6179 Lundy's Lane, Niagara Falls, ON Transportation Impact & Parking Study

Paradigm Transportation Solutions Limited

January 2024
220825

ptsl.com

Project Summary

Project Number
220825

Date: January 2024
Version 1.0.0

6179 Lundy's Lane, Niagara Falls, ON
Transportation Impact & Parking Study

Client
JB-RINE Developments
30 Eglinton Avenue West, Suite 306
Mississauga, ON L5R 3E7

Client Contact
Jawad Butt, Meng. Civil (UOT), PMP
Director

Consultant Project Team
Stew Elkins, B.E.S
Adam Makarewicz, CET, MITE
Greg Lue, M.A.Sc., P.Eng.
Scott Catton, CET
Adrian Soo, P.Eng.

Greg Lue, M.A.Sc., P.Eng.

Disclaimer

This document has been prepared for the titled project or named part thereof (the "project") and except for approval and commenting municipalities and agencies in their review and approval of this project, should not be relied upon or used for any other project without an independent check being carried out as to its suitability and prior written authorization of Paradigm Transportation Solutions Limited being obtained. Paradigm Transportation Solutions Limited accepts no responsibility or liability for the consequence of this document being used for a purpose other than the project for which it was commissioned. Any person using or relying on the document for such other purpose agrees and will by such use or reliance be taken to confirm their agreement to indemnify Paradigm Transportation Solutions Limited for all loss or damage resulting there from. Paradigm Transportation Solutions Limited accepts no responsibility or liability for this document to any party other than the person by whom it was commissioned and the approval and commenting municipalities and agencies for the project.

To the extent that this report is based on information supplied by other parties, Paradigm Transportation Solutions Limited accepts no liability for any loss or damage suffered by the client, whether through contract or tort, stemming from any conclusions based on data supplied by parties other than Paradigm Transportation Solutions Limited and used by Paradigm Transportation Solutions Limited in preparing this report.

Paradigm Transportation Solutions Limited
5A-150 Pinebush Road
Cambridge ON N1R 8J8
p: 519.896.3163
905.381.2229
416.479.9684
www.ptsl.com

Executive Summary

Paradigm Transportation Solutions Limited (Paradigm) was retained to conduct this Transportation Impact Study and Parking Study for a proposed mixed-use development at 6179 Lundy's Lane in the City of Niagara Falls.

The purpose of this study is to determine the net impacts of the development traffic on the surrounding road network and confirm the adequacy of the proposed parking supply. This study will identify improvements, if needed, to support the development of the subject site.

Conclusions

This study evaluated the impacts associated with the construction of a mixed-use development within a 9-storey tower, providing 131 residential units and 294 m^2 (3,163 sq.ft.) of ground floor retail. Access to the site is proposed from Lundy's Lane. For assessment purposes an opening year of 2026 is assumed.

Transportation Impact Assessment

The main findings and conclusions of the impact assessment are as follows:

- **Base Year Traffic Conditions:** All study area intersections are found to be operating at acceptable levels of service and within capacity. The exception being the Lundy's Lane at Drummond Road northbound left-turn lane 95th percentile queue length extending beyond the available storage during the AM and PM peak hours by up to 30 m.
- **Trip Generation:** The site's trip generation is estimated to be 53 AM and 72 PM peak hour trips.
- **Background Traffic Conditions:** With the addition of generalized background growth, all study area intersections are forecast to continue to operate at acceptable levels of service and within capacity. Localized congestion is forecast to occur at the intersection of Lundy's Lane at Drummond Road in the PM peak hour. Specifically, the eastbound left-turn movement from Lundy's Lane is forecast to operate at a LOS F; however, this movement is reported to operate with delays less than 65 seconds in the PM peak hour.
- **Total Traffic Conditions:** With the addition of site generated vehicular traffic, all study area intersections are forecast to

operate at acceptable levels of service and within capacity. Similar to background traffic conditions, localized congestion is forecast to occur at the intersection of Lundy's Lane at Drummond Road in the PM peak hour.

The westbound through 95th percentile queue length at Lundy's Lane at Drummond Road is forecast to extend beyond 100 metres encroaching and potentially blocking the site access.

The site access is forecast to operate with delays in the LOS C range or better; delays are not expected to exceed 25 seconds.

The additional traffic generated by the site is not expected to significantly impact the study area intersections. Overall, delays for individual movements are forecast to increase by less than 10 seconds during the AM and PM peak hours.

- **Remedial Measures:**
  - **Sightline**: Due to the presence of a vertical curve located east of the subject site, the required sight distance is not met east of the driveway for a design speed of 60 km/h. It is noted the available stopping sight distance approaching from the east is equivalent to the posted maximum speed limit of 50 km/h.

    The TAC guide states that "depending on specific circumstances, the designer may use different measurements of sight distance, including stopping sight distance, passing sight distance, etc.". Also noting "in many applications, one of these types of sight distance will govern, and the designer need satisfy only one requirement".
  - Furthermore, it is acknowledged the existing driveway serving the site is located approximately 25 metres west of the proposed driveway; accordingly, vehicles approaching the driveway currently encounter the sight distance deficiency.

    A review of midblock collisions between Drummond Road and Hanan Avenue shows the majority of the nine collisions over the last five years were rear end and sideswipe collisions, suggesting the collisions are likely attributed with vehicle maneuvers and queuing at the intersection Lundy's Lane and Drummond Road. No identifiable trends were noted related to turning movements.
  - **Access Review**: Given the location of the site and the length of the westbound left-turn lane provided at the adjacent intersection of Lundy's Lane and Drummond Road,

providing the TAC recommended spacing from the signalized intersection is not possible.

The number and type of conflict points at a driveway can be managed by limiting both the amount of access allowed at the driveway (e.g., full movement, left-in/left-out, right-in/right-out, right-in only or right-out only) and the location of the driveway relative to other driveways in the area.

A raised median on Lundy's Lane across the site's frontage is preferred to restrict left turns. The raised median, however, could also limit access to other properties with frontage to Lundy's Lane.

- **Auxiliary Turn Lanes**: The forecast traffic volumes warrant the consideration of a 15-metre eastbound left-turn lane at the site driveway. However, due to the proximity to Drummond Road, the provision of an eastbound left-turn lane would be located within functional area of the Drummond Road intersection and therefore is not recommended.

Parking Study

The main findings and conclusions of the parking assessment are as follows:

The City of Niagara Falls growth objective is to create and develop a transit and pedestrian-friendly, sustainable, and livable City through urban design criteria and guidelines. The Official Plan embraces sustainability and creates a vision for complete compact communities served by streets made for walking, cycling, and an attractive transit system. This vision is supported by policies to reduce auto dependence and limit the amount of land occupied by automobile parking. The transportation policies are deliberately interspersed with the land-use policies to emphasize the importance of considering both areas to achieve the overall vision of complete compact communities.

Parking supply is one of the most critical measures to shift demand from vehicles to sustainable travel modes. Research conducted focused on the provision of off-street parking and the choice to drive among individuals travelling. This research found that reductions in off-street vehicular parking for office, residential, and retail developments reduce the overall automobile mode share associated with those developments relative to projects with the same land uses in similar contexts that provide more off-street vehicular parking.

This research is further echoed within the Government of Ontario's "Housing Affordability Task Force." One of the main recommendations

by the Housing Task Force is removing or reducing the parking requirements in cities with over 50,000 in population. The report identified that residential minimum parking requirements should ensure a basic, responsible parking level is provided without increasing development costs. Minimum parking requirements add as much as $165,000 to the price of a new housing unit.

A parking supply of 1.12 spaces per residential unit is supported for the area based on a review of average vehicle ownership rates, and proxy survey data from similar high-rise developments.

Lastly, the proposed parking supply is supported with a Transportation Demand Management (TDM) program that includes unbundled parking spaces from dwelling units, and the provision of transit information for residents.

Recommendations

Based on the findings of this study, the following is recommended:

- The City of Niagara Falls monitor traffic volumes and operations of the signalized intersections of Lundy's Lane with Drummond Road and Main Street to provide appropriate signal timing plans to best serve all movements.
- The developer locate the site driveway at the eastern limit of the site (as proposed) and restrict movements at the site driveway to right-in/right-out to minimize the impact of the proposed driveway on Lundy's Lane while also accommodating the site vehicles to the site.
- Though the future total volume warrants the consideration of an eastbound left-turn lane at the site driveway, a left-turn lane is not recommended as the driveway is recommended to be restricted to only right-in/right-out movements in consideration of sight distance availability, and operational concerns related to adjacent vehicular queuing.
- The City accept the proposed residential parking rate of 1.12 spaces per unit.

Contents

Appendices

Figures

Tables

1 Introduction

1.1 Overview

Paradigm Transportation Solutions Limited (Paradigm) was retained to conduct this Transportation Impact Assessment (TIA) and Parking Study for a proposed mixed-use development located at 6179 Lundy's Lane in the City of Niagara Falls. **Figure 1.1** illustrates the location of the subject site.

This study determines the impacts of the additional traffic generated by the subject site on the surrounding road network and the remedial measures necessary to accommodate future traffic satisfactorily. The scope of this study includes:

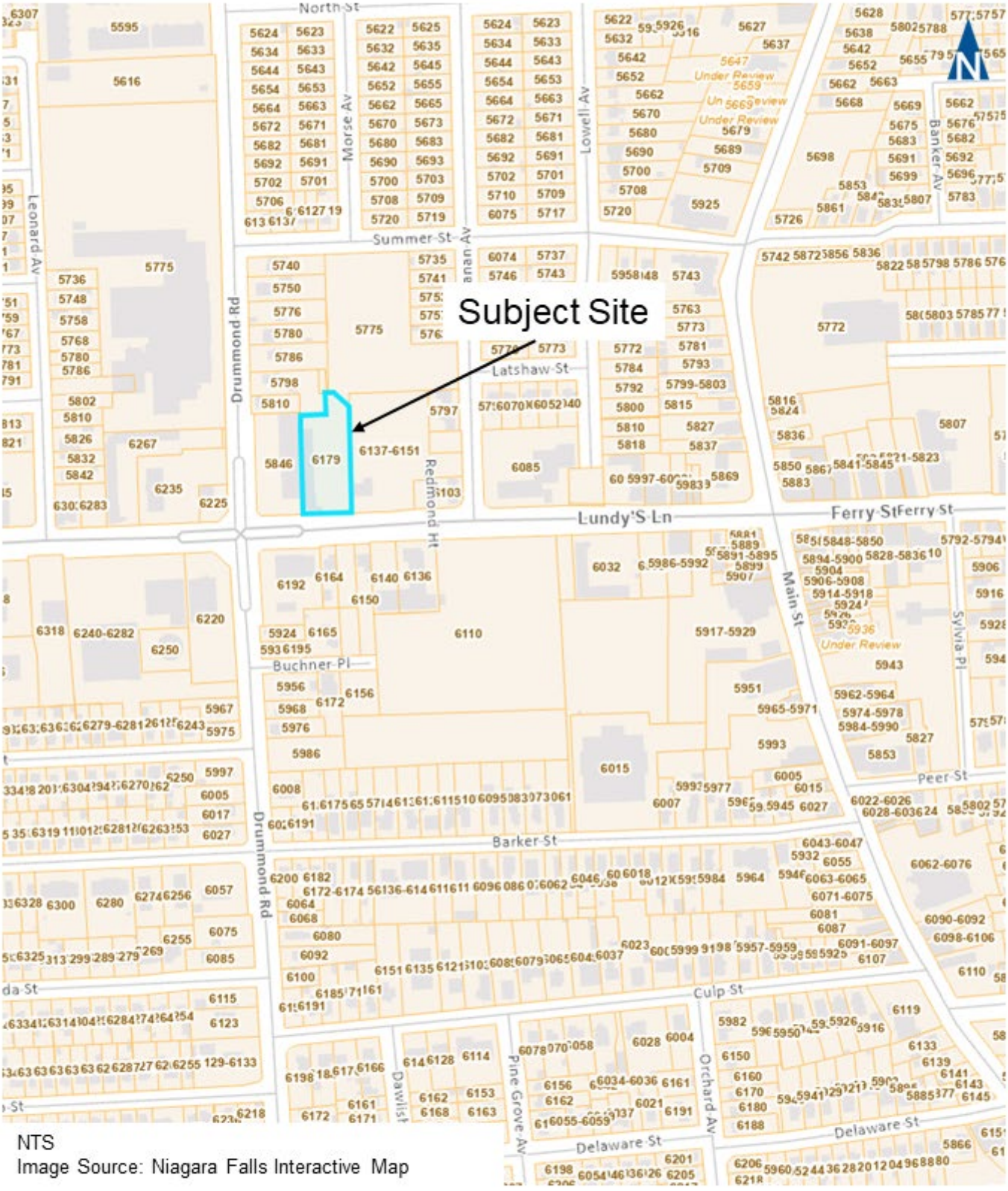
- Determine and assess the current study area traffic conditions;
- Forecast the additional traffic generated by the proposed development;
- Analyze the impacts of the additional traffic on the study area intersections for a 2031 horizon year, representative of five years following build-out in 2026;
- Recommend any necessary remedial measures to mitigate identified traffic impacts; and
- Review the proposed parking supply, and determine its adequacy compared to estimated parking demands.

The study scope was developed in consultation with the Niagara Region and the City of Niagara Falls in March 2023. **Appendix A** contains the pre-study consultation material.

1.2 Study Area

The study area intersections assessed in this study include:

- Lundy's Lane & Drummond Road (signalized);
- Lundy's Lane & Main Street (signalized); and
- One site driveway.



NTS
Image Source: Niagara Falls Interactive Map

paradigm TRANSPORTATION SOLUTIONS LIMITED

Subject Site Location

6179 Lundy's Lane, Niagara Falls
220825

Figure 1.1

2 Existing Conditions

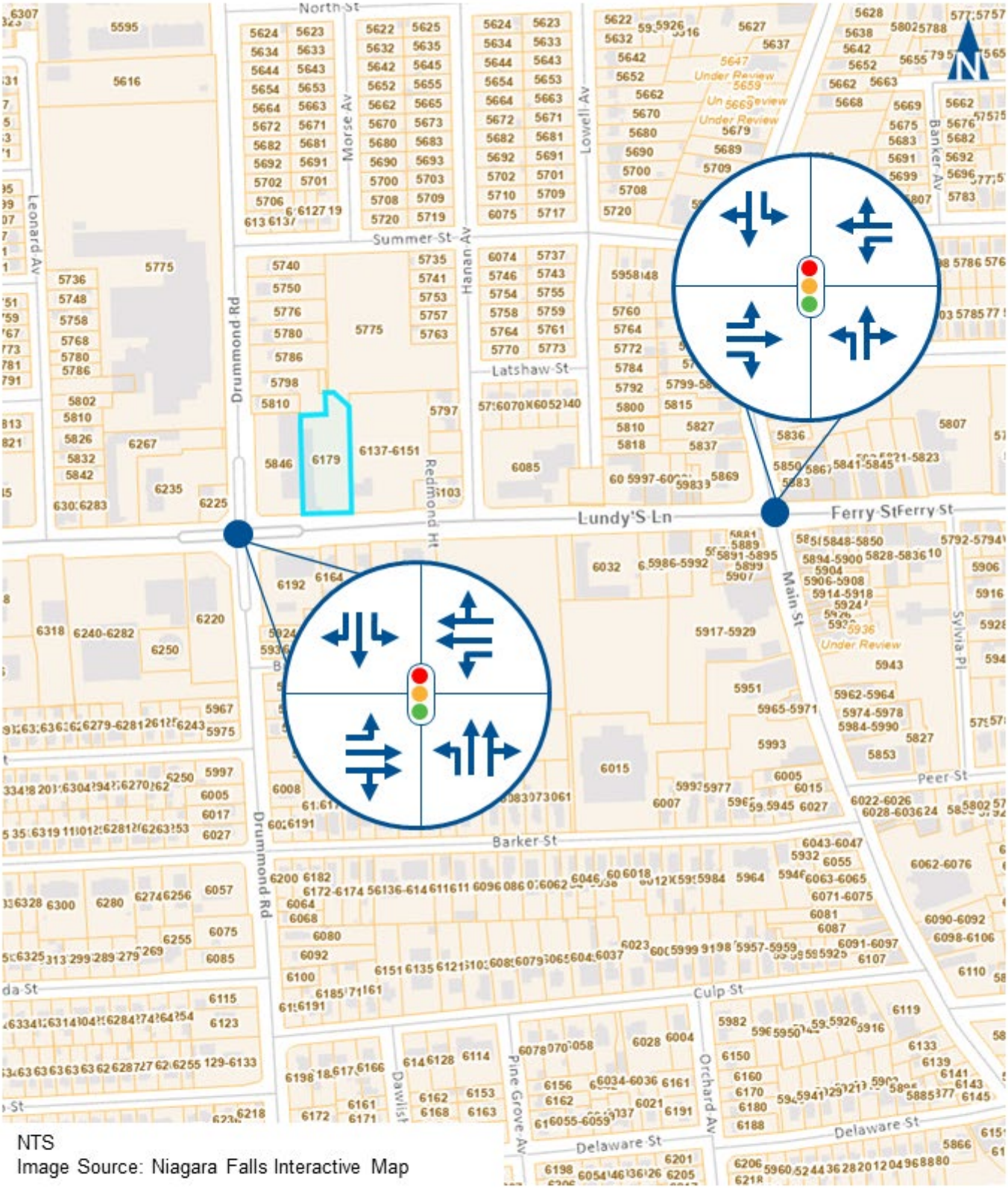
2.1 Roadway Characteristics

The City of Niagara Falls roadways of interest within the study area include:

- **Lundy's Lane (Regional Road 20)** is an east-west regional arterial road[1] with a four-lane cross-section providing two travel lanes in each direction in proximity to the site. The posted speed limit is 50 km/h. Sidewalks are present on both sides of the road. No dedicated on-street cycling facilities are present on the road.
- **Drummond Road** is a north-south arterial[2] road. It has a four-lane cross-section north of Lundy's Lane and two-lane cross-section south of Lundy's Lane. The posted speed limit is 50 km/h. Sidewalks are present on both sides of the road. Bike lanes are present on both sides of the road south of Lundy's Lane.
- **Main Street** is a north-south collector road with a two-lane cross-section. The posted speed limit is 50 km/h. Sidewalks are present on both sides of the road. No dedicated on-street cycling facilities are present on the road.

Figure 2.1 illustrates the existing lane configurations and traffic control at the study area intersections.

[1] Niagara Region – Regional Road Map 2021
[2] City of Niagara Falls – Official Plan Schedule C 2008



NTS
Image Source: Niagara Falls Interactive Map

paradigm TRANSPORTATION SOLUTIONS LIMITED

Existing Lane Configuration and Traffic Control

6179 Lundy's Lane, Niagara Falls
220825

Figure 2.1

2.2 Transit Service

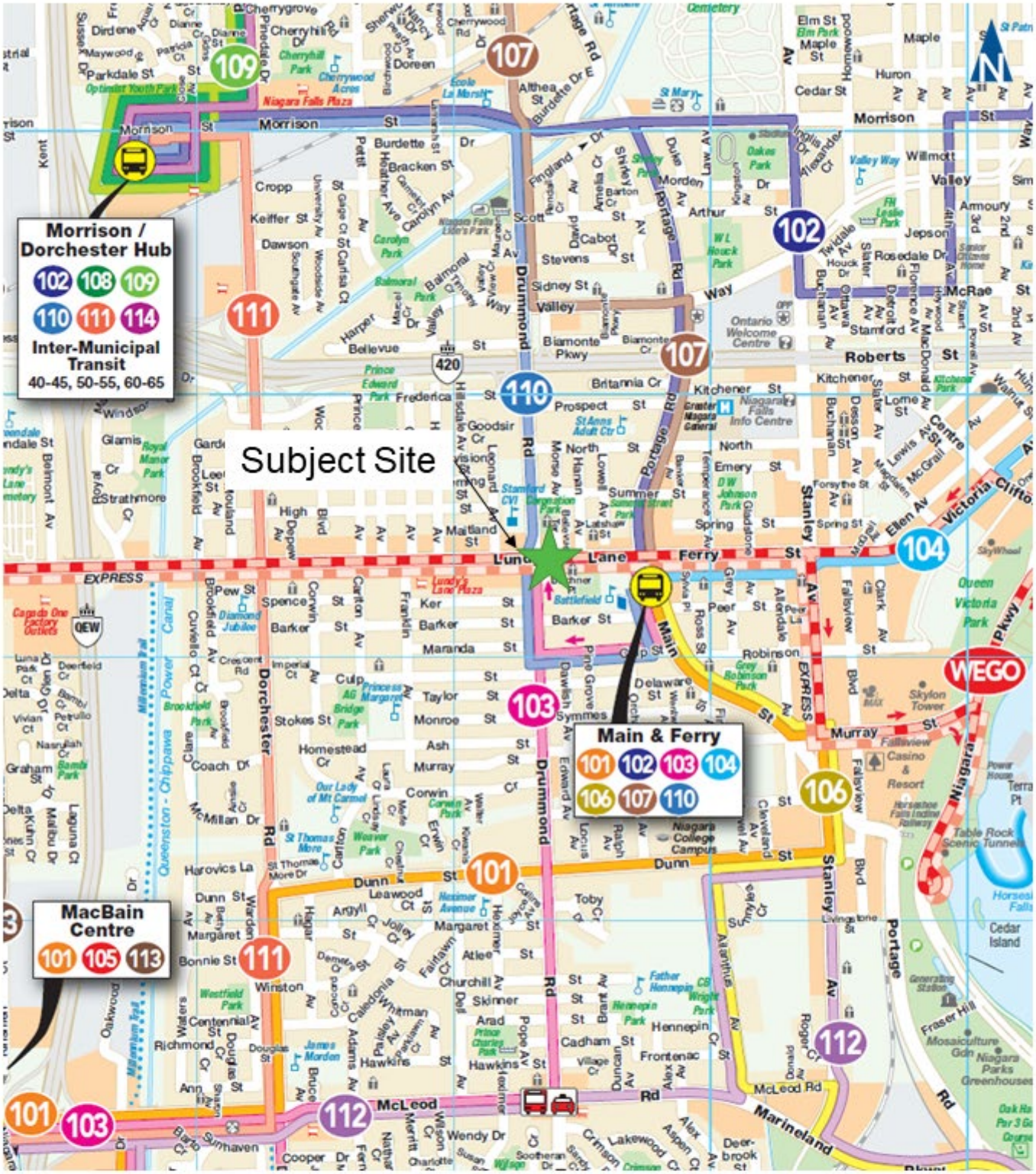
The study area is served by regional transit service (Niagara Region Transit) and local transit services (WEGO). Niagara Region Transit provides transit service across Niagara Region and local route service in St. Catharines, Niagara Falls, Welland, Port Colborne, and Fort Erie.

As of January 1, 2023, Niagara Falls Transit, which provided local transit service within Niagara Falls, has become part of Niagara Region Transit. WEGO Transit service remains a separate service. The following routes serve the study area:

- **WEGO:**
  - **WEGO Red Line** provides service along Lundy's Lane between the Canadian Drive Hub and Table Rock Welcome Centre. Service runs every 30 minutes between 6:00 AM and 10:22 PM on Sunday to Thursday. Sunday service starts one hour later at 7:00 AM. On Friday and Saturday, bus service runs every 30 minutes between 6:00 AM and 12:22 AM.
- **Niagara Region Transit:**
  - Route 103 provides service along Drummond Road between the Main Street Hub and the Canadian Drive Hub. Service runs generally every 30 minutes between 6:00 AM and 11:30 PM
  - Route 110 provides service along Drummond Road between the Main Street Hub and the Morrison/Dorchester Hub. Service runs every 30 minutes between 6:15 AM and 11:15 PM

The Main Street Hub is located approximately 450 metres (2-minute walk) from the subject site. At the Main Street & Ferry Street terminal, additional bus routes can be accessed.

Figure 2.2 illustrates the Niagara Region Transit and WEGO routes serving the study corridor.



paradigm TRANSPORTATION SOLUTIONS LIMITED

Existing Transit Network

6179 Lundy's Lane, Niagara Falls
220825

Figure 2.2

2.3 Active Transportation

Pedestrian infrastructure typically consists of sidewalks or multi-use paths parallel to the roadway. Sidewalks are present on both sides of the road for all roads in the study area.

Cycling infrastructure typically consists of on-street and off-street facilities. On-street facilities comprise cycling lanes, signed cycling routes, and paved shoulders. Off-street facilities are in the form of multi-use or informal trails.

Bike lanes are present on Drummond Road south of Lundy's Lane. Main Street is designated as a shared roadway for cyclists south of Lundy's Lane.

2.4 Traffic Volumes

To assess intersection operations, Turning Movement Counts (TMC) is used to quantify the movement of vehicles. Existing traffic counts at an intersection or on a road section form the analysis's foundation. The traffic counts are usually collected during peak periods at an intersection to complete the level of service analysis.

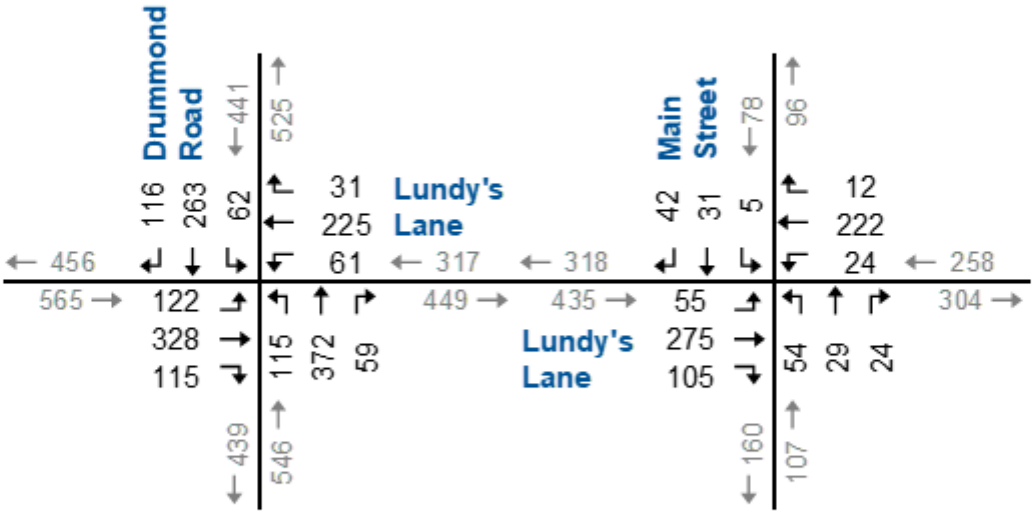
Weekday peak hour TMC data was collected by Niagara Region and Paradigm between August 2022 and April 2023. **Table 2.1** summarizes the location and date of the existing TMC data collected for the analysis. **Appendix B** contains the turning movement data. Traffic data collected before 2023 has been factored in using a 2% per annum growth rate as per Niagara Region's TIS guidelines.

TABLE 2.1: TRAFFIC COUNT LOCATION AND DATE

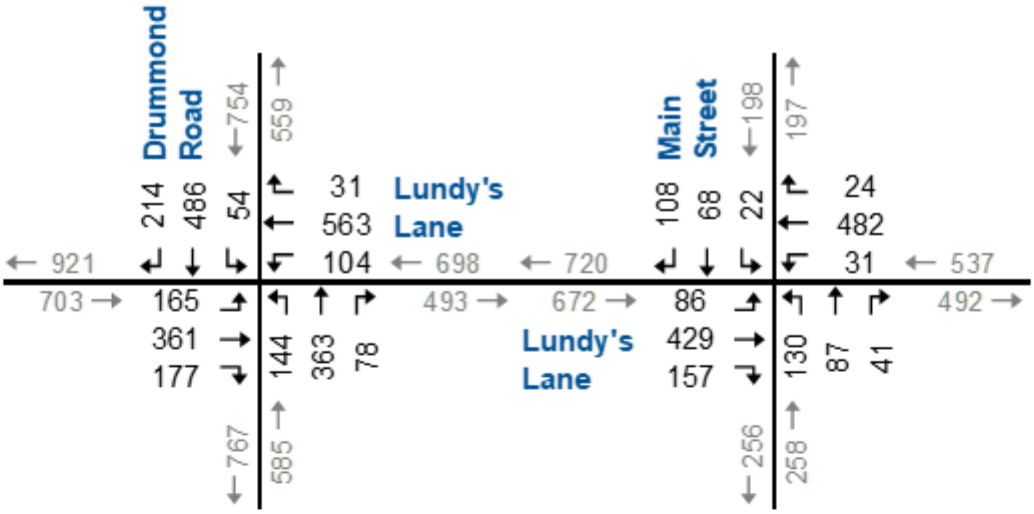
Intersection	Date
Lundy's Lane & Drummond Road (signalized)	April 2023
Lundy's Lane & Main Street (signalized)	August 2022

Figure 2.3 illustrates the base year traffic volumes.

AM Peak Hour



PM Peak Hour



Base Year Traffic Volumes

6179 Lundy's Lane, Niagara Falls
220825

Figure 2.3

2.5 Traffic Operations

Intersection level of service (LOS) is a recognized method of quantifying traffic flow efficiency at intersections. It is based on the delay experienced by individual vehicles executing the various movements. The delay is related to the number of vehicles desiring to move compared to the estimated capacity for that movement. The capacity is based on several criteria related to the opposing traffic flows. The highest possible rating is LOS A, under which the average total delay is equal to or less than 10 seconds per vehicle. When the average delay exceeds 80 seconds at signalized intersections (50 seconds at unsignalized intersections), the movement is considered to have a LOS F and remedial measures are usually implemented if feasible.

The intersections' operations in the study area were evaluated using the existing lane configuration, traffic control, existing base year traffic volumes and signal timings.

The service conditions on the existing road network have been assessed using Synchro 11. Based on Niagara Region's guidelines[3], movements are considered critical under the following conditions:

- Signalized intersections:
  - Volume to capacity ratios for through movements or shared through/turning movements is greater than or equal to 0.85,
  - Volume to capacity ratios for exclusive turning movements is greater than or equal to 0.90, and
- Unsignalized intersections
  - Delays classified as LOS D-F;

[3] Niagara Region, Guidelines for Transportation Impact Studies, May 2012

Table 2.3 summarizes the results of the analysis for the current weekday AM and PM peak hour intersection operations, indicating the level of service (LOS), average vehicle delays, volume-to-capacity (v/c) ratios, and 95th percentile queues.

All study area intersections are determined to be operating at acceptable levels of service and well within capacity.

The following identified critical movements are outlined below:

Weekday AM Peak Hour

- Lundy's Lane & Main Street (signalized):
  - Northbound left-turn lane 95th percentile queue length extends beyond the available storage by less than 10 m.

Weekday PM Peak Hour

- Lundy's Lane & Main Street (signalized):
  - Northbound left-turn lane 95th percentile queue length extends beyond the available storage by less than 30 m.

The limited right-of-way on Main Street means the northbound left-turn storage length is restricted to a relatively short 10 metre storage length. During the AM and PM peak hour, the 95th percentile and average queue lengths for the northbound left-turn movement at Lundy's Lane and Main Street extend beyond the available storage.

Appendix C contains the detailed Synchro reports.

TABLE 2.3: BASE YEAR TRAFFIC OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																
				Eastbound				Westbound				Northbound				Southbound				Overall
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	1 - Lundy's Lane & Drummond Road	TCS	LOS	C	C	>	C	C	C	>	C	B	C	>	C	B	C	C	C	C
			Delay	23	34	>	31	26	33	>	31	16	23	>	21	18	27	22	24	27
			V/C	0.33	0.48	>		0.22	0.31	>		0.26	0.35	>		0.16	0.43	0.09		0.43
			Q	31	60	>		17	36	>		24	52	>		14	72	12		
			Ex	60	--	>		55	--	>		--	--	>		55	--	--		
			Avail.	29	--	>		38	--	>		--	--	>		41	--	--		
	2 - Lundy's Lane & Main Street	TCS	LOS	B	B	B	B	B	B	>	B	C	C	>	C	C	C	>	C	B
			Delay	12	19	15	17	14	20	>	19	23	22	>	22	21	22	>	22	19
			V/C	0.13	0.41	0.09		0.07	0.37	>		0.15	0.08	>		0.02	0.10	>		0.29
			Q	11	64	9		6	55	>		18	13	>		4	14	>		
			Ex	45	--	--		25	--	>		10	--	>		25	--	>		
			Avail.	34	--	--		19	--	>		-8	--	>		22	--	>		
PM Peak Hour	1 - Lundy's Lane & Drummond Road	TCS	LOS	C	D	>	D	C	D	>	D	B	C	>	C	B	D	C	C	C
			Delay	31	39	>	37	26	41	>	38	19	23	>	22	18	37	23	32	33
			V/C	0.65	0.64	>		0.39	0.70	>		0.49	0.34	>		0.14	0.76	0.15		0.7
			Q	41	72	>		27	86	>		29	50	>		13	144	16		
			Ex	60	--	>		55	--	>		--	--	>		55	--	--		
			Avail.	19	--	>		28	--	>		--	--	>		42	--	--		
	2 - Lundy's Lane & Main Street	TCS	LOS	B	C	B	B	B	C	>	C	C	C	>	C	C	C	>	C	C
			Delay	14	22	15	19	14	27	>	27	27	23	>	25	22	24	>	23	23
			V/C	0.29	0.55	0.12		0.09	0.69	>		0.38	0.21	>		0.06	0.23	>		0.53
			Q	16	100	12		7	132	>		38	29	>		9	30	>		
			Ex	45	--	--		25	--	>		10	--	>		25	--	>		
			Avail.	29	--	--		18	--	>		-28	--	>		16	--	>		

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

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

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

RBT - Roundabout
< - Shared Left-turn
> - Shared Right-turn

3 Development Concept

3.1 Development Description

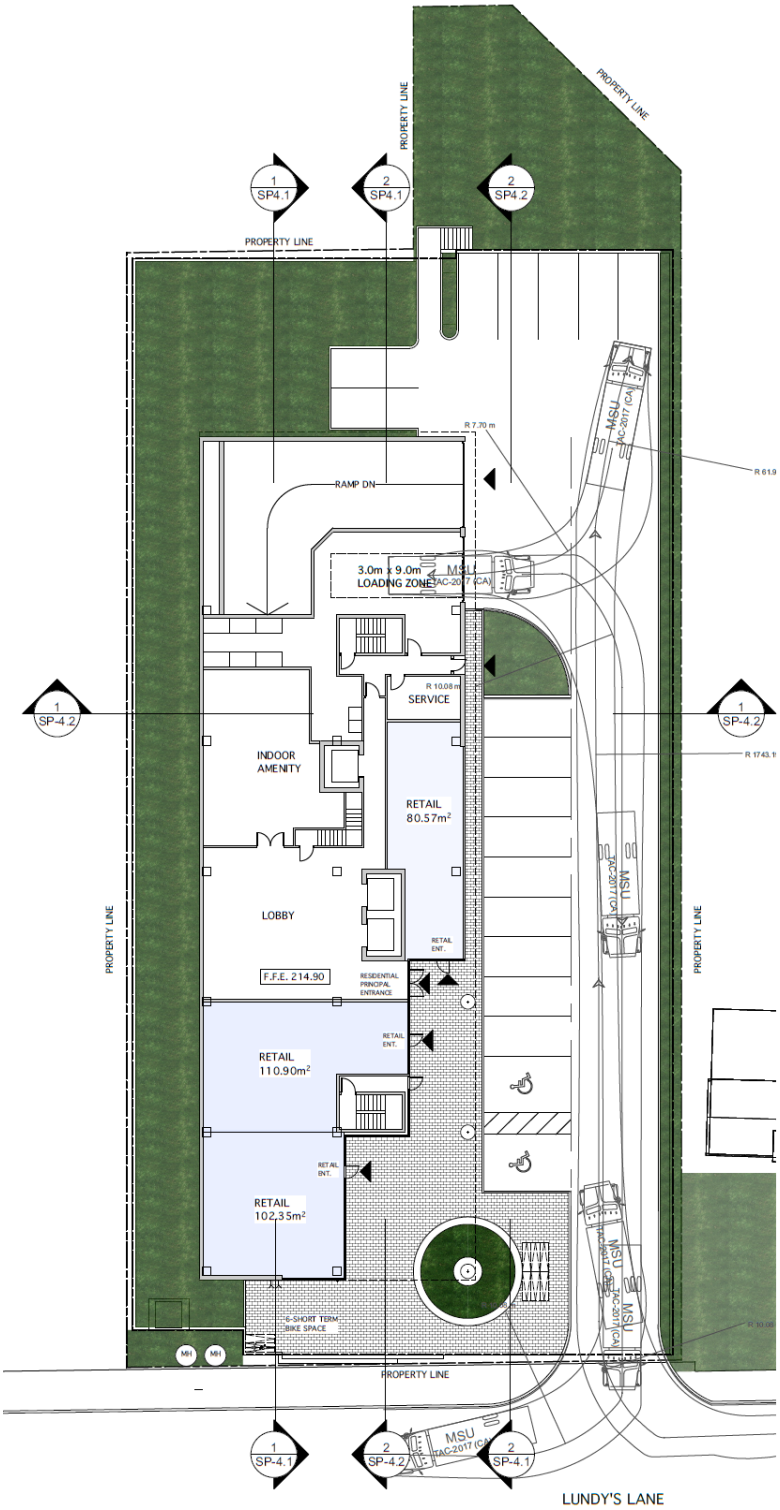
The subject site is located on the north side of Lundy's Lane, east of Drummond Road, at the municipal address 6179 Lundy's Lane. The property owner is proposing to redevelop the lands as a mixed-use development within a single 9-storey tower, providing 131 residential units, and 294 m^2 (3,163 sq.ft.) of ground floor retail.

Vehicle access to the site is proposed via a full-movement driveway connection to Lundy's Lane, located approximately 60 metres east of Drummond Road.

A total of 159 parking spaces are proposed (147 residential spaces and 12 retail spaces) to serve the overall development. Residential parking provisions is proposed at a rate of 1.12 parking spaces per unit, whereas commercial parking provisions is proposed at a rate of 1.00 parking spaces per $25m^2$.

For assessment purposes the development is assumed to built-out and occupied by 2026.

Figure 3.1 illustrates the site concept plan.



NTS

Site Concept Plan

6179 Lundy's Lane, Niagara Falls
220825

Figure 3.1

3.2 Site Trip Generation

The Institute of Transportation Engineers (ITE) Trip Generation[4] was referenced to estimate the peak hour vehicular traffic generated by the proposed development. The following Land Use Codes (LUC) were used:

- Multifamily Housing (Mid-Rise) (LUC 221); and
- Retail Plaza (<40k sq.ft. GFA) (LUC 822)

Table 3.1 summarizes the estimated trip generation. The site is estimated to generate approximately 53 AM peak hour trips and 72 PM peak hour trips. To remain conservative, no trip reductions in alternative modes of transportation have been applied.

Additionally, no pass-by trips have been accounted for the retail component representing a conservative approach.

TABLE 3.1: TRIP GENERATION

ITE Land Use Code / Number of Units	Trips	AM Peak Hour				PM Peak Hour			
		Rate	In	Out	Sum	Rate	In	Out	Sum
221 - Multifamily Housing (Mid-Rise) - 131 Units	Total	Eqn.	11	35	**46**	Eqn.	31	20	**51**
822 - Retail Plaza (<40k GFA) - 3163 GFA	Total	2.36	4	3	**7**	6.59	11	10	**21**
Total	**Total**	--	**15**	**38**	**53**	--	**42**	**30**	**72**

Equations

LUC 221 Rate per Unit AM: T = 0.44(X) - 11.61 | PM: T = 0.39(X) + 0.34

LUC 822 Eqn per 1,000 sq.ft. GFA AM: 2.36 | PM: 6.59

The directional distribution of traffic approaching and departing the subject site is a function of several variables including population density, existing travel patterns, and the efficiency of the roadways surrounding the site.

The trip distribution for the subject site was estimated based on a review of existing trip patterns at the study area intersections. This was determined to be appropriate given the surrounding land is predominately residential and displays typical commuter patterns. **Table 3.2** summarizes the resultant trip distribution applied.

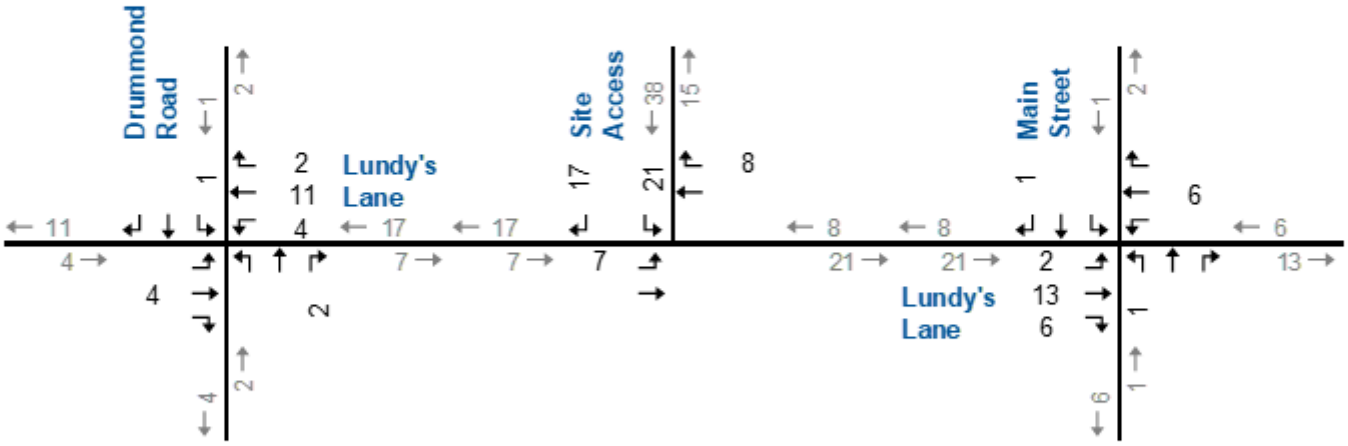
Figure 3.2 illustrates the trip assignment for the AM and PM peak hours.

[4] *Trip Generation 11th Edition*, Institute of Transportation Engineers, Washington D.C., 2022

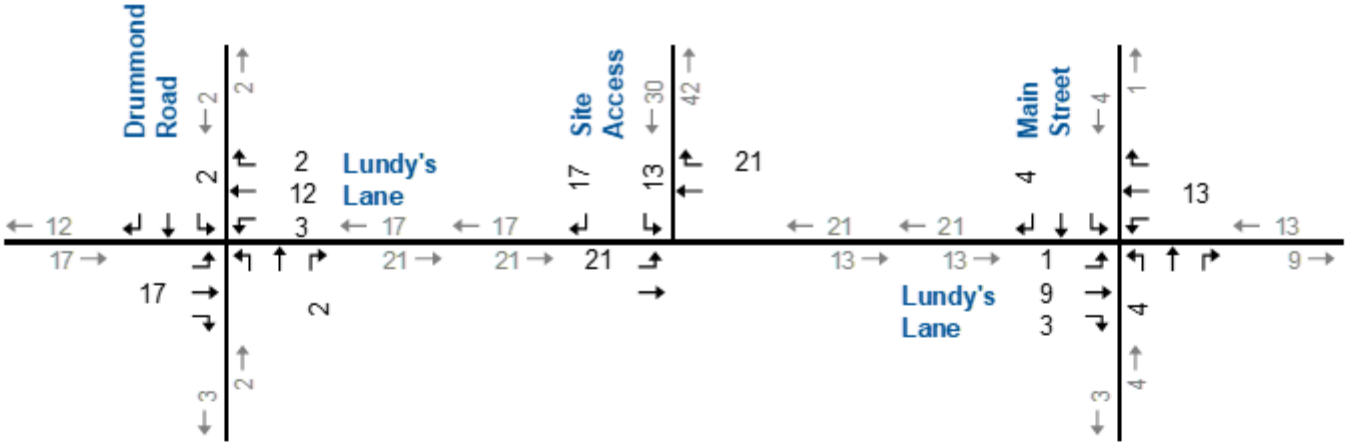
TABLE 3.2: TRIP DISTRIBUTION

From/To	AM		PM	
	In	Out	In	Out
North via Drummond Road	10%	5%	5%	5%
South via Drummond Road	10%	10%	5%	10%
East via Lundy's Lane	40%	35%	30%	30%
West via Lundy's Lane	30%	30%	40%	40%
North via Main Street	5%	5%	10%	5%
South via Main Street	5%	15%	10%	10%
Total	**100%**	**100%**	**100%**	**100%**

AM Peak Hour



PM Peak Hour



paradigm TRANSPORTATION SOLUTIONS LIMITED

Site Generated Traffic Volumes

6179 Lundy's Lane, Niagara Falls
220825

Figure 3.2

3.3 Access and Circulation Review

The proposed access driveway along with on-site circulation has been assessed using the following design vehicles:

- Niagara Falls Refuse Truck;
- TAC Medium Single Unit (MSU) Truck; and
- TAC Passenger Car (P).

AutoTURN software was used to review and confirm the design of the site access connection, internal circulation, and loading area would be able to accommodate the types of vehicles expected on-site.

The proposed geometry for the loading zone and parking garage ramp can accommodate the intended design vehicles without any conflicts. Traffic control signage is proposed at the top of the parking garage ramp to allow for two-way operation.

Appendix D contains the vehicle maneuvering diagrams for reference.

4 Evaluation of Future Traffic Conditions

The assessment of future conditions in this section includes the following components necessary to assess the traffic implications on the adjacent road network:

- Future background traffic volume forecasts;
- Level of service analysis for background traffic (pre-development) conditions;
- Future total traffic volume forecasts; and
- Level of service analysis for total traffic (post-development) conditions.

4.1 Forecast Traffic Volumes

A five-year horizon of 2031 following full build-out/occupancy in 2026 is assessed. The future 2031 horizon traffic volumes are estimated to consist of the following:

- Increased non-site traffic (generalized background traffic growth) is estimated to be 2.0% per annum, as confirmed by the Region; and
- Site traffic generated by the proposed development.

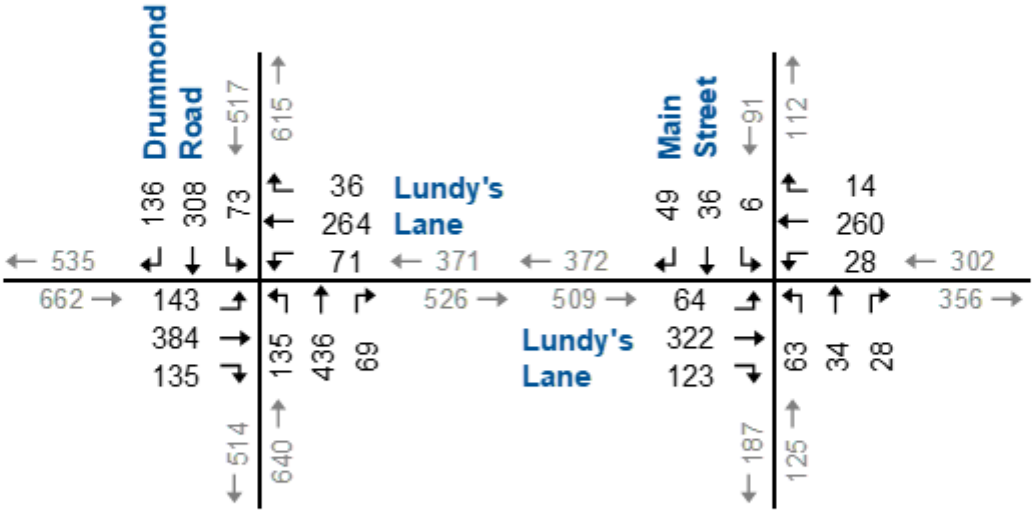
No background developments were identified by the City to be included and accounted for as part of the future traffic forecasts.

Figures 4.1 illustrates the 2031 background traffic forecasts for the weekday AM and PM peak hours.

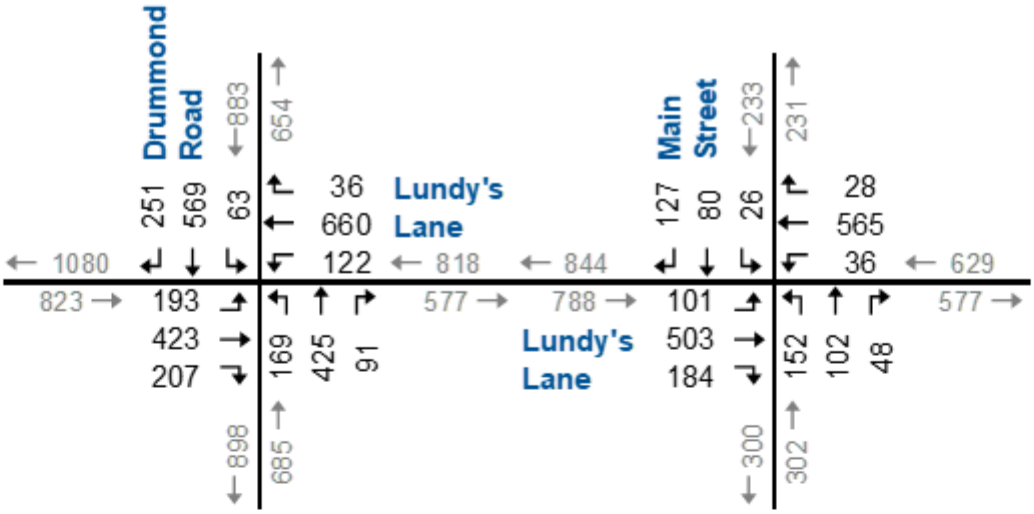
The background traffic forecasts were combined with the site traffic assignments to development the total traffic volumes.

Figure 4.2 illustrates the 2031and total traffic forecasts for the weekday AM and PM peak hours.

AM Peak Hour



PM Peak Hour



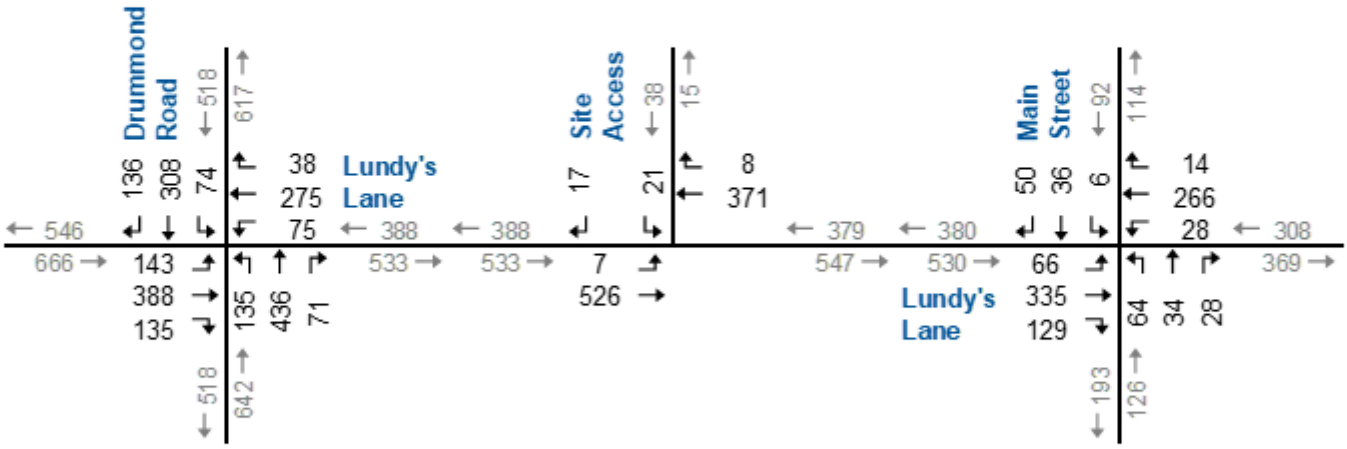
paradigm TRANSPORTATION SOLUTIONS LIMITED

Future Background Traffic Volumes

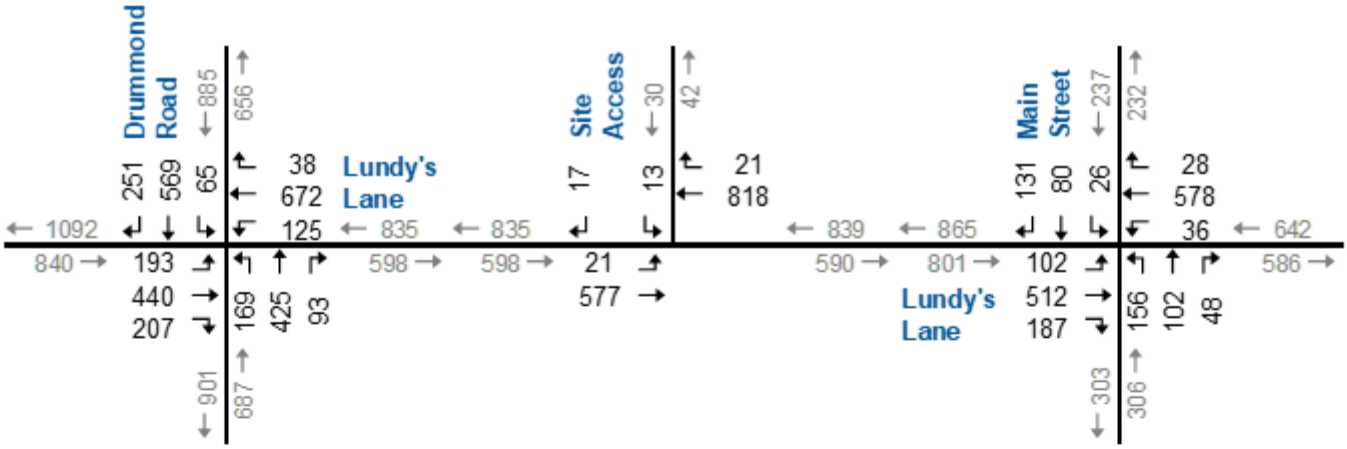
6179 Lundy's Lane, Niagara Falls
220825

Figure 4.1

AM Peak Hour



PM Peak Hour



paradigm TRANSPORTATION SOLUTIONS LIMITED

Future Total Traffic Volumes

6179 Lundy's Lane, Niagara Falls
220825

Figure 4.2

4.2 Future Traffic Operations

4.2.1 Background Traffic Operations

To assess operating conditions for the background traffic scenario, operational analyses were undertaken following the same methodology, parameters, lane arrangements, and traffic control devices as in the analysis of existing conditions.

The exception includes traffic signal optimization. Signal timing splits within existing cycle lengths were optimized to provide the best possible operations for all movements.

Table 4.1 summarizes the operational results, indicating the LOS, average vehicle delays, v/c ratios, and 95th percentile queues.

Accounting for background growth, all study area intersections are forecast to continue to operate at acceptable levels of service and within capacity.

The following identified critical movements are outlined below:

Weekday AM Peak Hour

- Lundy's Lane & Main Street (signalized):
  - Northbound left-turn lane 95th percentile queue length is forecast to extend beyond the available storage by less than 15 m.

Weekday PM Peak Hour

- Lundy's Lane & Drummond Road (signalized):
  - Eastbound left-turn lane is forecast to operate with delays in the LOS E range with a v/c ratio of 0.90. The 95th percentile queue length is forecast to extend beyond the available storage by less than 15 m.
  - Southbound through movement is forecast to operate with delays in the LOS D range with a v/c ratio greater than 0.85.
  - Overall, the intersection is forecast to operate with delays in the LOS D range with a v/c ratio greater than 0.85.
  - The identified critical movements and overall intersection would be at or slightly exceed the threshold criteria. It is noted the intersection and identified critical movements would still be within capacity.
- Lundy's Lane & Main Street (signalized):

- Northbound left-turn lane 95th percentile queue length is forecast to extend beyond the available storage by less than 40 m.

Appendix E contains the detailed Synchro reports.

Localized congestion is forecast to occur at the intersection of Lundy's Lane at Drummond Road in the PM peak hour. While the eastbound left-turn movement is forecast to operate at a LOS E with a v/c ratio of 0.90, the movement would experience delays less than 65 seconds and operate within capacity under the PM peak hour.

TABLE 4.1: FUTURE BACKGROUND TRAFFIC OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																
				Eastbound				Westbound				Northbound				Southbound				Overall
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	1 - Lundy's Lane & Drummond Road	TCS	LOS	C	C	>	C	C	C	>	C	B	C	>	C	C	C	C	C	C
			Delay	24	31	>	30	28	32	>	31	19	23	>	22	21	29	22	26	27
			V/C	0.43	0.51	>		0.32	0.34	>		0.38	0.41	>		0.24	0.50	0.11		0.5
			Q	36	67	>		20	43	>		29	60	>		17	87	12		
			Ex	60	--	>		55	--	>		--	--	>		55	--	--		
			Avail.	24	--	>		36	--	>		--	--	>		38	--	--		
	2 - Lundy's Lane & Main Street	TCS	LOS	B	B	B	B	B	B	>	B	C	C	>	C	C	C	>	C	B
			Delay	13	18	14	16	15	19	>	18	24	22	>	23	21	23	>	22	18
			V/C	0.18	0.45	0.11		0.10	0.41	>		0.18	0.10	>		0.02	0.12	>		0.34
			Q	12	72	9		7	62	>		20	14	>		4	16	>		
			Ex	45	--	--		25	--	>		10	--	>		25	--	>		
			Avail.	33	--	--		18	--	>		-10	--	>		21	--	>		
PM Peak Hour	1 - Lundy's Lane & Drummond Road	TCS	LOS	E	D	>	D	C	D	>	D	D	C	>	C	C	D	C	D	D
			Delay	61	38	>	43	33	44	>	42	43	22	>	27	20	44	22	36	38
			V/C	0.90	0.69	>		0.59	0.80	>		0.82	0.38	>		0.20	0.86	0.18		0.86
			Q	70	82	>		31	103	>		56	57	>		15	189	17		
			Ex	60	--	>		55	--	>		--	--	>		55	--	--		
			Avail.	-10	--	>		24	--	>		--	--	>		40	--	--		
	2 - Lundy's Lane & Main Street	TCS	LOS	B	B	B	B	B	C	>	C	C	C	>	C	C	C	>	C	C
			Delay	16	19	13	17	14	25	>	24	34	26	>	30	24	27	>	26	23
			V/C	0.41	0.59	0.14		0.13	0.72	>		0.54	0.27	>		0.08	0.31	>		0.63
			Q	16	112	11		7	143	>		48	36	>		10	40	>		
			Ex	45	--	--		25	--	>		10	--	>		25	--	>		
			Avail.	29	--	--		18	--	>		-38	--	>		15	--	>		

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

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

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

RBT - Roundabout
< - Shared Left-turn
> - Shared Right-turn

4.2.2 Total Traffic Operations

To assess operating conditions for the total traffic scenario, operational analyses were undertaken following the same methodology, parameters, lane arrangements, and traffic control devices as in the analysis of background conditions.

The exception includes traffic signal optimization. Signal timing splits within existing cycle lengths were optimized to provide the best possible operations for all movements.

Table 4.2 summarizes the operational results, indicating the LOS, average vehicle delays, v/c ratios, and 95th percentile queues.

With the addition of site generated traffic, all study area intersections are forecast to continue to operate at acceptable levels of service and within capacity, albeit slightly exacerbated.

The following identified critical movements are outlined below:

Weekday AM Peak Hour

- Lundy's Lane & Main Street (signalized):
  - Northbound left-turn lane 95th percentile queue length is forecast to extend beyond the available storage by less than 15 m.

Weekday PM Peak Hour

- Lundy's Lane & Drummond Road (signalized):
  - Eastbound left-turn lane is forecast to operate with delays in the LOS E range with a v/c ratio of 0.90. The 95th percentile queue length is forecast to extend beyond the available storage by less than 15 m.
  - Southbound through movement is forecast to operate with delays in the LOS D range with a v/c ratio greater than 0.85.
  - Overall, the intersection is forecast to operate with delays in the LOS D range with a v/c ratio greater than 0.85.
- Lundy's Lane & Main Street (signalized):
  - Northbound left-turn lane 95th percentile queue length is forecast to extend beyond the available storage by less than 45 m.

Appendix F contains the detailed Synchro reports.

As with in the background conditions, localized congestion is forecast to occur at the intersection of Lundy's Lane at Drummond Road in the PM peak hour. Eastbound left-turn traffic from Lundy's Lane is expected to experience delays less than 65 seconds in the PM peak hour.

The westbound through 95th percentile queue length at Lundy's Lane at Drummond Road is forecast to extend beyond 100 metres encroaching and potentially blocking the site access.

The site access is forecast to operate with delays in the LOS C range or better with delays not exceeding 25 seconds.

4.2.3 Impact Assessment Summary

Overall, the incremental impact of the proposed mixed-use development is considered minor. The additional traffic added to the adjacent transportation network (56 and 75 vehicular trips under the AM and PM peak hours, respectively) is considered modest.

This volume of additional traffic would be less than typical daily traffic variations (10%) experienced along the study area roadways.

The additional traffic generated by the site is not expected to significantly impact the study area intersections. Overall, delays for individual movements are forecast to increase by less than 10 seconds during the AM and PM peak hours.

The additional site generated traffic can be accommodated by the adjacent transportation network without the need for any geometric improvements.

TABLE 4.2: FUTURE TOTAL TRAFFIC OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																
				Eastbound				Westbound				Northbound				Southbound				Overall
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	1 - Lundy's Lane & Drummond Road	TCS	LOS	C	C	>	**C**	C	C	>	**C**	B	C	>	**C**	C	C	C	**C**	**C**
			Delay	24	31	>	**30**	29	32	>	**32**	19	23	>	**22**	21	29	22	**26**	**27**
			V/C	0.44	0.51	>		0.34	0.36	>		0.38	0.41	>		0.24	0.50	0.11		**0.51**
			Q	36	67	>		21	45	>		29	60	>		18	87	12		
			Ex	60	--	>		55	--	>		--	--	>		55	--	--		
			Avail.	24	--	>		35	--	>		--	--	>		37	--	--		
	2 - Lundy's Lane & Main Street	TCS	LOS	B	B	B	**B**	B	B	>	**B**	C	C	>	**C**	C	C	>	**C**	**B**
			Delay	13	18	13	**16**	14	18	>	**18**	24	23	>	**24**	22	23	>	**23**	**18**
			V/C	0.18	0.46	0.11		0.10	0.41	>		0.19	0.10	>		0.02	0.12	>		**0.35**
			Q	12	74	9		7	63	>		21	14	>		4	16	>		
			Ex	45	--	--		25	--	>		10	--	>		25	--	>		
			Avail.	33	--	--		19	--	>		-11	--	>		21	--	>		
	3 - Lundy's Lane & Site Access	TWSC	LOS	<	A		**A**		A	>	**A**					B		>	**B**	**A**
			Delay	<	0		**0**		0	>	**0**					12		>	**12**	**1**
			V/C	<	0.22				0.16	>						0.07		>		
			Q	<	0				0	>						2		>		
			Ex	<	--				--	>						--		>		
			Avail.	<	--				--	>						--		>		
PM Peak Hour	1 - Lundy's Lane & Drummond Road	TCS	LOS	E	D	>	**D**	C	D	>	**D**	D	C	>	**C**	C	D	C	**D**	**D**
			Delay	60	38	>	**43**	32	43	>	**41**	51	23	>	**30**	21	47	23	**38**	**38**
			V/C	0.90	0.70	>		0.60	0.79	>		0.86	0.39	>		0.21	0.88	0.18		**0.88**
			Q	70	85	>		31	104	>		61	58	>		16	193	17		
			Ex	60	--	>		55	--	>		--	--	>		55	--	--		
			Avail.	-10	--	>		24	--	>		--	--	>		40	--	--		
	2 - Lundy's Lane & Main Street	TCS	LOS	B	B	B	**B**	B	C	>	**C**	D	C	>	**C**	C	C	>	**C**	**C**
			Delay	16	20	13	**18**	15	27	>	**26**	35	26	>	**31**	24	27	>	**26**	**24**
			V/C	0.42	0.60	0.14		0.13	0.75	>		0.56	0.27	>		0.08	0.32	>		**0.66**
			Q	17	115	12		7	150	>		50	36	>		10	40	>		
			Ex	45	--	--		25	--	>		10	--	>		25	--	>		
			Avail.	29	--	--		18	--	>		-40	--	>		15	--	>		
	3 - Lundy's Lane & Site Access	TWSC	LOS	<	A		**A**		A	>	**A**					C		>	**C**	**A**
			Delay	<	1		**1**		0	>	**0**					21		>	**21**	**1**
			V/C	<	0.25				0.35	>						0.13		>		
			Q	<	1				0	>						4		>		
			Ex	<	--				--	>						--		>		
			Avail.	<	--				--	>						--		>		

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

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

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

RBT - Roundabout
< - Shared Left-turn
> - Shared Right-turn

5 Remedial Measures

5.1 Sight Distance Evaluation

5.1.1 Methodology

The proposed site driveway with Lundy's Lane has been reviewed to confirm sight distance and sight line availability and provisions.

The assessment has been carried out based on the methodology contained in The Transportation Association of Canada (TAC) *Geometric Design Guide for Canadian Roads* (GDGCR).[5] Sight distance requirements are considered for vehicles departing from the driveways (departure/intersection sight distance) and for vehicles approaching the driveways (approach sight distance). The following object heights were utilized in obtaining field measurements:

- Driver Eye Height: 1.05 metres;
- Top of Car: 1.30 metres (for departure sight distance, height of approaching vehicle); and
- Vehicle Headlight or Tail/Brake Light: 0.60 metres (for approach sight distance, height of vehicle/target object).

The posted speed limit on Lundy's Lane is 50 km/h. A design speed of 60 km/h (10 km/h above the posted speed limit) has been used to calculate the required stopping sight distance (SSD) for traffic approaching the proposed driveways and intersection sight distance (ISD) for traffic exiting the current driveway.

SSD is the distance required for a vehicle approaching an intersection from either direction to perceive, react and come to a complete stop to avoid colliding with an object on the road; in this respect, SSD can be considered as the minimum visibility criterion for the safe operation of an unsignalized intersection.

ISD is based on the time required for perception, reaction, and completion of the desired turning maneuver (typically, a left-turn) once the driver on a minor street approach (or driveway) decides to execute the maneuver. The calculation for the critical ISD includes the time to (1) turn left and clear the near half of the intersection without conflicting with the vehicles approaching from the left; and (2) upon turning left, accelerate to the operating speed on the roadway without causing approaching vehicles on the main road to unduly reduce their speed. In

[5] Transportation Association of Canada, *Geometric Design Guide for Canadian Roads*, 2017.

this context, ISD can be considered the desirable visibility criterion for the operation of an unsignalized intersection.

5.1.2 Analysis

An elevation profile was measured from the existing building at 6179 Lundy's Lane to Hanan Avenue to the east. Travelling eastbound from Drummond Road, Lundy's Lane has an upwards grade of 2.89%. The hill crests just before the "Lundy's Lane Battlefield" overhead sign before sloping downwards at a -3.69% grade.

Figure 5.1 illustrates the elevation profile and sightlines available on Lundy's Lane.

Due to the vertical curve east of the subject site, SSD is limited to approximately 65 metres and available ISD is approximately 85 metres. To the west, the roadway is relatively flat, with available sight distance greater than 200 metres.

Table 5.1 summarizes the sight distance analysis for the proposed driveway location. **Figure 5.2** provides photographs of the available sight distance and associated sightline conditions along Lundy's Lane from the proposed driveway. The calculation of the SSD and ISD account for the downward grade from the east.

TABLE 5.1: SIGHT DISTANCE ANALYSIS

Location	60 km/h Design Speed			
	SSD		ISD	
	Required	Measured	Required	Measured
Site Access				
To/From the West	90	200+	130	200+
To/From the East	90	65	130	85

**ISD based on left-turn movement from stop*

The required SSD and ISD are exceeded to the west of the driveway but are not met to the east of the driveway largely due to the vertical curvature present.

Under present day conditions vehicles approaching from the east and departing to the east are encountering this sight distance deficiency.

As the proposed driveway location is in a similar location to the existing driveway serving the site, collision information obtained by Niagara Region was analyzed for the midblock location between Drummond Road and Hanan Avenue to determine whether the available sight distance results in any collisions or notable trends.

The latest collision history (2018 and 2023) indicates a total of nine collisions were reported over the last five years. Environmental conditions were determined not to be a contributing factor for the collisions, as all the collisions occurred in a "clear" environment.

The most common impact type recorded at the midblock location was rear end (44%) and sideswipe (33%) collisions. Little to no collisions associated with turning movements (i.e., outbound left turns) were reported, alluding to the fact that departing turning movements are not a collision trend.

Based on the type of collisions (rear end and sideswipe), the reported collisions appear to be attributed to driver error and associated queuing operations from the nearby intersection of Lundy's Lane and Drummond Road.

5.1.3 Sight Distance Summary

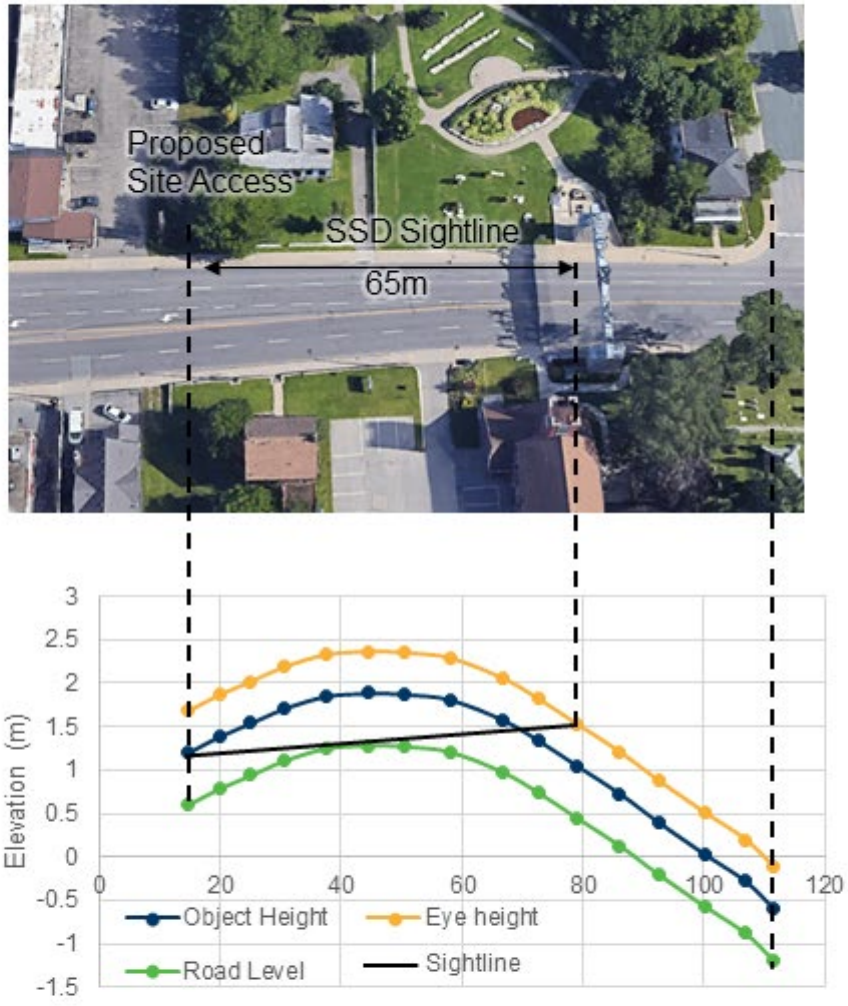
The available 65 metres of SSD is equivalent to speed of approximately 50 km/h (i.e., the maximum posted speed limit). That is, if a vehicle approaching from the west is travelling at 50 km/h or less the approaching motorist will be able to safely stop and avoid a collision.

The available 85 metres of ISD is equivalent to a speed of 42 km/h. That is, if an approaching vehicle from the west is travelling at 42 km/h or less, an outbound motorist performing a left turn movement will not impede or provide an opportunity for conflict.

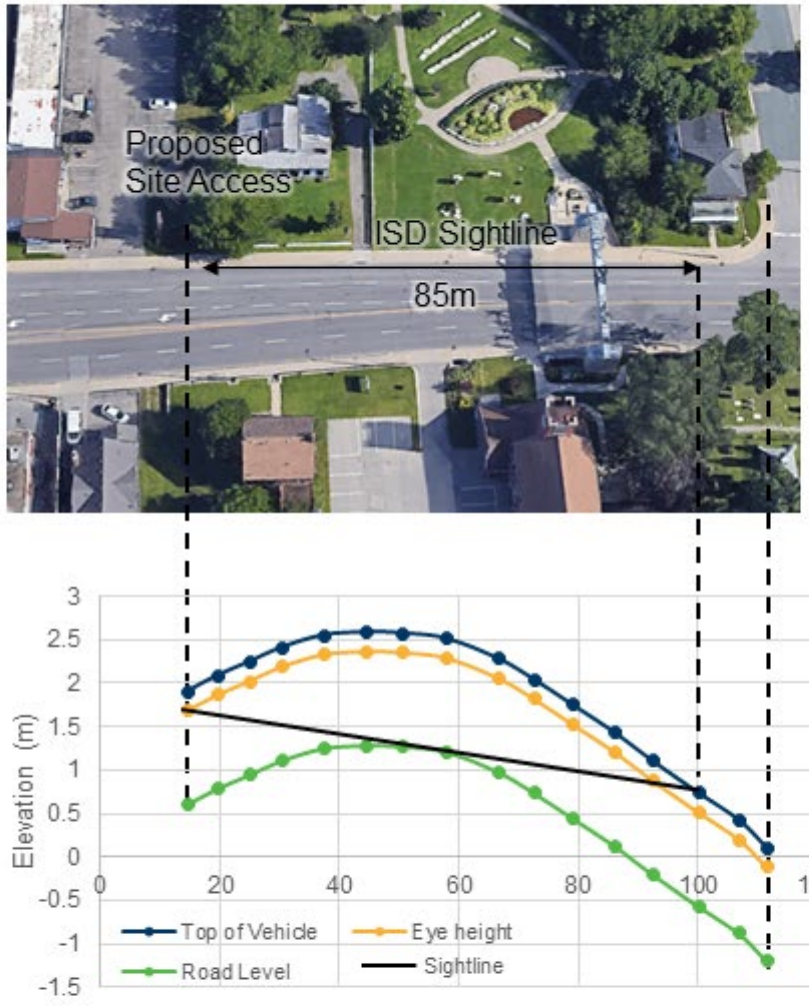
The TAC guide states that "depending on specific circumstances, the designer may use different measurements of sight distance, including stopping sight distance, passing sight distance, etc.". Also noting "in many applications, one of these types of sight distance will govern, and the designer need satisfy only one requirement".

The approach sight distance is found to be satisfactory in both directions approaching the proposed site driveway location.

Stopping Sight Distance



Intersection Sight Distance

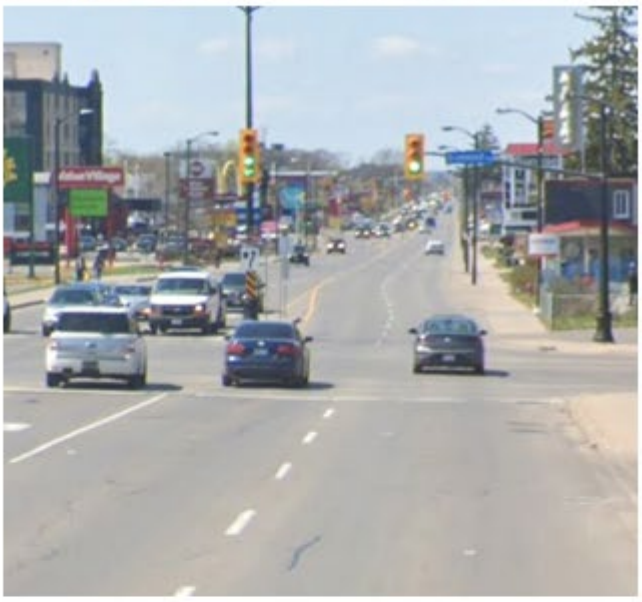


paradigm TRANSPORTATION SOLUTIONS LIMITED

Lundy's Lane Elevation Profile

6179 Lundy's Lane, Niagara Falls
220825

Figure 5.1



1. VIEW LOOKING WEST ALONG LUNDY'S LANE FROM PROPOSED DRIVEWAY

2. VIEW LOOKING EAST ALONG LUNDY'S LANE FROM PROPOSED DRIVEWAY

paradigm TRANSPORTATION SOLUTIONS LIMITED

Intersection Sight Distance View from Proposed Driveway

6179 Lundy's Lane, Niagara Falls
220825

Figure 5.2

5.2 Access Review

The spacing and location of the proposed site driveway location was reviewed using the requirements within the MTO's Design Supplement for the TAC Geometric Design Guide for driveways[6].

TAC Chapter 8.8 (Corner Clearances at Major Intersection), Section 8.8.1 (General) states, "Corner clearance is the distance from an intersection to the nearest access upstream or downstream of it. Corner clearance is measured from the near curb of the cross roadway to the near edge of the access throat. It consists of three components: the curb return radius at the intersection, a length of tangent, and the curb return radius or flare dimension at the driveway. Inadequate corner clearance between accesses and intersections along a major road, such as a major arterial, can create operational issues."

The TAC Guide requirements have been reviewed to determine whether sufficient corner clearance spacing from a major intersection is provided. The suggested corner clearances from a signalized intersection along an arterial road as stipulated by TAC is 70 metres or such that the driveway is positioned in advance of the left-turn storage length plus taper.

The site access is proposed to be on the eastern limit of the site, approximately 60 metres east (curb radii to curb radii) from Drummond Road.

The westbound left-turn lane storage plus taper extends approximately 110 m (curb radii to curb radii) from Drummond Road.

Given the site's location and the length of the westbound left-turn lane, providing the TAC-recommended spacing from the adjacent signalized intersection is not possible.

In general, it is desirable to minimize the number of conflict points created with existing and future driveways since more conflict points increase the risk of a collision. The number and type of conflict points at a driveway can be managed however by limiting both the amount of access allowed at the driveway (e.g., full movement, left-in/left-out, right-in/right-out, right-in only or right-out only) and the location of the driveway relative to other driveways in the area.

Based on our engineering judgement, it is recommended the site driveway be located as far east (as proposed) and the driveway be restricted to right-in/right-out movements. The restricted access will

[6] Transportation Association of Canada, "Access," chap. 8 in *Geometric Design Guide for Canadian Roads*, (Ottawa: TAC, 2017)

minimize the effects of the proposed driveway on Lundy's Lane. It is also noted that the access would operate as a defacto right-in/right-out only access as under existing and background conditions the 95th percentile queue for the westbound through movement from Lundy's Lane/Drummond Road would encroach and temporarily block the site access driveway location.

A raised median on Lundy's Lane across the site's frontage is preferred to restrict left turns. The raised median could limit access to other properties with frontage to Lundy's Lane.

5.3 Auxiliary Turn Lanes

Left-Turn Warrant

The need for an auxiliary left-turn lane for inbound traffic at site driveways was reviewed using the requirements in the MTO's Design Supplement for the TAC Geometric Design Guide for Canadian Roads[7]. **Appendix G** contains the warrant analysis.

The forecast traffic volumes at the site driveway suggest that an eastbound left-turn lane is warranted at the site driveway under future conditions for 15 m.

Based upon the preceding assessments, due to the proximity to Drummond Road, the provision of an eastbound left-turn lane would be located within functional area of the Lundy's Lane and Drummond Road intersection.

In summary, an eastbound left-turn lane is not recommended at the site driveway as the driveway should be restricted to only right-in/right-out movements. It is noted from an operational perspective the site access will operate without issue without the provision of an auxiliary turn lane.

5.4 Right-In/Right-Out Sensitivity

A sensitivity assessment has been conducted to assess the site driveway operations if the access is restricted to right-in/right-out movements.

It is assumed that inbound vehicles from the west will perform an indirect left turn into the via Drummond Road, Summer Road, Hanan Avenue, and turn right into the site via Lundy's Lane. This detour adds approximately 800 m of distance to the route but allows for a left turn at Drummond Road with a dedicated eastbound left-turn lane and phase.

[7] MTO Geometric Design Standards for Ontario Highways, Chapter E, 1976

Outbound vehicles destined east will perform an indirect left via Drummond Road to another east-west street. The additional volume of traffic that may infiltrate the adjacent local roads will be low volume and would be imperceptible.

Figure 5.3 illustrates the site traffic with the restricted access configuration.

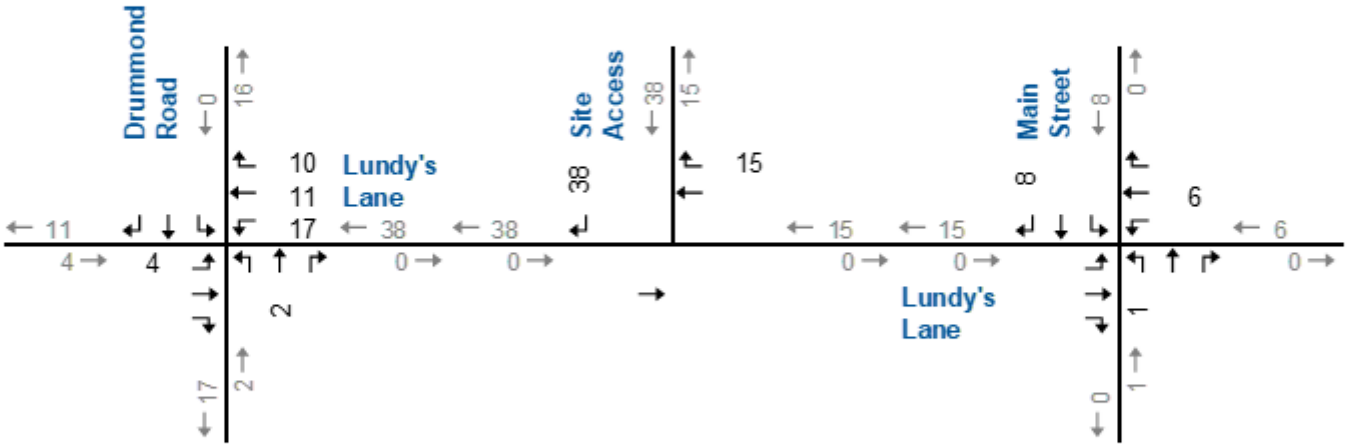
Table 5.2 summarizes the total traffic operations with the right-in/right-out driveway restriction.

The rerouted traffic does not significantly change the operations identified with a full-movement driveway configuration. Delays for the eastbound left-turn movement at Lundy's Lane and Drummond Road is forecast to increase by less than 10 seconds due to the rerouted traffic in the AM and PM peak hours.

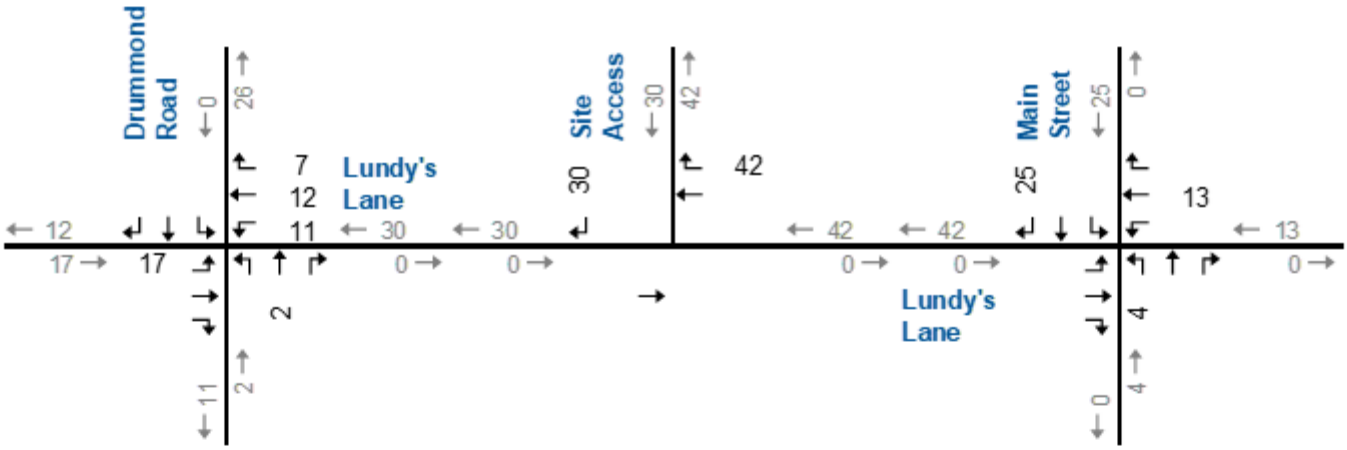
The site access is forecast to operate with delays in the LOS B range or better and delays not exceeding 15 seconds.

Appendix H contains the detailed Synchro reports.

AM Peak Hour



PM Peak Hour



Site Generated Traffic Volumes
Right-In/Right-Out

6179 Lundy's Lane, Niagara Falls
220825

Figure 5.3

TABLE 5.2: FUTURE TOTAL TRAFFIC OPERATIONS – RIGHT-IN/RIGHT-OUT

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																
				Eastbound				Westbound				Northbound				Southbound				Overall
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	1 - Lundy's Lane & Drummond Road	TCS	LOS	C	C	>	C	C	C	>	C	B	C	>	C	C	C	C	C	C
			Delay	24	32	>	30	29	33	>	32	18	23	>	22	21	29	22	26	27
			V/C	0.46	0.52	>		0.39	0.37	>		0.38	0.40	>		0.24	0.50	0.11		0.51
			Q	37	68	>		24	46	>		29	59	>		17	87	12		
			Ex	60	--	>		55	--	>		--	--	>		55	--	--		
			Avail.	23	--	>		32	--	>		--	--	>		38	--	--		
	2 - Lundy's Lane & Main Street	TCS	LOS	B	B	B	B	B	B	>	B	C	C	>	C	C	C	>	C	B
			Delay	13	18	14	16	15	19	>	18	24	22	>	23	21	23	>	23	18
			V/C	0.18	0.45	0.11		0.10	0.42	>		0.18	0.10	>		0.02	0.13	>		0.34
			Q	12	72	9		7	64	>		20	14	>		4	16	>		
			Ex	45	--	--		25	--	>		10	--	>		25	--	>		
			Avail.	33	--	--		18	--	>		-10	--	>		21	--	>		
	3 - Lundy's Lane & Site Access	TWSC	LOS	<	A		A		A	>	A					A		>	A	A
			Delay	<	0		0		0	>	0					10		>	10	0
			V/C	<	0.17				0.16	>						0.05		>		
			Q	<	0				0	>						1		>		
			Ex	<	--				--	>						--		>		
			Avail.	<	--				--	>						--		>		
PM Peak Hour	1 - Lundy's Lane & Drummond Road	TCS	LOS	E	D	>	D	C	D	>	D	E	C	>	C	C	D	C	D	D
			Delay	64	36	>	43	31	43	>	41	60	23	>	32	22	50	24	41	40
			V/C	0.92	0.66	>		0.60	0.80	>		0.89	0.40	>		0.21	0.90	0.19		0.9
			Q	78	81	>		32	105	>		65	59	>		15	197	18		
			Ex	60	--	>		55	--	>		--	--	>		55	--	--		
			Avail.	-18	--	>		23	--	>		--	--	>		40	--	--		
	2 - Lundy's Lane & Main Street	TCS	LOS	B	B	B	B	B	C	>	C	D	C	>	C	C	C	>	C	C
			Delay	16	19	13	18	15	25	>	25	37	26	>	32	24	27	>	27	23
			V/C	0.42	0.59	0.14		0.13	0.74	>		0.60	0.27	>		0.08	0.35	>		0.66
			Q	16	112	11		7	150	>		51	36	>		10	43	>		
			Ex	45	--	--		25	--	>		10	--	>		25	--	>		
			Avail.	29	--	--		18	--	>		-41	--	>		15	--	>		
	3 - Lundy's Lane & Site Access	TWSC	LOS	<	A		A		A	>	A					B		>	B	A
			Delay	<	0		0		0	>	0					12		>	12	0
			V/C	<	0.18				0.35	>						0.06		>		
			Q	<	0				0	>						2		>		
			Ex	<	--				--	>						--		>		
			Avail.	<	--				--	>						--		>		

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

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

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

RBT - Roundabout
< - Shared Left-turn
> - Shared Right-turn

6 Parking Review

As with any equilibrium system, there are a minimum of two components required to be in balance and reach the equilibrium point. With parking systems, this involves the balance of parking supply and demand. Achieving an appropriate supply level is equally important as demand. The ubiquitous oversupply of cheap and accessible parking has long been a significant contributing factor to single-occupant vehicle (SOV) travel growth.

6.1 Zoning Requirements

The current parking requirements are governed by the City of Niagara Falls Zoning By-Law (ZBL) 79-200. It is recognized that the actual demand for parking spaces may vary from development to development.

The minimum parking rate requirements are as follows:

- 1.4 parking for each dwelling unit; and
- 1.0 parking space per 25 square metres (215 square feet) gross floor area dedicated to retail.

Table 6.1 summarizes the minimum parking requirements for the proposed development. It is determined a total of 196 parking spaces would be required under the ZBL.

The development proposes 159 parking spaces on-site comprised of 147 residential spaces (a rate of 1.12 spaces per unit) and 12 retail spaces (a rate of 1 space per 25 m^2). This results in a theoretical shortfall of 37 parking spaces, or a 23% theoretical deficiency.

TABLE 6.1: ZONING PARKING BY-LAW REQUIREMENTS

Land Use	By-Law Requirement	Parking Spaces		
		Required	Provided	Net Surplus (Deficiency)
Apartment Dwelling (135 units)	1.40 spaces/unit	184	147	(37)
Retail (303 SM)	1.00 spaces/25 SM	12	12	Nil
Total Site		***201***	***159***	***(37)***

6.2 Rationale and Justification for Residential Component Parking Supply

6.2.1 Other Jurisdictions

Parking standards are increasingly seen as an instrument of planning policy, and parking ratios are now viewed as having the primary role in determining car use. Parking ratios have existed in most cities since the 1950s and have often been amended incrementally. Consequently, it is not surprising that municipalities are often unable to trace the justification or reasoning behind some of the older parking ratios found in their current Zoning By-laws.

Since parking standards reflect an "average" condition, they will rarely prescribe the number of parking spaces to match the parking demands of any individual development project exactly. Other municipalities recognize the advantages of parking ratios supporting broader Official Plan objectives. The empirical challenge is understanding how parking demand for a given use may vary. The policy question is where the parking standard or ratio should be set in that range.

The Town of Oakville recently developed a new zoning by-law for lands north of Dundas Street. The parking rates within this by-law for multiple dwelling units stipulate a maximum parking rate of 1.25 per unit would be accepted with no prescribed minimum parking requirement. In contrast to generic minimum parking requirements, North Oakville provides maximum limits to restrict the total number of spaces that can be constructed rather than establish a minimum number.

The City of Welland has recently undertaken a comprehensive review of the zoning by-law to ensure that land and growth are appropriately managed and that the zoning regulations are up to date. As part of this work, updated parking requirements were developed, which require multiple dwellings to provide a parking rate of 1.00 parking space per unit.

City of Hamilton has a staggered approach to parking requirements for multiple dwellings. The minimum parking required depends on the size of the dwellings and the number of units, with a maximum parking rate of 1.25 spaces per unit.

Attitudes towards automobile ownership and its role in an urban lifestyle are changing in the eyes of both consumers and policymakers, and lower parking regulations reflect this. As parking regulations are an attempt to supply to meet demand, regulations that require a lower supply for future buildings are an indication that future demand is likely

to be lower with the rise of sustainable travel modes (transit, cycling, and walking).

Parking regulations stipulated in the City of Niagara Falls By-law for residential zones are 35% higher than neighbouring municipalities that have adopted new standards.

From an infrastructure standpoint, the subject site is situated in a transit-accessible location with ample pedestrian facilities and is positioned to support a lower parking rate. In terms of employment opportunities, amenities, and services these are all situated within close proximity to the site.

Table 6.2 summarizes the parking requirements based on other jurisdictions municipal requirements. This comparison outlines the new parking rate standards being accepted by municipalities through a comprehensive review of research and best practices. The rates stipulated in the antiquated Zoning By-law provide for an oversupply of parking.

TABLE 6.2: OTHER JURISDICTIONS PARKING BY-LAWS

Municipality	Land Use	Number of Units	Parking Rate	Minimum Parking Required
Town of Oakville (North Oakville)	Multiple Residential	131	0.00 spaces per unit or maximum of 1.25 space per unit	78.6*
	Visitor	131	0.20 spaces per unit	26.2
			Total	**104.8**
City of Welland	Multiple Residential	131	1.00 space per unit	**131.0**
City of Hamilton	Multiple Residential	131	0.7 space per unit for units greater than 50.0 sq.m; units 51+; maximum 1.25 spaces per unit	**117****

*0.6 parking space per unit assumed
** 0.7 spaces per unit assumed for spaces <50 sq.m; 1.0 spaces per unit assumed for 51+ sq.m units

6.2.2 Policy Framework

The Growth Plan for the Greater Golden Horseshoe (Ministry of Infrastructure, 2013), Provincial Policy Statement (MMAH, 2014), and Niagara Falls Official Plan all directly call for a shift away from automobile travel and towards more sustainable forms of transportation, including transit, and active transportation:

- The Growth Plan states: "Population and employment growth will be accommodated by … reducing dependence on the automobile through the development of mixed-use, transit-supportive, pedestrian-friendly urban environments" (Ministry of Infrastructure, 2013/2020 – Section 4.2.10);

- The Provincial Policy Statement (PPS) states that land-use patterns should "minimize the length and number of vehicle trips and support current and future use of transit and active transportation" (MMAH, 2014/2020 – Section 1.6.7.4);
- Niagara Falls Official Plan (OP) states: "To ensure that adequate off-street parking is provided for all development, consideration may be given to the elimination of parking requirements for non-accommodation uses (City of Niagara Falls, – Section 4.5.2.3).

Traditionally, transportation networks focused on increasing the road network's capacity to accommodate more vehicles. However, as outlined in Niagara Region's Transportation Master Plan (TMP), the transportation system needs to look at a "balanced needs" approach that encourages alternative modes of transportation.

The City of Niagara Falls OP identifies that an integrated and multi-modal transportation system will be achieved. Decision-making will be prioritized to shift more trips away from the private car and more sustainable transportation options, such as walking, biking, transit, and car-sharing.

The intent is to reprioritize mobility to balance the transportation system. A more sustainable city requires an integrated transportation system that supports a compact urban form. Bringing jobs, housing services, and amenities closer encourages non-automobile modes of travel, providing more choices to Niagara Falls residents.

6.2.3 Climate Change

Municipalities have been identified by the Government of Canada as critical partners in the fight against climate change, as they influence 50% of Canada's greenhouse gas emissions. Land use planning is one of the most effective processes for local adaptation to climate change. Existing tools, such as official plans, zoning by-laws, and development permits, can help minimize climate change risks to the community.

Climate change and air pollution must be addressed to achieve a sustainable community and human and ecosystem health. Climate change and air pollution impacts are caused primarily by burning fossil fuels, resulting in greenhouse gases and air pollutants emissions. These impacts can be reduced through sustainable and efficient land use and transportation policies that reduce air and greenhouse gas emissions.

In Ontario, GHG emissions from the transportation sector in 2016 were 34% higher than in 1990. The majority of those emissions are due to

passenger vehicles on the road. In Niagara, transportation emissions at the community level in 2006 accounted for 40% of total emissions. Reducing automobile dependence and lowering GHG emissions from the transportation sector can mitigate climate change and promote other sustainable travel forms.

6.2.4 Parking and GHG Emissions

While single-occupant vehicle trips are commonly targeted in transport policies, they are only a consequence of the spatial layout and densities of the accompanying land uses. Therefore, there is merit in targeting the underlying cause of these carbon emissions rather than solely focusing on policies to reduce private vehicle use.

Parking management has an important role to play in reducing carbon emissions[8]. In this respect, car parking is the "glue" between these facets of land use and the transport environment. In addition, car parking is a critical factor that can be targeted relatively quickly by planners and their municipality plans.

The transportation sector is responsible for 23% of Canada's GHG emissions[9] and offers tremendous opportunities for significant emissions reduction. Municipalities in Canada are lagging behind other countries in supporting zero-emission vehicles and other sustainable transportation policies. Cities must transition towards zero and low-emissions transportation modes, increase cleaner fuels, improve public transit ridership, and encourage denser, mixed-use communities to reduce emissions. Significant encouragement is needed to shift travel modes from single-occupant vehicles towards public transit, auto-share, and active transportation to reduce greenhouse gas emissions related to the transportation sector.

6.2.5 Societal Changes

A sudden, dramatic shift in travel patterns occurred early in 2020 as society adjusted to the emergence of COVID-19, its declaration as a pandemic and subsequent public health measures to stop its spread.

As a result, recent societal changes have made living easier without owning a car. Vehicles-for-hire and bicycles have both increased in popularity. Online shopping has reduced the need for a vehicle to bring large purchases home. It has made it convenient for everyday errands to be delivered (i.e., groceries and household items). The future arrival

[8] Parking as a tool to reduce carbon emissions, McCormick Rankin Cagney Pty Ltd, 2009

[9] Reducing GHG Emissions in Canada's Transportation Sector, Clean Energy Canada, June 2016.

of automated vehicles may further support a reduction in personal automobile ownership and use. These societal changes will decrease vehicle parking needs with a shift to curbside management.

As businesses have adapted and residents have embraced the convenience of the delivery of everyday items, these changes will remain for the foreseeable future, providing further incentive to residents not to require a vehicle.

Results from the 2016 TTS show that approximately 35% of apartment households in Niagara Falls do not own a vehicle. These proportions have likely increased since 2016 and will continue to grow due to societal changes.

Given the expected changes in automobile ownership brought about by the changes in mobility-related technologies, it is likely that if the change in the parking policy framework is not revised, new residential developments will be left with an oversupply of parking, which is provided below grade will result in redundant space that will not be repurposed in the future.

6.2.6 Affordability

According to the Government of Ontario, housing prices in Ontario almost tripled, far outpacing the income growth. The Government of Ontario has developed a "Housing Affordability Task Force" comprised of industry leaders and experts to produce a report identifying and recommending measures to address the housing supply crisis[10].

One of the main recommendations by the Housing Task Force to increase housing supply and affordability is to reduce and streamline urban design rules to lower the costs of development. The Housing Task Force recommends removing or reducing the parking requirements in cities with over 50,000 people.

Generous parking requirements reduce housing affordability and impose various economic and environmental costs. The Housing Task Force reports that minimum parking requirements add as much as $165,000 to the price of a new housing unit, and parking space demand is falling, with one in three parking stalls going unsold. Based on typical affordable housing development costs, one parking space per unit increases costs by approximately 12.5%, and two parking spaces can raise prices by 25%.

[10] Housing Affordability Task Force Report, Government of Ontario, February 2022

Residential minimum parking requirements should ensure a basic, responsible parking level without unduly increasing the development costs.

6.2.7 Parking Reform

Minimum parking requirements have long been a staple of urban planning regulations based on some formulation. These regulations, unfortunately, have been driven by auto-centric engineering models. Over the past seven decades, the built form in Niagara Falls has been evolving significantly. Recent changes in transportation technology and services, characterized by ride-hailing and automobile sharing, and the emerging technologies dominated by autonomous vehicles (AVs) suggest that automobile ownership will likely experience declines.

The City of Niagara Falls growth objective is to create and develop a transit and pedestrian-friendly, sustainable, and livable City through urban design criteria and guidelines. The OP embraces sustainability and creates a vision for complete compact communities served by streets made for walking, cycling and an attractive transit system. This vision is supported by policies to reduce auto dependence and limit the amount of land occupied by automobile parking. The transportation policies are deliberately interspersed with the land-use policies to emphasize the importance of considering both areas to achieve the overall vision of complete compact communities.

The intent is to reprioritize mobility to balance the transportation system. A more sustainable city requires an integrated transportation system that supports a compact urban form. Bringing jobs, housing services, and amenities closer encourages non-automobile modes of travel, providing more choices to Niagara Falls residents.

Suppose the city wishes to encourage active transportation and transit-friendly neighbourhoods as outlined in the OP and strategic vision. In that case, the city needs to recognize that minimum parking requirements present a significant barrier to these goals. It must be remembered that parking carries high costs, heavily subsidizes the choice to drive, and hampers the ability to promote sustainable developments. Parking should not be viewed as only an amenity required to support our cities and our ability to drive; instead, it must be considered a significant economic investment that carries outcomes that shape our cities and regions.

As outlined in **Section 6.2,** other municipalities recognize this and have reduced parking requirements to reflect this. To reiterate, the City of Niagara Falls requires, on average, 35% more parking to be provided for this development than would be needed for the Town of

Oakville (North Oakville), City of Welland and City of Hamilton that have adopted new parking requirements.

6.3 Parking Demand Forecasts

A review of actual parking demands likely to be generated by the proposed development has been considered to assess, independent and separate from a review of the Residential Zoning By-Law requirements.

The "real" demands established for each land use are based upon a review of parking demand technical resources and information collected by Paradigm and others for comparable land uses. The specified demands consider several influencing factors, including market demands and interaction effects between uses.

A summary discussion relating to each of the significant land use components is provided in the following sections.

6.3.1 Residential Vehicle Ownership

A review of vehicle ownership extracted from 2016 Transportation Tomorrow Survey (TTS) data for the City of Niagara Falls suggests that approximately 35 percent of apartments surveyed do not own a vehicle. Further disposition of the survey results can conclude the actual vehicle ownership, based on a weighted average, is 0.74 vehicles per unit.

Table 6.3 summarizes the vehicle ownership characteristics for apartment dwellings.

TABLE 6.3: VEHICLE OWNERSHIP (APARTMENTS) – NIAGARA FALLS (2016 TTS)

Year	Vehicles Per Household					Households	Vehicles	Ownership
	0	1	2	3	4			
2016	2599 *35%*	4124 *56%*	631 *9%*	25 *0%*	0 *0%*	7,379	5,461	0.74

The vehicle ownership evaluation offers insight into the parking requirements of the City of Niagara Falls apartments. This review indicates that, despite preconceived notions, not all residents in apartment dwellings own a vehicle.

A review of socio-economic TTS data suggests that this vehicle ownership rate reflects lifestyle choice rather than the age or economic status. Lower vehicle ownership rates may be seen for seniors or

lower-income residents. However, TTS data indicates that 57% of apartment residents are under 60, with 51% of residents having an income of up to 40,000 dollars per year. In comparison, 24% of residents exceed this amount. The median income in Ontario was reported at $37,500 in 2019, based on the latest information through Statistics Canada[11]. The data would indicate that the demographic for apartments is evenly split between seniors and adults and the income levels are on par with the typical median in Ontario.

Given the site's location and proximity to transit, opportunities exist to provide reduced parking requirements associated with the proposed development. Access to local amenities within the City of Niagara Falls can be met through active travel or transit modes.

The potential parking demand for the proposed 131 units can be estimated using the 2016 vehicle ownership data set. This analysis supports the proposed parking supply of 159 residential spaces in that it would meet and exceed the residential requirements.

Table 6.4 outlines the estimated parking demand based on average apartment vehicle ownership rates.

TABLE 6.4: DEMAND – BASED ON VEHICLE OWNERSHIP

Land Use	Units	Parking Rate[a]	Spaces Required
Apartment Dwelling	131	0.74 per unit	97
Total Parking Required			***97***

a - TTS 2016 (Niagara Falls)

6.3.2 Travel Characteristics

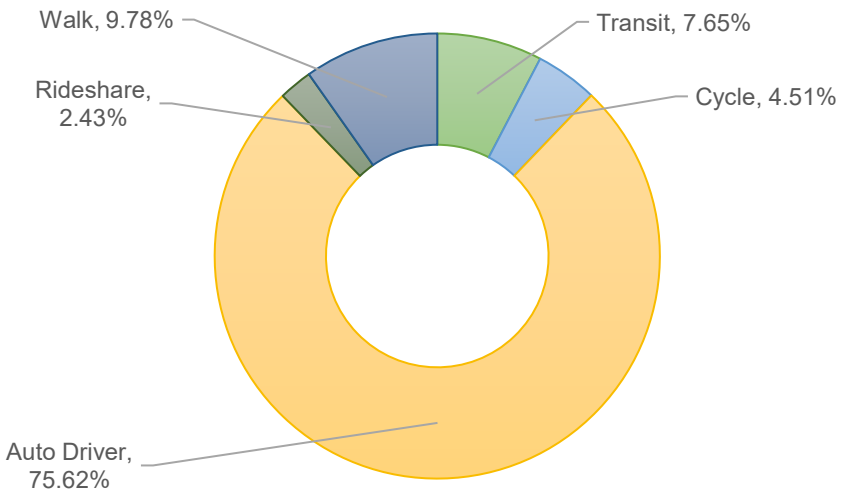
A review of travel characteristics provided by the 2016 Transportation Tomorrow Survey (TTS) for residents living in Niagara Falls confirms that a significant proportion of travel undertaken during the morning and afternoon peak periods is by non-auto means.

Information provided by the TTS program suggests the proportion of people who choose to drive in the area is, on average, 76%. Based on this data, it is reasonable to assume that only 76% of unit owners would require an automobile for everyday travel. In contrast, the remainder of the trips is fulfilled through transit and active modes.

Chart 6.5 outlines the 2016 trip characteristics within the City of Niagara Falls for apartments.

[11] https://www150.statcan.gc.ca

CHART 6.5: TRIPS IN THE STUDY AREA



The proposed parking supply will provide a resource that will logically be used by building residents who need a car for daily use, indispensable users. Such residents prioritize purchasing a unit and expect to utilize the on-site parking facilities. The proposed parking supply would accommodate parking of all units in the building (assuming one space is provided to any particular unit), which exceeds the base proportion of building unit occupants who need to drive regularly, approximately 76 percent during the peak periods.

Other unit purchasers who do not need to use a car on an ongoing basis would be satisfied by other available methods. They would not need to own a vehicle and not require a parking space.

6.3.3 Residential Proxy Surveys

Paradigm has reviewed two residential condominium parking proxy site surveys:

- 16 Concord Place in the Town of Grimsby
  - A 6-storey, 342-unit building with 559 parking spaces.
- 15 Towering Heights Boulevard in the City of St. Catharines
  - A 13-storey, 125-unit building with 183 parking spaces.

Parking surveys were conducted at the proxy sites between 10 PM and 1 AM to capture the maximum parking demand/occupancy. **Table 6.6** summarizes the observed parking rates. **Appendix I** provides the parking survey data for reference.

TABLE 6.6: PROXY SITE PARKING RATES

Proxy Site	Survey Date	Parking Rate
16 Concord Place, Grimsby	Friday June 3, 2022	0.94
	Saturday June 4, 2022	0.89
15 Towering Heights, St Catharines	Thursday February 28, 2019	0.90
	Saturday March 2, 2019	0.87

The parking surveys indicates a residential parking rate ranging from 0.87 spaces per unit to 0.94 spaces per unit. This data indicates the development's proposed residential parking rate of 1.12 spaces per unit is sufficient to meet the anticipated residential parking demand.

6.3.4 Parking Supply Influence

The parking supply is one of the most critical measures to shift demand from vehicles to sustainable travel modes. Recent research indicates that an area with more parking influences a higher demand for more automobile use.

- A New York City study of three boroughs showed a clear relationship between guaranteed vehicular parking at home and a greater tendency to use the automobile for trips to and from work, even when both work and home are well served by transit. The study infers that driving to other non-work activities is likely higher for households with guaranteed vehicular parking[12].
- A study of households within a two-mile radius of ten rail stations in New Jersey concluded that those developments would not reduce automobile use if development near transit stations had a high parking supply. The parking supply can undermine the incentive to use transit that proximity to transit provides[13].
- A study of nine cities across the United States examined whether citywide changes in vehicular parking cause automobile use to increase or whether minimum parking requirements are an appropriate response to the already rising automobile use. The study concluded that: "parking provision in cities is a likely

[12] Rachel Weinberger, Death by a thousand curb-cuts: Evidence on the effect of minimum parking requirements on the choice to drive. Transport Policy, 20, March 2012.

[13] Daniel Chatman, Does Transit-Oriented Development Need the Transit? Access, Fall 2015.

cause of increased driving among residents and employees in those places."[14]

Many existing Zoning By-Law parking requirements are antiquated and require updating to conform to and reflect current policies and best practices. Many municipalities recognize this and update parking requirements based on parking surveys and inter-jurisdictional reviews.

6.3.5 Precedent

The City has approved similar developments with parking rates lower than 1.4 spaces per unit, such as 5528 Ferry Street (0.81 parking spaces per unit), 5613 Victoria Avenue (1.03 parking spaces per unit), and 5500 Victoria Avenue (1.00 spaces per unit).

To further support that a lower parking rate is appropriate for the subject site (6179 Lundy's Lane), a comparison of the transportation context for aforementioned sites has been completed.

Analytical tools allow communities, transit agencies, developers, and employers to measure the environmental impact of neighbourhoods' transportation and land-use choices. These tools provide a data drive comparison between two separate city areas to objectively measure how well one area compares to another regarding sustainable travel choices.

Walk Score is a well-known (but proprietary) measure of walkability – it aggregates several data sources to provide a proxy measure of the quality of the pedestrian environment. It is utilized to gauge the walkability and destination density of each neighbourhood.

- 6179 Lundy's Lane has a Walk Score of 72 and is considered a "Very Walkable" location, meaning most errands can be accomplished on foot.
- 5528 Ferry Street has a Walk Score of 66 and is considered a "Somewhat Walkable" location, meaning some errands can be accomplished on foot.
- 5613 Victoria Avenue has a Walk Score of 74 and is considered a "Very Walkable" location, meaning most errands can be accomplished on foot.
- 5500 Victoria Avenue has a Walk Score of 78 and is considered a "Very Walkable." Consistent with the ranking for 5528 Ferry Street and 5613 Victoria Avenue.

[14] Chris McCahill, et al., Effects of Parking Provision on Automobile Use in Cities: Inferring Causality, Transportation Research Board, November 13, 2015.

Transit Score is a measure of transit accessibility. It aggregates information regarding transit frequency, the density of stops and routes, and the service model. It is used to gauge the transit accessibility of each neighbourhood.

- 6179 Lundy's Lane has a Transit Score of 48 and is considered "Some Transit," which means a few nearby public transportation options.
- 5528 Ferry Street has a Transit Score of 48 and is considered "Some Transit," which means a few nearby public transportation options.
- 5613 Victoria Avenue has a Transit Score of 44 and is considered "Some Transit.
- 5500 Victoria Avenue has a Transit Score of 44 and is considered "Some Transit. Consistent with the ranking for 5528 Ferry Street and 5613 Victoria Avenue.

Bike Score is a measure of the area's ability to accommodate cyclists. A Bike Score is calculated for a given location by measuring bike infrastructure (lanes, trails, etc.), hills, destinations and road connectivity, and the number of bike commuters.

- 6179 Lundy's Lane has a Bike Score of 53 and is considered "Bikeable," which means some bike infrastructure.
- 5528 Ferry Street has a Bike Score of 51 and is considered "Bikeable," which means some bike infrastructure.
- 5613 Victoria Avenue has a Bike Score of 67 and is considered "Bikeable."
- 5500 Victoria Avenue has a Bike Score of 70 and is considered "Very Bikeable." Consistent with the ranking for 5528 Ferry Street and 5613 Victoria Avenue.

6179 Lundy's Lane, 5528 Ferry Street, 5613 Victoria Avenue, and 5500 Victoria Avenue have nearly identical scores for sustainable travel options. The analytical tools identified that the sites have similar sustainable/alternative travel choices and that daily errands can be accomplished without a vehicle.

As a precedent of 0.81-1.03 parking spaces per unit has previously been supported by City Transportation Staff, a similar rate is considered supportable for 6179 Lundy's Lane as the transportation context (i.e., sustainable/alternative travel options) is nearly identical for the precedent sites.

6.4 Parking Demand Summary

Overall, parking demand based on a review of vehicle ownership rates, proxy data, and previously accepted parking rates by the city varies between 0.81 - 1.00 space per unit, all well below the City's prescribed zoning requirements of 1.40 spaces per unit.

Based on best practices and policy objectives, the proposed reduction is supported through a Transportation Demand Management (TDM) program. The provision of providing reduced parking in support of TDM measures is reflected in the City's Transportation Master Plan [15]:

- Consider TDM in the context of all development reviews.
- Establish maximum parking requirements and exceptions for residential, commercial, industrial and institutional developments.
- Land use and transportation are fundamentally linked. To successfully promote sustainable transport, transit-oriented development (TOD), transit improvements and intelligent growth initiatives should co-exist to achieve significant results.
- The City should consider any form of parking an integral component of a broader TDM strategy and sustainable urban development initiatives. These initiatives should champion sustainability and showcase the efficient movement of people and goods.

[15] Niagara Falls, Sustainable Transportation Master Plan, October 2011

7 Transportation Demand Management

A Transportation Demand Management (TDM) plan aims to reduce the development's overall traffic and parking impacts by implementing strategies to affect the demand side of the transportation equation. TDM strategies include all the incentives and disincentives that increase people's likelihood of changing travel behaviour. Strategies include financial incentives, time incentives, new or enhanced commuter services, dissemination of information, and marketing alternative services.

The TDM plan has been formulated to extend reasonable and practical strategies that encourage residents and visitors to take alternative modes of transportation. The strategies identified are expected to improve transportation access and connectivity within the development and reset of the study area.

7.1 Through Design

Several factors influencing peoples' travel mode choices support land use/infrastructure that encourages people to choose modes other than driving alone. These strategies are accounted for through the development's overall design and include the following.

7.1.1 Housing Density

Designing the plan with increased densities reduces Greenhouse Gas (GHG) emissions associated with traffic in several ways. Density is usually measured in persons, jobs, or dwellings per unit area. Increased densities generally shorten the distance people travel and provide greater options for the mode of travel. This strategy also provides a foundation for the implementation of many other strategies which would benefit from increased densities.

7.1.2 Land Use-Density Mix

Having different land uses nearby can decrease vehicle mode share since trips between land-use types are shorter and may be accommodated by non-automotive transportation. The mix of high-density housing and commercial uses provides land use diversity, reducing the number of automobile trips residents or employees make.

7.1.3 Pedestrian Facilities

Accessibility to and from development is essential in helping to ensure that those that can walk do. Proper pedestrian connections from the

surrounding community to the development should be constructed to ensure safety and enhance the overall pedestrian experience.

Walking is encouraged by providing a pedestrian-friendly site layout with an extensive network of sidewalks and entrances at critical points within the site and connecting to the existing pedestrian network. Most of the Site provides direct public access for pedestrians via street-level entrances to Lundy's Lane. This is intended to provide a comprehensive network of pedestrian connections for an enhanced pedestrian experience for all Site users.

By taking advantage of the future public sidewalk network to attract and serve pedestrians, combined with multiple pedestrian connections within the site, the development offers walkability as one of the critical design features.

7.1.4 Bicycle Facilities

Increasing bicycling to and within Niagara Falls is crucial for reducing vehicle trips. The number of people bicycling is directly related to the quality of the bicycling network, the presence of bicycle facilities, and the ability to leverage use of the infrastructure.

Bike lanes are on Drummond Road south of Lundy's Lane, and Main Street is designated as a shared roadway for cyclists south of Lundy's Lane.

7.1.5 Transit

The use of transit places less reliance on personal automobiles for trips that convenient and desirable transit options can complete. Suitable and desirable transit can be provided by providing well-lit transit stops with seating and weather-protective shelters. Additional amenities, including bicycle parking, schedule information, real-time bus status, and maps, can increase the convenience of the transit network.

The subject site is currently served by the WEGO Red Line, which operates primarily Lundy's Lane with headways in the order of 30 minutes during most service hours.

The Main Street Hub is approximately 450 metres (a 2-minute walk) from the subject site. Additional routes can be accessed at the Main Street & Ferry Street terminals.

7.2 Proposed Strategies

The development will implement the proposed strategies identified herein to reduce the number of auto-trips made to/from the Development:

7.2.1 Transportation Information

The applicant will develop marketing/informational materials as part of their initial scope of work. Information on transportation options and links to the appropriate website should be conveyed to all prospective residents as a component of a resident welcome packet.

Available information should include schedules for local and regional transit services, bicycle and trail networks and the location of retail and recreational establishments.

7.2.2 Parking Supply

Finding the right balance needed to support the City's goals is critical, mainly since parking is an expensive resource. Sufficient automobile parking is necessary for the development to be successful. However, too much parking can encourage traffic congestion, limit the ability to meet trip reduction goals, increase project costs, and impact site design and aesthetics.

Research conducted in San Francisco focuses on whether or not a relationship exists between the provision of off-street parking and the choice to drive among individuals travelling to or from the site. The research found that reductions in off-street vehicular parking for office, residential, and retail developments reduce the overall automobile mode share associated with those developments relative to projects with the same land uses in similar contexts that provide more off-street vehicular parking.

In other words, more off-street vehicular parking is linked to more driving, and people without dedicated parking spaces are less likely to drive. Based on recent research, a reduced Parking Supply is one of the most effective TDM measures available to minimize vehicle travel[16].

If free and unregulated parking is provided, there is little incentive for many residents and visitors to use alternative modes of transportation. Free and abundant parking encourages people to drive alone rather than car or vanpool, drop off or pick up, walk, cycle, or take transit.

[16] Transportation Demand Management Technical Justification, City and County of San Francisco, June 2018.

Alternative sustainable modes are substantially disadvantaged when too much free parking is provided.

As the development promotes using other modes of transportation through limited on-site parking to meet the projected demand, the development plays a significant role in setting an example for residents and visitors to consider non-automotive travel.

7.2.3 Unbundled Parking

Implementing a paid-parking operation is one of the most effective TDM strategies for encouraging alternative travel habits. Occupants are not forced to pay for parking they do not need and allow consumers to adjust their parking supply to reflect their needs. To further encourage residents of the apartment building to utilize sustainable travel modes, the development will enable residents to opt-out of purchasing their parking space, providing a discount on the purchase price.

The development will consider the use of unbundled parking. This is an essential factor as residents are notified at the project's onset that parking is proposed to be provided as an additional cost instead of the price to rent a unit. If residents are significantly considering changing their travel behaviour, the cost of renting a parking space could be a contributing factor to this change.

7.2.4 Bicycle Parking

The applicant will promote travel to the site by biking by providing convenient bicycle amenities. A total of 76 bike parking spaces (70 long-term and six short-term) will be provided on site.

7.3 TDM in Development Approvals

Parking supply can be controversial, and some industry and municipal representatives may resist lowering parking supplies for various reasons. Municipal staff need to understand the benefits of effective parking supply management and its relationship with TDM and recognize that TDM is a policy initiative outlined in the City's Transportation Master Plan.

Municipal staff should regularly review the parking requirements in their Zoning By-Law to ensure parking requirements are not excessive compared to findings of current technical research and what other municipalities are doing. Opportunities for reducing parking supply requirements in the Zoning By-Law should be explored and

implemented to complement the TDM initiatives being promoted by a development.

As outlined in **Section 6.2,** the City of Niagara Falls parking regulations are 35% higher when comparing the minimum requirements outlined by neighbouring municipalities adopting new standards based on best practices.

7.3.1 Parking Supply Credit

Some municipalities have created TDM checklists to assess new projects for sustainable development practices, particularly at the rezoning stage, where site-specific conditions can be negotiated. Checklists are designed to be used with reduced parking requirements through updated zoning requirements. The fact that minimum parking requirements are stipulated in antiquated Zoning By-law requirements means that a developer can provide more parking if desired. Requiring a minimum amount of parking is generally not considered supportive of TDM initiatives if it risks the provision of an over-supply of parking.

The emphasis should be on minimizing the over-supply of parking by using the lowest reasonable requirement for the area in contrast to the usual approach of requiring extra parking just in case there is not enough.

7.3.2 TDM Checklist

As outlined in Chapter 6, the parking study justification has indicated that the development's residential parking supply of 1.12 spaces per unit is supportable.

To further promote sustainable modes of travel, a TDM plan is recommended for the development and should reference the above for consideration. The existence of these options does not necessarily ensure they will be utilized. However, these alternatives are considered to provide significant encouragement to those residents willing to make the change to sustainable transportation.

The TDM checklist, as developed by the City of Kitchener, was related to the work completed for the Comprehensive Zoning By-law review that includes updating parking standards to reflect best practices (i.e., these two documents complement each other).

As Niagara Falls does not have a comprehensive checklist developed, the City of Kitchener's checklist is relied on. As a precedent of 1.00 space per unit has previously been supported by City Transportation Staff, the proposed rate of 1.12 spaces per unit has been used as a

conservative rate for the TDM checklist. In addition, commercial parking requirements have also been included.

The following measures are proposed that have been considered that will further reduce the sites parking demand:

- The building owner will charge for parking as a separate cost to occupants (15 parking space reduction).

Appendix J contains the City of Kitchener's TDM checklist.

8 Conclusions and Recommendations

8.1 Conclusions

Transportation Impact Assessment

The main findings and conclusions of the impact assessment are as follows:

- **Base Year Traffic Conditions:** All study area intersections are found to be operating at acceptable levels of service and within capacity. The exception being the Lundy's Lane at Drummond Road northbound left-turn lane 95th percentile queue length extending beyond the available storage during the AM and PM peak hours by up to 30 m.
- **Trip Generation:** The site's trip generation is estimated to be 53 AM and 72 PM peak hour trips.
- **Background Traffic Conditions:** With the addition of generalized background growth, all study area intersections are forecast to continue to operate at acceptable levels of service and within capacity. Localized congestion is forecast to occur at the intersection of Lundy's Lane at Drummond Road in the PM peak hour. Specifically, the eastbound left-turn movement from Lundy's Lane is forecast to operate at a LOS F; however, this movement is reported to operate with delays less than 65 seconds in the PM peak hour.
- **Total Traffic Conditions:** With the addition of site generated vehicular traffic, all study area intersections are forecast to operate at acceptable levels of service and within capacity. Similar to background traffic conditions, localized congestion is forecast to occur at the intersection of Lundy's Lane at Drummond Road in the PM peak hour.

  The westbound through 95th percentile queue length at Lundy's Lane at Drummond Road is forecast to extend beyond 100 metres encroaching and potentially blocking the site access.

  The site access is forecast to operate with delays in the LOS C range or better; delays are not expected to exceed 25 seconds.

  The additional traffic generated by the site is not expected to significantly impact the study area intersections. Overall, delays for individual movements are forecast to increase by less than 10 seconds during the AM and PM peak hours.

- **Remedial Measures:**
  - **Sightline**: Due to the presence of a vertical curve located east of the subject site, the required sight distance is not met east of the driveway for a design speed of 60 km/h. It is noted the available stopping sight distance approaching from the east is equivalent to the posted maximum speed limit of 50 km/h.

    The TAC guide states that "depending on specific circumstances, the designer may use different measurements of sight distance, including stopping sight distance, passing sight distance, etc.". Also noting "in many applications, one of these types of sight distance will govern, and the designer need satisfy only one requirement".
  - Furthermore, it is acknowledged the existing driveway serving the site is located approximately 25 metres west of the proposed driveway; accordingly, vehicles approaching the driveway currently encounter the sight distance deficiency.

    A review of midblock collisions between Drummond Road and Hanan Avenue shows the majority of the nine collisions over the last five years were rear end and sideswipe collisions, suggesting the collisions are likely attributed with vehicle maneuvers and queuing at the intersection Lundy's Lane and Drummond Road. No identifiable trends were noted related to turning movements.
  - **Access Review**: Given the location of the site and the length of the westbound left-turn lane provided at the adjacent intersection of Lundy's Lane and Drummond Road, providing the TAC recommended spacing from the signalized intersection is not possible.

    The number and type of conflict points at a driveway can be managed by limiting both the amount of access allowed at the driveway (e.g., full movement, left-in/left-out, right-in/right-out, right-in only or right-out only) and the location of the driveway relative to other driveways in the area.

    A raised median on Lundy's Lane across the site's frontage is preferred to restrict left turns. The raised median, however, could also limit access to other properties with frontage to Lundy's Lane.
  - **Auxiliary Turn Lanes**: The forecast traffic volumes warrant the consideration of a 15-metre eastbound left-turn lane at the site driveway. However, due to the proximity to Drummond Road, the provision of an eastbound left-turn

lane would be located within functional area of the Drummond Road intersection and therefore is not recommended.

Parking Study

The main findings and conclusions of the parking assessment are as follows:

The City of Niagara Falls growth objective is to create and develop a transit and pedestrian-friendly, sustainable, and livable City through urban design criteria and guidelines. The Official Plan embraces sustainability and creates a vision for complete compact communities served by streets made for walking, cycling, and an attractive transit system. This vision is supported by policies to reduce auto dependence and limit the amount of land occupied by automobile parking. The transportation policies are deliberately interspersed with the land-use policies to emphasize the importance of considering both areas to achieve the overall vision of complete compact communities.

Parking supply is one of the most critical measures to shift demand from vehicles to sustainable travel modes. Research conducted focused on the provision of off-street parking and the choice to drive among individuals travelling. This research found that reductions in off-street vehicular parking for office, residential, and retail developments reduce the overall automobile mode share associated with those developments relative to projects with the same land uses in similar contexts that provide more off-street vehicular parking.

This research is further echoed within the Government of Ontario's "Housing Affordability Task Force." One of the main recommendations by the Housing Task Force is removing or reducing the parking requirements in cities with over 50,000 in population. The report identified that residential minimum parking requirements should ensure a basic, responsible parking level is provided without increasing development costs. Minimum parking requirements add as much as $165,000 to the price of a new housing unit.

A parking supply of 1.12 spaces per residential unit is supported for the area based on a review of average vehicle ownership rates, and proxy survey data from similar high-rise developments.

Lastly, the proposed parking supply is supported with a Transportation Demand Management (TDM) program that includes unbundled parking spaces from dwelling units, and the provision of transit information for residents.

8.2 Recommendations

Based on the findings of this study, the following is recommended:

- The City of Niagara Falls monitor traffic volumes and operations of the signalized intersections of Lundy's Lane with Drummond Road and Main Street to provide appropriate signal timing plans to best serve all movements.
- The developer locate the site driveway at the eastern limit of the site (as proposed) and restrict movements at the site driveway to right-in/right-out to minimize the impact of the proposed driveway on Lundy's Lane while also accommodating the site vehicles to the site.
- Though the future total volume warrants the consideration of an eastbound left-turn lane at the site driveway, a left-turn lane is not recommended as the driveway is recommended to be restricted to only right-in/right-out movements in consideration of sight distance availability, and operational concerns related to adjacent vehicular queuing.
- The City accept the proposed residential parking rate of 1.12 spaces per unit.

Appendix A

Terms of Reference

Greg Lue

From: Dunsmore, Susan <Susan.Dunsmore@niagararegion.ca>
Sent: March 24, 2023 6:36 AM
To: Greg Lue
Cc: Adam Makarewicz; John Grubich
Subject: RE: 220825 - 6179 Lundy's Lane, Niagara Falls - TIA and Parking Study - Terms of Reference

Good Morning

Niagara Region's Transportation Planning staff have reviewed the terms of reference below and have provided the comments in red. Regional traffic data can be requested using the following link: https://www.niagararegion.ca/living/roads/permits/traffic-data-requests.aspx. If improvements are required to the Regional Road or intersections the TIS is to include function designs for the improvements.

If you have any questions or concerns please contact me at your convenience.

Susan

From: Greg Lue <glue@ptsl.com>
Sent: Thursday, March 16, 2023 1:43 PM
To: Dunsmore, Susan <Susan.Dunsmore@niagararegion.ca>; John Grubich <jgrubich@niagarafalls.ca>
Cc: Adam Makarewicz <amakarewicz@ptsl.com>
Subject: 220825 - 6179 Lundy's Lane, Niagara Falls - TIA and Parking Study - Terms of Reference

Hi all,

Paradigm Transportations Solutions Limited has been retained to conduct a Transportation Impact Analysis and Parking Study for a proposed development at the northeast corner of Lundy's Lane and Drummond Road, municipal address 6179 Lundy's Lane. The property owner is proposing to redevelop the lands as a mixed-use development with a single 9 storey tower, providing 120 residential units and ground floor retail.

Vehicle access to the site is proposed via a driveway connection to Lundy's Lane.

A total of 159 parking spaces is proposed. Parking for residential use is proposed at 1.20 parking spaces per unit, while the commercial space is at 1.00 parking spaces for every 38 square metres.

A preliminary concept plan is attached.

Proposed Terms of Reference
Proposed Terms of Reference
Study Area Intersections

- Lundy's Lane & Drummond Road (signalized);
- One site driveway.
- Lundy's Lane & Main Street (signalized)- TMC available (August 2022)

Existing Data
- Does the City/Region have issues with traffic counts being collected in the coming weeks? Traffic counts are preferred to be carried in the summer.

Horizon Years
- 2023 Base Year
- 5 years from date of study - The Region requests for examination of 5 years-horizon from full buildout.
-

Analysis Periods
- Weekday AM peak hour
- Weekday PM peak hour

Analysis
- Synchro 11
- HCM 2000
- SimTraffic Queueing (five 60-min iterations)

Background Traffic
- Generalized growth rate 1% per annum The Region usually requests a growth factor of 2% as per the Region's TIS Guidelines.
- Traffic generated by any in stream developments in the area. **City of Niagara Falls** – can you comment on this and provide any relevant studies or inputs to estimate the traffic for the site(s)?

Site Traffic Estimates
- ITE Trip Generation Data 11th Edition
- No modal split reductions

Site Traffic Distribution
- Existing travel patterns/TTS data

Parking Study
- Parking generation for the site will be calculated using parking rates obtained from ITE Parking Generation Manual, proxy site survey data, and Zoning By-Law comparisons. Based on a cursory review (8111 Forest Glen Drive and 7711 Green Vista Gate, Niagara Falls, appear to be suitable sites). In addition, we propose to survey the existing on-street parking adjacent to the development to determine the parking utilization.
- A parking rate will be recommended that is deemed applicable to the subject site taking into account the development's location. The recommended rate will then be used to estimate the number of parking spaces needed to meet the projected parking demand. The estimated parking supply needed will be compared to the By-law required supply to assess the feasibility of providing less than the By-law supply requirements. In the event that the parking review determines that a parking reduction cannot be justified, the report will speak to this point.

Report
- We will document the study methodologies, findings, and conclusions in a report with appendices containing the detailed analysis results and any data collected.

Please let us know if you have any comments on the proposed study.

Additional comments :

- Precon comments are still applicable:
    - The Regional staff has concerns with the access on Lundy's Lane, as it is substandard to TAC access spacing requirements. The TIS to address the location safety, and determine if there is an alternative option for access.
    - A sightline analysis is required due to the vertical curve on the east.
    - TIS to address the feasibility and requirement for EBL storage lane for site access.
- Access dimensions should be as per TAC requirements.
- Clear throat length of the proposed access to be compatible with the TIS capacity analysis results/TAC requirements.
- The Consultant is to follow Niagara Region Guidelines for TIS (2012) for traffic analysis software settings, intersections capacity thresholds and other requirements.
- For the ideal saturation flows, there are currently new saturation flow rates that will be a part of the new TIS Guidelines, shown in the below table. The Consultant can use either the new saturation values or 1750 across the board for all movements.

Variable	Saturation Flow Rate (pc/h/ln) - Niagara Falls
T	1,579
L	1,454
LT	1,178
LL	2,144
R	1,301
RT	1,338
LTR	1,433

Please let us know if you have any comments on the proposed study.

Thanks !

Greg Lue, M.A.Sc., P.Eng.
Project Manager
(he/him)

Paradigm Transportation Solutions Limited
5A-150 Pinebush Road, Cambridge ON N1R 8J8
p: 905.381.2229 x307
m: 905.981.7479
e: glue@ptsl.com
w: www.ptsl.com

**** Paradigm is now operating on a 4-day workweek. Our offices are closed Fridays. ****

immediately. Please note that any views or opinions presented in this e-mail are solely those of the author and do not necessarily represent those of Paradigm Transportation Solutions Limited. Finally, the recipient should check this e-mail and any attachments for the presence of viruses. Paradigm Transportation Solutions Limited accepts no liability for any damage caused by any virus transmitted by this e-mail.

Greg Lue

From: John Grubich <jgrubich@niagarafalls.ca>
Sent: April 11, 2023 11:28 AM
To: Greg Lue
Cc: Adam Makarewicz
Subject: RE: [EXTERNAL]-220825 - 6179 Lundy's Lane, Niagara Falls - TIA and Parking Study - Terms of Reference

Greg;

The site in Grimsby is acceptable. Please identify if all units are occupied when the study occurs.

I saw an ad in the Hamilton Spectator on Saturday on the site in Binbrook. On their website, 32 units are still vacant and available for lease. It may be premature to study this location now.

John Grubich, C.E.T. | Traffic Planning Supervisor | Municipal Works - Transportation Services | City of Niagara Falls
8208 Heartland Forest Road | Niagara Falls, ON L2H 0L7 | (905) 356-7521 ext 5214 | Fax 905-356-5576 | jgrubich@niagarafalls.ca

---

From: Greg Lue <glue@ptsl.com>
Sent: Monday, April 3, 2023 2:12 PM
To: John Grubich <jgrubich@niagarafalls.ca>
Cc: Adam Makarewicz <amakarewicz@ptsl.com>
Subject: RE: [EXTERNAL]-220825 - 6179 Lundy's Lane, Niagara Falls - TIA and Parking Study - Terms of Reference

Hi John,
We've scoped out two sites that should provide a reasonable estimate for the mixed use residential/commercial uses. They cover a range for mixed-used parking demand for high density residential (Waterview Condos) and lower density residential (3200 RR56, Hamilton):

- Waterview Condos (560 and 550 North Service Road), Grimsby
  - 9 and 15 storey mixed used buildings with ground floor commercial (dentist, physiotherapy, gym, medical spa, medical rehab/massage, bakery)
  - Limited transit access, should provide conservative estimate for parking
- 3200 Regional Road 56, Hamilton
  - 3 storey mixed use, ground floor retail (dentist, cannabis store, hair salon, bakery)
  - Though not in Niagara the site is on an arterial road and no transit is provided so it will likely provide a conservative estimate for parking.

Please let us know if you have any concerns.

Thanks,

Greg Lue, M.A.Sc., P.Eng.
Project Manager
(he/him)

Paradigm Transportation Solutions Limited
p: 905.381.2229 x307
m: 905.981.7479

**** Paradigm is now operating on a 4-day workweek. Our offices are closed Fridays. ****

From: John Grubich <jgrubich@niagarafalls.ca>
Sent: Wednesday, March 29, 2023 12:53 PM
To: Greg Lue <glue@ptsl.com>
Cc: Adam Makarewicz <amakarewicz@ptsl.com>
Subject: RE: [EXTERNAL]-220825 - 6179 Lundy's Lane, Niagara Falls - TIA and Parking Study - Terms of Reference

Greg;

I did my own review and did not find a comparable site in Niagara Falls. Given the foregoing, sites outside of Niagara Falls but still within the Niagara Region could be acceptable provided the context is similar (alongside an arterial road, transit access, etc.).

John Grubich, C.E.T. | Traffic Planning Supervisor | Municipal Works - Transportation Services | City of Niagara Falls
8208 Heartland Forest Road | Niagara Falls, ON L2H 0L7 | (905) 356-7521 ext 5214 | Fax 905-356-5576 | jgrubich@niagarafalls.ca

---

From: Greg Lue <glue@ptsl.com>
Sent: Monday, March 27, 2023 12:03 PM
To: John Grubich <jgrubich@niagarafalls.ca>
Cc: Adam Makarewicz <amakarewicz@ptsl.com>
Subject: RE: [EXTERNAL]-220825 - 6179 Lundy's Lane, Niagara Falls - TIA and Parking Study - Terms of Reference

Hi John,
Thanks for getting back to us with those comments. Our cursory search for mixed-use developments in Niagara Falls did not turn up similar sites to the proposed development.
Do you have knowledge of any mixed-use developments in Niagara Falls which would be acceptable? Alternatively, would you be willing to accept proxy sites outside of Niagara Falls if they are located in a comparable area (i.e. transit access, surrounding developments etc.)?

Thanks,

Greg Lue, M.A.Sc., P.Eng.
Project Manager
(he/him)

Paradigm Transportation Solutions Limited

p: 905.381.2229 x307
m: 905.981.7479

*** *Paradigm is now operating on a 4-day workweek. Our offices are closed Fridays.* ***

From: John Grubich <jgrubich@niagarafalls.ca>
Sent: Thursday, March 23, 2023 11:02 AM
To: Greg Lue <glue@ptsl.com>
Cc: Adam Makarewicz <amakarewicz@ptsl.com>; Susan.Dunsmore@niagararegion.ca
Subject: RE: [EXTERNAL]-220825 - 6179 Lundy's Lane, Niagara Falls - TIA and Parking Study - Terms of Reference

Greg;

There are no in stream developments affecting the study area.

For parking, both proxy sites you noted are entirely residential buildings, whereas the proposed development is mixed use, with ground floor commercial space. The proxy sites chosen would not address the proposed reduction in the commercial parking, from a 1/25 to a 1/38 rate. The City will want to have a couple of mixed-use sites surveyed.

John Grubich, C.E.T. | Traffic Planning Supervisor | Municipal Works - Transportation Services | City of Niagara Falls
8208 Heartland Forest Road | Niagara Falls, ON L2H 0L7 | (905) 356-7521 ext 5214 | Fax 905-356-5576 | jgrubich@niagarafalls.ca

---

From: Greg Lue <glue@ptsl.com>
Sent: Thursday, March 16, 2023 1:43 PM
To: Susan.Dunsmore@niagararegion.ca; John Grubich <jgrubich@niagarafalls.ca>
Cc: Adam Makarewicz <amakarewicz@ptsl.com>
Subject: [EXTERNAL]-220825 - 6179 Lundy's Lane, Niagara Falls - TIA and Parking Study - Terms of Reference

Hi all,

Paradigm Transportations Solutions Limited has been retained to conduct a Transportation Impact Analysis and Parking Study for a proposed development at the northeast corner of Lundy's Lane and Drummond Road, municipal address 6179 Lundy's Lane. The property owner is proposing to redevelop the lands as a mixed-use development with a single 9 storey tower, providing 120 residential units and ground floor retail.

Vehicle access to the site is proposed via a driveway connection to Lundy's Lane.

A total of 159 parking spaces is proposed. Parking for residential use is proposed at 1.20 parking spaces per unit, while the commercial space is at 1.00 parking spaces for every 38 square metres.

A preliminary concept plan is attached.

<u>Proposed Terms of Reference</u>
Study Area Intersections

- Lundy's Lane & Drummond Road (signalized);
- One site driveway.

Existing Data

- Does the City/Region have issues with traffic counts being collected in the coming weeks?

Horizon Years

- 2023 Base Year
- 5 years from date of study

Analysis Periods
- Weekday AM peak hour
- Weekday PM peak hour

Analysis
- Synchro 11
- HCM 2000
- SimTraffic Queueing (five 60-min iterations)

Background Traffic
- Generalized growth rate 1% per annum
- Traffic generated by any in stream developments in the area. **City of Niagara Falls** – can you comment on this and provide any relevant studies or inputs to estimate the traffic for the site(s)?

Site Traffic Estimates
- ITE Trip Generation Data 11th Edition
- No modal split reductions

Site Traffic Distribution
- Existing travel patterns/TTS data

Parking Study
- Parking generation for the site will be calculated using parking rates obtained from ITE Parking Generation Manual, proxy site survey data, and Zoning By-Law comparisons. Based on a cursory review (8111 Forest Glen Drive and 7711 Green Vista Gate, Niagara Falls, appear to be suitable sites). In addition, we propose to survey the existing on-street parking adjacent to the development to determine the parking utilization.
- A parking rate will be recommended that is deemed applicable to the subject site taking into account the development's location. The recommended rate will then be used to estimate the number of parking spaces needed to meet the projected parking demand. The estimated parking supply needed will be compared to the By-law required supply to assess the feasibility of providing less than the By-law supply requirements. In the event that the parking review determines that a parking reduction cannot be justified, the report will speak to this point.

Report
- We will document the study methodologies, findings, and conclusions in a report with appendices containing the detailed analysis results and any data collected.

Please let us know if you have any comments on the proposed study.

Thanks !

Greg Lue, M.A.Sc., P.Eng.
Project Manager
(he/him)

Paradigm Transportation Solutions Limited
5A-150 Pinebush Road, Cambridge ON N1R 8J8
p: 905.381.2229 x307
m: 905.981.7479

e: glue@ptsl.com
w: www.ptsl.com

*** *Paradigm is now operating on a 4-day workweek. Our offices are closed Fridays.* ***

This e-mail and any files transmitted with it are confidential and intended solely for the use of the individual or entity to whom they are addressed. If you have received this e-mail in error please notify the sender immediately. Please note that any views or opinions presented in this e-mail are solely those of the author and do not necessarily represent those of Paradigm Transportation Solutions Limited. Finally, the recipient should check this e-mail and any attachments for the presence of viruses. Paradigm Transportation Solutions Limited accepts no liability for any damage caused by any virus transmitted by this e-mail.
This e-mail and any files transmitted with it are confidential and intended solely for the use of the individual or entity to whom they are addressed. If you have received this e-mail in error please notify the sender immediately. Please note that any views or opinions presented in this e-mail are solely those of the author and do not necessarily represent those of Paradigm Transportation Solutions Limited. Finally, the recipient should check this e-mail and any attachments for the presence of viruses. Paradigm Transportation Solutions Limited accepts no liability for any damage caused by any virus transmitted by this e-mail.

Appendix B

Existing Traffic Data

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: Lundy's Lane & Drummond Road
Site Code: 220825
Start Date: 04/04/2023

Turning Movement Data

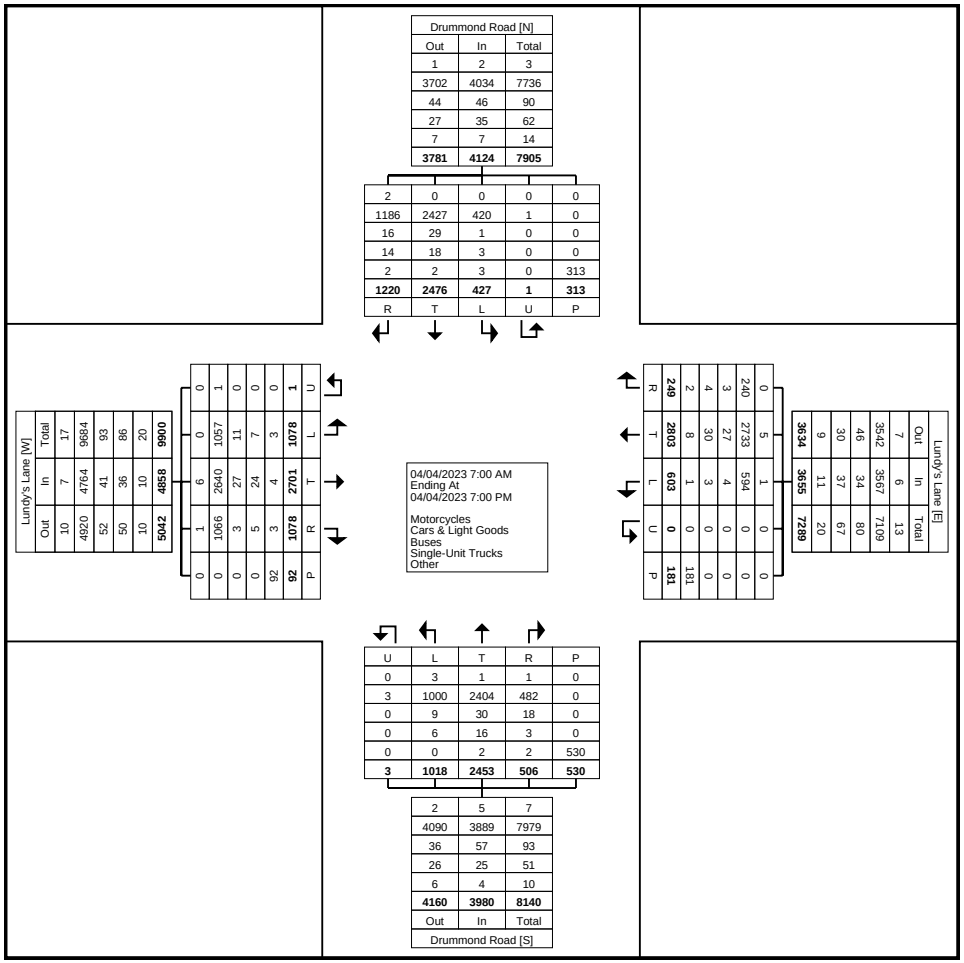
Start Time	Lundy's Lane Eastbound						Lundy's Lane Westbound						Drummond Road Northbound						Drummond Road Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
7:00 AM	12	31	13	0	0	56	11	36	10	0	1	57	12	43	10	0	3	65	3	23	13	0	0	39	217
7:15 AM	12	45	6	0	0	63	8	40	5	0	0	53	18	36	10	0	4	64	10	30	15	0	0	55	235
7:30 AM	16	54	20	0	1	90	11	40	8	0	1	59	19	72	9	0	3	100	13	35	18	0	6	66	315
7:45 AM	29	66	12	0	3	107	8	31	6	0	1	45	21	88	18	0	4	127	8	47	21	0	1	76	355
Hourly Total	69	196	51	0	4	316	38	147	29	0	3	214	70	239	47	0	14	356	34	135	67	0	7	236	1122
8:00 AM	18	52	18	0	4	88	19	46	8	0	6	73	18	81	11	0	6	110	10	47	20	0	9	77	348
8:15 AM	22	77	18	0	12	117	11	47	4	0	15	62	28	80	13	0	10	121	20	73	19	0	14	112	412
8:30 AM	26	86	35	0	13	147	9	64	10	0	10	83	36	107	14	0	15	157	18	68	20	0	11	106	493
8:45 AM	28	85	29	0	1	142	24	59	7	0	7	90	22	97	16	0	5	135	12	78	26	0	5	116	483
Hourly Total	94	300	100	0	30	494	63	216	29	0	38	308	104	365	54	0	36	523	60	266	85	0	39	411	1736
9:00 AM	38	81	26	0	4	145	15	54	10	0	1	79	34	87	18	0	1	139	22	52	35	0	4	109	472
9:15 AM	30	76	25	0	2	131	13	48	4	0	2	65	23	81	11	1	10	116	10	65	35	0	3	110	422
9:30 AM	29	75	17	0	0	121	13	60	4	0	3	77	19	91	25	0	3	135	14	65	36	0	5	115	448
9:45 AM	26	68	20	0	2	114	16	75	10	0	1	101	22	74	15	0	6	111	9	69	51	0	1	129	455
Hourly Total	123	300	88	0	8	511	57	237	28	0	7	322	98	333	69	1	20	501	55	251	157	0	13	463	1797
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11:30 AM	48	98	36	0	12	182	22	108	12	0	12	142	44	71	23	0	18	138	16	60	48	0	32	124	586
11:45 AM	45	90	39	0	10	174	24	95	6	0	14	125	33	75	17	0	31	125	15	82	47	0	27	144	568
Hourly Total	93	188	75	0	22	356	46	203	18	0	26	267	77	146	40	0	49	263	31	142	95	0	59	268	1154
12:00 PM	39	104	35	0	7	178	19	102	6	0	23	127	36	49	11	0	25	96	20	73	57	0	22	150	551
12:15 PM	36	109	38	0	4	183	19	88	10	0	4	117	47	83	17	0	21	147	17	75	51	0	17	143	590
12:30 PM	38	103	43	0	4	184	18	111	9	0	9	138	34	80	23	0	17	137	14	83	45	0	15	142	601
12:45 PM	50	116	58	0	2	224	17	86	7	0	7	110	44	83	21	0	12	148	10	70	34	0	10	114	596
Hourly Total	163	432	174	0	17	769	73	387	32	0	43	492	161	295	72	0	75	528	61	301	187	0	64	549	2338
1:00 PM	29	105	42	0	2	176	21	104	5	0	5	130	30	80	25	0	32	135	10	79	51	0	9	140	581
1:15 PM	46	111	34	0	4	191	17	95	11	0	8	123	35	76	14	0	35	125	19	83	46	0	13	148	587
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hourly Total	75	216	76	0	6	367	38	199	16	0	13	253	65	156	39	0	67	260	29	162	97	0	22	288	1168
4:00 PM	25	92	62	0	0	179	25	132	8	0	4	165	49	68	16	0	28	133	14	108	40	0	15	162	639
4:15 PM	54	83	41	0	1	178	27	125	6	0	6	158	37	93	16	0	28	146	13	116	42	0	4	171	653
4:30 PM	40	87	48	0	0	175	22	147	9	0	4	178	33	92	23	0	30	148	20	133	52	0	12	205	706
4:45 PM	42	104	43	0	0	189	22	139	9	0	6	170	34	83	17	0	15	134	8	118	49	0	8	175	668
Hourly Total	161	366	194	0	1	721	96	543	32	0	20	671	153	336	72	0	101	561	55	475	183	0	39	713	2666
5:00 PM	29	87	45	0	0	161	33	152	7	0	4	192	40	95	22	0	19	157	13	119	71	0	9	203	713
5:15 PM	48	91	38	0	0	177	25	110	13	0	4	148	36	72	14	0	33	122	11	105	54	0	4	170	617

5:30 PM	40	88	48	0	0	176	27	127	7	0	5	161	40	72	10	0	14	122	13	108	47	1	15	169	628
5:45 PM	37	100	43	0	4	180	23	109	9	0	0	141	40	87	14	0	28	141	15	98	39	0	6	152	614
Hourly Total	154	366	174	0	4	694	108	498	36	0	13	642	156	326	60	0	94	542	52	430	211	1	34	694	2572
6:00 PM	35	88	44	0	0	167	20	107	5	0	6	132	31	72	14	0	28	117	16	86	33	0	7	135	551
6:15 PM	45	83	34	0	0	162	26	104	11	0	5	141	39	62	16	1	9	118	11	67	35	0	9	113	534
6:30 PM	24	92	39	0	0	155	17	85	8	0	1	110	30	75	6	1	19	112	13	86	37	0	11	136	513
6:45 PM	42	74	29	1	0	146	21	77	5	0	6	103	34	48	17	0	18	99	10	75	33	0	9	118	466
Hourly Total	146	337	146	1	0	630	84	373	29	0	18	486	134	257	53	2	74	446	50	314	138	0	36	502	2064
Grand Total	1078	2701	1078	1	92	4858	603	2803	249	0	181	3655	1018	2453	506	3	530	3980	427	2476	1220	1	313	4124	16617
Approach %	22.2	55.6	22.2	0.0	-	-	16.5	76.7	6.8	0.0	-	-	25.6	61.6	12.7	0.1	-	-	10.4	60.0	29.6	0.0	-	-	-
Total %	6.5	16.3	6.5	0.0	-	29.2	3.6	16.9	1.5	0.0	-	22.0	6.1	14.8	3.0	0.0	-	24.0	2.6	14.9	7.3	0.0	-	24.8	-
Motorcycles	0	6	1	0	-	7	1	5	0	0	-	6	3	1	1	0	-	5	0	0	2	0	-	2	20
% Motorcycles	0.0	0.2	0.1	0.0	-	0.1	0.2	0.2	0.0	-	-	0.2	0.3	0.0	0.2	0.0	-	0.1	0.0	0.0	0.2	0.0	-	0.0	0.1
Cars & Light Goods	1057	2640	1066	1	-	4764	594	2733	240	0	-	3567	1000	2404	482	3	-	3889	420	2427	1186	1	-	4034	16254
% Cars & Light Goods	98.1	97.7	98.9	100.0	-	98.1	98.5	97.5	96.4	-	-	97.6	98.2	98.0	95.3	100.0	-	97.7	98.4	98.0	97.2	100.0	-	97.8	97.8
Buses	11	27	3	0	-	41	4	27	3	0	-	34	9	30	18	0	-	57	1	29	16	0	-	46	178
% Buses	1.0	1.0	0.3	0.0	-	0.8	0.7	1.0	1.2	-	-	0.9	0.9	1.2	3.6	0.0	-	1.4	0.2	1.2	1.3	0.0	-	1.1	1.1
Single-Unit Trucks	7	24	5	0	-	36	3	30	4	0	-	37	6	16	3	0	-	25	3	18	14	0	-	35	133
% Single-Unit Trucks	0.6	0.9	0.5	0.0	-	0.7	0.5	1.1	1.6	-	-	1.0	0.6	0.7	0.6	0.0	-	0.6	0.7	0.7	1.1	0.0	-	0.8	0.8
Articulated Trucks	2	4	2	0	-	8	1	5	2	0	-	8	0	2	1	0	-	3	3	2	2	0	-	7	26
% Articulated Trucks	0.2	0.1	0.2	0.0	-	0.2	0.2	0.2	0.8	-	-	0.2	0.0	0.1	0.2	0.0	-	0.1	0.7	0.1	0.2	0.0	-	0.2	0.2
Bicycles on Road	1	0	1	0	-	2	0	3	0	0	-	3	0	0	1	0	-	1	0	0	0	0	-	0	6
% Bicycles on Road	0.1	0.0	0.1	0.0	-	0.0	0.0	0.1	0.0	-	-	0.1	0.0	0.0	0.2	0.0	-	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	-	2	-	-	-	-	-	6	-	-	-	-	-	15	-	-	-	-	-	4	-	-
% Bicycles on Crosswalk	-	-	-	-	2.2	-	-	-	-	-	3.3	-	-	-	-	-	2.8	-	-	-	-	-	1.3	-	-
Pedestrians	-	-	-	-	90	-	-	-	-	-	175	-	-	-	-	-	515	-	-	-	-	-	309	-	-
% Pedestrians	-	-	-	-	97.8	-	-	-	-	-	96.7	-	-	-	-	-	97.2	-	-	-	-	-	98.7	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: Lundy's Lane & Drummond Road
Site Code: 220825
Start Date: 04/04/2023



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: Lundy's Lane & Drummond Road
Site Code: 220825
Start Date: 04/04/2023

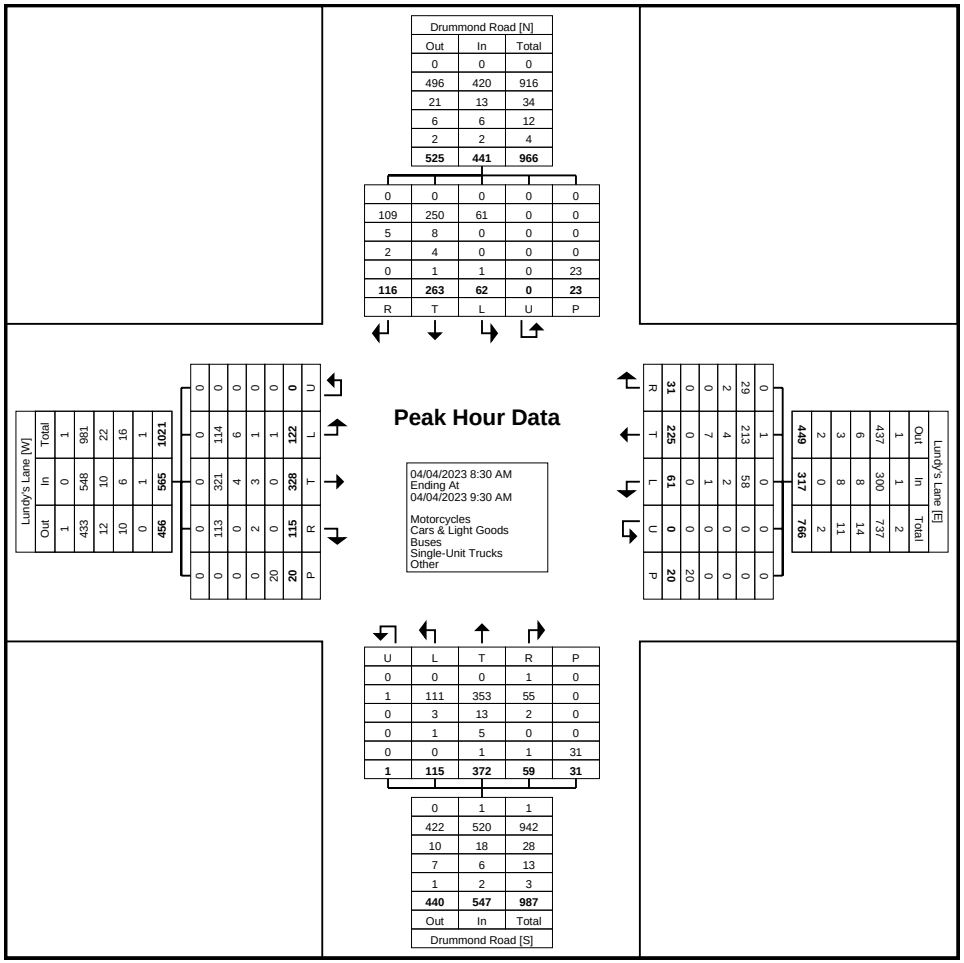
Turning Movement Peak Hour Data (8:30 AM)

Start Time	Lundy's Lane Eastbound						Lundy's Lane Westbound						Drummond Road Northbound						Drummond Road 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	
8:30 AM	26	86	35	0	13	147	9	64	10	0	10	83	36	107	14	0	15	157	18	68	20	0	11	106	493
8:45 AM	28	85	29	0	1	142	24	59	7	0	7	90	22	97	16	0	5	135	12	78	26	0	5	116	483
9:00 AM	38	81	26	0	4	145	15	54	10	0	1	79	34	87	18	0	1	139	22	52	35	0	4	109	472
9:15 AM	30	76	25	0	2	131	13	48	4	0	2	65	23	81	11	1	10	116	10	65	35	0	3	110	422
Total	122	328	115	0	20	565	61	225	31	0	20	317	115	372	59	1	31	547	62	263	116	0	23	441	1870
Approach %	21.6	58.1	20.4	0.0	-	-	19.2	71.0	9.8	0.0	-	-	21.0	68.0	10.8	0.2	-	-	14.1	59.6	26.3	0.0	-	-	-
Total %	6.5	17.5	6.1	0.0	-	30.2	3.3	12.0	1.7	0.0	-	17.0	6.1	19.9	3.2	0.1	-	29.3	3.3	14.1	6.2	0.0	-	23.6	-
PHF	0.803	0.953	0.821	0.000	-	0.961	0.635	0.879	0.775	0.000	-	0.881	0.799	0.869	0.819	0.250	-	0.871	0.705	0.843	0.829	0.000	-	0.950	0.948
Motorcycles	0	0	0	0	-	0	0	1	0	0	-	1	0	0	1	0	-	1	0	0	0	0	-	0	2
% Motorcycles	0.0	0.0	0.0	-	-	0.0	0.0	0.4	0.0	-	-	0.3	0.0	0.0	1.7	0.0	-	0.2	0.0	0.0	0.0	-	-	0.0	0.1
Cars & Light Goods	114	321	113	0	-	548	58	213	29	0	-	300	111	353	55	1	-	520	61	250	109	0	-	420	1788
% Cars & Light Goods	93.4	97.9	98.3	-	-	97.0	95.1	94.7	93.5	-	-	94.6	96.5	94.9	93.2	100.0	-	95.1	98.4	95.1	94.0	-	-	95.2	95.6
Buses	6	4	0	0	-	10	2	4	2	0	-	8	3	13	2	0	-	18	0	8	5	0	-	13	49
% Buses	4.9	1.2	0.0	-	-	1.8	3.3	1.8	6.5	-	-	2.5	2.6	3.5	3.4	0.0	-	3.3	0.0	3.0	4.3	-	-	2.9	2.6
Single-Unit Trucks	1	3	2	0	-	6	1	7	0	0	-	8	1	5	0	0	-	6	0	4	2	0	-	6	26
% Single-Unit Trucks	0.8	0.9	1.7	-	-	1.1	1.6	3.1	0.0	-	-	2.5	0.9	1.3	0.0	0.0	-	1.1	0.0	1.5	1.7	-	-	1.4	1.4
Articulated Trucks	1	0	0	0	-	1	0	0	0	0	-	0	0	1	1	0	-	2	1	1	0	0	-	2	5
% Articulated Trucks	0.8	0.0	0.0	-	-	0.2	0.0	0.0	0.0	-	-	0.0	0.0	0.3	1.7	0.0	-	0.4	1.6	0.4	0.0	-	-	0.5	0.3
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	0.0
Bicycles on Crosswalk	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	2	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	5.0	-	-	-	-	-	5.0	-	-	-	-	-	6.5	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	-	19	-	-	-	-	-	19	-	-	-	-	-	29	-	-	-	-	-	23	-	-
% Pedestrians	-	-	-	-	95.0	-	-	-	-	-	95.0	-	-	-	-	-	93.5	-	-	-	-	-	100.0	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: Lundy's Lane & Drummond Road
Site Code: 220825
Start Date: 04/04/2023



Turning Movement Peak Hour Data Plot (8:30 AM)

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: Lundy's Lane & Drummond Road
Site Code: 220825
Start Date: 04/04/2023

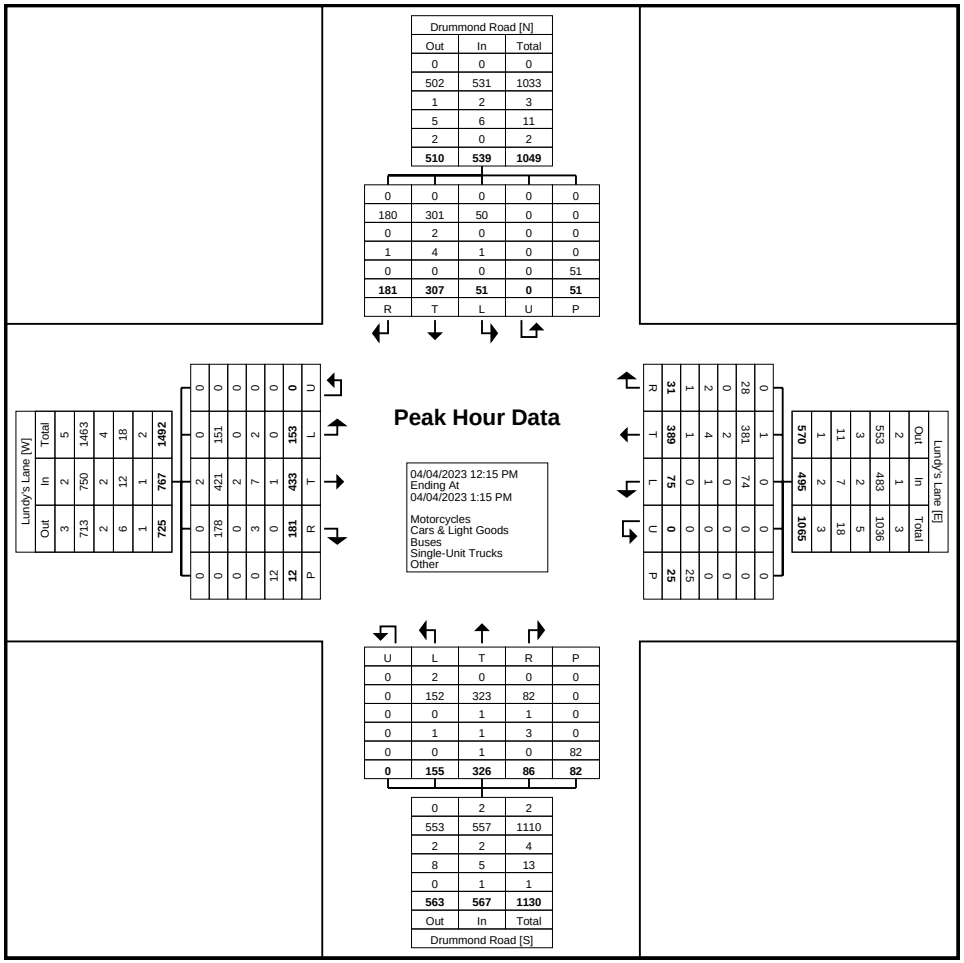
Turning Movement Peak Hour Data (12:15 PM)

Start Time	Lundy's Lane Eastbound						Lundy's Lane Westbound						Drummond Road Northbound						Drummond Road 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	
12:15 PM	36	109	38	0	4	183	19	88	10	0	4	117	47	83	17	0	21	147	17	75	51	0	17	143	590
12:30 PM	38	103	43	0	4	184	18	111	9	0	9	138	34	80	23	0	17	137	14	83	45	0	15	142	601
12:45 PM	50	116	58	0	2	224	17	86	7	0	7	110	44	83	21	0	12	148	10	70	34	0	10	114	596
1:00 PM	29	105	42	0	2	176	21	104	5	0	5	130	30	80	25	0	32	135	10	79	51	0	9	140	581
Total	153	433	181	0	12	767	75	389	31	0	25	495	155	326	86	0	82	567	51	307	181	0	51	539	2368
Approach %	19.9	56.5	23.6	0.0	-	-	15.2	78.6	6.3	0.0	-	-	27.3	57.5	15.2	0.0	-	-	9.5	57.0	33.6	0.0	-	-	-
Total %	6.5	18.3	7.6	0.0	-	32.4	3.2	16.4	1.3	0.0	-	20.9	6.5	13.8	3.6	0.0	-	23.9	2.2	13.0	7.6	0.0	-	22.8	-
PHF	0.765	0.933	0.780	0.000	-	0.856	0.893	0.876	0.775	0.000	-	0.897	0.824	0.982	0.860	0.000	-	0.958	0.750	0.925	0.887	0.000	-	0.942	0.985
Motorcycles	0	2	0	0	-	2	0	1	0	0	-	1	2	0	0	0	-	2	0	0	0	0	-	0	5
% Motorcycles	0.0	0.5	0.0	-	-	0.3	0.0	0.3	0.0	-	-	0.2	1.3	0.0	0.0	-	-	0.4	0.0	0.0	0.0	-	-	0.0	0.2
Cars & Light Goods	151	421	178	0	-	750	74	381	28	0	-	483	152	323	82	0	-	557	50	301	180	0	-	531	2321
% Cars & Light Goods	98.7	97.2	98.3	-	-	97.8	98.7	97.9	90.3	-	-	97.6	98.1	99.1	95.3	-	-	98.2	98.0	98.0	99.4	-	-	98.5	98.0
Buses	0	2	0	0	-	2	0	2	0	0	-	2	0	1	1	0	-	2	0	2	0	0	-	2	8
% Buses	0.0	0.5	0.0	-	-	0.3	0.0	0.5	0.0	-	-	0.4	0.0	0.3	1.2	-	-	0.4	0.0	0.7	0.0	-	-	0.4	0.3
Single-Unit Trucks	2	7	3	0	-	12	1	4	2	0	-	7	1	1	3	0	-	5	1	4	1	0	-	6	30
% Single-Unit Trucks	1.3	1.6	1.7	-	-	1.6	1.3	1.0	6.5	-	-	1.4	0.6	0.3	3.5	-	-	0.9	2.0	1.3	0.6	-	-	1.1	1.3
Articulated Trucks	0	1	0	0	-	1	0	1	1	0	-	2	0	1	0	0	-	1	0	0	0	0	-	0	4
% Articulated Trucks	0.0	0.2	0.0	-	-	0.1	0.0	0.3	3.2	-	-	0.4	0.0	0.3	0.0	-	-	0.2	0.0	0.0	0.0	-	-	0.0	0.2
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	0.0	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	2	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	2.4	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	-	12	-	-	-	-	-	25	-	-	-	-	-	80	-	-	-	-	-	51	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	97.6	-	-	-	-	-	100.0	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: Lundy's Lane & Drummond Road
Site Code: 220825
Start Date: 04/04/2023



Turning Movement Peak Hour Data Plot (12:15 PM)

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: Lundy's Lane & Drummond Road
Site Code: 220825
Start Date: 04/04/2023

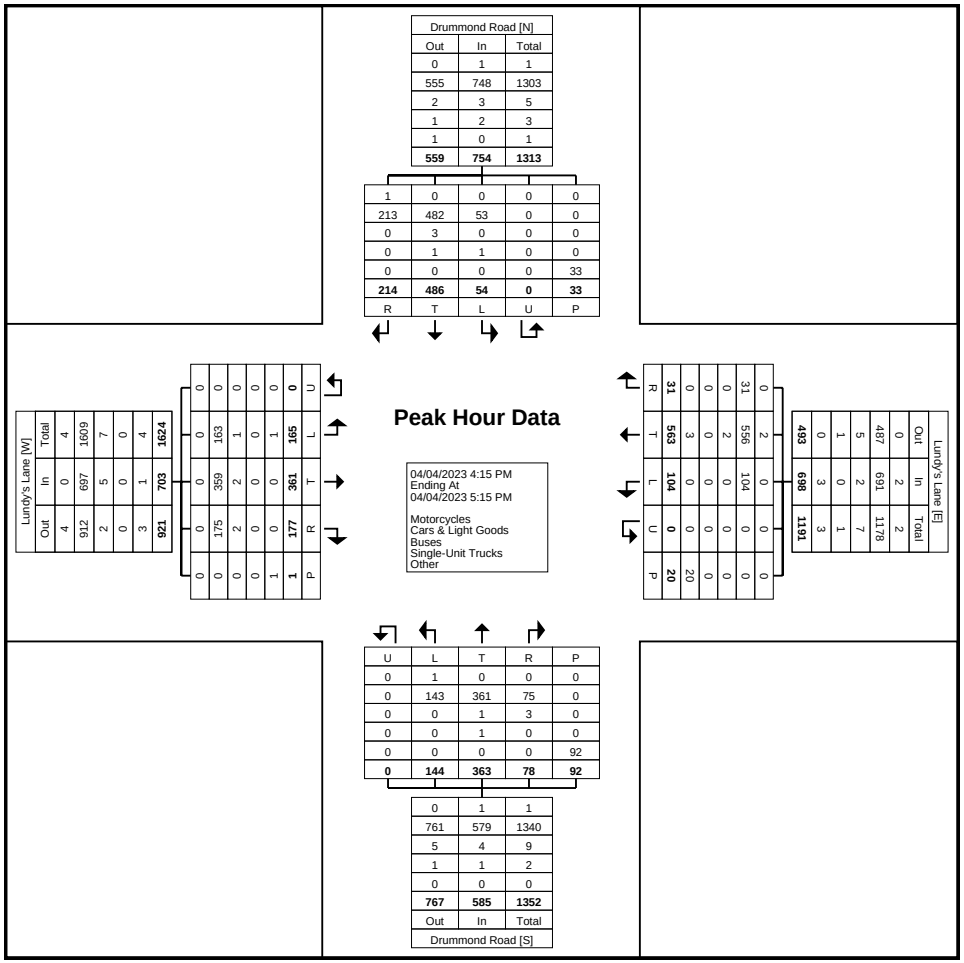
Turning Movement Peak Hour Data (4:15 PM)

Start Time	Lundy's Lane Eastbound						Lundy's Lane Westbound						Drummond Road Northbound						Drummond Road Southbound						
	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	Int. Total
4:15 PM	54	83	41	0	1	178	27	125	6	0	6	158	37	93	16	0	28	146	13	116	42	0	4	171	653
4:30 PM	40	87	48	0	0	175	22	147	9	0	4	178	33	92	23	0	30	148	20	133	52	0	12	205	706
4:45 PM	42	104	43	0	0	189	22	139	9	0	6	170	34	83	17	0	15	134	8	118	49	0	8	175	668
5:00 PM	29	87	45	0	0	161	33	152	7	0	4	192	40	95	22	0	19	157	13	119	71	0	9	203	713
Total	165	361	177	0	1	703	104	563	31	0	20	698	144	363	78	0	92	585	54	486	214	0	33	754	2740
Approach %	23.5	51.4	25.2	0.0	-	-	14.9	80.7	4.4	0.0	-	-	24.6	62.1	13.3	0.0	-	-	7.2	64.5	28.4	0.0	-	-	-
Total %	6.0	13.2	6.5	0.0	-	25.7	3.8	20.5	1.1	0.0	-	25.5	5.3	13.2	2.8	0.0	-	21.4	2.0	17.7	7.8	0.0	-	27.5	-
PHF	0.764	0.868	0.922	0.000	-	0.930	0.788	0.926	0.861	0.000	-	0.909	0.900	0.955	0.848	0.000	-	0.932	0.675	0.914	0.754	0.000	-	0.920	0.961
Motorcycles	0	0	0	0	-	0	0	2	0	0	-	2	1	0	0	0	-	1	0	0	1	0	-	1	4
% Motorcycles	0.0	0.0	0.0	-	-	0.0	0.0	0.4	0.0	-	-	0.3	0.7	0.0	0.0	-	-	0.2	0.0	0.0	0.5	-	-	0.1	0.1
Cars & Light Goods	163	359	175	0	-	697	104	556	31	0	-	691	143	361	75	0	-	579	53	482	213	0	-	748	2715
% Cars & Light Goods	98.8	99.4	98.9	-	-	99.1	100.0	98.8	100.0	-	-	99.0	99.3	99.4	96.2	-	-	99.0	98.1	99.2	99.5	-	-	99.2	99.1
Buses	1	2	2	0	-	5	0	2	0	0	-	2	0	1	3	0	-	4	0	3	0	0	-	3	14
% Buses	0.6	0.6	1.1	-	-	0.7	0.0	0.4	0.0	-	-	0.3	0.0	0.3	3.8	-	-	0.7	0.0	0.6	0.0	-	-	0.4	0.5
Single-Unit Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	1	0	0	-	1	1	1	0	0	-	2	3
% Single-Unit Trucks	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.3	0.0	-	-	0.2	1.9	0.2	0.0	-	-	0.3	0.1
Articulated Trucks	0	0	0	0	-	0	0	1	0	0	-	1	0	0	0	0	-	0	0	0	0	0	-	0	1
% Articulated Trucks	0.0	0.0	0.0	-	-	0.0	0.0	0.2	0.0	-	-	0.1	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Road	1	0	0	0	-	1	0	2	0	0	-	2	0	0	0	0	-	0	0	0	0	0	-	0	3
% Bicycles on Road	0.6	0.0	0.0	-	-	0.1	0.0	0.4	0.0	-	-	0.3	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.1
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	1	-	-	-	-	-	8	-	-	-	-	-	1	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	5.0	-	-	-	-	-	8.7	-	-	-	-	-	3.0	-	-
Pedestrians	-	-	-	-	1	-	-	-	-	-	19	-	-	-	-	-	84	-	-	-	-	-	32	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	95.0	-	-	-	-	-	91.3	-	-	-	-	-	97.0	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

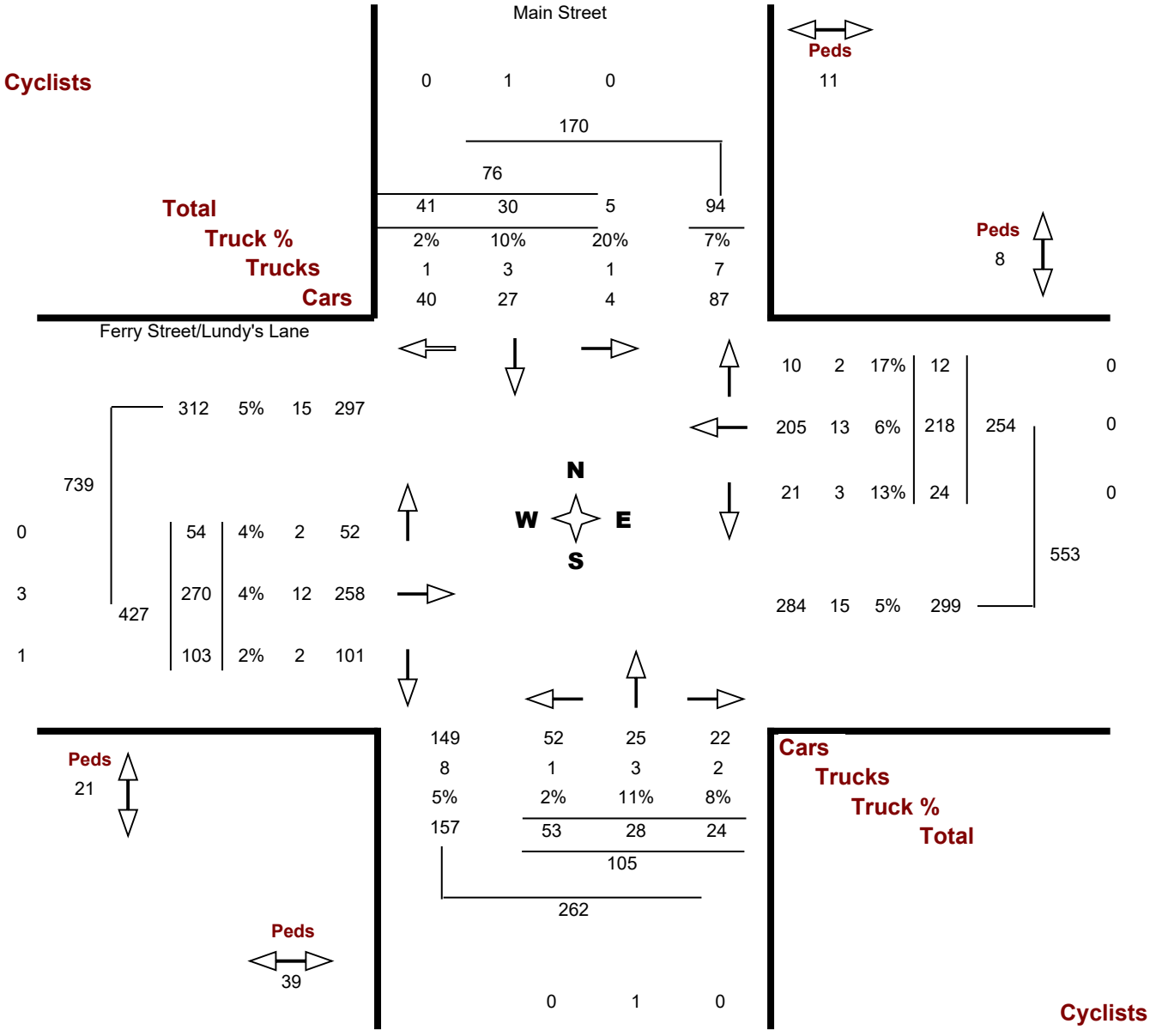
Count Name: Lundy's Lane & Drummond Road
Site Code: 220825
Start Date: 04/04/2023



Turning Movement Peak Hour Data Plot (4:15 PM)

Turning Movements Report - AM Period

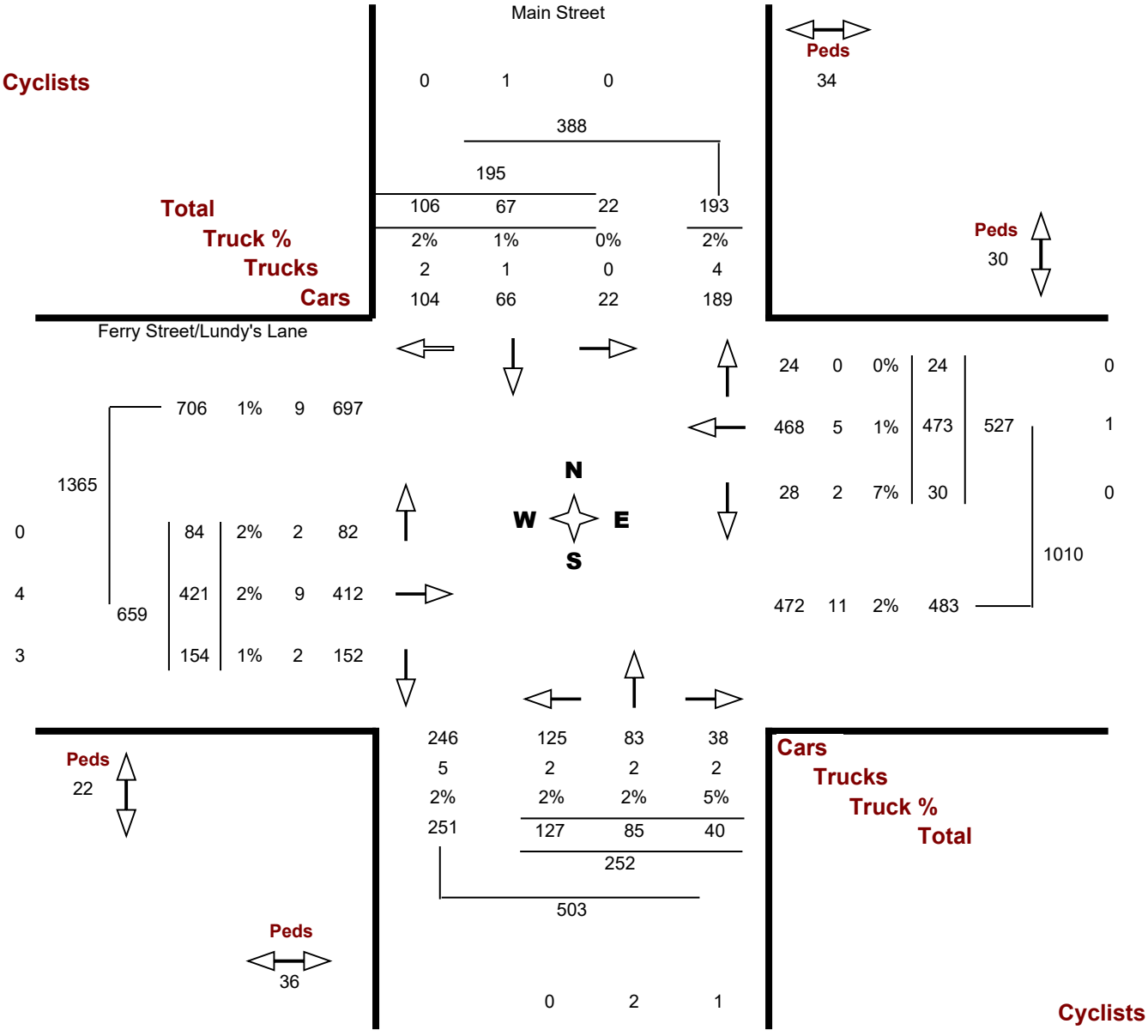
Location..... Ferry Street/Lundy's Lane @ Main Street
GeoID..... 01142
Municipality. NIAGARA FALLS
Count Date. Thursday, 11 August, 2022
Traffic Cont.
Count Time. 07:00 AM — 09:00 AM
Major Dir..... East west
Peak Hour.. 08:00 AM — 09:00 AM



Turning Movements Report - PM Period

Location..... Ferry Street/Lundy's Lane @ Main Street
Municipality. NIAGARA FALLS
Traffic Cont.
Major Dir..... East west

GeoID..... 01142
Count Date. Thursday, 11 August, 2022
Count Time. 03:00 PM — 06:00 PM
Peak Hour.. 03:00 PM — 04:00 PM



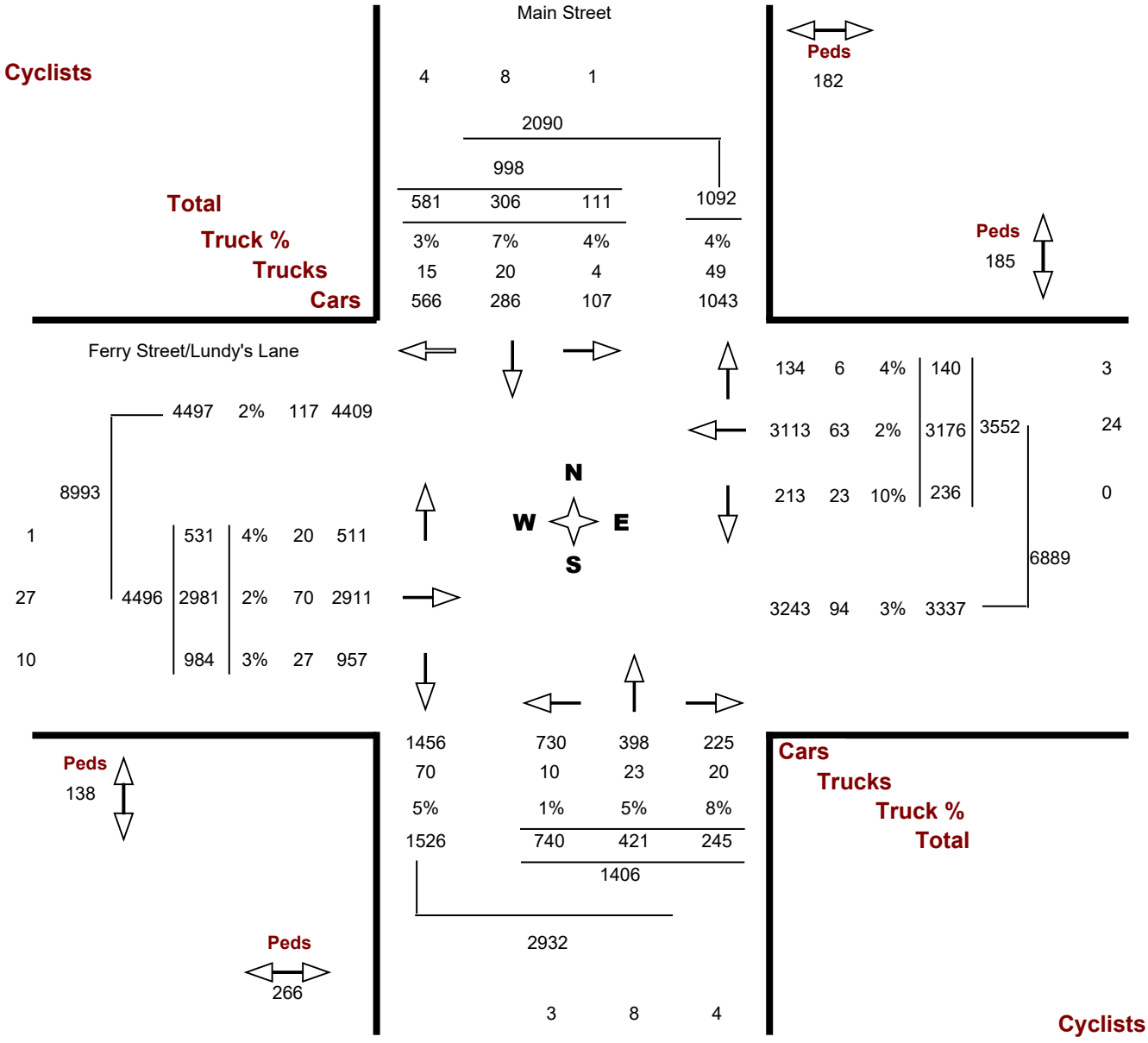
Turning Movement Count Report
Full Study

Location..... Ferry Street/Lundy's Lane @ Main Street

Municipality..... NIAGARA FALLS

GeoID..... 01142

Count Date..... Thursday, 11 August, 2022



Turning Movement Count - Details Report (15 min)

Location..... Ferry Street/Lundy's Lane @ Main Street

Municipality..... NIAGARA FALLS

Count Date..... Thursday, August 11, 2022

		Main Street										Ferry Street/Lundy's Lane									
		North Approach					South Approach					East Approach					West Approach				
Time Period		LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT
07:00	07:15	2	4	8	0	14	3	6	5	0	14	6	32	1	0	39	14	39	13	0	66
07:15	07:30	1	5	7	0	13	4	6	3	0	13	2	31	1	0	34	14	31	11	0	56
07:30	07:45	0	4	5	0	9	13	6	5	0	24	3	26	2	0	31	9	53	23	0	85
07:45	08:00	3	7	6	0	16	11	8	7	0	26	4	34	3	0	41	15	64	27	0	106
Hourly Total		6	20	26	0	52	31	26	20	0	77	15	123	7	0	145	52	187	74	0	313
08:00	08:15	0	8	10	0	18	10	5	4	0	19	1	47	4	0	52	10	60	24	0	94
08:15	08:30	3	6	3	0	12	12	6	6	0	24	8	51	1	0	60	12	62	31	0	105
08:30	08:45	0	9	11	0	20	15	10	5	0	30	9	51	4	0	64	10	77	23	0	110
08:45	09:00	2	7	17	0	26	16	7	9	0	32	6	69	3	0	78	22	71	25	0	118
Hourly Total		5	30	41	0	76	53	28	24	0	105	24	218	12	0	254	54	270	103	0	427
11:00	11:15	3	6	16	0	25	22	11	11	0	44	11	108	6	0	125	24	113	25	0	162
11:15	11:30	4	4	27	0	35	36	8	8	0	52	11	110	8	0	129	19	116	32	0	167
11:30	11:45	4	17	22	0	43	18	8	7	0	33	9	116	10	0	135	14	112	26	0	152
11:45	12:00	2	11	14	0	27	15	12	6	0	33	1	108	3	0	112	19	111	28	0	158
Hourly Total		13	38	79	0	130	91	39	32	0	162	32	442	27	0	501	76	452	111	0	639
12:00	12:15	4	11	13	0	28	21	15	9	0	45	8	116	2	0	126	19	95	42	0	156
12:15	12:30	11	9	24	0	44	28	9	5	0	42	8	121	5	0	134	13	97	33	0	143
12:30	12:45	3	7	22	0	32	24	10	11	0	45	10	128	5	0	143	19	102	24	0	145
12:45	13:00	6	8	15	0	29	16	14	11	0	41	5	105	5	0	115	18	121	35	0	174
Hourly Total		24	35	74	0	133	89	48	36	0	173	31	470	17	0	518	69	415	134	0	618
13:00	13:15	0	7	17	0	24	23	12	7	0	42	9	119	2	0	130	19	99	31	0	149
13:15	13:30	5	10	12	0	27	26	12	8	0	46	9	114	8	0	131	19	112	25	0	156
13:30	13:45	5	10	21	0	36	19	14	8	0	41	10	119	3	0	132	21	92	30	0	143
13:45	14:00	1	6	19	0	26	23	15	3	0	41	12	97	4	0	113	23	133	29	0	185
Hourly Total		11	33	69	0	113	91	53	26	0	170	40	449	17	0	506	82	436	115	0	633
15:00	15:15	6	19	25	0	50	38	20	9	0	67	10	114	6	0	130	29	117	33	0	179
15:15	15:30	8	14	30	0	52	30	20	11	0	61	8	127	5	0	140	19	101	32	0	152
15:30	15:45	5	18	35	0	58	31	25	9	0	65	5	115	6	0	126	16	110	42	0	168
15:45	16:00	3	16	16	0	35	28	20	11	0	59	7	117	7	0	131	20	93	47	0	160
Hourly Total		22	67	106	0	195	127	85	40	0	252	30	473	24	0	527	84	421	154	0	659
16:00	16:15	3	10	32	0	45	34	15	14	0	63	9	141	6	0	156	17	100	32	0	149

		Main Street										Ferry Street/Lundy's Lane									
		North Approach					South Approach					East Approach					West Approach				
Time Period		LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT
16:15	16:30	5	10	26	0	41	36	19	5	0	60	13	123	6	0	142	14	100	40	0	154
16:30	16:45	4	6	28	0	38	47	22	9	0	78	5	111	5	0	121	14	100	22	0	136
16:45	17:00	5	10	20	0	35	29	12	11	0	52	9	120	5	0	134	10	85	44	0	139
Hourly Total		17	36	106	0	159	146	68	39	0	253	36	495	22	0	553	55	385	138	0	578
17:00	17:15	1	11	24	0	36	23	23	11	0	57	6	133	5	0	144	10	98	38	0	146
17:15	17:30	5	10	18	0	33	32	17	4	0	53	6	138	4	0	148	13	99	37	0	149
17:30	17:45	3	8	23	0	34	21	23	8	0	52	6	127	1	0	134	15	103	41	0	159
17:45	18:00	4	18	15	0	37	36	11	5	0	52	10	108	4	0	122	21	115	39	0	175
Hourly Total		13	47	80	0	140	112	74	28	0	214	28	506	14	0	548	59	415	155	0	629
Grand Total		111	306	581	0	998	740	421	245	0	1406	236	3176	140	0	3552	531	2981	984	0	4496
Truck %		4%	7%	3%	0%	4%	1%	5%	8%	0%	4%	10%	2%	4%	0%	3%	4%	2%	3%	0%	3%

Signal Code: 020DRM

Intersection: RR20 (LUNDY'S LANE) & DRUMMOND RD.

Municipality: niagarafalls

Owner: region

Last Modified: 2021-10-12 12:26:44 PM

Timing Parameters	EBD & WBD THRU ADVANCE LUNDY'S LANE	EBD & WBD THRU LUNDY'S LANE	NBD & SBD ADVANCE DRUMMOND RD.	NBD & SBD THRU DRUMMOND RD.	n/a	n/a
Min Green	6	10	6	8	0	0
Walk	0	8	0	12	0	0
Ped Clearance	0	12	0	15	0	0
Vehicle Ext.	2.6	2.5	2.5	2.5	0	0
Max Green	10	35	10	36	0	0
Yellow	3	4.1	3	4.1	0	0
All Red	0	2.4	0	2.4	0	0

		Offset
Minimum Cycle	31	0
Pedestrian Cycle	60	
Maximum Cycle	110	72
Operation	FA	

Installed On:	2011-10-19
Count Date:	2015-07-07

FA = Fully Actuated SA = Semi Actuated FT = Fixed Time

Signal Code: 020MAN

Intersection: RR20 (FERRY ST.) & MAIN ST.

Municipality: niagarafalls

Owner: Region

Last Modified: 2021-10-12 12:43:19 PM

Timing Parameters	EBD & WBD ADVANCE LUNDYS LANE/FERRY ST.	EBD & WBD THRU LUNDYS LANE/FERRY ST.	NBD & SBD THRU MAIN ST.	n/a	n/a	n/a
Min Green	6	8	8	0	0	0
Walk	0	12	12	0	0	0
Ped Clearance	0	18	18	0	0	0
Vehicle Ext.	2.5	2.2	2.2	0	0	0
Max Green	12	35	30	0	0	0
Yellow	3	4	4	0	0	0
All Red	0	3	3	0	0	0

		Offset
Minimum Cycle	30	0
Pedestrian Cycle	74	
Maximum Cycle	100	51
Operation	FA	

Installed On:	2011-08-17
Count Date:	2009-08-05

FA = Fully Actuated SA = Semi Actuated FT = Fixed Time

Accident No.	Accident Date	Accident Year	Accident Time	Geo ID
21533	2020-03-08	2020	19:30	901247
2077261	2020-08-14	2020	21:10	901247
20106155	2020-10-31	2020	13:05	901247
20120258	2020-12-12	2020	06:23	901247
2196544	2021-08-28	2021	17:54	901247
2250851	2022-05-15	2022	12:01	23171
22106177	2022-09-16	2022	17:05	901247
22111993	2022-09-29	2022	18:20	901247
2315955	2023-02-15	2023	02:45	901247
9				

Location	Latitude	Longitude	Impact Location
Lundy's Lane btwn Bellevue Terrace & Lundys Lane/Drummond Road (901247)	43.089453	-79.097381	02 - Thru lane
Lundy's Lane btwn Bellevue Terrace & Lundys Lane/Drummond Road (901247)	43.089444	-79.097550	02 - Thru lane
Lundy's Lane btwn Bellevue Terrace & Lundys Lane/Drummond Road (901247)	43.089443	-79.097609	02 - Thru lane
Lundy's Lane btwn Bellevue Terrace & Lundys Lane/Drummond Road (901247)	43.089477	-79.096554	02 - Thru lane
Lundy's Lane btwn Bellevue Terrace & Lundys Lane/Drummond Road (901247)	43.089444	-79.097668	02 - Thru lane
Lundy's Lane btwn Hanan Avenue & Bellevue Terrace (23171)	43.089501	-79.095701	02 - Thru lane
Lundy's Lane btwn Bellevue Terrace & Lundys Lane/Drummond Road (901247)	43.089468	-79.096936	02 - Thru lane
Lundy's Lane btwn Bellevue Terrace & Lundys Lane/Drummond Road (901247)	43.089467	-79.096827	02 - Thru lane
Lundy's Lane btwn Bellevue Terrace & Lundys Lane/Drummond Road (901247)	43.089462	-79.097131	02 - Thru lane

Initial Impact Type	Traffic Control	Classification Of Accident	Collision Type	Cyclist Involved	Road Jurisdiction
03 - Rear end	10 - No control	04 - Non-reportable	PDO	FALSE	05 - Regional municipality
03 - Rear end	10 - No control	04 - Non-reportable	PDO	FALSE	05 - Regional municipality
02 - Angle	10 - No control	04 - Non-reportable	PDO	FALSE	05 - Regional municipality
04 - Sideswipe	10 - No control	03 - P.D. only	PDO	FALSE	05 - Regional municipality
03 - Rear end	10 - No control	03 - P.D. only	PDO	FALSE	05 - Regional municipality
04 - Sideswipe	10 - No control	03 - P.D. only	PDO	FALSE	05 - Regional municipality
02 - Angle	10 - No control	02 - Non-fatal injury	Injury	FALSE	05 - Regional municipality
03 - Rear end	10 - No control	03 - P.D. only	PDO	FALSE	05 - Regional municipality
04 - Sideswipe	10 - No control	03 - P.D. only	PDO	FALSE	05 - Regional municipality

Municipality	Environment Condition 1	Light	Pedestrian 1 Action	Apparent Driver 1 Action
NIAGARA FALLS	01 - Clear	07 - Dark		
NIAGARA FALLS	01 - Clear	07 - Dark		01 - Driving properly
NIAGARA FALLS	01 - Clear	01 - Daylight		01 - Driving properly
NIAGARA FALLS	01 - Clear	07 - Dark		06 - Improper turn
NIAGARA FALLS	01 - Clear	01 - Daylight		01 - Driving properly
NIAGARA FALLS	01 - Clear	01 - Daylight		12 - Improper lane change
NIAGARA FALLS	01 - Clear	01 - Daylight		06 - Improper turn
NIAGARA FALLS	01 - Clear	01 - Daylight		01 - Driving properly
NIAGARA FALLS	01 - Clear	08 - Dark, artificial		01 - Driving properly

Apparent Driver 2 Action
01 - Driving properly
01 - Driving properly
01 - Driving properly
01 - Driving properly
01 - Driving properly
01 - Driving properly

Appendix C

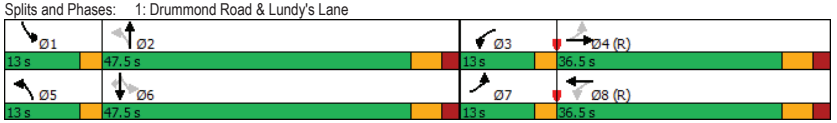
Base Year Traffic Operations

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	122	328	115	61	225	31	115	372	59	62	263	116
Future Volume (vph)	122	328	115	61	225	31	115	372	59	62	263	116
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	60.0		0.0	55.0		0.0	0.0		40.0	55.0		0.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00
Ped Bike Factor	0.98	0.97		0.96	0.99		0.99	1.00		0.99		0.96
Frt		0.961			0.982			0.980				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1554	3026	0	1583	3084	0	1599	3059	0	1630	1667	1403
Flt Permitted	0.491			0.396			0.453			0.455		
Satd. Flow (perm)	783	3026	0	637	3084	0	751	3059	0	772	1667	1353
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		45			14			19				122
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		156.1			67.9			167.8			223.0	
Travel Time (s)		11.2			4.9			12.1			16.1	
Confl. Peds. (#/hr)	23		31	31		23	20		20	20		20
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	7%	3%	2%	5%	5%	7%	4%	6%	6%	2%	5%	6%
Adj. Flow (vph)	128	345	121	64	237	33	121	392	62	65	277	122
Shared Lane Traffic (%)												
Lane Group Flow (vph)	128	466	0	64	270	0	121	454	0	65	277	122
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		6
Detector Phase	7	4		3	8		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	6.0	10.0		6.0	10.0		6.0	8.0		6.0	8.0	8.0
Minimum Split (s)	10.5	26.5		10.5	26.5		10.5	33.5		10.5	33.5	33.5
Total Split (s)	13.0	36.5		13.0	36.5		13.0	47.5		13.0	47.5	47.5
Total Split (%)	11.8%	33.2%		11.8%	33.2%		11.8%	43.2%		11.8%	43.2%	43.2%
Maximum Green (s)	10.0	30.0		10.0	30.0		10.0	41.0		10.0	41.0	41.0
Yellow Time (s)	3.0	4.1		3.0	4.1		3.0	4.1		3.0	4.1	4.1
All-Red Time (s)	0.0	2.4		0.0	2.4		0.0	2.4		0.0	2.4	2.4
Lost Time Adjust (s)	1.0	-2.5		1.0	-2.5		1.0	-2.5		1.0	-2.5	-2.5
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	2.6	2.5		2.6	2.5		2.5	2.5		2.5	2.5	2.5
Recall Mode	None	C-Max		None	C-Max		None	Max		None	Max	Max
Walk Time (s)		8.0			8.0			12.0			12.0	12.0
Flash Dont Walk (s)		12.0			12.0			15.0			15.0	15.0
Pedestrian Calls (#/hr)		0			0			0			0	0
Act Effct Green (s)	43.5	36.4		40.1	33.3		54.6	47.9		51.1	44.8	44.8
Actuated g/C Ratio	0.40	0.33		0.36	0.30		0.50	0.44		0.46	0.41	0.41
v/c Ratio	0.35	0.45		0.22	0.29		0.28	0.34		0.16	0.41	0.20
Control Delay	23.8	28.5		21.9	29.0		16.0	21.3		14.7	25.9	4.7
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	23.8	28.5		21.9	29.0		16.0	21.3		14.7	25.9	4.7
LOS	C	C		C	C		B	C		B	C	A
Approach Delay		27.5			27.6			20.1			18.7	
Approach LOS		C			C			C			B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 110			
Actuated Cycle Length: 110			
Offset: 72 (65%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green			
Natural Cycle: 85			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.45			
Intersection Signal Delay: 23.3		Intersection LOS: C	
Intersection Capacity Utilization 66.8%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 1: Drummond Road & Lundy's Lane



Queues
1: Drummond Road & Lundy's Lane

Base Year
AM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	128	466	64	270	121	454	65	277	122
v/c Ratio	0.35	0.45	0.22	0.29	0.28	0.34	0.16	0.41	0.20
Control Delay	23.8	28.5	21.9	29.0	16.0	21.3	14.7	25.9	4.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.8	28.5	21.9	29.0	16.0	21.3	14.7	25.9	4.7
Queue Length 50th (m)	18.1	39.9	8.7	23.3	13.8	34.3	7.2	44.2	0.0
Queue Length 95th (m)	31.8	57.7	17.7	35.1	24.5	49.4	14.6	68.7	11.6
Internal Link Dist (m)		132.1		43.9		143.8		199.0	
Turn Bay Length (m)	60.0		55.0				55.0		
Base Capacity (vph)	373	1032	322	942	445	1343	447	678	622
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.34	0.45	0.20	0.29	0.27	0.34	0.15	0.41	0.20

Intersection Summary

HCM Signalized Intersection Capacity Analysis
1: Drummond Road & Lundy's Lane

Base Year
AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	122	328	115	61	225	31	115	372	59	62	263	116
Future Volume (vph)	122	328	115	61	225	31	115	372	59	62	263	116
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.97		1.00	0.99		1.00	1.00		1.00	1.00	0.96
Flpb, ped/bikes	0.99	1.00		0.99	1.00		0.99	1.00		0.99	1.00	1.00
Frt	1.00	0.96		1.00	0.98		1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1537	3027		1561	3083		1589	3057		1621	1667	1353
Flt Permitted	0.49	1.00		0.40	1.00		0.45	1.00		0.45	1.00	1.00
Satd. Flow (perm)	794	3027		651	3083		758	3057		776	1667	1353
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	128	345	121	64	237	33	121	392	62	65	277	122
RTOR Reduction (vph)	0	31	0	0	10	0	0	11	0	0	0	72
Lane Group Flow (vph)	128	435	0	64	260	0	121	443	0	65	277	50
Confl. Peds. (#/hr)	23		31	31		23	20		20	20		20
Heavy Vehicles (%)	7%	3%	2%	5%	5%	7%	4%	6%	6%	2%	5%	6%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	41.9	32.7		36.9	30.2		54.1	45.4		49.1	42.9	42.9
Effective Green, g (s)	39.9	35.2		34.9	32.7		52.1	47.9		47.1	45.4	45.4
Actuated g/C Ratio	0.36	0.32		0.32	0.30		0.47	0.44		0.43	0.41	0.41
Clearance Time (s)	3.0	6.5		3.0	6.5		3.0	6.5		3.0	6.5	6.5
Vehicle Extension (s)	2.6	2.5		2.6	2.5		2.5	2.5		2.5	2.5	2.5
Lane Grp Cap (vph)	343	968		253	916		417	1331		372	688	558
v/s Ratio Prot	c0.03	c0.14		0.01	0.08		c0.02	0.14		0.01	c0.17	
v/s Ratio Perm	0.11			0.07			0.12			0.07		0.04
v/c Ratio	0.37	0.45		0.25	0.28		0.29	0.33		0.17	0.40	0.09
Uniform Delay, d1	24.5	29.7		26.9	29.7		17.0	20.5		18.8	22.7	19.7
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.5	1.5		0.4	0.8		0.3	0.7		0.2	1.8	0.3
Delay (s)	25.0	31.2		27.3	30.4		17.3	21.2		18.9	24.5	20.0
Level of Service	C	C		C	C		B	C		B	C	C
Approach Delay (s)		29.9			29.8			20.4			22.5	
Approach LOS		C			C			C			C	

Intersection Summary					
HCM 2000 Control Delay	25.4	HCM 2000 Level of Service	C		
HCM 2000 Volume to Capacity ratio	0.42				
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.0		
Intersection Capacity Utilization	66.8%	ICU Level of Service	C		
Analysis Period (min)	15				

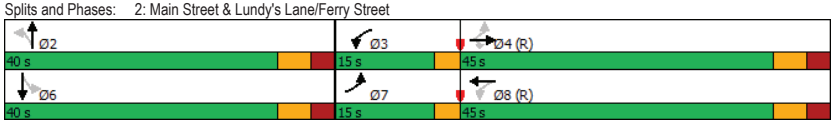
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	55	275	105	24	222	12	54	29	24	5	31	42
Future Volume (vph)	55	275	105	24	222	12	54	29	24	5	31	42
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	45.0		0.0	25.0		0.0	10.0		0.0	25.0		0.0
Storage Lanes	1		1	1		0	1		0	1		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	0.99		0.92	0.96	1.00			0.99		0.99	0.98	
Frt			0.850		0.992			0.932			0.914	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1599	1683	1458	1471	1626	0	1630	1465	0	1385	1489	0
Flt Permitted	0.493			0.496			0.702			0.717		
Satd. Flow (perm)	820	1683	1336	741	1626	0	1204	1465	0	1033	1489	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			124		3			28			49	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		344.7			143.8			206.1			169.2	
Travel Time (s)		24.8			10.4			14.8			12.2	
Confl. Peds. (#/hr)	11		39	39		11			8	8		21
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Heavy Vehicles (%)	4%	4%	2%	13%	6%	17%	2%	11%	8%	20%	10%	2%
Adj. Flow (vph)	65	324	124	28	261	14	64	34	28	6	36	49
Shared Lane Traffic (%)												
Lane Group Flow (vph)	65	324	124	28	275	0	64	62	0	6	85	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4		4	8			2			6		
Detector Phase	7	4	4	3	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	6.0	8.0	8.0	6.0	8.0		8.0	8.0		8.0	8.0	
Minimum Split (s)	10.5	37.0	37.0	10.5	37.0		37.0	37.0		37.0	37.0	
Total Split (s)	15.0	45.0	45.0	15.0	45.0		40.0	40.0		40.0	40.0	
Total Split (%)	15.0%	45.0%	45.0%	15.0%	45.0%		40.0%	40.0%		40.0%	40.0%	
Maximum Green (s)	12.0	38.0	38.0	12.0	38.0		33.0	33.0		33.0	33.0	
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	0.0	3.0	3.0	0.0	3.0		3.0	3.0		3.0	3.0	
Lost Time Adjust (s)	1.0	-3.0	-3.0	1.0	-3.0		-3.0	-3.0		-3.0	-3.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	2.5	2.2	2.2	2.5	2.2		2.2	2.2		2.2	2.2	
Recall Mode	None	C-Max	C-Max	None	C-Max		Max	Max		Max	Max	
Walk Time (s)		12.0	12.0		12.0		12.0	12.0		12.0	12.0	
Flash Dont Walk (s)		18.0	18.0		18.0		18.0	18.0		18.0	18.0	
Pedestrian Calls (#/hr)		0	0		0		0	0		0	0	
Act Effct Green (s)	54.3	50.3	50.3	52.0	47.8		36.0	36.0		36.0	36.0	
Actuated g/C Ratio	0.54	0.50	0.50	0.52	0.48		0.36	0.36		0.36	0.36	
v/c Ratio	0.13	0.38	0.17	0.07	0.35		0.15	0.11		0.02	0.15	
Control Delay	10.9	18.0	3.5	10.5	18.8		22.9	14.1		21.0	11.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	10.9	18.0	3.5	10.5	18.8		22.9	14.1		21.0	11.5	
LOS	B	B	A	B	B		C	B		C	B	
Approach Delay		13.6			18.0			18.6			12.2	
Approach LOS		B			B			B			B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 6 (6%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green			
Natural Cycle: 85			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.38			
Intersection Signal Delay: 15.4		Intersection LOS: B	
Intersection Capacity Utilization 65.0%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 2: Main Street & Lundy's Lane/Ferry Street



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	65	324	124	28	275	64	62	6	85
v/c Ratio	0.13	0.38	0.17	0.07	0.35	0.15	0.11	0.02	0.15
Control Delay	10.9	18.0	3.5	10.5	18.8	22.9	14.1	21.0	11.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.9	18.0	3.5	10.5	18.8	22.9	14.1	21.0	11.5
Queue Length 50th (m)	5.7	41.9	0.0	2.4	34.8	8.7	4.5	0.8	4.8
Queue Length 95th (m)	11.3	61.2	8.5	6.0	53.0	17.5	12.5	3.5	14.0
Internal Link Dist (m)		320.7			119.8		182.1		145.2
Turn Bay Length (m)	45.0			25.0		10.0		25.0	
Base Capacity (vph)	544	846	733	494	777	433	545	371	567
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.12	0.38	0.17	0.06	0.35	0.15	0.11	0.02	0.15

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	55	275	105	24	222	12	54	29	24	5	31	42
Future Volume (vph)	55	275	105	24	222	12	54	29	24	5	31	42
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.92	1.00	1.00		1.00	0.99		1.00	0.98	
Flpb, ped/bikes	0.99	1.00	1.00	0.98	1.00		1.00	1.00		0.99	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.93		1.00	0.91	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1590	1683	1336	1445	1627		1630	1466		1368	1488	
Flt Permitted	0.49	1.00	1.00	0.50	1.00		0.70	1.00		0.72	1.00	
Satd. Flow (perm)	826	1683	1336	754	1627		1204	1466		1032	1488	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	65	324	124	28	261	14	64	34	28	6	36	49
RTOR Reduction (vph)	0	0	63	0	2	0	0	18	0	0	31	0
Lane Group Flow (vph)	65	324	61	28	273	0	64	44	0	6	54	0
Confl. Peds. (#/hr)	11		39	39		11			8	8		21
Heavy Vehicles (%)	4%	4%	2%	13%	6%	17%	2%	11%	8%	20%	10%	2%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	51.9	46.1	46.1	48.1	44.2		33.0	33.0		33.0	33.0	
Effective Green, g (s)	49.9	49.1	49.1	46.1	47.2		36.0	36.0		36.0	36.0	
Actuated g/C Ratio	0.50	0.49	0.49	0.46	0.47		0.36	0.36		0.36	0.36	
Clearance Time (s)	3.0	7.0	7.0	3.0	7.0		7.0	7.0		7.0	7.0	
Vehicle Extension (s)	2.5	2.2	2.2	2.5	2.2		2.2	2.2		2.2	2.2	
Lane Grp Cap (vph)	448	826	655	367	767		433	527		371	535	
v/s Ratio Prot	c0.01	c0.19		0.00	0.17			0.03			0.04	
v/s Ratio Perm	0.07		0.05	0.03			c0.05			0.01		
v/c Ratio	0.15	0.39	0.09	0.08	0.36		0.15	0.08		0.02	0.10	
Uniform Delay, d1	13.4	16.0	13.6	15.0	16.8		21.6	21.1		20.6	21.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	1.4	0.3	0.1	1.3		0.7	0.3		0.1	0.4	
Delay (s)	13.5	17.4	13.9	15.0	18.1		22.4	21.4		20.7	21.6	
Level of Service	B	B	B	B	B		C	C		C	C	
Approach Delay (s)		16.1			17.8			21.9			21.6	
Approach LOS		B			B			C			C	

Intersection Summary				
HCM 2000 Control Delay	17.8	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.29			
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	65.0%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	449	317	0	0	0
Future Volume (vph)	0	449	317	0	0	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	0.95	0.95	0.95	0.95	1.00	1.00
Frt						
Flt Protected						
Satd. Flow (prot)	0	3228	3167	0	1716	0
Flt Permitted						
Satd. Flow (perm)	0	3228	3167	0	1716	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		67.9	344.7		104.5	
Travel Time (s)		4.9	24.8		7.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	3%	5%	2%	2%	2%
Adj. Flow (vph)	0	488	345	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	488	345	0	0	0
Enter Blocked Intersection	No	No	Yes	Yes	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.6	3.6		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	16.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	449	317	0	0	0
Future Volume (Veh/h)	0	449	317	0	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	488	345	0	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		68	345			
pX, platoon unblocked					0.91	
vC, conflicting volume	345				589	172
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	345				348	172
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	1211				566	841

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	163	325	230	115	0
Volume Left	0	0	0	0	0
Volume Right	0	0	0	0	0
cSH	1211	1700	1700	1700	1700
Volume to Capacity	0.00	0.19	0.14	0.07	0.00
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0
Lane LOS					A
Approach Delay (s)	0.0		0.0		0.0
Approach LOS					A

Intersection Summary				
Average Delay		0.0		
Intersection Capacity Utilization		16.8%	ICU Level of Service	A
Analysis Period (min)		15		

Intersection: 1: Drummond Road & Lundy's Lane

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	T	TR	L	T	R
Maximum Queue (m)	43.4	61.1	52.4	37.7	38.4	42.0	35.2	91.6	47.5	48.0	82.0	23.6
Average Queue (m)	17.3	31.1	27.6	13.6	18.3	21.5	16.3	42.1	21.8	12.0	37.3	10.4
95th Queue (m)	33.4	50.8	50.6	27.4	33.7	36.3	28.1	72.6	50.5	32.0	65.0	20.9
Link Distance (m)		142.0	142.0		47.5	47.5	153.8	153.8			209.0	209.0
Upstream Blk Time (%)				0	0	0						
Queuing Penalty (veh)				0	0	0						
Storage Bay Dist (m)	60.0			55.0					40.0	55.0		
Storage Blk Time (%)	0	0		0	0			9	1	0	2	
Queuing Penalty (veh)	0	0		0	0			21	1	0	1	

Intersection: 2: Main Street & Lundy's Lane/Ferry Street

Movement	EB	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	TR	L	TR	L	TR
Maximum Queue (m)	45.4	82.8	24.0	28.7	54.0	17.8	31.7	9.7	27.8
Average Queue (m)	8.8	29.3	7.1	5.4	23.0	9.5	9.7	0.9	10.3
95th Queue (m)	27.4	65.5	16.9	18.7	45.8	19.1	22.9	5.9	21.3
Link Distance (m)		321.7	321.7		131.6		193.1		153.4
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (m)	45.0			25.0		10.0		25.0	
Storage Blk Time (%)		5		0	6	24	15		1
Queuing Penalty (veh)		2		0	2	13	8		0

Intersection: 3: Lundy's Lane & Site Access

Movement
Directions Served
Maximum Queue (m)
Average Queue (m)
95th Queue (m)
Link Distance (m)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (m)
Storage Blk Time (%)
Queuing Penalty (veh)

Network Summary

Network wide Queuing Penalty: 49

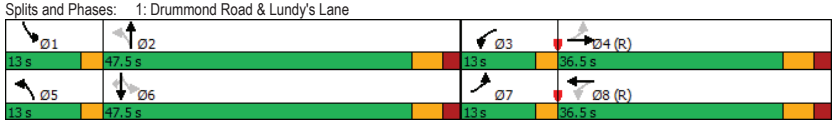
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	165	361	177	104	563	31	144	363	78	54	486	214
Future Volume (vph)	165	361	177	104	563	31	144	363	78	54	486	214
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	60.0		0.0	55.0		0.0	0.0		40.0	55.0		0.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00
Ped Bike Factor	0.98	0.91		0.92	1.00		1.00	0.99		0.99		0.99
Frt		0.951			0.992			0.974				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1646	2846	0	1662	3256	0	1662	3170	0	1630	1733	1488
Flt Permitted	0.219			0.286			0.213			0.461		
Satd. Flow (perm)	374	2846	0	459	3256	0	373	3170	0	782	1733	1468
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		77			5			27				223
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		156.1			67.9			167.8			223.0	
Travel Time (s)		11.2			4.9			12.1			16.1	
Confl. Peds. (#/hr)	33		92	92		33	1		20	20		1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	1%	1%	2%	0%	1%	0%	0%	1%	4%	2%	1%	0%
Adj. Flow (vph)	172	376	184	108	586	32	150	378	81	56	506	223
Shared Lane Traffic (%)												
Lane Group Flow (vph)	172	560	0	108	618	0	150	459	0	56	506	223
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		6
Detector Phase	7	4		3	8		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	6.0	10.0		6.0	10.0		6.0	8.0		6.0	8.0	8.0
Minimum Split (s)	10.5	26.5		10.5	26.5		10.5	33.5		10.5	33.5	33.5
Total Split (s)	13.0	36.5		13.0	36.5		13.0	47.5		13.0	47.5	47.5
Total Split (%)	11.8%	33.2%		11.8%	33.2%		11.8%	43.2%		11.8%	43.2%	43.2%
Maximum Green (s)	10.0	30.0		10.0	30.0		10.0	41.0		10.0	41.0	41.0
Yellow Time (s)	3.0	4.1		3.0	4.1		3.0	4.1		3.0	4.1	4.1
All-Red Time (s)	0.0	2.4		0.0	2.4		0.0	2.4		0.0	2.4	2.4
Lost Time Adjust (s)	1.0	-2.5		1.0	-2.5		1.0	-2.5		1.0	-2.5	-2.5
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	2.6	2.5		2.6	2.5		2.5	2.5		2.5	2.5	2.5
Recall Mode	None	C-Max		None	C-Max		None	Max		None	Max	Max
Walk Time (s)		8.0			8.0			12.0			12.0	12.0
Flash Dont Walk (s)		12.0			12.0			15.0			15.0	15.0
Pedestrian Calls (#/hr)		0			0			0			0	0
Act Effct Green (s)	42.4	33.7		40.6	32.8		55.2	48.2		50.4	44.3	44.3
Actuated g/C Ratio	0.39	0.31		0.37	0.30		0.50	0.44		0.46	0.40	0.40
v/c Ratio	0.70	0.61		0.43	0.63		0.53	0.33		0.14	0.72	0.31
Control Delay	39.0	31.3		25.8	36.7		21.6	20.5		14.6	35.2	4.1
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	39.0	31.3		25.8	36.7		21.6	20.5		14.6	35.2	4.1
LOS	D	C		C	D		C	C		B	D	A
Approach Delay		33.1			35.1			20.8			24.9	
Approach LOS		C			D			C			C	

Intersection Summary

Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 72 (65%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
Natural Cycle: 85
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.72
Intersection Signal Delay: 28.7 Intersection LOS: C
Intersection Capacity Utilization 77.8% ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 1: Drummond Road & Lundy's Lane



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	172	560	108	618	150	459	56	506	223
v/c Ratio	0.70	0.61	0.43	0.63	0.53	0.33	0.14	0.72	0.31
Control Delay	39.0	31.3	25.8	36.7	21.6	20.5	14.6	35.2	4.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	39.0	31.3	25.8	36.7	21.6	20.5	14.6	35.2	4.1
Queue Length 50th (m)	25.0	49.2	15.0	63.2	17.4	33.7	6.1	96.1	0.0
Queue Length 95th (m)	#46.8	69.1	27.1	83.3	29.5	48.3	12.8	138.6	15.2
Internal Link Dist (m)		132.1		43.9		143.8		199.0	
Turn Bay Length (m)	60.0		55.0				55.0		
Base Capacity (vph)	249	925	272	974	293	1404	448	698	724
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.69	0.61	0.40	0.63	0.51	0.33	0.13	0.72	0.31

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis
1: Drummond Road & Lundy's Lane

Base Year
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	165	361	177	104	563	31	144	363	78	54	486	214
Future Volume (vph)	165	361	177	104	563	31	144	363	78	54	486	214
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.91		1.00	1.00		1.00	0.99		1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00		0.98	1.00		1.00	1.00		0.99	1.00	1.00
Frt	1.00	0.95		1.00	0.99		1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1642	2845		1627	3257		1662	3168		1621	1733	1468
Flt Permitted	0.22	1.00		0.29	1.00		0.21	1.00		0.46	1.00	1.00
Satd. Flow (perm)	379	2845		489	3257		373	3168		786	1733	1468
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	172	376	184	108	586	32	150	378	81	56	506	223
RTOR Reduction (vph)	0	54	0	0	4	0	0	15	0	0	0	132
Lane Group Flow (vph)	172	506	0	108	614	0	150	444	0	56	506	91
Confl. Peds. (#/hr)	33		92	92		33	1		20	20		1
Heavy Vehicles (%)	1%	1%	2%	0%	1%	0%	0%	1%	4%	2%	1%	0%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	40.3	30.6		38.5	29.7		54.6	45.7		48.3	42.4	42.4
Effective Green, g (s)	38.3	33.1		36.5	32.2		52.9	48.2		46.3	44.9	44.9
Actuated g/C Ratio	0.35	0.30		0.33	0.29		0.48	0.44		0.42	0.41	0.41
Clearance Time (s)	3.0	6.5		3.0	6.5		3.0	6.5		3.0	6.5	6.5
Vehicle Extension (s)	2.6	2.5		2.6	2.5		2.5	2.5		2.5	2.5	2.5
Lane Grp Cap (vph)	231	856		242	953		275	1388		368	707	599
v/s Ratio Prot	c0.06	0.18		0.03	0.19		c0.04	0.14		0.01	c0.29	
v/s Ratio Perm	c0.20			0.12			0.22			0.06		0.06
v/c Ratio	0.74	0.59		0.45	0.64		0.55	0.32		0.15	0.72	0.15
Uniform Delay, d1	27.3	32.7		26.8	33.9		19.7	20.2		19.1	27.2	20.5
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	11.8	3.0		1.0	3.4		1.7	0.6		0.1	6.1	0.5
Delay (s)	39.0	35.7		27.9	37.3		21.4	20.8		19.3	33.3	21.1
Level of Service	D	D		C	D		C	C		B	C	C
Approach Delay (s)		36.5			35.9			21.0			28.8	
Approach LOS		D			D			C			C	

Intersection Summary				
HCM 2000 Control Delay	30.9	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.69			
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	77.8%	ICU Level of Service	D	
Analysis Period (min)	15			

c Critical Lane Group

Lanes, Volumes, Timings
2: Main Street & Lundy's Lane/Ferry Street

Base Year
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	86	429	157	31	482	24	130	87	41	22	68	108
Future Volume (vph)	86	429	157	31	482	24	130	87	41	22	68	108
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	45.0		0.0	25.0		0.0	10.0		0.0	25.0		0.0
Storage Lanes	1		1	1		0	1		0	1		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	0.98		0.92	0.98	1.00		0.98	0.98		0.96	0.98	
Frt			0.850		0.993			0.952			0.908	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1630	1716	1473	1554	1715	0	1630	1582	0	1662	1532	0
Flt Permitted	0.253			0.383			0.583			0.650		
Satd. Flow (perm)	426	1716	1357	611	1715	0	984	1582	0	1091	1532	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			164		3			27			90	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		344.7			143.8			206.1			169.2	
Travel Time (s)		24.8			10.4			14.8			12.2	
Confl. Peds. (#/hr)	34		36	36		34	22		30	30		22
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	2%	2%	1%	7%	1%	0%	2%	2%	5%	0%	1%	2%
Adj. Flow (vph)	90	447	164	32	502	25	135	91	43	23	71	113
Shared Lane Traffic (%)												
Lane Group Flow (vph)	90	447	164	32	527	0	135	134	0	23	184	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lanes, Volumes, Timings
2: Main Street & Lundy's Lane/Ferry Street

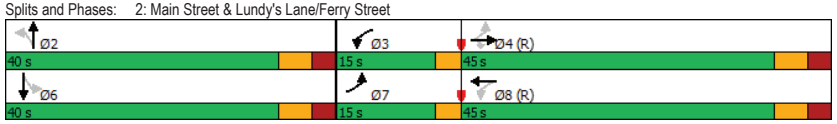
Base Year
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4		4	8			2			6		
Detector Phase	7	4	4	3	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	6.0	8.0	8.0	6.0	8.0		8.0	8.0		8.0	8.0	
Minimum Split (s)	10.5	37.0	37.0	10.5	37.0		37.0	37.0		37.0	37.0	
Total Split (s)	15.0	45.0	45.0	15.0	45.0		40.0	40.0		40.0	40.0	
Total Split (%)	15.0%	45.0%	45.0%	15.0%	45.0%		40.0%	40.0%		40.0%	40.0%	
Maximum Green (s)	12.0	38.0	38.0	12.0	38.0		33.0	33.0		33.0	33.0	
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	0.0	3.0	3.0	0.0	3.0		3.0	3.0		3.0	3.0	
Lost Time Adjust (s)	1.0	-3.0	-3.0	1.0	-3.0		-3.0	-3.0		-3.0	-3.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	2.5	2.2	2.2	2.5	2.2		2.2	2.2		2.2	2.2	
Recall Mode	None	C-Max	C-Max	None	C-Max		Max	Max		Max	Max	
Walk Time (s)		12.0	12.0		12.0		12.0	12.0		12.0	12.0	
Flash Dont Walk (s)		18.0	18.0		18.0		18.0	18.0		18.0	18.0	
Pedestrian Calls (#/hr)		0	0		0		0	0		0	0	
Act Effct Green (s)	54.8	50.3	50.3	51.5	47.1		36.0	36.0		36.0	36.0	
Actuated g/C Ratio	0.55	0.50	0.50	0.52	0.47		0.36	0.36		0.36	0.36	
v/c Ratio	0.29	0.52	0.21	0.09	0.65		0.38	0.23		0.06	0.30	
Control Delay	12.7	20.5	3.3	10.7	25.8		27.7	18.9		21.6	13.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	12.7	20.5	3.3	10.7	25.8		27.7	18.9		21.6	13.2	
LOS	B	C	A	B	C		C	B		C	B	
Approach Delay		15.5			25.0			23.3			14.1	
Approach LOS		B			C			C			B	

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 6 (6%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
Natural Cycle: 85
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.65
Intersection Signal Delay: 19.6 Intersection LOS: B
Intersection Capacity Utilization 80.6% ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 2: Main Street & Lundy's Lane/Ferry Street



Queues
2: Main Street & Lundy's Lane/Ferry Street

Base Year
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	90	447	164	32	527	135	134	23	184
v/c Ratio	0.29	0.52	0.21	0.09	0.65	0.38	0.23	0.06	0.30
Control Delay	12.7	20.5	3.3	10.7	25.8	27.7	18.9	21.6	13.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.7	20.5	3.3	10.7	25.8	27.7	18.9	21.6	13.2
Queue Length 50th (m)	8.1	63.1	0.0	2.8	81.5	20.2	14.8	3.0	12.9
Queue Length 95th (m)	15.6	96.3	11.2	7.0	126.3	37.6	29.0	8.6	29.6
Internal Link Dist (m)		320.7			119.8		182.1		145.2
Turn Bay Length (m)	45.0			25.0		10.0		25.0	
Base Capacity (vph)	371	862	763	442	809	354	586	392	609
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.24	0.52	0.21	0.07	0.65	0.38	0.23	0.06	0.30

Intersection Summary

HCM Signalized Intersection Capacity Analysis
2: Main Street & Lundy's Lane/Ferry Street

Base Year
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	86	429	157	31	482	24	130	87	41	22	68	108
Future Volume (vph)	86	429	157	31	482	24	130	87	41	22	68	108
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.92	1.00	1.00		1.00	0.98		1.00	0.98	
Flpb, ped/bikes	1.00	1.00	1.00	0.99	1.00		0.98	1.00		0.96	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.95		1.00	0.91	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1624	1716	1357	1539	1715		1604	1582		1595	1531	
Flt Permitted	0.25	1.00	1.00	0.38	1.00		0.58	1.00		0.65	1.00	
Satd. Flow (perm)	432	1716	1357	621	1715		984	1582		1091	1531	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	90	447	164	32	502	25	135	91	43	23	71	112
RTOR Reduction (vph)	0	0	83	0	2	0	0	17	0	0	58	0
Lane Group Flow (vph)	90	447	81	32	525	0	135	117	0	23	126	0
Confl. Peds. (#/hr)	34		36	36		34	22		30	30		22
Heavy Vehicles (%)	2%	2%	1%	7%	1%	0%	2%	2%	5%	0%	1%	2%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	52.6	46.1	46.1	47.4	43.5		33.0	33.0		33.0	33.0	
Effective Green, g (s)	50.6	49.1	49.1	45.4	46.5		36.0	36.0		36.0	36.0	
Actuated g/C Ratio	0.51	0.49	0.49	0.45	0.46		0.36	0.36		0.36	0.36	
Clearance Time (s)	3.0	7.0	7.0	3.0	7.0		7.0	7.0		7.0	7.0	
Vehicle Extension (s)	2.5	2.2	2.2	2.5	2.2		2.2	2.2		2.2	2.2	
Lane Grp Cap (vph)	284	842	666	308	797		354	569		392	551	
v/s Ratio Prot	c0.02	0.26		0.00	c0.31			0.07			0.08	
v/s Ratio Perm	0.14		0.06	0.04			c0.14			0.02		
v/c Ratio	0.32	0.53	0.12	0.10	0.66		0.38	0.21		0.06	0.23	
Uniform Delay, d1	15.3	17.5	13.8	15.8	20.6		23.7	22.1		20.9	22.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.5	2.4	0.4	0.1	4.3		3.1	0.8		0.3	1.0	
Delay (s)	15.8	19.9	14.1	15.9	24.9		26.8	22.9		21.2	23.3	
Level of Service	B	B	B	B	C		C	C		C	C	
Approach Delay (s)		18.0			24.4			24.9			23.1	
Approach LOS		B			C			C			C	

Intersection Summary				
HCM 2000 Control Delay	21.7	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.52			
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	80.6%	ICU Level of Service	D	
Analysis Period (min)	15			

c Critical Lane Group

Lanes, Volumes, Timings
3: Lundy's Lane & Site Access

Base Year
PM Peak Hour

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	493	698	0	0	0
Future Volume (vph)	0	493	698	0	0	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	0.95	0.95	0.95	0.95	1.00	1.00
Frt						
Flt Protected						
Satd. Flow (prot)	0	3292	3292	0	1716	0
Flt Permitted						
Satd. Flow (perm)	0	3292	3292	0	1716	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		67.9	344.7		104.5	
Travel Time (s)		4.9	24.8		7.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	1%	1%	2%	2%	2%
Adj. Flow (vph)	0	536	759	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	536	759	0	0	0
Enter Blocked Intersection	No	No	Yes	Yes	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.6	3.6		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	24.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	493	698	0	0	0
Future Volume (Veh/h)	0	493	698	0	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	536	759	0	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		68	345			
pX, platoon unblocked						
vC, conflicting volume	759				1027	380
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	759				1027	380
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	848				230	618

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	179	357	506	253	0
Volume Left	0	0	0	0	0
Volume Right	0	0	0	0	0
cSH	848	1700	1700	1700	1700
Volume to Capacity	0.00	0.21	0.30	0.15	0.00
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0
Lane LOS					A
Approach Delay (s)	0.0		0.0		0.0
Approach LOS					A

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	24.3%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection: 1: Drummond Road & Lundy's Lane

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	T	TR	L	T	R
Maximum Queue (m)	63.5	76.5	75.3	47.4	69.6	69.4	49.6	78.5	47.5	62.4	123.1	40.1
Average Queue (m)	27.8	40.0	38.8	23.8	47.2	50.4	22.3	40.6	22.8	15.5	72.2	17.9
95th Queue (m)	53.0	63.4	66.7	47.6	70.5	72.4	39.9	67.4	51.6	48.2	114.9	31.7
Link Distance (m)		142.0	142.0		47.5	47.5	153.8	153.8			209.0	209.0
Upstream Blk Time (%)				0	9	14						
Queuing Penalty (veh)				0	31	50						
Storage Bay Dist (m)	60.0			55.0					40.0	55.0		
Storage Blk Time (%)	0	1		0	9			8	1	0	19	
Queuing Penalty (veh)	1	2		0	9			21	1	0	10	

Intersection: 2: Main Street & Lundy's Lane/Ferry Street

Movement	EB	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	TR	L	TR	L	TR
Maximum Queue (m)	52.4	112.3	27.7	32.3	126.3	18.6	72.2	24.6	49.4
Average Queue (m)	16.8	47.5	10.4	6.9	60.2	15.4	27.0	5.5	20.3
95th Queue (m)	42.2	94.4	21.2	21.4	107.8	20.1	55.6	16.3	39.2
Link Distance (m)		321.7	321.7		131.6		193.1		153.4
Upstream Blk Time (%)					1				
Queuing Penalty (veh)					0				
Storage Bay Dist (m)	45.0			25.0		10.0		25.0	
Storage Blk Time (%)	0	10		0	29	46	32	0	6
Queuing Penalty (veh)	0	8		1	9	59	42	0	1

Intersection: 3: Lundy's Lane & Site Access

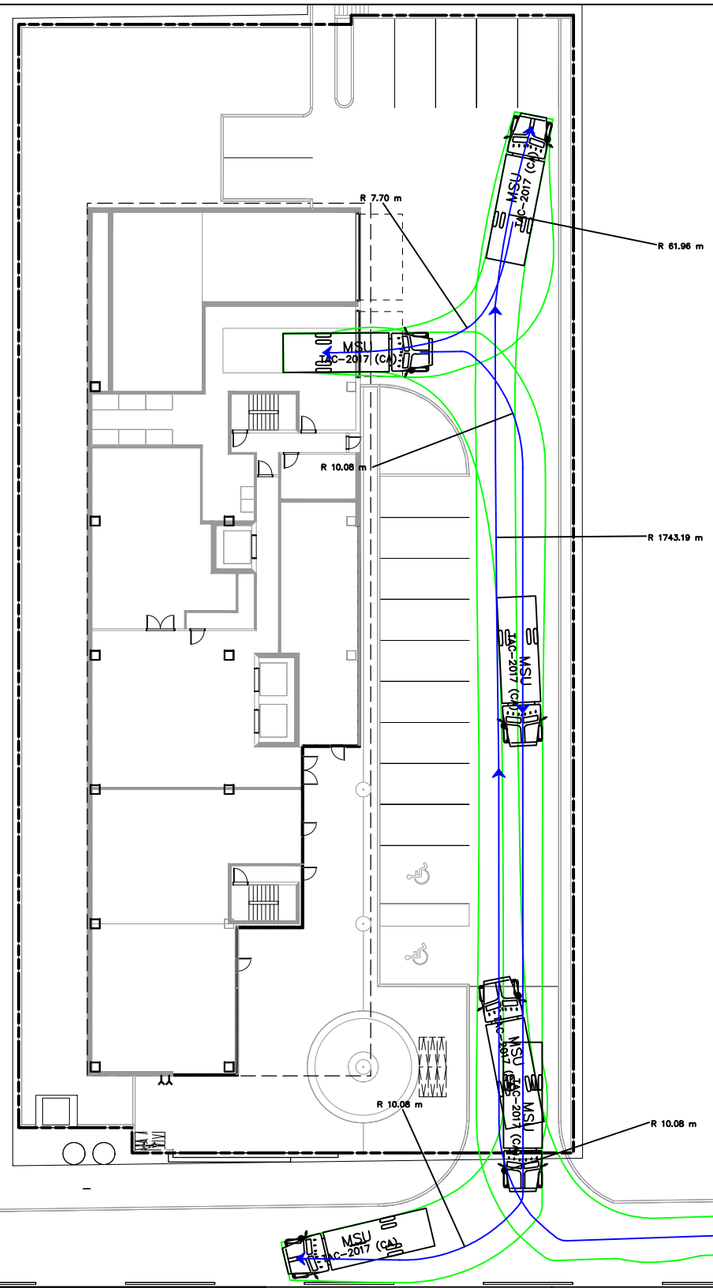
Movement	WB	WB
Directions Served	T	TR
Maximum Queue (m)	18.8	19.6
Average Queue (m)	1.5	2.0
95th Queue (m)	9.2	11.0
Link Distance (m)	321.7	321.7
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 245

Appendix D

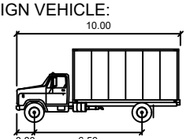
Vehicle Turning Movement Diagrams



THIS AUTOTURN SWEPT PATH ANALYSIS HAS BEEN PREPARED USING BASE PLANS PROVIDED BY OTHERS. THE PRACTITIONER HAS NOT INSPECTED THE ACCURACY AND/OR THE COMPLETENESS OF THESE BASE PLANS AND SHALL NOT BE RESPONSIBLE FOR ANY ERRORS OR OMISSIONS WHICH MAY BE INCORPORATED HEREIN AS A RESULT.

NO.	DATE	INITIAL	REVISION DETAIL
2	2023-10-19	SC	UPDATED SITE PLAN
1	2023-10-19	SC	UPDATED SITE PLAN

DESIGN VEHICLE:



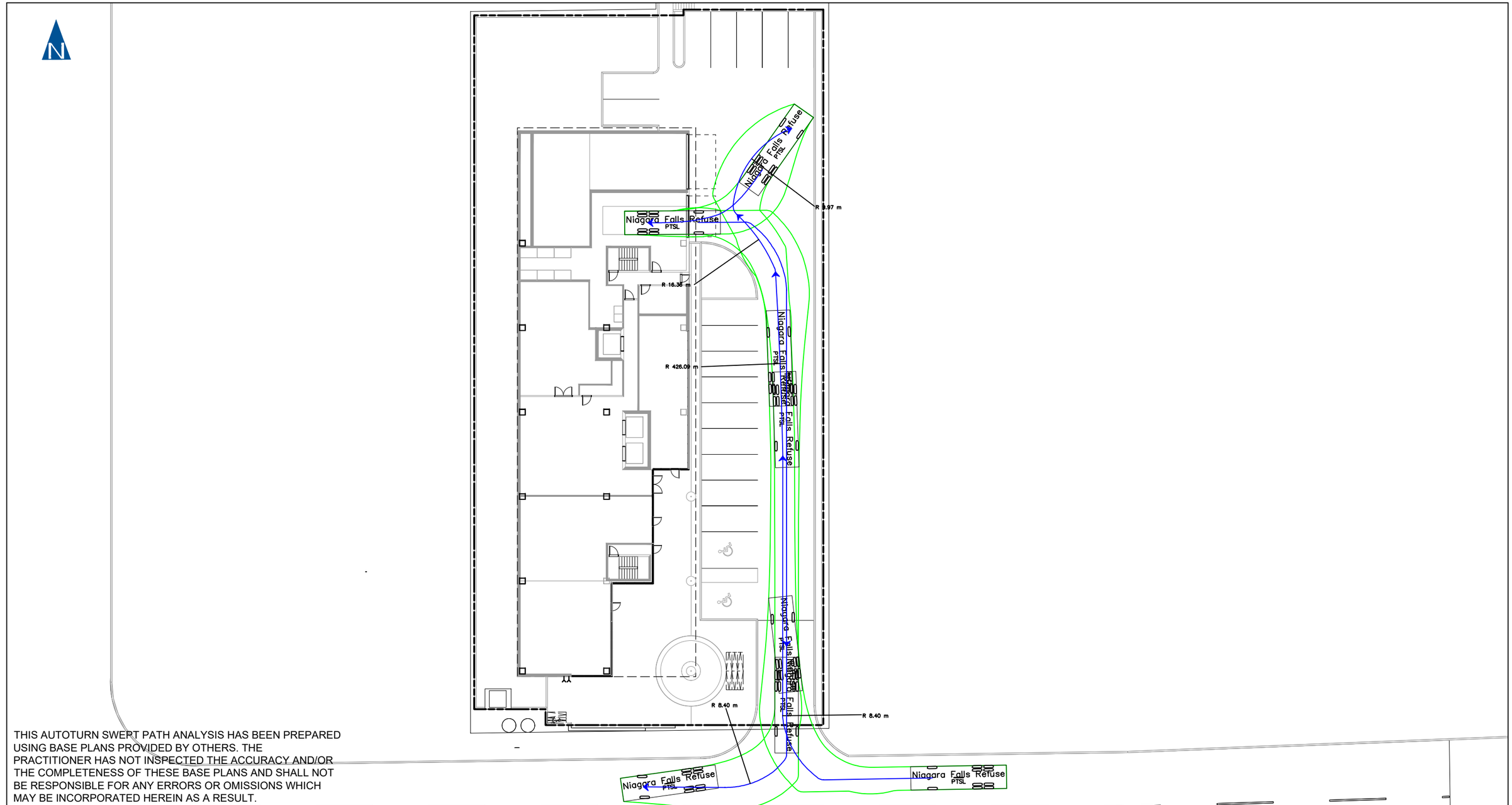
MSU

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

AUTOTURN ASSESSMENT
6179 LUNDY'S LANE
NIAGARA FALLS, ON

paradigm TRANSPORTATION SOLUTIONS LIMITED

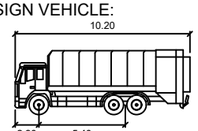
PROJECT NO.: 220825	DATE: JULY 2023	SCALE: 1:1000	DRAWING NO.: 01
DRAWN: LC	DESIGN: LC	CHECK: GL	



THIS AUTOTURN SWEPT PATH ANALYSIS HAS BEEN PREPARED USING BASE PLANS PROVIDED BY OTHERS. THE PRACTITIONER HAS NOT INSPECTED THE ACCURACY AND/OR THE COMPLETENESS OF THESE BASE PLANS AND SHALL NOT BE RESPONSIBLE FOR ANY ERRORS OR OMISSIONS WHICH MAY BE INCORPORATED HEREIN AS A RESULT.

NO.	DATE	INITIAL	REVISION DETAIL
2	2023-10-19	SC	UPDATED SITE PLAN
1	2023-10-19	SC	UPDATED SITE PLAN

DESIGN VEHICLE:



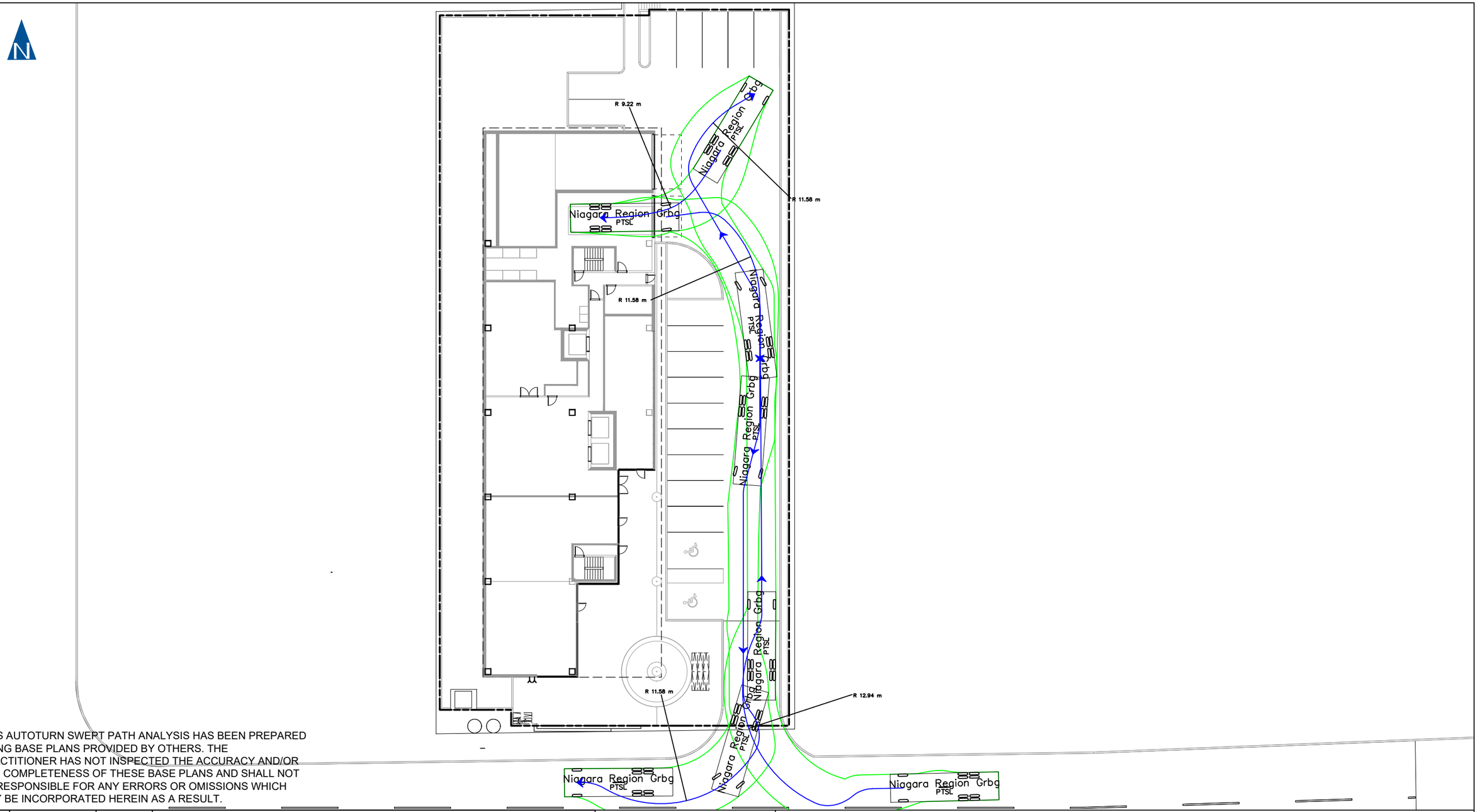
Niagara Falls Refuse

	meters
Width	: 2.50
Track	: 2.50
Lock to Lock Time	: 6.0
Steering Angle	: 40.0

AUTOTURN ASSESSMENT
6179 LUNDY'S LANE
NIAGARA FALLS, ON

paradigm TRANSPORTATION SOLUTIONS LIMITED

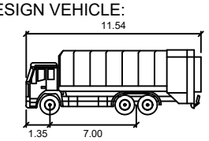
PROJECT NO.: 220825	DATE: JULY 2023	SCALE: 1:1000	DRAWING NO.: 02
DRAWN: LC	DESIGN: LC	CHECK: GL	



THIS AUTOTURN SWEPT PATH ANALYSIS HAS BEEN PREPARED USING BASE PLANS PROVIDED BY OTHERS. THE PRACTITIONER HAS NOT INSPECTED THE ACCURACY AND/OR THE COMPLETENESS OF THESE BASE PLANS AND SHALL NOT BE RESPONSIBLE FOR ANY ERRORS OR OMISSIONS WHICH MAY BE INCORPORATED HEREIN AS A RESULT.

NO.	DATE	INITIAL	REVISION DETAIL
2	2023-10-19	SC	UPDATED SITE PLAN
1	2023-10-19	SC	UPDATED SITE PLAN

DESIGN VEHICLE:



Niagara Region Grbg

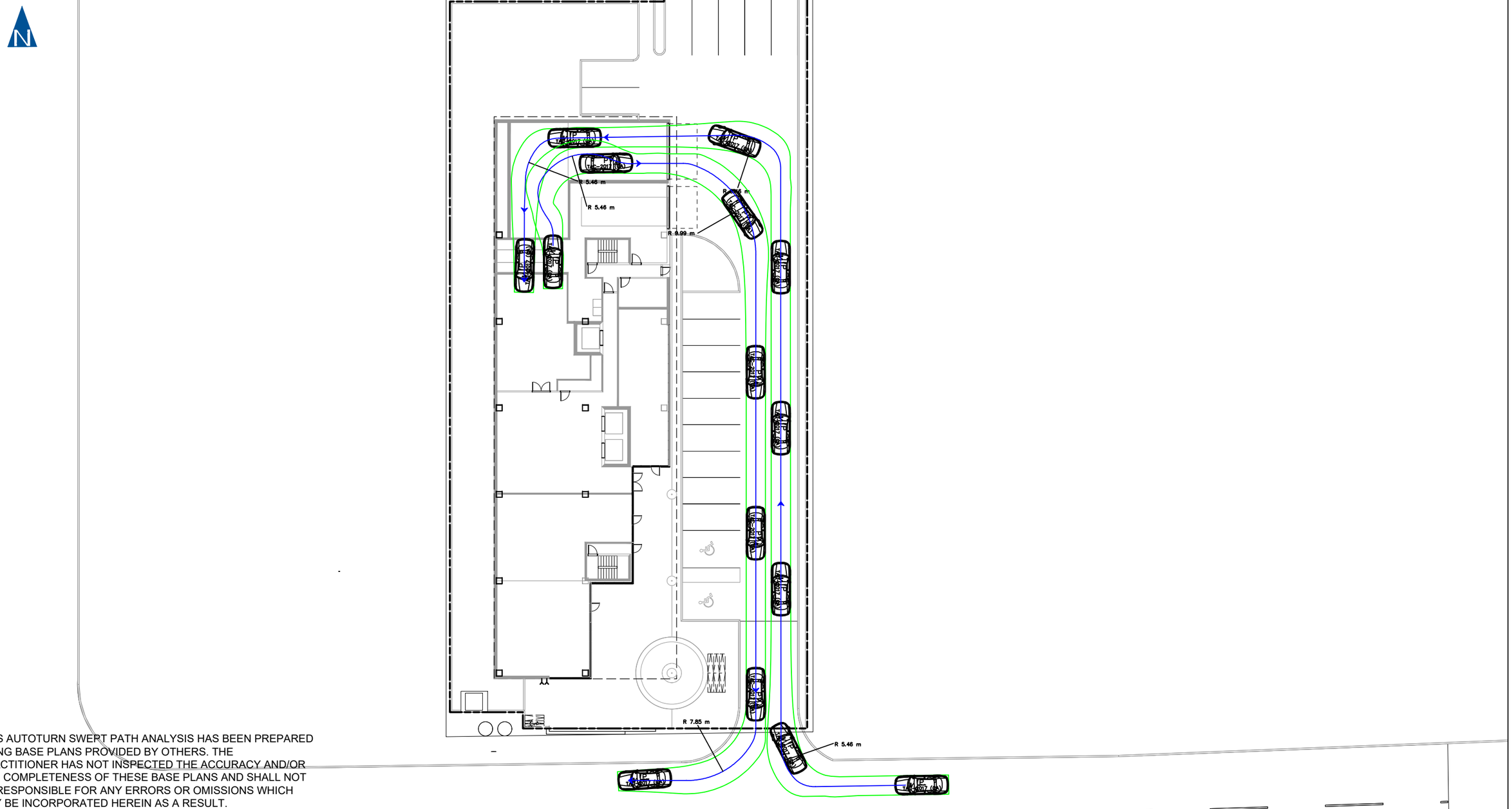
meters

Width	: 2.98
Track	: 2.98
Lock to Lock Time	: 6.0
Steering Angle	: 37.2

AUTOTURN ASSESSMENT
6179 LUNDY'S LANE
NIAGARA FALLS, ON

paradigm TRANSPORTATION SOLUTIONS LIMITED

PROJECT NO.: 220825	DATE: JULY 2023	SCALE: 1:1000	DRAWING NO.: 03
DRAWN: LC	DESIGN: LC	CHECK: GL	



THIS AUTOTURN SWEPT PATH ANALYSIS HAS BEEN PREPARED USING BASE PLANS PROVIDED BY OTHERS. THE PRACTITIONER HAS NOT INSPECTED THE ACCURACY AND/OR THE COMPLETENESS OF THESE BASE PLANS AND SHALL NOT BE RESPONSIBLE FOR ANY ERRORS OR OMISSIONS WHICH MAY BE INCORPORATED HEREIN AS A RESULT.

NO.	DATE	INITIAL	REVISION DETAIL
2	2023-10-19	SC	UPDATED SITE PLAN
1	2023-10-19	SC	UPDATED SITE PLAN

DESIGN VEHICLE:

P

	meters
Width	: 2.00
Track	: 2.00
Lock to Lock Time	: 6.0
Steering Angle	: 35.9

AUTOTURN ASSESSMENT
6179 LUNDY'S LANE
NIAGARA FALLS, ON

paradigm TRANSPORTATION SOLUTIONS LIMITED

PROJECT NO.: 220825	DATE: JULY 2023	SCALE: 1:1000	DRAWING NO.: 04
DRAWN: LC	DESIGN: LC	CHECK: GL	

Appendix E

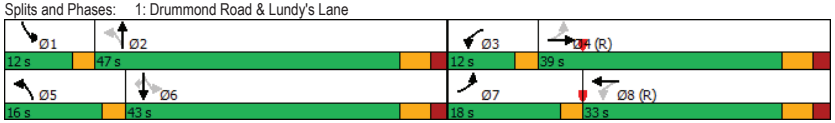
Future Background Operations

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	143	384	135	71	264	36	135	436	69	73	308	136
Future Volume (vph)	143	384	135	71	264	36	135	436	69	73	308	136
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	60.0		0.0	55.0		0.0	0.0		40.0	55.0		0.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00
Ped Bike Factor	0.98	0.97		0.96	0.99		0.99	1.00		0.99		0.96
Frt		0.961			0.982			0.979				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1554	3026	0	1583	3084	0	1599	3056	0	1630	1667	1403
Flt Permitted	0.422			0.369			0.371			0.408		
Satd. Flow (perm)	677	3026	0	593	3084	0	617	3056	0	692	1667	1353
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		47			13			19				154
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		156.1			67.9			167.8			223.0	
Travel Time (s)		11.2			4.9			12.1			16.1	
Confl. Peds. (#/hr)	23		31	31		23	20		20	20		20
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	7%	3%	2%	5%	5%	7%	4%	6%	6%	2%	5%	6%
Adj. Flow (vph)	151	404	142	75	278	38	142	459	73	77	324	143
Shared Lane Traffic (%)												
Lane Group Flow (vph)	151	546	0	75	316	0	142	532	0	77	324	143
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		6
Detector Phase	7	4		3	8		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	6.0	10.0		6.0	10.0		6.0	8.0		6.0	8.0	8.0
Minimum Split (s)	10.5	26.5		10.5	26.5		10.5	33.5		10.5	33.5	33.5
Total Split (s)	18.0	39.0		12.0	33.0		16.0	47.0		12.0	43.0	43.0
Total Split (%)	16.4%	35.5%		10.9%	30.0%		14.5%	42.7%		10.9%	39.1%	39.1%
Maximum Green (s)	15.0	32.5		9.0	26.5		13.0	40.5		9.0	36.5	36.5
Yellow Time (s)	3.0	4.1		3.0	4.1		3.0	4.1		3.0	4.1	4.1
All-Red Time (s)	0.0	2.4		0.0	2.4		0.0	2.4		0.0	2.4	2.4
Lost Time Adjust (s)	1.0	-2.5		1.0	-2.5		1.0	-2.5		1.0	-2.5	-2.5
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	2.6	2.5		2.6	2.5		2.5	2.5		2.5	2.5	2.5
Recall Mode	None	C-Max		None	C-Max		None	Max		None	Max	Max
Walk Time (s)		8.0			8.0			12.0			12.0	12.0
Flash Dont Walk (s)		12.0			12.0			15.0			15.0	15.0
Pedestrian Calls (#/hr)		0			0			0			0	0
Act Effct Green (s)	46.7	37.9		39.2	32.4		54.2	46.2		48.4	41.8	41.8
Actuated g/C Ratio	0.42	0.34		0.36	0.29		0.49	0.42		0.44	0.38	0.38
v/c Ratio	0.41	0.51		0.27	0.34		0.37	0.41		0.21	0.51	0.23
Control Delay	23.6	28.8		22.2	31.1		18.1	23.5		16.3	30.4	4.3
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	23.6	28.8		22.2	31.1		18.1	23.5		16.3	30.4	4.3
LOS	C	C		C	C		B	C		B	C	A
Approach Delay		27.7			29.4			22.3			21.5	
Approach LOS		C			C			C			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 110			
Actuated Cycle Length: 110			
Offset: 72 (65%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green			
Natural Cycle: 85			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.51			
Intersection Signal Delay: 24.9		Intersection LOS: C	
Intersection Capacity Utilization 69.2%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 1: Drummond Road & Lundy's Lane



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	151	546	75	316	142	532	77	324	143
v/c Ratio	0.41	0.51	0.27	0.34	0.37	0.41	0.21	0.51	0.23
Control Delay	23.6	28.8	22.2	31.1	18.1	23.5	16.3	30.4	4.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.6	28.8	22.2	31.1	18.1	23.5	16.3	30.4	4.3
Queue Length 50th (m)	21.2	48.2	10.0	28.2	17.0	43.2	8.8	55.7	0.0
Queue Length 95th (m)	36.0	66.6	19.5	43.0	29.1	59.7	17.2	87.4	11.7
Internal Link Dist (m)		132.1		43.9		143.8		199.0	
Turn Bay Length (m)	60.0		55.0				55.0		
Base Capacity (vph)	400	1074	289	916	415	1294	381	633	609
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.38	0.51	0.26	0.34	0.34	0.41	0.20	0.51	0.23

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	143	384	135	71	264	36	135	436	69	73	308	136
Future Volume (vph)	143	384	135	71	264	36	135	436	69	73	308	136
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.97		1.00	0.99		1.00	1.00		1.00	1.00	0.96
Flpb, ped/bikes	0.99	1.00		0.99	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.96		1.00	0.98		1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1542	3026		1565	3084		1592	3057		1623	1667	1353
Flt Permitted	0.42	1.00		0.37	1.00		0.37	1.00		0.41	1.00	1.00
Satd. Flow (perm)	685	3026		607	3084		622	3057		697	1667	1353
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	151	404	142	75	278	38	142	459	73	77	324	143
RTOR Reduction (vph)	0	31	0	0	9	0	0	11	0	0	0	88
Lane Group Flow (vph)	151	515	0	75	307	0	142	521	0	77	324	55
Confl. Peds. (#/hr)	23		31	31		23	20		20	20		20
Heavy Vehicles (%)	7%	3%	2%	5%	5%	7%	4%	6%	6%	2%	5%	6%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	43.9	34.2		36.0	29.3		53.1	43.7		46.3	39.9	39.9
Effective Green, g (s)	42.9	36.7		34.0	31.8		51.9	46.2		44.3	42.4	42.4
Actuated g/C Ratio	0.39	0.33		0.31	0.29		0.47	0.42		0.40	0.39	0.39
Clearance Time (s)	3.0	6.5		3.0	6.5		3.0	6.5		3.0	6.5	6.5
Vehicle Extension (s)	2.6	2.5		2.6	2.5		2.5	2.5		2.5	2.5	2.5
Lane Grp Cap (vph)	349	1009		237	891		374	1283		326	642	521
v/s Ratio Prot	c0.04	c0.17		0.02	0.10		c0.03	0.17		0.01	c0.19	
v/s Ratio Perm	0.13			0.08			0.15			0.08		0.04
v/c Ratio	0.43	0.51		0.32	0.34		0.38	0.41		0.24	0.50	0.11
Uniform Delay, d1	23.0	29.4		27.7	30.9		18.0	22.3		20.7	25.8	21.7
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.7	1.8		0.6	1.1		0.5	1.0		0.3	2.8	0.4
Delay (s)	23.7	31.3		28.3	31.9		18.5	23.3		20.9	28.6	22.1
Level of Service	C	C		C	C		B	C		C	C	C
Approach Delay (s)		29.6			31.2			22.3			25.8	
Approach LOS		C			C			C			C	

Intersection Summary				
HCM 2000 Control Delay	26.8	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.50			
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	69.2%	ICU Level of Service	C	
Analysis Period (min)	15			

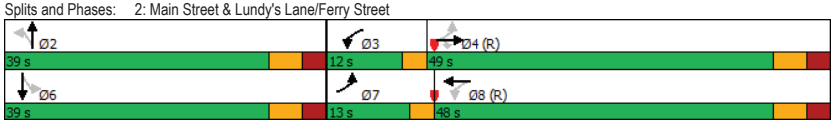
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	64	322	123	28	260	14	63	34	28	6	36	49
Future Volume (vph)	64	322	123	28	260	14	63	34	28	6	36	49
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	45.0		0.0	25.0		0.0	10.0		0.0	25.0		0.0
Storage Lanes	1		1	1		0	1		0	1		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	0.99		0.92	0.97	1.00			0.99		0.99	0.98	
Frt			0.850		0.993			0.932			0.913	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1599	1683	1458	1471	1628	0	1630	1465	0	1385	1488	0
Flt Permitted	0.449			0.448			0.692			0.709		
Satd. Flow (perm)	748	1683	1336	671	1628	0	1187	1465	0	1022	1488	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			145		3			33			58	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		344.7			143.8			206.1			169.2	
Travel Time (s)		24.8			10.4			14.8			12.2	
Confl. Peds. (#/hr)	11		39	39		11			8	8		21
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Heavy Vehicles (%)	4%	4%	2%	13%	6%	17%	2%	11%	8%	20%	10%	2%
Adj. Flow (vph)	75	379	145	33	306	16	74	40	33	7	42	58
Shared Lane Traffic (%)												
Lane Group Flow (vph)	75	379	145	33	322	0	74	73	0	7	100	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4		4	8			2			6		
Detector Phase	7	4	4	3	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	6.0	8.0	8.0	6.0	8.0		8.0	8.0		8.0	8.0	
Minimum Split (s)	10.5	37.0	37.0	10.5	37.0		37.0	37.0		37.0	37.0	
Total Split (s)	13.0	49.0	49.0	12.0	48.0		39.0	39.0		39.0	39.0	
Total Split (%)	13.0%	49.0%	49.0%	12.0%	48.0%		39.0%	39.0%		39.0%	39.0%	
Maximum Green (s)	10.0	42.0	42.0	9.0	41.0		32.0	32.0		32.0	32.0	
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	0.0	3.0	3.0	0.0	3.0		3.0	3.0		3.0	3.0	
Lost Time Adjust (s)	1.0	-3.0	-3.0	1.0	-3.0		-3.0	-3.0		-3.0	-3.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	2.5	2.2	2.2	2.5	2.2		2.2	2.2		2.2	2.2	
Recall Mode	None	C-Max	C-Max	None	C-Max		Max	Max		Max	Max	
Walk Time (s)		12.0	12.0		12.0		12.0	12.0		12.0	12.0	
Flash Dont Walk (s)		18.0	18.0		18.0		18.0	18.0		18.0	18.0	
Pedestrian Calls (#/hr)		0	0		0		0	0		0	0	
Act Effct Green (s)	55.5	51.2	51.2	52.9	48.5		35.0	35.0		35.0	35.0	
Actuated g/C Ratio	0.56	0.51	0.51	0.53	0.48		0.35	0.35		0.35	0.35	
v/c Ratio	0.16	0.44	0.19	0.08	0.41		0.18	0.14		0.02	0.18	
Control Delay	10.6	18.4	3.3	10.2	19.2		24.0	14.4		21.7	11.7	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	10.6	18.4	3.3	10.2	19.2		24.0	14.4		21.7	11.7	
LOS	B	B	A	B	B		C	B		C	B	
Approach Delay		13.8			18.4			19.2			12.4	
Approach LOS		B			B			B			B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 6 (6%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green			
Natural Cycle: 85			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.44			
Intersection Signal Delay: 15.7		Intersection LOS: B	
Intersection Capacity Utilization 65.0%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 2: Main Street & Lundy's Lane/Ferry Street



Queues
2: Main Street & Lundy's Lane/Ferry Street

Future Background
AM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	75	379	145	33	322	74	73	7	100
v/c Ratio	0.16	0.44	0.19	0.08	0.41	0.18	0.14	0.02	0.18
Control Delay	10.6	18.4	3.3	10.2	19.2	24.0	14.4	21.7	11.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.6	18.4	3.3	10.2	19.2	24.0	14.4	21.7	11.7
Queue Length 50th (m)	6.5	50.1	0.0	2.8	41.6	10.4	5.4	0.9	5.7
Queue Length 95th (m)	12.2	71.6	8.8	6.7	62.1	20.0	14.1	3.8	15.7
Internal Link Dist (m)		320.7			119.8		182.1		145.2
Turn Bay Length (m)	45.0			25.0		10.0		25.0	
Base Capacity (vph)	500	862	755	432	791	415	534	357	558
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.15	0.44	0.19	0.08	0.41	0.18	0.14	0.02	0.18

Intersection Summary

HCM Signalized Intersection Capacity Analysis
2: Main Street & Lundy's Lane/Ferry Street

Future Background
AM Peak Hour

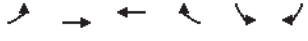
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	64	322	123	28	260	14	63	34	28	6	36	49
Future Volume (vph)	64	322	123	28	260	14	63	34	28	6	36	49
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.92	1.00	1.00		1.00	0.99		1.00	0.98	
Flpb, ped/bikes	1.00	1.00	1.00	0.99	1.00		1.00	1.00		0.99	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.93		1.00	0.91	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1592	1683	1336	1450	1627		1630	1466		1369	1488	
Flt Permitted	0.45	1.00	1.00	0.45	1.00		0.69	1.00		0.71	1.00	
Satd. Flow (perm)	753	1683	1336	684	1627		1188	1466		1022	1488	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	75	379	145	33	306	16	74	40	33	7	42	58
RTOR Reduction (vph)	0	0	73	0	2	0	0	21	0	0	38	0
Lane Group Flow (vph)	75	379	73	33	320	0	74	52	0	7	62	0
Confl. Peds. (#/hr)	11		39	39		11			8	8		21
Heavy Vehicles (%)	4%	4%	2%	13%	6%	17%	2%	11%	8%	20%	10%	2%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	53.1	47.0	47.0	48.9	44.9		32.0	32.0		32.0	32.0	
Effective Green, g (s)	51.1	50.0	50.0	46.9	47.9		35.0	35.0		35.0	35.0	
Actuated g/C Ratio	0.51	0.50	0.50	0.47	0.48		0.35	0.35		0.35	0.35	
Clearance Time (s)	3.0	7.0	7.0	3.0	7.0		7.0	7.0		7.0	7.0	
Vehicle Extension (s)	2.5	2.2	2.2	2.5	2.2		2.2	2.2		2.2	2.2	
Lane Grp Cap (vph)	427	841	668	343	779		415	513		357	520	
v/s Ratio Prot	c0.01	c0.23		0.00	0.20			0.04			0.04	
v/s Ratio Perm	0.08		0.05	0.04			c0.06			0.01		
v/c Ratio	0.18	0.45	0.11	0.10	0.41		0.18	0.10		0.02	0.12	
Uniform Delay, d1	13.0	16.1	13.2	14.7	16.9		22.5	21.9		21.3	22.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	1.7	0.3	0.1	1.6		0.9	0.4		0.1	0.5	
Delay (s)	13.2	17.9	13.5	14.8	18.5		23.5	22.3		21.4	22.5	
Level of Service	B	B	B	B	B		C	C		C	C	
Approach Delay (s)		16.2			18.2			22.9			22.4	
Approach LOS		B			B			C			C	

Intersection Summary				
HCM 2000 Control Delay	18.2	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.34			
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	65.0%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	526	371	0	0	0
Future Volume (vph)	0	526	371	0	0	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	0.95	0.95	0.95	0.95	1.00	1.00
Frt						
Flt Protected						
Satd. Flow (prot)	0	3228	3167	0	1716	0
Flt Permitted						
Satd. Flow (perm)	0	3228	3167	0	1716	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		67.9	344.7		104.5	
Travel Time (s)		4.9	24.8		7.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	3%	5%	2%	2%	2%
Adj. Flow (vph)	0	572	403	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	572	403	0	0	0
Enter Blocked Intersection	No	No	Yes	Yes	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.6	3.6		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	19.1%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	526	371	0	0	0
Future Volume (Veh/h)	0	526	371	0	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	572	403	0	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		68	345			
pX, platoon unblocked					0.89	
vC, conflicting volume	403				689	202
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	403				392	202
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	1152				518	806

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	191	381	269	134	0
Volume Left	0	0	0	0	0
Volume Right	0	0	0	0	0
cSH	1152	1700	1700	1700	1700
Volume to Capacity	0.00	0.22	0.16	0.08	0.00
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0
Lane LOS					A
Approach Delay (s)	0.0		0.0		0.0
Approach LOS					A

Intersection Summary				
Average Delay		0.0		
Intersection Capacity Utilization		19.1%	ICU Level of Service	A
Analysis Period (min)		15		

Intersection: 1: Drummond Road & Lundy's Lane

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	T	TR	L	T	R
Maximum Queue (m)	58.3	75.1	70.9	41.0	48.6	54.2	45.1	107.9	47.5	49.7	103.8	30.3
Average Queue (m)	21.8	38.8	31.1	14.8	22.9	26.3	19.2	55.1	30.8	13.2	46.9	12.7
95th Queue (m)	42.6	63.3	57.0	28.4	40.0	45.0	35.7	92.1	59.8	33.5	83.6	23.1
Link Distance (m)		142.0	142.0		47.5	47.5	153.8	153.8			209.0	209.0
Upstream Blk Time (%)				0	0	1						
Queuing Penalty (veh)				0	1	2						
Storage Bay Dist (m)	60.0			55.0					40.0	55.0		
Storage Blk Time (%)	0	1		0	0			16	1	0	5	
Queuing Penalty (veh)	0	1		0	0			46	3	0	4	

Intersection: 2: Main Street & Lundy's Lane/Ferry Street

Movement	EB	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	TR	L	TR	L	TR
Maximum Queue (m)	45.3	89.8	22.0	28.7	64.2	18.1	35.6	8.8	37.4
Average Queue (m)	11.0	34.2	7.9	6.0	27.4	10.2	11.3	0.8	11.6
95th Queue (m)	31.6	72.9	18.1	18.2	53.2	19.9	27.2	4.9	25.9
Link Distance (m)		321.7	321.7		131.6		193.1		153.4
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (m)	45.0			25.0		10.0		25.0	
Storage Blk Time (%)	0	6		0	11	28	15		1
Queuing Penalty (veh)	0	4		0	3	17	9		0

Intersection: 3: Lundy's Lane & Site Access

Movement
Directions Served
Maximum Queue (m)
Average Queue (m)
95th Queue (m)
Link Distance (m)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (m)
Storage Blk Time (%)
Queuing Penalty (veh)

Network Summary

Network wide Queuing Penalty: 90

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	193	423	207	122	660	36	169	425	91	63	569	251
Future Volume (vph)	193	423	207	122	660	36	169	425	91	63	569	251
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	60.0		0.0	55.0		0.0	0.0		40.0	55.0		0.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00
Ped Bike Factor		0.91		0.93	1.00			0.99		0.99		0.99
Frt		0.951			0.992			0.974				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1646	2846	0	1662	3256	0	1662	3170	0	1630	1733	1488
Flt Permitted	0.132			0.242			0.117			0.411		
Satd. Flow (perm)	229	2846	0	392	3256	0	205	3170	0	698	1733	1468
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		79			5			28				260
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		156.1			67.9			167.8			223.0	
Travel Time (s)		11.2			4.9			12.1			16.1	
Confl. Peds. (#/hr)	33		92	92		33	1		20	20		1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	1%	1%	2%	0%	1%	0%	0%	1%	4%	2%	1%	0%
Adj. Flow (vph)	201	441	216	127	688	38	176	443	95	66	593	261
Shared Lane Traffic (%)												
Lane Group Flow (vph)	201	657	0	127	726	0	176	538	0	66	593	261
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		6
Detector Phase	7	4		3	8		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	6.0	10.0		6.0	10.0		6.0	8.0		6.0	8.0	8.0
Minimum Split (s)	10.5	26.5		10.5	26.5		10.5	33.5		10.5	33.5	33.5
Total Split (s)	15.0	38.1		11.9	35.0		13.0	49.4		10.6	47.0	47.0
Total Split (%)	13.6%	34.6%		10.8%	31.8%		11.8%	44.9%		9.6%	42.7%	42.7%
Maximum Green (s)	12.0	31.6		8.9	28.5		10.0	42.9		7.6	40.5	40.5
Yellow Time (s)	3.0	4.1		3.0	4.1		3.0	4.1		3.0	4.1	4.1
All-Red Time (s)	0.0	2.4		0.0	2.4		0.0	2.4		0.0	2.4	2.4
Lost Time Adjust (s)	1.0	-2.5		1.0	-2.5		1.0	-2.5		1.0	-2.5	-2.5
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	2.6	2.5		2.6	2.5		2.5	2.5		2.5	2.5	2.5
Recall Mode	None	C-Max		None	C-Max		None	Max		None	Max	Max
Walk Time (s)		8.0			8.0			12.0			12.0	12.0
Flash Dont Walk (s)		12.0			12.0			15.0			15.0	15.0
Pedestrian Calls (#/hr)		0			0			0			0	0
Act Effct Green (s)	45.3	34.5		38.7	31.2		55.0	47.8		49.2	43.2	43.2
Actuated g/C Ratio	0.41	0.31		0.35	0.28		0.50	0.43		0.45	0.39	0.39
v/c Ratio	0.86	0.69		0.57	0.78		0.80	0.39		0.18	0.87	0.36
Control Delay	57.1	33.6		31.6	43.1		45.6	21.5		15.4	46.4	4.2
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	57.1	33.6		31.6	43.1		45.6	21.5		15.4	46.4	4.2
LOS	E	C		C	D		D	C		B	D	A
Approach Delay		39.1			41.4			27.5			32.2	
Approach LOS		D			D			C			C	

Intersection Summary

Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 72 (65%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
Natural Cycle: 85
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.87
Intersection Signal Delay: 35.3 Intersection LOS: D
Intersection Capacity Utilization 88.8% ICU Level of Service E
Analysis Period (min) 15

Splits and Phases: 1: Drummond Road & Lundy's Lane

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	201	657	127	726	176	538	66	593	261
v/c Ratio	0.86	0.69	0.57	0.78	0.80	0.39	0.18	0.87	0.36
Control Delay	57.1	33.6	31.6	43.1	45.6	21.5	15.4	46.4	4.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.1	33.6	31.6	43.1	45.6	21.5	15.4	46.4	4.2
Queue Length 50th (m)	29.6	60.7	17.7	79.2	21.0	41.6	7.4	122.2	0.1
Queue Length 95th (m)	#69.6	82.4	31.0	102.6	#55.5	56.6	14.8	#189.1	16.5
Internal Link Dist (m)		132.1		43.9		143.8		199.0	
Turn Bay Length (m)	60.0		55.0				55.0		
Base Capacity (vph)	235	947	230	927	221	1394	371	680	734
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.86	0.69	0.55	0.78	0.80	0.39	0.18	0.87	0.36

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	193	423	207	122	660	36	169	425	91	63	569	251
Future Volume (vph)	193	423	207	122	660	36	169	425	91	63	569	251
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.91		1.00	1.00		1.00	0.99		1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00		0.99	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.95		1.00	0.99		1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1646	2845		1638	3257		1662	3168		1623	1733	1468
Flt Permitted	0.13	1.00		0.24	1.00		0.12	1.00		0.41	1.00	1.00
Satd. Flow (perm)	228	2845		417	3257		205	3168		703	1733	1468
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	201	441	216	127	688	38	176	443	95	66	593	261
RTOR Reduction (vph)	0	55	0	0	4	0	0	16	0	0	0	156
Lane Group Flow (vph)	201	602	0	127	722	0	176	522	0	66	593	105
Confl. Peds. (#/hr)	33		92	92		33	1		20	20		1
Heavy Vehicles (%)	1%	1%	2%	0%	1%	0%	0%	1%	4%	2%	1%	0%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	42.9	31.4		36.6	28.1		54.1	45.3		47.1	41.3	41.3
Effective Green, g (s)	41.2	33.9		34.6	30.6		53.1	47.8		45.1	43.8	43.8
Actuated g/C Ratio	0.37	0.31		0.31	0.28		0.48	0.43		0.41	0.40	0.40
Clearance Time (s)	3.0	6.5		3.0	6.5		3.0	6.5		3.0	6.5	6.5
Vehicle Extension (s)	2.6	2.5		2.6	2.5		2.5	2.5		2.5	2.5	2.5
Lane Grp Cap (vph)	224	876		214	906		215	1376		328	690	584
v/s Ratio Prot	c0.09	0.21		0.04	0.22		c0.07	0.16		0.01	c0.34	
v/s Ratio Perm	c0.25			0.15			0.33			0.07		0.07
v/c Ratio	0.90	0.69		0.59	0.80		0.82	0.38		0.20	0.86	0.18
Uniform Delay, d1	27.2	33.4		28.7	36.8		22.7	21.1		20.0	30.3	21.4
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	33.5	4.4		3.8	7.2		20.5	0.8		0.2	13.2	0.7
Delay (s)	60.7	37.8		32.5	44.1		43.2	21.9		20.2	43.5	22.1
Level of Service	E	D		C	D		D	C		C	D	C
Approach Delay (s)		43.2			42.3			27.1			35.8	
Approach LOS		D			D			C			D	

Intersection Summary				
HCM 2000 Control Delay	37.5	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.86			
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	88.8%	ICU Level of Service	E	
Analysis Period (min)	15			

c Critical Lane Group

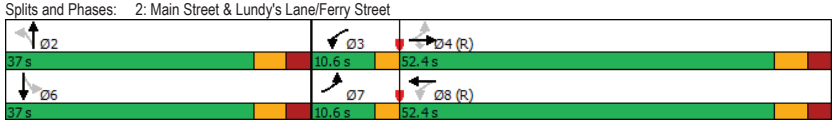
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	101	503	184	36	565	28	152	102	48	26	80	127
Future Volume (vph)	101	503	184	36	565	28	152	102	48	26	80	127
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	45.0		0.0	25.0		0.0	10.0		0.0	25.0		0.0
Storage Lanes	1		1	1		0	1		0	1		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	0.99		0.92	0.98	1.00		0.99	0.98		0.96	0.98	
Frt			0.850		0.993			0.952			0.908	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1630	1716	1473	1554	1715	0	1630	1582	0	1662	1532	0
Flt Permitted	0.215			0.329			0.527			0.611		
Satd. Flow (perm)	363	1716	1357	527	1715	0	891	1582	0	1028	1532	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			192		3			25			85	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		344.7			143.8			206.1			169.2	
Travel Time (s)		24.8			10.4			14.8			12.2	
Confl. Peds. (#/hr)	34		36	36		34	22		30	30		22
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	2%	2%	1%	7%	1%	0%	2%	2%	5%	0%	1%	2%
Adj. Flow (vph)	105	524	192	38	589	29	158	106	50	27	83	132
Shared Lane Traffic (%)												
Lane Group Flow (vph)	105	524	192	38	618	0	158	156	0	27	215	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4		4	8			2			6		
Detector Phase	7	4	4	3	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	6.0	8.0	8.0	6.0	8.0		8.0	8.0		8.0	8.0	
Minimum Split (s)	10.5	37.0	37.0	10.5	37.0		37.0	37.0		37.0	37.0	
Total Split (s)	10.6	52.4	52.4	10.6	52.4		37.0	37.0		37.0	37.0	
Total Split (%)	10.6%	52.4%	52.4%	10.6%	52.4%		37.0%	37.0%		37.0%	37.0%	
Maximum Green (s)	7.6	45.4	45.4	7.6	45.4		30.0	30.0		30.0	30.0	
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	0.0	3.0	3.0	0.0	3.0		3.0	3.0		3.0	3.0	
Lost Time Adjust (s)	1.0	-3.0	-3.0	1.0	-3.0		-3.0	-3.0		-3.0	-3.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	2.5	2.2	2.2	2.5	2.2		2.2	2.2		2.2	2.2	
Recall Mode	None	C-Max	C-Max	None	C-Max		Max	Max		Max	Max	
Walk Time (s)		12.0	12.0		12.0		12.0	12.0		12.0	12.0	
Flash Dont Walk (s)		18.0	18.0		18.0		18.0	18.0		18.0	18.0	
Pedestrian Calls (#/hr)		0	0		0		0	0		0	0	
Act Effct Green (s)	57.2	53.2	53.2	55.0	50.7		33.0	33.0		33.0	33.0	
Actuated g/C Ratio	0.57	0.53	0.53	0.55	0.51		0.33	0.33		0.33	0.33	
v/c Ratio	0.37	0.57	0.24	0.11	0.71		0.54	0.29		0.08	0.38	
Control Delay	12.9	20.0	2.9	9.5	25.4		35.4	22.5		24.0	17.4	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	12.9	20.0	2.9	9.5	25.4		35.4	22.5		24.0	17.4	
LOS	B	B	A	A	C		D	C		C	B	
Approach Delay		15.1			24.5			29.0			18.2	
Approach LOS		B			C			C			B	

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 6 (6%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
Natural Cycle: 85
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.71
Intersection Signal Delay: 20.6 Intersection LOS: C
Intersection Capacity Utilization 87.8% ICU Level of Service E
Analysis Period (min) 15

Splits and Phases: 2: Main Street & Lundy's Lane/Ferry Street



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	105	524	192	38	618	158	156	27	215
v/c Ratio	0.37	0.57	0.24	0.11	0.71	0.54	0.29	0.08	0.38
Control Delay	12.9	20.0	2.9	9.5	25.4	35.4	22.5	24.0	17.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.9	20.0	2.9	9.5	25.4	35.4	22.5	24.0	17.4
Queue Length 50th (m)	8.8	73.8	0.0	3.1	97.4	26.0	19.4	3.8	19.3
Queue Length 95th (m)	16.2	112.1	11.3	7.4	143.4	48.2	36.0	10.2	39.7
Internal Link Dist (m)		320.7			119.8		182.1		145.2
Turn Bay Length (m)	45.0			25.0		10.0		25.0	
Base Capacity (vph)	291	913	812	362	870	294	538	339	562
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.36	0.57	0.24	0.10	0.71	0.54	0.29	0.08	0.38

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	101	503	184	36	565	28	152	102	48	26	80	127
Future Volume (vph)	101	503	184	36	565	28	152	102	48	26	80	127
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.92	1.00	1.00		1.00	0.98		1.00	0.98	
Flpb, ped/bikes	1.00	1.00	1.00	0.99	1.00		0.99	1.00		0.96	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.95		1.00	0.91	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1626	1716	1357	1544	1715		1606	1582		1598	1531	
Flt Permitted	0.22	1.00	1.00	0.33	1.00		0.53	1.00		0.61	1.00	
Satd. Flow (perm)	369	1716	1357	534	1715		891	1582		1028	1531	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	105	524	192	38	589	29	158	106	50	27	83	132
RTOR Reduction (vph)	0	0	92	0	1	0	0	17	0	0	57	0
Lane Group Flow (vph)	105	524	100	38	617	0	158	139	0	27	158	0
Confl. Peds. (#/hr)	34		36	36		34	22		30	30		22
Heavy Vehicles (%)	2%	2%	1%	7%	1%	0%	2%	2%	5%	0%	1%	2%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	54.9	49.0	49.0	51.1	47.1		30.0	30.0		30.0	30.0	
Effective Green, g (s)	52.9	52.0	52.0	49.1	50.1		33.0	33.0		33.0	33.0	
Actuated g/C Ratio	0.53	0.52	0.52	0.49	0.50		0.33	0.33		0.33	0.33	
Clearance Time (s)	3.0	7.0	7.0	3.0	7.0		7.0	7.0		7.0	7.0	
Vehicle Extension (s)	2.5	2.2	2.2	2.5	2.2		2.2	2.2		2.2	2.2	
Lane Grp Cap (vph)	256	892	705	292	859		294	522		339	505	
v/s Ratio Prot	c0.02	0.31		0.00	c0.36			0.09			0.10	
v/s Ratio Perm	0.20		0.07	0.06			c0.18			0.03		
v/c Ratio	0.41	0.59	0.14	0.13	0.72		0.54	0.27		0.08	0.31	
Uniform Delay, d1	15.2	16.6	12.4	14.3	19.4		27.3	24.6		23.1	25.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.8	2.8	0.4	0.1	5.1		6.9	1.2		0.5	1.6	
Delay (s)	16.0	19.4	12.9	14.4	24.6		34.2	25.9		23.5	26.6	
Level of Service	B	B	B	B	C		C	C		C	C	
Approach Delay (s)		17.4			24.0			30.0			26.3	
Approach LOS		B			C			C			C	

Intersection Summary				
HCM 2000 Control Delay	22.6	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.63			
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	87.8%	ICU Level of Service	E	
Analysis Period (min)	15			

c Critical Lane Group

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	577	818	0	0	0
Future Volume (vph)	0	577	818	0	0	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	0.95	0.95	0.95	0.95	1.00	1.00
Frt						
Flt Protected						
Satd. Flow (prot)	0	3292	3292	0	1716	0
Flt Permitted						
Satd. Flow (perm)	0	3292	3292	0	1716	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		67.9	344.7		104.5	
Travel Time (s)		4.9	24.8		7.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	1%	1%	2%	2%	2%
Adj. Flow (vph)	0	627	889	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	627	889	0	0	0
Enter Blocked Intersection	No	No	Yes	Yes	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.6	3.6		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	27.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	577	818	0	0	0
Future Volume (Veh/h)	0	577	818	0	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	627	889	0	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		68	345			
pX, platoon unblocked						
vC, conflicting volume	889				1202	444
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	889				1202	444
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	758				177	561

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	209	418	593	296	0
Volume Left	0	0	0	0	0
Volume Right	0	0	0	0	0
cSH	758	1700	1700	1700	1700
Volume to Capacity	0.00	0.25	0.35	0.17	0.00
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0
Lane LOS					A
Approach Delay (s)	0.0		0.0		0.0
Approach LOS					A

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	27.9%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection: 1: Drummond Road & Lundy's Lane

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	T	TR	L	T	R
Maximum Queue (m)	66.3	100.8	100.7	47.4	70.2	72.8	72.5	104.4	47.5	62.4	201.6	105.0
Average Queue (m)	35.2	50.3	47.0	33.3	58.3	61.0	33.4	51.1	30.1	23.6	116.0	28.2
95th Queue (m)	65.2	83.7	81.2	58.4	77.2	79.3	60.1	84.8	57.7	62.2	186.0	90.9
Link Distance (m)		142.0	142.0		47.5	47.5	153.8	153.8			209.0	209.0
Upstream Blk Time (%)		0		1	18	26		0			1	0
Queuing Penalty (veh)		0		0	75	107		0			0	0
Storage Bay Dist (m)	60.0			55.0					40.0	55.0		
Storage Blk Time (%)	4	3		1	18			13	1	0	41	
Queuing Penalty (veh)	8	5		3	22			40	2	0	26	

Intersection: 2: Main Street & Lundy's Lane/Ferry Street

Movement	EB	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	TR	L	TR	L	TR
Maximum Queue (m)	52.4	114.5	31.4	32.3	123.1	18.2	85.6	32.2	70.3
Average Queue (m)	22.1	52.8	10.8	7.8	70.5	16.3	40.5	6.8	27.5
95th Queue (m)	50.4	102.8	23.9	24.5	114.8	20.0	74.2	22.4	53.5
Link Distance (m)		321.7	321.7		131.6		193.1		153.4
Upstream Blk Time (%)					0				
Queuing Penalty (veh)					0				
Storage Bay Dist (m)	45.0			25.0		10.0		25.0	
Storage Blk Time (%)		12		0	32	57	36	0	11
Queuing Penalty (veh)		12		0	11	86	54	0	3

Intersection: 3: Lundy's Lane & Site Access

Movement	EB	WB	WB
Directions Served	LT	T	TR
Maximum Queue (m)	1.2	35.2	35.9
Average Queue (m)	0.0	5.5	8.1
95th Queue (m)	0.9	21.5	25.5
Link Distance (m)	47.5	321.7	321.7
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 455

Appendix F

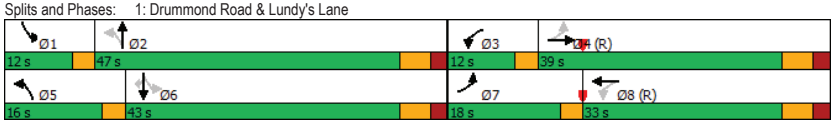
Future Traffic Total Operations

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	143	388	135	75	275	38	135	436	71	74	308	136
Future Volume (vph)	143	388	135	75	275	38	135	436	71	74	308	136
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	60.0		0.0	55.0		0.0	0.0		40.0	55.0		0.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00
Ped Bike Factor	0.98	0.97		0.96	0.99		0.99	0.99		0.99		0.96
Frt		0.961			0.982			0.979				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1554	3027	0	1583	3084	0	1599	3055	0	1630	1667	1403
Flt Permitted	0.411			0.365			0.371			0.407		
Satd. Flow (perm)	660	3027	0	587	3084	0	617	3055	0	691	1667	1353
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		46			13			20				154
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		156.1			67.9			167.8			223.0	
Travel Time (s)		11.2			4.9			12.1			16.1	
Confl. Peds. (#/hr)	23		31	31		23	20		20	20		20
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	7%	3%	2%	5%	5%	7%	4%	6%	6%	2%	5%	6%
Adj. Flow (vph)	151	408	142	79	289	40	142	459	75	78	324	143
Shared Lane Traffic (%)												
Lane Group Flow (vph)	151	550	0	79	329	0	142	534	0	78	324	143
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		6
Detector Phase	7	4		3	8		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	6.0	10.0		6.0	10.0		6.0	8.0		6.0	8.0	8.0
Minimum Split (s)	10.5	26.5		10.5	26.5		10.5	33.5		10.5	33.5	33.5
Total Split (s)	18.0	39.0		12.0	33.0		16.0	47.0		12.0	43.0	43.0
Total Split (%)	16.4%	35.5%		10.9%	30.0%		14.5%	42.7%		10.9%	39.1%	39.1%
Maximum Green (s)	15.0	32.5		9.0	26.5		13.0	40.5		9.0	36.5	36.5
Yellow Time (s)	3.0	4.1		3.0	4.1		3.0	4.1		3.0	4.1	4.1
All-Red Time (s)	0.0	2.4		0.0	2.4		0.0	2.4		0.0	2.4	2.4
Lost Time Adjust (s)	1.0	-2.5		1.0	-2.5		1.0	-2.5		1.0	-2.5	-2.5
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	2.6	2.5		2.6	2.5		2.5	2.5		2.5	2.5	2.5
Recall Mode	None	C-Max		None	C-Max		None	Max		None	Max	Max
Walk Time (s)		8.0			8.0			12.0			12.0	12.0
Flash Dont Walk (s)		12.0			12.0			15.0			15.0	15.0
Pedestrian Calls (#/hr)		0			0			0			0	0
Act Effct Green (s)	46.6	37.9		39.3	32.4		54.2	46.2		48.4	41.8	41.8
Actuated g/C Ratio	0.42	0.34		0.36	0.29		0.49	0.42		0.44	0.38	0.38
v/c Ratio	0.41	0.51		0.29	0.36		0.37	0.41		0.22	0.51	0.23
Control Delay	23.8	29.0		22.4	31.4		18.1	23.4		16.3	30.4	4.3
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	23.8	29.0		22.4	31.4		18.1	23.4		16.3	30.4	4.3
LOS	C	C		C	C		B	C		B	C	A
Approach Delay		27.9			29.6			22.3			21.5	
Approach LOS		C			C			C			C	

Intersection Summary		
Area Type:	Other	
Cycle Length: 110		
Actuated Cycle Length: 110		
Offset: 72 (65%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green		
Natural Cycle: 85		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.51		
Intersection Signal Delay: 25.1	Intersection LOS: C	
Intersection Capacity Utilization 69.2%	ICU Level of Service C	
Analysis Period (min) 15		

Splits and Phases: 1: Drummond Road & Lundy's Lane



Queues
1: Drummond Road & Lundy's Lane

Future Total
AM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	151	550	79	329	142	534	78	324	143
v/c Ratio	0.41	0.51	0.29	0.36	0.37	0.41	0.22	0.51	0.23
Control Delay	23.8	29.0	22.4	31.4	18.1	23.4	16.3	30.4	4.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.8	29.0	22.4	31.4	18.1	23.4	16.3	30.4	4.3
Queue Length 50th (m)	21.2	48.8	10.5	29.6	17.0	43.2	8.9	55.7	0.0
Queue Length 95th (m)	36.0	67.4	20.5	44.7	29.1	59.8	17.3	87.4	11.7
Internal Link Dist (m)		132.1		43.9		143.8		199.0	
Turn Bay Length (m)	60.0		55.0				55.0		
Base Capacity (vph)	395	1072	287	916	415	1294	381	633	609
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.38	0.51	0.28	0.36	0.34	0.41	0.20	0.51	0.23

Intersection Summary

HCM Signalized Intersection Capacity Analysis
1: Drummond Road & Lundy's Lane

Future Total
AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	143	388	135	75	275	38	135	436	71	74	308	136
Future Volume (vph)	143	388	135	75	275	38	135	436	71	74	308	136
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.97		1.00	0.99		1.00	0.99		1.00	1.00	0.96
Flpb, ped/bikes	0.99	1.00		0.99	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.96		1.00	0.98		1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1543	3028		1565	3083		1592	3055		1623	1667	1353
Flt Permitted	0.41	1.00		0.37	1.00		0.37	1.00		0.41	1.00	1.00
Satd. Flow (perm)	667	3028		602	3083		622	3055		695	1667	1353
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	151	408	142	79	289	40	142	459	75	78	324	143
RTOR Reduction (vph)	0	31	0	0	9	0	0	12	0	0	0	88
Lane Group Flow (vph)	151	519	0	79	320	0	142	522	0	78	324	55
Confl. Peds. (#/hr)	23		31	31		23	20		20	20		20
Heavy Vehicles (%)	7%	3%	2%	5%	5%	7%	4%	6%	6%	2%	5%	6%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	43.9	34.2		36.0	29.3		53.1	43.7		46.3	39.9	39.9
Effective Green, g (s)	42.9	36.7		34.0	31.8		51.9	46.2		44.3	42.4	42.4
Actuated g/C Ratio	0.39	0.33		0.31	0.29		0.47	0.42		0.40	0.39	0.39
Clearance Time (s)	3.0	6.5		3.0	6.5		3.0	6.5		3.0	6.5	6.5
Vehicle Extension (s)	2.6	2.5		2.6	2.5		2.5	2.5		2.5	2.5	2.5
Lane Grp Cap (vph)	344	1010		235	891		374	1283		325	642	521
v/s Ratio Prot	c0.04	c0.17		0.02	0.10		c0.03	0.17		0.01	c0.19	
v/s Ratio Perm	0.13			0.09			0.15			0.08		0.04
v/c Ratio	0.44	0.51		0.34	0.36		0.38	0.41		0.24	0.50	0.11
Uniform Delay, d1	23.1	29.5		27.8	31.0		18.0	22.3		20.7	25.8	21.7
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.7	1.9		0.7	1.1		0.5	1.0		0.3	2.8	0.4
Delay (s)	23.8	31.4		28.5	32.1		18.5	23.3		21.0	28.6	22.1
Level of Service	C	C		C	C		B	C		C	C	C
Approach Delay (s)		29.7			31.4			22.3			25.8	
Approach LOS		C			C			C			C	

Intersection Summary				
HCM 2000 Control Delay	26.9	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.51			
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	69.2%	ICU Level of Service	C	
Analysis Period (min)	15			

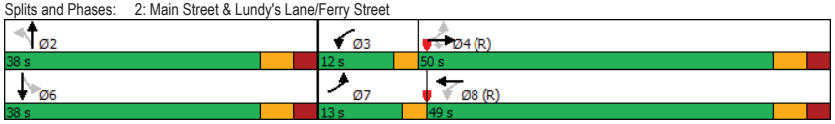
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	66	335	129	28	266	14	64	34	28	6	36	50
Future Volume (vph)	66	335	129	28	266	14	64	34	28	6	36	50
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	45.0		0.0	25.0		0.0	10.0		0.0	25.0		0.0
Storage Lanes	1		1	1		0	1		0	1		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	0.99		0.92	0.97	1.00			0.99		0.99	0.98	
Frt			0.850		0.993			0.932			0.912	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1599	1683	1458	1471	1628	0	1630	1465	0	1385	1486	0
Flt Permitted	0.448			0.439			0.692			0.709		
Satd. Flow (perm)	746	1683	1336	659	1628	0	1187	1465	0	1022	1486	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			152		3			33			59	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		344.7			143.8			206.1			169.2	
Travel Time (s)		24.8			10.4			14.8			12.2	
Confl. Peds. (#/hr)	11		39	39		11			8	8		21
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Heavy Vehicles (%)	4%	4%	2%	13%	6%	17%	2%	11%	8%	20%	10%	2%
Adj. Flow (vph)	78	394	152	33	313	16	75	40	33	7	42	59
Shared Lane Traffic (%)												
Lane Group Flow (vph)	78	394	152	33	329	0	75	73	0	7	101	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4		4	8			2			6		
Detector Phase	7	4	4	3	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	6.0	8.0	8.0	6.0	8.0		8.0	8.0		8.0	8.0	
Minimum Split (s)	10.5	37.0	37.0	10.5	37.0		37.0	37.0		37.0	37.0	
Total Split (s)	13.0	50.0	50.0	12.0	49.0		38.0	38.0		38.0	38.0	
Total Split (%)	13.0%	50.0%	50.0%	12.0%	49.0%		38.0%	38.0%		38.0%	38.0%	
Maximum Green (s)	10.0	43.0	43.0	9.0	42.0		31.0	31.0		31.0	31.0	
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	0.0	3.0	3.0	0.0	3.0		3.0	3.0		3.0	3.0	
Lost Time Adjust (s)	1.0	-3.0	-3.0	1.0	-3.0		-3.0	-3.0		-3.0	-3.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	2.5	2.2	2.2	2.5	2.2		2.2	2.2		2.2	2.2	
Recall Mode	None	C-Max	C-Max	None	C-Max		Max	Max		Max	Max	
Walk Time (s)		12.0	12.0		12.0		12.0	12.0		12.0	12.0	
Flash Dont Walk (s)		18.0	18.0		18.0		18.0	18.0		18.0	18.0	
Pedestrian Calls (#/hr)		0	0		0		0	0		0	0	
Act Effct Green (s)	56.5	52.2	52.2	53.9	49.5		34.0	34.0		34.0	34.0	
Actuated g/C Ratio	0.56	0.52	0.52	0.54	0.50		0.34	0.34		0.34	0.34	
v/c Ratio	0.16	0.45	0.20	0.08	0.41		0.19	0.14		0.02	0.19	
Control Delay	10.2	18.0	3.1	9.8	18.7		24.9	14.8		22.3	12.0	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	10.2	18.0	3.1	9.8	18.7		24.9	14.8		22.3	12.0	
LOS	B	B	A	A	B		C	B		C	B	
Approach Delay		13.4			17.9			19.9			12.7	
Approach LOS		B			B			B			B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 6 (6%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green			
Natural Cycle: 85			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.45			
Intersection Signal Delay: 15.4		Intersection LOS: B	
Intersection Capacity Utilization 65.0%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 2: Main Street & Lundy's Lane/Ferry Street



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	78	394	152	33	329	75	73	7	101
v/c Ratio	0.16	0.45	0.20	0.08	0.41	0.19	0.14	0.02	0.19
Control Delay	10.2	18.0	3.1	9.8	18.7	24.9	14.8	22.3	12.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.2	18.0	3.1	9.8	18.7	24.9	14.8	22.3	12.0
Queue Length 50th (m)	6.6	51.4	0.0	2.7	41.8	10.7	5.5	0.9	5.8
Queue Length 95th (m)	12.3	73.7	8.9	6.5	62.6	20.5	14.3	3.8	16.0
Internal Link Dist (m)		320.7			119.8		182.1		145.2
Turn Bay Length (m)	45.0			25.0		10.0		25.0	
Base Capacity (vph)	506	879	770	433	807	403	519	347	544
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.15	0.45	0.20	0.08	0.41	0.19	0.14	0.02	0.19

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	66	335	129	28	266	14	64	34	28	6	36	50
Future Volume (vph)	66	335	129	28	266	14	64	34	28	6	36	50
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.92	1.00	1.00		1.00	0.99		1.00	0.98	
Flpb, ped/bikes	1.00	1.00	1.00	0.99	1.00		1.00	1.00		0.99	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.93		1.00	0.91	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1592	1683	1336	1451	1628		1630	1466		1369	1487	
Flt Permitted	0.45	1.00	1.00	0.44	1.00		0.69	1.00		0.71	1.00	
Satd. Flow (perm)	751	1683	1336	671	1628		1187	1466		1022	1487	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	78	394	152	33	313	16	75	40	33	7	42	59
RTOR Reduction (vph)	0	0	74	0	2	0	0	22	0	0	39	0
Lane Group Flow (vph)	78	394	78	33	327	0	75	51	0	7	62	0
Confl. Peds. (#/hr)	11		39	39		11			8	8		21
Heavy Vehicles (%)	4%	4%	2%	13%	6%	17%	2%	11%	8%	20%	10%	2%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	54.1	48.0	48.0	49.9	45.9		31.0	31.0		31.0	31.0	
Effective Green, g (s)	52.1	51.0	51.0	47.9	48.9		34.0	34.0		34.0	34.0	
Actuated g/C Ratio	0.52	0.51	0.51	0.48	0.49		0.34	0.34		0.34	0.34	
Clearance Time (s)	3.0	7.0	7.0	3.0	7.0		7.0	7.0		7.0	7.0	
Vehicle Extension (s)	2.5	2.2	2.2	2.5	2.2		2.2	2.2		2.2	2.2	
Lane Grp Cap (vph)	434	858	681	344	796		403	498		347	505	
v/s Ratio Prot	c0.01	c0.23		0.00	0.20			0.03			0.04	
v/s Ratio Perm	0.08		0.06	0.04			c0.06			0.01		
v/c Ratio	0.18	0.46	0.11	0.10	0.41		0.19	0.10		0.02	0.12	
Uniform Delay, d1	12.6	15.7	12.7	14.2	16.3		23.3	22.6		21.9	22.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	1.8	0.3	0.1	1.6		1.0	0.4		0.1	0.5	
Delay (s)	12.7	17.4	13.1	14.3	17.9		24.3	23.0		22.0	23.2	
Level of Service	B	B	B	B	B		C	C		C	C	
Approach Delay (s)		15.8			17.6			23.6			23.2	
Approach LOS		B			B			C			C	

Intersection Summary				
HCM 2000 Control Delay	17.9	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.35			
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	65.0%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	7	526	371	8	21	17
Future Volume (vph)	7	526	371	8	21	17
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	0.95	0.95	0.95	0.95	1.00	1.00
Frt			0.997		0.941	
Flt Protected		0.999			0.973	
Satd. Flow (prot)	0	3225	3159	0	1571	0
Flt Permitted		0.999			0.973	
Satd. Flow (perm)	0	3225	3159	0	1571	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		67.9	344.7		104.5	
Travel Time (s)		4.9	24.8		7.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	3%	5%	2%	2%	2%
Adj. Flow (vph)	8	572	403	9	23	18
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	580	412	0	41	0
Enter Blocked Intersection	No	No	Yes	Yes	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.6	3.6		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 31.2%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	7	526	371	8	21	17
Future Volume (Veh/h)	7	526	371	8	21	17
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)	8	572	403	9	23	18
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		68	345			
pX, platoon unblocked					0.88	
vC, conflicting volume	412				710	206
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	412				410	206
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				95	98
cM capacity (veh/h)	1143				500	800

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	199	381	269	143	41
Volume Left	8	0	0	0	23
Volume Right	0	0	0	9	18
cSH	1143	1700	1700	1700	599
Volume to Capacity	0.01	0.22	0.16	0.08	0.07
Queue Length 95th (m)	0.2	0.0	0.0	0.0	1.8
Control Delay (s)	0.4	0.0	0.0	0.0	11.5
Lane LOS	A				B
Approach Delay (s)	0.1		0.0		11.5
Approach LOS					B

Intersection Summary				
Average Delay		0.5		
Intersection Capacity Utilization		31.2%	ICU Level of Service	A
Analysis Period (min)		15		

Intersection: 1: Drummond Road & Lundy's Lane

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	T	TR	L	T	R
Maximum Queue (m)	59.2	82.8	71.9	40.4	47.5	51.3	40.4	116.9	47.5	56.6	101.4	30.1
Average Queue (m)	21.0	38.3	32.3	15.6	24.2	27.5	20.1	53.2	32.3	14.2	47.3	12.7
95th Queue (m)	44.2	69.2	58.6	32.4	42.8	44.3	35.3	90.0	60.8	32.4	79.3	24.6
Link Distance (m)		142.0	142.0		47.5	47.5	153.8	153.8			209.0	209.0
Upstream Blk Time (%)		0		0	1	1		0				
Queuing Penalty (veh)		0		0	1	2		0				
Storage Bay Dist (m)	60.0			55.0					40.0	55.0		
Storage Blk Time (%)	0	1		0	1			16	1	0	6	
Queuing Penalty (veh)	0	2		0	0			46	3	0	4	

Intersection: 2: Main Street & Lundy's Lane/Ferry Street

Movement	EB	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	TR	L	TR	L	TR
Maximum Queue (m)	52.3	89.9	44.2	26.4	66.8	17.3	39.9	9.3	35.0
Average Queue (m)	10.7	35.0	8.9	6.4	29.0	10.6	12.5	1.0	12.1
95th Queue (m)	34.0	76.1	25.5	19.6	56.4	19.8	29.1	5.4	25.5
Link Distance (m)		321.7	321.7		131.6		193.1		153.4
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (m)	45.0			25.0		10.0		25.0	
Storage Blk Time (%)	0	6		0	10	29	20		2
Queuing Penalty (veh)	0	4		0	3	18	13		0

Intersection: 3: Lundy's Lane & Site Access

Movement	EB	EB	WB	SB
Directions Served	LT	T	TR	LR
Maximum Queue (m)	25.8	9.0	1.4	15.7
Average Queue (m)	1.5	0.3	0.0	7.1
95th Queue (m)	11.6	6.3	1.0	14.7
Link Distance (m)	47.5	47.5	321.7	90.6
Upstream Blk Time (%)	0	0		
Queuing Penalty (veh)	0	0		
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Network Summary

Network wide Queuing Penalty: 96

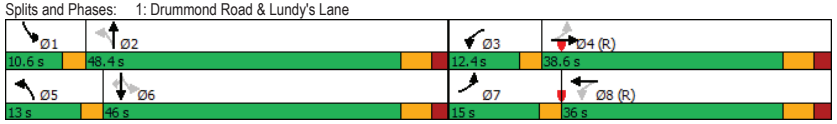
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	193	440	207	125	672	38	169	425	93	65	569	251
Future Volume (vph)	193	440	207	125	672	38	169	425	93	65	569	251
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	60.0		0.0	55.0		0.0	0.0		40.0	55.0		0.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00
Ped Bike Factor		0.91		0.93	1.00			0.99		0.99		0.99
Frt		0.952			0.992			0.973				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1646	2856	0	1662	3256	0	1662	3166	0	1630	1733	1488
Flt Permitted	0.129			0.233			0.103			0.408		
Satd. Flow (perm)	224	2856	0	379	3256	0	180	3166	0	693	1733	1468
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		74			5			28				256
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		156.1			67.9			167.8			223.0	
Travel Time (s)		11.2			4.9			12.1			16.1	
Confl. Peds. (#/hr)	33		92	92		33	1		20	20		1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	1%	1%	2%	0%	1%	0%	0%	1%	4%	2%	1%	0%
Adj. Flow (vph)	201	458	216	130	700	40	176	443	97	68	593	261
Shared Lane Traffic (%)												
Lane Group Flow (vph)	201	674	0	130	740	0	176	540	0	68	593	261
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		6
Detector Phase	7	4		3	8		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	6.0	10.0		6.0	10.0		6.0	8.0		6.0	8.0	8.0
Minimum Split (s)	10.5	26.5		10.5	26.5		10.5	33.5		10.5	33.5	33.5
Total Split (s)	15.0	38.6		12.4	36.0		13.0	48.4		10.6	46.0	46.0
Total Split (%)	13.6%	35.1%		11.3%	32.7%		11.8%	44.0%		9.6%	41.8%	41.8%
Maximum Green (s)	12.0	32.1		9.4	29.5		10.0	41.9		7.6	39.5	39.5
Yellow Time (s)	3.0	4.1		3.0	4.1		3.0	4.1		3.0	4.1	4.1
All-Red Time (s)	0.0	2.4		0.0	2.4		0.0	2.4		0.0	2.4	2.4
Lost Time Adjust (s)	1.0	-2.5		1.0	-2.5		1.0	-2.5		1.0	-2.5	-2.5
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	2.6	2.5		2.6	2.5		2.5	2.5		2.5	2.5	2.5
Recall Mode	None	C-Max		None	C-Max		None	Max		None	Max	Max
Walk Time (s)		8.0			8.0			12.0			12.0	12.0
Flash Dont Walk (s)		12.0			12.0			15.0			15.0	15.0
Pedestrian Calls (#/hr)		0			0			0			0	0
Act Effct Green (s)	46.0	35.2		40.0	32.2		54.0	46.8		48.1	42.1	42.1
Actuated g/C Ratio	0.42	0.32		0.36	0.29		0.49	0.43		0.44	0.38	0.38
v/c Ratio	0.86	0.70		0.57	0.77		0.85	0.40		0.19	0.89	0.36
Control Delay	57.2	33.7		30.5	41.8		54.7	22.3		16.0	50.0	4.6
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	57.2	33.7		30.5	41.8		54.7	22.3		16.0	50.0	4.6
LOS	E	C		C	D		D	C		B	D	A
Approach Delay		39.1			40.1			30.2			34.6	
Approach LOS		D			D			C			C	

Intersection Summary

Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 72 (65%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
Natural Cycle: 85
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.89
Intersection Signal Delay: 36.3 Intersection LOS: D
Intersection Capacity Utilization 89.3% ICU Level of Service E
Analysis Period (min) 15

Splits and Phases: 1: Drummond Road & Lundy's Lane



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	201	674	130	740	176	540	68	593	261
v/c Ratio	0.86	0.70	0.57	0.77	0.85	0.40	0.19	0.89	0.36
Control Delay	57.2	33.7	30.5	41.8	54.7	22.3	16.0	50.0	4.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.2	33.7	30.5	41.8	54.7	22.3	16.0	50.0	4.6
Queue Length 50th (m)	29.0	63.1	17.9	80.1	21.6	42.6	7.7	124.2	0.7
Queue Length 95th (m)	#69.9	85.2	31.0	103.4	#61.3	58.0	15.5	#192.9	17.4
Internal Link Dist (m)		132.1		43.9		143.8		199.0	
Turn Bay Length (m)	60.0		55.0				55.0		
Base Capacity (vph)	236	964	238	957	209	1363	363	663	719
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.85	0.70	0.55	0.77	0.84	0.40	0.19	0.89	0.36

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	193	440	207	125	672	38	169	425	93	65	569	251
Future Volume (vph)	193	440	207	125	672	38	169	425	93	65	569	251
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.91		1.00	1.00		1.00	0.99		1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00		0.99	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.95		1.00	0.99		1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1646	2856		1640	3256		1662	3166		1623	1733	1468
Flt Permitted	0.13	1.00		0.23	1.00		0.10	1.00		0.41	1.00	1.00
Satd. Flow (perm)	223	2856		403	3256		181	3166		697	1733	1468
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	201	458	216	130	700	40	176	443	97	68	593	261
RTOR Reduction (vph)	0	51	0	0	4	0	0	16	0	0	0	157
Lane Group Flow (vph)	201	623	0	130	736	0	176	524	0	68	593	104
Confl. Peds. (#/hr)	33		92	92		33	1		20	20		1
Heavy Vehicles (%)	1%	1%	2%	0%	1%	0%	0%	1%	4%	2%	1%	0%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	43.9	32.1		37.9	29.1		53.1	44.3		46.0	40.2	40.2
Effective Green, g (s)	41.9	34.6		35.9	31.6		52.1	46.8		44.0	42.7	42.7
Actuated g/C Ratio	0.38	0.31		0.33	0.29		0.47	0.43		0.40	0.39	0.39
Clearance Time (s)	3.0	6.5		3.0	6.5		3.0	6.5		3.0	6.5	6.5
Vehicle Extension (s)	2.6	2.5		2.6	2.5		2.5	2.5		2.5	2.5	2.5
Lane Grp Cap (vph)	224	898		219	935		205	1346		319	672	569
v/s Ratio Prot	c0.09	0.22		0.04	0.23		c0.07	0.17		0.01	c0.34	
v/s Ratio Perm	c0.25			0.15			0.34			0.08		0.07
v/c Ratio	0.90	0.69		0.59	0.79		0.86	0.39		0.21	0.88	0.18
Uniform Delay, d1	26.8	33.1		27.9	36.1		23.5	21.8		20.7	31.3	22.2
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	33.5	4.4		3.7	6.7		27.8	0.8		0.2	15.5	0.7
Delay (s)	60.3	37.5		31.6	42.8		51.3	22.6		21.0	46.9	22.9
Level of Service	E	D		C	D		D	C		C	D	C
Approach Delay (s)		42.7			41.1			29.7			38.2	
Approach LOS		D			D			C			D	

Intersection Summary				
HCM 2000 Control Delay	38.3	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.88			
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	89.3%	ICU Level of Service	E	
Analysis Period (min)	15			

c Critical Lane Group

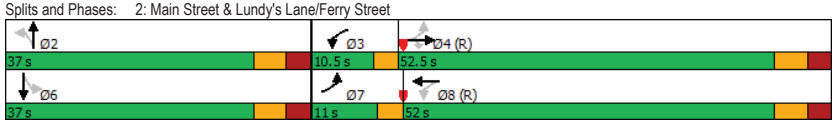
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	102	512	187	36	578	28	156	102	48	26	80	131
Future Volume (vph)	102	512	187	36	578	28	156	102	48	26	80	131
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	45.0		0.0	25.0		0.0	10.0		0.0	25.0		0.0
Storage Lanes	1		1	1		0	1		0	1		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	0.99		0.92	0.98	1.00		0.99	0.98		0.96	0.98	
Frt			0.850		0.993			0.952			0.907	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1630	1716	1473	1554	1715	0	1630	1582	0	1662	1529	0
Flt Permitted	0.186			0.331			0.522			0.611		
Satd. Flow (perm)	315	1716	1357	530	1715	0	882	1582	0	1028	1529	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			195		3			25			88	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		344.7			143.8			206.1			169.2	
Travel Time (s)		24.8			10.4			14.8			12.2	
Confl. Peds. (#/hr)	34		36	36		34	22		30	30		22
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	2%	2%	1%	7%	1%	0%	2%	2%	5%	0%	1%	2%
Adj. Flow (vph)	106	533	195	38	602	29	163	106	50	27	83	136
Shared Lane Traffic (%)												
Lane Group Flow (vph)	106	533	195	38	631	0	163	156	0	27	219	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4		4	8			2			6		
Detector Phase	7	4	4	3	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	6.0	8.0	8.0	6.0	8.0		8.0	8.0		8.0	8.0	
Minimum Split (s)	10.5	37.0	37.0	10.5	37.0		37.0	37.0		37.0	37.0	
Total Split (s)	11.0	52.5	52.5	10.5	52.0		37.0	37.0		37.0	37.0	
Total Split (%)	11.0%	52.5%	52.5%	10.5%	52.0%		37.0%	37.0%		37.0%	37.0%	
Maximum Green (s)	8.0	45.5	45.5	7.5	45.0		30.0	30.0		30.0	30.0	
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	0.0	3.0	3.0	0.0	3.0		3.0	3.0		3.0	3.0	
Lost Time Adjust (s)	1.0	-3.0	-3.0	1.0	-3.0		-3.0	-3.0		-3.0	-3.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	2.5	2.2	2.2	2.5	2.2		2.2	2.2		2.2	2.2	
Recall Mode	None	C-Max	C-Max	None	C-Max		Max	Max		Max	Max	
Walk Time (s)		12.0	12.0		12.0		12.0	12.0		12.0	12.0	
Flash Dont Walk (s)		18.0	18.0		18.0		18.0	18.0		18.0	18.0	
Pedestrian Calls (#/hr)		0	0		0		0	0		0	0	
Act Effct Green (s)	57.4	53.2	53.2	54.0	48.7		33.0	33.0		33.0	33.0	
Actuated g/C Ratio	0.57	0.53	0.53	0.54	0.49		0.33	0.33		0.33	0.33	
v/c Ratio	0.40	0.58	0.24	0.11	0.75		0.56	0.29		0.08	0.39	
Control Delay	13.7	20.2	2.9	9.6	28.0		36.4	22.5		24.0	17.4	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	13.7	20.2	2.9	9.6	28.0		36.4	22.5		24.0	17.4	
LOS	B	C	A	A	C		D	C		C	B	
Approach Delay		15.3			27.0			29.6			18.1	
Approach LOS		B			C			C			B	

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 6 (6%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
Natural Cycle: 85
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.75
Intersection Signal Delay: 21.6 Intersection LOS: C
Intersection Capacity Utilization 88.9% ICU Level of Service E
Analysis Period (min) 15

Splits and Phases: 2: Main Street & Lundy's Lane/Ferry Street



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	106	533	195	38	631	163	156	27	219
v/c Ratio	0.40	0.58	0.24	0.11	0.75	0.56	0.29	0.08	0.39
Control Delay	13.7	20.2	2.9	9.6	28.0	36.4	22.5	24.0	17.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.7	20.2	2.9	9.6	28.0	36.4	22.5	24.0	17.4
Queue Length 50th (m)	8.8	75.6	0.0	3.1	101.3	27.1	19.4	3.8	19.5
Queue Length 95th (m)	16.4	114.7	11.5	7.4	149.5	50.0	36.0	10.2	40.2
Internal Link Dist (m)		320.7			119.8		182.1		145.2
Turn Bay Length (m)	45.0			25.0		10.0		25.0	
Base Capacity (vph)	272	913	813	359	836	291	538	339	563
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.39	0.58	0.24	0.11	0.75	0.56	0.29	0.08	0.39

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	102	512	187	36	578	28	156	102	48	26	80	131
Future Volume (vph)	102	512	187	36	578	28	156	102	48	26	80	131
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.92	1.00	1.00		1.00	0.98		1.00	0.98	
Flpb, ped/bikes	1.00	1.00	1.00	0.99	1.00		0.99	1.00		0.96	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.95		1.00	0.91	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1627	1716	1357	1543	1716		1606	1582		1598	1529	
Flt Permitted	0.19	1.00	1.00	0.33	1.00		0.52	1.00		0.61	1.00	
Satd. Flow (perm)	319	1716	1357	538	1716		882	1582		1028	1529	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	106	533	195	38	602	29	162	106	50	27	83	136
RTOR Reduction (vph)	0	0	94	0	2	0	0	17	0	0	59	0
Lane Group Flow (vph)	106	533	101	38	629	0	163	139	0	27	160	0
Confl. Peds. (#/hr)	34		36	36		34	22		30	30		22
Heavy Vehicles (%)	2%	2%	1%	7%	1%	0%	2%	2%	5%	0%	1%	2%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	56.0	49.0	49.0	49.7	45.7		30.0	30.0		30.0	30.0	
Effective Green, g (s)	54.3	52.0	52.0	47.7	48.7		33.0	33.0		33.0	33.0	
Actuated g/C Ratio	0.54	0.52	0.52	0.48	0.49		0.33	0.33		0.33	0.33	
Clearance Time (s)	3.0	7.0	7.0	3.0	7.0		7.0	7.0		7.0	7.0	
Vehicle Extension (s)	2.5	2.2	2.2	2.5	2.2		2.2	2.2		2.2	2.2	
Lane Grp Cap (vph)	255	892	705	286	835		291	522		339	504	
v/s Ratio Prot	c0.03	0.31		0.00	c0.37			0.09			0.10	
v/s Ratio Perm	0.20		0.07	0.06			c0.18			0.03		
v/c Ratio	0.42	0.60	0.14	0.13	0.75		0.56	0.27		0.08	0.32	
Uniform Delay, d1	15.4	16.7	12.5	14.9	20.8		27.5	24.6		23.1	25.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.8	2.9	0.4	0.2	6.2		7.6	1.2		0.5	1.7	
Delay (s)	16.2	19.7	12.9	15.1	27.0		35.1	25.9		23.5	26.7	
Level of Service	B	B	B	B	C		D	C		C	C	
Approach Delay (s)		17.6			26.4			30.6			26.4	
Approach LOS		B			C			C			C	

Intersection Summary				
HCM 2000 Control Delay	23.5	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.66			
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	88.9%	ICU Level of Service	E	
Analysis Period (min)	15			

c Critical Lane Group

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	21	577	818	21	13	17
Future Volume (vph)	21	577	818	21	13	17
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	0.95	0.95	0.95	0.95	1.00	1.00
Frt			0.996		0.924	
Flt Protected		0.998			0.979	
Satd. Flow (prot)	0	3284	3278	0	1552	0
Flt Permitted		0.998			0.979	
Satd. Flow (perm)	0	3284	3278	0	1552	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		67.9	344.7		104.5	
Travel Time (s)		4.9	24.8		7.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	1%	1%	2%	2%	2%
Adj. Flow (vph)	23	627	889	23	14	18
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	650	912	0	32	0
Enter Blocked Intersection	No	No	Yes	Yes	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.6	3.6		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	43.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	21	577	818	21	13	17
Future Volume (Veh/h)	21	577	818	21	13	17
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)	23	627	889	23	14	18
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		68	345			
pX, platoon unblocked						
vC, conflicting volume	912				1260	456
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	912				1260	456
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				91	97
cM capacity (veh/h)	743				157	551

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	232	418	593	319	32
Volume Left	23	0	0	0	14
Volume Right	0	0	0	23	18
cSH	743	1700	1700	1700	263
Volume to Capacity	0.03	0.25	0.35	0.19	0.12
Queue Length 95th (m)	0.8	0.0	0.0	0.0	3.3
Control Delay (s)	1.3	0.0	0.0	0.0	20.6
Lane LOS	A				C
Approach Delay (s)	0.5		0.0		20.6
Approach LOS					C

Intersection Summary				
Average Delay	0.6			
Intersection Capacity Utilization	43.9%	ICU Level of Service		A
Analysis Period (min)	15			

Intersection: 1: Drummond Road & Lundy's Lane

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	T	TR	L	T	R
Maximum Queue (m)	65.4	85.3	78.0	47.4	69.0	73.5	59.4	92.9	47.5	62.4	212.6	182.4
Average Queue (m)	34.4	49.5	48.0	32.8	56.1	59.5	30.0	50.2	30.1	24.7	146.0	58.2
95th Queue (m)	62.2	76.0	73.2	57.8	76.1	76.4	50.8	80.8	58.7	63.6	235.9	179.7
Link Distance (m)		142.0	142.0		47.5	47.5	153.8	153.8			209.0	209.0
Upstream Blk Time (%)				0	17	25					12	5
Queuing Penalty (veh)				0	73	106					0	0
Storage Bay Dist (m)	60.0			55.0					40.0	55.0		
Storage Blk Time (%)	0	4		0	17			14	1	0	47	
Queuing Penalty (veh)	1	8		2	22			43	3	0	31	

Intersection: 2: Main Street & Lundy's Lane/Ferry Street

Movement	EB	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	TR	L	TR	L	TR
Maximum Queue (m)	52.3	115.6	30.4	28.8	111.3	17.8	94.9	22.5	62.5
Average Queue (m)	20.2	48.9	10.6	8.4	69.1	16.5	42.7	5.8	28.1
95th Queue (m)	45.9	96.8	23.6	25.2	110.5	20.1	84.0	17.9	51.6
Link Distance (m)		321.7	321.7		131.6		193.1		153.4
Upstream Blk Time (%)					0				
Queuing Penalty (veh)					0				
Storage Bay Dist (m)	45.0			25.0		10.0		25.0	
Storage Blk Time (%)	0	10		0	30	59	37	0	12
Queuing Penalty (veh)	0	10		0	11	89	58	0	3

Intersection: 3: Lundy's Lane & Site Access

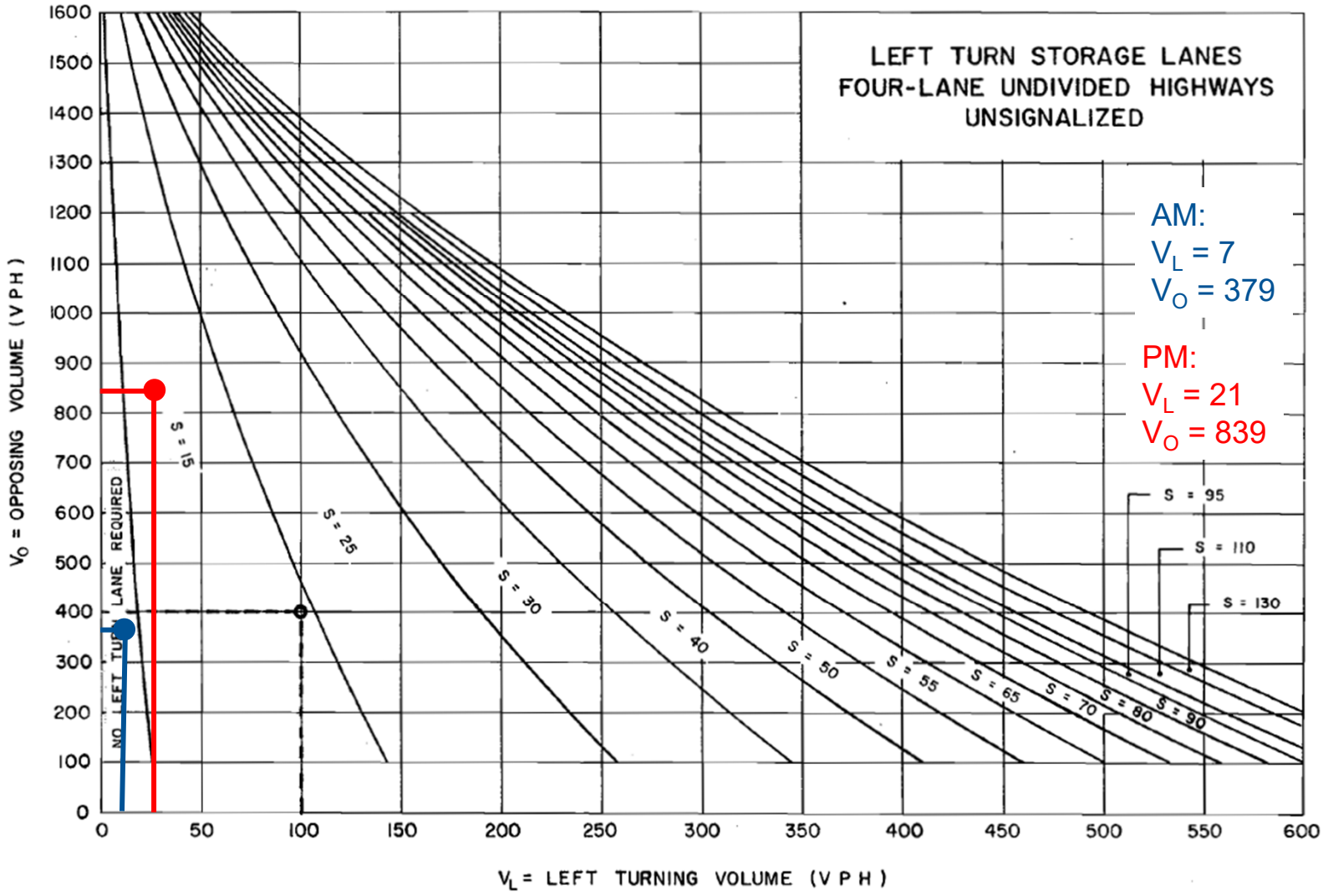
Movement	EB	EB	WB	WB	SB
Directions Served	LT	T	T	TR	LR
Maximum Queue (m)	52.8	48.1	28.4	31.9	26.9
Average Queue (m)	11.2	3.2	4.3	6.2	8.4
95th Queue (m)	38.4	22.0	18.4	23.0	20.2
Link Distance (m)	47.5	47.5	321.7	321.7	90.6
Upstream Blk Time (%)	1	0			
Queuing Penalty (veh)	2	0			
Storage Bay Dist (m)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Network Summary

Network wide Queuing Penalty: 460

Appendix G

Left-Turn Warrant



paradigm TRANSPORTATION SOLUTIONS LIMITED

Site Driveway
Eastbound Left-Turn Lane Warrant

Appendix H

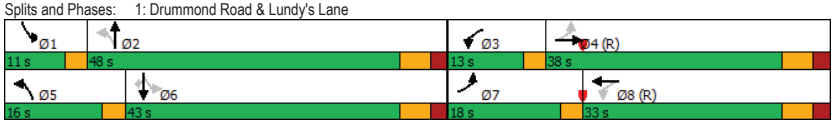
Future Traffic Total Operations – Sensitivity

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	147	384	135	88	275	46	135	438	69	73	308	136
Future Volume (vph)	147	384	135	88	275	46	135	438	69	73	308	136
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	60.0		0.0	55.0		0.0	0.0		40.0	55.0		0.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00
Ped Bike Factor	0.98	0.97		0.97	0.99		0.99	1.00		0.99		0.96
Frt		0.961			0.979			0.979				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1554	3026	0	1583	3070	0	1599	3056	0	1630	1667	1403
Flt Permitted	0.402			0.360			0.369			0.411		
Satd. Flow (perm)	645	3026	0	579	3070	0	614	3056	0	697	1667	1353
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		46			17			19				154
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		156.1			67.9			167.8			223.0	
Travel Time (s)		11.2			4.9			12.1			16.1	
Confl. Peds. (#/hr)	23		31	31		23	20		20	20		20
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	7%	3%	2%	5%	5%	7%	4%	6%	6%	2%	5%	6%
Adj. Flow (vph)	155	404	142	93	289	48	142	461	73	77	324	143
Shared Lane Traffic (%)												
Lane Group Flow (vph)	155	546	0	93	337	0	142	534	0	77	324	143
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		6
Detector Phase	7	4		3	8		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	6.0	10.0		6.0	10.0		6.0	8.0		6.0	8.0	8.0
Minimum Split (s)	10.5	26.5		10.5	26.5		10.5	33.5		10.5	33.5	33.5
Total Split (s)	18.0	38.0		13.0	33.0		16.0	48.0		11.0	43.0	43.0
Total Split (%)	16.4%	34.5%		11.8%	30.0%		14.5%	43.6%		10.0%	39.1%	39.1%
Maximum Green (s)	15.0	31.5		10.0	26.5		13.0	41.5		8.0	36.5	36.5
Yellow Time (s)	3.0	4.1		3.0	4.1		3.0	4.1		3.0	4.1	4.1
All-Red Time (s)	0.0	2.4		0.0	2.4		0.0	2.4		0.0	2.4	2.4
Lost Time Adjust (s)	1.0	-2.5		1.0	-2.5		1.0	-2.5		1.0	-2.5	-2.5
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	2.6	2.5		2.6	2.5		2.5	2.5		2.5	2.5	2.5
Recall Mode	None	C-Max		None	C-Max		None	Max		None	Max	Max
Walk Time (s)		8.0			8.0			12.0			12.0	12.0
Flash Dont Walk (s)		12.0			12.0			15.0			15.0	15.0
Pedestrian Calls (#/hr)		0			0			0			0	0
Act Effct Green (s)	46.5	37.3		39.8	32.2		54.3	46.5		48.1	41.8	41.8
Actuated g/C Ratio	0.42	0.34		0.36	0.29		0.49	0.42		0.44	0.38	0.38
v/c Ratio	0.43	0.52		0.33	0.37		0.37	0.41		0.22	0.51	0.23
Control Delay	24.1	29.5		23.1	31.3		18.1	23.1		16.4	30.4	4.3
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	24.1	29.5		23.1	31.3		18.1	23.1		16.4	30.4	4.3
LOS	C	C		C	C		B	C		B	C	A
Approach Delay		28.3			29.5			22.1			21.5	
Approach LOS		C			C			C			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 110			
Actuated Cycle Length: 110			
Offset: 72 (65%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green			
Natural Cycle: 85			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.52			
Intersection Signal Delay: 25.2		Intersection LOS: C	
Intersection Capacity Utilization 69.5%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 1: Drummond Road & Lundy's Lane



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	155	546	93	337	142	534	77	324	143
v/c Ratio	0.43	0.52	0.33	0.37	0.37	0.41	0.22	0.51	0.23
Control Delay	24.1	29.5	23.1	31.3	18.1	23.1	16.4	30.4	4.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.1	29.5	23.1	31.3	18.1	23.1	16.4	30.4	4.3
Queue Length 50th (m)	21.8	48.8	12.5	30.1	17.0	43.4	8.8	55.7	0.0
Queue Length 95th (m)	36.8	67.7	23.5	45.5	29.1	59.0	17.2	87.4	11.7
Internal Link Dist (m)		132.1		43.9		143.8		199.0	
Turn Bay Length (m)	60.0		55.0				55.0		
Base Capacity (vph)	391	1055	299	911	414	1303	368	633	609
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.40	0.52	0.31	0.37	0.34	0.41	0.21	0.51	0.23

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	147	384	135	88	275	46	135	438	69	73	308	136
Future Volume (vph)	147	384	135	88	275	46	135	438	69	73	308	136
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.97		1.00	0.99		1.00	1.00		1.00	1.00	0.96
Flpb, ped/bikes	0.99	1.00		0.99	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.96		1.00	0.98		1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1543	3026		1566	3069		1592	3057		1623	1667	1353
Flt Permitted	0.40	1.00		0.36	1.00		0.37	1.00		0.41	1.00	1.00
Satd. Flow (perm)	653	3026		593	3069		619	3057		702	1667	1353
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	155	404	142	93	289	48	142	461	73	77	324	143
RTOR Reduction (vph)	0	31	0	0	12	0	0	11	0	0	0	88
Lane Group Flow (vph)	155	515	0	93	325	0	142	523	0	77	324	55
Confl. Peds. (#/hr)	23		31	31		23	20		20	20		20
Heavy Vehicles (%)	7%	3%	2%	5%	5%	7%	4%	6%	6%	2%	5%	6%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	43.9	33.6		36.4	29.1		53.1	44.0		46.0	39.9	39.9
Effective Green, g (s)	42.9	36.1		34.4	31.6		52.1	46.5		44.0	42.4	42.4
Actuated g/C Ratio	0.39	0.33		0.31	0.29		0.47	0.42		0.40	0.39	0.39
Clearance Time (s)	3.0	6.5		3.0	6.5		3.0	6.5		3.0	6.5	6.5
Vehicle Extension (s)	2.6	2.5		2.6	2.5		2.5	2.5		2.5	2.5	2.5
Lane Grp Cap (vph)	342	993		241	881		374	1292		323	642	521
v/s Ratio Prot	c0.04	c0.17		0.02	0.11		c0.03	0.17		0.01	c0.19	
v/s Ratio Perm	0.13			0.10			0.15			0.08		0.04
v/c Ratio	0.45	0.52		0.39	0.37		0.38	0.40		0.24	0.50	0.11
Uniform Delay, d1	23.2	29.9		27.8	31.2		17.9	22.1		20.9	25.8	21.7
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.7	1.9		0.8	1.2		0.5	0.9		0.3	2.8	0.4
Delay (s)	23.9	31.9		28.6	32.4		18.4	23.1		21.1	28.6	22.1
Level of Service	C	C		C	C		B	C		C	C	C
Approach Delay (s)		30.1			31.6			22.1			25.8	
Approach LOS		C			C			C			C	

Intersection Summary				
HCM 2000 Control Delay	27.1	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.51			
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	69.5%	ICU Level of Service	C	
Analysis Period (min)	15			

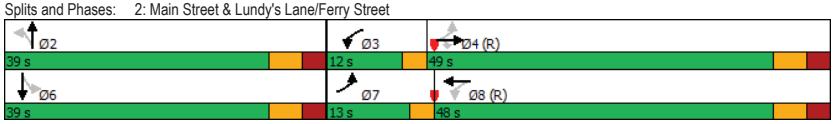
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	64	322	123	28	266	14	64	34	28	6	36	57
Future Volume (vph)	64	322	123	28	266	14	64	34	28	6	36	57
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	45.0		0.0	25.0		0.0	10.0		0.0	25.0		0.0
Storage Lanes	1		1	1		0	1		0	1		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	0.99		0.92	0.97	1.00			0.99		0.99	0.98	
Frt			0.850		0.993			0.932			0.908	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1599	1683	1458	1471	1628	0	1630	1465	0	1385	1482	0
Flt Permitted	0.443			0.448			0.683			0.709		
Satd. Flow (perm)	738	1683	1336	671	1628	0	1172	1465	0	1022	1482	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			145		3			33			67	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		344.7			143.8			206.1			169.2	
Travel Time (s)		24.8			10.4			14.8			12.2	
Confl. Peds. (#/hr)	11		39	39		11			8	8		21
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Heavy Vehicles (%)	4%	4%	2%	13%	6%	17%	2%	11%	8%	20%	10%	2%
Adj. Flow (vph)	75	379	145	33	313	16	75	40	33	7	42	67
Shared Lane Traffic (%)												
Lane Group Flow (vph)	75	379	145	33	329	0	75	73	0	7	109	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4		4	8			2			6		
Detector Phase	7	4	4	3	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	6.0	8.0	8.0	6.0	8.0		8.0	8.0		8.0	8.0	
Minimum Split (s)	10.5	37.0	37.0	10.5	37.0		37.0	37.0		37.0	37.0	
Total Split (s)	13.0	49.0	49.0	12.0	48.0		39.0	39.0		39.0	39.0	
Total Split (%)	13.0%	49.0%	49.0%	12.0%	48.0%		39.0%	39.0%		39.0%	39.0%	
Maximum Green (s)	10.0	42.0	42.0	9.0	41.0		32.0	32.0		32.0	32.0	
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	0.0	3.0	3.0	0.0	3.0		3.0	3.0		3.0	3.0	
Lost Time Adjust (s)	1.0	-3.0	-3.0	1.0	-3.0		-3.0	-3.0		-3.0	-3.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	2.5	2.2	2.2	2.5	2.2		2.2	2.2		2.2	2.2	
Recall Mode	None	C-Max	C-Max	None	C-Max		Max	Max		Max	Max	
Walk Time (s)		12.0	12.0		12.0		12.0	12.0		12.0	12.0	
Flash Dont Walk (s)		18.0	18.0		18.0		18.0	18.0		18.0	18.0	
Pedestrian Calls (#/hr)		0	0		0		0	0		0	0	
Act Effct Green (s)	55.5	51.2	51.2	52.9	48.5		35.0	35.0		35.0	35.0	
Actuated g/C Ratio	0.56	0.51	0.51	0.53	0.48		0.35	0.35		0.35	0.35	
v/c Ratio	0.16	0.44	0.19	0.08	0.42		0.18	0.14		0.02	0.19	
Control Delay	10.7	18.4	3.3	10.2	19.4		24.1	14.4		21.7	11.0	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	10.7	18.4	3.3	10.2	19.4		24.1	14.4		21.7	11.0	
LOS	B	B	A	B	B		C	B		C	B	
Approach Delay		13.8			18.6			19.3			11.7	
Approach LOS		B			B			B			B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 6 (6%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green			
Natural Cycle: 85			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.44			
Intersection Signal Delay: 15.7		Intersection LOS: B	
Intersection Capacity Utilization 65.0%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 2: Main Street & Lundy's Lane/Ferry Street



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	75	379	145	33	329	75	73	7	109
v/c Ratio	0.16	0.44	0.19	0.08	0.42	0.18	0.14	0.02	0.19
Control Delay	10.7	18.4	3.3	10.2	19.4	24.1	14.4	21.7	11.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.7	18.4	3.3	10.2	19.4	24.1	14.4	21.7	11.0
Queue Length 50th (m)	6.5	50.1	0.0	2.8	42.7	10.5	5.4	0.9	5.7
Queue Length 95th (m)	12.2	71.6	8.8	6.7	63.7	20.2	14.1	3.8	16.1
Internal Link Dist (m)		320.7			119.8		182.1		145.2
Turn Bay Length (m)	45.0			25.0		10.0		25.0	
Base Capacity (vph)	495	862	755	432	791	410	534	357	562
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.15	0.44	0.19	0.08	0.42	0.18	0.14	0.02	0.19

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	64	322	123	28	266	14	64	34	28	6	36	57
Future Volume (vph)	64	322	123	28	266	14	64	34	28	6	36	57
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.92	1.00	1.00		1.00	0.99		1.00	0.98	
Flpb, ped/bikes	1.00	1.00	1.00	0.99	1.00		1.00	1.00		0.99	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.93		1.00	0.91	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1592	1683	1336	1450	1628		1630	1466		1369	1482	
Flt Permitted	0.44	1.00	1.00	0.45	1.00		0.68	1.00		0.71	1.00	
Satd. Flow (perm)	742	1683	1336	684	1628		1172	1466		1022	1482	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	75	379	145	33	313	16	75	40	33	7	42	67
RTOR Reduction (vph)	0	0	73	0	2	0	0	21	0	0	44	0
Lane Group Flow (vph)	75	379	73	33	327	0	75	52	0	7	65	0
Confl. Peds. (#/hr)	11		39	39		11			8	8		21
Heavy Vehicles (%)	4%	4%	2%	13%	6%	17%	2%	11%	8%	20%	10%	2%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	53.1	47.0	47.0	48.9	44.9		32.0	32.0		32.0	32.0	
Effective Green, g (s)	51.1	50.0	50.0	46.9	47.9		35.0	35.0		35.0	35.0	
Actuated g/C Ratio	0.51	0.50	0.50	0.47	0.48		0.35	0.35		0.35	0.35	
Clearance Time (s)	3.0	7.0	7.0	3.0	7.0		7.0	7.0		7.0	7.0	
Vehicle Extension (s)	2.5	2.2	2.2	2.5	2.2		2.2	2.2		2.2	2.2	
Lane Grp Cap (vph)	422	841	668	343	779		410	513		357	518	
v/s Ratio Prot	c0.01	c0.23		0.00	0.20			0.04			0.04	
v/s Ratio Perm	0.08		0.05	0.04			c0.06			0.01		
v/c Ratio	0.18	0.45	0.11	0.10	0.42		0.18	0.10		0.02	0.13	
Uniform Delay, d1	13.1	16.1	13.2	14.7	17.0		22.6	21.9		21.3	22.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	1.7	0.3	0.1	1.7		1.0	0.4		0.1	0.5	
Delay (s)	13.2	17.9	13.5	14.8	18.7		23.6	22.3		21.4	22.6	
Level of Service	B	B	B	B	B		C	C		C	C	
Approach Delay (s)		16.2			18.3			22.9			22.5	
Approach LOS		B			B			C			C	

Intersection Summary				
HCM 2000 Control Delay	18.3	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.34			
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	65.0%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	526	371	15	0	38
Future Volume (vph)	0	526	371	15	0	38
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00
Frt			0.994			0.865
Flt Protected						
Satd. Flow (prot)	0	3228	3151	0	0	1484
Flt Permitted						
Satd. Flow (perm)	0	3228	3151	0	0	1484
Link Speed (k/h)		50	50		50	
Link Distance (m)		67.9	344.7		104.5	
Travel Time (s)		4.9	24.8		7.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	3%	5%	2%	2%	2%
Adj. Flow (vph)	0	572	403	16	0	41
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	572	419	0	0	41
Enter Blocked Intersection	No	No	Yes	Yes	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.6	3.6		0.0	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 21.7%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	526	371	15	0	38
Future Volume (Veh/h)	0	526	371	15	0	38
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	572	403	16	0	41
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		68	345			
pX, platoon unblocked					0.88	
vC, conflicting volume	419				697	210
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	419				398	210
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	95
cM capacity (veh/h)	1137				513	796

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	286	286	269	150	41
Volume Left	0	0	0	0	0
Volume Right	0	0	0	16	41
cSH	1700	1700	1700	1700	796
Volume to Capacity	0.17	0.17	0.16	0.09	0.05
Queue Length 95th (m)	0.0	0.0	0.0	0.0	1.3
Control Delay (s)	0.0	0.0	0.0	0.0	9.8
Lane LOS					A
Approach Delay (s)	0.0		0.0		9.8
Approach LOS					A

Intersection Summary				
Average Delay		0.4		
Intersection Capacity Utilization		21.7%	ICU Level of Service	A
Analysis Period (min)		15		

Intersection: 1: Drummond Road & Lundy's Lane

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	T	TR	L	T	R
Maximum Queue (m)	55.0	75.0	64.2	39.3	51.4	53.1	54.9	105.5	47.5	61.9	87.0	25.6
Average Queue (m)	21.0	40.6	32.4	17.0	23.1	28.4	20.9	55.8	33.0	15.1	45.0	12.6
95th Queue (m)	40.4	65.0	57.1	32.5	42.4	47.9	40.5	90.7	61.9	40.2	75.3	22.6
Link Distance (m)		142.0	142.0		45.9	45.9	153.8	153.8			209.0	209.0
Upstream Blk Time (%)				0	0	1						
Queuing Penalty (veh)				0	1	2						
Storage Bay Dist (m)	60.0			55.0					40.0	55.0		
Storage Blk Time (%)		1		0	0			16	1	0	5	
Queuing Penalty (veh)		1		0	0			45	3	0	4	

Intersection: 2: Main Street & Lundy's Lane/Ferry Street

Movement	EB	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	TR	L	TR	L	TR
Maximum Queue (m)	52.2	85.5	24.5	26.2	77.1	17.4	39.5	16.0	33.0
Average Queue (m)	11.2	34.8	8.4	5.8	29.9	10.1	12.0	1.3	12.6
95th Queue (m)	32.4	73.7	19.6	20.0	57.7	19.5	30.0	7.6	26.5
Link Distance (m)		323.3	323.3		131.6		193.1		153.4
Upstream Blk Time (%)					0				
Queuing Penalty (veh)					0				
Storage Bay Dist (m)	45.0			25.0		10.0		25.0	
Storage Blk Time (%)		7		0	11	27	16		2
Queuing Penalty (veh)		4		0	3	17	10		0

Intersection: 3: Lundy's Lane & Site Access

Movement	SB
Directions Served	R
Maximum Queue (m)	16.3
Average Queue (m)	6.7
95th Queue (m)	13.7
Link Distance (m)	90.5
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

Network wide Queuing Penalty: 92

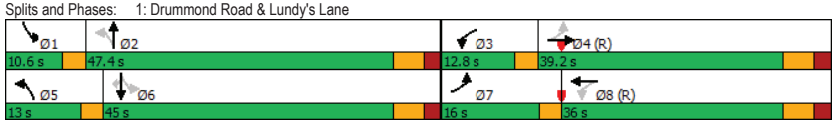
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	210	423	207	133	672	43	169	427	91	63	569	251
Future Volume (vph)	210	423	207	133	672	43	169	427	91	63	569	251
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	60.0		0.0	55.0		0.0	0.0		40.0	55.0		0.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00
Ped Bike Factor		0.91		0.93	1.00			0.99		0.99		0.99
Frt		0.951			0.991			0.974				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1646	2846	0	1662	3252	0	1662	3170	0	1630	1733	1488
Flt Permitted	0.126			0.257			0.095			0.404		
Satd. Flow (perm)	218	2846	0	416	3252	0	166	3170	0	686	1733	1468
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		80			6			27				253
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		156.1			67.9			167.8			223.0	
Travel Time (s)		11.2			4.9			12.1			16.1	
Confl. Peds. (#/hr)	33		92	92		33	1		20	20		1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	1%	1%	2%	0%	1%	0%	0%	1%	4%	2%	1%	0%
Adj. Flow (vph)	219	441	216	139	700	45	176	445	95	66	593	261
Shared Lane Traffic (%)												
Lane Group Flow (vph)	219	657	0	139	745	0	176	540	0	66	593	261
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		6
Detector Phase	7	4		3	8		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	6.0	10.0		6.0	10.0		6.0	8.0		6.0	8.0	8.0
Minimum Split (s)	10.5	26.5		10.5	26.5		10.5	33.5		10.5	33.5	33.5
Total Split (s)	16.0	39.2		12.8	36.0		13.0	47.4		10.6	45.0	45.0
Total Split (%)	14.5%	35.6%		11.6%	32.7%		11.8%	43.1%		9.6%	40.9%	40.9%
Maximum Green (s)	13.0	32.7		9.8	29.5		10.0	40.9		7.6	38.5	38.5
Yellow Time (s)	3.0	4.1		3.0	4.1		3.0	4.1		3.0	4.1	4.1
All-Red Time (s)	0.0	2.4		0.0	2.4		0.0	2.4		0.0	2.4	2.4
Lost Time Adjust (s)	1.0	-2.5		1.0	-2.5		1.0	-2.5		1.0	-2.5	-2.5
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	2.6	2.5		2.6	2.5		2.5	2.5		2.5	2.5	2.5
Recall Mode	None	C-Max		None	C-Max		None	Max		None	Max	Max
Walk Time (s)		8.0			8.0			12.0			12.0	12.0
Flash Dont Walk (s)		12.0			12.0			15.0			15.0	15.0
Pedestrian Calls (#/hr)		0			0			0			0	0
Act Effct Green (s)	47.5	35.9		40.4	32.3		53.0	45.8		47.1	41.1	41.1
Actuated g/C Ratio	0.43	0.33		0.37	0.29		0.48	0.42		0.43	0.37	0.37
v/c Ratio	0.89	0.67		0.57	0.78		0.88	0.40		0.19	0.92	0.37
Control Delay	60.3	32.0		29.4	42.0		62.2	23.0		16.5	54.0	4.9
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	60.3	32.0		29.4	42.0		62.2	23.0		16.5	54.0	4.9
LOS	E	C		C	D		E	C		B	D	A
Approach Delay		39.1			40.0			32.7			37.4	
Approach LOS		D			D			C			D	

Intersection Summary

Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 72 (65%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
Natural Cycle: 85
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.92
Intersection Signal Delay: 37.5 Intersection LOS: D
Intersection Capacity Utilization 90.5% ICU Level of Service E
Analysis Period (min) 15

Splits and Phases: 1: Drummond Road & Lundy's Lane



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	219	657	139	745	176	540	66	593	261
v/c Ratio	0.89	0.67	0.57	0.78	0.88	0.40	0.19	0.92	0.37
Control Delay	60.3	32.0	29.4	42.0	62.2	23.0	16.5	54.0	4.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	60.3	32.0	29.4	42.0	62.2	23.0	16.5	54.0	4.9
Queue Length 50th (m)	32.0	59.6	18.9	80.7	23.5	43.4	7.7	126.2	1.1
Queue Length 95th (m)	#76.6	81.0	32.4	104.3	#64.9	59.0	15.4	#196.6	18.1
Internal Link Dist (m)		132.1		43.9		143.8		199.0	
Turn Bay Length (m)	60.0		55.0				55.0		
Base Capacity (vph)	249	982	254	958	202	1336	353	646	706
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.88	0.67	0.55	0.78	0.87	0.40	0.19	0.92	0.37

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	210	423	207	133	672	43	169	427	91	63	569	251
Future Volume (vph)	210	423	207	133	672	43	169	427	91	63	569	251
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.91		1.00	1.00		1.00	0.99		1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00		0.98	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.95		1.00	0.99		1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1646	2845		1635	3251		1662	3168		1623	1733	1468
Flt Permitted	0.13	1.00		0.26	1.00		0.09	1.00		0.40	1.00	1.00
Satd. Flow (perm)	218	2845		443	3251		166	3168		691	1733	1468
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	219	441	216	139	700	45	176	445	95	66	593	261
RTOR Reduction (vph)	0	54	0	0	4	0	0	16	0	0	0	157
Lane Group Flow (vph)	219	603	0	139	741	0	176	524	0	66	593	104
Confl. Peds. (#/hr)	33		92	92		33	1		20	20		1
Heavy Vehicles (%)	1%	1%	2%	0%	1%	0%	0%	1%	4%	2%	1%	0%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	44.9	32.8		38.3	29.2		52.1	43.3		45.0	39.2	39.2
Effective Green, g (s)	43.5	35.3		36.3	31.7		51.1	45.8		43.0	41.7	41.7
Actuated g/C Ratio	0.40	0.32		0.33	0.29		0.46	0.42		0.39	0.38	0.38
Clearance Time (s)	3.0	6.5		3.0	6.5		3.0	6.5		3.0	6.5	6.5
Vehicle Extension (s)	2.6	2.5		2.6	2.5		2.5	2.5		2.5	2.5	2.5
Lane Grp Cap (vph)	238	912		233	936		198	1319		310	656	556
v/s Ratio Prot	c0.10	0.21		0.04	0.23		c0.07	0.17		0.01	c0.34	
v/s Ratio Perm	c0.27			0.15			0.34			0.07		0.07
v/c Ratio	0.92	0.66		0.60	0.79		0.89	0.40		0.21	0.90	0.19
Uniform Delay, d1	26.4	32.2		27.6	36.1		25.6	22.4		21.3	32.3	22.8
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	37.3	3.8		3.5	6.8		34.6	0.9		0.3	18.2	0.7
Delay (s)	63.7	35.9		31.1	42.9		60.2	23.3		21.6	50.4	23.6
Level of Service	E	D		C	D		E	C		C	D	C
Approach Delay (s)		42.9			41.0			32.4			40.7	
Approach LOS		D			D			C			D	

Intersection Summary				
HCM 2000 Control Delay	39.6	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.90			
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	90.5%	ICU Level of Service	E	
Analysis Period (min)	15			

c Critical Lane Group

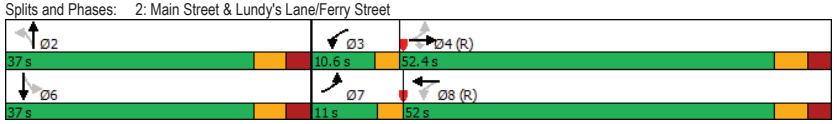
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	101	503	184	36	578	28	156	102	48	26	80	152
Future Volume (vph)	101	503	184	36	578	28	156	102	48	26	80	152
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	45.0		0.0	25.0		0.0	10.0		0.0	25.0		0.0
Storage Lanes	1		1	1		0	1		0	1		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	0.99		0.92	0.98	1.00		0.99	0.98		0.96	0.98	
Frt			0.850		0.993			0.952			0.902	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1630	1716	1473	1554	1715	0	1630	1582	0	1662	1519	0
Flt Permitted	0.203			0.330			0.492			0.611		
Satd. Flow (perm)	343	1716	1357	528	1715	0	832	1582	0	1028	1519	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			192		3			25			102	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		344.7			143.8			206.1			169.2	
Travel Time (s)		24.8			10.4			14.8			12.2	
Confl. Peds. (#/hr)	34		36	36		34	22		30	30		22
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	2%	2%	1%	7%	1%	0%	2%	2%	5%	0%	1%	2%
Adj. Flow (vph)	105	524	192	38	602	29	163	106	50	27	83	158
Shared Lane Traffic (%)												
Lane Group Flow (vph)	105	524	192	38	631	0	163	156	0	27	241	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4		4	8			2			6		
Detector Phase	7	4	4	3	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	6.0	8.0	8.0	6.0	8.0		8.0	8.0		8.0	8.0	
Minimum Split (s)	10.5	37.0	37.0	10.5	37.0		37.0	37.0		37.0	37.0	
Total Split (s)	11.0	52.4	52.4	10.6	52.0		37.0	37.0		37.0	37.0	
Total Split (%)	11.0%	52.4%	52.4%	10.6%	52.0%		37.0%	37.0%		37.0%	37.0%	
Maximum Green (s)	8.0	45.4	45.4	7.6	45.0		30.0	30.0		30.0	30.0	
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	0.0	3.0	3.0	0.0	3.0		3.0	3.0		3.0	3.0	
Lost Time Adjust (s)	1.0	-3.0	-3.0	1.0	-3.0		-3.0	-3.0		-3.0	-3.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	2.5	2.2	2.2	2.5	2.2		2.2	2.2		2.2	2.2	
Recall Mode	None	C-Max	C-Max	None	C-Max		Max	Max		Max	Max	
Walk Time (s)		12.0	12.0		12.0		12.0	12.0		12.0	12.0	
Flash Dont Walk (s)		18.0	18.0		18.0		18.0	18.0		18.0	18.0	
Pedestrian Calls (#/hr)		0	0		0		0	0		0	0	
Act Effct Green (s)	57.4	53.2	53.2	54.8	50.5		33.0	33.0		33.0	33.0	
Actuated g/C Ratio	0.57	0.53	0.53	0.55	0.50		0.33	0.33		0.33	0.33	
v/c Ratio	0.38	0.57	0.24	0.11	0.73		0.59	0.29		0.08	0.42	
Control Delay	13.1	20.0	2.9	9.6	26.3		38.5	22.5		24.0	17.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	13.1	20.0	2.9	9.6	26.3		38.5	22.5		24.0	17.2	
LOS	B	B	A	A	C		D	C		C	B	
Approach Delay		15.1			25.4			30.7			17.9	
Approach LOS		B			C			C			B	

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 6 (6%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
Natural Cycle: 85
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.73
Intersection Signal Delay: 21.2 Intersection LOS: C
Intersection Capacity Utilization 88.8% ICU Level of Service E
Analysis Period (min) 15

Splits and Phases: 2: Main Street & Lundy's Lane/Ferry Street



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	105	524	192	38	631	163	156	27	241
v/c Ratio	0.38	0.57	0.24	0.11	0.73	0.59	0.29	0.08	0.42
Control Delay	13.1	20.0	2.9	9.6	26.3	38.5	22.5	24.0	17.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.1	20.0	2.9	9.6	26.3	38.5	22.5	24.0	17.2
Queue Length 50th (m)	8.8	73.8	0.0	3.1	101.3	27.5	19.4	3.8	20.8
Queue Length 95th (m)	16.2	112.1	11.3	7.4	149.5	51.3	36.0	10.2	43.0
Internal Link Dist (m)		320.7			119.8		182.1		145.2
Turn Bay Length (m)	45.0			25.0		10.0		25.0	
Base Capacity (vph)	287	913	812	362	866	274	538	339	569
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.37	0.57	0.24	0.10	0.73	0.59	0.29	0.08	0.42

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	101	503	184	36	578	28	156	102	48	26	80	152
Future Volume (vph)	101	503	184	36	578	28	156	102	48	26	80	152
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.92	1.00	1.00		1.00	0.98		1.00	0.98	
Flpb, ped/bikes	1.00	1.00	1.00	0.99	1.00		0.99	1.00		0.96	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.95		1.00	0.90	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1626	1716	1357	1543	1716		1607	1582		1598	1518	
Flt Permitted	0.20	1.00	1.00	0.33	1.00		0.49	1.00		0.61	1.00	
Satd. Flow (perm)	347	1716	1357	537	1716		832	1582		1028	1518	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	105	524	192	38	602	29	162	106	50	27	83	158
RTOR Reduction (vph)	0	0	92	0	2	0	0	17	0	0	68	0
Lane Group Flow (vph)	105	524	100	38	629	0	163	139	0	27	173	0
Confl. Peds. (#/hr)	34		36	36		34	22		30	30		22
Heavy Vehicles (%)	2%	2%	1%	7%	1%	0%	2%	2%	5%	0%	1%	2%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	55.1	49.0	49.0	50.9	46.9		30.0	30.0		30.0	30.0	
Effective Green, g (s)	53.1	52.0	52.0	48.9	49.9		33.0	33.0		33.0	33.0	
Actuated g/C Ratio	0.53	0.52	0.52	0.49	0.50		0.33	0.33		0.33	0.33	
Clearance Time (s)	3.0	7.0	7.0	3.0	7.0		7.0	7.0		7.0	7.0	
Vehicle Extension (s)	2.5	2.2	2.2	2.5	2.2		2.2	2.2		2.2	2.2	
Lane Grp Cap (vph)	249	892	705	292	856		274	522		339	500	
v/s Ratio Prot	c0.02	0.31		0.00	c0.37			0.09			0.11	
v/s Ratio Perm	0.20		0.07	0.06			c0.20			0.03		
v/c Ratio	0.42	0.59	0.14	0.13	0.74		0.59	0.27		0.08	0.35	
Uniform Delay, d1	15.5	16.6	12.4	14.4	19.8		27.9	24.6		23.1	25.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.8	2.8	0.4	0.1	5.6		9.2	1.2		0.5	1.9	
Delay (s)	16.3	19.4	12.9	14.5	25.4		37.1	25.9		23.5	27.2	
Level of Service	B	B	B	B	C		D	C		C	C	
Approach Delay (s)		17.5			24.8			31.6			26.8	
Approach LOS		B			C			C			C	

Intersection Summary				
HCM 2000 Control Delay	23.2	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.66			
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	88.8%	ICU Level of Service	E	
Analysis Period (min)	15			

c Critical Lane Group

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	577	818	42	0	30
Future Volume (vph)	0	577	818	42	0	30
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00
Frt			0.993			0.865
Flt Protected						
Satd. Flow (prot)	0	3292	3267	0	0	1484
Flt Permitted						
Satd. Flow (perm)	0	3292	3267	0	0	1484
Link Speed (k/h)		50	50		50	
Link Distance (m)		67.9	344.7		104.5	
Travel Time (s)		4.9	24.8		7.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	1%	1%	2%	2%	2%
Adj. Flow (vph)	0	627	889	46	0	33
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	627	935	0	0	33
Enter Blocked Intersection	No	No	Yes	Yes	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.6	3.6		0.0	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	36.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	577	818	42	0	30
Future Volume (Veh/h)	0	577	818	42	0	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)	0	627	889	46	0	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)		68	345			
pX, platoon unblocked						
vC, conflicting volume	935				1226	468
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	935				1226	468
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	94
cM capacity (veh/h)	728				171	542

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	314	314	593	342	33
Volume Left	0	0	0	0	0
Volume Right	0	0	0	46	33
cSH	1700	1700	1700	1700	542
Volume to Capacity	0.18	0.18	0.35	0.20	0.06
Queue Length 95th (m)	0.0	0.0	0.0	0.0	1.6
Control Delay (s)	0.0	0.0	0.0	0.0	12.1
Lane LOS					B
Approach Delay (s)	0.0		0.0		12.1
Approach LOS					B

Intersection Summary				
Average Delay		0.2		
Intersection Capacity Utilization		36.0%	ICU Level of Service	A
Analysis Period (min)		15		

Intersection: 1: Drummond Road & Lundy's Lane

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	T	TR	L	T	R
Maximum Queue (m)	66.4	97.8	98.8	45.7	69.5	68.7	76.6	103.6	47.5	62.5	214.9	183.3
Average Queue (m)	37.1	48.5	48.4	33.2	55.9	59.6	37.2	52.3	32.6	26.7	147.7	55.2
95th Queue (m)	64.8	82.2	80.6	55.8	77.1	75.3	71.8	87.0	59.9	67.8	229.1	173.8
Link Distance (m)		142.0	142.0		45.9	45.9	153.8	153.8			209.0	209.0
Upstream Blk Time (%)				0	20	28					11	3
Queuing Penalty (veh)				0	83	120					0	0
Storage Bay Dist (m)	60.0			55.0					40.0	55.0		
Storage Blk Time (%)	3	2		0	20			14	1	0	51	
Queuing Penalty (veh)	7	4		2	26			43	3	0	32	

Intersection: 2: Main Street & Lundy's Lane/Ferry Street

Movement	EB	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	TR	L	TR	L	TR
Maximum Queue (m)	52.4	120.2	32.6	32.3	133.9	17.9	75.9	32.0	68.2
Average Queue (m)	20.7	53.5	11.6	9.6	75.4	16.2	35.7	6.9	29.2
95th Queue (m)	48.4	104.8	25.1	27.4	123.0	19.5	67.2	20.0	55.4
Link Distance (m)		323.3	323.3		131.6		193.1		153.4
Upstream Blk Time (%)					2				
Queuing Penalty (veh)					0				
Storage Bay Dist (m)	45.0			25.0		10.0		25.0	
Storage Blk Time (%)	0	11		0	33	56	39	0	14
Queuing Penalty (veh)	0	12		0	12	84	61	0	4

Intersection: 3: Lundy's Lane & Site Access

Movement	WB	WB	SB
Directions Served	T	TR	R
Maximum Queue (m)	31.9	31.7	27.3
Average Queue (m)	5.0	6.9	7.5
95th Queue (m)	20.1	23.6	18.9
Link Distance (m)	323.3	323.3	90.5
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 492

Appendix I

Parking Study Proxy Survey Data

16 Concord Place, Town of Grimsby

Aqua Zul - Parking Survey

Surveyor - Scott Catton

Friday, 03 June 2022

Area #	18:00	19:00	20:00	21:00	22:00	23:00	00:00	01:00
At Grade #1-2	16	14	16	15	15	18	24	20
At Grade #3	1	4	4	5	5	4	4	4
At Grade #4-5	16	12	12	13	9	12	12	12
At Grade #7	23	20	26	27	26	31	31	31
At Grade #8-9	27	36	34	37	38	41	37	37
U/G	123	147	158	170	185	198	211	216
Illegal	0	0	0	0	3	0	0	0
Aqua Blu (off site)	14	14	18	19	20	21	23	23

Aqua Zul	18:00	19:00	20:00	21:00	22:00	23:00	00:00	01:00
Visitor	59	62	62	65	65	71	**73**	69
Occupant	147	171	188	202	216	233	246	**251**
Sum	**206**	**233**	**250**	**267**	**281**	**304**	**319**	**320**
Overall Ratio	0.60	0.68	0.73	0.78	0.82	0.89	0.93	**0.94**
Visitor Ratio	0.17	0.18	0.18	0.19	0.19	**0.21**	**0.21**	0.20
Occupant Ratio	0.43	0.50	0.55	0.59	0.63	0.68	0.72	**0.73**

Notes

*Areas 1 & 2 merged for counting purposes. All visitor parking
*Area 3 is not signed visitor parking = assume occupant
*Areas 4 & 5 merged for counting purposes. All visitor parking
*Area 6 does not exist
*Area 7 is not signed visitor parking = assume occupant
*Areas 8 & 9 merged for counting purposes. All visitor parking

Observations

*On-demand transit service in use. Noticed 3 times
*pick-up/drop-off activity high around 18:00 (uber eats)
*some spaces in u/g have a car + motorcycle. Counted as 2
*Aqua Blu (off site) parking used by persons going to Aqua Zul, pick-up/drop-off, and Aqua Blu.
*one at grade space in #8 used by boat
*one at grade space in #8 used by large commercial truck
*sky jack on edge of site not counted
*Resident commented on occupants using at grade parking
*3 illegal parked trucks in fire route at front of site. Appear to be work trucks
*DeSantis truck parked in U/G

16 Concord Place, Town of Grimsby

Aqua Zul - Parking Survey

Surveyor - Scott Catton

Saturday, 04 June 2022

Area #	18:00	19:00	20:00	21:00	22:00	23:00	00:00	01:00
At Grade #1-2	17	15	16	16	17	17	20	20
At Grade #3	6	5	5	6	6	5	5	5
At Grade #4-5	12	13	13	13	10	12	13	13
At Grade #7	29	25	28	31	25	25	27	29
At Grade #8-9	40	37	39	45	39	37	42	40
U/G	142	142	147	156	163	179	191	197
Illegal	0	0	0	0	0	0	0	0
Aqua Blu (off site)	18	24	21	21	26	26	27	27

Aqua Zul	18:00	19:00	20:00	21:00	22:00	23:00	00:00	01:00
Visitor	69	65	68	74	66	66	**75**	73
Occupant	177	172	180	193	194	209	223	**231**
Sum	246	237	248	267	260	275	298	**304**
Overall Ratio	0.72	0.69	0.73	0.78	0.76	0.80	0.87	**0.89**
Visitor Ratio	0.20	0.19	0.20	0.22	0.19	0.19	**0.22**	0.21
Occupant Ratio	0.52	0.50	0.53	0.56	0.57	0.61	0.65	**0.68**

Notes

Areas 1 & 2 merged for counting purposes. All visitor parking
Area 3 is not signed visitor parking = assume occupant
Areas 4 & 5 merged for counting purposes. All visitor parking
Area 6 does not exist
Area 7 is not signed visitor parking = assume occupant
Areas 8 & 9 merged for counting purposes. All visitor parking

Observations

*some spaces in u/g have a car + motorcycle. Counted as 2
*Aqua Blu (off site) parking used by persons going to Aqua Zul, pick-up/drop-off, and Aqua Blu.
*one at grade space in #8 used by boat
*one at grade space in #8 used by large commercial truck
*sky jack on edge of site not counted
*DeSantis truck parked in U/G

Parking Study

Location:	15 Towering Heights Blvd. St. Catharines	Date:	February 28th - March 1st
Observer:	CK	Time:	22:00 - 01:00
Weather:	Clear		

Vehicles Parked at Start	Inside:	49	Visitor:	6
	Outside:	57	TOTAL:	112

Time	Vehicles at End of Period
22:00 - 22:15	112
22:16 - 22:30	113
22:31 - 22:45	113
22:46 - 23:00	112
23:01 - 23:15	113
23:16 - 23:30	114
23:31 - 23:45	114
23:46 - 00:00	114
00:01 - 00:15	114
00:16 - 00:30	114
00:31 - 00:45	115
00:46 - 01:00	116
MAXIMUM VEHICLES:	116

Parking Study

Location:	15 Towering Heights Blvd. St. Catharines	Date:	March 2nd - 3rd, 2019
Observer:	CK	Time:	22:00 - 01:00
Weather:	Clear		

Vehicles Parked at Start	Inside:	45	Visitor:	8
	Outside:	56	TOTAL:	109

Time	Vehicles at End of Period
22:00 - 22:15	109
22:16 - 22:30	109
22:31 - 22:45	110
22:46 - 23:00	110
23:01 - 23:15	111
23:16 - 23:30	112
23:31 - 23:45	111
23:46 - 00:00	113
00:01 - 00:15	114
00:16 - 00:30	116
00:31 - 00:45	117
00:46 - 01:00	118
MAXIMUM VEHICLES:	118

Appendix J

City of Kitchener TDM Checklist

PARTS TDM: City of Kitchener TDM Checklist

Applicant Name: _____ **Date of Application (YY-MM-DD):** _____

Site Location: _____ **Landowner / Developer Name:** _____

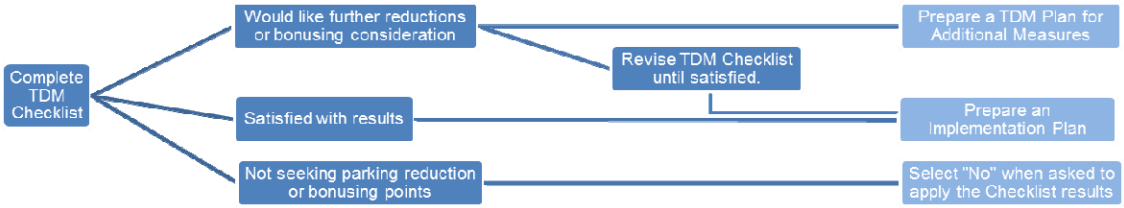
Zone: _____ **TDM Checklist No. (filled by staff):** _____

Using the TDM Report Checklist

The TDM Checklist is one component of submitting a TDM Report, and a tool intended for Developers' use when determining potential parking reductions in exchange for certain TDM measures. Derived from the Region of Waterloo's TDM Checklist and Parking Management Worksheet, this City of Kitchener TDM Checklist applies to all developments within Station Areas with the exception of residential developments with 6 units or less. Currently, this Checklist applies to the downtown area and the lands located within the Station Study Areas identified in PARTS Phase 1, and supersedes the Region's Checklist and Parking Management Worksheet for any developments within those defined areas.

TDM Report Reference Guide

A Reference Guide has been prepared for submission of a TDM Report, and can be found appended to the PARTS Phase 2: TDM Strategy.
The general process behind completing a TDM Report is depicted by the diagram below.



* Specific requirements for an Implementation Plan or TDM Plan are included within the Reference Guide.

Instructions to Complete the TDM Checklist

To complete the TDM Checklist, fill out Table A and Table B. Once completed, review the Summary Results in Table C and Table D.

Table A is broken down into two sections. Please complete Table A1 with any applicable parking and bicycle parking requirements from Schedule 6 of the Zoning By-law for your site. Mixed-use developments may also be eligible for shared parking space reductions where the development will use unassigned parking spaces; if in Table A1 you specify parking requirements for multiple land uses, Table A2 will automatically calculate shared parking rates and a percent parking reduction.

Table B indicates optional TDM measures that can included by the developer in exchange for potential parking reductions. Complete Table B for a potential parking reduction.

TABLE A — SHARED PARKING REQUIREMENTS

Mixed-use developments may be eligible for parking space reductions based on shared parking ratios between uses. Please fill out the yellow boxes in the table below based on the Zoning By-Law requirements for parking and bicycle parking for your land use(s). Orange boxes will automatically show your results.

TABLE A1. Zoning By-law Requirements			TABLE A2. Shared Parking Rate Breakdown							
			Morning		Noon		Afternoon		Evening	
Land Use	Parking	Class A Bike Parking	Weekday	Weekend	Weekday	Weekend	Weekday	Weekend	Weekday	Weekend
Office	0	0	0	0	0	0	0	0	0	0
Medical	0	0	0	0	0	0	0	0	0	0
Real Estate	0	0	0	0	0	0	0	0	0	0
Financial Institution	0	0	0	0	0	0	0	0	0	0
Retail	12	0	6	6	6	9	9	12	9	2
Personal Services	0	0								
Art Gallery	0	0								
Museum	0	0								
Repair Establishment	0	0								
Restaurant/Take-out Restaurant	0	0	0	0	0	0	0	0	0	0
Hotel (rooms)	0	0	0	0	0	0	0	0	0	0
Hotel (Function Space)	0	0	0	0	0	0	0	0	0	0
Residential - Resident	147	0	133	133	96	96	133	133	147	147
Residential - Visitor	0	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0
Total Required Parking	159	0	139	139	102	105	142	145	156	149
Shared / Unassigned Required Parking	**156**		**Parking Reduction (Individual Uses)**		**3**	**% Reduction Over Unshared Parking (Individual Uses)**		**1.9**		
Plaza Complex or Mixed-Office-Residential [T]	0	0	Parking Reduction (Plaza / Mixed [TT])		0	% Reduction Over Unshared Parking (Plaza / Mixed [TT])		#DIV/0!		

[T] Note: See Zoning By-Law S.6 to calculate parking requirement for Plaza / Mixed uses. | [TT] Note: For further potential reductions, apply individual use rates in Table A1.

Shared Parking Summary	Yes or No ?	Resultant Parking Required
Would you like to apply Table A shared rates for a parking reduction?	No	159.0 Spaces

Note: to apply these rates, 100% of parking must be shared between uses and unassigned. If you would like to use shared parking rates for only a portion of the required parking spaces, you must provide the proposed shared parking rates and applicable reductions in an Implementation Plan or TDM Plan within the TDM Report.

PARTS TDM: City of Kitchener TDM Checklist

TABLE B	OPTIONAL TDM MEASURES

Certain TDM measures are required by the Zoning By-Law. Exceeding these minimum requirements is optional and can lead to parking reductions based on the discretion of the City of Kitchener. To complete this form, please fill out the yellow boxes in the table below with details about your development proposal. Please refer to the Urban Design Manual for feature design standards.

Measure	Features	Parking Reduction Available	To a Maximum Reduction of		Developer Proposes Provision of		Maximum Reduction Allowable	Bonusing Points (TBD)
			Amount	Unit	Amount	Unit		
B1	Provision of indoor secure bicycle parking spaces beyond the minimum amount required by the Zoning By-law.	1 car space reduction per 5 bicycle spaces beyond minimum Zoning By-law requirement.	10%	of total parking required	0	Bicycle Spaces beyond minimum required	0	
B2	Non-residential uses: provision of shower and change facilities at an amount of not less than 13sqm in equal proportion of male and female facilities (Note: maximum reduction amount calculated based on required bicycle parking).	2 car space reduction for each additional shower facility provided at (13sqm).	0	parking space(s)	0	sqm of shower / change facilities	0	
B3*	Non-residential (office) uses: Provision of 1 car share vehicle and dedicated parking space in a priority location that is publically accessible for a development with at least 25 required parking spaces, and 1 additional car share vehicle and dedicated parking space for every 50 additional required parking spaces. (Note: maximum reduction amount calculated based on required parking).	4 car space reduction for each car share vehicle and dedicated parking space provided	0	parking space(s)	0	Non-residential car share vehicle(s) and Space(s)	0	
	Residential uses: Provision of 1 car share vehicle and dedicated parking space in a priority location that is publically accessible unless it is a private shared vehicle for every 75 dwelling units. (Note: maximum reduction amount calculated based on required parking).	4 car space reduction for each car share vehicle and dedicated parking space provided	4	parking space(s)	0	Residential car share vehicle(s) and Space(s)	0	
B4	Non-residential uses: Provision of ride share parking spaces in a priority location.	3 car space reduction for each ride share space provided	5%	of total parking required	0	Priority Car Pool Spaces	0	
B5	Provision of active uses at-grade along street frontages.	1% car space reduction	1%	of total parking required	☐ Yes	Check "Yes" (left) if you will provide	0	
B6*	The building owner/occupant will provide fully subsidized transit passes for all occupants for a period of two years.	10% car space reduction	10%	of total parking required	☐ Yes	Check "Yes" (left) if you will provide	0	
B7	Building owner/occupant agrees to charge for parking as a separate cost to occupants.	10% car space reduction	10%	of total parking required	☑ Yes	Check "Yes" (left) if you will provide	15	
B8*	Employment Uses: Building owner/occupant agrees to join Travelwise (TMA) that provides ride matching services for car/vanpooling and emergency ride home options.	10% car space reduction	10%	of total parking required	☐ Yes	Check "Yes" (left) if you will provide	0	
B9	Enhanced bus shelters with seating are provided at the transit stop immediately adjacent to the development in consultation with the City of Kitchener and the Region of Waterloo.	Not Applicable for parking reduction	Can only be applied to bonusing consideration		☐ Yes	Check "Yes" (left) if you will provide	0	
B10	Provide television monitors in visible and accessible locations on site and in adjacent transit stops to allow to City of Kitchener and the Region of Waterloo to display information regarding public transportation.	Not Applicable for parking reduction	Can only be applied to bonusing consideration		☑ Yes	Check "Yes" (left) if you will provide	0	
B11	Provision of bicycle self-service station equipped with tools necessary to perform basic repairs and maintenance	Not Applicable for parking reduction	Can only be applied to bonusing consideration		☐ Yes	Check "Yes" (left) if you will provide	0	
B12	25% to 49% of required parking is located underground or in a structure	Not Applicable for parking reduction	Can only be applied to bonusing consideration Select only one option (right)		☐ Yes	Check "Yes" (left) if you will provide	0	
	50% - 74% of required parking is located underground or in a structure				☐ Yes	Check "Yes" (left) if you will provide	0	
	A minimum of 75% of required parking is located underground or in a structure				☑ Yes	Check "Yes" (left) if you will provide	0	
B13	Non-residential use: Implements paid parking system, where price is set greater than the cost of a monthly transit pass, on all or part of the site (e.g. parking permits, paid parking near main entrances, enabled by gate and transponder access, or Pay & Display stations).	1% car space reduction for every 10% of parking spaces under a paid parking system	10%	of total parking required	0%	% of total parking spaces under paid parking system	0	

* If you have selected Measures B3, B6 or B8 for a parking reduction, you must demonstrate to the satisfaction of the Director of Transportation Services that you will be able to achieve the proposed TDM measure, including any ongoing programming or management that may be required for program success.

TABLE C	POTENTIAL PARKING REDUCTION SUMMARY	
Displayed below are the potential reductions to required parking spaces available based on the amounts entered into Table A and Table B above.		
Original # Parking Spaces Required:	159	0
Shared Parking Reduction [P]:	0	0
Parking Reduction for TDM Measures B1-B12:	15	0
Total Parking Reduction:	15	0
Resultant Parking Requirement:	144	0
PERCENT REDUCTION	9	#DIV/0!

[P] Note: If applicable, Parking Reductions for Plaza / Mixed-Use are noted in brown

TABLE D	BONUSING POINT SCORE SUMMARY *	
If you achieved a Bonusing Points score greater than X, you may be eligible for bonusing. Please contact City of Kitchener staff for more details.		
Total Bonusing Points Achieved		0
Eligible for Bonusing Consideration?		No

*Approach to bonusing to be determined by City staff

NEXT STEPS
Thank you for completing the TDM Checklist. Please select whether you would like to apply for a potential parking reduction at the bottom of this page. Refer to the TDM Report Reference Guide for submission requirements to City of Kitchener Staff. If you would like to achieve a greater parking reduction than may be considered through the TDM Checklist, you may develop a TDM Plan as set out in the TDM Report Reference Guide.

Would you like to apply Table C rates for a parking reduction?

Select an Option
Yes

If you selected No, please submit your completed Checklist to City staff for review.
If you selected Yes, please refer to the TDM Report Reference Guide for submission requirements of an Implementation Plan or TDM Plan.