Future Volume (Veh/h)	512	2	1	323	4	6
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	589	2	1	371	5	7
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			591		963	590
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			591		963	590
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		98	99
cM capacity (veh/h)			995		286	511

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	591	1	371	12
Volume Left	0	1	0	5
Volume Right	2	0	0	7
cSH	1700	995	1700	385
Volume to Capacity	0.35	0.00	0.22	0.03
Queue Length 95th (m)	0.0	0.0	0.0	0.8
Control Delay (s)	0.0	8.6	0.0	14.7
Lane LOS		A		B
Approach Delay (s)	0.0	0.0		14.7
Approach LOS				B

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	37.1%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	386	3	8	962	4	2
Future Volume (Veh/h)	386	3	8	962	4	2
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	398	3	8	992	4	2
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			401		1408	400
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			401		1408	400
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		97	100
cM capacity (veh/h)			1169		154	655

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	401	8	992	6
Volume Left	0	8	0	4
Volume Right	3	0	0	2
cSH	1700	1169	1700	206
Volume to Capacity	0.24	0.01	0.58	0.03
Queue Length 95th (m)	0.0	0.2	0.0	0.7
Control Delay (s)	0.0	8.1	0.0	23.0
Lane LOS		A		C
Approach Delay (s)	0.0	0.1		23.0
Approach LOS				C

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	60.6%	ICU Level of Service	B
Analysis Period (min)	15		

Appendix E

Total Traffic Operations - Year 2026





Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	537	2	1	339	4	6
Future Volume (Veh/h)	537	2	1	339	4	6
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	617	2	1	390	5	7
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			619		1010	618
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			619		1010	618
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		98	99
cM capacity (veh/h)			971		268	493

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	619	1	390	12
Volume Left	0	1	0	5
Volume Right	2	0	0	7
cSH	1700	971	1700	365
Volume to Capacity	0.36	0.00	0.23	0.03
Queue Length 95th (m)	0.0	0.0	0.0	0.8
Control Delay (s)	0.0	8.7	0.0	15.2
Lane LOS		A		C
Approach Delay (s)	0.0	0.0		15.2
Approach LOS				C

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	38.4%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	405	3	8	1010	4	2
Future Volume (Veh/h)	405	3	8	1010	4	2
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	418	3	8	1041	4	2
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			421		1476	420
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			421		1476	420
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		97	100
cM capacity (veh/h)			1149		139	638

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	421	8	1041	6
Volume Left	0	8	0	4
Volume Right	3	0	0	2
cSH	1700	1149	1700	189
Volume to Capacity	0.25	0.01	0.61	0.03
Queue Length 95th (m)	0.0	0.2	0.0	0.8
Control Delay (s)	0.0	8.2	0.0	24.7
Lane LOS		A		C
Approach Delay (s)	0.0	0.1		24.7
Approach LOS				C

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	63.2%	ICU Level of Service	B
Analysis Period (min)	15		

Appendix F

Total Traffic Operations - Year 2031





Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	563	2	1	355	4	6
Future Volume (Veh/h)	563	2	1	355	4	6
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	647	2	1	408	5	7
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			649		1058	648
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			649		1058	648
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		98	99
cM capacity (veh/h)			947		251	474

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	649	1	408	12
Volume Left	0	1	0	5
Volume Right	2	0	0	7
cSH	1700	947	1700	346
Volume to Capacity	0.38	0.00	0.24	0.03
Queue Length 95th (m)	0.0	0.0	0.0	0.9
Control Delay (s)	0.0	8.8	0.0	15.8
Lane LOS		A		C
Approach Delay (s)	0.0	0.0		15.8
Approach LOS				C

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	39.8%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	425	3	8	1060	4	2
Future Volume (Veh/h)	425	3	8	1060	4	2
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	438	3	8	1093	4	2
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			441		1548	440
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			441		1548	440
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		97	100
cM capacity (veh/h)			1130		126	622

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	441	8	1093	6
Volume Left	0	8	0	4
Volume Right	3	0	0	2
cSH	1700	1130	1700	172
Volume to Capacity	0.26	0.01	0.64	0.03
Queue Length 95th (m)	0.0	0.2	0.0	0.9
Control Delay (s)	0.0	8.2	0.0	26.7
Lane LOS		A		D
Approach Delay (s)	0.0	0.1		26.7
Approach LOS				D

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	65.8%	ICU Level of Service	C
Analysis Period (min)	15		