paradigm
TRANSPORTATION SOLUTIONS LIMITED



1335 – 1355 Plains Road East, City of Burlington Traffic Brief and Parking Justification Study

Paradigm Transportation Solutions Limited

November 2017

22 King Street South, Suite 300
Waterloo, ON N2J 1N8
p: 519.896.3163
905.381.2229
f: 1.855.764.7349

www.ptsl.com

29 November 2017
Project: 170263

Ayaz Adatiya
DVLP Property Group Inc.
1 Kawana Road
Brampton, ON L6Y 0W1

Dear Mr. Adatiya:

RE: 1335 – 1355 PLAINS ROAD EAST, CITY OF BURLINGTON TRAFFIC BRIEF AND PARKING JUSTIFICATION STUDY

Paradigm Transportation Solutions Limited has been retained by DVLP Property Group Inc. to prepare this traffic brief and parking justification study for the proposed residential redevelopment of 1335 & 1355 Plains Road East in the City of Burlington, Ontario. The subject site is located on the north side of the local portion of Plains Road East, west of Helena Street. **Figure 1** illustrates the location of the site.

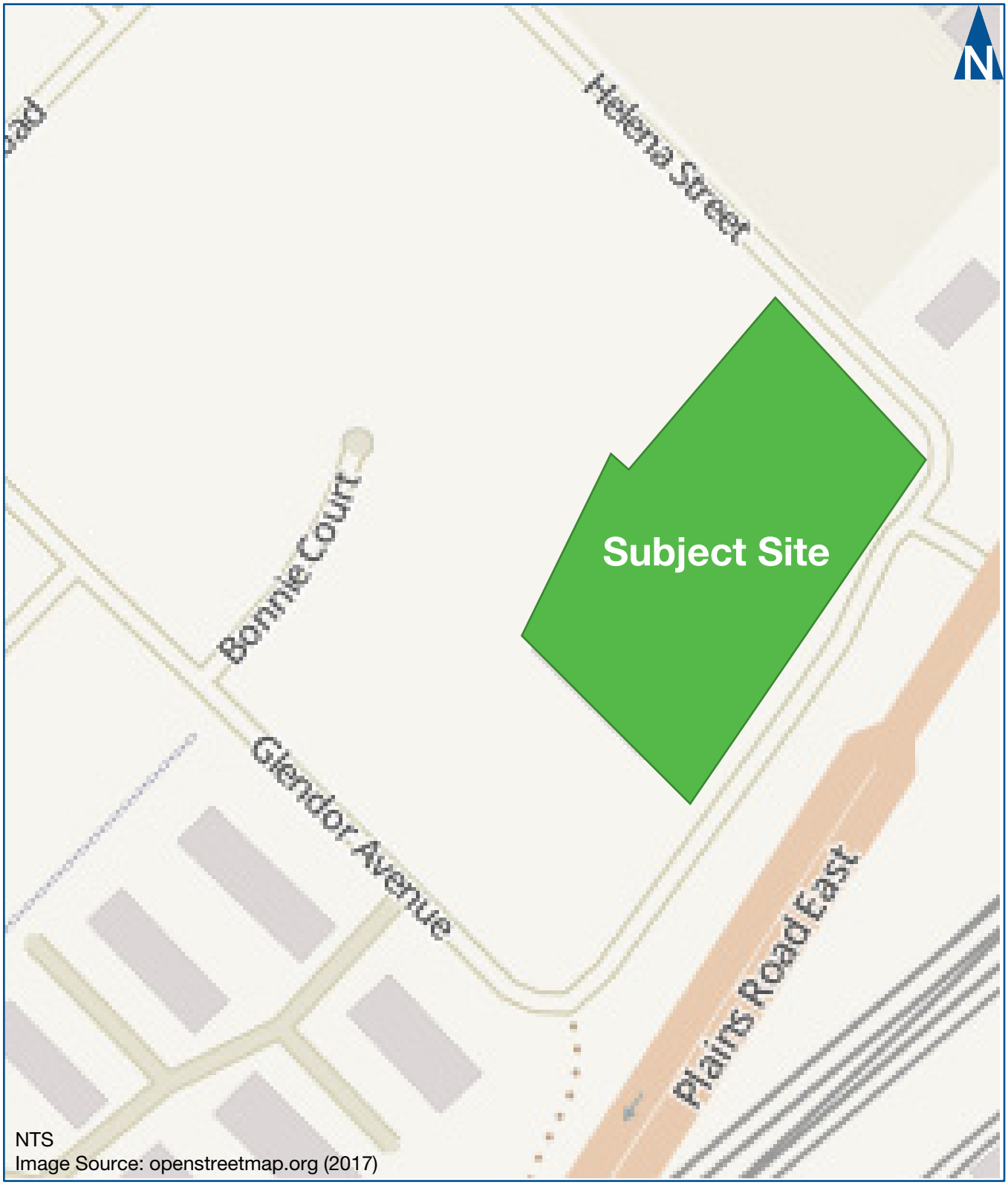
This letter provides an overview of the existing conditions within the vicinity of the subject site, a description of the proposed development, estimates of the traffic to be generated by the development, a review of existing and future traffic operations, and an assessment of the site's proposed parking supply.

Pre-study consultation was undertaken with the City of Burlington by e-mail in October 2017. Based on the consultation, the following intersections are required to be investigated:

- Plains Road East/Helena Street & Site Driveway; and
- Plains Road East & Plains Road East.

The City of Burlington does not currently have their own traffic impact study (TIS) guidelines; therefore, the Region of Halton's TIS Guidelines[1] have been used in the analyses for this letter. Also, based on our pre-consultation, horizon years of 2020 (opening year) and 2025 (five years beyond opening year) were used in the analyses. **Appendix A** contains the pre-study correspondence and comments received from the City of Burlington.

[1] Regional Municipality of Halton. Transportation Impact Study Guidelines. January 2015.



NTS
Image Source: openstreetmap.org (2017)

paradigm TRANSPORTATION SOLUTIONS LIMITED

Location of Subject Site
City of Burlington

Existing Conditions

Existing Roadways

The study area road network is comprised of Helena Street and the local and collector portions of Plains Road East. Information regarding each is as follows:

- **Plains Road East** (local) is a northeast/southwest local roadway that operates with two travel lanes and a parking lane, and connects existing Glendor Avenue to the west and Helena Street to the east. The maximum speed limit is not posted and is assumed to be 50 kilometres per hour. The existing land uses along Plains Road East are primarily residential in nature.
- **Helena Street** is a predominantly north-south local roadway that operates with two travel lanes. The maximum speed limit is not posted and is assumed to be 50 kilometres per hour. The existing land uses on Helena Street are primarily residential in nature.
- **Plains Road East** (connector) is a northeast/southwest roadway classified as an industrial connector, that operates under the jurisdiction of the City of Burlington. The roadway comprises four lanes, with an auxiliary eastbound left-turn lane provided at Plains Road East/Helena Street. The posted speed limit is 60 kilometres per hour.

Sidewalks are provided on both sides of the study area roadways. Cycling facilities (bike lanes, multi-use paths, etc.) are not provided within the study area.

Existing Transit Services

Burlington Transit, the public transit operator in the City of Burlington, operates three (3) surface bus routes on Plains Road East, all of which are accessible to the development and provide connections to the broader Burlington Transit system. Information regarding each is as follows:

- **Route 1,1x (Plains)** operates between Burlington GO Station and Downtown Hamilton, with an intermediate stop at Aldershot GO Station. Service is provided seven days a week with weekday service provided from about 4:30 AM to 12:45 AM on 30-minute headways during all service hours. Saturday service is provided from about 6:25 AM to 12:50 AM on 30-minute headways. Sunday service is provided from about 6:55 AM to 9:20 PM on 30-minute headways.
- **Route 10 (New-Maple)** operates between Burlington GO Station and Appleby GO Station via Downtown Burlington. Service is provided seven days a week with weekday service provided from about 4:50 AM to 10:55 PM on 30-minute headways during all service hours. Saturday service is provided from about 6:55 AM to 10:50 PM on 30-minute headways. Sunday service is provided from about 7:55 AM to 10:20 PM on 30-minute headways.
- **Route 50 (Burlington South)** operates from Burlington GO Station and offers late night service to major destinations south of the Queen Elizabeth Way/Highway 403. Service is provided Monday to Saturday from 10:55 PM to 1:16 AM on 60-minute headways. No service is provided on Sundays.

Bus stops for all other routes (1, 1x, 10, and 50) are located on both sides of Plains Road East, within 100 metres of the subject site. **Figure 2** illustrates the existing transit routes within the vicinity of the subject site.



paradigm TRANSPORTATION SOLUTIONS LIMITED

Existing Transit Services

1335 & 1355 Plains Road East Traffic Brief & Parking Justification Study
170263

Figure 2

Existing Traffic Volumes

The City of Burlington was contacted to determine whether recent turning movement count (TMC) data was available for the study area intersections. City staff advised that TMC data for the intersection of Plains Road East/Plains Road East was available from November 2013; however, no data was available for the intersection of Plains Road East/Helena Street/Site Driveway.

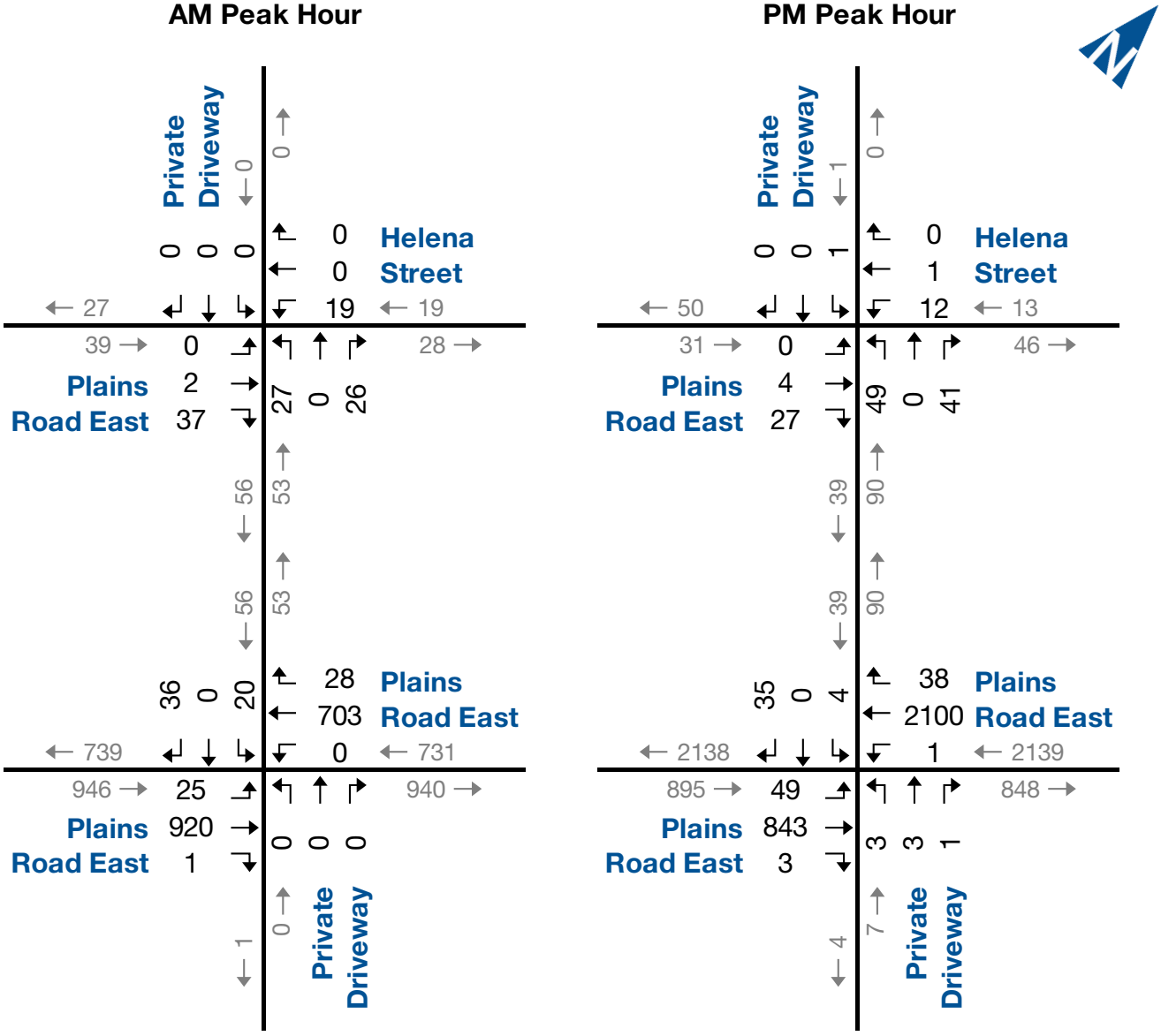
Due to ongoing construction on Plains Road East, updated traffic counts could not be conducted since they would not accurately reflect typical, non-construction operating conditions. City staff confirmed that the 2013 turning movement count could be utilized provided a growth rate of one percent compounded per annum was applied to the 2013 traffic volumes. The adjusted volumes are now considered representative of base year (2017) traffic volumes at this intersection.

To document existing traffic volumes at the intersection of Plains Road East/Helena Street/Site Driveway, Paradigm undertook turning movement counts on Tuesday 24 October 2017 from 6:00 AM to 9:00 AM and 3:00 PM to 6:00 PM. **Appendix B** contains the raw traffic data reports for both intersections.

Upon review of the north/south traffic volumes on the short link between the two intersections, it was noted that the volumes collected in November 2013 were 39% higher during the AM peak hour (43 trips) and 81% higher (105 trips) during the PM peak hour than those collected in October 2017. The difference in volume can be attributed to the daycare being operational in 2013 whereas it is currently closed. To further substantiate this, a review was undertaken based on the trip generation rates for day care facilities provided by the Institute of Transportation Engineer's Trip Generation Manual[2] Land Use Code 565 (Daycare). This review concluded that the daycare likely generated 144 trips in the weekday AM peak hour and 147 trips in the weekday PM peak hour during its operation. Although larger than the variation in traffic volumes, the PM peak hour trip generation indicates the closure of the daycare facility is the primary contributor to traffic volume variation.

The traffic volumes between the two intersections have been balanced based on the October 2017 volumes and the November 2013 distribution of southbound left/right turns onto Plains Road East (connector). **Figure 3** (attached) summarizes the base year (2017) AM and PM peak hour traffic volumes at the study area intersections.

[2] Institute of Transportation Engineers. Trip Generation Manual (9th Edition). Washington D.C. 2012.



Base Year (2017) Traffic Volumes
AM and PM Peak Hours

Existing Traffic Operations

Intersection level of service (LOS) is a recognized method of quantifying the delay experienced by drivers at intersections. It is based on the delay (in seconds) experienced by individual vehicles executing the various movements at an intersection. The delay is related to the number of vehicles desiring to make a particular movement, compared to the estimated capacity for that movement. The capacity is based on several criteria including, but not limited to, vehicle headways, intersection geometry, vehicle composition, opposing traffic flows, and for signalized intersections, signal timing. **Table 1** summarizes the level of service criteria for signalized and unsignalized intersections.

TABLE 1: LEVEL OF SERVICE DEFINITIONS

Level of Service	Signalized Intersections Average Total Delay (sec/veh)	Unsignalized Intersections Average Total Delay (sec/veh)
A	< = 10	< = 10
B	> 10 & < = 20	> 10 & < = 15
C	> 20 & < = 35	> 15 & < = 25
D	> 35 & < = 55	> 25 & < = 35
E	> 55 & < = 80	> 35 & < = 50
F	> 80	> 50

The operations of the study intersections under existing conditions have been assessed using Synchro 9 and HCM 2000 procedures. In accordance with Region of Halton TIS Guidelines, movements are considered critical under the following conditions:

- LOS, based on average delay per vehicle on individual movements exceeds LOS D at unsignalized intersections; and
- 95th percentile queue lengths for individual movements projected to exceed available turning lane storage.

The key parameters used in the analysis include:

- Existing lane configurations as documented from the site visit;
- Heavy vehicle percentages as derived from the existing turning movement counts; and
- Synchro default values for all other inputs.

Table 2 provides a summary of the results of the weekday AM and PM peak hours analyses. The key findings are as follows:

- The intersection of Plains Road East and Helena Street operates with excellent levels of service in the weekday AM and PM peak hours;
- The intersection of Plains Road East and Plains Road East/Private Driveway operates with excellent levels of service in the weekday AM peak hour, but operates with the following critical movements in the PM peak hour:

- The northbound approach operates at LOS F, with a v/c ratio of 0.20. The low v/c ratio on this approach indicates the delay is associated with the larger volume of traffic on Plains Road East (connector) which limits the opportunities for traffic from the minor approach (driveway) to enter the traffic stream; and
- The southbound left turn movement operates at LOS F, with a v/c ratio of 0.10. The low v/c ratio on this approach indicates the delay is associated with the larger volume of traffic on Plains Road East (collector) which limits the opportunities for traffic from the minor approach to enter the traffic stream.

Appendix C contains the detailed Synchro reports.

TABLE 2: BASE YEAR TRAFFIC OPERATIONS SUMMARY

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																
				Eastbound				Westbound				Northbound				Southbound				
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	1 - Plains Road East & Plains Road East/Private Driveway	TWSC	LOS	A	UM	>	A	<	UM	>	A	<	A	>	A	C	-	B	B	
			Delay	10		>	0	<		>	0	<	0	>	0	18	-	12	14	
			V/C	0.03		>		<		>		<	0.00	>		0.08	-	0.07		
			Q	1		>		<		>		<	0	>		2	-	2		
			Ex	20		>		<		>		<	-	>		-	-	-		
			Avail.	19		>		<		>		<	-	>		-	-	-		
	2 - Planes Road East & Helena Street	TWSC	LOS	<	A	A	A	<	A	>	A	<	A	>	A	<	A	>	A	
			Delay	<	9	9	9	<	9	>	9	<	4	>	4	<	0	>	0	
			V/C	<	0.04	0.04		<	0.02	>		<	0.02	>		<	0.00	>		
			Q	<	1	1		<	1	>		<	1	>		<	0	>		
			Ex	<	-	-		<	-	>		<	-	>		<	-	>		
			Avail.	<	-	-		<	-	>		<	-	>		<	-	>		
PM Peak Hour	1 - Plains Road East & Plains Road East/Private Driveway	TWSC	LOS	D	UM	>	A	<	UM	>	A	<	F	>	F	F	-	D	E	
			Delay	28		>	2	<		>	0	<	130	>	130	108	-	28	36	
			V/C	0.26		>		<		>		<	0.20	>		0.10	-	0.20		
			Q	8		>		<		>		<	5	>		3	-	6		
			Ex	20		>		<		>		<	-	>		-	-	-		
			Avail.	12		>		<		>		<	-	>		-	-	-		
	2 - Planes Road East & Helena Street	TWSC	LOS	<	A	A	A	<	A	>	A	<	A	>	A	<	A	>	A	
			Delay	<	9	9	9	<	10	>	10	<	4	>	4	<	7	>	7	
			V/C	<	0.03	0.03		<	0.02	>		<	0.03	>		<	0.00	>		
			Q	<	1	1		<	0	>		<	1	>		<	0	>		
			Ex	<	-	-		<	-	>		<	-	>		<	-	>		
			Avail.	<	-	-		<	-	>		<	-	>		<	-	>		

MOE - Measure of Effectiveness
LOS - Level of Service
Delay - Average Delay per Vehicle in Seconds

Q - 95th Percentile Queue Length (m)
Ex. - Existing Available Storage (m)
Avail. - Available Storage (m)

TCS - Traffic Control Signal
TWSC - Two-Way Stop Control
AWSC - All-Way Stop Control

<- Shared Left/Through Lane
>- Shared Right/Through Lane
UM - Unopposed Movement

Development Description

The subject site is located at 1335 & 1355 Plains Road East and currently contains four buildings: two comprising the former Ressel School, one detached residential dwelling and a one-storey office building. A total of four driveways currently provide access to the subject site: three via Plains Road East (local) and one via Helena Street. These buildings and their associated driveway connections will be removed to facilitate redevelopment of the site.

The redevelopment of the subject site is planned to consist of 29 back-to-back townhouses, nine (9) standard townhouse units and 71 square metres (764 square feet) of common amenity space/playground. Each unit is proposed to have two (2) parking spaces: one in the attached garage and one in the driveway. Five (5) visitor spaces will also be provided on the site.

Access to the subject site is proposed via one all movements driveway connection to Plains Road East (local), located approximately eight metres west of the existing easterly site driveway connection to Plains Road East (connector). Access to the nine (9) units fronting Plains Road East (local) and six (6) units fronting and Helena Street will be provided by individual private driveway connections to each respective street. **Figure 4** illustrates the preliminary concept plan. The development is proposed to be built-out and occupied by 2020.

Development Trip Generation

Trip generation information is used to forecast the level of new traffic activity anticipated to occur because of new development. The trips generated by the development have been estimated using land use code (LUC) 230 Residential Condominium/Townhouse contained in the ITE Trip Generation Manual. This LUC is described as:

- Ownership units that have at least one other owned unit within the same building structure. Both condominiums and townhouses are included in this land use.

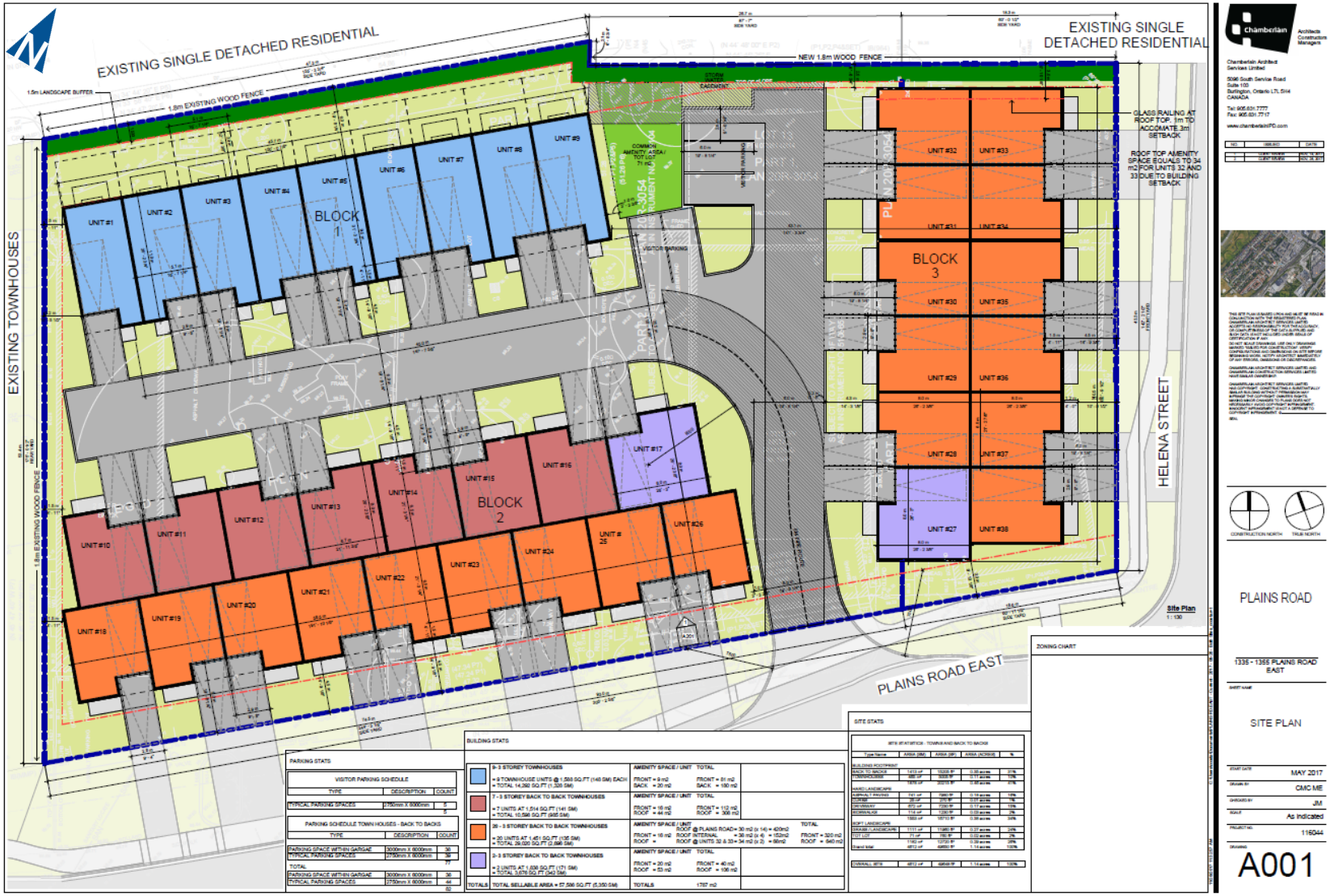
The base trip generation for the subject site has been developed using the regression equations as the criteria for their use were met. **Table 3** summarizes the base trip generation and indicates the development is forecast to generate 24 trips in the weekday AM peak hour and 27 trips in the weekday PM peak hour.

TABLE 3: TRIP GENERATION ESTIMATES

Land Use Code	Units	AM Peak Hour				PM Peak Hour			
		Rate	In	Out	Total	Rate	In	Out	Total
LUC 230 - Residential Condominium/Townhouse (Units)	38	Eq.[1]	4	20	24	Eq.[2]	18	9	27
Total New Trip Generation			**4**	**20**	**24**		**18**	**9**	**27**

[1] - LUC 230 AM Peak Hour Equation, Ln(T) = 0.8Ln(X)+0.26

[2] - LUC 230 PM Peak Hour Equation, Ln(T) = 0.82Ln(X)+0.32



paradigm TRANSPORTATION SOLUTIONS LIMITED

Conceptual Site Plan

Modal Share

It is recognized that the subject site is located adjacent to three transit routes that provide excellent connectivity to Burlington Transit's broader network and the Aldershot and Burlington GO stations. To recognize the potential for trips by transit, data on primary mode of travel for all home to work trips were extracted from the 2011 Transportation Tomorrow Survey (TTS) for traffic analysis zone (TAZ) 4058 (**Figure 5**). **Appendix D** contains the detailed TTS output for the weekday AM and PM peak hours.

Travel by personal vehicle within the TAZ accounts for approximately 70%, and 80% of all trips made from home to other destinations in the AM peak hour and PM peak hours respectively. Approximately 10% to 30% of trips are completed using some combination of transit or walking depending on the time of day. To remain conservative, a modal share reduction factor of 10% has been applied to the base trip generation, the results of which are summarized in **Table 4**. Based on this analysis two (2) trips in the weekday AM peak hour, and three (3) trips in the weekday PM peak hour are estimated to be completed by modes other than personal vehicles, and the subject site is forecast to generate 22 new vehicle trips in the weekday AM peak hour and 24 new vehicle trips in the weekday PM peak hour.

TABLE 4: ADJUSTED TRIP GENERATION ESTIMATES

Land Use Code	Units	Trips	AM Peak Hour				PM Peak Hour			
			Rate	In	Out	Total	Rate	In	Out	Total
LUC 230 - Residential Condominium/Townhouse (Units)	38	New Trips	Eq.	4	20	24	Eq.	18	9	27
		Modal Split	-10%	0	-2	-2	-10%	-2	-1	-3
Total New Trip Generation				**4**	**18**	**22**		**16**	**8**	**24**

Development Trip Distribution

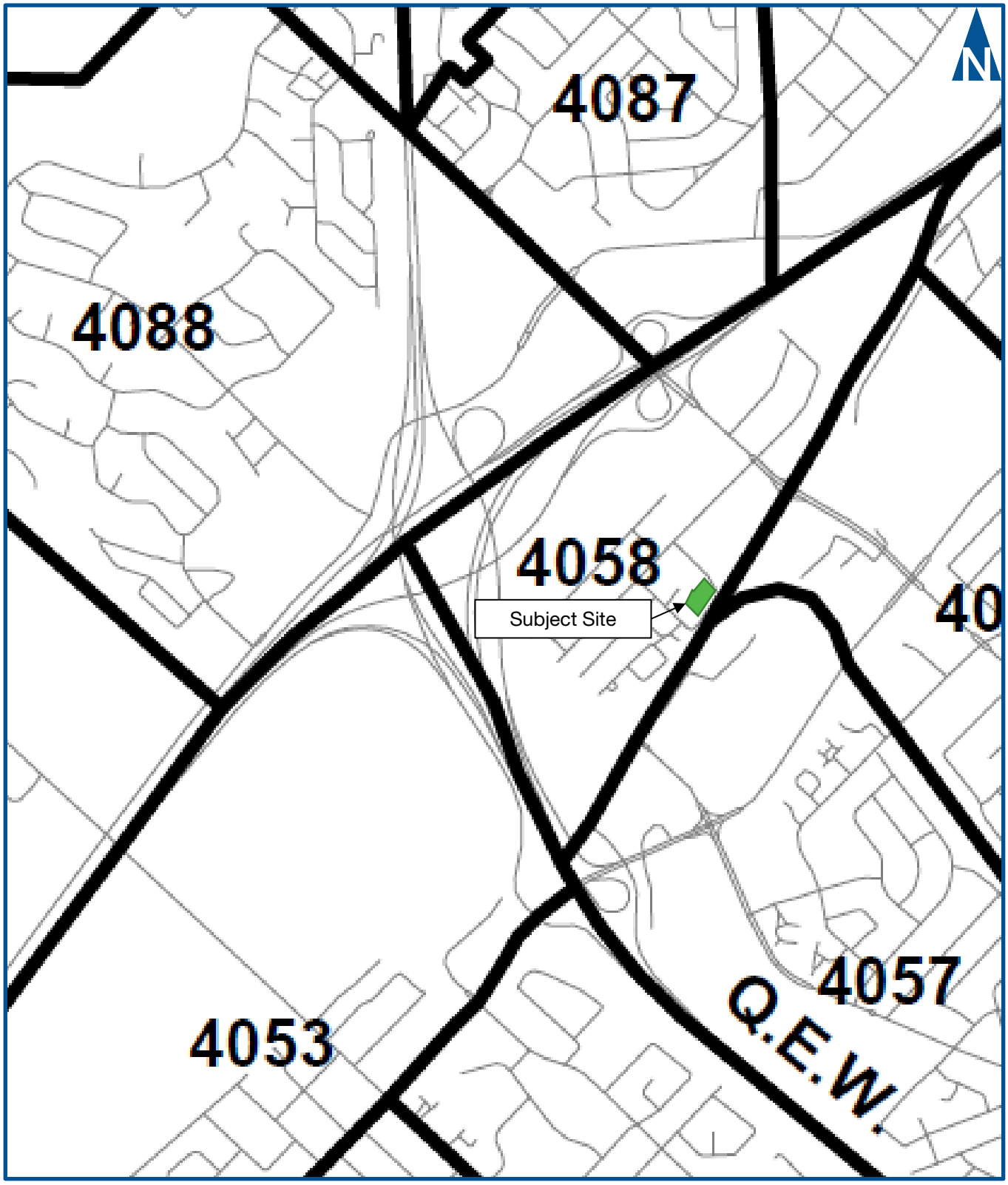
Traffic distribution patterns for the development have been estimated using the existing traffic patterns. As the study area is mostly residential, the proposed development is projected to resemble similar travel characteristics during the weekday peak hours. **Table 5** summarizes the trip distribution used for this study.

TABLE 5: TRIP DISTRIBUTION SUMMARY

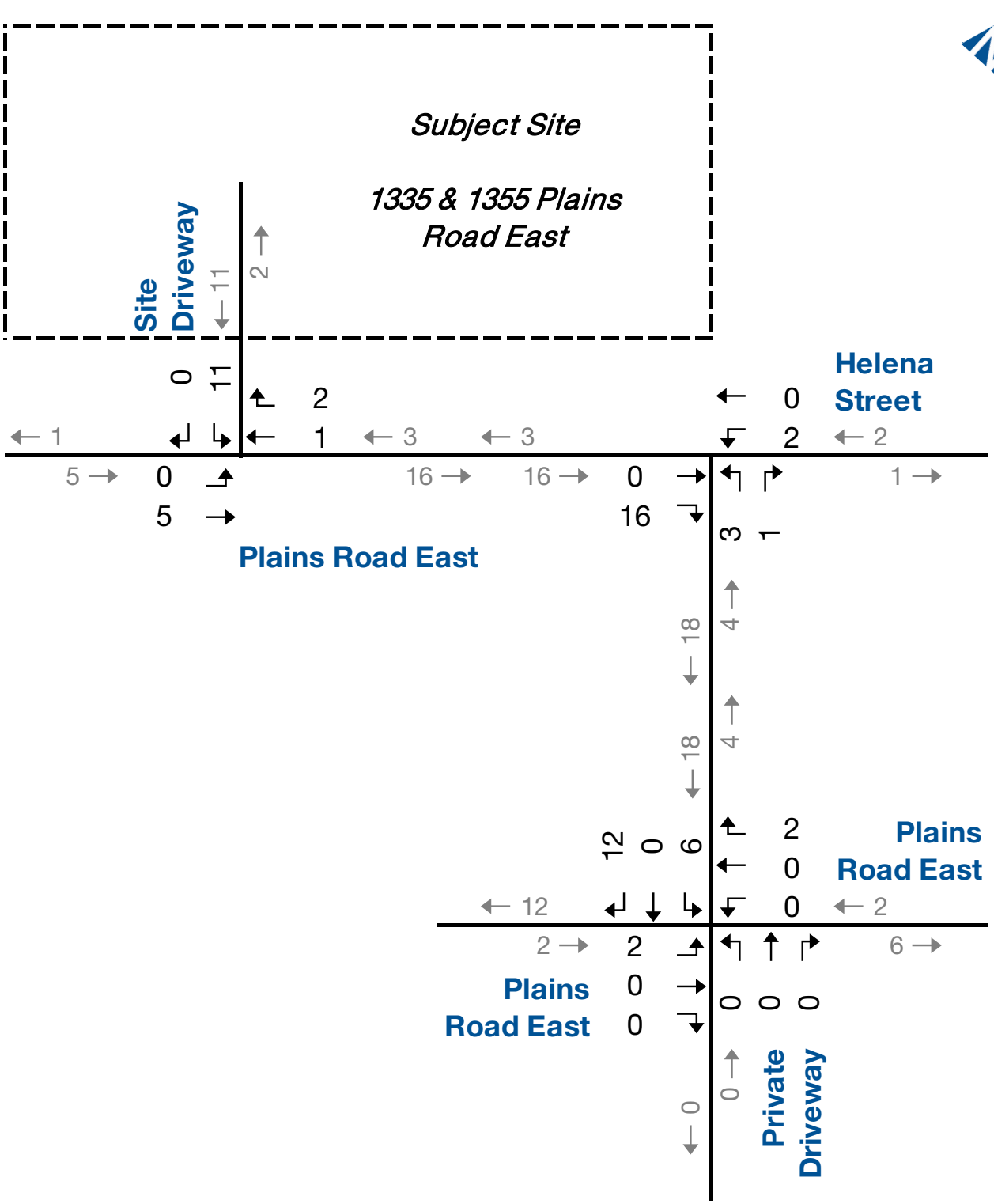
To/From	AM		PM	
	In	Out	In	Out
East via Plains Road East	50%	35%	45%	10%
West via Plains Road East	50%	65%	55%	90%
Total	**100%**	**100%**	**100%**	**100%**

Using the trip generation and trip distribution estimates, the site traffic was assigned to the road network. **Figure 6.1** and **Figure 6.2** illustrate the weekday AM and PM peak hour site generated traffic forecasts.

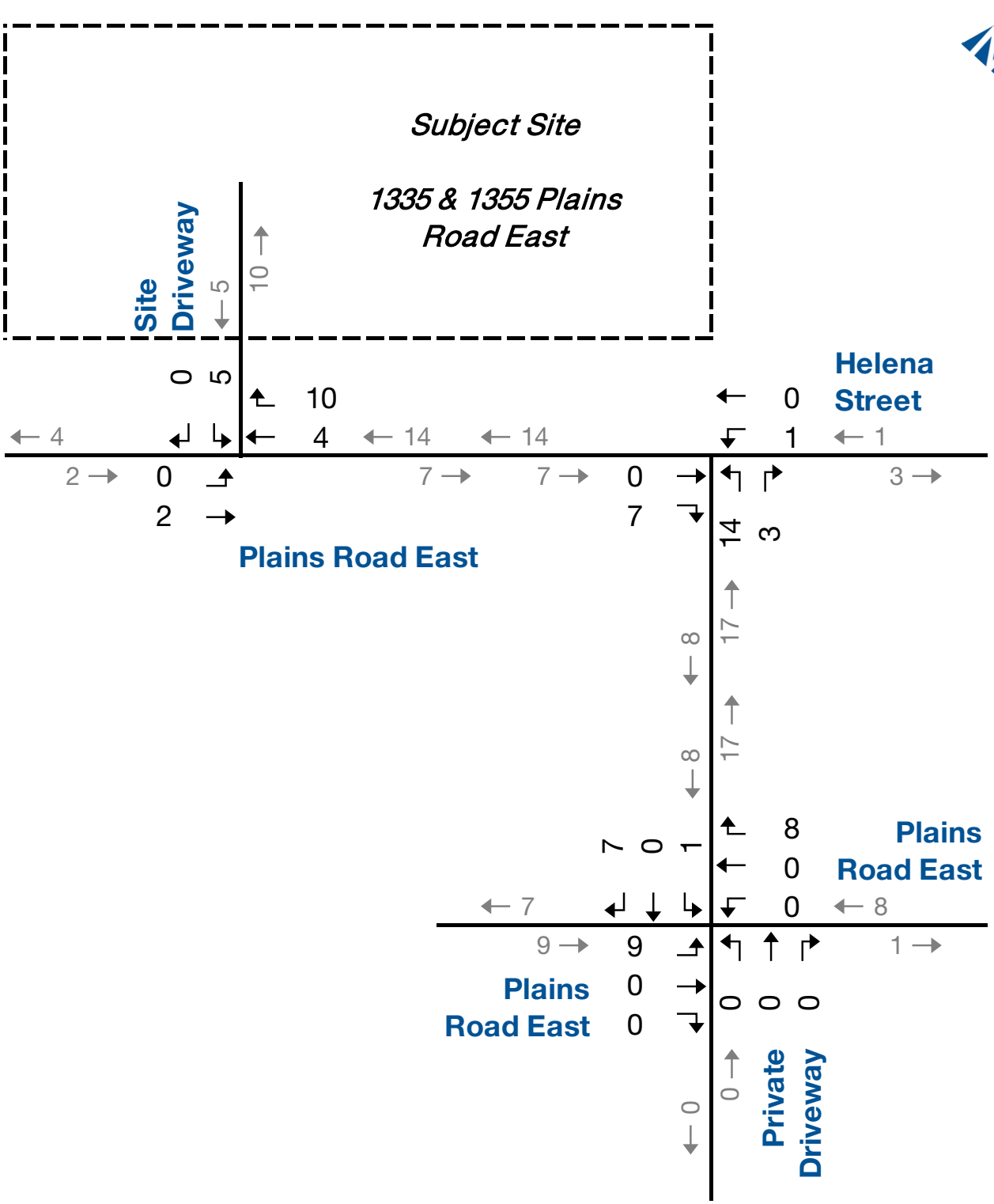




Transportation Tomorrow Survey
TAZ 4058



Site Generated Traffic Forecast
AM Peak Hour



Site Generated Traffic Forecast
PM Peak Hour

Future Traffic - 2020

Based on pre-consultation with City of Burlington staff, the following horizon years require analysis: opening year (2020) and five (5) years beyond opening year (2025). The following summarizes the future background and future total traffic volumes and an analysis of traffic operations at each horizon year.

2020 Future Background Traffic

The future background traffic volumes at the 2020 horizon have been estimated by applying a growth rate of one percent compounded per annum (total growth of 3.03 percent) to the base year traffic volumes. A review of the City's Development Activity Map for Ward 2 did not indicate any approved or in-stream developments within the vicinity of the subject site that should be included in the 2020 background forecasts. This was further confirmed by City staff. **Figure 7** illustrates the future background traffic volumes reasonably expected at the 2020 horizon.

2020 Future Total Traffic Volumes

The future total traffic volumes reasonably expected at the 2020 horizon upon full build-out, are illustrated in **Figure 8.1** and **Figure 8.2** and include the 2020 future background traffic forecasts (**Figure 7**) and site-generated traffic forecasts (**Figure 6.1** and **Figure 6.2**).

2020 Future Total Traffic Operations

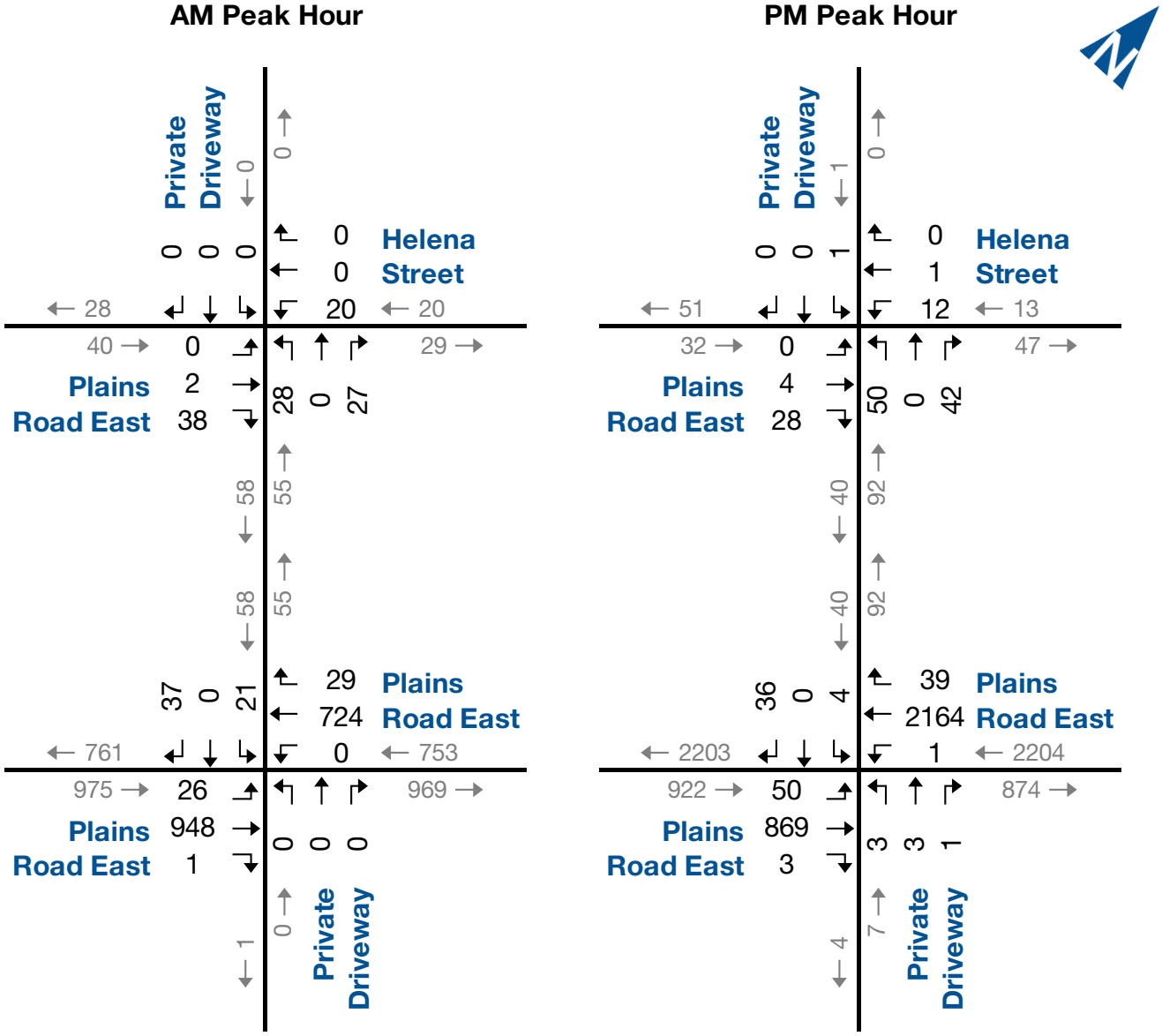
The operations of the study intersections at the 2020 horizon have been analyzed using the same analytical approach as with existing conditions, but using 2020 future total traffic forecasts. Stop control has been assumed at the proposed site driveway connection to Plains Road East (local). **Table 6** summarizes the results of the analysis and the following is noted:

- The intersection of Plains Road East and Plains Road East is forecast to operate with satisfactory (LOS C or better) levels of service, with the exception of the following:
  - The northbound approach in the PM peak hour is forecast to operate at LOS F, with a v/c ratio of 0.72 (an increase of 0.50 from existing conditions); however, this v/c ratio is within acceptable limits; and
  - The southbound left turn movement in the PM peak hour is forecast to operate at LOS F, with a v/c ratio of 0.14 (an increase of 0.04) from existing conditions).
- All other study area intersections and movements are forecast to operate at excellent levels of service.

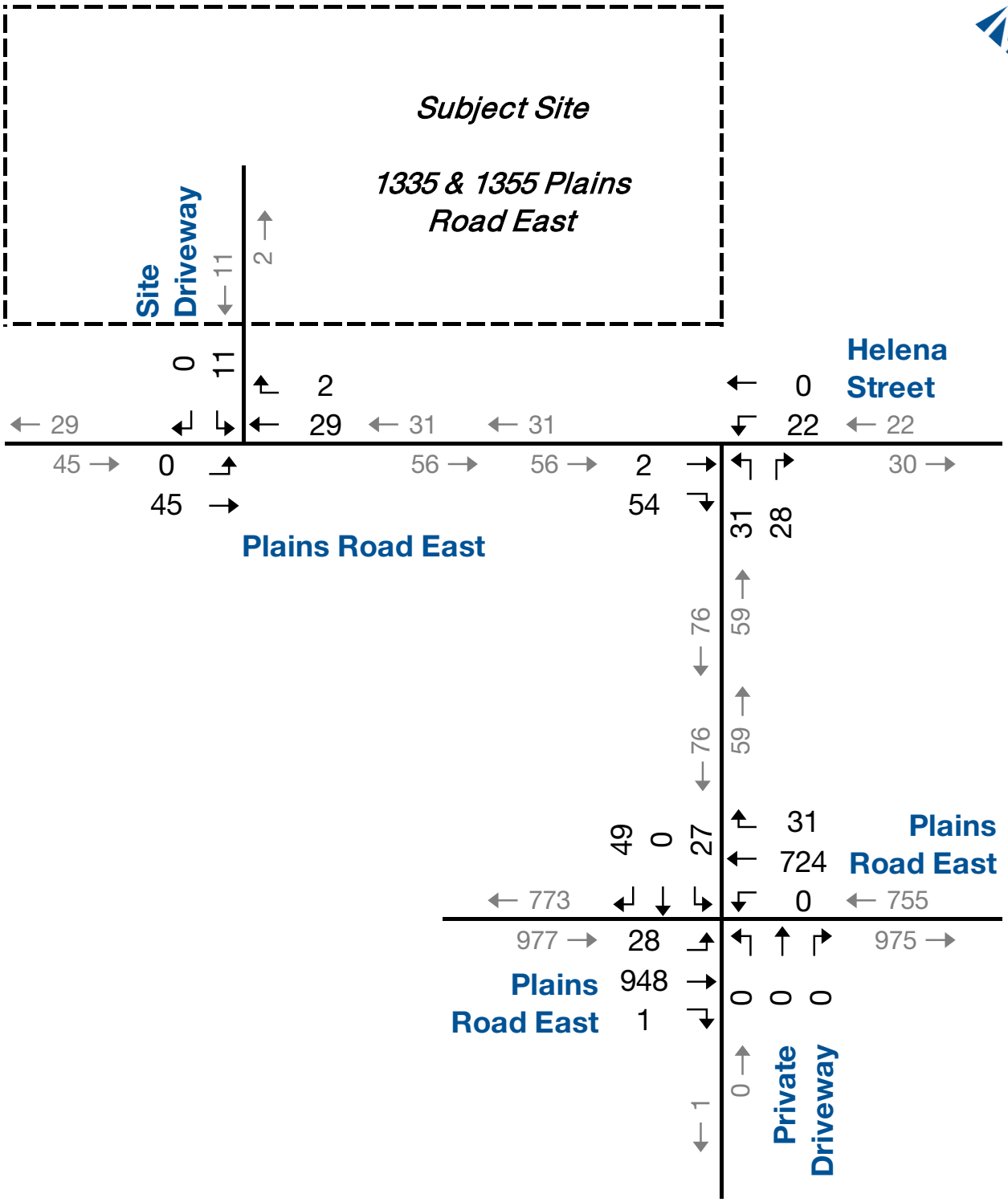
Appendix E contains the detailed Synchro reports.

The results of the analysis indicate the study area is forecast to operate with similar levels of service to existing conditions. The poor operations of the northbound and southbound approaches in the PM peak hour are noted to be related to the limited number of available gaps in the traffic stream on Plains Road East due to its high traffic volumes.

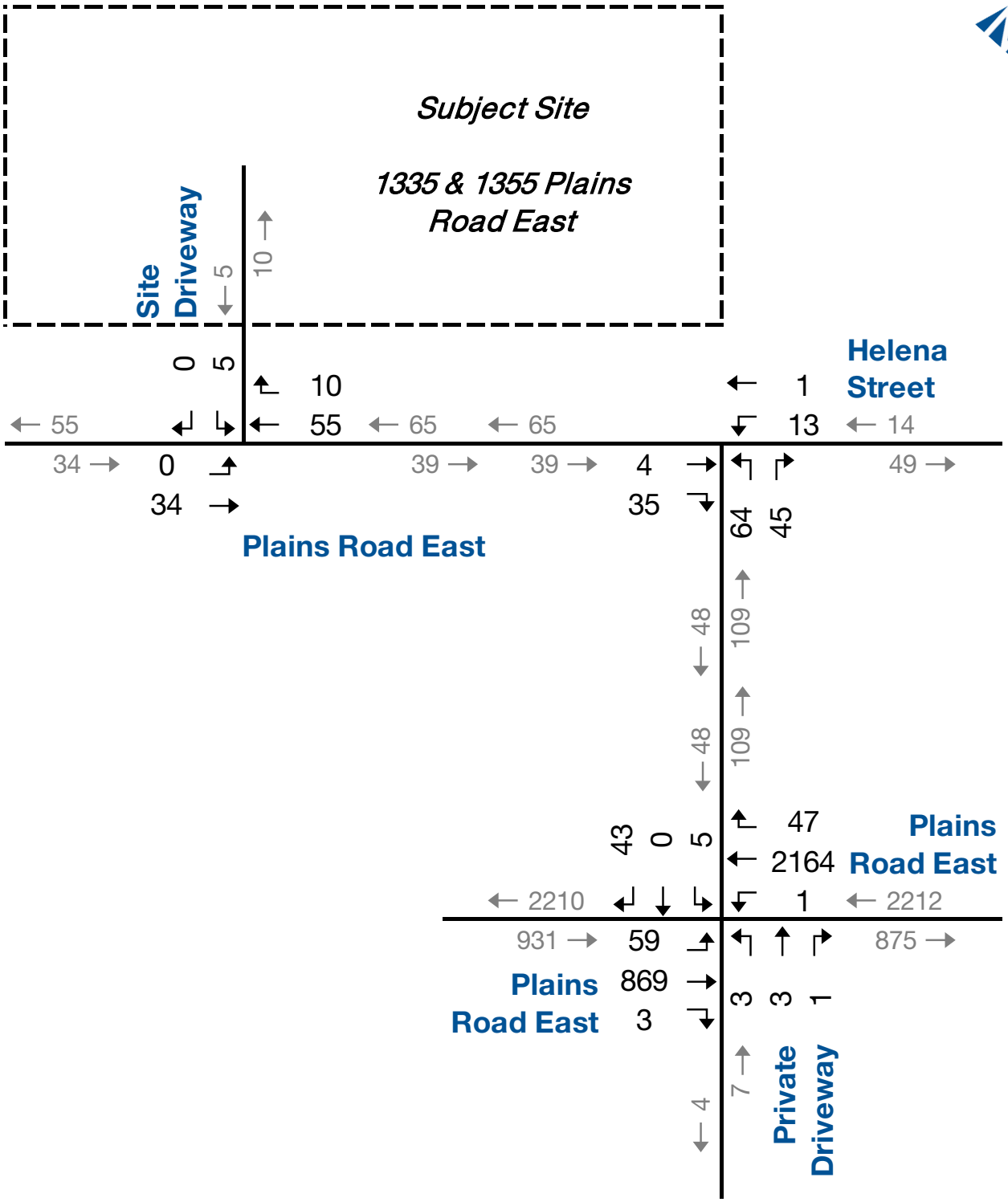




2020 Background Traffic Forecasts
AM & PM Peak Hour



2020 Total Traffic Forecast
AM Peak Hour



2020 Total Traffic Forecast
PM Peak Hour

TABLE 6: 2020 TOTAL TRAFFIC OPERATIONS SUMMARY

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach															
				Eastbound				Westbound				Northbound				Southbound			
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach
AM Peak Hour	1 - Plains Road East & Plains Road East/Private Driveway	TWSC	LOS	A	UM	>	**A**	<	UM	>	**A**	<	A	>	**A**	C	-	B	**B**
			Delay	10		>	**0**	<		>	**0**	<	0	>	**0**	19	-	12	**15**
			V/C	0.04		>		<		>		<	0.00	>		0.10	-	0.09	
			Q	1		>		<		>		<	0	>		3	-	2	
			Ex	20		>		<		>		<	-	>		-	-	-	
			Avail.	19		>		<		>		<	-	>		-	-	-	
	2 - Planes Road East & Helena Street	TWSC	LOS		B	A	**A**	<	A		**A**	A		A	**A**	**Approach Not Applicable**			
			Delay		11	9	**9**	<	10		**10**	4		4	**4**				
			V/C		0.00	0.05		<	0.03			0.02		0.02					
			Q		0	1		<	1			1		1					
			Ex		-	-		<	-			-		-					
			Avail.		-	-		<	-			-		-					
	3 - Plains Road East & Site Driveway	TWSC	LOS	<	UM		**A**		UM	>	**A**	**Approach Not Applicable**				A		A	**A**
			Delay	<			**0**			>	**0**					9		9	**9**
			V/C	<						>						0.01		0.01	
			Q	<						>						0		0	
			Ex	<						>						-		-	
			Avail.	<						>						-		-	
PM Peak Hour	1 - Plains Road East & Plains Road East/Private Driveway	TWSC	LOS	D	UM	>	**A**	<	UM	>	**A**	<	F	>	**F**	F	-	D	**E**
			Delay	33		>	**2**	<		>	**0**	<	667	>	**667**	126	-	32	**41**
			V/C	0.33		>		<		>		<	0.72	>		0.14	-	0.26	
			Q	11		>		<		>		<	12	>		4	-	8	
			Ex	20		>		<		>		<	-	>		-	-	-	
			Avail.	9		>		<		>		<	-	>		-	-	-	
	2 - Planes Road East & Helena Street	TWSC	LOS		B	A	**A**	<	B		**B**	A		A	**A**	**Approach Not Applicable**			
			Delay		11	9	**9**	<	10		**10**	4		4	**4**				
			V/C		0.01	0.04		<	0.02			0.04		0.04					
			Q		0	1		<	1			1		1					
			Ex		-	-		<	-			-		-					
			Avail.		-	-		<	-			-		-					
	3 - Plains Road East & Site Driveway	TWSC	LOS	<	UM		**A**		UM	>	**A**	**Approach Not Applicable**				A		A	**A**
			Delay	<			**0**			>	**0**					9		9	**9**
			V/C	<						>						0.01		0.01	
			Q	<						>						0		0	
			Ex	<						>						-		-	
			Avail.	<						>						-		-	

MOE - Measure of Effectiveness
LOS - Level of Service
Delay - Average Delay per Vehicle in Seconds

Q - 95th Percentile Queue Length (m)
Ex. - Existing Available Storage (m)
Avail. - Available Storage (m)

TCS - Traffic Control Signal
TWSC - Two-Way Stop Control
AWSC - All-Way Stop Control

<- Shared Left/Through Lane
>- Shared Right/Through Lane
UM - Unopposed Movement

Future Traffic - 2025

2025 Future Background Traffic

The future background traffic volumes at the 2025 horizon have been estimated by applying a growth rate of one percent compounded per annum (total growth of 8.29 percent) to the base year traffic volumes. A review of the City's Development Activity Map for Ward 2 did not indicate any approved or in-stream developments within the vicinity of the subject site that should be included in the 2020 background forecasts. This was further confirmed by City staff. **Figure 9** illustrates the future background traffic volumes reasonably expected at the 2025 horizon.

2025 Future Total Traffic Volumes

The future total traffic volumes reasonably expected at the 2025 horizon upon full build-out, are illustrated in **Figure 10.1** and **Figure 10.2** (attached) and include the 2025 future background traffic forecasts (**Figure 9**) and site-generated traffic forecasts (**Figure 6.1** and **Figure 6.2**).

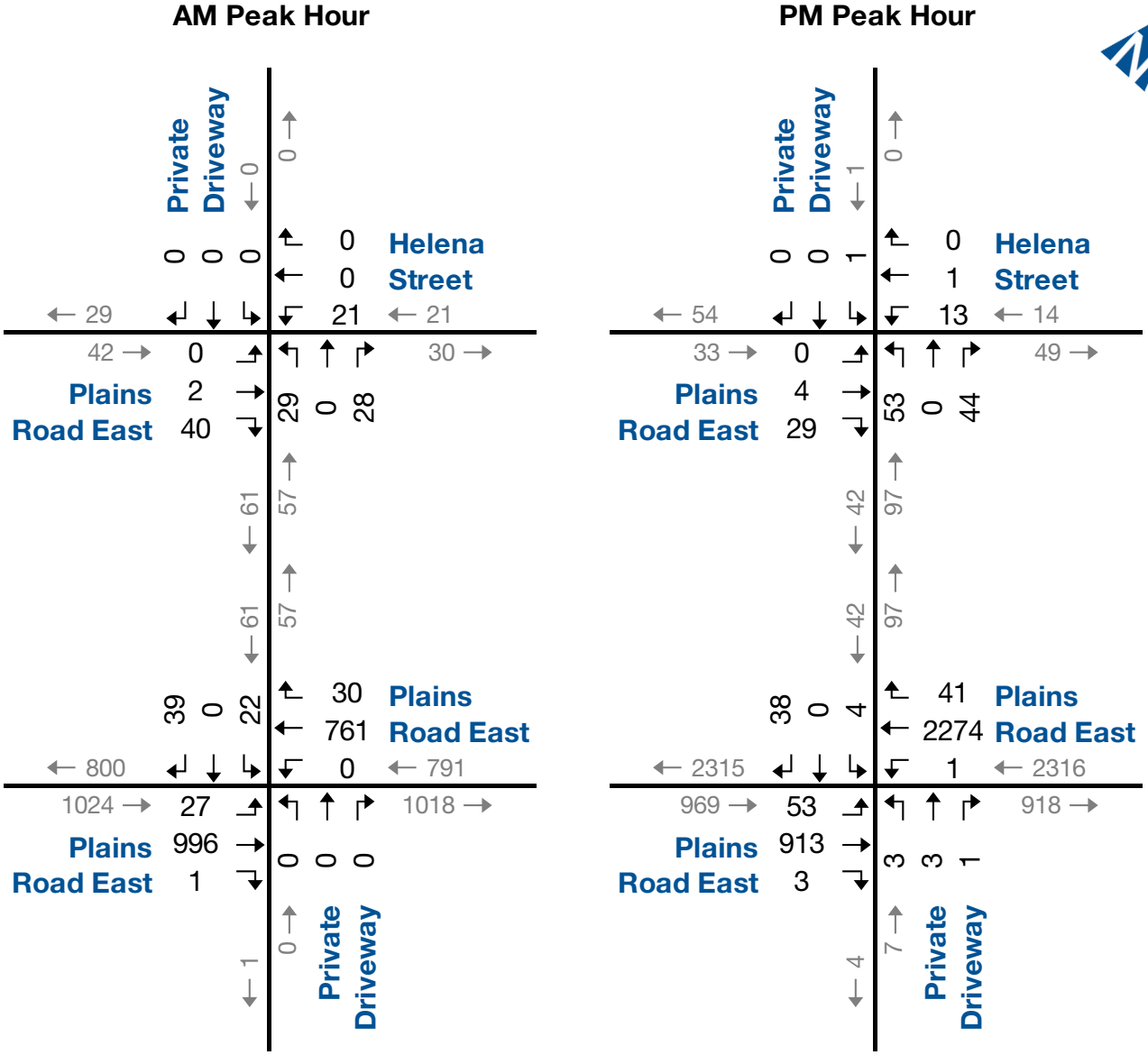
2025 Future Total Traffic Operations

The operations of the study intersections at the 2025 total traffic horizon have been analyzed using the same analytical approach as with existing and 2020 traffic conditions, but using 2025 future total traffic forecasts. Stop control has been assumed at the proposed site driveway connection to Plains Road East. **Table7** summarizes the results of the analysis and the following is noted:

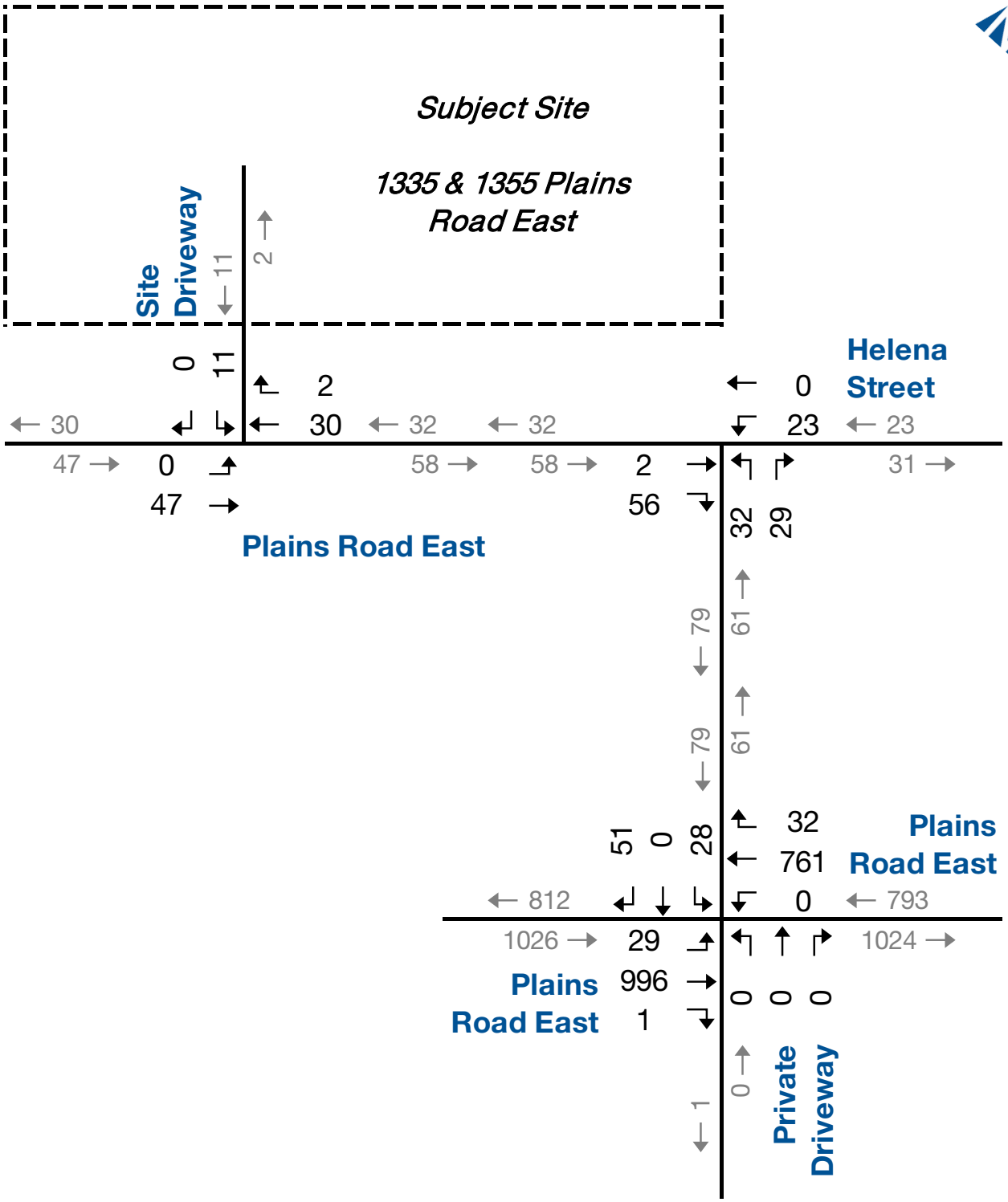
- The intersection of Plains Road East and Plains Road East is forecast to operate with satisfactory (LOS C or better) levels of service, with the exception of the following:
  - The northbound approach in the PM peak hour is forecast to operate at LOS F, with a v/c ratio of 1.03 (an increase of 0.83 from existing conditions); and
  - The southbound left turn movement in the PM peak hour is forecast to operate at LOS F, with a v/c ratio of 0.17 (an increase of 0.07) from existing conditions).
- All other study area intersections and movements are forecast to operate at excellent levels of service.

Appendix F contains the detailed Synchro reports.

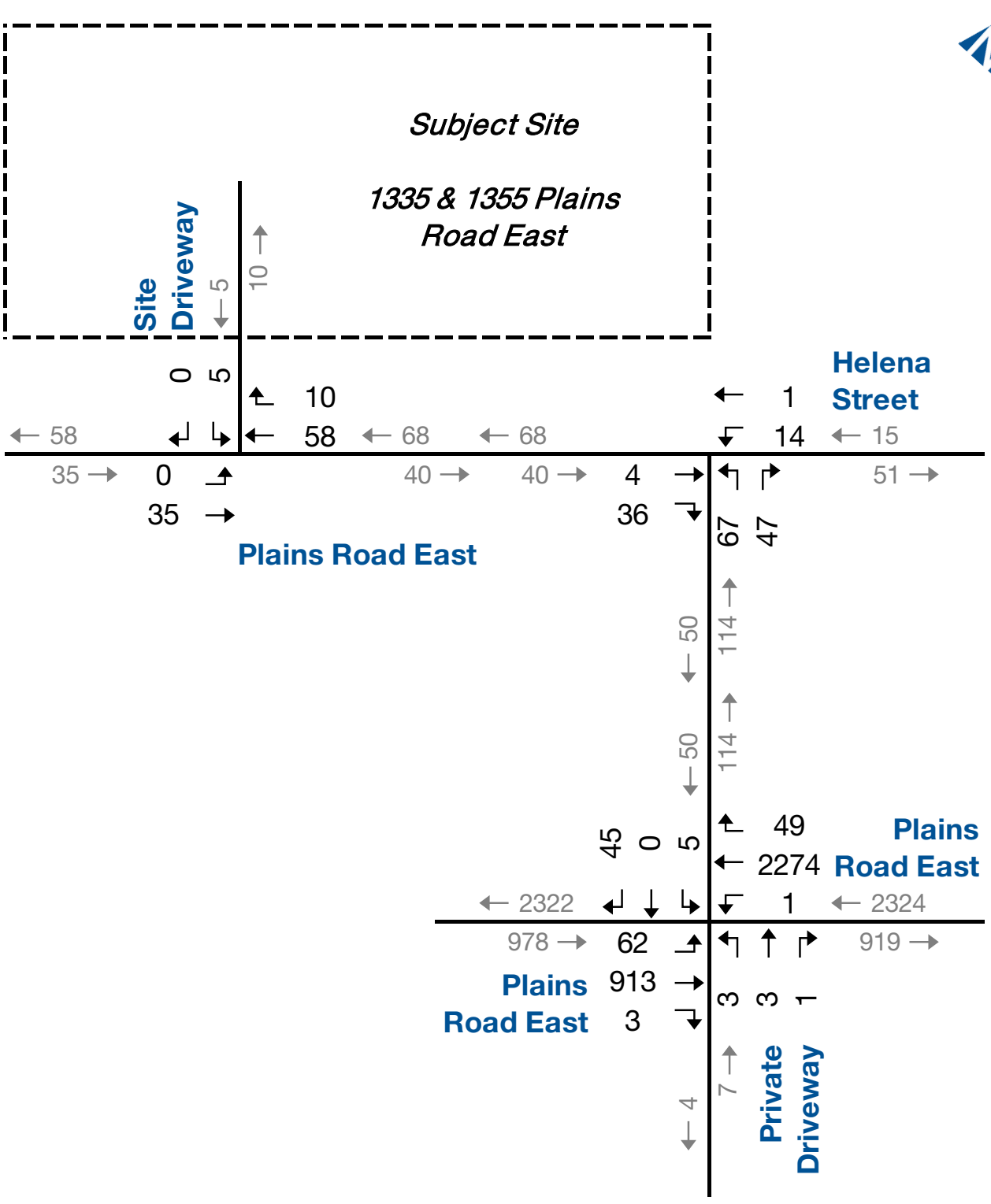
The results of the analysis indicate the study area is forecast to operate with similar levels of service to the 2020 horizon. The poor operations of the northbound and southbound approaches in the PM peak hour are noted to be related to the limited number of available gaps in the traffic stream on Plains Road East due to its high traffic volumes.



2025 Background Traffic Forecasts
AM & PM Peak Hour



2025 Total Traffic Forecast
AM Peak Hour



2025 Total Traffic Forecast
PM Peak Hour

TABLE 7: 2025 TOTAL TRAFFIC OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach															
				Eastbound				Westbound				Northbound				Southbound			
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach
AM Peak Hour	1 - Plains Road East & Plains Road East/Private Driveway	TWSC	LOS	A	UM	>	A	<	UM	>	A	<	A	>	A	C	-	B	C
			Delay	10		>	0	<		>	0	<	0	>	0	20	-	12	15
			V/C	0.04		>		<		>		<	0.00	>		0.11	-	0.10	
			Q	1		>		<		>		<	0	>		3	-	3	
			Ex	20		>		<		>		<	-	>		-	-	-	
			Avail.	19		>		<		>		<	-	>		-	-	-	
	2 - Planes Road East & Helena Street	TWSC	LOS		B	A	A	<	A		A	A		A	A	Approach Not Applicable			
			Delay		11	9	9	<	10		10	4		4	4				
			V/C		0.00	0.06		<	0.03			0.02		0.02					
			Q		0	1		<	1			1		1					
			Ex		-	-		<	-			-		-					
			Avail.		-	-		<	-			-		-					
	3 - Plains Road East & Site Driveway	TWSC	LOS	<	UM		A		UM	>	A	Approach Not Applicable				A		A	A
			Delay	<			0			>	0					9		9	9
			V/C	<						>						0.01		0.01	
			Q	<						>						0		0	
			Ex	<						>						-		-	
			Avail.	<						>						-		-	
PM Peak Hour	1 - Plains Road East & Plains Road East/Private Driveway	TWSC	LOS	E	UM	>	A	<	UM	>	A	<	F	>	F	F	-	E	E
			Delay	39		>	2	<		>	0	<	1037	>	1037	154	-	36	47
			V/C	0.39		>		<		>		<	1.03	>		0.17	-	0.30	
			Q	14		>		<		>		<	13	>		4	-	10	
			Ex	20		>		<		>		<	-	>		-	-	-	
			Avail.	7		>		<		>		<	-	>		-	-	-	
	2 - Planes Road East & Helena Street	TWSC	LOS		B	A	A	<	B		B	A		A	A	Approach Not Applicable			
			Delay		11	9	9	<	10		10	5		5	5				
			V/C		0.01	0.04		<	0.02			0.04		0.04					
			Q		0	1		<	1			1		1					
			Ex		-	-		<	-			-		-					
			Avail.		-	-		<	-			-		-					
	3 - Plains Road East & Site Driveway	TWSC	LOS	<	UM		A		UM	>	A	Approach Not Applicable				A		A	A
			Delay	<			0			>	0					9		9	9
			V/C	<						>						0.01		0.01	
			Q	<						>						0		0	
			Ex	<						>						-		-	
			Avail.	<						>						-		-	

MOE - Measure of Effectiveness
LOS - Level of Service
Delay - Average Delay per Vehicle in Seconds

Q - 95th Percentile Queue Length (m)
Ex. - Existing Available Storage (m)
Avail. - Available Storage (m)

TCS - Traffic Control Signal
TWSC - Two-Way Stop Control
AWSC - All-Way Stop Control

<- Shared Left/Through Lane
>- Shared Right/Through Lane
UM - Unopposed Movement

Parking Justification

Zoning By-Law Requirements

The City of Burlington's Zoning By-law 2020 requires 2.0 parking spaces per unit plus 0.35 visitor spaces per unit for stacked townhouse and back-to-back townhouse dwellings with exclusive garages. Under this By-law, a total of 89 parking spaces are required to service the site: 76 resident parking spaces and 13 visitor spaces. A total of 81 parking spaces are proposed to service the development: 76 resident spaces and five (5) visitor parking spaces. This is a deficiency of eight (8) visitor parking spaces, or 9% of the total By-law parking space requirement as shown in **Table 8**.

TABLE 8: BY-LAW 2020 PARKING REQUIREMENTS

Land Use	Units	Zoning By-Law 2020	
		Parking Rate	Spaces Required
Stacked and/or Back-to-Back Townhouse	38	2.0 spaces per unit	76
Vistor Parking		0.35 spaces per unit	13
Total By-Law Parking Requirements			**89**
Proposed Number of Spaces			**81**
Stall Deficiency			**-8**
Percent Deficiency			**9%**

ITE Parking Generation

The Institute of Transportation Engineers' (ITE) Parking Generation Manual (4th Edition)[3] provides data on parking surveys conducted across the United States and Canada of peak parking demands for different land uses. The data for land use code (LUC) 230 (Residential Condominium/Townhouse) was referenced to determine the average number of parked vehicles per dwelling unit.

The data for LUC 230 was collected at nine (9) sites in the United States and one in Canada between 1981 and 2004; eight of the nine study sites were located in suburban environments. The average size of the study sites was 151 dwelling units with a parking supply of 1.4 spaces per dwelling unit. The peak demand for the sites occurred between 11:00 PM and 6:00 AM. The average parking demand was 1.38 spaces per dwelling unit.

Table 9 summarizes the parking demand characteristics based on ITE parking generation data and indicates that 52 spaces will be required to service the site. Based on the proposed supply of 81 spaces, the development could have a surplus of 29 parking spaces or 56% more parking spaces than required to service the development. This estimation does not differentiate between resident and visitor parking spaces and therefore assumes some units would have available parking spaces within garages or on private driveways.

[3] Institute of Transportation Engineers. Parking Generation Manual, (4th Edition). Washington D.C. 2010.

TABLE 9: ITE PARKING GENERATION REQUIREMENTS

Land Use	Units	ITE Parking Generation	
		Parking Rate	Spaces Required
LUC 230 (Residential Condominium/Townhouse	38	1.38 spaces per unit	52
Total ITE Parking Generation Requirement			**52**
Proposed Number of Spaces			**81**
Stall Surplus			**29**
Percent Surplus			**56%**

Transportation Tomorrow Auto Ownership

The need for parking at a development is partly based on auto ownership rates and the assumption that each automobile will require parking. In order to better understand the auto ownership characteristics within the study area, results from the 2011 Transportation Tomorrow Survey (TTS) were reviewed. The data was queried to display auto ownership rates for townhouse units within traffic analysis zone 4058. The subject site is located within a built-up area where little to no future development is expected; therefore, the resulting auto ownership is considered to accurately reflect current and future conditions.

The auto ownership rates for the townhouse units located within the queried zones are shown in **Table 10** and indicate that:

- 100% of the townhouse units within the queried zone own at least one vehicle;
- The average number of vehicles per townhouse is 1.57;
- If auto ownership for the proposed development is consistent with the rate of auto ownership within the queried zone, a total of 60 parking spaces will be required to service the vehicles owned by the residents of the 38 proposed units;
- If auto ownership for the proposed development is consistent with the rate of auto ownership within the queried zone, there will be a surplus of 21 parking spaces, or 26% of the proposed parking supply; and
- The proposed parking supply rate equates to 2.0 spaces per unit which is higher than the TTS average number of vehicles per townhouse.

TABLE 10: TTS AUTO OWNERSHIP FOR TOWNHOUSES

Number of Vehicles per Unit	Number of Units	Total Vehicles
0	0	0
1	458	458
2	298	596
3	93	279
TOTAL	**849**	**1333**
Units with at least one vehicle		100%
TTS vehicles per unit		1.57
Proposed number of units		38
Parking required for development based on TTS auto ownership		**60**
Proposed parking supply		**81**
Surplus Spaces		**21**
Percent Surplus		**35%**

It should be noted that the TTS data does not include visitor parking requirements. If the By-law parking requirements for visitors (0.35 spaces/unit) is applied the proposed 38 units, a total of 14 visitor spaces will be required in addition to the 60 resident spaces required under TTS, for a total of 74 spaces. This results in a surplus of seven (7) spaces or 9% of the proposed parking supply. As well, the visitor parking may be accommodated within private driveways if the rate of auto ownership at this development remains consistent with the queried TAZ and the owned vehicle is parking within the garage.

On-Street Parking

As part of the site visit, existing parking restrictions within 150 metres of the subject site were documented to determine where short-term visitor parking needs could be accommodated on-street if demand exceeds on-site supply. At present, parking is prohibited on the east side of Helena Street within 20 metres of the intersection of Helena Street and Plains Road East (local). No other parking restrictions are in place within the study area.



The inventory is shown in **Table 11** and indicates there are approximately 35 on-street parking spaces available to service the visitor parking demands that may occasionally exceed the site's supply. This table is based on the estimated supply since on-street parking locations are not clearly delineated; therefore, the actual supply will vary depending on how vehicles are parked. Note that no other off-street parking is provided within the study area.

TABLE 11 STUDY AREA ON-STREET PARKING SUPPLY

Street	Location	Side	Restrictions[1]	Number of Spaces (approx)
Plains Road East (local)	Helena Street to Glendor Avenue	North	None	4
	Helena Street to Glendor Avenue	South	None	11
Helena Street	Plains Road East to Leighland Road	East	No parking within 20 metres of Plains Road East	11
	Plains Road East to Leighland Road	West	None	9
Total Study Area On-Street Parking Supply				**35**

[1] - Restrictions beyond those outlined in the City's By-law (re: overnight parking, five hour maximum).

Under the City's Parking By-law, parking on residential streets is prohibited between 1 AM and 6 AM, and parking is limited to five hours at all other times. In July 2016, the City approved the Neighbourhood On-Street Parking Program (NOSPP) which specifies designated areas where vehicles are permitted to park on residential streets between 1 AM and 6 AM. The study area does not include any streets that are designated within the NOSPP.

The Urban Land Institute publishes a document on shared parking[4] which includes information related to time-of-day demand for various land uses. **Table 12** summarizes the factors for residential guest parking and illustrates that peak visitor demand usually occurs between 6 PM to 10 PM during both weekdays and weekends. Therefore, the need for on-street parking to supplement the on-site parking should be limited to about four hours each day.

TABLE 12: RECOMMENDED TIME-OF-DAY FACTORS – RESIDENTIAL GUEST/VISITOR

Time	7 AM	8 AM	9 AM	10 AM	11 AM	12 AM	1 PM	2 PM	3 PM
Weekday[1]	10%	20%	20%	20%	20%	20%	20%	20%	20%
Weekend[2]	20%	20%	20%	20%	20%	20%	20%	20%	20%
Time	**4 PM**	**5 PM**	**6 PM**	**7 PM**	**8 PM**	**9 PM**	**10 PM**	**11 PM**	**12 AM**
Weekday	20%	40%	60%	100%	100%	100%	100%	80%	50%
Weekend	20%	40%	60%	100%	100%	100%	100%	80%	50%

[1] - Table 2-5, Urban Land Institute: *Shared Parking, 2005*

[2] - Table 2-6, Urban Land Institute: *Shared Parking, 2005*

Overall Parking Assessment

Based on the foregoing, the proposed development will have a deficiency of five parking spaces based on the City's Zoning By-Law. However, it is noted that the Zoning By-Law requirement of 2.35

[4] Urban Land Institute. Shared Parking, Second Edition, 2005.

parking spaces per townhouse unit is significantly higher than the average ITE parking generation rate of 1.35 spaces per unit. The rate of parking proposed for the development is 2.13 spaces per unit.

In addition, the Zoning By-Law rate and the proposed development rate assumes two autos per townhouse unit. However, the auto ownership in the study area based on TTS data is 1.57 autos per unit. Overall, the total parking supply for the proposed development is higher than the parking demand identified for similar developments (ITE), and higher than what would be required based on auto ownership in the study area (TTS).

As indicated, the theoretical shortfall in visitor supply could be addressed by on-street parking based on available supply as well as the peak time requirement for visitor parking identified by the Urban Land Institute.

Summary

In summary, the development is forecast to have a minimal impact on the surrounding road network, with the addition of 22 trips in the weekday AM peak hour and 24 trips in the weekday PM peak hour.

Based on the above analyses, it is concluded that:

- The development should be allowed to develop as planned;
- The City of Burlington monitor traffic volumes at the intersection of Plains Road East (collector) and Plains Road East (local) to ensure reasonable levels of service are provided; and
- The City accept the reduced parking provisions for this site.

We trust this information sufficiently outlines the potential impacts of the proposed development. Please do not hesitate to contact us if we can be of further assistance.

Yours very truly,

PARADIGM TRANSPORTATION SOLUTIONS LIMITED



Stew Elkins
B.Sc., MITE
Vice-President

APPENDIX A
TERMS OF REFERENCE



Andrew Steinsky

From: Jill Juhlke
Sent: October 17, 2017 11:10 AM
To: Zunic, John
Cc: Andrew Steinsky
Subject: RE: 170263: 1335 & 1355 Plains Road East Scope of Work

Follow Up Flag: Follow up
Flag Status: Completed

Thank you John. We will proceed on this basis.

I appreciate you working with us to get this study completed in a timely manner.

Jill Juhlke, Dipl.T., C.E.T., MITE
Senior Transportation Engineering Technologist

Paradigm Transportation Solutions Limited
22 King Street South, Suite 300, Waterloo ON N2J 1N8
p: 905.381.2229 x301 or 519.896.3163 x301
e: jjuhlke@ptsl.com
w: www.ptsl.com

From: Zunic, John [mailto:John.Zunic@burlington.ca]
Sent: October 17, 2017 11:06 AM
To: Jill Juhlke <jjuhlke@ptsl.com>
Subject: RE: 170263: 1335 & 1355 Plains Road East Scope of Work

Hi Jill,
In light of the situation outlined below, it would be our preference that PTSL use the City's TMC from 2013 for the purpose of your study, and apply a background growth rate of 1% compounded annually. The TMC data is available for purchase and I'd recommend that you contact Florin Patrau (contact information provided below) for more information.

Florin Patrau | Traffic Technologist
Transportation Services Department
City of Burlington
Phone: 905-335-7671 x 7838
Florin.Patrau@Burlington.ca

Thanks,

John Zunic
Transportation Planning Technologist
Transportation Services Department, City of Burlington
426 Brant Street, Burlington, Ontario L7R 3Z6

tel. 905-335-7600 ext. 7691
john.zunic@burlington.ca

Please consider the environment before printing this e-mail.

From: Jill Juhlke [mailto:jjuhlke@ptsl.com]
Sent: Tuesday, October 17, 2017 10:50 AM
To: Zunic, John
Cc: Andrew Steinsky
Subject: RE: 170263: 1335 & 1355 Plains Road East Scope of Work

Hi John,

Our client is quite anxious to submit their formal application for these sites. Our report is required as part of the submission and if we have to wait until mid to late November to conduct the counts, it will not be ready until mid-December.

We understand the City requires a full TIS as part of the submission, but is there any way the application can be submitted with a trip generation memo in the interim until we can collect the count data? I have looked at the ITE Trip Gen for LUC 230 Residential Condominium/Townhouse and using the conservative equation rates, the 39 proposed units will generate a total of 24 trips during the AM peak hour and 28 trips during the PM peak hour. These are very low volumes of traffic that will not have a significant overall impact to the operations of the Plains Road E (local) & Helena Street and Plains Road E (arterial) & Plains Road E (local) intersections.

Please advise if this will be acceptable.

Thank you,

Jill Juhlke, Dipl.T., C.E.T., MITE
Senior Transportation Engineering Technologist

Paradigm Transportation Solutions Limited
22 King Street South, Suite 300, Waterloo ON N2J 1N8
p: 905.381.2229 x301 or 519.896.3163 x301
e: jjuhlke@ptsl.com
w: www.ptsl.com

From: Zunic, John [mailto:John.Zunic@burlington.ca]
Sent: October 16, 2017 1:47 PM
To: Andrew Steinsky <asteinsky@ptsl.com>
Cc: Jill Juhlke <jjuhlke@ptsl.com>
Subject: RE: 170263: 1335 & 1355 Plains Road East Scope of Work

Hi Andrew,

With respect to your first question, that is correct – Transportation Services will be looking for the intersection of Plains Road East (Local)/Plains Road East (Major Arterial) to be analyzed in addition to the intersection of Plains Road East (local)/Site Driveway.

With respect to your second point, the City has count data for the intersection identified, however, the count was conducted in 2013. Given that the count was conducted 5 years ago, we do not necessarily feel that it is still accurate. As such, it is recommended that the TMC for Plains Rd. E (local)/Plains Rd. E (major arterial) be conducted after construction has more or less wrapped up (mid-November, as per the tentative timing provided on the City's website).

Thanks,

John Zunic
Transportation Planning Technologist
Transportation Services Department, City of Burlington
426 Brant Street, Burlington, Ontario L7R 3Z6

tel. 905-335-7600 ext. 7691
john.zunic@burlington.ca

Please consider the environment before printing this e-mail.

From: Andrew Steinsky [mailto:asteinsky@ptsl.com]
Sent: Monday, October 16, 2017 1:18 PM
To: Zunic, John
Cc: Jill Juhlke
Subject: RE: 170263: 1335 & 1355 Plains Road East Scope of Work

Hi John,

Thank you for getting back to me. Based on the comments received, could you please provide some clarification on the following points:

1. Does the request for a TMC at the intersection of Plains Road East (local) & Plains Road East (major arterial) indicate that the City requires this intersection analyzed (LOS, v/c, etc.), in addition to the intersection of Plains Road East (local)/Site Driveway/Helena Street. Our original intention was to review the Plains Road East (local)/Site Driveway/Helena Street intersection exclusively;

2. In recognition of the ongoing construction along this segment of Plains Road East (major arterial), does the City have any previous count data available for this intersection. We are concerned that completing a TMC at the intersection at this time may yield lower than typical traffic volumes. We offer three possibilities to rectify this potential traffic volume related issue, and request the City identify which possibility would be acceptable:
    a. Conduct the TMC as is;
    b. Conduct the TMC after construction has more or less wrapped up (scheduled for mid-November, courtesy of the following schedule on the City's website: https://www.burlington.ca/en/services-for-you/plains-road-east-minor-reconstruction.asp); or
    c. Factor up an older TMC (within the previous four years, if available) using a background growth rate of 1.0% compounded per annum.

I have cc'd my colleague, Jill Juhlke, for whom I am assisting with this project. Please include her in any responses.

Thanks,

Andrew Steinsky, B.Eng., EIT

Transportation Consultant

Paradigm Transportation Solutions Limited
p: 416.479.9684 x507

From: Zunic, John [mailto:John.Zunic@burlington.ca]
Sent: October 16, 2017 10:52 AM
To: Andrew Steinsky <asteinsky@ptsl.com>
Subject: RE: 170263: 1335 & 1355 Plains Road East Scope of Work

Hi Andrew,
My apologies for the delayed response. Please see my comments to your scope of work below, in red.
Thanks,

John Zunic
Transportation Planning Technologist
Transportation Services Department, City of Burlington
426 Brant Street, Burlington, Ontario L7R 3Z6

tel. 905-335-7600 ext. 7691
john.zunic@burlington.ca

Please consider the environment before printing this e-mail.

From: Andrew Steinsky [mailto:asteinsky@ptsl.com]
Sent: Friday, October 06, 2017 9:33 AM
To: Zunic, John
Subject: 170263: 1335 & 1355 Plains Road East Scope of Work

Hello John,

Paradigm Transportation Solutions Limited has been retained to complete a Traffic Brief and Parking Justification report for a proposed residential development to be located at 1335 & 1355 Plains Road East in the City of Burlington. The subject lands are located on the north side of Plains Road East, west of Helena Street. This email contains our understanding of the project and our intended work plan. We would ask the City to review this work plan and provide any comments no later than **Friday October 13, 2017** so that we may remain on schedule.

The subject site is currently occupied by the Ressel School and a small business within a one storey structure. These buildings will be removed to facilitate the redevelopment which is proposed to consist of 39 townhouses (30 back to back units, and 9 standard townhouses). Each unit will have two parking spaces: one in the attached garage, and another in the driveway. Five (5) visitor spaces are proposed for the site. Access to internal units on the site is proposed via one all movements driveway connection to Plains Road East. Units fronting onto Plains Road East and Helena Street will be provided via direct driveway connections.

Based on our current understanding of the redevelopment, we propose to carry out the following work plan:

TRAFFIC BRIEF

- **Task 1 – Data Collection:** Through consultation with our client we understand that the existing Ressel School is no longer in operation; however, an existing business remains open on a portion of the subject site with access to Plains Road East. We will conduct a turning movement count at this existing site access onto Plains Road East to establish existing traffic volumes within the vicinity of the subject site. This will enable us to account for existing traffic accessing the site, which will be factored out of future traffic estimates.

  Turning movement counts should be conducted at the proposed site entrance/Plains Rod East (local), as well as the intersection of the Plains Road East (local)/Plains Road East (Major Arterial).

- **Task 2 – Site Visit:** Paradigm will undertake a site visit to inventory the traffic and roadway conditions in the immediate area of the subject site, including lane configurations and traffic control. The site visit will also confirm pedestrian, cycling, and transit amenities, and traffic regulations and parking restrictions on the study area roadways.

- **Task 3 – Traffic Forecasting:** AM and PM peak hour site generated traffic forecasts will be developed based on trip generation data contained in the Institute of Transportation Engineer's Trip Generation Manual (9th Edition), and modal split information contained in the Transportation Tomorrow Survey. Traffic projections for an opening year of 2020 as well as 5 years post-development will be developed based on a growth rate provided by the City. **We would ask City staff to confirm the growth rate to be used.** Any existing traffic accessing the site will be netted out to avoid double counting of trips. A review of the development activity map for Ward 2 does not indicate any approved or in-stream developments that may affect future traffic forecasts. **Please confirm if there are any developments that are not presented on this map, but which should be included in our work.**

  The annual growth rate to be used is 1%. For development-related questions, please contact Rosalind Minaji, Coordinator of Development Review. Her contact information is:

  Rosalind Minaji MCIP RPP
  Coordinator of Development Review
  Burlington Planning & Building Department
  426 Brant Street, Burlington L7R 3Z6
  Phone: 905-335-7600 Ext. 7809
  Fax: 905-335-7880
  Email: rosalind.minaji@burlington.ca

- **Task 4 – Operational Analysis**: We will conduct level of service analysis for the proposed driveway connection to Plains Road East. We will also assess the potential impacts of direct driveway access to Plains Road East by comparing to existing and previous conditions and the City's plan to make Plains Road a more neighbourhood type corridor in the longer term. Any geometric or driveway alignment recommendations will be made using industry standard methods and professional judgment.

PARKING JUSTIFICAITON STUDY

- **Task 5 – Area Parking Inventory:** Paradigm staff will undertake an inventory of the current available on-street parking within convenient walking distance of the development. This will be used to demonstrate the additional supply of parking available if there are times when spillover parking may occur.

- **Task 6 – Parking Generation:** Paradigm will review the ITE Parking Generation Manual (4th Edition) to assess the potential parking needs of the development. We will also refer to Transportation Tomorrow

Survey (TTS) data and consider the impact walking, cycling, and transit use may have on parking demand on-site.

- **Task 7 – Parking Assessment:** Paradigm will assess the extent to which parking on-site can be accommodated and document the potential for spill-over parking that may need to be accommodated within the surrounding area.

If there are any questions related to this work plan or development, please do not hesitate to contact me.

Thanks,

Andrew Steinsky, B.Eng., EIT
Transportation Consultant

Paradigm Transportation Solutions Limited
5000 Yonge Street, Suite 1901, Toronto, Ontario, M2N 7E9
p: 416.479.9684 x507
e: asteinsky@ptsl.com
w: www.ptsl.com

This e-mail and any files transmitted with it are confidential and intended solely for the use of the individual or entity to whom they are addressed. If you have received this e-mail in error please notify the sender immediately. Please note that any views or opinions presented in this e-mail are solely those of the author and do not necessarily represent those of Paradigm Transportation Solutions Limited. Finally, the recipient should check this e-mail and any attachments for the presence of viruses. Paradigm Transportation Solutions Limited accepts no liability for any damage caused by any virus transmitted by this e-mail.
This message, including any attachments, is privileged and intended only for the addressee(s) named above. If you are not the intended recipient, you must not read, use or disseminate the information contained in this email/fax. If you have received this email/fax transmission in error, please notify the sender immediately by telephone, fax or email and permanently delete this email from your computer/shred this fax, including any attachments, without making a copy. Access to this email/fax by anyone else is unauthorized. Thank you.
This e-mail and any files transmitted with it are confidential and intended solely for the use of the individual or entity to whom they are addressed. If you have received this e-mail in error please notify the sender immediately. Please note that any views or opinions presented in this e-mail are solely those of the author and do not necessarily represent those of Paradigm Transportation Solutions Limited. Finally, the recipient should check this e-mail and any attachments for the presence of viruses. Paradigm Transportation Solutions Limited accepts no liability for any damage caused by any virus transmitted by this e-mail.
This message, including any attachments, is privileged and intended only for the addressee(s) named above. If you are not the intended recipient, you must not read, use or disseminate the information contained in this email/fax. If you have received this email/fax transmission in error, please notify the sender immediately by telephone, fax or email and permanently delete this email from your computer/shred this fax, including any attachments, without making a copy. Access to this email/fax by anyone else is unauthorized. Thank you.
This e-mail and any files transmitted with it are confidential and intended solely for the use of the individual or entity to whom they are addressed. If you have received this e-mail in error please notify the sender immediately. Please note that any views or opinions presented in this e-mail are solely those of the author and do not necessarily represent those of Paradigm Transportation Solutions Limited. Finally, the recipient should check this e-mail and any attachments for the presence of viruses. Paradigm Transportation Solutions Limited accepts no liability for any damage caused by any virus transmitted by this e-mail.

This message, including any attachments, is privileged and intended only for the addressee(s) named above. If you are not the intended recipient, you must not read, use or disseminate the information contained in this email/fax. If you have received this email/fax transmission in error, please notify the sender immediately by telephone, fax or email and permanently delete this email from your computer/shred this fax, including any attachments, without making a copy. Access to this email/fax by anyone else is unauthorized. Thank you.

APPENDIX B
TRAFFIC DATA



Plains Rd @ Glendor Ave

Morning Peak Diagram

Specified Period
From: 7:00:00
To: 9:00:00

One Hour Peak
From: 7:45:00
To: 8:45:00

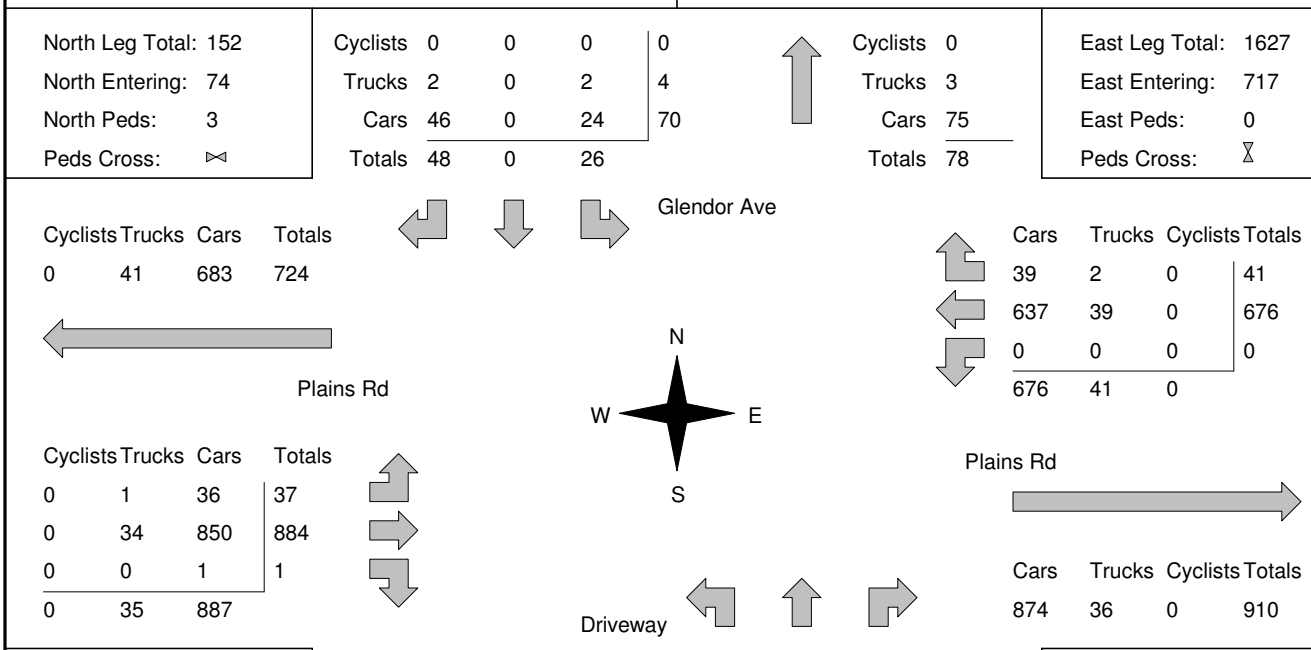
Municipality: Burlington
Site #: 0000201683
Intersection: Plains Rd & Glendor Ave
TFR File #: 3
Count date: 12-Nov-2013

Weather conditions:
Sunny/Dry

Person(s) who counted:
Bronek

**** Non-Signalized Intersection ****

Major Road: Plains Rd runs W/E



Comments

Plains Rd @ Glendor Ave

Mid-day Peak Diagram

Specified Period
From: 11:00:00
To: 14:00:00

One Hour Peak
From: 12:00:00
To: 13:00:00

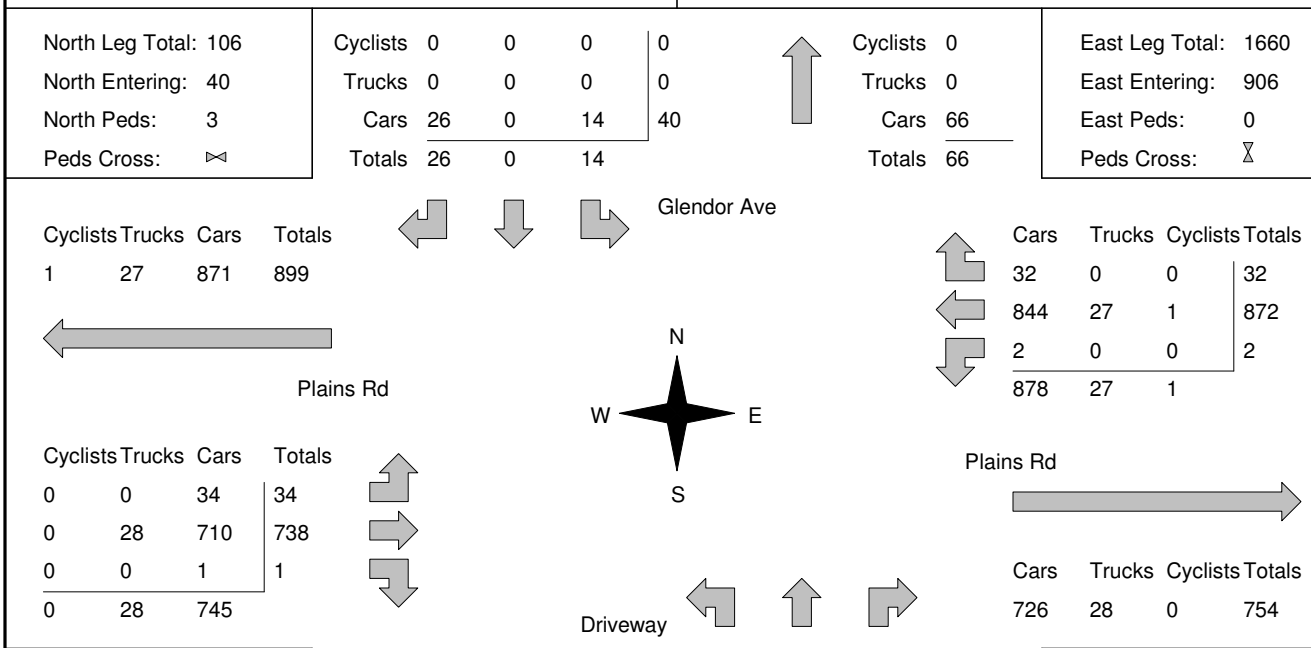
Municipality: Burlington
Site #: 0000201683
Intersection: Plains Rd & Glendor Ave
TFR File #: 3
Count date: 12-Nov-2013

Weather conditions:
Sunny/Dry

Person(s) who counted:
Bronek

**** Non-Signalized Intersection ****

Major Road: Plains Rd runs W/E



Comments

Plains Rd @ Glendor Ave

Afternoon Peak Diagram

Specified Period
From: 15:00:00
To: 18:00:00

One Hour Peak
From: 17:00:00
To: 18:00:00

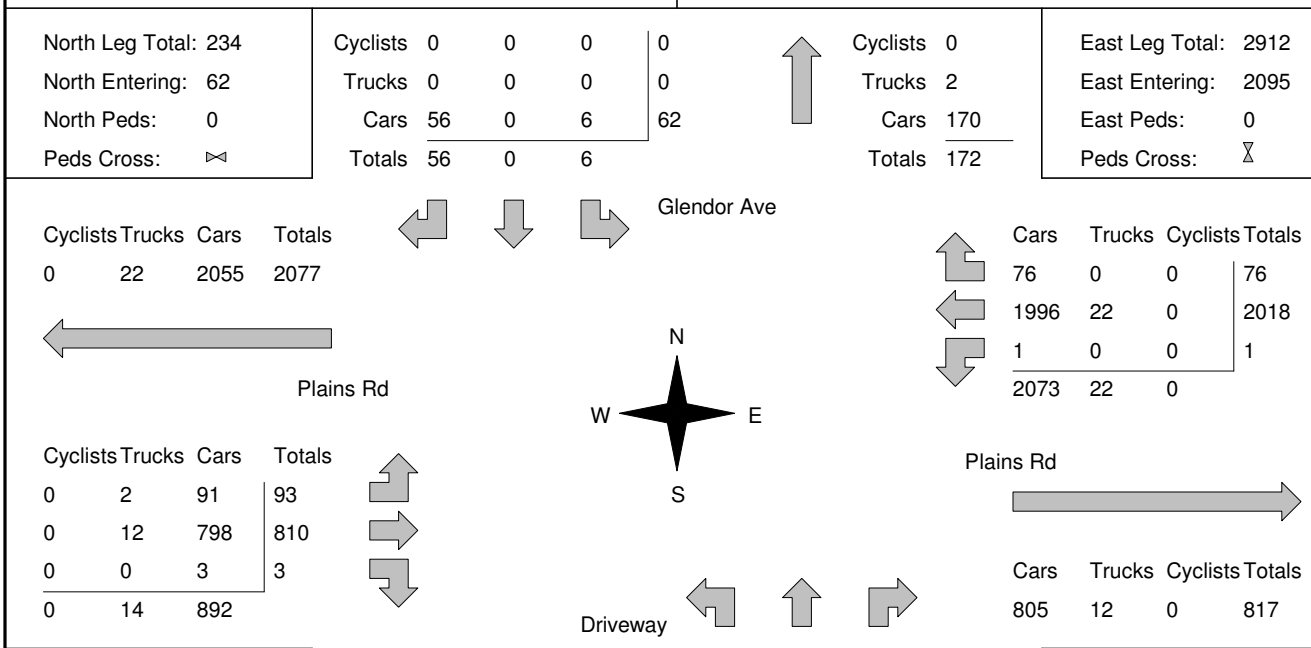
Municipality: Burlington
Site #: 0000201683
Intersection: Plains Rd & Glendor Ave
TFR File #: 3
Count date: 12-Nov-2013

Weather conditions:
Sunny/Dry

Person(s) who counted:
Bronek

**** Non-Signalized Intersection ****

Major Road: Plains Rd runs W/E



Comments

Plains Rd @ Glendor Ave

Total Count Diagram

Municipality: Burlington
Site #: 0000201683
Intersection: Plains Rd & Glendor Ave
TFR File #: 3
Count date: 12-Nov-2013

Weather conditions:
Sunny/Dry

Person(s) who counted:
Bronek

**** Non-Signalized Intersection ****

Major Road: Plains Rd runs W/E

North Leg Total: 1204
North Entering: 441
North Peds: 17
Peds Cross: ⋈

Cyclists	0	0	0	0
Trucks	9	0	6	15
Cars	308	1	117	426
Totals	317	1	123	

Cyclists	0
Trucks	22
Cars	741
Totals	763

East Leg Total: 14936
East Entering: 8572
East Peds: 3
Peds Cross: ⧖

Glendor Ave

Cyclists	Trucks	Cars	Totals
2	269	8265	8536

Cars	Trucks	Cyclists	Totals
344	9	0	353
7951	259	2	8212
7	0	0	7
8302	268	2	

Plains Rd

N
W E
S

Cyclists	Trucks	Cars	Totals
0	13	394	407
2	191	6041	6234
0	0	10	10
2	204	6445	

Plains Rd

Cars	Trucks	Cyclists	Totals
6164	198	2	6364

Driveway

Peds Cross: ⧖
West Peds: 3
West Entering: 6651
West Leg Total: 15187

Cars	18
Trucks	0
Cyclists	0
Totals	18

Cars	6	3	6	15
Trucks	1	0	1	2
Cyclists	0	0	0	0
Totals	7	3	7	

Peds Cross: ⋈
South Peds: 9
South Entering: 17
South Leg Total: 35

Comments

Plains Rd @ Glendor Ave

Annual Average Daily Traffic Diagram

Total Factor = Monthly Factor(0.99) x Daily Factor(0.93) x 24 Hour Factor(1.85) = 1.703295

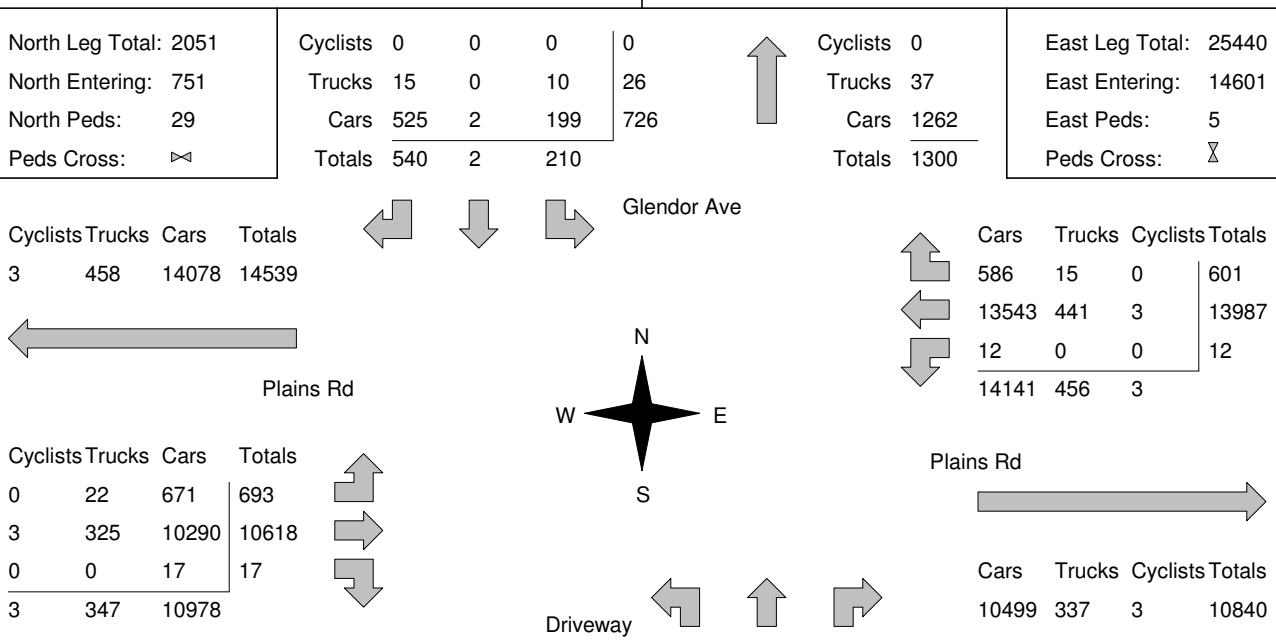
Municipality: Burlington
Site #: 0000201683
Intersection: Plains Rd & Glendor Ave
TFR File #: 3
Count date: 12-Nov-2013

Weather conditions:
Sunny/Dry

Person(s) who counted:
Bronek

**** Non-Signalized Intersection ****

Major Road: Plains Rd runs W/E



Comments

Paradigm Transportation Solutions Limited
22 King Street South, Suite 300

Waterloo, Ontario, Canada N2J 1N8
519-896-3163 cbowness@ptsl.com

Count Name: Plains Road East & Glendor Avenue
Site Code:
Start Date: 10/24/2017

Turning Movement Data

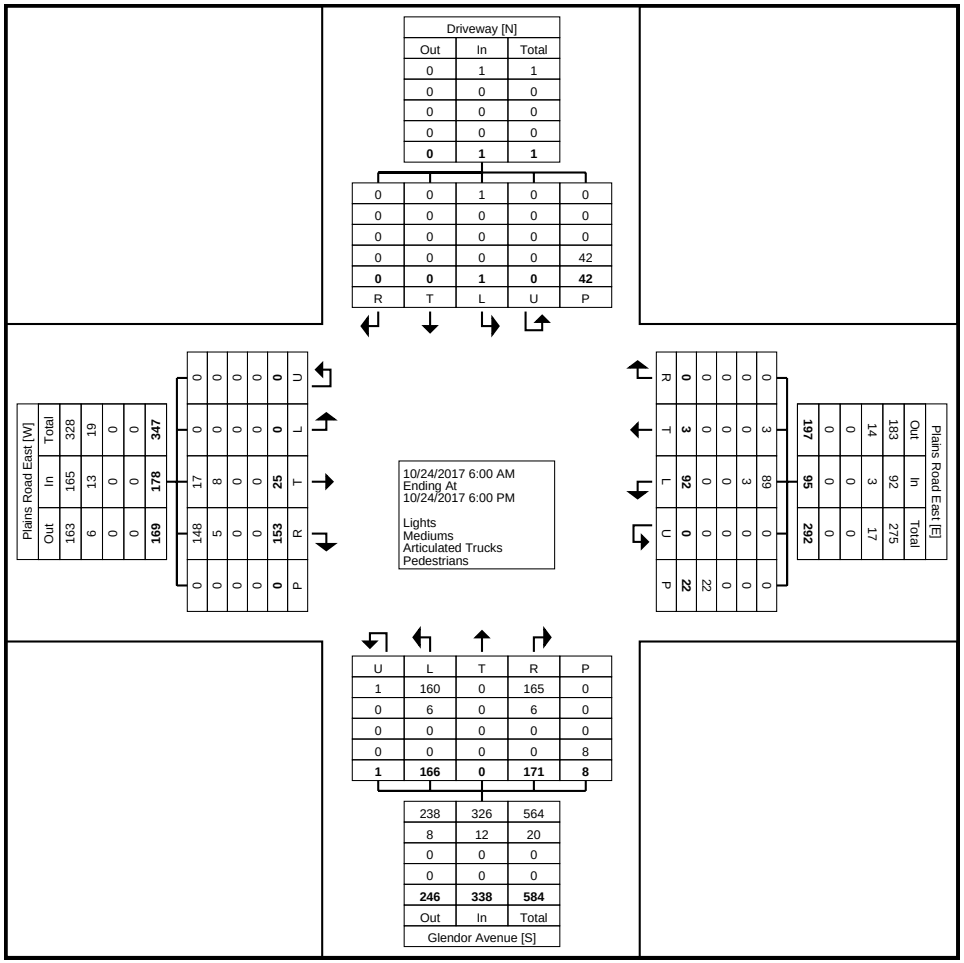
Start Time	Plains Road East Eastbound						Plains Road East Westbound						Glendor Avenue Northbound						Driveway Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
6:00 AM	0	0	2	0	0	2	3	0	0	0	0	3	1	0	0	0	0	1	0	0	0	0	0	0	6
6:15 AM	0	0	2	0	0	2	3	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	5
6:30 AM	0	1	8	0	0	9	2	0	0	0	2	2	1	0	0	0	0	1	0	0	0	0	1	0	12
6:45 AM	0	0	5	0	0	5	4	1	0	0	0	5	1	0	4	0	1	5	0	0	0	0	1	0	15
Hourly Total	0	1	17	0	0	18	12	1	0	0	2	13	3	0	4	0	1	7	0	0	0	0	2	0	38
7:00 AM	0	0	5	0	0	5	8	0	0	0	0	8	2	0	1	0	0	3	0	0	0	0	0	0	16
7:15 AM	0	0	6	0	0	6	7	0	0	0	2	7	3	0	3	0	1	6	0	0	0	0	2	0	19
7:30 AM	0	1	9	0	0	10	3	0	0	0	2	3	5	0	4	0	2	9	0	0	0	0	4	0	22
7:45 AM	0	3	13	0	0	16	4	1	0	0	0	5	1	0	5	0	1	6	0	0	0	0	0	0	27
Hourly Total	0	4	33	0	0	37	22	1	0	0	4	23	11	0	13	0	4	24	0	0	0	0	6	0	84
8:00 AM	0	0	9	0	0	9	7	0	0	0	0	7	6	0	6	0	0	12	0	0	0	0	0	0	28
8:15 AM	0	1	16	0	0	17	5	0	0	0	1	5	3	0	7	0	0	10	0	0	0	0	1	0	32
8:30 AM	0	0	6	0	0	6	2	0	0	0	0	2	8	0	2	0	0	10	0	0	0	0	1	0	18
8:45 AM	0	1	6	0	0	7	5	0	0	0	0	5	10	0	11	1	1	22	0	0	0	0	0	0	34
Hourly Total	0	2	37	0	0	39	19	0	0	0	1	19	27	0	26	1	1	54	0	0	0	0	2	0	112
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3:00 PM	0	3	4	0	0	7	4	0	0	0	0	4	9	0	10	0	0	19	0	0	0	0	1	0	30
3:15 PM	0	1	7	0	0	8	3	1	0	0	3	4	14	0	8	0	0	22	0	0	0	0	3	0	34
3:30 PM	0	1	7	0	0	8	4	0	0	0	2	4	14	0	12	0	0	26	0	0	0	0	6	0	38
3:45 PM	0	1	8	0	0	9	1	0	0	0	3	1	7	0	10	0	0	17	1	0	0	0	3	1	28
Hourly Total	0	6	26	0	0	32	12	1	0	0	8	13	44	0	40	0	0	84	1	0	0	0	13	1	130
4:00 PM	0	1	5	0	0	6	4	0	0	0	1	4	14	0	11	0	0	25	0	0	0	0	1	0	35
4:15 PM	0	2	5	0	0	7	4	0	0	0	2	4	6	0	7	0	1	13	0	0	0	0	2	0	24
4:30 PM	0	0	5	0	0	5	2	0	0	0	1	2	13	0	12	0	0	25	0	0	0	0	4	0	32
4:45 PM	0	3	5	0	0	8	2	0	0	0	1	2	10	0	16	0	0	26	0	0	0	0	6	0	36
Hourly Total	0	6	20	0	0	26	12	0	0	0	5	12	43	0	46	0	1	89	0	0	0	0	13	0	127
5:00 PM	0	1	2	0	0	3	5	0	0	0	1	5	7	0	9	0	0	16	0	0	0	0	3	0	24
5:15 PM	0	2	2	0	0	4	5	0	0	0	0	5	10	0	10	0	0	20	0	0	0	0	2	0	29
5:30 PM	0	1	6	0	0	7	2	0	0	0	0	2	12	0	12	0	0	24	0	0	0	0	0	0	33
5:45 PM	0	2	10	0	0	12	3	0	0	0	1	3	9	0	11	0	1	20	0	0	0	0	1	0	35
Hourly Total	0	6	20	0	0	26	15	0	0	0	2	15	38	0	42	0	1	80	0	0	0	0	6	0	121
Grand Total	0	25	153	0	0	178	92	3	0	0	22	95	166	0	171	1	8	338	1	0	0	0	42	1	612
Approach %	0.0	14.0	86.0	0.0	-	-	96.8	3.2	0.0	0.0	-	-	49.1	0.0	50.6	0.3	-	-	100.0	0.0	0.0	0.0	-	-	-
Total %	0.0	4.1	25.0	0.0	-	29.1	15.0	0.5	0.0	0.0	-	15.5	27.1	0.0	27.9	0.2	-	55.2	0.2	0.0	0.0	0.0	-	0.2	-
Lights	0	17	148	0	-	165	89	3	0	0	-	92	160	0	165	1	-	326	1	0	0	0	-	1	584
% Lights	-	68.0	96.7	-	-	92.7	96.7	100.0	-	-	-	96.8	96.4	-	96.5	100.0	-	96.4	100.0	-	-	-	-	100.0	95.4
Mediums	0	8	5	0	-	13	3	0	0	0	-	3	6	0	6	0	-	12	0	0	0	0	-	0	28

% Mediums	-	32.0	3.3	-	-	7.3	3.3	0.0	-	-	-	3.2	3.6	-	3.5	0.0	-	3.6	0.0	-	-	-	-	0.0	4.6
Articulated Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Articulated Trucks	-	0.0	0.0	-	-	0.0	0.0	0.0	-	-	-	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-	-	-	-	0.0	0.0
Pedestrians	-	-	-	-	0	-	-	-	-	-	22	-	-	-	-	-	8	-	-	-	-	-	42	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-

Paradigm Transportation Solutions Limited
22 King Street South, Suite 300

Waterloo, Ontario, Canada N2J 1N8
519-896-3163 cbowness@ptsl.com

Count Name: Plains Road East & Glendor Avenue
Site Code:
Start Date: 10/24/2017



Turning Movement Data Plot

Paradigm Transportation Solutions Limited
22 King Street South, Suite 300

Waterloo, Ontario, Canada N2J 1N8
519-896-3163 cbowness@ptsl.com

Count Name: Plains Road East & Glendor Avenue
Site Code:
Start Date: 10/24/2017

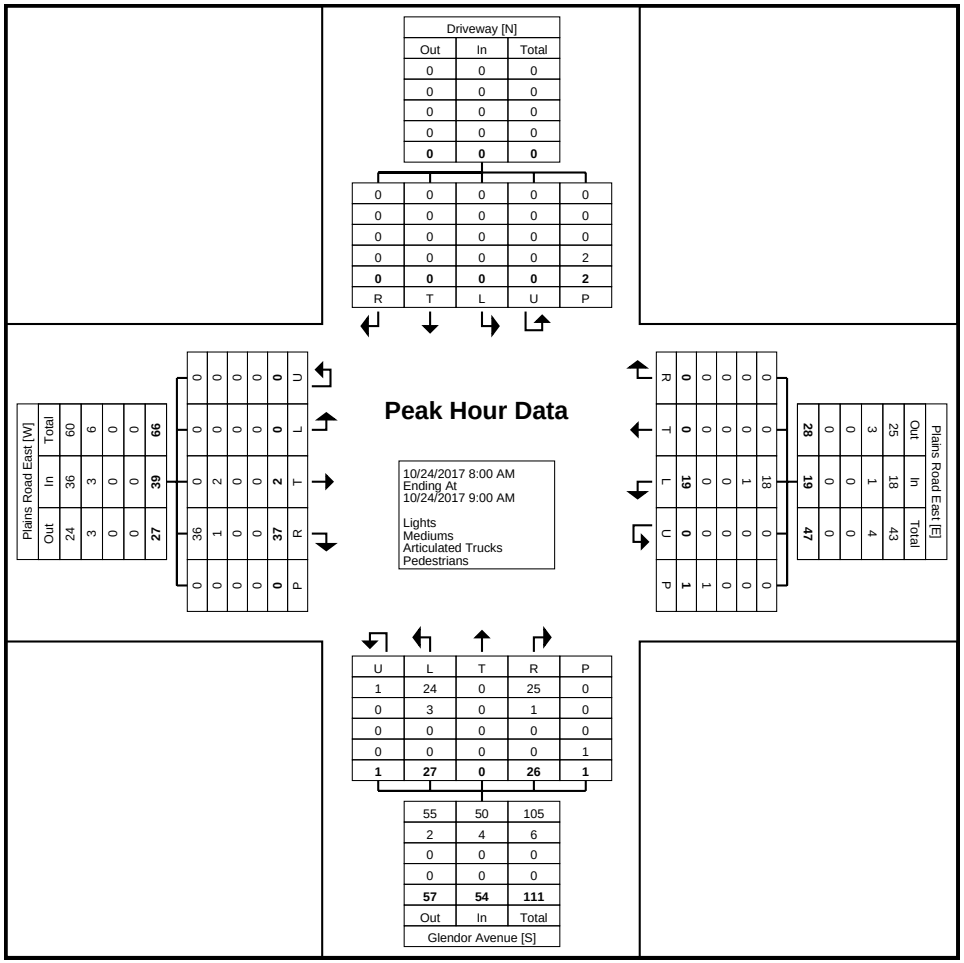
Turning Movement Peak Hour Data (8:00 AM)

Start Time	Plains Road East Eastbound						Plains Road East Westbound						Glendor Avenue Northbound						Driveway Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
8:00 AM	0	0	9	0	0	9	7	0	0	0	0	7	6	0	6	0	0	12	0	0	0	0	0	0	28
8:15 AM	0	1	16	0	0	17	5	0	0	0	1	5	3	0	7	0	0	10	0	0	0	0	1	0	32
8:30 AM	0	0	6	0	0	6	2	0	0	0	0	2	8	0	2	0	0	10	0	0	0	0	1	0	18
8:45 AM	0	1	6	0	0	7	5	0	0	0	0	5	10	0	11	1	1	22	0	0	0	0	0	0	34
Total	0	2	37	0	0	39	19	0	0	0	1	19	27	0	26	1	1	54	0	0	0	0	2	0	112
Approach %	0.0	5.1	94.9	0.0	-	-	100.0	0.0	0.0	0.0	-	-	50.0	0.0	48.1	1.9	-	-	NaN	NaN	NaN	NaN	-	-	-
Total %	0.0	1.8	33.0	0.0	-	34.8	17.0	0.0	0.0	0.0	-	17.0	24.1	0.0	23.2	0.9	-	48.2	0.0	0.0	0.0	0.0	-	0.0	-
PHF	0.000	0.500	0.578	0.000	-	0.574	0.679	0.000	0.000	0.000	-	0.679	0.675	0.000	0.591	0.250	-	0.614	0.000	0.000	0.000	0.000	-	0.000	0.824
Lights	0	0	36	0	-	36	18	0	0	0	-	18	24	0	25	1	-	50	0	0	0	0	-	0	104
% Lights	-	0.0	97.3	-	-	92.3	94.7	-	-	-	-	94.7	88.9	-	96.2	100.0	-	92.6	-	-	-	-	-	-	92.9
Mediums	0	2	1	0	-	3	1	0	0	0	-	1	3	0	1	0	-	4	0	0	0	0	-	0	8
% Mediums	-	100.0	2.7	-	-	7.7	5.3	-	-	-	-	5.3	11.1	-	3.8	0.0	-	7.4	-	-	-	-	-	-	7.1
Articulated Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Articulated Trucks	-	0.0	0.0	-	-	0.0	0.0	-	-	-	-	0.0	0.0	-	0.0	0.0	-	0.0	-	-	-	-	-	-	0.0
Pedestrians	-	-	-	-	0	-	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	2	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-

Paradigm Transportation Solutions Limited
22 King Street South, Suite 300

Waterloo, Ontario, Canada N2J 1N8
519-896-3163 cbowness@ptsl.com

Count Name: Plains Road East & Glendor Avenue
Site Code:
Start Date: 10/24/2017



Turning Movement Peak Hour Data Plot (8:00 AM)

Paradigm Transportation Solutions Limited
22 King Street South, Suite 300

Waterloo, Ontario, Canada N2J 1N8
519-896-3163 cbowness@ptsl.com

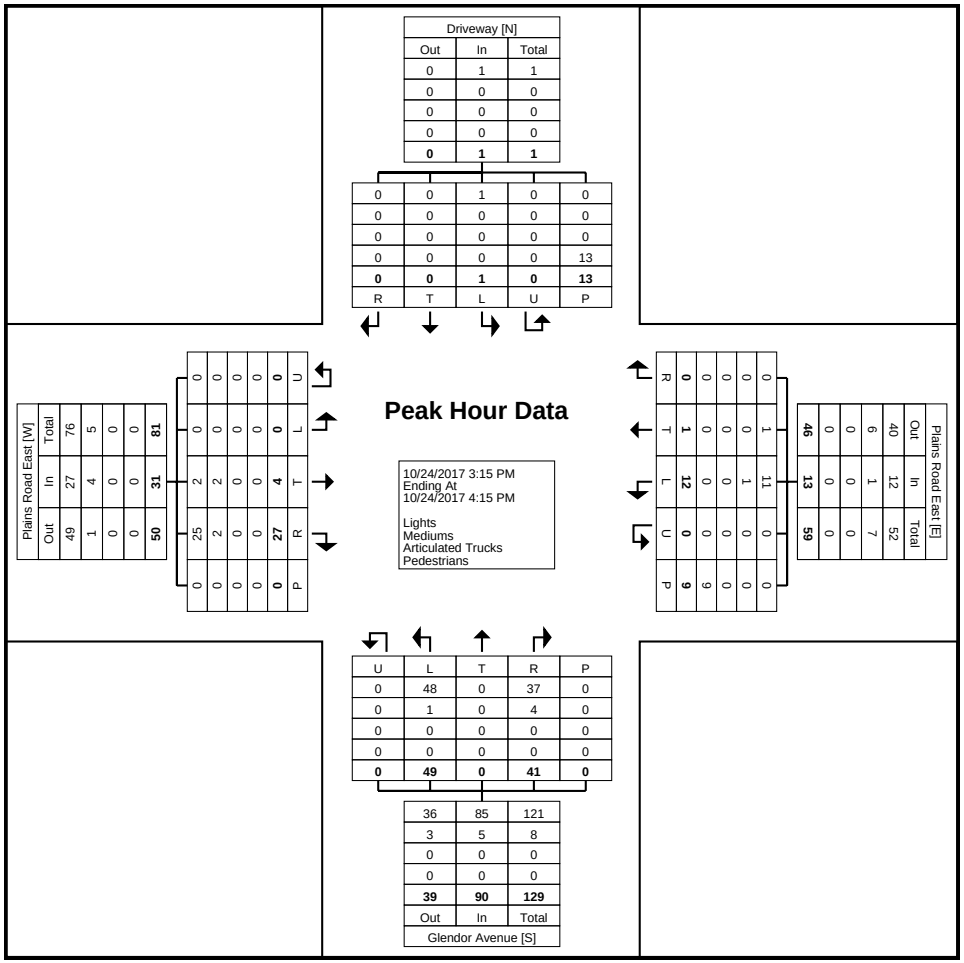
Count Name: Plains Road East & Glendor Avenue
Site Code:
Start Date: 10/24/2017

Turning Movement Peak Hour Data (3:15 PM)

Start Time	Plains Road East Eastbound						Plains Road East Westbound						Glendor Avenue Northbound						Driveway Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
3:15 PM	0	1	7	0	0	8	3	1	0	0	3	4	14	0	8	0	0	22	0	0	0	0	3	0	34
3:30 PM	0	1	7	0	0	8	4	0	0	0	2	4	14	0	12	0	0	26	0	0	0	0	6	0	38
3:45 PM	0	1	8	0	0	9	1	0	0	0	3	1	7	0	10	0	0	17	1	0	0	0	3	1	28
4:00 PM	0	1	5	0	0	6	4	0	0	0	1	4	14	0	11	0	0	25	0	0	0	0	1	0	35
Total	0	4	27	0	0	31	12	1	0	0	9	13	49	0	41	0	0	90	1	0	0	0	13	1	135
Approach %	0.0	12.9	87.1	0.0	-	-	92.3	7.7	0.0	0.0	-	-	54.4	0.0	45.6	0.0	-	-	100.0	0.0	0.0	0.0	-	-	-
Total %	0.0	3.0	20.0	0.0	-	23.0	8.9	0.7	0.0	0.0	-	9.6	36.3	0.0	30.4	0.0	-	66.7	0.7	0.0	0.0	0.0	-	0.7	-
PHF	0.000	1.000	0.844	0.000	-	0.861	0.750	0.250	0.000	0.000	-	0.813	0.875	0.000	0.854	0.000	-	0.865	0.250	0.000	0.000	0.000	-	0.250	0.888
Lights	0	2	25	0	-	27	11	1	0	0	-	12	48	0	37	0	-	85	1	0	0	0	-	1	125
% Lights	-	50.0	92.6	-	-	87.1	91.7	100.0	-	-	-	92.3	98.0	-	90.2	-	-	94.4	100.0	-	-	-	-	100.0	92.6
Mediums	0	2	2	0	-	4	1	0	0	0	-	1	1	0	4	0	-	5	0	0	0	0	-	0	10
% Mediums	-	50.0	7.4	-	-	12.9	8.3	0.0	-	-	-	7.7	2.0	-	9.8	-	-	5.6	0.0	-	-	-	-	0.0	7.4
Articulated Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Articulated Trucks	-	0.0	0.0	-	-	0.0	0.0	0.0	-	-	-	0.0	0.0	-	0.0	-	-	0.0	0.0	-	-	-	-	0.0	0.0
Pedestrians	-	-	-	-	0	-	-	-	-	-	9	-	-	-	-	-	0	-	-	-	-	-	13	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	100.0	-	-	-	-	-	-	-	-	-	-	-	100.0	-	-

Paradigm Transportation Solutions Limited
22 King Street South, Suite 300

Waterloo, Ontario, Canada N2J 1N8
519-896-3163 cbowness@ptsl.com



Turning Movement Peak Hour Data Plot (3:15 PM)

Paradigm Transportation Solutions Limited
22 King Street South, Suite 300

Waterloo, Ontario, Canada N2J 1N8
519-896-3163 cbowness@ptsl.com

Count Name: Plains Road East & Glendor Avenue
Site Code:
Start Date: 10/24/2017

APPENDIX C
2017 EXISTING TRAFFIC OPERATIONS REPORTS



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	920	1	0	703	28	0	0	0	20	0	36
Future Volume (vph)	25	920	1	0	703	28	0	0	0	20	0	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	20.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	0		0	0		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.994							0.850
Flt Protected	0.950									0.950		
Satd. Flow (prot)	1752	3471	0	0	3386	0	0	1863	0	1736	0	1495
Flt Permitted	0.950									0.950		
Satd. Flow (perm)	1752	3471	0	0	3386	0	0	1863	0	1736	0	1495
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		134.2			156.6			58.6			28.4	
Travel Time (s)		9.7			11.3			4.2			2.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	4%	2%	2%	6%	5%	2%	2%	2%	4%	2%	8%
Adj. Flow (vph)	27	1000	1	0	764	30	0	0	0	22	0	39
Shared Lane Traffic (%)												
Lane Group Flow (vph)	27	1001	0	0	794	0	0	0	0	22	0	39
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane					Yes							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	35.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	25	920	1	0	703	28	0	0	0	20	0	36
Future Volume (Veh/h)	25	920	1	0	703	28	0	0	0	20	0	36
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	27	1000	1	0	764	30	0	0	0	22	0	39
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			TWLTL							
Median storage veh)					2							
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	794			1001			1476	1848	500	1333	1834	397
vC1, stage 1 conf vol							1054	1054		779	779	
vC2, stage 2 conf vol							421	794		554	1055	
vCu, unblocked vol	794			1001			1476	1848	500	1333	1834	397
tC, single (s)	4.2			4.1			7.5	6.5	6.9	7.6	6.5	7.1
tC, 2 stage (s)							6.5	5.5		6.6	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.4
p0 queue free %	97			100			100	100	100	92	100	93
cM capacity (veh/h)	817			687			215	233	516	291	240	586

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total	27	667	334	382	412	0	22	39
Volume Left	27	0	0	0	0	0	22	0
Volume Right	0	0	1	0	30	0	0	39
cSH	817	1700	1700	687	1700	1700	291	586
Volume to Capacity	0.03	0.39	0.20	0.00	0.24	0.00	0.08	0.07
Queue Length 95th (m)	0.8	0.0	0.0	0.0	0.0	0.0	2.0	1.7
Control Delay (s)	9.6	0.0	0.0	0.0	0.0	0.0	18.4	11.6
Lane LOS	A					A	C	B
Approach Delay (s)	0.3			0.0		0.0	14.0	
Approach LOS						A	B	

Intersection Summary					
Average Delay	0.6				
Intersection Capacity Utilization	35.5%	ICU Level of Service		A	
Analysis Period (min)	15				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	2	37	19	0	0	27	0	26	0	0	0
Future Volume (vph)	0	2	37	19	0	0	27	0	26	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		9.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		1	0		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850					0.934				
Flt Protected					0.950			0.975				
Satd. Flow (prot)	0	950	1568	0	1719	0	0	1609	0	0	1900	0
Flt Permitted					0.950			0.975				
Satd. Flow (perm)	0	950	1568	0	1719	0	0	1609	0	0	1900	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		124.7			125.6			28.4			82.0	
Travel Time (s)		9.0			9.0			2.0			5.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	100%	3%	5%	0%	0%	11%	0%	4%	0%	0%	0%
Adj. Flow (vph)	0	2	40	21	0	0	29	0	28	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	2	40	0	21	0	0	57	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 17.7%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	2	37	19	0	0	27	0	26	0	0	0
Future Volume (Veh/h)	0	2	37	19	0	0	27	0	26	0	0	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	2	40	21	0	0	29	0	28	0	0	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)			1									
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	72	86	0	73	72	14	0			28		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	72	86	0	73	72	14	0			28		
tC, single (s)	7.1	7.5	6.2	7.1	6.5	6.2	4.2			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.9	3.3	3.5	4.0	3.3	2.3			2.2		
p0 queue free %	100	100	96	98	100	100	98			100		
cM capacity (veh/h)	911	639	1082	862	807	1072	1566			1599		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	42	21	57	0
Volume Left	0	21	29	0
Volume Right	40	0	28	0
cSH	1136	862	1566	1700
Volume to Capacity	0.04	0.02	0.02	0.00
Queue Length 95th (m)	0.9	0.6	0.5	0.0
Control Delay (s)	8.6	9.3	3.8	0.0
Lane LOS	A	A	A	
Approach Delay (s)	8.6	9.3	3.8	0.0
Approach LOS	A	A		

Intersection Summary				
Average Delay		6.4		
Intersection Capacity Utilization		17.7%	ICU Level of Service	A
Analysis Period (min)		15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	49	843	3	1	2100	38	3	3	1	4	0	35
Future Volume (vph)	49	843	3	1	2100	38	3	3	1	4	0	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	20.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	0		0	0		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.997			0.981				0.850
Flt Protected	0.950							0.979		0.950		
Satd. Flow (prot)	1752	3574	0	0	3564	0	0	1825	0	1805	0	1615
Flt Permitted	0.950							0.979		0.950		
Satd. Flow (perm)	1752	3574	0	0	3564	0	0	1825	0	1805	0	1615
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		134.2			156.6			66.4			28.4	
Travel Time (s)		9.7			11.3			4.8			2.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	1%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	53	916	3	1	2283	41	3	3	1	4	0	38
Shared Lane Traffic (%)												
Lane Group Flow (vph)	53	919	0	0	2325	0	0	7	0	4	0	38
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane					Yes							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	76.0%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	49	843	3	1	2100	38	3	3	1	4	0	35
Future Volume (Veh/h)	49	843	3	1	2100	38	3	3	1	4	0	35
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	53	916	3	1	2283	41	3	3	1	4	0	38
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			TWLTL							
Median storage veh)					2							
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	2324			919			2205	3350	460	2872	3330	1162
vC1, stage 1 conf vol							1024	1024		2306	2306	
vC2, stage 2 conf vol							1182	2326		566	1025	
vCu, unblocked vol	2324			919			2205	3350	460	2872	3330	1162
tC, single (s)	4.2			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	74			100			97	84	100	90	100	80
cM capacity (veh/h)	208			751			93	18	554	39	68	191

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total	53	611	308	1142	1182	7	4	38
Volume Left	53	0	0	1	0	3	4	0
Volume Right	0	0	3	0	41	1	0	38
cSH	208	1700	1700	751	1700	36	39	191
Volume to Capacity	0.26	0.36	0.18	0.00	0.70	0.20	0.10	0.20
Queue Length 95th (m)	7.8	0.0	0.0	0.0	0.0	5.0	2.6	5.7
Control Delay (s)	28.2	0.0	0.0	0.0	0.0	129.5	108.1	28.4
Lane LOS	D			A		F	F	D
Approach Delay (s)	1.5			0.0		129.5	36.0	
Approach LOS						F	E	

Intersection Summary				
Average Delay	1.2			
Intersection Capacity Utilization	76.0%	ICU Level of Service		D
Analysis Period (min)	15			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	4	27	12	1	0	49	0	41	1	0	0
Future Volume (vph)	0	4	27	12	1	0	49	0	41	1	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		9.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		1	0		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850					0.938				
Flt Protected					0.956			0.974			0.950	
Satd. Flow (prot)	0	1267	1509	0	1691	0	0	1643	0	0	1805	0
Flt Permitted					0.956			0.974			0.950	
Satd. Flow (perm)	0	1267	1509	0	1691	0	0	1643	0	0	1805	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		124.7			125.6			28.4			82.0	
Travel Time (s)		9.0			9.0			2.0			5.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	50%	7%	8%	0%	0%	2%	0%	10%	0%	0%	0%
Adj. Flow (vph)	0	4	29	13	1	0	53	0	45	1	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	4	29	0	14	0	0	98	0	0	1	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	20.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	4	27	12	1	0	49	0	41	1	0	0
Future Volume (Veh/h)	0	4	27	12	1	0	49	0	41	1	0	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	4	29	13	1	0	53	0	45	1	0	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)			1									
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	131	153	0	132	130	22	0			45		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	131	153	0	132	130	22	0			45		
tC, single (s)	7.1	7.0	6.3	7.2	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.5	3.4	3.6	4.0	3.3	2.2			2.2		
p0 queue free %	100	99	97	98	100	100	97			100		
cM capacity (veh/h)	824	637	1070	779	738	1060	1623			1576		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	33	14	98	1
Volume Left	0	13	53	1
Volume Right	29	0	45	0
cSH	1218	776	1623	1576
Volume to Capacity	0.03	0.02	0.03	0.00
Queue Length 95th (m)	0.7	0.4	0.8	0.0
Control Delay (s)	8.7	9.7	4.1	7.3
Lane LOS	A	A	A	A
Approach Delay (s)	8.7	9.7	4.1	7.3
Approach LOS	A	A		

Intersection Summary					
Average Delay		5.7			
Intersection Capacity Utilization		20.0%	ICU Level of Service		A
Analysis Period (min)		15			

APPENDIX D
TRANSPORTATION TOMORROW SURVEY DATA



Fri Nov 10 2017 16:44:44 GMT-0500 (Eastern Standard Time) - Run Time: 2772ms

Cross Tabulation Query Form - Trip - 2011

Row: Planning district of origin - pd_orig
Column: Primary travel mode of trip - mode_prime

Filters:
(2006 GTA zone of household - gta06_hhld In 4058
and
Start time of trip - start_time In 0600-0900
and
Trip purpose of destination - purp_dest In C, D, E, F, M, O, P, R, S, W,
and
Trip purpose of origin - purp_orig In H)

Trip 2011
ROW : pd_orig
COLUMN : mode_prime

pd_orig	mode_prime	total
40	B	62
40	D	449
40	G	84
40	P	66
40	S	65
40	W	22

Fri Nov 10 2017 16:46:58 GMT-0500 (Eastern Standard Time) - Run Time: 2269ms

Cross Tabulation Query Form - Trip - 2011

Row: Planning district of origin - pd_orig
Column: Primary travel mode of trip - mode_prime

Filters:
(2006 GTA zone of household - gta06_hhld In 4058
and
Start time of trip - start_time In 1500-1800
and
Trip purpose of destination - purp_dest In H,
and
Trip purpose of origin - purp_orig In D, E, F, L, M, O, P, S, W,)

Trip 2011
ROW : pd_orig
COLUMN : mode_prime

pd_orig	mode_prime	total
1	G	23
8	D	30
11	D	30
36	D	61
37	D	15
39	D	35
40	B	42
40	D	293
40	P	105
40	S	43
45	D	20
46	D	74
46	G	61
46	P	23

APPENDIX E
2020 FUTURE TOTAL TRAFFIC OPERATIONS REPORTS



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	28	948	0	0	724	31	0	0	0	27	0	49
Future Volume (vph)	28	948	0	0	724	31	0	0	0	27	0	49
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	20.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	0		0	0		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.994							0.850
Flt Protected	0.950									0.950		
Satd. Flow (prot)	1752	3471	0	0	3387	0	0	1863	0	1736	0	1495
Flt Permitted	0.950									0.950		
Satd. Flow (perm)	1752	3471	0	0	3387	0	0	1863	0	1736	0	1495
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		134.2			176.1			41.9			28.4	
Travel Time (s)		9.7			12.7			3.0			2.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	4%	2%	2%	6%	5%	2%	2%	2%	4%	2%	8%
Adj. Flow (vph)	30	1030	0	0	787	34	0	0	0	29	0	53
Shared Lane Traffic (%)												
Lane Group Flow (vph)	30	1030	0	0	821	0	0	0	0	29	0	53
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane					Yes							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 36.2%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	28	948	0	0	724	31	0	0	0	27	0	49
Future Volume (Veh/h)	28	948	0	0	724	31	0	0	0	27	0	49
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	30	1030	0	0	787	34	0	0	0	29	0	53
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			TWLTL							
Median storage veh)					2							
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	821			1030			1536	1911	515	1379	1894	410
vC1, stage 1 conf vol							1090	1090		804	804	
vC2, stage 2 conf vol							446	821		575	1090	
vCu, unblocked vol	821			1030			1536	1911	515	1379	1894	410
tC, single (s)	4.2			4.1			7.5	6.5	6.9	7.6	6.5	7.1
tC, 2 stage (s)							6.5	5.5		6.6	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.4
p0 queue free %	96			100			100	100	100	90	100	91
cM capacity (veh/h)	798			670			202	223	505	279	230	574

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total	30	687	343	394	428	0	29	53
Volume Left	30	0	0	0	0	0	29	0
Volume Right	0	0	0	0	34	0	0	53
cSH	798	1700	1700	670	1700	1700	279	574
Volume to Capacity	0.04	0.40	0.20	0.00	0.25	0.00	0.10	0.09
Queue Length 95th (m)	0.9	0.0	0.0	0.0	0.0	0.0	2.7	2.4
Control Delay (s)	9.7	0.0	0.0	0.0	0.0	0.0	19.4	11.9
Lane LOS	A					A	C	B
Approach Delay (s)	0.3			0.0		0.0	14.6	
Approach LOS						A	B	

Intersection Summary					
Average Delay	0.8				
Intersection Capacity Utilization	36.2%	ICU Level of Service		A	
Analysis Period (min)	15				

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	2	54	22	0	31	28
Future Volume (vph)	2	54	22	0	31	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850			0.937	
Flt Protected				0.950	0.974	
Satd. Flow (prot)	950	1568	0	1719	1610	0
Flt Permitted				0.950	0.974	
Satd. Flow (perm)	950	1568	0	1719	1610	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	26.4			125.6	28.4	
Travel Time (s)	1.9			9.0	2.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	100%	3%	5%	0%	11%	4%
Adj. Flow (vph)	2	59	24	0	34	30
Shared Lane Traffic (%)						
Lane Group Flow (vph)	2	59	0	24	64	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Stop			Stop	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	18.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	2	54	22	0	31	28
Future Volume (Veh/h)	2	54	22	0	31	28
Sign Control	Stop			Stop	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	59	24	0	34	30
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	98	0	143	83	0	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	98	0	143	83	0	
tC, single (s)	7.5	6.2	7.1	6.5	4.2	
tC, 2 stage (s)						
tF (s)	4.9	3.3	3.5	4.0	2.3	
p0 queue free %	100	95	97	100	98	
cM capacity (veh/h)	626	1082	760	793	1566	

Direction, Lane #	EB 1	EB 2	WB 1	NB 1
Volume Total	2	59	24	64
Volume Left	0	0	24	34
Volume Right	0	59	0	30
cSH	626	1082	760	1566
Volume to Capacity	0.00	0.05	0.03	0.02
Queue Length 95th (m)	0.1	1.4	0.8	0.5
Control Delay (s)	10.8	8.5	9.9	4.0
Lane LOS	B	A	A	A
Approach Delay (s)	8.6		9.9	4.0
Approach LOS	A		A	

Intersection Summary				
Average Delay		6.8		
Intersection Capacity Utilization		18.0%	ICU Level of Service	A
Analysis Period (min)		15		

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	45	29	2	11	0
Future Volume (vph)	0	45	29	2	11	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.992			
Flt Protected					0.950	
Satd. Flow (prot)	0	1759	1708	0	1805	0
Flt Permitted					0.950	
Satd. Flow (perm)	0	1759	1708	0	1805	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		98.3	26.4		67.4	
Travel Time (s)		7.1	1.9		4.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	8%	11%	0%	0%	0%
Adj. Flow (vph)	0	49	32	2	12	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	49	34	0	12	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	45	29	2	11	0
Future Volume (Veh/h)	0	45	29	2	11	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	49	32	2	12	0
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	34				82	33
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	34				82	33
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				99	100
cM capacity (veh/h)	1591				925	1046

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	49	34	12
Volume Left	0	0	12
Volume Right	0	2	0
cSH	1591	1700	925
Volume to Capacity	0.00	0.02	0.01
Queue Length 95th (m)	0.0	0.0	0.3
Control Delay (s)	0.0	0.0	8.9
Lane LOS			A
Approach Delay (s)	0.0	0.0	8.9
Approach LOS			A

Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	59	869	3	1	2164	47	3	3	1	5	0	43
Future Volume (vph)	59	869	3	1	2164	47	3	3	1	5	0	43
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	20.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	0		0	0		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.997			0.981				0.850
Flt Protected	0.950							0.979		0.950		
Satd. Flow (prot)	1752	3574	0	0	3564	0	0	1825	0	1805	0	1615
Flt Permitted	0.950							0.979		0.950		
Satd. Flow (perm)	1752	3574	0	0	3564	0	0	1825	0	1805	0	1615
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		134.2			176.1			41.9			28.4	
Travel Time (s)		9.7			12.7			3.0			2.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	1%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	64	945	3	1	2352	51	3	3	1	5	0	47
Shared Lane Traffic (%)												
Lane Group Flow (vph)	64	948	0	0	2404	0	0	7	0	5	0	47
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane					Yes							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	78.0%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	59	869	3	1	2164	47	3	3	1	5	0	43
Future Volume (Veh/h)	59	869	3	1	2164	47	3	3	1	5	0	43
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	64	945	3	1	2352	51	3	3	1	5	0	47
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			TWLTL							
Median storage veh)					2							
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	2403			948			2300	3480	474	2982	3456	1202
vC1, stage 1 conf vol							1074	1074		2380	2380	
vC2, stage 2 conf vol							1225	2405		603	1076	
vCu, unblocked vol	2403			948			2300	3480	474	2982	3456	1202
tC, single (s)	4.2			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	67			100			96	32	100	86	100	74
cM capacity (veh/h)	193			732			68	4	542	35	61	180

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total	64	630	318	1177	1227	7	5	47
Volume Left	64	0	0	1	0	3	5	0
Volume Right	0	0	3	0	51	1	0	47
cSH	193	1700	1700	732	1700	10	35	180
Volume to Capacity	0.33	0.37	0.19	0.00	0.72	0.72	0.14	0.26
Queue Length 95th (m)	11.0	0.0	0.0	0.0	0.0	11.7	3.6	8.0
Control Delay (s)	32.6	0.0	0.0	0.1	0.0	666.9	125.5	31.9
Lane LOS	D			A		F	F	D
Approach Delay (s)	2.1			0.0		666.9	40.9	
Approach LOS						F	E	

Intersection Summary				
Average Delay	2.6			
Intersection Capacity Utilization	78.0%	ICU Level of Service		D
Analysis Period (min)	15			

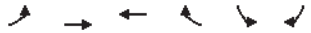
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	4	35	13	1	64	45
Future Volume (vph)	4	35	13	1	64	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850			0.944	
Flt Protected				0.955	0.971	
Satd. Flow (prot)	1267	1509	0	1688	1654	0
Flt Permitted				0.955	0.971	
Satd. Flow (perm)	1267	1509	0	1688	1654	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	26.4			125.6	28.4	
Travel Time (s)	1.9			9.0	2.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	50%	7%	8%	0%	2%	10%
Adj. Flow (vph)	4	38	14	1	70	49
Shared Lane Traffic (%)						
Lane Group Flow (vph)	4	38	0	15	119	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Stop			Stop	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	20.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	4	35	13	1	64	45
Future Volume (Veh/h)	4	35	13	1	64	45
Sign Control	Stop			Stop	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	38	14	1	70	49
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	189	0	204	164	0	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	189	0	204	164	0	
tC, single (s)	7.0	6.3	7.2	6.5	4.1	
tC, 2 stage (s)						
tF (s)	4.5	3.4	3.6	4.0	2.2	
p0 queue free %	99	96	98	100	96	
cM capacity (veh/h)	601	1070	687	700	1623	

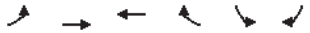
Direction, Lane #	EB 1	EB 2	WB 1	NB 1
Volume Total	4	38	15	119
Volume Left	0	0	14	70
Volume Right	0	38	0	49
cSH	601	1070	688	1623
Volume to Capacity	0.01	0.04	0.02	0.04
Queue Length 95th (m)	0.2	0.9	0.5	1.1
Control Delay (s)	11.0	8.5	10.3	4.4
Lane LOS	B	A	B	A
Approach Delay (s)	8.7		10.3	4.4
Approach LOS	A		B	

Intersection Summary			
Average Delay	6.0		
Intersection Capacity Utilization	20.4%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	34	55	10	5	0
Future Volume (vph)	0	34	55	10	5	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.979			
Flt Protected					0.950	
Satd. Flow (prot)	0	1681	1829	0	1805	0
Flt Permitted					0.950	
Satd. Flow (perm)	0	1681	1829	0	1805	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		98.3	26.4		67.4	
Travel Time (s)		7.1	1.9		4.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	13%	2%	0%	0%	0%
Adj. Flow (vph)	0	37	60	11	5	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	37	71	0	5	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	13.5%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	34	55	10	5	0
Future Volume (Veh/h)	0	34	55	10	5	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	37	60	11	5	0
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	71				102	66
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	71				102	66
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				99	100
cM capacity (veh/h)	1542				901	1004

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	37	71	5
Volume Left	0	0	5
Volume Right	0	11	0
cSH	1542	1700	901
Volume to Capacity	0.00	0.04	0.01
Queue Length 95th (m)	0.0	0.0	0.1
Control Delay (s)	0.0	0.0	9.0
Lane LOS			A
Approach Delay (s)	0.0	0.0	9.0
Approach LOS			A

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	13.5%	ICU Level of Service	A
Analysis Period (min)	15		

APPENDIX F
2025 FUTURE TOTAL TRAFFIC OPERATIONS REPORTS



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	29	996	1	0	761	32	0	0	0	28	0	51
Future Volume (vph)	29	996	1	0	761	32	0	0	0	28	0	51
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	20.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	0		0	0		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.994							0.850
Flt Protected	0.950									0.950		
Satd. Flow (prot)	1752	3471	0	0	3387	0	0	1863	0	1736	0	1495
Flt Permitted	0.950									0.950		
Satd. Flow (perm)	1752	3471	0	0	3387	0	0	1863	0	1736	0	1495
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		134.2			176.1			41.9			28.4	
Travel Time (s)		9.7			12.7			3.0			2.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	4%	2%	2%	6%	5%	2%	2%	2%	4%	2%	8%
Adj. Flow (vph)	32	1083	1	0	827	35	0	0	0	30	0	55
Shared Lane Traffic (%)												
Lane Group Flow (vph)	32	1084	0	0	862	0	0	0	0	30	0	55
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane					Yes							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 37.6%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	29	996	1	0	761	32	0	0	0	28	0	51
Future Volume (Veh/h)	29	996	1	0	761	32	0	0	0	28	0	51
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	32	1083	1	0	827	35	0	0	0	30	0	55
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			TWLTL							
Median storage veh)					2							
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	862			1084			1616	2010	542	1450	1992	431
vC1, stage 1 conf vol							1148	1148		844	844	
vC2, stage 2 conf vol							468	862		606	1148	
vCu, unblocked vol	862			1084			1616	2010	542	1450	1992	431
tC, single (s)	4.2			4.1			7.5	6.5	6.9	7.6	6.5	7.1
tC, 2 stage (s)							6.5	5.5		6.6	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.4
p0 queue free %	96			100			100	100	100	89	100	90
cM capacity (veh/h)	769			639			186	208	485	263	215	556

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total	32	722	362	414	448	0	30	55
Volume Left	32	0	0	0	0	0	30	0
Volume Right	0	0	1	0	35	0	0	55
cSH	769	1700	1700	639	1700	1700	263	556
Volume to Capacity	0.04	0.42	0.21	0.00	0.26	0.00	0.11	0.10
Queue Length 95th (m)	1.0	0.0	0.0	0.0	0.0	0.0	3.1	2.6
Control Delay (s)	9.9	0.0	0.0	0.0	0.0	0.0	20.4	12.2
Lane LOS	A					A	C	B
Approach Delay (s)	0.3			0.0		0.0	15.1	
Approach LOS						A	C	

Intersection Summary					
Average Delay	0.8				
Intersection Capacity Utilization	37.6%	ICU Level of Service		A	
Analysis Period (min)	15				

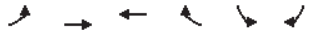
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	2	56	23	0	32	29
Future Volume (vph)	2	56	23	0	32	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850			0.936	
Flt Protected				0.950	0.975	
Satd. Flow (prot)	950	1568	0	1719	1611	0
Flt Permitted				0.950	0.975	
Satd. Flow (perm)	950	1568	0	1719	1611	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	26.4			125.6	28.4	
Travel Time (s)	1.9			9.0	2.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	100%	3%	5%	0%	11%	4%
Adj. Flow (vph)	2	61	25	0	35	32
Shared Lane Traffic (%)						
Lane Group Flow (vph)	2	61	0	25	67	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Stop			Stop	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	18.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	2	56	23	0	32	29
Future Volume (Veh/h)	2	56	23	0	32	29
Sign Control	Stop			Stop	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	61	25	0	35	32
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	102	0	148	86	0	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	102	0	148	86	0	
tC, single (s)	7.5	6.2	7.1	6.5	4.2	
tC, 2 stage (s)						
tF (s)	4.9	3.3	3.5	4.0	2.3	
p0 queue free %	100	94	97	100	98	
cM capacity (veh/h)	622	1082	753	790	1566	

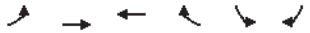
Direction, Lane #	EB 1	EB 2	WB 1	NB 1
Volume Total	2	61	25	67
Volume Left	0	0	25	35
Volume Right	0	61	0	32
cSH	622	1082	753	1566
Volume to Capacity	0.00	0.06	0.03	0.02
Queue Length 95th (m)	0.1	1.4	0.8	0.5
Control Delay (s)	10.8	8.5	9.9	3.9
Lane LOS	B	A	A	A
Approach Delay (s)	8.6		9.9	3.9
Approach LOS	A		A	

Intersection Summary			
Average Delay	6.8		
Intersection Capacity Utilization	18.2%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	47	30	2	11	0
Future Volume (vph)	0	47	30	2	11	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.992			
Flt Protected					0.950	
Satd. Flow (prot)	0	1759	1708	0	1805	0
Flt Permitted					0.950	
Satd. Flow (perm)	0	1759	1708	0	1805	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		98.3	26.4		67.4	
Travel Time (s)		7.1	1.9		4.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	8%	11%	0%	0%	0%
Adj. Flow (vph)	0	51	33	2	12	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	51	35	0	12	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	47	30	2	11	0
Future Volume (Veh/h)	0	47	30	2	11	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	51	33	2	12	0
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	35				85	34
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	35				85	34
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				99	100
cM capacity (veh/h)	1589				921	1045

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	51	35	12
Volume Left	0	0	12
Volume Right	0	2	0
cSH	1589	1700	921
Volume to Capacity	0.00	0.02	0.01
Queue Length 95th (m)	0.0	0.0	0.3
Control Delay (s)	0.0	0.0	9.0
Lane LOS			A
Approach Delay (s)	0.0	0.0	9.0
Approach LOS			A

Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	62	913	3	1	2274	49	3	3	1	5	0	45
Future Volume (vph)	62	913	3	1	2274	49	3	3	1	5	0	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	20.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	0		0	0		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.997			0.981				0.850
Flt Protected	0.950							0.979		0.950		
Satd. Flow (prot)	1752	3574	0	0	3564	0	0	1825	0	1805	0	1615
Flt Permitted	0.950							0.979		0.950		
Satd. Flow (perm)	1752	3574	0	0	3564	0	0	1825	0	1805	0	1615
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		134.2			176.1			41.9			28.4	
Travel Time (s)		9.7			12.7			3.0			2.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	1%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	67	992	3	1	2472	53	3	3	1	5	0	49
Shared Lane Traffic (%)												
Lane Group Flow (vph)	67	995	0	0	2526	0	0	7	0	5	0	49
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane					Yes							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	81.1%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	62	913	3	1	2274	49	3	3	1	5	0	45
Future Volume (Veh/h)	62	913	3	1	2274	49	3	3	1	5	0	45
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	67	992	3	1	2472	53	3	3	1	5	0	49
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			TWLTL							
Median storage veh)					2							
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	2525			995			2414	3654	498	3133	3630	1262
vC1, stage 1 conf vol							1128	1128		2500	2500	
vC2, stage 2 conf vol							1287	2527		632	1129	
vCu, unblocked vol	2525			995			2414	3654	498	3133	3630	1262
tC, single (s)	4.2			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	61			100			94	3	100	83	100	70
cM capacity (veh/h)	173			703			51	3	524	29	53	164

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total	67	661	334	1237	1289	7	5	49
Volume Left	67	0	0	1	0	3	5	0
Volume Right	0	0	3	0	53	1	0	49
cSH	173	1700	1700	703	1700	7	29	164
Volume to Capacity	0.39	0.39	0.20	0.00	0.76	1.03	0.17	0.30
Queue Length 95th (m)	13.5	0.0	0.0	0.0	0.0	13.1	4.3	9.5
Control Delay (s)	38.5	0.0	0.0	0.1	0.0	1037.2	153.8	36.1
Lane LOS	E			A		F	F	E
Approach Delay (s)	2.4			0.0		1037.2	47.0	
Approach LOS						F	E	

Intersection Summary				
Average Delay	3.4			
Intersection Capacity Utilization	81.1%	ICU Level of Service	D	
Analysis Period (min)	15			

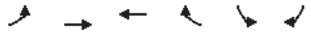
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	4	36	14	1	67	47
Future Volume (vph)	4	36	14	1	67	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850			0.944	
Flt Protected				0.955	0.971	
Satd. Flow (prot)	1267	1509	0	1688	1654	0
Flt Permitted				0.955	0.971	
Satd. Flow (perm)	1267	1509	0	1688	1654	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	26.4			125.6	28.4	
Travel Time (s)	1.9			9.0	2.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	50%	7%	8%	0%	2%	10%
Adj. Flow (vph)	4	39	15	1	73	51
Shared Lane Traffic (%)						
Lane Group Flow (vph)	4	39	0	16	124	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Stop			Stop	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	20.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	4	36	14	1	67	47
Future Volume (Veh/h)	4	36	14	1	67	47
Sign Control	Stop			Stop	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	39	15	1	73	51
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	197	0	212	172	0	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	197	0	212	172	0	
tC, single (s)	7.0	6.3	7.2	6.5	4.1	
tC, 2 stage (s)						
tF (s)	4.5	3.4	3.6	4.0	2.2	
p0 queue free %	99	96	98	100	96	
cM capacity (veh/h)	593	1070	677	693	1623	

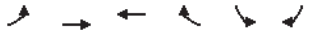
Direction, Lane #	EB 1	EB 2	WB 1	NB 1
Volume Total	4	39	16	124
Volume Left	0	0	15	73
Volume Right	0	39	0	51
cSH	593	1070	678	1623
Volume to Capacity	0.01	0.04	0.02	0.04
Queue Length 95th (m)	0.2	0.9	0.6	1.1
Control Delay (s)	11.1	8.5	10.4	4.5
Lane LOS	B	A	B	A
Approach Delay (s)	8.7		10.4	4.5
Approach LOS	A		B	

Intersection Summary			
Average Delay	6.0		
Intersection Capacity Utilization	20.8%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	35	58	10	5	0
Future Volume (vph)	0	35	58	10	5	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.980			
Flt Protected					0.950	
Satd. Flow (prot)	0	1681	1831	0	1805	0
Flt Permitted					0.950	
Satd. Flow (perm)	0	1681	1831	0	1805	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		98.3	26.4		67.4	
Travel Time (s)		7.1	1.9		4.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	13%	2%	0%	0%	0%
Adj. Flow (vph)	0	38	63	11	5	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	38	74	0	5	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	13.7%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	35	58	10	5	0
Future Volume (Veh/h)	0	35	58	10	5	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	38	63	11	5	0
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	74				106	68
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	74				106	68
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				99	100
cM capacity (veh/h)	1538				896	1000

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	38	74	5
Volume Left	0	0	5
Volume Right	0	11	0
cSH	1538	1700	896
Volume to Capacity	0.00	0.04	0.01
Queue Length 95th (m)	0.0	0.0	0.1
Control Delay (s)	0.0	0.0	9.0
Lane LOS			A
Approach Delay (s)	0.0	0.0	9.0
Approach LOS			A

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	13.7%	ICU Level of Service	A
Analysis Period (min)	15		