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RE: 132 COLLEGE STREET, WEST LINCOLN (SMITHVILLE), ON
RESIDENTIAL DEVELOPMENT TRANSPORTATION IMPACT BRIEF UPDATE

Phelps Homes Ltd. retained Paradigm Transportation Solutions Limited (Paradigm) to conduct this Transportation Impact Brief (TIB) Update for a proposed residential development at 132 College Street in Smithville, Ontario.

Figure 1 (attached) illustrates the site location.

Scope of Work

This study reviews the forecast impacts of the site-generated traffic on the surrounding road network and identifies any required remedial measures. The scope of the study includes:

- Assessing current traffic and site conditions within the study area;
- Forecasting future non-development (background) traffic growth;
- Forecasting the additional site-generated traffic;
- Analyzing future traffic impacts on the surrounding road network for five years after the study commissioned date;
- Estimating the site's parking demand based on industry publications and other municipalities in Niagara Region; and
- Recommending any necessary mitigation.

The study was initially scoped with the Township in March 2022. To confirm that the originally approved study scope is still valid, Paradigm reached out to the Township in May 2024; however, no response has been provided to date. **Appendix A** contains the pre-study consultation material and response from the Township.

The intersections assessed in this study area include:

- College Street and Morgan Avenue (unsignalized);
- College Street and College Street Estates Driveway (unsignalized);
- St. Catharines Street and College Street (unsignalized); and
- One Site Driveway connection to College Street (assumed unsignalized).

Roadway Characteristics

The roadways of interest within the study area include St. Catharines Street, College Street, Morgan Avenue, and Frank Street and are described as follows[1]:

- **St. Catharines Street** is an east-west, two-lane regional arterial with a posted speed limit of 50 km/h. Sidewalks are provided on both sides of the roadway;
- **College Street** is a north-south, two-lane local roadway. A statutory speed limit of 50 km/h is assumed, and a sidewalk is provided on the east side of the roadway;
- **Morgan Avenue** is an east-west, two-lane local roadway. A statutory speed limit of 50 km/h is assumed, and a sidewalk is provided on the south side of the roadway from Brock Street to approximately 70 m east of College Street; and
- **Frank Street** is a one-lane local roadway connecting travellers from Griffin Street to the intersection of St. Catharines Street at College Street. There are no sidewalks provided on either side of the roadway.

Existing Traffic Volumes

Paradigm undertook turning movement counts at the study area intersections in March 2022. The March 2022 data was factored to 2024 using a 2% annual growth rate. Volume balancing was also completed for the 2024 base year condition along College Street and Morgan Avenue.

Figure 2 (attached) illustrates the adjusted base year weekday AM and PM peak hour traffic volumes. **Appendix B** contains the detailed existing count data.

[1] Township of West Lincoln, *Official Plan Schedule 'F' Infrastructure & Transportation,* (Smithville: Township of West Lincoln, 2018).

Existing Traffic Operations

Intersection level of service (LOS) is a recognized method of quantifying the average delay experienced by drivers at intersections. It is based on the delay related to the number of vehicles desiring to move compared to the estimated capacity. The operations of the study intersections were evaluated using the existing lane configurations, traffic controls, and the base year traffic peak hour volumes. The level of service conditions on the existing road network has been assessed using Synchro 11 with HCM 2000 procedures.

As noted in Niagara Region TIS guidelines[2], movements at unsignalized intersections are considered critical under the following conditions:

- Volume to Capacity ratios (v/c) for movements that exceed 0.85 at a signalized intersection;
- The 95th percentile queues for an individual movement are projected to exceed available turning lane storage, block site accesses, and left and right turn lanes are blocked by the through movement queues (same approach); and
- Based on the average delay per vehicle on individual movements, LOS operates at LOS D or worse for an unsignalized intersection and LOS E or worse for a signalized intersection.

Table 1 summarizes the existing intersection operations. The entries in the table indicate the peak hour level of service, volume-to-capacity ratios, and 95th-percentile queues experienced. **Appendix C** contains the detailed Synchro reports. The following is noted with respect to the operational assessment:

- All study area intersections are forecast to operate at acceptable service levels during the AM and PM peak hours, and no critical movements have been noted.

[2] Niagara Region, *Transportation Impact Assessment Guidelines,* (Thorold: Niagara Region, 2023).

TABLE 1: EXISTING OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction/Movement/Approach																	Overall
				Eastbound				Westbound				Northbound				Southbound					
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach		
AM Peak Hour	Frank Street/College Street & St. Catharines Street	TWSC	LOS	A	A		**A**		A	>	**A**	<	B	>	**B**	B		>	**B**		
			Delay	8	0		**0**		0	>	**0**	<	13	>	**13**	15		>	**15**		
			V/C	0.02	0.20				0.21	>		<	0.00	>		0.06		>			
			Q	0	0				0	>		<	0	>		1		>			
			Stor.	15	-				-	>		<	-	>		-		>			
			Avail.	15	-				-	>		<	-	>		-		>			
	College Street & Morgan Avenue	TWSC	LOS		A	>	**A**	<	A		**A**	A		>	**A**						
			Delay		0	>	**0**	<	6		**6**	9		>	**9**						
			V/C		0.01	>		<	0.01			0.03		>							
			Q		0	>		<	0			1		>							
	College Street & Estates Driveway	TWSC	LOS					A		>	**A**		A	>	**A**	<	A		**A**		
			Delay					9		>	**9**		0	>	**0**	<	0		**0**		
			V/C					0.01		>			0.02	>		<	0.00				
			Q					0		>			0	>		<	0				
PM Peak Hour	Frank Street/College Street & St. Catharines Street	TWSC	LOS	A	A		**A**		A	>	**A**	<	C	>	**C**	C		>	**C**		
			Delay	9	0		**0**		0	>	**0**	<	17	>	**17**	23		>	**23**		
			V/C	0.02	0.29				0.30	>		<	0.01	>		0.15		>			
			Q	1	0				0	>		<	0	>		4		>			
			Stor.	15	-				-	>		<	-	>		-		>			
			Avail.	14	-				-	>		<	-	>		-		>			
	College Street & Morgan Avenue	TWSC	LOS		A	>	**A**	<	A		**A**	A		>	**A**						
			Delay		0	>	**0**	<	6		**6**	9		>	**9**						
			V/C		0.02	>		<	0.00			0.06		>							
			Q		0	>		<	0			1		>							
	College Street & Estates Driveway	TWSC	LOS					A		>	**A**		A	>	**A**	<	A		**A**		
			Delay					9		>	**9**		0	>	**0**	<	0		**0**		
			V/C					0.00		>			0.04	>		<	0.00				
			Q					0		>			0	>		<	0				

MOE - Measure of Effectiveness
LOS - Level of Service
Delay - Average Delay per Vehicle in Seconds
V/C - Volume to Capacity Ratio
Q - 95th Percentile Queue Length (m)
Stor. - Existing Storage (m)
Avail. - Available Storage (m)
TWSC - Two-Way Stop Control
< / > - Shared Movement

Development Concept

Development Description

The subject site is proposed to be redeveloped into nine stacked townhouse blocks with 144 units. Vehicle access is proposed via one all-move access to College Street.

Figure 3 (attached) shows the proposed development concept.

Trip Generation

The Institute of Transportation Engineers (ITE) Trip Generation manual[3] methods forecast site-generated trips. Land Use Code (LUC) 220 (Multifamily Housing, Low-Rise) was used to estimate the site trip generation.

Table 2 summarizes the forecast site-generated trips, indicating 67 AM peak hour and 82 PM peak trips. No reductions for alternative modes of transportation were used in the calculation.

TABLE 2: FORECAST SITE-GENERATED TRIPS

Land Use	Units	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
LUC 220	144	16	51	67[1]	52	30	82[2]

1: T = 0.31(X) + 22.85 | 2: T = 0.43(X) + 20.55

Trip Distribution

The directional distribution of traffic approaching and departing the development is a function of several variables: population densities, employment locations, existing travel patterns, and the efficiency of the site's roadways. The estimated distribution was developed using the Transportation Tomorrow Survey[4] (TTS) data for the subject site zone. **Table 3** summarizes the estimated trip distribution for site-generated traffic volumes. **Figure 4 (attached)** illustrates the weekday peak hour site-generated traffic volumes.

[3] Institute of Transportation Engineers, *Trip Generation Manual,* 11th ed., (Washington DC: ITE, 2021).
[4] Transportation Tomorrow Survey 2016, University of Toronto Data Management Group.

TABLE 3: TRIP DISTRIBUTION

Origin/Destination	Distribution
East via St. Catharines Street	25%
West via St. Catharines Street	75%
Total	**100%**

Future Traffic Volumes

A horizon year of five years after the year of study (2029) has been assessed. The likely future volumes near the subject site are estimated to consist of:

- Increased non-site traffic (generalized background traffic growth). A growth rate of 2% per annum was applied to existing traffic volumes; and
- Traffic generated by the subject site.

The Township identified no background developments for inclusion in the background traffic volumes.

Figure 5 and Figure 6 (attached) illustrate the future background traffic (without development) and total traffic volumes (with development), respectively.

Future Traffic Operations

Future Background Traffic Operations

The study area intersection operations analysis for the forecast background traffic scenario followed the same methodology used for the existing traffic conditions. **Table 4** details the level of service conditions. **Appendix D** contains the detailed Synchro 11 reports with HCM 2000 procedures.

All study area intersections are forecast to operate at acceptable levels of service during the AM and PM peak hours, with the following critical movements noted at the intersection of St. Catharines Street and College Street:

- The southbound movement is forecast to operate at LOS D during the PM peak hour and a v/c ratio of 0.20. The southbound approach is operating at 20% of its available capacity.

Future Total Traffic Operations

The study area intersection operations analysis for the future total traffic scenario followed the same methodology used for the existing and background traffic conditions. **Table 5** details the level of service conditions for the weekday AM and PM peak hours. **Appendix E** contains the detailed Synchro 11 reports with HCM 2000 procedures.

All study area intersections are forecast to operate at acceptable levels of service during the AM and PM peak hours, with the following critical movements noted at the intersection of St. Catharines Street and College Street:

- The southbound movement is forecast to operate at LOS D during the PM peak hour and a v/c ratio of 0.35. The southbound approach is operating at 35% of its available capacity.

With the addition of the site-generated traffic volumes, the approach delays at the existing study area intersections increase by three seconds or less during the AM and PM peak hours.

TABLE 4: BACKGROUND OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction/Movement/Approach																Overall
				Eastbound				Westbound				Northbound				Southbound				
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	Frank Street/College Street & St. Catharines Street	TWSC	LOS	A	A		**A**		A	>	**A**	<	B	>	**B**	C		>	**C**	
			Delay	8	0		**0**		0	>	**0**	<	14	>	**14**	16		>	**16**	
			V/C	0.02	0.23				0.24	>		<	0.00	>		0.07		>		
			Q	0	0				0	>		<	0	>		2		>		
			Stor.	15	-				-	>		<	-	>		-		>		
			Avail.	15	-				-	>		<	-	>		-		>		
	College Street & Morgan Avenue	TWSC	LOS		A	>	**A**	<	A		**A**	A		>	**A**					
			Delay		0	>	**0**	<	6		**6**	9		>	**9**					
			V/C		0.01	>		<	0.01			0.03		>						
			Q		0	>		<	0			1		>						
	College Street & Estates Driveway	TWSC	LOS					A		>	**A**		A	>	**A**	<	A		**A**	
			Delay					9		>	**9**		0	>	**0**	<	0		**0**	
			V/C					0.01		>			0.02	>		<	0.00			
			Q					0		>			0	>		<	0			
PM Peak Hour	Frank Street/College Street & St. Catharines Street	TWSC	LOS	A	A		**A**		A	>	**A**	<	C	>	**C**	D		>	**D**	
			Delay	9	0		**0**		0	>	**0**	<	19	>	**19**	28		>	**28**	
			V/C	0.03	0.32				0.34	>		<	0.02	>		0.20		>		
			Q	1	0				0	>		<	0	>		5		>		
			Stor.	15	-				-	>		<	-	>		-		>		
			Avail.	14	-				-	>		<	-	>		-		>		
	College Street & Morgan Avenue	TWSC	LOS		A	>	**A**	<	A		**A**	A		>	**A**					
			Delay		0	>	**0**	<	6		**6**	9		>	**9**					
			V/C		0.02	>		<	0.00			0.06		>						
			Q		0	>		<	0			1		>						
	College Street & Estates Driveway	TWSC	LOS					A		>	**A**		A	>	**A**	<	A		**A**	
			Delay					9		>	**9**		0	>	**0**	<	0		**0**	
			V/C					0.00		>			0.04	>		<	0.00			
			Q					0		>			0	>		<	0			

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Stor. - Existing Storage (m)
Avail. - Available Storage (m)
TWSC - Two-Way Stop Control
< / > - Shared Movement

TABLE 5: TOTAL OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction/Movement/Approach																Overall
				Eastbound				Westbound				Northbound				Southbound				
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	Frank Street/College Street & St. Catharines Street	TWSC	LOS	A	A		A		A	>	A	<	B	>	B	C		>	C	
			Delay	8	0		1		0	>	0	<	14	>	14	16		>	16	
			V/C	0.03	0.23				0.24	>		<	0.01	>		0.19		>		
			Q	1	0				0	>		<	0	>		5		>		
			Stor.	15	-				-	>		<	-	>		-		>		
			Avail.	14	-				-	>		<	-	>		-		>		
	College Street & Morgan Avenue	TWSC	LOS		A	>	A	<	A		A	A		>	A					
			Delay		0	>	0	<	6		6	9		>	9					
			V/C		0.01	>		<	0.01			0.03		>						
			Q		0	>		<	0			1		>						
	College Street & Estates Driveway	TWSC	LOS					A		>	A		A	>	A	<	A		A	
			Delay					9		>	9		0	>	0	<	0		0	
			V/C					0.01		>			0.03	>		<	0.00			
			Q					0		>			0	>		<	0			
	College Street & Site Driveway	TWSC	LOS					A		>	A		A	>	A	<	A		A	
			Delay					9		>	9		0	>	0	<	0		0	
			V/C					0.06		>			0.03	>		<	0.00			
			Q					1		>			0	>		<	0			
PM Peak Hour	Frank Street/College Street & St. Catharines Street	TWSC	LOS	A	A		A		A	>	A	<	C	>	C	D		>	D	
			Delay	9	0		1		0	>	0	<	22	>	22	31		>	31	
			V/C	0.07	0.32				0.34	>		<	0.02	>		0.35		>		
			Q	2	0				0	>		<	0	>		11		>		
			Stor.	15	-				-	>		<	-	>		-		>		
			Avail.	13	-				-	>		<	-	>		-		>		
	College Street & Morgan Avenue	TWSC	LOS		A	>	A	<	A		A	A		>	A					
			Delay		0	>	0	<	6		6	9		>	9					
			V/C		0.02	>		<	0.00			0.06		>						
			Q		0	>		<	0			1		>						
	College Street & Estates Driveway	TWSC	LOS					A		>	A		A	>	A	<	A		A	
			Delay					10		>	10		0	>	0	<	0		0	
			V/C					0.00		>			0.07	>		<	0.00			
			Q					0		>			0	>		<	0			
	College Street & Site Driveway	TWSC	LOS					A		>	A		A	>	A	<	A		A	
			Delay					9		>	9		0	>	0	<	0		0	
			V/C					0.04		>			0.07	>		<	0.00			
			Q					1		>			0	>		<	0			

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Delay - Average Delay per Vehicle in Seconds
V/C - Volume to Capacity Ratio
Q - 95th Percentile Queue Length (m)
Stor. - Existing Storage (m)
Avail. - Available Storage (m)
TWSC - Two-Way Stop Control
< / > - Shared Movement

Critical Movements

Under background and total traffic conditions, the southbound left-turn/right-turn movement at the intersection of St. Catharines Street and College Street is forecast to operate at LOS D (considered critical in Niagara Region TIS guidelines) during the PM peak hour. However, remedial measures are not recommended at this time, given the following:

- The approach delays are noted to be less than 35 seconds, and the v/c ratio does not surpass 0.35. The southbound movement is operating at 35% of its available capacity.
- The 95th percentile queue for the southbound movement at the intersection of St. Catharines Street and College Street reaches a length just shy of 2 passenger cars (11 metres). This confirms that delays at the intersection are reasonable as a significant queue is not projected for the southbound approach during the weekday peak hours.

Overall, there is still spare capacity available, and the queue lengths are reasonable; improvements are not recommended for the intersection of St. Catharines Street and College Street.

In the long term, if the Township would like to provide additional capacity at the intersection, a possible remedial measure could include the addition of separate left and right turn lanes for the southbound approach. No additional right-of-way would be required as College Street has a right-of-way of 20 metres. With respect to the possibility of signalizing the intersection, this improvement option would not be recommended, given spacing constraints at the signalized intersection of Regional Road 20 with Griffin Street South.

Neighbourhood Capacity

Roadway classifications are generally determined in accordance with the Transportation Association of Canada Geometric Design Guidelines for Canadian Roadways (TAC-GDGCR)[5]. A municipal road network typically has a local, collector, and arterial roadway hierarchy.

Per the Township of West Lincoln Official Plan, College Street and Morgan Avenue are classified as local roadways. The primary function of a local road is to provide direct access to properties. As indicated in TAC-GDGCR (Table 2.6.5), the environmental capacity for a local residential roadway is approximately 1,000 vehicles per day and 3,000 vehicles per day for a local industrial/commercial road. Based on the future total traffic forecast, it is estimated that the daily traffic volume will be less than 2,000 vehicles per day on College Street and less than 600 vehicles per day on Morgan Avenue.

College Street, which provides access to several commercial and residential properties, is forecast to operate within the daily capacity of a local commercial road based on the criteria outlined in TAC-GDGCR. Morgan Avenue is forecast to operate below the daily capacity for a local residential roadway. These roadways are not expected to experience any operational issues.

[5] Transportation Association of Canada, *Geometric Design Guide for Canadian Roads,* (Ottawa: TAC, 2017).

The above analysis indicates that the roadways will have sufficient capacity to accommodate additional traffic generated by the proposed development. The daily volumes along these roadways are expected to be within the capacity of a local road.

It is recognized that the proposed development will increase traffic on the study area roadways, and this traffic may be noticed by at least some of the adjacent residents who will perceive it to be a nuisance; however, the increased traffic volumes are not expected to result in deterioration in traffic operations.

Left-Turn Lane Warrant

The intersection of College Street at the Site Driveway was not assessed to determine if the projected traffic volumes warrant the installation of a left-turn lane. It is noted that none of the site-generated trips leave/access the site via College Street north of the Site Driveway. Therefore, no southbound left-turn lane is needed along College Street at the Site Driveway.

Parking Assessment

Zoning By-law Requirements

The proposed development is subject to the Township of West Lincoln Zoning By-law (ZBL) 2017-70. Under ZBL 2017-70[6], the following parking requirement applies:

- For every stacked townhouse unit, 1.75 parking spots are needed.

Applying the ZBL rate to the proposed use results in a total required parking supply of 252, whereas the site plan shows a parking supply of 219. **Table 6** summarizes the site-specific parking standard calculations.

TABLE 6: ZONING BY-LAW PARKING REQUIREMENTS

Units	ZBL 2017-70	Provided
144	252	219

[6] Township of West Lincoln Zoning By-law 2017-70, Part 3. General Provisions

ITE Parking Generation

Numerous industry associations and institutions are dedicated to surveying and reviewing parking requirements related to various land uses. These associations, such as the Institute of Transportation Engineers (ITE), collect, review and disseminate information about parking demand, supply, and appropriate design standards. This data helps establish a typical range of requirements. The parking generation manual[7] is a comparative starting point to determine baseline assumptions.

This study includes ITE peak period parking demand rates as guidelines to benchmark how the proposed supply compares to industry standards based on collected data at various proxy sites. The following ITE Land Use Code (LUC) was reviewed:

- **LUC 220 (Multifamily Housing, Low-Rise)** Low-rise multifamily housing with two-or-more bedrooms is a residential building with two or three floors (levels) of residence that contain at least one dwelling unit with two or more bedrooms. The average weekday peak parking demand ratio is 1.27 spaces per unit during the weekday and 1.18 spaces per unit on a Saturday. Various configurations can fit this description, including the following:
  - Walk-up apartment or multiplex-access to the individual dwelling units is typically internal to the structure and provided through a shared entry, stairway, and hallway.
  - Mansion apartment-several dwelling units within what appears from the outside to be a single-family dwelling unit.
  - Stacked townhouse-designed to match the external appearance of a townhouse, but which have dwelling units that share both floors and walls and with access through a central entry and stairway.

Table 7 outlines parking rates from ITE. The ITE parking rates stipulate the parking demand to be 183 spaces, whereas the site provides 219.

TABLE 7: ESTIMATED PARKING DEMAND – ITE RATES

Land Use Code	Units	Parking Rate	Parking Demand
220	144	1.27 spaces per unit	183

[7] Institute of Transportation Engineers. *Parking Generation Manual,* 6th ed., (Washington, DC: ITE, 2023).

Comparator Jurisdictional Review

Paradigm has completed a review of the parking by-law requirements for several other municipalities within the Niagara Region. The review included four municipalities that derive parking requirements for townhouses or private road developments.

- The Town of Grimsby's ZBL 14-45[8] indicates that every townhouse unit requires 1.50 parking spots. This results in a requirement of 216 parking spots for the proposed development.
- The City of Thorold's ZBL 2140-97[9] indicates block townhouse dwellings requires 1.50 parking spots. This results in a requirement of 216 parking spots for the proposed development.
- The Town of Fort Erie's ZBL 129-90[10] indicates that every block townhouse unit requires 1.50 parking spots. This results in a requirement of 216 parking spots for the proposed development.
- The Town of Pelham's ZBL 4481 (2022)[11] indicates an unspecified residential unit requires 1.25 parking spots. This results in a requirement of 180 parking spots for the proposed development.

The municipalities and their respective parking by-law requirements are presented in **Table 8**. As noted in **Table 8**, the parking rates for the comparator municipalities require a parking rate of 1.25 to 1.50 spaces per unit.

TABLE 8: COMPARATOR JURISDICTIONAL REVIEW

Municipality	By-Law	Land Use	Parking Requirement
Town of Grimsby	14-45	Townhouse Unit	1.50 spaces per unit
City of Thorold	2140-97	Fourplex, double duplex, block townhouse dwelling, or apartment building containing not more than 15 dwelling units	1.50 spaces per unit
Town of Pelham	4481(2022)	Other Permitted Residential	1.25 spaces per unit
Town of Fort Erie	129-90	Apartment and Block Townhouse Dwellings	1.50 spaces per unit

[8] Town of Grimsby Zoning By-law 14-45, Section 5.0 Parking and Loading Provisions
[9] City of Thorold By-law 2140-97, Section 6 General Provisions
[10] Town of Fort Erie Zoning By-law 129-09, Section 6 - General Provisions
[11] Town of Pelham Zoning By-law 4481 (2022), Section 4: Parking and Loading Requirements

Parking Summary

Based on the combination of ITE rates and parking requirements in other municipalities in the Niagara Region, the estimated parking demand is between 1.25 and 1.50 parking spaces per unit. With the site proposing 219 parking spaces (1.52 spaces per unit), the site falls just above the general demand estimated by ITE and the threshold based on a review of adjacent municipalities.

Conclusions and Recommendations

Conclusions

- **Existing Traffic Conditions:** All study area intersections are forecast to operate at acceptable service levels during the AM and PM peak hours, with no critical movements noted.
- **Development Trip Generation:** The development is forecast to generate approximately 67 and 82 trips during the AM and PM peak hours, respectively.
- **Future Background and Total Traffic Conditions:** The study area intersections are forecast to operate at acceptable levels of service similar to existing traffic conditions with the following critical movement noted:
  - Under background and total traffic conditions, the southbound left-turn/right-turn movement at the intersection of St. Catharines Street and College Street is forecast to operate at LOS D (considered critical in Niagara Region TIS guidelines) during the PM peak hour. However, remedial measures are not recommended at this time, given the following:
    - The approach delays are noted to be less than 35 seconds, and the v/c ratio does not surpass 0.35. The southbound movement is operating at 35% of its available capacity.
    - The 95th percentile queue for the southbound movement at the intersection of St. Catharines Street and College Street reaches a length just shy of 2 passenger cars (11 metres). This confirms that delays at the intersection are reasonable as a significant queue is not projected for the southbound approach during the weekday peak hours.
- **Zoning By-law Requirements:** Under the Township of West Lincoln ZBL 2017-70, the following parking requirement applies:
  - For every stacked townhouse unit, 1.75 parking spots are needed. Applying the ZBL rate to the proposed use results in a total required parking supply of 252, whereas the site plan shows a parking supply of 219.

- **Parking Summary:** Based on the combination of ITE rates and parking requirements in other municipalities in the Niagara Region, the estimated parking demand is between 1.25 and 1.50 parking spaces per unit. With the site proposing 219 parking spaces (1.50 spaces per unit), the site falls just above the general demand estimated by ITE and the threshold based on a review of adjacent municipalities.

Recommendations

Based on the findings of this study, it is recommended that the development be considered for approval with the proposed parking supply and no conditions related to off-site transportation improvements.

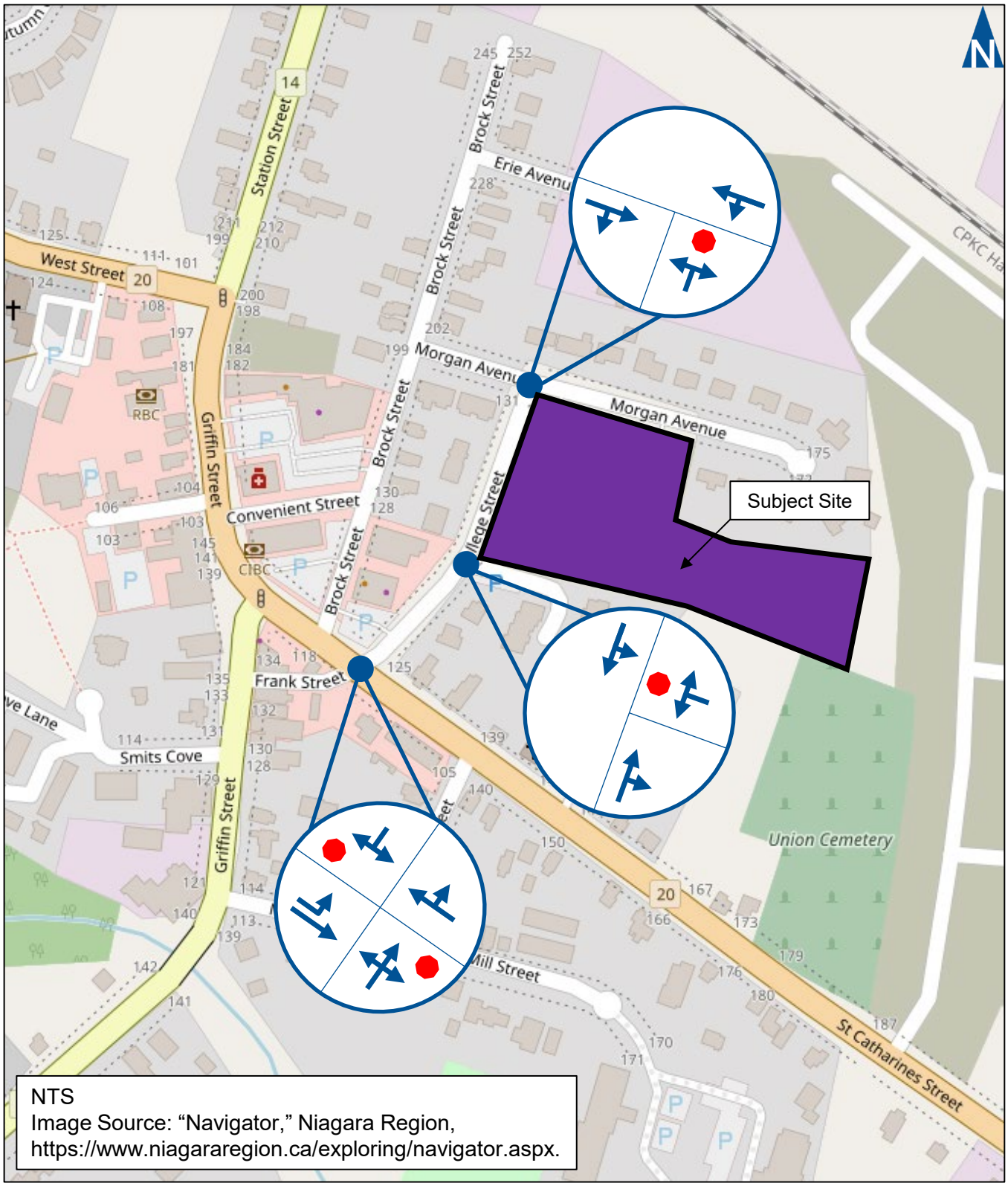
Yours truly,

PARADIGM TRANSPORTATION SOLUTIONS LIMITED

Adam J. Makarewicz
Dipl.T., C.E.T. MITE
Senior Project Manager

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

Attachments



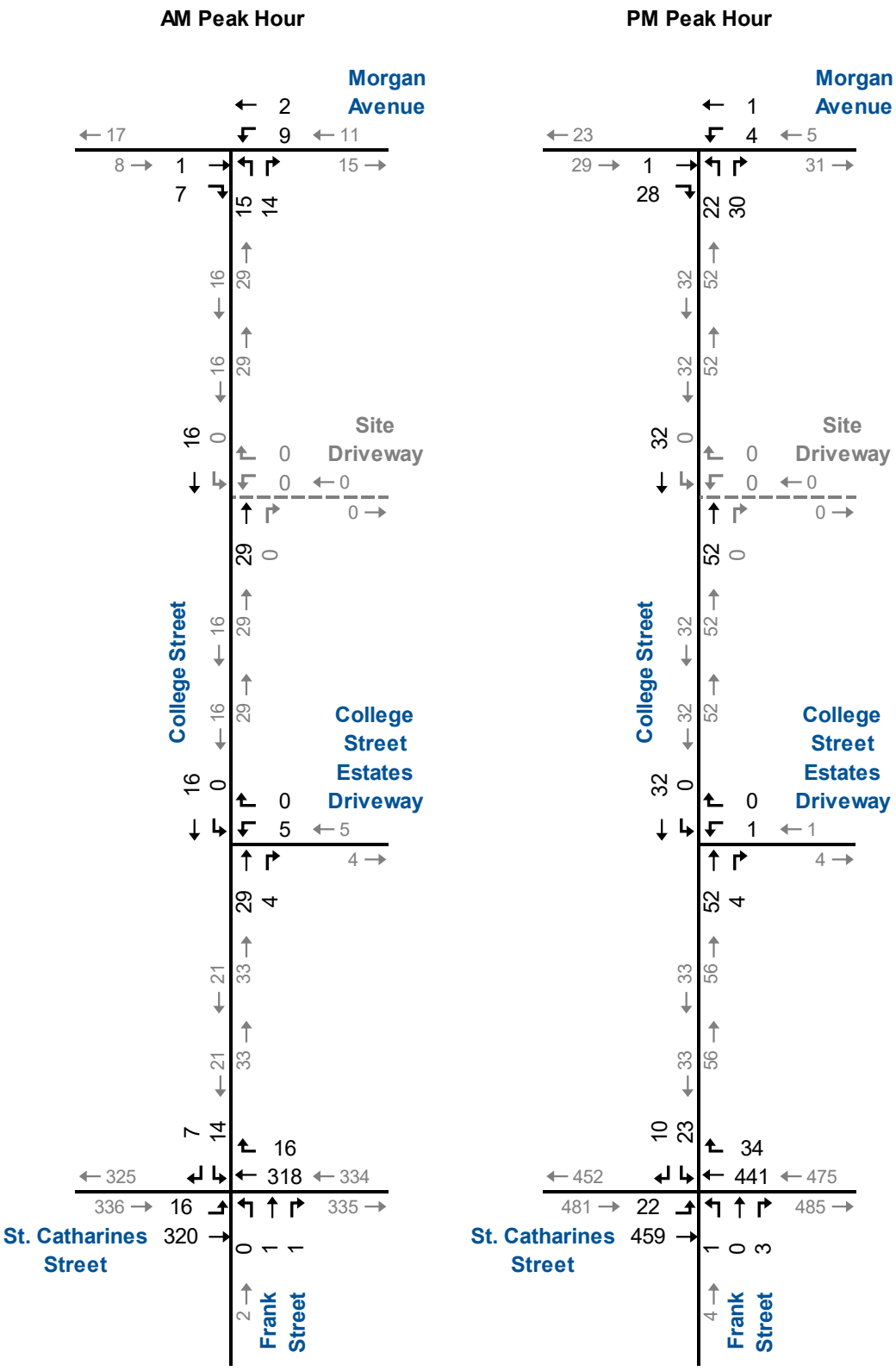
NTS
Image Source: “Navigator,” Niagara Region, https://www.niagararegion.ca/exploring/navigator.aspx.

paradigm TRANSPORTATION SOLUTIONS LIMITED

Site Location

132 College Street, Smithville TIB Update
240083

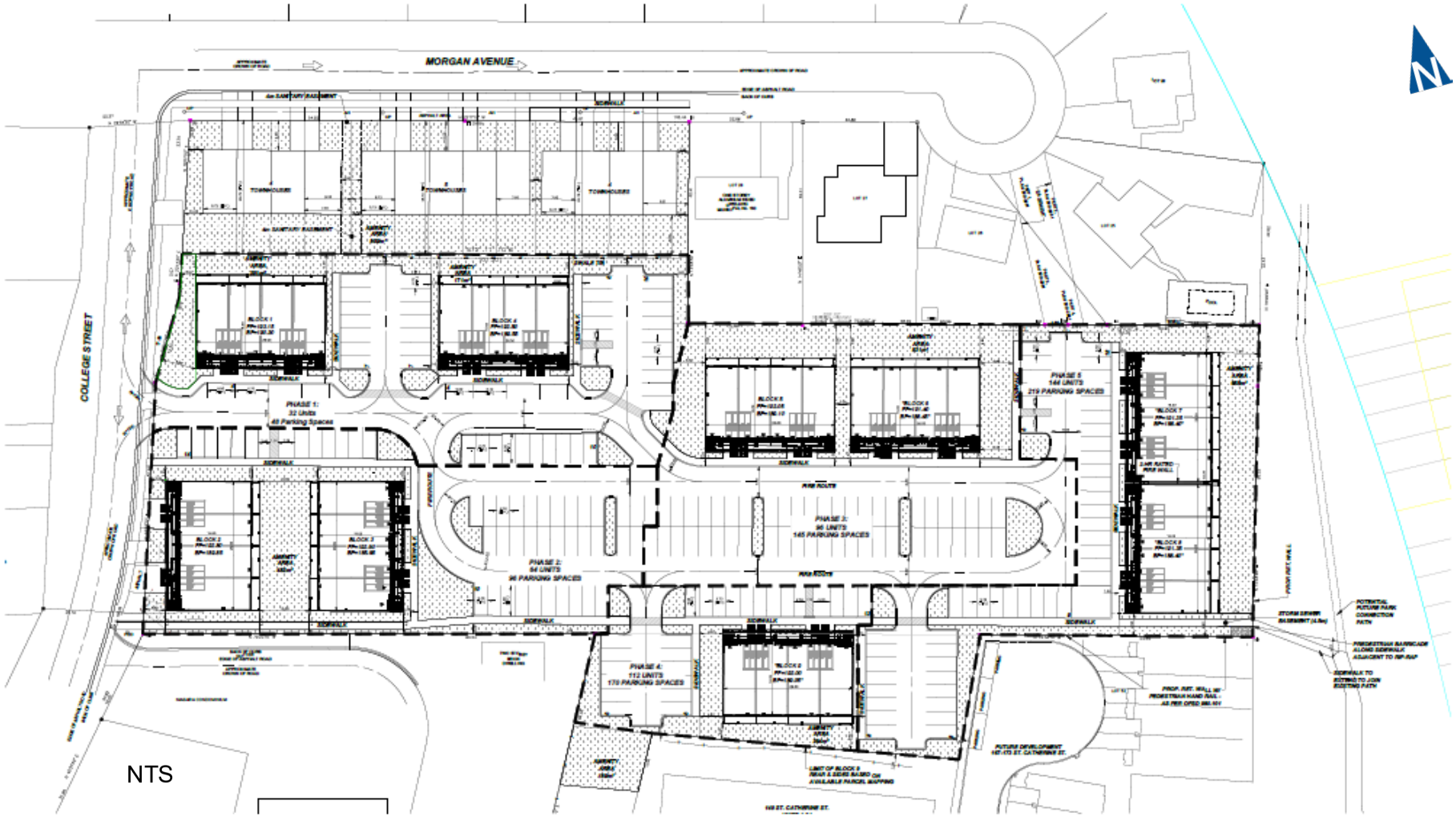
Figure 1



Base Year Traffic Volumes

132 College Street, Smithville TIB Update
240083

Figure 2

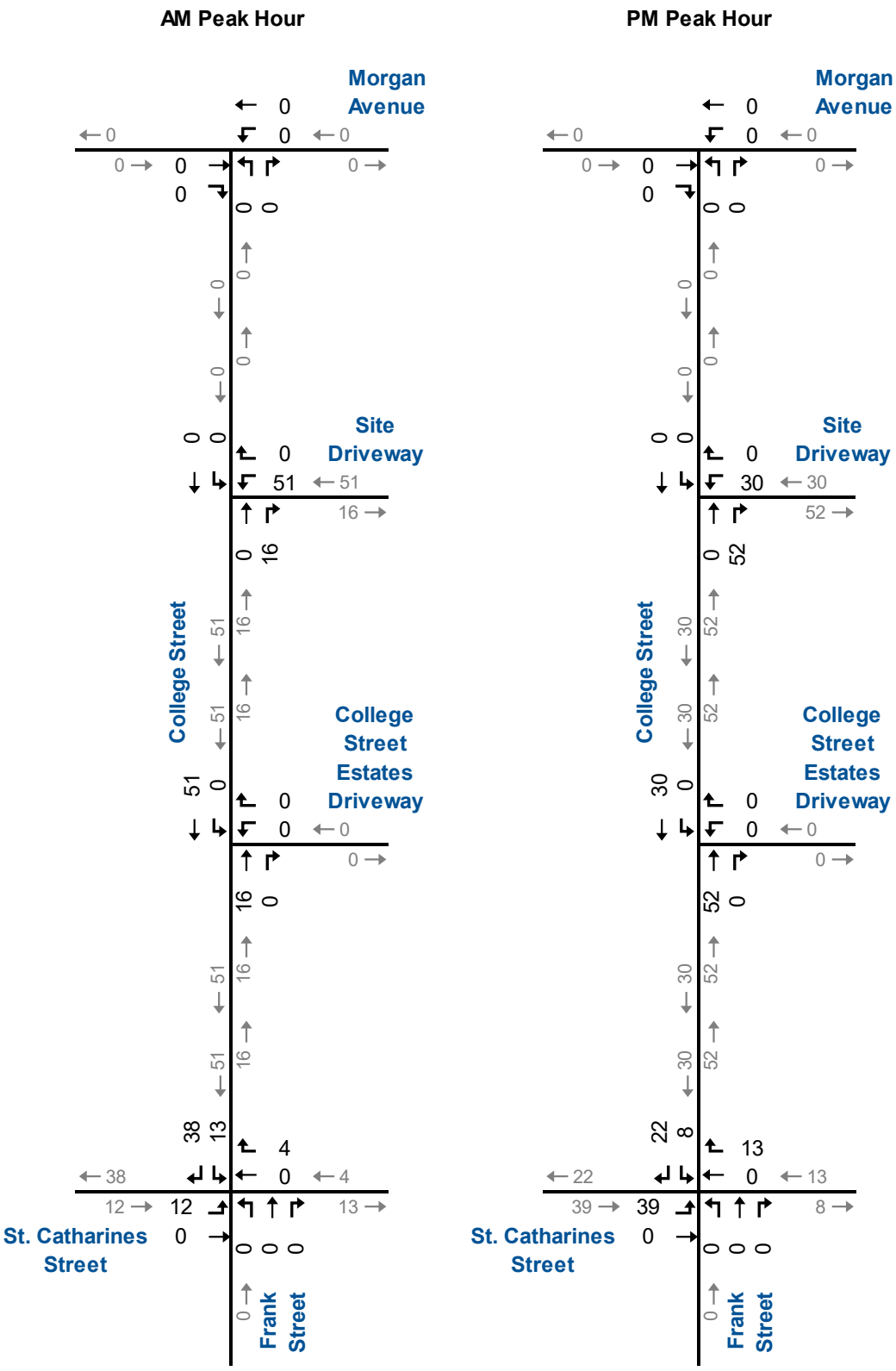


paradigm TRANSPORTATION SOLUTIONS LIMITED

Concept Plan

132 College Street, Smithville TIB Update
240083

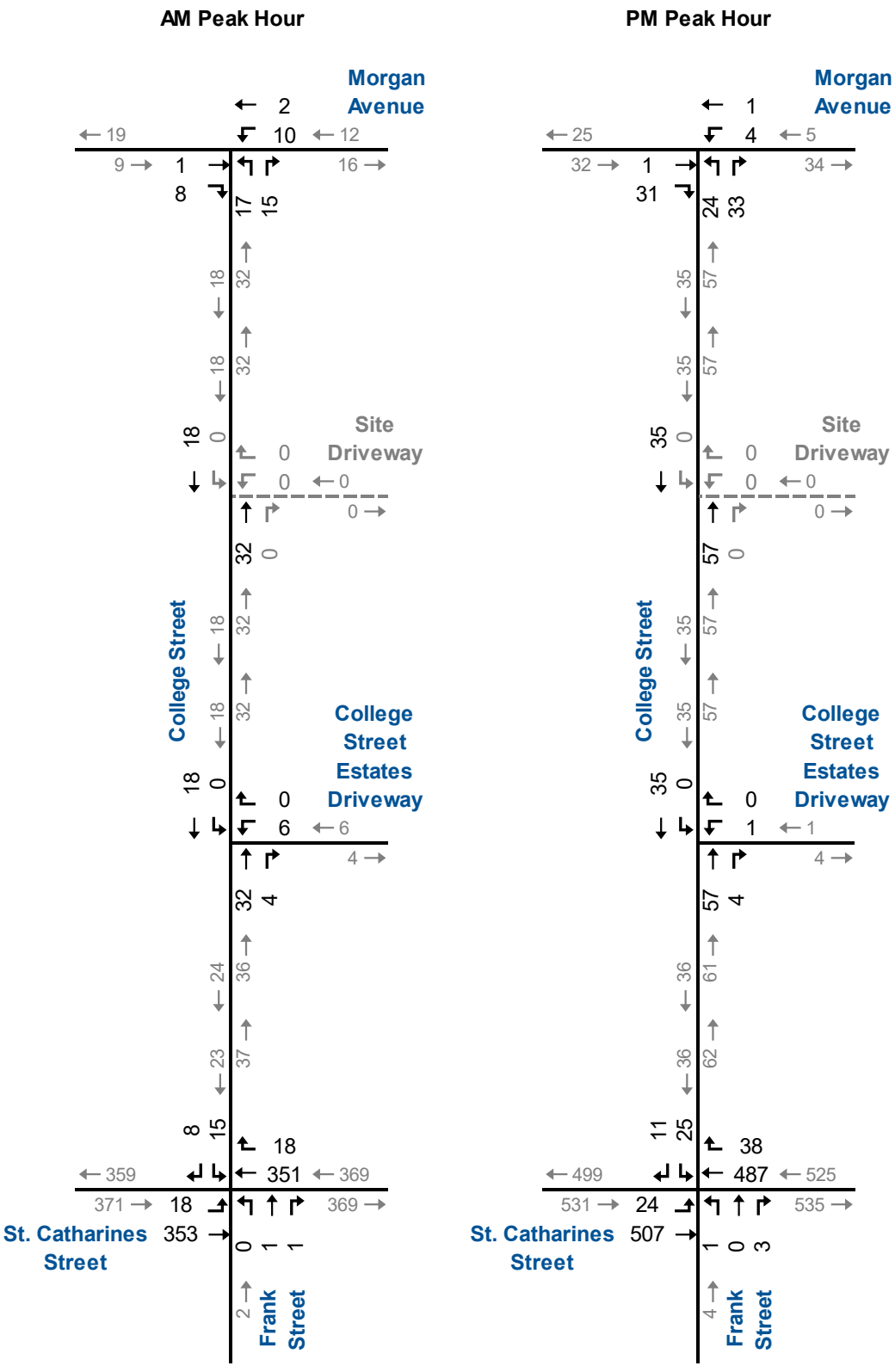
Figure 3



Site-Generated Traffic Volumes

132 College Street, Smithville TIB Update
240083

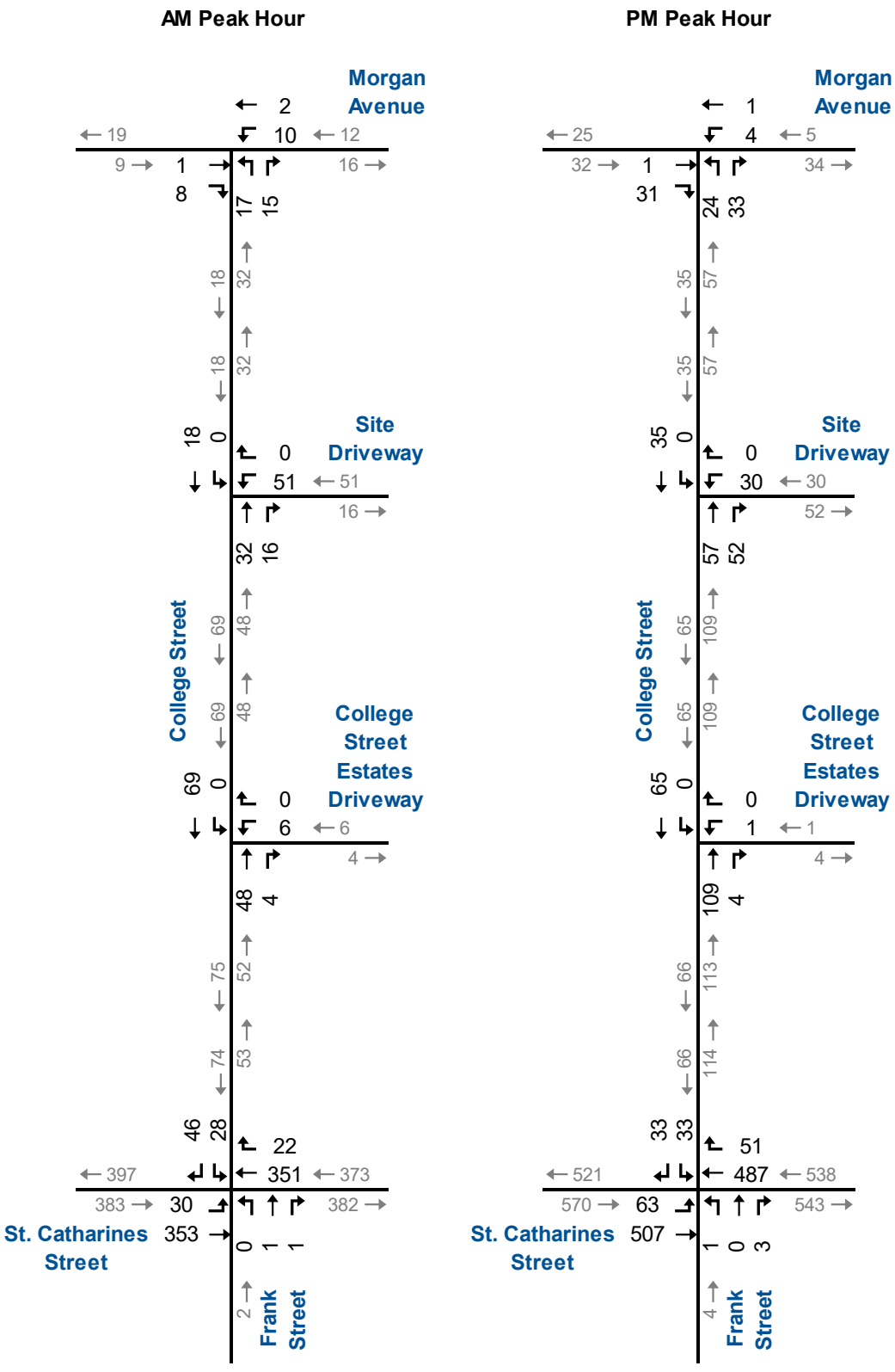
Figure 4



Background Traffic Volumes

132 College Street, Smithville TIB Update
240083

Figure 5



Total Traffic Volumes

132 College Street, Smithville TIB Update
240083

Figure 6

Appendix A: Pre-Study

From: Gerrit Boerema <gboerema@westlincoln.ca>
Sent: May 22, 2024 11:23 AM
To: Andrew Orr
Cc: Adam Makarewicz
Subject: RE: 240083 (132 College Street, Smithville) TIB Update

Hi Andrew,

Sorry for the delay – let me circle back with Public Works and get back to you.

Gerrit,

Our working hours may be different. Please do not feel obligated to reply outside of your working hours. Let's work together to help foster healthy work-life boundaries.

West Lincoln
Respecting our Roots – Realizing our Future

Gerrit Boerema

Manager of Planning
Tel: 905-957-3346 ext.5131
Email: gboerema@westlincoln.ca
Web: www.westlincoln.ca

From: Andrew Orr [mailto:aorr@ptsl.com]
Sent: May 22, 2024 10:46 AM
To: Gerrit Boerema <gboerema@westlincoln.ca>
Cc: Adam Makarewicz <amakarewicz@ptsl.com>
Subject: RE: 240083 (132 College Street, Smithville) TIB Update

Hi Gerrit,

I'm following up on the request below.

Best Regards,

Andrew Orr, M.A.Sc., EIT
Transportation Consultant, Associate
(He/Him)

5A-150 Pinebush Road, Cambridge ON, N1R 8J8
p: 519.896.3163 x210
m: 289-808-8997
e: aorr@ptsl.com
w: www.ptsl.com

From: Andrew Orr
Sent: Monday, May 13, 2024 4:32 PM
To: Gerrit Boerema <gboerema@westlincoln.ca>
Cc: Adam Makarewicz <amakarewicz@ptsl.com>
Subject: 240083 (132 College Street, Smithville) TIB Update

Hello Gerrit,

Paradigm Transportation Solutions Limited (Paradigm) has been retained to conduct an updated Transportation Impact Brief (TIB) for the development located at 132 College Street in Smithville, Ontario. Paradigm is wondering if the original terms of reference (attached) is still valid? The following updates are reflected in the latest concept plan (also attached):

- The updated residential unit count is 144; and
- There is only one driveway connection to College Street.

A parking study will also be prepared for this development

Best Regards,

Andrew Orr, M.A.Sc., EIT
Transportation Consultant, Associate
(He/Him)

5A-150 Pinebush Road, Cambridge ON, N1R 8J8
p: 519.896.3163 x210
m: 289-808-8997
e: aorr@ptsl.com
w: www.ptsl.com

From: Gerrit Boerema <gboerema@westlincoln.ca>
Sent: March 24, 2022 4:44 PM
To: Dunsmore, Susan; Patrick Neal
Cc: Adam Makarewicz; Alguire, Robert; Jennifer Bernard
Subject: RE: (220190) 130 College St, West Lincoln Transportation Brief - Pre-study Consultation
Attachments: Concept 7b-compressed.pdf

Hi Patrick,

What you have proposed is satisfactory to the Township.

One question, you mention there will be a connection to a private driveway, which I don't believe was on the original plan presented at pre-consultation. Can you confirm if that is even possible and if the condo would agree to that?

Gerrit,

West Lincoln
Your Future Naturally

Gerrit Boerema

Planner II

Tel: 905-957-3346 ext.5133
Email: gboerema@westlincoln.ca
Web: www.westlincoln.ca

COVID 19 Update March 1, 2022 – Beginning March 1st, the Township of West Lincoln is continuing to implement next steps in the Province's Next Phase of Reopening.

From: Dunsmore, Susan [mailto:Susan.Dunsmore@niagararegion.ca]
Sent: March 23, 2022 10:11 AM
To: Patrick Neal <pneal@ptsl.com>
Cc: Adam Makarewicz <amakarewicz@ptsl.com>; Gerrit Boerema <gboerema@westlincoln.ca>; Alguire, Robert <Robert.Alguire@niagararegion.ca>
Subject: RE: (220190) 130 College St, West Lincoln Transportation Brief - Pre-study Consultation

Hello Patrick

Thank you for looping the Region in on this terms of reference. The Region did not require the TIS therefore we have no comments on the Terms of Reference. If you require Regional traffic data requests are to be made through the website using the following link.

https://www.niagararegion.ca/living/roads/permits/traffic-data-requests.aspx

If you require anything further please contact me at your convenience.

Thank you,

Susan M. Dunsmore, P. Eng.
Manager, Development Engineering
Planning and Development Services

Phone: (905) 980-6000 or 1-800-263-7215 ext 3661
Address: 1815 Sir Isaac Brock Way, Thorold ON, L2V4T7

From: Patrick Neal <pneal@ptsl.com>
Sent: Tuesday, March 22, 2022 1:22 PM
To: Dunsmore, Susan <Susan.Dunsmore@niagararegion.ca>; Gerrit Boerema <gboerema@westlincoln.ca>
Cc: Adam Makarewicz <amakarewicz@ptsl.com>
Subject: (220190) 130 College St, West Lincoln Transportation Brief - Pre-study Consultation

Hi Susan and Gerrit,

We have been retained to complete the Transportation Brief for the proposed residential development located at 130 College Street in the Township of West Lincoln, Niagara Region. The property owner is proposing redevelopment of the lands to permit 132 townhouse units and 6 live/work units.

A concept site plan is attached.

Vehicle access to the development is proposed through three driveway connections to College Street, Morgan Avenue, and a private driveway located at the southern limit of the property.

Based on the above we will prepare the Transportation Brief in accordance with the Niagara Region Traffic Impact Study Guidelines with the following principles and assumptions and ask for these to be reviewed/confirmed:

- Weekday AM and PM peak hours of adjacent roads for analysis.
- Study Area Intersections:
    - College Street at Morgan Avenue (unsignalized);
    - College Street at Private Driveway (unsignalized); and
    - St. Catharines Street at College Street (signalized).

  We will collect traffic data in April 2022.

Please provide the signal timing plan for the St. Catharines Street at College Street intersection at your earliest convenience.

- Horizon Year: Five years from date of study (2027).
- Background Growth Rate: 2% per annum, **Please confirm.**
- Background Developments: **Please confirm and provide corresponding TIS reports or site statistics.**
- Background Roadway Improvements: **Please confirm, and provide build-out date and relevant reports/drawings.**
- Trip Generation: ITE Trip Generation Manual 11th Edition.
- Trip Distribution: Existing traffic patterns and Transportation Tomorrow Survey data.

Please let us know if you have any comments or questions.

Regards,

Patrick Neal
Transportation Consultant

Paradigm Transportation Solutions Limited
5A-150 Pinebush Road, Cambridge ON N1R 8J8
p: 416.479.9684 x510
m: 416.688.7338
e: pneal@ptsl.com
w: www.ptsl.com

Appendix B: Traffic Data

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: St. Catharines Street & College Street
Site Code: 220190
Start Date: 03/31/2022

Turning Movement Data

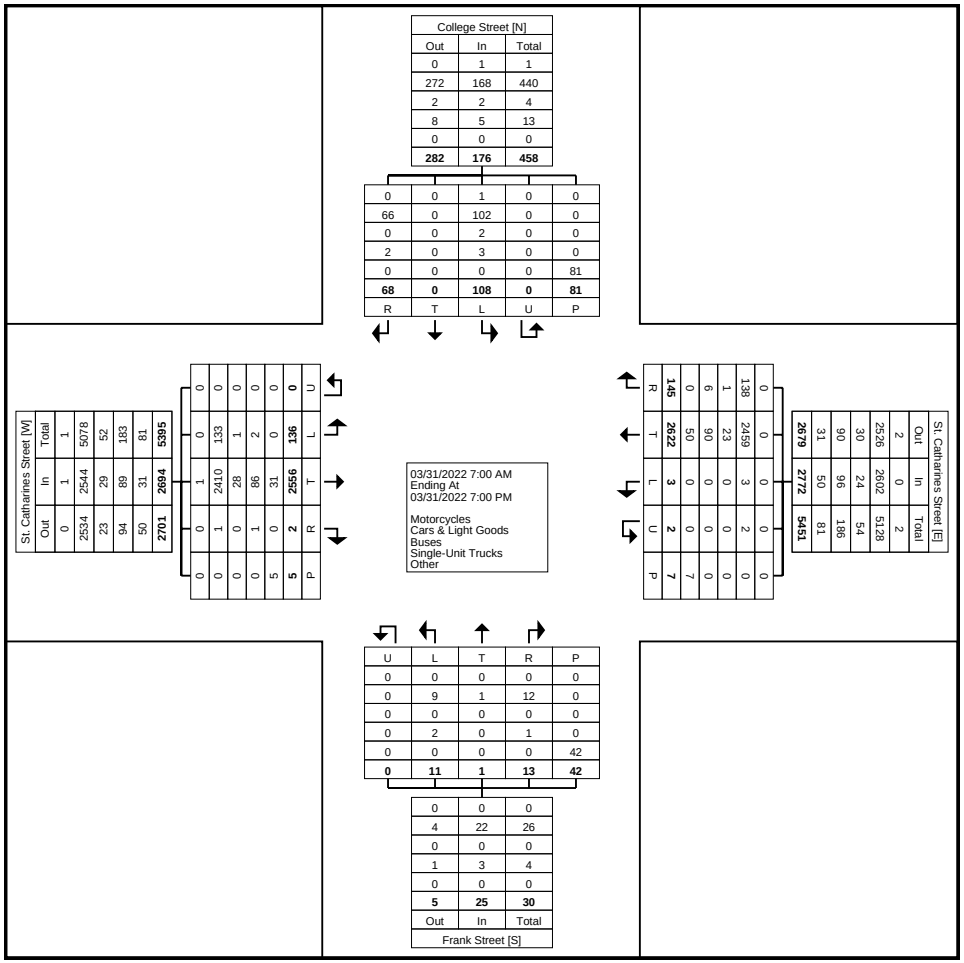
Start Time	St. Catharines Street Eastbound						St. Catharines Street Westbound						Frank Street Northbound						College Street Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
7:00 AM	3	50	0	0	0	53	0	75	2	0	0	77	0	0	2	0	0	2	2	0	4	0	0	6	138
7:15 AM	0	46	0	0	0	46	0	84	1	0	0	85	0	0	0	0	0	0	1	0	3	0	1	4	135
7:30 AM	3	53	0	0	0	56	0	84	3	0	0	87	0	0	0	0	0	0	1	0	2	0	1	3	146
7:45 AM	5	67	0	0	0	72	0	87	1	0	0	88	0	0	0	0	3	0	4	0	1	0	1	5	165
Hourly Total	11	216	0	0	0	227	0	330	7	0	0	337	0	0	2	0	3	2	8	0	10	0	3	18	584
8:00 AM	2	46	0	0	0	48	0	69	3	0	0	72	0	0	0	0	0	0	1	0	2	0	2	3	123
8:15 AM	4	76	0	0	0	80	0	81	4	0	0	85	0	0	0	0	1	0	3	0	3	0	7	6	171
8:30 AM	5	90	0	0	0	95	0	78	2	0	0	80	0	0	1	0	1	1	5	0	2	0	2	7	183
8:45 AM	2	66	0	0	1	68	1	74	7	0	0	82	0	0	0	0	0	0	3	0	1	0	1	4	154
Hourly Total	13	278	0	0	1	291	1	302	16	0	0	319	0	0	1	0	2	1	12	0	8	0	12	20	631
9:00 AM	4	76	0	0	0	80	0	72	2	0	0	74	0	1	0	0	1	1	2	0	1	0	1	3	158
9:15 AM	2	61	0	0	0	63	0	81	5	0	0	86	0	0	0	0	1	0	3	0	2	0	0	5	154
9:30 AM	4	74	0	0	0	78	0	69	2	0	0	71	0	0	0	0	0	0	3	0	2	0	1	5	154
9:45 AM	2	72	0	0	0	74	0	64	4	0	0	68	0	0	0	0	1	0	2	0	0	0	2	2	144
Hourly Total	12	283	0	0	0	295	0	286	13	0	0	299	0	1	0	0	3	1	10	0	5	0	4	15	610
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11:30 AM	1	66	0	0	0	67	0	77	5	0	0	82	1	0	0	0	0	1	1	0	0	0	4	1	151
11:45 AM	5	72	0	0	0	77	0	76	6	0	1	82	0	0	1	0	2	1	2	0	1	0	1	3	163
Hourly Total	6	138	0	0	0	144	0	153	11	0	1	164	1	0	1	0	2	2	3	0	1	0	5	4	314
12:00 PM	3	93	0	0	0	96	0	89	2	0	0	91	2	0	1	0	2	3	5	0	3	0	4	8	198
12:15 PM	2	72	0	0	0	74	0	93	4	0	1	97	0	0	0	0	1	0	3	0	0	0	0	3	174
12:30 PM	3	78	0	0	0	81	0	82	4	0	0	86	0	0	1	0	0	1	7	0	1	0	2	8	176
12:45 PM	1	81	1	0	0	83	0	82	5	0	0	87	0	0	0	0	0	0	3	0	1	0	7	4	174
Hourly Total	9	324	1	0	0	334	0	346	15	0	1	361	2	0	2	0	3	4	18	0	5	0	13	23	722
1:00 PM	8	94	0	0	0	102	0	85	5	0	0	90	1	0	0	0	3	1	5	0	4	0	4	9	202
1:15 PM	3	92	0	0	0	95	0	89	1	0	0	90	0	0	0	0	2	0	4	0	1	0	5	5	190
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hourly Total	11	186	0	0	0	197	0	174	6	0	0	180	1	0	0	0	5	1	9	0	5	0	9	14	392
4:00 PM	2	101	0	0	0	103	0	127	7	0	2	134	0	0	0	0	0	0	10	0	2	0	9	12	249
4:15 PM	9	129	0	0	0	138	1	94	12	0	1	107	0	0	3	0	0	3	4	0	1	0	3	5	253
4:30 PM	7	100	0	0	0	107	0	106	7	0	1	113	1	0	0	0	0	1	5	0	4	0	4	9	230
4:45 PM	3	111	0	0	0	114	0	96	7	0	0	103	0	0	0	0	5	0	3	0	3	0	2	6	223
Hourly Total	21	441	0	0	0	462	1	423	33	0	4	457	1	0	3	0	5	4	22	0	10	0	18	32	955
5:00 PM	9	131	0	0	2	140	0	91	5	0	0	96	1	0	0	0	0	1	5	0	5	0	1	10	247
5:15 PM	11	108	0	0	1	119	0	87	9	0	0	96	1	0	0	0	1	1	4	0	3	0	2	7	223

5:30 PM	3	101	0	0	1	104	0	90	8	0	0	98	1	0	0	0	2	1	4	0	2	0	0	6	209
5:45 PM	9	80	0	0	0	89	0	76	5	1	0	82	1	0	0	0	6	1	4	0	4	0	2	8	180
Hourly Total	32	420	0	0	4	452	0	344	27	1	0	372	4	0	0	0	9	4	17	0	14	0	5	31	859
6:00 PM	6	83	0	0	0	89	0	75	4	0	0	79	1	0	0	0	3	1	2	0	2	0	2	4	173
6:15 PM	4	51	0	0	0	55	0	70	4	1	0	75	0	0	2	0	1	2	5	0	2	0	2	7	139
6:30 PM	7	66	1	0	0	74	0	57	4	0	0	61	1	0	0	0	1	1	1	0	3	0	3	4	140
6:45 PM	4	70	0	0	0	74	1	62	5	0	1	68	0	0	2	0	5	2	1	0	3	0	5	4	148
Hourly Total	21	270	1	0	0	292	1	264	17	1	1	283	2	0	4	0	10	6	9	0	10	0	12	19	600
Grand Total	136	2556	2	0	5	2694	3	2622	145	2	7	2772	11	1	13	0	42	25	108	0	68	0	81	176	5667
Approach %	5.0	94.9	0.1	0.0	-	-	0.1	94.6	5.2	0.1	-	-	44.0	4.0	52.0	0.0	-	-	61.4	0.0	38.6	0.0	-	-	-
Total %	2.4	45.1	0.0	0.0	-	47.5	0.1	46.3	2.6	0.0	-	48.9	0.2	0.0	0.2	0.0	-	0.4	1.9	0.0	1.2	0.0	-	3.1	-
Motorcycles	0	1	0	0	-	1	0	0	0	0	-	0	0	0	0	0	-	0	1	0	0	0	-	1	2
% Motorcycles	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	0.9	-	0.0	-	-	0.6	0.0
Cars & Light Goods	133	2410	1	0	-	2544	3	2459	138	2	-	2602	9	1	12	0	-	22	102	0	66	0	-	168	5336
% Cars & Light Goods	97.8	94.3	50.0	-	-	94.4	100.0	93.8	95.2	100.0	-	93.9	81.8	100.0	92.3	-	-	88.0	94.4	-	97.1	-	-	95.5	94.2
Buses	1	28	0	0	-	29	0	23	1	0	-	24	0	0	0	0	-	0	2	0	0	0	-	2	55
% Buses	0.7	1.1	0.0	-	-	1.1	0.0	0.9	0.7	0.0	-	0.9	0.0	0.0	0.0	-	-	0.0	1.9	-	0.0	-	-	1.1	1.0
Single-Unit Trucks	2	86	1	0	-	89	0	90	6	0	-	96	2	0	1	0	-	3	3	0	2	0	-	5	193
% Single-Unit Trucks	1.5	3.4	50.0	-	-	3.3	0.0	3.4	4.1	0.0	-	3.5	18.2	0.0	7.7	-	-	12.0	2.8	-	2.9	-	-	2.8	3.4
Articulated Trucks	0	31	0	0	-	31	0	50	0	0	-	50	0	0	0	0	-	0	0	0	0	0	-	0	81
% Articulated Trucks	0.0	1.2	0.0	-	-	1.2	0.0	1.9	0.0	0.0	-	1.8	0.0	0.0	0.0	-	-	0.0	0.0	-	0.0	-	-	0.0	1.4
Bicycles on Road	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Bicycles on Road	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	0.0	-	0.0	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	1	-	-	-	-	-	2	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	2.4	-	-	-	-	-	2.5	-	-
Pedestrians	-	-	-	-	5	-	-	-	-	-	7	-	-	-	-	-	41	-	-	-	-	-	79	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	97.6	-	-	-	-	-	97.5	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: St. Catharines Street & College Street
Site Code: 220190
Start Date: 03/31/2022



Turning Movement Data Plot

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: St. Catharines Street & College Street
Site Code: 220190
Start Date: 03/31/2022

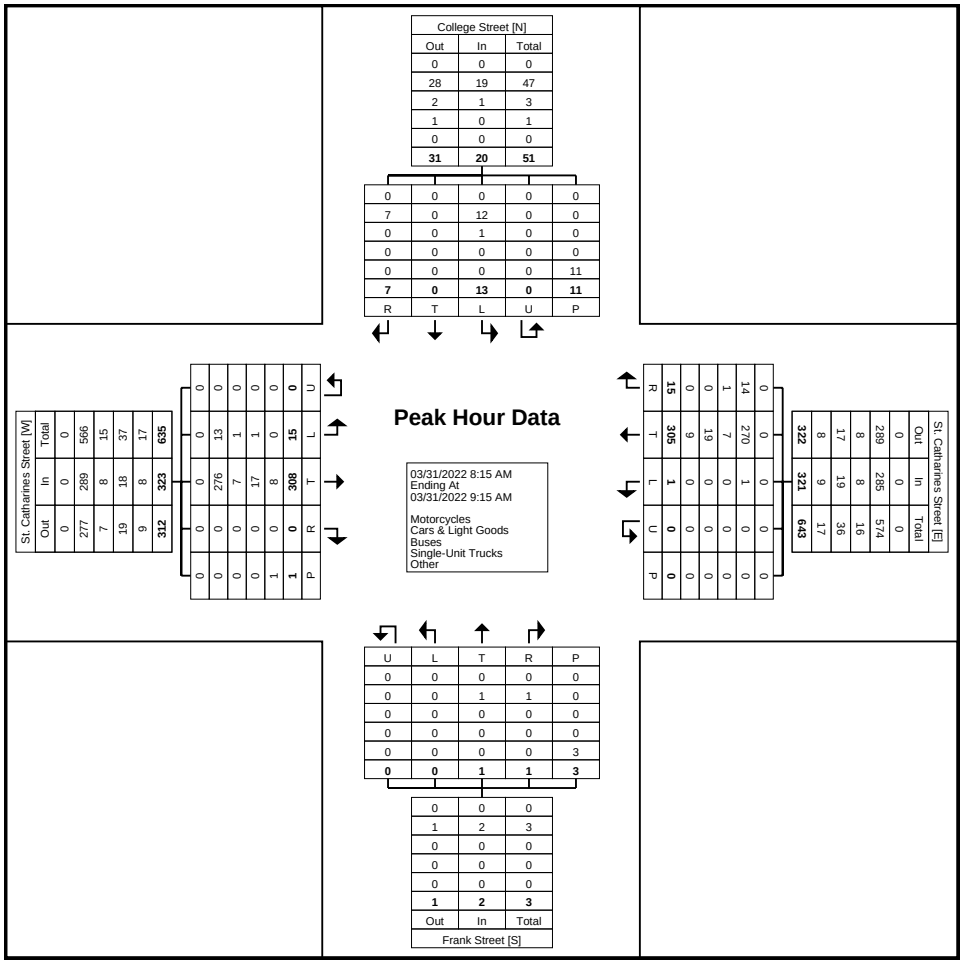
Turning Movement Peak Hour Data (8:15 AM)

Start Time	St. Catharines Street Eastbound						St. Catharines Street Westbound						Frank Street Northbound						College Street 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	
8:15 AM	4	76	0	0	0	80	0	81	4	0	0	85	0	0	0	0	1	0	3	0	3	0	7	6	171
8:30 AM	5	90	0	0	0	95	0	78	2	0	0	80	0	0	1	0	1	1	5	0	2	0	2	7	183
8:45 AM	2	66	0	0	1	68	1	74	7	0	0	82	0	0	0	0	0	0	3	0	1	0	1	4	154
9:00 AM	4	76	0	0	0	80	0	72	2	0	0	74	0	1	0	0	1	1	2	0	1	0	1	3	158
Total	15	308	0	0	1	323	1	305	15	0	0	321	0	1	1	0	3	2	13	0	7	0	11	20	666
Approach %	4.6	95.4	0.0	0.0	-	-	0.3	95.0	4.7	0.0	-	-	0.0	50.0	50.0	0.0	-	-	65.0	0.0	35.0	0.0	-	-	-
Total %	2.3	46.2	0.0	0.0	-	48.5	0.2	45.8	2.3	0.0	-	48.2	0.0	0.2	0.2	0.0	-	0.3	2.0	0.0	1.1	0.0	-	3.0	-
PHF	0.750	0.856	0.000	0.000	-	0.850	0.250	0.941	0.536	0.000	-	0.944	0.000	0.250	0.250	0.000	-	0.500	0.650	0.000	0.583	0.000	-	0.714	0.910
Motorcycles	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Motorcycles	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	0.0
Cars & Light Goods	13	276	0	0	-	289	1	270	14	0	-	285	0	1	1	0	-	2	12	0	7	0	-	19	595
% Cars & Light Goods	86.7	89.6	-	-	-	89.5	100.0	88.5	93.3	-	-	88.8	-	100.0	100.0	-	-	100.0	92.3	-	100.0	-	-	95.0	89.3
Buses	1	7	0	0	-	8	0	7	1	0	-	8	0	0	0	0	-	0	1	0	0	0	-	1	17
% Buses	6.7	2.3	-	-	-	2.5	0.0	2.3	6.7	-	-	2.5	-	0.0	0.0	-	-	0.0	7.7	-	0.0	-	-	5.0	2.6
Single-Unit Trucks	1	17	0	0	-	18	0	19	0	0	-	19	0	0	0	0	-	0	0	0	0	0	-	0	37
% Single-Unit Trucks	6.7	5.5	-	-	-	5.6	0.0	6.2	0.0	-	-	5.9	-	0.0	0.0	-	-	0.0	0.0	-	0.0	-	-	0.0	5.6
Articulated Trucks	0	8	0	0	-	8	0	9	0	0	-	9	0	0	0	0	-	0	0	0	0	0	-	0	17
% Articulated Trucks	0.0	2.6	-	-	-	2.5	0.0	3.0	0.0	-	-	2.8	-	0.0	0.0	-	-	0.0	0.0	-	0.0	-	-	0.0	2.6
Bicycles on Road	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Bicycles on Road	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	0.0
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	1	-	-	-	-	-	2	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	-	-	-	-	-	-	33.3	-	-	-	-	-	18.2	-	-
Pedestrians	-	-	-	-	1	-	-	-	-	-	0	-	-	-	-	-	2	-	-	-	-	-	9	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	-	-	-	-	-	-	66.7	-	-	-	-	-	81.8	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: St. Catharines Street & College Street
Site Code: 220190
Start Date: 03/31/2022



Turning Movement Peak Hour Data Plot (8:15 AM)

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: St. Catharines Street & College Street
Site Code: 220190
Start Date: 03/31/2022

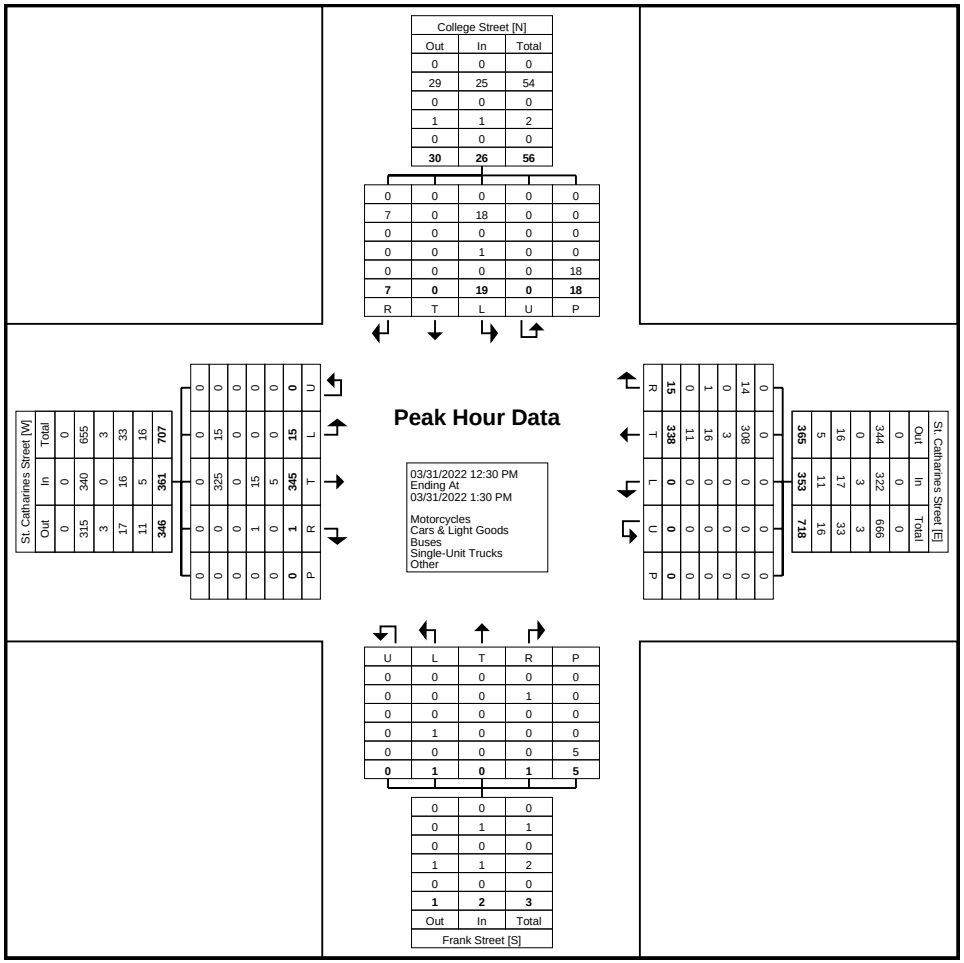
Turning Movement Peak Hour Data (12:30 PM)

Start Time	St. Catharines Street Eastbound						St. Catharines Street Westbound						Frank Street Northbound						College Street 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	
12:30 PM	3	78	0	0	0	81	0	82	4	0	0	86	0	0	1	0	0	1	7	0	1	0	2	8	176
12:45 PM	1	81	1	0	0	83	0	82	5	0	0	87	0	0	0	0	0	0	3	0	1	0	7	4	174
1:00 PM	8	94	0	0	0	102	0	85	5	0	0	90	1	0	0	0	3	1	5	0	4	0	4	9	202
1:15 PM	3	92	0	0	0	95	0	89	1	0	0	90	0	0	0	0	2	0	4	0	1	0	5	5	190
Total	15	345	1	0	0	361	0	338	15	0	0	353	1	0	1	0	5	2	19	0	7	0	18	26	742
Approach %	4.2	95.6	0.3	0.0	-	-	0.0	95.8	4.2	0.0	-	-	50.0	0.0	50.0	0.0	-	-	73.1	0.0	26.9	0.0	-	-	-
Total %	2.0	46.5	0.1	0.0	-	48.7	0.0	45.6	2.0	0.0	-	47.6	0.1	0.0	0.1	0.0	-	0.3	2.6	0.0	0.9	0.0	-	3.5	-
PHF	0.469	0.918	0.250	0.000	-	0.885	0.000	0.949	0.750	0.000	-	0.981	0.250	0.000	0.250	0.000	-	0.500	0.679	0.000	0.438	0.000	-	0.722	0.918
Motorcycles	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Motorcycles	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	0.0
Cars & Light Goods	15	325	0	0	-	340	0	308	14	0	-	322	0	0	1	0	-	1	18	0	7	0	-	25	688
% Cars & Light Goods	100.0	94.2	0.0	-	-	94.2	-	91.1	93.3	-	-	91.2	0.0	-	100.0	-	-	50.0	94.7	-	100.0	-	-	96.2	92.7
Buses	0	0	0	0	-	0	0	3	0	0	-	3	0	0	0	0	-	0	0	0	0	0	-	0	3
% Buses	0.0	0.0	0.0	-	-	0.0	-	0.9	0.0	-	-	0.8	0.0	-	0.0	-	-	0.0	0.0	-	0.0	-	-	0.0	0.4
Single-Unit Trucks	0	15	1	0	-	16	0	16	1	0	-	17	1	0	0	0	-	1	1	0	0	0	-	1	35
% Single-Unit Trucks	0.0	4.3	100.0	-	-	4.4	-	4.7	6.7	-	-	4.8	100.0	-	0.0	-	-	50.0	5.3	-	0.0	-	-	3.8	4.7
Articulated Trucks	0	5	0	0	-	5	0	11	0	0	-	11	0	0	0	0	-	0	0	0	0	0	-	0	16
% Articulated Trucks	0.0	1.4	0.0	-	-	1.4	-	3.3	0.0	-	-	3.1	0.0	-	0.0	-	-	0.0	0.0	-	0.0	-	-	0.0	2.2
Bicycles on Road	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Bicycles on Road	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	0.0
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	5	-	-	-	-	-	18	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: St. Catharines Street & College Street
Site Code: 220190
Start Date: 03/31/2022



Turning Movement Peak Hour Data Plot (12:30 PM)

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: St. Catharines Street & College Street
Site Code: 220190
Start Date: 03/31/2022

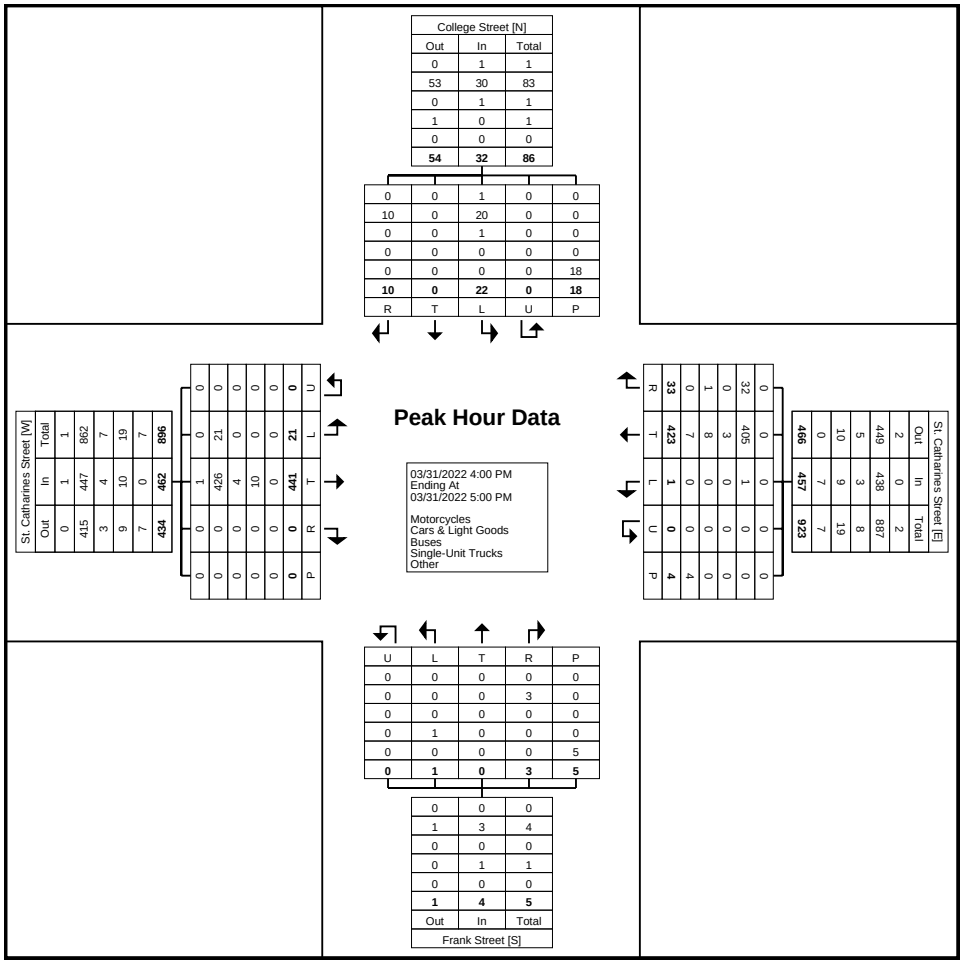
Turning Movement Peak Hour Data (4:00 PM)

Start Time	St. Catharines Street Eastbound						St. Catharines Street Westbound						Frank Street Northbound						College Street 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	
4:00 PM	2	101	0	0	0	103	0	127	7	0	2	134	0	0	0	0	0	0	10	0	2	0	9	12	249
4:15 PM	9	129	0	0	0	138	1	94	12	0	1	107	0	0	3	0	0	3	4	0	1	0	3	5	253
4:30 PM	7	100	0	0	0	107	0	106	7	0	1	113	1	0	0	0	0	1	5	0	4	0	4	9	230
4:45 PM	3	111	0	0	0	114	0	96	7	0	0	103	0	0	0	0	5	0	3	0	3	0	2	6	223
Total	21	441	0	0	0	462	1	423	33	0	4	457	1	0	3	0	5	4	22	0	10	0	18	32	955
Approach %	4.5	95.5	0.0	0.0	-	-	0.2	92.6	7.2	0.0	-	-	25.0	0.0	75.0	0.0	-	-	68.8	0.0	31.3	0.0	-	-	-
Total %	2.2	46.2	0.0	0.0	-	48.4	0.1	44.3	3.5	0.0	-	47.9	0.1	0.0	0.3	0.0	-	0.4	2.3	0.0	1.0	0.0	-	3.4	-
PHF	0.583	0.855	0.000	0.000	-	0.837	0.250	0.833	0.688	0.000	-	0.853	0.250	0.000	0.250	0.000	-	0.333	0.550	0.000	0.625	0.000	-	0.667	0.944
Motorcycles	0	1	0	0	-	1	0	0	0	0	-	0	0	0	0	0	-	0	1	0	0	0	-	1	2
% Motorcycles	0.0	0.2	-	-	-	0.2	0.0	0.0	0.0	-	-	0.0	0.0	-	0.0	-	-	0.0	4.5	-	0.0	-	-	3.1	0.2
Cars & Light Goods	21	426	0	0	-	447	1	405	32	0	-	438	0	0	3	0	-	3	20	0	10	0	-	30	918
% Cars & Light Goods	100.0	96.6	-	-	-	96.8	100.0	95.7	97.0	-	-	95.8	0.0	-	100.0	-	-	75.0	90.9	-	100.0	-	-	93.8	96.1
Buses	0	4	0	0	-	4	0	3	0	0	-	3	0	0	0	0	-	0	1	0	0	0	-	1	8
% Buses	0.0	0.9	-	-	-	0.9	0.0	0.7	0.0	-	-	0.7	0.0	-	0.0	-	-	0.0	4.5	-	0.0	-	-	3.1	0.8
Single-Unit Trucks	0	10	0	0	-	10	0	8	1	0	-	9	1	0	0	0	-	1	0	0	0	0	-	0	20
% Single-Unit Trucks	0.0	2.3	-	-	-	2.2	0.0	1.9	3.0	-	-	2.0	100.0	-	0.0	-	-	25.0	0.0	-	0.0	-	-	0.0	2.1
Articulated Trucks	0	0	0	0	-	0	0	7	0	0	-	7	0	0	0	0	-	0	0	0	0	0	-	0	7
% Articulated Trucks	0.0	0.0	-	-	-	0.0	0.0	1.7	0.0	-	-	1.5	0.0	-	0.0	-	-	0.0	0.0	-	0.0	-	-	0.0	0.7
Bicycles on Road	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Bicycles on Road	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	0.0
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	4	-	-	-	-	-	5	-	-	-	-	-	18	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: St. Catharines Street & College Street
Site Code: 220190
Start Date: 03/31/2022



Turning Movement Peak Hour Data Plot (4:00 PM)

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: College Street & Morgan Avenue
Site Code: 220190
Start Date: 03/31/2022

Turning Movement Data

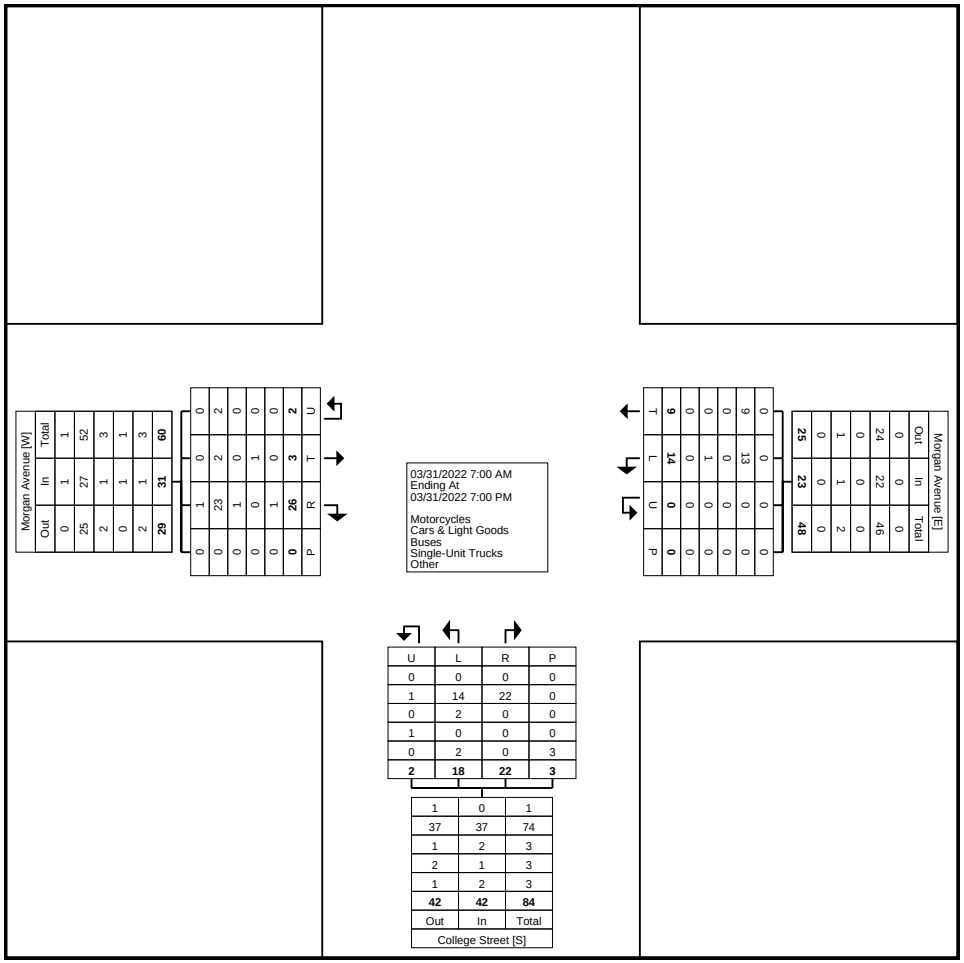
Start Time	Morgan Avenue Eastbound					Morgan Avenue Westbound					College Street Northbound					
	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	U-Turn	Peds	App. Total	Left	Right	U-Turn	Peds	App. Total	Int. Total
7:00 AM	0	0	0	0	0	1	1	0	0	2	1	0	0	0	1	3
7:15 AM	0	0	1	0	1	1	1	0	0	2	0	0	0	0	0	3
7:30 AM	0	0	0	0	0	1	0	0	0	1	0	1	0	0	1	2
7:45 AM	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	2
Hourly Total	0	2	1	0	3	3	2	0	0	5	1	1	0	0	2	10
8:00 AM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
8:15 AM	0	0	0	0	0	2	0	0	0	2	0	1	0	0	1	3
8:30 AM	0	0	0	0	0	0	1	0	0	1	3	0	0	0	3	4
8:45 AM	0	1	0	0	1	0	0	0	0	0	1	0	0	0	1	2
Hourly Total	0	2	0	0	2	2	1	0	0	3	4	1	0	0	5	10
9:00 AM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
9:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
9:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:45 AM	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
Hourly Total	0	2	0	0	2	0	0	0	0	0	0	1	1	0	2	4
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11:30 AM	0	1	0	0	1	0	0	0	0	0	1	1	0	0	2	3
11:45 AM	0	1	0	0	1	2	0	0	0	2	1	1	0	0	2	5
Hourly Total	0	2	0	0	2	2	0	0	0	2	2	2	0	0	4	8
12:00 PM	0	2	0	0	2	0	1	0	0	1	0	0	0	0	0	3
12:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30 PM	0	3	0	0	3	0	0	0	0	0	0	1	0	1	1	4
12:45 PM	0	1	0	0	1	1	1	0	0	2	0	0	0	0	0	3
Hourly Total	0	6	0	0	6	1	2	0	0	3	0	1	0	1	1	10
1:00 PM	0	1	0	0	1	0	0	0	0	0	1	0	0	0	1	2
1:15 PM	1	0	0	0	1	1	1	0	0	2	0	1	0	0	1	4
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hourly Total	1	1	0	0	2	1	1	0	0	2	1	1	0	0	2	6
4:00 PM	0	2	0	0	2	1	0	0	0	1	0	1	0	0	1	4
4:15 PM	0	1	0	0	1	0	1	0	0	1	4	1	0	0	5	7
4:30 PM	0	2	0	0	2	0	0	0	0	0	1	3	0	0	4	6
4:45 PM	1	2	0	0	3	0	0	0	0	0	0	2	0	0	2	5
Hourly Total	1	7	0	0	8	1	1	0	0	2	5	7	0	0	12	22
5:00 PM	0	1	0	0	1	2	0	0	0	2	0	0	0	0	0	3
5:15 PM	0	0	0	0	0	1	0	0	0	1	0	1	1	0	2	3
5:30 PM	0	0	0	0	0	0	1	0	0	1	0	1	0	0	1	2

5:45 PM	0	1	1	0	2	0	1	0	0	1	0	1	0	0	1	4
Hourly Total	0	2	1	0	3	3	2	0	0	5	0	3	1	0	4	12
6:00 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
6:15 PM	0	0	0	0	0	1	0	0	0	1	3	1	0	0	4	5
6:30 PM	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
6:45 PM	1	1	0	0	2	0	0	0	0	0	2	2	0	2	4	6
Hourly Total	1	2	0	0	3	1	0	0	0	1	5	5	0	2	10	14
Grand Total	3	26	2	0	31	14	9	0	0	23	18	22	2	3	42	96
Approach %	9.7	83.9	6.5	-	-	60.9	39.1	0.0	-	-	42.9	52.4	4.8	-	-	-
Total %	3.1	27.1	2.1	-	32.3	14.6	9.4	0.0	-	24.0	18.8	22.9	2.1	-	43.8	-
Motorcycles	0	1	0	-	1	0	0	0	-	0	0	0	0	-	0	1
% Motorcycles	0.0	3.8	0.0	-	3.2	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	0.0	1.0
Cars & Light Goods	2	23	2	-	27	13	9	0	-	22	14	22	1	-	37	86
% Cars & Light Goods	66.7	88.5	100.0	-	87.1	92.9	100.0	-	-	95.7	77.8	100.0	50.0	-	88.1	89.6
Buses	0	1	0	-	1	0	0	0	-	0	2	0	0	-	2	3
% Buses	0.0	3.8	0.0	-	3.2	0.0	0.0	-	-	0.0	11.1	0.0	0.0	-	4.8	3.1
Single-Unit Trucks	1	0	0	-	1	1	0	0	-	1	0	0	1	-	1	3
% Single-Unit Trucks	33.3	0.0	0.0	-	3.2	7.1	0.0	-	-	4.3	0.0	0.0	50.0	-	2.4	3.1
Articulated Trucks	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
Bicycles on Road	0	1	0	-	1	0	0	0	-	0	2	0	0	-	2	3
% Bicycles on Road	0.0	3.8	0.0	-	3.2	0.0	0.0	-	-	0.0	11.1	0.0	0.0	-	4.8	3.1
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	3	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	100.0	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: College Street & Morgan Avenue
Site Code: 220190
Start Date: 03/31/2022



Turning Movement Data Plot

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: College Street & Morgan Avenue
Site Code: 220190
Start Date: 03/31/2022

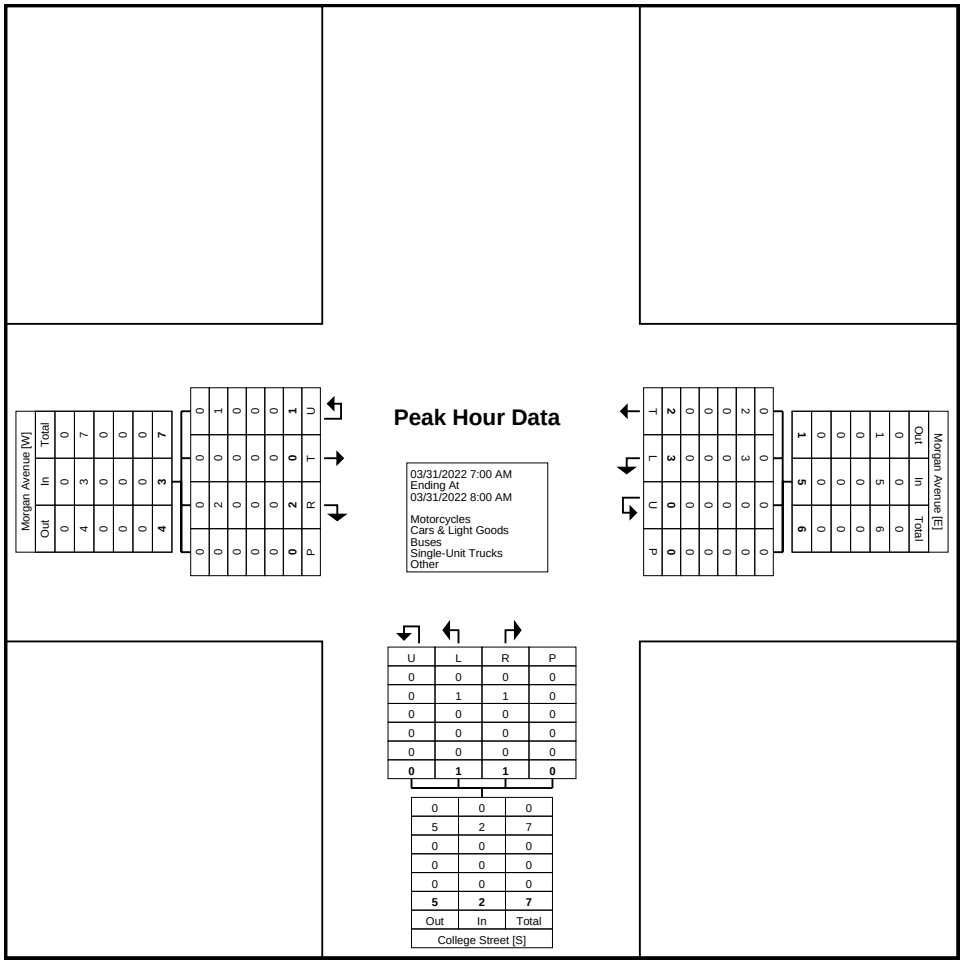
Turning Movement Peak Hour Data (7:00 AM)

Start Time	Morgan Avenue Eastbound					Morgan Avenue Westbound					College Street Northbound					
	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	U-Turn	Peds	App. Total	Left	Right	U-Turn	Peds	App. Total	Int. Total
7:00 AM	0	0	0	0	0	1	1	0	0	2	1	0	0	0	1	3
7:15 AM	0	0	1	0	1	1	1	0	0	2	0	0	0	0	0	3
7:30 AM	0	0	0	0	0	1	0	0	0	1	0	1	0	0	1	2
7:45 AM	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	2
Total	0	2	1	0	3	3	2	0	0	5	1	1	0	0	2	10
Approach %	0.0	66.7	33.3	-	-	60.0	40.0	0.0	-	-	50.0	50.0	0.0	-	-	-
Total %	0.0	20.0	10.0	-	30.0	30.0	20.0	0.0	-	50.0	10.0	10.0	0.0	-	20.0	-
PHF	0.000	0.250	0.250	-	0.375	0.750	0.500	0.000	-	0.625	0.250	0.250	0.000	-	0.500	0.833
Motorcycles	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Motorcycles	-	0.0	0.0	-	0.0	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0
Cars & Light Goods	0	2	1	-	3	3	2	0	-	5	1	1	0	-	2	10
% Cars & Light Goods	-	100.0	100.0	-	100.0	100.0	100.0	-	-	100.0	100.0	100.0	-	-	100.0	100.0
Buses	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Buses	-	0.0	0.0	-	0.0	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0
Single-Unit Trucks	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Single-Unit Trucks	-	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
% Articulated Trucks	-	0.0	0.0	-	0.0	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Road	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Bicycles on Road	-	0.0	0.0	-	0.0	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: College Street & Morgan Avenue
Site Code: 220190
Start Date: 03/31/2022



Turning Movement Peak Hour Data Plot (7:00 AM)

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: College Street & Morgan Avenue
Site Code: 220190
Start Date: 03/31/2022

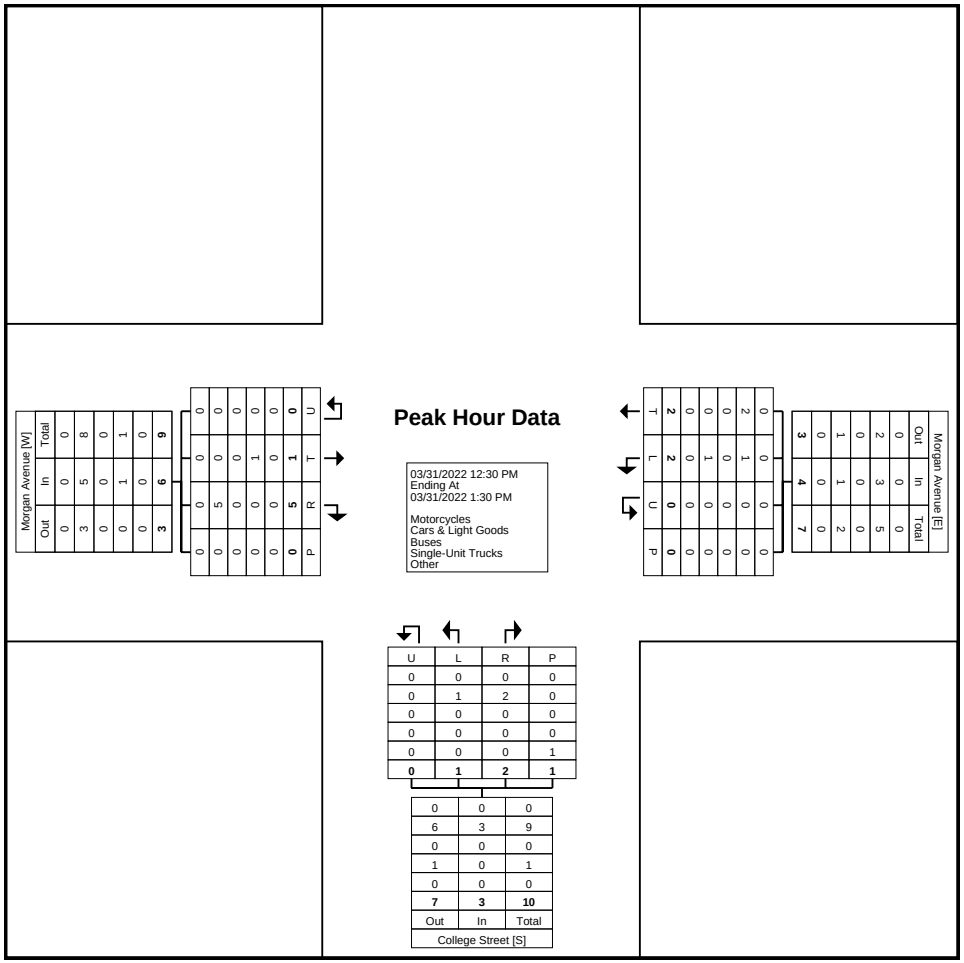
Turning Movement Peak Hour Data (12:30 PM)

Start Time	Morgan Avenue Eastbound					Morgan Avenue Westbound					College Street Northbound					
	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	U-Turn	Peds	App. Total	Left	Right	U-Turn	Peds	App. Total	Int. Total
12:30 PM	0	3	0	0	3	0	0	0	0	0	0	1	0	1	1	4
12:45 PM	0	1	0	0	1	1	1	0	0	2	0	0	0	0	0	3
1:00 PM	0	1	0	0	1	0	0	0	0	0	1	0	0	0	1	2
1:15 PM	1	0	0	0	1	1	1	0	0	2	0	1	0	0	1	4
Total	1	5	0	0	6	2	2	0	0	4	1	2	0	1	3	13
Approach %	16.7	83.3	0.0	-	-	50.0	50.0	0.0	-	-	33.3	66.7	0.0	-	-	-
Total %	7.7	38.5	0.0	-	46.2	15.4	15.4	0.0	-	30.8	7.7	15.4	0.0	-	23.1	-
PHF	0.250	0.417	0.000	-	0.500	0.500	0.500	0.000	-	0.500	0.250	0.500	0.000	-	0.750	0.813
Motorcycles	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Motorcycles	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0
Cars & Light Goods	0	5	0	-	5	1	2	0	-	3	1	2	0	-	3	11
% Cars & Light Goods	0.0	100.0	-	-	83.3	50.0	100.0	-	-	75.0	100.0	100.0	-	-	100.0	84.6
Buses	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Buses	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0
Single-Unit Trucks	1	0	0	-	1	1	0	0	-	1	0	0	0	-	0	2
% Single-Unit Trucks	100.0	0.0	-	-	16.7	50.0	0.0	-	-	25.0	0.0	0.0	-	-	0.0	15.4
Articulated Trucks	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
Bicycles on Road	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Bicycles on Road	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	1	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	100.0	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: College Street & Morgan Avenue
Site Code: 220190
Start Date: 03/31/2022



Turning Movement Peak Hour Data Plot (12:30 PM)

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

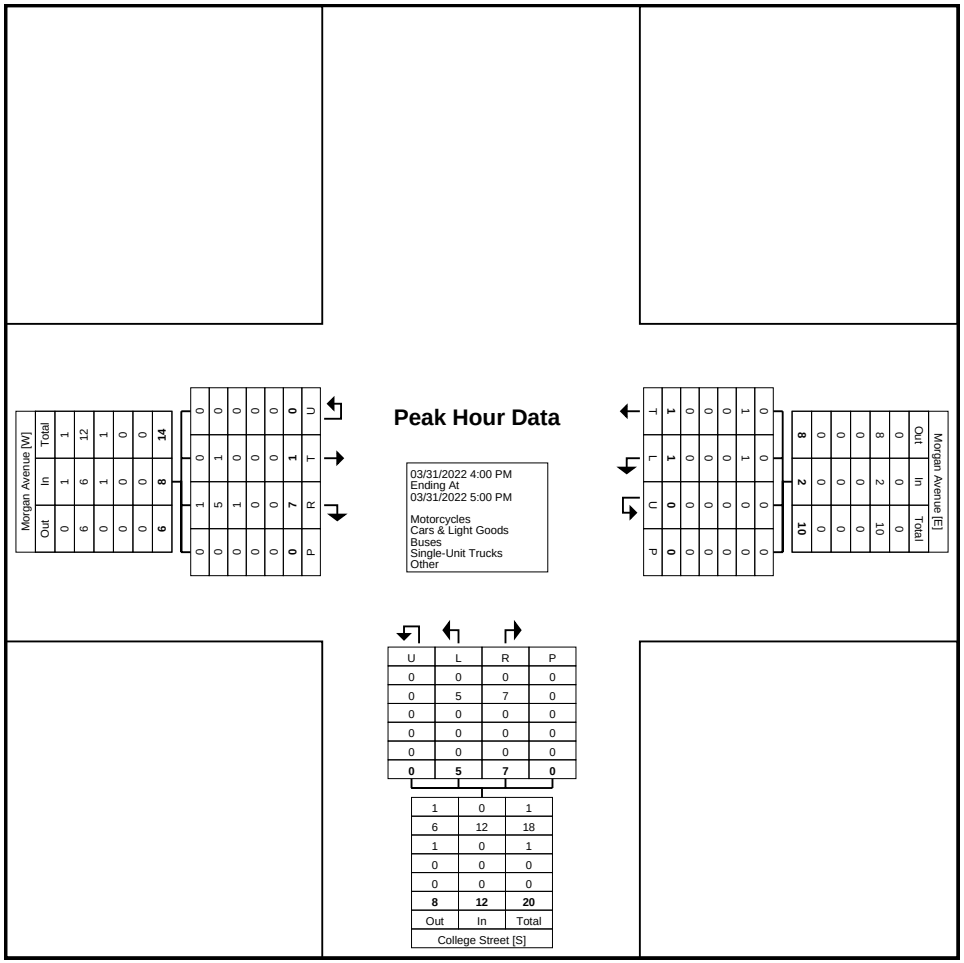
Count Name: College Street & Morgan Avenue
Site Code: 220190
Start Date: 03/31/2022

Turning Movement Peak Hour Data (4:00 PM)

Start Time	Morgan Avenue Eastbound					Morgan Avenue Westbound					College Street Northbound					
	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	U-Turn	Peds	App. Total	Left	Right	U-Turn	Peds	App. Total	Int. Total
4:00 PM	0	2	0	0	2	1	0	0	0	1	0	1	0	0	1	4
4:15 PM	0	1	0	0	1	0	1	0	0	1	4	1	0	0	5	7
4:30 PM	0	2	0	0	2	0	0	0	0	0	1	3	0	0	4	6
4:45 PM	1	2	0	0	3	0	0	0	0	0	0	2	0	0	2	5
Total	1	7	0	0	8	1	1	0	0	2	5	7	0	0	12	22
Approach %	12.5	87.5	0.0	-	-	50.0	50.0	0.0	-	-	41.7	58.3	0.0	-	-	-
Total %	4.5	31.8	0.0	-	36.4	4.5	4.5	0.0	-	9.1	22.7	31.8	0.0	-	54.5	-
PHF	0.250	0.875	0.000	-	0.667	0.250	0.250	0.000	-	0.500	0.313	0.583	0.000	-	0.600	0.786
Motorcycles	0	1	0	-	1	0	0	0	-	0	0	0	0	-	0	1
% Motorcycles	0.0	14.3	-	-	12.5	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	4.5
Cars & Light Goods	1	5	0	-	6	1	1	0	-	2	5	7	0	-	12	20
% Cars & Light Goods	100.0	71.4	-	-	75.0	100.0	100.0	-	-	100.0	100.0	100.0	-	-	100.0	90.9
Buses	0	1	0	-	1	0	0	0	-	0	0	0	0	-	0	1
% Buses	0.0	14.3	-	-	12.5	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	4.5
Single-Unit Trucks	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Single-Unit Trucks	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
% Articulated Trucks	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Road	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Bicycles on Road	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com



Turning Movement Peak Hour Data Plot (4:00 PM)

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: College Street & Driveway
Site Code: 220190
Start Date: 03/31/2022

Turning Movement Data

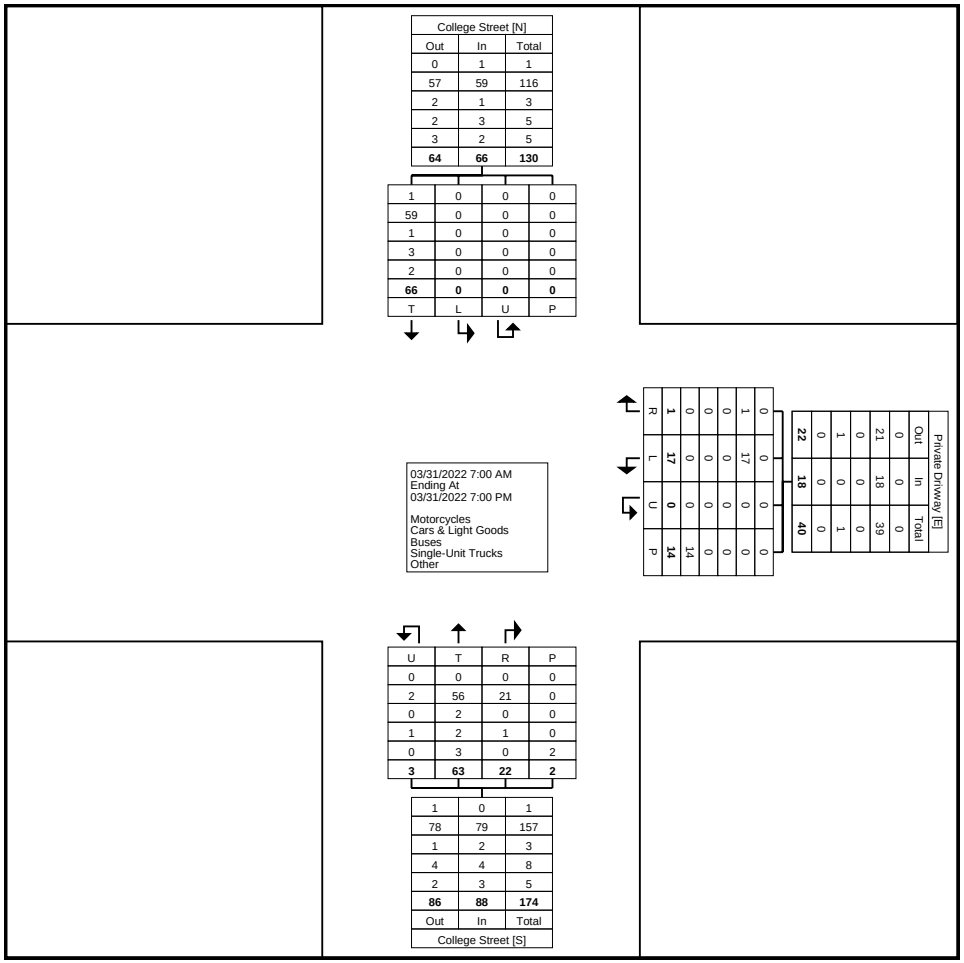
Start Time	Private Drivway Westbound					College Street Northbound					College Street Southbound					
	Left	Right	U-Turn	Peds	App. Total	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	U-Turn	Peds	App. Total	Int. Total
7:00 AM	0	0	0	0	0	1	0	0	0	1	0	2	0	0	2	3
7:15 AM	2	0	0	1	2	0	0	0	0	0	0	2	0	0	2	4
7:30 AM	0	0	0	0	0	1	0	1	0	2	0	1	0	0	1	3
7:45 AM	1	0	0	0	1	1	0	0	1	1	0	1	0	0	1	3
Hourly Total	3	0	0	1	3	3	0	1	1	4	0	6	0	0	6	13
8:00 AM	1	0	0	1	1	1	1	0	1	2	0	1	0	0	1	4
8:15 AM	1	0	0	0	1	1	1	0	0	2	0	4	0	0	4	7
8:30 AM	2	0	0	0	2	4	1	0	0	5	0	1	0	0	1	8
8:45 AM	1	0	0	0	1	3	1	0	0	4	0	1	0	0	1	6
Hourly Total	5	0	0	1	5	9	4	0	1	13	0	7	0	0	7	25
9:00 AM	1	0	0	0	1	1	1	0	0	2	0	2	0	0	2	5
9:15 AM	3	0	0	0	3	3	0	1	0	4	0	0	0	0	0	7
9:30 AM	0	0	0	0	0	1	0	0	0	1	0	4	0	0	4	5
9:45 AM	1	0	0	0	1	1	2	0	0	3	0	1	0	0	1	5
Hourly Total	5	0	0	0	5	6	3	1	0	10	0	7	0	0	7	22
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11:30 AM	0	0	0	2	0	2	1	0	0	3	0	1	0	0	1	4
11:45 AM	0	0	0	1	0	3	0	0	0	3	0	3	0	0	3	6
Hourly Total	0	0	0	3	0	5	1	0	0	6	0	4	0	0	4	10
12:00 PM	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3	3
12:15 PM	0	0	0	1	0	1	0	0	0	1	0	0	0	0	0	1
12:30 PM	0	0	0	0	0	1	0	0	0	1	0	3	0	0	3	4
12:45 PM	0	0	0	0	0	1	0	0	0	1	0	1	0	0	1	2
Hourly Total	0	0	0	1	0	3	0	0	0	3	0	7	0	0	7	10
1:00 PM	0	0	0	0	0	2	1	0	0	3	0	3	0	0	3	6
1:15 PM	0	0	0	0	0	2	0	0	0	2	0	1	0	0	1	3
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hourly Total	0	0	0	0	0	4	1	0	0	5	0	4	0	0	4	9
4:00 PM	1	0	0	4	1	1	1	0	0	2	0	5	0	0	5	8
4:15 PM	0	0	0	0	0	7	1	0	0	8	0	1	0	0	1	9
4:30 PM	0	0	0	1	0	5	1	0	0	6	0	5	0	0	5	11
4:45 PM	0	0	0	0	0	2	1	0	0	3	0	3	0	0	3	6
Hourly Total	1	0	0	5	1	15	4	0	0	19	0	14	0	0	14	34
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	4	0	0	4	4
5:15 PM	0	1	0	0	1	2	4	0	0	6	0	3	0	0	3	10
5:30 PM	1	0	0	0	1	4	2	0	0	6	0	2	0	0	2	9

5:45 PM	0	0	0	0	0	2	1	0	0	3	0	1	0	0	1	4
Hourly Total	1	1	0	0	2	8	7	0	0	15	0	10	0	0	10	27
6:00 PM	1	0	0	0	1	1	1	0	0	2	0	1	0	0	1	4
6:15 PM	1	0	0	3	1	4	0	0	0	4	0	3	0	0	3	8
6:30 PM	0	0	0	0	0	1	1	1	0	3	0	1	0	0	1	4
6:45 PM	0	0	0	0	0	4	0	0	0	4	0	2	0	0	2	6
Hourly Total	2	0	0	3	2	10	2	1	0	13	0	7	0	0	7	22
Grand Total	17	1	0	14	18	63	22	3	2	88	0	66	0	0	66	172
Approach %	94.4	5.6	0.0	-	-	71.6	25.0	3.4	-	-	0.0	100.0	0.0	-	-	-
Total %	9.9	0.6	0.0	-	10.5	36.6	12.8	1.7	-	51.2	0.0	38.4	0.0	-	38.4	-
Motorcycles	0	0	0	-	0	0	0	0	-	0	0	1	0	-	1	1
% Motorcycles	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	0.0	-	1.5	-	-	1.5	0.6
Cars & Light Goods	17	1	0	-	18	56	21	2	-	79	0	59	0	-	59	156
% Cars & Light Goods	100.0	100.0	-	-	100.0	88.9	95.5	66.7	-	89.8	-	89.4	-	-	89.4	90.7
Buses	0	0	0	-	0	2	0	0	-	2	0	1	0	-	1	3
% Buses	0.0	0.0	-	-	0.0	3.2	0.0	0.0	-	2.3	-	1.5	-	-	1.5	1.7
Single-Unit Trucks	0	0	0	-	0	2	1	1	-	4	0	3	0	-	3	7
% Single-Unit Trucks	0.0	0.0	-	-	0.0	3.2	4.5	33.3	-	4.5	-	4.5	-	-	4.5	4.1
Articulated Trucks	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
Bicycles on Road	0	0	0	-	0	3	0	0	-	3	0	2	0	-	2	5
% Bicycles on Road	0.0	0.0	-	-	0.0	4.8	0.0	0.0	-	3.4	-	3.0	-	-	3.0	2.9
Bicycles on Crosswalk	-	-	-	2	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	14.3	-	-	-	-	0.0	-	-	-	-	-	-	-
Pedestrians	-	-	-	12	-	-	-	-	2	-	-	-	-	0	-	-
% Pedestrians	-	-	-	85.7	-	-	-	-	100.0	-	-	-	-	-	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: College Street & Driveway
Site Code: 220190
Start Date: 03/31/2022



Turning Movement Data Plot

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: College Street & Driveway
Site Code: 220190
Start Date: 03/31/2022

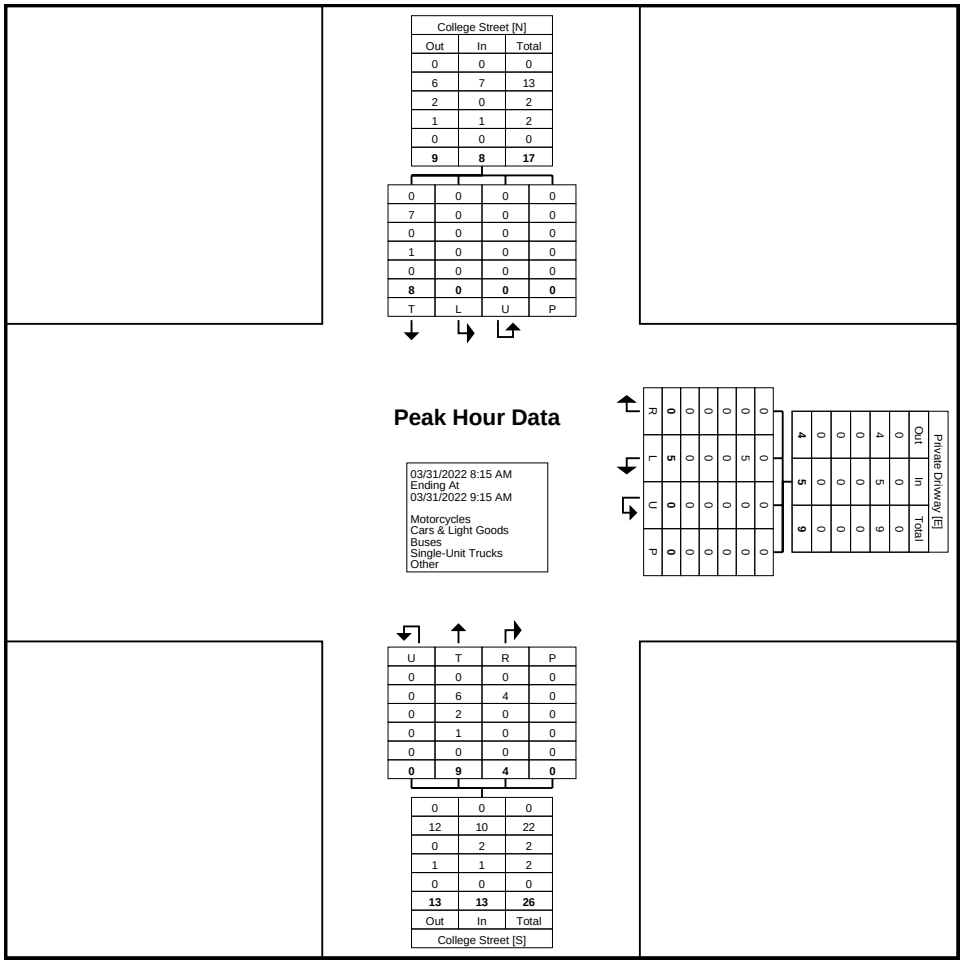
Turning Movement Peak Hour Data (8:15 AM)

Start Time	Private Drivway Westbound					College Street Northbound					College Street Southbound					
	Left	Right	U-Turn	Peds	App. Total	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	U-Turn	Peds	App. Total	Int. Total
8:15 AM	1	0	0	0	1	1	1	0	0	2	0	4	0	0	4	7
8:30 AM	2	0	0	0	2	4	1	0	0	5	0	1	0	0	1	8
8:45 AM	1	0	0	0	1	3	1	0	0	4	0	1	0	0	1	6
9:00 AM	1	0	0	0	1	1	1	0	0	2	0	2	0	0	2	5
Total	5	0	0	0	5	9	4	0	0	13	0	8	0	0	8	26
Approach %	100.0	0.0	0.0	-	-	69.2	30.8	0.0	-	-	0.0	100.0	0.0	-	-	-
Total %	19.2	0.0	0.0	-	19.2	34.6	15.4	0.0	-	50.0	0.0	30.8	0.0	-	30.8	-
PHF	0.625	0.000	0.000	-	0.625	0.563	1.000	0.000	-	0.650	0.000	0.500	0.000	-	0.500	0.813
Motorcycles	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Motorcycles	0.0	-	-	-	0.0	0.0	0.0	-	-	0.0	-	0.0	-	-	0.0	0.0
Cars & Light Goods	5	0	0	-	5	6	4	0	-	10	0	7	0	-	7	22
% Cars & Light Goods	100.0	-	-	-	100.0	66.7	100.0	-	-	76.9	-	87.5	-	-	87.5	84.6
Buses	0	0	0	-	0	2	0	0	-	2	0	0	0	-	0	2
% Buses	0.0	-	-	-	0.0	22.2	0.0	-	-	15.4	-	0.0	-	-	0.0	7.7
Single-Unit Trucks	0	0	0	-	0	1	0	0	-	1	0	1	0	-	1	2
% Single-Unit Trucks	0.0	-	-	-	0.0	11.1	0.0	-	-	7.7	-	12.5	-	-	12.5	7.7
Articulated Trucks	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
Bicycles on Road	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Bicycles on Road	0.0	-	-	-	0.0	0.0	0.0	-	-	0.0	-	0.0	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: College Street & Driveway
Site Code: 220190
Start Date: 03/31/2022



Turning Movement Peak Hour Data Plot (8:15 AM)

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: College Street & Driveway
Site Code: 220190
Start Date: 03/31/2022

Turning Movement Peak Hour Data (12:30 PM)

Start Time	Private Drivway Westbound					College Street Northbound					College Street Southbound					
	Left	Right	U-Turn	Peds	App. Total	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	U-Turn	Peds	App. Total	Int. Total
12:30 PM	0	0	0	0	0	1	0	0	0	1	0	3	0	0	3	4
12:45 PM	0	0	0	0	0	1	0	0	0	1	0	1	0	0	1	2
1:00 PM	0	0	0	0	0	2	1	0	0	3	0	3	0	0	3	6
1:15 PM	0	0	0	0	0	2	0	0	0	2	0	1	0	0	1	3
Total	0	0	0	0	0	6	1	0	0	7	0	8	0	0	8	15
Approach %	0.0	0.0	0.0	-	-	85.7	14.3	0.0	-	-	0.0	100.0	0.0	-	-	-
Total %	0.0	0.0	0.0	-	0.0	40.0	6.7	0.0	-	46.7	0.0	53.3	0.0	-	53.3	-
PHF	0.000	0.000	0.000	-	0.000	0.750	0.250	0.000	-	0.583	0.000	0.667	0.000	-	0.667	0.625
Motorcycles	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Motorcycles	-	-	-	-	-	0.0	0.0	-	-	0.0	-	0.0	-	-	0.0	0.0
Cars & Light Goods	0	0	0	-	0	6	1	0	-	7	0	7	0	-	7	14
% Cars & Light Goods	-	-	-	-	-	100.0	100.0	-	-	100.0	-	87.5	-	-	87.5	93.3
Buses	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Buses	-	-	-	-	-	0.0	0.0	-	-	0.0	-	0.0	-	-	0.0	0.0
Single-Unit Trucks	0	0	0	-	0	0	0	0	-	0	0	1	0	-	1	1
% Single-Unit Trucks	-	-	-	-	-	0.0	0.0	-	-	0.0	-	12.5	-	-	12.5	6.7
Articulated Trucks	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
Bicycles on Road	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Bicycles on Road	-	-	-	-	-	0.0	0.0	-	-	0.0	-	0.0	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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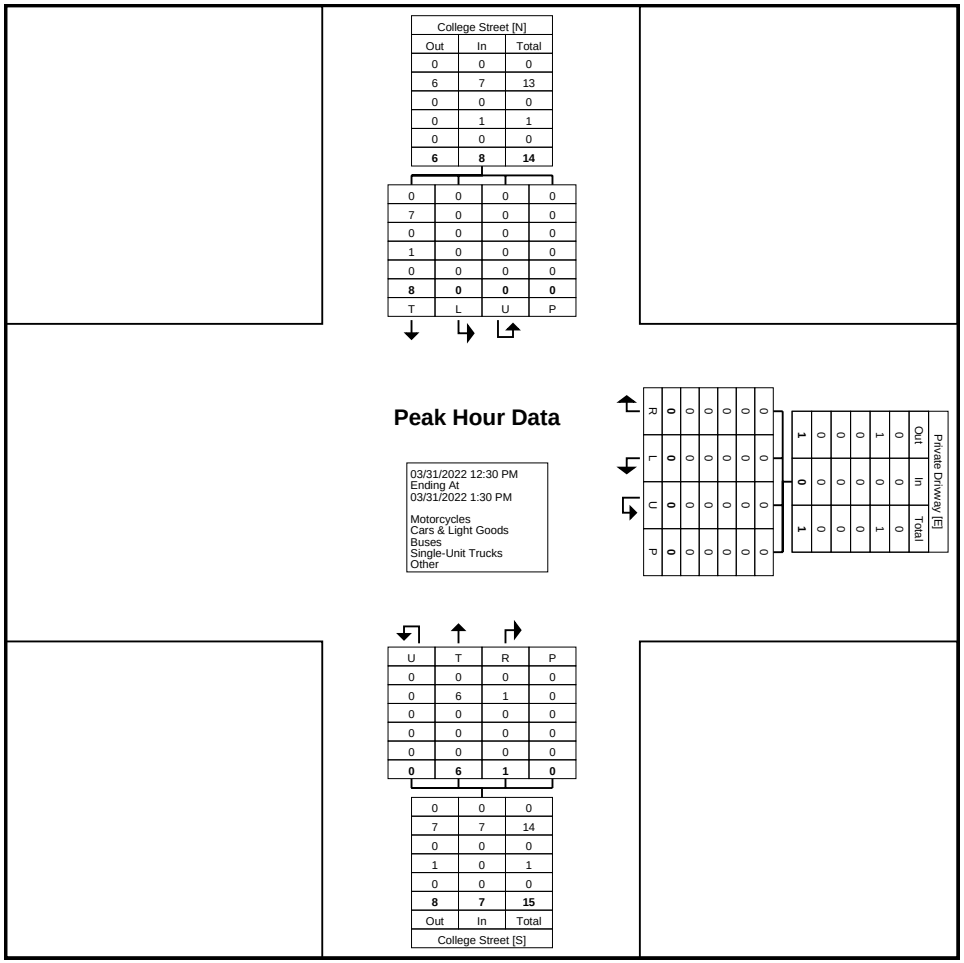

Turning Movement Peak Hour Data Plot (12:30 PM)

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: College Street & Driveway
Site Code: 220190
Start Date: 03/31/2022

Turning Movement Peak Hour Data (4:00 PM)

Start Time	Private Drivway Westbound					College Street Northbound					College Street Southbound					
	Left	Right	U-Turn	Peds	App. Total	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	U-Turn	Peds	App. Total	Int. Total
4:00 PM	1	0	0	4	1	1	1	0	0	2	0	5	0	0	5	8
4:15 PM	0	0	0	0	0	7	1	0	0	8	0	1	0	0	1	9
4:30 PM	0	0	0	1	0	5	1	0	0	6	0	5	0	0	5	11
4:45 PM	0	0	0	0	0	2	1	0	0	3	0	3	0	0	3	6
Total	1	0	0	5	1	15	4	0	0	19	0	14	0	0	14	34
Approach %	100.0	0.0	0.0	-	-	78.9	21.1	0.0	-	-	0.0	100.0	0.0	-	-	-
Total %	2.9	0.0	0.0	-	2.9	44.1	11.8	0.0	-	55.9	0.0	41.2	0.0	-	41.2	-
PHF	0.250	0.000	0.000	-	0.250	0.536	1.000	0.000	-	0.594	0.000	0.700	0.000	-	0.700	0.773
Motorcycles	0	0	0	-	0	0	0	0	-	0	0	1	0	-	1	1
% Motorcycles	0.0	-	-	-	0.0	0.0	0.0	-	-	0.0	-	7.1	-	-	7.1	2.9
Cars & Light Goods	1	0	0	-	1	15	4	0	-	19	0	12	0	-	12	32
% Cars & Light Goods	100.0	-	-	-	100.0	100.0	100.0	-	-	100.0	-	85.7	-	-	85.7	94.1
Buses	0	0	0	-	0	0	0	0	-	0	0	1	0	-	1	1
% Buses	0.0	-	-	-	0.0	0.0	0.0	-	-	0.0	-	7.1	-	-	7.1	2.9
Single-Unit Trucks	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Single-Unit Trucks	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
% Articulated Trucks	0.0	-	-	-	0.0	0.0	0.0	-	-	0.0	-	0.0	-	-	0.0	0.0
Bicycles on Road	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Bicycles on Road	0.0	-	-	-	0.0	0.0	0.0	-	-	0.0	-	0.0	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	0.0	-	-	-	-	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	5	-	-	-	-	0	-	-	-	-	0	-	-
% Pedestrians	-	-	-	100.0	-	-	-	-	-	-	-	-	-	-	-	-

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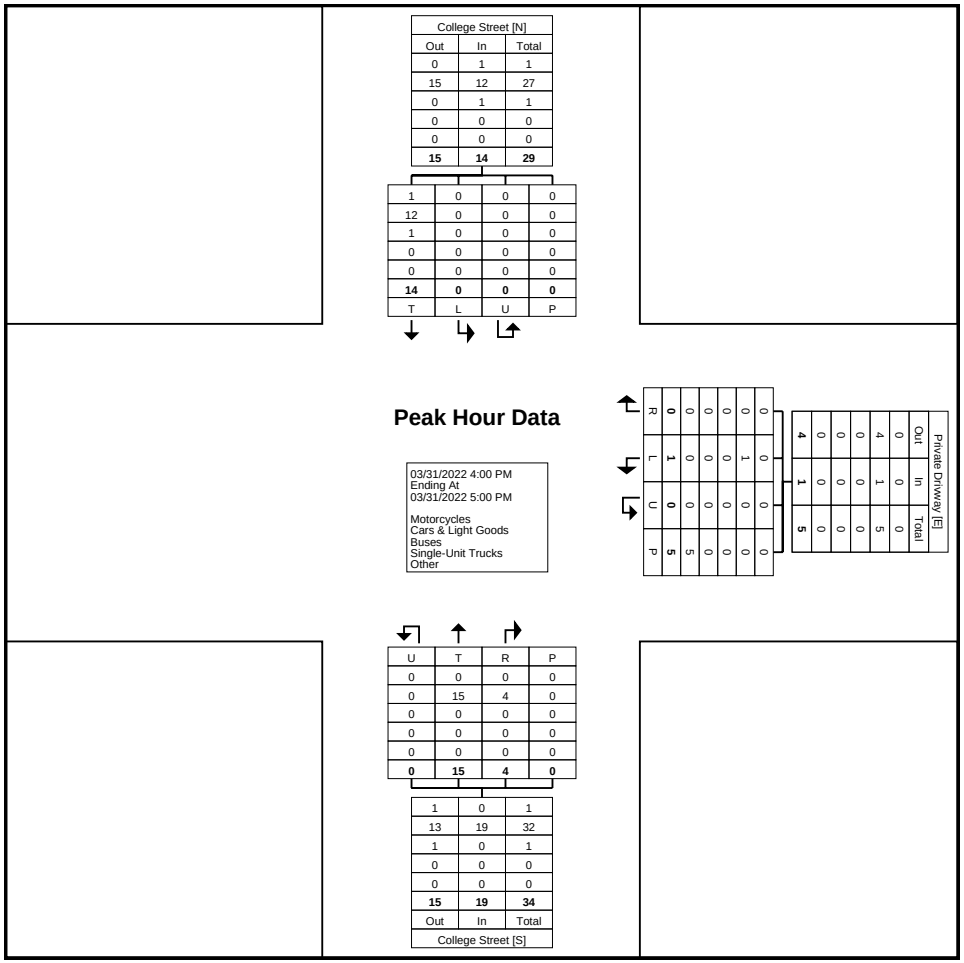
Count Name: College Street & Driveway
Site Code: 220190
Start Date: 03/31/2022



Turning Movement Peak Hour Data Plot (4:00 PM)

Appendix C: Base Year Operations

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	16	320	0	0	318	16	0	1	1	14	0	7
Future Volume (vph)	16	320	0	0	318	16	0	1	1	14	0	7
Ideal Flow (vphpl)	1504	1629	1900	1900	1388	1388	1483	1483	1483	1483	1483	1483
Storage Length (m)	15.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	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
Ped Bike Factor												
Frt					0.994			0.932			0.953	
Flt Protected	0.950										0.968	
Satd. Flow (prot)	1264	1481	0	0	1234	0	0	1382	0	0	1300	0
Flt Permitted	0.950										0.968	
Satd. Flow (perm)	1264	1481	0	0	1234	0	0	1382	0	0	1300	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		74.0			84.0			63.9			87.3	
Travel Time (s)		5.3			6.0			4.6			6.3	
Confl. Peds. (#/hr)	11		3	3		11	1					1
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 (%)	13%	10%	0%	0%	12%	7%	0%	0%	0%	8%	0%	0%
Adj. Flow (vph)	17	348	0	0	346	17	0	1	1	15	0	8
Shared Lane Traffic (%)												
Lane Group Flow (vph)	17	348	0	0	363	0	0	2	0	0	23	0
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	39.4%	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)	16	320	0	0	318	16	0	1	1	14	0	7
Future Volume (Veh/h)	16	320	0	0	318	16	0	1	1	14	0	7
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)	17	348	0	0	346	17	0	1	1	15	0	8
Pedestrians		1						3			11	
Lane Width (m)		3.6						3.6			3.6	
Walking Speed (m/s)		1.2						1.2			1.2	
Percent Blockage		0						0			1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	374			351			748	759	351	749	750	366
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	374			351			748	759	351	749	750	366
tC, single (s)	4.2			4.1			7.1	6.5	6.2	7.2	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.3			2.2			3.5	4.0	3.3	3.6	4.0	3.3
p0 queue free %	98			100			100	100	100	95	100	99
cM capacity (veh/h)	1116			1216			319	329	695	310	333	676

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total	17	348	363	2	23
Volume Left	17	0	0	0	15
Volume Right	0	0	17	1	8
cSH	1116	1700	1700	447	382
Volume to Capacity	0.02	0.20	0.21	0.00	0.06
Queue Length 95th (m)	0.3	0.0	0.0	0.1	1.4
Control Delay (s)	8.3	0.0	0.0	13.1	15.0
Lane LOS	A			B	C
Approach Delay (s)	0.4		0.0	13.1	15.0
Approach LOS				B	C

Intersection Summary					
Average Delay		0.7			
Intersection Capacity Utilization		39.4%	ICU Level of Service		A
Analysis Period (min)		15			

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1	7	9	2	15	14
Future Volume (vph)	1	7	9	2	15	14
Ideal Flow (vphpl)	1388	1388	1228	1228	1483	1483
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.880				0.935	
Flt Protected				0.960	0.975	
Satd. Flow (prot)	1221	0	0	1179	1352	0
Flt Permitted				0.960	0.975	
Satd. Flow (perm)	1221	0	0	1179	1352	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	63.4			60.5	70.2	
Travel Time (s)	4.6			4.4	5.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	1	8	10	2	16	15
Shared Lane Traffic (%)						
Lane Group Flow (vph)	9	0	0	12	31	0
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	17.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1	7	9	2	15	14
Future Volume (Veh/h)	1	7	9	2	15	14
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)	1	8	10	2	16	15
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			9		27	5
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			9		27	5
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		98	99
cM capacity (veh/h)			1624		987	1084

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	9	12	31
Volume Left	0	10	16
Volume Right	8	0	15
cSH	1700	1624	1032
Volume to Capacity	0.01	0.01	0.03
Queue Length 95th (m)	0.0	0.1	0.7
Control Delay (s)	0.0	6.0	8.6
Lane LOS		A	A
Approach Delay (s)	0.0	6.0	8.6
Approach LOS			A

Intersection Summary				
Average Delay		6.5		
Intersection Capacity Utilization		17.6%	ICU Level of Service	A
Analysis Period (min)		15		

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	5	0	29	4	0	16
Future Volume (vph)	5	0	29	4	0	16
Ideal Flow (vphpl)	1483	1483	1388	1388	1228	1228
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.985			
Flt Protected	0.950					
Satd. Flow (prot)	1409	0	1057	0	0	1087
Flt Permitted	0.950					
Satd. Flow (perm)	1409	0	1057	0	0	1087
Link Speed (k/h)	50		50			50
Link Distance (m)	45.1		87.3			47.1
Travel Time (s)	3.2		6.3			3.4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	33%	0%	0%	13%
Adj. Flow (vph)	5	0	32	4	0	17
Shared Lane Traffic (%)						
Lane Group Flow (vph)	5	0	36	0	0	17
Sign Control	Stop		Free			Free

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

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	5	0	29	4	0	16
Future Volume (Veh/h)	5	0	29	4	0	16
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	0	32	4	0	17
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	51	34			36	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	51	34			36	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	100			100	
cM capacity (veh/h)	963	1045			1588	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	5	36	17
Volume Left	5	0	0
Volume Right	0	4	0
cSH	963	1700	1588
Volume to Capacity	0.01	0.02	0.00
Queue Length 95th (m)	0.1	0.0	0.0
Control Delay (s)	8.8	0.0	0.0
Lane LOS	A		
Approach Delay (s)	8.8	0.0	0.0
Approach LOS	A		

Intersection Summary				
Average Delay		0.8		
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)	22	459	0	0	441	34	1	0	3	23	0	10
Future Volume (vph)	22	459	0	0	441	34	1	0	3	23	0	10
Ideal Flow (vphpl)	1504	1629	1900	1900	1388	1388	1483	1483	1483	1483	1483	1483
Storage Length (m)	15.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	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
Ped Bike Factor												
Frt					0.990			0.899			0.959	
Flt Protected	0.950							0.988			0.966	
Satd. Flow (prot)	1429	1582	0	0	1322	0	0	1054	0	0	1328	0
Flt Permitted	0.950							0.988			0.966	
Satd. Flow (perm)	1429	1582	0	0	1322	0	0	1054	0	0	1328	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		74.0			84.0			63.9			87.3	
Travel Time (s)		5.3			6.0			4.6			6.3	
Confl. Peds. (#/hr)	18		5	5		18			4	4		
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%	3%	0%	0%	4%	3%	100%	0%	0%	5%	0%	0%
Adj. Flow (vph)	24	499	0	0	479	37	1	0	3	25	0	11
Shared Lane Traffic (%)												
Lane Group Flow (vph)	24	499	0	0	516	0	0	4	0	0	36	0
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	47.1%	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)	22	459	0	0	441	34	1	0	3	23	0	10
Future Volume (Veh/h)	22	459	0	0	441	34	1	0	3	23	0	10
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)	24	499	0	0	479	37	1	0	3	25	0	11
Pedestrians					4			5			18	
Lane Width (m)					3.6			3.6			3.6	
Walking Speed (m/s)					1.2			1.2			1.2	
Percent Blockage					0			0			2	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	534			504			1060	1086	508	1070	1068	516
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	534			504			1060	1086	508	1070	1068	516
tC, single (s)	4.1			4.1			8.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			4.4	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			100			99	100	99	87	100	98
cM capacity (veh/h)	1028			1066			127	209	565	186	214	555

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total	24	499	516	4	36
Volume Left	24	0	0	1	25
Volume Right	0	0	37	3	11
cSH	1028	1700	1700	303	233
Volume to Capacity	0.02	0.29	0.30	0.01	0.15
Queue Length 95th (m)	0.5	0.0	0.0	0.3	4.0
Control Delay (s)	8.6	0.0	0.0	17.0	23.3
Lane LOS	A			C	C
Approach Delay (s)	0.4		0.0	17.0	23.3
Approach LOS				C	C

Intersection Summary					
Average Delay	1.0				
Intersection Capacity Utilization	47.1%	ICU Level of Service		A	
Analysis Period (min)	15				

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1	28	4	1	22	30
Future Volume (vph)	1	28	4	1	22	30
Ideal Flow (vphpl)	1388	1388	1228	1228	1483	1483
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.869				0.922	
Flt Protected				0.962	0.979	
Satd. Flow (prot)	1062	0	0	1181	1339	0
Flt Permitted				0.962	0.979	
Satd. Flow (perm)	1062	0	0	1181	1339	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	63.4			60.5	70.2	
Travel Time (s)	4.6			4.4	5.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	14%	0%	0%	0%	0%
Adj. Flow (vph)	1	30	4	1	24	33
Shared Lane Traffic (%)						
Lane Group Flow (vph)	31	0	0	5	57	0
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	16.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1	28	4	1	22	30
Future Volume (Veh/h)	1	28	4	1	22	30
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)	1	30	4	1	24	33
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			31		25	16
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			31		25	16
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		98	97
cM capacity (veh/h)			1595		993	1069

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	31	5	57
Volume Left	0	4	24
Volume Right	30	0	33
cSH	1700	1595	1036
Volume to Capacity	0.02	0.00	0.06
Queue Length 95th (m)	0.0	0.1	1.3
Control Delay (s)	0.0	5.8	8.7
Lane LOS		A	A
Approach Delay (s)	0.0	5.8	8.7
Approach LOS			A

Intersection Summary				
Average Delay		5.6		
Intersection Capacity Utilization		16.0%	ICU Level of Service	A
Analysis Period (min)		15		

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	1	0	52	4	0	32
Future Volume (vph)	1	0	52	4	0	32
Ideal Flow (vphpl)	1483	1483	1388	1388	1228	1228
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt			0.991			
Flt Protected	0.950					
Satd. Flow (prot)	1409	0	1376	0	0	1148
Flt Permitted	0.950					
Satd. Flow (perm)	1409	0	1376	0	0	1148
Link Speed (k/h)	50		50			50
Link Distance (m)	45.1		87.3			47.1
Travel Time (s)	3.2		6.3			3.4
Confl. Peds. (#/hr)				5	5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	7%
Adj. Flow (vph)	1	0	57	4	0	35
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1	0	61	0	0	35
Sign Control	Stop		Free			Free

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	15.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	1	0	52	4	0	32
Future Volume (Veh/h)	1	0	52	4	0	32
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	0	57	4	0	35
Pedestrians	5					
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	0					
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	99	64			66	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	99	64			66	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	901	1002			1542	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	1	61	35
Volume Left	1	0	0
Volume Right	0	4	0
cSH	901	1700	1542
Volume to Capacity	0.00	0.04	0.00
Queue Length 95th (m)	0.0	0.0	0.0
Control Delay (s)	9.0	0.0	0.0
Lane LOS	A		
Approach Delay (s)	9.0	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	15.5%	ICU Level of Service	A
Analysis Period (min)	15		

Appendix D: Background Operations

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	18	353	0	0	351	18	0	1	1	15	0	8
Future Volume (vph)	18	353	0	0	351	18	0	1	1	15	0	8
Ideal Flow (vphpl)	1504	1629	1900	1900	1388	1388	1483	1483	1483	1483	1483	1483
Storage Length (m)	15.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	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
Ped Bike Factor												
Frt					0.993			0.932			0.951	
Flt Protected	0.950										0.969	
Satd. Flow (prot)	1264	1481	0	0	1233	0	0	1382	0	0	1300	0
Flt Permitted	0.950										0.969	
Satd. Flow (perm)	1264	1481	0	0	1233	0	0	1382	0	0	1300	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		74.0			84.0			63.9			87.3	
Travel Time (s)		5.3			6.0			4.6			6.3	
Confl. Peds. (#/hr)	11		3	3		11	1					1
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 (%)	13%	10%	0%	0%	12%	7%	0%	0%	0%	8%	0%	0%
Adj. Flow (vph)	20	384	0	0	382	20	0	1	1	16	0	9
Shared Lane Traffic (%)												
Lane Group Flow (vph)	20	384	0	0	402	0	0	2	0	0	25	0
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	42.1%	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)	18	353	0	0	351	18	0	1	1	15	0	8
Future Volume (Veh/h)	18	353	0	0	351	18	0	1	1	15	0	8
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)	20	384	0	0	382	20	0	1	1	16	0	9
Pedestrians		1						3			11	
Lane Width (m)		3.6						3.6			3.6	
Walking Speed (m/s)		1.2						1.2			1.2	
Percent Blockage		0						0			1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	413			387			829	840	387	828	830	404
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	413			387			829	840	387	828	830	404
tC, single (s)	4.2			4.1			7.1	6.5	6.2	7.2	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.3			2.2			3.5	4.0	3.3	3.6	4.0	3.3
p0 queue free %	98			100			100	100	100	94	100	99
cM capacity (veh/h)	1079			1180			280	295	664	273	299	644

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total	20	384	402	2	25
Volume Left	20	0	0	0	16
Volume Right	0	0	20	1	9
cSH	1079	1700	1700	408	345
Volume to Capacity	0.02	0.23	0.24	0.00	0.07
Queue Length 95th (m)	0.4	0.0	0.0	0.1	1.8
Control Delay (s)	8.4	0.0	0.0	13.9	16.3
Lane LOS	A			B	C
Approach Delay (s)	0.4		0.0	13.9	16.3
Approach LOS				B	C

Intersection Summary					
Average Delay		0.7			
Intersection Capacity Utilization		42.1%	ICU Level of Service		A
Analysis Period (min)		15			

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1	8	10	2	17	15
Future Volume (vph)	1	8	10	2	17	15
Ideal Flow (vphpl)	1388	1388	1228	1228	1483	1483
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.878				0.936	
Flt Protected				0.959	0.974	
Satd. Flow (prot)	1219	0	0	1178	1352	0
Flt Permitted				0.959	0.974	
Satd. Flow (perm)	1219	0	0	1178	1352	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	63.4			60.5	70.2	
Travel Time (s)	4.6			4.4	5.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	1	9	11	2	18	16
Shared Lane Traffic (%)						
Lane Group Flow (vph)	10	0	0	13	34	0
Sign Control	Free			Free	Stop	

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

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1	8	10	2	17	15
Future Volume (Veh/h)	1	8	10	2	17	15
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)	1	9	11	2	18	16
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			10		30	6
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			10		30	6
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		98	99
cM capacity (veh/h)			1623		983	1083

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	10	13	34
Volume Left	0	11	18
Volume Right	9	0	16
cSH	1700	1623	1028
Volume to Capacity	0.01	0.01	0.03
Queue Length 95th (m)	0.0	0.2	0.8
Control Delay (s)	0.0	6.1	8.6
Lane LOS		A	A
Approach Delay (s)	0.0	6.1	8.6
Approach LOS			A

Intersection Summary				
Average Delay		6.5		
Intersection Capacity Utilization		17.7%	ICU Level of Service	A
Analysis Period (min)		15		

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	6	0	32	4	0	18
Future Volume (vph)	6	0	32	4	0	18
Ideal Flow (vphpl)	1483	1483	1388	1388	1228	1228
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.986			
Flt Protected	0.950					
Satd. Flow (prot)	1409	0	1056	0	0	1087
Flt Permitted	0.950					
Satd. Flow (perm)	1409	0	1056	0	0	1087
Link Speed (k/h)	50		50			50
Link Distance (m)	45.1		87.3			47.1
Travel Time (s)	3.2		6.3			3.4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	33%	0%	0%	13%
Adj. Flow (vph)	7	0	35	4	0	20
Shared Lane Traffic (%)						
Lane Group Flow (vph)	7	0	39	0	0	20
Sign Control	Stop		Free			Free

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

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	6	0	32	4	0	18
Future Volume (Veh/h)	6	0	32	4	0	18
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	0	35	4	0	20
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	57	37			39	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	57	37			39	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	100			100	
cM capacity (veh/h)	955	1041			1584	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	7	39	20
Volume Left	7	0	0
Volume Right	0	4	0
cSH	955	1700	1584
Volume to Capacity	0.01	0.02	0.00
Queue Length 95th (m)	0.2	0.0	0.0
Control Delay (s)	8.8	0.0	0.0
Lane LOS	A		
Approach Delay (s)	8.8	0.0	0.0
Approach LOS	A		

Intersection Summary				
Average Delay		0.9		
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)	24	507	0	0	487	38	1	0	3	25	0	11
Future Volume (vph)	24	507	0	0	487	38	1	0	3	25	0	11
Ideal Flow (vphpl)	1504	1629	1900	1900	1388	1388	1483	1483	1483	1483	1483	1483
Storage Length (m)	15.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	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
Ped Bike Factor												
Frt					0.990			0.899			0.958	
Flt Protected	0.950							0.988			0.967	
Satd. Flow (prot)	1429	1582	0	0	1322	0	0	1054	0	0	1328	0
Flt Permitted	0.950							0.988			0.967	
Satd. Flow (perm)	1429	1582	0	0	1322	0	0	1054	0	0	1328	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		74.0			84.0			63.9			87.3	
Travel Time (s)		5.3			6.0			4.6			6.3	
Confl. Peds. (#/hr)	18		5	5		18			4	4		
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%	3%	0%	0%	4%	3%	100%	0%	0%	5%	0%	0%
Adj. Flow (vph)	26	551	0	0	529	41	1	0	3	27	0	12
Shared Lane Traffic (%)												
Lane Group Flow (vph)	26	551	0	0	570	0	0	4	0	0	39	0
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	51.3%	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)	24	507	0	0	487	38	1	0	3	25	0	11
Future Volume (Veh/h)	24	507	0	0	487	38	1	0	3	25	0	11
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)	26	551	0	0	529	41	1	0	3	27	0	12
Pedestrians					4			5			18	
Lane Width (m)					3.6			3.6			3.6	
Walking Speed (m/s)					1.2			1.2			1.2	
Percent Blockage					0			0			2	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	588			556			1170	1196	560	1178	1176	568
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	588			556			1170	1196	560	1178	1176	568
tC, single (s)	4.1			4.1			8.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			4.4	4.0	3.3	3.5	4.0	3.3
p0 queue free %	97			100			99	100	99	83	100	98
cM capacity (veh/h)	982			1020			104	179	528	156	184	519

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total	26	551	570	4	39
Volume Left	26	0	0	1	27
Volume Right	0	0	41	3	12
cSH	982	1700	1700	261	199
Volume to Capacity	0.03	0.32	0.34	0.02	0.20
Queue Length 95th (m)	0.6	0.0	0.0	0.3	5.3
Control Delay (s)	8.8	0.0	0.0	19.0	27.5
Lane LOS	A			C	D
Approach Delay (s)	0.4		0.0	19.0	27.5
Approach LOS				C	D

Intersection Summary					
Average Delay	1.2				
Intersection Capacity Utilization	51.3%	ICU Level of Service		A	
Analysis Period (min)	15				

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1	31	4	1	24	33
Future Volume (vph)	1	31	4	1	24	33
Ideal Flow (vphpl)	1388	1388	1228	1228	1483	1483
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.869				0.922	
Flt Protected				0.962	0.979	
Satd. Flow (prot)	1062	0	0	1181	1339	0
Flt Permitted				0.962	0.979	
Satd. Flow (perm)	1062	0	0	1181	1339	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	63.4			60.5	70.2	
Travel Time (s)	4.6			4.4	5.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	14%	0%	0%	0%	0%
Adj. Flow (vph)	1	34	4	1	26	36
Shared Lane Traffic (%)						
Lane Group Flow (vph)	35	0	0	5	62	0
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	16.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1	31	4	1	24	33
Future Volume (Veh/h)	1	31	4	1	24	33
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)	1	34	4	1	26	36
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		27	18
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			35		27	18
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		97	97
cM capacity (veh/h)			1589		991	1066

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	35	5	62
Volume Left	0	4	26
Volume Right	34	0	36
cSH	1700	1589	1033
Volume to Capacity	0.02	0.00	0.06
Queue Length 95th (m)	0.0	0.1	1.4
Control Delay (s)	0.0	5.8	8.7
Lane LOS		A	A
Approach Delay (s)	0.0	5.8	8.7
Approach LOS			A

Intersection Summary				
Average Delay		5.6		
Intersection Capacity Utilization		16.4%	ICU Level of Service	A
Analysis Period (min)		15		

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	1	0	57	4	0	35
Future Volume (vph)	1	0	57	4	0	35
Ideal Flow (vphpl)	1483	1483	1388	1388	1228	1228
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt			0.992			
Flt Protected	0.950					
Satd. Flow (prot)	1409	0	1377	0	0	1148
Flt Permitted	0.950					
Satd. Flow (perm)	1409	0	1377	0	0	1148
Link Speed (k/h)	50		50			50
Link Distance (m)	45.1		87.3			47.1
Travel Time (s)	3.2		6.3			3.4
Confl. Peds. (#/hr)				5	5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	7%
Adj. Flow (vph)	1	0	62	4	0	38
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1	0	66	0	0	38
Sign Control	Stop		Free			Free

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	15.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	1	0	57	4	0	35
Future Volume (Veh/h)	1	0	57	4	0	35
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	0	62	4	0	38
Pedestrians	5					
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	0					
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	107	69			71	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	107	69			71	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	892	995			1536	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	1	66	38
Volume Left	1	0	0
Volume Right	0	4	0
cSH	892	1700	1536
Volume to Capacity	0.00	0.04	0.00
Queue Length 95th (m)	0.0	0.0	0.0
Control Delay (s)	9.0	0.0	0.0
Lane LOS	A		
Approach Delay (s)	9.0	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	15.8%	ICU Level of Service	A
Analysis Period (min)	15		

Appendix E: Total Operations

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	353	0	0	351	22	0	1	1	28	0	46
Future Volume (vph)	30	353	0	0	351	22	0	1	1	28	0	46
Ideal Flow (vphpl)	1504	1629	1900	1900	1388	1388	1483	1483	1483	1483	1483	1483
Storage Length (m)	15.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	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
Ped Bike Factor												
Frt					0.992			0.932			0.916	
Flt Protected	0.950										0.982	
Satd. Flow (prot)	1264	1481	0	0	1233	0	0	1382	0	0	1295	0
Flt Permitted	0.950										0.982	
Satd. Flow (perm)	1264	1481	0	0	1233	0	0	1382	0	0	1295	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		74.0			84.0			63.9			87.3	
Travel Time (s)		5.3			6.0			4.6			6.3	
Confl. Peds. (#/hr)	11		3	3		11	1					1
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 (%)	13%	10%	0%	0%	12%	7%	0%	0%	0%	8%	0%	0%
Adj. Flow (vph)	33	384	0	0	382	24	0	1	1	30	0	50
Shared Lane Traffic (%)												
Lane Group Flow (vph)	33	384	0	0	406	0	0	2	0	0	80	0
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	50.5%	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)	30	353	0	0	351	22	0	1	1	28	0	46
Future Volume (Veh/h)	30	353	0	0	351	22	0	1	1	28	0	46
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)	33	384	0	0	382	24	0	1	1	30	0	50
Pedestrians		1						3			11	
Lane Width (m)		3.6						3.6			3.6	
Walking Speed (m/s)		1.2						1.2			1.2	
Percent Blockage		0						0			1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	417			387			898	870	387	856	858	406
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	417			387			898	870	387	856	858	406
tC, single (s)	4.2			4.1			7.1	6.5	6.2	7.2	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.3			2.2			3.5	4.0	3.3	3.6	4.0	3.3
p0 queue free %	97			100			100	100	100	88	100	92
cM capacity (veh/h)	1075			1180			233	280	664	259	284	643

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total	33	384	406	2	80
Volume Left	33	0	0	0	30
Volume Right	0	0	24	1	50
cSH	1075	1700	1700	393	413
Volume to Capacity	0.03	0.23	0.24	0.01	0.19
Queue Length 95th (m)	0.7	0.0	0.0	0.1	5.3
Control Delay (s)	8.5	0.0	0.0	14.2	15.8
Lane LOS	A			B	C
Approach Delay (s)	0.7		0.0	14.2	15.8
Approach LOS				B	C

Intersection Summary					
Average Delay	1.7				
Intersection Capacity Utilization	50.5%	ICU Level of Service		A	
Analysis Period (min)	15				

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1	8	10	2	17	15
Future Volume (vph)	1	8	10	2	17	15
Ideal Flow (vphpl)	1388	1388	1228	1228	1483	1483
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.878				0.936	
Flt Protected				0.959	0.974	
Satd. Flow (prot)	1219	0	0	1178	1352	0
Flt Permitted				0.959	0.974	
Satd. Flow (perm)	1219	0	0	1178	1352	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	63.4			60.5	70.2	
Travel Time (s)	4.6			4.4	5.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	1	9	11	2	18	16
Shared Lane Traffic (%)						
Lane Group Flow (vph)	10	0	0	13	34	0
Sign Control	Free			Free	Stop	

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

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1	8	10	2	17	15
Future Volume (Veh/h)	1	8	10	2	17	15
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)	1	9	11	2	18	16
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			10		30	6
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			10		30	6
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		98	99
cM capacity (veh/h)			1623		983	1083

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	10	13	34
Volume Left	0	11	18
Volume Right	9	0	16
cSH	1700	1623	1028
Volume to Capacity	0.01	0.01	0.03
Queue Length 95th (m)	0.0	0.2	0.8
Control Delay (s)	0.0	6.1	8.6
Lane LOS		A	A
Approach Delay (s)	0.0	6.1	8.6
Approach LOS			A

Intersection Summary				
Average Delay		6.5		
Intersection Capacity Utilization		17.7%	ICU Level of Service	A
Analysis Period (min)		15		

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	6	0	48	4	0	69
Future Volume (vph)	6	0	48	4	0	69
Ideal Flow (vphpl)	1483	1483	1388	1388	1228	1228
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.990			
Flt Protected	0.950					
Satd. Flow (prot)	1409	0	1052	0	0	1087
Flt Permitted	0.950					
Satd. Flow (perm)	1409	0	1052	0	0	1087
Link Speed (k/h)	50		50			50
Link Distance (m)	45.1		87.3			47.1
Travel Time (s)	3.2		6.3			3.4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	33%	0%	0%	13%
Adj. Flow (vph)	7	0	52	4	0	75
Shared Lane Traffic (%)						
Lane Group Flow (vph)	7	0	56	0	0	75
Sign Control	Stop		Free			Free

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	15.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	6	0	48	4	0	69
Future Volume (Veh/h)	6	0	48	4	0	69
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	0	52	4	0	75
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	129	54			56	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	129	54			56	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	100			100	
cM capacity (veh/h)	870	1019			1562	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	7	56	75
Volume Left	7	0	0
Volume Right	0	4	0
cSH	870	1700	1562
Volume to Capacity	0.01	0.03	0.00
Queue Length 95th (m)	0.2	0.0	0.0
Control Delay (s)	9.2	0.0	0.0
Lane LOS	A		
Approach Delay (s)	9.2	0.0	0.0
Approach LOS	A		

Intersection Summary				
Average Delay	0.5			
Intersection Capacity Utilization	15.6%	ICU Level of Service		A
Analysis Period (min)	15			

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	51	0	32	16	0	18
Future Volume (vph)	51	0	32	16	0	18
Ideal Flow (vphpl)	1483	1483	1388	1388	1228	1228
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.956			
Flt Protected	0.950					
Satd. Flow (prot)	1381	0	1080	0	0	1087
Flt Permitted	0.950					
Satd. Flow (perm)	1381	0	1080	0	0	1087
Link Speed (k/h)	50		50			50
Link Distance (m)	43.0		47.1			70.2
Travel Time (s)	3.1		3.4			5.1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	33%	2%	2%	13%
Adj. Flow (vph)	55	0	35	17	0	20
Shared Lane Traffic (%)						
Lane Group Flow (vph)	55	0	52	0	0	20
Sign Control	Stop		Free			Free

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	13.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	51	0	32	16	0	18
Future Volume (Veh/h)	51	0	32	16	0	18
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	55	0	35	17	0	20
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	64	44			52	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	64	44			52	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	94	100			100	
cM capacity (veh/h)	942	1027			1554	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	55	52	20
Volume Left	55	0	0
Volume Right	0	17	0
cSH	942	1700	1554
Volume to Capacity	0.06	0.03	0.00
Queue Length 95th (m)	1.4	0.0	0.0
Control Delay (s)	9.1	0.0	0.0
Lane LOS	A		
Approach Delay (s)	9.1	0.0	0.0
Approach LOS	A		

Intersection Summary				
Average Delay		3.9		
Intersection Capacity Utilization		13.9%	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)	63	507	0	0	487	51	1	0	3	33	0	33
Future Volume (vph)	63	507	0	0	487	51	1	0	3	33	0	33
Ideal Flow (vphpl)	1504	1629	1900	1900	1388	1388	1483	1483	1483	1483	1483	1483
Storage Length (m)	15.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	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
Ped Bike Factor												
Frt					0.987			0.899			0.932	
Flt Protected	0.950							0.988			0.976	
Satd. Flow (prot)	1429	1582	0	0	1318	0	0	1054	0	0	1316	0
Flt Permitted	0.950							0.988			0.976	
Satd. Flow (perm)	1429	1582	0	0	1318	0	0	1054	0	0	1316	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		74.0			84.0			63.9			87.3	
Travel Time (s)		5.3			6.0			4.6			6.3	
Confl. Peds. (#/hr)	18		5	5		18			4	4		
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%	3%	0%	0%	4%	3%	100%	0%	0%	5%	0%	0%
Adj. Flow (vph)	68	551	0	0	529	55	1	0	3	36	0	36
Shared Lane Traffic (%)												
Lane Group Flow (vph)	68	551	0	0	584	0	0	4	0	0	72	0
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 63.1%		ICU Level of Service B	
Analysis Period (min) 15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	63	507	0	0	487	51	1	0	3	33	0	33
Future Volume (Veh/h)	63	507	0	0	487	51	1	0	3	33	0	33
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)	68	551	0	0	529	55	1	0	3	36	0	36
Pedestrians					4			5			18	
Lane Width (m)					3.6			3.6			3.6	
Walking Speed (m/s)					1.2			1.2			1.2	
Percent Blockage					0			0			2	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	602			556			1284	1294	560	1268	1266	574
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	602			556			1284	1294	560	1268	1266	574
tC, single (s)	4.1			4.1			8.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			4.4	4.0	3.3	3.5	4.0	3.3
p0 queue free %	93			100			99	100	99	72	100	93
cM capacity (veh/h)	971			1020			78	150	528	130	155	514

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total	68	551	584	4	72
Volume Left	68	0	0	1	36
Volume Right	0	0	55	3	36
cSH	971	1700	1700	216	208
Volume to Capacity	0.07	0.32	0.34	0.02	0.35
Queue Length 95th (m)	1.7	0.0	0.0	0.4	11.0
Control Delay (s)	9.0	0.0	0.0	22.0	31.2
Lane LOS	A			C	D
Approach Delay (s)	1.0		0.0	22.0	31.2
Approach LOS				C	D

Intersection Summary					
Average Delay		2.3			
Intersection Capacity Utilization		63.1%	ICU Level of Service		B
Analysis Period (min)		15			

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1	31	4	1	24	33
Future Volume (vph)	1	31	4	1	24	33
Ideal Flow (vphpl)	1388	1388	1228	1228	1483	1483
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.869				0.922	
Flt Protected				0.962	0.979	
Satd. Flow (prot)	1062	0	0	1181	1339	0
Flt Permitted				0.962	0.979	
Satd. Flow (perm)	1062	0	0	1181	1339	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	63.4			60.5	70.2	
Travel Time (s)	4.6			4.4	5.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	14%	0%	0%	0%	0%
Adj. Flow (vph)	1	34	4	1	26	36
Shared Lane Traffic (%)						
Lane Group Flow (vph)	35	0	0	5	62	0
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	16.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1	31	4	1	24	33
Future Volume (Veh/h)	1	31	4	1	24	33
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)	1	34	4	1	26	36
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		27	18
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			35		27	18
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		97	97
cM capacity (veh/h)			1589		991	1066

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	35	5	62
Volume Left	0	4	26
Volume Right	34	0	36
cSH	1700	1589	1033
Volume to Capacity	0.02	0.00	0.06
Queue Length 95th (m)	0.0	0.1	1.4
Control Delay (s)	0.0	5.8	8.7
Lane LOS		A	A
Approach Delay (s)	0.0	5.8	8.7
Approach LOS			A

Intersection Summary				
Average Delay		5.6		
Intersection Capacity Utilization		16.4%	ICU Level of Service	A
Analysis Period (min)		15		

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	1	0	109	4	0	65
Future Volume (vph)	1	0	109	4	0	65
Ideal Flow (vphpl)	1483	1483	1388	1388	1228	1228
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt			0.996			
Flt Protected	0.950					
Satd. Flow (prot)	1409	0	1382	0	0	1148
Flt Permitted	0.950					
Satd. Flow (perm)	1409	0	1382	0	0	1148
Link Speed (k/h)	50		50			50
Link Distance (m)	45.1		87.3			47.1
Travel Time (s)	3.2		6.3			3.4
Confl. Peds. (#/hr)				5	5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	7%
Adj. Flow (vph)	1	0	118	4	0	71
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1	0	122	0	0	71
Sign Control	Stop		Free			Free

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	19.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	1	0	109	4	0	65
Future Volume (Veh/h)	1	0	109	4	0	65
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	0	118	4	0	71
Pedestrians	5					
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	0					
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	196	125			127	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	196	125			127	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	794	927			1466	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	1	122	71
Volume Left	1	0	0
Volume Right	0	4	0
cSH	794	1700	1466
Volume to Capacity	0.00	0.07	0.00
Queue Length 95th (m)	0.0	0.0	0.0
Control Delay (s)	9.5	0.0	0.0
Lane LOS	A		
Approach Delay (s)	9.5	0.0	0.0
Approach LOS	A		

Intersection Summary				
Average Delay		0.0		
Intersection Capacity Utilization		19.0%	ICU Level of Service	A
Analysis Period (min)		15		

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	30	0	57	52	0	35
Future Volume (vph)	30	0	57	52	0	35
Ideal Flow (vphpl)	1483	1483	1388	1388	1228	1228
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt			0.935			
Flt Protected	0.950					
Satd. Flow (prot)	1381	0	1285	0	0	1148
Flt Permitted	0.950					
Satd. Flow (perm)	1381	0	1285	0	0	1148
Link Speed (k/h)	50		50			50
Link Distance (m)	43.0		47.1			70.2
Travel Time (s)	3.1		3.4			5.1
Confl. Peds. (#/hr)				5	5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	0%	2%	2%	7%
Adj. Flow (vph)	33	0	62	57	0	38
Shared Lane Traffic (%)						
Lane Group Flow (vph)	33	0	119	0	0	38
Sign Control	Stop		Free			Free

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	19.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	30	0	57	52	0	35
Future Volume (Veh/h)	30	0	57	52	0	35
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	33	0	62	57	0	38
Pedestrians	5					
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	0					
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	134	96			124	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	134	96			124	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	96	100			100	
cM capacity (veh/h)	857	957			1457	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	33	119	38
Volume Left	33	0	0
Volume Right	0	57	0
cSH	857	1700	1457
Volume to Capacity	0.04	0.07	0.00
Queue Length 95th (m)	0.9	0.0	0.0
Control Delay (s)	9.4	0.0	0.0
Lane LOS	A		
Approach Delay (s)	9.4	0.0	0.0
Approach LOS	A		

Intersection Summary				
Average Delay		1.6		
Intersection Capacity Utilization		19.4%	ICU Level of Service	A
Analysis Period (min)		15		