
MEMORANDUM

TO: Jeff Brown, 995423 Ontario Inc.	DATE: January 15, 2021
FROM: Daniel Riendeau	PROJECT #: 20-034
PROJECT: Proposed Development at 787 King Street East, Gananoque	
SUBJECT: Traffic Study	

1. Introduction

The purpose of this technical memorandum is to review the traffic impact of a proposed coffee shop to be located at 787 King Street East, Gananoque, Ontario. The site location is shown on **Figure 1**. A site plan is included in **Appendix A**.



Figure 1: Site Location

2. Existing Conditions

The project site is located on King Street East at Gananoque’s eastern gate, in a light commercial area near the Thousand Islands Parkway and Highway 401. The site is currently occupied by a miniature golf course and an information centre. The site driveway is shared with the adjacent Travelodge Motel, 2 residences located behind the motel, and 3 residences located further south on the shore of the St. Lawrence River.

From the project site going west, King Street East is a 3-lane roadway including a 2-way left-turn lane (TWLTL) with a posted speed limit of 50 km/h. East of the project site, King Street East tapers into a 2-lane roadway. It is identified as Highway 2 between Thousand Islands Parkway and Highway 401, with a posted speed limit of 70 km/h.

According to MTO’s Provincial Highway Traffic Volumes document, Highway 2 has experienced a 1% growth from 2006 to 2016.

Traffic counts were conducted on King Street East near Carmichael Road by the Town of Gananoque from Friday August 7 to Friday August 14, 2015. The hourly volume for an average weekday (Monday to Thursday) is illustrated in **Figure 2**.

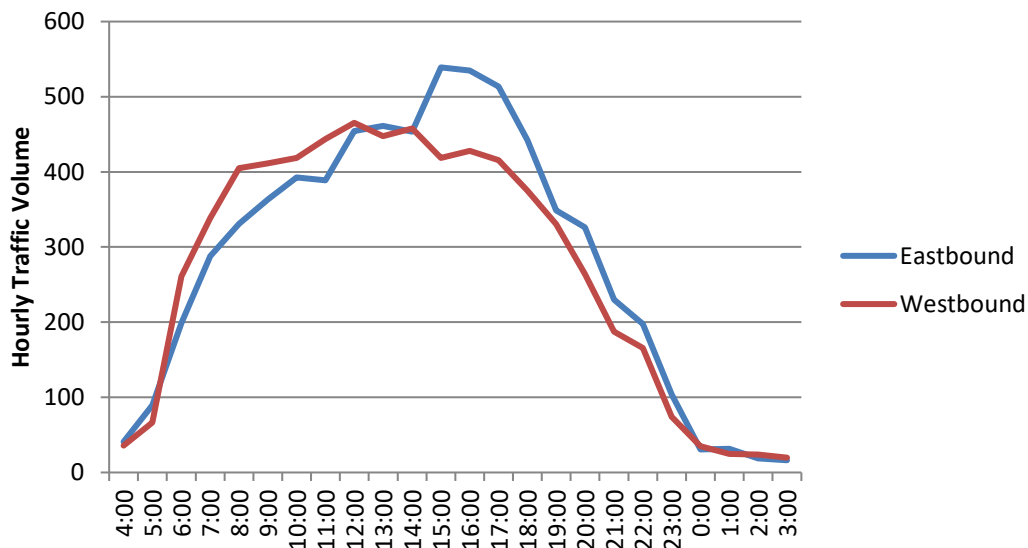


Figure 2: Average Weekday Hourly Traffic Volume on King Street East, August 2015

The traffic count data indicate that the weekend peak hours were very similar to the average weekday peak hours. Therefore, the average weekday peak hours were used for analysis.

Another traffic count was conducted by BT Engineering on Wednesday April 17, 2019 between 3:00 and 5:30 p.m. near the project site. The traffic volume measured during that period was found to be 1.14 times higher than the traffic volume measured during the same period in August 2015 near Carmichael Road. The

peak hour volumes provided by the Town were therefore multiplied by 1.14 and adjusted using an annual growth rate of 1% to determine existing (2021) traffic volumes.

The existing traffic volumes near the project site are presented in **Table 1**.

Table 1: Existing (2021) Traffic Volumes

	Morning Peak Hour	Afternoon Peak Hour
Westbound	413	437
Eastbound	384	621

3. 2026 Background Traffic

Future background conditions represent the anticipated traffic volumes resulting from general development growth within the region. It is anticipated that the proposed development will be completed in 2021. Therefore, the year 2026 (5 years from build-out) has been selected as the planning horizon. An annual growth rate of 1% has been assumed for analysis.

The 2026 background traffic volumes are presented in **Table 2**.

Table 2: Background (2026) Traffic Volumes

	Morning Peak Hour	Afternoon Peak Hour
Westbound	434	459
Eastbound	404	653

4. Trip Generation

The proposed development consists of a Starbucks coffee shop with a drive-through lane. The total floor area is 195 m² (2,100 sq. ft.).

The Institute of Transportation Engineering’s (ITE) Trip Generation Manual 10th Edition is used as a reference to determine the number of trips that will be generated by the development. The “Coffee/Donut Shop with Drive-Through Window” land use (ITE Land Use 937) has been selected to determine the trip generation rates. **Table 3** presents the number of trips anticipated for the overall development.

As stated above, the project site driveway is shared with the adjacent motel and with 5 houses. The motel can be accessed by 2 other driveways, including one directly in front of it, and each house is expected to generate no more than 1 trip during any peak hour. Therefore, the number of trips using the project site driveway to access either the motel or one of the houses is assumed to be very low. Additionally, many of the trips generated by the coffee shop will come from the adjacent motel as well as the nearby Holiday Inn. These trips will likely be done by foot or using the paved connection between the motel and the proposed

coffee shop. As a result, the number of trips using the coffee shop’s driveway will likely be lower than what is calculated in this study and, therefore, the traffic volumes presented below are considered as a worst-case scenario.

Table 3: Trip Generation

Land Use (ITE Code)	Unit	Item	Morning Peak Hour			Afternoon Peak Hour			
			Total	In	Out	Total	In	Out	
Coffee/Donut Shop with Drive-Through Window (937)	1,000 sq. ft. gross floor area	Quantity	2.7			2.7			
		ITE Trip Rate	88.99			43.38			
		Pass-By	60%			60%			
		Distribution	100%	51%	49%	100%	50%	50%	
		Net Trips		96	49	47	46	23	23
		Pass-By Trips		144	72	72	70	35	35

The proposed development is located in the eastern part of the Town of Gananoque. Part of the net generated trips is expected to come from the town core while the balance is expected to come from Highway 401 or Thousand Islands Parkway. Therefore, it is assumed that 50% of the net generated trips will be to/from the east and the other 50% to/from the west.

The proportion of pass-by trips (trips already existing on King Street East) is estimated as 60% and the distribution is anticipated to be consistent with the current traffic distribution (eastbound/westbound); that is, 48% eastbound / 52% westbound during the morning peak hour and 59% / 41% during the afternoon peak hour.

Figure 3 presents the trip assignments for the proposed development.

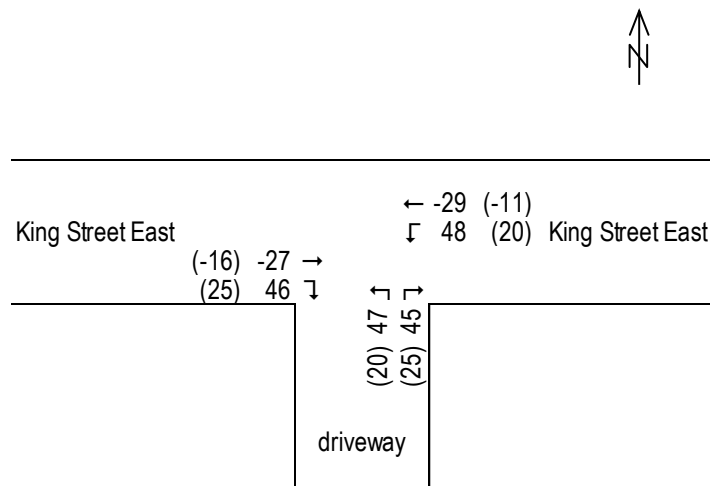


Figure 3: Trip Generation, AM (PM) Peak Hour

5. 2026 Total Traffic

The total traffic volumes, reflecting the combined growth in background and site generated traffic, projected for the 2026 planning horizon, are presented in **Figure 4**.

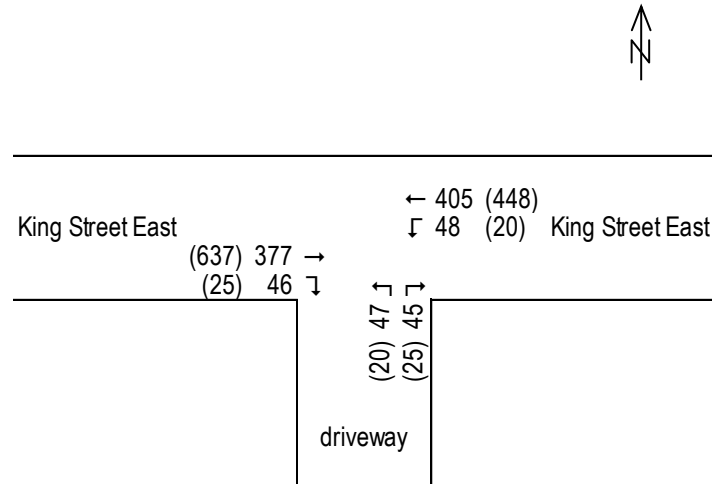


Figure 4: 2026 Total Traffic Volumes, AM (PM) Peak Hour

A traffic capacity analysis of the projected traffic volumes with the proposed development was performed using the PTV Vistro analysis tool. The methodologies from the Highway Capacity Manual (HCM) were used to determine the volume-to-capacity (V/C) ratio, average delay per vehicle and 95th percentile queue length for each vehicular movement. The “level of service” (LOS) is directly based on the average delay per vehicle, as described in **Table 4**. Typically, a LOS D is deemed satisfactory. A LOS E or F may require corrective measures depending on the context.

Table 4: Level of Service Definitions for Unsignalized Intersections

Delay (s)	LOS
≤ 10	A
≤ 15	B
≤ 25	C
≤ 35	D
≤ 50	E
> 50	F

The results of the traffic capacity analysis are presented in **Table 5**. For the purpose of the analysis, nearby driveways were not included as they are not expected to significantly impact the capacity analysis. PTV Vistro reports are provided in **Appendix C**.

Table 5: Intersection Performance, 2026 Total Traffic

Intersection	Movement ¹	Morning Peak Hour				Afternoon Peak Hour			
		V/C Ratio	Delay (s)	Level of Service	95th Queue (m)	V/C Ratio	Delay (s)	Level of Service	95th Queue (m)
King Street East / driveway (NB stop)	EBT/R	0.00	0	A	0	0.00	0	A	0
	WBL/T	0.05	1	A	1	0.02	0	A	1
	NBL/R	0.18	18	C	8	0.11	20	C	4

¹EB = eastbound, WB = westbound, NB = northbound, L = left turn, T = through, R = right turn

The overall impact of the proposed development is minor and there are no issues anticipated at the proposed driveways within the 2026 planning horizon.

6. Sightline Analysis

A sightline analysis has been completed on the east side of the driveway to determine if the gate structure in front of the project site causes any obstruction.

Two kinds of distance are considered in the sightline analysis: stopping sight distance and intersection sight distance. The stopping sight distance is the distance required for a driver on the roadway to comfortably brake to a halt, including reaction time. The intersection sight distance is the distance required for a driver waiting for a gap (i.e., leaving the parking lot) to determine if the gap in traffic is sufficient to enter the roadway.

Table 6 presents the different sight distances based on design speed, according to TAC’s Geometric Design Guide for Canadian Roads. Since the intersection sight distance is longer than the stopping sight distance, the former is used for the sightline analysis.

Table 6: Design Sight Distances

Design Speed	Stopping Sight Distance (m)	Intersection Sight Distance (m)
50 km/h	65	105
60 km/h	85	130

Assuming a design speed of 60 km/h, a driver leaving the project site and performing a left turn should be able to see oncoming traffic up to 130 m. The sightline from the project site is shown on **Figure 5**.

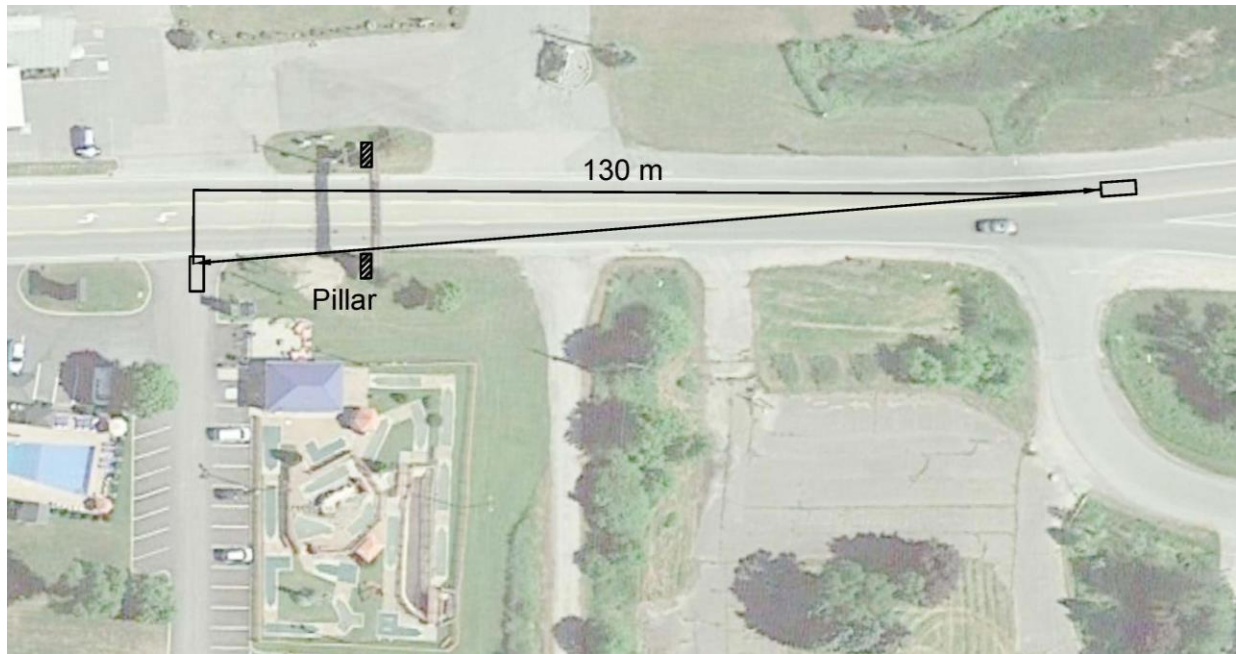


Figure 5: Departure Sightline

As illustrated, the driver exiting the project site will be able to see up to 130 m from their location, and even beyond since the roadway is curved to the north from that point. It is therefore concluded that no sightline issue is anticipated with the presence of the gate.

7. Conclusion

The project site is located on King Street East in a light commercial area near Thousand Islands Parkway and Highway 401. The posted speed limit is 50 km/h and a 2-way left-turn lane (TWLTL) is provided to facilitate left-turn movements to businesses on each side of the street.

The above analysis determined that no traffic capacity issue is expected to result from the proposed development of a coffee shop and that the gate in front of the project site is not expected to cause any sightline issue with drivers exiting the site. The proposed driveways are expected to operate satisfactorily and, as a result, no roadway improvements to accommodate additional traffic are required.

Subject: Traffic Study

Project: 20-034 Proposed Development at 787 King Street East, Gananoque

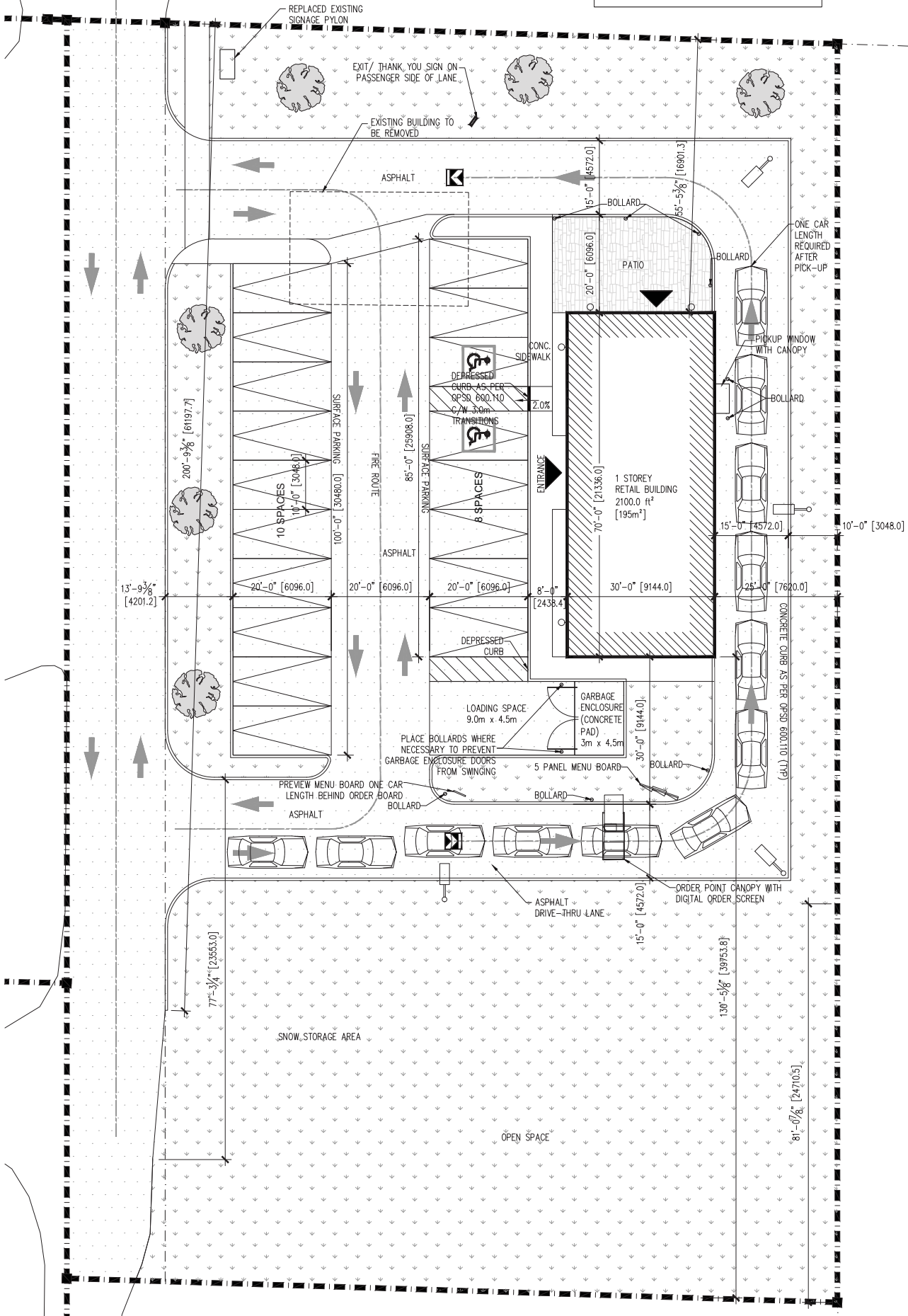
Date: January 15, 2021



Appendix A

Site Plan

SITE STATS	
LOT AREA	= 40,141 ft ²
BUILDING TOTAL	= 2100 ft ² (5%)
ASPHALT	= 17,884 ft ² (44%)
SOFT LANDSCAPE	= 17,900 ft ² (6%)
HARD LANDSCAPE	= 2257 ft ² (45%)
PARKING REQUIRED	= 20 SPACES
PARKING PROPOSED	= 18 SPACES



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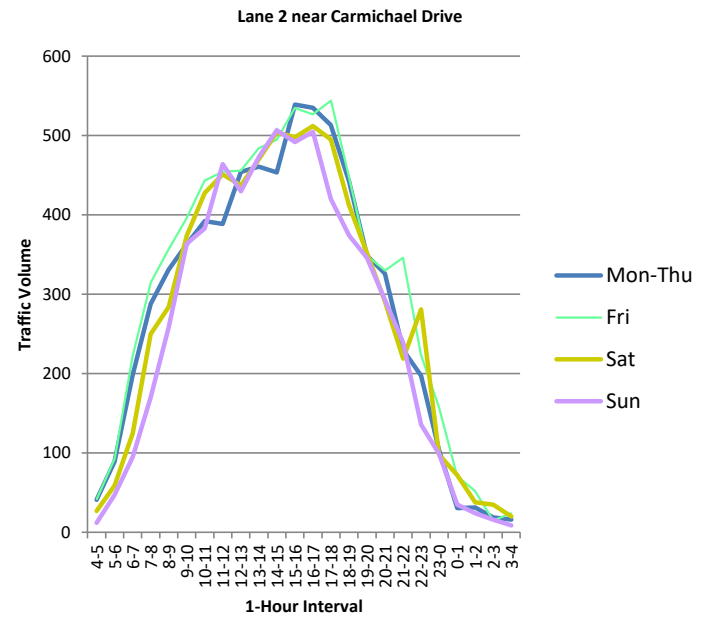
Appendix B

Traffic Count Data

Roadway
King Street East in Gananoque, ON

Location
Lane 1 near Carmichael Drive

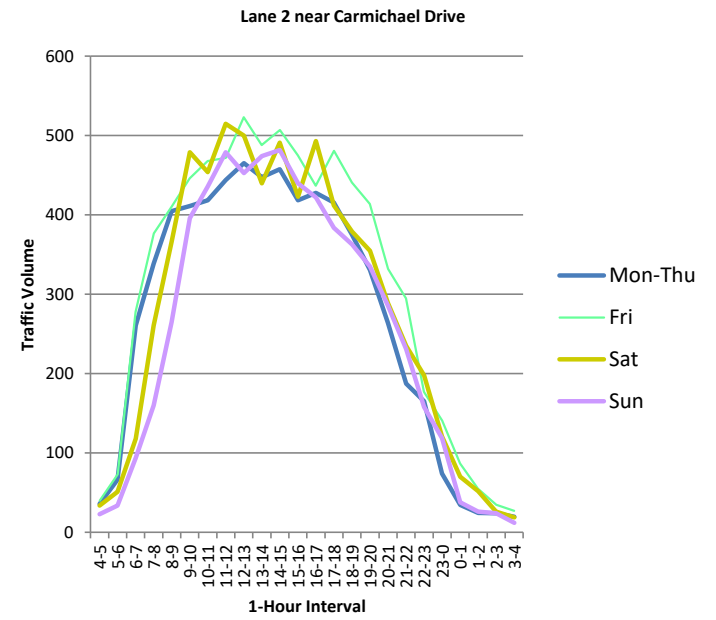
		7 Aug 2015	8	9	10	11	12	13	14
Start	End	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri
0:00	1:00		71	72	35	38	22	24	39
1:00	2:00		52	38	24	35	32	24	35
2:00	3:00		15	35	16	18	18	27	12
3:00	4:00		24	20	9	5	14	22	24
4:00	5:00		27	12	33	62	36	33	42
5:00	6:00		59	47	71	102	92	92	93
6:00	7:00		125	95	221	191	176	207	222
7:00	8:00		250	170	300	271	285	295	315
8:00	9:00	350	284	258	351	323	309	341	364
9:00	10:00	373	374	364	364	373	336	380	419
10:00	11:00	445	428	383	410	373	386	401	442
11:00	12:00	450	451	464	395	364	389	407	459
12:00	13:00	456	437	430	420	442	478	477	
13:00	14:00	484	470	473	498	438	455	453	
14:00	15:00	495	504	507	486	432	467	429	
15:00	16:00	535	498	492	562	503	557	534	
16:00	17:00	527	512	505	531	511	535	563	
17:00	18:00	544	495	420	516	479	538	521	
18:00	19:00	448	412	374	474	437	406	452	
19:00	20:00	349	352	346	352	322	351	370	
20:00	21:00	330	291	293	321	295	308	380	
21:00	22:00	346	219	239	194	214	208	304	
22:00	23:00	224	281	136	135	204	218	233	
23:00	0:00	157	98	99	108	95	96	117	



Roadway
King Street East in Gananoque, ON

Location
Lane 2 near Carmichael Drive

		7 Aug 2015	8	9	10	11	12	13	14
Start	End	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri
0:00	1:00		87	70	38	36	35	29	39
1:00	2:00		55	52	26	17	32	25	24
2:00	3:00		35	26	24	26	26	24	20
3:00	4:00		27	19	12	10	15	32	22
4:00	5:00		34	23	34	38	32	39	40
5:00	6:00		51	34	58	76	69	63	73
6:00	7:00		118	94	277	246	253	268	278
7:00	8:00		261	160	357	302	340	355	377
8:00	9:00	434	366	265	403	392	396	429	387
9:00	10:00	451	479	396	430	399	400	416	441
10:00	11:00	459	454	436	449	414	409	402	477
11:00	12:00	472	515	479	443	419	465	448	472
12:00	13:00	523	500	453	453	461	473	474	
13:00	14:00	488	440	474	438	464	466	422	
14:00	15:00	507	491	482	464	449	454	464	
15:00	16:00	475	423	440	395	417	448	414	
16:00	17:00	437	493	422	398	414	427	473	
17:00	18:00	481	412	384	397	409	405	452	
18:00	19:00	441	379	363	319	376	411	394	
19:00	20:00	414	355	335	316	302	334	370	
20:00	21:00	332	289	286	243	253	254	306	
21:00	22:00	295	235	231	167	199	171	213	
22:00	23:00	177	198	158	135	158	174	195	
23:00	0:00	141	121	119	84	71	57	85	



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Appendix C

PTV Vistro Analysis

Intersection Level Of Service Report
Intersection 1: Project Site Driveway

Control Type:	Two-way stop	Delay (sec / veh):	21.5
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.180

Intersection Setup

Name	proposed development		King St E		King St E	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [m]	3.50	3.50	3.50	3.50	3.50	3.50
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [m]	30.48	30.48	30.48	30.48	30.48	30.48
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [m]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [km/h]	50.00		50.00		50.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	proposed development		King St E		King St E	
Base Volume Input [veh/h]	47	45	377	46	48	405
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	47	45	377	46	48	405
Peak Hour Factor	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	12	12	99	12	13	107
Total Analysis Volume [veh/h]	49	47	397	48	51	426
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.18	0.07	0.00	0.00	0.05	0.00
d_M, Delay for Movement [s/veh]	21.48	13.92	0.00	0.00	8.38	0.00
Movement LOS	C	B	A	A	A	A
95th-Percentile Queue Length [veh/ln]	1.00	1.00	0.00	0.00	0.14	0.14
95th-Percentile Queue Length [m/ln]	7.59	7.59	0.00	0.00	1.09	1.09
d_A, Approach Delay [s/veh]	17.78		0.00		0.90	
Approach LOS	C		A		A	
d_I, Intersection Delay [s/veh]	2.10					
Intersection LOS	C					

Intersection Level Of Service Report
Intersection 1: Project Site Driveway

Control Type:	Two-way stop	Delay (sec / veh):	26.2
Analysis Method:	HCM 6th Edition	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.109

Intersection Setup

Name	proposed development		King St E		King St E	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [m]	3.50	3.50	3.50	3.50	3.50	3.50
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [m]	30.48	30.48	30.48	30.48	30.48	30.48
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [m]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [km/h]	50.00		50.00		50.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	proposed development		King St E		King St E	
Base Volume Input [veh/h]	20	25	637	25	20	468
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	20	25	637	25	20	468
Peak Hour Factor	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	5	7	168	7	5	123
Total Analysis Volume [veh/h]	21	26	671	26	21	493
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.11	0.06	0.01	0.00	0.02	0.00
d_M, Delay for Movement [s/veh]	26.22	15.57	0.00	0.00	9.10	0.00
Movement LOS	D	C	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.59	0.59	0.00	0.00	0.07	0.07
95th-Percentile Queue Length [m/ln]	4.49	4.49	0.00	0.00	0.55	0.55
d_A, Approach Delay [s/veh]	20.33		0.00		0.37	
Approach LOS	C		A		A	
d_I, Intersection Delay [s/veh]	0.91					
Intersection LOS	D					