



**Hotel Development
5234-5278 Ferry Street
City of Niagara Falls
Transportation Impact Study
and Circulation Review**

Paradigm Transportation Solutions Limited

May 2024
230405



Project Summary



Project Number
230405

Date: May 2024
Version 0.0.1

Hotel Development 5234-5278 Ferry Street City of Niagara Falls Transportation Impact Study and Circulation Review

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Executive Summary

Content

1000136413 Ontario Inc. retained Paradigm Transportation Solutions to conduct a Transportation Impact Study (TIS) and Circulation Review (CR) for a proposed hotel development at 5234-5278 Ferry Street in Niagara Falls.

This study includes an analysis of existing traffic conditions, a description of the proposed development, an operational assessment of traffic forecasts for the opening year and a five-year horizon following the full build-out of the development, and recommendations to address and mitigate future traffic conditions.

Development Concept

The development concept includes two 26-storey hotels providing a total of 548 rooms. Vehicle access is proposed via two driveway connections to Clark Avenue. Development is anticipated to be built out by Year 2027.

Conclusions

Based on the findings of this study, it is concluded:

- ▶ **Existing Traffic Conditions:** The study area intersections operate overall at acceptable service levels during the weekday AM and PM peak hours. The following critical movements are noted:

Ferry Street at Fallsview Boulevard:

- The northbound left-turn/right-turn movement is forecast to operate at LOS F during the Saturday peak hour.

Victoria Avenue at Magdalen Street:

- The southbound left-turn/right-turn movement is forecast to operate at LOS F during the Saturday peak hour.

- ▶ **Site Traffic:** The site is forecast to generate approximately 378 and 384 trips during the weekday PM and Saturday peak hours, respectively;
- ▶ **Circulation Review:** A Passenger Car can circulate through the internal hotel roadway outside the lobby and the parking structure without any conflicts. A Medium Single Unit (MSU)



can enter/leave the three loading spaces connecting to Clark Avenue with no conflicts too;

- ▶ **2027 Background Traffic Conditions:** The study area intersections are forecast to operate with the following critical movements noted:

Ferry Street at Clark Avenue/Ellen Avenue:

- The northbound through/left-turn/right-turn movement is forecast to have a v/c ratio surpassing 0.85 during the Saturday peak hour.

Ferry Street at Fallsview Boulevard:

- The eastbound through/right-turn movement is forecast to have a v/c ratio surpassing 0.85 during the Saturday peak hour.

Victoria Avenue at Magdalen Street:

- The southbound left-turn/right-turn movement is forecast to operate at LOS F during the weekday PM and Saturday peak hours. This movement is also critical under existing traffic conditions.

Robinson Street at Clark Avenue:

- The northbound through/left-turn/right-turn movement is forecast to operate at LOS F during the Saturday peak hour;
- The southbound through/left-turn/right-turn movement is forecast to operate at LOS F during the weekday PM and Saturday peak hours.

- ▶ **2027 Total Traffic Conditions:** The study area intersections are expected to operate similarly to 2027 background traffic conditions with the following additional critical movements:

Ferry Street at Clark Avenue/Ellen Avenue:

- The overall v/c ratio is forecast to surpass 0.85 and 1.00 during the weekday PM and Saturday peak hours, respectively;
- The eastbound through/right-turn movement is forecast to have a v/c ratio surpassing 0.85 and 1.00 during the weekday PM and Saturday peak hours, respectively;
- The westbound left-turn movement is forecast to have a v/c ratio exceeding 1.00 and a queue length that surpasses its storage length during the Saturday peak hour.



Ferry Street at Fallsview Boulevard:

- The overall v/c ratio is forecast to surpass 0.85 during the Saturday peak hour;
 - The westbound left-turn movement is forecast to have a v/c ratio surpassing 0.90 and a queue length that exceeds its storage length during the Saturday peak hour;
 - The northbound through/left-turn/right-turn movement is forecast to have a v/c ratio surpassing 0.85 during the Saturday peak hour.
- **2032 Background Traffic Conditions:** The study area intersections are forecast to operate similarly to 2027 background traffic conditions with the following additional critical movements:

Ferry Street at Fallsview Boulevard:

- The overall v/c ratio is forecast to surpass 0.85 during the Saturday peak hour. Although this v/c ratio is critical under 2027 total traffic conditions;
 - The westbound left-turn movement is forecast to have a queue length that surpasses its storage length during the Saturday peak hour. However, this movement is critical under 2027 total traffic conditions.
- **2032 Total Traffic Conditions:** The study area intersections are expected to operate similarly to 2032 background traffic conditions with the following additional critical movements:

Ferry Street at Clark Avenue/Ellen Avenue:

- The overall v/c ratio is forecasted to surpass 0.85 and 1.00 during the weekday PM and Saturday peak hours, respectively. Although this movement is critical under 2027 total traffic conditions;
- The eastbound through/right-turn movement is forecast to have a v/c ratio surpassing 0.85 and 1.00 during the weekday PM and Saturday peak hours, respectively. Although this movement is critical under 2027 total traffic conditions;
- The westbound left-turn movement is forecast to have a v/c ratio surpassing 1.00 and a queue length that exceeds its storage length during the Saturday peak hour. However, this movement is critical under 2027 total traffic conditions.



- ▶ **Traffic Control Signals:** Under 2032 total traffic conditions, traffic control signals are not justified at the intersections of Victoria Street at Magdalen Street and Robinson Street at Clark Avenue;
- ▶ **Left-Turn Lane Warrant:** Under 2027 and 2032 total traffic conditions, a 25 m southbound left-turn lane is warranted at the intersection of Clark Avenue and the Northern Driveway;
- ▶ **Remedial Measures:** The following remedial measures are identified. It is noted that all additional lanes can likely be accommodated by repainting the existing cross-section on Clark Avenue at Ferry Street, Robinson Street, and the Northern Driveway:
 - Optimized signal timings and the addition of permissive protected westbound left-turn phases at the intersections of Ferry Street at Clark Avenue/Ellen Street and Ferry Street at Fallsview Boulevard;
 - Add a 15 m northbound through/right-turn lane at the Ferry Street and Clark Avenue/Ellen Street intersections. The northbound left-turn movement at the intersection of Ferry Street at Clark Avenue/Ellen Street has no storage to accommodate its queue lengths;
 - Add a separate 25 m southbound through/right-turn lane at Robinson Street and Clark Avenue intersection. The southbound left-turn movement at the intersection of Robinson Street at Clark Avenue has no storage to accommodate its queue lengths;
 - Add a separate 15 m southbound left-turn lane at the intersection of Clark Avenue and the Northern Driveway. The additional 25 m southbound left-turn lane at the intersection of Clark Avenue and the Northern Driveway could conflict with the proposed 15 m northbound through/right-turn lane at the intersection of Ferry Street and Clark Avenue/Ellen Avenue.
- ▶ **Sensitivity Analysis:** The addition of remedial measures generally does not resolve all the forecast critical movements under 2032 total traffic conditions, although the following improvements are noted:
 - The westbound left-turn movements at the intersections of Ferry Street at Clark Avenue and Fallsview Boulevard no longer have a v/c ratio surpassing 1.00. The westbound left movement queue lengths also don't exceed their storage lengths at the intersections of Ferry Street at Clark Avenue and Ferry Street at Fallsview Boulevard;



- The northbound through/right movement at the intersection of Ferry Street and Clark Avenue/Ellen Avenue is forecast to have queue lengths not surpassing the proposed storage plus taper length;
- The southbound through/right-turn movement at the intersection of Robinson Street and Clark Avenue is forecasted to operate in the LOS C to D range, and the queue lengths are also forecasted to be contained by the proposed storage length.

Recommendations

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

- ▶ At the intersection of Ferry Street at Clark Avenue/Ellen Avenue
 - Based on background traffic conditions (2027), the City provide a separate northbound through/right-turn movement with 15 m of storage;
 - The City optimize the signal timings;
 - Based on total traffic conditions (2027), the Applicant add a permissive protected phase for the westbound left-turn movement (Saturday peak hour).
- ▶ At the intersection of Ferry Street at Fallsview Boulevard
 - The City optimize the signal timings;
 - Based on total (2027) and background (2032) traffic conditions, the Applicant add a permissive protected phase for the westbound left-turn movement (Saturday peak hour).
- ▶ At the intersection of Robinson Street at Clark Avenue
 - Based on background (2027) traffic conditions, the City provide a separate southbound through/right-turn lane with 25 m of storage.
- ▶ At the intersection of Clark Avenue at the Northern Driveway
 - Based on total traffic conditions (2027), the Applicant provide a separate southbound left-turn lane with 15 m of storage.
- ▶ The southern site driveway me modified to provide a shared westbound left-turn/right-turn approach.



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1 Introduction

1.1 Overview

1000136413 Ontario Inc. retained Paradigm Transportation Solutions to conduct a Transportation Impact Study (TIS) and Circulation Review (CR) for a proposed hotel development at 5234-5278 Ferry Street in Niagara Falls.

Figure 1.1 illustrates the site location.

The scope of the study includes:

- ▶ An assessment of the current traffic and site conditions within the study area;
- ▶ Estimates of background traffic growth (general background growth and contributions from approved/in-stream other area background developments, if any);
- ▶ Estimates of additional traffic generated by the subject site;
- ▶ Analyses of the impact of future traffic conditions on the surrounding road network; and
- ▶ Recommendations to mitigate the site-generated traffic satisfactorily, if required.

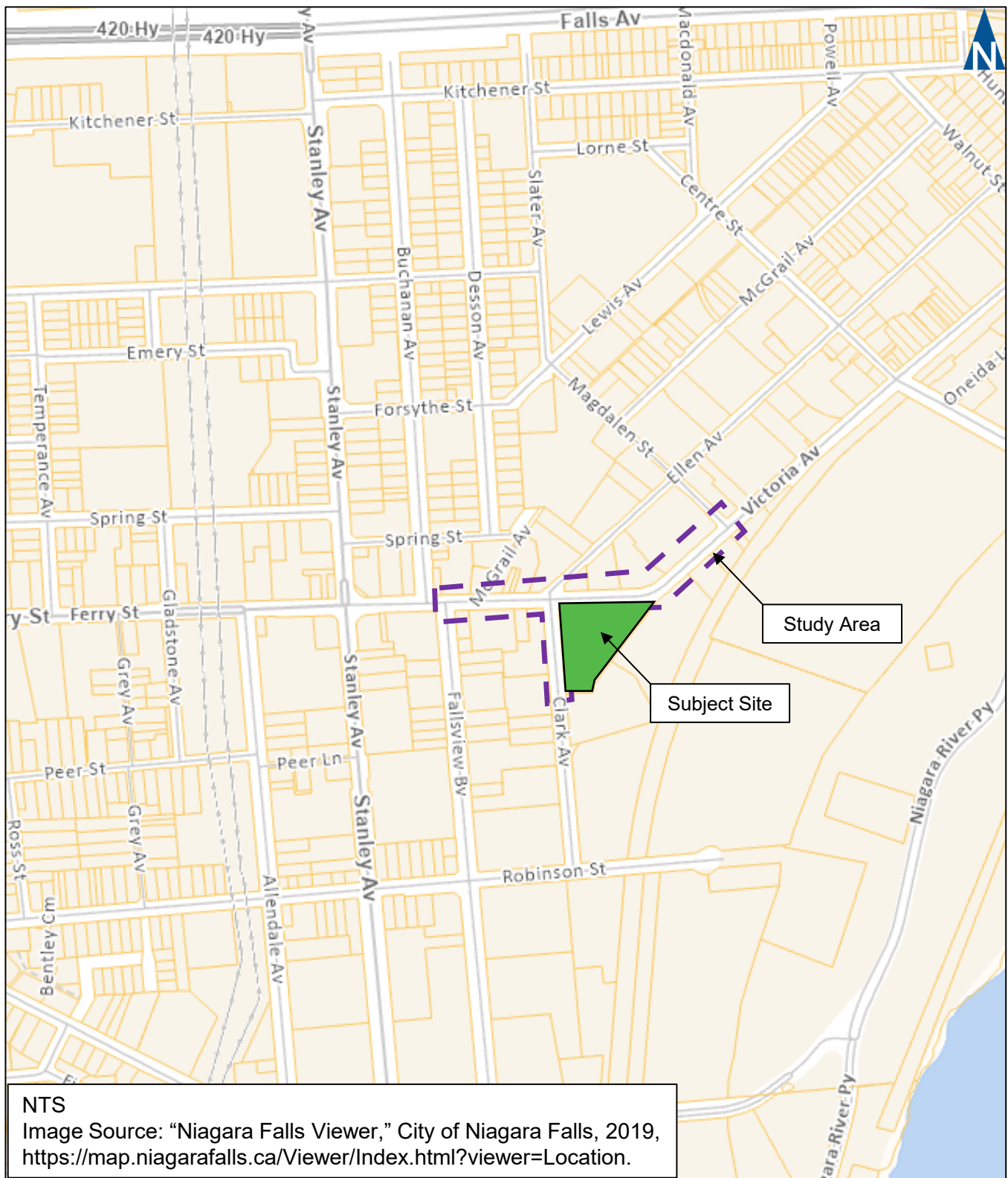
The study scope was developed in consultation with the City of Niagara Falls in July 2023. The study generally follows the City of Niagara Falls TIS guidelines¹. **Appendix A** contains the pre-study consultation material and responses from the City.

The intersections assessed in this study include:

- ▶ Ferry Street at Clark Avenue/Ellen Avenue (signalized);
- ▶ Ferry Street at Fallsview Boulevard (unsignalized);
- ▶ Clark Avenue at Robinson Street (unsignalized);
- ▶ Victoria Avenue at Magdalen Street (unsignalized); and
- ▶ Two driveway connections to Clark Avenue (unsignalized).

¹ City of Niagara Falls, Guidelines for the Preparation of Transportation Impact Studies and Site Plan Review, (Niagara Falls: City of Niagara Falls, 2011).





2 Existing Conditions

2.1 Road Network

The roadways of interest within the study area are under the jurisdiction of the City of Niagara Falls² and are described below. Reference was made to the City's Official Plan³:

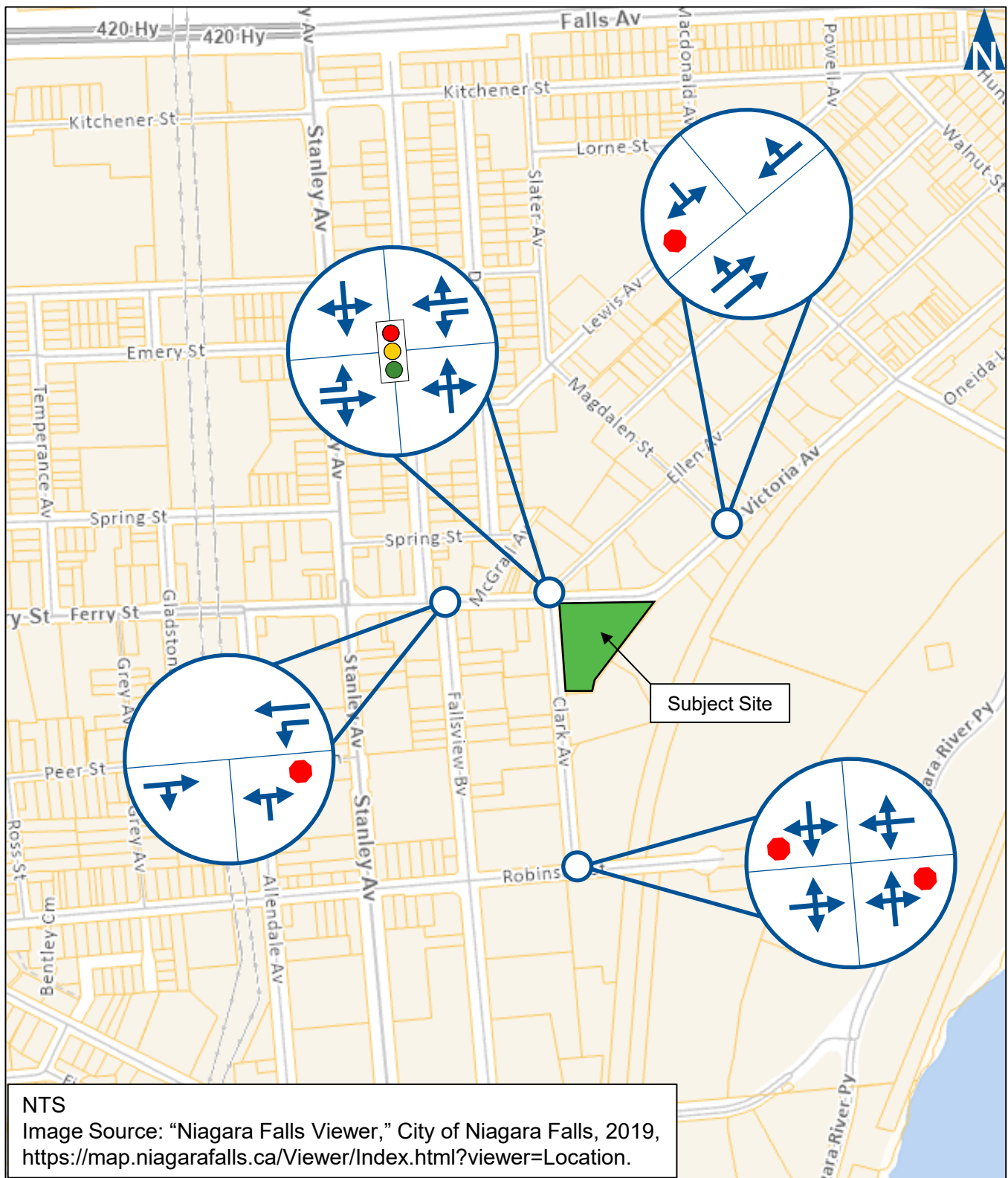
- ▶ **Ferry Street** is a three-lane, 50 km/h arterial road with a centre lane used for left turns. Sidewalks are provided on both sides of the road;
- ▶ **Clark Avenue** is a two-lane, 50 km/h collector road. Sidewalks are provided on both sides of the road;
- ▶ **Fallsview Boulevard** is a two-lane, 50 km/h collector road. Sidewalks are provided on both sides of the road;
- ▶ **Robinson Street** is a two-lane, 50 km/h collector road. Sidewalks are provided on both sides of the road;
- ▶ **Victoria Avenue** is a three-lane, 50 km/h arterial road with one westbound and two eastbound lanes. Sidewalks are provided on both sides of the road;
- ▶ **Ellen Avenue** is a two-lane, 50 km/h collector road. Sidewalks are provided on both sides of the road, and
- ▶ **Magdalen Street** is a two-lane, 50 km/h local road. Between Victoria Avenue and Ellen Avenue, sidewalks are provided on both sides of the roadway. North of Ellen Avenue, a sidewalk is only provided on the west side of the road.

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

² Niagara Region, *Niagara Official Plan: Schedule J-1 – Transportation Infrastructure*, (Thorold: Niagara Region, 2022).

³ City of Niagara Falls, *Official Plan: Schedule C - Roads*, (Niagara Falls: City of Niagara Falls, 2008).



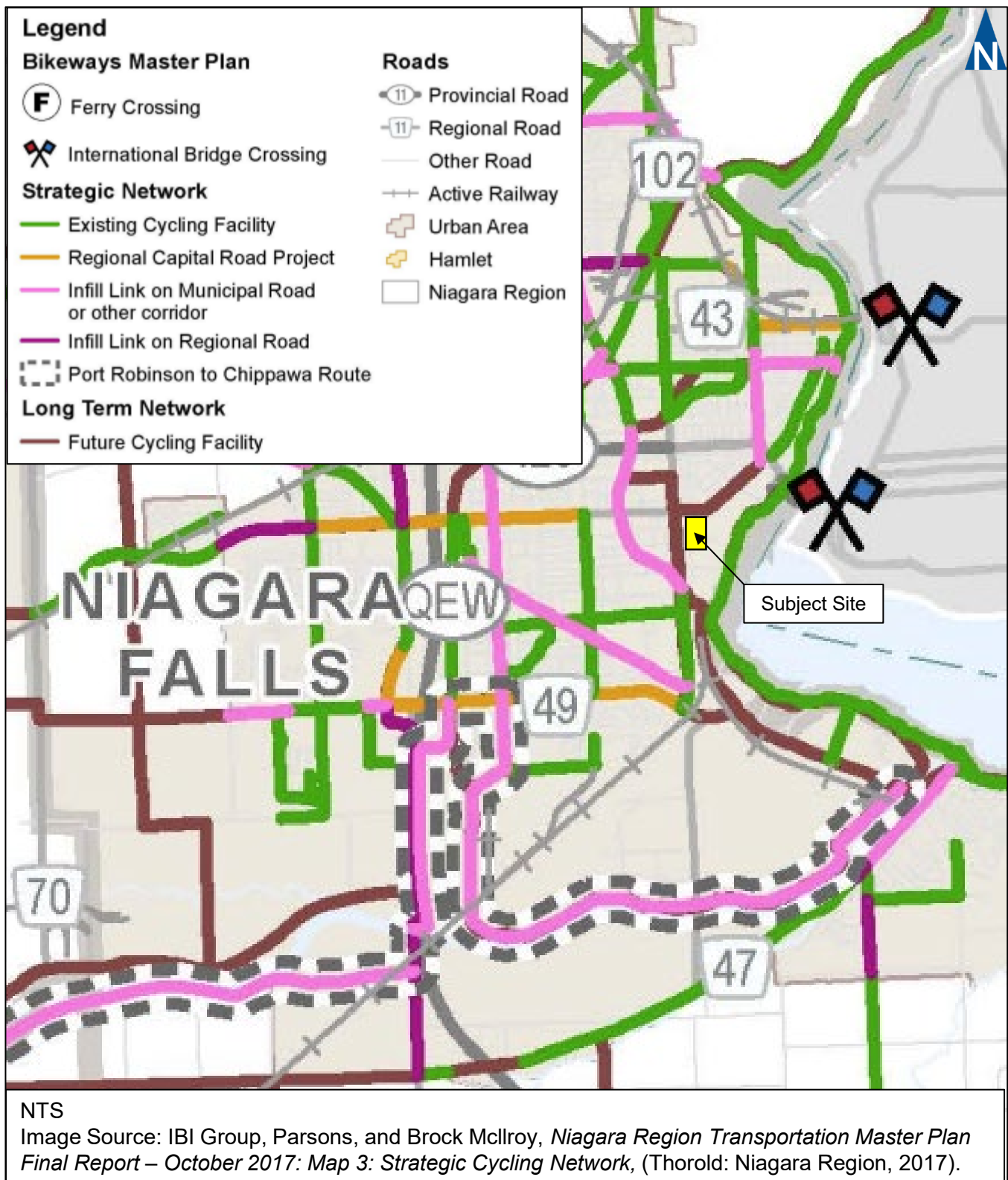


2.2 Cycling Network

Figure 2.2 illustrates the existing cycling network within the area. The current cycling infrastructure includes:

- ▶ Existing cycling facilities running along Niagara River Parkway;
- ▶ An infill link running along Portage Road/Main Street between Valley Way and Stanely Avenue;
- ▶ Future cycling facilities running along:
 - Ferry Street/Victoria Avenue between Stanely Avenue and Bender Street;
 - Stanely Avenue between North Street and Main Street; and
 - North Street between Stanely Avenue and Portage Road/Main Street.





2.3 Transit Service

Niagara Region Transit⁴ and WEGO⁵ operate Niagara Falls' public transit system. **Figure 2.3** illustrates the existing transit network. The following bus routes currently service the area:

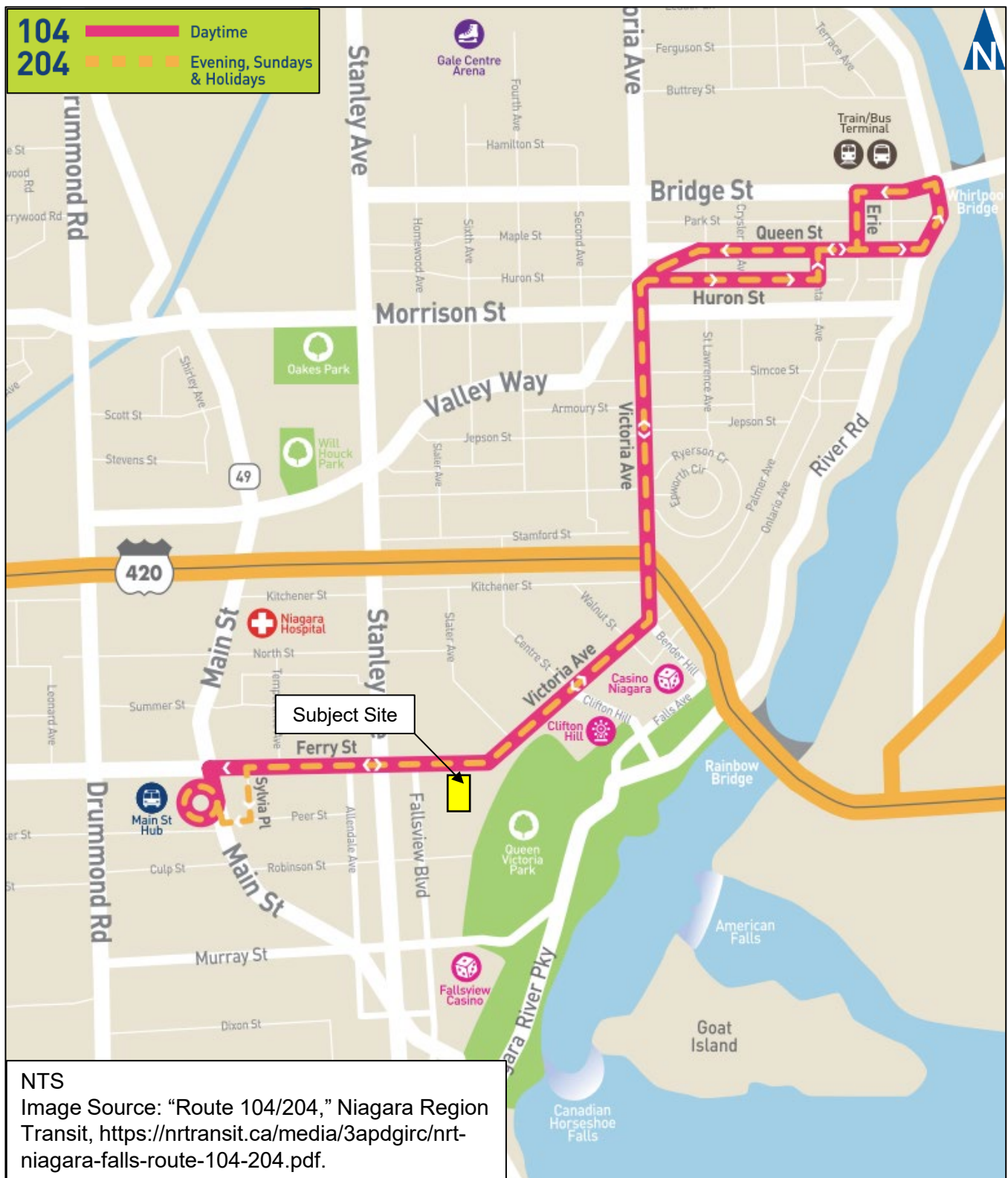
- ▶ **Route 104/204 – Main Street Hub - Downtown** travels between the Train/Bus Terminal and the Main Street Hub. These two routes operate Monday to Saturday from 6:15 AM to 6:40 PM (Route 104) and from 6:45 PM to 12:00 AM (Route 204) with 30-minute headways. Route 204 operates from 7:15 AM to 9:10 PM on Sundays or Holidays with 30-minute headways;
- ▶ **Route 601 (WEGO) – Red Line – Lundy's Lane** travels between Scott's Family Campground via Clifton Hill to the WEGO Main Transfer. The route operates Monday to Saturday from 6:00 AM to 11:55 PM (Route 601) with 30-minute headways. Route 601 also operates from 7:10 AM to 11:55 PM on Sunday with 30-minute headways, and
- ▶ **Route 602 (WEGO) – Blue Line – Fallsview Clifton Hill** travels between the WEGO Main Transfer to the Sheraton at the Falls and Rapidsview Park. This route operates Monday to Sunday from 9:35 AM to 10:50 PM with 40-minute headways.

The closest westbound bus stop is across the street from the subject site on the northeast corner of the Ferry Street and Clark Avenue/Ellen Avenue intersection. The nearest eastbound bus stop is located 110 m (1-minute walk) east of the subject site on the south side of Victoria Avenue.

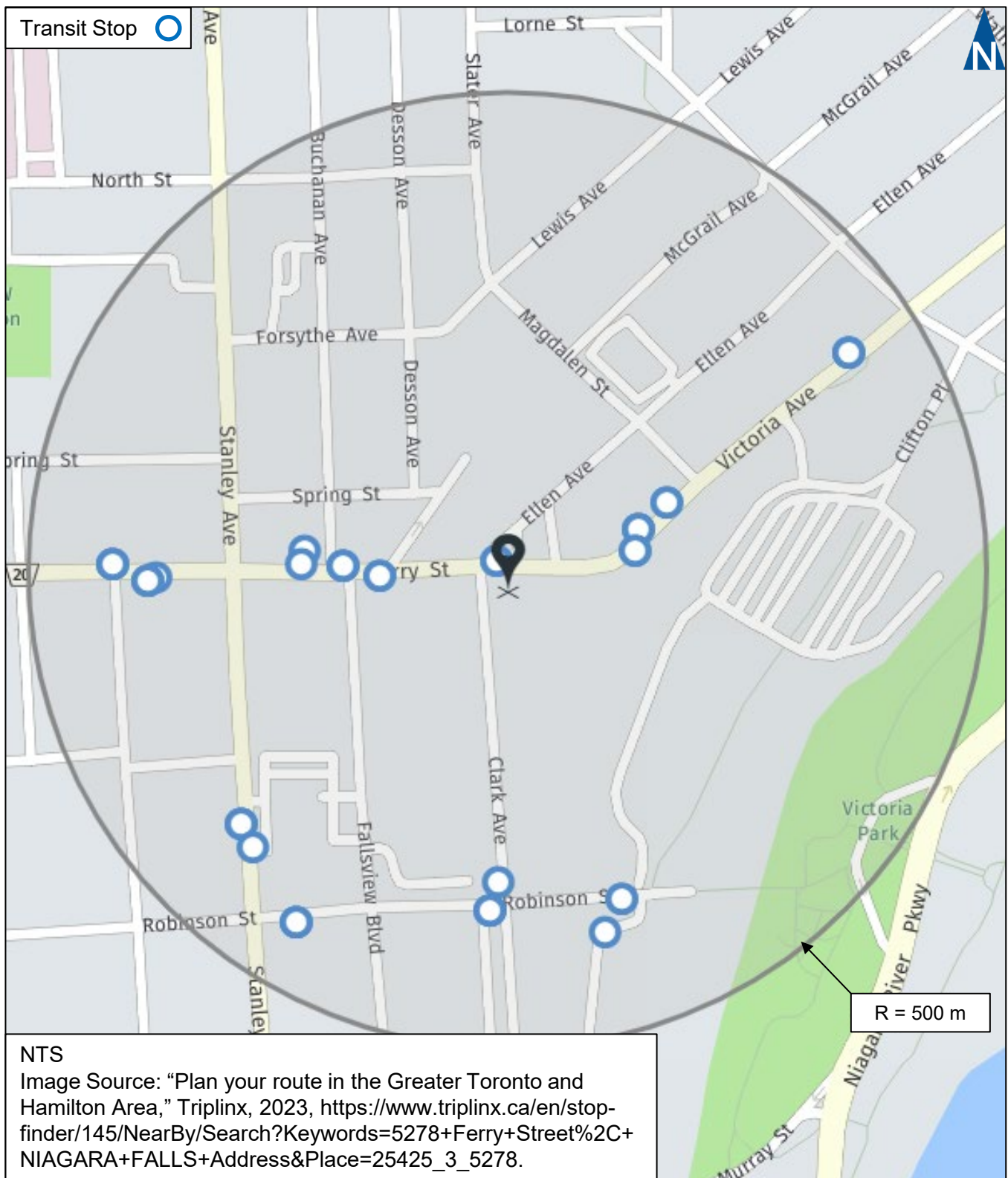
⁴ "Routes and Schedules," Niagara Region Transit, <https://nrtransit.ca/routes/>.

⁵ "Winter Schedule 2023," Niagara Parks, 2023, https://www.niagaraparks.com/media/2023/10/2023_WEGO_Brochure_Winter.pdf.







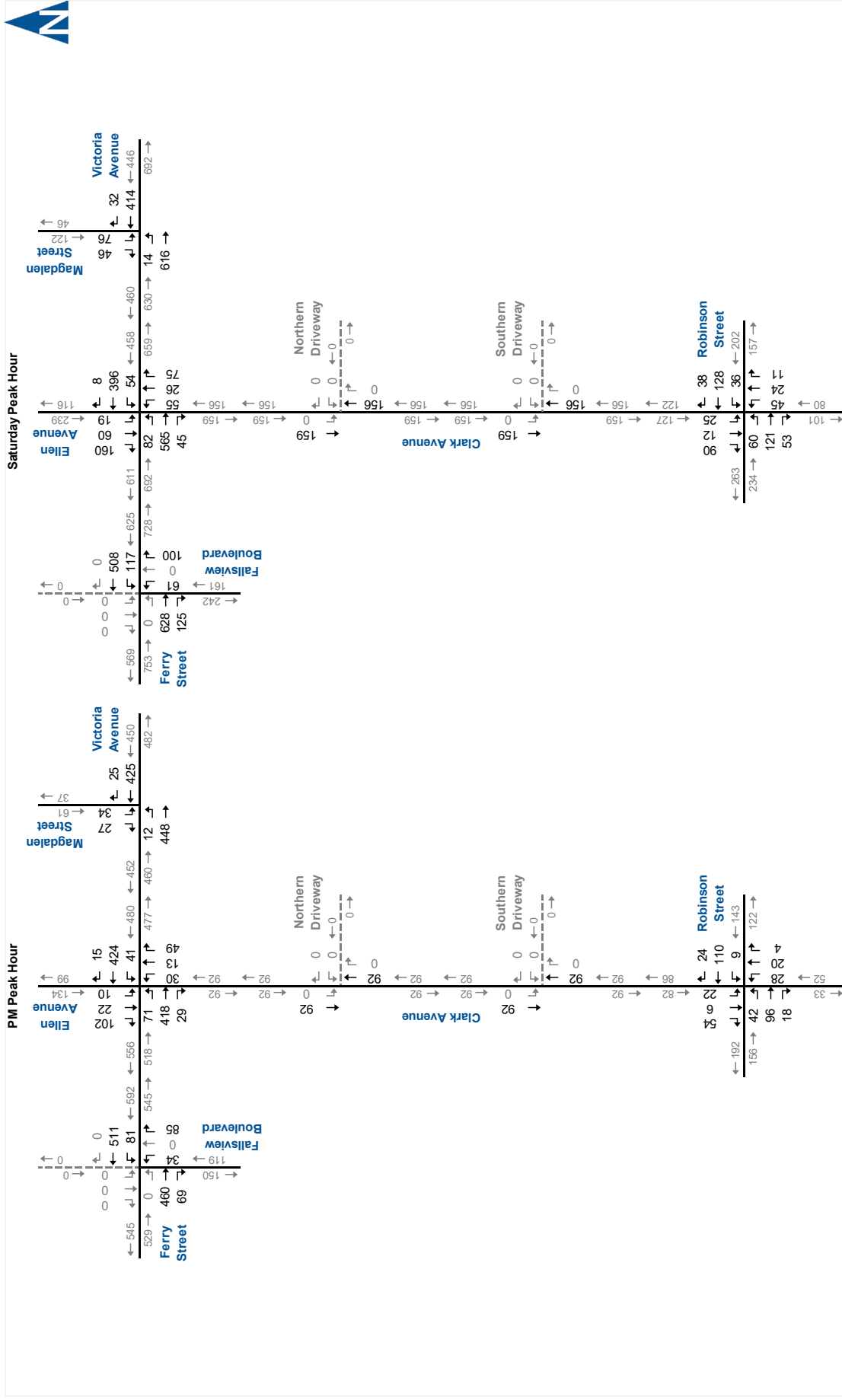


2.4 Traffic Volumes

Paradigm collected weekday and Saturday Turning Movement Count (TMC) data at the study area intersections in August 2023.

Figure 2.6 illustrates the base year weekday PM and Saturday peak hour volumes. **Appendix B** contains the TMC data and existing signal timing data for reference.





Base Year Traffic Volumes

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 wanting to make a movement 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, where the average total delay is equal to or less than 10.0 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 operations of the intersections in the study area were evaluated under existing conditions using Synchro 11 and Highway Capacity Manual (HCM) 2000 procedures. The intersection analysis considered three separate measures of performance:

- ▶ The LOS for each turning movement. LOS is based on the average control delay per vehicle;
- ▶ The volume-to-capacity ratio for each intersection and
- ▶ 95th percentile queue length (metres).

Under the City's TIS Guidelines⁶, the operational analysis must include the identification of signalized and unsignalized intersections where:

- ▶ Volume to Capacity ratios (v/c) for overall intersection operations, through movements, or shared through/turning movements increased to 0.85 or above at a signalized intersection;
- ▶ V/C ratios for exclusive left turn or right turn movements increased to 0.95 or above at a signalized intersection;
- ▶ 95th percentile queues for an individual movement are projected to exceed available turning lane storage, and
- ▶ Based on the average delay per vehicle, LOS on individual movements exceeds LOS "E" at an unsignalized intersection.

⁶ City of Niagara Falls, *Guidelines for the Preparation of Transportation Impact Studies and Site Plan Review*, (Niagara Falls: City of Niagara Falls, 2011).



Table 2.1 summarizes the level of service conditions. In general, the study area intersections are operating at acceptable levels of service with the following critical movement noted:

- ▶ Ferry Street at Fallsview Boulevard:
 - The northbound shared left/right-turn movement is forecast to operate at LOS F during the Saturday peak hour, and
- ▶ Victoria Avenue at Magdalen Street:
 - The southbound shared left/right-turn movement is forecast to operate at LOS F during the Saturday peak hour.

Appendix C contains the detailed Synchro 11 reports.



TABLE 2.1: BASE YEAR 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	
PM Peak Hour	Clark Avenue/Ellen Avenue & Ferry Street	TCS	LOS Delay V/C Q Stor. Avail.	A 6 0.25 8 40 32	A 8 0.61 38 - -	> > > >	A 8	A 5 0.15 5 40 35	A 8 0.59 37 - -	> > > >	A 7	< < < <	A 9 0.16 11 - -	> > > >	A 9	< < < <	A 9 0.16 12 - -	> > > >	A 9	A 8 0.44
	Fallsview Boulevard & Ferry Street	TWSC	LOS Delay V/C Q Stor. Avail.		A 0 0.34 0 - -	> > > >	A 0	B 10 0.11 3 45 42	A 0 0.33 0 - -		A 1	E 46 0.61 26 - -	> > > >	E 46						
	Victoria Avenue & Magdalen Street	TWSC	LOS Delay V/C Q	< < <	A 1 0.19 1		A 0	A 0 0.29 0	> > >	A 0					E 46 0.43 15		> > >	E 46		
	Robinson Street & Clark Avenue	TWSC	LOS Delay V/C Q	< < <	A 2 0.04 1	> > >	A 2	< < <	A 1 0.01 0	> > >	A 1	< < <	C 16 0.15 4	> > >	C 16	< < <	B 13 0.17 5	> > >	B 13	
Saturday Peak Hour	Clark Avenue/Ellen Avenue & Ferry Street	TCS	LOS Delay V/C Q Stor. Avail.	A 6 0.27 15 40 25	B 12 0.73 108 - -	> > > >	B 11	A 6 0.26 10 40 30	A 7 0.47 57 - -	> > > >	A 7	< < <	B 16 0.41 36 - -	> > > >	B 16	< < <	B 16 0.46 46 - -	> > > >	B 16	B 11 0.64
	Fallsview Boulevard & Ferry Street	TWSC	LOS Delay V/C Q Stor. Avail.		A 0 0.48 0 - -	> > > >	A 0	B 15 0.26 8 45 37	A 0 0.32 0 - -		A 3	F 652 2.18 120 - -	> > > >	F 652						
	Victoria Avenue & Magdalen Street	TWSC	LOS Delay V/C Q	< < <	A 2 0.26 1		A 1	A 0 0.29 0	> > >	A 0					F 468 1.73 86		> > >	F 468		
	Robinson Street & Clark Avenue	TWSC	LOS Delay V/C Q	< < <	A 3 0.06 1	> > >	A 3	< < <	A 2 0.03 1	> > >	A 2	< < <	E 39 0.46 16	> > >	E 39	< < <	C 22 0.40 14	> > >	C 22	

MOE - Measure of Effectiveness

LOS - Level of Service

Delay - Average Delay per Vehicle in Seconds

V/C - Volume to Capacity Ratio

Q - 95th Percentile Queue Length (m)

Stor. - Existing Storage (m)

Avail. - Available Storage (m)

TCS - Traffic Control Signal

TWSC - Two-Way Stop Control

</> - Shared Movement



3 Development Concept

3.1 Description

The development concept includes two 26-storey hotels providing a total of 548 rooms.

Vehicle access is proposed via two driveway connections to Clark Avenue. The site driveways are approximately 60 m apart (centreline to centreline). The Northern Site Driveway is approximately 55 m from the intersection of Ferry Street at Clark Avenue/Ellen Avenue.

Development is anticipated to be built out by Year 2027 in one phase.

Figure 3.1 illustrates the site concept plan.

3.2 Circulation Review

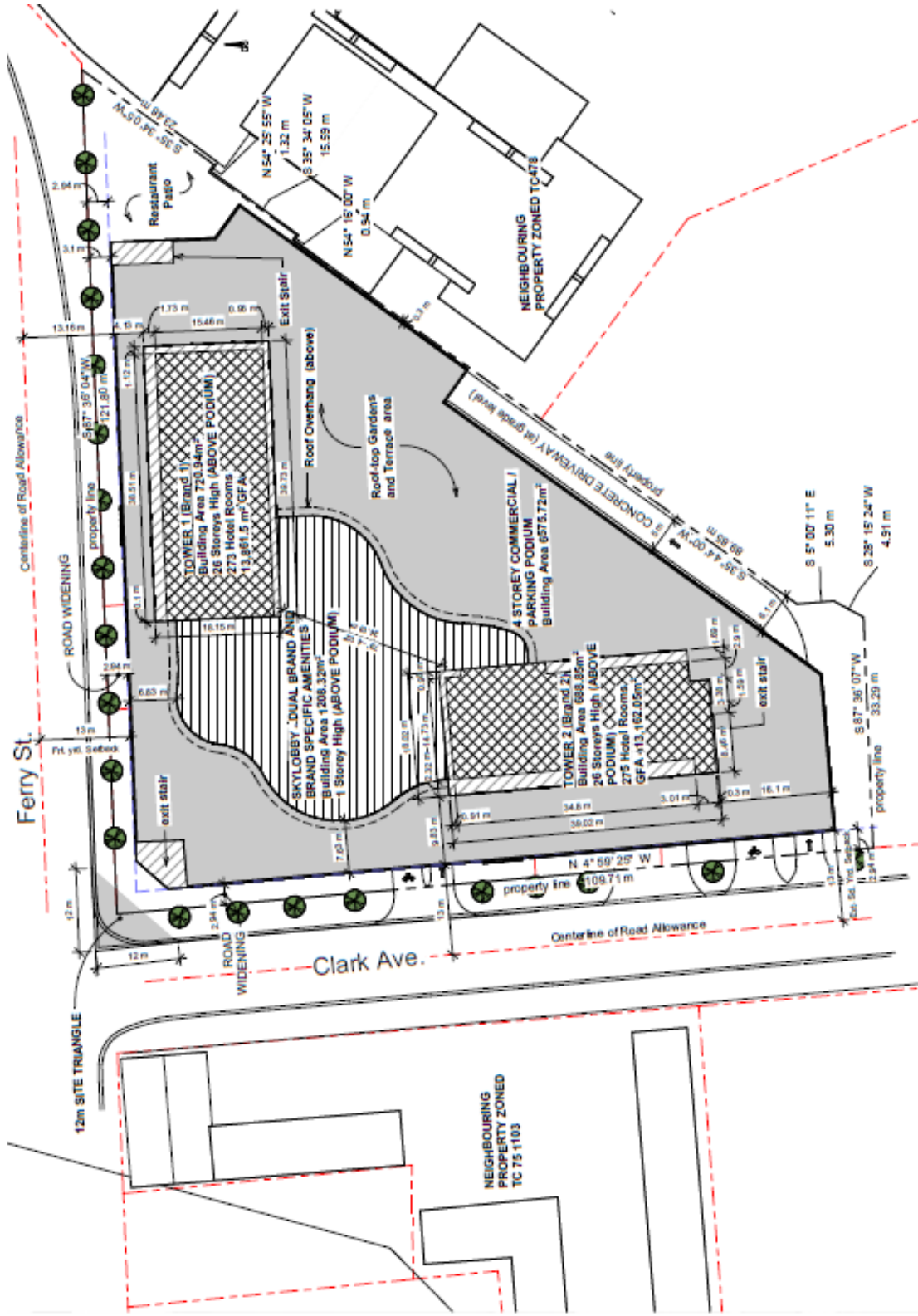
The site circulation has been assessed using a Transportation Association of Canada (TAC)⁷ Passenger Car (P) and Medium Single Unit (MSU) to represent the design vehicles expected to utilize the site.

Based on the analysis, a Passenger Car can circulate through the internal hotel roadway outside the lobby and the parking structure without conflicts. An MSU can enter/leave the three loading spaces connecting to Clark Avenue with no conflicts too.

Appendix D contains the AutoTURN analysis.

⁷ Transportation Association of Canada, *Geometric Design Guide for Canadian Roads*, (Ottawa: TAC, 2017).





5234-5278 Niagara Falls, TIS and CR
230405

Figure 3.1

3.3 Trip Generation and Distribution

The Institute of Transportation Engineers (ITE) Trip Generation⁸ methods are used to estimate the site trip generation. Land Use Code (LUC) 310 –Hotel was used to estimate the site’s trip generation.

No modal split adjustments have been applied to the trip generation estimate to account for active transportation or transit-oriented trips.

Table 3.1 summarizes the estimated trip generation. The subject site is forecast to generate approximately 378 and 384 trips during the weekday PM and Saturday peak hours, respectively.

TABLE 3.1: ESTIMATED SITE GENERATED TRAFFIC

Land Use	PM Peak Hour			Saturday Peak Hour		
	In	Out	Sum	In	Out	Sum
310 - Hotel – 548 Rooms	193	185	378	215	169	384
Total	193	185	378	215	169	384

LUC 310 – PM: $T = 0.74(X) - 27.89$ | Saturday: $T = 0.69(X) + 5.95$

As it is expected that not all hotel guests will have access to a vehicle, it has been assumed that some guests will utilize a taxi or rideshare service. To further clarify the number of guests expected not to have access to a vehicle, the Transportation Tomorrow Survey (TTS) has been reviewed for the City of Niagara Falls. Based on the 2016 TTS data, the following trip composition is assumed:

- ▶ Auto Driver (approximately 93% of the proposed hotel trips):
 - 351 and 357 total trips during the weekday PM and Saturday peak hours;
 - 179 and 200 trips during the weekday PM and Saturday peak hours that enter the site, and
 - 172 and 157 trips during the weekday PM and Saturday peak hours that leave the site.
- ▶ Taxi/Rideshare (approximately 7% of the proposed hotel trips):
 - 27 total trips each during the weekday PM and Saturday peak hours;
 - 14 and 15 trips during the weekday PM and Saturday peak hours that enter the site, and

⁸ Institute of Transportation Engineers, *Trip Generation Manual*, 11th ed., (Washington DC: ITE, 2021).



- 13 and 12 trips during the weekday PM and Saturday peak hours that leave the site.

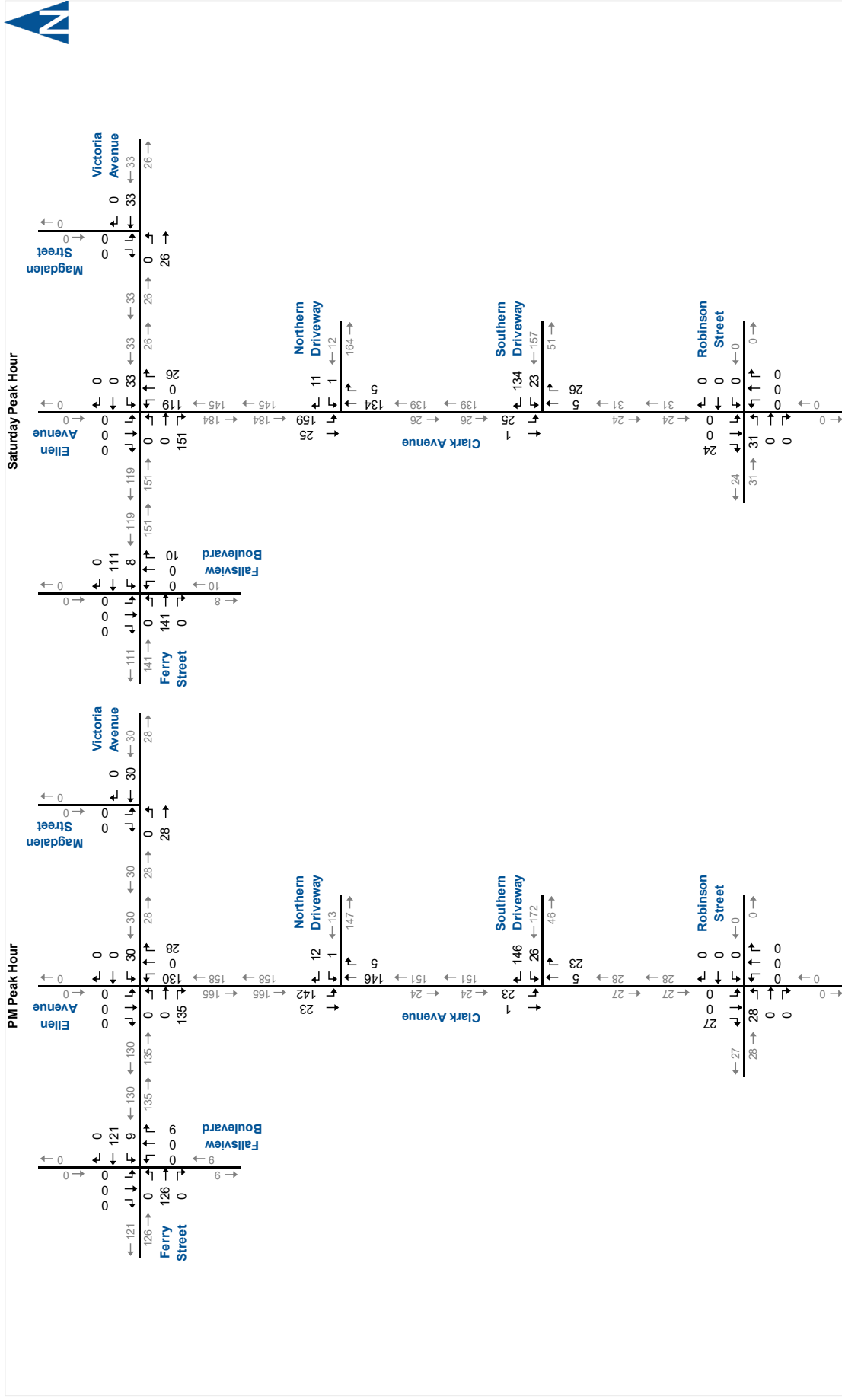
It is also anticipated that taxi/rideshare trips mostly travel to/from local places. Therefore, taxi/rideshare travellers are assumed to not have similar travel behaviours as personal auto drivers.

Table 3.2 summarizes the estimated trip distribution. The distribution is also based on the 2016 Transportation Tomorrow Survey (TTS) data. However, taxi/rideshare trips along Victoria Avenue were decreased by 5% and added to the Robinson Street segment west of Clark Avenue. It is assumed that the trip distribution captures the typical tourist travel patterns of the surrounding area. **Figure 3.2** illustrates the site-generated traffic assignments for the weekday PM and Saturday peak hours.

TABLE 3.2: ESTIMATED TRIP DISTRIBUTION

From/To	Auto Driver	Taxi/Rideshare
East via Victoria Avenue	10%	90%
West via Ferry Street	70%	5%
West via Robinson Street	15%	5%
South via Fallsview Boulevard	5%	0%
Total	100%	100%





Site-Generated Traffic Volumes

Figure 3.2

4 Future Traffic Conditions

This section's assessment of future conditions includes traffic forecasts and an intersection operational analysis. An opening year (2027) and five-year horizon following the anticipated build-out (2032) of the subject site have been assessed to determine the impact of the subject site.

4.1 Traffic Forecasts

The likely future traffic volumes near the subject site are estimated to consist of the following:

- ▶ Increased non-site traffic (generalized background traffic growth). City staff confirmed the use of a 1% growth rate during pre-study consultation;
- ▶ Traffic generated by the subject site, and
- ▶ Traffic generated by the following background developments:
 - Eastern Terminus of Robinson Street: This hotel development comprises 807 rooms in one 40-storey building. The development is forecast to generate 585 and 566 trips during the weekday PM and Saturday peak hours;
 - Southwest corner of Fallsview Boulevard and Ferry Street: This mixed-use development consists of 350 residential units and an assumed commercial space of less than 10,000 ft² in one 30-storey building. The development is forecast to generate 114 and 189 trips during the weekday PM and Saturday peak hours. ITE trip generation rates were used to estimate trip generation during the Saturday peak hour. An ITE pass-by trip reduction of 31% was applied during the Saturday peak hour for LUC 822 per LUC 821.

During pre-study consultation, improvements to the intersection of Ferry Street and Fallsview Boulevard include:

- ▶ The removal of the existing Buchanan Avenue connection to Ferry Street;
- ▶ The removal of the existing LCBO building on Ferry Street across from the existing Fallsview Boulevard connection;
- ▶ The addition of a north leg connecting to a proposed 10,000 ft² commercial establishment, and
- ▶ The installation of traffic control signals.



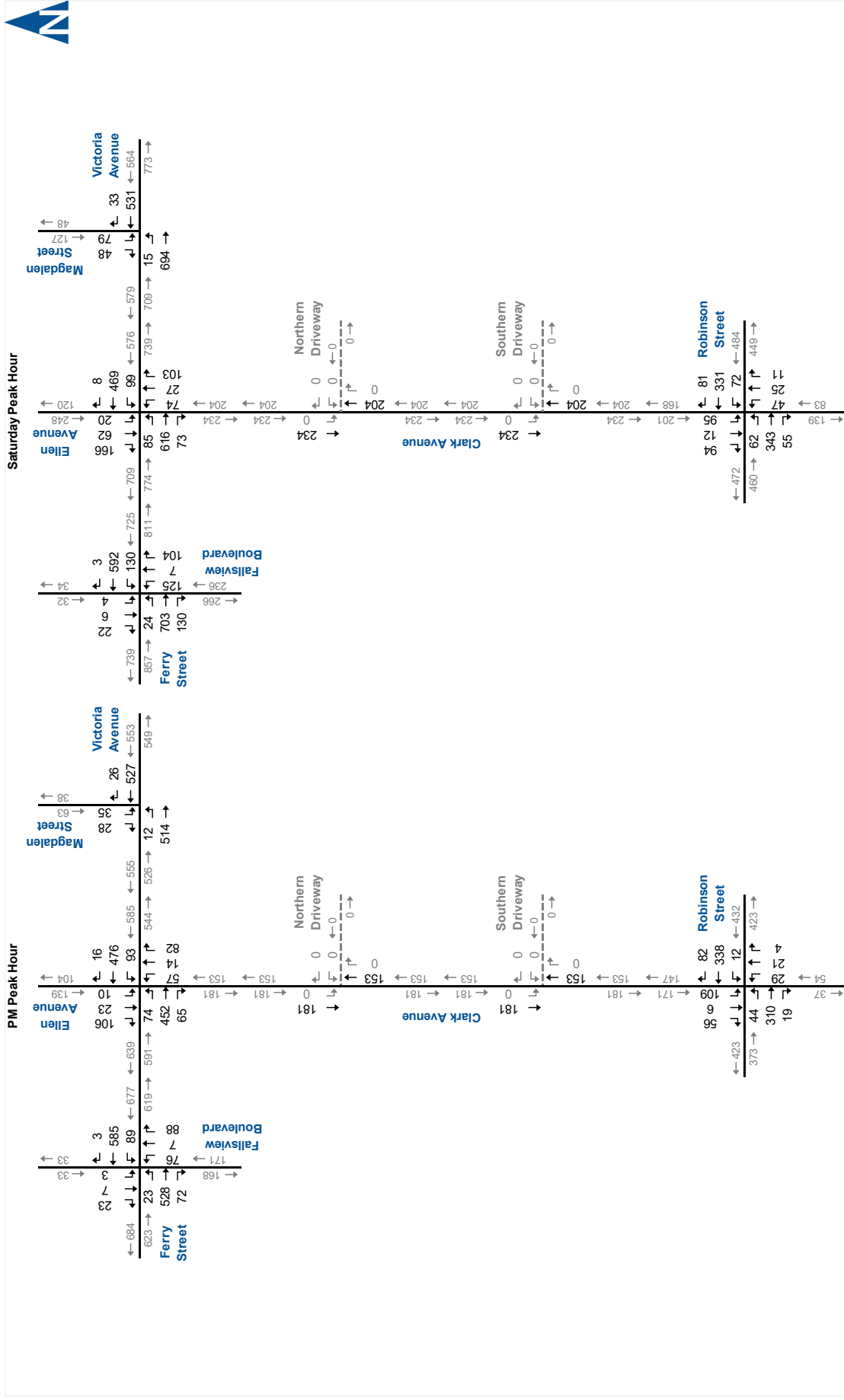
With the implementation of road improvements at the intersection of Ferry Street and Fallsview Boulevard, the following is assumed:

- ▶ The existing 30 m eastbound left-turn lane along Ferry Street at Buchanan Avenue will keep the same storage length and shift east to the proposed 10,000 ft² commercial establishment driveway (north leg);
- ▶ The proposed 10,000 ft² commercial establishment connecting to the north leg is forecast to generate 66 trips each during the weekday PM and Saturday peak hours. ITE trip generation rates were used to estimate trip generation. The distribution is based on the trip distribution in **Section 3.3**. Although no trips travel along Clark Avenue and alternatively use Fallsview Boulevard, and
- ▶ The signalized intersections of Ferry Street at Fallsview Boulevard and Ferry Street at Clark Avenue/Ellen Avenue will be coordinated (matching cycle lengths). Therefore, the existing cycle length at the Ferry Street and Clark Avenue intersection is adjusted under total traffic conditions.

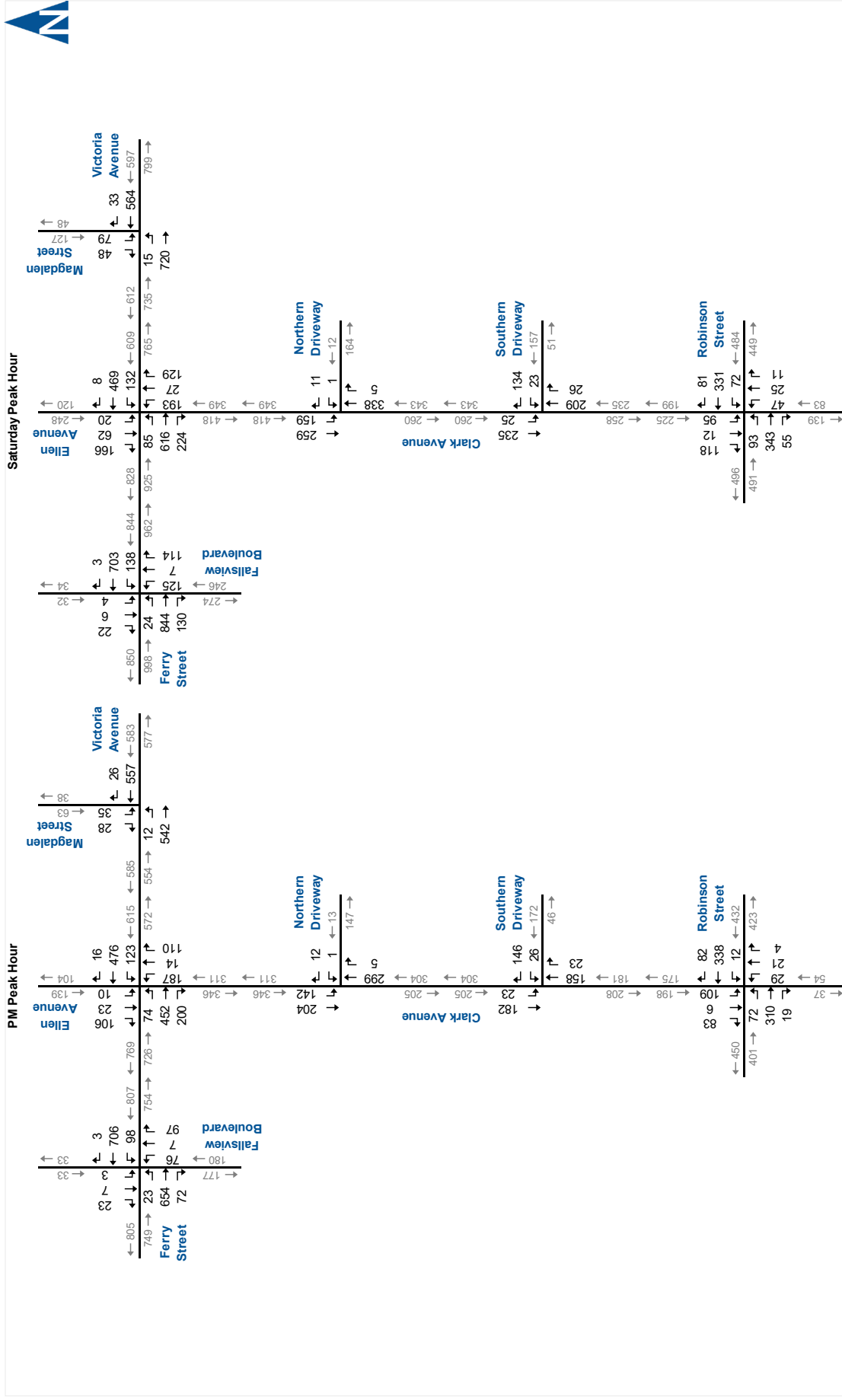
Appendix E contains the other area background development traffic material.

Figures 4.1 – 4.4 illustrate the 2027-2032 future background and total forecasts.



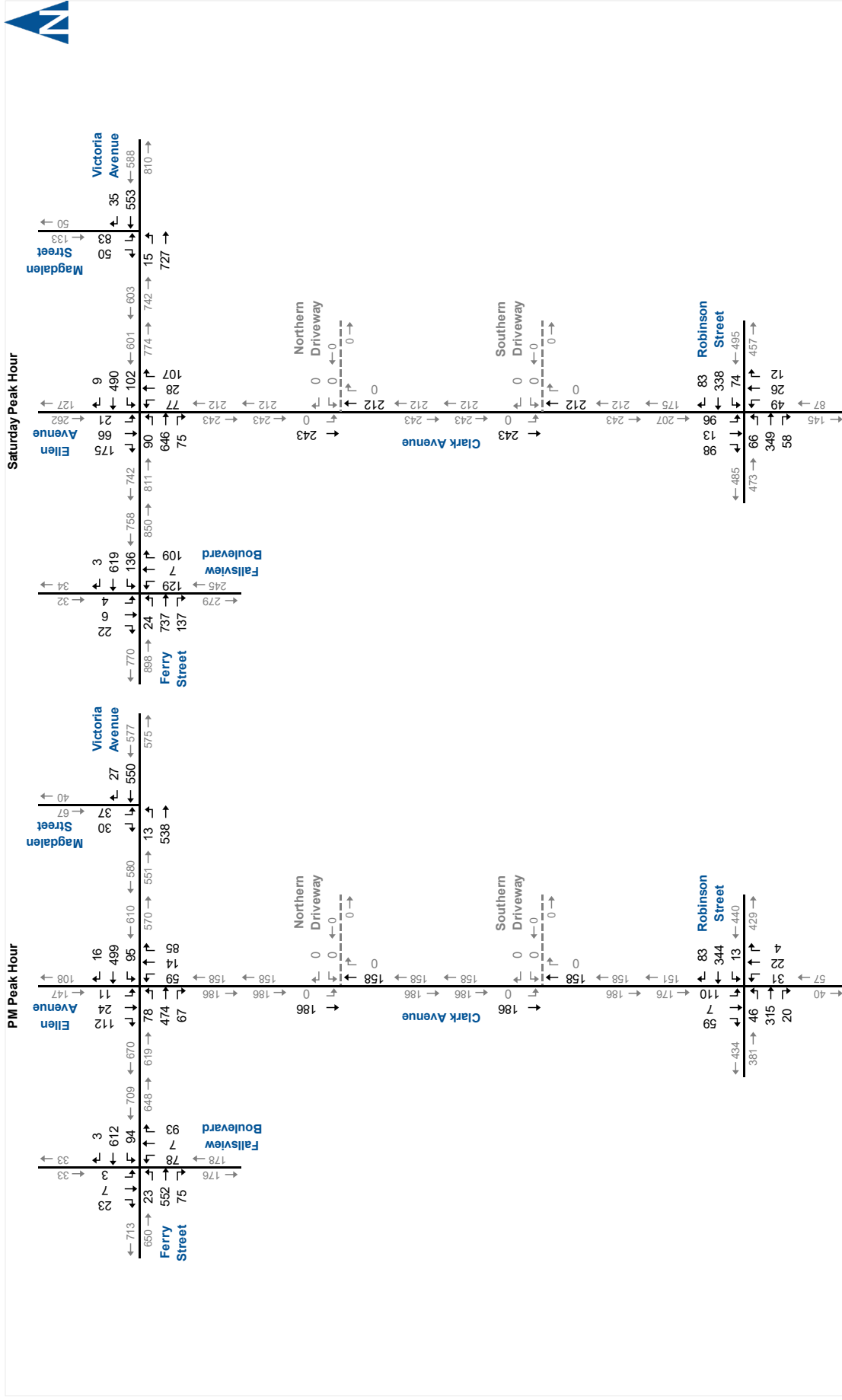


2027 Forecast Background Traffic Volumes

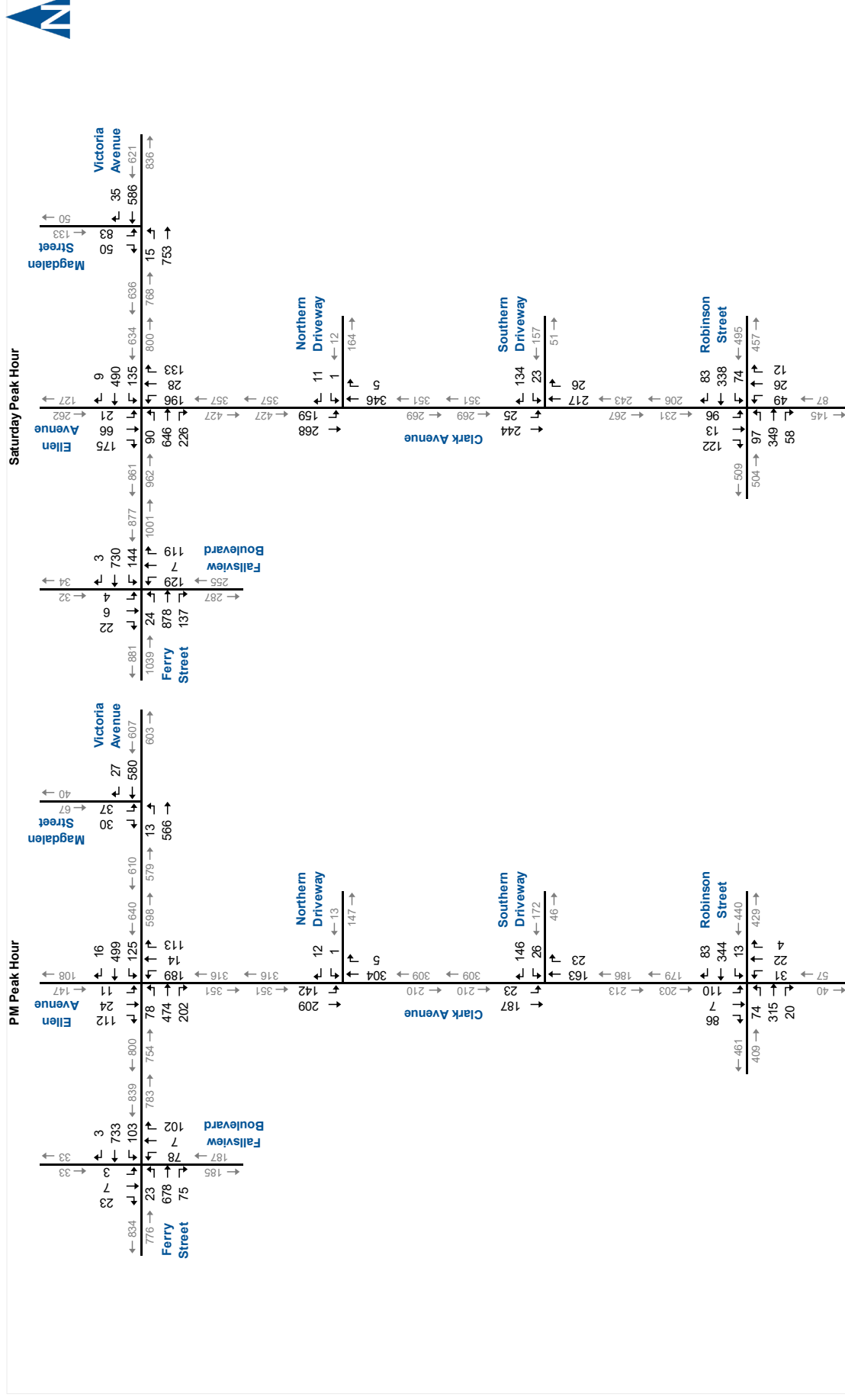


2027 Forecast Total Traffic Volumes

Figure 4.2



2032 Forecast Background Traffic Volumes



4.2 Forecast Traffic Operations (Opening Year)

4.2.1 Background Traffic Operations (Opening Year)

Table 4.1 summarizes the level of service conditions. **Appendix F** contains the detailed Synchro 11 reports. In general, all study area intersections are found to be operating at acceptable levels of service with the following critical movements noted:

- ▶ Ferry Street at Clark Avenue/Ellen Avenue:
 - The northbound through/left-turn/right-turn movement is forecast to have a v/c ratio surpassing 0.85 during the Saturday peak hour.
- ▶ Ferry Street at Fallsview Boulevard:
 - The eastbound through/right-turn movement is forecast to have a v/c ratio surpassing 0.85 during the Saturday peak hour.
- ▶ Victoria Avenue at Magdalen Street:
 - The southbound left-turn/right-turn movement is forecast to operate at LOS F during the weekday PM and Saturday peak hours. This movement is also critical under existing traffic conditions.
- ▶ Robinson Street at Clark Avenue:
 - The northbound through/left-turn/right-turn movement is forecast to operate at LOS F during the Saturday peak hour;
 - The southbound through/left-turn/right-turn movement is forecast to operate at LOS F during the weekday PM and Saturday peak hours.



TABLE 4.1: 2027 BACKGROUND 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	
PM Peak Hour	Clark Avenue/Ellen Avenue & Ferry Street	TCS	LOS Delay V/C Q Stor. Avail.	A 2 0.19 3 40 37	A 3 0.50 15 - -	> > > > >	A 3 - - -	A 5 0.25 13 40 27	A 6 0.45 55 - -	> > > > >	A 6 - - -	< < < < <	C 26 0.47 24 - -	> > > > >	C 26 - - -	< < < < <	C 24 0.23 16 - -	> > > > >	C 24 - - -	A 9 0.50 - -
	Fallsview Boulevard & Ferry Street	TCS	LOS Delay V/C Q Stor. Avail.	A 4 0.07 4 30 26	A 8 0.57 80 - -	> > > > >	A 8 - - -	A 5 0.26 10 45 35	A 6 0.55 48 - -	> > > > >	A 6 - - -	< < < < <	C 26 0.48 27 - -	> > > > >	C 26 - - -	< < < < <	C 23 0.06 7 - -	> > > > >	C 23 - - -	A 9 0.55 - -
	Victoria Avenue & Magdalen Street	TWSC	LOS Delay V/C Q	< < <	A 1 0.22 1	> > >	A 0 - -	< < <	A 0 0.35 0	> > >	A 0 - -	< < <	< < <	< < <	< < <	F 65 0.55 20	> > >	F 64 - -	> > >	< < <
	Robinson Street & Clark Avenue	TWSC	LOS Delay V/C Q	< < <	A 2 0.05 1	> > >	A 2 - -	< < <	A 0 0.01 0	> > >	A 0 - -	< < <	E 37 0.35 11	> > >	E 37 - -	< < <	F 133 1.04 66	> > >	F 133 - -	> > >
Saturday Peak Hour	Clark Avenue/Ellen Avenue & Ferry Street	TCS	LOS Delay V/C Q Stor. Avail.	A 3 0.25 2 40 38	A 6 0.73 20 - -	> > > > >	A 5 - -	B 11 0.41 20 40 20	A 8 0.47 63 - -	> > > > >	A 9 - -	< < < < <	E 63 0.89 60 - -	> > > > >	E 63 - -	< < < < <	C 30 0.63 47 - -	> > > > >	C 30 - -	B 16 0.77 - -
	Fallsview Boulevard & Ferry Street	TCS	LOS Delay V/C Q Stor. Avail.	A 5 0.08 5 30 25	C 21 0.87 201 - -	> > > > >	C 20 - -	B 20 0.67 45 45 0	A 7 0.56 59 - -	> > > > >	A 9 - -	< < < < <	D 36 0.74 52 - -	> > > > >	D 36 - -	< < < < <	C 24 0.05 7 - -	> > > > >	C 24 - -	B 18 0.84 - -
	Victoria Avenue & Magdalen Street	TWSC	LOS Delay V/C Q	< < <	A 2 0.30 1	> > >	A 1 - -	< < <	A 0 0.36 0	> > >	A 0 - -	< < <	< < <	< < <	< < <	F 746 2.31 102	> > >	F 746 - -	> > >	< < <
	Robinson Street & Clark Avenue	TWSC	LOS Delay V/C Q	< < <	A 2 0.08 2	> > >	A 2 - -	< < <	A 2 0.08 2	> > >	A 2 - -	< < <	F 332 1.34 56	> > >	F 332 - -	< < <	F 580 2.07 139	> > >	F 580 - -	> > >

MOE - Measure of Effectiveness

LOS - Level of Service

Delay - Average Delay per Vehicle in Seconds

V/C - Volume to Capacity Ratio

Q - 95th Percentile Queue Length (m)

Stor. - Existing Storage (m)

Avail. - Available Storage (m)

TCS - Traffic Control Signal

TWSC - Two-Way Stop Control

</> - Shared Movement



4.2.2 Total Traffic Operations (Opening Year)

Table 4.2a and **Table 4.2b** summarize the level of service conditions. **Appendix G** contains the detailed Synchro 11 reports. In general, all study area intersections are found to be operating at acceptable levels of service with the following critical movements noted:

- ▶ Ferry Street at Clark Avenue/Ellen Avenue:
 - The overall v/c ratio is forecast to surpass 0.85 and 1.00 during the weekday PM and Saturday peak hours, respectively;
 - The eastbound through/right-turn movement is forecast to have a v/c ratio surpassing 0.85 and 1.00 during the weekday PM and Saturday peak hours, respectively;
 - The westbound left-turn movement is forecast to have a v/c ratio surpassing 1.00 and a queue length that exceeds its storage length during the Saturday peak hour;
 - The northbound through/left-turn/right-turn movement is forecast to have a v/c ratio surpassing 0.85 and 1.00 during the weekday PM and Saturday peak hours. This movement is critical under background traffic conditions (opening year).
- ▶ Ferry Street at Fallsview Boulevard:
 - The overall v/c ratio is forecast to surpass 0.85 during the Saturday peak hour;
 - The eastbound through/right-turn movement is forecast to have a v/c ratio surpassing 0.85 during the Saturday peak hour. This movement is critical under background traffic conditions (opening year);
 - The westbound left-turn movement is forecast to have a v/c ratio surpassing 0.90 and a queue length that exceeds its storage length during the Saturday peak hour;
 - The northbound through/left-turn/right-turn movement is forecast to have a v/c ratio surpassing 0.85 during the Saturday peak hour.
- ▶ Victoria Avenue at Magdalen Street:
 - The southbound left-turn/right-turn movement is forecast to operate at LOS F during the weekday PM and Saturday peak hours. This movement is critical under existing and background traffic conditions (opening year).
- ▶ Robinson Street at Clark Avenue:



- The northbound through/left-turn/right-turn movement is forecast to operate at LOS F during the Saturday peak hour. This movement is critical under background traffic conditions (opening year);
- The southbound through/left-turn/right-turn movement is forecast to operate at LOS F during the weekday PM and Saturday peak hours. This movement is critical under background traffic conditions.

All approaches at the site driveways connecting to Clark Avenue are forecast to operate in the LOS A to C range with v/c ratios not surpassing 0.50 during the weekday PM and Saturday peak hours.



TABLE 4.2A: 2027 TOTAL OPERATIONS (PM PEAK HOUR)

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	
PM Peak Hour	Clark Avenue/Ellen Avenue & Ferry Street	TCS	LOS Delay V/C Q Stor. Avail.	A 6 0.26 3 40 37	B 19 0.87 155 - -	> > > > >	B 18	B 19 0.55 32 40 8	B 13 0.55 74 - -	> > > > >	B 14	< < < < <	E 55 0.92 91 - -	> > > > >	E 55	< < < < <	B 19 0.17 16 - -	> > > > >	B 19	C 23 0.89
	Fallsview Boulevard & Ferry Street	TCS	LOS Delay V/C Q Stor. Avail.	A 4 0.08 4 30 26	A 10 0.67 123 - -	> > > > >	A 9	A 5 0.34 10 45 35	A 6 0.64 70 - -	> > > > >	A 6	< < < < <	C 31 0.56 33 - -	> > > > >	C 31	< < < < <	C 27 0.06 8 - -	> > > > >	C 27	B 10 0.65
	Victoria Avenue & Magdalen Street	TWSC	LOS Delay V/C Q	< < < <	A 1 0.23 1		A 0		A 0 0.37 0	> > > >	A 0					F 72 0.58 22		> > > >	F 72	
	Robinson Street & Clark Avenue	TWSC	LOS Delay V/C Q	< < < <	A 2 0.08 2	> > > >	A 2	< < < <	A 0 0.01 0	> > > >	A 0	< < < <	E 48 0.42 14	> > > >	E 48	< < < <	F 196 1.23 89	> > > >	F 196	
	Clark Avenue & Northern Driveway	TWSC	LOS Delay V/C Q					C 16 0.04 1		> > > >	C 16		A 0 0.19 0	> > > >	A 0	< < < <	A 6 0.20 6		A 6	
	Clark Avenue & Southern Driveway	TWSC	LOS Delay V/C Q					C 19 0.42 16		> > > >	C 19		A 0 0.12 0	> > > >	A 0	< < < <	A 1 0.03 1		A 1	

MOE - Measure of Effectiveness

LOS - Level of Service

Delay - Average Delay per Vehicle in Seconds

V/C - Volume to Capacity Ratio

Q - 95th Percentile Queue Length (m)

Stor. - Existing Storage (m)

Avail. - Available Storage (m)

TCS - Traffic Control Signal

TWSC - Two-Way Stop Control

</> - Shared Movement



TABLE 4.2B: 2027 TOTAL OPERATIONS (SATURDAY PEAK HOUR)

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	
Saturday Peak Hour	Clark Avenue/Ellen Avenue & Ferry Street	TCS	LOS Delay V/C Q Stor. Avail.	A 6 0.31 5 40 35	F 86 1.15 226 - -	> > > > >	E 78	F 303 1.52 58 40 -18	B 16 0.54 85 - -	> > > > >	E 78	< < < < <	F 229 1.39 148 - -	> > > > >	F 229	< < < < <	C 26 0.51 55 - -	> > > > >	C 26	F 97 1.47
	Fallsview Boulevard & Ferry Street	TCS	LOS Delay V/C Q Stor. Avail.	A 5 0.09 4 30 26	C 32 0.96 279 - -	> > > > >	C 31	E 68 0.99 50 45 -5	A 7 0.63 74 - -	> > > > >	B 17	< < < < <	E 62 0.87 85 - -	> > > > >	E 62	< < < < <	C 31 0.05 9 - -	> > > > >	C 31	C 29 0.96
	Victoria Avenue & Magdalen Street	TWSC	LOS Delay V/C Q	< < < <	A 2 0.31 1		A 1		A 0 0.38 0	> > > >	A 0					F 834 2.49 105		> > > >	F 834	
	Robinson Street & Clark Avenue	TWSC	LOS Delay V/C Q	< < < <	A 3 0.12 3	> > > >	A 3	< < < <	A 2 0.08 2	> > > >	A 2	< < < <	F 533 1.75 65	> > > >	F 533	< < < <	F 764 2.48 167	> > > >	F 764	
	Clark Avenue & Northern Driveway	TWSC	LOS Delay V/C Q					C 19 0.05 1		> > > >	C 19		A 0 0.22 0	> > > >	A 0	< < < <	A 7 0.26 8		A 7	
	Clark Avenue & Southern Driveway	TWSC	LOS Delay V/C Q					C 24 0.48 19		> > > >	C 24		A 0 0.15 0	> > > >	A 0	< < < <	A 1 0.04 1		A 1	

MOE - Measure of Effectiveness

LOS - Level of Service

Delay - Average Delay per Vehicle in Seconds

V/C - Volume to Capacity Ratio

Q - 95th Percentile Queue Length (m)

Stor. - Existing Storage (m)

Avail. - Available Storage (m)

TCS - Traffic Control Signal

TWSC - Two-Way Stop Control

</> - Shared Movement



4.3 Forecast Traffic Operations (Five-Year Horizon)

4.3.1 Background Traffic Operations (Five-Year Horizon)

Table 4.3 summarizes the level of service conditions. **Appendix H** contains the detailed Synchro 11 reports. In general, all study area intersections are found to be operating at acceptable levels of service with the following critical movements noted:

- ▶ Ferry Street at Clark Avenue/Ellen Avenue:
 - The northbound through/left-turn/right-turn movement is forecast to have a v/c ratio surpassing 0.85 during the Saturday peak hour. This movement is critical under background and total traffic conditions (opening year).
- ▶ Ferry Street at Fallsview Boulevard:
 - The overall v/c ratio is forecast to surpass 0.85 during the Saturday peak hour. This v/c ratio is critical under total traffic conditions (opening year);
 - The eastbound through/right-turn movement is forecast to have a v/c ratio surpassing 0.85 during the Saturday peak hour. This movement is critical under background and total traffic conditions (both opening year);
 - The westbound left-turn movement is forecast to have a queue length that surpasses its storage length during the Saturday peak hour. This movement is critical under total traffic conditions (opening year).
- ▶ Victoria Avenue at Magdalen Street:
 - The southbound left-turn/right-turn movement is forecast to operate at LOS F during the weekday PM and Saturday peak hours. This movement is critical under the existing, background (opening year), and total (opening year) traffic conditions.
- ▶ Robinson Street at Clark Avenue:
 - The northbound through/left-turn/right-turn movement is forecast to operate at LOS F during the Saturday peak hour. This movement is critical under background and total traffic conditions (opening year);
 - The southbound through/left-turn/right-turn movement is forecast to operate at LOS F during the weekday PM and Saturday peak hours. This movement is critical under background and total traffic conditions (opening year).



TABLE 4.3: 2032 BACKGROUND 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	
PM Peak Hour	Clark Avenue/Ellen Avenue & Ferry Street	TCS	LOS Delay V/C Q Stor. Avail.	A 2 0.20 3 40 37	A 3 0.53 16 - -	> > > > >	A 3 - - -	A 6 0.27 14 40 26	A 6 0.48 61 - -	> > > > >	A 6 - - -	< < < < <	C 26 0.51 25 - -	> > > > >	C 26 - - -	< < < < <	C 24 0.26 17 - -	> > > > >	C 24 - - -	A 9 0.53
	Fallsview Boulevard & Ferry Street	TCS	LOS Delay V/C Q Stor. Avail.	A 4 0.07 4 30 26	A 8 0.60 88 - -	> > > > >	A 8 - - -	A 5 0.28 11 45 34	A 6 0.57 50 - -	> > > > >	A 6 - - -	< < < < <	C 26 0.50 28 - -	> > > > >	C 26 - - -	< < < < <	C 23 0.06 7 - -	> > > > >	C 23 - - -	A 9 0.58
	Victoria Avenue & Magdalen Street	TWSC	LOS Delay V/C Q	< < <	A 1 0.23 1	> > >	A 0 - -	< < <	A 0 0.37 0	> > >	A 0 - -	< < <	< < <	< < <	< < <	F 76 0.62 23	> > >	F 76 - -	> > >	< < <
	Robinson Street & Clark Avenue	TWSC	LOS Delay V/C Q	< < <	A 2 0.05 1	> > >	A 2 - -	< < <	A 0 0.01 0	> > >	A 0 - -	< < <	E 41 0.38 12	> > >	E 41 - -	< < <	F 156 1.11 73	> > >	F 156 - -	> > >
Saturday Peak Hour	Clark Avenue/Ellen Avenue & Ferry Street	TCS	LOS Delay V/C Q Stor. Avail.	A 3 0.29 2 40 38	A 6 0.78 23 - -	> > > > >	A 6 - - -	B 13 0.43 23 40 17	A 10 0.50 68 - -	> > > > >	A 10 - -	< < < < <	E 65 0.91 64 - -	> > > > >	E 65 - -	< < < < <	C 30 0.66 52 - -	> > > > >	C 30 - -	B 17 0.81
	Fallsview Boulevard & Ferry Street	TCS	LOS Delay V/C Q Stor. Avail.	A 6 0.09 5 30 25	C 26 0.92 217 - -	> > > > >	C 26 - -	D 38 0.84 52 45 -7	A 13 0.59 61 - -	> > > > >	B 13 - -	< < < < <	D 38 0.76 55 - -	> > > > >	D 38 - -	< < < < <	C 23 0.05 7 - -	> > > > >	C 23 - -	C 22 0.88
	Victoria Avenue & Magdalen Street	TWSC	LOS Delay V/C Q	< < <	A 2 0.31 1	> > >	A 1 - -	< < <	A 0 0.38 0	> > >	A 0 - -	< < <	< < <	< < <	< < <	F 866 2.56 110	> > >	F 866 - -	> > >	< < <
	Robinson Street & Clark Avenue	TWSC	LOS Delay V/C Q	< < <	A 2 0.08 2	> > >	A 2 - -	< < <	A 2 0.08 2	> > >	A 2 - -	< < <	F 414 1.53 62	> > >	F 414 - -	< < <	F 668 2.26 150	> > >	F 668 - -	> > >

MOE - Measure of Effectiveness

LOS - Level of Service

Delay - Average Delay per Vehicle in Seconds

V/C - Volume to Capacity Ratio

Q - 95th Percentile Queue Length (m)

Stor. - Existing Storage (m)

Avail. - Available Storage (m)

TCS - Traffic Control Signal

TWSC - Two-Way Stop Control

</> - Shared Movement



4.3.2 Total Traffic Operations (Five-Year Horizon)

Table 4.4a and **Table 4.4b** summarize the level of service conditions. **Appendix I** contains the detailed Synchro 11 reports. In general, all study area intersections are found to be operating at acceptable levels of service with the following critical movements noted:

- ▶ Ferry Street at Clark Avenue/Ellen Avenue:
 - The overall v/c ratio is forecasted to surpass 0.85 and 1.00 during the weekday PM and Saturday peak hours, respectively. This v/c ratio is critical under total traffic conditions (opening year);
 - The eastbound through/right-turn movement is forecast to have a v/c ratio surpassing 0.85 and 1.00 during the weekday PM and Saturday peak hours, respectively. This movement is critical under total traffic conditions (opening year);
 - The westbound left-turn movement is forecast to have a v/c ratio surpassing 1.00 and a queue length that exceeds its storage length during the Saturday peak hour. This movement is critical under total traffic conditions (opening year);
 - The northbound through/left-turn/right-turn movement is forecast to have a v/c ratio surpassing 0.85 and 1.00 during the weekday PM and Saturday peak hours. This movement is critical under background (opening and five-year) and total (opening year) traffic conditions.
- ▶ Ferry Street at Fallsview Boulevard:
 - The overall v/c ratio is forecast to surpass 1.00 during the Saturday peak hour. This v/c ratio is critical under total (opening year) and background (5-year) traffic conditions;
 - The eastbound through/right-turn movement is forecast to have a v/c ratio surpassing 1.00 during the Saturday peak hour. This movement is critical under background (opening and 5-year) and total (opening year) traffic conditions;
 - The westbound left-turn movement is forecast to have a v/c ratio surpassing 1.00 and a queue length that exceeds its storage length during the Saturday peak hour. This movement is critical under total (opening year) and background (five-year) traffic conditions.



- ▶ Victoria Avenue at Magdalen Street:
 - The southbound left-turn/right-turn movement is forecast to operate at LOS F during the weekday PM and Saturday peak hours. This movement is critical under the existing, background (opening and five-year), and total (opening year) traffic conditions.
- ▶ Robinson Street at Clark Avenue:
 - The northbound through/left-turn/right-turn movement is forecast to operate at LOS F during the weekday PM and Saturday peak hours. This movement is critical under background (opening and five-year) and total (opening year) traffic conditions;
 - The southbound through/left-turn/right-turn movement is forecast to operate at LOS F during the weekday PM and Saturday peak hours. This movement is critical under background (opening and five-year) and total (opening year) traffic conditions.

All approaches at the site driveways connecting to Clark Avenue are forecast to operate in the LOS A to C range with v/c ratios not surpassing 0.50 during the weekday PM and Saturday peak hours.



TABLE 4.4A: 2032 TOTAL OPERATIONS (PM PEAK HOUR)

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	
PM Peak Hour	Clark Avenue/Ellen Avenue & Ferry Street	TCS	LOS Delay V/C Q Stor. Avail.	A 5 0.29 3 40 37	C 20 0.91 147 - -	> > > > >	B 19	C 28 0.69 38 40 2	B 13 0.59 72 - -	> > > > >	B 16	< < < < <	D 51 0.92 83 - -	> > > > >	D 51	< < < < <	B 17 0.19 16 - -	> > > > >	B 17	C 23 0.91
	Fallsview Boulevard & Ferry Street	TCS	LOS Delay V/C Q Stor. Avail.	A 4 0.09 4 30 26	B 11 0.72 151 - -	> > > > >	B 11	A 7 0.40 12 45 33	A 7 0.69 82 - -	> > > > >	A 7	< < < < <	C 26 0.51 29 - -	> > > > >	C 26	< < < < <	C 23 0.05 7 - -	> > > > >	C 23	B 11 0.67
	Victoria Avenue & Magdalen Street	TWSC	LOS Delay V/C Q	< < < <	A 1 0.24 1		A 0	A 0 0.39 0	> > > >		A 0					F 86 0.66 25		> > > >	F 86	
	Robinson Street & Clark Avenue	TWSC	LOS Delay V/C Q	< < < <	A 2 0.08 2	> > > >	A 2	< < < <	A 0 0.01 0	> > > >	A 0	< < < <	F 54 0.47 16	> > > >	F 54	< < < <	F 226 1.31 97	> > > >	F 226	
	Clark Avenue & Northern Driveway	TWSC	LOS Delay V/C Q					C 16 0.04 1		> > > >	C 16		A 0 0.20 0	> > > >	A 0	< < < <	A 6 0.20 6		A 6	
	Clark Avenue & Southern Driveway	TWSC	LOS Delay V/C Q					C 19 0.43 16		> > > >	C 19		A 0 0.12 0	> > > >	A 0	< < < <	A 1 0.03 1		A 1	

MOE - Measure of Effectiveness

LOS - Level of Service

Delay - Average Delay per Vehicle in Seconds

V/C - Volume to Capacity Ratio

Q - 95th Percentile Queue Length (m)

Stor. - Existing Storage (m)

Avail. - Available Storage (m)

TCS - Traffic Control Signal

TWSC - Two-Way Stop Control

</> - Shared Movement



TABLE 4.4B: 2032 TOTAL OPERATIONS (SATURDAY PEAK HOUR)

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	
Saturday Peak Hour	Clark Avenue/Ellen Avenue & Ferry Street	TCS	LOS Delay V/C Q Stor. Avail.	A 3 0.39 2 40 38	F 122 1.25 133 - -	> > > > >	F 110	F 294 1.52 47 40 -7	B 14 0.61 73 - -	> > > > >	E 74	< < < < <	F 158 1.25 109 - -	> > > > >	F 158	< < < < <	B 18 0.53 46 - -	> > > > >	B 18	F 97 1.40
	Fallsview Boulevard & Ferry Street	TCS	LOS Delay V/C Q Stor. Avail.	A 7 0.13 5 30 25	F 88 1.14 251 - -	> > > > >	F 86	F 318 1.62 47 45 -2	B 11 0.76 92 - -	> > > > >	E 61	< < < < <	C 31 0.75 51 - -	> > > > >	C 31	< < < < <	B 18 0.04 6 - -	> > > > >	B 18	E 69 1.33
	Victoria Avenue & Magdalen Street	TWSC	LOS Delay V/C Q	< < < <	A 2 0.32 1		A 1		A 0 0.40 0	> > > >	A 0					F 962 2.76 113		> > > >	F 962	
	Robinson Street & Clark Avenue	TWSC	LOS Delay V/C Q	< < < <	A 3 0.12 3	> > > >	A 3	< < < <	A 2 0.08 2	> > > >	A 2	< < < <	F 649 1.99 72	> > > >	F 649	< < < <	F 868 2.70 178	> > > >	F 868	
	Clark Avenue & Northern Driveway	TWSC	LOS Delay V/C Q					C 19 0.05 1		> > > >	C 19		A 0 0.22 0	> > > >	A 0	< < < <	A 7 0.26 8		A 7	
	Clark Avenue & Southern Driveway	TWSC	LOS Delay V/C Q					C 25 0.49 20		> > > >	C 25		A 0 0.16 0	> > > >	A 0	< < < <	A 1 0.04 1		A 1	

MOE - Measure of Effectiveness

LOS - Level of Service

Delay - Average Delay per Vehicle in Seconds

V/C - Volume to Capacity Ratio

Q - 95th Percentile Queue Length (m)

Stor. - Existing Storage (m)

Avail. - Available Storage (m)

TCS - Traffic Control Signal

TWSC - Two-Way Stop Control

</> - Shared Movement



5 Remedial Measures

5.1 Traffic Signal Control

Under total traffic conditions, the side street approaches at the intersections of Victoria Avenue at Magdalen Street and Robinson Street at Clark Avenue are forecast to operate at LOS F during the weekday PM and Saturday peak hours.

5.1.1 OTM Traffic Manual Book 12 – Justifications 1 to 3

The need for traffic control improvements was assessed using the Ontario Traffic Manual (OTM Book 12 – Justifications 1 to 3) signal warrant⁹ procedures. To warrant the consideration for the installation of traffic signal control with forecast traffic volumes (average hourly volumes for eight hours), at least one warrant must be fulfilled by 100% or 80% (cross traffic only).

Table 5.1 summarizes the OTM signal warrants for the intersections of Victoria Avenue at Magdalen Street and Robinson Street at Clark Avenue under 2032 total traffic conditions. Based on the volume warrant analysis, signals are not warranted.

Appendix J contains the warrant analysis.

⁹ Ontario Ministry of Transportation, *Ontario Traffic Manual Book 12: Traffic Signals*, (Toronto: Queen's Printer for Ontario, 2012).



TABLE 5.1: OTM WARRANT SUMMARY

Intersection	Time	OTM Warrant				Warranted
		1A	1B	2A	2B	
Victoria Avenue and Magdalen Street	07:00 - 08:00	60%	6%	58%	39%	No
	08:00 - 09:00	86%	13%	82%	35%	
	11:00 - 12:00	100%	24%	100%	100%	
	12:00 - 13:00	100%	27%	100%	100%	
	13:00 - 14:00	100%	26%	100%	100%	
	15:00 - 16:00	100%	23%	100%	100%	
	16:00 - 17:00	100%	27%	100%	100%	
	17:00 - 18:00	100%	28%	100%	100%	
Robinson Street and Clark Avenue	07:00 - 08:00	71%	44%	61%	65%	No
	08:00 - 09:00	83%	61%	68%	100%	
	11:00 - 12:00	100%	100%	100%	100%	
	12:00 - 13:00	100%	100%	100%	100%	
	13:00 - 14:00	100%	100%	100%	100%	
	15:00 - 16:00	100%	100%	100%	100%	
	16:00 - 17:00	100%	100%	100%	100%	
	17:00 - 18:00	100%	100%	100%	100%	



5.1.2 OTM Traffic Manual Book 12 – Justification 5

The need for traffic control improvements was also assessed using the Ontario Traffic Manual (OTM Book 12 – Justification 5) signal warrant procedures. To warrant the consideration for the installation of traffic signal control based on collision history, the following must be fulfilled:

- ▶ Within three years, the intersection must accumulate a minimum of 15 known reducible collisions.

It is noted that the intersection of Victoria Avenue at Magdalen Street accumulated eight known collisions (0 reducible) from 2018 to 2023.

It is also noted that the intersection of Robinson Street at Magdalen Street accumulated four known collisions (2 reducible) from 2018 to 2023.

Based on the five-year collision history, signals are not warranted.

Appendix B also contains the five-year collision data for reference.

No change in the existing traffic control (stop sign) is recommended for the intersections of Victoria Avenue at Magdalen Street and Robinson Street at Clark Avenue.

5.2 Left-Turn Lanes

The intersections of Clark Avenue with the two site driveways within the study area were assessed to determine if the projected traffic volumes warrant the installation of left-turn lanes. The warrants for left-turn lanes follow the Ministry of Transportation's (MTO) Geometric Design Standards¹⁰. A design speed of 60 km/h was used for the analysis.

The percentages of left-turning vehicles in the approaching volume were rounded to the nearest 5%, as nomographs are only provided for 5% increments.

Table 5.2 summarizes the left-turn lane warrants. The warrant analysis suggests that a 25 m southbound left-turn lane is warranted at the intersection of Clark Avenue and the Northern Driveway under 2027 total traffic conditions.

¹⁰ Ontario Ministry of Transportation, *MTO Design Supplement for TAC Geometric Design Guide for Canadian Roads*, (Toronto: Queen's Printer for Ontario, 2020).



TABLE 5.2: LEFT-TURN LANE WARRANT SUMMARY

Roadway	Clark Avenue					
Intersection	Northern Driveway				Southern Driveway	
Approach Direction	Southbound				Southbound	
Design Speed	60 km/h				60 km/h	
Horizon	Total (2032)		Total (2027)		Total (2032)	
Peak Hour	PM	SAT	PM	SAT	PM	SAT
Advancing Volume	351	427	346	418	210	269
Opposing Volume	309	351	304	343	186	243
Left Turning Traffic	142	159	142	159	23	25
% of Left Turning Traffic	40%	37%	41%	38%	11%	9%
Figure Used*	9A-10	9A-10	9A-10	9A-10	9A-7	9A-7
Warranted	Yes	Yes	Yes	Yes	No	No
Storage Length Required	15 m	25 m	15 m	25 m	-	-

*Ontario Ministry of Transportation, *MTO Design Supplement for TAC Geometric Design Guide for Canadian Roads*, (Toronto: Queens Printer for Ontario, 2020).

Appendix K contains the left-turn lane warrant nomographs.

5.3 Assessment of Impacts

5.3.1 Signal Timing and Geometric Improvements

Under future traffic conditions, all existing intersections have critical movements noted. Signal timing adjustments at the intersections of Ferry Street at Clark Avenue/Ellen Avenue and Ferry Street at Fallsview Boulevard could reduce v/c ratios and prevent exclusive turning movement queue lengths from surpassing their storage lengths.

Additional improvement options for the study area intersections are discussed below:

- **Ferry Street and Clark Avenue/Ellen Avenue**, the eastbound through/right-turn movement is expected to have a v/c ratio exceeding 0.85 and 1.00 on weekdays and Saturdays, respectively. The westbound left-turn movement is predicted to have a v/c ratio exceeding 1.00 and a queue length surpassing its storage length during the Saturday peak hour. Lastly, the northbound through/left-turn/right-turn movement is expected to have a v/c ratio greater than 0.85 and 1.00 during the weekday PM and Saturday peak hours.

Based on the projected volumes and analysis under the Background Horizon (opening year), the addition of a separate northbound through/right-turn movement with 15 metres of storage would improve operations. In addition, with the addition of site generated traffic under the Total Horizon (opening year), the addition of a permissive protected phase for the westbound left-turn movement during the Saturday peak hour would improve operations.



- ▶ **Ferry Street and Fallsview Boulevard**, the eastbound through/right-turn movement is forecast to have a v/c ratio surpassing 1.00 under. The westbound left-turn movement is also projected to have a v/c ratio exceeding 1.00, along with a queue length that surpasses its storage length during the Saturday peak hour.

Based on the projected volumes and analysis under the Total Horizon (opening year), the addition of a permissive protected phase for the westbound left-turn movement during the Saturday peak hour would improve operations.

- ▶ **Robinson Street and Clark Avenue**, during weekday PM and Saturday peak hours, both the northbound and southbound through/left-turn/right-turn movements are expected to operate at level of service F.

Based on the projected volumes and analysis under the Background Horizon (opening year) the addition of a separate southbound through/right-turn lane with 25 m of storage would improve operations.

- ▶ **Clark Avenue at the Southern Driveway**, the site concept plan illustrates separated left-turn and right-turn movements (westbound left-turn and right-turn) for traffic leaving the southern site driveway. However, the separation of the westbound left-turn and right-turn movements at the south site driveway is not likely needed.

It is noted that the existing cross-section along Clark Avenue between Ferry Street and Robinson Street can likely accommodate the separation of the northbound and southbound approaches at the intersections of Ferry Street at Clark Avenue/Ellen Avenue and Robinson Street at Clark Avenue, respectively, to add more intersection capacity. The existing cross-section along Clark Avenue is also likely wide enough to accommodate a left-turn lane for traffic entering the northern site driveway.

At Victoria Avenue and Magdalen Street intersection, the side street approach (Magdalen Street) is critical under existing and future traffic conditions. However, it is assumed that the existing cross-section along Magdalen Street is likely not wide enough to accommodate an additional turn lane at Victoria Avenue and add more intersection capacity.



5.4 Sensitivity Analysis

A sensitivity analysis has been undertaken for the 2032 total traffic conditions. **Table 5.3a** and **Table 5.3b** summarize the level of service conditions with remedial measures implemented under 2032 total traffic conditions. **Appendix L** contains the detailed Synchro 11 reports. The following subsections discuss the proposed improvements and analysis summary.

5.4.1 Ferry Street at Clark Avenue/Ellen Avenue

- ▶ Based on background traffic conditions (opening year), add a separate northbound through/right-turn movement with 15 m of storage;
- ▶ Optimize the signal timings;
- ▶ Based on total traffic conditions (opening year), add a permissive protected phase for the westbound left-turn movement (Saturday peak hour).

With the addition of permissive protected left-turn phases, the westbound left-turn movements at Ferry Street and Clark Avenue intersections are no longer projected to have a v/c ratio surpassing 1.00. The westbound left movement queue lengths also don't exceed their storage lengths.

However, the eastbound through/right-turn movement is forecast to have a v/c ratio surpassing 1.00 during the Saturday peak hour. This is a result of the heavy pedestrian volumes crossing east-west along the south leg of the intersection. As a result, the eastbound right turn movement faces significant delays, impacting the eastbound through movement.

Additionally, the northbound through/right-turn movement is forecast to have a queue length surpassing its storage length by 1 and 2 m during the weekday PM and Saturday peak hours. The proposed taper lane should accommodate the northbound through/right-turn queue lengths.



5.4.2 Ferry Street at Fallsview Boulevard

- ▶ Optimize the signal timings;
- ▶ Based on total (opening year) and background (five-year) traffic conditions, add a permissive protected phase for the westbound left-turn movement (Saturday peak hour).

With the addition of permissive protected left-turn phases, the westbound left-turn movements at the intersections of Ferry Street and Fallsview Boulevard no longer have a v/c ratio surpassing 1.00. The westbound left movement queue lengths also don't exceed their storage lengths.

However, the eastbound through/right-turn movement is forecast to have a v/c ratio surpassing 1.00 during the Saturday peak hour. This is a result of the heavy pedestrian volumes crossing east-west along the south leg of the intersection. As a result, the eastbound right turn movement faces significant delays, impacting the eastbound through movement.

5.4.3 Robinson Street at Clark Avenue

- ▶ Based on background traffic conditions (opening year), add a separate southbound through/right-turn lane with 25 m of storage.

With the addition of a southbound through/right-turn movement at the intersection of Robinson Street and Clark Avenue, the movement is forecasted to operate in the LOS C to D range, and the queue lengths are also forecasted to be contained by the proposed storage length. Adding a 25 m southbound through/right-turn lane at the intersection of Robinson Street and Clark Avenue shouldn't conflict with the on-street parking along Clark Avenue.

However, the northbound through/left-turn/right-turn movement is forecast to still operate at LOS F during the weekday PM and Saturday peak hours. The southbound left-turn movement is also forecast to operate at LOS F during the weekday PM and Saturday peak hours.



5.4.4 Clark Avenue at the Northern Driveway

- ▶ Based on total traffic conditions (opening year), add a separate southbound left-turn lane with 15 m of storage.

The southbound left-turn movement at the intersection of Clark Avenue and the Northern Driveway is forecast to have queue lengths not surpassing the proposed storage length of 15 m. The additional 25 m southbound left-turn lane at the intersection of Clark Avenue and the Northern Driveway could potentially conflict with the lane upstream intersection of Ferry Street and Clark Avenue/Ellen Avenue north approach. As a result, the storage for the southbound left-turn movement will need to be further reviewed as part of a functional design to determine if 25 m is feasible.

5.4.5 Clark Avenue at the Southern Driveway

- ▶ Based on total traffic conditions (five-year), a single inbound and outbound lane for driveway approach will be sufficient from an operational perspective.

It is noted that the site concept plan illustrates separated left-turn and right-turn movements (westbound left-turn and right-turn) for traffic leaving the southern site driveway. However, the separation of the westbound left-turn and right-turn movements at the south site driveway is not likely needed. As a shared approach, the westbound left-turn/right-turn movement is forecast to operate at LOS C, the delays and 95th percentile queue lengths don't surpass 25 seconds and 20 m (approximately three passenger cars), respectively, and v/c ratios are smaller than 0.50. Therefore, it is recommended that the lane configuration be changed to a shared westbound left-turn/right-turn approach at the southern site driveway.



TABLE 5.3A: SENSITIVITY OPERATIONS (PM PEAK HOUR)

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	
PM Peak Hour	Clark Avenue/Ellen Avenue & Ferry Street	TCS	LOS Delay V/C Q Stor. Avail.	A 4 0.24 3 40 37	B 12 0.81 154 - -	> > > > > >	B 11	B 15 0.52 27 40 13	A 10 0.53 71 - -	> > > > > >	B 11	D 47 0.83 59 - -	C 23 0.18 16 15 -1	> > > > > >	D 37	< < < < < <	C 23 0.20 17 - -	> > > > > >	C 23	B 17 0.82
	Fallsview Boulevard & Ferry Street	TCS	LOS Delay V/C Q Stor. Avail.	A 4 0.08 4 30 26	B 10 0.70 138 - -	> > > > > >	B 10	A 6 0.38 13 45 32	A 7 0.67 84 - -	> > > > > >	A 7	< < < < < <	C 31 0.57 35 - -	> > > > > >	C 31	< < < < < <	C 26 0.06 8 - -	> > > > > >	C 26	B 11 0.67
	Victoria Avenue & Magdalen Street	TWSC	LOS Delay V/C Q	< < < <	A 1 0.24 1		A 0	A 0 0.39 0	> > > >		A 0					F 86 0.66 25		> > > >	F 86	
	Robinson Street & Clark Avenue	TWSC	LOS Delay V/C Q Stor. Avail.	< < < < < <	A 2 0.08 2 - -	> > > > > >	A 2	< < < < < <	A 0 0.01 0 - -	> > > > > >	A 0	< < < < < <	F 54 0.47 16 - -	> > > > > >	F 54	F 180 1.07 54 - -	C 16 0.23 7 25 18	> > > > > >	F 105	
	Clark Avenue & Northern Driveway	TWSC	LOS Delay V/C Q Stor. Avail.					C 16 0.04 1 - -		> > > > > >	C 16		A 0 0.20 0 - -	> > > > > >	A 0	B 11 0.20 6 15 9	A 0 0.13 0 - -		A 4	
	Clark Avenue & Southern Driveway	TWSC	LOS Delay V/C Q					C 19 0.43 16		> > > >	C 19		A 0 0.12 0	> > > >	A 0	< < < <	A 1 0.03 1		A 1	

MOE - Measure of Effectiveness

LOS - Level of Service

Delay - Average Delay per Vehicle in Seconds

V/C - Volume to Capacity Ratio

Q - 95th Percentile Queue Length (m)

Stor. - Existing Storage (m)

Avail. - Available Storage (m)

TCS - Traffic Control Signal

TWSC - Two-Way Stop Control

</> - Shared Movement



TABLE 5.3B: SENSITIVITY OPERATIONS (SATURDAY PEAK HOUR)

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	
Saturday Peak Hour	Clark Avenue/Ellen Avenue & Ferry Street	TCS	LOS Delay V/C Q Stor. Avail.	A 6 0.37 4 40 36	F 230 1.49 178 - -	> > > > > >	F 209	C 26 0.67 40 40 0	B 14 0.55 93 - -	> > > > > >	B 16	E 63 0.91 68 - -	C 22 0.25 17 15 -2	> > > > > >	D 45	< < < < < <	C 27 0.60 54 - -	> > > > > >	C 27	F 106 1.19
	Fallsview Boulevard & Ferry Street	TCS	LOS Delay V/C Q Stor. Avail.	B 10 0.10 6 30 24	F 149 1.27 320 - -	> > > > > >	F 146	D 36 0.75 37 45 8	A 9 0.68 99 - -	> > > > > >	B 13	< < < < < <	D 49 0.83 75 - -	> > > > > >	D 49	< < < < < <	C 27 0.05 8 - -	> > > > > >	C 27	F 80 1.10
	Victoria Avenue & Magdalen Street	TWSC	LOS Delay V/C Q	< < < <	A 2 0.32 1		A 1		A 0 0.40 0	> > > >	A 0					F 962 2.76 113		> > > >	F 962	
	Robinson Street & Clark Avenue	TWSC	LOS Delay V/C Q Stor. Avail.	< < < < < <	A 3 0.12 3 - -	> > > > > >	A 3	< < < < < <	A 2 0.08 2 - -	> > > > > >	A 2	< < < < < <	F 649 1.99 72 - -	> > > > > >	F 649	F 723 2.17 80 - -	D 32 0.53 22 25 3	> > > > > >	F 318	
	Clark Avenue & Northern Driveway	TWSC	LOS Delay V/C Q Stor. Avail.					C 19 0.05 1 - -		> > > > > >	C 19		A 0 0.22 0 - -	> > > > > >	A 0	B 12 0.26 8 15 7	A 0 0.17 0 - -		A 5	
	Clark Avenue & Southern Driveway	TWSC	LOS Delay V/C Q					C 25 0.49 20		> > > >	C 25		A 0 0.16 0	> > > >	A 0	< < < <	A 1 0.04 1		A 1	

MOE - Measure of Effectiveness

LOS - Level of Service

Delay - Average Delay per Vehicle in Seconds

V/C - Volume to Capacity Ratio

Q - 95th Percentile Queue Length (m)

Stor. - Existing Storage (m)

Avail. - Available Storage (m)

TCS - Traffic Control Signal

TWSC - Two-Way Stop Control

</> - Shared Movement



6 Conclusions and Recommendations

6.1 Conclusions

Based on the findings of this study, it is concluded:

- ▶ **Existing Traffic Conditions:** The study area intersections operate overall at acceptable service levels during the weekday AM and PM peak hours. The following critical movements are noted:

Ferry Street at Fallsview Boulevard:

- The northbound left-turn/right-turn movement is forecast to operate at LOS F during the Saturday peak hour.

Victoria Avenue at Magdalen Street:

- The southbound left-turn/right-turn movement is forecast to operate at LOS F during the Saturday peak hour.

- ▶ **Site Traffic:** The site is forecast to generate approximately 378 and 384 trips during the weekday PM and Saturday peak hours, respectively;

- ▶ **Circulation Review:** A Passenger Car can circulate through the internal hotel roadway outside the lobby and the parking structure without any conflicts. A Medium Single Unit (MSU) can enter/leave the three loading spaces connecting to Clark Avenue with no conflicts too;

- ▶ **2027 Background Traffic Conditions:** The study area intersections are forecast to operate with the following critical movements noted:

Ferry Street at Clark Avenue/Ellen Avenue:

- The northbound through/left-turn/right-turn movement is forecast to have a v/c ratio surpassing 0.85 during the Saturday peak hour.



Ferry Street at Fallsview Boulevard:

- The eastbound through/right-turn movement is forecast to have a v/c ratio surpassing 0.85 during the Saturday peak hour.

Victoria Avenue at Magdalen Street:

- The southbound left-turn/right-turn movement is forecast to operate at LOS F during the weekday PM and Saturday peak hours. This movement is also critical under existing traffic conditions.

Robinson Street at Clark Avenue:

- The northbound through/left-turn/right-turn movement is forecast to operate at LOS F during the Saturday peak hour;
- The southbound through/left-turn/right-turn movement is forecast to operate at LOS F during the weekday PM and Saturday peak hours.

- ▶ **2027 Total Traffic Conditions:** The study area intersections are expected to operate similarly to 2027 background traffic conditions with the following additional critical movements:

Ferry Street at Clark Avenue/Ellen Avenue:

- The overall v/c ratio is forecast to surpass 0.85 and 1.00 during the weekday PM and Saturday peak hours, respectively;
- The eastbound through/right-turn movement is forecast to have a v/c ratio surpassing 0.85 and 1.00 during the weekday PM and Saturday peak hours, respectively;
- The westbound left-turn movement is forecast to have a v/c ratio exceeding 1.00 and a queue length that surpasses its storage length during the Saturday peak hour.

Ferry Street at Fallsview Boulevard:

- The overall v/c ratio is forecast to surpass 0.85 during the Saturday peak hour;
- The westbound left-turn movement is forecast to have a v/c ratio surpassing 0.90 and a queue length that exceeds its storage length during the Saturday peak hour;
- The northbound through/left-turn/right-turn movement is forecast to have a v/c ratio surpassing 0.85 during the Saturday peak hour.



- ▶ **2032 Background Traffic Conditions:** The study area intersections are forecast to operate similarly to 2027 background traffic conditions with the following additional critical movements:

Ferry Street at Fallsview Boulevard:

- The overall v/c ratio is forecast to surpass 0.85 during the Saturday peak hour. Although this v/c ratio is critical under 2027 total traffic conditions;
- The westbound left-turn movement is forecast to have a queue length that surpasses its storage length during the Saturday peak hour. However, this movement is critical under 2027 total traffic conditions.

- ▶ **2032 Total Traffic Conditions:** The study area intersections are expected to operate similarly to 2032 background traffic conditions with the following additional critical movements:

Ferry Street at Clark Avenue/Ellen Avenue:

- The overall v/c ratio is forecasted to surpass 0.85 and 1.00 during the weekday PM and Saturday peak hours, respectively. Although this movement is critical under 2027 total traffic conditions;
- The eastbound through/right-turn movement is forecast to have a v/c ratio surpassing 0.85 and 1.00 during the weekday PM and Saturday peak hours, respectively. Although this movement is critical under 2027 total traffic conditions;
- The westbound left-turn movement is forecast to have a v/c ratio surpassing 1.00 and a queue length that exceeds its storage length during the Saturday peak hour. However, this movement is critical under 2027 total traffic conditions.
- ▶ **Traffic Control Signals:** Under 2032 total traffic conditions, traffic control signals are not justified at the intersections of Victoria Street at Magdalen Street and Robinson Street at Clark Avenue;
- ▶ **Left-Turn Lane Warrant:** Under 2027 and 2032 total traffic conditions, a 25 m southbound left-turn lane is warranted at the intersection of Clark Avenue and the Northern Driveway;
- ▶ **Remedial Measures:** The following remedial measures are identified. It is noted that all additional lanes can likely be accommodated by repainting the existing cross-section on



Clark Avenue at Ferry Street, Robinson Street, and the Northern Driveway:

- Optimized signal timings and the addition of permissive protected westbound left-turn phases at the intersections of Ferry Street at Clark Avenue/Ellen Street and Ferry Street at Fallsview Boulevard;
 - Add a 15 m northbound through/right-turn lane at the Ferry Street and Clark Avenue/Ellen Street intersections. The northbound left-turn movement at the intersection of Ferry Street at Clark Avenue/Ellen Street has no storage to accommodate its queue lengths;
 - Add a separate 25 m southbound through/right-turn lane at Robinson Street and Clark Avenue intersection. The southbound left-turn movement at the intersection of Robinson Street at Clark Avenue has no storage to accommodate its queue lengths;
 - Add a separate 15 m southbound left-turn lane at the intersection of Clark Avenue and the Northern Driveway. The additional 25 m southbound left-turn lane at the intersection of Clark Avenue and the Northern Driveway could conflict with the proposed 15 m northbound through/right-turn lane at the intersection of Ferry Street and Clark Avenue/Ellen Avenue.
- **Sensitivity Analysis:** The addition of remedial measures generally does not resolve all the forecast critical movements under 2032 total traffic conditions, although the following improvements are noted:
- The westbound left-turn movements at the intersections of Ferry Street at Clark Avenue and Fallsview Boulevard no longer have a v/c ratio surpassing 1.00. The westbound left movement queue lengths also don't exceed their storage lengths at the intersections of Ferry Street at Clark Avenue and Ferry Street at Fallsview Boulevard;
 - The northbound through/right movement at the intersection of Ferry Street and Clark Avenue/Ellen Avenue is forecast to have queue lengths not surpassing the proposed storage plus taper length;
 - The southbound through/right-turn movement at the intersection of Robinson Street and Clark Avenue is forecasted to operate in the LOS C to D range, and the queue lengths are also forecasted to be contained by the proposed storage length.



6.2 Recommendations

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

- ▶ At the intersection of Ferry Street at Clark Avenue/Ellen Avenue
 - Based on background traffic conditions (2027), the City provide a separate northbound through/right-turn movement with 15 m of storage;
 - The City optimize the signal timings;
 - Based on total traffic conditions (2027), the Applicant add a permissive protected phase for the westbound left-turn movement (Saturday peak hour).
- ▶ At the intersection of Ferry Street at Fallsview Boulevard
 - The City optimize the signal timings;
 - Based on total (2027) and background (2032) traffic conditions, the Applicant add a permissive protected phase for the westbound left-turn movement (Saturday peak hour).
- ▶ At the intersection of Robinson Street at Clark Avenue
 - Based on background (2027) traffic conditions, the City provide a separate southbound through/right-turn lane with 25 m of storage.
- ▶ At the intersection of Clark Avenue at the Northern Driveway
 - Based on total traffic conditions (2027), the Applicant provide a separate southbound left-turn lane with 15 m of storage.
- ▶ The southern site driveway me modified to provide a shared westbound left-turn/right-turn approach.



Appendix A

Pre-Study Consultation



From: John Grubich <jgrubich@niagarafalls.ca>
Sent: August 29, 2023 9:20 AM
To: Andrew Orr
Cc: Mathew Bilodeau; Adam Makarewicz
Subject: RE: [EXTERNAL]-230405: 5234-5278 Ferry Street, Niagara Falls - TIA - Scope of Work

Hi Andrew;

There was a preliminary plan for redeveloping the lands, but nothing formal has been submitted. It was for a new one-storey, 10,000 square foot retail building in place of the existing LCBO. The driveway to the site was planned to be the fourth (northern) leg of the Ferry/Fallsview intersection. If/when the lands do redevelop, the applicant will need to lay out the site to allow for their driveway to align with Fallsview Boulevard and be subject to signal control.

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: Andrew Orr <aorr@ptsl.com>
Sent: Monday, August 28, 2023 1:07 PM
To: John Grubich <jgrubich@niagarafalls.ca>
Cc: Mathew Bilodeau <mbilodeau@niagarafalls.ca>; Adam Makarewicz <amakarewicz@ptsl.com>
Subject: [EXTERNAL]-230405: 5234-5278 Ferry Street, Niagara Falls - TIA - Scope of Work

Hello John,

In your response to the attached scope of work, the following is mentioned:

- **“The 3rd phase of the Victoria Avenue road and streetscape improvements is tentatively scheduled to start this fall for Ferry Street, between Clark Avenue and Stanley Avenue. Traffic signals are planned for Ferry Street @ Fallsview Boulevard with the north leg (Buchanan Avenue) to close. A new fourth leg would be provided when the lands on the north side of Ferry Street redevelop.”**

Therefore, I was wondering what type of redevelopment is proposed for the north side of Ferry Street? I'm assuming the redevelopment driveway will form the fourth leg at the intersection of Ferry Street and Fallsview Boulevard.

Best Regards,

Andrew Orr, M.A.Sc., EIT
Transportation Consultant

Paradigm Transportation Solutions Limited
5A-150 Pinebush Road, Cambridge ON N1R 8J8
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From: John Grubich <jgrubich@niagarafalls.ca>
Sent: Friday, July 28, 2023 1:26 PM
To: Adam Makarewicz <amakarewicz@ptsl.com>
Cc: Mathew Bilodeau <mbilodeau@niagarafalls.ca>
Subject: RE: [EXTERNAL]-230405: 5234-5278 Ferry Street, Niagara Falls - TIA - Scope of Work

Adam;

Thank you for forwarding your terms of reference for the traffic study/report your firm will be carrying out in support of this development proposal. I provided comments/notes in your original e-mail below. Please feel free to contact me if you wish to discuss anything further.

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: Adam Makarewicz <amakarewicz@ptsl.com>
Sent: Wednesday, July 26, 2023 1:02 PM
To: John Grubich <jgrubich@niagarafalls.ca>
Subject: [EXTERNAL]-230405: 5234-5278 Ferry Street, Niagara Falls - TIA - Scope of Work

Hi John,

We've been retained to complete a traffic study for a hotel development located on the southeast corner of Ferry Street and Clark Avenue; the municipal address is 5234-5278 Ferry Street and 5928 Clark Avenue in Niagara Falls. The property owner proposes developing the site with two 30-storey hotels with 548 rooms. Vehicle access is proposed via two driveways to Clark Avenue and a single driveway to Ferry Street.

Would the following work plan be acceptable to the City to satisfy the traffic study requirements?

- Study Area **Accepted**
 - Ferry Street at Clark Avenue (signalized);
 - Ferry Street at Magdalen Street (unsignalized);
 - Ferry Street at Fallsview Boulevard (unsignalized);
 - Clark Avenue at Robinson Street (signalized); and
 - Three Site Driveways (unsignalized).

- Existing Data
 - We will conduct traffic counts to determine the baseline traffic volumes. **Given that the site is in the tourist core, please have TMC's done by late August to capture the peak tourist season traffic conditions.**
- Peak Hours
 - Weekday AM – **not necessary**
 - Weekday PM
 - Saturday Peak
- Horizon Years
 - Existing Year (2023)
 - **Planned opening year (20xx)**
 - 5-Years from ~~the date of the study (2028)~~ **planned opening year (20xx + 5)**
- Analysis
 - Synchro 11.
 - HCM 2000
 - **Please use a 1,750 saturation flow rate**
- Background Traffic
 - Generalized growth rate of 2% per annum. **A 1% annual growth rate will be accepted**
 - Other Area Developments as suggested by the City.
 - **The City completed an Environmental Assessment for Fallsview Boulevard (2018) which resulted in the completion of recent road improvements for Fallsview Boulevard, between Ferry Street and Murray Street. The road remains 2 lanes with on-street parking but can be converted to 4 lanes when traffic volumes warrant additional capacity.**
 - **The 3rd phase of the Victoria Avenue road and streetscape improvements is tentatively scheduled to start this fall for Ferry Street, between Clark Avenue and Stanley Avenue. Traffic signals are planned for Ferry Street @ Fallsview Boulevard with the north leg (Buchanan Avenue) to close. A new fourth leg would be provided when the lands on the north side of Ferry Street redevelop.**
 - **Please include trips for a proposed 30-storey, 350-unit mixed use building on the SW corner of Ferry/Fallsview (formal zoning application submitted); site trips for the weekday PM attached, updated study with weekend trips to be done at site plan.**
 - **Please include trips for a proposed 40-storey, 807-room hotel at the end of Robinson Street (phase 1 in site plan stage); site trips attached.**
- Site Traffic Estimates **Accepted**
 - ITE Trip Generation Data 11th Edition
 - No modal split reductions
- Site Traffic Distribution
 - Existing travel patterns
 - **TTS travel data**
- Access and Circulation Review
 - Cursory safety review of the proposed accesses **City Staff questions the need to separate the inbound, outbound left and outbound right movements for the southernmost driveway. City Staff requests that the Ferry Street access be closed; the other two driveways should be adequate for the site.**

- AutoTURN assessment with respect to large design vehicles expected to use the site. **Staff notes the 3 loading zone spaces. It appears trucks enter/exit via garage doors. Truck drivers must only enter and exit the site in a forward direction. Is the only way to access this loading zone from Clark Avenue, meaning the driver will either reverse into or out of the loading zone onto the road allowance?**

Thanks,

Adam J. Makarewicz

Senior Project Manager, Associate

Paradigm Transportation Solutions Limited

5A-150 Pinebush Road, Cambridge ON N1R 8J8

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Summer 2023 Vacation Notice: July 10-17



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Appendix B

Existing Data





Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: Clark Avenue & Robinson Street
Site Code: 230405
Start Date: 08/10/2023
Page No: 1

Turning Movement Data

Start Time	Robinson Street Eastbound						Robinson Street Westbound						Parking Lot Driveway Northbound						Clark Avenue 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	2	3	0	0	0	5	0	0	1	0	1	1	0	0	0	0	1	0	0	2	0	0	0	2	8
7:15 AM	1	4	0	0	0	5	1	2	0	0	2	3	1	1	0	0	1	2	0	0	1	0	5	1	11
7:30 AM	1	4	1	0	0	6	0	2	1	0	3	3	0	0	0	0	0	0	0	0	1	0	1	1	10
7:45 AM	10	7	3	0	0	20	0	3	0	0	8	3	1	0	0	0	4	1	0	2	3	0	0	5	29
Hourly Total	14	18	4	0	0	36	1	7	2	0	14	10	2	1	0	0	6	3	0	4	5	0	6	9	58
8:00 AM	5	10	3	0	3	18	0	5	0	0	0	5	1	2	0	0	4	3	0	0	4	0	3	4	30
8:15 AM	5	18	1	0	5	24	1	7	1	0	6	9	1	1	0	0	7	2	1	0	10	1	6	12	47
8:30 AM	13	9	2	0	0	24	5	3	3	0	7	11	1	0	1	0	2	2	1	0	6	0	3	7	44
8:45 AM	8	15	5	0	6	28	4	8	2	0	4	14	0	1	1	0	0	2	2	1	2	0	1	5	49
Hourly Total	31	52	11	0	14	94	10	23	6	0	17	39	3	4	2	0	13	9	4	1	22	1	13	28	170
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11:00 AM	9	22	3	0	3	34	3	12	2	0	15	17	3	0	1	0	2	4	3	1	10	0	34	14	69
11:15 AM	9	24	10	0	9	43	3	16	6	1	8	26	2	0	1	0	16	3	6	2	4	0	13	12	84
11:30 AM	10	15	2	0	6	27	1	12	8	0	22	21	2	1	0	0	11	3	5	2	11	0	23	18	69
11:45 AM	11	28	4	0	5	43	3	22	2	0	17	27	0	2	1	0	15	3	9	1	6	0	28	16	89
Hourly Total	39	89	19	0	23	147	10	62	18	1	62	91	7	3	3	0	44	13	23	6	31	0	98	60	311
12:00 PM	5	18	3	0	0	26	0	15	5	0	11	20	3	2	0	0	4	5	4	2	13	0	14	19	70
12:15 PM	6	20	4	0	10	30	1	9	1	1	8	12	0	1	0	0	4	1	9	1	12	1	15	23	66
12:30 PM	8	16	4	0	2	28	2	17	6	2	26	27	3	0	0	0	8	3	7	2	17	0	17	26	84
12:45 PM	10	12	2	0	3	24	0	14	9	0	16	23	2	1	0	0	14	3	4	1	16	0	17	21	71
Hourly Total	29	66	13	0	15	108	3	55	21	3	61	82	8	4	0	0	30	12	24	6	58	1	63	89	291
1:00 PM	7	20	2	0	4	29	0	15	5	0	20	20	7	0	5	0	4	12	4	1	4	0	24	9	70
1:15 PM	7	14	6	0	13	27	0	15	5	0	34	20	3	4	1	0	13	8	5	3	12	0	30	20	75
1:30 PM	17	14	5	0	6	36	3	17	6	0	20	26	3	1	3	0	7	7	5	2	8	0	30	15	84
1:45 PM	8	19	9	1	9	37	1	20	7	0	11	28	7	3	2	0	16	12	3	3	10	0	6	16	93
Hourly Total	39	67	22	1	32	129	4	67	23	0	85	94	20	8	11	0	40	39	17	9	34	0	90	60	322
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3:00 PM	12	19	7	0	1	38	2	20	5	2	10	29	1	2	4	0	14	7	4	0	10	0	13	14	88
3:15 PM	10	18	8	0	17	36	0	24	6	1	31	31	9	3	0	0	21	12	5	3	9	0	21	17	96
3:30 PM	14	21	8	0	2	43	0	26	10	0	22	36	1	3	2	0	11	6	4	2	14	0	12	20	105
3:45 PM	8	11	11	0	20	30	2	27	2	0	49	31	2	4	1	0	22	7	3	0	10	0	26	13	81
Hourly Total	44	69	34	0	40	147	4	97	23	3	112	127	13	12	7	0	68	32	16	5	43	0	72	64	370
4:00 PM	13	22	5	0	12	40	2	25	8	0	27	35	8	5	1	0	18	14	4	1	16	0	26	21	110
4:15 PM	5	21	3	0	8	29	1	34	10	0	18	45	4	2	2	0	8	8	6	3	15	0	26	24	106
4:30 PM	12	26	6	0	1	44	4	28	2	0	40	34	10	6	0	0	13	16	8	2	12	0	22	22	116

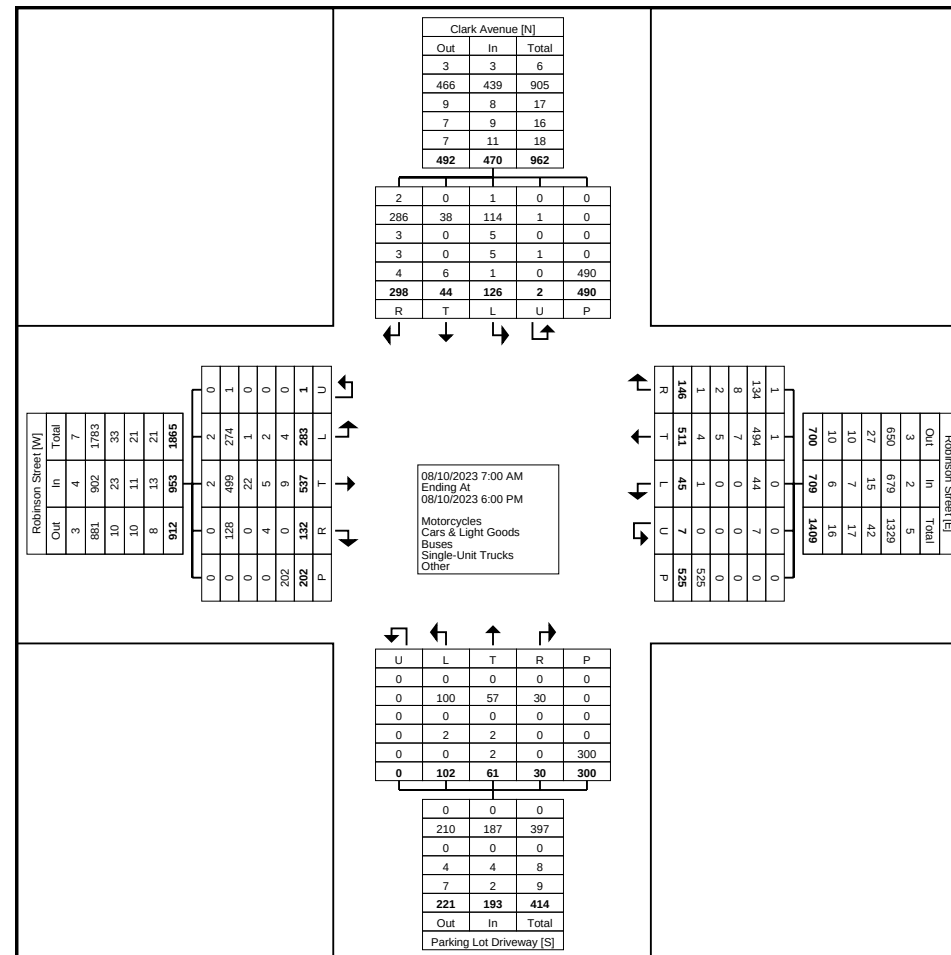
4:45 PM	12	27	4	0	7	43	2	23	4	0	18	29	6	7	1	0	18	14	4	0	11	0	6	15	101
Hourly Total	42	96	18	0	28	156	9	110	24	0	103	143	28	20	4	0	57	52	22	6	54	0	80	82	433
5:00 PM	12	17	2	0	8	31	2	36	9	0	7	47	8	1	2	0	5	11	2	3	14	0	19	19	108
5:15 PM	12	16	5	0	21	33	0	22	8	0	15	30	4	3	1	0	20	8	11	0	16	0	21	27	98
5:30 PM	13	24	3	0	6	40	0	16	10	0	29	26	5	3	0	0	8	8	4	1	11	0	22	16	90
5:45 PM	8	23	1	0	15	32	2	16	2	0	20	20	4	2	0	0	9	6	3	3	10	0	6	16	74
Hourly Total	45	80	11	0	50	136	4	90	29	0	71	123	21	9	3	0	42	33	20	7	51	0	68	78	370
Grand Total	283	537	132	1	202	953	45	511	146	7	525	709	102	61	30	0	300	193	126	44	298	2	490	470	2325
Approach %	29.7	56.3	13.9	0.1	-	-	6.3	72.1	20.6	1.0	-	-	52.8	31.6	15.5	0.0	-	-	26.8	9.4	63.4	0.4	-	-	-
Total %	12.2	23.1	5.7	0.0	-	41.0	1.9	22.0	6.3	0.3	-	30.5	4.4	2.6	1.3	0.0	-	8.3	5.4	1.9	12.8	0.1	-	20.2	-
Motorcycles	2	2	0	0	-	4	0	1	1	0	-	2	0	0	0	0	-	0	1	0	2	0	-	3	9
% Motorcycles	0.7	0.4	0.0	0.0	-	0.4	0.0	0.2	0.7	0.0	-	0.3	0.0	0.0	0.0	-	-	0.0	0.8	0.0	0.7	0.0	-	0.6	0.4
Cars & Light Goods	274	499	128	1	-	902	44	494	134	7	-	679	100	57	30	0	-	187	114	38	286	1	-	439	2207
% Cars & Light Goods	96.8	92.9	97.0	100.0	-	94.6	97.8	96.7	91.8	100.0	-	95.8	98.0	93.4	100.0	-	-	96.9	90.5	86.4	96.0	50.0	-	93.4	94.9
Buses	1	22	0	0	-	23	0	7	8	0	-	15	0	0	0	0	-	0	5	0	3	0	-	8	46
% Buses	0.4	4.1	0.0	0.0	-	2.4	0.0	1.4	5.5	0.0	-	2.1	0.0	0.0	0.0	-	-	0.0	4.0	0.0	1.0	0.0	-	1.7	2.0
Single-Unit Trucks	2	5	4	0	-	11	0	5	2	0	-	7	2	2	0	0	-	4	5	0	3	1	-	9	31
% Single-Unit Trucks	0.7	0.9	3.0	0.0	-	1.2	0.0	1.0	1.4	0.0	-	1.0	2.0	3.3	0.0	-	-	2.1	4.0	0.0	1.0	50.0	-	1.9	1.3
Articulated Trucks	1	2	0	0	-	3	0	1	0	0	-	1	0	0	0	0	-	0	0	0	2	0	-	2	6
% Articulated Trucks	0.4	0.4	0.0	0.0	-	0.3	0.0	0.2	0.0	0.0	-	0.1	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.7	0.0	-	0.4	0.3
Bicycles on Road	3	7	0	0	-	10	1	3	1	0	-	5	0	2	0	0	-	2	1	6	2	0	-	9	26
% Bicycles on Road	1.1	1.3	0.0	0.0	-	1.0	2.2	0.6	0.7	0.0	-	0.7	0.0	3.3	0.0	-	-	1.0	0.8	13.6	0.7	0.0	-	1.9	1.1
Bicycles on Crosswalk	-	-	-	-	4	-	-	-	-	-	0	-	-	-	-	-	10	-	-	-	-	-	2	-	-
% Bicycles on Crosswalk	-	-	-	-	2.0	-	-	-	-	-	0.0	-	-	-	-	-	3.3	-	-	-	-	-	0.4	-	-
Pedestrians	-	-	-	-	198	-	-	-	-	-	525	-	-	-	-	-	290	-	-	-	-	-	488	-	-
% Pedestrians	-	-	-	-	98.0	-	-	-	-	-	100.0	-	-	-	-	-	96.7	-	-	-	-	-	99.6	-	-



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@pts1.com

Count Name: Clark Avenue & Robinson Street
Site Code: 230405
Start Date: 08/10/2023
Page No: 3



Turning Movement Data Plot



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@pts1.com

Count Name: Clark Avenue & Robinson Street
Site Code: 230405
Start Date: 08/10/2023
Page No: 4

Turning Movement Peak Hour Data (8:00 AM)

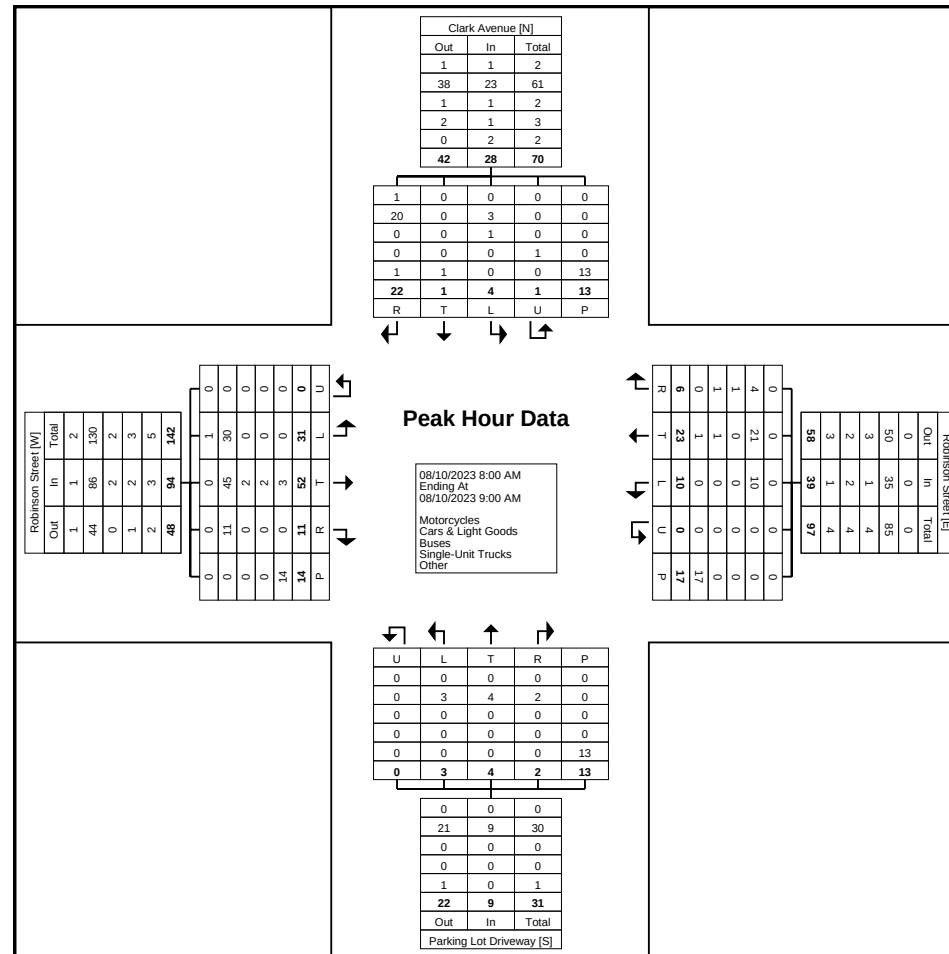
Start Time	Robinson Street Eastbound						Robinson Street Westbound						Parking Lot Driveway Northbound						Clark Avenue Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
8:00 AM	5	10	3	0	3	18	0	5	0	0	0	5	1	2	0	0	4	3	0	0	4	0	3	4	30
8:15 AM	5	18	1	0	5	24	1	7	1	0	6	9	1	1	0	0	7	2	1	0	10	1	6	12	47
8:30 AM	13	9	2	0	0	24	5	3	3	0	7	11	1	0	1	0	2	2	1	0	6	0	3	7	44
8:45 AM	8	15	5	0	6	28	4	8	2	0	4	14	0	1	1	0	0	2	2	1	2	0	1	5	49
Total	31	52	11	0	14	94	10	23	6	0	17	39	3	4	2	0	13	9	4	1	22	1	13	28	170
Approach %	33.0	55.3	11.7	0.0	-	-	25.6	59.0	15.4	0.0	-	-	33.3	44.4	22.2	0.0	-	-	14.3	3.6	78.6	3.6	-	-	-
Total %	18.2	30.6	6.5	0.0	-	55.3	5.9	13.5	3.5	0.0	-	22.9	1.8	2.4	1.2	0.0	-	5.3	2.4	0.6	12.9	0.6	-	16.5	-
PHF	0.596	0.722	0.550	0.000	-	0.839	0.500	0.719	0.500	0.000	-	0.696	0.750	0.500	0.500	0.000	-	0.750	0.500	0.250	0.550	0.250	-	0.583	0.867
Motorcycles	1	0	0	0	-	1	0	0	0	0	-	0	0	0	0	0	-	0	0	0	1	0	-	1	2
% Motorcycles	3.2	0.0	0.0	-	-	1.1	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	4.5	0.0	-	3.6	1.2
Cars & Light Goods	30	45	11	0	-	86	10	21	4	0	-	35	3	4	2	0	-	9	3	0	20	0	-	23	153
% Cars & Light Goods	96.8	86.5	100.0	-	-	91.5	100.0	91.3	66.7	-	-	89.7	100.0	100.0	100.0	-	-	100.0	75.0	0.0	90.9	0.0	-	82.1	90.0
Buses	0	2	0	0	-	2	0	0	1	0	-	1	0	0	0	0	-	0	1	0	0	0	-	1	4
% Buses	0.0	3.8	0.0	-	-	2.1	0.0	0.0	16.7	-	-	2.6	0.0	0.0	0.0	-	-	0.0	25.0	0.0	0.0	0.0	-	3.6	2.4
Single-Unit Trucks	0	2	0	0	-	2	0	1	1	0	-	2	0	0	0	0	-	0	0	0	0	1	-	1	5
% Single-Unit Trucks	0.0	3.8	0.0	-	-	2.1	0.0	4.3	16.7	-	-	5.1	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	100.0	-	3.6	2.9
Articulated Trucks	0	2	0	0	-	2	0	1	0	0	-	1	0	0	0	0	-	0	0	0	1	0	-	1	4
% Articulated Trucks	0.0	3.8	0.0	-	-	2.1	0.0	4.3	0.0	-	-	2.6	0.0	0.0	0.0	-	-	0.0	0.0	0.0	4.5	0.0	-	3.6	2.4
Bicycles on Road	0	1	0	0	-	1	0	0	0	0	-	0	0	0	0	0	-	0	0	1	0	0	-	1	2
% Bicycles on Road	0.0	1.9	0.0	-	-	1.1	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	100.0	0.0	0.0	-	3.6	1.2
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	1	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	7.7	-	-
Pedestrians	-	-	-	-	14	-	-	-	-	-	17	-	-	-	-	-	13	-	-	-	-	-	12	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	92.3	-	-



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@pts1.com

Count Name: Clark Avenue & Robinson Street
Site Code: 230405
Start Date: 08/10/2023
Page No: 5



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



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: Clark Avenue & Robinson Street
Site Code: 230405
Start Date: 08/10/2023
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Turning Movement Peak Hour Data (1:00 PM)

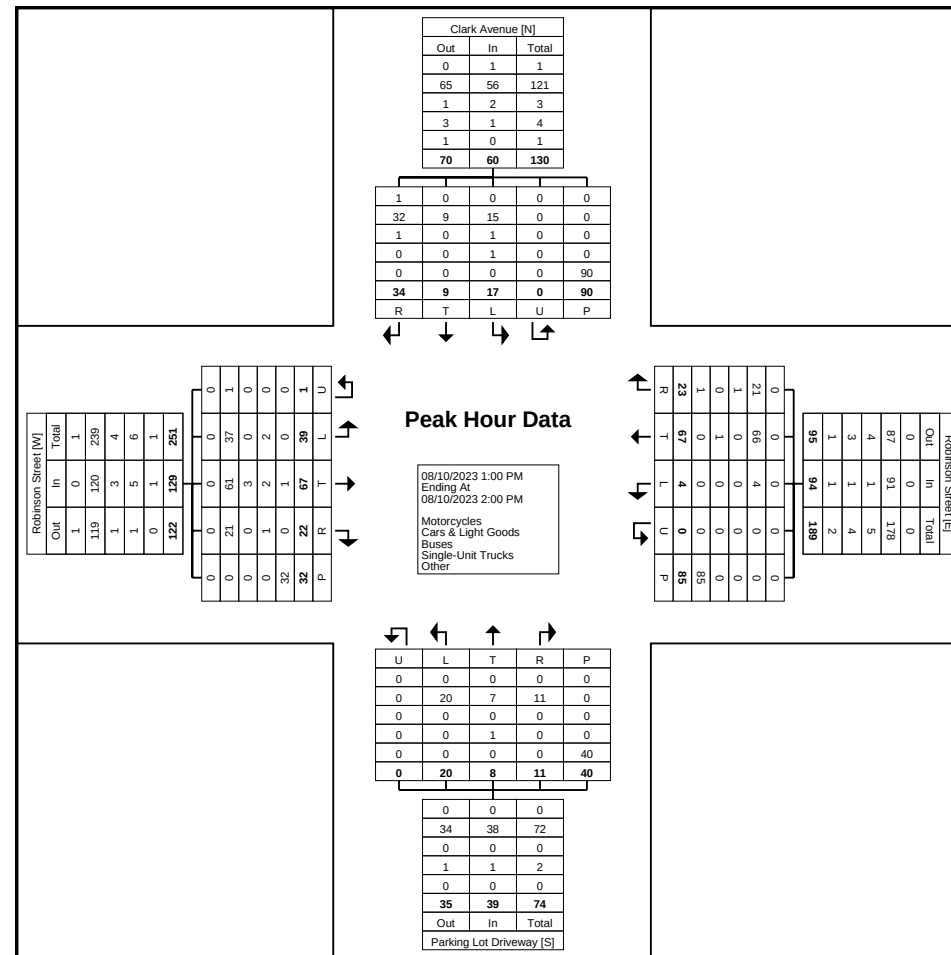
Start Time	Robinson Street Eastbound						Robinson Street Westbound						Parking Lot Driveway Northbound						Clark Avenue Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
1:00 PM	7	20	2	0	4	29	0	15	5	0	20	20	7	0	5	0	4	12	4	1	4	0	24	9	70
1:15 PM	7	14	6	0	13	27	0	15	5	0	34	20	3	4	1	0	13	8	5	3	12	0	30	20	75
1:30 PM	17	14	5	0	6	36	3	17	6	0	20	26	3	1	3	0	7	7	5	2	8	0	30	15	84
1:45 PM	8	19	9	1	9	37	1	20	7	0	11	28	7	3	2	0	16	12	3	3	10	0	6	16	93
Total	39	67	22	1	32	129	4	67	23	0	85	94	20	8	11	0	40	39	17	9	34	0	90	60	322
Approach %	30.2	51.9	17.1	0.8	-	-	4.3	71.3	24.5	0.0	-	-	51.3	20.5	28.2	0.0	-	-	28.3	15.0	56.7	0.0	-	-	-
Total %	12.1	20.8	6.8	0.3	-	40.1	1.2	20.8	7.1	0.0	-	29.2	6.2	2.5	3.4	0.0	-	12.1	5.3	2.8	10.6	0.0	-	18.6	-
PHF	0.574	0.838	0.611	0.250	-	0.872	0.333	0.838	0.821	0.000	-	0.839	0.714	0.500	0.550	0.000	-	0.813	0.850	0.750	0.708	0.000	-	0.750	0.866
Motorcycles	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	1	0	-	1	1
% Motorcycles	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	2.9	-	-	1.7	0.3
Cars & Light Goods	37	61	21	1	-	120	4	66	21	0	-	91	20	7	11	0	-	38	15	9	32	0	-	56	305
% Cars & Light Goods	94.9	91.0	95.5	100.0	-	93.0	100.0	98.5	91.3	-	-	96.8	100.0	87.5	100.0	-	-	97.4	88.2	100.0	94.1	-	-	93.3	94.7
Buses	0	3	0	0	-	3	0	0	1	0	-	1	0	0	0	0	-	0	1	0	1	0	-	2	6
% Buses	0.0	4.5	0.0	0.0	-	2.3	0.0	0.0	4.3	-	-	1.1	0.0	0.0	0.0	-	-	0.0	5.9	0.0	2.9	-	-	3.3	1.9
Single-Unit Trucks	2	2	1	0	-	5	0	1	0	0	-	1	0	1	0	0	-	1	1	0	0	0	-	1	8
% Single-Unit Trucks	5.1	3.0	4.5	0.0	-	3.9	0.0	1.5	0.0	-	-	1.1	0.0	12.5	0.0	-	-	2.6	5.9	0.0	0.0	-	-	1.7	2.5
Articulated Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Articulated Trucks	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Road	0	1	0	0	-	1	0	0	1	0	-	1	0	0	0	0	-	0	0	0	0	0	-	0	2
% Bicycles on Road	0.0	1.5	0.0	0.0	-	0.8	0.0	0.0	4.3	-	-	1.1	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.6
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	-	32	-	-	-	-	-	85	-	-	-	-	-	40	-	-	-	-	-	90	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@pts1.com

Count Name: Clark Avenue & Robinson Street
Site Code: 230405
Start Date: 08/10/2023
Page No: 7



Turning Movement Peak Hour Data Plot (1:00 PM)



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: Clark Avenue & Robinson Street
Site Code: 230405
Start Date: 08/10/2023
Page No: 8

Turning Movement Peak Hour Data (4:00 PM)

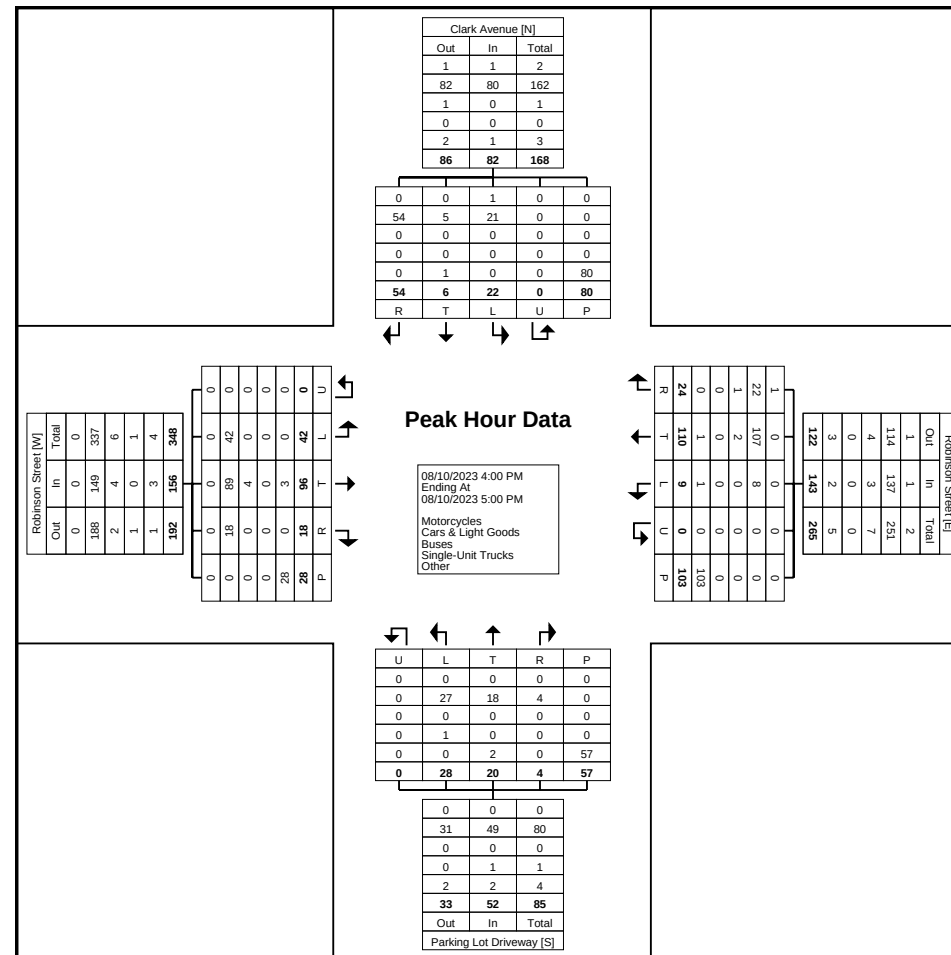
Start Time	Robinson Street Eastbound						Robinson Street Westbound						Parking Lot Driveway Northbound						Clark Avenue Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
4:00 PM	13	22	5	0	12	40	2	25	8	0	27	35	8	5	1	0	18	14	4	1	16	0	26	21	110
4:15 PM	5	21	3	0	8	29	1	34	10	0	18	45	4	2	2	0	8	8	6	3	15	0	26	24	106
4:30 PM	12	26	6	0	1	44	4	28	2	0	40	34	10	6	0	0	13	16	8	2	12	0	22	22	116
4:45 PM	12	27	4	0	7	43	2	23	4	0	18	29	6	7	1	0	18	14	4	0	11	0	6	15	101
Total	42	96	18	0	28	156	9	110	24	0	103	143	28	20	4	0	57	52	22	6	54	0	80	82	433
Approach %	26.9	61.5	11.5	0.0	-	-	6.3	76.9	16.8	0.0	-	-	53.8	38.5	7.7	0.0	-	-	26.8	7.3	65.9	0.0	-	-	-
Total %	9.7	22.2	4.2	0.0	-	36.0	2.1	25.4	5.5	0.0	-	33.0	6.5	4.6	0.9	0.0	-	12.0	5.1	1.4	12.5	0.0	-	18.9	-
PHF	0.808	0.889	0.750	0.000	-	0.886	0.563	0.809	0.600	0.000	-	0.794	0.700	0.714	0.500	0.000	-	0.813	0.688	0.500	0.844	0.000	-	0.854	0.933
Motorcycles	0	0	0	0	-	0	0	0	1	0	-	1	0	0	0	0	-	0	1	0	0	0	-	1	2
% Motorcycles	0.0	0.0	0.0	-	-	0.0	0.0	0.0	4.2	-	-	0.7	0.0	0.0	0.0	-	-	0.0	4.5	0.0	0.0	-	-	1.2	0.5
Cars & Light Goods	42	89	18	0	-	149	8	107	22	0	-	137	27	18	4	0	-	49	21	5	54	0	-	80	415
% Cars & Light Goods	100.0	92.7	100.0	-	-	95.5	88.9	97.3	91.7	-	-	95.8	96.4	90.0	100.0	-	-	94.2	95.5	83.3	100.0	-	-	97.6	95.8
Buses	0	4	0	0	-	4	0	2	1	0	-	3	0	0	0	0	-	0	0	0	0	0	-	0	7
% Buses	0.0	4.2	0.0	-	-	2.6	0.0	1.8	4.2	-	-	2.1	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	1.6
Single-Unit Trucks	0	0	0	0	-	0	0	0	0	0	-	0	1	0	0	0	-	1	0	0	0	0	-	0	1
% Single-Unit Trucks	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	3.6	0.0	0.0	-	-	1.9	0.0	0.0	0.0	-	-	0.0	0.2
Articulated Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Articulated Trucks	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Road	0	3	0	0	-	3	1	1	0	0	-	2	0	2	0	0	-	2	0	1	0	0	-	1	8
% Bicycles on Road	0.0	3.1	0.0	-	-	1.9	11.1	0.9	0.0	-	-	1.4	0.0	10.0	0.0	-	-	3.8	0.0	16.7	0.0	-	-	1.2	1.8
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	1	-	-	-	-	-	1	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	1.8	-	-	-	-	-	1.3	-	-
Pedestrians	-	-	-	-	28	-	-	-	-	-	103	-	-	-	-	-	56	-	-	-	-	-	79	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	98.2	-	-	-	-	-	98.8	-	-



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: Clark Avenue & Robinson Street
Site Code: 230405
Start Date: 08/10/2023
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Turning Movement Peak Hour Data Plot (4:00 PM)



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: Clark Avenue & Robinson Street -
Saturday
Site Code: 230405
Start Date: 08/12/2023
Page No: 1

Turning Movement Data

Start Time	Robinson Street Eastbound						Robinson Street Westbound						Parking Lot Driveway Northbound						Clark Avenue 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	
10:00 AM	12	12	2	0	5	26	2	4	7	0	21	13	2	1	0	0	18	3	4	1	11	0	7	16	58
10:15 AM	13	21	4	0	4	38	0	16	1	0	23	17	0	1	1	0	7	2	6	3	13	0	14	22	79
10:30 AM	11	26	10	0	4	47	0	7	2	0	24	9	0	0	0	0	11	0	6	1	13	0	13	20	76
10:45 AM	19	24	5	0	6	48	2	13	6	0	32	21	2	3	0	0	3	5	10	1	13	0	30	24	98
Hourly Total	55	83	21	0	19	159	4	40	16	0	100	60	4	5	1	0	39	10	26	6	50	0	64	82	311
11:00 AM	26	21	2	0	11	49	2	21	6	0	2	29	2	2	0	0	5	4	10	3	22	0	15	35	117
11:15 AM	18	24	7	1	11	50	0	13	6	0	18	19	4	2	2	0	0	8	20	1	11	0	2	32	109
11:30 AM	21	22	3	0	2	46	0	13	5	0	24	18	1	0	0	0	2	1	10	2	18	0	8	30	95
11:45 AM	12	28	12	0	4	52	1	24	7	0	16	32	3	3	1	0	8	7	7	3	21	0	17	31	122
Hourly Total	77	95	24	1	28	197	3	71	24	0	60	98	10	7	3	0	15	20	47	9	72	0	42	128	443
12:00 PM	17	28	5	0	3	50	1	18	5	0	14	24	3	3	1	0	0	7	12	5	14	0	45	31	112
12:15 PM	10	28	6	0	5	44	3	16	3	2	7	24	2	1	1	0	14	4	9	0	21	0	27	30	102
12:30 PM	12	22	5	1	12	40	7	24	8	1	9	40	2	1	0	0	21	3	12	1	13	0	19	26	109
12:45 PM	10	24	12	2	6	48	6	24	12	0	19	42	0	1	1	0	24	2	7	4	12	0	21	23	115
Hourly Total	49	102	28	3	26	182	17	82	28	3	49	130	7	6	3	0	59	16	40	10	60	0	112	110	438
1:00 PM	14	19	3	1	4	37	12	19	3	0	21	34	3	1	0	0	19	4	6	2	15	0	24	23	98
1:15 PM	28	20	9	0	5	57	14	26	5	0	39	45	3	4	0	0	26	7	6	4	10	0	19	20	129
1:30 PM	25	22	8	1	16	56	14	23	8	0	48	45	5	3	1	0	15	9	10	1	17	0	18	28	138
1:45 PM	17	19	8	2	9	46	16	21	10	0	28	47	4	3	1	0	21	8	6	1	12	0	12	19	120
Hourly Total	84	80	28	4	34	196	56	89	26	0	136	171	15	11	2	0	81	28	28	8	54	0	73	90	485
2:00 PM	18	13	13	0	6	44	11	32	4	1	36	48	2	2	1	0	17	5	10	2	3	0	24	15	112
2:15 PM	26	18	10	0	10	54	8	23	6	0	46	37	13	6	0	0	9	19	9	0	5	0	33	14	124
2:30 PM	18	29	7	1	22	55	2	22	8	0	34	32	5	0	6	0	48	11	9	5	4	0	22	18	116
2:45 PM	26	21	8	0	9	55	8	22	7	0	55	37	12	3	4	0	17	19	7	3	4	1	14	15	126
Hourly Total	88	81	38	1	47	208	29	99	25	1	171	154	32	11	11	0	91	54	35	10	16	1	93	62	478
3:00 PM	27	22	16	0	44	65	12	38	8	1	45	59	8	4	3	0	40	15	6	1	11	0	23	18	157
3:15 PM	21	22	8	0	15	51	2	27	5	0	50	34	9	4	1	0	34	14	3	1	10	0	45	14	113
3:30 PM	26	25	15	0	22	66	9	23	13	0	37	45	5	6	2	0	29	13	6	6	18	0	30	30	154
3:45 PM	20	30	12	0	9	62	4	24	11	0	50	39	10	5	3	0	20	18	13	4	25	0	54	42	161
Hourly Total	94	99	51	0	90	244	27	112	37	1	182	177	32	19	9	0	123	60	28	12	64	0	152	104	585
4:00 PM	6	24	10	0	22	40	15	36	10	0	17	61	8	8	6	0	15	22	6	2	24	0	37	32	155
4:15 PM	15	30	12	0	20	57	11	33	12	0	22	56	6	3	4	0	25	13	3	1	23	0	52	27	153
4:30 PM	19	31	16	0	35	66	6	25	9	0	22	40	9	4	0	0	22	13	6	6	25	0	22	37	156
4:45 PM	19	36	15	1	46	71	4	34	7	0	34	45	22	9	1	0	24	32	10	3	18	0	31	31	179
Hourly Total	59	121	53	1	123	234	36	128	38	0	95	202	45	24	11	0	86	80	25	12	90	0	142	127	643

5:00 PM	19	20	12	0	24	51	8	24	4	0	39	36	7	5	1	0	21	13	9	3	20	0	39	32	132
5:15 PM	21	34	10	0	33	65	6	23	8	0	29	37	4	7	4	0	19	15	10	2	21	0	43	33	150
5:30 PM	16	31	7	0	26	54	11	39	13	2	22	65	8	5	4	0	31	17	7	7	15	0	46	29	165
5:45 PM	18	28	12	0	2	58	5	38	8	0	48	51	8	4	2	0	10	14	11	4	18	0	43	33	156
Hourly Total	74	113	41	0	85	228	30	124	33	2	138	189	27	21	11	0	81	59	37	16	74	0	171	127	603
Grand Total	580	774	284	10	452	1648	202	745	227	7	931	1181	172	104	51	0	575	327	266	83	480	1	849	830	3986
Approach %	35.2	47.0	17.2	0.6	-	-	17.1	63.1	19.2	0.6	-	-	52.6	31.8	15.6	0.0	-	-	32.0	10.0	57.8	0.1	-	-	-
Total %	14.6	19.4	7.1	0.3	-	41.3	5.1	18.7	5.7	0.2	-	29.6	4.3	2.6	1.3	0.0	-	8.2	6.7	2.1	12.0	0.0	-	20.8	-
Motorcycles	4	0	0	0	-	4	0	0	0	0	-	0	0	0	0	0	-	0	1	0	3	0	-	4	8
% Motorcycles	0.7	0.0	0.0	0.0	-	0.2	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	-	0.0	0.4	0.0	0.6	0.0	-	0.5	0.2
Cars & Light Goods	564	743	282	10	-	1599	201	732	214	7	-	1154	170	103	51	0	-	324	250	79	465	1	-	795	3872
% Cars & Light Goods	97.2	96.0	99.3	100.0	-	97.0	99.5	98.3	94.3	100.0	-	97.7	98.8	99.0	100.0	-	-	99.1	94.0	95.2	96.9	100.0	-	95.8	97.1
Buses	7	29	0	0	-	36	0	12	13	0	-	25	0	0	0	0	-	0	13	0	7	0	-	20	81
% Buses	1.2	3.7	0.0	0.0	-	2.2	0.0	1.6	5.7	0.0	-	2.1	0.0	0.0	0.0	-	-	0.0	4.9	0.0	1.5	0.0	-	2.4	2.0
Single-Unit Trucks	2	1	0	0	-	3	1	1	0	0	-	2	2	1	0	0	-	3	2	0	4	0	-	6	14
% Single-Unit Trucks	0.3	0.1	0.0	0.0	-	0.2	0.5	0.1	0.0	0.0	-	0.2	1.2	1.0	0.0	-	-	0.9	0.8	0.0	0.8	0.0	-	0.7	0.4
Articulated Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Articulated Trucks	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0
Bicycles on Road	3	1	2	0	-	6	0	0	0	0	-	0	0	0	0	0	-	0	0	4	1	0	-	5	11
% Bicycles on Road	0.5	0.1	0.7	0.0	-	0.4	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	4.8	0.2	0.0	-	0.6	0.3
Bicycles on Crosswalk	-	-	-	-	4	-	-	-	-	-	2	-	-	-	-	-	5	-	-	-	-	-	3	-	-
% Bicycles on Crosswalk	-	-	-	-	0.9	-	-	-	-	-	0.2	-	-	-	-	-	0.9	-	-	-	-	-	0.4	-	-
Pedestrians	-	-	-	-	448	-	-	-	-	-	929	-	-	-	-	-	570	-	-	-	-	-	846	-	-
% Pedestrians	-	-	-	-	99.1	-	-	-	-	-	99.8	-	-	-	-	-	99.1	-	-	-	-	-	99.6	-	-

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: Clark Avenue & Robinson Street -
Saturday
Site Code: 230405
Start Date: 08/12/2023
Page No: 4

Turning Movement Peak Hour Data (4:00 PM)

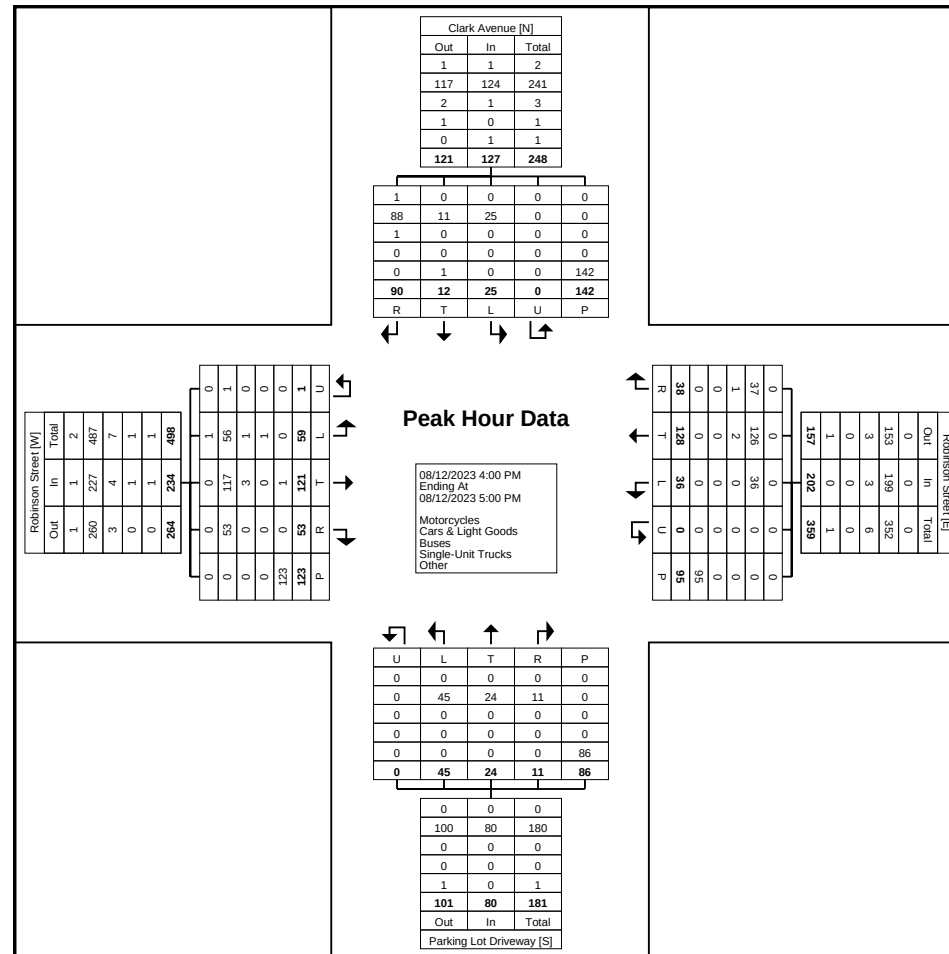
Start Time	Robinson Street Eastbound						Robinson Street Westbound						Parking Lot Driveway Northbound						Clark Avenue Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
4:00 PM	6	24	10	0	22	40	15	36	10	0	17	61	8	8	6	0	15	22	6	2	24	0	37	32	155
4:15 PM	15	30	12	0	20	57	11	33	12	0	22	56	6	3	4	0	25	13	3	1	23	0	52	27	153
4:30 PM	19	31	16	0	35	66	6	25	9	0	22	40	9	4	0	0	22	13	6	6	25	0	22	37	156
4:45 PM	19	36	15	1	46	71	4	34	7	0	34	45	22	9	1	0	24	32	10	3	18	0	31	31	179
Total	59	121	53	1	123	234	36	128	38	0	95	202	45	24	11	0	86	80	25	12	90	0	142	127	643
Approach %	25.2	51.7	22.6	0.4	-	-	17.8	63.4	18.8	0.0	-	-	56.3	30.0	13.8	0.0	-	-	19.7	9.4	70.9	0.0	-	-	-
Total %	9.2	18.8	8.2	0.2	-	36.4	5.6	19.9	5.9	0.0	-	31.4	7.0	3.7	1.7	0.0	-	12.4	3.9	1.9	14.0	0.0	-	19.8	-
PHF	0.776	0.840	0.828	0.250	-	0.824	0.600	0.889	0.792	0.000	-	0.828	0.511	0.667	0.458	0.000	-	0.625	0.625	0.500	0.900	0.000	-	0.858	0.898
Motorcycles	1	0	0	0	-	1	0	0	0	0	-	0	0	0	0	0	-	0	0	0	1	0	-	1	2
% Motorcycles	1.7	0.0	0.0	0.0	-	0.4	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	1.1	-	-	0.8	0.3
Cars & Light Goods	56	117	53	1	-	227	36	126	37	0	-	199	45	24	11	0	-	80	25	11	88	0	-	124	630
% Cars & Light Goods	94.9	96.7	100.0	100.0	-	97.0	100.0	98.4	97.4	-	-	98.5	100.0	100.0	100.0	-	-	100.0	100.0	91.7	97.8	-	-	97.6	98.0
Buses	1	3	0	0	-	4	0	2	1	0	-	3	0	0	0	0	-	0	0	0	1	0	-	1	8
% Buses	1.7	2.5	0.0	0.0	-	1.7	0.0	1.6	2.6	-	-	1.5	0.0	0.0	0.0	-	-	0.0	0.0	0.0	1.1	-	-	0.8	1.2
Single-Unit Trucks	1	0	0	0	-	1	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	1
% Single-Unit Trucks	1.7	0.0	0.0	0.0	-	0.4	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.2
Articulated Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Articulated Trucks	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Road	0	1	0	0	-	1	0	0	0	0	-	0	0	0	0	0	-	0	0	1	0	0	-	1	2
% Bicycles on Road	0.0	0.8	0.0	0.0	-	0.4	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	8.3	0.0	-	-	0.8	0.3
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	1	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	1.2	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	-	123	-	-	-	-	-	95	-	-	-	-	-	85	-	-	-	-	-	142	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	98.8	-	-	-	-	-	100.0	-	-



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@pts1.com

Count Name: Clark Avenue & Robinson Street -
Saturday
Site Code: 230405
Start Date: 08/12/2023
Page No: 5





Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@pts1.com

Count Name: Ferry Street & Clark Avenue -
Saturday
Site Code: 230405
Start Date: 08/12/2023
Page No: 1

Turning Movement Data

Start Time	Ferry Street Eastbound						Ferry Street Westbound						Clark Avenue Northbound						Ellen Avenue 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	
10:00 AM	7	134	3	0	2	144	12	84	2	0	0	98	4	4	17	0	19	25	5	2	21	0	23	28	295
10:15 AM	10	130	3	0	2	143	8	65	1	0	11	74	7	2	8	0	20	17	1	7	21	0	24	29	263
10:30 AM	13	138	5	0	5	156	10	83	1	0	19	94	7	2	9	0	43	18	3	6	18	0	24	27	295
10:45 AM	16	135	8	0	20	159	12	109	3	0	26	124	11	4	12	0	38	27	6	6	26	0	39	38	348
Hourly Total	46	537	19	0	29	602	42	341	7	0	56	390	29	12	46	0	120	87	15	21	86	0	110	122	1201
11:00 AM	17	134	6	0	5	157	17	88	6	0	6	111	13	4	22	0	32	39	2	6	37	0	24	45	352
11:15 AM	12	113	19	0	11	144	9	84	3	0	7	96	8	0	15	0	15	23	2	10	18	0	15	30	293
11:30 AM	24	114	16	0	3	154	13	69	3	0	3	85	3	2	13	0	30	18	1	7	30	0	20	38	295
11:45 AM	15	120	13	0	0	148	15	92	4	0	0	111	2	4	15	0	20	21	2	9	29	1	28	41	321
Hourly Total	68	481	54	0	19	603	54	333	16	0	16	403	26	10	65	0	97	101	7	32	114	1	87	154	1261
12:00 PM	20	126	9	0	8	155	5	63	4	0	7	72	7	6	12	0	60	25	0	13	27	0	71	40	292
12:15 PM	20	107	10	0	43	137	16	71	3	0	11	90	8	2	11	0	43	21	2	8	21	0	40	31	279
12:30 PM	13	126	12	0	14	151	8	71	0	0	11	79	4	5	10	0	48	19	7	6	24	0	32	37	286
12:45 PM	12	128	6	0	10	146	9	65	4	0	37	78	5	5	15	0	52	25	1	9	19	0	41	29	278
Hourly Total	65	487	37	0	75	589	38	270	11	0	66	319	24	18	48	0	203	90	10	36	91	0	184	137	1135
1:00 PM	16	122	12	0	9	150	4	62	1	0	25	67	1	2	7	0	66	10	7	11	17	0	47	35	262
1:15 PM	17	138	15	0	13	170	13	68	2	0	14	83	6	6	11	0	31	23	4	8	26	0	37	38	314
1:30 PM	14	127	17	0	27	158	8	77	1	0	15	86	8	1	19	0	40	28	3	14	16	0	35	33	305
1:45 PM	19	123	16	0	18	158	12	66	6	0	26	84	11	4	18	0	46	33	1	5	28	0	44	34	309
Hourly Total	66	510	60	0	67	636	37	273	10	0	80	320	26	13	55	0	183	94	15	38	87	0	163	140	1190
2:00 PM	9	144	15	0	27	168	6	72	4	0	22	82	13	6	9	0	57	28	3	15	29	0	70	47	325
2:15 PM	21	146	14	0	18	181	7	85	3	0	26	95	8	3	17	0	56	28	2	15	28	0	39	45	349
2:30 PM	14	136	13	0	17	163	18	97	4	0	45	119	8	5	13	0	65	26	0	7	26	0	40	33	341
2:45 PM	15	153	8	1	8	177	16	98	6	0	41	120	14	3	17	0	83	34	1	4	24	0	55	29	360
Hourly Total	59	579	50	1	70	689	47	352	17	0	134	416	43	17	56	0	261	116	6	41	107	0	204	154	1375
3:00 PM	8	153	7	0	40	168	7	92	3	0	30	102	15	7	20	0	82	42	4	8	40	0	61	52	364
3:15 PM	11	137	14	0	21	162	4	99	6	0	41	109	13	0	16	0	67	29	1	7	32	0	64	40	340
3:30 PM	21	146	12	0	15	179	11	96	7	0	32	114	12	7	23	0	85	42	3	12	25	0	79	40	375
3:45 PM	20	156	9	0	25	185	15	99	1	0	42	115	15	11	16	0	53	42	6	19	35	0	99	60	402
Hourly Total	60	592	42	0	101	694	37	386	17	0	145	440	55	25	75	0	287	155	14	46	132	0	303	192	1481
4:00 PM	19	140	14	0	22	173	10	97	0	0	48	107	14	3	16	0	86	33	5	15	43	0	57	63	376
4:15 PM	20	138	3	0	24	161	17	102	4	0	36	123	14	6	24	0	90	44	4	10	48	0	88	62	390
4:30 PM	23	131	19	0	21	173	12	98	3	0	64	113	12	6	19	0	88	37	4	16	34	0	65	54	377
4:45 PM	30	139	15	0	33	184	10	77	2	0	37	89	14	9	14	0	103	37	3	14	52	0	103	69	379
Hourly Total	92	548	51	0	100	691	49	374	9	0	185	432	54	24	73	0	367	151	16	55	177	0	313	248	1522

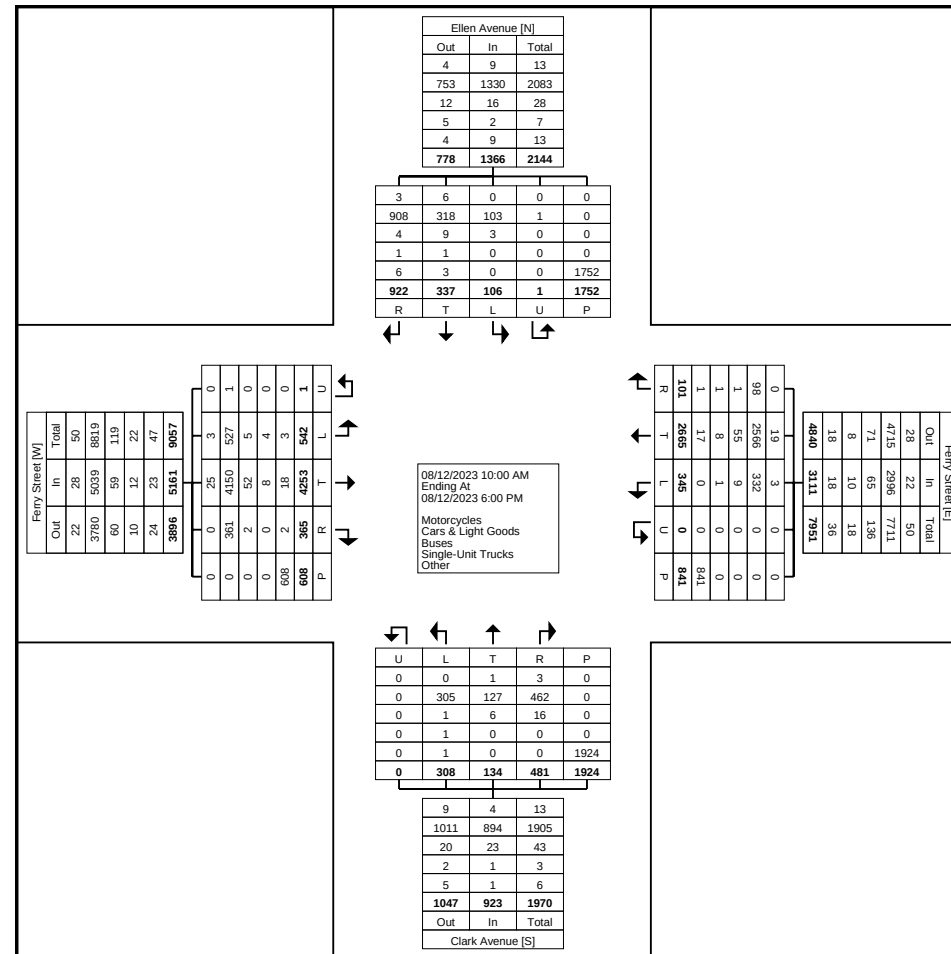
5:00 PM	16	136	10	0	44	162	5	89	3	0	37	97	14	8	14	0	101	36	2	16	33	0	73	51	346
5:15 PM	25	120	21	0	32	166	15	79	0	0	20	94	10	1	30	0	78	41	3	14	35	0	92	52	353
5:30 PM	21	142	6	0	32	169	9	87	3	0	34	99	16	1	13	0	87	30	4	16	36	0	111	56	354
5:45 PM	24	121	15	0	39	160	12	81	8	0	68	101	11	5	6	0	140	22	14	22	24	0	112	60	343
Hourly Total	86	519	52	0	147	657	41	336	14	0	159	391	51	15	63	0	406	129	23	68	128	0	388	219	1396
Grand Total	542	4253	365	1	608	5161	345	2665	101	0	841	3111	308	134	481	0	1924	923	106	337	922	1	1752	1366	10561
Approach %	10.5	82.4	7.1	0.0	-	-	11.1	85.7	3.2	0.0	-	-	33.4	14.5	52.1	0.0	-	-	7.8	24.7	67.5	0.1	-	-	-
Total %	5.1	40.3	3.5	0.0	-	48.9	3.3	25.2	1.0	0.0	-	29.5	2.9	1.3	4.6	0.0	-	8.7	1.0	3.2	8.7	0.0	-	12.9	-
Motorcycles	3	25	0	0	-	28	3	19	0	0	-	22	0	1	3	0	-	4	0	6	3	0	-	9	63
% Motorcycles	0.6	0.6	0.0	0.0	-	0.5	0.9	0.7	0.0	-	-	0.7	0.0	0.7	0.6	-	-	0.4	0.0	1.8	0.3	0.0	-	0.7	0.6
Cars & Light Goods	527	4150	361	1	-	5039	332	2566	98	0	-	2996	305	127	462	0	-	894	103	318	908	1	-	1330	10259
% Cars & Light Goods	97.2	97.6	98.9	100.0	-	97.6	96.2	96.3	97.0	-	-	96.3	99.0	94.8	96.0	-	-	96.9	97.2	94.4	98.5	100.0	-	97.4	97.1
Buses	5	52	2	0	-	59	9	55	1	0	-	65	1	6	16	0	-	23	3	9	4	0	-	16	163
% Buses	0.9	1.2	0.5	0.0	-	1.1	2.6	2.1	1.0	-	-	2.1	0.3	4.5	3.3	-	-	2.5	2.8	2.7	0.4	0.0	-	1.2	1.5
Single-Unit Trucks	4	8	0	0	-	12	1	8	1	0	-	10	1	0	0	0	-	1	0	1	1	0	-	2	25
% Single-Unit Trucks	0.7	0.2	0.0	0.0	-	0.2	0.3	0.3	1.0	-	-	0.3	0.3	0.0	0.0	-	-	0.1	0.0	0.3	0.1	0.0	-	0.1	0.2
Articulated Trucks	1	0	0	0	-	1	0	8	0	0	-	8	0	0	0	0	-	0	0	1	1	0	-	2	11
% Articulated Trucks	0.2	0.0	0.0	0.0	-	0.0	0.0	0.3	0.0	-	-	0.3	0.0	0.0	0.0	-	-	0.0	0.0	0.3	0.1	0.0	-	0.1	0.1
Bicycles on Road	2	18	2	0	-	22	0	9	1	0	-	10	1	0	0	0	-	1	0	2	5	0	-	7	40
% Bicycles on Road	0.4	0.4	0.5	0.0	-	0.4	0.0	0.3	1.0	-	-	0.3	0.3	0.0	0.0	-	-	0.1	0.0	0.6	0.5	0.0	-	0.5	0.4
Bicycles on Crosswalk	-	-	-	-	10	-	-	-	-	-	4	-	-	-	-	-	40	-	-	-	-	-	13	-	-
% Bicycles on Crosswalk	-	-	-	-	1.6	-	-	-	-	-	0.5	-	-	-	-	-	2.1	-	-	-	-	-	0.7	-	-
Pedestrians	-	-	-	-	598	-	-	-	-	-	837	-	-	-	-	-	1884	-	-	-	-	-	1739	-	-
% Pedestrians	-	-	-	-	98.4	-	-	-	-	-	99.5	-	-	-	-	-	97.9	-	-	-	-	-	99.3	-	-



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@pts1.com

Count Name: Ferry Street & Clark Avenue -
Saturday
Site Code: 230405
Start Date: 08/12/2023
Page No: 3



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: Ferry Street & Clark Avenue -
Saturday
Site Code: 230405
Start Date: 08/12/2023
Page No: 4

Turning Movement Peak Hour Data (3:45 PM)

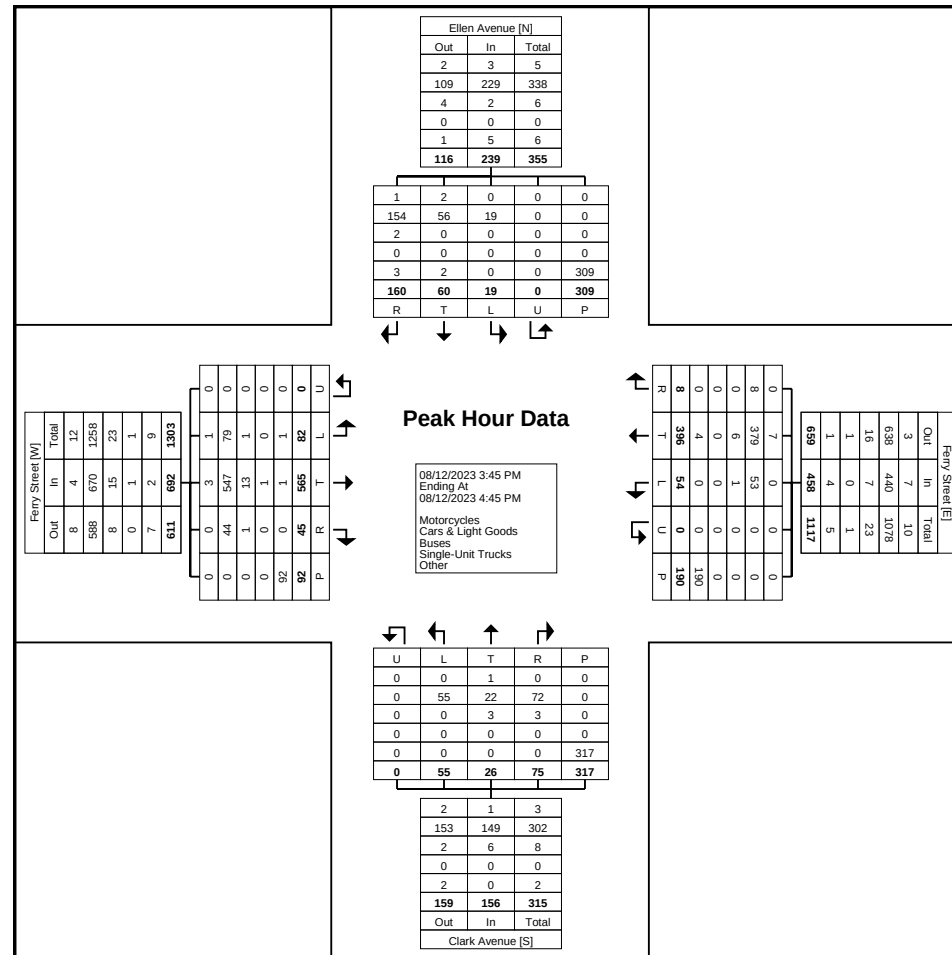
Start Time	Ferry Street Eastbound						Ferry Street Westbound						Clark Avenue Northbound						Ellen Avenue Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
3:45 PM	20	156	9	0	25	185	15	99	1	0	42	115	15	11	16	0	53	42	6	19	35	0	99	60	402
4:00 PM	19	140	14	0	22	173	10	97	0	0	48	107	14	3	16	0	86	33	5	15	43	0	57	63	376
4:15 PM	20	138	3	0	24	161	17	102	4	0	36	123	14	6	24	0	90	44	4	10	48	0	88	62	390
4:30 PM	23	131	19	0	21	173	12	98	3	0	64	113	12	6	19	0	88	37	4	16	34	0	65	54	377
Total	82	565	45	0	92	692	54	396	8	0	190	458	55	26	75	0	317	156	19	60	160	0	309	239	1545
Approach %	11.8	81.6	6.5	0.0	-	-	11.8	86.5	1.7	0.0	-	-	35.3	16.7	48.1	0.0	-	-	7.9	25.1	66.9	0.0	-	-	-
Total %	5.3	36.6	2.9	0.0	-	44.8	3.5	25.6	0.5	0.0	-	29.6	3.6	1.7	4.9	0.0	-	10.1	1.2	3.9	10.4	0.0	-	15.5	-
PHF	0.891	0.905	0.592	0.000	-	0.935	0.794	0.971	0.500	0.000	-	0.931	0.917	0.591	0.781	0.000	-	0.886	0.792	0.789	0.833	0.000	-	0.948	0.961
Motorcycles	1	3	0	0	-	4	0	7	0	0	-	7	0	1	0	0	-	1	0	2	1	0	-	3	15
% Motorcycles	1.2	0.5	0.0	-	-	0.6	0.0	1.8	0.0	-	-	1.5	0.0	3.8	0.0	-	-	0.6	0.0	3.3	0.6	-	-	1.3	1.0
Cars & Light Goods	79	547	44	0	-	670	53	379	8	0	-	440	55	22	72	0	-	149	19	56	154	0	-	229	1488
% Cars & Light Goods	96.3	96.8	97.8	-	-	96.8	98.1	95.7	100.0	-	-	96.1	100.0	84.6	96.0	-	-	95.5	100.0	93.3	96.3	-	-	95.8	96.3
Buses	1	13	1	0	-	15	1	6	0	0	-	7	0	3	3	0	-	6	0	0	2	0	-	2	30
% Buses	1.2	2.3	2.2	-	-	2.2	1.9	1.5	0.0	-	-	1.5	0.0	11.5	4.0	-	-	3.8	0.0	0.0	1.3	-	-	0.8	1.9
Single-Unit Trucks	0	1	0	0	-	1	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	1
% Single-Unit Trucks	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	0.0	0.0	-	-	0.0	0.1
Articulated Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	1	0	0	-	1	1
% Articulated Trucks	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	1.7	0.0	-	-	0.4	0.1
Bicycles on Road	1	1	0	0	-	2	0	4	0	0	-	4	0	0	0	0	-	0	0	1	3	0	-	4	10
% Bicycles on Road	1.2	0.2	0.0	-	-	0.3	0.0	1.0	0.0	-	-	0.9	0.0	0.0	0.0	-	-	0.0	0.0	1.7	1.9	-	-	1.7	0.6
Bicycles on Crosswalk	-	-	-	-	2	-	-	-	-	-	0	-	-	-	-	-	13	-	-	-	-	-	2	-	-
% Bicycles on Crosswalk	-	-	-	-	2.2	-	-	-	-	-	0.0	-	-	-	-	-	4.1	-	-	-	-	-	0.6	-	-
Pedestrians	-	-	-	-	90	-	-	-	-	-	190	-	-	-	-	-	304	-	-	-	-	-	307	-	-
% Pedestrians	-	-	-	-	97.8	-	-	-	-	-	100.0	-	-	-	-	-	95.9	-	-	-	-	-	99.4	-	-



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cdowness@pts1.com

Count Name: Ferry Street & Clark Avenue -
Saturday
Site Code: 230405
Start Date: 08/12/2023
Page No: 5



Turning Movement Peak Hour Data Plot (3:45 PM)



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: Ferry Street & Clark Avenue
Site Code: 230405
Start Date: 08/10/2023
Page No: 1

Turning Movement Data

Start Time	Ferry Street Eastbound						Ferry Street Westbound						Clark Avenue Northbound						Ellen Avenue 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	6	32	4	0	0	42	0	24	0	0	0	24	2	0	3	0	0	5	0	0	3	0	2	3	74
7:15 AM	4	22	0	0	1	26	0	25	2	1	2	28	1	0	1	0	5	2	0	0	6	0	7	6	62
7:30 AM	6	34	4	0	1	44	1	31	1	0	2	33	0	0	3	0	3	3	0	0	8	0	1	8	88
7:45 AM	8	50	6	0	2	64	3	37	0	0	5	40	1	2	4	0	7	7	0	0	6	0	4	6	117
Hourly Total	24	138	14	0	4	176	4	117	3	1	9	125	4	2	11	0	15	17	0	0	23	0	14	23	341
8:00 AM	9	49	1	0	4	59	4	46	0	0	4	50	1	1	3	0	26	5	2	1	5	0	2	8	122
8:15 AM	14	52	4	0	1	70	6	48	1	0	0	55	5	1	6	0	12	12	1	1	9	0	11	11	148
8:30 AM	8	64	0	0	2	72	4	53	1	0	4	58	3	2	9	0	4	14	1	0	11	0	5	12	156
8:45 AM	5	76	3	0	1	84	4	48	1	0	2	53	3	0	10	0	5	13	0	1	11	0	21	12	162
Hourly Total	36	241	8	0	8	285	18	195	3	0	10	216	12	4	28	0	47	44	4	3	36	0	39	43	588
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11:00 AM	9	112	7	0	6	128	1	73	3	0	7	77	8	2	9	0	33	19	0	4	16	0	26	20	244
11:15 AM	19	112	6	0	4	137	7	87	2	0	25	96	6	2	10	0	31	18	3	3	11	0	29	17	268
11:30 AM	13	129	10	0	9	152	8	87	2	0	8	97	6	5	13	0	34	24	2	3	21	0	30	26	299
11:45 AM	12	130	9	0	3	151	7	85	3	0	14	95	4	4	11	0	22	19	6	2	19	0	32	27	292
Hourly Total	53	483	32	0	22	568	23	332	10	0	54	365	24	13	43	0	120	80	11	12	67	0	117	90	1103
12:00 PM	14	142	7	0	14	163	7	92	7	0	21	106	4	1	8	0	58	13	3	3	26	0	22	32	314
12:15 PM	10	129	11	0	1	150	10	88	2	0	16	100	0	2	10	0	48	12	6	2	19	0	57	27	289
12:30 PM	14	122	3	0	7	139	14	66	3	0	13	83	5	2	13	0	31	20	1	4	21	0	15	26	268
12:45 PM	18	96	5	0	7	119	12	81	1	0	28	94	0	5	16	0	46	21	2	7	20	0	39	29	263
Hourly Total	56	489	26	0	29	571	43	327	13	0	78	383	9	10	47	0	183	66	12	16	86	0	133	114	1134
1:00 PM	6	118	6	0	6	130	4	92	2	0	22	98	5	2	11	0	16	18	1	4	16	0	34	21	267
1:15 PM	18	117	10	0	3	145	9	73	2	0	7	84	1	2	9	0	49	12	3	3	18	0	22	24	265
1:30 PM	13	125	5	0	8	143	10	74	4	0	20	88	2	5	16	4	40	27	1	5	19	0	37	25	283
1:45 PM	7	110	10	1	0	128	5	79	4	0	20	88	8	5	11	1	34	25	4	4	21	0	23	29	270
Hourly Total	44	470	31	1	17	546	28	318	12	0	69	358	16	14	47	5	139	82	9	16	74	0	116	99	1085
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3:00 PM	9	125	11	0	13	145	4	80	2	0	9	86	9	2	10	0	57	21	3	3	24	0	35	30	282
3:15 PM	7	105	6	0	5	118	9	93	6	0	19	108	10	4	9	0	35	23	0	5	17	0	40	22	271
3:30 PM	12	112	10	0	8	134	8	101	0	0	9	109	6	7	13	0	41	26	4	5	35	0	50	44	313
3:45 PM	8	117	6	0	20	131	11	96	0	0	35	107	8	1	9	0	45	18	1	1	29	0	35	31	287
Hourly Total	36	459	33	0	46	528	32	370	8	0	72	410	33	14	41	0	178	88	8	14	105	0	160	127	1153
4:00 PM	12	98	9	0	10	119	10	104	6	0	8	120	14	6	17	0	62	37	3	6	33	0	21	42	318
4:15 PM	10	116	7	0	13	133	10	91	4	0	16	105	6	2	14	0	28	22	3	5	16	0	34	24	284
4:30 PM	16	99	10	0	13	125	13	110	6	0	18	129	7	2	9	0	60	18	1	3	31	0	51	35	307

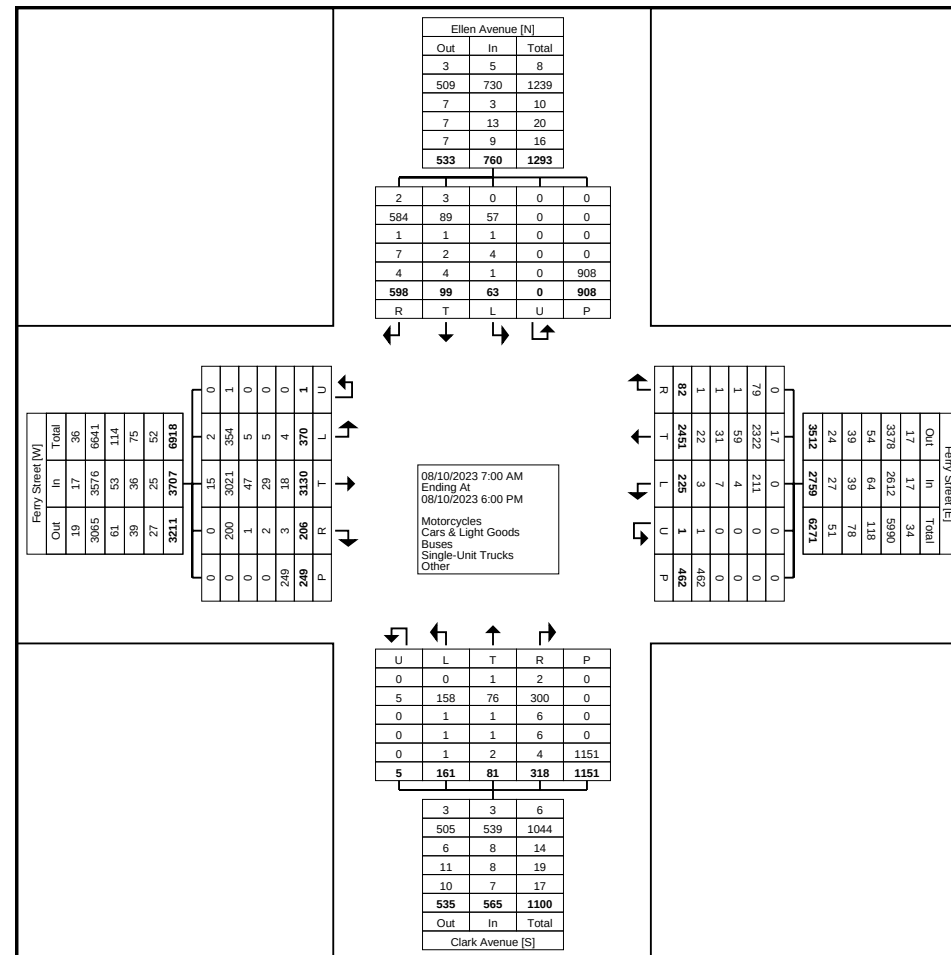
4:45 PM	17	114	4	0	15	135	10	96	4	0	19	110	7	3	14	0	95	24	2	5	23	0	45	30	299
Hourly Total	55	427	30	0	51	512	43	401	20	0	61	464	34	13	54	0	245	101	9	19	103	0	151	131	1208
5:00 PM	14	110	5	0	27	129	11	107	3	0	24	121	14	4	10	0	56	28	2	4	22	0	63	28	306
5:15 PM	24	95	10	0	10	129	7	111	2	0	14	120	2	4	16	0	52	22	5	10	26	0	32	41	312
5:30 PM	12	113	9	0	14	134	9	94	5	0	31	108	7	3	12	0	42	22	0	3	25	0	48	28	292
5:45 PM	16	105	8	0	21	129	7	79	3	0	40	89	6	0	9	0	74	15	3	2	31	0	35	36	269
Hourly Total	66	423	32	0	72	521	34	391	13	0	109	438	29	11	47	0	224	87	10	19	104	0	178	133	1179
Grand Total	370	3130	206	1	249	3707	225	2451	82	1	462	2759	161	81	318	5	1151	565	63	99	598	0	908	760	7791
Approach %	10.0	84.4	5.6	0.0	-	-	8.2	88.8	3.0	0.0	-	-	28.5	14.3	56.3	0.9	-	-	8.3	13.0	78.7	0.0	-	-	-
Total %	4.7	40.2	2.6	0.0	-	47.6	2.9	31.5	1.1	0.0	-	35.4	2.1	1.0	4.1	0.1	-	7.3	0.8	1.3	7.7	0.0	-	9.8	-
Motorcycles	2	15	0	0	-	17	0	17	0	0	-	17	0	1	2	0	-	3	0	3	2	0	-	5	42
% Motorcycles	0.5	0.5	0.0	0.0	-	0.5	0.0	0.7	0.0	0.0	-	0.6	0.0	1.2	0.6	0.0	-	0.5	0.0	3.0	0.3	-	-	0.7	0.5
Cars & Light Goods	354	3021	200	1	-	3576	211	2322	79	0	-	2612	158	76	300	5	-	539	57	89	584	0	-	730	7457
% Cars & Light Goods	95.7	96.5	97.1	100.0	-	96.5	93.8	94.7	96.3	0.0	-	94.7	98.1	93.8	94.3	100.0	-	95.4	90.5	89.9	97.7	-	-	96.1	95.7
Buses	5	47	1	0	-	53	4	59	1	0	-	64	1	1	6	0	-	8	1	1	1	0	-	3	128
% Buses	1.4	1.5	0.5	0.0	-	1.4	1.8	2.4	1.2	0.0	-	2.3	0.6	1.2	1.9	0.0	-	1.4	1.6	1.0	0.2	-	-	0.4	1.6
Single-Unit Trucks	5	29	2	0	-	36	7	31	1	0	-	39	1	1	6	0	-	8	4	2	7	0	-	13	96
% Single-Unit Trucks	1.4	0.9	1.0	0.0	-	1.0	3.1	1.3	1.2	0.0	-	1.4	0.6	1.2	1.9	0.0	-	1.4	6.3	2.0	1.2	-	-	1.7	1.2
Articulated Trucks	1	7	0	0	-	8	1	8	0	1	-	10	1	1	1	0	-	3	0	1	1	0	-	2	23
% Articulated Trucks	0.3	0.2	0.0	0.0	-	0.2	0.4	0.3	0.0	100.0	-	0.4	0.6	1.2	0.3	0.0	-	0.5	0.0	1.0	0.2	-	-	0.3	0.3
Bicycles on Road	3	11	3	0	-	17	2	14	1	0	-	17	0	1	3	0	-	4	1	3	3	0	-	7	45
% Bicycles on Road	0.8	0.4	1.5	0.0	-	0.5	0.9	0.6	1.2	0.0	-	0.6	0.0	1.2	0.9	0.0	-	0.7	1.6	3.0	0.5	-	-	0.9	0.6
Bicycles on Crosswalk	-	-	-	-	3	-	-	-	-	-	3	-	-	-	-	-	10	-	-	-	-	-	21	-	-
% Bicycles on Crosswalk	-	-	-	-	1.2	-	-	-	-	-	0.6	-	-	-	-	-	0.9	-	-	-	-	-	2.3	-	-
Pedestrians	-	-	-	-	246	-	-	-	-	-	459	-	-	-	-	-	1141	-	-	-	-	-	887	-	-
% Pedestrians	-	-	-	-	98.8	-	-	-	-	-	99.4	-	-	-	-	-	99.1	-	-	-	-	-	97.7	-	-



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: Ferry Street & Clark Avenue
Site Code: 230405
Start Date: 08/10/2023
Page No: 3



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: Ferry Street & Clark Avenue
Site Code: 230405
Start Date: 08/10/2023
Page No: 4

Turning Movement Peak Hour Data (8:00 AM)

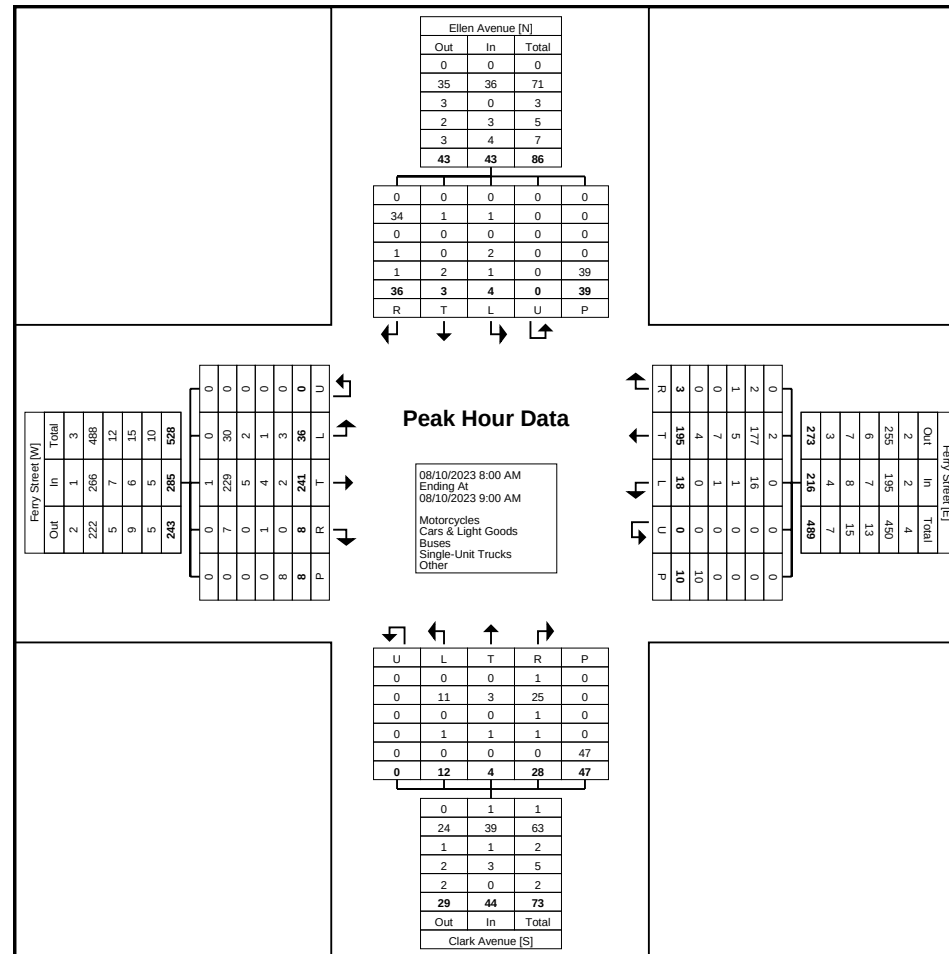
Start Time	Ferry Street Eastbound						Ferry Street Westbound						Clark Avenue Northbound						Ellen Avenue Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
8:00 AM	9	49	1	0	4	59	4	46	0	0	4	50	1	1	3	0	26	5	2	1	5	0	2	8	122
8:15 AM	14	52	4	0	1	70	6	48	1	0	0	55	5	1	6	0	12	12	1	1	9	0	11	11	148
8:30 AM	8	64	0	0	2	72	4	53	1	0	4	58	3	2	9	0	4	14	1	0	11	0	5	12	156
8:45 AM	5	76	3	0	1	84	4	48	1	0	2	53	3	0	10	0	5	13	0	1	11	0	21	12	162
Total	36	241	8	0	8	285	18	195	3	0	10	216	12	4	28	0	47	44	4	3	36	0	39	43	588
Approach %	12.6	84.6	2.8	0.0	-	-	8.3	90.3	1.4	0.0	-	-	27.3	9.1	63.6	0.0	-	-	9.3	7.0	83.7	0.0	-	-	-
Total %	6.1	41.0	1.4	0.0	-	48.5	3.1	33.2	0.5	0.0	-	36.7	2.0	0.7	4.8	0.0	-	7.5	0.7	0.5	6.1	0.0	-	7.3	-
PHF	0.643	0.793	0.500	0.000	-	0.848	0.750	0.920	0.750	0.000	-	0.931	0.600	0.500	0.700	0.000	-	0.786	0.500	0.750	0.818	0.000	-	0.896	0.907
Motorcycles	0	1	0	0	-	1	0	2	0	0	-	2	0	0	1	0	-	1	0	0	0	0	-	0	4
% Motorcycles	0.0	0.4	0.0	-	-	0.4	0.0	1.0	0.0	-	-	0.9	0.0	0.0	3.6	-	-	2.3	0.0	0.0	0.0	-	-	0.0	0.7
Cars & Light Goods	30	229	7	0	-	266	16	177	2	0	-	195	11	3	25	0	-	39	1	1	34	0	-	36	536
% Cars & Light Goods	83.3	95.0	87.5	-	-	93.3	88.9	90.8	66.7	-	-	90.3	91.7	75.0	89.3	-	-	88.6	25.0	33.3	94.4	-	-	83.7	91.2
Buses	2	5	0	0	-	7	1	5	1	0	-	7	0	0	1	0	-	1	0	0	0	0	-	0	15
% Buses	5.6	2.1	0.0	-	-	2.5	5.6	2.6	33.3	-	-	3.2	0.0	0.0	3.6	-	-	2.3	0.0	0.0	0.0	-	-	0.0	2.6
Single-Unit Trucks	1	4	1	0	-	6	1	7	0	0	-	8	1	1	1	0	-	3	2	0	1	0	-	3	20
% Single-Unit Trucks	2.8	1.7	12.5	-	-	2.1	5.6	3.6	0.0	-	-	3.7	8.3	25.0	3.6	-	-	6.8	50.0	0.0	2.8	-	-	7.0	3.4
Articulated Trucks	0	1	0	0	-	1	0	2	0	0	-	2	0	0	0	0	-	0	0	1	0	0	-	1	4
% Articulated Trucks	0.0	0.4	0.0	-	-	0.4	0.0	1.0	0.0	-	-	0.9	0.0	0.0	0.0	-	-	0.0	0.0	33.3	0.0	-	-	2.3	0.7
Bicycles on Road	3	1	0	0	-	4	0	2	0	0	-	2	0	0	0	0	-	0	1	1	1	0	-	3	9
% Bicycles on Road	8.3	0.4	0.0	-	-	1.4	0.0	1.0	0.0	-	-	0.9	0.0	0.0	0.0	-	-	0.0	25.0	33.3	2.8	-	-	7.0	1.5
Bicycles on Crosswalk	-	-	-	-	1	-	-	-	-	-	0	-	-	-	-	-	3	-	-	-	-	-	3	-	-
% Bicycles on Crosswalk	-	-	-	-	12.5	-	-	-	-	-	0.0	-	-	-	-	-	6.4	-	-	-	-	-	7.7	-	-
Pedestrians	-	-	-	-	7	-	-	-	-	-	10	-	-	-	-	-	44	-	-	-	-	-	36	-	-
% Pedestrians	-	-	-	-	87.5	-	-	-	-	-	100.0	-	-	-	-	-	93.6	-	-	-	-	-	92.3	-	-



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
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Count Name: Ferry Street & Clark Avenue
Site Code: 230405
Start Date: 08/10/2023
Page No: 5





Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: Ferry Street & Clark Avenue
Site Code: 230405
Start Date: 08/10/2023
Page No: 6

Turning Movement Peak Hour Data (11:30 AM)

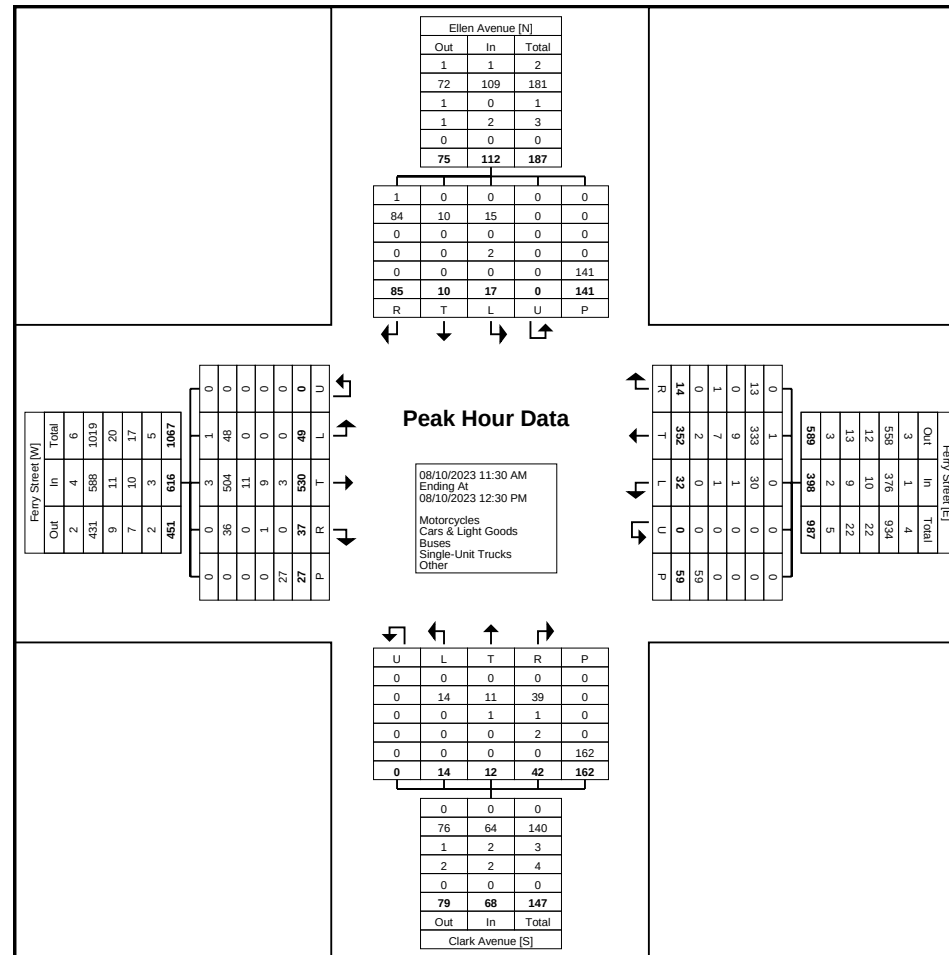
Start Time	Ferry Street Eastbound						Ferry Street Westbound						Clark Avenue Northbound						Ellen Avenue Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
11:30 AM	13	129	10	0	9	152	8	87	2	0	8	97	6	5	13	0	34	24	2	3	21	0	30	26	299
11:45 AM	12	130	9	0	3	151	7	85	3	0	14	95	4	4	11	0	22	19	6	2	19	0	32	27	292
12:00 PM	14	142	7	0	14	163	7	92	7	0	21	106	4	1	8	0	58	13	3	3	26	0	22	32	314
12:15 PM	10	129	11	0	1	150	10	88	2	0	16	100	0	2	10	0	48	12	6	2	19	0	57	27	289
Total	49	530	37	0	27	616	32	352	14	0	59	398	14	12	42	0	162	68	17	10	85	0	141	112	1194
Approach %	8.0	86.0	6.0	0.0	-	-	8.0	88.4	3.5	0.0	-	-	20.6	17.6	61.8	0.0	-	-	15.2	8.9	75.9	0.0	-	-	-
Total %	4.1	44.4	3.1	0.0	-	51.6	2.7	29.5	1.2	0.0	-	33.3	1.2	1.0	3.5	0.0	-	5.7	1.4	0.8	7.1	0.0	-	9.4	-
PHF	0.875	0.933	0.841	0.000	-	0.945	0.800	0.957	0.500	0.000	-	0.939	0.583	0.600	0.808	0.000	-	0.708	0.708	0.833	0.817	0.000	-	0.875	0.951
Motorcycles	1	3	0	0	-	4	0	1	0	0	-	1	0	0	0	0	-	0	0	0	1	0	-	1	6
% Motorcycles	2.0	0.6	0.0	-	-	0.6	0.0	0.3	0.0	-	-	0.3	0.0	0.0	0.0	-	-	0.0	0.0	0.0	1.2	-	-	0.9	0.5
Cars & Light Goods	48	504	36	0	-	588	30	333	13	0	-	376	14	11	39	0	-	64	15	10	84	0	-	109	1137
% Cars & Light Goods	98.0	95.1	97.3	-	-	95.5	93.8	94.6	92.9	-	-	94.5	100.0	91.7	92.9	-	-	94.1	88.2	100.0	98.8	-	-	97.3	95.2
Buses	0	11	0	0	-	11	1	9	0	0	-	10	0	1	1	0	-	2	0	0	0	0	-	0	23
% Buses	0.0	2.1	0.0	-	-	1.8	3.1	2.6	0.0	-	-	2.5	0.0	8.3	2.4	-	-	2.9	0.0	0.0	0.0	-	-	0.0	1.9
Single-Unit Trucks	0	9	1	0	-	10	1	7	1	0	-	9	0	0	2	0	-	2	2	0	0	0	-	2	23
% Single-Unit Trucks	0.0	1.7	2.7	-	-	1.6	3.1	2.0	7.1	-	-	2.3	0.0	0.0	4.8	-	-	2.9	11.8	0.0	0.0	-	-	1.8	1.9
Articulated Trucks	0	2	0	0	-	2	0	1	0	0	-	1	0	0	0	0	-	0	0	0	0	0	-	0	3
% Articulated Trucks	0.0	0.4	0.0	-	-	0.3	0.0	0.3	0.0	-	-	0.3	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.3
Bicycles on Road	0	1	0	0	-	1	0	1	0	0	-	1	0	0	0	0	-	0	0	0	0	0	-	0	2
% Bicycles on Road	0.0	0.2	0.0	-	-	0.2	0.0	0.3	0.0	-	-	0.3	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.2
Bicycles on Crosswalk	-	-	-	-	1	-	-	-	-	-	0	-	-	-	-	-	2	-	-	-	-	-	1	-	-
% Bicycles on Crosswalk	-	-	-	-	3.7	-	-	-	-	-	0.0	-	-	-	-	-	1.2	-	-	-	-	-	0.7	-	-
Pedestrians	-	-	-	-	26	-	-	-	-	-	59	-	-	-	-	-	160	-	-	-	-	-	140	-	-
% Pedestrians	-	-	-	-	96.3	-	-	-	-	-	100.0	-	-	-	-	-	98.8	-	-	-	-	-	99.3	-	-



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: Ferry Street & Clark Avenue
Site Code: 230405
Start Date: 08/10/2023
Page No: 7



Turning Movement Peak Hour Data Plot (11:30 AM)



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: Ferry Street & Clark Avenue
Site Code: 230405
Start Date: 08/10/2023
Page No: 8

Turning Movement Peak Hour Data (4:30 PM)

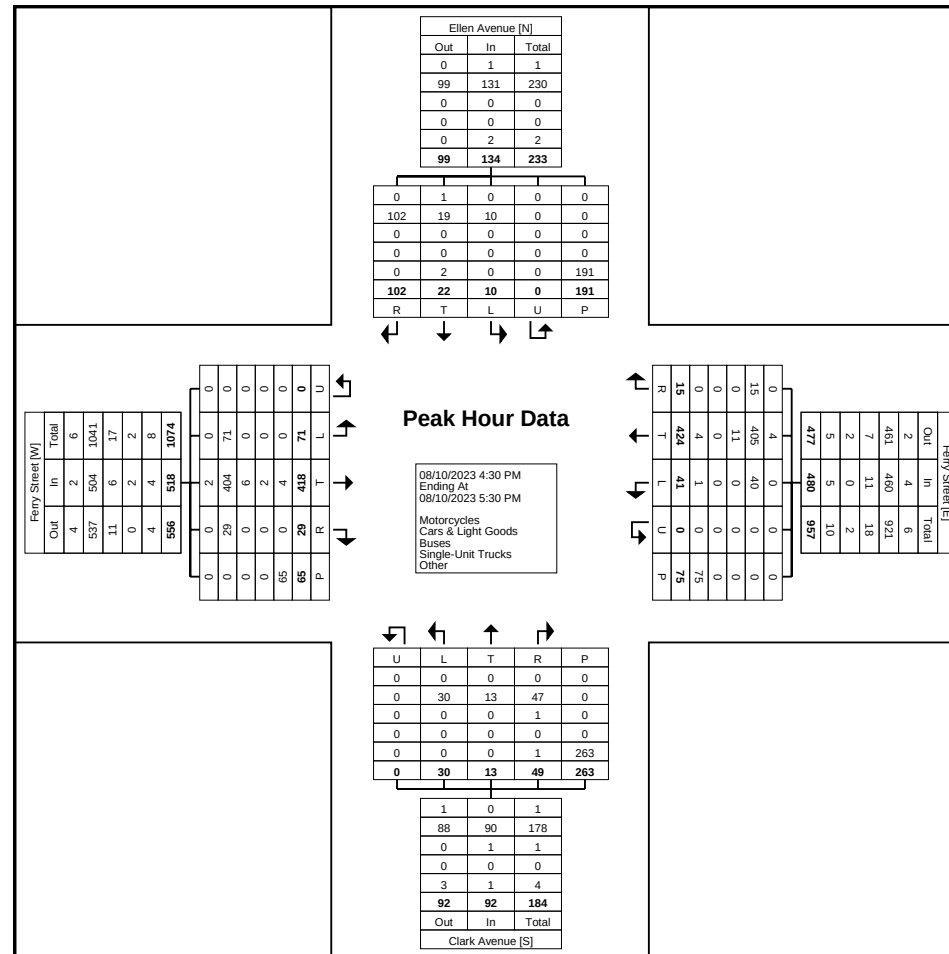
Start Time	Ferry Street Eastbound						Ferry Street Westbound						Clark Avenue Northbound						Ellen Avenue Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
4:30 PM	16	99	10	0	13	125	13	110	6	0	18	129	7	2	9	0	60	18	1	3	31	0	51	35	307
4:45 PM	17	114	4	0	15	135	10	96	4	0	19	110	7	3	14	0	95	24	2	5	23	0	45	30	299
5:00 PM	14	110	5	0	27	129	11	107	3	0	24	121	14	4	10	0	56	28	2	4	22	0	63	28	306
5:15 PM	24	95	10	0	10	129	7	111	2	0	14	120	2	4	16	0	52	22	5	10	26	0	32	41	312
Total	71	418	29	0	65	518	41	424	15	0	75	480	30	13	49	0	263	92	10	22	102	0	191	134	1224
Approach %	13.7	80.7	5.6	0.0	-	-	8.5	88.3	3.1	0.0	-	-	32.6	14.1	53.3	0.0	-	-	7.5	16.4	76.1	0.0	-	-	-
Total %	5.8	34.2	2.4	0.0	-	42.3	3.3	34.6	1.2	0.0	-	39.2	2.5	1.1	4.0	0.0	-	7.5	0.8	1.8	8.3	0.0	-	10.9	-
PHF	0.740	0.917	0.725	0.000	-	0.959	0.788	0.955	0.625	0.000	-	0.930	0.536	0.813	0.766	0.000	-	0.821	0.500	0.550	0.823	0.000	-	0.817	0.981
Motorcycles	0	2	0	0	-	2	0	4	0	0	-	4	0	0	0	0	-	0	0	1	0	0	-	1	7
% Motorcycles	0.0	0.5	0.0	-	-	0.4	0.0	0.9	0.0	-	-	0.8	0.0	0.0	0.0	-	-	0.0	0.0	4.5	0.0	-	-	0.7	0.6
Cars & Light Goods	71	404	29	0	-	504	40	405	15	0	-	460	30	13	47	0	-	90	10	19	102	0	-	131	1185
% Cars & Light Goods	100.0	96.7	100.0	-	-	97.3	97.6	95.5	100.0	-	-	95.8	100.0	100.0	95.9	-	-	97.8	100.0	86.4	100.0	-	-	97.8	96.8
Buses	0	6	0	0	-	6	0	11	0	0	-	11	0	0	1	0	-	1	0	0	0	0	-	0	18
% Buses	0.0	1.4	0.0	-	-	1.2	0.0	2.6	0.0	-	-	2.3	0.0	0.0	2.0	-	-	1.1	0.0	0.0	0.0	-	-	0.0	1.5
Single-Unit Trucks	0	2	0	0	-	2	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	2
% Single-Unit Trucks	0.0	0.5	0.0	-	-	0.4	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.2
Articulated Trucks	0	0	0	0	-	0	0	2	0	0	-	2	0	0	0	0	-	0	0	0	0	0	-	0	2
% Articulated Trucks	0.0	0.0	0.0	-	-	0.0	0.0	0.5	0.0	-	-	0.4	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.2
Bicycles on Road	0	4	0	0	-	4	1	2	0	0	-	3	0	0	1	0	-	1	0	2	0	0	-	2	10
% Bicycles on Road	0.0	1.0	0.0	-	-	0.8	2.4	0.5	0.0	-	-	0.6	0.0	0.0	2.0	-	-	1.1	0.0	9.1	0.0	-	-	1.5	0.8
Bicycles on Crosswalk	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	2	-	-	-	-	-	4	-	-
% Bicycles on Crosswalk	-	-	-	-	1.5	-	-	-	-	-	1.3	-	-	-	-	-	0.8	-	-	-	-	-	2.1	-	-
Pedestrians	-	-	-	-	64	-	-	-	-	-	74	-	-	-	-	-	261	-	-	-	-	-	187	-	-
% Pedestrians	-	-	-	-	98.5	-	-	-	-	-	98.7	-	-	-	-	-	99.2	-	-	-	-	-	97.9	-	-



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@pts1.com

Count Name: Ferry Street & Clark Avenue
Site Code: 230405
Start Date: 08/10/2023
Page No: 9



Turning Movement Peak Hour Data Plot (4:30 PM)



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: Ferry Street & Fallsview Blvd -
Saturday
Site Code: 230405
Start Date: 08/12/2023
Page No: 1

Turning Movement Data

Start Time	Ferry Street Eastbound					Ferry Street Westbound					Fallsview Blvd Northbound					Int. Total
	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	U-Turn	Peds	App. Total	Left	Right	U-Turn	Peds	App. Total	
10:00 AM	138	11	0	1	149	22	92	0	5	114	10	16	0	14	26	289
10:15 AM	124	14	0	1	138	16	86	0	0	102	12	23	0	19	35	275
10:30 AM	141	28	0	3	169	12	103	0	0	115	8	16	0	38	24	308
10:45 AM	139	13	0	0	152	18	131	0	2	149	15	33	0	18	48	349
Hourly Total	542	66	0	5	608	68	412	0	7	480	45	88	0	89	133	1221
11:00 AM	118	17	0	2	135	23	118	0	2	141	17	31	0	37	48	324
11:15 AM	125	20	0	4	145	18	100	0	0	118	18	25	0	25	43	306
11:30 AM	135	25	0	0	160	14	87	0	2	101	17	23	0	24	40	301
11:45 AM	141	30	0	1	171	31	98	0	1	129	14	18	0	28	32	332
Hourly Total	519	92	0	7	611	86	403	0	5	489	66	97	0	114	163	1263
12:00 PM	142	28	0	4	170	17	87	0	6	104	8	24	0	52	32	306
12:15 PM	112	18	0	4	130	22	83	0	3	105	10	23	0	46	33	268
12:30 PM	150	19	0	0	169	18	93	0	4	111	10	18	0	38	28	308
12:45 PM	138	34	0	0	172	19	71	0	10	90	9	13	0	34	22	284
Hourly Total	542	99	0	8	641	76	334	0	23	410	37	78	0	170	115	1166
1:00 PM	138	31	0	7	169	17	64	0	0	81	8	21	0	12	29	279
1:15 PM	137	21	0	5	158	9	83	0	0	92	7	29	0	27	36	286
1:30 PM	148	36	0	3	184	15	87	0	0	102	6	18	0	47	24	310
1:45 PM	150	32	0	3	182	13	90	0	4	103	5	20	0	31	25	310
Hourly Total	573	120	0	18	693	54	324	0	4	378	26	88	0	117	114	1185
2:00 PM	153	26	0	1	179	13	105	0	4	118	7	24	0	37	31	328
2:15 PM	151	23	0	1	174	25	104	0	0	129	8	34	0	37	42	345
2:30 PM	150	17	0	4	167	21	114	0	4	135	8	25	0	49	33	335
2:45 PM	164	32	0	10	196	26	116	0	3	142	8	29	0	67	37	375
Hourly Total	618	98	0	16	716	85	439	0	11	524	31	112	0	190	143	1383
3:00 PM	156	31	0	3	187	29	118	0	6	147	10	26	0	41	36	370
3:15 PM	148	17	0	9	165	30	128	0	4	158	8	28	0	39	36	359
3:30 PM	149	21	0	1	170	26	115	0	12	141	8	40	0	83	48	359
3:45 PM	164	27	0	6	191	37	112	0	12	149	9	24	0	35	33	373
Hourly Total	617	96	0	19	713	122	473	0	34	595	35	118	0	198	153	1461
4:00 PM	159	23	0	0	182	27	130	0	4	157	11	25	0	53	36	375
4:15 PM	141	30	0	0	171	34	134	0	8	168	13	31	0	82	44	383
4:30 PM	152	48	0	2	200	33	125	0	11	158	16	25	0	62	41	399
4:45 PM	176	24	0	2	200	23	119	0	16	142	21	19	0	81	40	382
Hourly Total	628	125	0	4	753	117	508	0	39	625	61	100	0	278	161	1539
5:00 PM	147	31	0	3	178	28	120	0	14	148	14	24	0	58	38	364

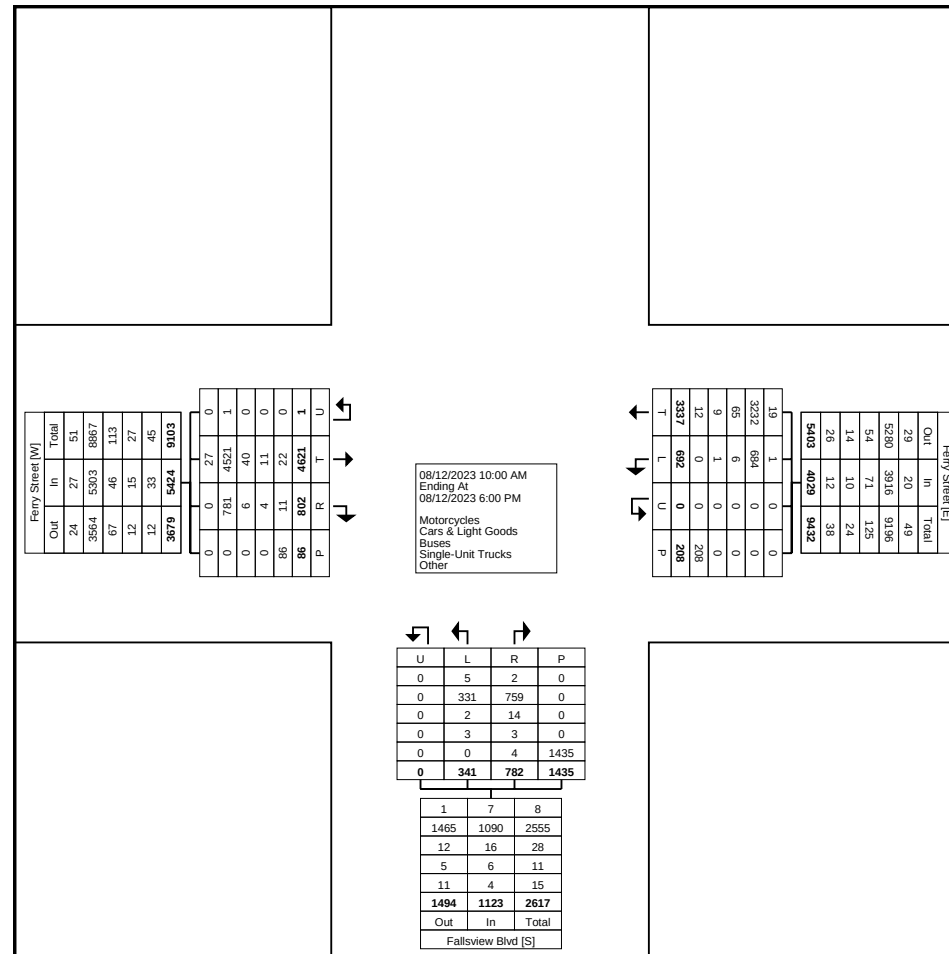
5:15 PM	147	22	1	3	170	16	105	0	32	121	6	25	0	56	31	322
5:30 PM	143	29	0	3	172	29	109	0	22	138	9	29	0	58	38	348
5:45 PM	145	24	0	0	169	11	110	0	17	121	11	23	0	107	34	324
Hourly Total	582	106	1	9	689	84	444	0	85	528	40	101	0	279	141	1358
Grand Total	4621	802	1	86	5424	692	3337	0	208	4029	341	782	0	1435	1123	10576
Approach %	85.2	14.8	0.0	-	-	17.2	82.8	0.0	-	-	30.4	69.6	0.0	-	-	-
Total %	43.7	7.6	0.0	-	51.3	6.5	31.6	0.0	-	38.1	3.2	7.4	0.0	-	10.6	-
Motorcycles	27	0	0	-	27	1	19	0	-	20	5	2	0	-	7	54
% Motorcycles	0.6	0.0	0.0	-	0.5	0.1	0.6	-	-	0.5	1.5	0.3	-	-	0.6	0.5
Cars & Light Goods	4521	781	1	-	5303	684	3232	0	-	3916	331	759	0	-	1090	10309
% Cars & Light Goods	97.8	97.4	100.0	-	97.8	98.8	96.9	-	-	97.2	97.1	97.1	-	-	97.1	97.5
Buses	40	6	0	-	46	6	65	0	-	71	2	14	0	-	16	133
% Buses	0.9	0.7	0.0	-	0.8	0.9	1.9	-	-	1.8	0.6	1.8	-	-	1.4	1.3
Single-Unit Trucks	11	4	0	-	15	1	9	0	-	10	3	3	0	-	6	31
% Single-Unit Trucks	0.2	0.5	0.0	-	0.3	0.1	0.3	-	-	0.2	0.9	0.4	-	-	0.5	0.3
Articulated Trucks	0	0	0	-	0	0	2	0	-	2	0	0	0	-	0	2
% Articulated Trucks	0.0	0.0	0.0	-	0.0	0.0	0.1	-	-	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Road	22	11	0	-	33	0	10	0	-	10	0	4	0	-	4	47
% Bicycles on Road	0.5	1.4	0.0	-	0.6	0.0	0.3	-	-	0.2	0.0	0.5	-	-	0.4	0.4
Bicycles on Crosswalk	-	-	-	3	-	-	-	-	2	-	-	-	-	22	-	-
% Bicycles on Crosswalk	-	-	-	3.5	-	-	-	-	1.0	-	-	-	-	1.5	-	-
Pedestrians	-	-	-	83	-	-	-	-	206	-	-	-	-	1413	-	-
% Pedestrians	-	-	-	96.5	-	-	-	-	99.0	-	-	-	-	98.5	-	-



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@pts1.com

Count Name: Ferry Street & Fallsview Blvd -
Saturday
Site Code: 230405
Start Date: 08/12/2023
Page No: 3



Turning Movement Data Plot



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@pts1.com

Count Name: Ferry Street & Fallsview Blvd -
Saturday
Site Code: 230405
Start Date: 08/12/2023
Page No: 4

Turning Movement Peak Hour Data (4:00 PM)

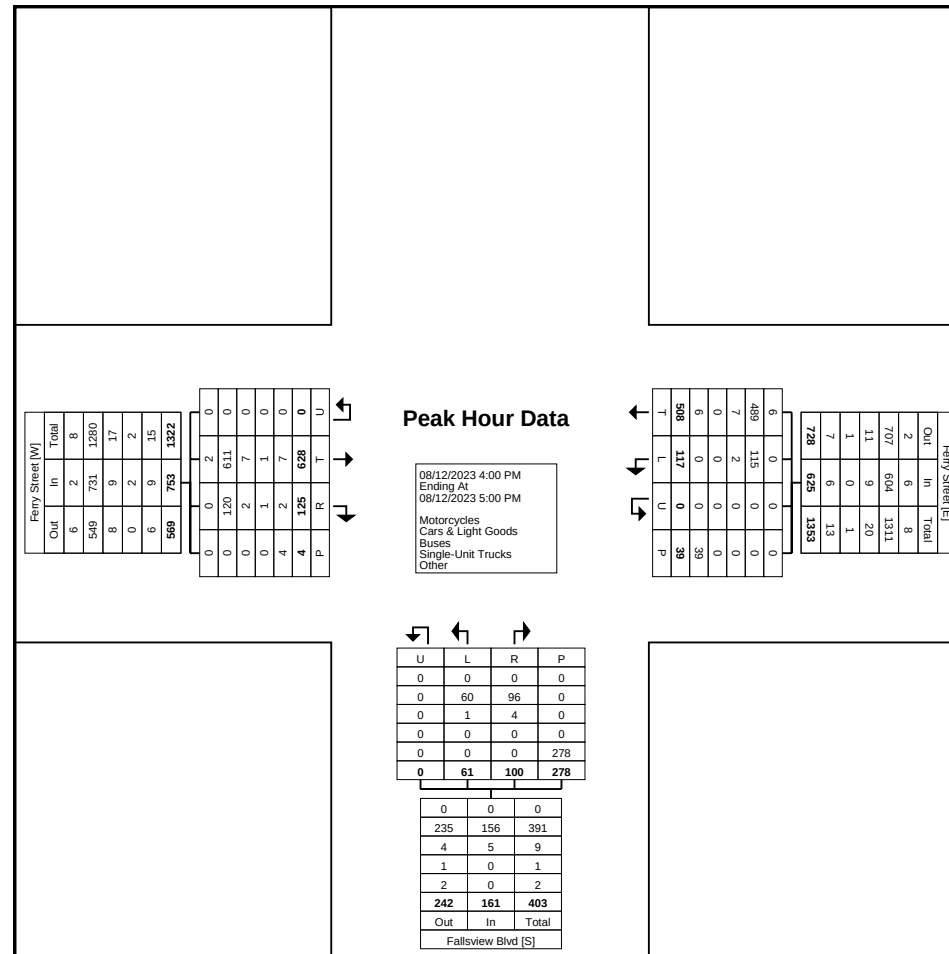
Start Time	Ferry Street Eastbound					Ferry Street Westbound					Fallsview Blvd Northbound					Int. Total
	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	U-Turn	Peds	App. Total	Left	Right	U-Turn	Peds	App. Total	
4:00 PM	159	23	0	0	182	27	130	0	4	157	11	25	0	53	36	375
4:15 PM	141	30	0	0	171	34	134	0	8	168	13	31	0	82	44	383
4:30 PM	152	48	0	2	200	33	125	0	11	158	16	25	0	62	41	399
4:45 PM	176	24	0	2	200	23	119	0	16	142	21	19	0	81	40	382
Total	628	125	0	4	753	117	508	0	39	625	61	100	0	278	161	1539
Approach %	83.4	16.6	0.0	-	-	18.7	81.3	0.0	-	-	37.9	62.1	0.0	-	-	-
Total %	40.8	8.1	0.0	-	48.9	7.6	33.0	0.0	-	40.6	4.0	6.5	0.0	-	10.5	-
PHF	0.892	0.651	0.000	-	0.941	0.860	0.948	0.000	-	0.930	0.726	0.806	0.000	-	0.915	0.964
Motorcycles	2	0	0	-	2	0	6	0	-	6	0	0	0	-	0	8
% Motorcycles	0.3	0.0	-	-	0.3	0.0	1.2	-	-	1.0	0.0	0.0	-	-	0.0	0.5
Cars & Light Goods	611	120	0	-	731	115	489	0	-	604	60	96	0	-	156	1491
% Cars & Light Goods	97.3	96.0	-	-	97.1	98.3	96.3	-	-	96.6	98.4	96.0	-	-	96.9	96.9
Buses	7	2	0	-	9	2	7	0	-	9	1	4	0	-	5	23
% Buses	1.1	1.6	-	-	1.2	1.7	1.4	-	-	1.4	1.6	4.0	-	-	3.1	1.5
Single-Unit Trucks	1	1	0	-	2	0	0	0	-	0	0	0	0	-	0	2
% Single-Unit Trucks	0.2	0.8	-	-	0.3	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.1
Articulated Trucks	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Articulated Trucks	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Road	7	2	0	-	9	0	6	0	-	6	0	0	0	-	0	15
% Bicycles on Road	1.1	1.6	-	-	1.2	0.0	1.2	-	-	1.0	0.0	0.0	-	-	0.0	1.0
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	3	-	-
% Bicycles on Crosswalk	-	-	-	0.0	-	-	-	-	0.0	-	-	-	-	1.1	-	-
Pedestrians	-	-	-	4	-	-	-	-	39	-	-	-	-	275	-	-
% Pedestrians	-	-	-	100.0	-	-	-	-	100.0	-	-	-	-	98.9	-	-



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
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Count Name: Ferry Street & Fallsview Blvd -
Saturday
Site Code: 230405
Start Date: 08/12/2023
Page No: 5



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



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: Ferry Street & Fallsview Blvd
Site Code: 230405
Start Date: 08/10/2023
Page No: 1

Turning Movement Data

Start Time	Ferry Street Eastbound					Ferry Street Westbound					Fallsview Blvd Northbound					Int. Total
	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	U-Turn	Peds	App. Total	Left	Right	U-Turn	Peds	App. Total	
7:00 AM	36	11	0	0	47	3	25	0	0	28	8	5	0	0	13	88
7:15 AM	23	11	0	0	34	5	28	0	1	33	7	3	0	6	10	77
7:30 AM	41	15	0	0	56	4	34	0	0	38	4	3	0	1	7	101
7:45 AM	58	18	0	0	76	5	41	0	1	46	11	8	0	5	19	141
Hourly Total	158	55	0	0	213	17	128	0	2	145	30	19	0	12	49	407
8:00 AM	53	18	0	0	71	8	45	0	1	53	5	9	0	13	14	138
8:15 AM	60	9	0	1	69	7	54	0	1	61	10	11	0	7	21	151
8:30 AM	60	8	0	2	68	7	63	0	0	70	13	12	0	4	25	163
8:45 AM	72	15	0	0	87	6	55	0	0	61	7	12	0	24	19	167
Hourly Total	245	50	0	3	295	28	217	0	2	245	35	44	0	48	79	619
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11:00 AM	113	18	0	0	131	15	93	0	6	108	13	19	0	30	32	271
11:15 AM	131	16	0	4	147	14	98	0	0	112	14	20	0	21	34	293
11:30 AM	127	17	0	4	144	16	107	0	13	123	14	32	0	58	46	313
11:45 AM	134	24	0	0	158	14	97	0	0	111	12	30	0	27	42	311
Hourly Total	505	75	0	8	580	59	395	0	19	454	53	101	0	136	154	1188
12:00 PM	132	18	0	0	150	17	104	0	2	121	11	34	0	15	45	316
12:15 PM	134	9	0	0	143	21	96	0	5	117	4	24	0	37	28	288
12:30 PM	126	17	0	0	143	12	77	0	0	89	8	19	0	11	27	259
12:45 PM	111	19	0	0	130	18	96	0	1	114	8	11	0	42	19	263
Hourly Total	503	63	0	0	566	68	373	0	8	441	31	88	0	105	119	1126
1:00 PM	123	21	0	0	144	11	101	0	4	112	9	12	0	21	21	277
1:15 PM	121	11	0	0	132	11	84	0	0	95	10	21	0	14	31	258
1:30 PM	121	22	0	1	143	13	89	0	6	102	4	26	0	26	30	275
1:45 PM	114	17	0	0	131	18	90	0	0	108	16	17	0	30	33	272
Hourly Total	479	71	0	1	550	53	364	0	10	417	39	76	0	91	115	1082
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3:00 PM	129	26	0	4	155	13	107	0	13	120	8	26	0	46	34	309
3:15 PM	106	16	0	0	122	17	106	0	6	123	9	17	0	17	26	271
3:30 PM	115	25	0	6	140	19	126	0	7	145	10	27	0	32	37	322
3:45 PM	112	21	0	4	133	20	123	0	4	143	8	25	0	63	33	309
Hourly Total	462	88	0	14	550	69	462	0	30	531	35	95	0	158	130	1211
4:00 PM	104	15	0	1	119	24	133	0	6	157	8	24	0	35	32	308
4:15 PM	128	12	0	2	140	13	99	0	5	112	10	23	0	12	33	285
4:30 PM	122	18	0	4	140	25	135	0	6	160	13	17	0	33	30	330
4:45 PM	122	18	0	4	140	26	113	0	3	139	5	24	0	44	29	308

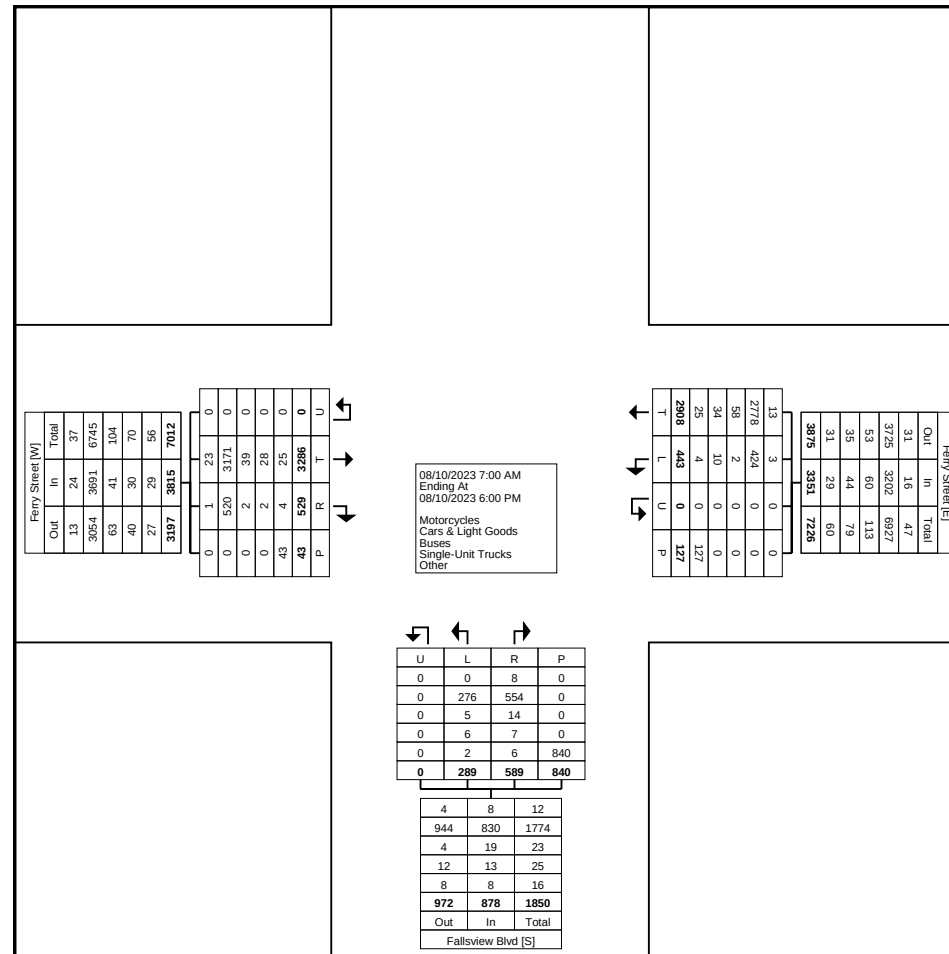
Hourly Total	476	63	0	11	539	88	480	0	20	568	36	88	0	124	124	1231
5:00 PM	107	20	0	1	127	10	138	0	6	148	8	24	0	40	32	307
5:15 PM	109	13	0	3	122	20	125	0	14	145	8	20	0	29	28	295
5:30 PM	132	15	0	2	147	17	119	0	10	136	7	9	0	54	16	299
5:45 PM	110	16	0	0	126	14	107	0	6	121	7	25	0	43	32	279
Hourly Total	458	64	0	6	522	61	489	0	36	550	30	78	0	166	108	1180
Grand Total	3286	529	0	43	3815	443	2908	0	127	3351	289	589	0	840	878	8044
Approach %	86.1	13.9	0.0	-	-	13.2	86.8	0.0	-	-	32.9	67.1	0.0	-	-	-
Total %	40.9	6.6	0.0	-	47.4	5.5	36.2	0.0	-	41.7	3.6	7.3	0.0	-	10.9	-
Motorcycles	23	1	0	-	24	3	13	0	-	16	0	8	0	-	8	48
% Motorcycles	0.7	0.2	-	-	0.6	0.7	0.4	-	-	0.5	0.0	1.4	-	-	0.9	0.6
Cars & Light Goods	3171	520	0	-	3691	424	2778	0	-	3202	276	554	0	-	830	7723
% Cars & Light Goods	96.5	98.3	-	-	96.7	95.7	95.5	-	-	95.6	95.5	94.1	-	-	94.5	96.0
Buses	39	2	0	-	41	2	58	0	-	60	5	14	0	-	19	120
% Buses	1.2	0.4	-	-	1.1	0.5	2.0	-	-	1.8	1.7	2.4	-	-	2.2	1.5
Single-Unit Trucks	28	2	0	-	30	10	34	0	-	44	6	7	0	-	13	87
% Single-Unit Trucks	0.9	0.4	-	-	0.8	2.3	1.2	-	-	1.3	2.1	1.2	-	-	1.5	1.1
Articulated Trucks	6	0	0	-	6	1	8	0	-	9	0	2	0	-	2	17
% Articulated Trucks	0.2	0.0	-	-	0.2	0.2	0.3	-	-	0.3	0.0	0.3	-	-	0.2	0.2
Bicycles on Road	19	4	0	-	23	3	17	0	-	20	2	4	0	-	6	49
% Bicycles on Road	0.6	0.8	-	-	0.6	0.7	0.6	-	-	0.6	0.7	0.7	-	-	0.7	0.6
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	2	-	-	-	-	19	-	-
% Bicycles on Crosswalk	-	-	-	0.0	-	-	-	-	1.6	-	-	-	-	2.3	-	-
Pedestrians	-	-	-	43	-	-	-	-	125	-	-	-	-	821	-	-
% Pedestrians	-	-	-	100.0	-	-	-	-	98.4	-	-	-	-	97.7	-	-



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@pts1.com

Count Name: Ferry Street & Fallsview Blvd
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Turning Movement Data Plot



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
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Count Name: Ferry Street & Fallsview Blvd
Site Code: 230405
Start Date: 08/10/2023
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Turning Movement Peak Hour Data (8:00 AM)

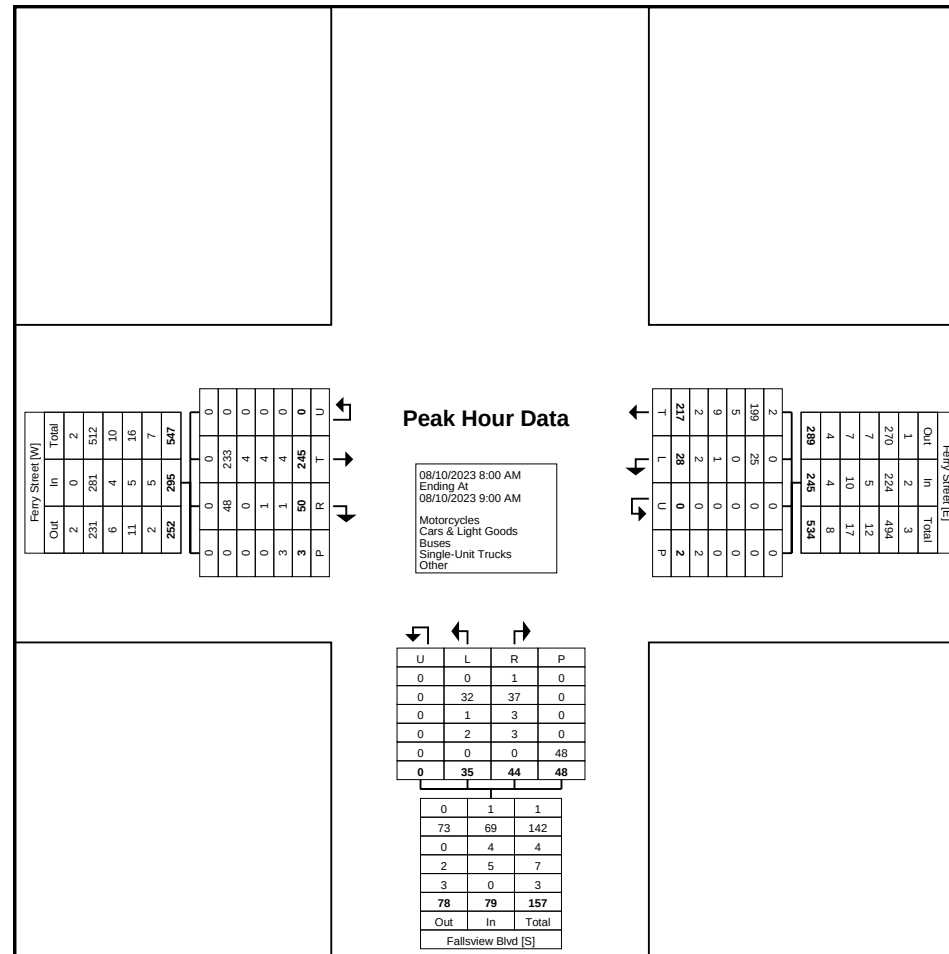
Start Time	Ferry Street Eastbound					Ferry Street Westbound					Fallsview Blvd Northbound					Int. Total
	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	U-Turn	Peds	App. Total	Left	Right	U-Turn	Peds	App. Total	
8:00 AM	53	18	0	0	71	8	45	0	1	53	5	9	0	13	14	138
8:15 AM	60	9	0	1	69	7	54	0	1	61	10	11	0	7	21	151
8:30 AM	60	8	0	2	68	7	63	0	0	70	13	12	0	4	25	163
8:45 AM	72	15	0	0	87	6	55	0	0	61	7	12	0	24	19	167
Total	245	50	0	3	295	28	217	0	2	245	35	44	0	48	79	619
Approach %	83.1	16.9	0.0	-	-	11.4	88.6	0.0	-	-	44.3	55.7	0.0	-	-	-
Total %	39.6	8.1	0.0	-	47.7	4.5	35.1	0.0	-	39.6	5.7	7.1	0.0	-	12.8	-
PHF	0.851	0.694	0.000	-	0.848	0.875	0.861	0.000	-	0.875	0.673	0.917	0.000	-	0.790	0.927
Motorcycles	0	0	0	-	0	0	2	0	-	2	0	1	0	-	1	3
% Motorcycles	0.0	0.0	-	-	0.0	0.0	0.9	-	-	0.8	0.0	2.3	-	-	1.3	0.5
Cars & Light Goods	233	48	0	-	281	25	199	0	-	224	32	37	0	-	69	574
% Cars & Light Goods	95.1	96.0	-	-	95.3	89.3	91.7	-	-	91.4	91.4	84.1	-	-	87.3	92.7
Buses	4	0	0	-	4	0	5	0	-	5	1	3	0	-	4	13
% Buses	1.6	0.0	-	-	1.4	0.0	2.3	-	-	2.0	2.9	6.8	-	-	5.1	2.1
Single-Unit Trucks	4	1	0	-	5	1	9	0	-	10	2	3	0	-	5	20
% Single-Unit Trucks	1.6	2.0	-	-	1.7	3.6	4.1	-	-	4.1	5.7	6.8	-	-	6.3	3.2
Articulated Trucks	1	0	0	-	1	1	0	0	-	1	0	0	0	-	0	2
% Articulated Trucks	0.4	0.0	-	-	0.3	3.6	0.0	-	-	0.4	0.0	0.0	-	-	0.0	0.3
Bicycles on Road	3	1	0	-	4	1	2	0	-	3	0	0	0	-	0	7
% Bicycles on Road	1.2	2.0	-	-	1.4	3.6	0.9	-	-	1.2	0.0	0.0	-	-	0.0	1.1
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	3	-	-
% Bicycles on Crosswalk	-	-	-	0.0	-	-	-	-	0.0	-	-	-	-	6.3	-	-
Pedestrians	-	-	-	3	-	-	-	-	2	-	-	-	-	45	-	-
% Pedestrians	-	-	-	100.0	-	-	-	-	100.0	-	-	-	-	93.8	-	-



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
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Count Name: Ferry Street & Fallsview Blvd
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Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: Ferry Street & Fallsview Blvd
Site Code: 230405
Start Date: 08/10/2023
Page No: 6

Turning Movement Peak Hour Data (11:15 AM)

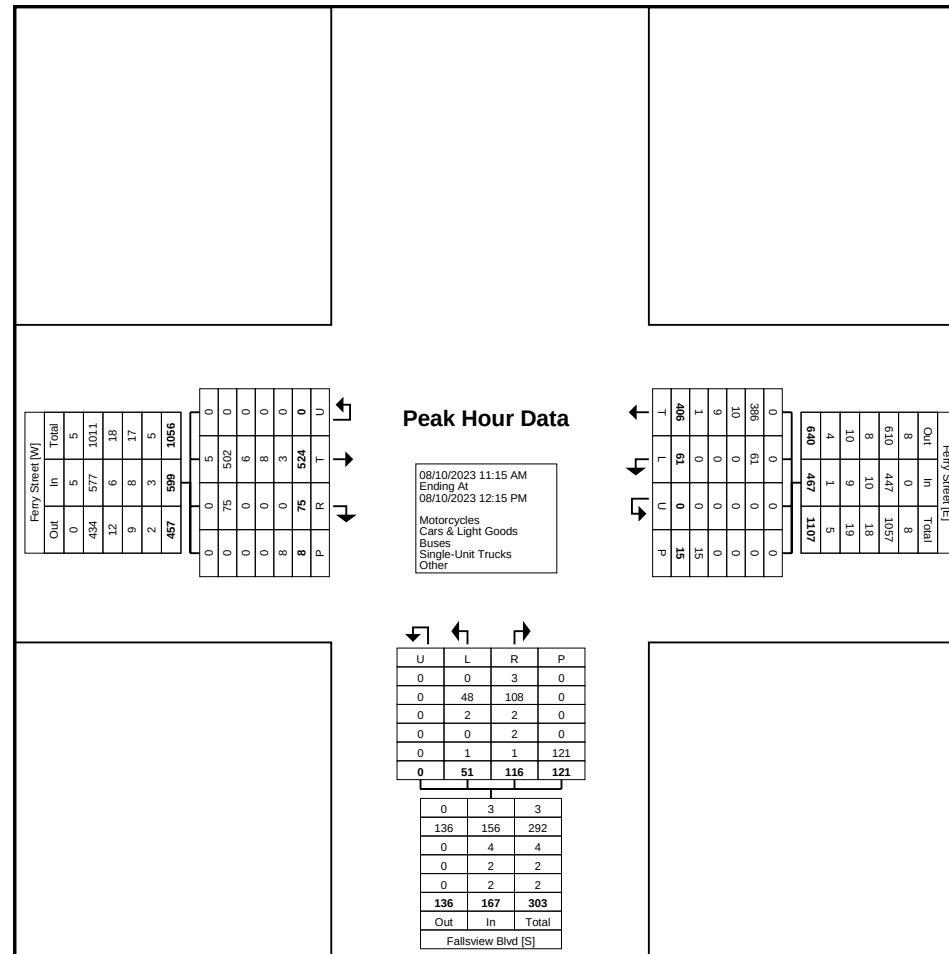
Start Time	Ferry Street Eastbound					Ferry Street Westbound					Fallsview Blvd Northbound					Int. Total
	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	U-Turn	Peds	App. Total	Left	Right	U-Turn	Peds	App. Total	
11:15 AM	131	16	0	4	147	14	98	0	0	112	14	20	0	21	34	293
11:30 AM	127	17	0	4	144	16	107	0	13	123	14	32	0	58	46	313
11:45 AM	134	24	0	0	158	14	97	0	0	111	12	30	0	27	42	311
12:00 PM	132	18	0	0	150	17	104	0	2	121	11	34	0	15	45	316
Total	524	75	0	8	599	61	406	0	15	467	51	116	0	121	167	1233
Approach %	87.5	12.5	0.0	-	-	13.1	86.9	0.0	-	-	30.5	69.5	0.0	-	-	-
Total %	42.5	6.1	0.0	-	48.6	4.9	32.9	0.0	-	37.9	4.1	9.4	0.0	-	13.5	-
PHF	0.978	0.781	0.000	-	0.948	0.897	0.949	0.000	-	0.949	0.911	0.853	0.000	-	0.908	0.975
Motorcycles	5	0	0	-	5	0	0	0	-	0	0	3	0	-	3	8
% Motorcycles	1.0	0.0	-	-	0.8	0.0	0.0	-	-	0.0	0.0	2.6	-	-	1.8	0.6
Cars & Light Goods	502	75	0	-	577	61	386	0	-	447	48	108	0	-	156	1180
% Cars & Light Goods	95.8	100.0	-	-	96.3	100.0	95.1	-	-	95.7	94.1	93.1	-	-	93.4	95.7
Buses	6	0	0	-	6	0	10	0	-	10	2	2	0	-	4	20
% Buses	1.1	0.0	-	-	1.0	0.0	2.5	-	-	2.1	3.9	1.7	-	-	2.4	1.6
Single-Unit Trucks	8	0	0	-	8	0	9	0	-	9	0	2	0	-	2	19
% Single-Unit Trucks	1.5	0.0	-	-	1.3	0.0	2.2	-	-	1.9	0.0	1.7	-	-	1.2	1.5
Articulated Trucks	1	0	0	-	1	0	1	0	-	1	0	1	0	-	1	3
% Articulated Trucks	0.2	0.0	-	-	0.2	0.0	0.2	-	-	0.2	0.0	0.9	-	-	0.6	0.2
Bicycles on Road	2	0	0	-	2	0	0	0	-	0	1	0	0	-	1	3
% Bicycles on Road	0.4	0.0	-	-	0.3	0.0	0.0	-	-	0.0	2.0	0.0	-	-	0.6	0.2
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	4	-	-
% Bicycles on Crosswalk	-	-	-	0.0	-	-	-	-	0.0	-	-	-	-	3.3	-	-
Pedestrians	-	-	-	8	-	-	-	-	15	-	-	-	-	117	-	-
% Pedestrians	-	-	-	100.0	-	-	-	-	100.0	-	-	-	-	96.7	-	-



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
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Count Name: Ferry Street & Fallsview Blvd
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Turning Movement Peak Hour Data Plot (11:15 AM)



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: Ferry Street & Fallsview Blvd
Site Code: 230405
Start Date: 08/10/2023
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Turning Movement Peak Hour Data (4:30 PM)

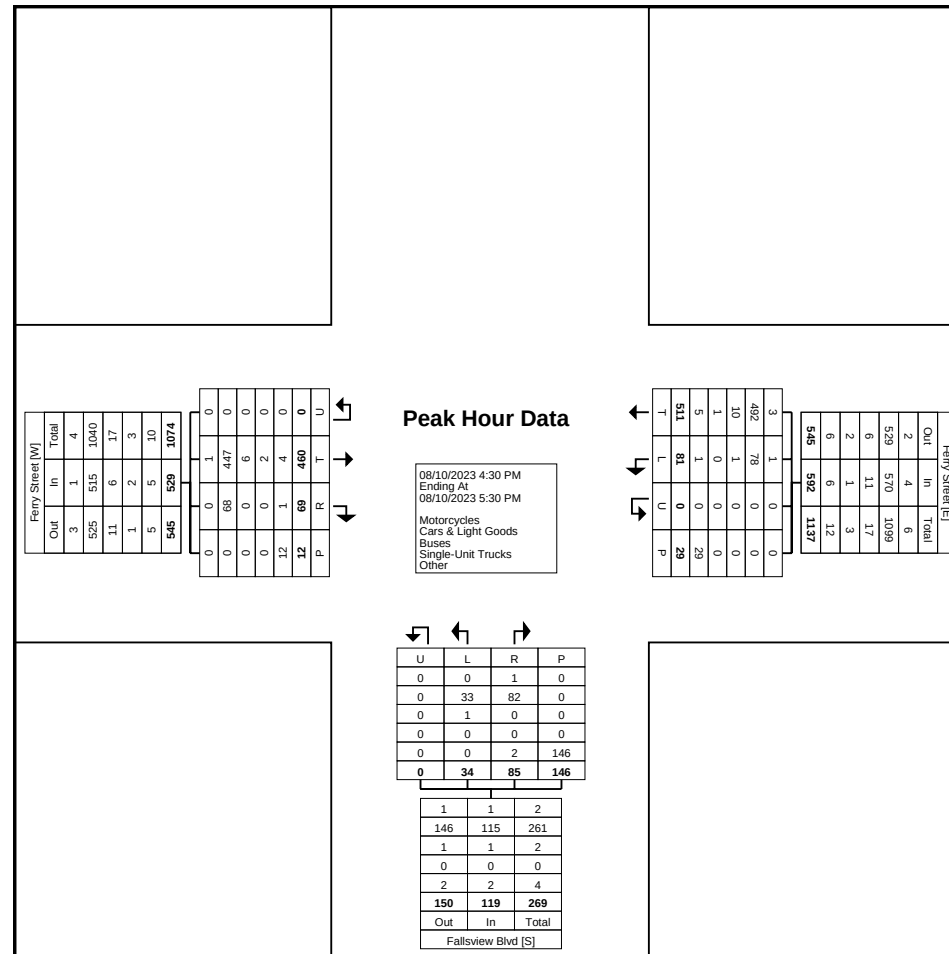
Start Time	Ferry Street Eastbound					Ferry Street Westbound					Fallsview Blvd Northbound					Int. Total
	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	U-Turn	Peds	App. Total	Left	Right	U-Turn	Peds	App. Total	
4:30 PM	122	18	0	4	140	25	135	0	6	160	13	17	0	33	30	330
4:45 PM	122	18	0	4	140	26	113	0	3	139	5	24	0	44	29	308
5:00 PM	107	20	0	1	127	10	138	0	6	148	8	24	0	40	32	307
5:15 PM	109	13	0	3	122	20	125	0	14	145	8	20	0	29	28	295
Total	460	69	0	12	529	81	511	0	29	592	34	85	0	146	119	1240
Approach %	87.0	13.0	0.0	-	-	13.7	86.3	0.0	-	-	28.6	71.4	0.0	-	-	-
Total %	37.1	5.6	0.0	-	42.7	6.5	41.2	0.0	-	47.7	2.7	6.9	0.0	-	9.6	-
PHF	0.943	0.863	0.000	-	0.945	0.779	0.926	0.000	-	0.925	0.654	0.885	0.000	-	0.930	0.939
Motorcycles	1	0	0	-	1	1	3	0	-	4	0	1	0	-	1	6
% Motorcycles	0.2	0.0	-	-	0.2	1.2	0.6	-	-	0.7	0.0	1.2	-	-	0.8	0.5
Cars & Light Goods	447	68	0	-	515	78	492	0	-	570	33	82	0	-	115	1200
% Cars & Light Goods	97.2	98.6	-	-	97.4	96.3	96.3	-	-	96.3	97.1	96.5	-	-	96.6	96.8
Buses	6	0	0	-	6	1	10	0	-	11	1	0	0	-	1	18
% Buses	1.3	0.0	-	-	1.1	1.2	2.0	-	-	1.9	2.9	0.0	-	-	0.8	1.5
Single-Unit Trucks	2	0	0	-	2	0	1	0	-	1	0	0	0	-	0	3
% Single-Unit Trucks	0.4	0.0	-	-	0.4	0.0	0.2	-	-	0.2	0.0	0.0	-	-	0.0	0.2
Articulated Trucks	0	0	0	-	0	0	2	0	-	2	0	0	0	-	0	2
% Articulated Trucks	0.0	0.0	-	-	0.0	0.0	0.4	-	-	0.3	0.0	0.0	-	-	0.0	0.2
Bicycles on Road	4	1	0	-	5	1	3	0	-	4	0	2	0	-	2	11
% Bicycles on Road	0.9	1.4	-	-	0.9	1.2	0.6	-	-	0.7	0.0	2.4	-	-	1.7	0.9
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	1	-	-	-	-	3	-	-
% Bicycles on Crosswalk	-	-	-	0.0	-	-	-	-	3.4	-	-	-	-	2.1	-	-
Pedestrians	-	-	-	12	-	-	-	-	28	-	-	-	-	143	-	-
% Pedestrians	-	-	-	100.0	-	-	-	-	96.6	-	-	-	-	97.9	-	-



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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Count Name: Ferry Street & Fallsview Blvd
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Turning Movement Peak Hour Data Plot (4:30 PM)



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: Ferry Street & Magdalen Street -
Saturday
Site Code: 230405
Start Date: 08/12/2023
Page No: 1

Turning Movement Data

Start Time	Ferry Street Eastbound					Ferry Street Westbound					Magdalen Street Southbound					Int. Total
	Left	Thru	U-Turn	Peds	App. Total	Thru	Right	U-Turn	Peds	App. Total	Left	Right	U-Turn	Peds	App. Total	
10:00 AM	4	144	0	0	148	62	4	0	2	66	10	5	0	51	15	229
10:15 AM	2	145	0	10	147	63	4	0	2	67	16	7	0	80	23	237
10:30 AM	3	151	0	5	154	75	3	1	0	79	11	6	0	62	17	250
10:45 AM	14	124	0	0	138	85	5	0	0	90	14	10	0	91	24	252
Hourly Total	23	564	0	15	587	285	16	1	4	302	51	28	0	284	79	968
11:00 AM	4	149	0	0	153	83	6	0	7	89	12	7	0	90	19	261
11:15 AM	10	94	0	0	104	64	9	0	9	73	30	17	0	37	47	224
11:30 AM	13	130	0	0	143	69	14	0	8	83	16	11	0	62	27	253
11:45 AM	5	137	0	0	142	84	12	0	18	96	26	12	0	99	38	276
Hourly Total	32	510	0	0	542	300	41	0	42	341	84	47	0	288	131	1014
12:00 PM	8	120	0	0	128	61	3	0	0	64	30	3	0	93	33	225
12:15 PM	4	105	0	3	109	80	6	0	0	86	5	6	1	123	12	207
12:30 PM	3	127	0	0	130	66	9	0	0	75	17	11	0	95	28	233
12:45 PM	5	125	1	8	131	60	5	0	0	65	17	9	0	110	26	222
Hourly Total	20	477	1	11	498	267	23	0	0	290	69	29	1	421	99	887
1:00 PM	1	125	0	3	126	52	0	0	16	52	20	9	0	127	29	207
1:15 PM	2	133	0	0	135	59	3	0	23	62	16	9	0	102	25	222
1:30 PM	2	130	1	10	133	78	8	0	7	86	21	5	0	150	26	245
1:45 PM	5	139	0	8	144	81	9	0	3	90	21	6	0	92	27	261
Hourly Total	10	527	1	21	538	270	20	0	49	290	78	29	0	471	107	935
2:00 PM	2	132	0	4	134	86	12	0	6	98	21	6	0	98	27	259
2:15 PM	3	148	0	7	151	82	13	0	25	95	20	7	0	141	27	273
2:30 PM	2	137	0	10	139	112	9	0	7	121	12	14	0	140	26	286
2:45 PM	5	143	0	0	148	102	6	0	16	108	19	10	0	128	29	285
Hourly Total	12	560	0	21	572	382	40	0	54	422	72	37	0	507	109	1103
3:00 PM	3	166	0	7	169	99	6	0	19	105	21	6	0	149	27	301
3:15 PM	5	135	0	7	140	110	7	0	8	117	18	17	0	87	35	292
3:30 PM	2	150	1	1	153	100	11	0	20	111	18	13	0	159	31	295
3:45 PM	3	165	0	3	168	105	8	0	12	113	19	10	0	152	29	310
Hourly Total	13	616	1	18	630	414	32	0	59	446	76	46	0	547	122	1198
4:00 PM	6	138	0	11	144	98	6	0	6	104	26	8	0	179	34	282
4:15 PM	4	141	0	12	145	105	7	0	25	112	16	18	0	133	34	291
4:30 PM	10	133	1	12	144	98	14	0	15	112	25	7	0	151	32	288
4:45 PM	8	129	0	1	137	78	17	0	16	95	17	15	0	185	32	264
Hourly Total	28	541	1	36	570	379	44	0	62	423	84	48	0	648	132	1125
5:00 PM	3	122	0	3	125	84	4	0	6	88	26	7	1	179	34	247

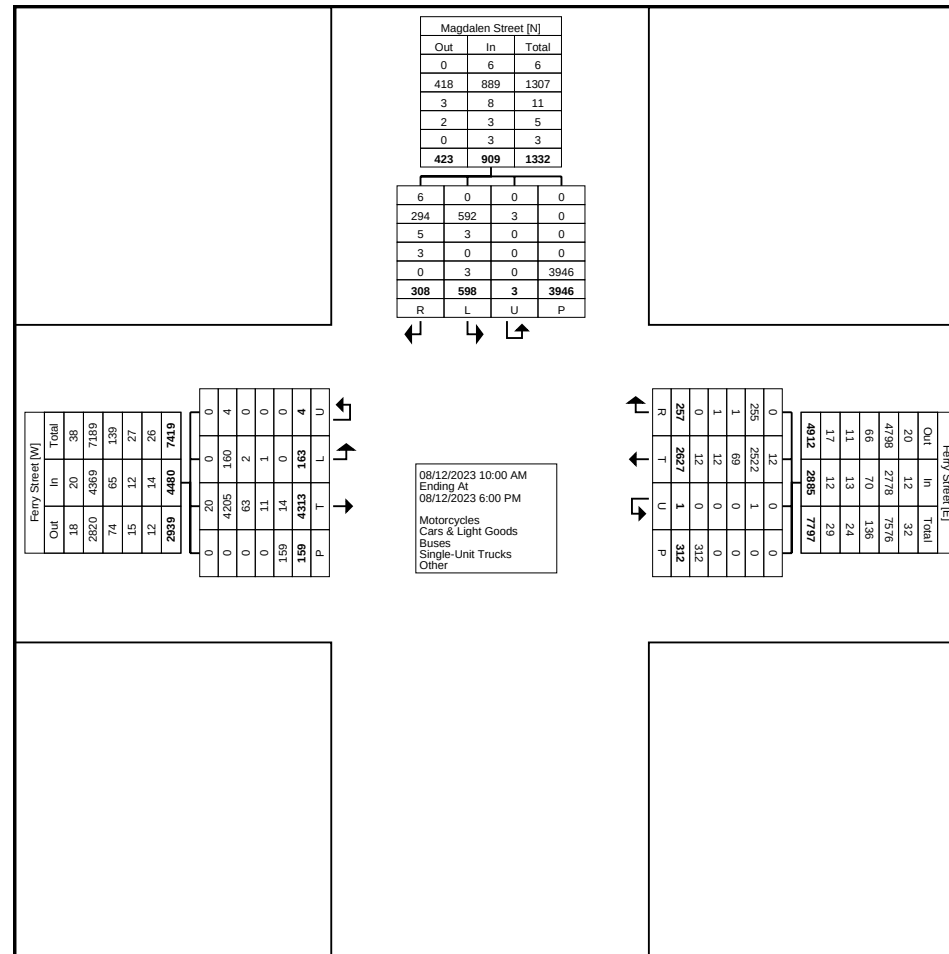
5:15 PM	8	129	0	8	137	85	11	0	15	96	20	7	1	175	28	261
5:30 PM	10	146	0	20	156	85	19	0	17	104	22	16	0	169	38	298
5:45 PM	4	121	0	6	125	76	7	0	4	83	16	14	0	257	30	238
Hourly Total	25	518	0	37	543	330	41	0	42	371	84	44	2	780	130	1044
Grand Total	163	4313	4	159	4480	2627	257	1	312	2885	598	308	3	3946	909	8274
Approach %	3.6	96.3	0.1	-	-	91.1	8.9	0.0	-	-	65.8	33.9	0.3	-	-	-
Total %	2.0	52.1	0.0	-	54.1	31.8	3.1	0.0	-	34.9	7.2	3.7	0.0	-	11.0	-
Motorcycles	0	20	0	-	20	12	0	0	-	12	0	6	0	-	6	38
% Motorcycles	0.0	0.5	0.0	-	0.4	0.5	0.0	0.0	-	0.4	0.0	1.9	0.0	-	0.7	0.5
Cars & Light Goods	160	4205	4	-	4369	2522	255	1	-	2778	592	294	3	-	889	8036
% Cars & Light Goods	98.2	97.5	100.0	-	97.5	96.0	99.2	100.0	-	96.3	99.0	95.5	100.0	-	97.8	97.1
Buses	2	63	0	-	65	69	1	0	-	70	3	5	0	-	8	143
% Buses	1.2	1.5	0.0	-	1.5	2.6	0.4	0.0	-	2.4	0.5	1.6	0.0	-	0.9	1.7
Single-Unit Trucks	1	11	0	-	12	12	1	0	-	13	0	3	0	-	3	28
% Single-Unit Trucks	0.6	0.3	0.0	-	0.3	0.5	0.4	0.0	-	0.5	0.0	1.0	0.0	-	0.3	0.3
Articulated Trucks	0	0	0	-	0	1	0	0	-	1	0	0	0	-	0	1
% Articulated Trucks	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0
Bicycles on Road	0	14	0	-	14	11	0	0	-	11	3	0	0	-	3	28
% Bicycles on Road	0.0	0.3	0.0	-	0.3	0.4	0.0	0.0	-	0.4	0.5	0.0	0.0	-	0.3	0.3
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	9	-	-
% Bicycles on Crosswalk	-	-	-	0.0	-	-	-	-	0.0	-	-	-	-	0.2	-	-
Pedestrians	-	-	-	159	-	-	-	-	312	-	-	-	-	3937	-	-
% Pedestrians	-	-	-	100.0	-	-	-	-	100.0	-	-	-	-	99.8	-	-



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@pts1.com

Count Name: Ferry Street & Magdalen Street -
Saturday
Site Code: 230405
Start Date: 08/12/2023
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Turning Movement Data Plot



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: Ferry Street & Magdalen Street -
Saturday
Site Code: 230405
Start Date: 08/12/2023
Page No: 4

Turning Movement Peak Hour Data (3:00 PM)

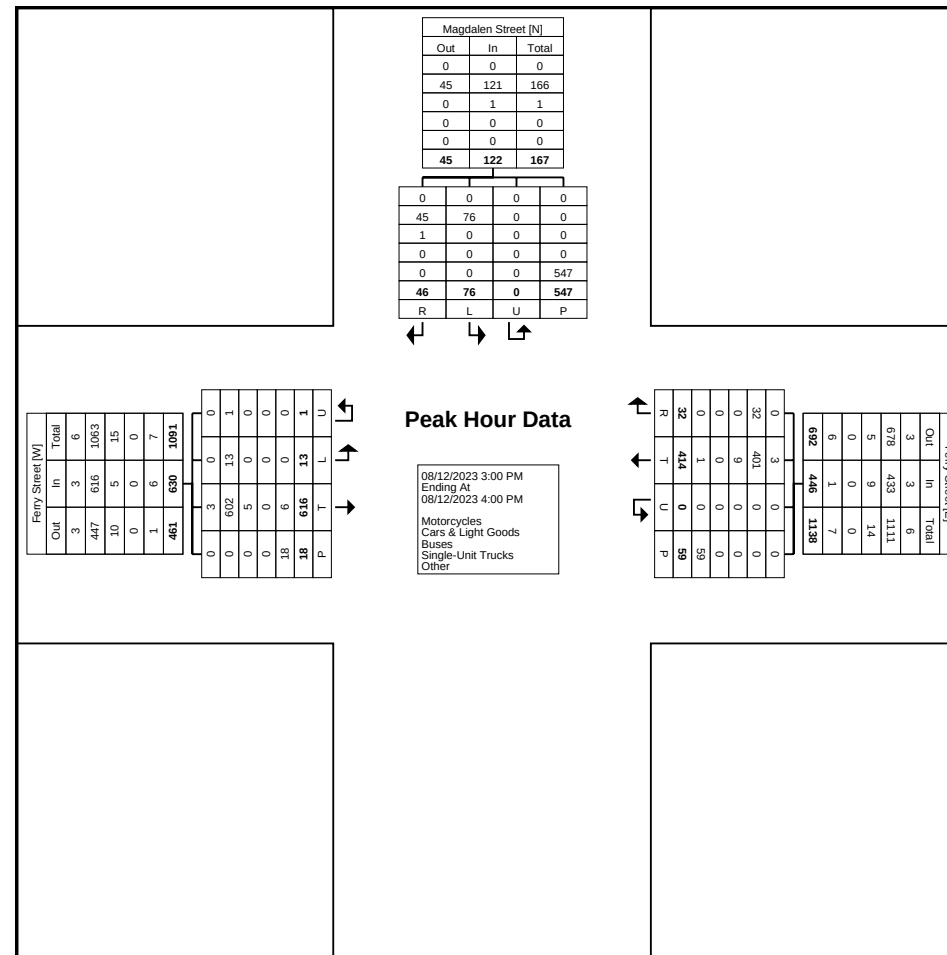
Start Time	Ferry Street Eastbound					Ferry Street Westbound					Magdalen Street Southbound					Int. Total
	Left	Thru	U-Turn	Peds	App. Total	Thru	Right	U-Turn	Peds	App. Total	Left	Right	U-Turn	Peds	App. Total	
3:00 PM	3	166	0	7	169	99	6	0	19	105	21	6	0	149	27	301
3:15 PM	5	135	0	7	140	110	7	0	8	117	18	17	0	87	35	292
3:30 PM	2	150	1	1	153	100	11	0	20	111	18	13	0	159	31	295
3:45 PM	3	165	0	3	168	105	8	0	12	113	19	10	0	152	29	310
Total	13	616	1	18	630	414	32	0	59	446	76	46	0	547	122	1198
Approach %	2.1	97.8	0.2	-	-	92.8	7.2	0.0	-	-	62.3	37.7	0.0	-	-	-
Total %	1.1	51.4	0.1	-	52.6	34.6	2.7	0.0	-	37.2	6.3	3.8	0.0	-	10.2	-
PHF	0.650	0.928	0.250	-	0.932	0.941	0.727	0.000	-	0.953	0.905	0.676	0.000	-	0.871	0.966
Motorcycles	0	3	0	-	3	3	0	0	-	3	0	0	0	-	0	6
% Motorcycles	0.0	0.5	0.0	-	0.5	0.7	0.0	-	-	0.7	0.0	0.0	-	-	0.0	0.5
Cars & Light Goods	13	602	1	-	616	401	32	0	-	433	76	45	0	-	121	1170
% Cars & Light Goods	100.0	97.7	100.0	-	97.8	96.9	100.0	-	-	97.1	100.0	97.8	-	-	99.2	97.7
Buses	0	5	0	-	5	9	0	0	-	9	0	1	0	-	1	15
% Buses	0.0	0.8	0.0	-	0.8	2.2	0.0	-	-	2.0	0.0	2.2	-	-	0.8	1.3
Single-Unit Trucks	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Single-Unit Trucks	0.0	0.0	0.0	-	0.0	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0
Articulated Trucks	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Articulated Trucks	0.0	0.0	0.0	-	0.0	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Road	0	6	0	-	6	1	0	0	-	1	0	0	0	-	0	7
% Bicycles on Road	0.0	1.0	0.0	-	1.0	0.2	0.0	-	-	0.2	0.0	0.0	-	-	0.0	0.6
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	4	-	-
% Bicycles on Crosswalk	-	-	-	0.0	-	-	-	-	0.0	-	-	-	-	0.7	-	-
Pedestrians	-	-	-	18	-	-	-	-	59	-	-	-	-	543	-	-
% Pedestrians	-	-	-	100.0	-	-	-	-	100.0	-	-	-	-	99.3	-	-



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@pts1.com

Count Name: Ferry Street & Magdalen Street -
Saturday
Site Code: 230405
Start Date: 08/12/2023
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Turning Movement Peak Hour Data Plot (3:00 PM)



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: Ferry Street & Magdalen Street
Site Code: 230405
Start Date: 08/10/2023
Page No: 1

Turning Movement Data

Start Time	Ferry Street Eastbound					Ferry Street Westbound					Magdalen Street Southbound					Int. Total
	Left	Thru	U-Turn	Peds	App. Total	Thru	Right	U-Turn	Peds	App. Total	Left	Right	U-Turn	Peds	App. Total	
7:00 AM	0	35	0	0	35	22	0	0	0	22	3	0	0	11	3	60
7:15 AM	1	22	0	0	23	28	1	0	4	29	1	0	0	7	1	53
7:30 AM	1	32	0	0	33	26	2	0	6	28	3	0	0	9	3	64
7:45 AM	1	58	0	0	59	40	1	0	4	41	7	1	0	11	8	108
Hourly Total	3	147	0	0	150	116	4	0	14	120	14	1	0	38	15	285
8:00 AM	0	46	0	0	46	38	2	0	0	40	3	5	0	24	8	94
8:15 AM	2	53	0	0	55	48	2	0	2	50	2	2	0	20	4	109
8:30 AM	1	68	0	0	69	43	5	0	3	48	3	2	0	24	5	122
8:45 AM	2	74	0	0	76	40	1	0	1	41	10	3	0	45	13	130
Hourly Total	5	241	0	0	246	169	10	0	6	179	18	12	0	113	30	455
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11:00 AM	3	129	0	0	132	66	8	0	17	74	12	3	0	125	15	221
11:15 AM	2	124	0	0	126	90	7	0	6	97	6	2	0	87	8	231
11:30 AM	5	134	0	0	139	86	4	0	4	90	12	4	0	113	16	245
11:45 AM	4	138	0	0	142	86	7	0	4	93	15	3	0	94	18	253
Hourly Total	14	525	0	0	539	328	26	0	31	354	45	12	0	419	57	950
12:00 PM	2	152	0	0	154	82	0	0	9	82	17	5	0	88	22	258
12:15 PM	2	136	0	0	138	99	9	0	17	108	5	2	0	111	7	253
12:30 PM	5	141	0	0	146	75	6	0	10	81	10	6	0	91	16	243
12:45 PM	3	107	0	4	110	84	3	0	0	87	13	5	0	91	18	215
Hourly Total	12	536	0	4	548	340	18	0	36	358	45	18	0	381	63	969
1:00 PM	1	124	0	2	125	94	2	1	4	97	10	6	0	102	16	238
1:15 PM	1	113	0	0	114	85	9	0	15	94	9	8	0	87	17	225
1:30 PM	3	131	0	4	134	91	6	0	3	97	14	6	0	86	20	251
1:45 PM	1	123	0	11	124	88	8	0	8	96	5	3	0	105	8	228
Hourly Total	6	491	0	17	497	358	25	1	30	384	38	23	0	380	61	942
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3:00 PM	5	109	0	6	114	77	4	0	5	81	9	2	0	98	11	206
3:15 PM	1	116	0	5	117	115	5	0	7	120	10	3	0	62	13	250
3:30 PM	5	113	1	0	119	107	8	0	14	115	7	8	0	111	15	249
3:45 PM	4	115	1	4	120	101	9	0	5	110	7	7	0	115	14	244
Hourly Total	15	453	2	15	470	400	26	0	31	426	33	20	0	386	53	949
4:00 PM	0	104	0	5	104	102	3	0	12	105	10	9	0	83	19	228
4:15 PM	5	103	0	10	108	110	7	0	15	117	9	8	0	83	17	242
4:30 PM	2	104	2	0	108	124	6	0	17	130	6	3	0	101	9	247
4:45 PM	3	106	0	14	109	91	6	0	10	97	10	7	0	68	17	223

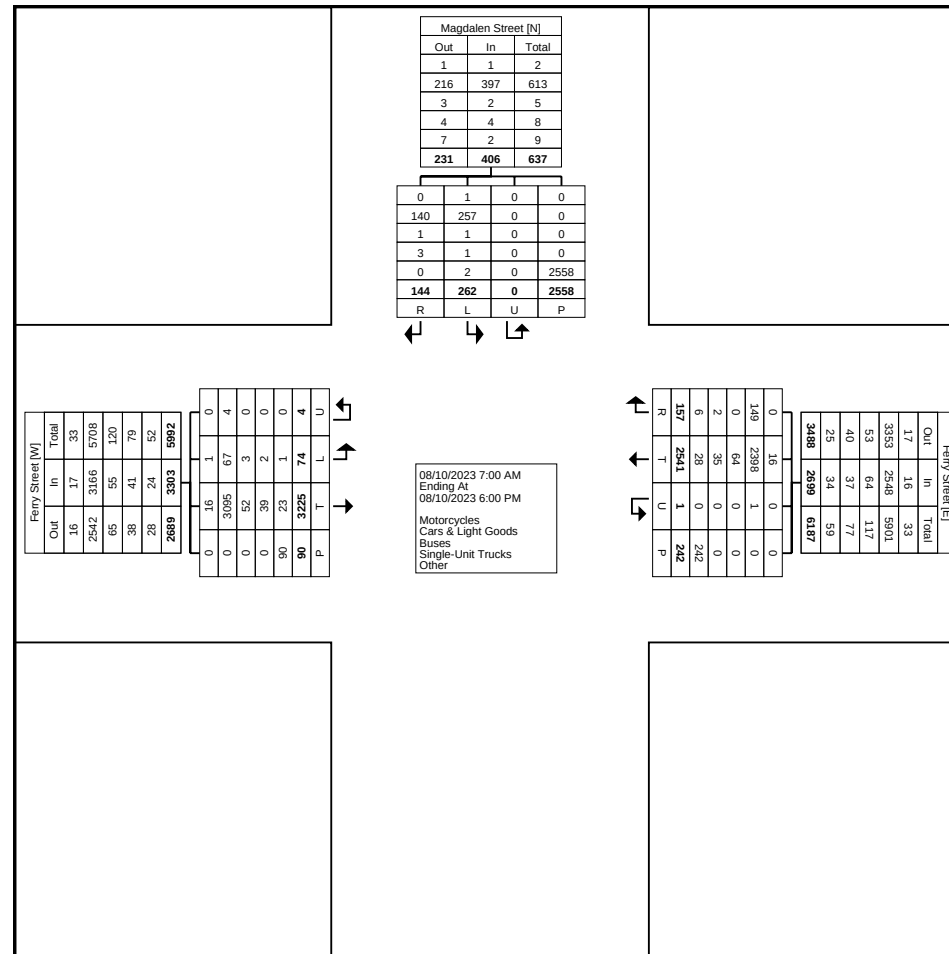
Hourly Total	10	417	2	29	429	427	22	0	54	449	35	27	0	335	62	940
5:00 PM	2	101	0	8	103	102	3	0	8	105	12	9	0	120	21	229
5:15 PM	1	106	0	8	107	117	5	0	12	122	3	5	0	134	8	237
5:30 PM	3	108	0	3	111	103	5	0	13	108	10	13	0	109	23	242
5:45 PM	3	100	0	6	103	81	13	0	7	94	9	4	0	143	13	210
Hourly Total	9	415	0	25	424	403	26	0	40	429	34	31	0	506	65	918
Grand Total	74	3225	4	90	3303	2541	157	1	242	2699	262	144	0	2558	406	6408
Approach %	2.2	97.6	0.1	-	-	94.1	5.8	0.0	-	-	64.5	35.5	0.0	-	-	-
Total %	1.2	50.3	0.1	-	51.5	39.7	2.5	0.0	-	42.1	4.1	2.2	0.0	-	6.3	-
Motorcycles	1	16	0	-	17	16	0	0	-	16	1	0	0	-	1	34
% Motorcycles	1.4	0.5	0.0	-	0.5	0.6	0.0	0.0	-	0.6	0.4	0.0	-	-	0.2	0.5
Cars & Light Goods	67	3095	4	-	3166	2398	149	1	-	2548	257	140	0	-	397	6111
% Cars & Light Goods	90.5	96.0	100.0	-	95.9	94.4	94.9	100.0	-	94.4	98.1	97.2	-	-	97.8	95.4
Buses	3	52	0	-	55	64	0	0	-	64	1	1	0	-	2	121
% Buses	4.1	1.6	0.0	-	1.7	2.5	0.0	0.0	-	2.4	0.4	0.7	-	-	0.5	1.9
Single-Unit Trucks	2	39	0	-	41	35	2	0	-	37	1	3	0	-	4	82
% Single-Unit Trucks	2.7	1.2	0.0	-	1.2	1.4	1.3	0.0	-	1.4	0.4	2.1	-	-	1.0	1.3
Articulated Trucks	1	5	0	-	6	8	3	0	-	11	0	0	0	-	0	17
% Articulated Trucks	1.4	0.2	0.0	-	0.2	0.3	1.9	0.0	-	0.4	0.0	0.0	-	-	0.0	0.3
Bicycles on Road	0	18	0	-	18	20	3	0	-	23	2	0	0	-	2	43
% Bicycles on Road	0.0	0.6	0.0	-	0.5	0.8	1.9	0.0	-	0.9	0.8	0.0	-	-	0.5	0.7
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	13	-	-
% Bicycles on Crosswalk	-	-	-	0.0	-	-	-	-	0.0	-	-	-	-	0.5	-	-
Pedestrians	-	-	-	90	-	-	-	-	242	-	-	-	-	2545	-	-
% Pedestrians	-	-	-	100.0	-	-	-	-	100.0	-	-	-	-	99.5	-	-



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@pts1.com

Count Name: Ferry Street & Magdalen Street
Site Code: 230405
Start Date: 08/10/2023
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Turning Movement Data Plot



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@pts1.com

Count Name: Ferry Street & Magdalen Street
Site Code: 230405
Start Date: 08/10/2023
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Turning Movement Peak Hour Data (8:00 AM)

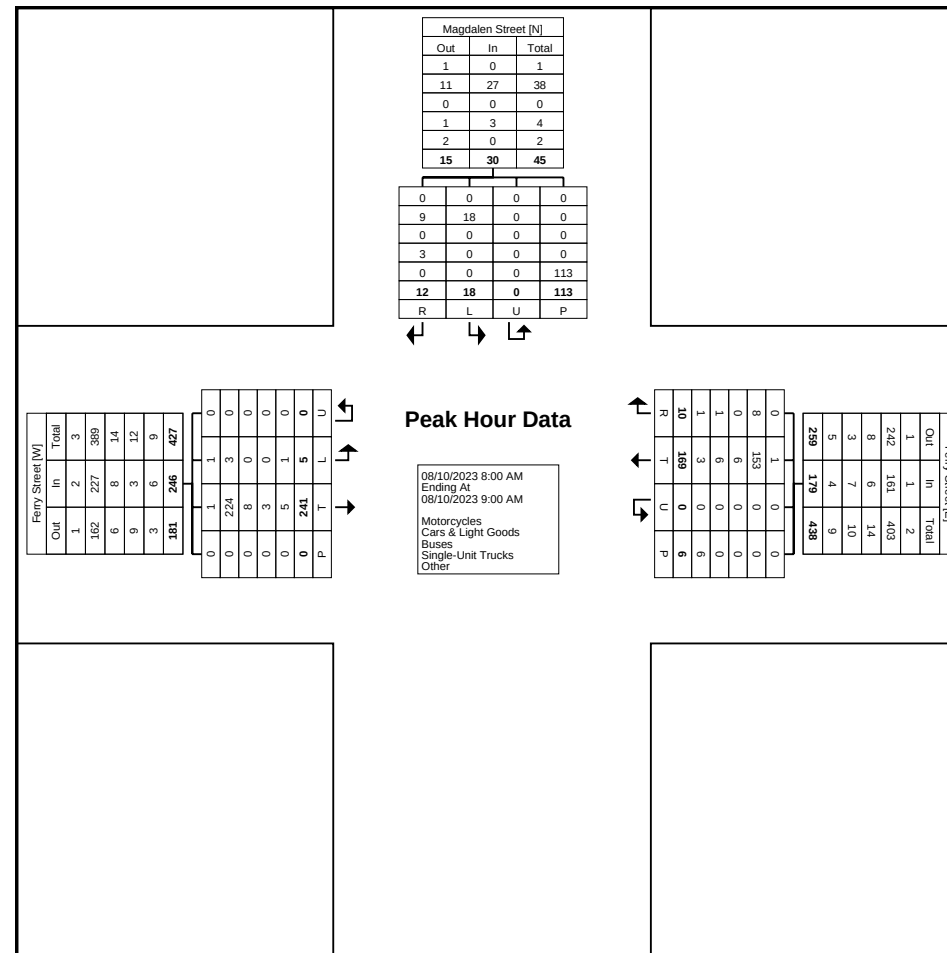
Start Time	Ferry Street Eastbound					Ferry Street Westbound					Magdalen Street Southbound					Int. Total
	Left	Thru	U-Turn	Peds	App. Total	Thru	Right	U-Turn	Peds	App. Total	Left	Right	U-Turn	Peds	App. Total	
8:00 AM	0	46	0	0	46	38	2	0	0	40	3	5	0	24	8	94
8:15 AM	2	53	0	0	55	48	2	0	2	50	2	2	0	20	4	109
8:30 AM	1	68	0	0	69	43	5	0	3	48	3	2	0	24	5	122
8:45 AM	2	74	0	0	76	40	1	0	1	41	10	3	0	45	13	130
Total	5	241	0	0	246	169	10	0	6	179	18	12	0	113	30	455
Approach %	2.0	98.0	0.0	-	-	94.4	5.6	0.0	-	-	60.0	40.0	0.0	-	-	-
Total %	1.1	53.0	0.0	-	54.1	37.1	2.2	0.0	-	39.3	4.0	2.6	0.0	-	6.6	-
PHF	0.625	0.814	0.000	-	0.809	0.880	0.500	0.000	-	0.895	0.450	0.600	0.000	-	0.577	0.875
Motorcycles	1	1	0	-	2	1	0	0	-	1	0	0	0	-	0	3
% Motorcycles	20.0	0.4	-	-	0.8	0.6	0.0	-	-	0.6	0.0	0.0	-	-	0.0	0.7
Cars & Light Goods	3	224	0	-	227	153	8	0	-	161	18	9	0	-	27	415
% Cars & Light Goods	60.0	92.9	-	-	92.3	90.5	80.0	-	-	89.9	100.0	75.0	-	-	90.0	91.2
Buses	0	8	0	-	8	6	0	0	-	6	0	0	0	-	0	14
% Buses	0.0	3.3	-	-	3.3	3.6	0.0	-	-	3.4	0.0	0.0	-	-	0.0	3.1
Single-Unit Trucks	0	3	0	-	3	6	1	0	-	7	0	3	0	-	3	13
% Single-Unit Trucks	0.0	1.2	-	-	1.2	3.6	10.0	-	-	3.9	0.0	25.0	-	-	10.0	2.9
Articulated Trucks	1	1	0	-	2	1	1	0	-	2	0	0	0	-	0	4
% Articulated Trucks	20.0	0.4	-	-	0.8	0.6	10.0	-	-	1.1	0.0	0.0	-	-	0.0	0.9
Bicycles on Road	0	4	0	-	4	2	0	0	-	2	0	0	0	-	0	6
% Bicycles on Road	0.0	1.7	-	-	1.6	1.2	0.0	-	-	1.1	0.0	0.0	-	-	0.0	1.3
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	1	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	0.0	-	-	-	-	0.9	-	-
Pedestrians	-	-	-	0	-	-	-	-	6	-	-	-	-	112	-	-
% Pedestrians	-	-	-	-	-	-	-	-	100.0	-	-	-	-	99.1	-	-



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
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Count Name: Ferry Street & Magdalen Street
Site Code: 230405
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Turning Movement Peak Hour Data Plot (8:00 AM)



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
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Count Name: Ferry Street & Magdalen Street
Site Code: 230405
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Turning Movement Peak Hour Data (11:30 AM)

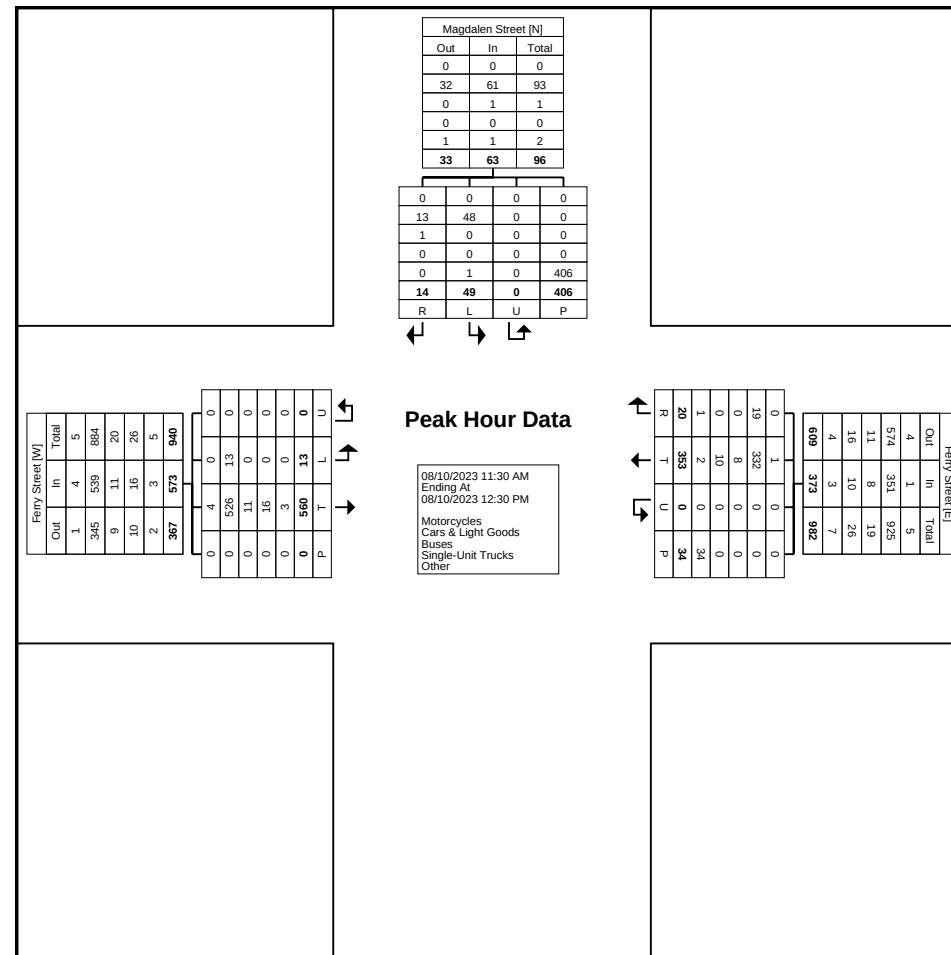
Start Time	Ferry Street Eastbound					Ferry Street Westbound					Magdalen Street Southbound					Int. Total
	Left	Thru	U-Turn	Peds	App. Total	Thru	Right	U-Turn	Peds	App. Total	Left	Right	U-Turn	Peds	App. Total	
11:30 AM	5	134	0	0	139	86	4	0	4	90	12	4	0	113	16	245
11:45 AM	4	138	0	0	142	86	7	0	4	93	15	3	0	94	18	253
12:00 PM	2	152	0	0	154	82	0	0	9	82	17	5	0	88	22	258
12:15 PM	2	136	0	0	138	99	9	0	17	108	5	2	0	111	7	253
Total	13	560	0	0	573	353	20	0	34	373	49	14	0	406	63	1009
Approach %	2.3	97.7	0.0	-	-	94.6	5.4	0.0	-	-	77.8	22.2	0.0	-	-	-
Total %	1.3	55.5	0.0	-	56.8	35.0	2.0	0.0	-	37.0	4.9	1.4	0.0	-	6.2	-
PHF	0.650	0.921	0.000	-	0.930	0.891	0.556	0.000	-	0.863	0.721	0.700	0.000	-	0.716	0.978
Motorcycles	0	4	0	-	4	1	0	0	-	1	0	0	0	-	0	5
% Motorcycles	0.0	0.7	-	-	0.7	0.3	0.0	-	-	0.3	0.0	0.0	-	-	0.0	0.5
Cars & Light Goods	13	526	0	-	539	332	19	0	-	351	48	13	0	-	61	951
% Cars & Light Goods	100.0	93.9	-	-	94.1	94.1	95.0	-	-	94.1	98.0	92.9	-	-	96.8	94.3
Buses	0	11	0	-	11	8	0	0	-	8	0	1	0	-	1	20
% Buses	0.0	2.0	-	-	1.9	2.3	0.0	-	-	2.1	0.0	7.1	-	-	1.6	2.0
Single-Unit Trucks	0	16	0	-	16	10	0	0	-	10	0	0	0	-	0	26
% Single-Unit Trucks	0.0	2.9	-	-	2.8	2.8	0.0	-	-	2.7	0.0	0.0	-	-	0.0	2.6
Articulated Trucks	0	1	0	-	1	1	1	0	-	2	0	0	0	-	0	3
% Articulated Trucks	0.0	0.2	-	-	0.2	0.3	5.0	-	-	0.5	0.0	0.0	-	-	0.0	0.3
Bicycles on Road	0	2	0	-	2	1	0	0	-	1	1	0	0	-	1	4
% Bicycles on Road	0.0	0.4	-	-	0.3	0.3	0.0	-	-	0.3	2.0	0.0	-	-	1.6	0.4
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	0.0	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	0	-	-	-	-	34	-	-	-	-	406	-	-
% Pedestrians	-	-	-	-	-	-	-	-	100.0	-	-	-	-	100.0	-	-



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@pts1.com

Count Name: Ferry Street & Magdalen Street
Site Code: 230405
Start Date: 08/10/2023
Page No: 7



Turning Movement Peak Hour Data Plot (11:30 AM)



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: Ferry Street & Magdalen Street
Site Code: 230405
Start Date: 08/10/2023
Page No: 8

Turning Movement Peak Hour Data (3:15 PM)

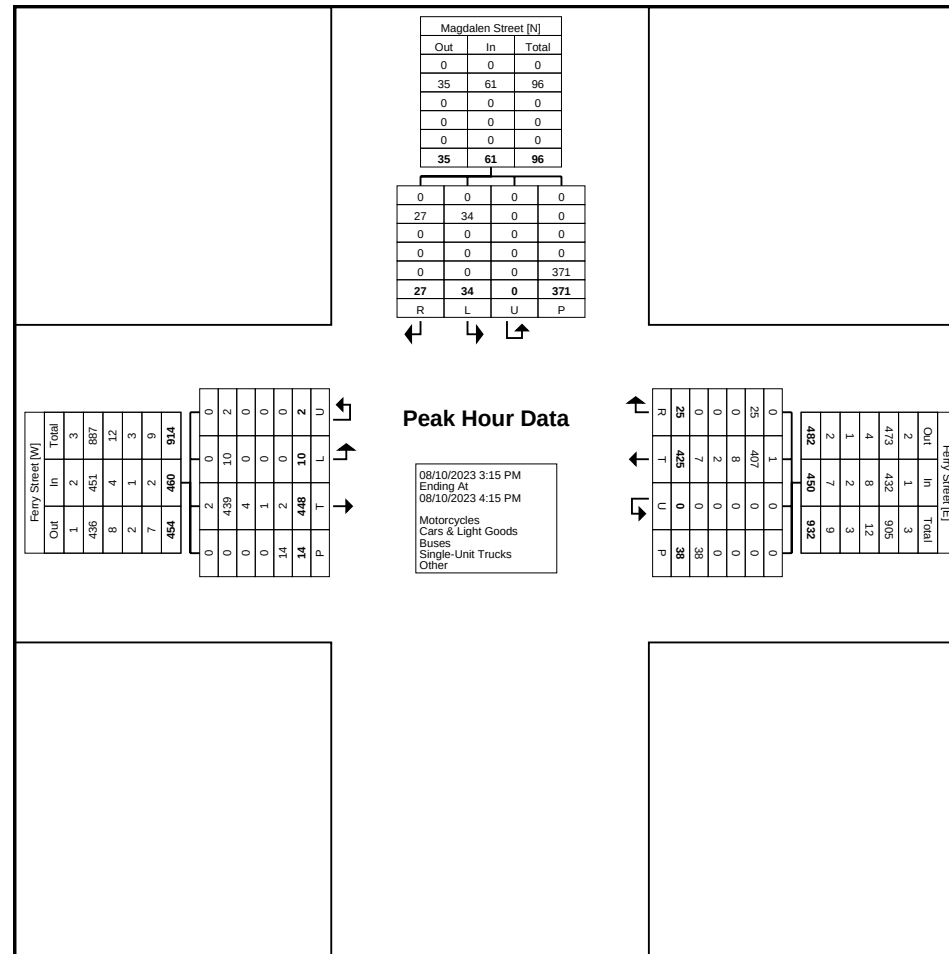
Start Time	Ferry Street Eastbound					Ferry Street Westbound					Magdalen Street Southbound					Int. Total
	Left	Thru	U-Turn	Peds	App. Total	Thru	Right	U-Turn	Peds	App. Total	Left	Right	U-Turn	Peds	App. Total	
3:15 PM	1	116	0	5	117	115	5	0	7	120	10	3	0	62	13	250
3:30 PM	5	113	1	0	119	107	8	0	14	115	7	8	0	111	15	249
3:45 PM	4	115	1	4	120	101	9	0	5	110	7	7	0	115	14	244
4:00 PM	0	104	0	5	104	102	3	0	12	105	10	9	0	83	19	228
Total	10	448	2	14	460	425	25	0	38	450	34	27	0	371	61	971
Approach %	2.2	97.4	0.4	-	-	94.4	5.6	0.0	-	-	55.7	44.3	0.0	-	-	-
Total %	1.0	46.1	0.2	-	47.4	43.8	2.6	0.0	-	46.3	3.5	2.8	0.0	-	6.3	-
PHF	0.500	0.966	0.500	-	0.958	0.924	0.694	0.000	-	0.938	0.850	0.750	0.000	-	0.803	0.971
Motorcycles	0	2	0	-	2	1	0	0	-	1	0	0	0	-	0	3
% Motorcycles	0.0	0.4	0.0	-	0.4	0.2	0.0	-	-	0.2	0.0	0.0	-	-	0.0	0.3
Cars & Light Goods	10	439	2	-	451	407	25	0	-	432	34	27	0	-	61	944
% Cars & Light Goods	100.0	98.0	100.0	-	98.0	95.8	100.0	-	-	96.0	100.0	100.0	-	-	100.0	97.2
Buses	0	4	0	-	4	8	0	0	-	8	0	0	0	-	0	12
% Buses	0.0	0.9	0.0	-	0.9	1.9	0.0	-	-	1.8	0.0	0.0	-	-	0.0	1.2
Single-Unit Trucks	0	1	0	-	1	2	0	0	-	2	0	0	0	-	0	3
% Single-Unit Trucks	0.0	0.2	0.0	-	0.2	0.5	0.0	-	-	0.4	0.0	0.0	-	-	0.0	0.3
Articulated Trucks	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Articulated Trucks	0.0	0.0	0.0	-	0.0	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Road	0	2	0	-	2	7	0	0	-	7	0	0	0	-	0	9
% Bicycles on Road	0.0	0.4	0.0	-	0.4	1.6	0.0	-	-	1.6	0.0	0.0	-	-	0.0	0.9
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	3	-	-
% Bicycles on Crosswalk	-	-	-	0.0	-	-	-	-	0.0	-	-	-	-	0.8	-	-
Pedestrians	-	-	-	14	-	-	-	-	38	-	-	-	-	368	-	-
% Pedestrians	-	-	-	100.0	-	-	-	-	100.0	-	-	-	-	99.2	-	-



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: Ferry Street & Magdalen Street
Site Code: 230405
Start Date: 08/10/2023
Page No: 9



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

Signal Code: ELLFRR**Intersection: ELLEN/CLARK & FERRY ST.****Municipality: niagarafalls****Owner: City****Last Modified: 2017-03-29 9:07:34 AM**

Timing Parameters	EBD & WBD FERRY	NBD & SBD ELLEN/CLARK	n/a	n/a	n/a	n/a
Min Green	8	8	0	0	0	0
Walk	8	7	0	0	0	0
Ped Clearance	13	10	0	0	0	0
Vehicle Ext.	2.1	2.1	0	0	0	0
Max Green	54	26	0	0	0	0
Yellow	4.1	4.1	0	0	0	0
All Red	2.1	2	0	0	0	0
Offset						
Minimum Cycle		28.3		0		
Pedestrian Cycle		50.3				
Maximum Cycle		92.3		0		
Operation		FA				
Installed On:		1988-11-19				
Count Date:		--/--/----				
FA = Fully Actuated	SA = Semi Actuated	FT = Fixed Time				
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Collision Details Report

From: January 1, 2018 **To:** October 31, 2023

Location Clark Avenue @ Robinson Street

Municipality..... NIAGARA FALLS

Traffic Control.... Unknown

Total Collisions.... 4

Collision ID	Date/Day/Time	Environment	Impact Type	Classification	Direction	Surface	Cond'n	Vehicle Manoeuver	Vehicle type	First Event	Driver Action	No. Ped
1844842	2018-May-20, Sun,23:39	Clear	Angle	Non-fatal injury	South	Dry		Going ahead	Automobile, station wagon	Other motor vehicle	Failed to yield right-of-way	
Comments: d1 charged					East	Dry		Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly	
19131827	2020-Jan-01, Wed,05:49	Clear	SMV other	Non-fatal injury	East	Dry		Going ahead	Automobile, station wagon	Pedestrian	Other	
Comments:						Dry						
2250895	2022-May-15, Sun,03:30	Clear	Angle	P.D. only	North	Dry		Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly	
Comments:					West	Dry		Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly	
2183399	2021-Aug-01, Sun,15:30	Clear	Sideswipe	Non-reportable	South	Wet		Turning right	Automobile, station wagon	Other motor vehicle		
Comments:					South	Wet		Overtaking	Automobile, station wagon	Other motor vehicle		

Collision Details Report

From: January 1, 2018 **To:** October 31, 2023

Location Magdalen Street @ Victoria Avenue

Municipality..... NIAGARA FALLS

Traffic Control.... Unknown

Total Collisions.... 8

Collision ID	Date/Day/Time	Environment	Impact Type	Classification	Direction	Surface Cond'n	Vehicle Manoeuvre	Vehicle type	First Event	Driver Action	No. Ped
21146145	2021-Dec-25, Sat,06:57	Rain	SMV other	P.D. only	South	Wet	Reversing	Automobile, station wagon	Pole (sign, parking meter)	Disobeyed traffic control	
Comments: d1 charged											
2371539	2023-Jul-01, Sat,14:40	Clear	Sideswipe	P.D. only	North	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly	
Comments:					North		Changing lanes	Automobile, station wagon	Other motor vehicle		
2180798	2021-Jul-27, Tue,13:10	Clear	Rear end	P.D. only	North	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Following too close	
Comments:					North	Dry	Slowing or stopping	Passenger van	Other motor vehicle	Driving properly	
2343770	2023-Apr-30, Sun,18:01	Rain	Rear end	P.D. only	East	Wet	Slowing or stopping	Automobile, station wagon	Other motor vehicle	Following too close	
Comments: Charged Driver #1 on page 1: HTA 158 (1) (NA)					East	Wet	Slowing or stopping	Automobile, station wagon	Other motor vehicle	Driving properly	
2261643	2022-Jun-08, Wed,23:10	Rain	SMV other	P.D. only	West	Wet	Turning right	Automobile, station wagon	Pedestrian	Failed to yield right-of-way	
Comments: d1 charged											
1822340	2018-Mar-16, Fri,05:37	Clear	Approaching	P.D. only	South	Loose snow	Going ahead	Automobile, station wagon	Other motor vehicle	Wrong way on one-way road	
Comments: d1 charged					North	Loose snow	Going ahead	Passenger van	Other motor vehicle	Driving properly	
2281573	2022-Jul-22, Fri,21:40	Clear	Rear end	P.D. only	South	Dry	Going ahead	Bicycle	Other motor vehicle	Improper passing	
Comments:					South	Dry	Turning right	Automobile, station wagon	Other motor vehicle	Driving properly	
1988270	2019-Sep-01, Sun,23:00	Clear	SMV unattended vehicle	Non-reportable	East	Dry			Unattended vehicle		
Comments:					East		Parked	Automobile, station wagon	Other motor vehicle		

Appendix C

Base Year Traffic Operations



Lanes, Volumes, Timings
1: Clark Avenue/Ellen Avenue & Ferry Street

Lanes, Volumes, Timings
1: Clark Avenue/Ellen Avenue & Ferry Street

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	71	418	29	41	424	15	30	13	49	10	22	102
Future Volume (vph)	71	418	29	41	424	15	30	13	49	10	22	102
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	40.0	0.0	40.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Storage Lanes	1	0	1	0	0	0	0	0	0	0	0	0
Taper Length (m)	7.5	0	7.5	0	0	0	0	0	0	0	0	0
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	0.81	0.96	0.80	0.98			0.87		0.87		0.87	
Frt	0.990		0.995		0.928		0.984		0.996		0.996	
Flt Protected	0.950		0.950									
Satd. Flow (prot)	1662	1639	0	1662	1663	0	0	1429	0	0	1373	0
Flt Permitted	0.412		0.404					0.858			0.972	
Satd. Flow (perm)	583	1639	0	565	1663	0	0	1204	0	0	1327	0
Right Turn on Red		Yes		Yes		Yes			Yes			Yes
Satd. Flow (RTOR)	7		3		53		53		111			
Link Speed (km/h)	50		50		52.1		52.1		169.1			
Link Distance (m)	133.8		121.5		52.1		52.1		169.1			
Travel Time (s)	9.6		8.7		3.8		3.8		12.2			
Confl. Peds. (#/hr)	191		263		191		65		75		75	65
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	2%	0%	0%	3%	0%	0%	0%	2%	0%	0%	0%
Adj. Flow (vph)	77	454	32	45	461	16	33	14	53	11	24	111
Shared Lane Traffic (%)												
Lane Group Flow (vph)	77	486	0	45	477	0	0	100	0	0	146	0
Turn Type	Perm	NA	NA	Perm	NA	NA	Perm	NA	NA	Perm	NA	NA
Protected Phases	2		2		6		4		8		8	
Permitted Phases	2		2		6		4		8		8	
Detector Phase	2		2		6		4		8		8	
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	23.2	23.2	23.2	27.1	27.1	27.1	27.1	27.1	27.1	27.1	27.1	27.1
Total Split (s)	60.2	60.2	60.2	60.2	60.2	60.2	32.1	32.1	32.1	32.1	32.1	32.1
Total Split (%)	65.2%	65.2%	65.2%	65.2%	65.2%	65.2%	34.8%	34.8%	34.8%	34.8%	34.8%	34.8%
Maximum Green (s)	54.0	54.0	54.0	54.0	54.0	54.0	26.0	26.0	26.0	26.0	26.0	26.0
Yellow Time (s)	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
All-Red Time (s)	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.1	-2.1	-2.1	-2.1	-2.1	-2.1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Recall Mode	Min	Min	Min	Min	Min	Min	Min	Min	Min	Min	Min	Min
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	8.0	8.0	8.0	8.0	8.0	8.0
Flash Dont Walk (s)	10.0	10.0	10.0	10.0	10.0	10.0	13.0	13.0	13.0	13.0	13.0	13.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Act Effct Green (s)	17.1	17.1	17.1	17.1	17.1	17.1	10.7	10.7	10.7	10.7	10.7	10.7
Actuated g/C Ratio	0.48	0.48	0.48	0.48	0.48	0.48	0.30	0.30	0.30	0.30	0.30	0.30
v/c Ratio	0.28	0.62	0.17	0.60			0.25		0.31			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	8.4	10.7	6.8	6.8	10.4	0.0	0.0	0.0	8.8	0.0	6.9	6.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.4	10.7	6.8	6.8	10.4	0.0	0.0	0.0	8.8	0.0	6.9	6.9
LOS	A	B	A	A	B				A		A	A
Approach Delay	10.4		10.4		10.0				8.8		6.9	
Approach LOS	B		B		B				A		A	
Queue Length 50th (m)	2.2	17.1	1.3	1.3	16.8				1.9		1.4	
Queue Length 95th (m)	8.1	38.4	5.0	5.0	37.2				11.1		11.8	
Internal Link Dist (m)	109.8		97.5		97.5				28.1		145.1	
Turn Bay Length (m)	40.0		40.0		40.0							
Base Capacity (vph)	583	1639	565	565	1663				972		1082	
Starvation Cap Reductn	0	0	0	0	0				0		0	
Spillback Cap Reductn	0	0	0	0	0				0		0	
Storage Cap Reductn	0	0	0	0	0				0		0	
Reduced v/c Ratio	0.13	0.30	0.08	0.08	0.29				0.10		0.13	
Intersection Summary	Other											
Area Type	Other											
Cycle Length	92.3											
Actuated Cycle Length	35.9											
Natural Cycle	55											
Control Type	Actuated-Uncoordinated											
Maximum v/c Ratio	0.62											
Intersection Signal Delay	9.8											
Intersection Capacity Utilization	61.3%											
Analysis Period (min)	15											

Splits and Phases: 1: Clark Avenue/Ellen Avenue & Ferry Street



HCM Signalized Intersection Capacity Analysis 5234-5278 Ferry Street, Niagara Falls TIS
 1: Clark Avenue/Ellen Avenue & Ferry Street Base Year PM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	7	1	1	1	1	1	1	1	1	1	1	1
Traffic Volume (vph)	71	418	29	41	424	15	30	13	49	10	22	102
Future Volume (vph)	71	418	29	41	424	15	30	13	49	10	22	102
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	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	1.00	1.00	1.00
Flpb. ped/bikes	1.00	0.98	1.00	1.00	0.99	1.00	0.96	0.99	1.00	0.99	1.00	0.94
Flpb. ped/bikes	0.91	1.00	1.00	0.87	1.00	0.99	0.99	0.99	1.00	0.99	1.00	0.90
Flt	1.00	0.99	1.00	1.00	0.99	1.00	0.93	1.00	0.98	1.00	1.00	0.90
Flt Protected	0.95	1.00	0.95	1.00	0.99	1.00	0.98	1.00	0.98	1.00	1.00	0.90
Satd. Flow (prot)	1505	1668	1449	1680	1490	1490	1490	1490	1490	1490	1490	1470
Flt Permitted	0.41	1.00	0.40	1.00	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Satd. Flow (perm)	653	1668	616	1680	1300	1300	1300	1300	1300	1300	1300	1300
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	77	454	32	45	461	16	33	14	53	11	24	111
RTOR Reduction (vph)	0	4	0	0	2	0	0	37	0	0	78	0
Lane Group Flow (vph)	77	482	0	45	475	0	0	63	0	0	68	0
Confl. Peds. (#/hr)	191	263	263	191	65	75	75	75	75	75	65	65
Heavy Vehicles (%)	0%	2%	0%	0%	3%	0%	0%	0%	2%	0%	0%	0%
Turn Type	Perm	NA	NA	Perm	NA	Perm	NA	Perm	NA	Perm	NA	NA
Protected Phases	2	2	2	6	6	6	4	4	4	4	8	8
Permitted Phases	2	2	2	6	6	6	4	4	4	4	8	8
Actuated Green, G (s)	14.8	14.8	14.8	14.8	14.8	14.8	8.5	8.5	8.5	8.5	8.5	8.5
Effective Green, g (s)	17.0	17.0	17.0	17.0	17.0	17.0	10.6	10.6	10.6	10.6	10.6	10.6
Actuated G/C Ratio	0.48	0.48	0.48	0.48	0.48	0.48	0.30	0.30	0.30	0.30	0.30	0.30
Clearance Time (s)	6.2	6.2	6.2	6.2	6.2	6.2	6.1	6.1	6.1	6.1	6.1	6.1
Vehicle Extension (s)	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Lane Grp Cap (vph)	311	796	294	802	387	387	387	387	387	387	427	427
v/s Ratio Prot	c0.29	c0.29	c0.29	c0.29	c0.29	c0.29	c0.29	c0.29	c0.29	c0.29	c0.29	c0.29
v/s Ratio Perm	0.12	0.12	0.07	0.07	0.07	0.07	c0.05	c0.05	c0.05	c0.05	c0.05	c0.05
v/c Ratio	0.25	0.61	0.15	0.15	0.59	0.16	0.16	0.16	0.16	0.16	0.16	0.16
Uniform Delay, d1	5.5	6.8	5.2	6.8	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2
Progression 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
Incremental Delay, d2	0.2	0.9	0.1	0.8	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Delay (s)	5.7	7.8	5.3	7.6	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3
Level of Service	A	A	A	A	A	A	A	A	A	A	A	A
Approach Delay (s)	7.5	7.5	7.4	7.4	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3
Approach LOS	A	A	A	A	A	A	A	A	A	A	A	A
Intersection Summary												
HCM 2000 Control Delay	7.8											
HCM 2000 Volume to Capacity ratio	0.44											
Actuated Cycle Length (s)	35.6											
Intersection Capacity Utilization	61.3%											
Analysis Period (min)	15											
c Critical Lane Group												

Lanes, Volumes, Timings 5234-5278 Ferry Street, Niagara Falls TIS
 2: Fallsview Boulevard & Ferry Street Base Year PM

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	1	1	1	1	1	1
Traffic Volume (vph)	460	69	81	511	34	85
Future Volume (vph)	460	69	81	511	34	85
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0	45.0	0.0	0.0	0.0	0.0
Storage Lanes	0	1	1	1	1	0
Taper Length (m)		7.5		7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Flt	0.982			0.904		
Flt Protected		0.950		0.986		
Satd. Flow (prot)	1689	0	1646	1699	1547	0
Flt Permitted		0.950		0.986		
Satd. Flow (perm)	1689	0	1646	1699	1547	0
Link Speed (k/h)	50		50	50		
Link Distance (m)	99.9		133.8	195.3		
Travel Time (s)	7.2		9.6	14.1		
Confl. Peds. (#/hr)		146	146	12	29	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	0%	1%	3%	3%	0%
Adj. Flow (vph)	500	75	88	555	37	92
Shared Lane Traffic (%)						
Lane Group Flow (vph)	575	0	88	555	129	0
Sign Control	Free		Free	Free	Stop	
Intersection Summary						
Area Type:	Other					
Control Type: Unsignalized						
Intersection Capacity Utilization 58.5%						
Analysis Period (min) 15						
ICU Level of Service B						

HCM Unsignalized Intersection Capacity Analysis 5234-5278 Ferry Street, Niagara Falls TIS
 2: Fallsview Boulevard & Ferry Street Base Year PM

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	←	←	←	←	←	←
Traffic Volume (veh/h)	460	69	81	511	34	85
Future Volume (Veh/h)	460	69	81	511	34	85
Sign Control	Free	Free	Free	Free	Free	Free
Grade	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	500	75	88	555	37	92
Pedestrians	12			29	146	
Lane Width (m)	3.6			3.6	3.6	
Walking Speed (m/s)	1.2			1.2	1.2	
Percent Blockage	1			2	12	
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)				134		
pX platoon unblocked					0.87	
VC, conflicting volume				721	1426	712
VC1, stage 1 conf vol						
VC2, stage 2 conf vol						
VCu, unblocked vol				721	1416	712
IC, single (s)				4.1	6.4	6.2
IC, 2 stage (s)				2.2	3.5	3.3
p0 queue free %				89	64	75
CM capacity (veh/h)				778	101	373
Direction, Lane #	EB 1	WB 1	WB 2	NB 1		
Volume Total	575	88	555	129		
Volume Left	0	88	0	37		
Volume Right	75	0	0	92		
cSH	1700	778	1700	211		
Volume to Capacity	0.34	0.11	0.33	0.61		
Queue Length 95th (m)	0.0	2.9	0.0	26.4		
Control Delay (s)	0.0	10.2	0.0	45.7		
Lane LOS		B		E		
Approach Delay (s)	0.0	1.4		45.7		
Approach LOS				E		
Intersection Summary						
Average Delay				5.0		
Intersection Capacity Utilization				58.5%		B
Analysis Period (min)				15		

Lanes, Volumes, Timings 5234-5278 Ferry Street, Niagara Falls TIS
 3: Victoria Avenue & Magdalen Street Base Year PM

Lane Group	EBL	EBT	WBT	WBL	SBL	SBR
Lane Configurations	←	←	←	←	←	←
Traffic Volume (vph)	12	448	425	25	34	27
Future Volume (vph)	12	448	425	25	34	27
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt			0.993		0.941	
Flt Protected		0.999			0.973	
Satd. Flow (prot)	0	3290	1706	0	1602	0
Flt Permitted		0.999			0.973	
Satd. Flow (perm)	0	3290	1706	0	1602	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		134.5	118.7		82.8	
Travel Time (s)		9.7	8.5		6.0	
Conf. Peds. (#/hr)	371			371	38	14
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	1%	2%	0%	0%	0%
Adj. Flow (vph)	13	487	462	27	37	29
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	500	489	0	66	0
Sign Control		Free	Free		Stop	
Intersection Summary						
Area Type:				Other		
Control Type:				Unsignalized		
Intersection Capacity Utilization				40.9%		
Analysis Period (min)				15		

HCM Unsignalized Intersection Capacity Analysis 5234-5278 Ferry Street, Niagara Falls TIS
 3: Victoria Avenue & Magdalen Street

Base Year PM

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕↕	↕		↕	
Traffic Volume (Veh/h)	12	448	425	25	34	27
Future Volume (Veh/h)	12	448	425	25	34	27
Sign Control	Free	Free	Free	Stop	Stop	0%
Grade	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	13	487	462	27	37	29
Pedestrians	14	38			371	
Lane Width (m)	3.6	3.6	3.6		3.6	
Walking Speed (m/s)	1.2	1.2	1.2		1.2	
Percent Blockage	1	3			31	
Right turn flare (veh)						
Median type	None	None				
Median storage (veh)		256				
Upstream signal (m)						
pX; platoon unblocked					1154	860
vC1; stage 1 conf vol						
vC2; stage 2 conf vol						
vCu; unblocked vol	860				1154	860
IC; single (s)	4.1				6.8	6.9
IC; 2 stage (s)						
IF (s)	2.2				3.5	3.3
p0 queue free %	98				71	86
cM capacity (veh/h)	546				126	207
Direction, Lane #	EB 1	EB 2	WB 1	SB 1		
Volume Total	175	325	489	66		
Volume Left	13	0	0	37		
Volume Right	0	0	27	29		
cSH	546	1700	1700	152		
Volume to Capacity	0.02	0.19	0.29	0.43		
Queue Length 95th (m)	0.5	0.0	0.0	14.6		
Control Delay (s)	1.2	0.0	0.0	45.5		
Lane LOS	A			E		
Approach Delay (s)	0.4	0.0	0.0	45.5		
Approach LOS				E		
Intersection Summary						
Average Delay	3.0			A		
Intersection Capacity Utilization	40.9%			15		
Analysis Period (min)	15					

PTSL (230405)

Lanes, Volumes, Timings 5234-5278 Ferry Street, Niagara Falls TIS
 4: Robinson Street & Clark Avenue

Base Year PM

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔		↔	↔			↔	↔		↔	
Traffic Volume (vph)	42	96	18	9	110	24	28	20	4	22	6	54
Future Volume (vph)	42	96	18	9	110	24	28	20	4	22	6	54
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
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												
Fit	0.984											
Fit Protected	0.987											
Satd. Flow (prot)	0											
Fit Permitted	0.987											
Satd. Flow (perm)	0											
Link Speed (k/h)	50											
Link Distance (m)	133.5											
Travel Time (s)	9.6											
Confl. Peds. (#/hr)	80											
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%											
Adj. Flow (vph)	46	104	20	10	120	26	30	22	4	24	7	59
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	170	0	0	156	0	0	56	0	0	90	0
Sign Control	Free											
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	43.3%											
Analysis Period (min)	15											

PTSL (230405)

4: Robinson Street & Clark Avenue

5234-5278 Ferry Street, Niagara Falls TIS

Base Year PM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	42	96	18	9	110	24	28	20	4	22	6	54
Traffic Volume (veh/h)	42	96	18	9	110	24	28	20	4	22	6	54
Future Volume (Veh/h)	42	96	18	9	110	24	28	20	4	22	6	54
Sign Control	Free	Free	Free	Free	Free	Free	Free	Free	Free	Free	Free	Free
Grade	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	46	104	20	10	120	26	30	22	4	24	7	59
Pedestrians	28	28	28	103	103	103	103	57	57	80	80	80
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Walking Speed (m/s)	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Percent Blockage	2	2	2	9	9	9	9	5	5	7	7	7
Right turn flare (veh)	None	None	None	None	None	None	None	None	None	None	None	None
Median type	None	None	None	None	None	None	None	None	None	None	None	None
Median storage (veh)	None	None	None	None	None	None	None	None	None	None	None	None
Upstream signal (m)	226	226	226	181	181	181	506	509	274	557	506	241
pX platoon unblocked	226	226	226	181	181	181	506	509	274	557	506	241
VC, conflicting volume	4.1	4.1	4.1	4.1	4.1	4.1	7.1	6.5	6.2	7.1	6.5	6.2
VC1, stage 1 conf vol	2.2	2.2	2.2	2.2	2.2	2.2	3.5	4.0	3.3	3.5	4.0	3.3
VC2, stage 2 conf vol	96	96	96	99	99	99	92	94	99	92	98	92
IC, single (s)	1264	1264	1264	1340	1340	1340	354	400	670	320	401	732
IC, 2 stage (s)	2.2	2.2	2.2	2.2	2.2	2.2	3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	96	96	96	99	99	99	92	94	99	92	98	92
p0 queue free (s)	1264	1264	1264	1340	1340	1340	354	400	670	320	401	732
CM capacity (veh/h)	1264	1264	1264	1340	1340	1340	354	400	670	320	401	732
Direction, Lane #	EB 1	WB 1	NB 1	SB 1	EB 1	WB 1	NB 1	SB 1	EB 1	WB 1	NB 1	SB 1
Volume Total	170	156	56	90	170	156	56	90	170	156	56	90
Volume Left	46	10	30	24	46	10	30	24	46	10	30	24
Volume Right	20	26	4	59	20	26	4	59	20	26	4	59
cSH	1264	1340	384	520	1264	1340	384	520	1264	1340	384	520
Volume to Capacity	0.04	0.01	0.15	0.17	0.04	0.01	0.15	0.17	0.04	0.01	0.15	0.17
Queue Length 95th (m)	0.8	0.2	3.8	4.7	0.8	0.2	3.8	4.7	0.8	0.2	3.8	4.7
Control Delay (s)	2.4	0.6	16.0	13.4	2.4	0.6	16.0	13.4	2.4	0.6	16.0	13.4
Lane LOS	A	A	C	B	A	A	C	B	A	A	C	B
Approach Delay (s)	2.4	0.6	16.0	13.4	2.4	0.6	16.0	13.4	2.4	0.6	16.0	13.4
Approach LOS	C	B	C	B	C	B	C	B	C	B	C	B
Intersection Summary												
Average Delay	5.5											
Intersection Capacity Utilization	43.3%											
Analysis Period (min)	15											

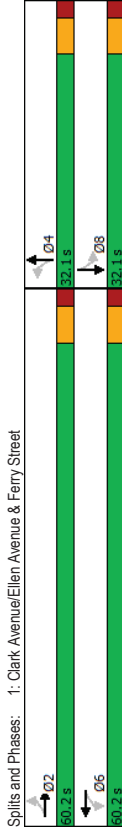
1: Clark Avenue/Ellen Avenue & Ferry Street

5234-5278 Ferry Street, Niagara Falls TIS

Base Year Saturday

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	8	8	8	8	8	8	8	8	8	8	8	8
Traffic Volume (vph)	82	565	45	54	396	8	55	26	75	19	60	160
Future Volume (vph)	82	565	45	54	396	8	55	26	75	19	60	160
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	40.0	0.0	40.0	0.0	40.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Storage Lanes	1	0	1	0	1	0	0	0	0	0	0	0
Taper Length (m)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	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	0.76	0.96	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Frt	0.950	0.989	0.989	0.950	0.989	0.989	0.950	0.989	0.989	0.950	0.989	0.989
Flt Protected	1646	1609	0	1630	1691	0	0	1228	0	0	1339	0
Satd. Flow (prot)	0.445	0.445	0.445	0.445	0.445	0.445	0.445	0.445	0.445	0.445	0.445	0.445
Flt Permitted	587	1609	0	474	1691	0	0	979	0	0	1269	0
Satd. Flow (perm)	0.445	0.445	0.445	0.445	0.445	0.445	0.445	0.445	0.445	0.445	0.445	0.445
Right Turn on Red	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Satd. Flow (RTOR)	8	8	8	8	8	8	8	8	8	8	8	8
Link Speed (k/h)	50	50	50	50	50	50	50	50	50	50	50	50
Link Distance (m)	133.8	133.8	133.8	133.8	133.8	133.8	133.8	133.8	133.8	133.8	133.8	133.8
Travel Time (s)	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6
Conf. Peds. (#/hr)	309	317	317	317	317	317	309	317	317	317	317	317
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	3%	2%	2%	0%	0%	0%	12%	4%	0%	2%	1%
Adj. Flow (vph)	88	614	49	59	430	9	60	28	82	21	65	174
Shared Lane Traffic (%)	88	663	0	59	439	0	0	170	0	0	260	0
Lane Group Flow (vph)	Perm	NA	NA	Perm	NA	NA	Perm	NA	NA	Perm	NA	NA
Turn Type	2	2	2	2	2	2	2	2	2	2	2	2
Protected Phases	2	2	2	2	2	2	2	2	2	2	2	2
Permitted Phases	2	2	2	2	2	2	2	2	2	2	2	2
Detector Phase	2	2	2	2	2	2	2	2	2	2	2	2
Switch Phase	2	2	2	2	2	2	2	2	2	2	2	2
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	23.2	23.2	23.2	23.2	23.2	23.2	27.1	27.1	27.1	27.1	27.1	27.1
Total Split (s)	60.2	60.2	60.2	60.2	60.2	60.2	32.1	32.1	32.1	32.1	32.1	32.1
Total Split (%)	65.2%	65.2%	65.2%	65.2%	65.2%	65.2%	34.8%	34.8%	34.8%	34.8%	34.8%	34.8%
Maximum Green (s)	54.0	54.0	54.0	54.0	54.0	54.0	26.0	26.0	26.0	26.0	26.0	26.0
Yellow Time (s)	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
All-Red Time (s)	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.1	-2.1	-2.1	-2.1	-2.1	-2.1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Vehicle Extension (s)	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Recall Mode	Min	Min	Min	Min	Min	Min	Min	Min	Min	Min	Min	Min
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	8.0	8.0	8.0	8.0	8.0	8.0
Flash Dont Walk (s)	10.0	10.0	10.0	10.0	10.0	10.0	13.0	13.0	13.0	13.0	13.0	13.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Act Effct Green (s)	30.3	30.3	30.3	30.3	30.3	30.3	16.1	16.1	16.1	16.1	16.1	16.1
Actuated g/C Ratio	0.55	0.55	0.55	0.55	0.55	0.55	0.29	0.29	0.29	0.29	0.29	0.29
v/c Ratio	0.28	0.75	0.23	0.23	0.48	0.23	0.53	0.53	0.53	0.53	0.53	0.53

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	9.9	16.0	9.6	9.6	9.7	9.7	21.4	21.4	0.0	0.0	0.0	18.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.9	16.0	9.6	9.6	9.7	9.7	21.4	21.4	0.0	0.0	0.0	18.3
LOS	A	B	A	A	A	A	C	C				B
Approach Delay	15.3			9.7	9.7	9.7	21.4	21.4				18.3
Approach LOS	B			A	A	A	C	C				B
Queue Length 50th (m)	3.5	37.0	2.3	19.6	8.3	8.3	36.1	36.1				10.8
Queue Length 95th (m)	14.7	107.8	10.5	56.6	28.1	28.1	145.1	145.1				45.6
Internal Link Dist (m)	40.0			40.0								
Turn Bay Length (m)	529	1451	427	1524			582	582				771
Base Capacity (vph)	0	0	0	0	0	0	0	0				0
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	0.17	0.46	0.14	0.29			0.29	0.29				0.34
Intersection Summary												
Area Type: Other												
Cycle Length: 92.3												
Actuated Cycle Length: 55.5												
Natural Cycle: 60												
Control Type: Actuated-Uncoordinated												
Maximum v/c Ratio: 0.75												
Intersection Signal Delay: 14.7												
Intersection Capacity Utilization 83.2%												
Analysis Period (min) 15												



	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Volume (vph)	82	565	45	54	396	8	55	26	75	19	60	160
Future Volume (vph)	82	565	45	54	396	8	55	26	75	19	60	160
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	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	1.00	1.00	1.00
Frb. ped/bikes	1.00	0.96	1.00	1.00	0.99	1.00	0.88	1.00	0.97	0.99	0.99	0.91
Frb. ped/bikes	0.76	1.00	0.86	1.00	0.86	1.00	0.97	0.97	0.97	0.99	0.99	0.91
Frt	1.00	0.99	1.00	1.00	1.00	1.00	0.93	1.00	0.98	1.00	1.00	0.91
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00	0.98	1.00	0.98	1.00	1.00	0.91
Satd. Flow (prot)	1256	1618	1400	1694	1400	1694	1320	1400	1404	1404	1404	1404
Flt Permitted	0.45	1.00	0.28	1.00	0.28	1.00	0.82	1.00	0.82	0.97	1.00	0.97
Satd. Flow (perm)	588	1618	407	1694	407	1694	1085	1085	1085	1362	1362	1362
Peak-Hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	89	614	49	59	430	9	60	28	82	21	65	174
RTOR Reduction (vph)	0	4	0	0	1	0	0	37	0	0	75	0
Lane Group Flow (vph)	89	659	0	59	438	0	0	133	0	0	185	0
Confl. Peds. (#/hr)	309	317	317	309	92	309	92	190	190	92	92	92
Heavy Vehicles (%)	1%	3%	2%	2%	0%	0%	0%	12%	4%	0%	2%	1%
Turn Type	Perm	NA	NA	Perm	NA	Perm	NA	Perm	NA	Perm	NA	NA
Protected Phases	2			6		6		4		8		8
Permitted Phases	2			6		6		4		8		8
Actuated Green, G (s)	27.8	27.8	27.8	27.8	27.8	27.8	13.8	13.8	13.8	13.8	13.8	13.8
Effective Green, g (s)	30.0	30.0	30.0	30.0	30.0	30.0	15.9	15.9	15.9	15.9	15.9	15.9
Actuated 9/C Ratio	0.56	0.56	0.56	0.56	0.56	0.56	0.29	0.29	0.29	0.29	0.29	0.29
Clearance Time (s)	6.2	6.2	6.2	6.2	6.2	6.2	6.1	6.1	6.1	6.1	6.1	6.1
Vehicle Extension (s)	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Lane Grp Cap (vph)	327	900	226	942	226	942	323	323	323	401	401	401
v/s Ratio Prot	0.15			0.14		0.26				0.12		0.14
v/s Ratio Perm	0.27	0.73	0.26	0.47	0.47	0.41	0.41	0.41	0.41	0.46	0.46	0.46
v/c Ratio	6.2	8.9	6.2	7.1	7.1	15.3	15.3	15.3	15.3	15.5	15.5	15.5
Uniform Delay, d1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Progression Factor	0.2	0.2	0.2	0.3	0.2	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Incremental Delay, d2	6.4	11.7	6.5	7.3	7.3	15.6	15.6	15.6	15.6	15.9	15.9	15.9
Delay (s)	A	B	A	A	A	B	B	B	B	B	B	B
Level of Service	A	B	A	A	A	B	B	B	B	B	B	B
Approach Delay (s)	11.1			7.2		15.6				15.9		15.9
Approach LOS	B			A		B				B		B
Intersection Summary												
HCM 2000 Control Delay	11.1											
HCM 2000 Volume to Capacity ratio	0.64											
Actuated Cycle Length (s)	53.9											
Intersection Capacity Utilization	83.2%											
Analysis Period (min)	15											
c Critical Lane Group	E											

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	
Lane Configurations							
Traffic Volume (vph)	628	125	117	508	61	100	
Future Volume (vph)	628	125	117	508	61	100	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	
Storage Length (m)		0.0	45.0		0.0	0.0	
Storage Lanes		0	1		1	0	
Taper Length (m)			7.5		7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Peak Hour Factor							
Fit	0.978				0.916		
Fit Protected			0.950		0.981		
Satd. Flow (prot)	1692	0	1630	1733	1523	0	
Fit Permitted			0.950		0.981		
Satd. Flow (perm)	1692	0	1630	1733	1523	0	
Link Speed (k/h)		50		50		50	
Link Distance (m)		99.9		133.8		195.3	
Travel Time (s)		7.2		9.6		14.1	
Confl. Peds. (#/hr)			278		4	39	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Heavy Vehicles (%)	1%	2%	2%	1%	2%	4%	
Adj. Flow (vph)		683	136	127	552	66	109
Shared Lane Traffic (%)							
Lane Group Flow (vph)		819	0	127	552	175	0
Sign Control		Free		Free		Stop	
Intersection Summary							
Area Type:	Other						
Control Type:	Unsignalized						
Intersection Capacity Utilization	75.7%			ICU Level of Service D			
Analysis Period (min)	15						

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔	↔	↔	↔	↔	↔
Traffic Volume (veh/h)	628	125	117	508	61	100
Future Volume (Veh/h)	628	125	117	508	61	100
Sign Control	Free		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)	683	136	127	552	66	109
Pedestrians	4			39	278	
Lane Width (m)	3.6			3.6	3.6	
Walking Speed (m/s)	1.2			1.2	1.2	
Percent Blockage	0			3	23	
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)				134		
pX, platoon unblocked					0.91	
vc, conflicting volume			1097		1839	1068
vc1, stage 1 conf vol						
vc2, stage 2 conf vol						
vcU, unblocked vol			1097		1874	1068
IC, single (s)			4.1		6.4	6.2
IC, 2 stage (s)						
p0 queue free %			2.2		3.5	3.3
IF (s)			74		0	45
dM capacity (veh/h)			489		41	198
Direction, Lane #						
	EB 1	WB 1	WB 2	NB 1		
Volume Total	819	127	552	175		
Volume Left	0	127	0	66		
Volume Right	136	0	0	109		
cSH	1700	489	1700	80		
Volume to Capacity	0.48	0.26	0.32	2.18		
Queue Length 95th (m)	0.0	7.7	0.0	119.6		
Control Delay (s)	0.0	14.9	0.0	652.4		
Lane LOS		B		F		
Approach Delay (s)	0.0	2.8	652.4			
Approach LOS			F			
Intersection Summary						
Average Delay	69.4					
Intersection Capacity Utilization	75.7%			ICU Level of Service		
Analysis Period (min)	15			D		

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↔↔	↔		↔	↔
Traffic Volume (vph)	14	616	414	32	76	46
Future Volume (vph)	14	616	414	32	76	46
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor						
Flt			0.990		0.949	
Flt Protected		0.999			0.970	
Satd. Flow (prot)	0	3290	1701	0	1599	0
Flt Permitted		0.999			0.970	
Satd. Flow (perm)	0	3290	1701	0	1599	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		134.5	118.7		82.8	
Travel Time (s)		9.7	8.5		6.0	
Confl. Peds. (#/hr)	547			547	59	18
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	1%	2%	0%	0%	2%
Adj. Flow (vph)	15	670	450	35	83	50
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	685	485	0	133	0
Sign Control		Free	Free		Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	46.6%					
Analysis Period (min)	15					
ICU Level of Service A						

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		414	414	32	76	46
Traffic Volume (veh/h)	14	616	414	32	76	46
Future Volume (Veh/h)	14	616	414	32	76	46
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)	15	670	450	35	83	50
Pedestrians		18	59		547	
Lane Width (m)		3.6	3.6		3.6	
Walking Speed (m/s)		1.2	1.2		1.2	
Percent Blockage		2	5		46	
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)		256				
pX, platoon unblocked					1438	1032
VC, conflicting volume		1032				
VC1, stage 1 conf vol						
VC2, stage 2 conf vol						
VCu, unblocked vol		1032			1438	1032
IC, single (s)		4.1			6.8	6.9
IC, 2 stage (s)						
IF (s)		2.2			3.5	3.3
p0 queue free %		96			0	59
dM capacity (veh/h)		371			63	123
Direction, Lane #	EB 1	EB 2	WB 1	SB 1		
Volume Total	238	447	485	133		
Volume Left	15	0	0	83		
Volume Right	0	0	35	50		
cSH	371	1700	1700	77		
Volume to Capacity	0.04	0.26	0.29	1.73		
Queue Length 95th (m)	0.9	0.0	0.0	85.5		
Control Delay (s)	1.6	0.0	0.0	468.3		
Lane LOS	A			F		
Approach Delay (s)	0.6		0.0	468.3		
Approach LOS				F		
Intersection Summary						
Average Delay	48.1					
Intersection Capacity Utilization	46.6%					
ICU Level of Service	A					
Analysis Period (min)	15					

Lanes, Volumes, Timings

4: Robinson Street & Clark Avenue

5234-5278 Ferry Street, Niagara Falls TIS

Base Year Saturday

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	60	121	53	36	128	38	45	24	11	25	12	90
Future Volume (vph)	60	121	53	36	128	38	45	24	11	25	12	90
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
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		0.969			0.975			0.981				0.904
Frt		0.987			0.991			0.973				0.990
Flt Protected		0	1636	0	0	1660	0	0	1670	0	0	1555
Satd. Flow (prot)		0.987			0.991			0.973				0.990
Flt Permitted		0	1636	0	0	1660	0	0	1670	0	0	1555
Satd. Flow (perm)		50			50			50				50
Link Speed (k/h)		133.5			132.0			59.2				232.7
Link Distance (m)		9.6			9.5			4.3				16.8
Travel Time (s)		142			86			142				123
Confl. Peds. (#/hr)		0.92			0.92			0.92				0.92
Peak Hour Factor		3%			0%			3%				0%
Heavy Vehicles (%)		65			39			41				27
Adj. Flow (vph)		0			0			0				13
Shared Lane Traffic (%)		0			0			0				0
Lane Group Flow (vph)		255			219			87				138
Sign Control		Free			Free			Stop				Stop
Intersection Summary												
Area Type:	Other											
Control Type: Unsignalized	ICU Level of Service A											
Intersection Capacity Utilization	42.9%											
Analysis Period (min)	15											

HCM Unsignalized Intersection Capacity Analysis

4: Robinson Street & Clark Avenue

5234-5278 Ferry Street, Niagara Falls TIS

Base Year Saturday

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	60	121	53	36	128	38	45	24	11	25	12	90
Future Volume (Veh/h)	60	121	53	36	128	38	45	24	11	25	12	90
Sign Control		Free			Free			Stop				Stop
Grade		0%			0%			0%				0%
Peak Hour Factor		0.92			0.92			0.92				0.92
Hourly flow rate (vph)		65			132			139				98
Pedestrians		123			39			49				13
Lane Width (m)		3.6			3.6			3.6				3.6
Walking Speed (m/s)		1.2			1.2			1.2				1.2
Percent Blockage		10			8			7				12
Right turn flare (veh)		None			None			None				None
Median type		None			None			None				None
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
VC, conflicting volume		322			276			842				786
VC1, stage 1 conf vol												
VC2, stage 2 conf vol												
VCu, unblocked vol		322			276			842				786
IC, single (s)		4.1			4.1			7.1				6.2
IC, 2 stage (s)		2.2			2.2			3.5				3.3
IF (s)		94			97			67				80
p0 queue free %		1086			1206			148				500
dM capacity (veh/h)												
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	255	219	87	138								
Volume Left	65	39	49	27								
Volume Right	58	41	12	98								
cSH	1086	1206	190	347								
Volume to Capacity	0.06	0.03	0.46	0.40								
Queue Length 95th (m)	1.4	0.8	16.2	13.8								
Control Delay (s)	2.6	1.7	38.9	22.0								
Lane LOS	A	A	E	C								
Approach Delay (s)	2.6	1.7	38.9	22.0								
Approach LOS	E	C										
Intersection Summary												
Average Delay	10.7											
Intersection Capacity Utilization	42.9%											
Analysis Period (min)	15											

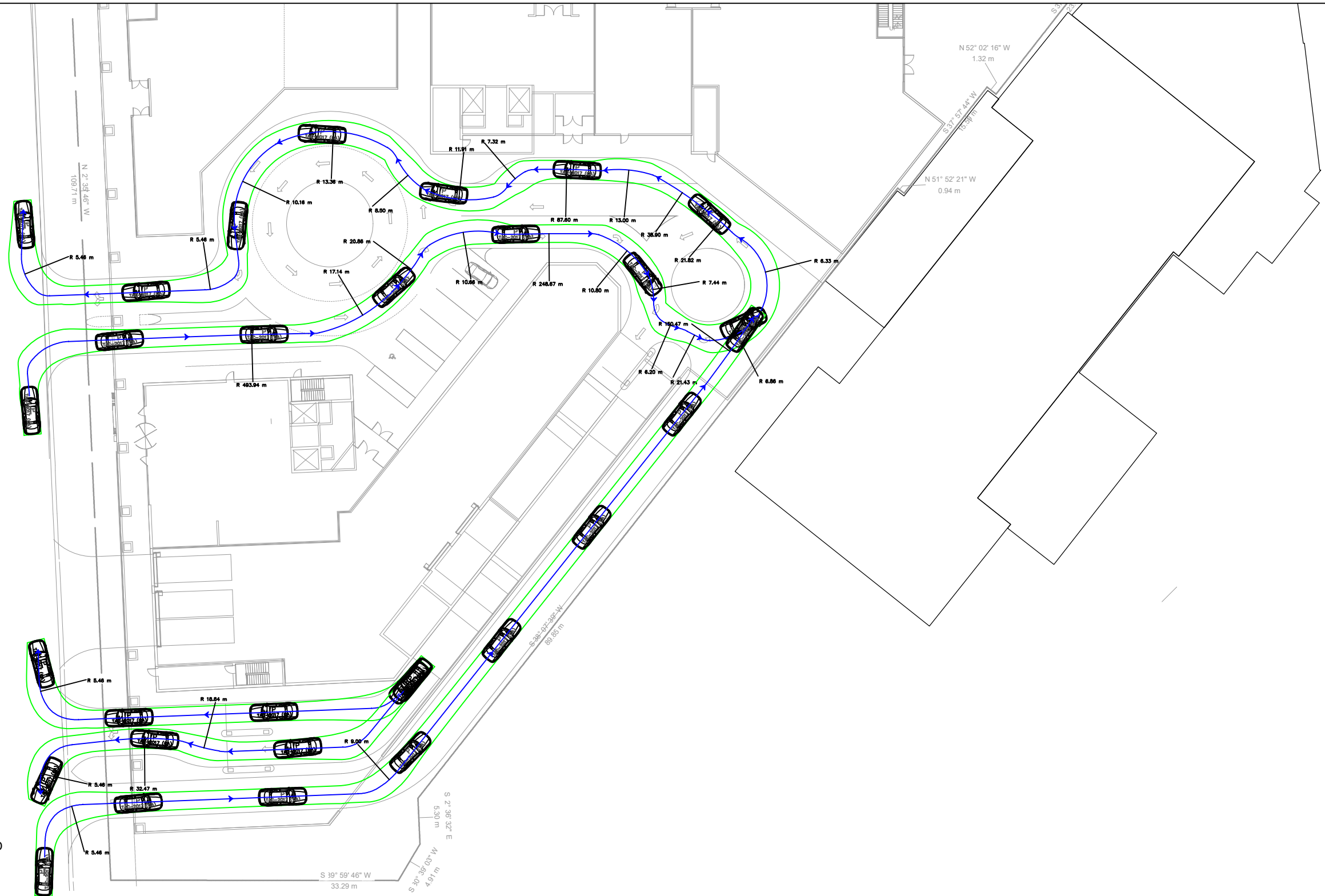
Appendix D

AutoTURN Analysis





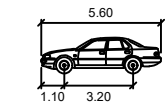
APPROX EX'EP



THIS AUTOTURN SWEEP 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.

2	2024-04-29	SC	LOADING ZONE
1	2024-04-16	LC	UPDATED SITE PLAN
NO.	DATE	INITIAL	REVISION DETAIL

DESIGN VEHICLE:



P

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

AUTOTURN ASSESSMENT
5234-5278 FERRY STREET
NIAGARA FALLS, ON



PROJECT NO.: 230405

DATE: AUG 2023

SCALE: 1:500

DRAWING NO.:

DRAWN: LC

DESIGN: LC

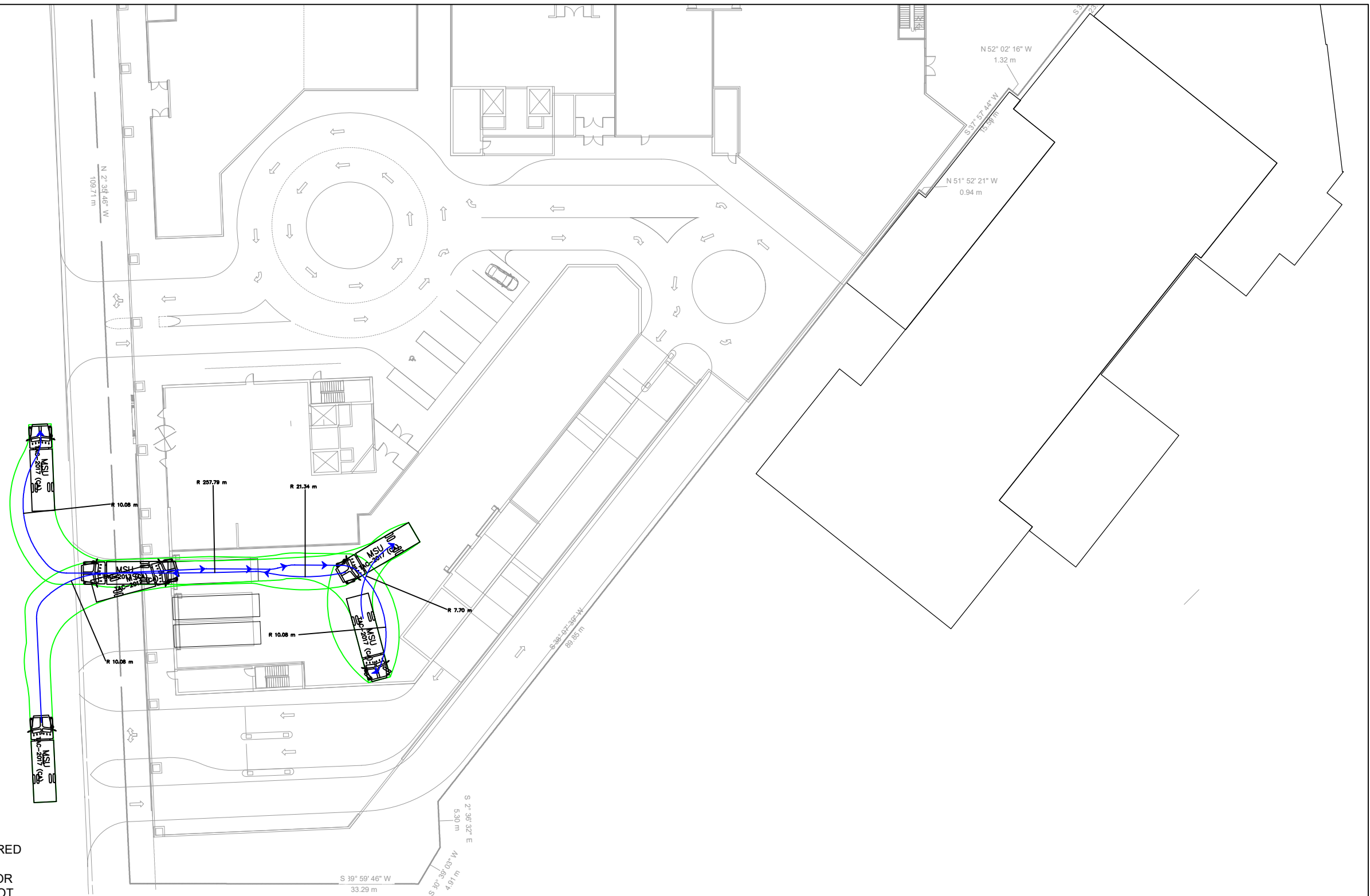
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01



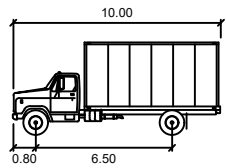
APPROX EX'EP

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NO.	DATE	INITIAL	REVISION DETAIL
2	2024-04-29	SC	LOADING ZONE
1	2024-04-16	LC	UPDATED SITE PLAN

DESIGN VEHICLE:



MSU

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

AUTOTURN ASSESSMENT
5234-5278 FERRY STREET
NIAGARA FALLS, ON



PROJECT NO.: 230405

DATE: AUG 2023

SCALE: 1:500

DRAWING NO.:

DRAWN: LC

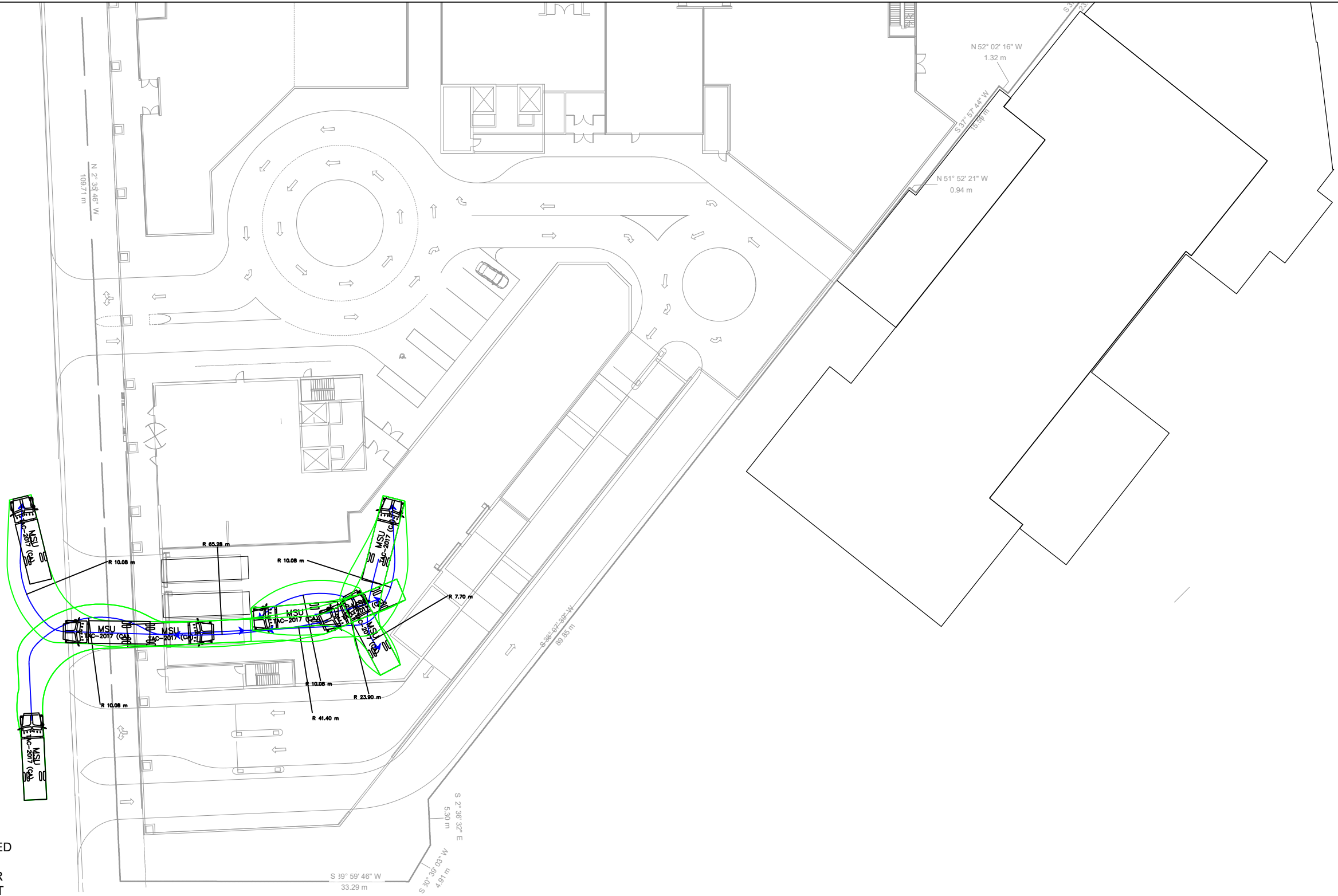
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CHECK: AMa

02



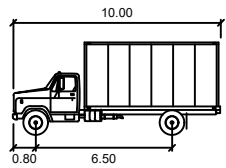
APPROX EX'EP



THIS AUTOTURN SWEEP 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	2024-04-29	SC	LOADING ZONE
1	2024-04-16	LC	UPDATED SITE PLAN

DESIGN VEHICLE:



MSU

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

AUTOTURN ASSESSMENT
5234-5278 FERRY STREET
NIAGARA FALLS, ON



PROJECT NO.: 230405

DATE: AUG 2023

SCALE: 1:500

DRAWING NO.:

DRAWN: LC

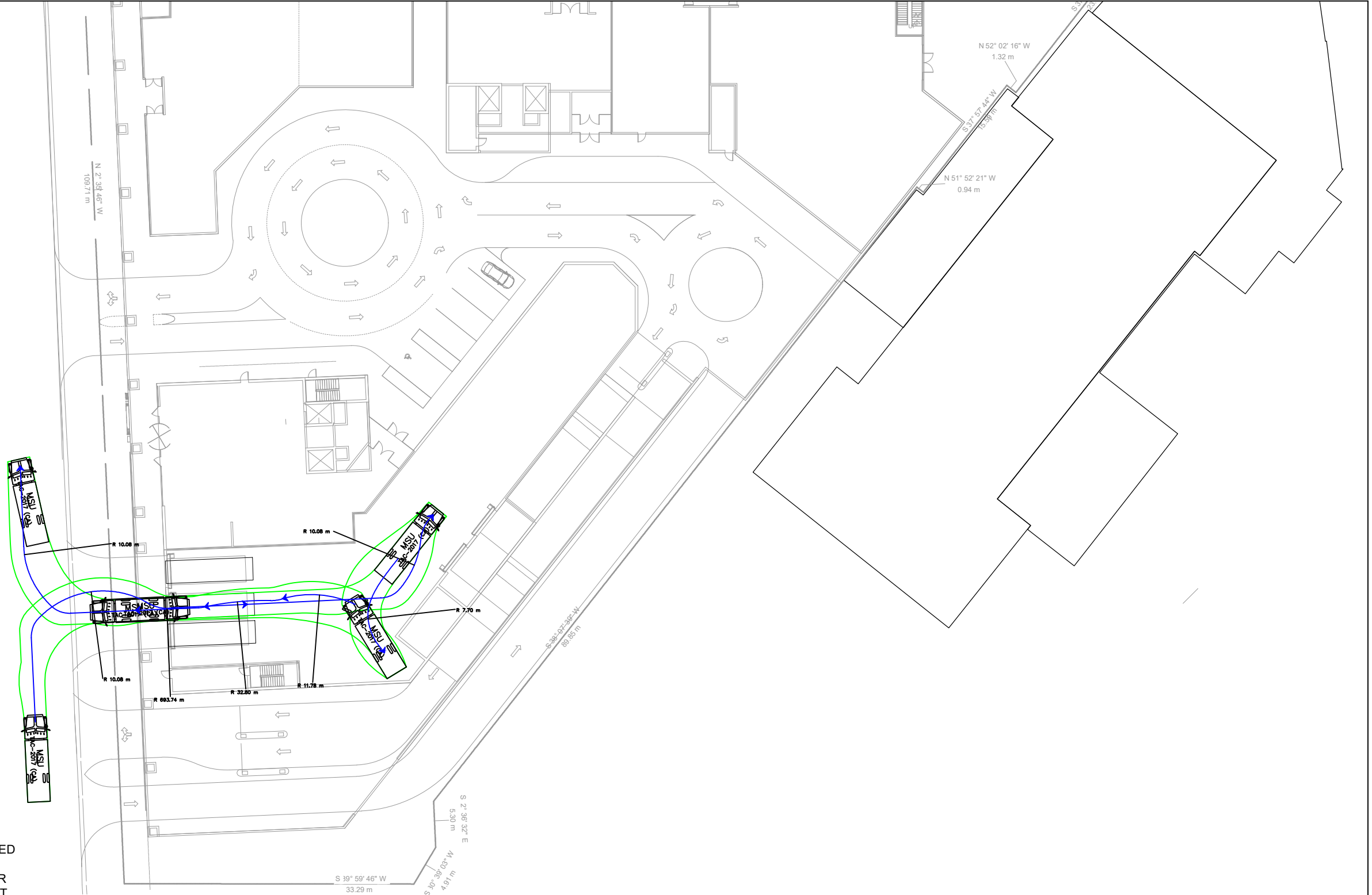
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03



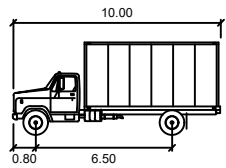
APPROX EX'EP



THIS AUTOTURN SWEEP 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.

2	2024-04-29	SC	LOADING ZONE
1	2024-04-16	LC	UPDATED SITE PLAN
NO.	DATE	INITIAL	REVISION DETAIL

DESIGN VEHICLE:



MSU

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

AUTOTURN ASSESSMENT
5234-5278 FERRY STREET
NIAGARA FALLS, ON



PROJECT NO.: 230405

DATE: AUG 2023

SCALE: 1:500

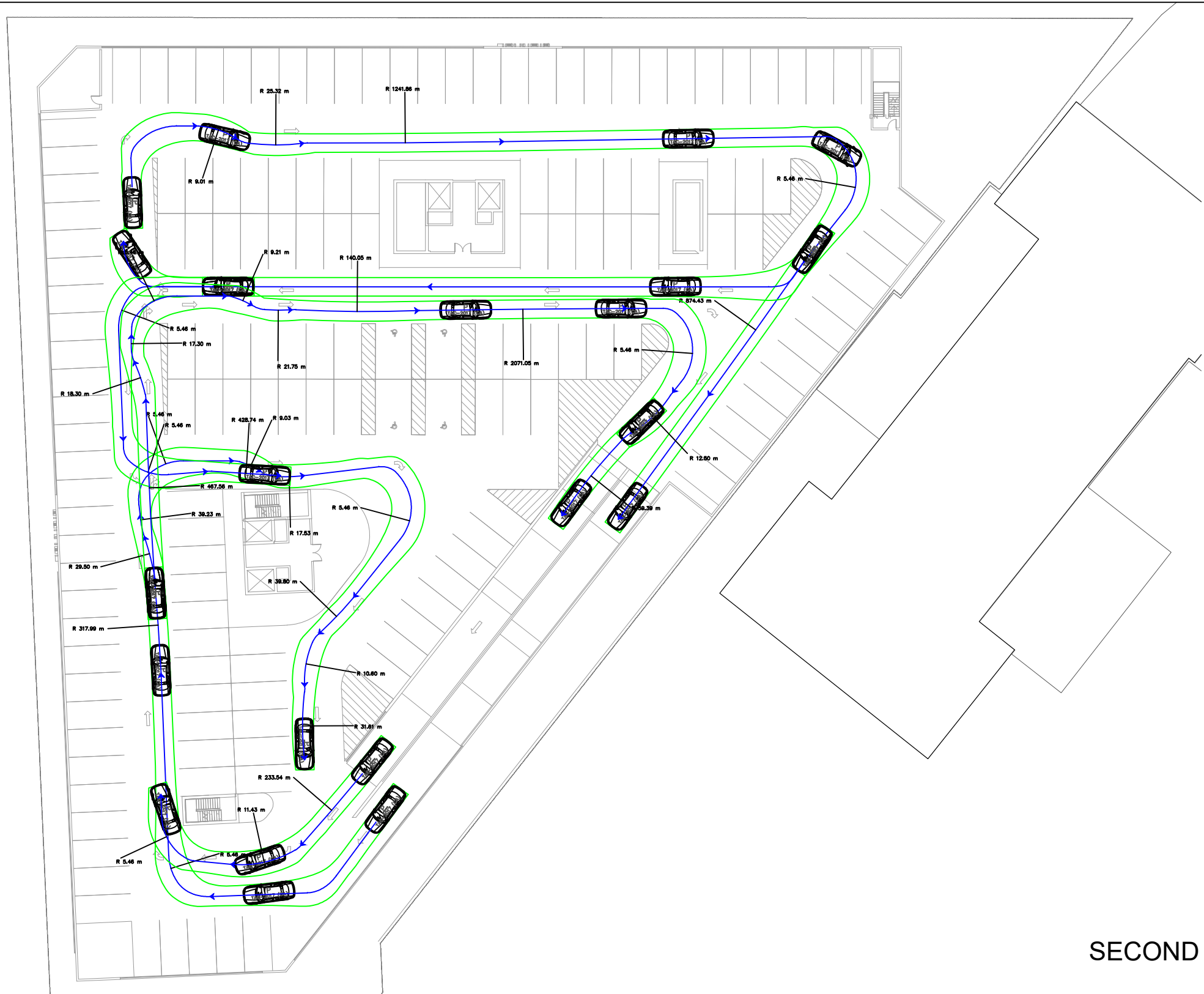
DRAWING NO.:

DRAWN: LC

DESIGN: LC

CHECK: AMa

04

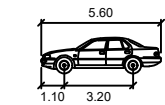


THIS AUTOTURN SWEEP PATH ANALYSIS HAS BEEN PREPARED USING BASE PLANS PROVIDED BY OTHERS. THE PRACTITIONER HAS NOT INSPECTED THE ACCURACY AND/OR THE COMPLETENESS OF THESE BASE PLANS AND SHALL NOT BE RESPONSIBLE FOR ANY ERRORS OR OMISSIONS WHICH MAY BE INCORPORATED HEREIN AS A RESULT.

SECOND FLOOR

2	2024-04-29	SC	LOADING ZONE
1	2024-04-16	LC	UPDATED SITE PLAN
NO.	DATE	INITIAL	REVISION DETAIL

DESIGN VEHICLE:



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

AUTOTURN ASSESSMENT
5234-5278 FERRY STREET
NIAGARA FALLS, ON



PROJECT NO.: 230405

DATE: AUG 2023

SCALE: 1:500

DRAWING NO.:

DRAWN: LC

DESIGN: LC

CHECK: AMa

05

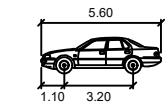


THIS AUTOTURN SWEEP PATH ANALYSIS HAS BEEN PREPARED USING BASE PLANS PROVIDED BY OTHERS. THE PRACTITIONER HAS NOT INSPECTED THE ACCURACY AND/OR THE COMPLETENESS OF THESE BASE PLANS AND SHALL NOT BE RESPONSIBLE FOR ANY ERRORS OR OMISSIONS WHICH MAY BE INCORPORATED HEREIN AS A RESULT.

THIRD - FOURTH FLOOR

2	2024-04-29	SC	LOADING ZONE
1	2024-04-16	LC	UPDATED SITE PLAN
NO.	DATE	INITIAL	REVISION DETAIL

DESIGN VEHICLE:



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

AUTOTURN ASSESSMENT
5234-5278 FERRY STREET
NIAGARA FALLS, ON



PROJECT NO.: 230405

DATE: AUG 2023

SCALE: 1:500

DRAWING NO.:

DRAWN: LC

DESIGN: LC

CHECK: AMa

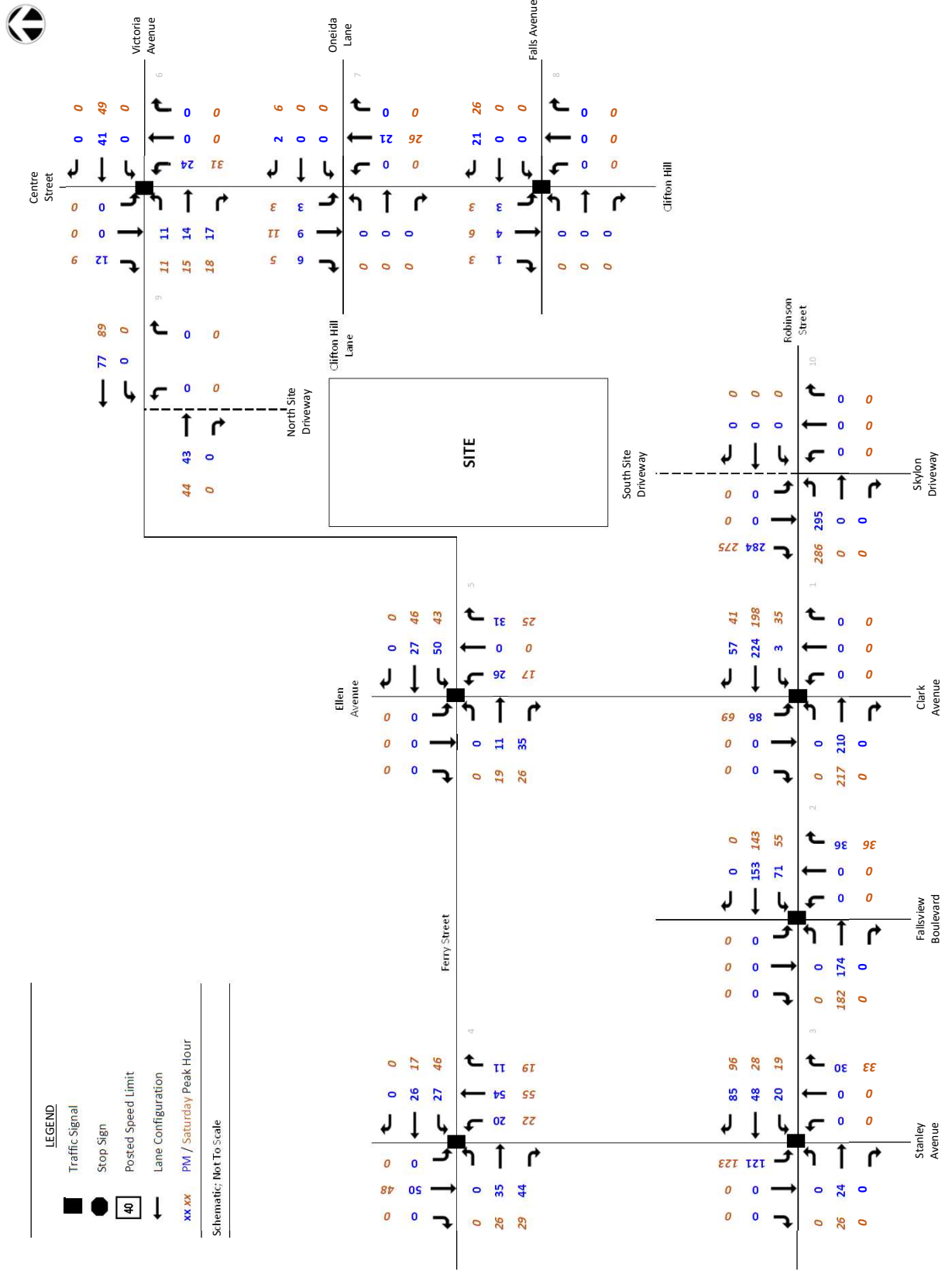
06

Appendix E

Background Development Traffic Material



Figure 11 - Phase 1, Site Traffic Assignment, Friday PM and Saturday Peak Hours



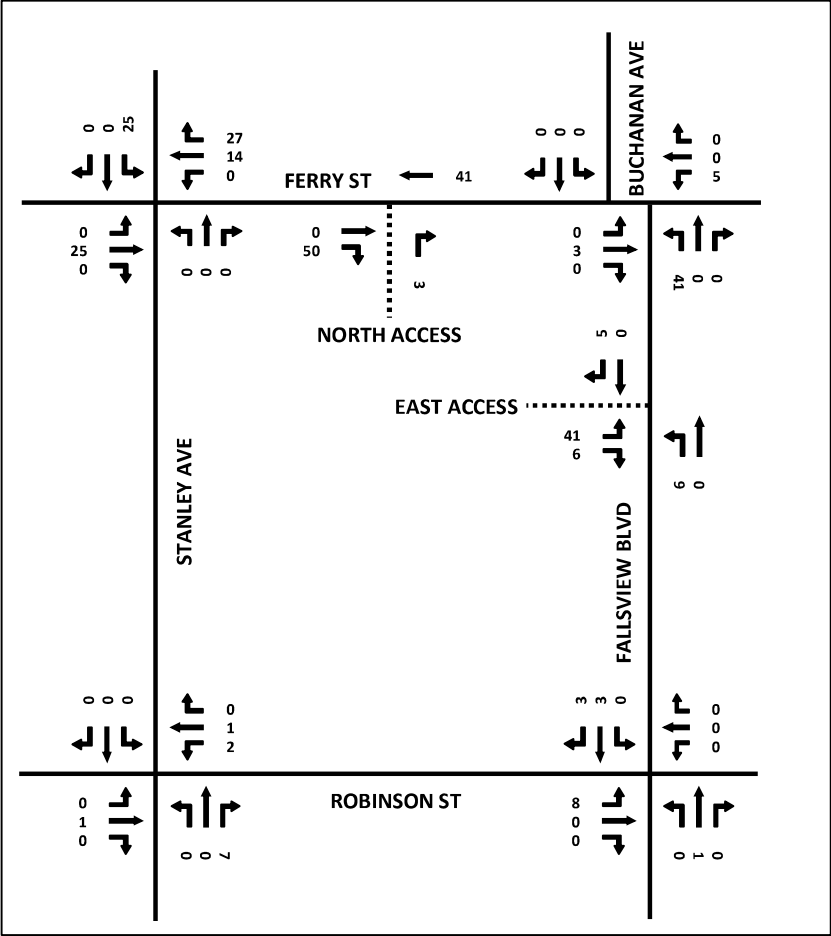


Figure 4-3
Site Traffic Assignment

Fourth Leg of Ferry Street and Fallsview Boulevard

Land Use	GFA	PM Peak Hour				SAT Peak Hour			
		Rate	In	Out	Total	Rate	In	Out	Total
LUC 822 - Strip Retail Plaza, <40k	10,000 ft ²	Avg	33	33	66	Avg	34	32	66

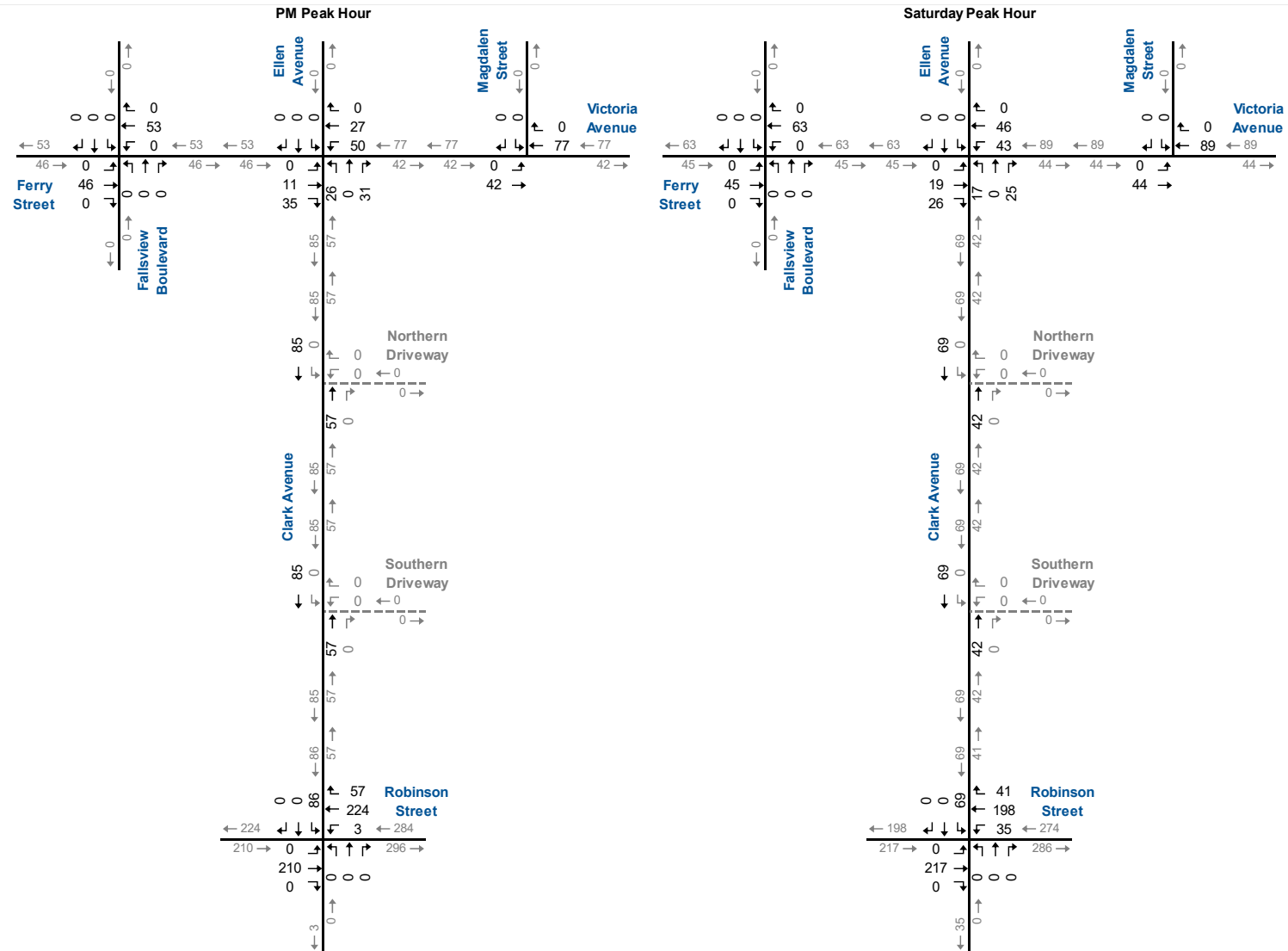
PM: Average Rate = 6.59 | SAT: Average Rate = 6.57

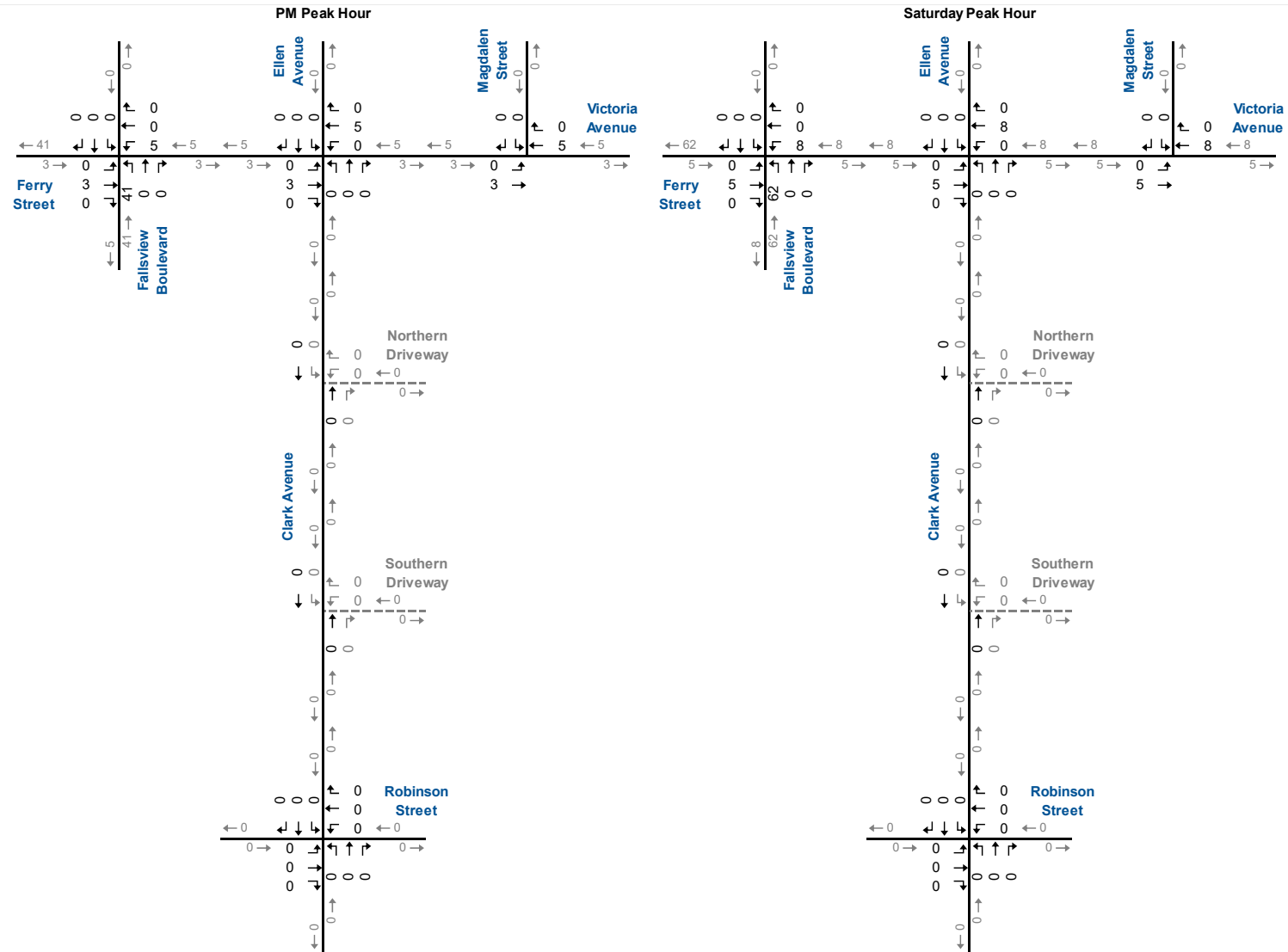
Southwest Corner of Ferry Street and Fallsview Boulevard

Land Use	Units/GFA	SAT Peak Hour			
		Rate	In	Out	Total
LUC 222 - Multi-family Housing, High-Rise	350 Units	Eq	77	58	135
LUC 822 - Strip Retail Plaza, <40k	8,150 ft ²	Avg	27	27	54
<i>Pass-By Trips</i>		<i>31%</i>	<i>8</i>	<i>8</i>	<i>16</i>
Net Trip Generation			96	77	173

LUC 222 - SAT: T = 0.30(X) + 30.34

LUC 822 - SAT: Average Rate = 6.57

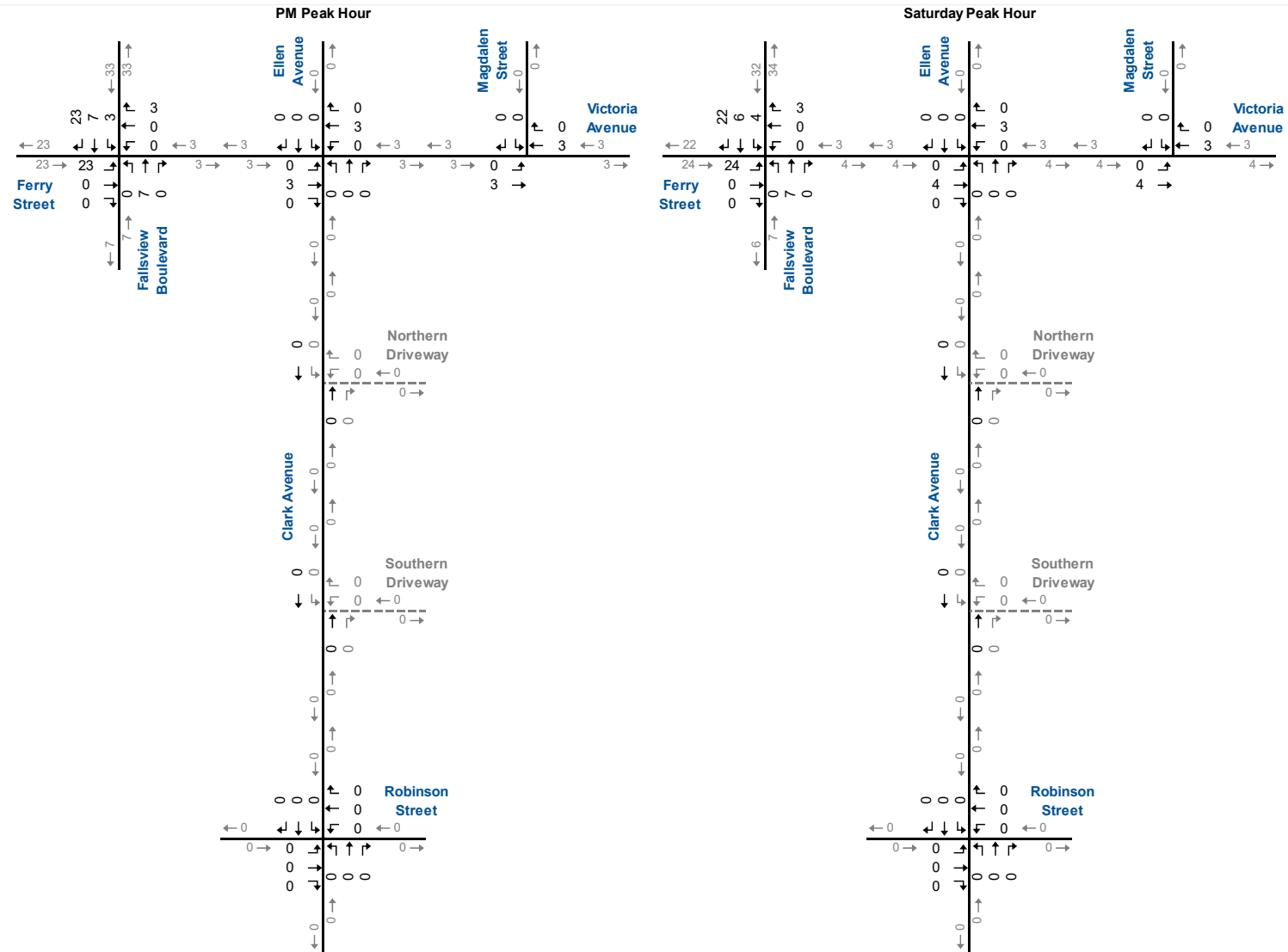




Development in the Southwest Corner of Ferry Street and Fallsview Boulevard

5234-5278 Niagara Falls, TIS and CR
230405

Traffic Volumes



Development Connecting to the Fourth Leg of Ferry Street and Fallsview Boulevard

Appendix F

2027 Background Traffic Operations



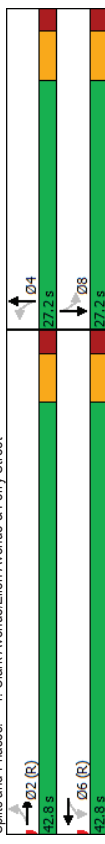
Lanes, Volumes, Timings
1: Clark Avenue/Ellen Avenue & Ferry Street

5234-5278 Ferry Street, Niagara Falls TIS
1: Clark Avenue/Ellen Avenue & Ferry Street

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	74	452	65	93	476	16	57	14	82	10	23	106
Future Volume (vph)	74	452	65	93	476	16	57	14	82	10	23	106
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	40.0	0.0	40.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Storage Lanes	1	0	1	0	0	0	0	0	0	0	0	0
Tapor Length (m)	7.5	0	7.5	0	0	0	0	0	0	0	0	0
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	0.86	0.93	0.84	0.99	0.99	0.99	0.928	0.928	0.99	0.90	0.90	0.90
Frt	0.950	0.981	0.950	0.950	0.950	0.950	0.928	0.928	0.99	0.996	0.996	0.996
Flt Protected	1662	1577	0	1662	1670	0	0	1457	0	0	1413	0
Satd. Flow (prot)	0.420	0.420	0.403	0.403	0.403	0.403	0.759	0.759	0.976	0.976	0.976	0.976
Flt Permitted	634	1577	0	590	1670	0	0	1092	0	0	1376	0
Satd. Flow (perm)	0.420	0.420	0.403	0.403	0.403	0.403	0.759	0.759	0.976	0.976	0.976	0.976
Right Turn on Red	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Satd. Flow (RTOR)	17	4	88	50	50	50	50	50	50	50	50	50
Link Speed (km/h)	133.8	121.5	52.1	52.1	52.1	52.1	52.1	52.1	52.1	52.1	52.1	52.1
Link Distance (m)	9.6	8.7	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8
Travel Time (s)	191	263	263	191	65	65	75	75	75	75	65	65
Confl. Peds. (#/hr)	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Peak Hour Factor	0%	2%	0%	0%	3%	0%	0%	0%	2%	0%	0%	0%
Heavy Vehicles (%)	80	491	71	101	517	17	62	15	89	11	25	115
Adj. Flow (vph)	80	491	71	101	517	17	62	15	89	11	25	115
Shared Lane Traffic (%)	80	562	0	101	534	0	0	166	0	0	151	0
Lane Group Flow (vph)	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Turn Type	2	2	2	2	2	2	2	2	2	2	2	2
Protected Phases	2	2	2	2	2	2	2	2	2	2	2	2
Permitted Phases	2	2	2	2	2	2	2	2	2	2	2	2
Detector Phase	2	2	2	2	2	2	2	2	2	2	2	2
Switch Phase	2	2	2	2	2	2	2	2	2	2	2	2
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	23.2	23.2	23.2	23.2	27.1	27.1	27.1	27.1	27.1	27.1	27.1	27.1
Total Split (s)	42.8	42.8	42.8	42.8	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2
Total Split (%)	61.1%	61.1%	61.1%	61.1%	38.9%	38.9%	38.9%	38.9%	38.9%	38.9%	38.9%	38.9%
Maximum Green (s)	36.6	36.6	36.6	36.6	21.1	21.1	21.1	21.1	21.1	21.1	21.1	21.1
Yellow Time (s)	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
All-Red Time (s)	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.1	-2.1	-2.1	-2.1	-2.1	-2.1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Vehicle Extension (s)	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max
Walk Time (s)	7.0	7.0	7.0	7.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Flash Dont Walk (s)	10.0	10.0	10.0	10.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Act Effct Green (s)	49.1	49.1	49.1	49.1	49.1	49.1	49.1	49.1	49.1	49.1	49.1	49.1
Actuated g/C Ratio	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70
v/c Ratio	0.18	0.51	0.24	0.46	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	2.7	3.2	6.6	6.6	6.8	6.8	22.5	22.5	22.5	11.9	11.9	11.9
Queue Delay	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	2.7	3.4	6.6	6.6	6.8	6.8	22.5	22.5	22.5	11.9	11.9	11.9
LOS	A	A	A	A	A	A	C	C	C	B	B	B
Approach Delay	3.3	3.3	6.8	6.8	6.8	6.8	22.5	22.5	22.5	11.9	11.9	11.9
Approach LOS	A	A	A	A	A	A	C	C	C	B	B	B
Queue Length 50th (m)	1.3	9.0	3.4	21.7	9.2	9.2	9.2	9.2	9.2	4.1	4.1	4.1
Queue Length 95th (m)	m2.9	15.0	12.9	55.2	23.9	23.9	23.9	23.9	23.9	16.0	16.0	16.0
Internal Link Dist (m)	109.8	109.8	40.0	40.0	97.5	97.5	28.1	28.1	28.1	145.1	145.1	145.1
Turn Bay Length (m)	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
Base Capacity (vph)	444	1110	413	1171	420	420	532	532	532	532	532	532
Starvation Cap Reductn	0	76	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.18	0.54	0.24	0.46	0.40	0.40	0.40	0.40	0.40	0.28	0.28	0.28
Intersection Summary	Other											
Area Type	Other											
Cycle Length	70											
Actuated Cycle Length	70											
Offset	8 (11%) Referenced to phase 2:EBTL and 6:WBTL Start of Green											
Natural Cycle	60											
Control Type	Actuated-Coordinated											
Maximum v/c Ratio	0.61											
Intersection Signal Delay	7.5											
Intersection Capacity Utilization	79.9%											
ICU Level of Service	D											
Analysis Period (min)	15											
m	Volume for 95th percentile queue is metered by upstream signal.											

Splits and Phases: 1: Clark Avenue/Ellen Avenue & Ferry Street



HCM Signalized Intersection Capacity Analysis 5234-5278 Ferry Street, Niagara Falls TIS
 1: Clark Avenue/Ellen Avenue & Ferry Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	74	452	65	93	476	16	57	14	82	10	23	106
Traffic Volume (vph)	74	452	65	93	476	16	57	14	82	10	23	106
Future Volume (vph)	74	452	65	93	476	16	57	14	82	10	23	106
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	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	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.93	1.00	0.99	1.00	0.99	0.92	1.00	0.97	0.99	0.90	0.90
Flpb, ped/bikes	0.84	1.00	0.80	1.00	0.80	1.00	0.97	1.00	0.93	0.90	0.90	0.90
Fr	1.00	0.98	1.00	1.00	1.00	1.00	0.93	1.00	0.98	1.00	1.00	1.00
Flt Protected	0.95	1.00	0.95	1.00	0.95	1.00	0.98	1.00	0.98	1.00	1.00	1.00
Satd. Flow (prot)	1395	1577	1338	1671	1395	1671	1414	1414	1414	1405	1405	1405
Flt Permitted	0.42	1.00	0.40	1.00	0.40	1.00	0.76	1.00	0.76	0.98	0.98	0.98
Satd. Flow (perm)	616	1577	567	1671	567	1671	1093	1093	1093	1376	1376	1376
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	80	491	71	101	517	17	62	15	89	11	25	115
RTOR Reduction (vph)	0	5	0	0	1	0	0	72	0	0	94	0
Lane Group Flow (vph)	80	557	0	101	533	0	0	94	0	0	57	0
Confl. Peds. (#/hr)	191	263	263	191	65	65	75	75	75	75	65	65
Heavy Vehicles (%)	0%	2%	0%	0%	3%	0%	0%	0%	2%	0%	0%	0%
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases	2	2	2	2	2	2	2	2	2	2	2	2
Permitted Phases	2	2	2	2	2	2	2	2	2	2	2	2
Actuated Green, G (s)	46.9	46.9	46.9	46.9	46.9	46.9	10.8	10.8	10.8	10.8	10.8	10.8
Effective Green, g (s)	49.1	49.1	49.1	49.1	49.1	49.1	12.9	12.9	12.9	12.9	12.9	12.9
Actuated g/C Ratio	0.70	0.70	0.70	0.70	0.70	0.70	0.18	0.18	0.18	0.18	0.18	0.18
Clearance Time (s)	6.2	6.2	6.2	6.2	6.2	6.2	6.1	6.1	6.1	6.1	6.1	6.1
Vehicle Extension (s)	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Lane Grp Cap (vph)	432	1106	397	1172	397	1172	201	201	201	253	253	253
v/s Ratio Prot	c0.35	c0.35	c0.35	c0.35	c0.35	c0.35	c0.09	c0.09	c0.09	c0.04	c0.04	c0.04
v/s Ratio Perm	0.13	0.13	0.13	0.13	0.13	0.13	0.47	0.47	0.47	0.23	0.23	0.23
Uniform Delay, d1	3.6	4.8	3.8	4.6	3.8	4.6	25.5	25.5	25.5	24.3	24.3	24.3
Progression Factor	0.40	0.32	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.8	1.4	1.5	1.3	1.5	1.3	0.8	0.8	0.8	0.2	0.2	0.2
Delay (s)	2.2	2.9	5.3	5.9	5.3	5.9	26.2	26.2	26.2	24.5	24.5	24.5
Level of Service	A	A	A	A	A	A	C	C	C	C	C	C
Approach Delay (s)	2.8	2.8	2.8	2.8	2.8	2.8	26.2	26.2	26.2	24.5	24.5	24.5
Approach LOS	A	A	A	A	A	A	C	C	C	C	C	C
Intersection Summary												
HCM 2000 Control Delay	8.5											
HCM 2000 Volume to Capacity ratio	0.50											
Actuated Cycle Length (s)	70.0											
Intersection Capacity Utilization	79.9%											
Analysis Period (min)	15											
c Critical Lane Group												

Lanes, Volumes, Timings 5234-5278 Ferry Street, Niagara Falls TIS
 2: Fallsview Boulevard & Ferry Street

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	74	452	65	93	476	16	57	14	82	10	23	106
Traffic Volume (vph)	74	452	65	93	476	16	57	14	82	10	23	106
Future Volume (vph)	74	452	65	93	476	16	57	14	82	10	23	106
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
Storage Lanes	1	0	0	1	0	0	0	0	0	0	0	0
Taper Length (m)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	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	0.91	0.97	0.93	1.00	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Fr	0.982	0.982	0.982	0.982	0.982	0.982	0.982	0.982	0.982	0.982	0.982	0.982
Flt Protected	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950
Satd. Flow (prot)	1630	1637	0	1646	1695	0	0	1517	0	0	1506	0
Flt Permitted	0.353	0.353	0	0.345	0.345	0	0	0.840	0	0	0.974	0
Satd. Flow (perm)	551	1637	0	558	1695	0	0	1292	0	0	1468	0
Right Turn on Red	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Satd. Flow (RTOR)	16	16	16	16	16	16	16	16	16	16	16	16
Satd. Flow (k/h)	50	50	50	50	50	50	50	50	50	50	50	50
Link Speed (k/h)	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9
Link Distance (m)	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2
Travel Time (s)	191	191	191	191	191	191	191	191	191	191	191	191
Confl. Peds. (#/hr)	191	191	191	191	191	191	191	191	191	191	191	191
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	0%	1%	3%	2%	0%	2%	0%	2%	2%	2%
Adj. Flow (vph)	25	574	78	97	636	3	83	8	96	3	8	25
Shared Lane Traffic (%)	25	652	0	97	639	0	0	187	0	0	36	0
Lane Group Flow (vph)	25	652	0	97	639	0	0	187	0	0	36	0
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases	2	2	2	2	2	2	2	2	2	2	2	2
Permitted Phases	2	2	2	2	2	2	2	2	2	2	2	2
Detector Phase	2	2	2	2	2	2	2	2	2	2	2	2
Switch Phase	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Minimum Initial (s)	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2
Minimum Split (s)	42.7	42.7	42.7	42.7	42.7	42.7	42.7	42.7	42.7	42.7	42.7	42.7
Total Split (s)	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%
Total Split (%)	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%
Maximum Green (s)	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5
Yellow Time (s)	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
All-Red Time (s)	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Lost Time Adjust (s)	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max
Flash Dont Walk (s)	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Pedestrian Walks (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Act Effct Green (s)	48.3	48.3	48.3	48.3	48.3	48.3	48.3	48.3	48.3	48.3	48.3	48.3
Actuated g/C Ratio	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69
v/c Ratio	0.07	0.57	0.07	0.25	0.55	0.07	0.25	0.55	0.07	0.25	0.55	0.12

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	5.3	8.8	6.0	6.5	22.0	12.1						
Control Delay	0.0	0.0	0.0	0.1	0.0	0.0						
Queue Delay	0.0	0.0	0.0	0.1	0.0	0.0						
Total Delay	5.3	8.8	6.0	6.7	22.0	12.1						
LOS	A	A	A	A	C	C						
Approach Delay	8.7	6.6	22.0	12.1								
Approach LOS	A	A	C	B								
Queue Length 50th (m)	0.8	32.1	3.3	22.9	12.3	1.2						
Queue Length 95th (m)	4.0	79.8	10.0	48.0	27.0	6.9						
Internal Link Dist (m)	75.9	109.8	45.0	33.8								
Turn Bay Length (m)	30.0											
Base Capacity (vph)	380	1135	385	1170	484	505						
Starvation Cap Reductn	0	0	0	0	0	0						
Spillback Cap Reductn	0	0	0	0	0	0						
Storage Cap Reductn	0	0	0	0	0	0						
Reduced v/c Ratio	0.07	0.57	0.25	0.58	0.39	0.07						
Intersection Summary												
Area Type: Other												
Cycle Length: 70												
Actuated Cycle Length: 70												
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green												
Natural Cycle: 60												
Control Type: Actuated-Coordinated												
Maximum v/c Ratio: 0.59												
Intersection Signal Delay: 9.3												
Intersection Capacity Utilization 71.3%												
Analysis Period (min) 15												

Splits and Phases: 2: Fallsview Boulevard & Ferry Street



	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Volume (vph)	23	528	72	89	585	3	76	7	88	3	7	23
Future Volume (vph)	23	528	72	89	585	3	76	7	88	3	7	23
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	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	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.97	1.00	1.00	1.00	1.00	0.97	1.00	0.97	1.00	0.97	1.00
Flpb, ped/bikes	0.88	1.00	0.92	1.00	0.92	1.00	0.99	1.00	0.99	1.00	0.91	1.00
Frt	1.00	0.98	1.00	1.00	1.00	1.00	0.93	1.00	0.98	1.00	0.91	1.00
Flt Protected	0.95	1.00	0.95	1.00	0.95	1.00	0.98	1.00	0.98	1.00	0.91	1.00
Satd. Flow (prot)	1457	1637	1516	1695	1504	1504	1504	1504	1504	1504	1504	1504
Flt Permitted	0.35	1.00	0.35	1.00	0.35	1.00	0.84	1.00	0.84	1.00	0.97	1.00
Satd. Flow (perm)	541	1637	551	1695	1291	1291	1291	1291	1291	1291	1291	1291
Peak-Hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	25	574	78	97	636	3	83	8	96	3	8	25
RTOR Reduction (vph)	0	5	0	0	0	0	0	65	0	0	20	0
Lane Group Flow (vph)	25	647	0	97	639	0	122	0	122	0	16	0
Confl. Peds. (#/hr)	191	146	146	191	12	29	29	29	29	29	12	12
Heavy Vehicles (%)	2%	2%	0%	1%	3%	2%	3%	2%	0%	2%	2%	2%
Turn Type	Perm	NA	NA	Perm	NA	Perm	NA	NA	Perm	NA	NA	NA
Protected Phases	2	2	2	6	6	4	4	4	4	4	4	4
Permitted Phases	2	2	2	6	6	4	4	4	4	4	4	4
Actuated Green, G (s)	46.1	46.1	46.1	46.1	46.1	11.5	11.5	11.5	11.5	11.5	11.5	11.5
Effective Green, g (s)	48.3	48.3	48.3	48.3	48.3	13.7	13.7	13.7	13.7	13.7	13.7	13.7
Actuated 9/C Ratio	0.69	0.69	0.69	0.69	0.69	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Clearance Time (s)	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2
Vehicle Extension (s)	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Lane Grp Cap (vph)	373	1129	380	1169	252	252	252	252	252	252	252	252
v/s Ratio Prot	0.05	0.05	0.05	0.18	0.18	0.09	0.09	0.09	0.09	0.09	0.09	0.09
v/s Ratio Perm	0.07	0.57	0.26	0.55	0.48	0.06	0.06	0.06	0.06	0.06	0.06	0.06
Uniform Delay, d1	3.5	5.6	4.1	5.4	25.0	22.9	22.9	22.9	22.9	22.9	22.9	22.9
Progression Factor	1.00	1.00	0.79	0.73	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	2.1	1.5	1.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Delay (s)	3.9	7.7	4.7	5.7	25.6	22.9	22.9	22.9	22.9	22.9	22.9	22.9
Level of Service	A	A	A	A	A	C	C	C	C	C	C	C
Approach Delay (s)	7.5	7.5	5.5	5.5	25.6	22.9	22.9	22.9	22.9	22.9	22.9	22.9
Approach LOS	A	A	A	A	C	C	C	C	C	C	C	C
Intersection Summary												
HCM 2000 Control Delay												
HCM 2000 Volume to Capacity ratio												
Actuated Cycle Length (s)												
Intersection Capacity Utilization												
Analysis Period (min)												
Critical Lane Group												

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	
Lane Configurations		↕↕	↕		↕		
Traffic Volume (vph)	12	514	527	26	35	28	
Future Volume (vph)	12	514	527	26	35	28	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00	
Ped Bike Factor							
Fit			0.994		0.940		
Flt Protected		0.999			0.973		
Satd. Flow (prot)	0	3290	1707	0	1601	0	
Flt Permitted		0.999			0.973		
Satd. Flow (perm)	0	3290	1707	0	1601	0	
Link Speed (k/h)		50	50		50		
Link Distance (m)		134.5	118.7		82.8		
Travel Time (s)		9.7	8.5		6.0		
Confl. Peds. (#/hr)	371			371	38	14	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Heavy Vehicles (%)	0%	1%	2%	0%	0%	0%	
Adj. Flow (vph)	13	559	573	28	38	30	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	0	572	601	0	68	0	
Sign Control		Free	Free		Stop		
Intersection Summary							
Area Type:	Other						
Control Type:	Unsignalized						
Intersection Capacity Utilization	46.8%						
Analysis Period (min)	15						
ICU Level of Service A							

	EBL	EBT	WBT	WBR	SBL	SBR	
Movement	EBL	EBT	WBT	WBR	SBL	SBR	
Lane Configurations	12	514	527	26	35	28	
Traffic Volume (veh/h)	12	514	527	26	35	28	
Future Volume (Veh/h)	12	514	527	26	35	28	
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)	13	559	573	28	38	30	
Pedestrians		14	38		371		
Lane Width (m)		3.6	3.6		3.6		
Walking Speed (m/s)		1.2	1.2		1.2		
Percent Blockage		1	3		31		
Right turn flare (veh)							
Median type		None	None				
Median storage (veh)							
Upstream signal (m)		256					
pX, platoon unblocked					1302	972	
VC, conflicting volume		972					
VC1, stage 1 conf vol							
VC2, stage 2 conf vol							
VCu, unblocked vol		972			1302	972	
IC, single (s)		4.1			6.8	6.9	
IC, 2 stage (s)		2.2			3.5	3.3	
p0 queue free %		97			62	83	
dM capacity (veh/h)		496			101	175	
Direction, Lane #	EB 1	EB 2	WB 1	SB 1			
Volume Total	199	373	601	68			
Volume Left	13	0	0	38			
Volume Right	0	0	28	30			
cSH	496	1700	1700	124			
Volume to Capacity	0.03	0.22	0.35	0.55			
Queue Length 95th (m)	0.6	0.0	0.0	19.8			
Control Delay (s)	1.2	0.0	0.0	64.5			
Lane LOS	A			F			
Approach Delay (s)	0.4		0.0	64.5			
Approach LOS				F			
Intersection Summary							
Average Delay			3.7				
Intersection Capacity Utilization			46.8%				
Analysis Period (min)			15				
ICU Level of Service A							

Lanes, Volumes, Timings
4: Robinson Street & Clark Avenue

5234-5278 Ferry Street, Niagara Falls TIS

Background PMI (Open)

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	44	310	19	12	338	82	29	21	4	109	6	56
Traffic Volume (vph)	44	310	19	12	338	82	29	21	4	109	6	56
Future Volume (vph)	44	310	19	12	338	82	29	21	4	109	6	56
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
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		0.993			0.974			0.991				0.956
Frt		0.994			0.999			0.974				0.969
Flt Protected		0	1672	0	0	1664	0	0	1653	0	0	1621
Satd. Flow (prot)		0.994			0.999			0.974				0.969
Flt Permitted		0	1672	0	0	1664	0	0	1653	0	0	1621
Satd. Flow (perm)		50			50			50				50
Link Speed (k/h)		133.5			132.0			59.2				232.7
Travel Time (s)		9.6			9.5			4.3				16.8
Confl. Peds. (#/hr)		80			57			80				103
Peak Hour Factor		0.92			0.92			0.92				0.92
Heavy Vehicles (%)		0%			0%			4%				0%
Adj. Flow (vph)		48			21			367				118
Shared Lane Traffic (%)		0			0			0				0
Lane Group Flow (vph)		406			469			59				186
Sign Control		Free			Free			Stop				Stop
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	63.9%											
Analysis Period (min)	15											

HCM Unsignalized Intersection Capacity Analysis
4: Robinson Street & Clark Avenue

5234-5278 Ferry Street, Niagara Falls TIS

Background PMI (Open)

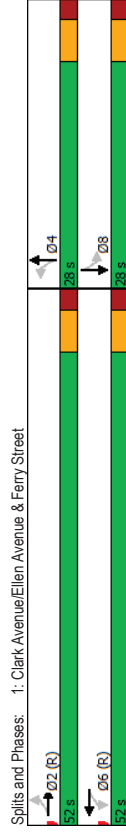
	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	44	310	19	12	338	82	29	21	4	109	6	56
Traffic Volume (veh/h)	44	310	19	12	338	82	29	21	4	109	6	56
Future Volume (Veh/h)	44	310	19	12	338	82	29	21	4	109	6	56
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
Grade	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	48	337	21	13	367	89	32	23	4	118	7	61
Pedestrians		28			103			57				80
Lane Width (m)		3.6			3.6			3.6				3.6
Walking Speed (m/s)		1.2			1.2			1.2				1.2
Percent Blockage		2			9			5				7
Right turn flare (veh)		None			None			None				None
Median type		None			None			None				None
Median storage (veh)		None			None			None				None
Upstream signal (m)		None			None			None				None
pX, platoon unblocked		536			415			1030				1028
VC, conflicting volume		536			415			1030				1028
VC1, stage 1 conf vol		536			415			1030				1028
VC2, stage 2 conf vol		4.1			4.1			7.1				6.2
VCu, unblocked vol		536			415			1030				1028
IC, single (s)		4.1			4.1			7.1				6.2
IC, 2 stage (s)		2.2			2.2			3.5				3.3
IF (s)		2.2			2.2			3.5				3.3
p0 queue free %		95			99			78				96
dM capacity (veh/h)		973			1100			146				188
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	406	469	59	186								
Volume Left	48	13	32	118								
Volume Right	21	89	4	61								
cSH	973	1100	169	178								
Volume to Capacity	0.05	0.01	0.35	1.04								
Queue Length 95th (m)	1.2	0.3	10.9	66.4								
Control Delay (s)	1.5	0.4	37.4	133.0								
Lane LOS	A	A	E	F								
Approach Delay (s)	1.5	0.4	37.4	133.0								
Approach LOS	E	F										
Intersection Summary												
Average Delay	24.8											
Intersection Capacity Utilization	63.9%											
Analysis Period (min)	15											

Lanes, Volumes, Timings
1: Clark Avenue/Ellen Avenue & Ferry Street

Lanes, Volumes, Timings
1: Clark Avenue/Ellen Avenue & Ferry Street

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	85	616	73	99	469	8	74	27	103	20	62	166
Future Volume (vph)	85	616	73	99	469	8	74	27	103	20	62	166
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	40.0	0.0	40.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Storage Lanes	1	0	1	0	0	0	0	0	0	0	0	0
Tapor Length (m)	7.5	0	7.5	0	0	0	0	0	0	0	0	0
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	0.80	0.94		0.99			0.78				0.86	
Frt	0.984		0.950		0.997		0.932		0.932		0.910	
Flt Protected	0.950			0.950			0.932		0.932		0.996	
Satd. Flow (prot)	1646	1575	0	1630	1695	0	0	1252	0	0	1367	0
Flt Permitted	0.405		0.264				0.657		0.657		0.967	
Satd. Flow (perm)	585	1575	0	453	1695	0	0	809	0	0	1303	0
Right Turn on Red		Yes			Yes		Yes		Yes		Yes	
Satd. Flow (RTOR)	13		2		55		50		50		84	
Link Speed (km/h)	50		50		52.1		52.1		52.1		169.1	
Link Distance (m)	133.8		121.5		8.7		3.8		12.2		12.2	
Travel Time (s)	9.6		317		309		92		190		190	
Confl. Peds. (#/hr)	309		317		309		92		190		190	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	3%	2%	2%	0%	0%	12%	4%	0%	2%	1%	
Adj. Flow (vph)	92	670	79	108	510	9	80	29	112	22	67	180
Shared Lane Traffic (%)												
Lane Group Flow (vph)	92	749	0	108	519	0	0	221	0	0	269	0
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases	2	2	6	6	4	4	8	8	8	8	8	8
Permitted Phases	2	2	6	6	6	6	4	4	4	4	8	8
Detector Phase	2	2	6	6	6	6	4	4	4	4	8	8
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	23.2	23.2	23.2	27.1	27.1	27.1	27.1	27.1	27.1	27.1	27.1	27.1
Total Split (s)	52.0	52.0	52.0	52.0	52.0	52.0	28.0	28.0	28.0	28.0	28.0	28.0
Total Split (%)	65.0%	65.0%	65.0%	65.0%	65.0%	65.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%
Maximum Green (s)	45.8	45.8	45.8	45.8	45.8	45.8	21.9	21.9	21.9	21.9	21.9	21.9
Yellow Time (s)	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
All-Red Time (s)	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.1	-2.1	-2.1	-2.1	-2.1	-2.1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	None	None	None	None	None	None
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	8.0	8.0	8.0	8.0	8.0	8.0
Flash Dont Walk (s)	10.0	10.0	10.0	10.0	10.0	10.0	13.0	13.0	13.0	13.0	13.0	13.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Act Effct Green (s)	52.0	52.0	52.0	52.0	52.0	52.0	20.0	20.0	20.0	20.0	20.0	20.0
Actuated g/c Ratio	0.65	0.65	0.65	0.65	0.65	0.65	0.25	0.25	0.25	0.25	0.25	0.25
v/c Ratio	0.25	0.73	0.37	0.37	0.47	0.37	0.91	0.91	0.91	0.91	0.91	0.91

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	3.4	6.7		12.5	9.8		60.8		60.8		27.4	
Queue Delay	0.0	0.8		0.0	0.0		0.0		0.0		0.0	
Total Delay	3.4	7.6		12.5	9.8		60.8		60.8		27.4	
LOS	A	A		B	A		E		E		C	
Approach Delay	7.1			10.3			60.8		60.8		27.4	
Approach LOS	A			B			E		E		C	
Queue Length 50th (m)	1.9	20.4		7.4	38.6		23.4		23.4		23.6	
Queue Length 95th (m)	m2.4	m20.3		19.6	63.3		#59.5		#59.5		47.0	
Internal Link Dist (m)		109.8			97.5		28.1		28.1		145.1	
Turn Bay Length (m)	40.0			40.0								
Base Capacity (vph)	367	1027		294	1101		281		281		449	
Starvation Cap Reductn	0	89		0	0		0		0		0	
Spillback Cap Reductn	0	0		0	0		0		0		0	
Storage Cap Reductn	0	0		0	0		0		0		0	
Reduced v/c Ratio	0.25	0.80		0.37	0.47		0.79		0.79		0.60	
Intersection Summary	Other											
Area Type	Other											
Cycle Length	80											
Actuated Cycle Length	80											
Offset	10 (13%), Referenced to phase 2EBTL and 6WBTL, Start of Green											
Natural Cycle	70											
Control Type	Actuated-Coordinated											
Maximum v/c Ratio	0.91											
Intersection Signal Delay	17.0											
Intersection Capacity Utilization	97.4%											
ICU Level of Service	F											
Analysis Period (min)	15											
# 95th percentile volume exceeds capacity, queue may be longer.												
Queue shown is maximum after two cycles.												
m Volume for 95th percentile queue is metered by upstream signal.												



HCM Signalized Intersection Capacity Analysis 5234-5278 Ferry Street, Niagara Falls TIS
1: Clark Avenue/Ellen Avenue & Ferry Street Background Saturday (Open)

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Volume (vph)	85	616	73	99	469	8	74	27	103	20	62	166
Future Volume (vph)	85	616	73	99	469	8	74	27	103	20	62	166
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	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	1.00	1.00	1.00
Flpb. ped/bikes	1.00	0.94	1.00	0.99	1.00	0.99	0.81	0.97	0.98	0.98	0.98	0.98
Flt	0.79	1.00	0.98	1.00	1.00	1.00	0.93	0.93	0.91	0.91	0.91	0.91
Flt Protected	0.95	1.00	0.95	1.00	1.00	0.98	1.00	0.98	1.00	1.00	1.00	1.00
Satd. Flow (prot)	1304	1575	1462	1695	1211	1462	1695	1211	1462	1695	1211	1342
Flt Permitted	0.41	1.00	0.26	1.00	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.97
Satd. Flow (perm)	556	1575	407	1695	809	1695	809	809	1303	1303	1303	1303
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	92	670	79	108	510	9	80	29	112	22	67	180
RTOR Reduction (vph)	0	5	0	0	1	0	0	41	0	0	63	0
Lane Group Flow (vph)	92	744	0	108	518	0	0	180	0	0	206	0
Confl. Peds. (#/hr)	309	317	317	309	92	190	190	92	190	190	92	92
Heavy Vehicles (%)	1%	3%	2%	2%	0%	0%	12%	4%	0%	2%	1%	1%
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases	2	2	2	2	2	2	2	2	2	2	2	2
Permitted Phases	2	2	2	2	2	2	2	2	2	2	2	2
Actuated Green, G (s)	49.8	49.8	49.8	49.8	49.8	17.9	17.9	17.9	17.9	17.9	17.9	17.9
Effective Green, g (s)	52.0	52.0	52.0	52.0	52.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Actuated g/C Ratio	0.65	0.65	0.65	0.65	0.65	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Clearance Time (s)	0.9	2.4	0.9	2.4	0.9	6.1	6.1	6.1	6.1	6.1	6.1	6.1
Vehicle Extension (s)	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Lane Grp Cap (vph)	361	1023	264	1101	1101	202	202	202	325	325	325	325
v/s Ratio Prot	0.17	0.27	0.27	0.27	0.27	0.22	0.22	0.22	0.16	0.16	0.16	0.16
v/s Ratio Perm	0.25	0.73	0.41	0.47	0.89	0.89	0.89	0.89	0.63	0.63	0.63	0.63
Uniform Delay, d1	5.9	9.3	6.7	7.1	28.9	28.9	28.9	28.9	26.7	26.7	26.7	26.7
Progression Factor	0.33	0.35	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.9	2.4	0.9	2.4	0.9	6.1	6.1	6.1	3.1	3.1	3.1	3.1
Delay (s)	2.8	5.6	11.3	8.5	62.7	62.7	62.7	62.7	29.8	29.8	29.8	29.8
Level of Service	A	A	B	A	E	E	E	E	C	C	C	C
Approach Delay (s)	5.3	9.0	9.0	9.0	62.7	62.7	62.7	62.7	29.8	29.8	29.8	29.8
Approach LOS	A	A	A	A	E	E	E	E	C	C	C	C
Intersection Summary												
HCM 2000 Control Delay	16.3											
HCM 2000 Volume to Capacity ratio	0.77											
Actuated Cycle Length (s)	80.0											
Intersection Capacity Utilization	97.4%											
Analysis Period (min)	15											
c Critical Lane Group												

Lanes, Volumes, Timings 5234-5278 Ferry Street, Niagara Falls TIS
2: Fallsview Boulevard & Ferry Street Background Saturday (Open)

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Volume (vph)	24	703	130	130	592	3	125	7	104	4	6	22
Future Volume (vph)	24	703	130	130	592	3	125	7	104	4	6	22
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	30.0	4.0	4.0	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	1.00	1.00	1.00
Flpb. ped/bikes	1.00	0.94	1.00	0.99	1.00	0.99	0.94	0.94	0.94	0.94	0.94	0.94
Flt	0.950	0.97	0.950	0.950	0.950	0.950	0.941	0.941	0.941	0.941	0.941	0.941
Flt Protected	0.950	0.97	0.950	0.950	0.950	0.950	0.941	0.941	0.941	0.941	0.941	0.941
Satd. Flow (prot)	1630	1554	0	1630	1727	0	0	1495	0	0	1518	0
Flt Permitted	0.332	0.332	0	0.332	0.332	0	0	0.332	0	0	0.332	0
Satd. Flow (perm)	488	1554	0	317	1727	0	0	1247	0	0	1460	0
Right Turn on Red	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Satd. Flow (RTOR)	21	21	21	21	21	21	21	21	21	21	21	21
Link Speed (k/h)	50	50	50	50	50	50	50	50	50	50	50	50
Link Distance (m)	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9
Travel Time (s)	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2
Confl. Peds. (#/hr)	309	278	278	309	4	39	39	4	39	39	4	4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	1%	2%	2%	1%	2%	2%	4%	2%	2%	2%	2%
Adj. Flow (vph)	26	764	141	141	643	3	136	8	113	4	7	24
Shared Lane Traffic (%)												
Lane Group Flow (vph)	26	905	0	141	646	0	0	257	0	0	35	0
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases	2	2	2	2	2	2	2	2	2	2	2	2
Permitted Phases	2	2	2	2	2	2	2	2	2	2	2	2
Detector Phase	2	2	2	2	2	2	2	2	2	2	2	2
Switch Phase	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Minimum Initial (s)	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2
Minimum Split (s)	52.8	52.8	52.8	52.8	52.8	52.8	52.8	52.8	52.8	52.8	52.8	52.8
Total Split (s)	66.0%	66.0%	66.0%	66.0%	66.0%	66.0%	66.0%	66.0%	66.0%	66.0%	66.0%	66.0%
Total Split (%)	66.0%	66.0%	66.0%	66.0%	66.0%	66.0%	66.0%	66.0%	66.0%	66.0%	66.0%	66.0%
Maximum Green (s)	46.6	46.6	46.6	46.6	46.6	46.6	46.6	46.6	46.6	46.6	46.6	46.6
Yellow Time (s)	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
All-Red Time (s)	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Lost Time Adjust (s)	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag												
Vehicle Extension (s)	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max
Walk Time (s)	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Flash Dont Walk (s)	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Act Effect Green (s)	53.0	53.0	53.0	53.0	53.0	53.0	53.0	53.0	53.0	53.0	53.0	53.0
Actuated g/C Ratio	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66
v/c Ratio	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87

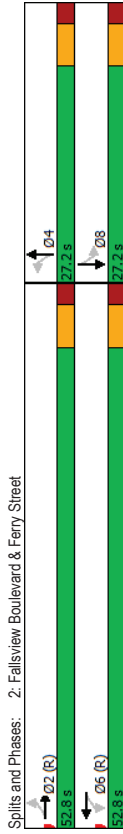
Lanes, Volumes, Timings

2: Fallsview Boulevard & Ferry Street

5234-5278 Ferry Street, Niagara Falls TIS

Background Saturday (Open)

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	7.0	24.2	25.5	7.6	41.6	28.4	38.0	38.0	38.0	38.0	38.0	38.0
Queue Delay	0.0	0.7	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.0	25.0	25.5	7.8	41.6	28.4	38.0	38.0	38.0	38.0	38.0	38.0
LOS	A	C	C	A	B	B	D	D	D	D	D	D
Approach Delay	24.5	11.0	11.0	38.0	38.0	38.0	38.0	38.0	38.0	38.0	38.0	38.0
Approach LOS	C	B	B	D	D	D	D	D	D	D	D	D
Queue Length 50th (m)	1.3	98.2	9.7	41.6	28.4	28.4	51.7	51.7	51.7	51.7	51.7	51.7
Queue Length 95th (m)	4.6	#201.1	m#45.0	m#58.7	109.8	171.3	33.8	33.8	33.8	33.8	33.8	33.8
Internal Link Dist (m)	30.0	75.9	45.0	210	1145	397	440	440	440	440	440	440
Base Capacity (vph)	323	1037	210	1145	0	79	0	0	0	0	0	0
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	24	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.08	0.89	0.67	0.61	0.65	0.65	0.08	0.08	0.08	0.08	0.08	0.08
Intersection Summary	Other											
Area Type:	Other											
Cycle Length: 80	Actuated Cycle Length: 80											
Offset: 0 (0%)	Referenced to phase 2:EBTL and 6:WBTL, Start of Green											
Natural Cycle: 90	Control Type: Actuated-Coordinated											
Control Type: Actuated-Coordinated	Maximum v/c Ratio: 0.87											
Intersection Signal Delay: 20.7	Intersection LOS: C											
Intersection Capacity Utilization 90.8%	ICU Level of Service E											
Analysis Period (min) 15	# 95th percentile volume exceeds capacity, queue may be longer.											
# 95th percentile volume exceeds capacity, queue may be longer.	Queue shown is maximum after two cycles.											
m Volume for 95th percentile queue is metered by upstream signal.												



HCM Signalized Intersection Capacity Analysis

2: Fallsview Boulevard & Ferry Street

5234-5278 Ferry Street, Niagara Falls TIS

Background Saturday (Open)

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Volume (vph)	24	703	130	130	592	3	125	7	104	4	6	22
Future Volume (vph)	24	703	130	130	592	3	125	7	104	4	6	22
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	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	1.00	1.00	1.00
Frb. ped/bikes	1.00	0.92	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frb. ped/bikes	0.84	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00	0.97	1.00	0.99	1.00	1.00	1.00
Satd. Flow (prot)	1377	1554	1630	1727	1489	1512	1489	1512	1489	1512	1489	1512
Flt Permitted	0.33	1.00	0.18	1.00	0.82	0.96	0.33	1.00	0.18	1.00	0.82	0.96
Satd. Flow (perm)	480	1554	317	1727	1247	1461	480	1554	317	1727	1247	1461
Peak-Hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	26	764	141	141	643	3	136	8	113	4	7	24
RTOR Reduction (vph)	0	7	0	0	0	0	0	38	0	0	18	0
Lane Group Flow (vph)	26	898	0	141	646	0	219	0	0	0	17	0
Confl. Peds. (#/hr)	309	278	278	309	4	39	39	4	39	39	4	4
Heavy Vehicles (%)	2%	1%	2%	2%	2%	2%	2%	2%	4%	2%	2%	2%
Turn Type	Perm	NA	NA	Perm	NA	Perm	NA	NA	Perm	NA	NA	NA
Protected Phases	2	2	2	6	6	4	4	4	4	4	4	4
Permitted Phases	2	2	2	6	6	4	4	4	4	4	4	4
Actuated Green, G (s)	50.8	50.8	50.8	50.8	50.8	16.8	16.8	16.8	16.8	16.8	16.8	16.8
Effective Green, g (s)	53.0	53.0	53.0	53.0	53.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0
Actuated 9/C Ratio	0.66	0.66	0.66	0.66	0.66	0.24	0.24	0.24	0.24	0.24	0.24	0.24
Clearance Time (s)	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2
Vehicle Extension (s)	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Lane Grp Cap (vph)	318	1029	210	1144	296	346	318	1029	210	1144	296	346
v/s Ratio Prot	0.05	0.05	0.05	0.45	0.37	0.01	0.01	0.01	0.01	0.01	0.01	0.01
v/s Ratio Perm	0.08	0.87	0.08	0.67	0.56	0.74	0.74	0.74	0.74	0.74	0.74	0.74
Uniform Delay, d1	4.8	10.8	8.2	7.3	28.2	23.5	23.5	23.5	23.5	23.5	23.5	23.5
Progression Factor	1.00	1.00	1.00	0.69	0.68	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.5	10.2	13.8	1.7	8.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Delay (s)	5.3	21.0	19.5	6.7	36.4	23.6	23.6	23.6	23.6	23.6	23.6	23.6
Level of Service	A	C	B	A	A	D	D	D	D	D	D	D
Approach Delay (s)	20.5	20.5	9.0	9.0	36.4	23.6	23.6	23.6	23.6	23.6	23.6	23.6
Approach LOS	C	C	A	A	D	C	C	C	C	C	C	C
Intersection Summary												
HCM 2000 Control Delay	18.1	18.1	18.1	18.1	18.1	18.1	18.1	18.1	18.1	18.1	18.1	18.1
HCM 2000 Volume to Capacity ratio	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Actuated Cycle Length (s)	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
Intersection Capacity Utilization	90.8%	90.8%	90.8%	90.8%	90.8%	90.8%	90.8%	90.8%	90.8%	90.8%	90.8%	90.8%
Analysis Period (min)	15	15	15	15	15	15	15	15	15	15	15	15
c Critical Lane Group												

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		4A	4A		W	
Traffic Volume (vph)	15	694	531	33	79	48
Future Volume (vph)	15	694	531	33	79	48
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor			0.992		0.949	
Fit						
Fit Protected		0.999			0.970	
Satd. Flow (prot)	0	3289	1704	0	1599	0
Fit Permitted		0.999			0.970	
Satd. Flow (perm)	0	3289	1704	0	1599	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		134.5	118.7		82.8	
Travel Time (s)		9.7	8.5		6.0	
Conf. Peds. #/hr	547			547	59	18
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	1%	2%	0%	0%	2%
Adj. Flow (vph)	16	754	577	36	86	52
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	770	613	0	138	0
Sign Control		Free	Free		Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	50.5%					
Analysis Period (min)	15					
ICU Level of Service A						

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		4A			W	
Traffic Volume (veh/h)	15	694	531	33	79	48
Future Volume (Veh/h)	15	694	531	33	79	48
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)	16	754	577	36	86	52
Pedestrians		18	59		547	
Lane Width (m)		3.6	3.6		3.6	
Walking Speed (m/s)		1.2	1.2		1.2	
Percent Blockage		2	5		46	
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)		256				
pX, platoon unblocked					1610	1160
VC, conflicting volume		1160				
VC1, stage 1 conf vol						
VC2, stage 2 conf vol						
VCu, unblocked vol		1160			1610	1160
IC, single (s)		4.1			6.8	6.9
IC, 2 stage (s)						
IF (s)		2.2			3.5	3.3
p0 queue free %		95			0	49
dM capacity (veh/h)		332			48	101
Direction, Lane #	EB 1	EB 2	WB 1	SB 1		
Volume Total	267	503	613	138		
Volume Left	16	0	0	86		
Volume Right	0	0	36	52		
cSH	332	1700	1700	60		
Volume to Capacity	0.05	0.30	0.36	2.31		
Queue Length 95th (m)	1.1	0.0	0.0	101.9		
Control Delay (s)	1.9	0.0	0.0	746.5		
Lane LOS	A			F		
Approach Delay (s)	0.6		0.0	746.5		
Approach LOS				F		
Intersection Summary						
Average Delay			68.1			
Intersection Capacity Utilization			50.5%			A
Analysis Period (min)			15			

Lanes, Volumes, Timings
4: Robinson Street & Clark Avenue

5234-5278 Ferry Street, Niagara Falls TIS

Background Saturday (Open)

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	62	343	55	72	331	81	47	25	11	95	12	94
Traffic Volume (vph)	62	343	55	72	331	81	47	25	11	95	12	94
Future Volume (vph)	62	343	55	72	331	81	47	25	11	95	12	94
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
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	0.984				0.977			0.982			0.937	
Frt	0.993				0.993			0.972			0.977	
Flt Protected	0	1666	0	0	1667	0	0	1670	0	0	1595	0
Satd. Flow (prot)	0.993				0.993			0.972			0.977	
Flt Permitted	0	1666	0	0	1667	0	0	1670	0	0	1595	0
Satd. Flow (perm)	50				50			50			50	
Link Speed (k/h)	133.5				132.0			59.2			232.7	
Travel Time (s)	9.6				9.5			4.3			16.8	
Confl. Peds. (#/hr)	142				86			142			95	
Peak Hour Factor	0.92				0.92			0.92			0.92	
Heavy Vehicles (%)	3%				0%			0%			0%	
Adj. Flow (vph)	67	373	60	78	360	88	51	27	12	103	13	102
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	500	0	0	526	0	0	90	0	0	218	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	64.8%											
Analysis Period (min)	15											

HCM Unsignalized Intersection Capacity Analysis
4: Robinson Street & Clark Avenue

5234-5278 Ferry Street, Niagara Falls TIS

Background Saturday (Open)

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰		↰	↰	↰		↰	↰	↰	↰	↰
Traffic Volume (veh/h)	62	343	55	72	331	81	47	25	11	95	12	94
Future Volume (veh/h)	62	343	55	72	331	81	47	25	11	95	12	94
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
Grade	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	67	373	60	78	360	88	51	27	12	103	13	102
Pedestrians	123				95			86			142	
Lane Width (m)	3.6				3.6			3.6			3.6	
Walking Speed (m/s)	1.2				1.2			1.2			1.2	
Percent Blockage	10				8			7			12	
Right turn flare (veh)												
Median type	None				None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	590			519			1414	1369	584	1360	1355	669
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	590			519			1414	1369	584	1360	1355	669
IC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
IC, 2 stage (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
IF (s)	92			92			0	74	97	0	88	72
p0 queue free %	865			982			48	103	440	62	105	363
dM capacity (veh/h)												
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	500	526	90	218								
Volume Left	67	78	51	103								
Volume Right	60	88	12	102								
cSH	865	982	67	105								
Volume to Capacity	0.08	0.08	1.34	2.07								
Queue Length 95th (m)	1.9	1.9	55.6	138.8								
Control Delay (s)	2.1	2.2	331.6	579.8								
Lane LOS	A	A	F	F								
Approach Delay (s)	2.1	2.2	331.6	579.8								
Approach LOS	F	F	F	F								
Intersection Summary												
Average Delay	118.8											
Intersection Capacity Utilization	64.8%											
ICU Level of Service	C											
Analysis Period (min)	15											

Appendix G

2027 Total Traffic Operations



Lanes, Volumes, Timings
1: Clark Avenue/Ellen Avenue & Ferry Street

5234-5278 Ferry Street, Niagara Falls TIS

Total PM (Open)

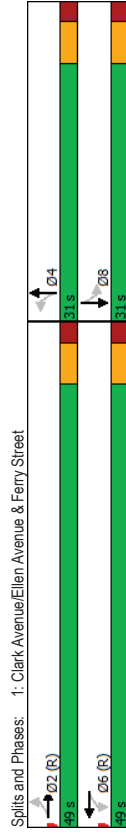
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	74	452	200	123	476	16	187	14	110	10	23	106
Future Volume (vph)	74	452	200	123	476	16	187	14	110	10	23	106
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	40.0	0.0	40.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Storage Lanes	1	0	1	0	0	0	0	0	0	0	0	0
Tapor Length (m)	7.5	0	7.5	0	0	0	7.5	0	0	0	7.5	0
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	0.85	0.84		0.99		0.99		0.89		0.89		0.89
Frt	0.954			0.954		0.954		0.954		0.954		0.954
Flt Protected	0.950			0.950		0.950		0.950		0.950		0.950
Satd. Flow (prot)	1662	1378	0	1662	1667	0	0	1515	0	0	1395	0
Flt Permitted	0.361			0.242				0.713			0.967	
Satd. Flow (perm)	539	1378	0	424	1667	0	0	1052	0	0	1348	0
Right Turn on Red		Yes			Yes		Yes		Yes			Yes
Satd. Flow (RTOR)	45			3			37				115	
Link Speed (km/h)	50			50			50				50	
Link Distance (m)	133.8			121.5			52.1				169.1	
Travel Time (s)	9.6			8.7			3.8				12.2	
Confl. Peds. (#/hr)	191			263			191				75	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	2%	0%	0%	3%	0%	0%	0%	2%	0%	0%	0%
Adj. Flow (vph)	80	491	217	134	517	17	203	15	120	11	25	115
Shared Lane Traffic (%)												
Lane Group Flow (vph)	80	708	0	134	534	0	0	338	0	0	151	0
Turn Type	Perm	NA	NA	Perm	NA	NA	Perm	NA	NA	Perm	NA	NA
Protected Phases	2			6			4			8		8
Permitted Phases	2			6			4			8		8
Detector Phase	2			6			4			8		8
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0		8.0	8.0		8.0	8.0	8.0
Minimum Split (s)	23.2	23.2		23.2	23.2		27.1	27.1		27.1	27.1	27.1
Total Split (s)	49.0	49.0		49.0	49.0		31.0	31.0		31.0	31.0	31.0
Total Split (%)	61.3%	61.3%		61.3%	61.3%		38.8%	38.8%		38.8%	38.8%	38.8%
Maximum Green (s)	42.8	42.8		42.8	42.8		24.9	24.9		24.9	24.9	24.9
Yellow Time (s)	4.1	4.1		4.1	4.1		4.1	4.1		4.1	4.1	4.1
All-Red Time (s)	2.1	2.1		2.1	2.1		2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	-2.2	-2.2		-2.2	-2.2		-2.1	-2.1		-2.1	-2.1	-2.1
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 Optimize?												
Vehicle Extension (s)	2.1	2.1		2.1	2.1		2.1	2.1		2.1	2.1	2.1
Recall Mode	C-Max	C-Max		C-Max	C-Max		None	None		None	None	None
Walk Time (s)	7.0	7.0		7.0	7.0		8.0	8.0		8.0	8.0	8.0
Flash Dont Walk (s)	10.0	10.0		10.0	10.0		13.0	13.0		13.0	13.0	13.0
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	0
Act Effct Green (s)	46.1	46.1		46.1	46.1		25.9	25.9		25.9	25.9	25.9
Actuated g/C Ratio	0.58	0.58		0.58	0.58		0.32	0.32		0.32	0.32	0.32
v/c Ratio	0.26	0.87		0.55	0.56		0.93	0.93		0.93	0.93	0.93

Lanes, Volumes, Timings
1: Clark Avenue/Ellen Avenue & Ferry Street

5234-5278 Ferry Street, Niagara Falls TIS

Total PM (Open)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	6.4	21.2	21.9	13.6			57.2			8.0		8.0
Queue Delay	0.0	0.3	0.0	0.0			0.0			0.0		0.0
Total Delay	6.4	21.5	21.9	13.6			57.2			8.0		8.0
LOS	A	C	C	B			E			A		A
Approach Delay	20.0			15.3			57.2			8.0		8.0
Approach LOS	B			B			E			A		A
Queue Length 50th (m)	4.3	86.5	11.9	47.2			42.8			3.6		3.6
Queue Length 95th (m)	m2.9	#155.3	32.2	74.4			#91.0			15.7		15.7
Internal Link Dist (m)	109.8			97.5			28.1			145.1		145.1
Turn Bay Length (m)	40.0			40.0								
Base Capacity (vph)	310	813	244	962			379			531		531
Starvation Cap Reductn	0	6	0	0			0			0		0
Spillback Cap Reductn	0	0	0	1			0			0		0
Storage Cap Reductn	0	0	0	0			0			0		0
Reduced v/c Ratio	0.26	0.88	0.55	0.56			0.89			0.28		0.28
Intersection Summary												
Area Type	Other											
Cycle Length	80											
Actuated Cycle Length	80											
Offset: 12 (15%), Referenced to phase 2EBTL and 6:WBT, Start of Green												
Natural Cycle: 75												
Control Type: Actuated-Coordinated												
Maximum v/c Ratio: 0.93												
Intersection Signal Delay: 23.9												
Intersection Capacity Utilization 100.5%												
ICU Level of Service G												
Analysis Period (min) 15												
# 95th percentile volume exceeds capacity, queue may be longer.												
Queue shown is maximum after two cycles.												
m Volume for 95th percentile queue is metered by upstream signal.												



HCM Signalized Intersection Capacity Analysis 5234-5278 Ferry Street, Niagara Falls TIS
 1: Clark Avenue/Ellen Avenue & Ferry Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Total PMV (Open)
Lane Configurations	74	452	200	123	476	16	187	14	110	10	23	106	
Traffic Volume (vph)	74	452	200	123	476	16	187	14	110	10	23	106	
Future Volume (vph)	74	452	200	123	476	16	187	14	110	10	23	106	
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	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	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	0.84	1.00	1.00	0.99	1.00	0.94	1.00	0.95	1.00	0.89	1.00	
Flpb, ped/bikes	0.85	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.95	1.00	0.90	1.00	
Fr	1.00	0.95	1.00	1.00	1.00	1.00	0.95	1.00	0.95	1.00	0.90	1.00	
Flt Protected	0.95	1.00	0.95	1.00	0.95	1.00	0.97	1.00	0.97	1.00	0.90	1.00	
Satd. Flow (prot)	1414	1378	1662	1668	1668	1433	1433	1668	1433	1389	1668	1389	
Flt Permitted	0.36	1.00	0.24	1.00	0.24	1.00	0.71	1.00	0.71	1.00	0.97	1.00	
Satd. Flow (perm)	538	1378	423	1668	423	1668	1052	1668	1052	1348	1668	1348	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	80	491	217	134	517	17	203	15	120	11	25	115	
RTOR Reduction (vph)	0	19	0	0	1	0	0	25	0	0	78	0	
Lane Group Flow (vph)	80	689	0	134	533	0	0	313	0	0	73	0	
Confl. Peds. (#/hr)	191	263	263	191	65	65	75	75	75	75	65	65	
Heavy Vehicles (%)	0%	2%	0%	0%	3%	0%	0%	0%	2%	0%	0%	0%	
Turn Type	Perm	NA	NA	Perm	NA	Perm	NA	NA	Perm	NA	NA	NA	
Protected Phases	2	2	2	6	6	6	4	4	4	8	8	8	
Permitted Phases	43.9	43.9	43.9	43.9	43.9	43.9	23.8	23.8	23.8	23.8	23.8	23.8	
Actuated Green, G (s)	46.1	46.1	46.1	46.1	46.1	46.1	25.9	25.9	25.9	25.9	25.9	25.9	
Effective Green, g (s)	0.58	0.58	0.58	0.58	0.58	0.58	0.32	0.32	0.32	0.32	0.32	0.32	
Actuated g/C Ratio	6.2	6.2	6.2	6.2	6.2	6.2	6.1	6.1	6.1	6.1	6.1	6.1	
Clearance Time (s)	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	
Vehicle Extension (s)	310	794	243	961	340	340	340	340	340	340	340	340	
Lane Grp Cap (vph)	0.15	0.26	0.87	0.55	0.55	0.55	0.92	0.92	0.92	0.92	0.92	0.92	
v/s Ratio Prot	0.26	0.87	0.55	0.55	0.55	0.55	0.92	0.92	0.92	0.92	0.92	0.92	
v/s Ratio Perm	8.4	14.4	10.5	10.6	10.6	10.6	26.1	26.1	26.1	26.1	26.1	26.1	
Uniform Delay, d1	0.50	0.67	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Progression Factor	1.5	9.7	8.7	2.3	29.1	55.1	55.1	55.1	55.1	55.1	55.1	55.1	
Incremental Delay, d2	5.7	19.3	19.3	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9	
Delay (s)	A	B	B	B	B	B	E	E	E	E	B	B	
Level of Service	A	B	B	B	B	B	E	E	E	E	B	B	
Approach Delay (s)	17.9	17.9	17.9	14.1	14.1	14.1	55.1	55.1	55.1	55.1	19.4	19.4	
Approach LOS	B	B	B	B	B	B	E	E	E	E	B	B	
Intersection Summary													
HCM 2000 Control Delay	23.2												C
HCM 2000 Volume to Capacity ratio	0.89												
Actuated Cycle Length (s)	80.0												8.0
Intersection Capacity Utilization	100.5%												G
Analysis Period (min)	15												
c Critical Lane Group													

Lanes, Volumes, Timings 5234-5278 Ferry Street, Niagara Falls TIS
 2: Fallsview Boulevard & Ferry Street

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Total PMV (Open)
Lane Configurations	74	452	200	123	476	16	187	14	110	10	23	106	
Traffic Volume (vph)	74	452	200	123	476	16	187	14	110	10	23	106	
Future Volume (vph)	74	452	200	123	476	16	187	14	110	10	23	106	
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	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	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	0.84	1.00	1.00	0.99	1.00	0.94	1.00	0.95	1.00	0.89	1.00	
Flpb, ped/bikes	0.85	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.95	1.00	0.90	1.00	
Fr	1.00	0.95	1.00	1.00	1.00	1.00	0.95	1.00	0.95	1.00	0.90	1.00	
Flt Protected	0.95	1.00	0.95	1.00	0.95	1.00	0.97	1.00	0.97	1.00	0.90	1.00	
Satd. Flow (prot)	1414	1378	1662	1668	1668	1433	1433	1668	1433	1389	1668	1389	
Flt Permitted	0.36	1.00	0.24	1.00	0.24	1.00	0.71	1.00	0.71	1.00	0.97	1.00	
Satd. Flow (perm)	538	1378	423	1668	423	1668	1052	1668	1052	1348	1668	1348	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	80	491	217	134	517	17	203	15	120	11	25	115	
RTOR Reduction (vph)	0	19	0	0	1	0	0	25	0	0	78	0	
Lane Group Flow (vph)	80	689	0	134	533	0	0	313	0	0	73	0	
Confl. Peds. (#/hr)	191	263	263	191	65	65	75	75	75	75	65	65	
Heavy Vehicles (%)	0%	2%	0%	0%	3%	0%	0%	0%	2%	0%	0%	0%	
Turn Type	Perm	NA	NA	Perm	NA	Perm	NA	NA	Perm	NA	NA	NA	
Protected Phases	2	2	2	6	6	6	4	4	4	8	8	8	
Permitted Phases	43.9	43.9	43.9	43.9	43.9	43.9	23.8	23.8	23.8	23.8	23.8	23.8	
Actuated Green, G (s)	46.1	46.1	46.1	46.1	46.1	46.1	25.9	25.9	25.9	25.9	25.9	25.9	
Effective Green, g (s)	0.58	0.58	0.58	0.58	0.58	0.58	0.32	0.32	0.32	0.32	0.32	0.32	
Actuated g/C Ratio	6.2	6.2	6.2	6.2	6.2	6.2	6.1	6.1	6.1	6.1	6.1	6.1	
Clearance Time (s)	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	
Vehicle Extension (s)	310	794	243	961	340	340	340	340	340	340	340	340	
Lane Grp Cap (vph)	0.15	0.26	0.87	0.55	0.55	0.55	0.92	0.92	0.92	0.92	0.92	0.92	
v/s Ratio Prot	0.26	0.87	0.55	0.55	0.55	0.55	0.92	0.92	0.92	0.92	0.92	0.92	
v/s Ratio Perm	8.4	14.4	10.5	10.6	10.6	10.6	26.1	26.1	26.1	26.1	26.1	26.1	
Uniform Delay, d1	0.50	0.67	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Progression Factor	1.5	9.7	8.7	2.3	29.1	55.1	55.1	55.1	55.1	55.1	55.1	55.1	
Incremental Delay, d2	5.7	19.3	19.3	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9	
Delay (s)	A	B	B	B	B	B	E	E	E	E	B	B	
Level of Service	A	B	B	B	B	B	E	E	E	E	B	B	
Approach Delay (s)	17.9	17.9	17.9	14.1	14.1	14.1	55.1	55.1	55.1	55.1	19.4	19.4	
Approach LOS	B	B	B	B	B	B	E	E	E	E	B	B	
Intersection Summary													
HCM 2000 Control Delay	23.2												C
HCM 2000 Volume to Capacity ratio	0.89												
Actuated Cycle Length (s)	80.0												8.0
Intersection Capacity Utilization	100.5%												G
Analysis Period (min)	15												
c Critical Lane Group													

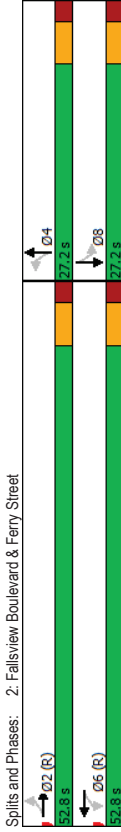
Lanes, Volumes, Timings

2: Fallsview Boulevard & Ferry Street

5234-5278 Ferry Street, Niagara Falls TIS

Total PM (Open)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	5.7	11.3	6.7	7.0	7.0	7.0	27.7	27.7	0.0	0.0	13.4	13.4
Queue Delay	0.0	0.0	0.0	0.2	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	5.7	11.3	6.7	7.2	7.2	7.2	27.7	27.7	0.0	0.0	13.4	13.4
LOS	A	B	A	A	A	A	C	C			B	B
Approach Delay	11.2	7.1	7.1	27.7	27.7	27.7	13.4	13.4			13.4	13.4
Approach LOS	B	A	A	C	C	C	B	B			B	B
Queue Length 50th (m)	0.9	51.4	3.1	30.7	30.7	30.7	16.9	16.9			1.4	1.4
Queue Length 95th (m)	4.3	122.9	m10.5	m69.7	m69.7	m69.7	33.4	33.4			7.6	7.6
Internal Link Dist (m)	30.0	75.9	109.8	45.0	45.0	45.0	171.3	171.3			33.8	33.8
Base Capacity (vph)	324	1170	322	1203	1203	1203	425	425			444	444
Starvation Cap Reductn	0	0	0	0	0	0	0	0			0	0
Spillback Cap Reductn	0	11	0	0	0	0	0	0			0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0			0	0
Reduced v/c Ratio	0.08	0.68	0.33	0.68	0.68	0.68	0.46	0.46			0.08	0.08
Intersection Summary												
Area Type: Other												
Cycle Length: 80												
Actuated Cycle Length: 80												
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green												
Natural Cycle: 70												
Control Type: Actuated-Coordinated												
Maximum v/c Ratio: 0.67												
Intersection Signal Delay: 11.0												
Intersection Capacity Utilization 79.0%												
Analysis Period (min) 15												
m Volume for 95th percentile queue is metered by upstream signal.												



HCM Signalized Intersection Capacity Analysis

2: Fallsview Boulevard & Ferry Street

5234-5278 Ferry Street, Niagara Falls TIS

Total PM (Open)

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	23	654	72	98	706	3	76	7	97	3	7	23
Future Volume (vph)	23	654	72	98	706	3	76	7	97	3	7	23
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	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	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.97	1.00	1.00	1.00	1.00	0.96	1.00	0.96	1.00	0.97	1.00
Flpb, ped/bikes	0.91	1.00	0.94	1.00	0.94	1.00	0.99	1.00	0.99	1.00	0.91	1.00
Fit	1.00	0.99	1.00	1.00	1.00	1.00	0.93	1.00	0.93	1.00	0.91	1.00
Flt Protected	0.95	1.00	0.95	1.00	0.95	1.00	0.98	1.00	0.98	1.00	0.95	1.00
Satd. Flow (prot)	1491	1645	1544	1696	1491	1645	1492	1696	1492	1696	1499	1696
Flt Permitted	0.29	1.00	0.28	1.00	0.28	1.00	0.85	1.00	0.85	1.00	0.98	1.00
Satd. Flow (perm)	449	1645	449	1696	449	1696	1290	1696	1290	1696	1470	1696
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	25	711	78	107	767	3	83	8	105	3	8	25
RTOR Reduction (vph)	0	4	0	0	0	0	0	59	0	0	20	0
Lane Group Flow (vph)	25	785	0	107	770	0	0	137	0	0	16	0
Confl. Peds. (#/hr)	191	146	146	191	12	29	29	29	12	29	12	12
Heavy Vehicles (%)	2%	2%	0%	1%	3%	2%	3%	2%	0%	2%	2%	2%
Turn Type	Perm	NA	NA	Perm	NA	Perm	NA	NA	Perm	NA	NA	NA
Protected Phases	2	2	2	6	6	6	4	4	8	8	8	8
Permitted Phases	2	2	2	6	6	6	4	4	8	8	8	8
Actuated Green, G (s)	54.6	54.6	54.6	54.6	54.6	54.6	13.0	13.0	13.0	13.0	13.0	13.0
Effective Green, g (s)	56.8	56.8	56.8	56.8	56.8	56.8	15.2	15.2	15.2	15.2	15.2	15.2
Actuated g/C Ratio	0.71	0.71	0.71	0.71	0.71	0.71	0.19	0.19	0.19	0.19	0.19	0.19
Clearance Time (s)	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2
Vehicle Extension (s)	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Lane Grp Cap (vph)	318	1167	318	1204	1204	1204	245	245	279	279	279	279
v/s Ratio Prot	c0.48					0.45						
v/s Ratio Perm	0.06			0.24		0.24			c0.11			0.01
v/c Ratio	0.08	0.67	0.34	0.64	0.64	0.64	0.56	0.56	0.56	0.56	0.06	0.06
Uniform Delay, d1	3.6	6.4	4.4	6.2	6.2	6.2	29.4	29.4	26.5	26.5	1.00	1.00
Progression Factor	1.00	1.00	0.67	0.61	0.61	0.61	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.5	3.1	2.4	2.2	2.2	2.2	1.7	1.7	0.0	0.0	0.0	0.0
Delay (s)	4.0	9.5	5.3	5.9	5.9	5.9	31.1	31.1	26.6	26.6	0.0	0.0
Level of Service	A	A	A	A	A	A	C	C	C	C	C	C
Approach Delay (s)	9.4	9.4	5.9	5.9	5.9	5.9	31.1	31.1	26.6	26.6	0.0	0.0
Approach LOS	A	A	A	A	A	A	C	C	C	C	C	C
Intersection Summary												
HCM 2000 Control Delay	10.3						B					
HCM 2000 Volume to Capacity ratio	0.65						B					
Actuated Cycle Length (s)	80.0						8.0					
Intersection Capacity Utilization	79.0%						D					
Analysis Period (min)	15						15					
Critical Lane Group												

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		4↑	1↓		W	
Traffic Volume (vph)	12	542	557	26	35	28
Future Volume (vph)	12	542	557	26	35	28
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor						
Flt			0.994		0.940	
Flt Protected		0.999			0.973	
Satd. Flow (prot)	0	3289	1707	0	1601	0
Flt Permitted		0.999			0.973	
Satd. Flow (perm)	0	3289	1707	0	1601	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		134.5	118.7		82.8	
Travel Time (s)		9.7	8.5		6.0	
Confl. Peds. (#/hr)	371			371	38	14
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	1%	2%	0%	0%	0%
Adj. Flow (vph)	13	589	605	28	38	30
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	602	633	0	68	0
Sign Control		Free	Free		Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	48.5%					
Analysis Period (min)	15					
ICU Level of Service A						

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		4↑	↓		W	
Traffic Volume (veh/h)	12	542	557	26	35	28
Future Volume (Veh/h)	12	542	557	26	35	28
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)	13	589	605	28	38	30
Pedestrians		14	38		371	
Lane Width (m)		3.6	3.6		3.6	
Walking Speed (m/s)		1.2	1.2		1.2	
Percent Blockage		1	3		31	
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)		256				
pX, platoon unblocked					1348	1004
VC, conflicting volume	1004					
VC1, stage 1 conf vol						
VC2, stage 2 conf vol						
VCu, unblocked vol	1004				1348	1004
IC, single (s)	4.1				6.8	6.9
IC, 2 stage (s)						
IF (s)	2.2				3.5	3.3
p0 queue free %	97				60	82
dM capacity (veh/h)	482				94	166
Direction, Lane #						
	EB 1	EB 2	WB 1	SB 1		
Volume Total	209	393	633	68		
Volume Left	13	0	0	38		
Volume Right	0	0	28	30		
cSH	482	1700	1700	116		
Volume to Capacity	0.03	0.23	0.37	0.58		
Queue Length 95th (m)	0.6	0.0	0.0	21.5		
Control Delay (s)	1.1	0.0	0.0	72.3		
Lane LOS	A			F		
Approach Delay (s)	0.4		0.0	72.3		
Approach LOS				F		
Intersection Summary						
Average Delay			4.0			
Intersection Capacity Utilization			48.5%			A
Analysis Period (min)			15			

Lanes, Volumes, Timings
4: Robinson Street & Clark Avenue

5234-5278 Ferry Street, Niagara Falls TIS

Total PM (Open)														Total PM (Open)	
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR			
Lane Configurations															
Traffic Volume (vph)	72	310	19	12	338	82	29	21	4	109	6	83			
Future Volume (vph)	72	310	19	12	338	82	29	21	4	109	6	83			
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750			
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		0.993			0.974			0.991				0.943			
Frt		0.991			0.999			0.974				0.973			
Flt Protected		0	1670	0	0	1664	0	0	1653	0	0	1606	0		
Satd. Flow (prot)		0	1670	0	0	1664	0	0	1653	0	0	1606	0		
Flt Permitted		0.991			0.999			0.974				0.973			
Satd. Flow (perm)		0	1670	0	0	1664	0	0	1653	0	0	1606	0		
Link Speed (k/h)		50			50			50				50			
Link Distance (m)		133.5			132.0			59.2				232.7			
Travel Time (s)		9.6			9.5			4.3				16.8			
Confl. Peds. (#/hr)		80		57		80		28		103		103			
Peak Hour Factor		0.92		0.92		0.92		0.92		0.92		0.92			
Heavy Vehicles (%)		0%		0%		2%		4%		0%		0%			
Adj. Flow (vph)		78		337		21		13		367		89			
Shared Lane Traffic (%)															
Lane Group Flow (vph)		0	436	0	0	469	0	0	59	0	0	215	0		
Sign Control		Free		Free		Free		Stop		Stop		Stop			
Intersection Summary															
Area Type:	Other														
Control Type:	Unsignalized														
Intersection Capacity Utilization	76.5%														
Analysis Period (min)	15														

HCM Unsignalized Intersection Capacity Analysis
4: Robinson Street & Clark Avenue

5234-5278 Ferry Street, Niagara Falls TIS

Total PM (Open)														Total PM (Open)	
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR			
Lane Configurations															
Traffic Volume (veh/h)	72	310	19	12	338	82	29	21	4	109	6	83			
Future Volume (Veh/h)	72	310	19	12	338	82	29	21	4	109	6	83			
Sign Control		Free		Free		Free		Stop		Stop		Stop			
Grade		0%		0%		0%		0%		0%		0%			
Peak Hour Factor		0.92		0.92		0.92		0.92		0.92		0.92			
Hourly flow rate (vph)		78		337		13		367		89		32			
Pedestrians				28		103		57				80			
Lane Width (m)				3.6		3.6		3.6				3.6			
Walking Speed (m/s)				1.2		1.2		1.2				1.2			
Percent Blockage				2		9		5				7			
Right turn flare (veh)															
Median type				None		None									
Median storage (veh)															
Upstream signal (m)															
pX, platoon unblocked															
VC, conflicting volume				536		415		1120		1122		508			
VC1, stage 1 conf vol															
VC2, stage 2 conf vol															
VCu, unblocked vol				536		415		1120		1122		508			
IC, single (s)				4.1		4.1		7.1		6.5		6.2			
IC, 2 stage (s)				2.2		2.2		3.5		4.0		3.3			
IF (s)				92		99		72		86		99			
p0 queue free %															
qM capacity (veh/h)				973		1100		116		168		496			
Direction, Lane #		EB 1	WB 1	NB 1	SB 1										
Volume Total		436	469	59	215										
Volume Left		78	13	32	118										
Volume Right		21	89	4	90										
CSH		973	1100	140	175										
Volume to Capacity		0.08	0.01	0.42	1.23										
Queue Length 95th (m)		2.0	0.3	13.9	88.7										
Control Delay (s)		2.4	0.4	48.4	195.5										
Lane LOS		A	A	E	F										
Approach Delay (s)		2.4	0.4	48.4	195.5										
Approach LOS			E	F											
Intersection Summary															
Average Delay				39.1											
Intersection Capacity Utilization				76.5%											
Analysis Period (min)				15											

Lanes, Volumes, Timings

5234-5278 Ferry Street, Niagara Falls TIS

5: Clark Avenue & Northern Driveway

Total PM (Open)

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	1	12	299	5	142	204
Future Volume (vph)	1	12	299	5	142	204
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Fit	0.875		0.998			
Flt Protected	0.996					0.980
Satd. Flow (prot)	1495	0	1729	0	0	1701
Flt Permitted	0.996					0.980
Satd. Flow (perm)	1495	0	1729	0	0	1701
Link Speed (km/h)	50		50			50
Link Distance (m)	42.4		61.6			52.1
Travel Time (s)	3.1		4.4			3.8
Conflt. Peds. (#/hr)				263	263	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	1%	2%	2%	0%
Adj. Flow (vph)	1	13	325	5	154	222
Shared Lane Traffic (%)						
Lane Group Flow (vph)	14	0	330	0	0	376
Sign Control	Stop		Free			Free
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	51.1%					
Analysis Period (min)	15					
ICU Level of Service A						

HCM Unsignalized Intersection Capacity Analysis

5234-5278 Ferry Street, Niagara Falls TIS

5: Clark Avenue & Northern Driveway

Total PM (Open)

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W					T
Traffic Volume (veh/h)	1	12	299	5	142	204
Future Volume (Veh/h)	1	12	299	5	142	204
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	13	325	5	154	222
Pedestrians		263				
Lane Width (m)		3.6				
Walking Speed (m/s)		1.2				
Percent Blockage		22				
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (m)						52
pX, platoon unblocked		0.97				
VC, conflicting volume		1120	590		593	
VC1, stage 1 conf vol						
VC2, stage 2 conf vol						
VCu, unblocked vol		1110	590		593	
IC, single (s)		6.4	6.2		4.1	
IC, 2 stage (s)						
IF (s)		3.5	3.3		2.2	
p0 queue free %		99	97		80	
dM capacity (veh/h)		141	396		768	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	14	330	376			
Volume Left	1	0	154			
Volume Right	13	5	0			
cSH	351	1700	768			
Volume to Capacity	0.04	0.19	0.20			
Queue Length 95th (m)	0.9	0.0	5.6			
Control Delay (s)	15.7	0.0	5.9			
Lane LOS	C		A			
Approach Delay (s)	15.7	0.0	5.9			
Approach LOS	C					
Intersection Summary						
Average Delay			3.4			
Intersection Capacity Utilization			51.1%			A
Analysis Period (min)			15			

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	26	146	158	23	23	182
Future Volume (vph)	26	146	158	23	23	182
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Fit	0.885		0.983			
Flt Protected	0.993					0.994
Satd. Flow (prot)	1508	0	1701	0	0	1736
Flt Permitted	0.993					0.994
Satd. Flow (perm)	1508	0	1701	0	0	1736
Link Speed (k/h)	50		50			50
Link Distance (m)	33.2		232.7			61.6
Travel Time (s)	2.4		16.8			4.4
Confl. Peds. (#/hr)				263	263	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	1%	2%	2%	0%
Adj. Flow (vph)	28	159	172	25	25	198
Shared Lane Traffic (%)						
Lane Group Flow (vph)	187	0	197	0	0	223
Sign Control	Stop		Free			Free
Intersection Summary						
Area Type:	Other					
Control Type: Unsignalized						
Intersection Capacity Utilization	46.5%					
Analysis Period (min)	15					
	ICU Level of Service A					

	WBL	WBR	NBT	NBR	SBL	SBT
Movement						
Lane Configurations	W		P			4
Traffic Volume (veh/h)	26	146	158	23	23	182
Future Volume (Veh/h)	26	146	158	23	23	182
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	28	159	172	25	25	198
Pedestrians						
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	22					
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (m)						114
pX, platoon unblocked						
VC, conflicting volume	696	448			460	
VC1, stage 1 conf vol						
VC2, stage 2 conf vol						
VCu, unblocked vol	696	448			460	
IC, single (s)	6.4	6.2			4.1	
IC, 2 stage (s)						
IF (s)	3.5	3.3			2.2	
p0 queue free %	91	67			97	
dM capacity (veh/h)	309	477			860	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	187	197	223			
Volume Left	28	0	25			
Volume Right	159	25	0			
cSH	441	1700	860			
Volume to Capacity	0.42	0.12	0.03			
Queue Length 95th (m)	15.5	0.0	0.7			
Control Delay (s)	19.0	0.0	1.3			
Lane LOS	C		A			
Approach Delay (s)	19.0	0.0	1.3			
Approach LOS	C					
Intersection Summary						
Average Delay			6.3			
Intersection Capacity Utilization			46.5%			A
Analysis Period (min)			15			

Lanes, Volumes, Timings
1: Clark Avenue/Ellen Avenue & Ferry Street

Lanes, Volumes, Timings
1: Clark Avenue/Ellen Avenue & Ferry Street

5234-5278 Ferry Street, Niagara Falls TIS

5234-5278 Ferry Street, Niagara Falls TIS

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Volume (vph)	85	616	224	132	469	8	193	27	129	20	62	166
Future Volume (vph)	85	616	224	132	469	8	193	27	129	20	62	166
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	40.0	0.0	40.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Storage Lanes	1	0	1	0	0	0	0	0	0	0	0	0
Tapor Length (m)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	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	0.83	0.84	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Fit Protected	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950
Satd. Flow (prot)	1646	1376	0	1630	1694	0	0	1309	0	0	1322	0
Fit Permitted	0.361	0.096	0.096	0.096	0.096	0.096	0.096	0.385	0.096	0.096	0.096	0.096
Satd. Flow (perm)	518	1376	0	165	1694	0	0	738	0	0	1251	0
Right Turn on Red	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Satd. Flow (RTOR)	30	50	50	50	50	50	50	50	50	50	50	50
Link Speed (km/h)	133.8	121.5	52.1	52.1	52.1	52.1	52.1	52.1	52.1	52.1	52.1	52.1
Travel Time (s)	9.6	8.7	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8
Confl. Peds. (#/hr)	309	317	317	309	92	92	92	92	92	92	92	92
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	3%	2%	2%	0%	0%	0%	12%	4%	0%	2%	1%
Adj. Flow (vph)	92	670	243	143	510	9	210	29	140	22	67	180
Shared Lane Traffic (%)	92	913	0	143	519	0	0	379	0	0	269	0
Lane Group Flow (vph)	Perm	NA	NA	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm
Turn Type	2	2	2	2	2	2	2	2	2	2	2	2
Protected Phases	2	2	2	2	2	2	2	2	2	2	2	2
Permitted Phases	2	2	2	2	2	2	2	2	2	2	2	2
Detector Phase	2	2	2	2	2	2	2	2	2	2	2	2
Switch Phase	2	2	2	2	2	2	2	2	2	2	2	2
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	23.2	23.2	23.2	23.2	27.1	27.1	27.1	27.1	27.1	27.1	27.1	27.1
Total Split (s)	61.0	61.0	61.0	61.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0
Total Split (%)	61.0%	61.0%	61.0%	61.0%	39.0%	39.0%	39.0%	39.0%	39.0%	39.0%	39.0%	39.0%
Maximum Green (s)	54.8	54.8	54.8	54.8	32.9	32.9	32.9	32.9	32.9	32.9	32.9	32.9
Yellow Time (s)	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
All-Red Time (s)	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.1	-2.1	-2.1	-2.1	-2.1	-2.1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Vehicle Extension (s)	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max
Walk Time (s)	7.0	7.0	7.0	7.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Flash Dont Walk (s)	10.0	10.0	10.0	10.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Act Effct Green (s)	57.0	57.0	57.0	57.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0
Actuated g/C Ratio	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57
v/c Ratio	0.31	1.15	1.52	0.54	1.36	0.55	1.36	0.55	1.36	0.55	1.36	0.55

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	6.7	88.3	305.1	15.9	0.0	0.0	210.4	0.0	0.0	23.7	0.0	0.0
Queue Delay	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.7	88.5	305.1	15.9	0.0	0.0	210.4	0.0	0.0	23.7	0.0	0.0
LOS	A	F	F	B	F	F	F	F	F	C	C	C
Approach Delay	81.1	78.4	210.4	210.4	210.4	210.4	210.4	210.4	210.4	23.7	23.7	23.7
Approach LOS	F	F	E	E	E	E	E	E	E	C	C	C
Queue Length 50th (m)	4.6	~205.0	~38.4	57.6	~38.4	57.6	~92.3	~92.3	~92.3	29.4	29.4	29.4
Queue Length 95th (m)	m5.0	m226.2	#58.2	85.3	#58.2	85.3	#147.5	#147.5	#147.5	54.6	54.6	54.6
Internal Link Dist (m)	109.8	40.0	40.0	97.5	28.1	28.1	145.1	145.1	145.1	145.1	145.1	145.1
Turn Bay Length (m)	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
Base Capacity (vph)	295	797	94	966	279	279	485	485	485	485	485	485
Starvation Cap Reductn	0	32	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.31	1.19	1.52	0.54	1.36	0.55	1.36	0.55	1.36	0.55	1.36	0.55
Intersection Summary	Other											
Area Type	Other											
Cycle Length	100											
Actuated Cycle Length	100											
Offset: 16 (16%), Referenced to phase 2EBTL and 6WBTL, Start of Green												
Natural Cycle: 65												
Control Type: Actuated-Coordinated												
Maximum v/c Ratio: 1.52												
Intersection Signal Delay: 94.8												
Intersection Capacity Utilization 117.8%												
Analysis Period (min) 15												
Intersection LOS: F												
ICU Level of Service H												
Volume exceeds capacity, queue is theoretically infinite.												
Queue shown is maximum after two cycles.												
# 95th percentile volume exceeds capacity, queue may be longer.												
Queue shown is maximum after two cycles.												
Volume for 95th percentile queue is metered by upstream signal.												
Splits and Phases: 1: Clark Avenue/Ellen Avenue & Ferry Street												
02 (R)	04	04	04	04	04	04	04	04	04	04	04	04
06 (R)	08	08	08	08	08	08	08	08	08	08	08	08

HCM Signalized Intersection Capacity Analysis 5234-5278 Ferry Street, Niagara Falls TIS
 1: Clark Avenue/Ellen Avenue & Ferry Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Total Saturday (Open)
Lane Configurations	85	616	224	132	469	8	193	27	129	20	62	166	
Traffic Volume (vph)	85	616	224	132	469	8	193	27	129	20	62	166	
Future Volume (vph)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	
Ideal Flow (vphpl)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Total Lost time (s)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Lane Util. Factor	1.00	0.84	1.00	1.00	0.99	1.00	0.83	1.00	0.94	0.99	0.99	0.84	
Frbp. ped/bikes	0.83	1.00	1.00	1.00	1.00	1.00	0.94	1.00	0.95	1.00	1.00	0.84	
Frt	1.00	0.96	1.00	1.00	1.00	1.00	0.97	1.00	0.95	1.00	1.00	0.91	
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00	0.97	1.00	0.95	1.00	1.00	0.91	
Satd. Flow (prot)	1364	1377	1630	1694	1630	1694	1228	1228	1302	1302	1302	1302	
Flt Permitted	0.36	1.00	0.10	1.00	1.00	1.00	0.58	0.58	0.96	0.96	0.96	0.96	
Satd. Flow (perm)	518	1377	165	1694	165	1694	738	738	1250	1250	1250	1250	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	92	670	243	143	510	9	210	29	140	22	67	180	
RTOR Reduction (vph)	0	13	0	0	0	0	0	21	0	0	48	0	
Lane Group Flow (vph)	92	900	0	143	519	0	0	358	0	0	221	0	
Confl. Peds. (#/hr)	309	317	317	309	92	92	190	190	92	92	92	92	
Heavy Vehicles (%)	1%	3%	2%	2%	2%	0%	0%	12%	4%	0%	2%	1%	
Turn Type	Perm	NA	NA	Perm	NA	Perm	NA	NA	Perm	NA	NA	NA	
Protected Phases	2	2	2	2	2	2	2	2	2	2	2	2	
Permitted Phases	2	2	2	2	2	2	2	2	2	2	2	2	
Actuated Green, G (s)	54.8	54.8	54.8	54.8	54.8	54.8	32.9	32.9	32.9	32.9	32.9	32.9	
Effective Green, g (s)	57.0	57.0	57.0	57.0	57.0	57.0	35.0	35.0	35.0	35.0	35.0	35.0	
Actuated g/C Ratio	0.57	0.57	0.57	0.57	0.57	0.57	0.35	0.35	0.35	0.35	0.35	0.35	
Clearance Time (s)	6.2	6.2	6.2	6.2	6.2	6.2	6.1	6.1	6.1	6.1	6.1	6.1	
Vehicle Extension (s)	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	
Lane Grp Cap (vph)	295	784	94	965	94	965	258	258	437	437	437	437	
v/s Ratio Prot	0.65	0.65	0.65	0.65	0.65	0.65	0.31	0.31	0.31	0.31	0.31	0.31	
v/s Ratio Perm	0.18	0.18	0.18	0.18	0.18	0.18	0.087	0.087	0.087	0.087	0.087	0.087	
v/c Ratio	0.31	1.15	1.52	0.54	1.52	0.54	1.39	1.39	0.51	0.51	0.51	0.51	
Uniform Delay, d1	11.2	21.5	21.5	13.3	21.5	13.3	32.5	32.5	25.7	25.7	25.7	25.7	
Progression Factor	0.47	0.62	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.9	72.3	281.2	2.1	72.3	2.1	196.9	196.9	0.4	0.4	0.4	0.4	
Delay (s)	6.3	85.6	302.7	15.5	85.6	15.5	229.4	229.4	26.1	26.1	26.1	26.1	
Level of Service	A	F	F	B	F	B	F	F	C	C	C	C	
Approach Delay (s)	78.4	78.4	78.4	77.5	77.5	77.5	229.4	229.4	26.1	26.1	26.1	26.1	
Approach LOS	E	E	E	E	E	E	F	F	C	C	C	C	
Intersection Summary													
HCM 2000 Control Delay	96.8												F
HCM 2000 Volume to Capacity ratio	1.47												
Actuated Cycle Length (s)	100.0												8.0
Intersection Capacity Utilization	117.8%												H
Analysis Period (min)	15												
c Critical Lane Group													

Lanes, Volumes, Timings 5234-5278 Ferry Street, Niagara Falls TIS
 2: Fallsview Boulevard & Ferry Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Total Saturday (Open)
Lane Configurations	85	616	224	132	469	8	193	27	129	20	62	166	
Traffic Volume (vph)	85	616	224	132	469	8	193	27	129	20	62	166	
Future Volume (vph)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	
Ideal Flow (vphpl)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Total Lost time (s)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Lane Util. Factor	1.00	0.84	1.00	1.00	0.99	1.00	0.83	1.00	0.94	0.99	0.99	0.84	
Frbp. ped/bikes	0.83	1.00	1.00	1.00	1.00	1.00	0.94	1.00	0.95	1.00	1.00	0.84	
Frt	1.00	0.96	1.00	1.00	1.00	1.00	0.97	1.00	0.95	1.00	1.00	0.91	
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00	0.97	1.00	0.95	1.00	1.00	0.91	
Satd. Flow (prot)	1364	1377	1630	1694	1630	1694	1228	1228	1302	1302	1302	1302	
Flt Permitted	0.36	1.00	0.10	1.00	1.00	1.00	0.58	0.58	0.96	0.96	0.96	0.96	
Satd. Flow (perm)	518	1377	165	1694	165	1694	738	738	1250	1250	1250	1250	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	92	670	243	143	510	9	210	29	140	22	67	180	
RTOR Reduction (vph)	0	13	0	0	0	0	0	21	0	0	48	0	
Lane Group Flow (vph)	92	900	0	143	519	0	0	358	0	0	221	0	
Confl. Peds. (#/hr)	309	317	317	309	92	92	190	190	92	92	92	92	
Heavy Vehicles (%)	1%	3%	2%	2%	2%	0%	0%	12%	4%	0%	2%	1%	
Turn Type	Perm	NA	NA	Perm	NA	Perm	NA	NA	Perm	NA	NA	NA	
Protected Phases	2	2	2	2	2	2	2	2	2	2	2	2	
Permitted Phases	2	2	2	2	2	2	2	2	2	2	2	2	
Actuated Green, G (s)	54.8	54.8	54.8	54.8	54.8	54.8	32.9	32.9	32.9	32.9	32.9	32.9	
Effective Green, g (s)	57.0	57.0	57.0	57.0	57.0	57.0	35.0	35.0	35.0	35.0	35.0	35.0	
Actuated g/C Ratio	0.57	0.57	0.57	0.57	0.57	0.57	0.35	0.35	0.35	0.35	0.35	0.35	
Clearance Time (s)	6.2	6.2	6.2	6.2	6.2	6.2	6.1	6.1	6.1	6.1	6.1	6.1	
Vehicle Extension (s)	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	
Lane Grp Cap (vph)	295	784	94	965	94	965	258	258	437	437	437	437	
v/s Ratio Prot	0.65	0.65	0.65	0.65	0.65	0.65	0.31	0.31	0.31	0.31	0.31	0.31	
v/s Ratio Perm	0.18	0.18	0.18	0.18	0.18	0.18	0.087	0.087	0.087	0.087	0.087	0.087	
v/c Ratio	0.31	1.15	1.52	0.54	1.52	0.54	1.39	1.39	0.51	0.51	0.51	0.51	
Uniform Delay, d1	11.2	21.5	21.5	13.3	21.5	13.3	32.5	32.5	25.7	25.7	25.7	25.7	
Progression Factor	0.47	0.62	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.9	72.3	281.2	2.1	72.3	2.1	196.9	196.9	0.4	0.4	0.4	0.4	
Delay (s)	6.3	85.6	302.7	15.5	85.6	15.5	229.4	229.4	26.1	26.1	26.1	26.1	
Level of Service	A	F	F	B	F	B	F	F	C	C	C	C	
Approach Delay (s)	78.4	78.4	78.4	77.5	77.5	77.5	229.4	229.4	26.1	26.1	26.1	26.1	
Approach LOS	E	E	E	E	E	E	F	F	C	C	C	C	
Intersection Summary													
HCM 2000 Control Delay	96.8												F
HCM 2000 Volume to Capacity ratio	1.47												
Actuated Cycle Length (s)	100.0												8.0
Intersection Capacity Utilization	117.8%												H
Analysis Period (min)	15												
c Critical Lane Group													

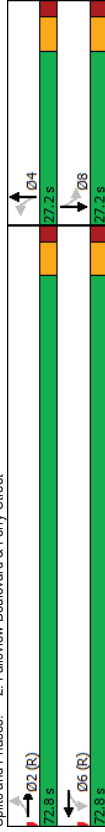
Lanes, Volumes, Timings
 2: Fallsview Boulevard & Ferry Street

5234-5278 Ferry Street, Niagara Falls TIS

Total Saturday (Open)

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	6.1	34.2		77.0	7.9			62.0			16.6	
Queue Delay	0.0	43.4		0.0	0.4			1.1			0.0	
Total Delay	6.1	77.6		77.0	8.3			63.1			16.6	
LOS	A	E		E	A			E			B	
Approach Delay		75.9			19.5			63.1			16.6	
Approach LOS		E			B			E			B	
Queue Length 50th (m)	1.5	166.5		~27.8	60.9			42.3			1.6	
Queue Length 95th (m)	4.3	#279.1		m#50.1	m73.8			#85.4			9.2	
Internal Link Dist (m)		75.9			109.8			171.3			33.8	
Turn Bay Length (m)	30.0			45.0								
Base Capacity (vph)	298	1105		152	1208			317			359	
Starvation Cap Reductn	0	0		0	118			0			0	
Spillback Cap Reductn	0	259		0	0			6			0	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.09	1.25		0.99	0.70			0.86			0.10	
Intersection Summary												
Other												
Cycle Length: 100												
Actuated Cycle Length: 100												
Offset: 96 (96%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green												
Natural Cycle: 100												
Control Type: Actuated-Coordinated												
Maximum v/c Ratio: 0.99												
Intersection Signal Delay: 51.1												
Intersection Capacity Utilization 99.9%												
Analysis Period (min) 15												
~ Volume exceeds capacity, queue is theoretically infinite.												
Queue shown is maximum after two cycles.												
# 95th percentile volume exceeds capacity, queue may be longer.												
Queue shown is maximum after two cycles.												
m Volume for 95th percentile queue is metered by upstream signal.												

Splits and Phases: 2: Fallsview Boulevard & Ferry Street



HCM Signalized Intersection Capacity Analysis
 2: Fallsview Boulevard & Ferry Street

5234-5278 Ferry Street, Niagara Falls TIS

Total Saturday (Open)

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Volume (vph)	24	844	130	138	703	3	125	7	114	4	6	22
Future Volume (vph)	24	844	130	138	703	3	125	7	114	4	6	22
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	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	1.00	1.00	1.00
Frb. ped/bikes	1.00	0.93	1.00	1.00	1.00	1.00	0.95	1.00	0.95	1.00	0.98	1.00
Frb. ped/bikes	0.88	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.94	1.00	0.91	1.00
Frt	1.00	0.98	1.00	1.00	1.00	1.00	0.98	1.00	0.94	1.00	0.99	1.00
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.98	1.00	0.98	1.00	0.99	1.00
Satd. Flow (prot)	1456	1573	1630	1728	1468	1509	1468	1509	1468	1509	1468	1509
Flt Permitted	0.28	1.00	1.00	0.13	1.00	0.82	0.82	1.00	0.82	1.00	0.97	1.00
Satd. Flow (perm)	425	1573	218	1728	1237	1470	1237	1470	1237	1470	1237	1470
Peak-Hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	26	917	141	150	764	3	136	8	124	4	7	24
RTOR Reduction (vph)	0	5	0	0	0	0	0	31	0	0	19	0
Lane Group Flow (vph)	26	1053	0	150	767	0	0	237	0	0	16	0
Confl. Peds. (#/hr)	309	278	278	309	4	39	39	4	39	39	4	4
Heavy Vehicles (%)	2%	1%	2%	2%	2%	1%	2%	2%	4%	2%	2%	2%
Turn Type	Perm	NA	NA	Perm	NA	Perm	NA	NA	Perm	NA	NA	NA
Protected Phases	2	2	2	6	6	4	4	4	4	4	4	4
Permitted Phases	2	2	2	6	6	4	4	4	4	4	4	4
Actuated Green, G (s)	67.8	67.8	67.8	67.8	67.8	19.8	19.8	19.8	67.8	67.8	67.8	67.8
Effective Green, g (s)	70.0	70.0	70.0	70.0	70.0	22.0	22.0	22.0	70.0	70.0	70.0	70.0
Actuated 9/C Ratio	0.70	0.70	0.70	0.70	0.70	0.22	0.22	0.22	0.70	0.70	0.70	0.70
Clearance Time (s)	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2
Vehicle Extension (s)	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Lane Grp Cap (vph)	297	1101	152	1209	272	323	323	323	1101	1101	1101	1101
v/s Ratio Prot	0.67	0.67	0.67	0.44	0.44	0.01	0.01	0.01	0.67	0.67	0.67	0.67
v/s Ratio Perm	0.09	0.96	0.99	0.63	0.63	0.87	0.87	0.87	0.09	0.96	0.99	0.99
Uniform Delay, d1	4.8	13.6	14.6	8.1	8.1	37.6	37.6	37.6	4.8	13.6	14.6	14.6
Progression Factor	1.00	1.00	0.78	0.69	0.69	1.00	1.00	1.00	1.00	1.00	0.78	0.69
Incremental Delay, d2	0.6	18.4	56.9	1.7	1.7	24.2	24.2	24.2	0.6	18.4	56.9	56.9
Delay (s)	5.4	32.0	68.3	7.3	7.3	61.8	61.8	61.8	5.4	32.0	68.3	68.3
Level of Service	A	C	E	A	A	E	E	E	A	C	E	E
Approach Delay (s)	31.4	31.4	17.3	17.3	17.3	61.8	61.8	61.8	31.4	31.4	17.3	17.3
Approach LOS	C	C	B	B	B	E	E	E	C	C	B	B
Intersection Summary												
HCM 2000 Control Delay												
HCM 2000 Volume to Capacity ratio												
Actuated Cycle Length (s)												
Intersection Capacity Utilization												
Analysis Period (min)												
c Critical Lane Group												

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕↕	↕		↕	
Traffic Volume (vph)	15	720	564	33	79	48
Future Volume (vph)	15	720	564	33	79	48
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor						
Fit			0.993		0.949	
Flt Protected		0.999			0.970	
Satd. Flow (prot)	0	3289	1706	0	1599	0
Flt Permitted		0.999			0.970	
Satd. Flow (perm)	0	3289	1706	0	1599	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		134.5	118.7		82.8	
Travel Time (s)		9.7	8.5		6.0	
Confl. Peds. (#/hr)	547			547	59	18
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	1%	2%	0%	0%	2%
Adj. Flow (vph)	16	783	613	36	86	52
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	799	649	0	138	0
Sign Control		Free	Free		Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	52.4%					
Analysis Period (min)	15					
ICU Level of Service A						

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		44	44		W	
Traffic Volume (veh/h)	15	720	564	33	79	48
Future Volume (Veh/h)	15	720	564	33	79	48
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)	16	783	613	36	86	52
Pedestrians		18	59		547	
Lane Width (m)		3.6	3.6		3.6	
Walking Speed (m/s)		1.2	1.2		1.2	
Percent Blockage		2	5		46	
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)		256				
pX platoon unblocked					1660	1196
VC, conflicting volume	1196					
VC1, stage 1 conf vol						
VC2, stage 2 conf vol						
VCu, unblocked vol	1196				1660	1196
IC, single (s)	4.1				6.8	6.9
IC, 2 stage (s)						
IF (s)	2.2				3.5	3.3
p0 queue free %	95				0	46
dM capacity (veh/h)	321				44	96
Direction, Lane #	EB 1	EB 2	WB 1	SB 1		
Volume Total	277	522	649	138		
Volume Left	16	0	0	86		
Volume Right	0	0	36	52		
cSH	321	1700	1700	56		
Volume to Capacity	0.05	0.31	0.38	2.49		
Queue Length 95th (m)	1.2	0.0	0.0	105.0		
Control Delay (s)	1.9	0.0	0.0	833.6		
Lane LOS	A			F		
Approach Delay (s)	0.7		0.0	833.6		
Approach LOS				F		
Intersection Summary						
Average Delay			72.9			
Intersection Capacity Utilization			52.4%			A
Analysis Period (min)			15			

Lanes, Volumes, Timings
4: Robinson Street & Clark Avenue

5234-5278 Ferry Street, Niagara Falls TIS

Total Saturday (Open)

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	93	343	55	72	331	81	47	25	11	95	12	118
Traffic Volume (vph)	93	343	55	72	331	81	47	25	11	95	12	118
Future Volume (vph)	93	343	55	72	331	81	47	25	11	95	12	118
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
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		0.985			0.977			0.982				0.929
Frt		0.991			0.993			0.972				0.979
Flt Protected		0.991			0.993			0.972				0.979
Satd. Flow (prot)	0	1664	0	0	1667	0	0	1670	0	0	1583	0
Flt Permitted		0.991			0.993			0.972				0.979
Satd. Flow (perm)	0	1664	0	0	1667	0	0	1670	0	0	1583	0
Link Speed (k/h)		50			50			50				50
Link Distance (m)		133.5			132.0			59.2				232.7
Travel Time (s)		9.6			9.5			4.3				16.8
Confl. Peds. (#/hr)	142	86	86	142	123	95	95	95	95	95	123	123
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	0%	0%	0%	2%	3%	0%	0%	0%	0%	0%	1%
Adj. Flow (vph)	101	373	60	78	360	88	51	27	12	103	13	128
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	534	0	0	526	0	0	90	0	0	244	0
Sign Control		Free			Free			Stop				Stop
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	68.6%											
Analysis Period (min)	15											

HCM Unsignalized Intersection Capacity Analysis
4: Robinson Street & Clark Avenue

5234-5278 Ferry Street, Niagara Falls TIS

Total Saturday (Open)

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	93	343	55	72	331	81	47	25	11	95	12	118
Traffic Volume (veh/h)	93	343	55	72	331	81	47	25	11	95	12	118
Future Volume (Veh/h)	93	343	55	72	331	81	47	25	11	95	12	118
Sign Control	Free	Free	Free	Free	Free	Free	Free	Free	Free	Free	Free	Free
Grade	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	101	373	60	78	360	88	51	27	12	103	13	128
Pedestrians		123			95			86				142
Lane Width (m)		3.6			3.6			3.6				3.6
Walking Speed (m/s)		1.2			1.2			1.2				1.2
Percent Blockage		10			8			7				12
Right turn flare (veh)												
Median type	None	None	None	None	None	None	None	None	None	None	None	None
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
VC, conflicting volume	590			519			1508	1437	584	1428	1423	669
VC1, stage 1 conf vol												
VC2, stage 2 conf vol												
VCU, unblocked vol	590			519			1508	1437	584	1428	1423	669
IC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
IC, 2 stage (s)												
IF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	88			92			0	70	97	0	86	65
dM capacity (veh/h)	865			982			36	90	440	52	91	363
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	534	526	90	244								
Volume Left	101	78	51	103								
Volume Right	60	88	12	128								
CSH	865	982	51	98								
Volume to Capacity	0.12	0.08	1.75	2.48								
Queue Length 95th (m)	3.0	1.9	65.2	167.2								
Control Delay (s)	3.1	2.2	532.7	763.5								
Lane LOS	A	A	F	F								
Approach Delay (s)	3.1	2.2	532.7	763.5								
Approach LOS	F	F	F	F								
Intersection Summary												
Average Delay	170.0											
Intersection Capacity Utilization	68.6%											
ICU Level of Service	C											
Analysis Period (min)	15											

Lanes, Volumes, Timings

5234-5278 Ferry Street, Niagara Falls TIS

5: Clark Avenue & Northern Driveway

Total Saturday (Open)

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	1	11	338	5	159	259
Future Volume (vph)	1	11	338	5	159	259
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Fit	0.875		0.998			
Flt Protected	0.996					0.981
Satd. Flow (prot)	1495	0	1680	0	0	1683
Flt Permitted	0.996					0.981
Satd. Flow (perm)	1495	0	1680	0	0	1683
Link Speed (k/h)	50		50			50
Link Distance (m)	42.4		61.6			52.1
Travel Time (s)	3.1		4.4			3.8
Confl. Peds. (#/hr)				317	317	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	4%	2%	2%	2%
Adj. Flow (vph)	1	12	367	5	173	282
Shared Lane Traffic (%)						
Lane Group Flow (vph)	13	0	372	0	0	455
Sign Control	Stop		Free			Free
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	57.5%					
Analysis Period (min)	15					
	ICU Level of Service B					

HCM Unsignalized Intersection Capacity Analysis

5234-5278 Ferry Street, Niagara Falls TIS

5: Clark Avenue & Northern Driveway

Total Saturday (Open)

	WBL	WBR	NBT	NBR	SBL	SBT
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W					4
Traffic Volume (veh/h)	1	11	338	5	159	259
Future Volume (Veh/h)	1	11	338	5	159	259
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	12	367	5	173	282
Pedestrians						
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	26					
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (m)						52
pX, platoon unblocked	0.97					
VC, conflicting volume	1314		686		689	
VC1, stage 1 conf vol						
VC2, stage 2 conf vol						
VCu, unblocked vol	1308		686		689	
IC, single (s)	6.4		6.2		4.1	
IC, 2 stage (s)						
IF (s)	3.5		3.3		2.2	
p0 queue free %	99		96		74	
dM capacity (veh/h)	93		329		666	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	13	372	455			
Volume Left	1	0	173			
Volume Right	12	5	0			
cSH	275	1700	666			
Volume to Capacity	0.05	0.22	0.26			
Queue Length 95th (m)	1.1	0.0	7.8			
Control Delay (s)	18.7	0.0	7.0			
Lane LOS	C		A			
Approach Delay (s)	18.7	0.0	7.0			
Approach LOS	C					
Intersection Summary						
Average Delay			4.1			
Intersection Capacity Utilization			57.5%		ICU Level of Service	B
Analysis Period (min)			15			

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	23	134	209	26	25	235
Future Volume (vph)	23	134	209	26	25	235
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Ft	0.885		0.985			
Flt Protected	0.993					0.995
Satd. Flow (prot)	1508	0	1661	0	0	1707
Flt Permitted	0.993					0.995
Satd. Flow (perm)	1508	0	1661	0	0	1707
Link Speed (k/h)	50		50			50
Link Distance (m)	33.2		232.7			61.6
Travel Time (s)	2.4		16.8			4.4
Confl. Peds. (#/hr)				317	317	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	4%	2%	2%	2%
Adj. Flow (vph)	25	146	227	28	27	255
Shared Lane Traffic (%)						
Lane Group Flow (vph)	171	0	255	0	0	282
Sign Control	Stop		Free			Free
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	49.9%					
Analysis Period (min)	15					
ICU Level of Service A						

	WBL	WBR	NBT	NBR	SBL	SBT
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W					4
Traffic Volume (veh/h)	23	134	209	26	25	235
Future Volume (Veh/h)	23	134	209	26	25	235
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	25	146	227	28	27	255
Pedestrians						
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	26					
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (m)						114
pX, platoon unblocked						
VC, conflicting volume	867	558			572	
VC1, stage 1 conf vol						
VC2, stage 2 conf vol						
VCu, unblocked vol	867	558			572	
IC, single (s)	6.4	6.2			4.1	
IC, 2 stage (s)						
IF (s)	3.5	3.3			2.2	
p0 queue free %	89	63			96	
dM capacity (veh/h)	229	389			736	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	171	255	282			
Volume Left	25	0	27			
Volume Right	146	28	0			
cSH	353	1700	736			
Volume to Capacity	0.48	0.15	0.04			
Queue Length 95th (m)	19.0	0.0	0.9			
Control Delay (s)	24.4	0.0	1.4			
Lane LOS	C		A			
Approach Delay (s)	24.4	0.0	1.4			
Approach LOS	C					
Intersection Summary						
Average Delay			6.4			
Intersection Capacity Utilization			49.9%			A
Analysis Period (min)			15			

Appendix H

2032 Background Traffic Operations



HCM Signalized Intersection Capacity Analysis 5234-5278 Ferry Street, Niagara Falls TIS
 1: Clark Avenue/Ellen Avenue & Ferry Street Background PM (5-Year)

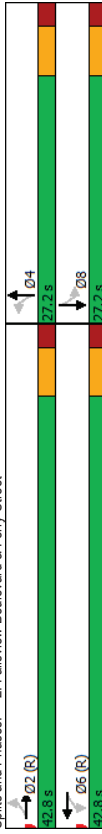
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	7	8	474	67	95	499	16	59	14	85	11	24
Traffic Volume (vph)	78	474	67	95	499	16	59	14	85	11	24	112
Future Volume (vph)	78	474	67	95	499	16	59	14	85	11	24	112
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	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	1.00	1.00	1.00
Flpb. ped/bikes	1.00	0.94	1.00	1.00	0.99	1.00	0.92	1.00	0.97	0.99	0.90	0.90
Flpb. ped/bikes	0.85	1.00	0.82	1.00	0.82	1.00	0.97	0.97	0.97	0.99	0.90	0.90
Flt	1.00	0.98	1.00	1.00	1.00	1.00	0.93	1.00	0.93	1.00	0.90	0.90
Flt Protected	0.95	1.00	0.95	1.00	0.95	1.00	0.98	1.00	0.98	1.00	1.00	1.00
Satd. Flow (prot)	1411	1579	1359	1672	1672	1672	1414	1414	1414	1405	1405	1405
Flt Permitted	0.40	1.00	0.39	1.00	0.39	1.00	0.75	0.75	0.75	0.97	0.97	0.97
Satd. Flow (perm)	598	1579	551	1672	1672	1672	1079	1079	1079	1374	1374	1374
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	85	515	73	103	542	17	64	15	92	12	26	122
RTOR Reduction (vph)	0	5	0	0	1	0	0	67	0	0	92	0
Lane Group Flow (vph)	85	583	0	103	558	0	0	104	0	0	68	0
Confl. Peds. (#/hr)	191	263	263	191	65	65	75	75	75	75	65	65
Heavy Vehicles (%)	0%	2%	0%	0%	3%	0%	0%	0%	2%	0%	0%	0%
Turn Type	Perm	NA	NA	Perm	NA	Perm	NA	Perm	NA	Perm	NA	NA
Protected Phases	2	2	2	6	6	6	4	4	4	8	8	8
Permitted Phases	2	2	2	6	6	6	4	4	4	8	8	8
Actuated Green, G (s)	46.5	46.5	46.5	46.5	46.5	46.5	11.2	11.2	11.2	11.2	11.2	11.2
Effective Green, g (s)	48.7	48.7	48.7	48.7	48.7	48.7	13.3	13.3	13.3	13.3	13.3	13.3
Actuated g/C Ratio	0.70	0.70	0.70	0.70	0.70	0.70	0.19	0.19	0.19	0.19	0.19	0.19
Clearance Time (s)	6.2	6.2	6.2	6.2	6.2	6.2	6.1	6.1	6.1	6.1	6.1	6.1
Vehicle Extension (s)	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Lane Grp Cap (vph)	416	1098	383	1163	1163	1163	205	205	205	261	261	261
v/s Ratio Prot	0.14	0.37	0.19	0.33	0.33	0.33	0.10	0.10	0.10	0.05	0.05	0.05
v/s Ratio Perm	0.20	0.53	0.27	0.48	0.48	0.48	0.51	0.51	0.51	0.26	0.26	0.26
Uniform Delay, d1	3.8	5.1	4.0	4.9	4.9	4.9	25.4	25.4	25.4	24.2	24.2	24.2
Progression Factor	0.39	0.32	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.9	1.5	1.7	1.4	1.4	1.4	0.9	0.9	0.9	0.2	0.2	0.2
Delay (s)	2.4	3.2	5.7	6.3	6.3	6.3	26.3	26.3	26.3	24.4	24.4	24.4
Level of Service	A	A	A	A	A	A	C	C	C	C	C	C
Approach Delay (s)	3.1	6.2	6.2	6.2	6.2	6.2	26.3	26.3	26.3	24.4	24.4	24.4
Approach LOS	A	A	A	A	A	A	C	C	C	C	C	C
Intersection Summary												
HCM 2000 Control Delay	8.7											
HCM 2000 Volume to Capacity ratio	0.53											
Actuated Cycle Length (s)	70.0											
Intersection Capacity Utilization	81.7%											
Analysis Period (min)	15											
c Critical Lane Group												

Lanes, Volumes, Timings 5234-5278 Ferry Street, Niagara Falls TIS
 2: Fallsview Boulevard & Ferry Street Background PM (5-Year)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	7	8	474	67	95	499	16	59	14	85	11	24
Traffic Volume (vph)	78	474	67	95	499	16	59	14	85	11	24	112
Future Volume (vph)	78	474	67	95	499	16	59	14	85	11	24	112
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	30.0	45.0	45.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Storage Lanes	1	0	1	0	1	0	0	0	0	0	0	0
Taper Length (m)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	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	0.92	0.97	0.94	1.00	0.96	1.00	0.96	0.96	0.96	0.96	0.96	0.96
Flt	0.950	0.982	0.950	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999
Flt Protected	0.950	0.982	0.950	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999
Satd. Flow (prot)	1630	1636	0	1646	1695	0	0	1516	0	0	1506	0
Flt Permitted	0.335	0.327	0.327	0.327	0.327	0.327	0.327	0.327	0.327	0.327	0.327	0.327
Satd. Flow (perm)	527	1636	0	532	1695	0	0	1293	0	0	1470	0
Right Turn on Red	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Satd. Flow (RTOR)	16	16	16	16	16	16	16	16	16	16	16	16
Satd. Flow (RTOR)	50	50	50	50	50	50	50	50	50	50	50	50
Link Speed (k/h)	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9
Link Distance (m)	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2
Travel Time (s)	191	146	146	191	12	12	29	29	29	29	29	29
Confl. Peds. (#/hr)	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Peak Hour Factor	2%	2%	0%	1%	3%	2%	0%	2%	0%	2%	2%	2%
Adj. Flow (vph)	25	600	82	102	665	3	85	8	101	3	8	25
Shared Lane Traffic (%)	25	682	0	102	668	0	0	194	0	0	36	0
Lane Group Flow (vph)	Perm	NA	NA	Perm	NA	Perm	NA	Perm	NA	Perm	NA	NA
Turn Type	Perm	NA	NA	Perm	NA	Perm	NA	Perm	NA	Perm	NA	NA
Protected Phases	2	2	2	6	6	6	4	4	4	8	8	8
Permitted Phases	2	2	2	6	6	6	4	4	4	8	8	8
Detector Phase	2	2	2	6	6	6	4	4	4	8	8	8
Switch Phase	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Minimum Initial (s)	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2
Minimum Split (s)	42.8	42.8	42.8	42.8	42.8	42.8	27.2	27.2	27.2	27.2	27.2	27.2
Total Split (s)	61.1%	61.1%	61.1%	61.1%	61.1%	61.1%	38.9%	38.9%	38.9%	38.9%	38.9%	38.9%
Total Split (%)	36.6	36.6	36.6	36.6	36.6	36.6	21.0	21.0	21.0	21.0	21.0	21.0
Maximum Green (s)	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
Yellow Time (s)	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
All-Red Time (s)	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2
Lost Time Adjust (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Total Lost Time (s)	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	None	None	None	None	None	None
Walk Time (s)	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Flash Dont Walk (s)	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Act Effect Green (s)	48.2	48.2	48.2	48.2	48.2	48.2	13.8	13.8	13.8	13.8	13.8	13.8
Actuated g/C Ratio	0.69	0.69	0.69	0.69	0.69	0.69	0.20	0.20	0.20	0.20	0.20	0.20
v/c Ratio	0.07	0.60	0.28	0.57	0.57	0.57	0.60	0.60	0.60	0.60	0.60	0.60

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group												
Control Delay	5.5	9.5	6.4	6.8	22.1							11.9
Queue Delay	0.0	0.0	0.0	0.1	0.0							0.0
Total Delay	5.5	9.5	6.4	7.0	22.1							11.9
LOS	A	A	A	A	C							B
Approach Delay	9.4	6.9	22.1									11.9
Approach LOS	A	A	C									B
Queue Length 50th (m)	0.8	35.2	3.5	24.0	12.8							1.2
Queue Length 95th (m)	4.1	87.7	10.7	50.5	27.7							6.9
Internal Link Dist (m)	30.0	75.9	109.8									33.8
Turn Bay Length (m)	362	1131	366	1167	484							503
Base Capacity (vph)	0	0	0	58	0							0
Starvation Cap Reductn	0	0	0	0	0							0
Spillback Cap Reductn	0	0	0	0	0							0
Storage Cap Reductn	0	0	0	0	0							0
Reduced v/c Ratio	0.07	0.60	0.28	0.60	0.40							0.07
Intersection Summary												
Area Type: Other												
Cycle Length: 70												
Actuated Cycle Length: 70												
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green												
Natural Cycle: 60												
Control Type: Actuated-Coordinated												
Maximum v/c Ratio: 0.60												
Intersection Signal Delay: 9.7												
Intersection Capacity Utilization 73.3%												
ICU Level of Service D												
Analysis Period (min) 15												

Splits and Phases: 2: Fallsview Boulevard & Ferry Street



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰	↰	↰	↰	↰	↰	↰	↰	↰	↰	↰
Traffic Volume (vph)	23	552	75	94	612	3	78	7	93	3	7	23
Future Volume (vph)	23	552	75	94	612	3	78	7	93	3	7	23
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	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	1.00	1.00	1.00
Frb. ped/bikes	1.00	0.97	1.00	1.00	1.00	1.00	0.96	0.99	1.00	0.96	0.97	1.00
Fibb. ped/bikes	0.90	1.00	0.93	1.00	0.93	1.00	0.99	1.00	0.99	1.00	0.91	1.00
Frt	1.00	0.98	1.00	1.00	1.00	1.00	0.93	0.93	1.00	0.93	0.91	1.00
Flt Protected	0.95	1.00	0.95	1.00	0.95	1.00	0.98	1.00	0.98	1.00	0.91	1.00
Satd. Flow (prot)	1468	1636	1525	1695	1525	1695	1502	1502	1502	1502	1502	1502
Flt Permitted	0.34	1.00	0.33	1.00	0.33	1.00	0.84	0.84	0.84	0.84	0.98	1.00
Satd. Flow (perm)	518	1636	526	1695	526	1695	1292	1292	1292	1292	1470	1470
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	25	600	82	102	665	3	85	8	101	3	8	25
RTOR Reduction (vph)	0	5	0	0	0	0	0	67	0	0	20	0
Lane Group Flow (vph)	25	677	0	102	668	0	0	127	0	0	16	0
Confl. Peds. (#/hr)	191	146	146	191	12	29	29	29	29	29	12	12
Heavy Vehicles (%)	2%	2%	0%	1%	3%	2%	3%	2%	0%	2%	2%	2%
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm	NA	NA	NA
Protected Phases	2	2		6	6		4		4		8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	46.0	46.0	46.0	46.0	46.0	46.0	11.6	11.6	11.6	11.6	11.6	11.6
Effective Green, g (s)	48.2	48.2	48.2	48.2	48.2	48.2	13.8	13.8	13.8	13.8	13.8	13.8
Actuated g/C Ratio	0.69	0.69	0.69	0.69	0.69	0.69	0.20	0.20	0.20	0.20	0.20	0.20
Clearance Time (s)	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2
Vehicle Extension (s)	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Lane Grp Cap (vph)	356	1126	362	1167	362	1167	254	254	254	254	269	269
v/s Ratio Prot	c0.41			0.39								
v/s Ratio Perm	0.05			0.19			0.19			0.01		
v/c Ratio	0.07	0.60	0.28	0.57	0.57	0.57	0.50	0.50	0.50	0.06	0.06	0.06
Uniform Delay, d1	3.6	5.8	4.2	5.6	5.6	5.6	25.0	25.0	25.0	22.8	22.8	22.8
Progression Factor	1.00	1.00	0.77	0.71	0.71	0.71	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4	2.4	1.8	1.9	1.9	1.9	0.7	0.7	0.7	0.0	0.0	0.0
Delay (s)	3.9	8.2	5.1	5.9	5.9	5.9	25.7	25.7	25.7	22.8	22.8	22.8
Level of Service	A	A	A	A	A	A	C	C	C	C	C	C
Approach Delay (s)	8.0	8.0	5.7	5.7	5.7	5.7	25.7	25.7	25.7	22.8	22.8	22.8
Approach LOS	A	A	A	A	A	A	C	C	C	C	C	C
Intersection Summary												
HCM 2000 Control Delay	9.3					HCM 2000 Level of Service					A	
HCM 2000 Volume to Capacity ratio	0.58											
Actuated Cycle Length (s)	70.0					Sum of lost time (s)					8.0	
Intersection Capacity Utilization	73.3%					ICU Level of Service					D	
Analysis Period (min)	15											
Critical Lane Group												

	EBL	EBT	WBT	WBR	SBL	SBR	
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	
Lane Configurations		↕↕	↗		↖		
Traffic Volume (vph)	13	538	550	27	37	30	
Future Volume (vph)	13	538	550	27	37	30	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00	
Ped Bike Factor							
Fit			0.994		0.939		
Flt Protected		0.999			0.973		
Satd. Flow (prot)	0	3290	1707	0	1599	0	
Flt Permitted		0.999			0.973		
Satd. Flow (perm)	0	3290	1707	0	1599	0	
Link Speed (k/h)		50	50		50		
Link Distance (m)		134.5	118.7		82.8		
Travel Time (s)		9.7	8.5		6.0		
Conf. Peds. (#/hr)	371			371	38	14	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Heavy Vehicles (%)	0%	1%	2%	0%	0%	0%	
Adj. Flow (vph)	14	585	598	29	40	33	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	0	599	627	0	73	0	
Sign Control		Free	Free		Stop		
Intersection Summary							
Area Type:	Other						
Control Type:	Unsignalized						
Intersection Capacity Utilization	48.3%						
Analysis Period (min)	15						
	ICU Level of Service A						

	EBL	EBT	WBT	WBR	SBL	SBR	
Movement	EBL	EBT	WBT	WBR	SBL	SBR	
Lane Configurations	13	538	550	27	37	30	
Traffic Volume (veh/h)	13	538	550	27	37	30	
Future Volume (Veh/h)	13	538	550	27	37	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)	14	585	598	29	40	33	
Pedestrians		14	38		371		
Lane Width (m)		3.6	3.6		3.6		
Walking Speed (m/s)		1.2	1.2		1.2		
Percent Blockage		1	3		31		
Right turn flare (veh)							
Median type		None	None				
Median storage (veh)							
Upstream signal (m)		256					
pX, platoon unblocked					1342	998	
VC, conflicting volume		998					
VC1, stage 1 conf vol							
VC2, stage 2 conf vol							
VCu, unblocked vol		998			1342	998	
IC, single (s)		4.1			6.8	6.9	
IC, 2 stage (s)							
IF (s)		2.2			3.5	3.3	
p0 queue free %		97			58	80	
dM capacity (veh/h)		485			95	168	
Direction, Lane #	EB 1	EB 2	WB 1	SB 1			
Volume Total	209	390	627	73			
Volume Left	14	0	0	40			
Volume Right	0	0	29	33			
cSH	485	1700	1700	118			
Volume to Capacity	0.03	0.23	0.37	0.62			
Queue Length 95th (m)	0.7	0.0	0.0	23.4			
Control Delay (s)	1.2	0.0	0.0	75.5			
Lane LOS	A			F			
Approach Delay (s)	0.4		0.0	75.5			
Approach LOS				F			
Intersection Summary							
Average Delay			4.4				
Intersection Capacity Utilization			48.3%				
ICU Level of Service							A
Analysis Period (min)			15				

Lanes, Volumes, Timings
4: Robinson Street & Clark Avenue

5234-5278 Ferry Street, Niagara Falls TIS
Background PM (5-Year)

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	46	315	20	13	344	83	31	22	4	110	7	59
Traffic Volume (vph)	46	315	20	13	344	83	31	22	4	110	7	59
Future Volume (vph)	46	315	20	13	344	83	31	22	4	110	7	59
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
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		0.993			0.975			0.991				0.955
Frt		0.994			0.999			0.973				0.970
Flt Protected		0	1672	0	0	1666	0	0	1651	0	0	1621
Satd. Flow (prot)		0.994			0.999			0.973				0.970
Flt Permitted		0	1672	0	0	1666	0	0	1651	0	0	1621
Satd. Flow (perm)		50			50			50				50
Link Speed (k/h)		133.5			132.0			59.2				232.7
Travel Time (s)		9.6			9.5			4.3				16.8
Confl. Peds. (#/hr)		80			57			80				103
Peak Hour Factor		0.92			0.92			0.92				0.92
Heavy Vehicles (%)		0%			0%			4%				0%
Adj. Flow (vph)		50			22			34				8
Shared Lane Traffic (%)		0			0			0				0
Lane Group Flow (vph)		414			478			62				192
Sign Control		Free			Free			Stop				Stop
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	64.9%											
Analysis Period (min)	15											

HCM Unsignalized Intersection Capacity Analysis
4: Robinson Street & Clark Avenue

5234-5278 Ferry Street, Niagara Falls TIS
Background PM (5-Year)

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	46	315	20	13	344	83	31	22	4	110	7	59
Traffic Volume (veh/h)	46	315	20	13	344	83	31	22	4	110	7	59
Future Volume (Veh/h)	46	315	20	13	344	83	31	22	4	110	7	59
Sign Control	Free	Free	Free	Free	Free	Free	Free	Free	Free	Free	Free	Free
Grade	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	50	342	22	14	374	90	34	24	4	120	8	64
Pedestrians		28			103			57				80
Lane Width (m)		3.6			3.6			3.6				3.6
Walking Speed (m/s)		1.2			1.2			1.2				1.2
Percent Blockage		2			9			5				7
Right turn flare (veh)		None			None			None				None
Median type		None			None			None				None
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
VC, conflicting volume		544			421			1053		513		1048
VC1, stage 1 conf vol												
VC2, stage 2 conf vol												
VCU, unblocked vol		544			421			1053		513		1048
IC, single (s)		4.1			4.1			7.1		6.2		6.5
IC, 2 stage (s)		2.2			2.2			3.5		4.0		3.3
IF (s)		95			99			76		87		96
p0 queue free %		966			1094			139		182		191
dM capacity (veh/h)												
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	414	478	62	192								
Volume Left	50	14	34	120								
Volume Right	22	90	4	64								
cSH	966	1094	161	173								
Volume to Capacity	0.05	0.01	0.38	1.11								
Queue Length 95th (m)	1.2	0.3	12.4	73.2								
Control Delay (s)	1.6	0.4	40.6	155.5								
Lane LOS	A	A	E	F								
Approach Delay (s)	1.6	0.4	40.6	155.5								
Approach LOS	E	F										
Intersection Summary												
Average Delay	29.0											
Intersection Capacity Utilization	64.9%											
Analysis Period (min)	15											

Lanes, Volumes, Timings
1: Clark Avenue/Ellen Avenue & Ferry Street

5234-5278 Ferry Street, Niagara Falls TIS
Background Saturday (5-Year)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	90	646	75	102	490	9	77	28	107	21	66	175
Future Volume (vph)	90	646	75	102	490	9	77	28	107	21	66	175
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	40.0	0.0	40.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Storage Lanes	1	0	1	0	0	0	0	0	0	0	0	0
Tapor Length (m)	7.5	0	7.5	0	0	0	0	0	0	0	0	0
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	0.82	0.94		0.99		0.78						0.86
Frt	0.984		0.997		0.932		0.910					0.996
Flt Protected	0.950		0.950		0.932		0.910					0.996
Satd. Flow (prot)	1646	1576	0	1630	1694	0	0	1254	0	0	1367	0
Flt Permitted	0.364	0.235		0.652		0.652		0.652		0.967		0.967
Satd. Flow (perm)	544	1576	0	403	1694	0	0	805	0	0	1305	0
Right Turn on Red	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Satd. Flow (RTOR)	13	2	51									79
Link Speed (km/h)	50	50	50	50	50	50	50	50	50	50	50	50
Link Distance (m)	133.8	121.5		52.1		169.1						12.2
Travel Time (s)	9.6	8.7		3.8								12.2
Confl. Peds. (#/hr)	309	317	317	309	92	92	92	92	92	92	92	92
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	3%	2%	2%	0%	0%	12%	4%	0%	2%	1%	1%
Adj. Flow (vph)	98	702	82	111	533	10	84	30	116	23	72	190
Shared Lane Traffic (%)												
Lane Group Flow (vph)	98	784	0	111	543	0	0	230	0	0	285	0
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases	2	2	6	6	4	4	8	8	8	8	8	8
Permitted Phases	2	2	6	6	6	6	4	4	4	4	4	4
Detector Phase	2	2	6	6	6	6	4	4	4	4	4	4
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	23.2	23.2	23.2	23.2	27.1	27.1	27.1	27.1	27.1	27.1	27.1	27.1
Total Split (s)	51.8	51.8	51.8	51.8	28.2	28.2	28.2	28.2	28.2	28.2	28.2	28.2
Total Split (%)	64.8%	64.8%	64.8%	64.8%	35.3%	35.3%	35.3%	35.3%	35.3%	35.3%	35.3%	35.3%
Maximum Green (s)	45.6	45.6	45.6	45.6	22.1	22.1	22.1	22.1	22.1	22.1	22.1	22.1
Yellow Time (s)	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
All-Red Time (s)	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-2.2	-2.2	-2.2	-2.2	-2.1	-2.1	-2.1	-2.1	-2.1	-2.1	-2.1	-2.1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max
Walk Time (s)	7.0	7.0	7.0	7.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Flash Dont Walk (s)	10.0	10.0	10.0	10.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Act Effct Green (s)	50.9	50.9	50.9	50.9	21.1	21.1	21.1	21.1	21.1	21.1	21.1	21.1
Actuated g/C Ratio	0.64	0.64	0.64	0.64	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26
v/c Ratio	0.28	0.78	0.43	0.50	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92

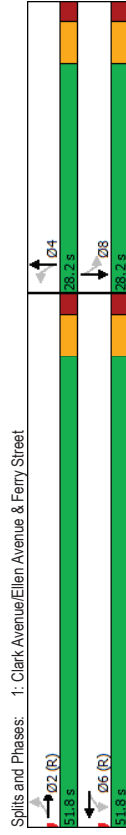
PTSL (230405)

Synchro 11 Report
Page 1

Lanes, Volumes, Timings
1: Clark Avenue/Ellen Avenue & Ferry Street

5234-5278 Ferry Street, Niagara Falls TIS
Background Saturday (5-Year)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	3.7	8.1	15.4	10.6	63.6	28.8	28.8	28.8	28.8	28.8	28.8	28.8
Queue Delay	0.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	3.7	9.4	15.4	10.6	63.6	28.8	28.8	28.8	28.8	28.8	28.8	28.8
LOS	A	A	B	B	E	E	E	E	E	E	E	E
Approach Delay	8.8	11.4	63.6	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8
Approach LOS	A	A	B	B	E	E	E	E	E	E	E	E
Queue Length 50th (m)	2.1	28.2	8.4	43.5	25.1	25.1	25.1	25.1	25.1	25.1	25.1	25.1
Queue Length 95th (m)	m2.5	m22.6	22.6	68.2	#63.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6
Internal Link Dist (m)	109.8	40.0	40.0	97.5	28.1	145.1	145.1	145.1	145.1	145.1	145.1	145.1
Turn Bay Length (m)	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
Base Capacity (vph)	346	1007	256	1078	279	449	449	449	449	449	449	449
Starvation Cap Reductn	0	85	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.28	0.85	0.43	0.50	0.92	0.63	0.63	0.63	0.63	0.63	0.63	0.63
Intersection Summary	Other											
Area Type	Other											
Cycle Length	80											
Actuated Cycle Length	80											
Offset	10 (13%), Referenced to phase 2EBTL and 6WBTL, Start of Green											
Natural Cycle	70											
Control Type	Actuated-Coordinated											
Maximum v/c Ratio	0.92											
Intersection Signal Delay	18.6											
Intersection Capacity Utilization	100.8%											
Analysis Period (min)	15											
# 95th percentile volume exceeds capacity, queue may be longer.	Queue shown is maximum after two cycles.											
m Volume for 95th percentile queue is metered by upstream signal.												



PTSL (230405)

Synchro 11 Report
Page 2

HCM Signalized Intersection Capacity Analysis 5234-5278 Ferry Street, Niagara Falls TIS
 1: Clark Avenue/Ellen Avenue & Ferry Street Background Saturday (5-Year)

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	90	646	75	102	490	9	77	28	107	21	66	175
Traffic Volume (vph)	90	646	75	102	490	9	77	28	107	21	66	175
Future Volume (vph)	90	646	75	102	490	9	77	28	107	21	66	175
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	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	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.94	1.00	1.00	0.99	1.00	0.81	0.97	0.93	0.91	0.87	0.87
Flpb, ped/bikes	0.81	1.00	1.00	1.00	1.00	1.00	0.97	0.97	0.98	0.98	0.98	0.98
Frt	1.00	0.98	1.00	1.00	1.00	1.00	0.93	1.00	0.93	1.00	1.00	1.00
Flt Protected	0.95	1.00	0.95	1.00	0.98	1.00	0.98	1.00	0.98	1.00	1.00	1.00
Satd. Flow (prot)	1330	1576	1630	1694	1214	1344	1214	1344	1214	1344	1344	1344
Flt Permitted	0.38	1.00	0.24	1.00	0.65	1.00	0.65	1.00	0.65	1.00	0.97	0.97
Satd. Flow (perm)	537	1576	403	1694	806	1304	806	1304	806	1304	1304	1304
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	98	702	82	111	533	10	84	30	116	23	72	190
RTOR Reduction (vph)	0	5	0	0	1	0	0	38	0	0	58	0
Lane Group Flow (vph)	98	779	0	111	542	0	0	192	0	0	227	0
Confl. Peds. (#/hr)	309	317	317	309	92	190	190	92	190	190	92	92
Heavy Vehicles (%)	1%	3%	2%	2%	2%	0%	0%	12%	4%	0%	2%	1%
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases	2	2	2	2	2	2	2	2	2	2	2	2
Permitted Phases	2	2	2	2	2	2	2	2	2	2	2	2
Actuated Green, G (s)	48.7	48.7	48.7	48.7	48.7	48.7	48.7	48.7	48.7	48.7	48.7	48.7
Effective Green, g (s)	50.9	50.9	50.9	50.9	50.9	50.9	50.9	50.9	50.9	50.9	50.9	50.9
Actuated g/C Ratio	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64
Clearance Time (s)	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2
Vehicle Extension (s)	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Lane Grp Cap (vph)	341	1002	256	1077	212	343	212	343	212	343	343	343
v/s Ratio Prot	0.49	0.49	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32
v/s Ratio Perm	0.18	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28
v/c Ratio	0.29	0.78	0.43	0.50	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Uniform Delay, d1	6.5	10.5	7.3	7.8	28.5	26.3	26.3	26.3	26.3	26.3	26.3	26.3
Progression Factor	0.34	0.36	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.9	2.7	5.3	1.7	36.6	3.8	3.8	3.8	3.8	3.8	3.8	3.8
Delay (s)	3.1	6.5	12.6	9.5	65.1	30.1	30.1	30.1	30.1	30.1	30.1	30.1
Level of Service	A	A	B	A	E	C	E	C	E	C	C	C
Approach Delay (s)	6.1	10.0	10.0	10.0	65.1	30.1	30.1	30.1	30.1	30.1	30.1	30.1
Approach LOS	A	A	A	A	E	C	E	C	E	C	C	C
Intersection Summary												
HCM 2000 Control Delay	17.3											
HCM 2000 Volume to Capacity ratio	0.81											
Actuated Cycle Length (s)	80.0											
Intersection Capacity Utilization	100.8%											
Analysis Period (min)	15											
c Critical Lane Group												

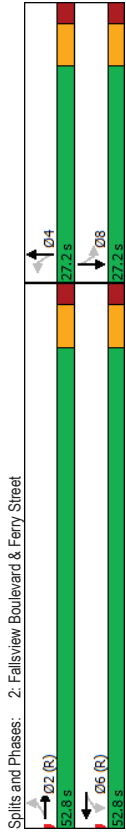
Lanes, Volumes, Timings 5234-5278 Ferry Street, Niagara Falls TIS
 2: Fallsview Boulevard & Ferry Street Background Saturday (5-Year)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	90	646	75	102	490	9	77	28	107	21	66	175
Traffic Volume (vph)	90	646	75	102	490	9	77	28	107	21	66	175
Future Volume (vph)	90	646	75	102	490	9	77	28	107	21	66	175
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	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	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.94	1.00	1.00	0.99	1.00	0.81	0.97	0.93	0.91	0.87	0.87
Flpb, ped/bikes	0.81	1.00	1.00	1.00	1.00	1.00	0.97	0.97	0.98	0.98	0.98	0.98
Frt	1.00	0.98	1.00	1.00	1.00	1.00	0.93	1.00	0.93	1.00	1.00	1.00
Flt Protected	0.95	1.00	0.95	1.00	0.98	1.00	0.98	1.00	0.98	1.00	1.00	1.00
Satd. Flow (prot)	1330	1576	1630	1694	1214	1344	1214	1344	1214	1344	1344	1344
Flt Permitted	0.38	1.00	0.24	1.00	0.65	1.00	0.65	1.00	0.65	1.00	0.97	0.97
Satd. Flow (perm)	537	1576	403	1694	806	1304	806	1304	806	1304	1304	1304
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	98	702	82	111	533	10	84	30	116	23	72	190
RTOR Reduction (vph)	0	5	0	0	1	0	0	38	0	0	58	0
Lane Group Flow (vph)	98	779	0	111	542	0	0	192	0	0	227	0
Confl. Peds. (#/hr)	309	317	317	309	92	190	190	92	190	190	92	92
Heavy Vehicles (%)	1%	3%	2%	2%	2%	0%	0%	12%	4%	0%	2%	1%
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases	2	2	2	2	2	2	2	2	2	2	2	2
Permitted Phases	2	2	2	2	2	2	2	2	2	2	2	2
Actuated Green, G (s)	48.7	48.7	48.7	48.7	48.7	48.7	48.7	48.7	48.7	48.7	48.7	48.7
Effective Green, g (s)	50.9	50.9	50.9	50.9	50.9	50.9	50.9	50.9	50.9	50.9	50.9	50.9
Actuated g/C Ratio	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64
Clearance Time (s)	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2
Vehicle Extension (s)	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Lane Grp Cap (vph)	341	1002	256	1077	212	343	212	343	212	343	343	343
v/s Ratio Prot	0.49	0.49	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32
v/s Ratio Perm	0.18	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28
v/c Ratio	0.29	0.78	0.43	0.50	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Uniform Delay, d1	6.5	10.5	7.3	7.8	28.5	26.3	26.3	26.3	26.3	26.3	26.3	26.3
Progression Factor	0.34	0.36	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.9	2.7	5.3	1.7	36.6	3.8	3.8	3.8	3.8	3.8	3.8	3.8
Delay (s)	3.1	6.5	12.6	9.5	65.1	30.1	30.1	30.1	30.1	30.1	30.1	30.1
Level of Service	A	A	B	A	E	C	E	C	E	C	C	C
Approach Delay (s)	6.1	10.0	10.0	10.0	65.1	30.1	30.1	30.1	30.1	30.1	30.1	30.1
Approach LOS	A	A	A	A	E	C	E	C	E	C	C	C
Intersection Summary												
HCM 2000 Control Delay	17.3											
HCM 2000 Volume to Capacity ratio	0.81											
Actuated Cycle Length (s)	80.0											
Intersection Capacity Utilization	100.8%											
Analysis Period (min)	15											
c Critical Lane Group												

Lanes, Volumes, Timings
 2: Fallsview Boulevard & Ferry Street

5234-5278 Ferry Street, Niagara Falls TIS
 Background Saturday (5-Year)

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	7.1	30.2	47.4	8.0	47.4	8.0	39.1	39.1	0.0	0.0	12.1	12.1
Queue Delay	0.0	2.8	0.0	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.1	33.0	47.4	8.2	47.4	8.2	39.1	39.1	0.0	0.0	12.1	12.1
LOS	A	C	D	A	D	A	D	D	D	D	B	B
Approach Delay	32.3	15.2	15.2	39.1	39.1	39.1	12.1	12.1	12.1	12.1	12.1	12.1
Approach LOS	C	B	B	D	D	D	B	B	B	B	B	B
Queue Length 50th (m)	1.3	114.4	10.8	44.4	29.4	29.4	1.2	1.2	1.2	1.2	1.2	1.2
Queue Length 95th (m)	4.6	#216.9	m#51.6	m60.7	#54.6	#54.6	7.3	7.3	7.3	7.3	7.3	7.3
Internal Link Dist (m)	30.0	75.9	109.8	171.3	171.3	171.3	33.8	33.8	33.8	33.8	33.8	33.8
Turn Bay Length (m)	30.0	45.0	45.0	177	1137	1137	397	397	397	397	440	440
Base Capacity (vph)	306	1029	177	1137	1137	1137	397	397	397	397	440	440
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	35	0	0	0	0	1	1	0	0	0	0
Storage Cap Reducth	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.08	0.96	0.84	0.64	0.67	0.67	0.08	0.08	0.08	0.08	0.08	0.08
Intersection Summary												
Area Type:	Other											
Cycle Length: 80												
Actuated Cycle Length: 80												
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green												
Natural Cycle: 90												
Control Type: Actuated-Coordinated												
Maximum v/c Ratio: 0.92												
Intersection Signal Delay: 26.1												
Intersection Capacity Utilization 94.2%												
Analysis Period (min) 15												
# 95th percentile volume exceeds capacity, queue may be longer.												
Queue shown is maximum after two cycles.												
m Volume for 95th percentile queue is metered by upstream signal.												



HCM Signalized Intersection Capacity Analysis
 2: Fallsview Boulevard & Ferry Street

5234-5278 Ferry Street, Niagara Falls TIS
 Background Saturday (5-Year)

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Volume (vph)	24	737	137	136	619	3	129	7	109	4	6	22
Future Volume (vph)	24	737	137	136	619	3	129	7	109	4	6	22
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	4.0	4.0	4.0
Loss Ratio	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Flpb. ped/bikes	0.86	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flpb. ped/bikes	0.86	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.98	1.00	1.00	1.00	1.00	0.94	0.94	0.94	0.94	0.91	0.91
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.97	0.97	0.97	0.97	0.99	0.99
Satd. Flow (prot)	1397	1553	1630	1727	1488	1488	1512	1512	1512	1512	1512	1512
Flt Permitted	0.31	1.00	1.00	0.16	1.00	1.00	0.82	0.82	0.82	0.82	0.82	0.82
Satd. Flow (perm)	459	1553	269	1727	1247	1247	1461	1461	1461	1461	1461	1461
Peak-Hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	26	801	149	148	673	3	140	8	118	4	7	24
RTOR Reduction (vph)	0	7	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	26	943	0	148	676	0	227	0	39	0	17	0
Confl. Peds. (#/hr)	309	278	278	309	4	39	39	39	39	39	39	39
Heavy Vehicles (%)	2%	1%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Perm	NA	NA	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm
Protected Phases	2	2	2	6	6	6	4	4	4	4	4	4
Permitted Phases	2	2	2	6	6	6	4	4	4	4	4	4
Actuated Green, G (s)	50.5	50.5	50.5	50.5	50.5	50.5	17.1	17.1	17.1	17.1	17.1	17.1
Effective Green, g (s)	52.7	52.7	52.7	52.7	52.7	52.7	19.3	19.3	19.3	19.3	19.3	19.3
Actuated 9/C Ratio	0.66	0.66	0.66	0.66	0.66	0.66	0.24	0.24	0.24	0.24	0.24	0.24
Clearance Time (s)	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2
Vehicle Extension (s)	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Lane Grp Cap (vph)	302	1023	177	1137	300	352	352	352	352	352	352	352
v/s Ratio Prot	0.06	0.06	0.06	0.55	0.55	0.55	0.18	0.18	0.18	0.18	0.18	0.18
v/s Ratio Perm	0.09	0.09	0.09	0.84	0.84	0.84	0.76	0.76	0.76	0.76	0.76	0.76
Uniform Delay, d1	4.9	11.9	10.4	7.7	28.2	28.2	23.3	23.3	23.3	23.3	23.3	23.3
Progression Factor	1.00	1.00	1.00	0.68	0.67	0.67	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.6	14.6	30.7	1.9	9.5	9.5	0.0	0.0	0.0	0.0	0.0	0.0
Delay (s)	5.5	26.5	37.8	7.0	37.6	37.6	23.3	23.3	23.3	23.3	23.3	23.3
Level of Service	A	C	D	A	D	D	C	C	C	C	C	C
Approach Delay (s)	25.9	25.9	25.9	12.6	12.6	12.6	37.6	37.6	37.6	37.6	37.6	37.6
Approach LOS	C	C	C	B	B	B	D	D	D	D	D	D
Intersection Summary												
HCM 2000 Control Delay	22.1											
HCM 2000 Volume to Capacity ratio	0.88											
Actuated Cycle Length (s)	80.0											
Intersection Capacity Utilization	94.2%											
Analysis Period (min)	15											
c Critical Lane Group												

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕↕	↕		↕	
Traffic Volume (vph)	15	727	553	35	83	50
Future Volume (vph)	15	727	553	35	83	50
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor			0.992		0.949	
Fit						
Flt Protected		0.999			0.970	
Satd. Flow (prot)	0	3289	1704	0	1599	0
Flt Permitted		0.999			0.970	
Satd. Flow (perm)	0	3289	1704	0	1599	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		134.5	118.7		82.8	
Travel Time (s)		9.7	8.5		6.0	
Confl. Peds. (#/hr)	547			547	59	18
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	1%	2%	0%	0%	2%
Adj. Flow (vph)	16	790	601	38	90	54
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	806	639	0	144	0
Sign Control		Free	Free		Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	52.1%					
Analysis Period (min)	15					
ICU Level of Service A						

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		4↑	↓		W	
Traffic Volume (veh/h)	15	727	553	35	83	50
Future Volume (Veh/h)	15	727	553	35	83	50
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)	16	790	601	38	90	54
Pedestrians		18	59		547	
Lane Width (m)		3.6	3.6		3.6	
Walking Speed (m/s)		1.2	1.2		1.2	
Percent Blockage		2	5		46	
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)		256				
pK, platoon unblocked					1653	1185
VC, conflicting volume	1186					
VC1, stage 1 conf vol						
VC2, stage 2 conf vol						
VCu, unblocked vol	1186				1653	1185
IC, single (s)	4.1				6.8	6.9
IC, 2 stage (s)						
IF (s)	2.2				3.5	3.3
p0 queue free %	95				0	45
dM capacity (veh/h)	324				45	97
Direction, Lane #	EB 1	EB 2	WB 1	SB 1		
Volume Total	279	627	639	144		
Volume Left	16	0	0	90		
Volume Right	0	0	38	54		
cSH	324	1700	1700	56		
Volume to Capacity	0.05	0.31	0.38	2.56		
Queue Length 95th (m)	1.2	0.0	0.0	110.0		
Control Delay (s)	1.9	0.0	0.0	865.7		
Lane LOS	A			F		
Approach Delay (s)	0.6		0.0	865.7		
Approach LOS				F		
Intersection Summary						
Average Delay			78.8			
Intersection Capacity Utilization			52.1%			A
Analysis Period (min)			15			

Lanes, Volumes, Timings
4: Robinson Street & Clark Avenue

5234-5278 Ferry Street, Niagara Falls TIS
Background Saturday (5-Year)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	66	349	58	74	338	83	49	26	12	96	13	98	
Traffic Volume (vph)	66	349	58	74	338	83	49	26	12	96	13	98	
Future Volume (vph)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	
Ideal Flow (vphpl)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
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		0.983			0.977			0.981				0.936	
Frt		0.993			0.993			0.973				0.977	
Flt Protected		0.993			0.993			0.973				0.977	
Satd. Flow (prot)	0	1664	0	0	1667	0	0	1670	0	0	1593	0	
Flt Permitted		0.993			0.993			0.973				0.977	
Satd. Flow (perm)	0	1664	0	0	1667	0	0	1670	0	0	1593	0	
Link Speed (k/h)		50			50			50				50	
Link Distance (m)		133.5			132.0			59.2				232.7	
Travel Time (s)		9.6			9.5			4.3				16.8	
Confl. Peds. (#/hr)	142	86	86	142	123			95	95			123	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Heavy Vehicles (%)	3%	3%	0%	0%	2%	3%	0%	0%	0%	0%	0%	1%	
Adj. Flow (vph)	72	379	63	80	367	90	53	28	13	104	14	107	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	514	0	0	537	0	0	94	0	0	225	0	
Sign Control		Free			Free			Stop			Stop		
Intersection Summary													
Area Type:	Other												
Control Type:	Unsignalized												
Intersection Capacity Utilization	65.8%												
Analysis Period (min)	15												
ICU Level of Service C													

HCM Unsignalized Intersection Capacity Analysis
4: Robinson Street & Clark Avenue

5234-5278 Ferry Street, Niagara Falls TIS
Background Saturday (5-Year)

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (veh/h)	66	349	58	74	338	83	49	26	12	96	13	98
Future Volume (Veh/h)	66	349	58	74	338	83	49	26	12	96	13	98
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
Grade	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	72	379	63	80	367	90	53	28	13	104	14	107
Pedestrians		123			95			86			142	
Lane Width (m)		3.6			3.6			3.6			3.6	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		10			8			7			12	
Right turn flare (veh)												
Median type	None											
Median storage (veh)	None											
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	599			528			1450	1400	592	1390	1386	677
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCU, unblocked vol	599			528			1450	1400	592	1390	1386	677
IC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
IC, 2 stage (s)												
IF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	92			92			0	71	97	0	86	70
dM capacity (veh/h)	858			974			44	98	436	57	99	360
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	514	537	94	225								
Volume Left	72	80	53	104								
Volume Right	63	90	13	107								
CSH	858	974	62	99								
Volume to Capacity	0.08	0.08	1.53	2.26								
Queue Length 95th (m)	2.1	2.0	62.2	149.5								
Control Delay (s)	2.3	2.2	414.2	668.5								
Lane LOS	A	A	F	F								
Approach Delay (s)	2.3	2.2	414.2	668.5								
Approach LOS	F	F	F	F								
Intersection Summary												
Average Delay	139.9											
Intersection Capacity Utilization	65.8%											
Analysis Period (min)	15											
	ICU Level of Service C											

Appendix I

2032 Total Traffic Operations

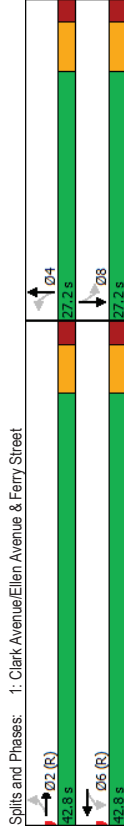


Lanes, Volumes, Timings
1: Clark Avenue/Ellen Avenue & Ferry Street

Lanes, Volumes, Timings
1: Clark Avenue/Ellen Avenue & Ferry Street

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	78	474	202	125	499	16	189	14	113	11	24	112
Future Volume (vph)	78	474	202	125	499	16	189	14	113	11	24	112
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	40.0	0.0	40.0	0.0	40.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Storage Lanes	1	0	1	0	1	0	0	0	0	0	0	0
Taper Length (m)	7.5	0	7.5	0	7.5	0	7.5	0	7.5	0	7.5	0
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	0.87	0.84		0.99		0.99		0.90		0.90		0.90
Frt	0.950	0.955		0.995		0.995		0.952		0.952		0.897
Flt Protected	0.950		0.950			0.950		0.971		0.971		0.996
Satd. Flow (prot)	1662	1393	0	1662	1671	0	0	1524	0	0	1413	0
Flt Permitted	0.343		0.221			0.221		0.717		0.717		0.964
Satd. Flow (perm)	524	1393	0	387	1671	0	0	1072	0	0	1362	0
Right Turn on Red		Yes		Yes		Yes		Yes		Yes		Yes
Satd. Flow (RTOR)	49		4		4		43		50		50	114
Link Speed (km/h)	50		50		50		52.1		52.1		52.1	169.1
Link Distance (m)	133.8		121.5		121.5		52.1		52.1		52.1	169.1
Travel Time (s)	9.6		8.7		8.7		3.8		3.8		3.8	12.2
Confl. Peds. (#/hr)	191		263		263		191		65		75	65
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	2%	0%	0%	3%	0%	0%	0%	2%	0%	0%	0%
Adj. Flow (vph)	85	515	220	136	542	17	205	15	123	12	26	122
Shared Lane Traffic (%)												
Lane Group Flow (vph)	85	735	0	136	559	0	0	343	0	0	160	0
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases	2	2	6	6	6	6	4	4	8	8	8	8
Permitted Phases	2	2	6	6	6	6	4	4	8	8	8	8
Detector Phase	2	2	6	6	6	6	4	4	8	8	8	8
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	23.2	23.2	23.2	23.2	23.2	23.2	27.1	27.1	27.1	27.1	27.1	27.1
Total Split (s)	42.8	42.8	42.8	42.8	42.8	42.8	27.2	27.2	27.2	27.2	27.2	27.2
Total Split (%)	61.1%	61.1%	61.1%	61.1%	61.1%	61.1%	38.9%	38.9%	38.9%	38.9%	38.9%	38.9%
Maximum Green (s)	36.6	36.6	36.6	36.6	36.6	36.6	21.1	21.1	21.1	21.1	21.1	21.1
Yellow Time (s)	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
All-Red Time (s)	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.1	-2.1	-2.1	-2.1	-2.1	-2.1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	None	None	None	None	None	None
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	8.0	8.0	8.0	8.0	8.0	8.0
Flash Dont Walk (s)	10.0	10.0	10.0	10.0	10.0	10.0	13.0	13.0	13.0	13.0	13.0	13.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Act Effct Green (s)	39.6	39.6	39.6	39.6	39.6	39.6	22.4	22.4	22.4	22.4	22.4	22.4
Actuated g/C Ratio	0.57	0.57	0.57	0.57	0.57	0.57	0.32	0.32	0.32	0.32	0.32	0.32
v/c Ratio	0.29	0.91	0.62	0.59	0.92	0.59	0.92	0.92	0.92	0.92	0.92	0.92

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	5.9	23.3	27.1	13.4	13.4	53.7	8.1	8.1	8.1	8.1	8.1	8.1
Queue Delay	0.0	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	5.9	23.4	27.1	13.5	13.5	53.7	8.1	8.1	8.1	8.1	8.1	8.1
LOS	A	C	C	B	B	D	A	A	A	A	A	A
Approach Delay	21.6		16.1	53.7		8.1						
Approach LOS	C		B	D		A						
Queue Length 50th (m)	3.1	79.5	11.0	43.7		36.7	4.0					
Queue Length 95th (m)	m2.7	#147.0	#38.5	71.8		#82.9	15.9					
Internal Link Dist (m)	109.8		97.5			28.1	145.1					
Turn Bay Length (m)	40.0		40.0									
Base Capacity (vph)	296	809	219	947		384	527					
Starvation Cap Reductn	0	2	0	0		0	0					
Spillback Cap Reductn	0	0	0	33		0	2					
Storage Cap Reductn	0	0	0	0		0	0					
Reduced v/c Ratio	0.29	0.91	0.62	0.61		0.89	0.30					
Intersection Summary												
Area Type	Other											
Cycle Length	70											
Actuated Cycle Length	70											
Offset	8 (11%) Referenced to phase 2:EBTL and 6:WBTL Start of Green											
Natural Cycle	70											
Control Type	Actuated-Coordinated											
Maximum v/c Ratio	0.92											
Intersection Signal Delay	24.1											
Intersection Capacity Utilization	102.3%											
Analysis Period (min)	15											
# 95th percentile volume exceeds capacity, queue may be longer.	m											
Queue shown is maximum after two cycles.	m											
Volume for 95th percentile queue is metered by upstream signal.	m											



HCM Signalized Intersection Capacity Analysis 5234-5278 Ferry Street, Niagara Falls TIS
 1: Clark Avenue/Ellen Avenue & Ferry Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	7	474	202	125	499	16	189	14	113	11	24	112
Traffic Volume (vph)	78	474	202	125	499	16	189	14	113	11	24	112
Future Volume (vph)	78	474	202	125	499	16	189	14	113	11	24	112
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	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	1.00	1.00	1.00
Flpb. ped/bikes	1.00	0.84	1.00	0.99	1.00	0.99	1.00	0.95	1.00	0.95	1.00	0.90
Flpb. ped/bikes	0.87	1.00	0.91	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.90	0.90
Flt Protected	0.95	1.00	0.95	1.00	0.95	1.00	0.97	1.00	0.97	1.00	1.00	1.00
Satd. Flow (prot)	1447	1393	1510	1672	1447	1393	1510	1672	1447	1393	1510	1672
Flt Permitted	0.34	1.00	0.22	1.00	0.22	1.00	0.72	1.00	0.72	1.00	0.96	1.00
Satd. Flow (perm)	523	1393	351	1672	523	1393	351	1672	523	1393	351	1672
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	85	515	220	136	542	17	205	15	123	12	26	122
RTOR Reduction (vph)	0	21	0	0	2	0	0	29	0	0	78	0
Lane Group Flow (vph)	85	714	0	136	557	0	0	314	0	0	82	0
Confl. Peds. (#/hr)	191	263	263	191	65	65	75	75	75	75	65	65
Heavy Vehicles (%)	0%	2%	0%	0%	3%	0%	0%	0%	2%	0%	0%	0%
Turn Type	Perm	NA	NA	Perm	NA	Perm	NA	NA	Perm	NA	NA	NA
Protected Phases	2	2	2	6	6	2	2	2	4	4	8	8
Permitted Phases	37.4	37.4	37.4	37.4	37.4	39.6	39.6	22.4	20.3	20.3	20.3	20.3
Actuated Green, G (s)	39.6	39.6	39.6	39.6	39.6	39.6	39.6	22.4	20.3	20.3	20.3	20.3
Effective Green, g (s)	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.32	0.32	0.32	0.32	0.32
Actuated g/C Ratio	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.1	6.1	6.1	6.1	6.1
Clearance Time (s)	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Vehicle Extension (s)	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Lane Grp Cap (vph)	295	788	198	945	295	788	198	945	342	342	435	435
v/s Ratio Prot	0.16	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.29	0.29	0.06	0.06
v/s Ratio Perm	0.29	0.91	0.69	0.59	0.69	0.59	0.69	0.59	0.92	0.92	0.19	0.19
Uniform Delay, d1	7.9	13.5	10.8	9.9	10.8	9.9	10.8	9.9	22.9	22.9	17.2	17.2
Progression Factor	0.44	0.60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.8	12.3	17.7	2.7	28.0	2.7	28.0	2.7	28.0	2.7	0.1	0.1
Delay (s)	5.3	20.4	28.5	12.6	51.0	12.6	51.0	12.6	51.0	12.6	17.3	17.3
Level of Service	A	C	C	B	B	B	B	D	D	D	B	B
Approach Delay (s)	18.9	18.9	18.9	15.7	15.7	15.7	15.7	51.0	51.0	51.0	17.3	17.3
Approach LOS	B	B	B	B	B	B	B	D	D	D	B	B
Intersection Summary												
HCM 2000 Control Delay	23.1											
HCM 2000 Volume to Capacity ratio	0.91											
Actuated Cycle Length (s)	70.0											
Intersection Capacity Utilization	102.3%											
Analysis Period (min)	15											
c Critical Lane Group												

Lanes, Volumes, Timings 5234-5278 Ferry Street, Niagara Falls TIS
 2: Fallsview Boulevard & Ferry Street

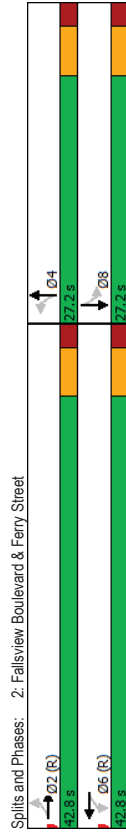
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	7	474	202	125	499	16	189	14	113	11	24	112
Traffic Volume (vph)	78	474	202	125	499	16	189	14	113	11	24	112
Future Volume (vph)	78	474	202	125	499	16	189	14	113	11	24	112
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	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	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	1.00	1.00	1.00
Flpb. ped/bikes	1.00	0.84	1.00	0.99	1.00	0.99	1.00	0.95	1.00	0.95	1.00	0.90
Flpb. ped/bikes	0.87	1.00	0.91	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.90	0.90
Flt Protected	0.95	1.00	0.95	1.00	0.95	1.00	0.97	1.00	0.97	1.00	1.00	1.00
Satd. Flow (prot)	1447	1393	1510	1672	1447	1393	1510	1672	1447	1393	1510	1672
Flt Permitted	0.34	1.00	0.22	1.00	0.22	1.00	0.72	1.00	0.72	1.00	0.96	1.00
Satd. Flow (perm)	523	1393	351	1672	523	1393	351	1672	523	1393	351	1672
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	85	515	220	136	542	17	205	15	123	12	26	122
RTOR Reduction (vph)	0	21	0	0	2	0	0	29	0	0	78	0
Lane Group Flow (vph)	85	714	0	136	557	0	0	314	0	0	82	0
Confl. Peds. (#/hr)	191	263	263	191	65	65	75	75	75	75	65	65
Heavy Vehicles (%)	0%	2%	0%	0%	3%	0%	0%	0%	2%	0%	0%	0%
Turn Type	Perm	NA	NA	Perm	NA	Perm	NA	NA	Perm	NA	NA	NA
Protected Phases	2	2	2	6	6	2	2	2	4	4	8	8
Permitted Phases	37.4	37.4	37.4	37.4	37.4	39.6	39.6	22.4	20.3	20.3	20.3	20.3
Actuated Green, G (s)	39.6	39.6	39.6	39.6	39.6	39.6	39.6	22.4	20.3	20.3	20.3	20.3
Effective Green, g (s)	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.32	0.32	0.32	0.32	0.32
Actuated g/C Ratio	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.1	6.1	6.1	6.1	6.1
Clearance Time (s)	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Vehicle Extension (s)	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Lane Grp Cap (vph)	295	788	198	945	295	788	198	945	342	342	435	435
v/s Ratio Prot	0.16	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.29	0.29	0.06	0.06
v/s Ratio Perm	0.29	0.91	0.69	0.59	0.69	0.59	0.69	0.59	0.92	0.92	0.19	0.19
Uniform Delay, d1	7.9	13.5	10.8	9.9	10.8	9.9	10.8	9.9	22.9	22.9	17.2	17.2
Progression Factor	0.44	0.60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.8	12.3	17.7	2.7	28.0	2.7	28.0	2.7	28.0	2.7	0.1	0.1
Delay (s)	5.3	20.4	28.5	12.6	51.0	12.6	51.0	12.6	51.0	12.6	17.3	17.3
Level of Service	A	C	C	B	B	B	B	D	D	D	B	B
Approach Delay (s)	18.9	18.9	18.9	15.7	15.7	15.7	15.7	51.0	51.0	51.0	17.3	17.3
Approach LOS	B	B	B	B	B	B	B	D	D	D	B	B
Intersection Summary												
HCM 2000 Control Delay	23.1											
HCM 2000 Volume to Capacity ratio	0.91											
Actuated Cycle Length (s)	70.0											
Intersection Capacity Utilization	102.3%											
Analysis Period (min)	15											
c Critical Lane Group												

Lanes, Volumes, Timings
 2: Fallsview Boulevard & Ferry Street

5234-5278 Ferry Street, Niagara Falls TIS

Total PM (5-Year)

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group												
Control Delay	6.0	13.4	8.6	9.2	8.6	9.2	22.0	22.0	0.0	0.0	11.7	
Queue Delay	0.0	0.2	0.0	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0	
Total Delay	6.0	13.5	8.6	9.4	8.6	9.4	22.1	22.1	0.0	0.0	11.7	
LOS	A	B	A	A	A	A	C	C			B	
Approach Delay	13.3			9.3			22.1				11.7	
Approach LOS	B			A			C				B	
Queue Length 50th (m)	0.9	50.5	3.2	29.7	3.2	29.7	13.4				1.2	
Queue Length 95th (m)	4.3	#150.9	m12.2	m82.4	m12.2	m82.4	28.6				6.8	
Internal Link Dist (m)	30.0		75.9	109.8			171.3				33.8	
Turn Bay Length (m)	289	1133	294	1160	294	1160	489				503	
Base Capacity (vph)	0	0	0	0	0	0	0				0	
Starvation Cap Reductn	0	31	0	0	0	0	1				0	
Spillback Cap Reductn	0	0	0	0	0	0	0				0	
Storage Cap Reductn	0	0	0	0	0	0	0				0	
Reduced v/c Ratio	0.09	0.74	0.38	0.72	0.38	0.72	0.42				0.07	
Intersection Summary												
Area Type: Other												
Cycle Length: 70												
Actuated Cycle Length: 70												
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green												
Natural Cycle: 70												
Control Type: Actuated-Coordinated												
Maximum v/c Ratio: 0.72												
Intersection Signal Delay: 12.4												
Intersection Capacity Utilization 81.0%												
Analysis Period (min) 15												
# 95th percentile volume exceeds capacity, queue may be longer.												
Queue shown is maximum after two cycles.												
m Volume for 95th percentile queue is metered by upstream signal.												



HCM Signalized Intersection Capacity Analysis
 2: Fallsview Boulevard & Ferry Street

5234-5278 Ferry Street, Niagara Falls TIS

Total PM (5-Year)

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement												
Lane Configurations												
Traffic Volume (vph)	23	678	75	103	733	3	78	7	102	3	7	23
Future Volume (vph)	23	678	75	103	733	3	78	7	102	3	7	23
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	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	1.00	1.00	1.00
Frb. ped/bikes	1.00	0.97	1.00	1.00	1.00	1.00	0.96	1.00	0.96	1.00	0.97	1.00
Fibb. ped/bikes	0.93	1.00	1.00	0.95	1.00	0.95	1.00	0.99	1.00	0.99	1.00	1.00
Frt	1.00	0.98	1.00	1.00	1.00	1.00	0.93	1.00	0.93	1.00	0.91	1.00
Flt Protected	0.95	1.00	1.00	0.95	1.00	0.95	1.00	0.98	1.00	0.98	1.00	1.00
Satd. Flow (prot)	1515	1649	1562	1696	1562	1696	1498	1502	1502	1502	1502	1502
Flt Permitted	0.26	1.00	0.25	1.00	0.25	1.00	0.85	0.85	0.85	0.85	0.85	0.85
Satd. Flow (perm)	414	1649	410	1696	410	1696	1237	1237	1237	1237	1237	1237
Peak-Hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	25	737	82	112	797	3	85	8	111	3	8	25
RTOR Reduction (vph)	0	4	0	0	0	0	0	71	0	0	20	0
Lane Group Flow (vph)	25	815	0	112	800	0	133	0	133	0	16	0
Confl. Peds. (#/hr)	191	146	146	191	12	29	29	29	29	29	12	12
Heavy Vehicles (%)	2%	2%	0%	1%	3%	2%	3%	2%	0%	2%	2%	2%
Turn Type	Perm	NA	NA	Perm	NA	Perm	NA	NA	Perm	NA	NA	NA
Protected Phases	2			6			4			8		8
Permitted Phases	2			6			4			8		8
Actuated Green, G (s)	45.7	45.7		45.7			11.9			11.9		11.9
Effective Green, g (s)	47.9	47.9		47.9			14.1			14.1		14.1
Actuated 9/C Ratio	0.68	0.68		0.68			0.20			0.20		0.20
Clearance Time (s)	6.2	6.2		6.2			6.2			6.2		6.2
Vehicle Extension (s)	2.1	2.1		2.1			2.1			2.1		2.1
Lane Grp Cap (vph)	283	1128		280			261			296		296
v/s Ratio Prot	0.06			0.27			0.10			0.01		0.01
v/s Ratio Perm	0.09	0.72		0.40			0.51			0.05		0.05
Uniform Delay, d1	3.7	6.9		4.8			24.9			22.6		22.6
Progression Factor	1.00	1.00		0.78			1.00			1.00		1.00
Incremental Delay, d2	0.6	4.0		3.4			0.7			0.0		0.0
Delay (s)	4.3	10.9		7.2			25.6			22.6		22.6
Level of Service	A	B		A			C			C		C
Approach Delay (s)	10.7			7.4			25.6			22.6		22.6
Approach LOS	B			A			C			C		C
Intersection Summary												
HCM 2000 Control Delay												
HCM 2000 Volume to Capacity ratio												
Actuated Cycle Length (s)												
Intersection Capacity Utilization												
Analysis Period (min)												
c Critical Lane Group												

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		4A	1A		W	
Traffic Volume (vph)	13	566	580	27	37	30
Future Volume (vph)	13	566	580	27	37	30
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor						
Fit			0.994		0.939	
Flt Protected		0.999			0.973	
Satd. Flow (prot)	0	3290	1707	0	1599	0
Flt Permitted		0.999			0.973	
Satd. Flow (perm)	0	3290	1707	0	1599	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		134.5	118.7		82.8	
Travel Time (s)		9.7	8.5		6.0	
Confl. Peds. (#/hr)	371			371	38	14
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	1%	2%	0%	0%	0%
Adj. Flow (vph)	14	615	630	29	40	33
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	629	659	0	73	0
Sign Control		Free	Free		Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	50.0%					
Analysis Period (min)	15					
	ICU Level of Service A					

	EBL	EBT	WBT	WBR	SBL	SBR
Movement						
Lane Configurations		4A			W	
Traffic Volume (veh/h)	13	566	580	27	37	30
Future Volume (Veh/h)	13	566	580	27	37	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)	14	615	630	29	40	33
Pedestrians		14	38		371	
Lane Width (m)		3.6	3.6		3.6	
Walking Speed (m/s)		1.2	1.2		1.2	
Percent Blockage		1	3		31	
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)		256				
pX, platoon unblocked					1389	1030
VC, conflicting volume	1030					
VC1, stage 1 conf vol						
VC2, stage 2 conf vol						
VCu, unblocked vol	1030				1389	1030
IC, single (s)	4.1				6.8	6.9
IC, 2 stage (s)						
IF (s)	2.2				3.5	3.3
p0 queue free %	97				55	79
dM capacity (veh/h)	471				88	160
Direction, Lane #	EB 1	EB 2	WB 1	SB 1		
Volume Total	219	410	659	73		
Volume Left	14	0	0	40		
Volume Right	0	0	29	33		
cSH	471	1700	1700	111		
Volume to Capacity	0.03	0.24	0.39	0.66		
Queue Length 95th (m)	0.7	0.0	0.0	25.4		
Control Delay (s)	1.2	0.0	0.0	85.5		
Lane LOS	A			F		
Approach Delay (s)	0.4		0.0	85.5		
Approach LOS				F		
Intersection Summary						
Average Delay			4.8			
Intersection Capacity Utilization			50.0%			A
Analysis Period (min)			15			

Lanes, Volumes, Timings
4: Robinson Street & Clark Avenue

5234-5278 Ferry Street, Niagara Falls TIS

Total PM (5-Year)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (vph)	74	315	20	13	344	83	31	22	4	110	7	86
Future Volume (vph)	74	315	20	13	344	83	31	22	4	110	7	86
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
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												
Fit	0.993				0.975			0.991				0.943
Flt Protected	0.991				0.999			0.973				0.974
Satd. Flow (prot)	0	1671	0	0	1666	0	0	1651	0	0	1607	0
Flt Permitted	0.991				0.999			0.973				0.974
Satd. Flow (perm)	0	1671	0	0	1666	0	0	1651	0	0	1607	0
Link Speed (k/h)	50				50			50				50
Link Distance (m)	133.5				132.0			59.2				232.7
Travel Time (s)	9.6				9.5			4.3				16.8
Confl. Peds. (#/hr)	80		57		57		80	28	103	103		28
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	2%	4%	4%	0%	0%	0%	0%	0%
Adj. Flow (vph)	80	342	22	14	374	90	34	24	4	120	8	93
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	444	0	0	478	0	0	62	0	0	221	0
Sign Control	Free				Free			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	77.6%											
Analysis Period (min)	15											
ICU Level of Service D												

HCM Unsignalized Intersection Capacity Analysis
4: Robinson Street & Clark Avenue

5234-5278 Ferry Street, Niagara Falls TIS

Total PM (5-Year)

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔		↔	↔	
Traffic Volume (veh/h)	74	315	20	13	344	83	31	22	4	110	7	86
Future Volume (Veh/h)	74	315	20	13	344	83	31	22	4	110	7	86
Sign Control		Free			Free			Stop		Stop		
Grade		0%			0%			0%				0%
Peak Hour Factor		0.92		0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)		80	342	22	14	374	90	34	24	4	120	8
Pedestrians		28			103			57			80	
Lane Width (m)		3.6			3.6			3.6			3.6	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		2			9			5			7	
Right turn flare (veh)		None			None							
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume		544		421				1142	513	1159	1108	527
vC1, stage 1 conf vol									6.2	7.1	6.5	6.2
vC2, stage 2 conf vol												
vCU, unblocked vol		544		421				1142	513	1159	1108	527
IC, single (s)		4.1		4.1				6.5	6.2	7.1	6.5	6.2
IC, 2 stage (s)		2.2		2.2				3.5	4.0	3.3	4.0	3.3
p0 queue free %		92		99				69	85	99	0	95
dM capacity (veh/h)		966		1094				110	163	492	112	170
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	444	478	62	221								
Volume Left	80	14	34	120								
Volume Right	22	90	4	93								
cSH	966	1094	133	169								
Volume to Capacity	0.08	0.01	0.47	1.31								
Queue Length 95th (m)	2.0	0.3	15.9	96.7								
Control Delay (s)	2.4	0.4	53.7	226.1								
Lane LOS	A	A	F	F								
Approach Delay (s)	2.4	0.4	53.7	226.1								
Approach LOS	F	F	F	F								
Intersection Summary												
Average Delay	45.3											
Intersection Capacity Utilization	77.6%											
Analysis Period (min)	15											
										D		

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	1	12	304	5	142	209
Future Volume (vph)	1	12	304	5	142	209
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Fit	0.875		0.998			
Flt Protected	0.996					0.980
Satd. Flow (prot)	1495	0	1729	0	0	1701
Flt Permitted	0.996					0.980
Satd. Flow (perm)	1495	0	1729	0	0	1701
Link Speed (k/h)	50		50			50
Link Distance (m)	42.4		61.6			52.1
Travel Time (s)	3.1		4.4			3.8
Conf. Peds. (#/hr)				263	263	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	1%	2%	2%	0%
Adj. Flow (vph)	1	13	330	5	154	227
Shared Lane Traffic (%)						
Lane Group Flow (vph)	14	0	335	0	0	381
Sign Control	Stop		Free			Free
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	51.6%					
Analysis Period (min)	15					
	ICU Level of Service A					

	WBL	WBR	NBT	NBR	SBL	SBT
Movement						
Lane Configurations	W		P			4
Traffic Volume (veh/h)	1	12	304	5	142	209
Future Volume (Veh/h)	1	12	304	5	142	209
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	13	330	5	154	227
Pedestrians		263				
Lane Width (m)		3.6				
Walking Speed (m/s)		1.2				
Percent Blockage		22				
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (m)						52
pX, platoon unblocked		0.97				
VC, conflicting volume		1130		596		598
VC1, stage 1 conf vol						
VC2, stage 2 conf vol						
VCu, unblocked vol		1120		596		598
IC, single (s)		6.4		6.2		4.1
IC, 2 stage (s)						
IF (s)		3.5		3.3		2.2
p0 queue free %		99		97		80
dM capacity (veh/h)		139		393		764
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	14	335	381			
Volume Left	1	0	154			
Volume Right	13	5	0			
cSH	348	1700	764			
Volume to Capacity	0.04	0.20	0.20			
Queue Length 95th (m)	0.9	0.0	5.6			
Control Delay (s)	15.8	0.0	5.9			
Lane LOS	C		A			
Approach Delay (s)	15.8	0.0	5.9			
Approach LOS	C					
Intersection Summary						
Average Delay			3.4			
Intersection Capacity Utilization			51.6%			A
Analysis Period (min)			15			

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	26	146	163	23	23	187
Future Volume (vph)	26	146	163	23	23	187
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Fit	0.885		0.983			
Flt Protected	0.993					0.995
Satd. Flow (prot)	1508	0	1701	0	0	1737
Flt Permitted	0.993					0.995
Satd. Flow (perm)	1508	0	1701	0	0	1737
Link Speed (k/h)	50		50			50
Link Distance (m)	33.2		232.7			61.6
Travel Time (s)	2.4		16.8			4.4
Confl. Peds. (#/hr)				263	263	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	1%	2%	2%	0%
Adj. Flow (vph)	28	159	177	25	25	203
Shared Lane Traffic (%)						
Lane Group Flow (vph)	187	0	202	0	0	228
Sign Control	Stop		Free			Free
Intersection Summary						
Area Type:	Other					
Control Type: Unsignalized						
Intersection Capacity Utilization	46.7%					
Analysis Period (min)	15					
	ICU Level of Service A					

	WBL	WBR	NBT	NBR	SBL	SBT
Movement						
Lane Configurations	W		P			4
Traffic Volume (veh/h)	26	146	163	23	23	187
Future Volume (Veh/h)	26	146	163	23	23	187
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	28	159	177	25	25	203
Pedestrians	263					
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	22					
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (m)						114
pX, platoon unblocked						
VC, conflicting volume	706	452			465	
VC1, stage 1 conf vol						
VC2, stage 2 conf vol						
VCu, unblocked vol	706	452			465	
IC, single (s)	6.4	6.2			4.1	
IC, 2 stage (s)						
IF (s)	3.5	3.3			2.2	
p0 queue free %	91	66			97	
dM capacity (veh/h)	305	474			856	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	187	202	228			
Volume Left	28	0	25			
Volume Right	159	25	0			
cSH	438	1700	856			
Volume to Capacity	0.43	0.12	0.03			
Queue Length 95th (m)	15.7	0.0	0.7			
Control Delay (s)	19.2	0.0	1.3			
Lane LOS	C		A			
Approach Delay (s)	19.2	0.0	1.3			
Approach LOS	C					
Intersection Summary						
Average Delay			6.3			
Intersection Capacity Utilization			46.7%			A
Analysis Period (min)			15			

Lanes, Volumes, Timings
1: Clark Avenue/Ellen Avenue & Ferry Street

Lanes, Volumes, Timings
1: Clark Avenue/Ellen Avenue & Ferry Street

5234-5278 Ferry Street, Niagara Falls TIS
Total Saturday (5-Year)

5234-5278 Ferry Street, Niagara Falls TIS
Total Saturday (5-Year)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	90	646	226	135	490	9	196	28	133	21	66	175
Future Volume (vph)	90	646	226	135	490	9	196	28	133	21	66	175
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	40.0	0.0	40.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Storage Lanes	1	0	1	0	0	0	0	0	0	0	0	0
Tapor Length (m)	7.5	0.0	7.5	0.0	0.0	0.0	7.5	0.0	0.0	0.0	7.5	0.0
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	0.83	0.86		0.99		0.99	0.84		0.84		0.88	
Frt	0.961			0.997			0.950		0.910			
Flt Protected	0.950			0.950			0.973		0.996			
Satd. Flow (prot)	1646	1408	0	1630	1694	0	0	1384	0	0	1390	0
Flt Permitted	0.334	0.108		0.108			0.610		0.956			
Satd. Flow (perm)	478	1408	0	185	1694	0	0	827	0	0	1319	0
Right Turn on Red	Yes	Yes		Yes			Yes		Yes		Yes	
Satd. Flow (RTOR)	38	2		2			32		53			
Link Speed (km/h)	50			50			50		50			
Link Distance (m)	133.8			121.5			52.1		169.1			
Travel Time (s)	9.6			8.7			3.8		12.2			
Confl. Peds. (#/hr)	309	317		309			92		190			92
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	3%	2%	2%	0%	0%	12%	4%	0%	2%	1%	1%
Adj. Flow (vph)	98	702	246	147	533	10	213	30	145	23	72	190
Shared Lane Traffic (%)												
Lane Group Flow (vph)	98	948	0	147	543	0	0	388	0	0	285	0
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases	2	2		6			4		8		8	
Permitted Phases	2	2		6			4		8		8	
Detector Phase	2	2		6			4		8		8	
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0			8.0		8.0		8.0	
Minimum Split (s)	23.2	23.2		23.2			27.1		27.1		27.1	
Total Split (s)	41.0	41.0		41.0			29.0		29.0		29.0	
Total Split (%)	58.6%	58.6%		58.6%			41.4%		41.4%		41.4%	
Maximum Green (s)	34.8	34.8		34.8			22.9		22.9		22.9	
Yellow Time (s)	4.1	4.1		4.1			4.1		4.1		4.1	
All-Red Time (s)	2.1	2.1		2.1			2.0		2.0		2.0	
Lost Time Adjust (s)	-2.2	-2.2		-2.2			-2.1		-2.1		-2.1	
Total Lost Time (s)	4.0	4.0		4.0			4.0		4.0		4.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	2.1	2.1		2.1			2.1		2.1		2.1	
Recall Mode	C-Max	C-Max		C-Max			None		None		None	
Walk Time (s)	7.0	7.0		7.0			8.0		8.0		8.0	
Flash Dont Walk (s)	10.0	10.0		10.0			13.0		13.0		13.0	
Pedestrian Calls (#/hr)	0	0		0			0		0		0	
Act Effct Green (s)	37.0	37.0		37.0			25.0		25.0		25.0	
Actuated g/C Ratio	0.53	0.53		0.53			0.36		0.36		0.36	
v/c Ratio	0.39	1.24		1.52			1.23		1.23		0.56	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	3.8	126.0	300.3	15.0	15.0	15.0	152.7	152.7	152.7	19.8	19.8	19.8
Queue Delay	0.0	0.1	0.0	0.3	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	3.8	126.1	300.3	15.3	15.3	15.3	152.8	152.8	152.8	19.8	19.8	19.8
LOS	A	F	F	B	B	B	F	F	F	B	B	B
Approach Delay	114.7			76.0			152.8			19.8		
Approach LOS	F			E			F			B		
Queue Length 50th (m)	2.0	~154.0	~27.0	44.8			~60.9			23.2		
Queue Length 95th (m)	m1.7	m4133.4	#47.0	73.1			#109.1			45.5		
Internal Link Dist (m)	109.8			97.5			28.1			145.1		
Turn Bay Length (m)	40.0			40.0								
Base Capacity (vph)	252	762	97	896			315			505		
Starvation Cap Reductn	0	15	0	0			0			0		
Spillback Cap Reductn	0	0	0	58			1			1		
Storage Cap Reductn	0	0	0	0			0			0		
Reduced v/c Ratio	0.39	1.27	1.52	0.65			1.24			0.57		
Intersection Summary												
Area Type	Other											
Cycle Length	70											
Actuated Cycle Length	70											
Offset	12 (17%), Referenced to phase 2 EBT and 6 WBT, Start of Green											
Natural Cycle	70											
Control Type	Actuated-Coordinated											
Maximum v/c Ratio	1.52											
Intersection Signal Delay	98.5											
Intersection Capacity Utilization	121.2%											
Analysis Period (min)	15											
~	Volume exceeds capacity, queue is theoretically infinite.											
#	Queue shown is maximum after two cycles.											
	95th percentile volume exceeds capacity, queue may be longer.											
m	Queue shown is maximum after two cycles.											
	Volume for 95th percentile queue is metered by upstream signal.											
Splits and Phases	1: Clark Avenue/Ellen Avenue & Ferry Street											
	Ø2 (R)						Ø4					
	41 s						29 s					
	Ø6 (R)						Ø8					
	41 s						29 s					

HCM Signalized Intersection Capacity Analysis 5234-5278 Ferry Street, Niagara Falls TIS
 1: Clark Avenue/Ellen Avenue & Ferry Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	9	1	1	1	1	1	1	1	1	1	1	1
Traffic Volume (vph)	90	646	226	135	490	9	196	28	133	21	66	175
Future Volume (vph)	90	646	226	135	490	9	196	28	133	21	66	175
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	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	1.00	1.00	1.00
Flpb. ped/bikes	1.00	0.86	1.00	1.00	0.99	1.00	0.88	1.00	0.95	0.89	0.99	0.89
Frt	1.00	0.96	1.00	1.00	1.00	1.00	0.95	1.00	0.95	0.91	1.00	0.91
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00	0.97	1.00	0.97	1.00	1.00	0.97
Satd. Flow (prot)	1361	1408	1630	1695	1320	1320	1630	1695	1320	1630	1695	1320
Flt Permitted	0.33	1.00	0.11	1.00	1.00	1.00	0.61	1.00	0.61	1.00	0.96	1.00
Satd. Flow (perm)	478	1408	185	1695	827	827	1695	185	827	1695	185	827
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	98	702	246	147	533	10	213	30	145	23	72	190
RTOR Reduction (vph)	0	18	0	0	1	0	0	21	0	0	34	0
Lane Group Flow (vph)	98	930	0	147	542	0	0	367	0	0	251	0
Confl. Peds. (#/hr)	309	317	317	309	92	309	92	190	190	190	92	92
Heavy Vehicles (%)	1%	3%	2%	2%	2%	0%	0%	12%	4%	0%	2%	1%
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases	2	2	2	2	2	2	2	2	2	2	2	2
Permitted Phases	2	2	2	2	2	2	2	2	2	2	2	2
Actuated Green, G (s)	34.8	34.8	34.8	34.8	34.8	34.8	34.8	34.8	34.8	34.8	34.8	34.8
Effective Green, g (s)	37.0	37.0	37.0	37.0	37.0	37.0	37.0	37.0	37.0	37.0	37.0	37.0
Actuated g/C Ratio	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53
Clearance Time (s)	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2
Vehicle Extension (s)	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Lane Grp Cap (vph)	252	744	97	895	295	295	895	97	295	895	97	295
v/s Ratio Prot	0.21	0.66	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32
v/s Ratio Perm	0.39	1.25	1.52	0.61	1.25	1.25	0.61	1.25	1.25	1.25	1.25	1.25
Uniform Delay, d1	9.8	16.5	16.5	11.4	22.5	22.5	11.4	22.5	22.5	22.5	22.5	22.5
Progression Factor	0.31	0.48	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4	113.6	277.6	3.0	135.7	135.7	3.0	135.7	135.7	135.7	135.7	135.7
Delay (s)	3.4	121.6	294.1	14.5	158.2	158.2	14.5	158.2	158.2	158.2	158.2	158.2
Level of Service	A	F	F	B	F	F	B	F	F	F	B	F
Approach Delay (s)	110.5	110.5	110.5	74.0	158.2	158.2	74.0	158.2	158.2	158.2	158.2	158.2
Approach LOS	F	F	F	E	F	F	E	F	F	F	E	F
Intersection Summary												
HCM 2000 Control Delay	96.9											
HCM 2000 Volume to Capacity ratio	1.40											
Actuated Cycle Length (s)	70.0											
Intersection Capacity Utilization	121.2%											
Analysis Period (min)	15											
c Critical Lane Group												

Lanes, Volumes, Timings 5234-5278 Ferry Street, Niagara Falls TIS
 2: Fallsview Boulevard & Ferry Street

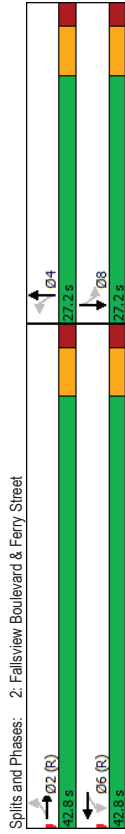
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	9	1	1	1	1	1	1	1	1	1	1	1
Traffic Volume (vph)	24	878	137	144	730	3	129	7	119	4	6	22
Future Volume (vph)	24	878	137	144	730	3	129	7	119	4	6	22
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
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
Flpb. ped/bikes	1.00	0.86	1.00	1.00	0.99	1.00	0.88	1.00	0.95	0.89	0.99	0.89
Frt	1.00	0.96	1.00	1.00	1.00	1.00	0.95	1.00	0.95	0.91	1.00	0.91
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00	0.97	1.00	0.97	1.00	1.00	0.97
Satd. Flow (prot)	1630	1587	0	1630	1728	0	0	1493	0	0	1519	0
Flt Permitted	0.213	0.335	0.161	0.994	0.822	0.822	0.161	0.994	0.822	0.161	0.994	0.822
Satd. Flow (perm)	335	1587	0	161	1728	0	0	1254	0	0	1461	0
Right Turn on Red	18	50	50	50	50	50	50	50	50	50	50	50
Satd. Flow (RTOR)	18	50	50	50	50	50	50	50	50	50	50	50
Link Speed (k/h)	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9
Link Distance (m)	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2
Travel Time (s)	309	278	278	309	309	309	309	309	309	309	309	309
Confl. Peds. (#/hr)	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Peak Hour Factor	2%	1%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	26	954	149	157	793	3	140	8	129	4	7	24
Shared Lane Traffic (%)	26	1103	0	157	796	0	0	277	0	0	35	0
Lane Group Flow (vph)	26	1103	0	157	796	0	0	277	0	0	35	0
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases	2	2	2	2	2	2	2	2	2	2	2	2
Permitted Phases	2	2	2	2	2	2	2	2	2	2	2	2
Detector Phase	2	2	2	2	2	2	2	2	2	2	2	2
Switch Phase	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Minimum Initial (s)	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2
Minimum Split (s)	42.8	42.8	42.8	42.8	42.8	42.8	42.8	42.8	42.8	42.8	42.8	42.8
Total Split (s)	61.1%	61.1%	61.1%	61.1%	61.1%	61.1%	61.1%	61.1%	61.1%	61.1%	61.1%	61.1%
Total Split (%)	36.6	36.6	36.6	36.6	36.6	36.6	36.6	36.6	36.6	36.6	36.6	36.6
Maximum Green (s)	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
Yellow Time (s)	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
All-Red Time (s)	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2
Lost Time Adjust (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max
Walk Time (s)	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Flash Dont Walk (s)	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Act Effct Green (s)	42.6	42.6	42.6	42.6	42.6	42.6	42.6	42.6	42.6	42.6	42.6	42.6
Actuated g/C Ratio	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61
v/c Ratio	0.13	1.13	1.60	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76

Lanes, Volumes, Timings
 2: Fallsview Boulevard & Ferry Street

5234-5278 Ferry Street, Niagara Falls TIS

Total Saturday (5-Year)

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	9.3	92.1	324.2	13.1	0.0	0.4	0.0	0.0	34.4	0.0	0.0	9.6
Queue Delay	0.0	0.6	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.3	92.6	324.2	13.6	0.4	0.4	0.0	0.0	34.4	0.0	0.0	9.6
LOS	A	F	F	B	F	B	C	C	C	C	C	A
Approach Delay	90.7	64.8	34.4	34.4	34.4	34.4	34.4	34.4	34.4	34.4	34.4	9.6
Approach LOS	F	E	C	C	C	C	C	C	C	C	C	A
Queue Length 50th (m)	1.4	~174.3	~28.8	51.5	28.7	28.7	28.7	28.7	28.7	28.7	28.7	1.0
Queue Length 95th (m)	5.3	#250.9	m#46.8	m#92.0	51.1	51.1	51.1	51.1	51.1	51.1	51.1	6.4
Internal Link Dist (m)	75.9	109.8	171.3	171.3	171.3	171.3	171.3	171.3	171.3	171.3	171.3	33.8
Turn Bay Length (m)	30.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	30.0
Base Capacity (vph)	203	973	98	1051	432	432	432	432	432	432	432	500
Storage Cap Reductn	0	0	0	0	48	0	0	0	0	0	0	0
Spillback Cap Reductn	0	101	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.13	1.26	1.60	0.79	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.07
Intersection Summary												
Area Type:	Other											
Cycle Length: 70												
Actuated Cycle Length: 70												
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green												
Natural Cycle: 120												
Control Type: Actuated-Coordinated												
Maximum v/c Ratio: 1.60												
Intersection Signal Delay: 72.7												
Intersection Capacity Utilization 103.3%												
Analysis Period (min) 15												
~ Volume exceeds capacity, queue is theoretically infinite.												
Queue shown is maximum after two cycles.												
# 95th percentile volume exceeds capacity, queue may be longer.												
Queue shown is maximum after two cycles.												
m Volume for 95th percentile queue is metered by upstream signal.												



HCM Signalized Intersection Capacity Analysis
 2: Fallsview Boulevard & Ferry Street

5234-5278 Ferry Street, Niagara Falls TIS

Total Saturday (5-Year)

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↡		↰	↡			↰↡	↰↡		↰↡	↰↡
Traffic Volume (vph)	24	878	137	144	730	3	129	7	119	4	6	22
Future Volume (vph)	24	878	137	144	730	3	129	7	119	4	6	22
Ideal Flow (vophpl)	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	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Frb. ped/bikes	1.00	0.94		1.00	1.00			1.00			1.00	
Frb. ped/bikes	0.90	1.00		1.00	1.00			1.00			1.00	
Flt	1.00	0.98		1.00	1.00			0.94			0.91	
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.99	
Satd. Flow (prot)	1473	1587		1630	1728			1489			1514	
Flt Permitted	0.21	1.00		0.09	1.00			0.82			0.96	
Satd. Flow (perm)	330	1587		161	1728			1255			1461	
Peak-hour factor, PHF	0.92	0.92		0.92	0.92			0.92			0.92	
Adj. Flow (vph)	26	954	149	157	793	3	140	8	129	4	7	24
RTOR Reduction (vph)	0	7	0	0	0	0	0	18	0	0	17	0
Lane Group Flow (vph)	26	1096	0	157	796	0	0	259	0	0	18	0
Confl. Peds. (#/hr)	309		278	278		309	4		39	39		4
Heavy Vehicles (%)	2%	1%	2%	2%	1%	2%	2%	2%	4%	2%	2%	2%
Turn Type	Perm	NA	NA	Perm	NA	Perm	NA	NA	Perm	NA	NA	NA
Protected Phases	2	2		6	6		4	4		8	8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	40.4	40.4		40.4	40.4		17.2	17.2		17.2		
Effective Green, g (s)	42.6	42.6		42.6	42.6		19.4	19.4		19.4		
Actuated g/C Ratio	0.61	0.61		0.61	0.61		0.28	0.28		0.28		
Clearance Time (s)	6.2	6.2		6.2	6.2		6.2	6.2		6.2		
Vehicle Extension (s)	2.1	2.1		2.1	2.1		2.1	2.1		2.1		
Lane Grp Cap (vph)	200	965		97	1051		347	347		404		
v/s Ratio Prot	0.08	0.69			0.46							
v/s Ratio Perm	0.13	1.14		1.62	0.76			0.21		0.01		
v/c Ratio	0.13	1.14		1.62	0.76			0.75		0.04		
Uniform Delay, d1	5.8	13.7		13.7	9.9		23.1	23.1		18.5		
Progression Factor	1.00	1.00		0.74	0.73		1.00	1.00		1.00		
Incremental Delay, d2	1.3	74.0		307.8	3.5		7.6	7.6		0.0		
Delay (s)	7.2	87.7		318.0	10.8		30.6	30.6		18.5		
Level of Service	A	F		F	B		C	C		B		
Approach Delay (s)	85.8			61.4			30.6			18.5		
Approach LOS	F			E			C			B		
Intersection Summary												
HCM 2000 Control Delay	68.7		HCM 2000 Level of Service		E							
HCM 2000 Volume to Capacity ratio	1.33											
Actuated Cycle Length (s)	70.0		Sum of lost time (s)		8.0							
Intersection Capacity Utilization	103.3%		ICU Level of Service		G							
Analysis Period (min)	15											
Critical Lane Group												

Lanes, Volumes, Timings

3: Victoria Avenue & Magdalen Street

5234-5278 Ferry Street, Niagara Falls TIS

Total Saturday (5-Year)

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕↕	↕		↕	
Traffic Volume (vph)	15	753	586	35	83	50
Future Volume (vph)	15	753	586	35	83	50
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor						
Flt			0.992		0.949	
Flt Protected		0.999			0.970	
Satd. Flow (prot)	0	3289	1704	0	1599	0
Flt Permitted		0.999			0.970	
Satd. Flow (perm)	0	3289	1704	0	1599	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		134.5	118.7		82.8	
Travel Time (s)		9.7	8.5		6.0	
Conf. Peds. (#/hr)	547			547	59	18
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	1%	2%	0%	0%	2%
Adj. Flow (vph)	16	818	637	38	90	54
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	834	675	0	144	0
Sign Control		Free	Free		Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	54.0%					
Analysis Period (min)	15					
ICU Level of Service A						

HCM Unsignalized Intersection Capacity Analysis

3: Victoria Avenue & Magdalen Street

5234-5278 Ferry Street, Niagara Falls TIS

Total Saturday (5-Year)

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		4↑	↓		W	
Traffic Volume (veh/h)	15	753	586	35	83	50
Future Volume (Veh/h)	15	753	586	35	83	50
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)	16	818	637	38	90	54
Pedestrians		18	59		547	
Lane Width (m)		3.6	3.6		3.6	
Walking Speed (m/s)		1.2	1.2		1.2	
Percent Blockage		2	5		46	
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)		256				
pK, platoon unblocked					1703	1221
VC, conflicting volume	1222					
VC1, stage 1 conf vol						
VC2, stage 2 conf vol						
VCu, unblocked vol	1222				1703	1221
IC, single (s)	4.1				6.8	6.9
IC, 2 stage (s)						
IF (s)	2.2				3.5	3.3
p0 queue free %	95				0	41
dM capacity (veh/h)	314				41	92
Direction, Lane #						
	EB 1	EB 2	WB 1	SB 1		
Volume Total	289	545	675	144		
Volume Left	16	0	0	90		
Volume Right	0	0	38	54		
CSH	314	1700	1700	52		
Volume to Capacity	0.05	0.32	0.40	2.76		
Queue Length 95th (m)	1.2	0.0	0.0	113.0		
Control Delay (s)	1.9	0.0	0.0	961.9		
Lane LOS	A			F		
Approach Delay (s)	0.7		0.0	961.9		
Approach LOS				F		
Intersection Summary						
Average Delay			84.1			
Intersection Capacity Utilization			54.0%		ICU Level of Service	A
Analysis Period (min)			15			

Lanes, Volumes, Timings
4: Robinson Street & Clark Avenue

5234-5278 Ferry Street, Niagara Falls TIS

Total Saturday (5-Year)

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	97	349	58	74	338	83	49	26	12	96	13	122
Traffic Volume (vph)	97	349	58	74	338	83	49	26	12	96	13	122
Future Volume (vph)	97	349	58	74	338	83	49	26	12	96	13	122
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
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		0.984		0.977		0.981		0.981		0.928		
Frt		0.990		0.993		0.973		0.973		0.980		
Flt Protected		0	1661	0	0	1667	0	0	1670	0	0	1583
Satd. Flow (prot)		0	1661	0	0	1667	0	0	1670	0	0	1583
Flt Permitted		0	1661	0	0	1667	0	0	1670	0	0	1583
Satd. Flow (perm)		0	1661	0	0	1667	0	0	1670	0	0	1583
Link Speed (k/h)		50		50		50		50		50		
Link Distance (m)		133.5		132.0		59.2		59.2		232.7		
Travel Time (s)		9.6		9.5		4.3		4.3		16.8		
Confl. Peds. (#/hr)		142		86		142		123		95		123
Peak Hour Factor		0.92		0.92		0.92		0.92		0.92		0.92
Heavy Vehicles (%)		3%		0%		3%		0%		0%		0%
Adj. Flow (vph)		105		379		63		80		53		28
Shared Lane Traffic (%)		105		379		63		80		53		28
Lane Group Flow (vph)		0	547	0	0	537	0	0	94	0	0	251
Sign Control		Free		Free		Free		Stop		Stop		Stop
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	70.3%											
Analysis Period (min)	15											

HCM Unsignalized Intersection Capacity Analysis
4: Robinson Street & Clark Avenue

5234-5278 Ferry Street, Niagara Falls TIS

Total Saturday (5-Year)

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	97	349	58	74	338	83	49	26	12	96	13	122
Traffic Volume (veh/h)	97	349	58	74	338	83	49	26	12	96	13	122
Future Volume (Veh/h)	97	349	58	74	338	83	49	26	12	96	13	122
Sign Control	Free	Free	Free	Free	Free	Free	Free	Free	Free	Free	Free	Free
Grade	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	105	379	63	80	367	90	53	28	13	104	14	133
Pedestrians	123				95			86		142		
Lane Width (m)	3.6				3.6			3.6		3.6		
Walking Speed (m/s)	1.2				1.2			1.2		1.2		
Percent Blockage	10				8			7		12		
Right turn flare (veh)												
Median type	None				None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
VC, conflicting volume	599			528			1542	1466	592	1456	1452	677
VC1, stage 1 conf vol												
VC2, stage 2 conf vol												
VCU, unblocked vol	599			528			1542	1466	592	1456	1452	677
IC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
IC, 2 stage (s)												
IF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	88			92			0	67	97	0	84	63
dM capacity (veh/h)	858			974			32	85	436	48	87	360
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	547	537	94	251								
Volume Left	105	80	53	104								
Volume Right	63	90	13	133								
CSH	858	974	47	93								
Volume to Capacity	0.12	0.08	1.99	2.70								
Queue Length 95th (m)	3.1	2.0	71.6	178.0								
Control Delay (s)	3.2	2.2	649.2	868.1								
Lane LOS	A	A	F	F								
Approach Delay (s)	3.2	2.2	649.2	868.1								
Approach LOS	F	F	F	F								
Intersection Summary												
Average Delay	197.2											
Intersection Capacity Utilization	70.3%											
Analysis Period (min)	15											

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	1	11	346	5	159	268
Future Volume (vph)	1	11	346	5	159	268
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Fit	0.875		0.998			
Fit Protected	0.996					0.982
Satd. Flow (prot)	1495	0	1680	0	0	1685
Fit Permitted	0.996					0.982
Satd. Flow (perm)	1495	0	1680	0	0	1685
Link Speed (k/h)	50		50			50
Link Distance (m)	42.4		61.6			52.1
Travel Time (s)	3.1		4.4			3.8
Confl. Peds. #/hr				317	317	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	4%	2%	2%	2%
Adj. Flow (vph)	1	12	376	5	173	291
Shared Lane Traffic (%)						
Lane Group Flow (vph)	13	0	381	0	0	464
Sign Control	Stop		Free			Free
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	58.4%					
Analysis Period (min)	15					
ICU Level of Service B						

	WBL	WBR	NBT	NBR	SBL	SBT
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W					4
Traffic Volume (veh/h)	1	11	346	5	159	268
Future Volume (Veh/h)	1	11	346	5	159	268
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	12	376	5	173	291
Pedestrians						
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	26					
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (m)						52
pK, platoon unblocked	0.97					
VC, conflicting volume	1332	696			698	
VC1, stage 1 conf vol						
VC2, stage 2 conf vol						
VCu, unblocked vol	1326	696			698	
IC, single (s)	6.4	6.2			4.1	
IC, 2 stage (s)						
IF (s)	3.5	3.3			2.2	
p0 queue free %	99	96			74	
dM capacity (veh/h)	90	325			661	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	13	381	464			
Volume Left	1	0	173			
Volume Right	12	5	0			
cSH	271	1700	661			
Volume to Capacity	0.05	0.22	0.26			
Queue Length 95th (m)	1.1	0.0	7.8			
Control Delay (s)	19.0	0.0	7.1			
Lane LOS	C		A			
Approach Delay (s)	19.0	0.0	7.1			
Approach LOS	C					
Intersection Summary						
Average Delay			4.1			
Intersection Capacity Utilization			58.4%			B
Analysis Period (min)			15			

Lanes, Volumes, Timings

6: Clark Avenue & Southern Driveway

5234-5278 Ferry Street, Niagara Falls TIS

Total Saturday (5-Year)

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	23	134	217	26	25	244
Future Volume (vph)	23	134	217	26	25	244
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Fit	0.885		0.986			
Flt Protected	0.993					0.995
Satd. Flow (prot)	1508	0	1663	0	0	1707
Flt Permitted	0.993					0.995
Satd. Flow (perm)	1508	0	1663	0	0	1707
Link Speed (k/h)	50		50			50
Link Distance (m)	33.2		232.7			61.6
Travel Time (s)	2.4		16.8			4.4
Conf. Peds. (#/hr)				317	317	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	4%	2%	2%	2%
Adj. Flow (vph)	25	146	236	28	27	265
Shared Lane Traffic (%)						
Lane Group Flow (vph)	171	0	264	0	0	292
Sign Control	Stop		Free			Free
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	50.9%					
Analysis Period (min)	15					
ICU Level of Service A						

HCM Unsignalized Intersection Capacity Analysis

6: Clark Avenue & Southern Driveway

5234-5278 Ferry Street, Niagara Falls TIS

Total Saturday (5-Year)

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W		P			A
Traffic Volume (veh/h)	23	134	217	26	25	244
Future Volume (Veh/h)	23	134	217	26	25	244
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	25	146	236	28	27	265
Pedestrians						
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	26					
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (m)						114
pX, platoon unblocked						
VC, conflicting volume	886	567			581	
VC1, stage 1 conf vol						
VC2, stage 2 conf vol						
VCu, unblocked vol	886	567			581	
IC, single (s)	6.4	6.2			4.1	
IC, 2 stage (s)						
IF (s)	3.5	3.3			2.2	
p0 queue free %	89	62			96	
dM capacity (veh/h)	223	385			731	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	171	264	292			
Volume Left	25	0	27			
Volume Right	146	28	0			
cSH	348	1700	731			
Volume to Capacity	0.49	0.16	0.04			
Queue Length 95th (m)	19.5	0.0	0.9			
Control Delay (s)	24.9	0.0	1.3			
Lane LOS	C		A			
Approach Delay (s)	24.9	0.0	1.3			
Approach LOS	C					
Intersection Summary						
Average Delay			6.4			
Intersection Capacity Utilization			50.9%			A
Analysis Period (min)			15			

Appendix J

Traffic Control Justification



Signal Justification Calculation (OTM Book 12 - Justifications 1, 2, 3)



Horizon Year: Total 2032
Region/City/Township: Niagara Falls

Major Street: Robinson Street
Minor Street: Clark Avenue

North/South?: N

Number of Approach Lanes: 1
Tee Intersection? N
Flow Conditions: Restricted

PM Forecast Only? N

Hour	Major Street						Minor Street						Peds Crossing
	Robinson Street						Clark Avenue						
	Eastbound			Westbound			Northbound			Southbound			
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
7:00 - 8:00	25	91	4	4	252	64	2	1	0	29	4	38	14
8:00 - 9:00	47	155	12	13	211	54	3	4	2	45	1	49	31
1:00 - 12:0	72	315	21	15	309	81	8	3	3	114	7	67	85
2:00 - 13:0	73	378	14	9	244	70	9	4	0	152	7	88	76
3:00 - 14:0	87	389	24	7	287	80	22	9	12	149	10	66	117
5:00 - 16:0	81	319	37	11	312	77	14	13	8	117	5	75	152
6:00 - 17:0	74	315	20	13	344	83	31	22	4	110	7	89	131
7:00 - 18:0	84	348	12	7	292	81	23	10	3	129	8	82	121

	1A		1B		2A		2B	
Hour	All Approach Lanes		Minor Street Both		Major Street Both		Traffic Crossing Major Street	
Threshold	720		170		720		75	
1	514	71%	74	44%	440	61%	49	65%
2	596	83%	104	61%	492	68%	83	100%
3	1015	100%	202	100%	813	100%	214	100%
4	1048	100%	260	100%	788	100%	244	100%
5	1142	100%	268	100%	874	100%	298	100%
6	1069	100%	232	100%	837	100%	296	100%
7	1112	100%	263	100%	849	100%	294	100%
8	1079	100%	255	100%	824	100%	283	100%

Hours 100% Fulfilled?
Hours 80% Fulfilled?

No No No No
No No No No

Justification Results

Justification 1 (Minimum Vehicle Volume) No
Justification 2 (Delay To Cross Traffic) No
Justification 3 (Volume/Delay Combination) No

Is A Signal Justified? **No**

Signal Justification Calculation (OTM Book 12 - Justifications 1, 2, 3)



Horizon Year: Total 2032
Region/City/Township: Niagara Falls

Major Street: Victoria Avenue
Minor Street: Magdalen Street

North/South?: N

Number of Approach Lanes: 1
Tee Intersection? Y
Flow Conditions: Restricted

PM Forecast Only? N

Hour	Major Street						Minor Street						Peds Crossing
	Victoria Avenue						Magdalen Street						
	Eastbound			Westbound			Northbound			Southbound			
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
7:00 - 8:00	3	247	0	0	165	4	0	0	0	15	0	1	14
8:00 - 9:00	5	333	0	0	238	11	0	0	0	20	0	13	6
1:00 - 12:0	15	657	0	0	476	28	0	0	0	49	0	13	31
2:00 - 13:0	13	651	0	0	533	20	0	0	0	49	0	20	40
3:00 - 14:0	7	612	0	0	561	27	0	0	0	42	0	25	47
5:00 - 16:0	19	568	0	0	568	28	0	0	0	36	0	22	46
6:00 - 17:0	13	535	0	0	583	24	0	0	0	38	0	30	83
7:00 - 18:0	10	523	0	0	585	28	0	0	0	37	0	34	65

	1A		1B		2A		2B	
Hour	All Approach Lanes		Minor Street Both		Major Street Both		Traffic Crossing Major Street	
Threshold	720		255		720		75	
1	435	60%	16	6%	419	58%	29	39%
2	620	86%	33	13%	587	82%	26	35%
3	1238	100%	62	24%	1176	100%	80	100%
4	1286	100%	69	27%	1217	100%	89	100%
5	1274	100%	67	26%	1207	100%	89	100%
6	1241	100%	58	23%	1183	100%	82	100%
7	1223	100%	68	27%	1155	100%	121	100%
8	1217	100%	71	28%	1146	100%	102	100%

Hours 100% Fulfilled? No
Hours 80% Fulfilled? No

Justification Results

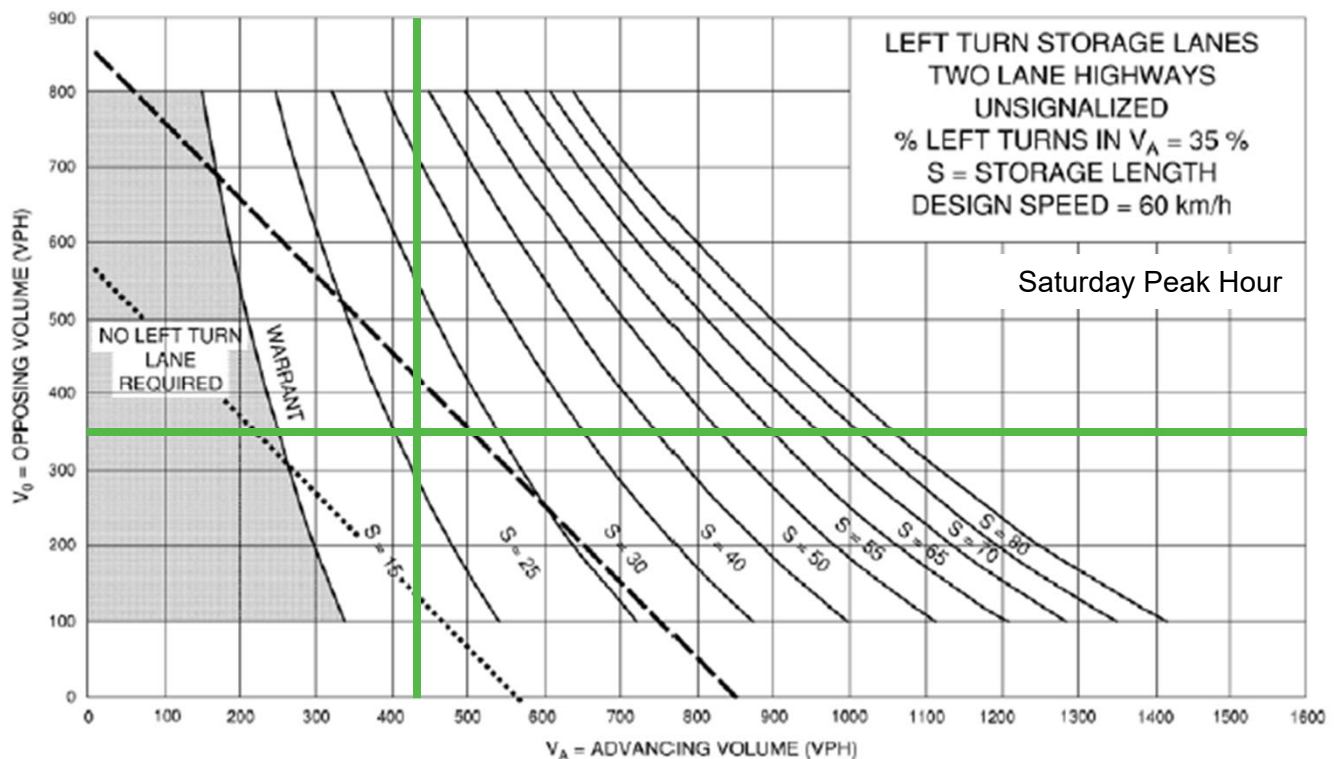
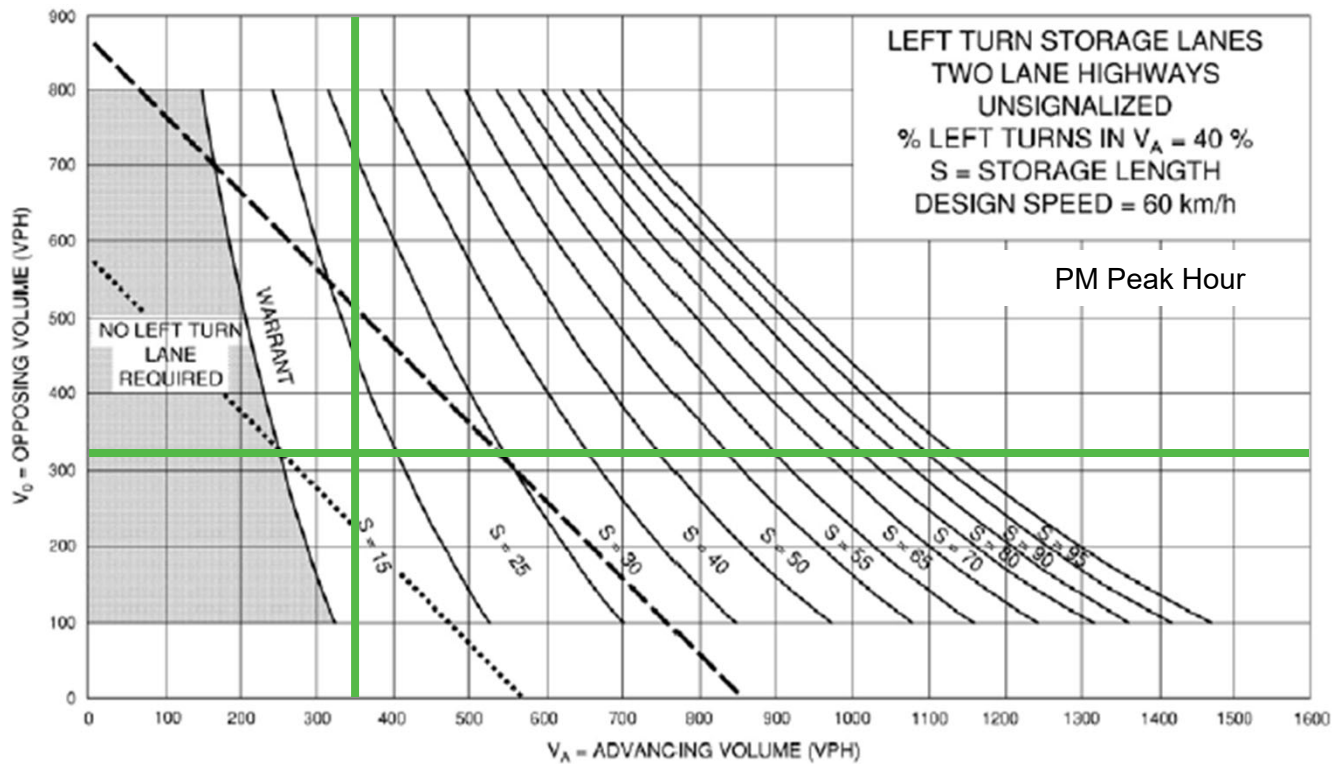
Justification 1 (Minimum Vehicle Volume) No
Justification 2 (Delay To Cross Traffic) No
Justification 3 (Volume/Delay Combination) No

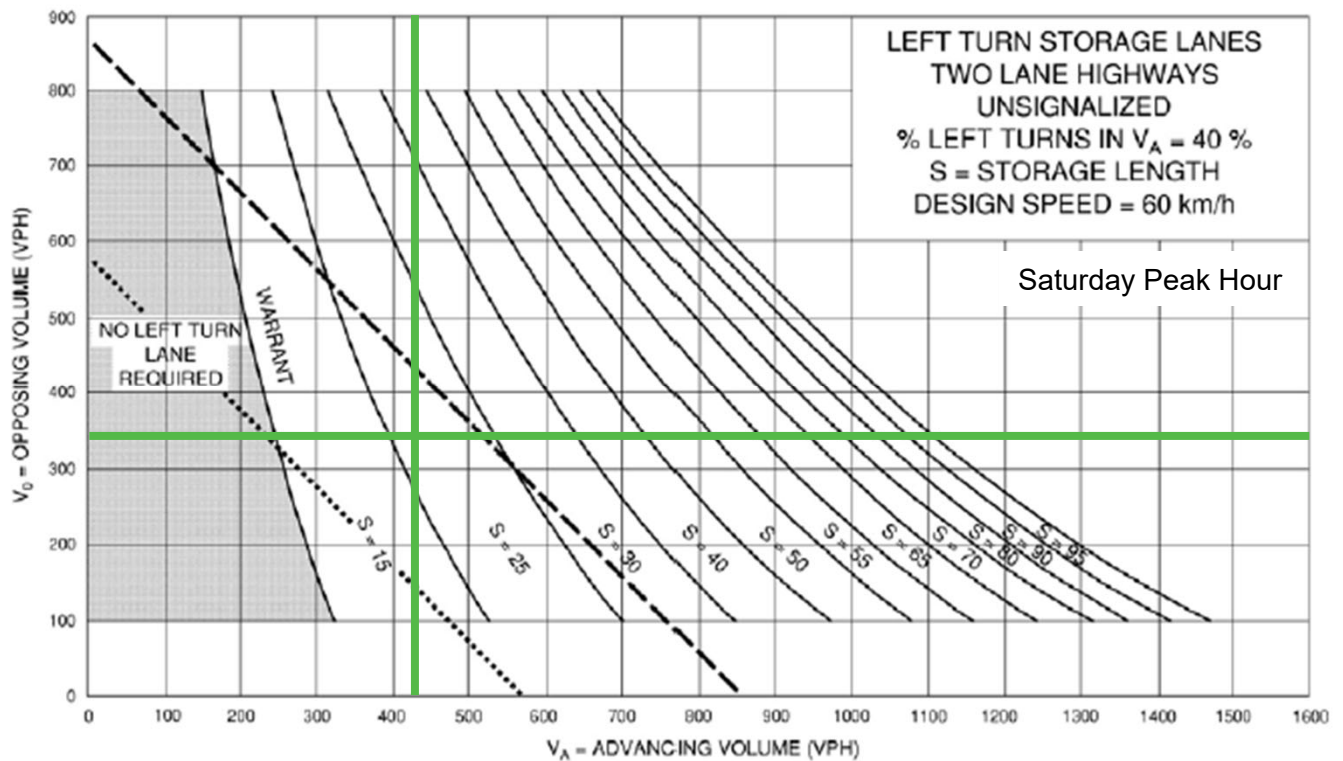
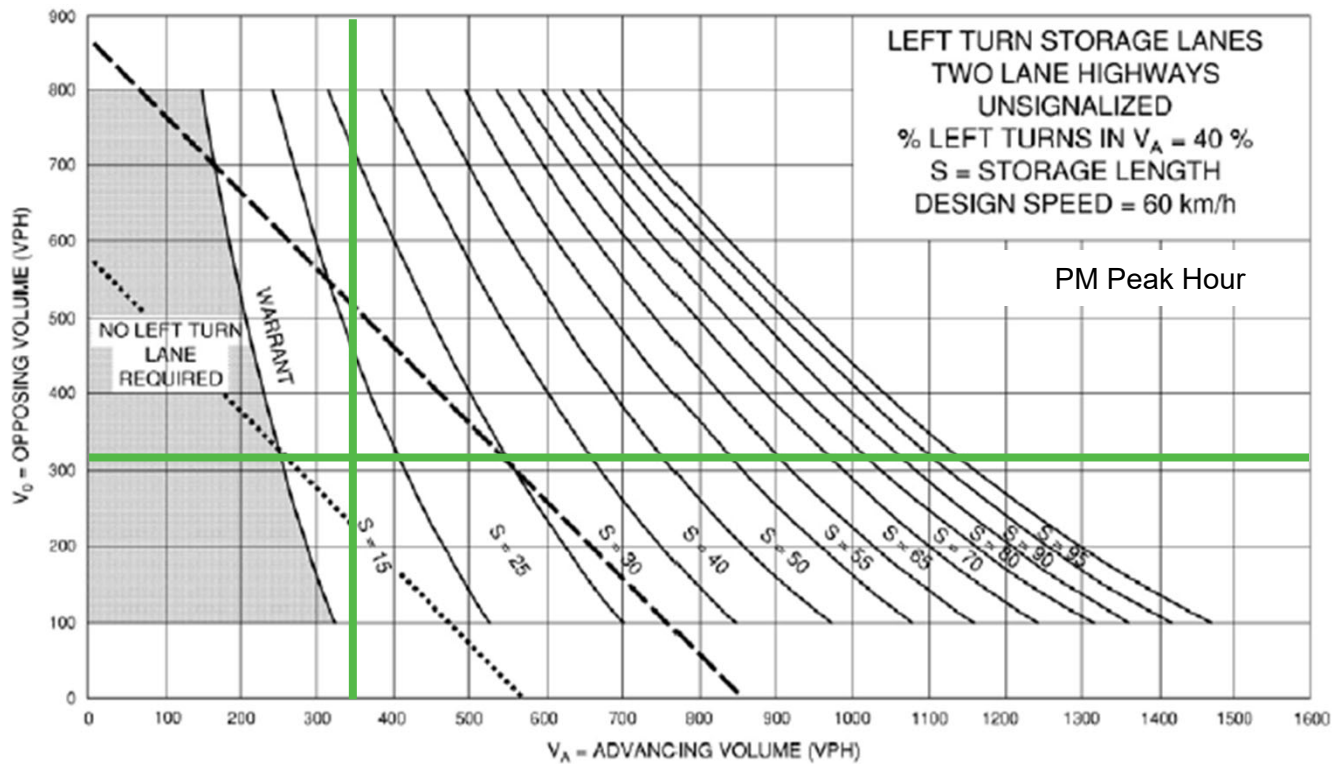
Is A Signal Justified? **No**

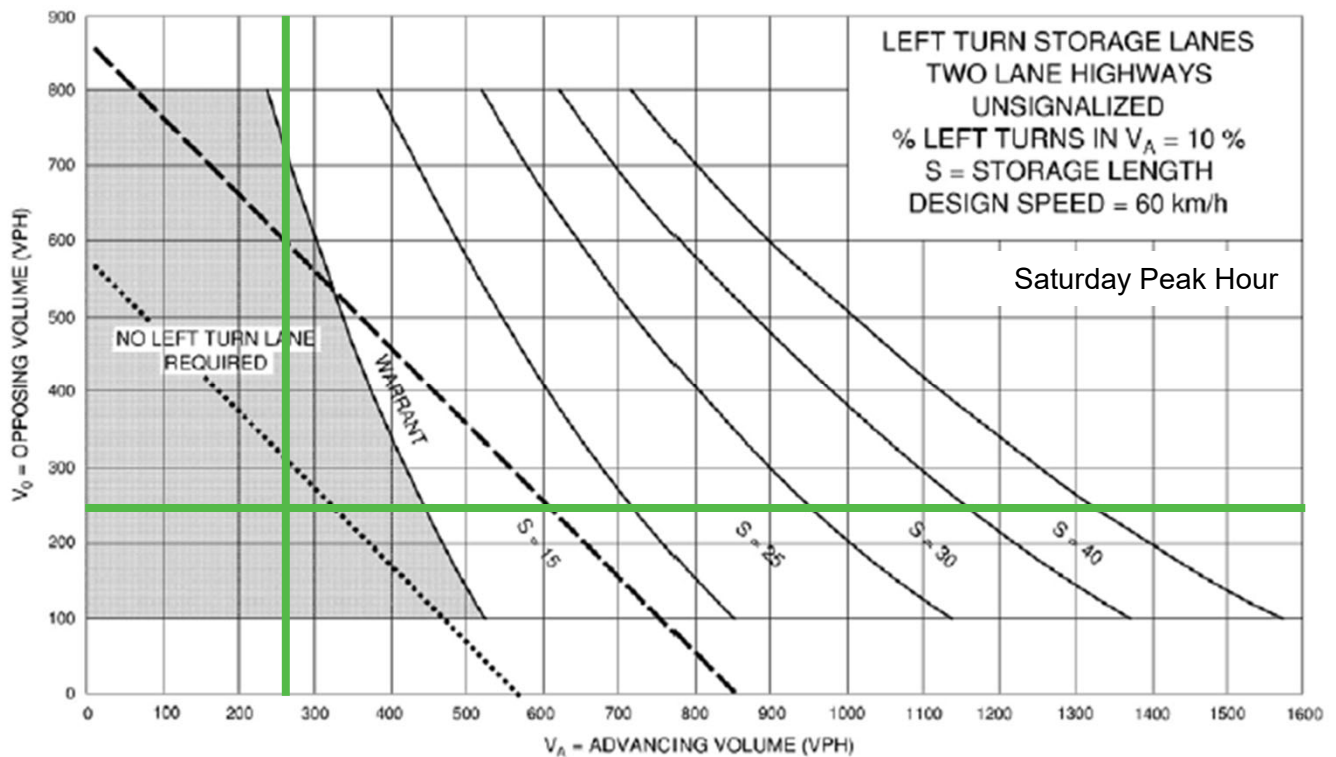
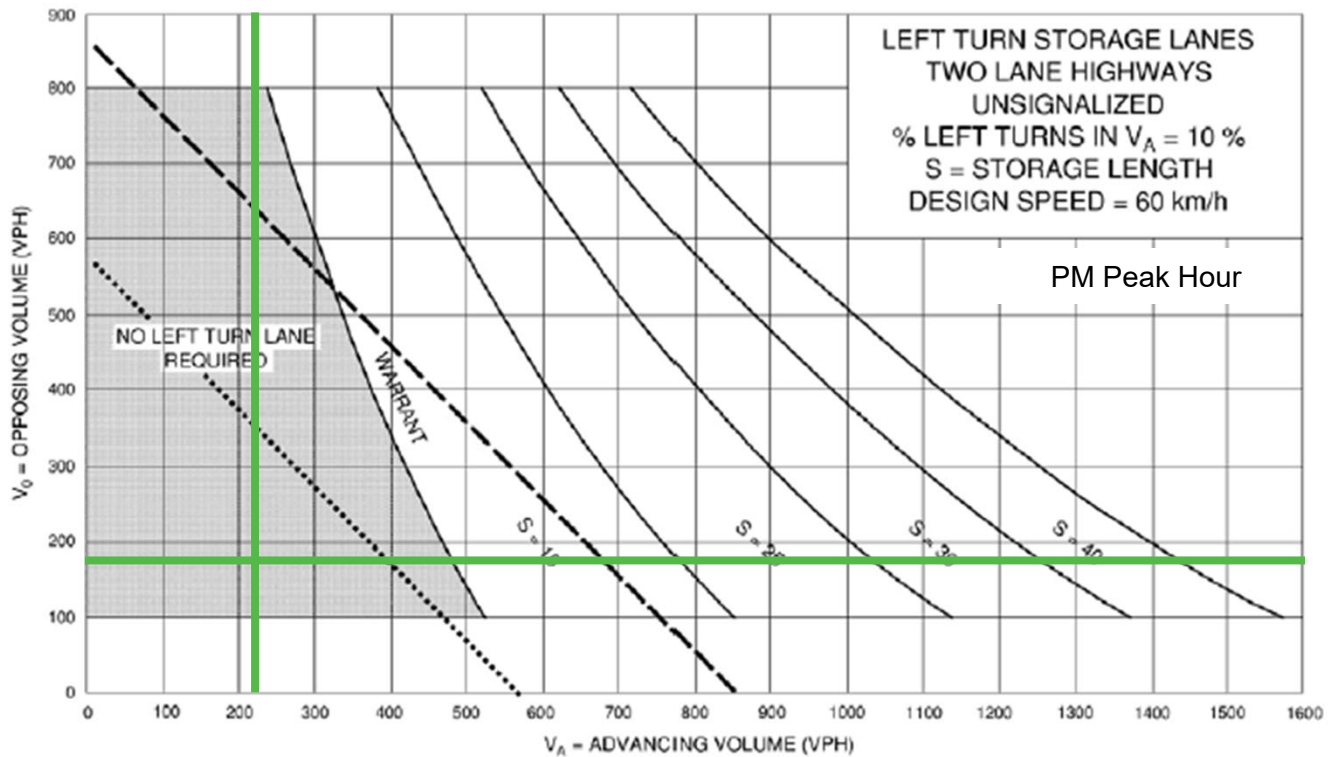
Appendix K

Left-Turn Lane Warrant









Appendix L

2032 Total Traffic Operations with Remedial Measures



Lanes, Volumes, Timings
1: Clark Avenue/Ellen Avenue & Ferry Street

Lanes, Volumes, Timings
1: Clark Avenue/Ellen Avenue & Ferry Street

5234-5278 Ferry Street, Niagara Falls TIS
Total PM (5-Year Improved)

5234-5278 Ferry Street, Niagara Falls TIS
Total PM (5-Year Improved)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	78	474	202	125	499	16	189	14	113	11	24	112
Future Volume (vph)	78	474	202	125	499	16	189	14	113	11	24	112
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	40.0	0.0	40.0	0.0	0.0	0.0	0.0	0.0	15.0	0.0	0.0	0.0
Storage Lanes	1	0	1	0	1	0	1	1	1	0	0	0
Taper Length (m)	7.5	0	7.5	0	0	0	7.5	0	0	7.5	0	0
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	0.86	0.84	0.99	0.99	0.91	0.86	0.86	0.86	0.86	0.88	0.88	0.88
Frt	0.950	0.955	0.950	0.950	0.995	0.950	0.866	0.866	0.866	0.897	0.897	0.897
Flt Protected	0.950	0.955	0.950	0.950	0.995	0.950	0.866	0.866	0.866	0.897	0.897	0.897
Satd. Flow (prot)	1662	1385	0	1662	1668	0	1662	1277	0	0	1395	0
Flt Permitted	0.373	0.264	0.264	0.589	0.589	0.589	0.589	0.589	0.589	0.589	0.589	0.589
Satd. Flow (perm)	559	1385	0	462	1668	0	940	1277	0	0	1355	0
Right Turn on Red	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Satd. Flow (RTOR)	48	50	50	50	50	50	50	50	50	50	50	50
Link Speed (km/h)	133.8	133.8	133.8	133.8	133.8	133.8	133.8	133.8	133.8	133.8	133.8	133.8
Link Distance (m)	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6
Travel Time (s)	191	263	263	191	65	65	75	75	75	75	65	65
Confl. Peds. (#/hr)	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Peak Hour Factor	0%	2%	0%	0%	3%	0%	0%	0%	2%	0%	0%	0%
Heavy Vehicles (%)	85	515	220	136	542	17	205	15	123	12	26	122
Adj. Flow (vph)	85	515	220	136	542	17	205	15	123	12	26	122
Shared Lane Traffic (%)	85	735	0	136	559	0	205	138	0	0	160	0
Lane Group Flow (vph)	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Turn Type	2	2	2	2	2	2	2	2	2	2	2	2
Protected Phases	2	2	2	2	2	2	2	2	2	2	2	2
Permitted Phases	2	2	2	2	2	2	2	2	2	2	2	2
Detector Phase	2	2	2	2	2	2	2	2	2	2	2	2
Switch Phase	2	2	2	2	2	2	2	2	2	2	2	2
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	23.2	23.2	23.2	23.2	23.2	23.2	23.2	23.2	23.2	23.2	23.2	23.2
Total Split (s)	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0
Total Split (%)	65.0%	65.0%	65.0%	65.0%	65.0%	65.0%	65.0%	65.0%	65.0%	65.0%	65.0%	65.0%
Maximum Green (s)	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8
Yellow Time (s)	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
All-Red Time (s)	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Lost Time Adjust (s)	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.1	-2.1	-2.1	-2.1	-2.1	-2.1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Vehicle Extension (s)	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Act Effct Green (s)	50.9	50.9	50.9	50.9	50.9	50.9	50.9	50.9	50.9	50.9	50.9	50.9
Actuated g/C Ratio	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64
v/c Ratio	0.24	0.82	0.46	0.53	0.83	0.33	0.33	0.33	0.33	0.33	0.33	0.33

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	4.3	14.4	15.3	10.9	54.6	9.8	0.0	0.0	0.0	0.0	0.0	9.5
Queue Delay	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	4.3	14.6	15.3	11.0	54.6	9.8	0.0	0.0	0.0	0.0	0.0	9.5
LOS	A	B	B	B	D	A	A	A	A	A	A	A
Approach Delay	13.5	11.8	36.5	27.5	3.7	4.1	17.4	145.1	0.33	0.33	0.33	0.33
Approach LOS	B	B	D	B	A	A	A	A	A	A	A	A
Queue Length 50th (m)	3.1	84.1	10.4	44.9	26.8	71.3	28.1	28.1	0.33	0.33	0.33	0.33
Queue Length 95th (m)	m2.6	#154.5	26.8	71.3	28.1	28.1	28.1	28.1	0.33	0.33	0.33	0.33
Internal Link Dist (m)	40.0	109.8	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
Base Capacity (vph)	355	888	293	1061	282	455	491	491	491	491	491	491
Starvation Cap Reductn	0	10	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	28	0	0	2	2	2	2	2	2
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.24	0.83	0.46	0.54	0.73	0.30	0.33	0.33	0.33	0.33	0.33	0.33
Intersection Summary	Other											
Area Type	Other											
Cycle Length	80											
Actuated Cycle Length	80											
Offset	10 (13%), Referenced to phase 2EBTL and 6:WBT, Start of Green											
Natural Cycle	75											
Control Type	Actuated-Coordinated											
Maximum v/c Ratio	0.83											
Intersection Signal Delay	16.5											
Intersection Capacity Utilization	97.9%											
Analysis Period (min)	15											
# 95th percentile volume exceeds capacity, queue may be longer.	Queue shown is maximum after two cycles.											
m Volume for 95th percentile queue is metered by upstream signal.												
Splits and Phases	1: Clark Avenue/Ellen Avenue & Ferry Street											

HCM Signalized Intersection Capacity Analysis 5234-5278 Ferry Street, Niagara Falls TIS
 1: Clark Avenue/Ellen Avenue & Ferry Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	78	474	202	125	499	16	189	14	113	11	24	112
Traffic Volume (vph)	78	474	202	125	499	16	189	14	113	11	24	112
Future Volume (vph)	78	474	202	125	499	16	189	14	113	11	24	112
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	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	1.00	1.00	1.00
Flpb. ped/bikes	1.00	0.84	1.00	1.00	0.99	1.00	0.86	1.00	0.86	1.00	0.89	1.00
Flpb. ped/bikes	0.85	1.00	0.90	1.00	0.90	1.00	0.91	1.00	0.90	1.00	0.99	1.00
Flt	1.00	0.96	1.00	1.00	1.00	1.00	0.87	1.00	0.87	1.00	0.90	1.00
Flt Protected	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1411	1385	1497	1669	1519	1277	1497	1669	1519	1277	1497	1669
Flt Permitted	0.37	1.00	0.26	1.00	0.26	1.00	0.59	1.00	0.59	1.00	0.98	1.00
Satd. Flow (perm)	554	1385	416	1689	942	1277	942	1277	942	1277	1355	1355
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	85	515	220	136	542	17	205	15	123	12	26	122
RTOR Reduction (vph)	0	17	0	0	1	0	0	77	0	0	90	0
Lane Group Flow (vph)	85	718	0	136	558	0	205	61	0	0	70	0
Confl. Peds. (#/hr)	191	263	263	191	65	75	75	75	75	75	65	65
Heavy Vehicles (%)	0%	2%	0%	0%	3%	0%	0%	0%	2%	0%	0%	0%
Turn Type	Perm	NA	NA	Perm	NA	Perm	NA	NA	Perm	NA	NA	NA
Protected Phases	2	2	2	2	2	2	2	2	2	2	2	2
Permitted Phases	2	2	2	2	2	2	2	2	2	2	2	2
Actuated Green, G (s)	48.7	48.7	48.7	48.7	48.7	48.7	48.7	48.7	48.7	48.7	48.7	48.7
Effective Green, g (s)	50.9	50.9	50.9	50.9	50.9	50.9	50.9	50.9	50.9	50.9	50.9	50.9
Actuated g/C Ratio	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64
Clearance Time (s)	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2
Vehicle Extension (s)	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Lane Grp Cap (vph)	352	881	264	1061	336	336	336	336	336	336	357	357
v/s Ratio Prot	0.15	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33
v/s Ratio Perm	0.24	0.81	0.52	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53
Uniform Delay, d1	6.3	11.0	7.9	8.0	27.7	22.8	27.7	22.8	27.7	22.8	22.9	22.9
Progression Factor	0.40	0.56	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.2	6.1	7.0	1.9	18.9	0.1	18.9	0.1	18.9	0.1	0.1	0.1
Delay (s)	3.7	12.3	14.9	9.8	46.7	22.9	46.7	22.9	46.7	22.9	23.0	23.0
Level of Service	A	B	B	A	D	C	D	C	D	C	C	C
Approach Delay (s)	11.4	11.4	11.4	10.8	10.8	37.1	37.1	37.1	37.1	37.1	23.0	23.0
Approach LOS	B	B	B	B	B	D	D	D	D	D	C	C
Intersection Summary												
HCM 2000 Control Delay	16.5											
HCM 2000 Volume to Capacity ratio	0.82											
Actuated Cycle Length (s)	80.0											
Intersection Capacity Utilization	97.9%											
Analysis Period (min)	15											
c Critical Lane Group												

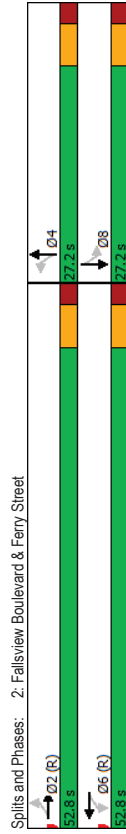
Lanes, Volumes, Timings 5234-5278 Ferry Street, Niagara Falls TIS
 2: Fallsview Boulevard & Ferry Street

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	78	474	202	125	499	16	189	14	113	11	24	112
Traffic Volume (vph)	78	474	202	125	499	16	189	14	113	11	24	112
Future Volume (vph)	78	474	202	125	499	16	189	14	113	11	24	112
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
Storage Lanes	1	1	1	1	1	1	1	1	1	1	1	1
Taper Length (m)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	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
Pod Bike Factor	0.94	0.97	1.00	0.99	1.00	1.00	0.95	1.00	0.95	1.00	0.97	1.00
Flt	0.950	0.985	0.999	0.999	0.999	0.999	0.927	0.999	0.927	0.999	0.906	0.996
Flt Protected	0.950	0.985	0.999	0.999	0.999	0.999	0.927	0.999	0.927	0.999	0.906	0.996
Satd. Flow (prot)	1630	1644	0	1646	1695	0	0	1506	0	0	1503	0
Flt Permitted	0.268	0.432	0.447	0.447	0.447	0.447	0.447	0.447	0.447	0.447	0.447	0.447
Satd. Flow (perm)	432	1644	0	447	1695	0	0	1291	0	0	1470	0
Right Turn on Red	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Satd. Flow (RTOR)	13	13	13	13	13	13	13	13	13	13	13	13
Satd. Flow (k/h)	50	50	50	50	50	50	50	50	50	50	50	50
Link Distance (m)	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9
Travel Time (s)	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2
Confl. Peds. (#/hr)	191	263	263	191	65	75	75	75	75	75	65	65
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	0%	1%	3%	2%	0%	2%	0%	2%	2%	2%
Adj. Flow (vph)	25	737	82	112	797	3	85	8	111	3	8	25
Shared Lane Traffic (%)												
Lane Group Flow (vph)	25	819	0	112	800	0	0	204	0	0	36	0
Turn Type	Perm	NA	NA	Perm	NA	Perm	NA	NA	Perm	NA	NA	NA
Protected Phases	2	2	2	2	2	2	2	2	2	2	2	2
Permitted Phases	2	2	2	2	2	2	2	2	2	2	2	2
Detector Phase	2	2	2	2	2	2	2	2	2	2	2	2
Switch Phase	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Minimum Initial (s)	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2
Minimum Split (s)	52.8	52.8	52.8	52.8	52.8	52.8	52.8	52.8	52.8	52.8	52.8	52.8
Total Split (s)	66.0%	66.0%	66.0%	66.0%	66.0%	66.0%	66.0%	66.0%	66.0%	66.0%	66.0%	66.0%
Total Split (%)	66.0%	66.0%	66.0%	66.0%	66.0%	66.0%	66.0%	66.0%	66.0%	66.0%	66.0%	66.0%
Maximum Green (s)	46.6	46.6	46.6	46.6	46.6	46.6	46.6	46.6	46.6	46.6	46.6	46.6
Yellow Time (s)	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
All-Red Time (s)	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Lost Time Adjust (s)	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max
Flash Dont Walk (s)	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Act Effct Green (s)	56.5	56.5	56.5	56.5	56.5	56.5	56.5	56.5	56.5	56.5	56.5	56.5
Actuated g/C Ratio	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71
v/c Ratio	0.08	0.70	0.36	0.36	0.67	0.36	0.67	0.36	0.67	0.36	0.67	0.36

Lanes, Volumes, Timings
 2: Fallsview Boulevard & Ferry Street

5234-5278 Ferry Street, Niagara Falls TIS
 Total PM (5-Year Improved)

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group												
Control Delay	6.0	12.6		7.4	8.2			27.8				13.2
Queue Delay	0.0	0.1		0.0	0.2			0.0				0.0
Total Delay	6.0	12.6		7.4	8.5			27.8				13.2
LOS	A	B		A	A			C				B
Approach Delay		12.4			8.3			27.8				13.2
Approach LOS		B			A			C				B
Queue Length 50th (m)	1.0	56.6		3.4	36.8			17.6				1.4
Queue Length 95th (m)	4.4	#137.6		m13.3	84.1			34.6				7.5
Internal Link Dist (m)		75.9			109.8			171.3				33.8
Turn Bay Length (m)	30.0			45.0								
Base Capacity (vph)	304	1164		315	1196			428				444
Starvation Cap Reductn	0	0		0	0			0				0
Spillback Cap Reductn	0	13		0	0			0				0
Storage Cap Reductn	0	0		0	0			0				0
Reduced v/c Ratio	0.08	0.71		0.36	0.71			0.48				0.08
Intersection Summary												
Area Type: Other												
Cycle Length: 80												
Actuated Cycle Length: 80												
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green												
Natural Cycle: 70												
Control Type: Actuated-Coordinated												
Maximum v/c Ratio: 0.70												
Intersection Signal Delay: 12.2												
Intersection LOS: B												
Intersection Capacity Utilization 81.0%												
Analysis Period (min) 15												
# 95th percentile volume exceeds capacity, queue may be longer.												
Queue shown is maximum after two cycles.												
m Volume for 95th percentile queue is metered by upstream signal.												



HCM Signalized Intersection Capacity Analysis
 2: Fallsview Boulevard & Ferry Street

5234-5278 Ferry Street, Niagara Falls TIS
 Total PM (5-Year Improved)

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement												
Lane Configurations												
Traffic Volume (vph)	23	678	75	103	733	3	78	7	102	3	7	23
Future Volume (vph)	23	678	75	103	733	3	78	7	102	3	7	23
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
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00		1.00
Frpb, ped/bikes	1.00	0.97		1.00	1.00		1.00	0.96		1.00		0.97
Flpb, ped/bikes	0.92	1.00		0.94	1.00		0.99	0.99		1.00		1.00
Fr	1.00	0.98		1.00	1.00		0.93	0.93		1.00		0.91
Flt Protected	0.95	1.00		0.95	1.00		0.98	0.98		1.00		0.98
Satd. Flow (prot)	1503	1644		1554	1696		1491	1491		1499		1499
Flt Permitted	0.27	1.00		0.26	1.00		0.85	0.85		0.98		0.98
Satd. Flow (perm)	424	1644		422	1696		1291	1291		1470		1470
Peak-Hour factor, PHF	0.92	0.92		0.92	0.92		0.92	0.92		0.92		0.92
Adj. Flow (vph)	25	737	82	112	797	3	85	8	111	3	8	25
RTOR Reduction (vph)	0	4	0	0	0	0	0	61	0	0	20	0
Lane Group Flow (vph)	25	815	0	112	800	0	143	0	143	0	16	0
Confl. Peds. (#/hr)	191	146		146	191		12	29	29	12		12
Heavy Vehicles (%)	2%	2%	0%	1%	3%	2%	3%	2%	0%	2%	2%	2%
Turn Type	Perm	NA	NA	Perm	NA	Perm	NA	NA	Perm	NA	NA	NA
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	54.3	54.3		54.3	54.3		13.3			13.3		
Effective Green, g (s)	56.5	56.5		56.5	56.5		15.5			15.5		
Actuated 9/C Ratio	0.71	0.71		0.71	0.71		0.19			0.19		
Clearance Time (s)	6.2	6.2		6.2	6.2		6.2			6.2		
Vehicle Extension (s)	2.1	2.1		2.1	2.1		2.1			2.1		
Lane Grp Cap (vph)	299	1161		298	1197		250			284		
v/s Ratio Prot		c0.50			0.47							
v/s Ratio Perm	0.06			0.27			c0.11					
v/c Ratio	0.08	0.70		0.38	0.67		0.57			0.06		
Uniform Delay, d1	3.7	6.8		4.7	6.5		29.2			26.3		
Progression Factor	1.00	1.00		0.68	0.67		1.00			1.00		
Incremental Delay, d2	0.5	3.6		3.1	2.6		2.1			0.0		
Delay (s)	4.2	10.4		6.3	7.0		31.3			26.3		
Level of Service	A	B		A	A		C			C		
Approach Delay (s)		10.2			6.9		31.3			26.3		
Approach LOS		B			A		C			C		
Intersection Summary												
HCM 2000 Control Delay												
HCM 2000 Volume to Capacity ratio												
Actuated Cycle Length (s)												
Intersection Capacity Utilization												
Analysis Period (min)												
c Critical Lane Group												

	EBL	EBT	WBT	WBR	SBL	SBR	
Lane Group							
Lane Configurations		↕↕	↗		↖		
Traffic Volume (vph)	13	566	580	27	37	30	
Future Volume (vph)	13	566	580	27	37	30	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00	
Ped Bike Factor							
Flt			0.994		0.939		
Flt Protected		0.999			0.973		
Satd. Flow (prot)	0	3290	1707	0	1599	0	
Flt Permitted		0.999			0.973		
Satd. Flow (perm)	0	3290	1707	0	1599	0	
Link Speed (k/h)		50	50		50		
Link Distance (m)		134.5	118.7		82.8		
Travel Time (s)		9.7	8.5		6.0		
Conf. Peds. (#/hr)	371			371	38	14	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Heavy Vehicles (%)	0%	1%	2%	0%	0%	0%	
Adj. Flow (vph)	14	615	630	29	40	33	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	0	629	659	0	73	0	
Sign Control		Free	Free		Stop		
Intersection Summary							
Area Type:	Other						
Control Type:	Unsignalized						
Intersection Capacity Utilization	50.0%						
Analysis Period (min)	15						
	ICU Level of Service A						

	EBL	EBT	WBT	WBR	SBL	SBR	
Movement							
Lane Configurations							
Traffic Volume (veh/h)	13	566	580	27	37	30	
Future Volume (Veh/h)	13	566	580	27	37	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)	14	615	630	29	40	33	
Pedestrians		14	38		371		
Lane Width (m)		3.6	3.6		3.6		
Walking Speed (m/s)		1.2	1.2		1.2		
Percent Blockage		1	3		31		
Right turn flare (veh)							
Median type		None	None				
Median storage (veh)							
Upstream signal (m)		256					
pX, platoon unblocked					1389	1030	
VC, conflicting volume	1030						
VC1, stage 1 conf vol							
VC2, stage 2 conf vol							
VCu, unblocked vol	1030				1389	1030	
IC, single (s)	4.1				6.8	6.9	
IC, 2 stage (s)							
IF (s)	2.2				3.5	3.3	
p0 queue free %	97				55	79	
dM capacity (veh/h)	471				88	160	
Direction, Lane #	EB 1	EB 2	WB 1	SB 1			
Volume Total	219	410	659	73			
Volume Left	14	0	0	40			
Volume Right	0	0	29	33			
cSH	471	1700	1700	111			
Volume to Capacity	0.03	0.24	0.39	0.66			
Queue Length 95th (m)	0.7	0.0	0.0	25.4			
Control Delay (s)	1.2	0.0	0.0	85.5			
Lane LOS	A			F			
Approach Delay (s)	0.4		0.0	85.5			
Approach LOS				F			
Intersection Summary							
Average Delay			4.8				
Intersection Capacity Utilization			50.0%				A
Analysis Period (min)			15				

Lanes, Volumes, Timings
4: Robinson Street & Clark Avenue

5234-5278 Ferry Street, Niagara Falls TIS
Total PM (5-Year Improved)

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group												
Lane Configurations												
Traffic Volume (vph)	74	315	20	13	344	83	31	22	4	110	7	86
Future Volume (vph)	74	315	20	13	344	83	31	22	4	110	7	86
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.0	
Storage Lanes	0	0	0	0	0	0	0	0	0	1	1	
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt	0.993			0.975			0.991			0.862		
Flt Protected	0.991			0.999			0.973			0.950		
Satd. Flow (prot)	0	1671	0	0	1666	0	0	1651	0	1662	1508	0
Flt Permitted	0.991			0.989			0.973			0.950		
Satd. Flow (perm)	0	1671	0	0	1666	0	0	1651	0	1662	1508	0
Link Speed (k/h)	50			50			50			50		
Link Distance (m)	133.5			132.0			59.2			232.7		
Travel Time (s)	9.6			9.5			4.3			16.8		
Confl. Peds. (#/hr)	80	57		57		80	28		103	103		28
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	4%	0%	0%	2%	4%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	80	342	22	14	374	90	34	24	4	120	8	93
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	444	0	0	478	0	0	62	0	120	101	0
Sign Control	Free	Free		Free			Stop		Stop	Stop		Stop
Intersection Summary												
Area Type:	Other											
Control Type: Unsignalized												
Intersection Capacity Utilization	74.1%											
Analysis Period (min)	15											

HCM Unsignalized Intersection Capacity Analysis
4: Robinson Street & Clark Avenue

5234-5278 Ferry Street, Niagara Falls TIS
Total PM (5-Year Improved)

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement												
Lane Configurations												
Traffic Volume (veh/h)	74	315	20	13	344	83	31	22	4	110	7	86
Future Volume (Veh/h)	74	315	20	13	344	83	31	22	4	110	7	86
Sign Control	Free	Free		Free			Stop		Stop	Stop		Stop
Grade	0%			0%			0%			0%		0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	80	342	22	14	374	90	34	24	4	120	8	93
Pedestrians		28		103			57			36		80
Lane Width (m)		3.6		3.6			3.6			3.6		3.6
Walking Speed (m/s)		1.2		1.2			1.2			1.2		1.2
Percent Blockage		2		9			5					7
Right turn flare (veh)		None		None								
Median type		None		None								
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
VC, conflicting volume	544			421			1142	1142	513	1159	1108	527
VC1, stage 1 conf vol												
VC2, stage 2 conf vol												
VCu, unblocked vol	544			421			1142	1142	513	1159	1108	527
IC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
IC, 2 stage (s)												
IF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	92			99			69	85	99	0	95	82
dM capacity (veh/h)	966			1094			110	163	492	112	170	506
Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2							
Volume Total	444	478	62	120	101							
Volume Left	80	14	34	120	0							
Volume Right	22	90	4	0	93							
cSH	966	1094	133	112	438							
Volume to Capacity	0.08	0.01	0.47	1.07	0.23							
Queue Length 95th (m)	2.0	0.3	15.9	54.4	6.6							
Control Delay (s)	2.4	0.4	53.7	179.9	15.7							
Lane LOS	A	A	F	F	C							
Approach Delay (s)	2.4	0.4	53.7	104.9								
Approach LOS	F	F	F									
Intersection Summary												
Average Delay	23.0											
Intersection Capacity Utilization	74.1%											
Analysis Period (min)	15											

Lanes, Volumes, Timings

5: Clark Avenue & Northern Driveway

5234-5278 Ferry Street, Niagara Falls TIS

Total PM (5-Year Improved)

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	1	12	304	5	142	209
Future Volume (vph)	1	12	304	5	142	209
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0	0.0		0.0	15.0	
Storage Lanes	1	0		0	1	
Taper Length (m)	7.5				7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Fit	0.875		0.998			
Flt Protected	0.996			0.950		
Satd. Flow (prot)	1495	0	1729	0	1630	1750
Flt Permitted	0.996			0.950		
Satd. Flow (perm)	1495	0	1729	0	1630	1750
Link Speed (k/h)	50		50		50	
Link Distance (m)	42.4		61.6		52.1	
Travel Time (s)	3.1		4.4		3.8	
Confl. Peds. (#/hr)				263	263	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	1%	2%	2%	0%
Adj. Flow (vph)	1	13	330	5	154	227
Shared Lane Traffic (%)						
Lane Group Flow (vph)	14	0	335	0	154	227
Sign Control	Stop		Free		Free	
Intersection Summary						
Area Type: Other						
Control Type: Unsignalized						
Intersection Capacity Utilization 39.7%						
Analysis Period (min) 15						
ICU Level of Service A						

HCM Unsignalized Intersection Capacity Analysis

5: Clark Avenue & Northern Driveway

5234-5278 Ferry Street, Niagara Falls TIS

Total PM (5-Year Improved)

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	1	12	304	5	142	209
Future Volume (Veh/h)	1	12	304	5	142	209
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	13	330	5	154	227
Pedestrians	263					
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	22					
Right turn flare (veh)						
Median type			None		None	
Median storage (veh)						52
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1130	596			598	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1130	596			598	
IC, single (s)	6.4	6.2			4.1	
IC, 2 stage (s)						
IF (s)	3.5	3.3			2.2	
p0 queue free %	99	97			80	
dM capacity (veh/h)	140	393			764	
Direction, Lane #	WB 1	NB 1	SB 1	SB 2		
Volume Total	14	335	154	227		
Volume Left	1	0	154	0		
Volume Right	13	5	0	0		
cSH	349	1700	764	1700		
Volume to Capacity	0.04	0.20	0.20	0.13		
Queue Length 95th (m)	0.9	0.0	5.6	0.0		
Control Delay (s)	15.8	0.0	10.9	0.0		
Lane LOS	C		B			
Approach Delay (s)	15.8	0.0	4.4			
Approach LOS	C					
Intersection Summary						
Average Delay	2.6					
Intersection Capacity Utilization	39.7%					
Analysis Period (min)	15					
	ICU Level of Service A					

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	26	146	163	23	23	187
Future Volume (vph)	26	146	163	23	23	187
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.885		0.983			
Flt Protected	0.993					0.995
Satd. Flow (prot)	1508	0	1701	0	0	1737
Flt Permitted	0.993					0.995
Satd. Flow (perm)	1508	0	1701	0	0	1737
Link Speed (k/h)	50		50			50
Link Distance (m)	33.2		232.7			61.6
Travel Time (s)	2.4		16.8			4.4
Conf. Peds. (#/hr)				263	263	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	1%	2%	2%	0%
Adj. Flow (vph)	28	159	177	25	25	203
Shared Lane Traffic (%)						
Lane Group Flow (vph)	187	0	202	0	0	228
Sign Control	Stop		Free			Free
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	46.7%					
Analysis Period (min)	15					
ICU Level of Service A						

	WBL	WBR	NBT	NBR	SBL	SBT
Movement						
Lane Configurations	W		P			4
Traffic Volume (veh/h)	26	146	163	23	23	187
Future Volume (Veh/h)	26	146	163	23	23	187
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	28	159	177	25	25	203
Pedestrians	263					
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	22					
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (m)						114
pX, platoon unblocked						
VC, conflicting volume	706	452			465	
VC1, stage 1 conf vol						
VC2, stage 2 conf vol						
VCu, unblocked vol	706	452			465	
IC, single (s)	6.4	6.2			4.1	
IC, 2 stage (s)						
IF (s)	3.5	3.3			2.2	
p0 queue free %	91	66			97	
dM capacity (veh/h)	305	474			856	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	187	202	228			
Volume Left	28	0	25			
Volume Right	159	25	0			
cSH	438	1700	856			
Volume to Capacity	0.43	0.12	0.03			
Queue Length 95th (m)	15.7	0.0	0.7			
Control Delay (s)	19.2	0.0	1.3			
Lane LOS	C		A			
Approach Delay (s)	19.2	0.0	1.3			
Approach LOS	C					
Intersection Summary						
Average Delay			6.3			
Intersection Capacity Utilization			46.7%			A
Analysis Period (min)			15			

Lanes, Volumes, Timings
1: Clark Avenue/Ellen Avenue & Ferry Street

5234-5278 Ferry Street, Niagara Falls TIS
Total Saturday (5-Year Improved)

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group												
Lane Configurations	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Volume (vph)	90	646	226	135	490	9	196	28	133	21	66	175
Future Volume (vph)	90	646	226	135	490	9	196	28	133	21	66	175
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	40.0	0.0	40.0	0.0	0.0	0.0	0.0	0.0	15.0	0.0	0.0	0.0
Storage Lanes	1	0	1	0	1	0	1	1	1	0	0	0
Taper Length (m)	7.5	0.0	7.5	0.0	7.5	0.0	7.5	0.0	7.5	0.0	0.0	0.0
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	0.76	0.85	0.99	0.99	0.99	0.99	0.90	0.65	0.65	0.84	0.84	0.84
Frt	0.961	0.961	0.950	0.950	0.950	0.950	0.876	0.876	0.876	0.910	0.910	0.910
Flt Protected	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950
Satd. Flow (prot)	1646	1392	0	1630	1693	0	1662	950	0	0	1345	0
Flt Permitted	0.459	0.094	0.094	0.094	0.094	0.094	0.457	0.094	0.094	0.094	0.094	0.094
Satd. Flow (perm)	607	1392	0	161	1693	0	717	950	0	0	1275	0
Right Turn on Red	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Satd. Flow (RTOR)	23	2	2	2	2	2	145	50	50	169.1	12.2	53
Link Speed (km/h)	50	50	50	50	50	50	52.1	52.1	52.1	169.1	12.2	50
Link Distance (m)	133.8	121.5	121.5	121.5	121.5	121.5	3.8	3.8	3.8	12.2	12.2	50
Travel Time (s)	9.6	9.6	9.6	9.6	9.6	9.6	3.8	3.8	3.8	12.2	12.2	50
Conf. Peds. (#/hr)	309	317	317	309	309	309	92	92	92	190	190	92
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	3%	2%	2%	0%	0%	0%	0%	4%	0%	2%	1%
Adj. Flow (vph)	98	702	246	147	533	10	213	30	145	23	72	190
Shared Lane Traffic (%)												
Lane Group Flow (vph)	98	948	0	147	543	0	213	175	0	0	285	0
Turn Type	Perm	NA	NA	pm-pt	NA	NA	Perm	NA	NA	Perm	NA	NA
Protected Phases	2	2	2	1	6	4	4	4	4	8	8	8
Permitted Phases	2	2	2	1	6	4	4	4	4	8	8	8
Detector Phase	2	2	2	1	6	4	4	4	4	8	8	8
Switch Phase												
Minimum Initial (s)	8.0	8.0	7.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	23.2	23.2	11.0	23.2	27.1	27.1	27.1	27.1	27.1	27.1	27.1	27.1
Total Split (s)	40.0	40.0	11.0	51.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0
Total Split (%)	44.4%	44.4%	12.2%	56.7%	43.3%	43.3%	43.3%	43.3%	43.3%	43.3%	43.3%	43.3%
Maximum Green (s)	33.8	33.8	7.0	44.8	32.9	32.9	32.9	32.9	32.9	32.9	32.9	32.9
Yellow Time (s)	4.1	4.1	3.0	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
All-Red Time (s)	2.1	2.1	1.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-2.2	-2.2	0.0	-2.2	-2.1	-2.1	-2.1	-2.1	-2.1	-2.1	-2.1	-2.1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lag	Lag	Lag	Lead	Lead	Lead	Lead	Lead	Lead	Lead	Lead	Lead
Lead-Lag Optimize?												
Vehicle Extension (s)	2.1	2.1	3.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Recall Mode	C-Max	C-Max	None	C-Max	None	None	None	None	None	None	None	None
Walk Time (s)	7.0	7.0	7.0	7.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Flash Dont Walk (s)	10.0	10.0	10.0	10.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Act Effct Green (s)	40.7	40.7	52.6	52.6	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4
Actuated g/c Ratio	0.45	0.45	0.58	0.58	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33
v/c Ratio	0.36	1.48	0.66	0.55	0.91	0.43	0.43	0.43	0.43	0.43	0.43	0.43

Lanes, Volumes, Timings
1: Clark Avenue/Ellen Avenue & Ferry Street

5234-5278 Ferry Street, Niagara Falls TIS
Total Saturday (5-Year Improved)

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group												
Control Delay	7.6	233.1	30.2	15.5	69.3	8.7	69.3	8.7	69.3	8.7	26.3	26.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	1.2	0.0	1.2	0.0	0.1	0.1
Total Delay	7.6	233.1	30.2	15.5	70.5	8.7	70.5	8.7	70.5	8.7	26.4	26.4
LOS	A	F	C	B	E	A	E	A	E	A	C	C
Approach Delay	211.9	18.6	42.6	42.6	42.6	42.6	42.6	42.6	42.6	42.6	26.4	26.4
Approach LOS	F	B	D	D	D	D	D	D	D	D	C	C
Queue Length 50th (m)	5.4	~232.9	11.4	56.2	32.9	3.4	32.9	3.4	32.9	3.4	31.6	31.6
Queue Length 95th (m)	m4.5 m4.5	178.5	#39.6	93.4	#68.0	17.3	#68.0	17.3	#68.0	17.3	53.8	53.8
Internal Link Dist (m)	109.8	97.5	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	145.1	145.1
Turn Bay Length (m)	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
Base Capacity (vph)	274	642	222	990	278	458	278	458	278	458	528	528
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	10	0	10	0	19	19
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.36	1.48	0.66	0.55	0.79	0.38	0.79	0.38	0.79	0.38	0.56	0.56
Intersection Summary												
Area Type	Other											
Cycle Length	90											
Actuated Cycle Length	90											
Offset: 21 (23%), Referenced to phase 2EBTL and 6WBTL, Start of Green												
Natural Cycle: 120												
Control Type: Actuated-Coordinated												
Maximum v/c Ratio: 1.48												
Intersection Signal Delay: 107.4												
Intersection Capacity Utilization 113.6%												
ICU Level of Service H												
Analysis Period (min) 15												
Volume exceeds capacity, queue is theoretically infinite.												
Queue shown is maximum after two cycles.												
# 95th percentile volume exceeds capacity, queue may be longer.												
Queue shown is maximum after two cycles.												
m Volume for 95th percentile queue is metered by upstream signal.												



HCM Signalized Intersection Capacity Analysis 5234-5278 Ferry Street, Niagara Falls TIS
 1: Clark Avenue/Ellen Avenue & Ferry Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	90	646	226	135	490	9	196	28	133	21	66	175
Traffic Volume (vph)	90	646	226	135	490	9	196	28	133	21	66	175
Future Volume (vph)	90	646	226	135	490	9	196	28	133	21	66	175
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	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	1.00	1.00	1.00
Flpb. ped/bikes	1.00	0.85	1.00	1.00	0.99	1.00	0.99	1.00	0.65	1.00	0.86	0.98
Fltb. ped/bikes	0.74	1.00	1.00	1.00	1.00	1.00	0.90	1.00	1.00	0.88	0.91	1.00
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1213	1392	1630	1694	1497	949	1497	949	1312	1312	1312	1312
Flt Permitted	0.46	1.00	0.09	1.00	0.46	1.00	0.46	1.00	0.97	0.97	0.97	0.97
Satd. Flow (perm)	585	1392	161	1694	720	949	720	949	1276	1276	1276	1276
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	98	702	246	147	533	10	213	30	145	23	72	190
RTOR Reduction (vph)	0	13	0	0	1	0	0	98	0	0	36	0
Lane Group Flow (vph)	98	935	0	147	542	0	213	77	0	0	249	0
Confl. Peds. (#/hr)	309	317	317	309	92	190	190	92	190	190	92	92
Heavy Vehicles (%)	1%	3%	2%	2%	0%	0%	12%	4%	0%	2%	1%	1%
Turn Type	Perm	NA	NA	pm+pt	NA	Perm	NA	NA	Perm	NA	NA	NA
Protected Phases	2	2	2	6	6	4	4	4	4	4	4	4
Permitted Phases	2	2	2	6	6	4	4	4	4	4	4	4
Actuated Green, G (s)	38.5	38.5	50.4	50.4	50.4	27.3	27.3	27.3	27.3	27.3	27.3	27.3
Effective Green, g (s)	40.7	40.7	50.4	52.6	52.6	29.4	29.4	29.4	29.4	29.4	29.4	29.4
Actuated g/C Ratio	0.45	0.45	0.56	0.58	0.58	0.33	0.33	0.33	0.33	0.33	0.33	0.33
Clearance Time (s)	6.2	6.2	6.2	6.2	6.2	6.1	6.1	6.1	6.1	6.1	6.1	6.1
Vehicle Extension (s)	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Lane Grp Cap (vph)	264	629	219	990	235	310	235	310	416	416	416	416
v/s Ratio Prot	0.17	0.37	0.32	0.32	0.32	0.30	0.30	0.30	0.30	0.30	0.30	0.30
v/s Ratio Perm	0.37	1.49	0.67	0.55	0.55	0.91	0.25	0.25	0.25	0.25	0.25	0.25
Uniform Delay, d1	16.2	24.6	18.6	11.4	11.4	29.0	22.2	22.2	22.2	22.2	25.4	25.4
Progression Factor	0.37	0.40	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4	220.0	7.8	2.2	33.9	0.2	33.9	0.2	33.9	0.2	1.6	1.6
Delay (s)	6.3	229.9	26.4	13.6	62.9	22.4	62.9	22.4	22.4	22.4	27.0	27.0
Level of Service	A	F	C	B	E	C	E	C	C	C	C	C
Approach Delay (s)	209.0	209.0	209.0	16.3	16.3	44.6	44.6	44.6	44.6	44.6	27.0	27.0
Approach LOS	F	F	F	B	B	D	D	D	D	D	C	C
Intersection Summary												
HCM 2000 Control Delay	105.8											
HCM 2000 Volume to Capacity ratio	1.19											
Actuated Cycle Length (s)	90.0											
Intersection Capacity Utilization	113.6%											
Analysis Period (min)	15											
c Critical Lane Group												

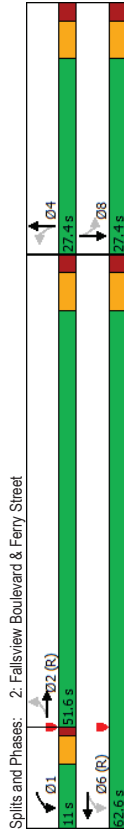
Lanes, Volumes, Timings 5234-5278 Ferry Street, Niagara Falls TIS
 2: Fallsview Boulevard & Ferry Street

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	90	646	226	135	490	9	196	28	133	21	66	175
Traffic Volume (vph)	90	646	226	135	490	9	196	28	133	21	66	175
Future Volume (vph)	90	646	226	135	490	9	196	28	133	21	66	175
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
Storage Lanes	1	1	1	1	1	1	1	1	1	1	1	1
Taper Length (m)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	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
Pod Bike Factor	0.87	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Flt Protected	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950
Satd. Flow (prot)	1630	1575	0	1630	1727	0	0	1480	0	0	1517	0
Flt Permitted	0.308	1575	0	0.078	1727	0	0	0.822	0	0	0.966	0
Satd. Flow (perm)	457	1575	0	134	1727	0	0	1242	0	0	1467	0
Right Turn on Red	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Satd. Flow (RTOR)	13	13	13	13	13	13	13	13	13	13	13	13
Link Speed (k/h)	50	50	50	50	50	50	50	50	50	50	50	50
Link Distance (m)	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9
Travel Time (s)	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2
Confl. Peds. (#/hr)	309	278	278	309	278	278	309	278	278	309	278	278
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	1%	2%	2%	1%	2%	2%	4%	2%	2%	2%	2%
Adj. Flow (vph)	26	954	149	157	793	3	140	8	129	4	7	24
Shared Lane Traffic (%)												
Lane Group Flow (vph)	26	1103	0	157	796	0	0	277	0	0	35	0
Turn Type	Perm	NA	pm+pt	NA	Perm	NA	Perm	NA	Perm	NA	NA	NA
Protected Phases	2	2	6	6	4	4	4	4	4	4	4	4
Permitted Phases	2	2	6	6	4	4	4	4	4	4	4	4
Detector Phase	2	2	1	1	6	6	6	6	6	6	6	6
Switch Phase	8.0	8.0	7.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Minimum Initial (s)	27.2	27.2	11.0	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2
Minimum Split (s)	51.6	51.6	11.0	62.6	62.6	27.4	27.4	27.4	27.4	27.4	27.4	27.4
Total Split (s)	57.3%	57.3%	12.2%	69.6%	69.6%	30.4%	30.4%	30.4%	30.4%	30.4%	30.4%	30.4%
Total Split (%)	45.4	45.4	7.0	56.4	56.4	21.2	21.2	21.2	21.2	21.2	21.2	21.2
Maximum Green (s)	4.1	4.1	3.0	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
Yellow Time (s)	2.1	2.1	1.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
All-Red Time (s)	-2.2	-2.2	0.0	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2
Lost Time Adjust (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lag	Lag	Lag	Lag	Lag	Lag	Lag	Lag	Lag	Lag	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	2.1	2.1	3.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Recall Mode	C-Max	C-Max	None	C-Max	None	C-Max	None	C-Max	None	C-Max	None	C-Max
Walk Time (s)	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Flash Dont Walk (s)	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Act Effect Green (s)	49.5	49.5	60.9	60.9	60.9	60.9	60.9	60.9	60.9	60.9	60.9	60.9
Actuated g/C Ratio	0.55	0.55	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68
v/c Ratio	0.10	1.26	0.74	0.68	0.74	0.68	0.74	0.68	0.74	0.68	0.74	0.68

Lanes, Volumes, Timings
 2: Fallsview Boulevard & Ferry Street

5234-5278 Ferry Street, Niagara Falls TIS
 Total Saturday (5-Year Improved)

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	12.0	150.9	34.7	9.8	36.6	50.7	50.7	50.7	50.7	50.7	50.7	50.7
Queue Delay	0.0	4.5	0.0	0.6	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Total Delay	12.0	155.5	34.7	10.4	37.7	51.8	51.8	51.8	51.8	51.8	51.8	51.8
LOS	B	F	C	B	B	D	D	D	D	D	D	D
Approach Delay	152.2	14.4	14.4	14.4	14.4	51.8	51.8	51.8	51.8	51.8	51.8	51.8
Approach LOS	F	B	B	B	B	D	D	D	D	D	D	D
Queue Length 50th (m)	2.1	~246.1	12.0	71.7	36.6	50.7	50.7	50.7	50.7	50.7	50.7	50.7
Queue Length 95th (m)	6.4	#319.8	m#37.2	98.7	#75.0	171.3	171.3	171.3	171.3	171.3	171.3	171.3
Internal Link Dist (m)	30.0	75.9	109.8	45.0	109.8	171.3	171.3	171.3	171.3	171.3	171.3	171.3
Turn Bay Length (m)	30.0	75.9	109.8	45.0	109.8	171.3	171.3	171.3	171.3	171.3	171.3	171.3
Base Capacity (vph)	251	872	212	1167	357	357	357	357	357	357	357	357
Starvation Cap Reductn	0	0	0	110	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	415	0	0	0	13	13	13	13	13	13	13
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.10	2.41	0.74	0.75	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Intersection Summary	Other											
Area Type:	Other											
Cycle Length: 90	Actuated Cycle Length: 90											
Offset: 0 (0%)	Referenced to phase 2:EBTL and 6:WBTL, Start of Green											
Natural Cycle: 140	Natural Cycle: 140											
Control Type: Actuated-Coordinated	Control Type: Actuated-Coordinated											
Maximum v/c Ratio: 1.26	Maximum v/c Ratio: 1.26											
Intersection Signal Delay: 83.7	Intersection Signal Delay: 83.7											
Intersection Capacity Utilization 103.3%	Intersection Capacity Utilization 103.3%											
Analysis Period (min) 15	Analysis Period (min) 15											
~ Volume exceeds capacity, queue is theoretically infinite.	~ Volume exceeds capacity, queue is theoretically infinite.											
# Queue shown is maximum after two cycles.	# Queue shown is maximum after two cycles.											
~ Queue shown is maximum after two cycles.	~ Queue shown is maximum after two cycles.											
m Volume for 95th percentile queue is metered by upstream signal.	m Volume for 95th percentile queue is metered by upstream signal.											



HCM Signalized Intersection Capacity Analysis
 2: Fallsview Boulevard & Ferry Street

5234-5278 Ferry Street, Niagara Falls TIS
 Total Saturday (5-Year Improved)

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Volume (vph)	24	878	137	144	730	3	129	7	119	4	6	22
Future Volume (vph)	24	878	137	144	730	3	129	7	119	4	6	22
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	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	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.93	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	0.86	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt Protected	0.95	1.00	0.95	1.00	1.00	0.98	1.00	0.98	1.00	0.99	1.00	0.99
Satd. Flow (prot)	1396	1574	1630	1728	1474	1474	1474	1474	1474	1511	1511	1511
Flt Permitted	0.31	1.00	0.08	1.00	0.82	0.82	0.82	0.82	0.82	0.97	0.97	0.97
Satd. Flow (perm)	452	1574	134	1728	1243	1243	1243	1243	1243	1468	1468	1468
Peak-Hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	26	954	149	157	793	3	140	8	129	4	7	24
RTOR Reduction (vph)	0	6	0	0	0	0	0	36	0	0	18	0
Lane Group Flow (vph)	26	1097	0	157	796	0	0	241	0	0	17	0
Confl. Peds. (#/hr)	309	278	278	309	4	39	39	4	39	39	4	4
Heavy Vehicles (%)	2%	1%	2%	2%	1%	2%	2%	2%	4%	2%	2%	2%
Turn Type	Perm	NA	NA	pm+pt	NA	Perm	NA	Perm	NA	Perm	NA	NA
Protected Phases	2	2	2	1	6	4	4	4	4	8	8	8
Permitted Phases	2	2	2	6	6	4	4	4	4	8	8	8
Actuated Green, G (s)	47.4	47.4	47.4	58.7	58.7	18.9	18.9	18.9	18.9	21.1	21.1	21.1
Effective Green, g (s)	49.6	49.6	49.6	58.7	58.7	60.9	60.9	60.9	60.9	62.2	62.2	62.2
Actuated 9/C Ratio	0.55	0.55	0.55	0.65	0.65	0.23	0.23	0.23	0.23	0.23	0.23	0.23
Clearance Time (s)	6.2	6.2	6.2	4.0	4.0	6.2	6.2	6.2	6.2	6.2	6.2	6.2
Vehicle Extension (s)	2.1	2.1	2.1	3.0	3.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Lane Grp Cap (vph)	249	867	208	1169	1169	291	291	291	291	344	344	344
v/s Ratio Prot	0.06	0.06	0.06	0.06	0.06	0.43	0.43	0.43	0.43	0.01	0.01	0.01
v/c Ratio	0.10	1.27	0.43	0.75	0.68	0.83	0.83	0.83	0.83	0.05	0.05	0.05
Uniform Delay, d1	9.6	20.2	22.7	8.7	8.7	32.7	32.7	32.7	32.7	26.7	26.7	26.7
Progression Factor	1.00	1.00	1.00	1.05	0.72	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.8	128.7	12.0	2.6	2.6	16.7	16.7	16.7	16.7	0.0	0.0	0.0
Delay (s)	10.5	148.9	35.8	8.9	8.9	49.4	49.4	49.4	49.4	26.7	26.7	26.7
Level of Service	B	F	D	A	A	D	D	D	D	C	C	C
Approach Delay (s)	145.7	145.7	145.7	13.3	13.3	49.4	49.4	49.4	49.4	26.7	26.7	26.7
Approach LOS	F	F	F	B	B	D	D	D	D	C	C	C
Intersection Summary	Intersection Summary											
HCM 2000 Control Delay	HCM 2000 Control Delay											
HCM 2000 Volume to Capacity ratio	HCM 2000 Volume to Capacity ratio											
Actuated Cycle Length (s)	Actuated Cycle Length (s)											
Intersection Capacity Utilization	Intersection Capacity Utilization											
Analysis Period (min)	Analysis Period (min)											
c Critical Lane Group	c Critical Lane Group											

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕↕	↗		↖	
Traffic Volume (vph)	15	753	586	35	83	50
Future Volume (vph)	15	753	586	35	83	50
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor						
Flt			0.992		0.949	
Flt Protected		0.999			0.970	
Satd. Flow (prot)	0	3289	1704	0	1599	0
Flt Permitted		0.999			0.970	
Satd. Flow (perm)	0	3289	1704	0	1599	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		134.5	118.7		82.8	
Travel Time (s)		9.7	8.5		6.0	
Confl. Peds. (#/hr)	547			547	59	18
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	1%	2%	0%	0%	2%
Adj. Flow (vph)	16	818	637	38	90	54
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	834	675	0	144	0
Sign Control		Free	Free		Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	54.0%					
Analysis Period (min)	15					
ICU Level of Service A						

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		4↑	↓		W	
Traffic Volume (veh/h)	15	753	586	35	83	50
Future Volume (Veh/h)	15	753	586	35	83	50
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)	16	818	637	38	90	54
Pedestrians		18	59		547	
Lane Width (m)		3.6	3.6		3.6	
Walking Speed (m/s)		1.2	1.2		1.2	
Percent Blockage		2	5		46	
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)		256				
pX, platoon unblocked					1703	1221
VC, conflicting volume	1222					
VC1, stage 1 conf vol						
VC2, stage 2 conf vol						
VCu, unblocked vol	1222				1703	1221
IC, single (s)	4.1				6.8	6.9
IC, 2 stage (s)						
IF (s)	2.2				3.5	3.3
p0 queue free %	95				0	41
dM capacity (veh/h)	314				41	92
Direction, Lane #	EB 1	EB 2	WB 1	SB 1		
Volume Total	289	545	675	144		
Volume Left	16	0	0	90		
Volume Right	0	0	38	54		
cSH	314	1700	1700	52		
Volume to Capacity	0.05	0.32	0.40	2.76		
Queue Length 95th (m)	1.2	0.0	0.0	113.0		
Control Delay (s)	1.9	0.0	0.0	961.9		
Lane LOS	A			F		
Approach Delay (s)	0.7		0.0	961.9		
Approach LOS				F		
Intersection Summary						
Average Delay			84.1			
Intersection Capacity Utilization			54.0%			A
Analysis Period (min)			15			

Lanes, Volumes, Timings
4: Robinson Street & Clark Avenue

5234-5278 Ferry Street, Niagara Falls TIS
Total Saturday (5-Year Improved)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	97	349	58	74	338	83	49	26	12	96	13	122
Future Volume (vph)	97	349	58	74	338	83	49	26	12	96	13	122
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.0
Taper Length (m)	0	0	0	0	0	0	0	0	0	0	0	1
Storage Lanes	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	1
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt	0.984	0.977						0.981				0.864
Flt Protected	0.990	0.993						0.973				0.950
Satd. Flow (prot)	0	1661	0	0	1667	0	0	1670	0	1662	1498	0
Flt Permitted	0.990	0.993						0.973				0.950
Satd. Flow (perm)	0	1661	0	0	1667	0	0	1670	0	1662	1498	0
Link Speed (k/h)	50	50						50				50
Link Distance (m)	133.5	132.0						59.2				232.7
Travel Time (s)	9.6	9.5						4.3				16.8
Confl. Peds. (#/hr)	142	86						123				95
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	0%	0%	0%	2%	3%	0%	0%	0%	0%	0%	1%
Adj. Flow (vph)	105	379	63	80	367	90	53	28	13	104	14	133
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	547	0	0	537	0	0	94	0	104	147	0
Sign Control	Free	Free						Stop				Stop
Intersection Summary												
Area Type:	Other											
Control Type: Unsignalized												
Intersection Capacity Utilization	81.8%											
Analysis Period (min)	15											
	ICU Level of Service D											

HCM Unsignalized Intersection Capacity Analysis
4: Robinson Street & Clark Avenue

5234-5278 Ferry Street, Niagara Falls TIS
Total Saturday (5-Year Improved)

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔		↔		
Traffic Volume (veh/h)	97	349	58	74	338	83	49	26	12	96	13	122
Future Volume (Veh/h)	97	349	58	74	338	83	49	26	12	96	13	122
Sign Control	Free	Free		Free	Free		Stop	Stop		Stop	Stop	
Grade	0%	0%		0%	0%		0%	0%		0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	105	379	63	80	367	90	53	28	13	104	14	133
Pedestrians	123			95				86		142		
Lane Width (m)	3.6	3.6		3.6				3.6		3.6		
Walking Speed (m/s)	1.2	1.2		1.2				1.2		1.2		
Percent Blockage	10			8				7		12		
Right turn flare (veh)												
Median type	None			None								
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	599			528			1542	1466	592	1456	1452	677
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	599			528			1542	1466	592	1456	1452	677
IC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
IC, 2 stage (s)												
IF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	88			92			0	67	97	0	84	63
dM capacity (veh/h)	858			974			32	85	436	48	87	360
Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2							
Volume Total	547	537	94	104	147							
Volume Left	105	80	53	104	0							
Volume Right	63	90	13	0	133							
CSH	858	974	47	48	277							
Volume to Capacity	0.12	0.08	1.99	2.17	0.53							
Queue Length 95th (m)	3.1	2.0	71.6	80.0	21.6							
Control Delay (s)	3.2	2.2	649.2	722.9	31.8							
Lane LOS	A	A	F	F	D							
Approach Delay (s)	3.2	2.2	649.2	318.2								
Approach LOS	F	F										
Intersection Summary												
Average Delay	100.6											
Intersection Capacity Utilization	81.8%											
Analysis Period (min)	15											
	ICU Level of Service D											

	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group						
Lane Configurations	W		P		P	↑
Traffic Volume (vph)	1	11	346	5	159	268
Future Volume (vph)	1	11	346	5	159	268
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0	0.0	0.0	0.0	15.0	
Storage Lanes	1	0	0	0	1	
Taper Length (m)	7.5				7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.875		0.998			
Flt Protected	0.996				0.950	
Satd. Flow (prot)	1495	0	1680	0	1630	1716
Flt Permitted	0.996				0.950	
Satd. Flow (perm)	1495	0	1680	0	1630	1716
Link Speed (k/h)	50		50		50	50
Link Distance (m)	42.4		61.6		52.1	3.8
Travel Time (s)	3.1		4.4			
Confl. Peds. (#/hr)				317	317	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	4%	2%	2%	2%
Adj. Flow (vph)	1	12	376	5	173	291
Shared Lane Traffic (%)						
Lane Group Flow (vph)	13	0	381	0	173	291
Sign Control	Stop		Free		Free	
Intersection Summary						
Area Type:	Other					
Control Type: Unsignalized						
Intersection Capacity Utilization	43.1%					
Analysis Period (min)	15					
	ICU Level of Service A					

	WBL	WBR	NBT	NBR	SBL	SBT
Movement						
Lane Configurations	W		P		P	↑
Traffic Volume (veh/h)	1	11	346	5	159	268
Future Volume (Veh/h)	1	11	346	5	159	268
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	12	376	5	173	291
Pedestrians	317					
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	26					
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (m)						52
pK, platoon unblocked						
VC, conflicting volume	1332	696			698	
VC1, stage 1 conf vol						
VC2, stage 2 conf vol						
VCu, unblocked vol	1332	696			698	
IC, single (s)	6.4	6.2			4.1	
IC, 2 stage (s)						
pQ queue free %	3.5	3.3			2.2	
IF (s)		99	96		74	
dM capacity (veh/h)	92	325			661	
Direction, Lane #	WB 1	NB 1	SB 1	SB 2		
Volume Total	13	381	173	291		
Volume Left	1	0	173	0		
Volume Right	12	5	0	0		
cSH	272	1700	661	1700		
Volume to Capacity	0.05	0.22	0.26	0.17		
Queue Length 95th (m)	1.1	0.0	7.8	0.0		
Control Delay (s)	18.9	0.0	12.4	0.0		
Lane LOS	C		B			
Approach Delay (s)	18.9	0.0	4.6			
Approach LOS	C					
Intersection Summary						
Average Delay	2.8					
Intersection Capacity Utilization	43.1%					
Analysis Period (min)	15					
	ICU Level of Service A					

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	23	134	217	26	25	244
Future Volume (vph)	23	134	217	26	25	244
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Fit	0.885		0.986			
Flt Protected	0.993					0.995
Satd. Flow (prot)	1508	0	1663	0	0	1707
Flt Permitted	0.993					0.995
Satd. Flow (perm)	1508	0	1663	0	0	1707
Link Speed (k/h)	50		50			50
Link Distance (m)	33.2		232.7			61.6
Travel Time (s)	2.4		16.8			4.4
Conf. Peds. (#/hr)				317	317	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	4%	2%	2%	2%
Adj. Flow (vph)	25	146	236	28	27	265
Shared Lane Traffic (%)						
Lane Group Flow (vph)	171	0	264	0	0	292
Sign Control	Stop		Free			Free
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	50.9%					
Analysis Period (min)	15					
ICU Level of Service A						

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W		P			A
Traffic Volume (veh/h)	23	134	217	26	25	244
Future Volume (Veh/h)	23	134	217	26	25	244
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	25	146	236	28	27	265
Pedestrians						
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	26					
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (m)						114
pX, platoon unblocked						
VC, conflicting volume	886	567			581	
VC1, stage 1 conf vol						
VC2, stage 2 conf vol						
VCu, unblocked vol	886	567			581	
IC, single (s)	6.4	6.2			4.1	
IC, 2 stage (s)						
IF (s)	3.5	3.3			2.2	
p0 queue free %	89	62			96	
dM capacity (veh/h)	223	385			731	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	171	264	292			
Volume Left	25	0	27			
Volume Right	146	28	0			
cSH	348	1700	731			
Volume to Capacity	0.49	0.16	0.04			
Queue Length 95th (m)	19.5	0.0	0.9			
Control Delay (s)	24.9	0.0	1.3			
Lane LOS	C		A			
Approach Delay (s)	24.9	0.0	1.3			
Approach LOS	C					
Intersection Summary						
Average Delay			6.4			
Intersection Capacity Utilization			50.9%			A
Analysis Period (min)			15			