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Willoughby Drive Development

TRANSPORTATION IMPACT STUDY

Lawrence Avenue Group Limited

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Document Control

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Issue	Date	Description
1	October 11, 2024	Final Report

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1 Introduction

Tatham Engineering Limited was retained by Lawrence Avenue Group Limited to conduct a transportation impact study in support of the proposed residential development to be located southeast of the intersection of Willoughby Drive and Cattell Drive in the community of Chippawa, City of Niagara Falls. The location of the development site is illustrated in Figure 1.

1.1 REPORT PURPOSE

The purpose of this report is to present the findings of the transportation impact study and address the requirements of the City with respect to the potential transportation impacts of the development on the area road network. In particular, the following will be discussed:

- the operations of the road system through the study area prior to the proposed development;
- the growth in the traffic volumes not otherwise attributed to the development (i.e. from overall growth in the area and/or other developments);
- the number of new trips the proposed development is likely to generate;
- the operations of the study area road system upon completion of the development; and
- the resulting impacts and need for mitigating measures (if required) to ensure acceptable overall road operations.

A Terms of Reference encompassing the above scope was submitted to the City for review prior to commencement of this study. The accepted Terms of Reference is provided in Appendix A.

1.2 REPORT STRUCTURE

The report is structured as follows:

- Chapter 1: introduction and study purpose;
- Chapter 2: existing conditions, detailing the road system and corresponding traffic operations;
- Chapter 3: future conditions, prior to the completion of the proposed development (referred to as future background conditions), the expected growth in traffic levels and the resulting operating conditions;
- Chapter 4: proposed development and associated details including land use, access, and traffic volumes;
- Chapter 5: future conditions, with completion of the proposed development (referred to as future total conditions); and
- Chapter 6: summary of the report and key findings.

2 Existing Conditions

This chapter will detail the current road network, traffic volumes, and traffic operations under existing conditions.

2.1 ROAD NETWORK

The road network to be addressed by this study consists of the following roads and intersections:

Roads

- Cattell Drive
- Weinbrenner Road
- Willoughby Drive

Intersections

- Willoughby Drive & Main Street
- Willoughby Drive & Cattell Drive
- Willoughby Drive & Weinbrenner Road

Aerial mapping and imagery of the road system is provided in Figure 2 with additional details provided below.

2.1.1 Roads

A brief description of each study area road is provided below. The functional classification of each road has been based on that presented in *Schedule C – Roads* of the *City of Niagara Falls Official Plan*[1]. Each road is under the jurisdiction of the City of Niagara Falls, has an urban cross-section (curb and gutter with sidewalk) and a posted speed limit of 50 km/h within the study area.

Cattell Drive

Cattell Drive is an east-west collector road. The road provides 1 lane of travel per direction with an approximate 8.5 metre paved driving platform. Cattell Drive has a sidewalk on the south side of the road.

Weinbrenner Road

Weinbrenner Road is an east-west road providing one lane of travel per direction. West of Willoughby Drive, Weinbrenner Road is classified as a collector road, providing a paved platform approximately 10.5 metres wide, on-street curbside bike lanes and a sidewalk on each side of the road. East of Willoughby Drive, the road is classified as a local road providing a paved platform approximately 8.5 metres wide and a sidewalk only on the south side of the road.

[1] *City of Niagara Falls Official Plan*. City of Niagara Falls. Consolidated to August 1, 2023.

Willoughby Drive

Willoughby Drive is a north-south collector road providing one lane of travel per direction. The road platform varies in width between approximately 8.5 metres and 11.0 metres within the study area. A sidewalk is present on both sides of the road between Weinbrenner Road and Cattell Drive and between Aberdeen Street and Main Street, and on only one side of the road elsewhere within the study area. Curbside bike lanes of varying widths are provided intermittently within the study area between Weinbrenner Road and Aberdeen Street.

2.1.2 Intersections

The configuration of each existing study area intersection is detailed below.

Willoughby Drive & Main Street

The intersection of Willoughby Drive with Main Street is a 4-leg signalized intersection. The west (Main Street) and north (Portage Road) approaches consist of a left turn lane and shared through-right turn lane. The south approach (Willoughby Drive) consists of a shared left-through-right turn lane, whereas the east approach (Main Street) consists of a right turn lane and a shared left-through lane.

Willoughby Drive & Cattell Drive

The intersection of Willoughby Drive with Cattell Drive is a 3-leg, unsignalized intersection operating under all-way stop control. Each approach consists of a single shared lane for all movements (i.e. through-right, left-through of left-right).

Willoughby Drive & Weinbrenner Road

The intersection of Willoughby Drive with Weinbrenner Road is a 4-leg, unsignalized intersection with Weinbrenner Road operating under stop control (i.e. 2-way stop control). Each approach consists of a shared left-through-right turn lane.

2.2 TRANSIT NETWORK

Niagara Region Transit (NRT) currently operates 3 transit routes within the study area – Route 106, Route 206 and Route 112. Each route provides connections to other routes operated by NRT. A map illustrating the existing transit stops and routing through the study area is provided in Figure 3.

Route 106 & Route 206

Route 106 provides service between Chippawa (via a loop of Willoughby Drive, Main Street, Welland Street and Gunning Drive) and the Main Street Hub near Ferry Street. It operates Monday

to Saturday between 6:00 AM and 6:00 PM with a service frequency of 30 minutes during AM and PM peaks (7:00 AM to 9:00 AM, 2:00 PM to 6:00 PM) and 60 minutes outside of these periods.

Route 206 service the same route as Route 106 at a service frequency of every 30 minutes but operates during evenings (Monday to Saturday 6:00 PM to 11:00 PM) and on Sundays/holidays (7:00 AM to 8:30 PM)

The nearest stop to the proposed development is located at the intersection of Gunning Drive and Willoughby Drive, approximately 75 metres north of Cattell Drive.

Route 112

Route 112 provides service between Chippawa (via a clockwise loop of Willoughby Drive, Weinbrenner Road, Welland Street and Gunning Road) and the Canadian Drive Hub at the Niagara Square shopping mall. The route operates Monday to Saturday from 6:45 AM to 5:15 PM with a service frequency of every 60 minutes. Evening/Sunday/holiday service is not provided.

The nearest stops to the proposed development are located along Willoughby Drive at Gunning Drive, Caronpost Road and 8729 Willoughby Drive.

2.3 TRAFFIC VOLUMES

To determine existing traffic volumes, traffic counts were conducted at the intersections of Willoughby Drive with Cattell Drive and Willoughby Drive with Weinbrenner Road on Thursday, September 28, 2023, from 7:00 to 10:00 and 15:00 to 18:00.

Traffic counts were not completed at the intersection of Willoughby Drive with Main Street as ongoing road work along Main Street required closures and lane restrictions which were deemed disruptive to typical traffic patterns. To represent existing volumes at this intersection (and as dictated in the approved study Terms of Reference), City staff supplied traffic counts completed on Thursday, October 11, 2018, from 8:00 to 10:00 and 15:00 to 18:00.

All counts were projected forward to a 2024 base year assuming 2% growth per annum (see Section 3.3.1).

The resulting 2024 peak hour traffic volumes are illustrated in Figure 4, with detailed count sheets provided in Appendix B.

2.4 TRAFFIC OPERATIONS

The assessment of existing traffic operations provides the baseline from which the future traffic operations (both without and with the subject development) can be assessed.

The capacity, and hence operations, of a road system is effectively dictated by its intersections. The analysis is based on the 2024 traffic volumes, the existing intersection configurations and

control, and procedures outlined in the *2000 Highway Capacity Manual*[2] (using Synchro v.11 software). For each intersection, the analysis considers:

- the average delay (measured in seconds);
- level of service (LOS); and
- volume to capacity (v/c) for each movement if signalized or, if unsignalized (such as those operating under stop control), for critical movements only.

With respect to the noted metrics:

- level of service 'A' corresponds to the best operating condition with minimal delays whereas level of service 'F' corresponds to poor operations resulting from high intersection delays (additional details regarding Level of Service definitions are provided in Appendix C); and
- a v/c ratio of less than 1.0 indicates the intersection movement is operating at less than capacity while v/c of 1.0 indicates capacity has been reached.

Key assessment parameters, such as intersection peak hour factors and heavy vehicle percentages, were calculated based on the traffic count data and input into the Synchro model. Existing signal timing at the intersection of Willoughby Drive and Main Street was determined based on field observations. An ideal saturated flow rate of 1,750 has been used in accordance with City requirements.

A summary of the analysis is provided in Table 1 with detailed worksheets available in Appendix D. In accordance with City requirements, any metrics satisfying the following criteria have been bolded in the summary table:

- signalized intersections
  - through or shared movements, or intersection overall where $v/c \geq 0.85$; and
  - exclusive turning movements where $v/c \geq 0.95$.
- unsignalized intersections
  - any individual movement where level of service exceeds LOS E.

As indicated, each intersection currently provides good operations overall (LOS C or better) with low to average delays. Critical movements at each intersection provide good operations (LOS C or better) with reserve capacity remaining ($v/c \leq 0.72$).

[2] *Highway Capacity Manual.* Transportation Research Board, Washington DC, 2000.

Table 1: Intersection Operations – 2024

INTERSECTION, MOVEMENTS & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			Delay	LOS	V/C	Delay	LOS	V/C
Willoughby Drive/ Portage Road & Main Street	EB L	signal	22	C	0.60	21	C	0.53
	EB TR	signal	17	B	0.10	18	B	0.16
	WB LT	signal	25	C	0.09	26	C	0.18
	WB R	signal	24	C	0.03	25	C	0.03
	NB LTR	signal	25	C	0.66	27	C	0.68
	SB L	signal	13	B	0.18	13	B	0.34
	SB TR	signal	14	B	0.44	19	C	0.71
	overall	signal	19	B	0.67	21	C	0.74
Willoughby Drive & Cattell Drive	WB LR	stop	9	A	0.30	9	A	0.16
	NB TR	stop	9	A	0.24	9	A	0.18
	SB LT	stop	11	B	0.36	10	A	0.35
Willoughby Drive & Weinbrenner Road	EB LTR	stop	11	A	0.10	12	B	0.08
	WB LTR	stop	9	A	0.04	11	B	0.02

2.5 ROAD NETWORK IMPROVEMENTS

Based on the operational assessment under existing conditions, no improvements are required to accommodate the existing traffic volumes on the study area road network.

3 Future Background Conditions

This chapter will describe the road network and background traffic volumes expected for the years 2027, 2030 and 2035. The 2027 and 2030 horizon years have been adopted to reflect partial build-out and full build-out of the subject development, respectively, whereas the 2035 horizon will address longer-term impacts of the proposed development (5 years beyond build-out).

3.1 ROAD NETWORK

City staff indicated that Willoughby Drive is planned to be reconstructed between Weinbrenner Road and Main Street starting in 2024. The reconstruction will see the addition of continuous bike lanes on each side of the road but will otherwise retain the existing 2-lane cross-section within the study area.

No other improvements to the study area road network were identified, thus the road network as described in Section 2.1 has been maintained.

3.2 TRANSIT NETWORK

No new or expanded transit services were identified within the study area to be implemented within the study horizons.

3.3 TRAFFIC VOLUMES

Background traffic volumes expected for the 2027, 2030 and 2035 horizon years have been determined based on the existing traffic volumes, background growth rates, and consideration for other development-specific traffic volumes.

3.3.1 Background Growth

City staff indicated the following growth rates to apply to the study area roads:

- 2% per annum up to 2030; and
- 1% per annum beyond 2030.

3.3.2 Background Development

City staff indicated that the nearby development known as *Queensway Chippawa East Subdivision* (Chippawa East) was to be considered in this study. Chippawa East is a large residential development bounded by Sodom Road, Willick Road, Willoughby Drive and the Patrick Cummings Memorial Sports Complex, as illustrated in Figure 5. The development will contain 926 residential units with the following unit breakdown:

- 449 single detached units;
- 48 semi-detached units;
- 183 townhouse units; and
- 246 condominium units.

Trip assignment for this development to the adjacent road network was supplied by the City and is illustrated in Figure 6, reflective of full build-out of the development (excerpts supplied by the City are provided in Appendix E).

The development site is currently undergoing servicing works with no units completed as of September 2023 (the time of the traffic counts). For the purposes of this study, Chippawa East is assumed to be 60% built-out by the 2027 horizon and fully built-out by the 2030 horizon.

3.3.3 Background Traffic Volumes

The resulting 2027, 2030 and 2035 background traffic volumes are illustrated in Figure 7 through Figure 9 and are reflective of the 2024 volumes plus the noted background growth rate and additional volumes generated by the Chippawa East development.

3.4 TRAFFIC OPERATIONS

The study area intersections were reviewed at each future horizon year considering the future background traffic volumes. Signal timing was optimized at each horizon to ensure that peak performance is maintained. The results of the operational analyses are summarized below with detailed worksheets provided in Appendix F.

2027 Horizon

Results of the operational analysis under 2027 background conditions are summarized in Table 2. As indicated, each intersection is expected to provide good overall operations (LOS C or better), with critical movements at each intersection expected to provide acceptable operations (LOS D or better) with reserve capacity remaining ($v/c \leq 0.86$).

Table 2: Intersection Operations – 2027 Background

INTERSECTION, MOVEMENTS & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			Delay	LOS	V/C	Delay	LOS	V/C
Willoughby Drive/ Portage Road & Main Street	EB L	signal	40	D	0.86	47	D	0.84
	EB TR	signal	18	B	0.11	25	C	0.22
	WB LT	signal	26	C	0.10	34	C	0.24
	WB R	signal	25	C	0.03	32	C	0.03
	NB LTR	signal	29	C	0.77	24	C	0.68
	SB L	signal	13	B	0.20	12	B	0.33
	SB TR	signal	15	B	0.51	22	C	0.81
	overall	signal	26	C	**0.85**	26	C	**0.92**
Willoughby Drive & Cattell Drive	WB LR	stop	11	B	0.32	9	A	0.17
	NB TR	stop	12	B	0.41	9	A	0.26
	SB LT	stop	12	B	0.43	12	B	0.46
Willoughby Drive & Weinbrenner Road	EB LTR	stop	12	B	0.12	14	B	0.12
	WB LTR	stop	11	B	0.05	11	B	0.02

2030 Horizon

Results of the operational analysis under 2030 background conditions are summarized in Table 3. As indicated, due to increasing traffic volumes, the eastbound left turn at the intersection of Willoughby Drive with Main Street/Portage Street is expected to operate over capacity with high delays (LOS F) during the weekday PM peak period. This is due largely to the increased volumes travelling between Main Street and Portage Street (eastbound to northbound and southbound to westbound). Therefore, improvements are necessary to accommodate the anticipated volumes. It is noted that the intersection is located in a constrained urban environment – development is immediately adjacent to the existing right-of-way at 3 of 4 corners of the intersection. Recognizing this, options which result in minimal property impacts were explored initially. It was found that implementation of a dedicated southbound right turn lane on Portage Road (implemented by removing some of the on-street parking currently present) resulted in notable improvements in performance at the intersection, the results of which are summarized in Table 4. No further improvements were necessary to ensure acceptable performance of the intersection through the 2030 horizon.

Table 3: Intersection Operations – 2030 Background

INTERSECTION, MOVEMENTS & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			Delay	LOS	V/C	Delay	LOS	V/C
Willoughby Drive/ Portage Road & Main Street	EB L	signal	51	D	0.92	**186**	**F**	**1.25**
	EB TR	signal	19	B	0.12	37	D	0.33
	WB LT	signal	30	C	0.12	45	D	0.31
	WB R	signal	30	C	0.03	43	D	0.03
	NB LTR	signal	34	C	0.83	23	C	0.71
	SB L	signal	14	B	0.23	9	A	0.32
	SB TR	signal	17	C	0.58	22	C	0.84
	overall	signal	32	C	**0.91**	48	D	**1.02**
Willoughby Drive & Cattell Drive	WB LR	stop	11	B	0.34	9	A	0.18
	NB TR	stop	14	B	0.53	9	A	0.32
	SB LT	stop	13	B	0.48	13	B	0.55
Willoughby Drive & Weinbrenner Road	EB LTR	stop	12	B	0.14	17	C	0.14
	WB LTR	stop	12	B	0.06	12	B	0.02

Table 4: Intersection Operations – 2030 Background + Improvements

INTERSECTION, MOVEMENTS & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			Delay	LOS	V/C	Delay	LOS	V/C
Willoughby Drive/ Portage Road & Main Street	EB L	signal	30	C	0.79	34	C	0.78
	EB TR	signal	18	B	0.11	21	C	0.21
	WB LT	signal	33	C	0.12	33	C	0.25
	WB R	signal	32	C	0.03	32	C	0.03
	NB LTR	signal	41	D	**0.86**	38	D	0.85
	SB L	signal	17	B	0.25	15	B	0.44
	SB T	signal	16	B	0.31	15	B	0.48
	SB R	signal	16	B	0.20	15	B	0.49
	overall	signal	28	C	0.83	25	C	0.84

With respect to the remaining intersections within the study area, each is expected to continue to provide good operations (LOS B or better) on critical movements through the 2030 horizon under background conditions.

2035 Horizon

Results of the operational analysis under 2035 background conditions are summarized in Table 5. As indicated, the intersection of Willoughby Drive with Main Street/Portage Street is to provide acceptable overall operations (LOS D or better) with critical movements expected to provide acceptable operations (LOS E or better) with limited reserve capacity remaining (v/c ≤ 0.98) during the weekday AM peak period.

With respect to the remaining study area intersections, each is expected to provide good operations (LOS C or better) on critical movements through the 2035 horizon.

Table 5: Intersection Operations – 2035 Background

INTERSECTION, MOVEMENTS & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			Delay	LOS	V/C	Delay	LOS	V/C
Willoughby Drive/ Portage Road & Main Street	EB L	signal	34	C	0.82	41	D	0.83
	EB TR	signal	18	B	0.12	22	C	0.22
	WB LT	signal	33	C	0.13	34	C	0.26
	WB R	signal	32	C	0.03	32	C	0.03
	NB LTR	signal	43	D	**0.88**	37	D	**0.86**
	SB L	signal	17	B	0.27	15	B	0.46
	SB T	signal	16	B	0.32	15	B	0.49
	SB R	signal	16	B	0.22	16	B	0.51
	overall	signal	29	C	**0.85**	26	C	**0.86**
Willoughby Drive & Cattell Drive	WB LR	stop	11	B	0.34	9	A	0.18
	NB TR	stop	14	B	0.54	9	A	0.33
	SB LT	stop	14	B	0.49	14	B	0.56
Willoughby Drive & Weinbrenner Road	EB LTR	stop	13	B	0.15	17	C	0.16
	WB LTR	stop	12	B	0.06	13	B	0.03

3.5 ROAD NETWORK IMPROVEMENTS

Based on the results of the operational analyses under future background conditions, it was found that a southbound right turn lane on Portage Road at its intersection with Wiloughby Drive and Main Street was necessary by the 2030 horizon to accommodate the anticipated traffic volumes. No other improvements were required to accommodate the future background traffic volumes through the 2035 horizon.

4 Proposed Development

This chapter will provide additional details with respect to the proposed development, including its location, land use, anticipated trip generation and the assignment of such to the adjacent road network.

4.1 LOCATION

As illustrated in Figure 1, the subject development is located southeast of the intersection of Willoughby Drive with Cattell Drive and consists of several undeveloped properties totaling approximately 11 ha of land. The site is generally bounded by Cattell Drive to the north, existing developments to the east, Weinbrenner Road to the south and Willoughby Drive to the west. The site is bisected by a 26 metre right-of-way allocated to Caronpost Road, a municipal collector road which is currently unbuilt.

4.2 LAND USE & PHASING

The proposed development contains a total of 978 residential units consisting of:

- 318 townhouse units (of various types); and
- 660 apartment units.

As indicated on the site plan (provided in Figure 10), the development is divided into 3 planned development phases. Development details for each phase are summarized in Table 6.

Table 6: Development Statistics

LAND USE	UNIT COUNT			DEVELOPMENT TOTAL
	Phase 1	Phase 2	Phase 3	
front-loaded townhouses	32 units	44 units	15 units	91 units
back-to-back townhouses	15	33	33	81
stacked townhouses	100	22	24	146
Total Townhouses	**147**	**99**	**72**	**318**
apartments	0	220	440	660
Total Towns + Apartments	**147**	**319**	**512**	**978**

For the purposes of this study, it is assumed that Phases 1 and 2 will be completed by the 2027 horizon, corresponding to completion of approximately 50% of the residential units. Phase 3 is assumed to be completed by the 2030 horizon.

4.3 SITE ACCESS

Access to the subject site will be provided by several connections to the adjacent road network:

- East Access – new municipal road connecting to Cattell Drive, located approximately 110 metres east (centreline to centreline) of Willoughby Drive (assumed to be constructed as part of Phase 1 development);
- West Access – private road connecting to Cattell Drive, located approximately 65 metres east of Willoughby Drive (assumed to be constructed as part of Phase 1 development);
- Willoughby Access – new municipal road connecting to Willoughby Drive, located immediately north of 8646 Willoughby Drive approximately 180 metres south of Cattell Drive (assumed to be constructed as part of Phase 1 development); and
- Caronpost Road – eastward extension of the planned municipal road, which does not currently extend beyond its intersection with Willoughby Drive (assumed to be constructed as part of Phase 3 development).

Each proposed municipal access road will be designed according to the relevant municipal standards for a local road, whereas the West Access will be designed according to the relevant municipal standards for an apartment/multi-unit residential access. Other key elements are detailed below, reviewed in context of the recommendations published in the Transportation Association of Canada (TAC) *Geometric Design Guide for Canadian Roads*[3].

4.3.1 Intersection Spacing

Municipal Roads

On a collector road, TAC recommends a minimum intersection spacing of 60 metres between adjacent intersections (measured from the near curb of each road); on a local road, a minimum spacing of 40 metres is recommended between adjacent T-intersections. Based on the proposed location of each new municipal intersection (as illustrated in Figure 10), the intersection spacing is a minimum of approximately 75 metres, thus is considered appropriate.

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

Private Accesses

With respect to private driveways/accesses, TAC recommends a minimum spacing of 3 metres between accesses and 5 metres between adjacent intersections, measured between the end of the curb returns of each access (i.e. not including the corner radii). With regard to the West Access, the separation from the East Access (approximately 38 metres, including corner radii) is appropriate, while the separation from the adjacent commercial driveway to the west (less than 3 metres in total) is insufficient. TAC notes that this increases the size of conflict zones around the accesses and can lead to driver confusion over which driveway serves each adjacent development. To address this, mitigation measures could be employed to provide better delineation between the accesses and reduce conflicts, such as:

- movement restrictions at the West Access, such as no left turns, right-out only, etc.; and
- provision of a barrier between the accesses (such as a curb) extending to the edge of the site.

4.3.2 Intersection Offset

TAC recommends that, where opposing legs at a 4-leg intersection are offset, the offset (measured centreline to centreline) is either less than 1.5 metres or greater than 40 metres. This ensures that the size of the intersection conflict area is either minimized, or the opposing legs function as consecutive T-intersections rather than a 4-leg intersection.

The East Access is offset from Parkway Drive by approximately 17 metres, which TAC identifies as undesirable. In context of the proposed development, however, this offset is not considered problematic. Parkway Drive serves a local function within a residential subdivision and does not provide a convenient route for through traffic. As such, the road is expected to facilitate a low volume of local traffic only. Furthermore, given the residential nature of both the subject site and the area served by Parkway Drive, minimal cross-traffic is expected between Parkway Drive and the East Access. In consideration of this, the noted offset is considered acceptable.

4.3.3 Sight Lines

Sight lines at each proposed access were reviewed to ensure that sufficient sight distance is provided along the external road. The assessment has considered both minimum stopping and intersection sight distance, as defined below and dictated per TAC standards:

- the minimum stopping sight distance provides sufficient distance for an approaching motorist to observe a stationary hazard in the road and bring their vehicle to a complete stop prior to the hazard; and

- the intersection sight distance allows a vehicle to enter a main road from a side street (or site access) and attain the appropriate operating speed without significantly impacting the operating speed of an approaching vehicle.

The minimum stopping and intersection sight distance requirements for a design speed of 60 km/h (posted speed + 10 km/h on lower-speed roads) is summarized in Table 7 whereas the available sight lines at each access are summarized in Table 8.

Table 7: Sight Distance Requirements

POSTED SPEED	DESIGN SPEED	STOPPING SIGHT DISTANCE	INTERSECTION SIGHT DISTANCE	
			Left Turn	Right Turn
50 km/h	60 km/h	85 m	130 m	110 m

As indicated, the available sight lines at each proposed access on Willoughby Drive exceed the noted TAC requirements. The sight lines on Cattell Drive at the East Access and west access do not satisfy the required intersection sight distance to/from the west, however, this is not considered problematic. As defined, the intersection sight distance is intended to reduce disruptions to through traffic flow; by design, disruptions to through traffic are expected on a local road given the high degree of direct land access permitted. Additionally, vehicles approaching from the west will be doing so at a reduced speed, having just completed a turning manoeuvre from Willoughby Drive. In consideration of such, the available sight distance at the East Access and West Access is considered sufficient.

Table 8: Available Sight Distance

ACCESS LOCATION	DESIGN SPEED	AVAILABLE SIGHT DISTANCE TO/FROM			
		North	South	East	West
East Access	60 km/h	-	-	>200 m	100m[1]
West Access	60 km/h	-	-	>200 m	60m[1]
Willoughby Access	60 km/h	170 m[2]	>250 m	-	-
Caronpost Road	60 km/h	>250 m	>250 m	-	-

[1]sight distance ends at intersection at Willoughby Drive
[2]sight distance to intersection at Cattell Drive. Actual sight lines exceed 250 m

4.4 SITE CIRCULATION

Internal circulation within the development will be provided by a series of municipal and private roads providing access to each of the proposed townhouse units and apartment buildings. Each municipal road will be a minimum of 8.5 metres in width, whereas each private road will be a minimum of 7.0 metres in width. This provides sufficient space for two-way traffic operations and satisfies the requirements of the Ontario Building Code for a fire route.

4.5 SITE PARKING

Parking rates for land uses within the proposed development, as per *City of Niagara Falls By-law No. 79-200*[4], are summarized in Table 9 as is the required parking supply. As indicated, the site is required to supply a total of 1,242 parking spaces. As per the site plan, a total of 1,281 parking spaces will be supplied, thus exceeding the requirements.

Table 9: Parking Requirements

LAND USE	PARKING SUPPLY RATE	SIZE	REQUIRED SUPPLY
on-street townhouse dwelling	1.0 space per unit	318 units	318 spaces
other multi-unit dwellings	1.4 spaces per unit	660 units	924 spaces
Total		**978 units**	**1,242 spaces**

4.6 SITE TRIPS

4.6.1 Trip Generation

The number of vehicle trips to be generated by the proposed development for the weekday AM and weekday PM peak hours has been determined based on type of use, development size and trip generation rates per the *ITE Trip Generation Manual, 11th Edition*. Based on the proposed development, trip rates for the following land-uses have been applied (corresponding trip rates are provided in Table 10):

- *single family attached* (ITE land-use code 215);
- *multifamily housing – low-rise* (ITE 220); and
- *multifamily housing – mid rise* (ITE 221).

[4] *City of Niagara Falls By-law No. 79-200*. City of Niagara Falls, as amended.

Table 10: Trip Rates

LAND USE	VARIABLE	WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
		In	Out	Total	In	Out	Total
single family attached (215)	per unit	0.15	0.33	0.48	0.32	0.25	0.57
multifamily housing low-rise (220)	per unit	0.10	0.30	0.40	0.32	0.19	0.51
multifamily housing mid-rise (221)	per unit	0.09	0.28	0.37	0.24	0.15	0.39

The noted trip rates were applied to each type of unit within the proposed development based on the land-use definitions provided by ITE (definitions are provided in Appendix G), as follows:

- ITE 215 – front loaded and back-to-back townhouses (i.e. traditional towns);
- ITE 220 – stacked townhouses; and
- ITE 221 – apartment blocks.

Table 11: Trip Estimates

PHASE & LAND USE		SIZE	WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			In	Out	Total	In	Out	Total
1	traditional towns (ITE 215)	132	20	44	64	43	32	75
	stacked towns (ITE 220)	15	1	5	6	5	3	8
	Phase 1 Total	**147 units**	**21**	**49**	**70**	**48**	**35**	**83**
2	traditional towns (ITE 215)	66	10	22	32	21	16	37
	stacked towns (ITE 220)	33	3	10	13	11	6	17
	apartments (ITE 221)	220	18	63	81	52	34	86
	Phase 2 Total	**319 units**	**31**	**95**	**126**	**84**	**56**	**140**
3	traditional towns (ITE 215)	39	6	13	19	13	9	22
	stacked towns (ITE 220)	33	3	10	13	11	6	17
	apartments (ITE 221)	440	38	125	163	105	67	172
	Phase 3 Total	**512 units**	**47**	**148**	**195**	**129**	**82**	**211**
Development Total		**978 units**	**99**	**292**	**391**	**261**	**173**	**434**

The corresponding trip estimates for the proposed development are summarized in Table 11. As indicated, upon completion the development is expected to generate 391 new trips during the weekday AM peak hour and 434 new trips during the weekday PM peak hour.

4.6.2 Trip Distribution

The distribution of new trips generated by the subject site has been developed based on trip distribution data provided in the 2016 *Transportation Tomorrow Survey* (TTS). The TTS is a comprehensive travel survey conducted every 5 years throughout the Greater Golden Horseshoe which can be used to identify travel patterns between different *zones*. The 2021 survey was delayed by the COVID-19 pandemic with data not yet available. Therefore, the 2016 survey represents the most recent survey data available.

The subject development is located within *2006 GTA Zone 6252*, which covers an area bounded by Willoughby Drive, the Niagara River, Welland River, and Streets Creek (i.e. northern and eastern Chippawa). Trips travelling to/from Zone 6252 were obtained, with the resulting distribution of trips as follows:

- to/from the north – 71%;
- to/from the south – 4%; and
- to/from the west – 25%.

It is noted that no trips were realized to/from the east as the Niagara River prevents travel in that direction.

Considering the distribution detailed above and expected travel routes to/from the subject site, the following overall distribution was applied to the site-generated trips:

- to/from the north (via Willoughby Drive/Portage Road) – 70%;
- to/from the south (Sodom Road via Weinbrenner Road) – 5%; and
- to/from the west (Lyons Creek Road via Weinbrenner Road) – 25%.

4.6.3 Trip Assignment

Trips were assigned to the adjacent road network considering the overall distribution determined above and considering the available site access points at each future horizon; recall that Caronpost Road is assumed to be constructed as part of Phase 3 development, thus will not be usable as an access for Phase 1 and Phase 2 traffic at the 2027 horizon. As such, two trip assignment exercises were undertaken, as follows:

- Figure 11 – interim assignment at the 2027 horizon, reflective of completion of Phase 1 and 2 development with site access only through the Cattell and Willoughby access points; and

- Figure 12 – final assignment at the 2030 horizon, reflective of the complete development state of the site with full use of all access points.

Trips have only been assigned through a single access on Cattell Drive as such reflects a more conservative assessment of the site operations; should a single access provide acceptable operations when handling all traffic on Cattell Drive, so too will two accesses sharing the traffic between them. Detailed assignment figures for each phase at each horizon are provided in Appendix H.

5 Future Total Conditions

This chapter will address the resulting impacts of the proposed development on the adjacent road system. The following areas will be addressed:

- operations of the key intersections; and
- potential improvements to the study area road network, if necessary.

5.1 TRAFFIC VOLUMES

To assess the impacts of the proposed development, the site-generated traffic volumes were added to the background traffic volumes at each horizon year. The resulting total traffic volumes are illustrated in Figure 13 through Figure 15.

5.2 TRAFFIC OPERATIONS

A final analysis of the study area intersections was conducted at each horizon year to determine the impact of the proposed development. Results of the operational analyses are summarized below with detailed operations worksheets provided in Appendix I.

2027 Horizon

Results of the operational analysis under 2027 total conditions are summarized in Table 12. As indicated, the intersection of Willoughby Drive with Main Street and Portage Road will provide acceptable overall operations (LOS D or better) through the 2027 horizon. The intersection is noted to operate at capacity (v/c = 1.00) during the weekday PM peak hour, through individual movements are noted to provide acceptable operations (LOS E or better) with reserve capacity remaining (v/c ≤ 0.90).

With respect to the remaining intersections and future site access points, each is expected to provide good operations (LOS C or better) on critical movements through the 2027 horizon.

Compared to background conditions at the 2027 horizon, delays on each critical movement throughout the study area have increased by 0 to 18 seconds, with increases in utilized capacity of 0% to 22% under total conditions.

Table 12: Intersection Operations – 2027 Total

INTERSECTION, MOVEMENTS & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			Delay	LOS	V/C	Delay	LOS	V/C
Willoughby Drive/ Portage Road & Main Street	EB L	signal	39	D	0.83	54	D	0.87
	EB TR	signal	19	B	0.11	26	C	0.23
	WB LT	signal	30	C	0.11	34	C	0.24
	WB R	signal	32	C	0.03	33	C	0.03
	NB LTR	signal	36	D	**0.85**	42	D	**0.90**
	SB L	signal	14	B	0.22	12	B	0.35
	SB TR	signal	16	B	0.54	31	C	**0.91**
	overall	signal	28	C	**0.88**	34	C	**1.00**
Willoughby Drive & Cattell Drive	WB LR	stop	14	B	0.46	9	A	0.23
	NB TR	stop	17	C	0.61	11	B	0.36
	SB LT	stop	16	C	0.56	16	C	0.62
Cattell Drive & East Access	NB LR	stop	11	B	0.07	11	B	0.05
Willoughby Drive & Willoughby Access	WB LR	stop	11	B	0.15	12	B	0.11
Willoughby Drive & Caronpost Road	WB LR	stop	-	-	-	-	-	-
Willoughby Drive & Weinbrenner Road	EB LTR	stop	12	B	0.16	17	C	0.25
	WB LTR	stop	11	B	0.05	11	B	0.02

2030 Horizon

Results of the operational analysis under 2030 total conditions are summarized in Table 13. As indicated, the intersection of Willoughby Drive with Main Street and Portage Road is expected to experience poor operations (LOS F) and operate over capacity during the weekday AM peak period. As noted previously, the intersection is located within a constrained urban environment, thus limited opportunities for geometric improvements are possible. As such, alternative methods for improving operations were explored. Ultimately, it was found that disabling the protected southbound left turn phase during the AM peak period (thus providing increased northbound green time) resulted in a significant performance improvement, as summarized in Table 14. With this timing change in place (and the southbound right turn lane implemented as

identified under background conditions), the intersection will provide good overall operations (LOS C) with some reserve capacity remaining (overall v/c ≤ 0.97). Individual movements at the intersection are expected to provide acceptable operations (LOS E or better) with moderate delays and reserve capacity remaining (v/c ≤ 0.90), except for the northbound movement during the weekday PM peak hour, which is expected to operate at capacity.

Table 13: Intersection Operations – 2030 Total

INTERSECTION, MOVEMENTS & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			Delay	LOS	V/C	Delay	LOS	V/C
Willoughby Drive/ Portage Road & Main Street	EB L	signal	**84**	**F**	**1.03**	47	D	0.86
	EB TR	signal	22	B	0.13	24	C	0.22
	WB LT	signal	33	C	0.13	34	C	0.25
	WB R	signal	33	C	0.03	33	C	0.03
	NB LTR	signal	73	E	**1.04**	62	E	**1.00**
	SB L	signal	14	B	0.27	15	B	0.47
	SB T	signal	13	B	0.35	18	B	0.67
	SB R	signal	11	B	0.21	15	B	0.52
	overall	signal	51	D	**1.04**	33	C	**0.97**
Willoughby Drive & Cattell Drive	WB LR	stop	16	C	0.50	11	B	0.25
	NB TR	stop	**70**	**F**	**1.04**	14	B	0.53
	SB LT	stop	23	C	0.72	31	D	0.86
Cattell Drive & East Access	NB LR	stop	11	B	0.05	11	B	0.04
Willoughby Drive & Willoughby Access	WB LR	stop	13	B	0.14	14	B	0.10
Willoughby Drive & Caronpost Road	WB LR	stop	14	B	0.32	14	B	0.23
Willoughby Drive & Weinbrenner Road	EB LTR	stop	14	B	0.22	26	D	0.47
	WB LTR	stop	12	B	0.06	12	B	0.02

Table 14: Intersection Operations – 2030 Total + Timing Changes

INTERSECTION, MOVEMENTS & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			Delay	LOS	V/C	Delay	LOS	V/C
Willoughby Drive/ Portage Road & Main Street	EB L	signal	47	D	0.90	47	D	0.86
	EB TR	signal	19	B	0.12	24	C	0.22
	WB LT	signal	33	C	0.13	34	C	0.25
	WB R	signal	33	C	0.03	33	C	0.03
	NB LTR	signal	32	C	**0.88**	62	E	**1.00**
	SB L	signal	15	B	0.29	15	B	0.47
	SB T	signal	15	B	0.38	18	B	0.67
	SB R	signal	14	B	0.23	15	B	0.52
	overall	signal	29	C	**0.93**	33	C	**0.97**

With respect to the remaining intersections and site access points, each is expected to provide acceptable operations (LOS D or better) with low to average delays and reserve capacity remaining (v/c ≤ 0.86) on each critical movement. One exception is noted – the northbound movement at the intersection of Willoughby Drive with Cattell Drive provides poor operations (LOS F) and operates over capacity during the weekday AM peak period. This is not considered problematic as this is a symptom of the low peak hour factor realized in the 2023 counts at the intersection (0.66 during the AM peak). As traffic through the intersection increases, it tends to become more evenly distributed across the peak hour, resulting in a higher peak hour factor. As demonstrated at the same intersection, a much high peak hour factor during the weekday PM peak (0.92 in the PM compared to 0.66 in the AM) results in better operations despite higher traffic volumes passing through the intersection in the afternoon.

Compared to background conditions at the 2030 horizon, delays on each critical movement throughout the study area have increased by 0 to 24 seconds (excluding the nearly 60 second increase at Willoughby/Cattell, which may not ultimately be realized), with increases in utilized capacity of 0% to 35% under total conditions.

2035 Horizon

Results of the operational analysis under 2030 total conditions are summarized in Table 15. As indicated, the intersection of Willoughby Drive with Main Street and Portage Road will continue to provide good overall operations (LOS C) with some reserve capacity remaining (v/c ≤ 0.95),

whereas each individual movement will provide acceptable operations (LOS E or better) with reserve capacity remaining.

Table 15: Intersection Operations – 2035 Total

INTERSECTION, MOVEMENTS & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			Delay	LOS	V/C	Delay	LOS	V/C
Willoughby Drive/ Portage Road & Main Street	EB L	signal	48	D	0.90	65	E	0.93
	EB TR	signal	19	B	0.12	28	C	0.26
	WB LT	signal	34	B	0.13	40	D	0.30
	WB R	signal	33	B	0.03	38	D	0.03
	NB LTR	signal	37	D	**0.91**	43	D	**0.91**
	SB L	signal	16	B	0.32	14	B	0.46
	SB T	signal	16	B	0.39	17	B	0.65
	SB R	signal	14	B	0.24	15	B	0.52
	overall	signal	31	C	**0.95**	31	C	**0.95**
Willoughby Drive & Cattell Drive	WB LR	stop	16	C	0.50	11	B	0.25
	NB TR	stop	**75**	**F**	**1.06**	14	B	0.54
	SB LT	stop	24	C	0.74	32	D	0.87
Cattell Drive & East Access	NB LR	stop	11	B	0.05	11	B	0.04
Willoughby Drive & Willoughby Access	WB LR	stop	13	B	0.14	14	B	0.10
Willoughby Drive & Caronpost Road	WB LR	stop	14	B	0.33	14	B	0.24
Willoughby Drive & Weinbrenner Road	EB LTR	stop	14	B	0.24	28	D	0.50
	WB LTR	stop	12	B	0.06	13	B	0.03

The remaining intersections and site access points are expected to continue to provide acceptable operations (LOS D or better) with low to average delays and reserve capacity remaining (v/c ≤ 0.86) on each critical movement. As noted under 2030 total conditions, the northbound movement at the intersection of Willoughby Drive with Cattell Drive provides poor operations (LOS F) and operates over capacity during the weekday AM peak period owing to the low peak hour factor realized during the AM peak.

Compared to background conditions at the 2035 horizon, delays on each critical movement throughout the study area have increased by 0 to 24 seconds (excluding the 60 second increase at Willoughby/Cattell, which may not ultimately be realized), with increases in utilized capacity of 0% to 34% under total conditions.

5.3 ROAD NETWORK IMPROVEMENTS

5.3.1 Intersection Operations

Based on the results of the operational analyses under future total conditions, no further intersection improvements were found to be necessary to accommodate the future total traffic volumes. That said, at the intersection of Willoughby Drive with Main Street and Portage Road, disabling of the protected southbound left turn signal phase during the weekday AM peak hour was found to be necessary by the 2030 horizon to ensure that acceptable intersection operations were maintained.

5.3.2 Turn Lane Requirements

Notwithstanding the otherwise acceptable operations realized in the above operational assessment, the need for exclusive turn lanes at each future site access point (i.e. East Access, Willoughby Access, and Caronpost Road) were reviewed based on MTO warrants. The review is based on the following:

- MTO guidelines[5] for auxiliary turn lanes at unsignalized intersections;
- a design speed of 60 km/h (reflective of the recommended 50 km/h speed limit); and
- the 2035 total traffic volumes (reflecting the highest reviewed volumes on the road network).

Left Turn Lanes

In considering the need for an exclusive left turn lane, MTO warrants for auxiliary left turn lanes on 2-lane, undivided highways were considered. The warrants are based on design speed, advancing volume (i.e. traffic travelling in the same direction as the left-turning traffic), opposing volume (i.e. traffic travelling in the opposite direction as the left-turning traffic) and percentage of left turns in the advancing volume. Recognizing that minimal left-turning (i.e. westbound) traffic is expected to travel to the site along Cattell Drive, the need for a left turn lane at the East Access has not been reviewed.

[5] *MTO Design Supplement for TAC Geometric Design Guide for Canadian Roads*. Ontario Ministry of Transportation Design Standards & Specifications Office, April 2020.

Completed left turn warrants are provided in Appendix J. As indicated, a southbound left turn lane with 15 metres of storage is warranted on Willoughby Drive at both the Willoughby Access and Caronpost Road to support the subject development.

Right Turn Lanes

With respect to right turn lanes, as per MTO standards, such are generally warranted where right turn volumes exceed 60 vehicles per hour (vph) and/or impede the operations of through traffic. Based on the 2035 volume projections, the following right-turning volumes are anticipated at each access:

- East Access – 14 to 32 vph;
- Willoughby Access – 8 to 20 vph; and
- Caronpost Road – 18 to 49 vph.

As indicated, right-turning volumes at each access point do not exceed the 60 vph threshold. As such, right turn lanes are not warranted to serve the proposed development.

6 Summary

This study has addressed the transportation impacts associated with the proposed residential development to be located at the southeast corner of the intersection of Willoughby Drive with Cattell Drive in the community of Chippawa, City of Niagara Falls.

Proposed Development

The proposed development will consist of a total of 978 residential units (318 townhouse units of various types and 660 apartment units), to be constructed in 3 phases. Upon completion of all phases, the development is expected to generate approximately 390 trips during the weekday AM peak hour and 435 trips during the weekday PM peak hour.

Transportation Impacts

In assessing the impact of the development on the study area road network, the key intersections were analyzed under existing (2024) and future (2027, 2030 and 2035) horizon periods.

Results of the operational analyses indicate that the study intersections currently provide good overall operations (LOS C or better) with critical movements providing good operations (LOS C or better) with low to average delays.

Under future background conditions, the intersection of Willoughby Drive with Main Street and Portage Road will provide good overall operations (LOS C) through the 2027 horizon with critical movements providing acceptable operations (LOS D or better) with low to moderate delays. This intersection will require implementation of a southbound right turn lane by the 2030 horizon to ensure that acceptable operational performance is maintained. With the addition of this lane, the intersection was found to provide good overall operations (LOS C) with critical movements providing acceptable operations (LOS D or better) with low to moderate delays through the 2035 horizon under background conditions. Under total conditions, disabling of the protected southbound left turn signal phase during the morning peak period (to provided increased green time to the northbound direction of travel) was necessary by the 2030 horizon to accommodate the additional site-generated traffic. No further improvements were necessary at this intersection to accommodate the proposed development.

With respect to the remaining intersections within the study area, each is expected to provide acceptable operations (LOS D or better) on each critical movement through the 2035 horizon, both with and without the subject development.

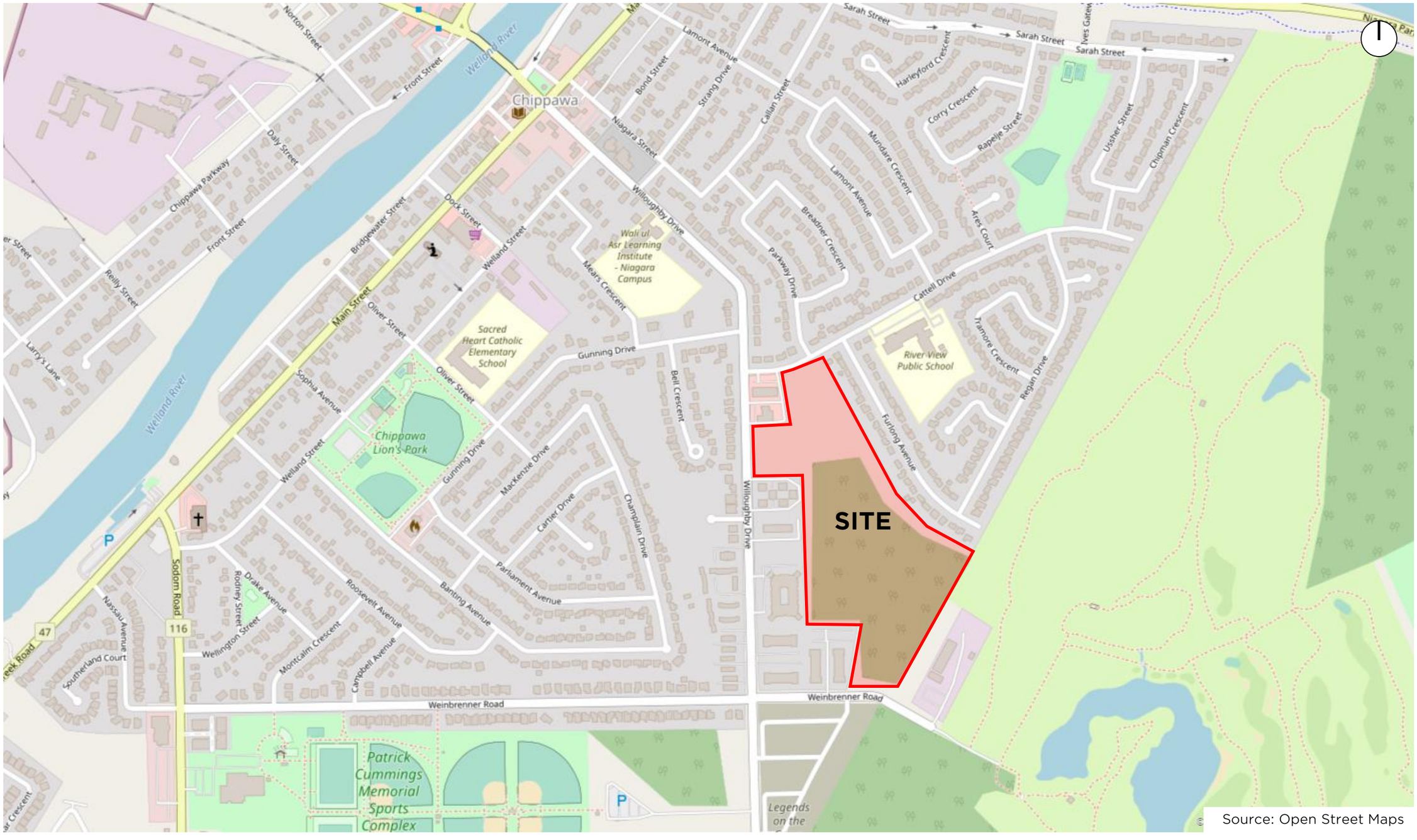
Each new site access point is expected to provide excellent operations (LOS B or better) through the 2035 horizon.

Access Review

The proposed site access points were reviewed in context of industry standards with respect to location, geometry, and available sight distance. Based on this review, each proposed municipal access point was found to be compliant with respect to separation, geometry and available sight distance. One private access point is proposed in close proximity to an existing access, thus mitigating measures were explored to reduce conflicts between the accesses.

Turn Lanes Requirements

The need for exclusive turn lanes on Willoughby Drive and Cattell Drive at the future site access points were reviewed in context of MTO warrants for auxiliary turn lanes at unsignalized intersections. Based on this review, a southbound left turn lane with 15 metres of storage was found to be warranted at both access points on Willoughby Drive. No other turn lanes were found to be warranted.



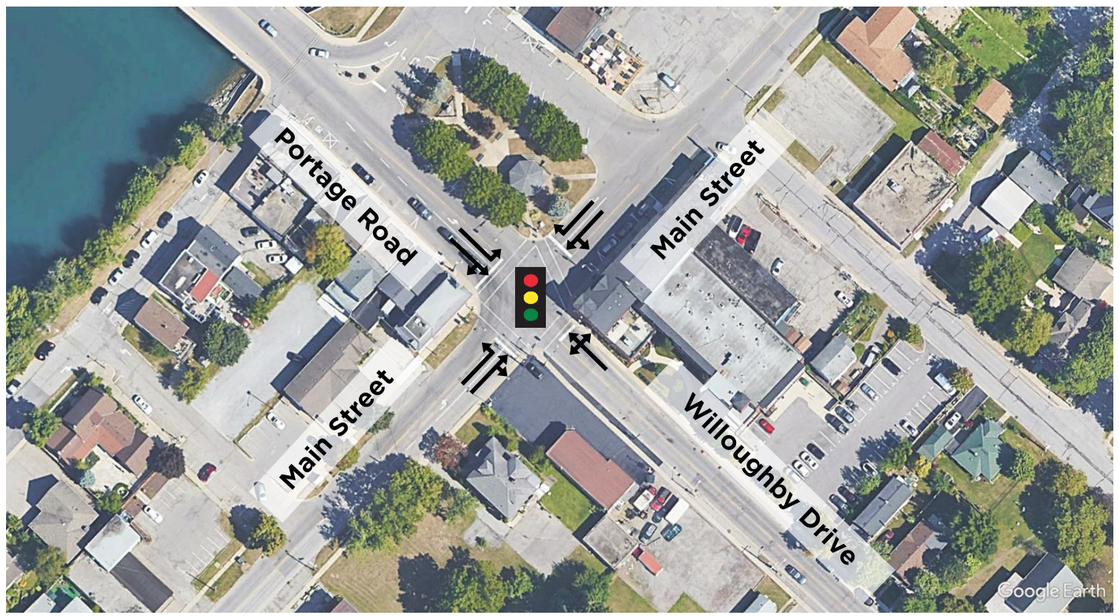
Source: Open Street Maps

WILLOUGHBY DRIVE DEVELOPMENT, TRANSPORTATION IMPACT STUDY

Figure 1: Site Location

WILLOUGHBY DRIVE DEVELOPMENT, TRANSPORTATION IMPACT STUDY

Figure 2A: Road Network



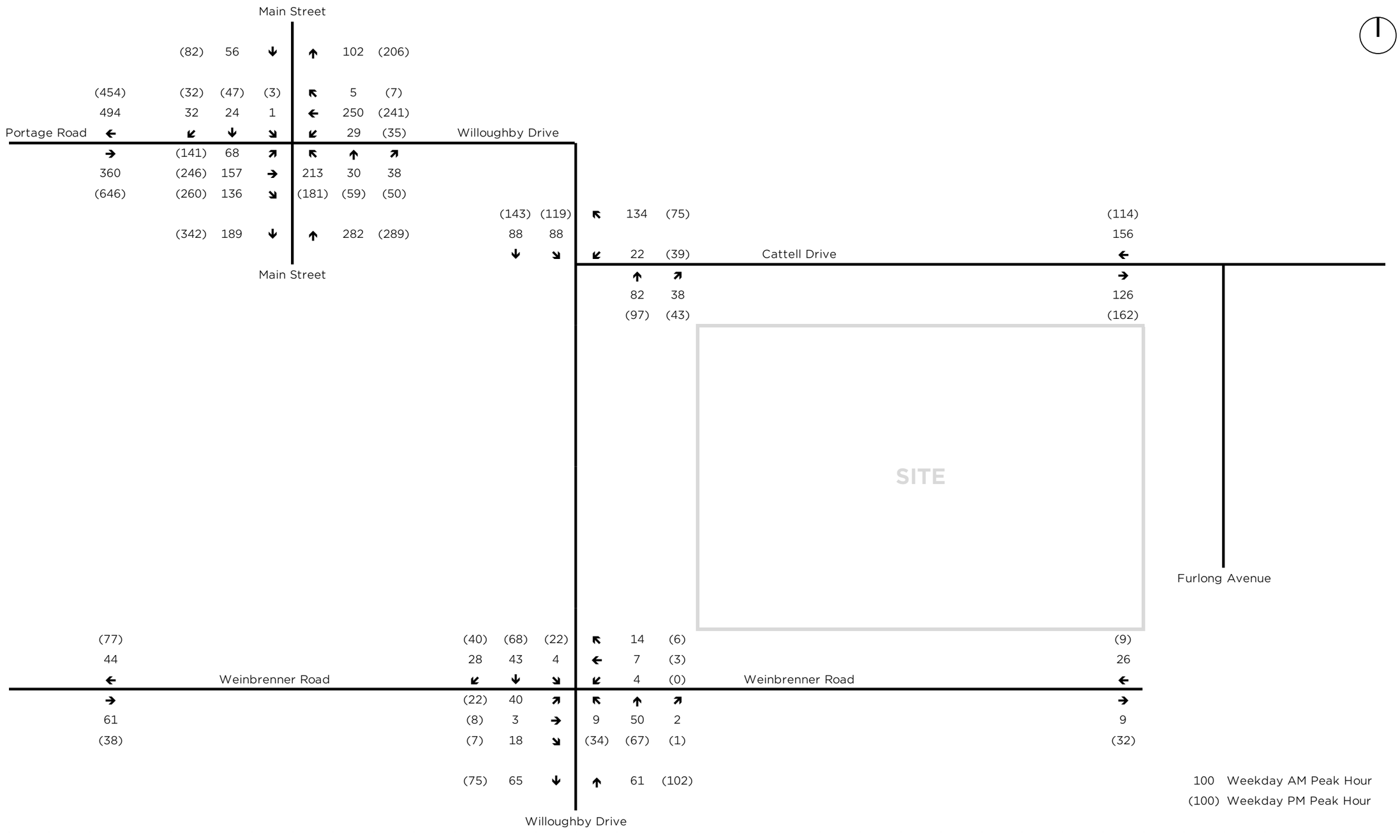
Intersection of Willoughby Drive and Portage Road with Main Street

Intersection of Willoughby Drive with Cattell Drive

Intersection of Willoughby Drive with Weinbrenner Road

WILLOUGHBY DRIVE DEVELOPMENT, TRANSPORTATION IMPACT STUDY

Figure 3: Transit Network – Existing



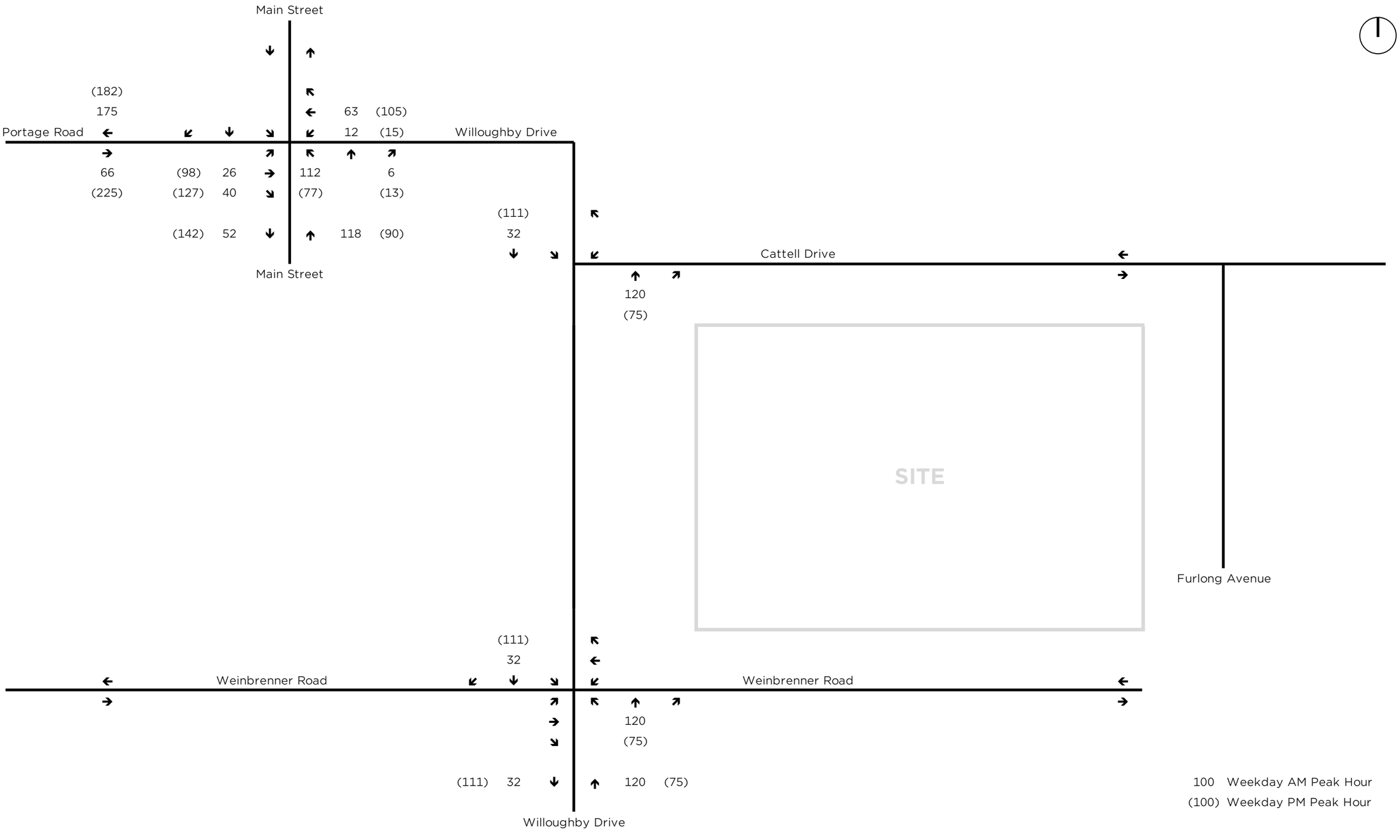
WILLOUGHBY DRIVE DEVELOPMENT, TRANSPORTATION IMPACT STUDY

Figure 4: Traffic Volumes – 2024

Source: Google Earth

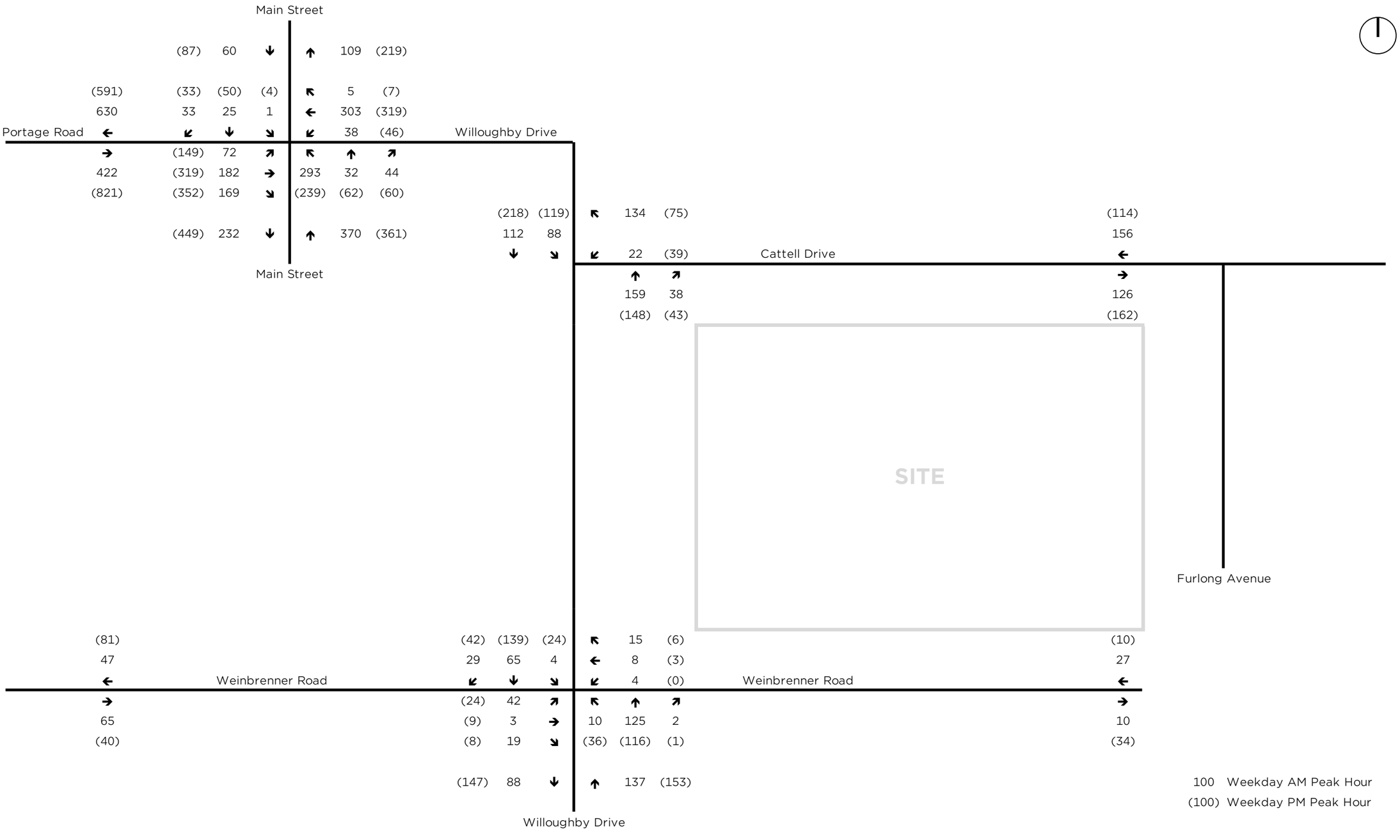
WILLOUGHBY DRIVE DEVELOPMENT, TRANSPORTATION IMPACT STUDY

Figure 5: Background Development



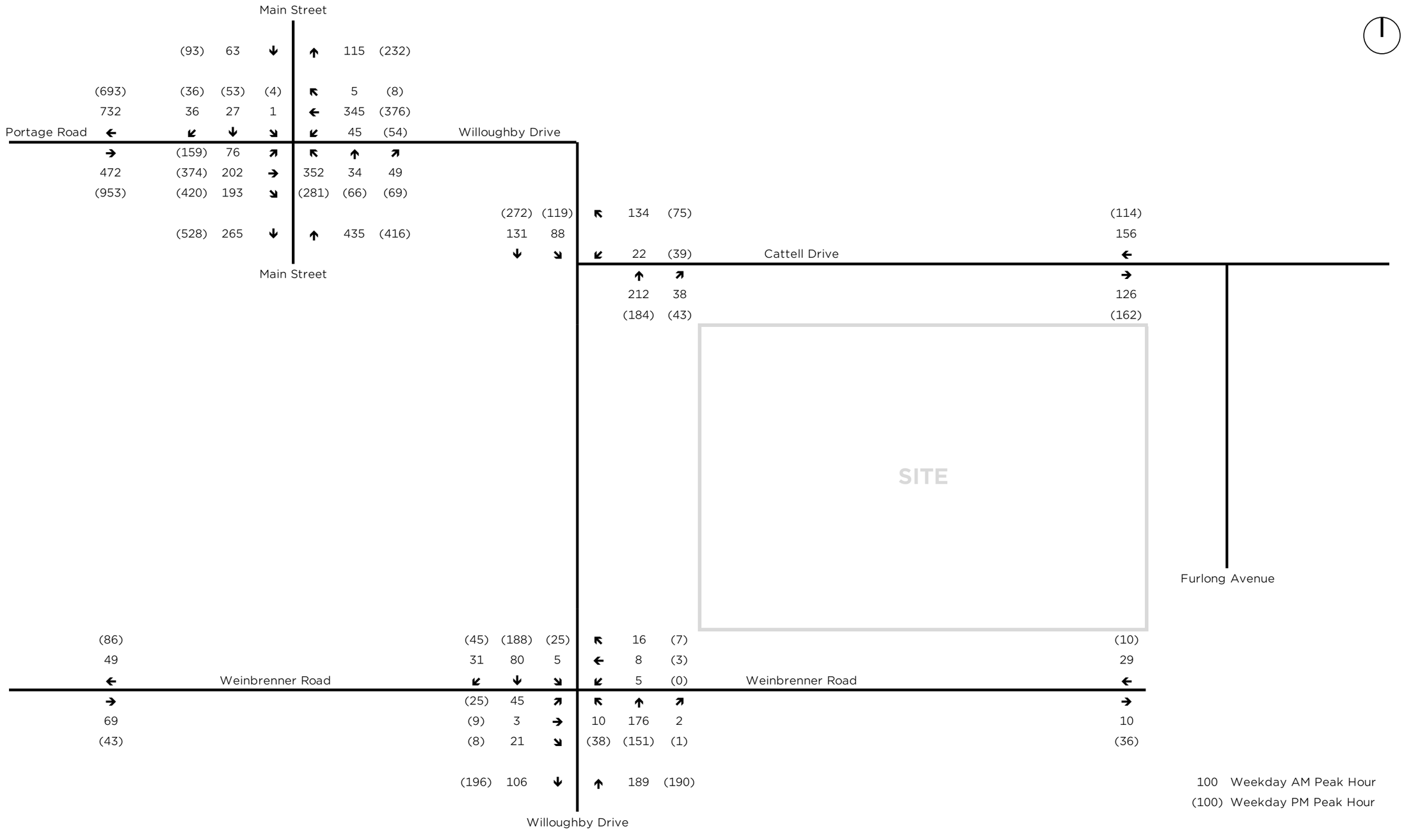
WILLOUGHBY DRIVE DEVELOPMENT, TRANSPORTATION IMPACT STUDY

Figure 6: Background Development Traffic – Chippawa East



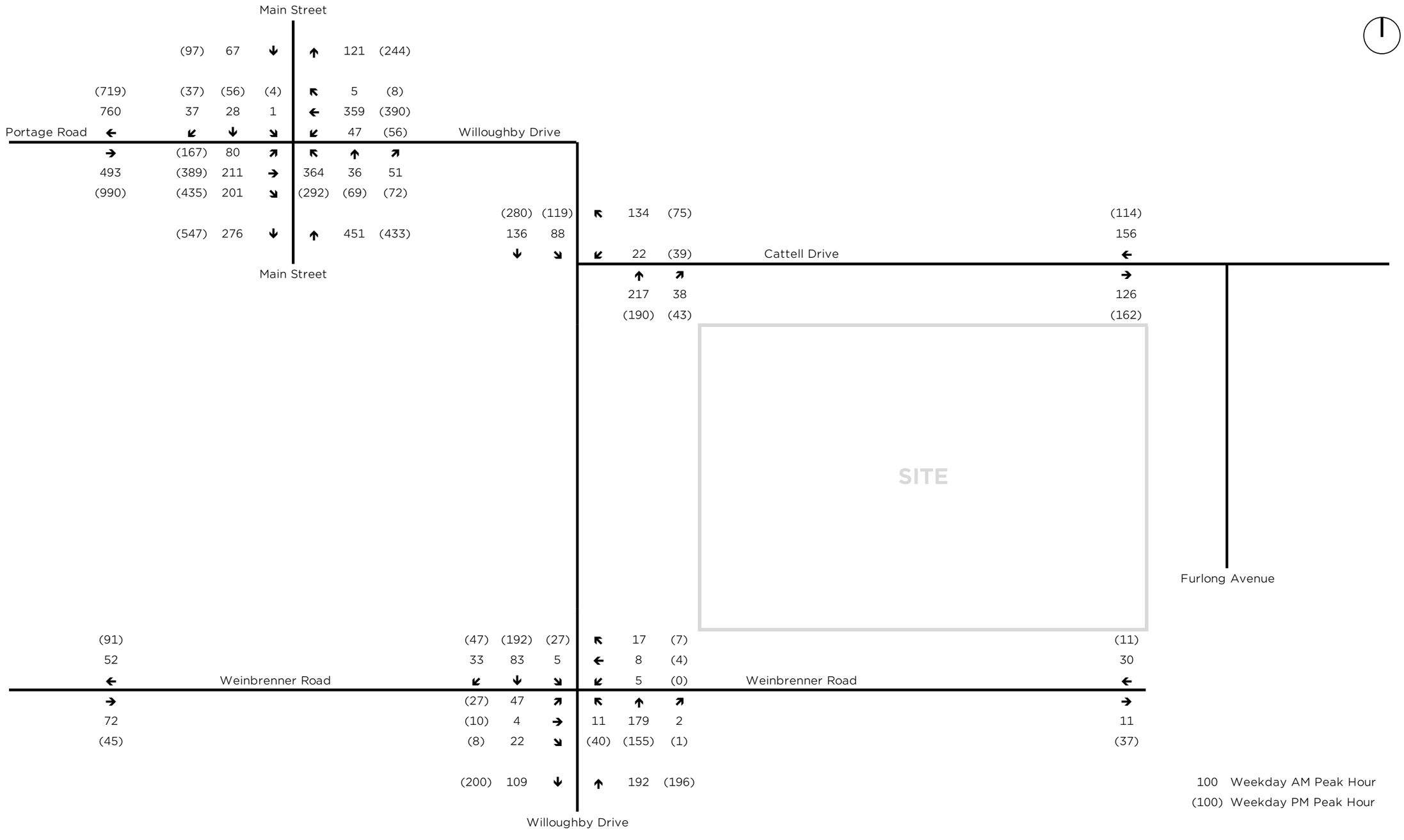
WILLOUGHBY DRIVE DEVELOPMENT, TRANSPORTATION IMPACT STUDY

Figure 7: Traffic Volumes – 2027 Background



WILLOUGHBY DRIVE DEVELOPMENT, TRANSPORTATION IMPACT STUDY

Figure 8: Traffic Volumes – 2030 Background



WILLOUGHBY DRIVE DEVELOPMENT, TRANSPORTATION IMPACT STUDY

Figure 9: Traffic Volumes – 2035 Background

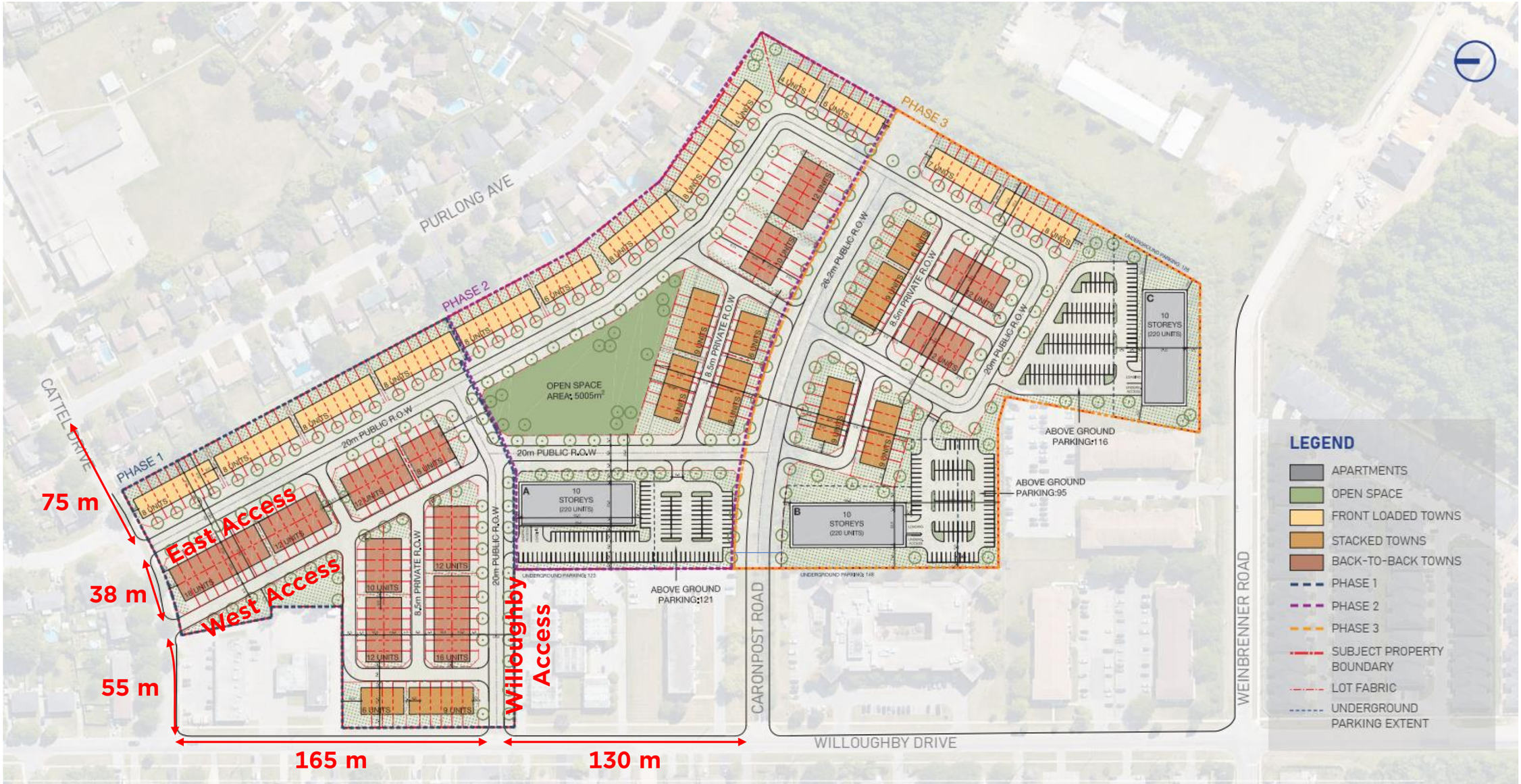
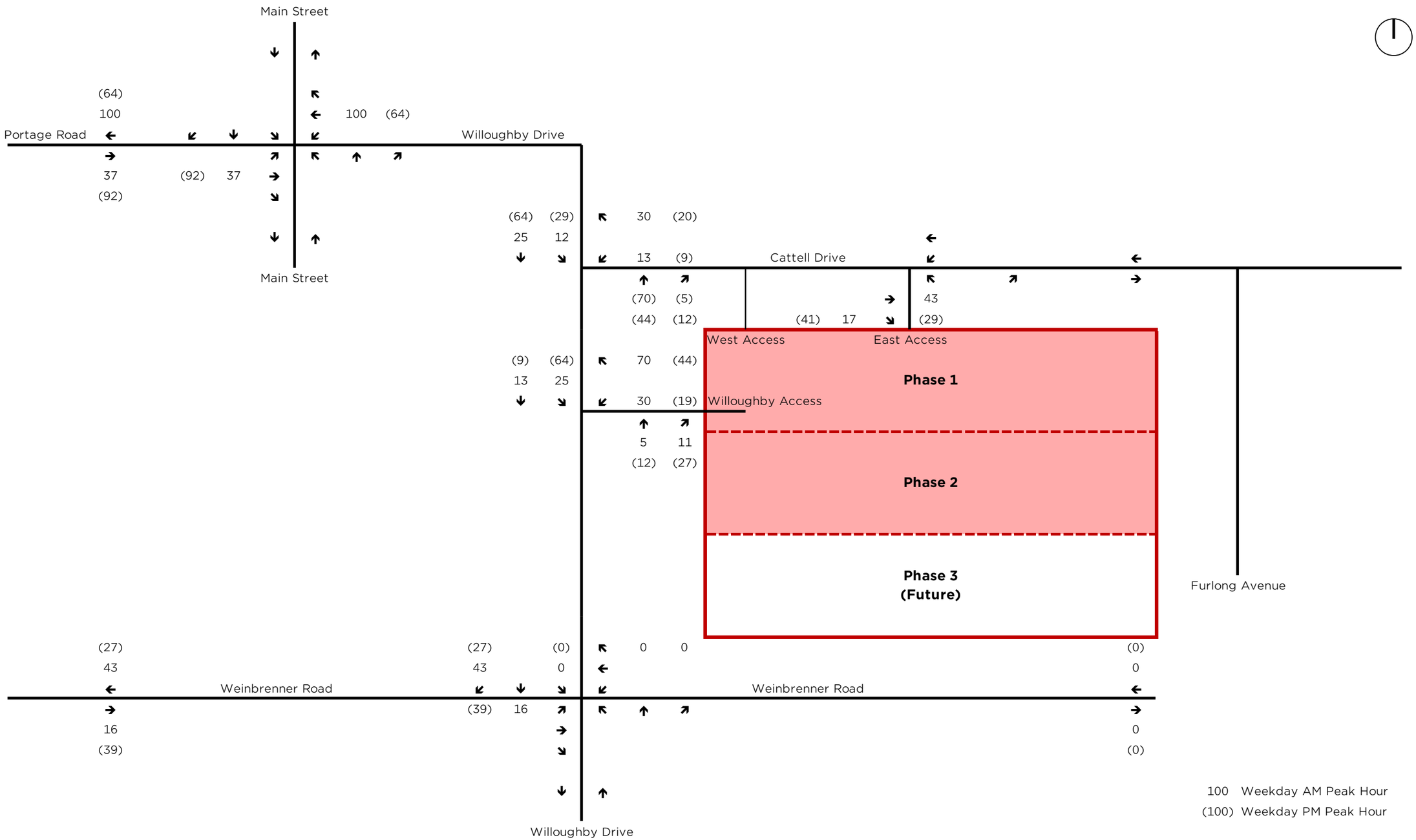
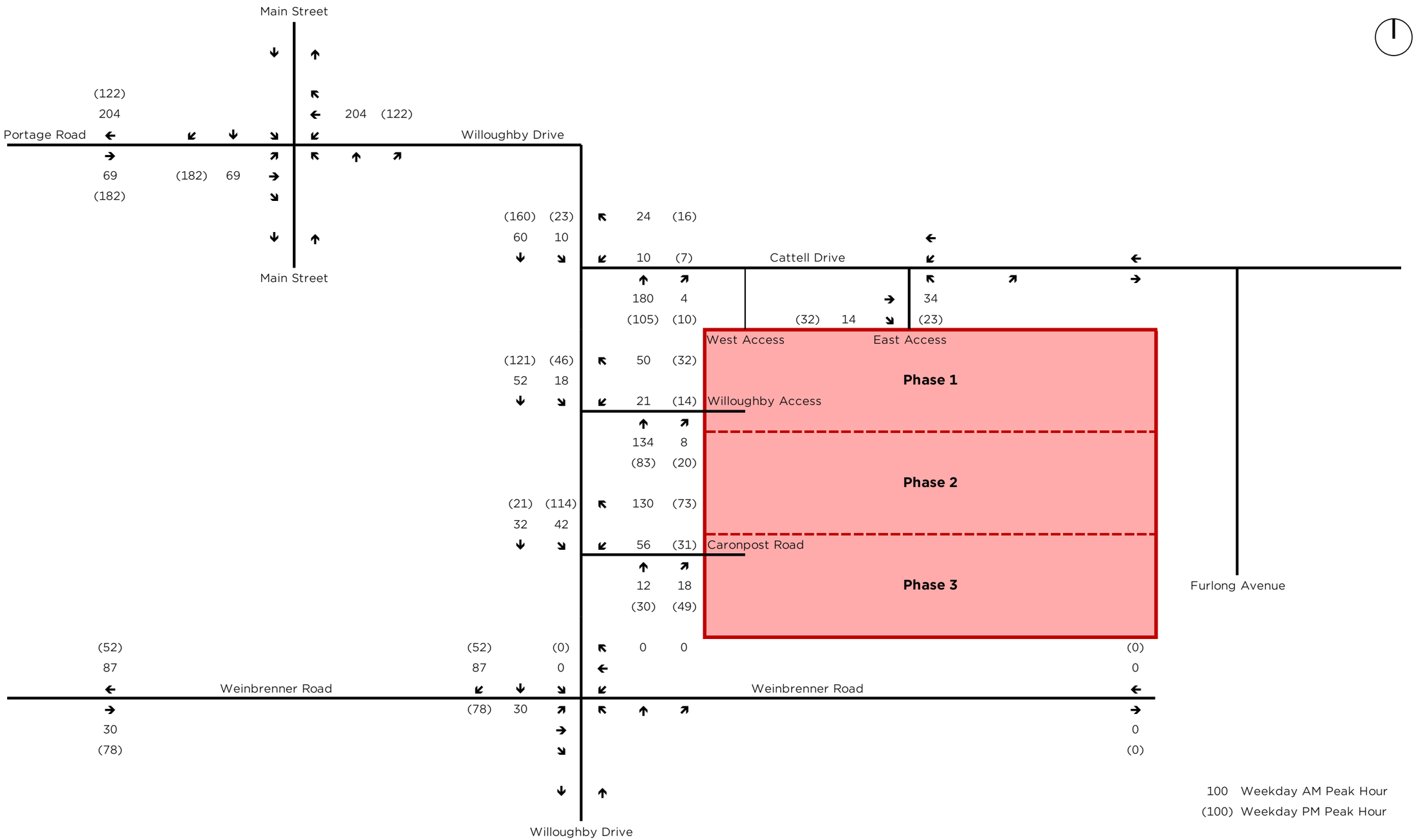


Figure 10: Site Plan



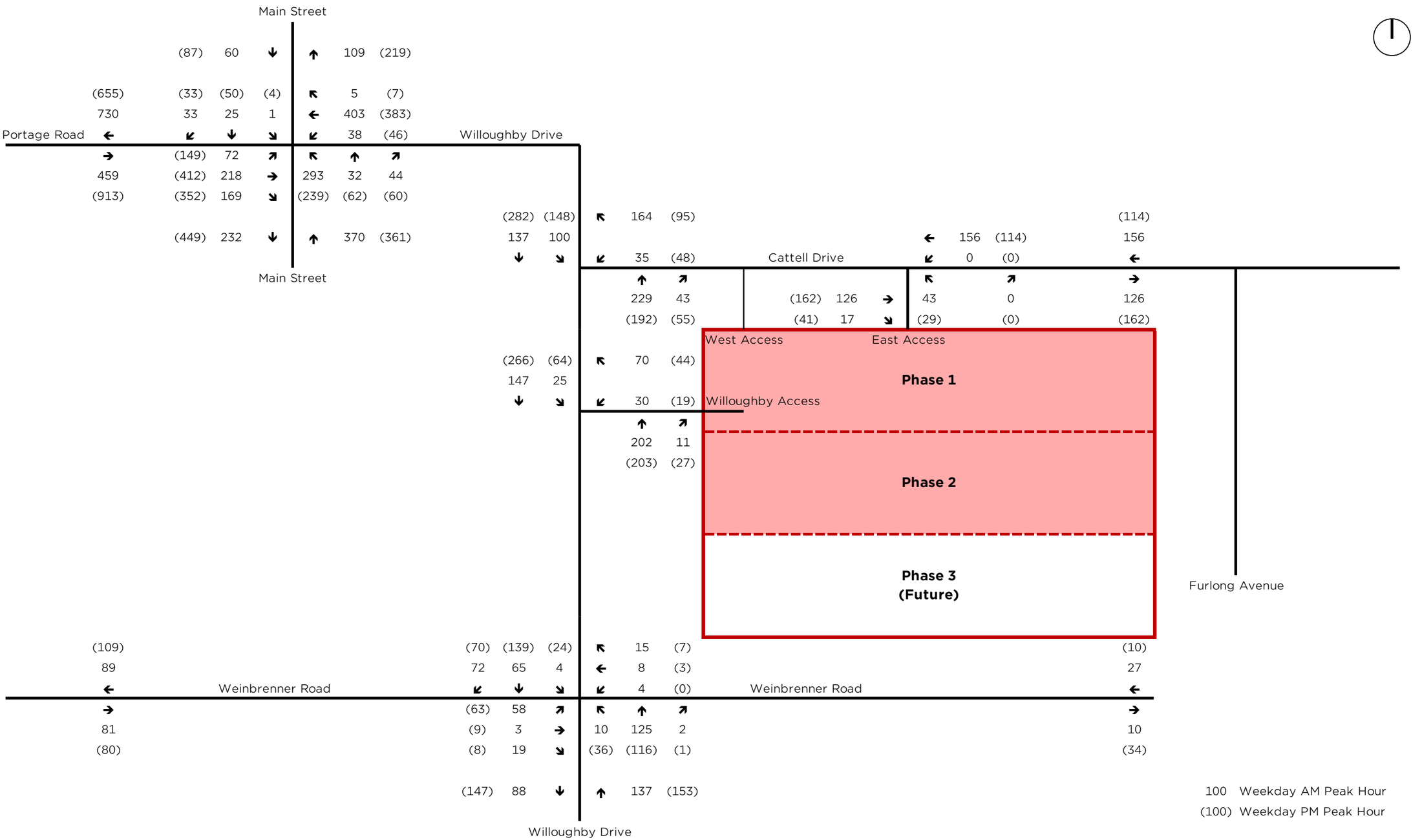
WILLOUGHBY DRIVE DEVELOPMENT, TRANSPORTATION IMPACT STUDY

Figure 11: Site Traffic – 2027



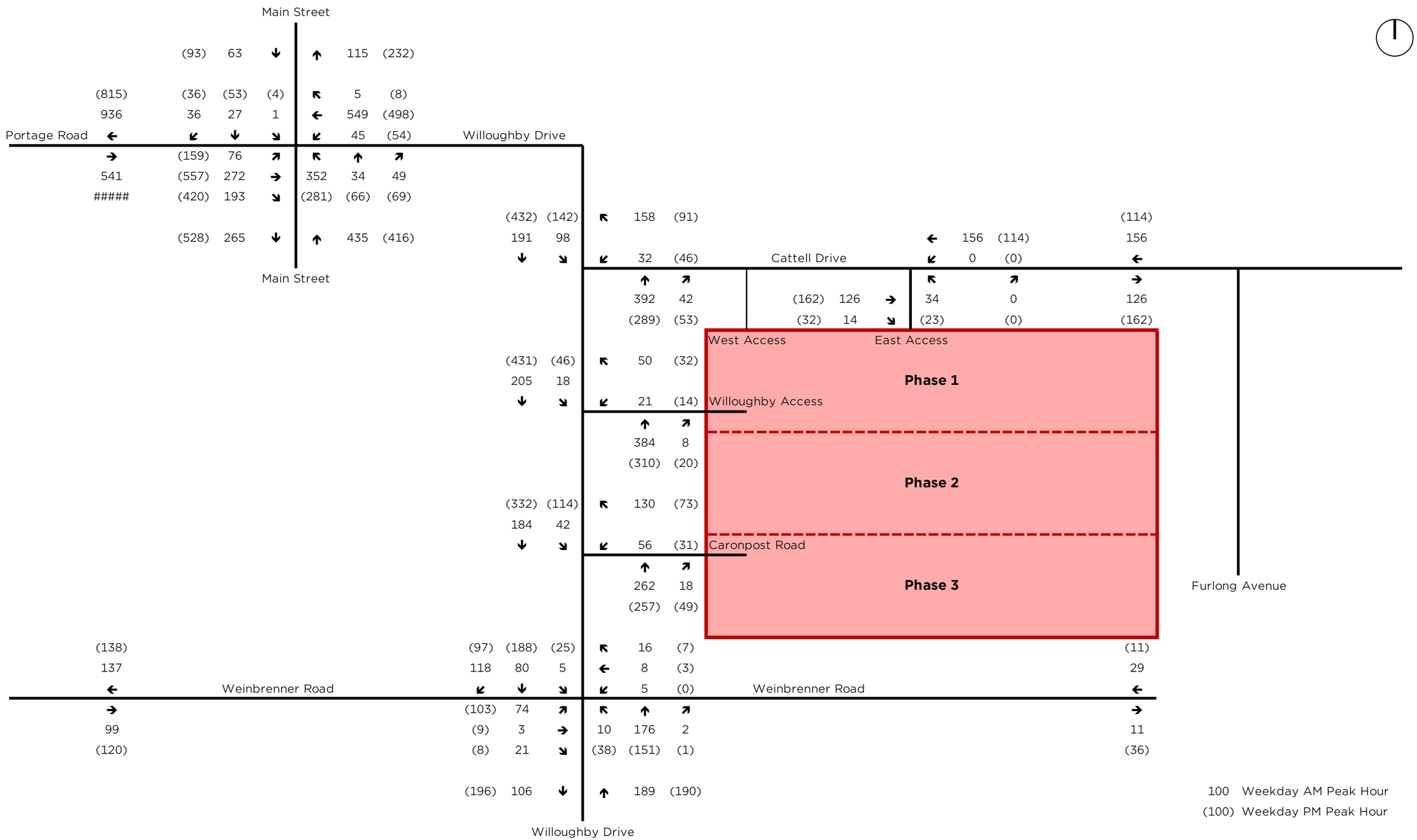
WILLOUGHBY DRIVE DEVELOPMENT, TRANSPORTATION IMPACT STUDY

Figure 12: Site Traffic – 2030



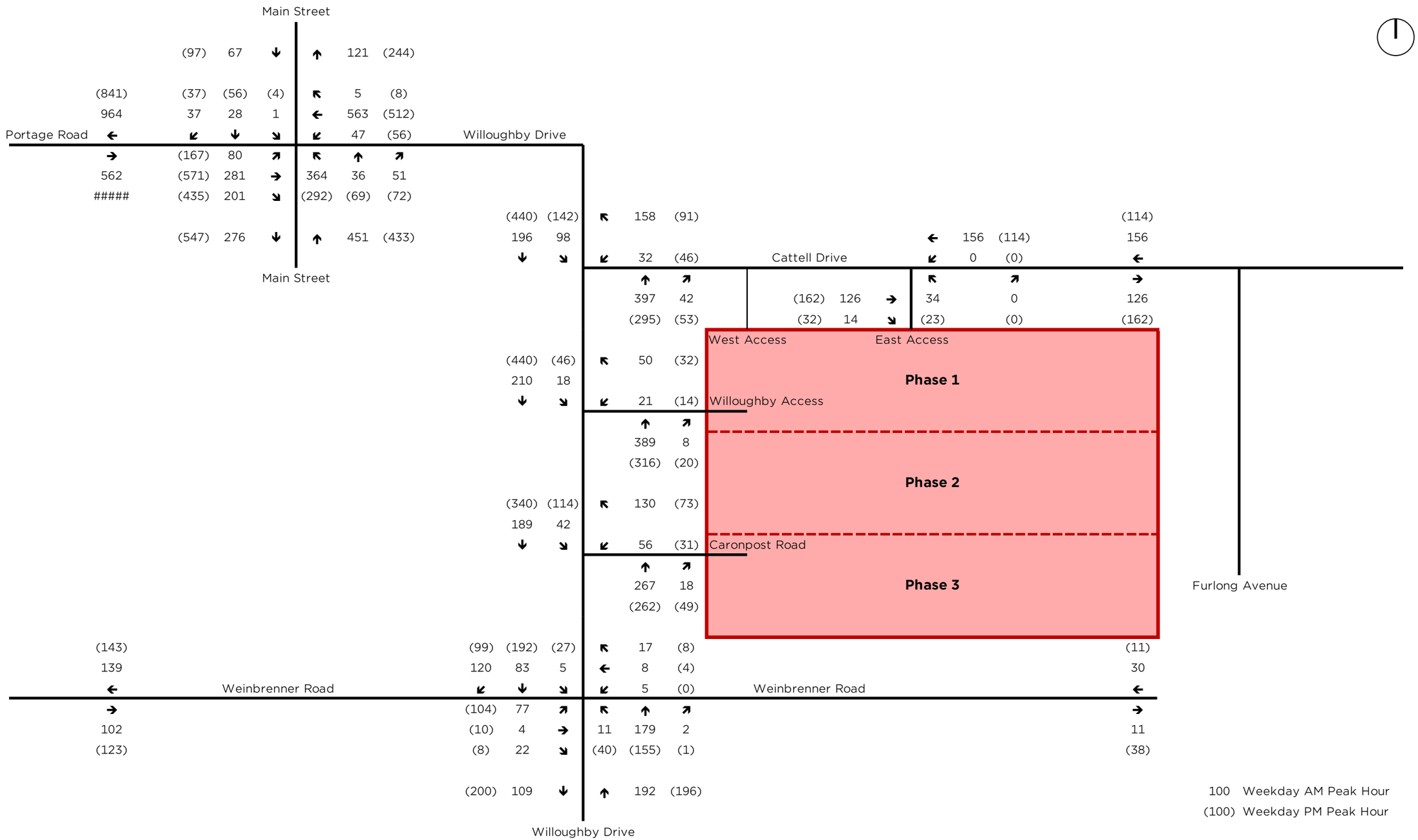
WILLOUGHBY DRIVE DEVELOPMENT, TRANSPORTATION IMPACT STUDY

Figure 13: Traffic Volumes – 2027 Total



WILLOUGHBY DRIVE DEVELOPMENT, TRANSPORTATION IMPACT STUDY

Figure 14: Traffic Volumes – 2030 Total



WILLOUGHBY DRIVE DEVELOPMENT, TRANSPORTATION IMPACT STUDY

Figure 15: Traffic Volumes – 2035 Total

Appendix A:
Study Terms of Reference

From: John Grubich
Sent: Thursday, August 31, 2023 9:55 AM
To: Matthew Buttrum
Subject: RE: [EXTERNAL]-Traffic Study Terms of Reference

Matthew;

The first phase of the Main Street reconstruction won't be finished by the second week of September. Judging by the progress, it likely won't be ready and open to two-way traffic for at least a month before progressing to the second phase.

I'd be agreeable to allow you to use the 2018 TMC already provided to proceed ahead with the zoning submission, using a 2% growth to bring the 2018 volumes to 2023 volumes. The City will likely add a draft plan condition that an updated TIS be submitted using updated traffic volumes after the Main Street work is completed.

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

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From: Matthew Buttrum <mbuttrum@tathameng.com>
Sent: Thursday, August 24, 2023 11:43 AM
To: John Grubich <jgrubich@niagarafalls.ca>
Subject: RE: [EXTERNAL]-Traffic Study Terms of Reference

Hello again John,

We were looking to have the traffic counts for this project scheduled for the second week of September, but realize that there are currently road works underway on Main Street which may impact the counts at Main & Willoughby. According to the project page on the City's website the next phase of work (Dock Street to Oliver Street) is supposed to start very soon.

My question then is this – when are the works between Main and Dock scheduled to wrap up? Follow-up to that, what will the detour for Phase 2 work look like? Can we expect traffic to behave normally at the intersection of Main and Willoughby or do you still expect drivers to avoid travelling along Main despite it being fully open down to Dock Street?

Thanks,

TATHAM ENGINEERING

Matthew Buttrum EIT
Engineering Intern

mbuttrum@tathameng.com **T** 705-733-9037 x2222
41 king Street, Unit 4, Barrie, Ontario L4N 6B5

tathameng.com

From: John Grubich <jgrubich@niagarafalls.ca>
Sent: Friday, August 11, 2023 10:02 AM
To: Matthew Buttrum <mbuttrum@tathameng.com>
Subject: RE: [EXTERNAL]-Traffic Study Terms of Reference

Matthew;

See below.

John

From: Matthew Buttrum <mbuttrum@tathameng.com>
Sent: Friday, August 11, 2023 9:55 AM
To: John Grubich <jgrubich@niagarafalls.ca>
Subject: RE: [EXTERNAL]-Traffic Study Terms of Reference

Hello John,

Thank you for the prompt response, it's quite refreshing not having to wait long to get started on a project. I do have a couple of follow-up questions for you:

1. With respect to the traffic counts, we'll be sure to have them completed in September to capture any school traffic. Are 6-hour counts at each intersection (3 hrs AM and 3 hrs PM) sufficient? **Yes, that is fine.**
2. Could you please supply the 2018 TMC's for our reference? **Attached.**
3. We will include the East Chippawa development in our study. The trip assignment figure you supplied is very helpful – is it possible to also get the overall site statistics (i.e. unit counts/type, size of any commercial/retail, etc.) for reference in our study? **Here is the link to the Council report which describes the unit breakdown and provides the plan, it is all residential -> https://niagarafalls.civicweb.net/filepro/documents/32707/?preview=41359&attachmenturl=%2Fdocument%2F41360**

Thanks,

Matthew Buttrum EIT
Engineering Intern

mbuttrum@tathameng.com **T** 705-733-9037 x2222
41 king Street, Unit 4, Barrie, Ontario L4N 6B5

tathameng.com

From: John Grubich <jgrubich@niagarafalls.ca>
Sent: Friday, August 11, 2023 9:20 AM
To: Matthew Buttrum <mbuttrum@tathameng.com>
Cc: David Perks <dperks@tathameng.com>; TPServices <tpservices@niagarafalls.ca>
Subject: RE: [EXTERNAL]-Traffic Study Terms of Reference

Matthew;

Thank you for forwarding your terms of reference for the traffic study you will be preparing for this development.

I added notes below in your e-mail. Please feel free to contact me if you have any questions.

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

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From: Matthew Buttrum <mbuttrum@tathameng.com>
Sent: Thursday, August 10, 2023 2:29 PM
To: TPServices <tpservices@niagarafalls.ca>
Cc: John Grubich <jgrubich@niagarafalls.ca>; David Perks <dperks@tathameng.com>
Subject: [EXTERNAL]-Traffic Study Terms of Reference

Hello,

We (Tatham Engineering Ltd.) have been retained to complete a traffic study in support of a proposed development to be located in the City of Niagara Falls. We have prepared the following Terms of Reference for City review and acceptance prior to commencement of the study. John, you were listed as

the City's transportation representative in the pre-consultation meeting for this development, thus we have cc'd you in this email.

Development Description

The development site is approximately 11 ha in size and consists of several undeveloped properties around the future Caronpost Road, generally bounded by Cattell Drive, Willoughby Drive, Weinbrenner Drive and the existing development along Furlong Avenue. The proposed development consists of a total of 924 residential units (321 stacked townhouse units and 603 apartment units). Access to the wider road network will be provided via Caronpost Road and another access to Willoughby Drive adjacent to the development at 8646 Willoughby Drive.

Terms of Reference

1. Study area to consist of the following intersections:
    a. Weinbrenner Drive with Willoughby Drive
    b. Willoughby Drive with Cattell Drive
    c. Future intersections along Willoughby Drive built to serve the subject development.
    d. **Willoughby Drive & Main Street - Signalized Intersection**
    - Study horizons – 2023 (existing), 2030 (full build-out) and a 5-year and 10-year horizon beyond full build-out (2035 and 2040). **You can exclude the 10-year (2040) period. Also, identify the phasing plan, if development is to be phased.**
2. Traffic volumes will be based on traffic counts conducted at the study area intersections. If the City does have any recent data available at said intersections, new counts will be completed. Please confirm if summer counts (i.e. July/August) are the preferred counts to use in the study. **New traffic counts would be required. Please carry out new TMCs in September once school resumes. We have October 2018 TMCs for all 3 intersections above for historical reference.**
3. Establish future background volumes through application of general background growth (annual growth based on historic and projected population and traffic growth) with explicit consideration given to any other planned developments in the area. **Please use a 2% growth rate to 2030, and 1% thereafter. Background traffic to include the Chippawa East Subdivision which has received Council approval; these lands are being pre-serviced at this time. Their trip diagram is attached.**

   Be advised that reconstruction of Willoughby Drive between Main Street and Weinbrenner Road is planned for 2024-2025, pending approvals. The road will remain as a two-lane road, with on-road bike lanes added in each direction.

4. Provide details of the proposed development and estimate trip generation based on trip rates contained within the *ITE Trip Generation Manual, 11th Edition*. Trips will be distributed based on the location of the site in relation to the built-up area of Niagara Falls, surrounding employment centres and expected travel patterns and routes. The anticipated trip generation, distribution and assignment is illustrated in the figure attached to this email.
   Assess operations of the study area intersections considering weekday AM and weekday PM peak periods. Operations will be assessed under existing (2023) conditions and at the future horizons noted above, both with and without the subject development. Any improvements required to support either existing or future conditions will be identified. **Please assess if a turning lane(s) is required and appropriate traffic control at Willoughby Drive and the new road(s).**
5. Review the site access locations and configurations in context of the type and number of vehicles expected, and applicable standards (including the appropriateness of the separation from adjacent intersections and/or driveways).
6. Conduct a sight line assessment at each access in context of relevant standards.
7. Review the parking supply in context of the municipal requirements and confirm a parking surplus or deficiency. This will be completed on a block-by-block basis. **The concept plan provided during the pre-consultation only identified proposed land use and density. Parking may need to be vetted when more details are known.**
8. Document the findings of the above work into a Traffic Study for submission to the City for review and approval.

Please review the above and let me know if you have any questions or comments. I look forward to hearing back from you.

Thank you,

Matthew Buttrum EIT
Engineering Intern

mbuttrum@tathameng.com **T** 705-733-9037 x2222
41 king Street, Unit 4, Barrie, Ontario L4N 6B5

tathameng.com

Appendix B: Traffic Data

Main St @ Willoughby Dr

Morning Peak Diagram

Specified Period
From: 8:00:00
To: 10:00:00

One Hour Peak
From: 8:15:00
To: 9:15:00

Municipality: Niagara Falls
Site #: 0000000001
Intersection: Willoughby Dr & Main St
TFR File #: 1
Count date: 11-Oct-2018

Weather conditions:
Clear/Dry

Person(s) who counted:
Cam

**** Signalized Intersection ****

Major Road: Willoughby Dr runs N/S

North Leg Total: 759
North Entering: 320
North Peds: 0
Peds Cross: ⋈

Cyclists	0	1	0	1
Trucks	11	8	1	20
Cars	110	130	59	299
Totals	121	139	60	

Cyclists	1
Trucks	19
Cars	419
Totals	439

East Leg Total: 141
East Entering: 50
East Peds: 4
Peds Cross: ⧖

Cummington Square W

Cyclists	Trucks	Cars	Totals
0	11	157	168

Cars	Trucks	Cyclists	Totals
26	2	0	28
21	0	0	21
1	0	0	1
48	2	0	

Main St

N
W E
S

Cyclists	Trucks	Cars	Totals
0	4	185	189
0	4	23	27
0	4	30	34
0	12	238	

Main St

Cars	Trucks	Cyclists	Totals
86	5	0	91

Willoughby Dr

Peds Cross: ⧖
West Peds: 6
West Entering: 250
West Leg Total: 418

Cars	161
Trucks	12
Cyclists	1
Totals	174

Cars	26	208	4	238
Trucks	0	13	0	13
Cyclists	0	1	0	1
Totals	26	222	4	

Peds Cross: ⋈
South Peds: 3
South Entering: 252
South Leg Total: 426

Comments

Main St @ Willoughby Dr

Mid-day Peak Diagram

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

One Hour Peak
From: 11:45:00
To: 12:45:00

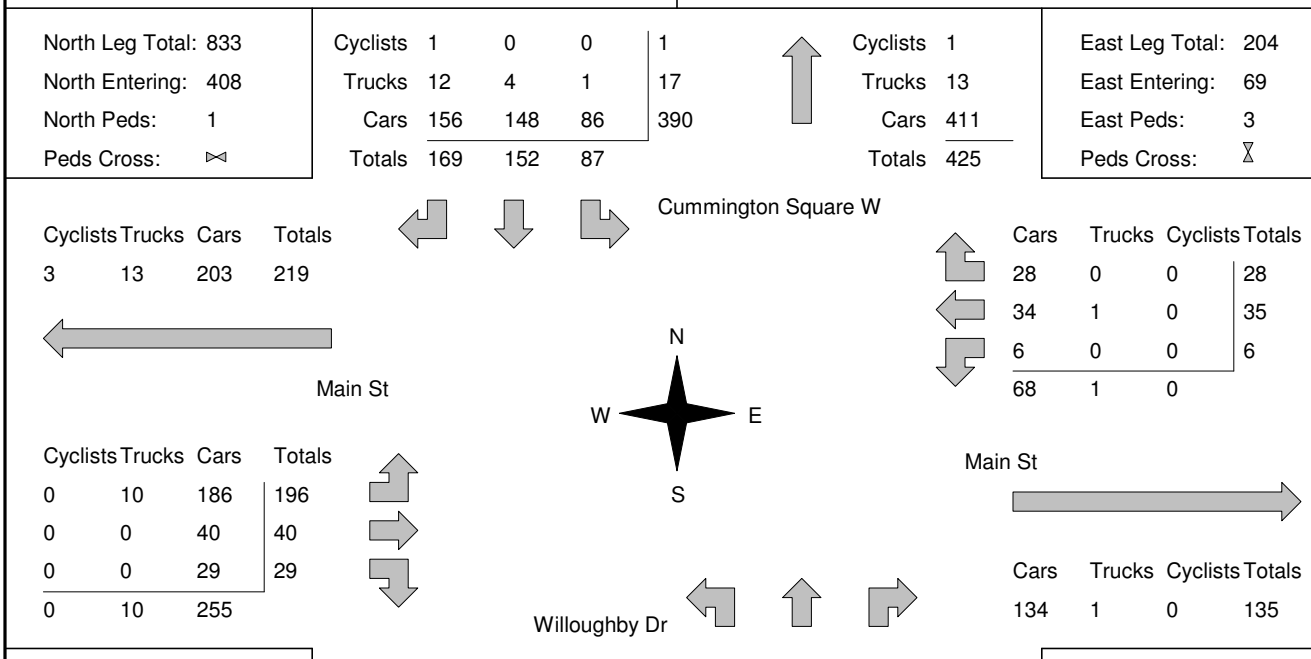
Municipality: Niagara Falls
Site #: 0000000001
Intersection: Willoughby Dr & Main St
TFR File #: 1
Count date: 11-Oct-2018

Weather conditions:
Clear/Dry

Person(s) who counted:
Cam

**** Signalized Intersection ****

Major Road: Willoughby Dr runs N/S



Comments

Main St @ Willoughby Dr

Afternoon Peak Diagram

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

One Hour Peak
From: 15:15:00
To: 16:15:00

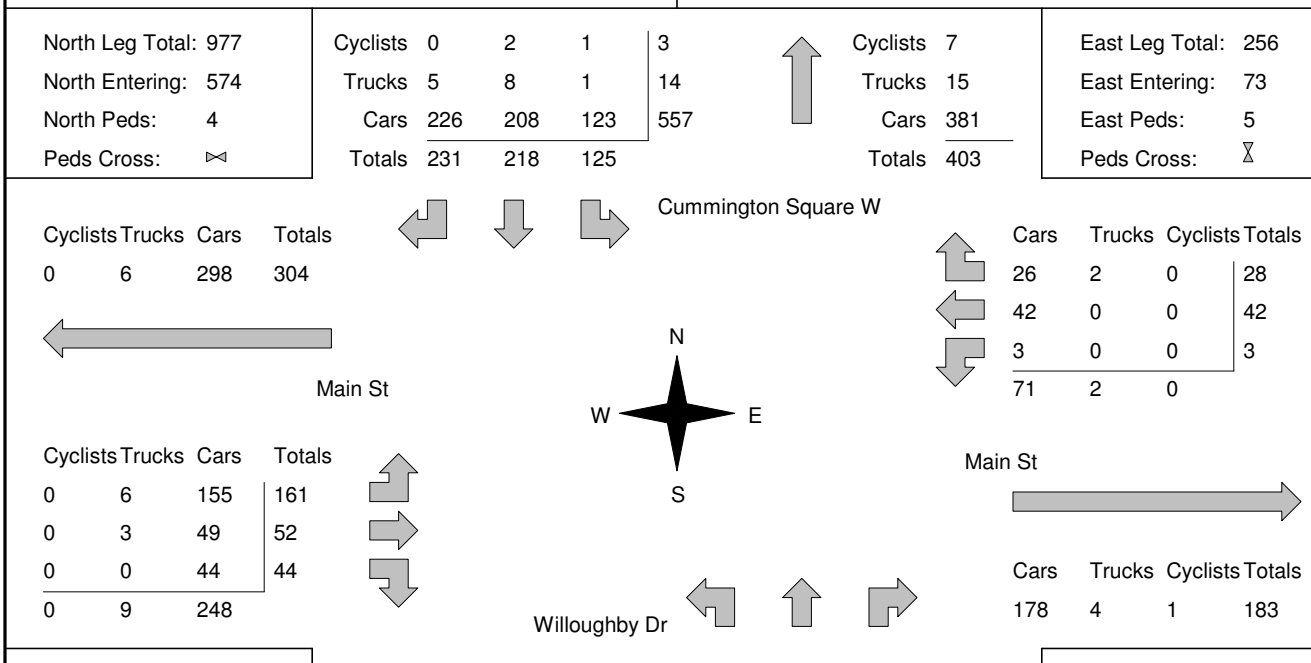
Municipality: Niagara Falls
Site #: 0000000001
Intersection: Willoughby Dr & Main St
TFR File #: 1
Count date: 11-Oct-2018

Weather conditions:
Clear/Dry

Person(s) who counted:
Cam

**** Signalized Intersection ****

Major Road: Willoughby Dr runs N/S



Comments

Main St @ Willoughby Dr

Total Count Diagram

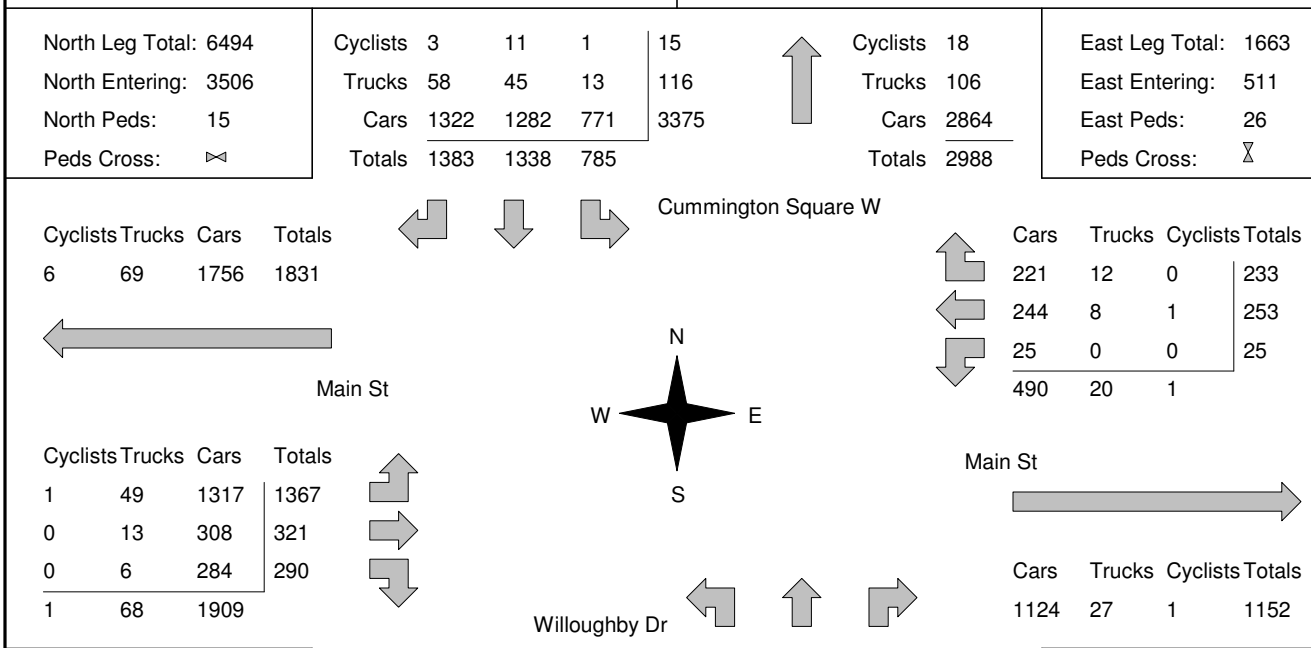
Municipality: Niagara Falls
Site #: 0000000001
Intersection: Willoughby Dr & Main St
TFR File #: 1
Count date: 11-Oct-2018

Weather conditions:
Clear/Dry

Person(s) who counted:
Cam

**** Signalized Intersection ****

Major Road: Willoughby Dr runs N/S



Comments

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis

Morning Peak Diagram

Specified Period
From: 7:00:00
To: 10:00:00

One Hour Peak
From: 8:30:00
To: 9:30:00

Municipality: Niagara Falls
Site #: 2321600001
Intersection: Willoughby Dr & Cattell Dr
TFR File #: 1
Count date: 28-Sep-23

Weather conditions:

Person counted:
Person prepared:
Person checked:

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

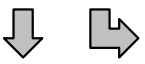
Major Road: Willoughby Dr runs N/S

North Leg Total: 388
North Entering: 174
North Peds: 1
Peds Cross: ⋈

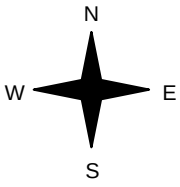
Buses	2	9	11
Trucks	3	3	6
Cars	81	76	157
Totals	86	88	

Buses	13
Trucks	5
Cars	196
Totals	214

East Leg Total: 282
East Entering: 156
East Peds: 1
Peds Cross: ⋈



Cars	Trucks	Buses	Totals
124	0	10	134
22	0	0	22
146	0	10	



Cattell Dr

Cars	Trucks	Buses	Totals
111	4	11	126

Cars	103
Trucks	3
Buses	2
Totals	108

Cars	72	35	107
Trucks	5	1	6
Buses	3	2	5
Totals	80	38	

Peds Cross: ⋈
South Peds: 29
South Entering: 118
South Leg Total: 226

Comments

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis

Afternoon Peak Diagram

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

One Hour Peak
From: 16:30:00
To: 17:30:00

Municipality: Niagara Falls
Site #: 2321600001
Intersection: Willoughby Dr & Cattell Dr
TFR File #: 1
Count date: 28-Sep-23

Weather conditions:

Person counted:
Person prepared:
Person checked:

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

Major Road: Willoughby Dr runs N/S

North Leg Total: 429
North Entering: 259
North Peds: 0
Peds Cross: ⋈

Buses	2	1	3
Trucks	1	0	1
Cars	137	118	255
Totals	140	119	

Buses	1
Trucks	1
Cars	168
Totals	170

East Leg Total: 276
East Entering: 114
East Peds: 4
Peds Cross: ⋈

Willoughby Dr

Cars	Trucks	Buses	Totals
74	0	1	75
39	0	0	39
113	0	1	

N
W E
S

Cattell Dr

Cars	Trucks	Buses	Totals
160	0	2	162

Willoughby Dr

Cars	176
Trucks	1
Buses	2
Totals	179

Cars	94	42	136
Trucks	1	0	1
Buses	0	1	1
Totals	95	43	

Peds Cross: ⋈
South Peds: 17
South Entering: 138
South Leg Total: 317

Comments

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis

Total Count Diagram

Municipality: Niagara Falls
Site #: 2321600001
Intersection: Willoughby Dr & Cattell Dr
TFR File #: 1
Count date: 28-Sep-23

Weather conditions:

Person counted:
Person prepared:
Person checked:

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

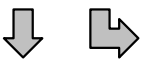
Major Road: Willoughby Dr runs N/S

North Leg Total: 2126
North Entering: 1098
North Peds: 3
Peds Cross: ⋈

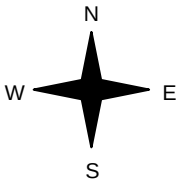
Buses	20	20	40
Trucks	9	6	15
Cars	597	446	1043
Totals	626	472	

Buses	31
Trucks	14
Cars	983
Totals	1028

East Leg Total: 1287
East Entering: 662
East Peds: 9
Peds Cross: ⋈



Cars	Trucks	Buses	Totals
473	0	22	495
158	1	8	167
631	1	30	



Cattell Dr

Cars	Trucks	Buses	Totals
592	7	26	625

Cars	755
Trucks	10
Buses	28
Totals	793

Cars	510	146	656
Trucks	14	1	15
Buses	9	6	15
Totals	533	153	

Peds Cross: ⋈
South Peds: 161
South Entering: 686
South Leg Total: 1479

Comments

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis

Traffic Count Summary

Intersection: Willoughby Dr & Cattell Dr | **Count Date:** 28-Sep-23 | **Municipality:** Niagara Falls

North Approach Totals

Hour Ending	Includes Cars, Trucks, & Buses				Total Peds
	Left	Thru	Right	Grand Total	
7:00:00	*0*	*0*	*0*	*0*	*0*
8:00:00	*23*	*77*	*0*	*100*	*0*
9:00:00	*88*	*64*	*0*	*152*	*1*
10:00:00	*37*	*95*	*0*	*132*	*1*
15:00:00	*0*	*0*	*0*	*0*	*0*
16:00:00	*108*	*121*	*0*	*229*	*0*
17:00:00	*103*	*137*	*0*	*240*	*0*
18:00:00	*113*	*132*	*0*	*245*	*1*
Totals:	472	626	0	1098	3

North/South Total Approaches: 1784

South Approach Totals

Hour Ending	Includes Cars, Trucks, & Buses				Total Peds
	Left	Thru	Right	Grand Total	
7:00:00	*0*	*0*	*0*	*0*	*0*
8:00:00	*0*	*59*	*10*	*69*	*6*
9:00:00	*0*	*85*	*44*	*129*	*53*
10:00:00	*0*	*72*	*13*	*85*	*6*
15:00:00	*0*	*0*	*0*	*0*	*0*
16:00:00	*0*	*103*	*21*	*124*	*72*
17:00:00	*0*	*109*	*32*	*141*	*10*
18:00:00	*0*	*105*	*33*	*138*	*14*
S Totals:	0	533	153	686	161

East Approach Totals

Hour Ending	Includes Cars, Trucks, & Buses				Total Peds
	Left	Thru	Right	Grand Total	
7:00:00	*0*	*0*	*0*	*0*	*0*
8:00:00	*15*	*0*	*56*	*71*	*0*
9:00:00	*25*	*0*	*137*	*162*	*0*
10:00:00	*12*	*0*	*64*	*76*	*1*
15:00:00	*0*	*0*	*0*	*0*	*0*
16:00:00	*50*	*0*	*86*	*136*	*3*
17:00:00	*30*	*0*	*82*	*112*	*1*
18:00:00	*35*	*0*	*70*	*105*	*4*
Totals:	167	0	495	662	9

East/West Total Approaches: 662

West Approach Totals

Hour Ending	Includes Cars, Trucks, & Buses				Total Peds
	Left	Thru	Right	Grand Total	
7:00:00	*0*	*0*	*0*	*0*	*0*
8:00:00	*0*	*0*	*0*	*0*	*0*
9:00:00	*0*	*0*	*0*	*0*	*0*
10:00:00	*0*	*0*	*0*	*0*	*0*
15:00:00	*0*	*0*	*0*	*0*	*0*
16:00:00	*0*	*0*	*0*	*0*	*0*
17:00:00	*0*	*0*	*0*	*0*	*0*
18:00:00	*0*	*0*	*0*	*0*	*0*
W Totals:	0	0	0	0	0

Calculated Values for Traffic Crossing Major Street

Hours Ending:	*7:00*	*8:00*	*9:00*	*10:00*	*15:00*	*16:00*	*17:00*	*18:00*
Crossing Values:	*0*	*21*	*79*	*19*	*0*	*122*	*40*	*50*

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis

Count Date: 28-Sep-23 Site #: 2321600001

Interval Time	Passenger Cars - North Approach						Trucks - North Approach						Buses - North Approach						Pedestrians	
	Left		Thru		Right		Left		Thru		Right		Left		Thru		Right		North Cross	
	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr
7:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15:00	2	2	13	13	0	0	0	0	1	1	0	0	0	0	1	1	0	0	0	0
7:30:00	9	7	29	16	0	0	0	0	1	0	0	0	0	0	4	3	0	0	0	0
7:45:00	12	3	47	18	0	0	1	1	1	0	0	0	1	1	4	0	0	0	0	0
8:00:00	21	9	71	24	0	0	1	0	2	1	0	0	1	0	4	0	0	0	0	0
8:15:00	32	11	84	13	0	0	1	0	3	1	0	0	1	0	5	1	0	0	0	0
8:30:00	41	9	92	8	0	0	1	0	3	0	0	0	1	0	6	1	0	0	1	1
8:45:00	75	34	113	21	0	0	2	1	3	0	0	0	8	7	6	0	0	0	1	0
9:00:00	99	24	131	18	0	0	2	0	4	1	0	0	10	2	6	0	0	0	1	0
9:15:00	109	10	152	21	0	0	4	2	5	1	0	0	10	0	7	1	0	0	2	1
9:30:00	117	8	173	21	0	0	4	0	6	1	0	0	10	0	8	1	0	0	2	0
9:45:00	126	9	199	26	0	0	4	0	6	0	0	0	10	0	9	1	0	0	2	0
10:00:00	133	7	220	21	0	0	5	1	6	0	0	0	10	0	10	1	0	0	2	0
10:15:00	133	0	220	0	0	0	5	0	6	0	0	0	10	0	10	0	0	0	2	0
15:00:00	133	0	220	0	0	0	5	0	6	0	0	0	10	0	10	0	0	0	2	0
15:15:00	165	32	254	34	0	0	6	1	6	0	0	0	17	7	13	3	0	0	2	0
15:30:00	184	19	279	25	0	0	6	0	6	0	0	0	19	2	14	1	0	0	2	0
15:45:00	205	21	307	28	0	0	6	0	7	1	0	0	19	0	15	1	0	0	2	0
16:00:00	231	26	334	27	0	0	6	0	8	1	0	0	19	0	15	0	0	0	2	0
16:15:00	256	25	373	39	0	0	6	0	8	0	0	0	19	0	17	2	0	0	2	0
16:30:00	279	23	405	32	0	0	6	0	8	0	0	0	19	0	18	1	0	0	2	0
16:45:00	300	21	437	32	0	0	6	0	8	0	0	0	19	0	19	1	0	0	2	0
17:00:00	334	34	467	30	0	0	6	0	8	0	0	0	19	0	19	0	0	0	2	0
17:15:00	366	32	508	41	0	0	6	0	9	1	0	0	19	0	20	1	0	0	2	0
17:30:00	397	31	542	34	0	0	6	0	9	0	0	0	20	1	20	0	0	0	2	0
17:45:00	421	24	570	28	0	0	6	0	9	0	0	0	20	0	20	0	0	0	3	1
18:00:00	446	25	597	27	0	0	6	0	9	0	0	0	20	0	20	0	0	0	3	0
18:15:00	446	0	597	0	0	0	6	0	9	0	0	0	20	0	20	0	0	0	3	0
18:15:15	446	0	597	0	0	0	6	0	9	0	0	0	20	0	20	0	0	0	3	0

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis

Count Date: 28-Sep-23 Site #: 2321600001

Interval Time	Passenger Cars - East Approach						Trucks - East Approach						Buses - East Approach						Pedestrians	
	Left		Thru		Right		Left		Thru		Right		Left		Thru		Right		East Cross	
	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr
7:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15:00	3	3	0	0	5	5	0	0	0	0	0	0	1	1	0	0	1	1	0	0
7:30:00	7	4	0	0	18	13	0	0	0	0	0	0	1	0	0	0	2	1	0	0
7:45:00	11	4	0	0	39	21	0	0	0	0	0	0	2	1	0	0	4	2	0	0
8:00:00	13	2	0	0	52	13	0	0	0	0	0	0	2	0	0	0	4	0	0	0
8:15:00	17	4	0	0	72	20	0	0	0	0	0	0	2	0	0	0	4	0	0	0
8:30:00	21	4	0	0	94	22	0	0	0	0	0	0	2	0	0	0	5	1	0	0
8:45:00	28	7	0	0	141	47	0	0	0	0	0	0	2	0	0	0	9	4	0	0
9:00:00	38	10	0	0	179	38	0	0	0	0	0	0	2	0	0	0	14	5	0	0
9:15:00	40	2	0	0	196	17	0	0	0	0	0	0	2	0	0	0	15	1	1	1
9:30:00	43	3	0	0	218	22	0	0	0	0	0	0	2	0	0	0	15	0	1	0
9:45:00	45	2	0	0	229	11	0	0	0	0	0	0	2	0	0	0	15	0	1	0
10:00:00	49	4	0	0	242	13	1	1	0	0	0	0	2	0	0	0	15	0	1	0
10:15:00	49	0	0	0	242	0	1	0	0	0	0	0	2	0	0	0	15	0	1	0
15:00:00	49	0	0	0	242	0	1	0	0	0	0	0	2	0	0	0	15	0	1	0
15:15:00	70	21	0	0	260	18	1	0	0	0	0	0	2	0	0	0	16	1	1	0
15:30:00	78	8	0	0	279	19	1	0	0	0	0	0	7	5	0	0	20	4	4	3
15:45:00	86	8	0	0	306	27	1	0	0	0	0	0	7	0	0	0	21	1	4	0
16:00:00	94	8	0	0	322	16	1	0	0	0	0	0	7	0	0	0	21	0	4	0
16:15:00	102	8	0	0	345	23	1	0	0	0	0	0	8	1	0	0	21	0	4	0
16:30:00	108	6	0	0	368	23	1	0	0	0	0	0	8	0	0	0	21	0	4	0
16:45:00	113	5	0	0	385	17	1	0	0	0	0	0	8	0	0	0	21	0	4	0
17:00:00	123	10	0	0	404	19	1	0	0	0	0	0	8	0	0	0	21	0	5	1
17:15:00	133	10	0	0	419	15	1	0	0	0	0	0	8	0	0	0	21	0	5	0
17:30:00	147	14	0	0	442	23	1	0	0	0	0	0	8	0	0	0	22	1	8	3
17:45:00	152	5	0	0	459	17	1	0	0	0	0	0	8	0	0	0	22	0	9	1
18:00:00	158	6	0	0	473	14	1	0	0	0	0	0	8	0	0	0	22	0	9	0
18:15:00	158	0	0	0	473	0	1	0	0	0	0	0	8	0	0	0	22	0	9	0
18:15:15	158	0	0	0	473	0	1	0	0	0	0	0	8	0	0	0	22	0	9	0

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis

Count Date: 28-Sep-23 Site #: 2321600001

Interval Time	Passenger Cars - South Approach						Trucks - South Approach						Buses - South Approach						Pedestrians	
	Left		Thru		Right		Left		Thru		Right		Left		Thru		Right		South Cross	
	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr
7:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15:00	0	0	8	8	2	2	0	0	1	1	0	0	0	0	0	0	0	0	0	0
7:30:00	0	0	22	14	3	1	0	0	1	0	0	0	0	0	2	2	0	0	2	2
7:45:00	0	0	33	11	5	2	0	0	1	0	0	0	0	0	3	1	0	0	4	2
8:00:00	0	0	54	21	9	4	0	0	2	1	0	0	0	0	3	0	1	1	6	2
8:15:00	0	0	72	18	15	6	0	0	3	1	0	0	0	0	3	0	2	1	8	2
8:30:00	0	0	95	23	21	6	0	0	3	0	0	0	0	0	3	0	2	0	34	26
8:45:00	0	0	119	24	42	21	0	0	3	0	0	0	0	0	5	2	4	2	50	16
9:00:00	0	0	135	16	50	8	0	0	3	0	0	0	0	0	6	1	4	0	59	9
9:15:00	0	0	143	8	55	5	0	0	6	3	0	0	0	0	6	0	4	0	62	3
9:30:00	0	0	167	24	56	1	0	0	8	2	1	1	0	0	6	0	4	0	63	1
9:45:00	0	0	183	16	57	1	0	0	8	0	1	0	0	0	6	0	4	0	64	1
10:00:00	0	0	201	18	62	5	0	0	9	1	1	0	0	0	6	0	4	0	65	1
10:15:00	0	0	201	0	62	0	0	0	9	0	1	0	0	0	6	0	4	0	65	0
15:00:00	0	0	201	0	62	0	0	0	9	0	1	0	0	0	6	0	4	0	65	0
15:15:00	0	0	229	28	71	9	0	0	10	1	1	0	0	0	6	0	4	0	96	31
15:30:00	0	0	246	17	75	4	0	0	10	0	1	0	0	0	6	0	5	1	119	23
15:45:00	0	0	268	22	77	2	0	0	10	0	1	0	0	0	6	0	5	0	131	12
16:00:00	0	0	301	33	82	5	0	0	11	1	1	0	0	0	7	1	5	0	137	6
16:15:00	0	0	342	41	89	7	0	0	12	1	1	0	0	0	7	0	5	0	139	2
16:30:00	0	0	358	16	94	5	0	0	13	1	1	0	0	0	8	1	5	0	140	1
16:45:00	0	0	381	23	106	12	0	0	13	0	1	0	0	0	8	0	5	0	143	3
17:00:00	0	0	407	26	114	8	0	0	13	0	1	0	0	0	8	0	5	0	147	4
17:15:00	0	0	429	22	125	11	0	0	13	0	1	0	0	0	8	0	6	1	155	8
17:30:00	0	0	452	23	136	11	0	0	14	1	1	0	0	0	8	0	6	0	157	2
17:45:00	0	0	481	29	140	4	0	0	14	0	1	0	0	0	9	1	6	0	161	4
18:00:00	0	0	510	29	146	6	0	0	14	0	1	0	0	0	9	0	6	0	161	0
18:15:00	0	0	510	0	146	0	0	0	14	0	1	0	0	0	9	0	6	0	161	0
18:15:15	0	0	510	0	146	0	0	0	14	0	1	0	0	0	9	0	6	0	161	0

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis

Count Date: 28-Sep-23 Site #: 2321600001

Interval Time	Passenger Cars - West Approach						Trucks - West Approach						Buses - West Approach						Pedestrians	
	Left		Thru		Right		Left		Thru		Right		Left		Thru		Right		West Cross	
	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr
7:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:30:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:30:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:45:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:30:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:45:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:30:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:45:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:30:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:45:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:15:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis

Morning Peak Diagram

Specified Period
From: 7:00:00
To: 10:00:00

One Hour Peak
From: 8:00:00
To: 9:00:00

Municipality: Niagara Falls
Site #: 2321600002
Intersection: Willoughby Dr & Weinbrenner Rd
TFR File #: 1
Count date: 28-Sep-23

Weather conditions:

Person counted:
Person prepared:
Person checked:

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

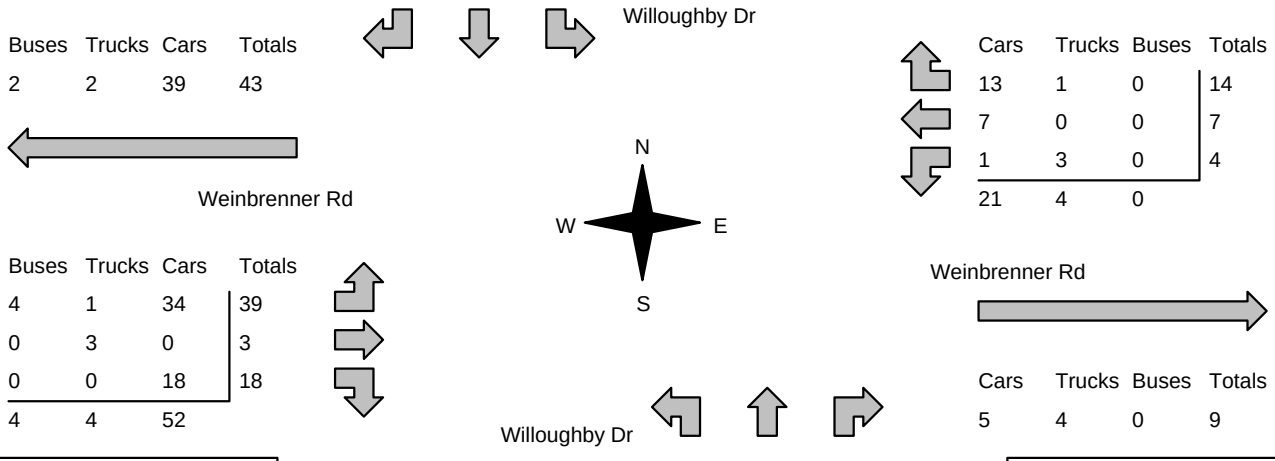
Major Road: Willoughby Dr runs N/S

North Leg Total: 175
North Entering: 73
North Peds: 2
Peds Cross: ⋈

Buses	2	0	0	2
Trucks	2	0	0	2
Cars	23	42	4	69
Totals	27	42	4	

Buses	6
Trucks	2
Cars	94
Totals	102

East Leg Total: 34
East Entering: 25
East Peds: 3
Peds Cross: ⧖



Buses	Trucks	Cars	Totals
2	2	39	43

Cars	Trucks	Buses	Totals
13	1	0	14
7	0	0	7
1	3	0	4
21	4	0	

Buses	Trucks	Cars	Totals
4	1	34	39
0	3	0	3
0	0	18	18
4	4	52	

Cars	Trucks	Buses	Totals
5	4	0	9

Peds Cross: ⧖
West Peds: 2
West Entering: 60
West Leg Total: 103

Cars	61			
Trucks	3			
Buses	0			
Totals	64			

Cars	9	47	1	57
Trucks	0	0	1	1
Buses	0	2	0	2
Totals	9	49	2	

Peds Cross: ⋈
South Peds: 2
South Entering: 60
South Leg Total: 124

Comments

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis

Afternoon Peak Diagram

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

One Hour Peak
From: 16:00:00
To: 17:00:00

Municipality: Niagara Falls
Site #: 2321600002
Intersection: Willoughby Dr & Weinbrenner Rd
TFR File #: 1
Count date: 28-Sep-23

Weather conditions:

Person counted:
Person prepared:
Person checked:

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

Major Road: Willoughby Dr runs N/S

North Leg Total: 222
North Entering: 128
North Peds: 2
Peds Cross: ⋈

Buses	4	0	0	4
Trucks	0	0	0	0
Cars	35	67	22	124
Totals	39	67	22	

Buses	0
Trucks	1
Cars	93
Totals	94

East Leg Total: 40
East Entering: 9
East Peds: 6
Peds Cross: ⧖

Willoughby Dr

Buses	Trucks	Cars	Totals
4	0	71	75

Weinbrenner Rd

Cars	Trucks	Buses	Totals
6	0	0	6
3	0	0	3
0	0	0	0
9	0	0	

N
W E
S

Buses	Trucks	Cars	Totals
0	0	22	22
0	0	8	8
0	0	7	7
0	0	37	

Weinbrenner Rd

Cars	Trucks	Buses	Totals
31	0	0	31

Willoughby Dr

Peds Cross: ⧖
West Peds: 3
West Entering: 37
West Leg Total: 112

Cars	74
Trucks	0
Buses	0
Totals	74

Cars	33	65	1	99
Trucks	0	1	0	1
Buses	0	0	0	0
Totals	33	66	1	

Peds Cross: ⋈
South Peds: 10
South Entering: 100
South Leg Total: 174

Comments

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis

Total Count Diagram

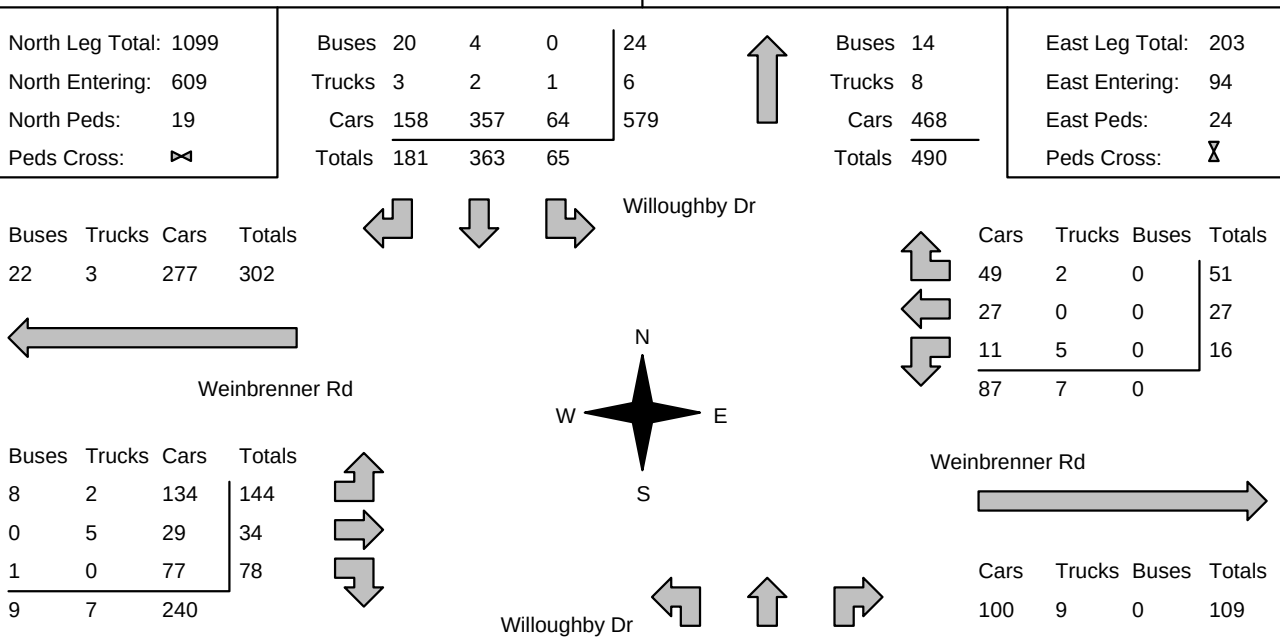
Municipality: Niagara Falls
Site #: 2321600002
Intersection: Willoughby Dr & Weinbrenner Rd
TFR File #: 1
Count date: 28-Sep-23

Weather conditions:

Person counted:
Person prepared:
Person checked:

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

Major Road: Willoughby Dr runs N/S



Comments

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis

Traffic Count Summary

Intersection: Willoughby Dr & Weinbrenner Rd | **Count Date:** 28-Sep-23 | **Municipality:** Niagara Falls

North Approach Totals

Hour Ending	Includes Cars, Trucks, & Buses				Total Peds
	Left	Thru	Right	Grand Total	
7:00:00	0	0	0	0	0
8:00:00	5	54	19	78	9
9:00:00	4	42	27	73	2
10:00:00	12	56	12	80	2
15:00:00	0	0	0	0	0
16:00:00	9	70	46	125	2
17:00:00	22	67	39	128	2
18:00:00	13	74	38	125	2
Totals:	65	363	181	609	19

North/South Total Approaches: 1008

South Approach Totals

Hour Ending	Includes Cars, Trucks, & Buses				Total Peds
	Left	Thru	Right	Grand Total	
7:00:00	0	0	0	0	0
8:00:00	3	23	1	27	8
9:00:00	9	49	2	60	2
10:00:00	7	38	2	47	5
15:00:00	0	0	0	0	0
16:00:00	23	54	2	79	6
17:00:00	33	66	1	100	10
18:00:00	19	65	2	86	6
S Totals:	94	295	10	399	37

East Approach Totals

Hour Ending	Includes Cars, Trucks, & Buses				Total Peds
	Left	Thru	Right	Grand Total	
7:00:00	0	0	0	0	0
8:00:00	0	4	7	11	4
9:00:00	4	7	14	25	3
10:00:00	6	3	12	21	3
15:00:00	0	0	0	0	0
16:00:00	4	5	7	16	4
17:00:00	0	3	6	9	6
18:00:00	2	5	5	12	4
Totals:	16	27	51	94	24

East/West Total Approaches: 350

West Approach Totals

Hour Ending	Includes Cars, Trucks, & Buses				Total Peds
	Left	Thru	Right	Grand Total	
7:00:00	0	0	0	0	0
8:00:00	15	3	17	35	14
9:00:00	39	3	18	60	2
10:00:00	16	4	15	35	3
15:00:00	0	0	0	0	0
16:00:00	21	10	12	43	4
17:00:00	22	8	7	37	3
18:00:00	31	6	9	46	3
W Totals:	144	34	78	256	29

Calculated Values for Traffic Crossing Major Street

Hours Ending:	7:00	8:00	9:00	10:00	15:00	16:00	17:00	18:00
Crossing Values:	0	36	54	33	0	43	42	47

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis

Count Date: 28-Sep-23 Site #: 2321600002

Interval Time	Passenger Cars - North Approach						Trucks - North Approach						Buses - North Approach						Pedestrians	
	Left		Thru		Right		Left		Thru		Right		Left		Thru		Right		North Cross	
	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr
7:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15:00	1	1	15	15	3	3	0	0	0	0	0	0	0	0	0	0	2	2	1	1
7:30:00	2	1	27	12	7	4	0	0	0	0	0	0	0	0	1	1	3	1	1	0
7:45:00	4	2	40	13	8	1	0	0	0	0	0	0	0	0	1	0	4	1	3	2
8:00:00	4	0	53	13	15	7	1	1	0	0	0	0	0	0	1	0	4	0	9	6
8:15:00	5	1	62	9	20	5	1	0	0	0	1	1	0	0	1	0	5	1	9	0
8:30:00	6	1	69	7	24	4	1	0	0	0	1	0	0	0	1	0	6	1	9	0
8:45:00	7	1	83	14	30	6	1	0	0	0	1	0	0	0	1	0	6	0	9	0
9:00:00	8	1	95	12	38	8	1	0	0	0	2	1	0	0	1	0	6	0	11	2
9:15:00	12	4	107	12	40	2	1	0	0	0	2	0	0	0	1	0	7	1	11	0
9:30:00	12	0	124	17	42	2	1	0	0	0	2	0	0	0	1	0	7	0	12	1
9:45:00	16	4	136	12	43	1	1	0	1	1	2	0	0	0	1	0	7	0	12	0
10:00:00	20	4	149	13	48	5	1	0	1	0	3	1	0	0	2	1	7	0	13	1
10:15:00	20	0	149	0	48	0	1	0	1	0	3	0	0	0	2	0	7	0	13	0
15:00:00	20	0	149	0	48	0	1	0	1	0	3	0	0	0	2	0	7	0	13	0
15:15:00	24	4	170	21	63	15	1	0	1	0	3	0	0	0	2	0	9	2	15	2
15:30:00	26	2	185	15	72	9	1	0	1	0	3	0	0	0	4	2	14	5	15	0
15:45:00	27	1	202	17	78	6	1	0	1	0	3	0	0	0	4	0	15	1	15	0
16:00:00	29	2	216	14	86	8	1	0	2	1	3	0	0	0	4	0	15	0	15	0
16:15:00	36	7	242	26	90	4	1	0	2	0	3	0	0	0	4	0	18	3	15	0
16:30:00	41	5	255	13	103	13	1	0	2	0	3	0	0	0	4	0	18	0	16	1
16:45:00	45	4	269	14	111	8	1	0	2	0	3	0	0	0	4	0	19	1	17	1
17:00:00	51	6	283	14	121	10	1	0	2	0	3	0	0	0	4	0	19	0	17	0
17:15:00	57	6	299	16	134	13	1	0	2	0	3	0	0	0	4	0	20	1	17	0
17:30:00	57	0	326	27	146	12	1	0	2	0	3	0	0	0	4	0	20	0	19	2
17:45:00	60	3	341	15	154	8	1	0	2	0	3	0	0	0	4	0	20	0	19	0
18:00:00	64	4	357	16	158	4	1	0	2	0	3	0	0	0	4	0	20	0	19	0
18:15:00	64	0	357	0	158	0	1	0	2	0	3	0	0	0	4	0	20	0	19	0
18:15:15	64	0	357	0	158	0	1	0	2	0	3	0	0	0	4	0	20	0	19	0

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis

Count Date: 28-Sep-23 Site #: 2321600002

Interval Time	Passenger Cars - East Approach						Trucks - East Approach						Buses - East Approach						Pedestrians	
	Left		Thru		Right		Left		Thru		Right		Left		Thru		Right		East Cross	
	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr
7:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15:00	0	0	1	1	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30:00	0	0	2	1	4	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45:00	0	0	3	1	6	2	0	0	0	0	0	0	0	0	0	0	0	0	4	4
8:00:00	0	0	4	1	7	1	0	0	0	0	0	0	0	0	0	0	0	0	4	0
8:15:00	0	0	6	2	10	3	1	1	0	0	0	0	0	0	0	0	0	0	4	0
8:30:00	0	0	8	2	14	4	1	0	0	0	0	0	0	0	0	0	0	0	6	2
8:45:00	0	0	10	2	18	4	3	2	0	0	1	1	0	0	0	0	0	0	7	1
9:00:00	1	1	11	1	20	2	3	0	0	0	1	0	0	0	0	0	0	0	7	0
9:15:00	1	0	11	0	21	1	3	0	0	0	2	1	0	0	0	0	0	0	7	0
9:30:00	2	1	13	2	23	2	3	0	0	0	2	0	0	0	0	0	0	0	7	0
9:45:00	2	0	14	1	23	0	3	0	0	0	2	0	0	0	0	0	0	0	7	0
10:00:00	6	4	14	0	31	8	4	1	0	0	2	0	0	0	0	0	0	0	10	3
10:15:00	6	0	14	0	31	0	4	0	0	0	2	0	0	0	0	0	0	0	10	0
15:00:00	6	0	14	0	31	0	4	0	0	0	2	0	0	0	0	0	0	0	10	0
15:15:00	8	2	15	1	33	2	4	0	0	0	2	0	0	0	0	0	0	0	11	1
15:30:00	9	1	17	2	34	1	4	0	0	0	2	0	0	0	0	0	0	0	13	2
15:45:00	9	0	18	1	35	1	5	1	0	0	2	0	0	0	0	0	0	0	14	1
16:00:00	9	0	19	1	38	3	5	0	0	0	2	0	0	0	0	0	0	0	14	0
16:15:00	9	0	20	1	40	2	5	0	0	0	2	0	0	0	0	0	0	0	14	0
16:30:00	9	0	20	0	40	0	5	0	0	0	2	0	0	0	0	0	0	0	14	0
16:45:00	9	0	21	1	42	2	5	0	0	0	2	0	0	0	0	0	0	0	19	5
17:00:00	9	0	22	1	44	2	5	0	0	0	2	0	0	0	0	0	0	0	20	1
17:15:00	9	0	22	0	44	0	5	0	0	0	2	0	0	0	0	0	0	0	20	0
17:30:00	11	2	22	0	47	3	5	0	0	0	2	0	0	0	0	0	0	0	23	3
17:45:00	11	0	24	2	48	1	5	0	0	0	2	0	0	0	0	0	0	0	24	1
18:00:00	11	0	27	3	49	1	5	0	0	0	2	0	0	0	0	0	0	0	24	0
18:15:00	11	0	27	0	49	0	5	0	0	0	2	0	0	0	0	0	0	0	24	0
18:15:15	11	0	27	0	49	0	5	0	0	0	2	0	0	0	0	0	0	0	24	0

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis

Count Date: 28-Sep-23 Site #: 2321600002

Interval Time	Passenger Cars - South Approach						Trucks - South Approach						Buses - South Approach						Pedestrians	
	Left		Thru		Right		Left		Thru		Right		Left		Thru		Right		South Cross	
	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr
7:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15:00	1	1	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30:00	1	0	7	4	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45:00	3	2	11	4	1	0	0	0	0	0	0	0	0	0	1	1	0	0	5	5
8:00:00	3	0	22	11	1	0	0	0	0	0	0	0	0	0	1	0	0	0	8	3
8:15:00	7	4	37	15	1	0	0	0	0	0	0	0	0	0	1	0	0	0	10	2
8:30:00	8	1	49	12	1	0	0	0	0	0	0	0	0	0	2	1	0	0	10	0
8:45:00	8	0	59	10	1	0	0	0	0	0	1	1	0	0	3	1	0	0	10	0
9:00:00	12	4	69	10	2	1	0	0	0	0	1	0	0	0	3	0	0	0	10	0
9:15:00	14	2	79	10	2	0	0	0	0	0	1	0	0	0	3	0	0	0	12	2
9:30:00	16	2	91	12	3	1	0	0	1	1	2	1	0	0	3	0	0	0	12	0
9:45:00	17	1	98	7	3	0	0	0	1	0	2	0	0	0	3	0	0	0	12	0
10:00:00	19	2	106	8	3	0	0	0	1	0	2	0	0	0	3	0	0	0	15	3
10:15:00	19	0	106	0	3	0	0	0	1	0	2	0	0	0	3	0	0	0	15	0
15:00:00	19	0	106	0	3	0	0	0	1	0	2	0	0	0	3	0	0	0	15	0
15:15:00	23	4	122	16	3	0	0	0	2	1	2	0	0	0	3	0	0	0	17	2
15:30:00	26	3	130	8	4	1	0	0	2	0	3	1	0	0	4	1	0	0	21	4
15:45:00	39	13	141	11	4	0	0	0	2	0	3	0	0	0	4	0	0	0	21	0
16:00:00	41	2	156	15	4	0	0	0	3	1	3	0	1	1	5	1	0	0	21	0
16:15:00	59	18	174	18	4	0	0	0	4	1	3	0	1	0	5	0	0	0	22	1
16:30:00	65	6	188	14	5	1	0	0	4	0	3	0	1	0	5	0	0	0	23	1
16:45:00	68	3	205	17	5	0	0	0	4	0	3	0	1	0	5	0	0	0	28	5
17:00:00	74	6	221	16	5	0	0	0	4	0	3	0	1	0	5	0	0	0	31	3
17:15:00	78	4	231	10	6	1	0	0	4	0	3	0	1	0	5	0	0	0	33	2
17:30:00	81	3	243	12	7	1	0	0	4	0	3	0	1	0	5	0	0	0	34	1
17:45:00	87	6	261	18	7	0	0	0	4	0	3	0	1	0	6	1	0	0	34	0
18:00:00	92	5	285	24	7	0	0	0	4	0	3	0	2	1	6	0	0	0	37	3
18:15:00	92	0	285	0	7	0	0	0	4	0	3	0	2	0	6	0	0	0	37	0
18:15:15	92	0	285	0	7	0	0	0	4	0	3	0	2	0	6	0	0	0	37	0

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis

Count Date: 28-Sep-23 Site #: 2321600002

Interval Time	Passenger Cars - West Approach						Trucks - West Approach						Buses - West Approach						Pedestrians	
	Left		Thru		Right		Left		Thru		Right		Left		Thru		Right		West Cross	
	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr
7:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15:00	4	4	0	0	6	6	0	0	0	0	0	0	0	0	0	0	0	0	1	1
7:30:00	8	4	1	1	10	4	0	0	0	0	0	0	1	1	0	0	0	0	6	5
7:45:00	8	0	1	0	15	5	0	0	0	0	0	0	1	0	0	0	1	1	6	0
8:00:00	13	5	2	1	16	1	0	0	1	1	0	0	2	1	0	0	1	0	14	8
8:15:00	18	5	2	0	21	5	1	1	1	0	0	0	3	1	0	0	1	0	14	0
8:30:00	23	5	2	0	24	3	1	0	3	2	0	0	3	0	0	0	1	0	14	0
8:45:00	40	17	2	0	28	4	1	0	4	1	0	0	5	2	0	0	1	0	14	0
9:00:00	47	7	2	0	34	6	1	0	4	0	0	0	6	1	0	0	1	0	16	2
9:15:00	51	4	3	1	36	2	1	0	5	1	0	0	7	1	0	0	1	0	18	2
9:30:00	55	4	3	0	40	4	2	1	5	0	0	0	7	0	0	0	1	0	18	0
9:45:00	59	4	3	0	43	3	2	0	5	0	0	0	7	0	0	0	1	0	18	0
10:00:00	61	2	5	2	49	6	2	0	5	0	0	0	7	0	0	0	1	0	19	1
10:15:00	61	0	5	0	49	0	2	0	5	0	0	0	7	0	0	0	1	0	19	0
15:00:00	61	0	5	0	49	0	2	0	5	0	0	0	7	0	0	0	1	0	19	0
15:15:00	70	9	9	4	52	3	2	0	5	0	0	0	7	0	0	0	1	0	19	0
15:30:00	73	3	11	2	55	3	2	0	5	0	0	0	7	0	0	0	1	0	23	4
15:45:00	76	3	14	3	59	4	2	0	5	0	0	0	7	0	0	0	1	0	23	0
16:00:00	81	5	15	1	61	2	2	0	5	0	0	0	8	1	0	0	1	0	23	0
16:15:00	88	7	16	1	62	1	2	0	5	0	0	0	8	0	0	0	1	0	25	2
16:30:00	92	4	16	0	64	2	2	0	5	0	0	0	8	0	0	0	1	0	26	1
16:45:00	97	5	21	5	67	3	2	0	5	0	0	0	8	0	0	0	1	0	26	0
17:00:00	103	6	23	2	68	1	2	0	5	0	0	0	8	0	0	0	1	0	26	0
17:15:00	117	14	23	0	72	4	2	0	5	0	0	0	8	0	0	0	1	0	28	2
17:30:00	122	5	23	0	74	2	2	0	5	0	0	0	8	0	0	0	1	0	29	1
17:45:00	129	7	25	2	77	3	2	0	5	0	0	0	8	0	0	0	1	0	29	0
18:00:00	134	5	29	4	77	0	2	0	5	0	0	0	8	0	0	0	1	0	29	0
18:15:00	134	0	29	0	77	0	2	0	5	0	0	0	8	0	0	0	1	0	29	0
18:15:15	134	0	29	0	77	0	2	0	5	0	0	0	8	0	0	0	1	0	29	0

Appendix C:
Level of Service Definitions

TATHAM ENGINEERING

Level of Service – Unsignalized Intersections

Level of Service (LOS) for unsignalized intersections is defined in terms of control delay for each critical lane. Control delay includes initial deceleration, queue move-up time, stopped delay and final acceleration delay, and is a function of the service rate or capacity of the approach and degree of saturation.

The following table describes in detail the characteristics of each level of service, with A being the best and F being the worst.

LOS	EXPECTED DELAY TO STREET TRAFFIC	DELAY (sec/veh)
A	Little or no delays	$0 < d \leq 10$
B	Short traffic delays	$10 < d \leq 15$
C	Average traffic delays	$15 < d \leq 25$
D	Long traffic delays	$25 < d \leq 35$
E	Very long traffic delays	$35 < d \leq 50$
F	Extreme delays with queuing which may cause congestion affecting other traffic movements in the intersection	$50 < d$

source: 2010 Highway Capacity Manual

TATHAM ENGINEERING

Level of Service – Signalized Intersections

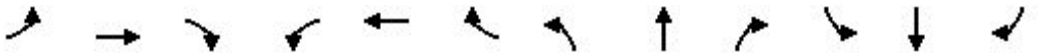
Level of Service (LOS) for signalized intersections is defined in terms of delay, which is made up of a number of factors that relate to control, geometrics, traffic and incidents. Only the portion of total delay attributed to the control facility is quantified. This control delay includes initial deceleration, queue move-up time, stopped delay and final acceleration delay.

The following table describes in detail the characteristics of each level of service, with A being the best and F being the worst.

LOS	EXPECTED DELAY TO STREET TRAFFIC	DELAY (sec/veh)
A	This level of service occurs when progression is extremely favorable and most vehicles arrive during the green phase. Most vehicles do not stop at all at this LOS. Short cycle lengths may also contribute to low delay.	$0 < d \leq 10$
B	This level generally occurs with good progression, short cycle lengths, or both. More vehicles stop at this level than at LOS A, causing longer average delays.	$10 < d \leq 20$
C	These higher delays may result from fair progression, longer cycle length, or both. Individual cycle failures may begin to appear at this level. The number of vehicles stopping is significant, though many still pass through the intersection without stopping.	$20 < d \leq 35$
D	At this level, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavourable progression, long cycle lengths, or high volume to capacity ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures become noticeable.	$35 < d \leq 55$
E	This level is considered by many agencies to be the limit of acceptable delay. These high delay values generally indicate poor progression, long cycle lengths, and high v/c ratios. Individual cycle failures are frequent occurrences.	$55 < d \leq 80$
F	At this level, oversaturation occurs when arrival flow rates exceed the design capacity of the intersection. It may also occur at high v/c ratios below 1.0 with many individual cycle failures. Poor progression and long cycle lengths may also be major contributing factors to such high delay levels. LOS F is considered to be unacceptable to most drivers.	$80 < d$

source: 2010 Highway Capacity Manual

Appendix D:
Existing Operations Worksheets

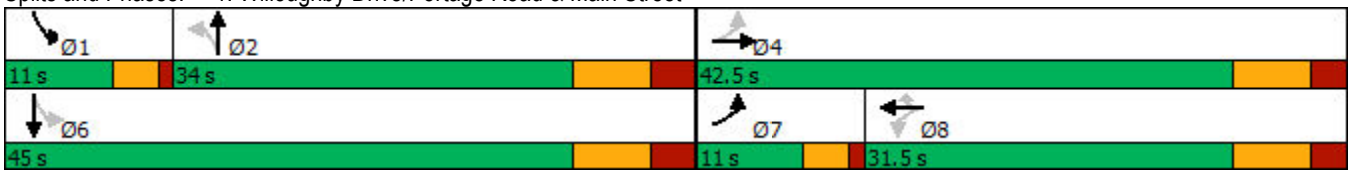


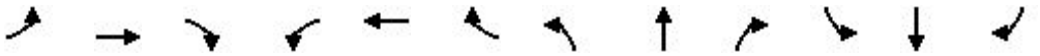
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	213	30	38	1	24	32	29	250	5	68	157	136
Future Volume (vph)	213	30	38	1	24	32	29	250	5	68	157	136
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	25.0		0.0	0.0		15.0	0.0		0.0	20.0		0.0
Storage Lanes	1		0	0		1	0		0	1		0
Taper Length (m)	25.0			25.0			25.0			25.0		
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	0.99	0.98			1.00	0.97		1.00		1.00	0.98	
Frt		0.916				0.850		0.997			0.930	
Flt Protected	0.950				0.998			0.995		0.950		
Satd. Flow (prot)	1648	1404	0	0	1731	1406	0	1663	0	1648	1507	0
Flt Permitted	0.560				0.988			0.927		0.455		
Satd. Flow (perm)	957	1404	0	0	1714	1362	0	1548	0	785	1507	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		42				162		1			62	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		140.4			117.0			399.6			174.8	
Travel Time (s)		10.1			8.4			28.8			12.6	
Confl. Peds. (#/hr)	9		7	4		6	7		4	6		9
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	2%	15%	12%	2%	2%	7%	2%	6%	2%	2%	6%	9%
Adj. Flow (vph)	237	33	42	1	27	36	32	278	6	76	174	151
Shared Lane Traffic (%)												
Lane Group Flow (vph)	237	75	0	0	28	36	0	316	0	76	325	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	1		1	1	1	1	0		1	0	
Detector Template	Left			Left		Right	Left			Left		
Leading Detector (m)	6.1	1.8		6.1	1.8	6.1	6.1	0.0		6.1	0.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8	6.1	6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8		8	2			6		
Detector Phase	7	4		8	8	8	2	2		1	6	
Switch Phase												

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	7.0	10.0		10.0	10.0	10.0	20.0	20.0		7.0	20.0	
Minimum Split (s)	11.0	31.5		31.5	31.5	31.5	34.0	34.0		11.0	34.0	
Total Split (s)	11.0	42.5		31.5	31.5	31.5	34.0	34.0		11.0	45.0	
Total Split (%)	12.6%	48.6%		36.0%	36.0%	36.0%	38.9%	38.9%		12.6%	51.4%	
Maximum Green (s)	7.0	35.0		24.0	24.0	24.0	26.0	26.0		7.0	37.0	
Yellow Time (s)	3.0	5.0		5.0	5.0	5.0	5.0	5.0		3.0	5.0	
All-Red Time (s)	1.0	2.5		2.5	2.5	2.5	3.0	3.0		1.0	3.0	
Lost Time Adjust (s)	0.0	0.0			0.0	0.0		0.0		0.0	0.0	
Total Lost Time (s)	4.0	7.5			7.5	7.5		8.0		4.0	8.0	
Lead/Lag	Lead			Lag	Lag	Lag	Lag	Lag		Lead		
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes	Yes		Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	Min		Min	Min	Min	Min	Min		None	Min	
Walk Time (s)		9.0		9.0	9.0	9.0	10.0	10.0			10.0	
Flash Dont Walk (s)		15.0		15.0	15.0	15.0	16.0	16.0			16.0	
Pedestrian Calls (#/hr)		3		4	4	4	0	0			2	
Act Effct Green (s)	27.2	23.6			12.4	12.4		21.6		34.2	30.1	
Actuated g/C Ratio	0.39	0.34			0.18	0.18		0.31		0.49	0.43	
v/c Ratio	0.53	0.15			0.09	0.10		0.66		0.16	0.47	
Control Delay	21.3	10.0			25.4	0.5		30.0		11.0	14.2	
Queue Delay	0.0	0.0			0.0	0.0		0.0		0.0	0.0	
Total Delay	21.3	10.0			25.4	0.5		30.0		11.0	14.2	
LOS	C	A			C	A		C		B	B	
Approach Delay		18.5			11.4			30.0			13.6	
Approach LOS		B			B			C			B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 87.5			
Actuated Cycle Length: 69.6			
Natural Cycle: 90			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.66			
Intersection Signal Delay: 19.6		Intersection LOS: B	
Intersection Capacity Utilization 73.5%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 1: Willoughby Drive/Portage Road & Main Street





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	213	30	38	1	24	32	29	250	5	68	157	136
Future Volume (vph)	213	30	38	1	24	32	29	250	5	68	157	136
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	7.5			7.5	7.5		8.0		4.0	8.0	
Lane Util. Factor	1.00	1.00			1.00	1.00		1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.98			1.00	0.97		1.00		1.00	0.99	
Flpb, ped/bikes	0.99	1.00			1.00	1.00		1.00		1.00	1.00	
Frt	1.00	0.92			1.00	0.85		1.00		1.00	0.93	
Flt Protected	0.95	1.00			1.00	1.00		0.99		0.95	1.00	
Satd. Flow (prot)	1638	1406			1731	1365		1662		1645	1510	
Flt Permitted	0.56	1.00			0.99	1.00		0.93		0.46	1.00	
Satd. Flow (perm)	965	1406			1714	1365		1550		788	1510	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	237	33	42	1	27	36	32	278	6	76	174	151
RTOR Reduction (vph)	0	28	0	0	0	30	0	1	0	0	35	0
Lane Group Flow (vph)	237	47	0	0	28	6	0	315	0	76	290	0
Confl. Peds. (#/hr)	9		7	4		6	7		4	6		9
Heavy Vehicles (%)	2%	15%	12%	2%	2%	7%	2%	6%	2%	2%	6%	9%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	23.6	23.6			12.5	12.5		21.6		31.0	31.0	
Effective Green, g (s)	23.6	23.6			12.5	12.5		21.6		31.0	31.0	
Actuated g/C Ratio	0.34	0.34			0.18	0.18		0.31		0.44	0.44	
Clearance Time (s)	4.0	7.5			7.5	7.5		8.0		4.0	8.0	
Vehicle Extension (s)	3.0	3.0			3.0	3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)	393	473			305	243		477		414	667	
v/s Ratio Prot	c0.06	0.03								0.01	c0.19	
v/s Ratio Perm	c0.14				0.02	0.00		c0.20		0.07		
v/c Ratio	0.60	0.10			0.09	0.03		0.66		0.18	0.44	
Uniform Delay, d1	18.5	16.0			24.1	23.8		21.1		12.1	13.5	
Progression Factor	1.00	1.00			1.00	1.00		1.00		1.00	1.00	
Incremental Delay, d2	2.6	0.1			0.1	0.0		3.4		0.2	0.5	
Delay (s)	21.1	16.1			24.2	23.8		24.5		12.3	14.0	
Level of Service	C	B			C	C		C		B	B	
Approach Delay (s)		19.9			24.0			24.5			13.6	
Approach LOS		B			C			C			B	

Intersection Summary			
HCM 2000 Control Delay	19.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	70.1	Sum of lost time (s)	23.5
Intersection Capacity Utilization	73.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

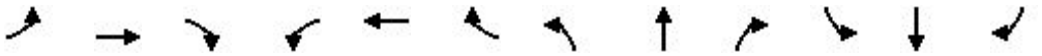
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	22	134	82	38	88	88
Future Volume (vph)	22	134	82	38	88	88
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.884		0.957			
Flt Protected	0.993					0.976
Satd. Flow (prot)	1523	0	1612	0	0	1677
Flt Permitted	0.993					0.976
Satd. Flow (perm)	1523	0	1612	0	0	1677
Link Speed (k/h)	50		50			50
Link Distance (m)	112.0		177.9			249.8
Travel Time (s)	8.1		12.8			18.0
Confl. Peds. (#/hr)	30	2		30	2	
Peak Hour Factor	0.66	0.66	0.66	0.66	0.66	0.66
Heavy Vehicles (%)	2%	2%	6%	3%	3%	3%
Adj. Flow (vph)	33	203	124	58	133	133
Shared Lane Traffic (%)						
Lane Group Flow (vph)	236	0	182	0	0	266
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.7		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.9		4.9			4.9
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24	14		14	24	
Sign Control	Stop		Stop			Stop

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	34.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	22	134	82	38	88	88
Future Volume (vph)	22	134	82	38	88	88
Peak Hour Factor	0.66	0.66	0.66	0.66	0.66	0.66
Hourly flow rate (vph)	33	203	124	58	133	133

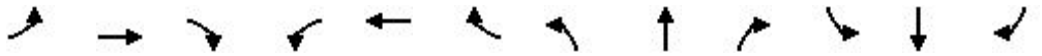
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	236	182	266
Volume Left (vph)	33	0	133
Volume Right (vph)	203	58	0
Hadj (s)	-0.45	-0.11	0.15
Departure Headway (s)	4.5	4.7	4.9
Degree Utilization, x	0.30	0.24	0.36
Capacity (veh/h)	735	720	705
Control Delay (s)	9.4	9.2	10.5
Approach Delay (s)	9.4	9.2	10.5
Approach LOS	A	A	B

Intersection Summary			
Delay	9.8		
Level of Service	A		
Intersection Capacity Utilization	34.3%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	40	3	18	4	7	14	9	50	2	4	43	28
Future Volume (vph)	40	3	18	4	7	14	9	50	2	4	43	28
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												
Frt		0.960			0.923			0.996			0.950	
Flt Protected		0.969			0.992			0.993			0.997	
Satd. Flow (prot)	0	1525	0	0	1385	0	0	1694	0	0	1614	0
Flt Permitted		0.969			0.992			0.993			0.997	
Satd. Flow (perm)	0	1525	0	0	1385	0	0	1694	0	0	1614	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		265.5			209.0			181.2			264.5	
Travel Time (s)		19.1			15.0			13.0			19.0	
Confl. Peds. (#/hr)	4		4	5		5	4		5	5		4
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Heavy Vehicles (%)	3%	100%	2%	75%	2%	7%	2%	2%	50%	2%	2%	7%
Adj. Flow (vph)	48	4	22	5	8	17	11	60	2	5	52	34
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	74	0	0	30	0	0	73	0	0	91	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Stop			Stop			Free			Free	

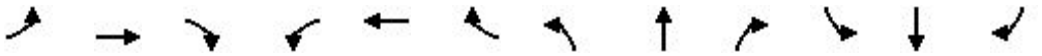
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 25.1%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	40	3	18	4	7	14	9	50	2	4	43	28
Future Volume (Veh/h)	40	3	18	4	7	14	9	50	2	4	43	28
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Hourly flow rate (vph)	48	4	22	5	8	17	11	60	2	5	52	34
Pedestrians		4			5			5			5	
Lane Width (m)		3.7			3.7			3.7			3.7	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		0			0			0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	192	172	78	196	188	71	90			67		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	192	172	78	196	188	71	90			67		
tC, single (s)	7.1	7.5	6.2	7.8	6.5	6.3	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.9	3.3	4.2	4.0	3.4	2.2			2.2		
p0 queue free %	93	99	98	99	99	98	99			100		
cM capacity (veh/h)	729	565	975	598	694	969	1500			1528		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	74	30	73	91
Volume Left	48	5	11	5
Volume Right	22	17	2	34
cSH	775	801	1500	1528
Volume to Capacity	0.10	0.04	0.01	0.00
Queue Length 95th (m)	2.4	0.9	0.2	0.1
Control Delay (s)	10.1	9.7	1.2	0.4
Lane LOS	B	A	A	A
Approach Delay (s)	10.1	9.7	1.2	0.4
Approach LOS	B	A		

Intersection Summary				
Average Delay	4.3			
Intersection Capacity Utilization	25.1%	ICU Level of Service	A	
Analysis Period (min)	15			

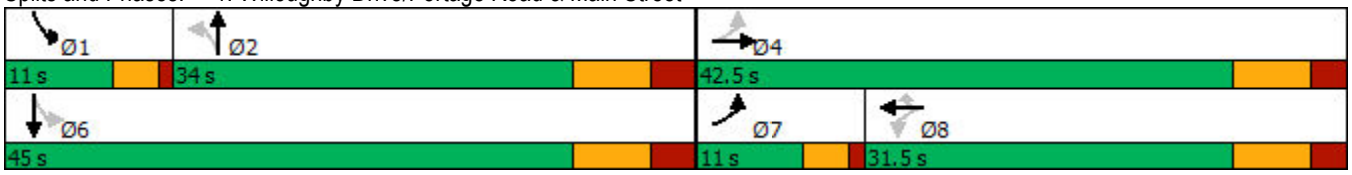


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	181	59	50	3	47	32	35	241	7	141	246	260
Future Volume (vph)	181	59	50	3	47	32	35	241	7	141	246	260
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	25.0		0.0	0.0		15.0	0.0		0.0	20.0		0.0
Storage Lanes	1		0	0		1	0		0	1		0
Taper Length (m)	25.0			25.0			25.0			25.0		
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	0.97	0.98			1.00	0.95		1.00		0.99	0.97	
Frt		0.931				0.850		0.996			0.923	
Flt Protected	0.950				0.997			0.994		0.950		
Satd. Flow (prot)	1616	1554	0	0	1730	1406	0	1700	0	1648	1546	0
Flt Permitted	0.546				0.978			0.868		0.463		
Satd. Flow (perm)	903	1554	0	0	1695	1335	0	1483	0	792	1546	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		54				162		2			75	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		140.4			117.0			399.6			174.8	
Travel Time (s)		10.1			8.4			28.8			12.6	
Confl. Peds. (#/hr)	18		10	9		17	10		9	17		18
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	4%	6%	2%	2%	2%	7%	3%	3%	2%	2%	4%	2%
Adj. Flow (vph)	195	63	54	3	51	34	38	259	8	152	265	280
Shared Lane Traffic (%)												
Lane Group Flow (vph)	195	117	0	0	54	34	0	305	0	152	545	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	1		1	1	1	1	0		1	0	
Detector Template	Left			Left		Right	Left			Left		
Leading Detector (m)	6.1	1.8		6.1	1.8	6.1	6.1	0.0		6.1	0.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8	6.1	6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8		8	2			6		
Detector Phase	7	4		8	8	8	2	2		1	6	
Switch Phase												

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	7.0	10.0		10.0	10.0	10.0	20.0	20.0		7.0	20.0	
Minimum Split (s)	11.0	31.5		31.5	31.5	31.5	34.0	34.0		11.0	34.0	
Total Split (s)	11.0	42.5		31.5	31.5	31.5	34.0	34.0		11.0	45.0	
Total Split (%)	12.6%	48.6%		36.0%	36.0%	36.0%	38.9%	38.9%		12.6%	51.4%	
Maximum Green (s)	7.0	35.0		24.0	24.0	24.0	26.0	26.0		7.0	37.0	
Yellow Time (s)	3.0	5.0		5.0	5.0	5.0	5.0	5.0		3.0	5.0	
All-Red Time (s)	1.0	2.5		2.5	2.5	2.5	3.0	3.0		1.0	3.0	
Lost Time Adjust (s)	0.0	0.0			0.0	0.0		0.0		0.0	0.0	
Total Lost Time (s)	4.0	7.5			7.5	7.5		8.0		4.0	8.0	
Lead/Lag	Lead			Lag	Lag	Lag	Lag	Lag		Lead		
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes	Yes		Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	Min		Min	Min	Min	Min	Min		None	Min	
Walk Time (s)		9.0		9.0	9.0	9.0	10.0	10.0			10.0	
Flash Dont Walk (s)		15.0		15.0	15.0	15.0	16.0	16.0			16.0	
Pedestrian Calls (#/hr)		3		9	9	9	3	3			4	
Act Effct Green (s)	27.0	23.5			12.4	12.4		21.5		36.7	32.6	
Actuated g/C Ratio	0.38	0.33			0.17	0.17		0.30		0.51	0.45	
v/c Ratio	0.48	0.21			0.18	0.09		0.68		0.31	0.73	
Control Delay	20.4	11.3			26.8	0.5		31.9		12.3	21.7	
Queue Delay	0.0	0.0			0.0	0.0		0.0		0.0	0.0	
Total Delay	20.4	11.3			26.8	0.5		31.9		12.3	21.7	
LOS	C	B			C	A		C		B	C	
Approach Delay		17.0			16.6			31.9			19.7	
Approach LOS		B			B			C			B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 87.5			
Actuated Cycle Length: 71.8			
Natural Cycle: 90			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.73			
Intersection Signal Delay: 21.5		Intersection LOS: C	
Intersection Capacity Utilization 77.6%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 1: Willoughby Drive/Portage Road & Main Street



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	181	59	50	3	47	32	35	241	7	141	246	260
Future Volume (vph)	181	59	50	3	47	32	35	241	7	141	246	260
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	7.5			7.5	7.5		8.0		4.0	8.0	
Lane Util. Factor	1.00	1.00			1.00	1.00		1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.98			1.00	0.96		1.00		1.00	0.98	
Flpb, ped/bikes	0.99	1.00			1.00	1.00		1.00		0.99	1.00	
Frt	1.00	0.93			1.00	0.85		1.00		1.00	0.92	
Flt Protected	0.95	1.00			1.00	1.00		0.99		0.95	1.00	
Satd. Flow (prot)	1597	1556			1729	1343		1699		1639	1550	
Flt Permitted	0.55	1.00			0.98	1.00		0.87		0.46	1.00	
Satd. Flow (perm)	917	1556			1695	1343		1484		798	1550	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	195	63	54	3	51	34	38	259	8	152	265	280
RTOR Reduction (vph)	0	36	0	0	0	28	0	1	0	0	41	0
Lane Group Flow (vph)	195	81	0	0	54	6	0	304	0	152	504	0
Confl. Peds. (#/hr)	18		10	9		17	10		9	17		18
Heavy Vehicles (%)	4%	6%	2%	2%	2%	7%	3%	3%	2%	2%	4%	2%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	23.5	23.5			12.4	12.4		21.6		32.7	32.7	
Effective Green, g (s)	23.5	23.5			12.4	12.4		21.6		32.7	32.7	
Actuated g/C Ratio	0.33	0.33			0.17	0.17		0.30		0.46	0.46	
Clearance Time (s)	4.0	7.5			7.5	7.5		8.0		4.0	8.0	
Vehicle Extension (s)	3.0	3.0			3.0	3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)	367	509			293	232		447		447	706	
v/s Ratio Prot	c0.05	0.05								0.03	c0.33	
v/s Ratio Perm	c0.12				0.03	0.00		0.20		0.12		
v/c Ratio	0.53	0.16			0.18	0.03		0.68		0.34	0.71	
Uniform Delay, d1	18.6	17.1			25.3	24.6		22.0		12.4	15.7	
Progression Factor	1.00	1.00			1.00	1.00		1.00		1.00	1.00	
Incremental Delay, d2	1.5	0.1			0.3	0.0		4.1		0.5	3.4	
Delay (s)	20.1	17.2			25.6	24.7		26.1		12.8	19.2	
Level of Service	C	B			C	C		C		B	B	
Approach Delay (s)		19.0			25.3			26.1			17.8	
Approach LOS		B			C			C			B	

Intersection Summary			
HCM 2000 Control Delay	20.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	71.7	Sum of lost time (s)	23.5
Intersection Capacity Utilization	77.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

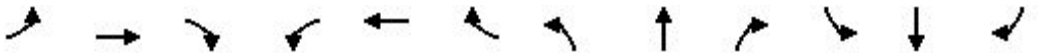
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	39	75	97	43	119	143
Future Volume (vph)	39	75	97	43	119	143
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.911		0.958			
Flt Protected	0.983					0.978
Satd. Flow (prot)	1553	0	1662	0	0	1697
Flt Permitted	0.983					0.978
Satd. Flow (perm)	1553	0	1662	0	0	1697
Link Speed (k/h)	50		50			50
Link Distance (m)	112.0		177.9			249.8
Travel Time (s)	8.1		12.8			18.0
Confl. Peds. (#/hr)	21	4		21	4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	42	82	105	47	129	155
Shared Lane Traffic (%)						
Lane Group Flow (vph)	124	0	152	0	0	284
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.7		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.9		4.9			4.9
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24	14		14	24	
Sign Control	Stop		Stop			Stop

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 44.9%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	39	75	97	43	119	143
Future Volume (vph)	39	75	97	43	119	143
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	42	82	105	47	129	155

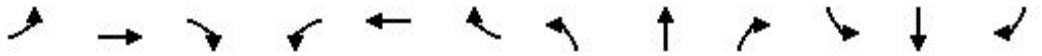
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	124	152	284
Volume Left (vph)	42	0	129
Volume Right (vph)	82	47	0
Hadj (s)	-0.30	-0.15	0.12
Departure Headway (s)	4.6	4.4	4.5
Degree Utilization, x	0.16	0.18	0.35
Capacity (veh/h)	717	787	772
Control Delay (s)	8.5	8.4	10.0
Approach Delay (s)	8.5	8.4	10.0
Approach LOS	A	A	A

Intersection Summary			
Delay	9.2		
Level of Service	A		
Intersection Capacity Utilization	44.9%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	22	8	7	0	3	6	34	67	1	22	68	40
Future Volume (vph)	22	8	7	0	3	6	34	67	1	22	68	40
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												
Frt		0.975			0.910			0.999			0.958	
Flt Protected		0.971						0.984			0.991	
Satd. Flow (prot)	0	1642	0	0	1579	0	0	1705	0	0	1647	0
Flt Permitted		0.971						0.984			0.991	
Satd. Flow (perm)	0	1642	0	0	1579	0	0	1705	0	0	1647	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		265.5			209.0			181.2			264.5	
Travel Time (s)		19.1			15.0			13.0			19.0	
Confl. Peds. (#/hr)	5		13	16		8	13		16	8		5
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
Adj. Flow (vph)	29	10	9	0	4	8	44	87	1	29	88	52
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	48	0	0	12	0	0	132	0	0	169	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 29.1%		ICU Level of Service A	
Analysis Period (min) 15			

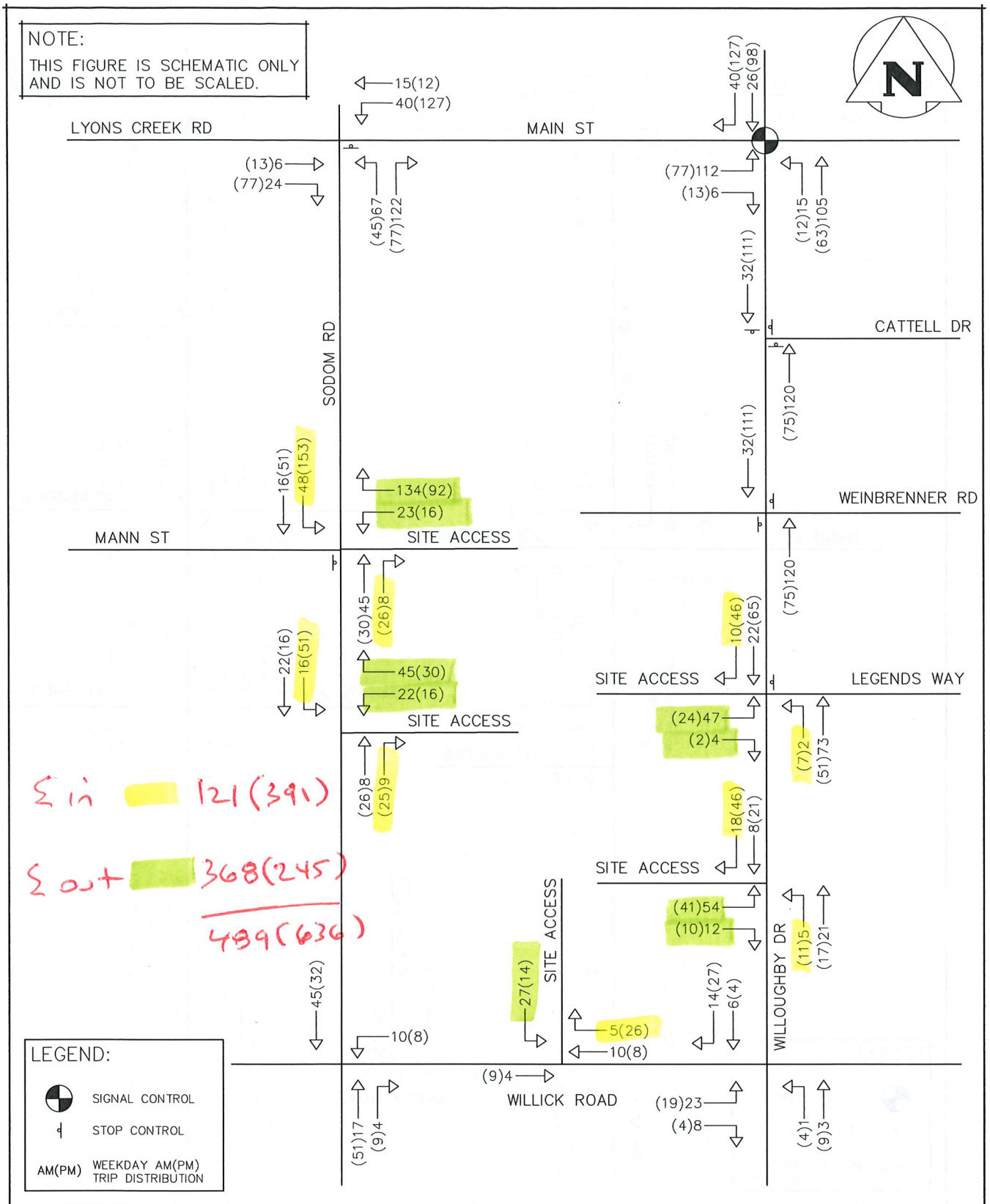


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	22	8	7	0	3	6	34	67	1	22	68	40
Future Volume (Veh/h)	22	8	7	0	3	6	34	67	1	22	68	40
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
Hourly flow rate (vph)	29	10	9	0	4	8	44	87	1	29	88	52
Pedestrians		13			16			16			8	
Lane Width (m)		3.7			3.7			3.7			3.7	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		1			1			1			1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	378	377	143	394	402	112	153			104		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	378	377	143	394	402	112	153			104		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	95	98	99	100	99	99	97			98		
cM capacity (veh/h)	529	514	882	507	497	922	1412			1467		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	48	12	132	169
Volume Left	29	0	44	29
Volume Right	9	8	1	52
cSH	568	718	1412	1467
Volume to Capacity	0.08	0.02	0.03	0.02
Queue Length 95th (m)	2.1	0.4	0.7	0.5
Control Delay (s)	11.9	10.1	2.7	1.4
Lane LOS	B	B	A	A
Approach Delay (s)	11.9	10.1	2.7	1.4
Approach LOS	B	B		

Intersection Summary				
Average Delay	3.6			
Intersection Capacity Utilization	29.1%	ICU Level of Service	A	
Analysis Period (min)	15			

Appendix E: Background Development Excerpts



QUEENSWAY CHIPPAWA EAST
CITY OF NIAGARA FALLS

SITE TRIP ASSIGNMENT

CROZIER & ASSOCIATES
Consulting Engineers
2800 High Point Drive
Suite 100
Milton, ON L9T 6P4
905 875-0026 T
905 875-4915 F
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Drawn	Design	Project No.	
A.K.	K.S.		1483-4804
Check	Check	Scale	Dwg.
A.W.	A.W.	N.T.S	FIG. 09

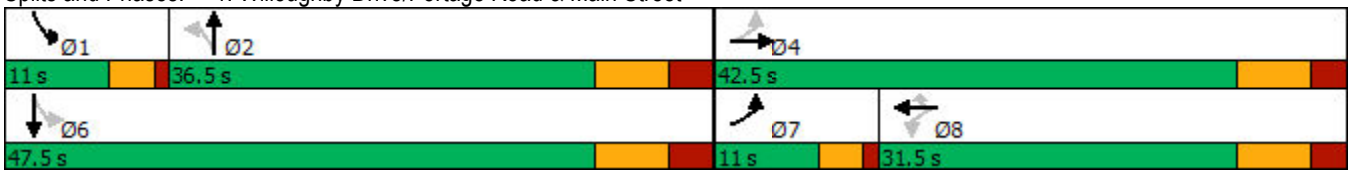
Appendix F: Background Operations Worksheets

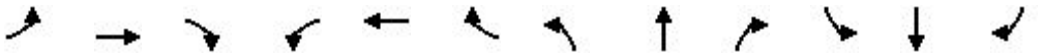
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	293	32	44	1	25	33	38	303	5	72	182	169
Future Volume (vph)	293	32	44	1	25	33	38	303	5	72	182	169
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	25.0		0.0	0.0		15.0	0.0		0.0	20.0		0.0
Storage Lanes	1		0	0		1	0		0	1		0
Taper Length (m)	25.0			25.0			25.0			25.0		
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	0.99	0.98			1.00	0.97		1.00		1.00	0.98	
Frt		0.914				0.850		0.998			0.928	
Flt Protected	0.950				0.998			0.995		0.950		
Satd. Flow (prot)	1648	1401	0	0	1731	1406	0	1665	0	1648	1502	0
Flt Permitted	0.559				0.988			0.910		0.409		
Satd. Flow (perm)	955	1401	0	0	1714	1362	0	1521	0	706	1502	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		49				158		1			66	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		140.4			117.0			399.6			174.8	
Travel Time (s)		10.1			8.4			28.8			12.6	
Confl. Peds. (#/hr)	9		7	4		6	7		4	6		9
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	2%	15%	12%	2%	2%	7%	2%	6%	2%	2%	6%	9%
Adj. Flow (vph)	326	36	49	1	28	37	42	337	6	80	202	188
Shared Lane Traffic (%)												
Lane Group Flow (vph)	326	85	0	0	29	37	0	385	0	80	390	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	1		1	1	1	1	0		1	0	
Detector Template	Left			Left		Right	Left			Left		
Leading Detector (m)	6.1	1.8		6.1	1.8	6.1	6.1	0.0		6.1	0.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8	6.1	6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8		8	2			6		
Detector Phase	7	4		8	8	8	2	2		1	6	
Switch Phase												

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	7.0	10.0		10.0	10.0	10.0	20.0	20.0		7.0	20.0	
Minimum Split (s)	11.0	31.5		31.5	31.5	31.5	34.0	34.0		11.0	34.0	
Total Split (s)	11.0	42.5		31.5	31.5	31.5	36.5	36.5		11.0	47.5	
Total Split (%)	12.2%	47.2%		35.0%	35.0%	35.0%	40.6%	40.6%		12.2%	52.8%	
Maximum Green (s)	7.0	35.0		24.0	24.0	24.0	28.5	28.5		7.0	39.5	
Yellow Time (s)	3.0	5.0		5.0	5.0	5.0	5.0	5.0		3.0	5.0	
All-Red Time (s)	1.0	2.5		2.5	2.5	2.5	3.0	3.0		1.0	3.0	
Lost Time Adjust (s)	0.0	0.0			0.0	0.0		0.0		0.0	0.0	
Total Lost Time (s)	4.0	7.5			7.5	7.5		8.0		4.0	8.0	
Lead/Lag	Lead			Lag	Lag	Lag	Lag	Lag		Lead		
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes	Yes		Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	Min		Min	Min	Min	Min	Min		None	Min	
Walk Time (s)		9.0		9.0	9.0	9.0	10.0	10.0			10.0	
Flash Dont Walk (s)		15.0		15.0	15.0	15.0	16.0	16.0			16.0	
Pedestrian Calls (#/hr)		3		4	4	4	0	0			2	
Act Effct Green (s)	27.3	23.7			12.5	12.5		24.0		36.6	32.5	
Actuated g/C Ratio	0.38	0.33			0.17	0.17		0.33		0.51	0.45	
v/c Ratio	0.76	0.17			0.10	0.10		0.76		0.18	0.55	
Control Delay	33.0	10.7			27.3	0.5		34.3		10.7	15.4	
Queue Delay	0.0	0.0			0.0	0.0		0.0		0.0	0.0	
Total Delay	33.0	10.7			27.3	0.5		34.3		10.7	15.4	
LOS	C	B			C	A		C		B	B	
Approach Delay		28.4			12.3			34.3			14.6	
Approach LOS		C			B			C			B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 72.1			
Natural Cycle: 90			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.76			
Intersection Signal Delay: 24.4		Intersection LOS: C	
Intersection Capacity Utilization 86.1%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 1: Willoughby Drive/Portage Road & Main Street





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	293	32	44	1	25	33	38	303	5	72	182	169
Future Volume (vph)	293	32	44	1	25	33	38	303	5	72	182	169
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	7.5			7.5	7.5		8.0		4.0	8.0	
Lane Util. Factor	1.00	1.00			1.00	1.00		1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.98			1.00	0.97		1.00		1.00	0.98	
Flpb, ped/bikes	0.99	1.00			1.00	1.00		1.00		1.00	1.00	
Frt	1.00	0.91			1.00	0.85		1.00		1.00	0.93	
Flt Protected	0.95	1.00			1.00	1.00		0.99		0.95	1.00	
Satd. Flow (prot)	1637	1402			1731	1365		1663		1646	1504	
Flt Permitted	0.56	1.00			0.99	1.00		0.91		0.41	1.00	
Satd. Flow (perm)	964	1402			1714	1365		1521		708	1504	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	326	36	49	1	28	37	42	337	6	80	202	188
RTOR Reduction (vph)	0	33	0	0	0	31	0	1	0	0	36	0
Lane Group Flow (vph)	326	52	0	0	29	6	0	384	0	80	354	0
Confl. Peds. (#/hr)	9		7	4		6	7		4	6		9
Heavy Vehicles (%)	2%	15%	12%	2%	2%	7%	2%	6%	2%	2%	6%	9%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	23.7	23.7			12.5	12.5		24.0		33.4	33.4	
Effective Green, g (s)	23.7	23.7			12.5	12.5		24.0		33.4	33.4	
Actuated g/C Ratio	0.33	0.33			0.17	0.17		0.33		0.46	0.46	
Clearance Time (s)	4.0	7.5			7.5	7.5		8.0		4.0	8.0	
Vehicle Extension (s)	3.0	3.0			3.0	3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)	381	457			295	235		502		395	691	
v/s Ratio Prot	c0.08	0.04								0.02	c0.24	
v/s Ratio Perm	c0.19				0.02	0.00		c0.25		0.08		
v/c Ratio	0.86	0.11			0.10	0.03		0.77		0.20	0.51	
Uniform Delay, d1	22.4	17.1			25.3	25.0		21.8		12.1	13.9	
Progression Factor	1.00	1.00			1.00	1.00		1.00		1.00	1.00	
Incremental Delay, d2	16.9	0.1			0.1	0.0		6.9		0.3	0.6	
Delay (s)	39.3	17.2			25.5	25.0		28.6		12.3	14.5	
Level of Service	D	B			C	C		C		B	B	
Approach Delay (s)		34.8			25.2			28.6			14.1	
Approach LOS		C			C			C			B	

Intersection Summary			
HCM 2000 Control Delay	25.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	72.6	Sum of lost time (s)	23.5
Intersection Capacity Utilization	86.1%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

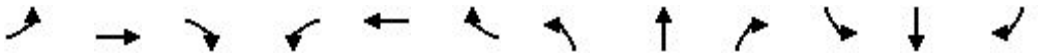
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	22	134	159	38	88	112
Future Volume (vph)	22	134	159	38	88	112
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.884		0.974			
Flt Protected	0.993					0.979
Satd. Flow (prot)	1523	0	1635	0	0	1682
Flt Permitted	0.993					0.979
Satd. Flow (perm)	1523	0	1635	0	0	1682
Link Speed (k/h)	50		50			50
Link Distance (m)	112.0		177.9			249.8
Travel Time (s)	8.1		12.8			18.0
Confl. Peds. (#/hr)	30	2		30	2	
Peak Hour Factor	0.66	0.66	0.66	0.66	0.66	0.66
Heavy Vehicles (%)	2%	2%	6%	3%	3%	3%
Adj. Flow (vph)	33	203	241	58	133	170
Shared Lane Traffic (%)						
Lane Group Flow (vph)	236	0	299	0	0	303
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.7		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.9		4.9			4.9
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24	14		14	24	
Sign Control	Stop		Stop			Stop

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	45.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	22	134	159	38	88	112
Future Volume (vph)	22	134	159	38	88	112
Peak Hour Factor	0.66	0.66	0.66	0.66	0.66	0.66
Hourly flow rate (vph)	33	203	241	58	133	170

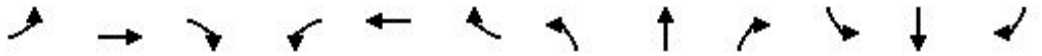
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	236	299	303
Volume Left (vph)	33	0	133
Volume Right (vph)	203	58	0
Hadj (s)	-0.45	-0.02	0.14
Departure Headway (s)	4.9	4.9	5.0
Degree Utilization, x	0.32	0.41	0.43
Capacity (veh/h)	668	700	679
Control Delay (s)	10.2	11.2	11.7
Approach Delay (s)	10.2	11.2	11.7
Approach LOS	B	B	B

Intersection Summary			
Delay	11.1		
Level of Service	B		
Intersection Capacity Utilization	45.2%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	42	3	19	4	8	15	10	125	2	4	65	29
Future Volume (vph)	42	3	19	4	8	15	10	125	2	4	65	29
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												
Frt		0.960			0.926			0.998			0.960	
Flt Protected		0.968			0.992			0.996			0.998	
Satd. Flow (prot)	0	1527	0	0	1404	0	0	1715	0	0	1638	0
Flt Permitted		0.968			0.992			0.996			0.998	
Satd. Flow (perm)	0	1527	0	0	1404	0	0	1715	0	0	1638	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		265.5			209.0			181.2			264.5	
Travel Time (s)		19.1			15.0			13.0			19.0	
Confl. Peds. (#/hr)	4		4	5		5	4		5	5		4
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Heavy Vehicles (%)	3%	100%	2%	75%	2%	7%	2%	2%	50%	2%	2%	7%
Adj. Flow (vph)	51	4	23	5	10	18	12	151	2	5	78	35
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	78	0	0	33	0	0	165	0	0	118	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 29.5%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	42	3	19	4	8	15	10	125	2	4	65	29
Future Volume (Veh/h)	42	3	19	4	8	15	10	125	2	4	65	29
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Hourly flow rate (vph)	51	4	23	5	10	18	12	151	2	5	78	35
Pedestrians		4			5			5			5	
Lane Width (m)		3.7			3.7			3.7			3.7	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		0			0			0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	314	292	104	316	308	162	117			158		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	314	292	104	316	308	162	117			158		
tC, single (s)	7.1	7.5	6.2	7.8	6.5	6.3	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.9	3.3	4.2	4.0	3.4	2.2			2.2		
p0 queue free %	92	99	98	99	98	98	99			100		
cM capacity (veh/h)	602	476	943	489	594	863	1466			1416		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	78	33	165	118
Volume Left	51	5	12	5
Volume Right	23	18	2	35
cSH	664	689	1466	1416
Volume to Capacity	0.12	0.05	0.01	0.00
Queue Length 95th (m)	3.0	1.1	0.2	0.1
Control Delay (s)	11.1	10.5	0.6	0.3
Lane LOS	B	B	A	A
Approach Delay (s)	11.1	10.5	0.6	0.3
Approach LOS	B	B		

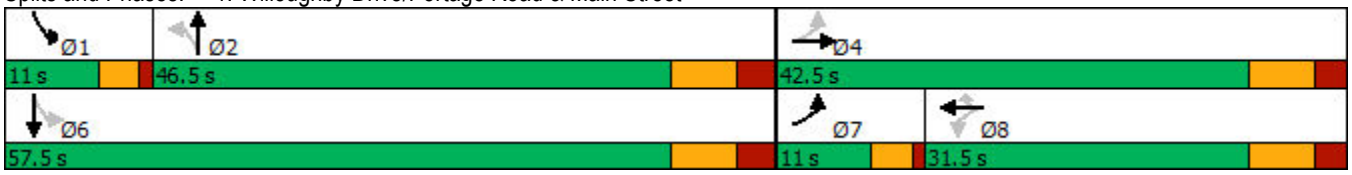
Intersection Summary				
Average Delay	3.4			
Intersection Capacity Utilization	29.5%	ICU Level of Service	A	
Analysis Period (min)	15			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	239	62	60	4	50	33	46	319	7	149	319	352
Future Volume (vph)	239	62	60	4	50	33	46	319	7	149	319	352
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	25.0		0.0	0.0		15.0	0.0		0.0	20.0		0.0
Storage Lanes	1		0	0		1	0		0	1		0
Taper Length (m)	25.0			25.0			25.0			25.0		
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	0.97	0.98			1.00	0.95		1.00		0.99	0.97	
Frt		0.926				0.850		0.997			0.921	
Flt Protected	0.950				0.997			0.994		0.950		
Satd. Flow (prot)	1616	1544	0	0	1730	1406	0	1702	0	1648	1538	0
Flt Permitted	0.545				0.970			0.819		0.441		
Satd. Flow (perm)	898	1544	0	0	1681	1329	0	1401	0	755	1538	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		54				142		1			79	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		140.4			117.0			399.6			174.8	
Travel Time (s)		10.1			8.4			28.8			12.6	
Confl. Peds. (#/hr)	18		10	9		17	10		9	17		18
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	4%	6%	2%	2%	2%	7%	3%	3%	2%	2%	4%	2%
Adj. Flow (vph)	257	67	65	4	54	35	49	343	8	160	343	378
Shared Lane Traffic (%)												
Lane Group Flow (vph)	257	132	0	0	58	35	0	400	0	160	721	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	1		1	1	1	1	0		1	0	
Detector Template	Left			Left		Right	Left			Left		
Leading Detector (m)	6.1	1.8		6.1	1.8	6.1	6.1	0.0		6.1	0.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8	6.1	6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8		8	2			6		
Detector Phase	7	4		8	8	8	2	2		1	6	
Switch Phase												

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	7.0	10.0		10.0	10.0	10.0	20.0	20.0		7.0	20.0	
Minimum Split (s)	11.0	31.5		31.5	31.5	31.5	34.0	34.0		11.0	34.0	
Total Split (s)	11.0	42.5		31.5	31.5	31.5	46.5	46.5		11.0	57.5	
Total Split (%)	11.0%	42.5%		31.5%	31.5%	31.5%	46.5%	46.5%		11.0%	57.5%	
Maximum Green (s)	7.0	35.0		24.0	24.0	24.0	38.5	38.5		7.0	49.5	
Yellow Time (s)	3.0	5.0		5.0	5.0	5.0	5.0	5.0		3.0	5.0	
All-Red Time (s)	1.0	2.5		2.5	2.5	2.5	3.0	3.0		1.0	3.0	
Lost Time Adjust (s)	0.0	0.0			0.0	0.0		0.0		0.0	0.0	
Total Lost Time (s)	4.0	7.5			7.5	7.5		8.0		4.0	8.0	
Lead/Lag	Lead			Lag	Lag	Lag	Lag	Lag		Lead		
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes	Yes		Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	Min		Min	Min	Min	Min	Min		None	Min	
Walk Time (s)		9.0		9.0	9.0	9.0	10.0	10.0			10.0	
Flash Dont Walk (s)		15.0		15.0	15.0	15.0	16.0	16.0			16.0	
Pedestrian Calls (#/hr)		3		9	9	9	3	3			4	
Act Effct Green (s)	27.1	23.6			12.5	12.5		35.9		51.0	47.0	
Actuated g/C Ratio	0.31	0.27			0.15	0.15		0.42		0.59	0.55	
v/c Ratio	0.75	0.29			0.24	0.11		0.69		0.31	0.82	
Control Delay	40.8	17.1			35.5	0.7		28.5		10.4	25.0	
Queue Delay	0.0	0.0			0.0	0.0		0.0		0.0	0.0	
Total Delay	40.8	17.1			35.5	0.7		28.5		10.4	25.0	
LOS	D	B			D	A		C		B	C	
Approach Delay		32.8			22.4			28.5			22.4	
Approach LOS		C			C			C			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 86.2			
Natural Cycle: 90			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.82			
Intersection Signal Delay: 26.1		Intersection LOS: C	
Intersection Capacity Utilization 94.9%		ICU Level of Service F	
Analysis Period (min) 15			

Splits and Phases: 1: Willoughby Drive/Portage Road & Main Street



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	239	62	60	4	50	33	46	319	7	149	319	352
Future Volume (vph)	239	62	60	4	50	33	46	319	7	149	319	352
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	7.5			7.5	7.5		8.0		4.0	8.0	
Lane Util. Factor	1.00	1.00			1.00	1.00		1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.98			1.00	0.95		1.00		1.00	0.97	
Flpb, ped/bikes	0.99	1.00			1.00	1.00		1.00		0.99	1.00	
Frt	1.00	0.93			1.00	0.85		1.00		1.00	0.92	
Flt Protected	0.95	1.00			1.00	1.00		0.99		0.95	1.00	
Satd. Flow (prot)	1593	1546			1727	1336		1701		1640	1543	
Flt Permitted	0.54	1.00			0.97	1.00		0.82		0.44	1.00	
Satd. Flow (perm)	914	1546			1681	1336		1402		760	1543	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	257	67	65	4	54	35	49	343	8	160	343	378
RTOR Reduction (vph)	0	39	0	0	0	30	0	1	0	0	36	0
Lane Group Flow (vph)	257	93	0	0	58	5	0	399	0	160	685	0
Confl. Peds. (#/hr)	18		10	9		17	10		9	17		18
Heavy Vehicles (%)	4%	6%	2%	2%	2%	7%	3%	3%	2%	2%	4%	2%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	23.6	23.6			12.5	12.5		35.9		47.0	47.0	
Effective Green, g (s)	23.6	23.6			12.5	12.5		35.9		47.0	47.0	
Actuated g/C Ratio	0.27	0.27			0.15	0.15		0.42		0.55	0.55	
Clearance Time (s)	4.0	7.5			7.5	7.5		8.0		4.0	8.0	
Vehicle Extension (s)	3.0	3.0			3.0	3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)	306	423			244	193		584		487	842	
v/s Ratio Prot	c0.07	0.06								0.03	c0.44	
v/s Ratio Perm	c0.16				0.03	0.00		0.28		0.15		
v/c Ratio	0.84	0.22			0.24	0.03		0.68		0.33	0.81	
Uniform Delay, d1	29.0	24.1			32.6	31.6		20.5		10.8	16.0	
Progression Factor	1.00	1.00			1.00	1.00		1.00		1.00	1.00	
Incremental Delay, d2	18.0	0.3			0.5	0.1		3.3		0.4	6.1	
Delay (s)	46.9	24.4			33.1	31.6		23.8		11.2	22.0	
Level of Service	D	C			C	C		C		B	C	
Approach Delay (s)		39.3			32.5			23.8			20.1	
Approach LOS		D			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	25.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	86.1	Sum of lost time (s)	23.5
Intersection Capacity Utilization	94.9%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	39	75	148	43	119	218
Future Volume (vph)	39	75	148	43	119	218
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	0.911		0.969			
Flt Protected	0.983					0.983
Satd. Flow (prot)	1553	0	1681	0	0	1705
Flt Permitted	0.983					0.983
Satd. Flow (perm)	1553	0	1681	0	0	1705
Link Speed (k/h)	50		50			50
Link Distance (m)	112.0		177.9			249.8
Travel Time (s)	8.1		12.8			18.0
Confl. Peds. (#/hr)	21	4		21	4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	42	82	161	47	129	237
Shared Lane Traffic (%)						
Lane Group Flow (vph)	124	0	208	0	0	366
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.7		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.9		4.9			4.9
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24	14		14	24	
Sign Control	Stop		Stop			Stop

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 50.5%		ICU Level of Service A	
Analysis Period (min) 15			

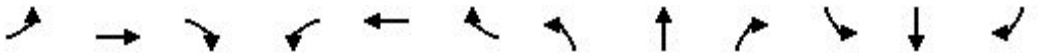
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	39	75	148	43	119	218
Future Volume (vph)	39	75	148	43	119	218
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	42	82	161	47	129	237

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	124	208	366
Volume Left (vph)	42	0	129
Volume Right (vph)	82	47	0
Hadj (s)	-0.30	-0.10	0.10
Departure Headway (s)	4.9	4.5	4.6
Degree Utilization, x	0.17	0.26	0.46
Capacity (veh/h)	660	759	763
Control Delay (s)	8.9	9.1	11.5
Approach Delay (s)	8.9	9.1	11.5
Approach LOS	A	A	B

Intersection Summary			
Delay	10.3		
Level of Service	B		
Intersection Capacity Utilization	50.5%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	24	9	8	0	3	6	36	116	1	24	139	42
Future Volume (vph)	24	9	8	0	3	6	36	116	1	24	139	42
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												
Frt		0.975			0.910			0.999			0.972	
Flt Protected		0.972						0.988			0.994	
Satd. Flow (prot)	0	1644	0	0	1579	0	0	1712	0	0	1676	0
Flt Permitted		0.972						0.988			0.994	
Satd. Flow (perm)	0	1644	0	0	1579	0	0	1712	0	0	1676	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		265.5			209.0			181.2			264.5	
Travel Time (s)		19.1			15.0			13.0			19.0	
Confl. Peds. (#/hr)	5		13	16		8	13		16	8		5
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
Adj. Flow (vph)	31	12	10	0	4	8	47	151	1	31	181	55
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	53	0	0	12	0	0	199	0	0	267	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Stop			Stop			Free			Free	

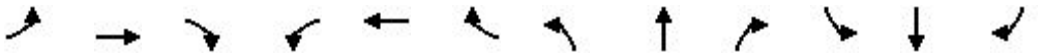
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 33.1%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	24	9	8	0	3	6	36	116	1	24	139	42
Future Volume (Veh/h)	24	9	8	0	3	6	36	116	1	24	139	42
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
Hourly flow rate (vph)	31	12	10	0	4	8	47	151	1	31	181	55
Pedestrians		13			16			16			8	
Lane Width (m)		3.7			3.7			3.7			3.7	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		1			1			1			1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	547	546	238	564	572	176	249			168		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	547	546	238	564	572	176	249			168		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	92	97	99	100	99	99	96			98		
cM capacity (veh/h)	406	409	782	384	395	850	1302			1390		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	53	12	199	267
Volume Left	31	0	47	31
Volume Right	10	8	1	55
cSH	447	614	1302	1390
Volume to Capacity	0.12	0.02	0.04	0.02
Queue Length 95th (m)	3.0	0.5	0.9	0.5
Control Delay (s)	14.1	11.0	2.1	1.1
Lane LOS	B	B	A	A
Approach Delay (s)	14.1	11.0	2.1	1.1
Approach LOS	B	B		

Intersection Summary				
Average Delay	3.0			
Intersection Capacity Utilization	33.1%	ICU Level of Service	A	
Analysis Period (min)	15			

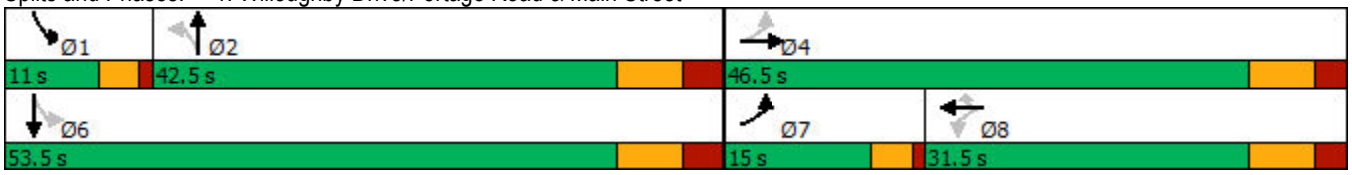


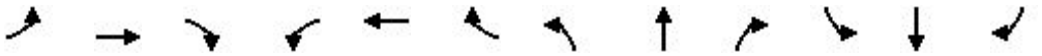
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	352	34	49	1	27	36	45	345	5	76	202	193
Future Volume (vph)	352	34	49	1	27	36	45	345	5	76	202	193
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	25.0		0.0	0.0		15.0	0.0		0.0	20.0		0.0
Storage Lanes	1		0	0		1	0		0	1		0
Taper Length (m)	25.0			25.0			25.0			25.0		
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	0.98	0.98			1.00	0.97		1.00		1.00	0.98	
Frt		0.912				0.850		0.998			0.927	
Flt Protected	0.950				0.998			0.994		0.950		
Satd. Flow (prot)	1648	1396	0	0	1731	1406	0	1663	0	1648	1499	0
Flt Permitted	0.559				0.989			0.897		0.377		
Satd. Flow (perm)	954	1396	0	0	1715	1360	0	1500	0	651	1499	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		54				142		1			63	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		140.4			117.0			399.6			174.8	
Travel Time (s)		10.1			8.4			28.8			12.6	
Confl. Peds. (#/hr)	9		7	4		6	7		4	6		9
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	2%	15%	12%	2%	2%	7%	2%	6%	2%	2%	6%	9%
Adj. Flow (vph)	391	38	54	1	30	40	50	383	6	84	224	214
Shared Lane Traffic (%)												
Lane Group Flow (vph)	391	92	0	0	31	40	0	439	0	84	438	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	1		1	1	1	1	0		1	0	
Detector Template	Left			Left		Right	Left			Left		
Leading Detector (m)	6.1	1.8		6.1	1.8	6.1	6.1	0.0		6.1	0.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8	6.1	6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8		8	2			6		
Detector Phase	7	4		8	8	8	2	2		1	6	
Switch Phase												

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	7.0	10.0		10.0	10.0	10.0	20.0	20.0		7.0	20.0	
Minimum Split (s)	11.0	31.5		31.5	31.5	31.5	34.0	34.0		11.0	34.0	
Total Split (s)	15.0	46.5		31.5	31.5	31.5	42.5	42.5		11.0	53.5	
Total Split (%)	15.0%	46.5%		31.5%	31.5%	31.5%	42.5%	42.5%		11.0%	53.5%	
Maximum Green (s)	11.0	39.0		24.0	24.0	24.0	34.5	34.5		7.0	45.5	
Yellow Time (s)	3.0	5.0		5.0	5.0	5.0	5.0	5.0		3.0	5.0	
All-Red Time (s)	1.0	2.5		2.5	2.5	2.5	3.0	3.0		1.0	3.0	
Lost Time Adjust (s)	0.0	0.0			0.0	0.0		0.0		0.0	0.0	
Total Lost Time (s)	4.0	7.5			7.5	7.5		8.0		4.0	8.0	
Lead/Lag	Lead			Lag	Lag	Lag	Lag	Lag		Lead		
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes	Yes		Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	Min		Min	Min	Min	Min	Min		None	Min	
Walk Time (s)		9.0		9.0	9.0	9.0	10.0	10.0			10.0	
Flash Dont Walk (s)		15.0		15.0	15.0	15.0	16.0	16.0			16.0	
Pedestrian Calls (#/hr)		3		4	4	4	0	0			2	
Act Effct Green (s)	31.5	27.9			12.5	12.5		28.7		41.2	37.0	
Actuated g/C Ratio	0.39	0.34			0.15	0.15		0.35		0.51	0.46	
v/c Ratio	0.84	0.18			0.12	0.12		0.83		0.20	0.61	
Control Delay	40.9	11.5			32.6	0.8		39.6		11.7	18.1	
Queue Delay	0.0	0.0			0.0	0.0		0.0		0.0	0.0	
Total Delay	40.9	11.5			32.6	0.8		39.6		11.7	18.1	
LOS	D	B			C	A		D		B	B	
Approach Delay		35.3			14.7			39.6			17.1	
Approach LOS		D			B			D			B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 80.9			
Natural Cycle: 90			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.84			
Intersection Signal Delay: 29.3		Intersection LOS: C	
Intersection Capacity Utilization 95.0%		ICU Level of Service F	
Analysis Period (min) 15			

Splits and Phases: 1: Willoughby Drive/Portage Road & Main Street





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	352	34	49	1	27	36	45	345	5	76	202	193
Future Volume (vph)	352	34	49	1	27	36	45	345	5	76	202	193
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	7.5			7.5	7.5		8.0		4.0	8.0	
Lane Util. Factor	1.00	1.00			1.00	1.00		1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.98			1.00	0.97		1.00		1.00	0.98	
Flpb, ped/bikes	0.99	1.00			1.00	1.00		1.00		1.00	1.00	
Frt	1.00	0.91			1.00	0.85		1.00		1.00	0.93	
Flt Protected	0.95	1.00			1.00	1.00		0.99		0.95	1.00	
Satd. Flow (prot)	1636	1399			1732	1364		1663		1646	1501	
Flt Permitted	0.56	1.00			0.99	1.00		0.90		0.38	1.00	
Satd. Flow (perm)	963	1399			1715	1364		1500		653	1501	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	391	38	54	1	30	40	50	383	6	84	224	214
RTOR Reduction (vph)	0	35	0	0	0	34	0	1	0	0	34	0
Lane Group Flow (vph)	391	57	0	0	31	6	0	438	0	84	404	0
Confl. Peds. (#/hr)	9		7	4		6	7		4	6		9
Heavy Vehicles (%)	2%	15%	12%	2%	2%	7%	2%	6%	2%	2%	6%	9%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	27.9	27.9			12.6	12.6		28.7		38.0	38.0	
Effective Green, g (s)	27.9	27.9			12.6	12.6		28.7		38.0	38.0	
Actuated g/C Ratio	0.34	0.34			0.15	0.15		0.35		0.47	0.47	
Clearance Time (s)	4.0	7.5			7.5	7.5		8.0		4.0	8.0	
Vehicle Extension (s)	3.0	3.0			3.0	3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)	423	479			265	211		528		369	700	
v/s Ratio Prot	c0.13	0.04								0.01	c0.27	
v/s Ratio Perm	c0.19				0.02	0.00		c0.29		0.09		
v/c Ratio	0.92	0.12			0.12	0.03		0.83		0.23	0.58	
Uniform Delay, d1	24.7	18.3			29.6	29.2		24.1		13.5	15.8	
Progression Factor	1.00	1.00			1.00	1.00		1.00		1.00	1.00	
Incremental Delay, d2	25.8	0.1			0.2	0.1		10.7		0.3	1.2	
Delay (s)	50.5	18.4			29.8	29.3		34.8		13.8	17.0	
Level of Service	D	B			C	C		C		B	B	
Approach Delay (s)		44.4			29.5			34.8			16.5	
Approach LOS		D			C			C			B	

Intersection Summary			
HCM 2000 Control Delay	31.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	81.4	Sum of lost time (s)	23.5
Intersection Capacity Utilization	95.0%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	22	134	212	38	88	131
Future Volume (vph)	22	134	212	38	88	131
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	0.884		0.979			
Flt Protected	0.993					0.980
Satd. Flow (prot)	1523	0	1641	0	0	1684
Flt Permitted	0.993					0.980
Satd. Flow (perm)	1523	0	1641	0	0	1684
Link Speed (k/h)	50		50			50
Link Distance (m)	112.0		177.9			249.8
Travel Time (s)	8.1		12.8			18.0
Confl. Peds. (#/hr)	30	2		30	2	
Peak Hour Factor	0.66	0.66	0.66	0.66	0.66	0.66
Heavy Vehicles (%)	2%	2%	6%	3%	3%	3%
Adj. Flow (vph)	33	203	321	58	133	198
Shared Lane Traffic (%)						
Lane Group Flow (vph)	236	0	379	0	0	331
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.7		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.9		4.9			4.9
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24	14		14	24	
Sign Control	Stop		Stop			Stop

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	48.5%	ICU Level of Service	A
Analysis Period (min)	15		

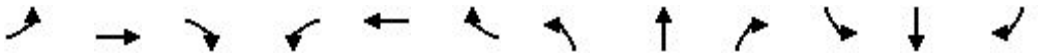
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	22	134	212	38	88	131
Future Volume (vph)	22	134	212	38	88	131
Peak Hour Factor	0.66	0.66	0.66	0.66	0.66	0.66
Hourly flow rate (vph)	33	203	321	58	133	198

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	236	379	331
Volume Left (vph)	33	0	133
Volume Right (vph)	203	58	0
Hadj (s)	-0.45	0.00	0.13
Departure Headway (s)	5.2	5.0	5.2
Degree Utilization, x	0.34	0.53	0.48
Capacity (veh/h)	629	680	662
Control Delay (s)	10.9	13.6	12.9
Approach Delay (s)	10.9	13.6	12.9
Approach LOS	B	B	B

Intersection Summary			
Delay	12.7		
Level of Service	B		
Intersection Capacity Utilization	48.5%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	45	3	21	5	8	16	10	176	2	5	80	31
Future Volume (vph)	45	3	21	5	8	16	10	176	2	5	80	31
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												
Frt		0.959			0.927			0.999			0.964	
Flt Protected		0.968			0.992			0.997			0.998	
Satd. Flow (prot)	0	1530	0	0	1388	0	0	1721	0	0	1647	0
Flt Permitted		0.968			0.992			0.997			0.998	
Satd. Flow (perm)	0	1530	0	0	1388	0	0	1721	0	0	1647	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		265.5			209.0			181.2			264.5	
Travel Time (s)		19.1			15.0			13.0			19.0	
Confl. Peds. (#/hr)	4		4	5		5	4		5	5		4
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Heavy Vehicles (%)	3%	100%	2%	75%	2%	7%	2%	2%	50%	2%	2%	7%
Adj. Flow (vph)	54	4	25	6	10	19	12	212	2	6	96	37
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	83	0	0	35	0	0	226	0	0	139	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	32.2%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	45	3	21	5	8	16	10	176	2	5	80	31
Future Volume (Veh/h)	45	3	21	5	8	16	10	176	2	5	80	31
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Hourly flow rate (vph)	54	4	25	6	10	19	12	212	2	6	96	37
Pedestrians		4			5			5			5	
Lane Width (m)		3.7			3.7			3.7			3.7	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		0			0			0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	396	374	124	400	391	223	137			219		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	396	374	124	400	391	223	137			219		
tC, single (s)	7.1	7.5	6.2	7.8	6.5	6.3	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.9	3.3	4.2	4.0	3.4	2.2			2.2		
p0 queue free %	90	99	97	99	98	98	99			100		
cM capacity (veh/h)	528	422	920	424	534	797	1442			1345		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	83	35	226	139
Volume Left	54	6	12	6
Volume Right	25	19	2	37
cSH	597	617	1442	1345
Volume to Capacity	0.14	0.06	0.01	0.00
Queue Length 95th (m)	3.7	1.4	0.2	0.1
Control Delay (s)	12.0	11.2	0.5	0.4
Lane LOS	B	B	A	A
Approach Delay (s)	12.0	11.2	0.5	0.4
Approach LOS	B	B		

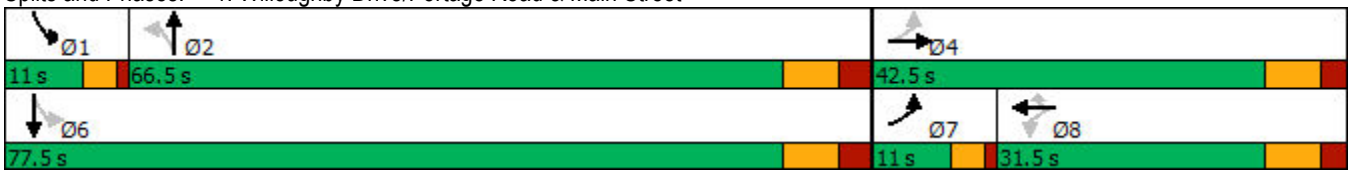
Intersection Summary				
Average Delay	3.2			
Intersection Capacity Utilization	32.2%	ICU Level of Service	A	
Analysis Period (min)	15			

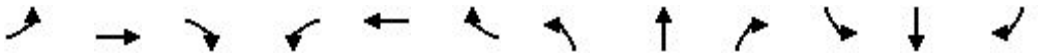
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	281	66	69	4	53	36	54	376	8	159	374	420
Future Volume (vph)	281	66	69	4	53	36	54	376	8	159	374	420
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	25.0		0.0	0.0		15.0	0.0		0.0	20.0		0.0
Storage Lanes	1		0	0		1	0		0	1		0
Taper Length (m)	25.0			25.0			25.0			25.0		
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	0.96	0.98			1.00	0.94		1.00		0.99	0.97	
Frt		0.923				0.850		0.997			0.921	
Flt Protected	0.950				0.997			0.994		0.950		
Satd. Flow (prot)	1616	1535	0	0	1730	1406	0	1701	0	1648	1532	0
Flt Permitted	0.545				0.970			0.722		0.439		
Satd. Flow (perm)	892	1535	0	0	1681	1319	0	1236	0	751	1532	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		44				118		1			80	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		140.4			117.0			399.6			174.8	
Travel Time (s)		10.1			8.4			28.8			12.6	
Confl. Peds. (#/hr)	18		10	9		17	10		9	17		18
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	4%	6%	2%	2%	2%	7%	3%	3%	2%	2%	4%	2%
Adj. Flow (vph)	302	71	74	4	57	39	58	404	9	171	402	452
Shared Lane Traffic (%)												
Lane Group Flow (vph)	302	145	0	0	61	39	0	471	0	171	854	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	1		1	1	1	1	0		1	0	
Detector Template	Left			Left		Right	Left			Left		
Leading Detector (m)	6.1	1.8		6.1	1.8	6.1	6.1	0.0		6.1	0.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8	6.1	6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8		8	2			6		
Detector Phase	7	4		8	8	8	2	2		1	6	
Switch Phase												

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	7.0	10.0		10.0	10.0	10.0	20.0	20.0		7.0	20.0	
Minimum Split (s)	11.0	31.5		31.5	31.5	31.5	34.0	34.0		11.0	34.0	
Total Split (s)	11.0	42.5		31.5	31.5	31.5	66.5	66.5		11.0	77.5	
Total Split (%)	9.2%	35.4%		26.3%	26.3%	26.3%	55.4%	55.4%		9.2%	64.6%	
Maximum Green (s)	7.0	35.0		24.0	24.0	24.0	58.5	58.5		7.0	69.5	
Yellow Time (s)	3.0	5.0		5.0	5.0	5.0	5.0	5.0		3.0	5.0	
All-Red Time (s)	1.0	2.5		2.5	2.5	2.5	3.0	3.0		1.0	3.0	
Lost Time Adjust (s)	0.0	0.0			0.0	0.0		0.0		0.0	0.0	
Total Lost Time (s)	4.0	7.5			7.5	7.5		8.0		4.0	8.0	
Lead/Lag	Lead			Lag	Lag	Lag	Lag	Lag		Lead		
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes	Yes		Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	Min		Min	Min	Min	Min	Min		None	Min	
Walk Time (s)		9.0		9.0	9.0	9.0	10.0	10.0			10.0	
Flash Dont Walk (s)		15.0		15.0	15.0	15.0	16.0	16.0			16.0	
Pedestrian Calls (#/hr)		3		9	9	9	3	3			4	
Act Effct Green (s)	27.2	23.7			12.7	12.7		58.6		73.7	69.7	
Actuated g/C Ratio	0.25	0.22			0.12	0.12		0.54		0.68	0.64	
v/c Ratio	1.12	0.39			0.31	0.15		0.71		0.30	0.85	
Control Delay	129.9	28.0			47.8	1.2		27.0		8.6	24.6	
Queue Delay	0.0	0.0			0.0	0.0		0.0		0.0	0.0	
Total Delay	129.9	28.0			47.8	1.2		27.0		8.6	24.6	
LOS	F	C			D	A		C		A	C	
Approach Delay		96.8			29.6			27.0			21.9	
Approach LOS		F			C			C			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 108.9			
Natural Cycle: 120			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 1.12			
Intersection Signal Delay: 39.9		Intersection LOS: D	
Intersection Capacity Utilization 108.0%		ICU Level of Service G	
Analysis Period (min) 15			

Splits and Phases: 1: Willoughby Drive/Portage Road & Main Street





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	281	66	69	4	53	36	54	376	8	159	374	420
Future Volume (vph)	281	66	69	4	53	36	54	376	8	159	374	420
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	7.5			7.5	7.5		8.0		4.0	8.0	
Lane Util. Factor	1.00	1.00			1.00	1.00		1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.98			1.00	0.94		1.00		1.00	0.97	
Flpb, ped/bikes	0.98	1.00			1.00	1.00		1.00		0.99	1.00	
Frt	1.00	0.92			1.00	0.85		1.00		1.00	0.92	
Flt Protected	0.95	1.00			1.00	1.00		0.99		0.95	1.00	
Satd. Flow (prot)	1587	1538			1727	1324		1701		1639	1535	
Flt Permitted	0.55	1.00			0.97	1.00		0.72		0.44	1.00	
Satd. Flow (perm)	911	1538			1680	1324		1236		757	1535	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	302	71	74	4	57	39	58	404	9	171	402	452
RTOR Reduction (vph)	0	34	0	0	0	34	0	0	0	0	29	0
Lane Group Flow (vph)	302	111	0	0	61	5	0	471	0	171	825	0
Confl. Peds. (#/hr)	18		10	9		17	10		9	17		18
Heavy Vehicles (%)	4%	6%	2%	2%	2%	7%	3%	3%	2%	2%	4%	2%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	23.7	23.7			12.7	12.7		58.7		69.7	69.7	
Effective Green, g (s)	23.7	23.7			12.7	12.7		58.7		69.7	69.7	
Actuated g/C Ratio	0.22	0.22			0.12	0.12		0.54		0.64	0.64	
Clearance Time (s)	4.0	7.5			7.5	7.5		8.0		4.0	8.0	
Vehicle Extension (s)	3.0	3.0			3.0	3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)	241	334			195	154		666		541	982	
v/s Ratio Prot	c0.08	0.07								0.02	c0.54	
v/s Ratio Perm	c0.19				0.04	0.00		0.38		0.18		
v/c Ratio	1.25	0.33			0.31	0.03		0.71		0.32	0.84	
Uniform Delay, d1	42.2	35.9			44.1	42.6		18.7		8.7	15.3	
Progression Factor	1.00	1.00			1.00	1.00		1.00		1.00	1.00	
Incremental Delay, d2	143.3	0.6			0.9	0.1		3.4		0.3	6.6	
Delay (s)	185.5	36.5			45.0	42.7		22.1		9.1	21.8	
Level of Service	F	D			D	D		C		A	C	
Approach Delay (s)		137.2			44.1			22.1			19.7	
Approach LOS		F			D			C			B	

Intersection Summary			
HCM 2000 Control Delay	47.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	108.9	Sum of lost time (s)	23.5
Intersection Capacity Utilization	108.0%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

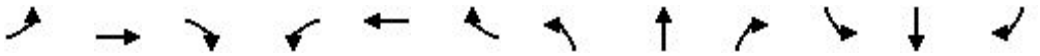
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	39	75	184	43	119	272
Future Volume (vph)	39	75	184	43	119	272
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.911		0.974			
Flt Protected	0.983					0.985
Satd. Flow (prot)	1553	0	1690	0	0	1709
Flt Permitted	0.983					0.985
Satd. Flow (perm)	1553	0	1690	0	0	1709
Link Speed (k/h)	50		50			50
Link Distance (m)	112.0		177.9			249.8
Travel Time (s)	8.1		12.8			18.0
Confl. Peds. (#/hr)	21	4		21	4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	42	82	200	47	129	296
Shared Lane Traffic (%)						
Lane Group Flow (vph)	124	0	247	0	0	425
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.7		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.9		4.9			4.9
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24	14		14	24	
Sign Control	Stop		Stop			Stop

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 54.8%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	39	75	184	43	119	272
Future Volume (vph)	39	75	184	43	119	272
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	42	82	200	47	129	296

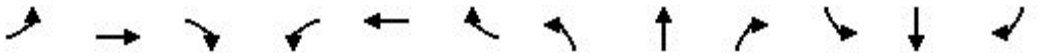
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	124	247	425
Volume Left (vph)	42	0	129
Volume Right (vph)	82	47	0
Hadj (s)	-0.30	-0.08	0.09
Departure Headway (s)	5.1	4.7	4.6
Degree Utilization, x	0.18	0.32	0.55
Capacity (veh/h)	625	742	756
Control Delay (s)	9.2	9.8	13.0
Approach Delay (s)	9.2	9.8	13.0
Approach LOS	A	A	B

Intersection Summary			
Delay	11.4		
Level of Service	B		
Intersection Capacity Utilization	54.8%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	9	8	0	3	7	38	151	1	25	188	45
Future Volume (vph)	25	9	8	0	3	7	38	151	1	25	188	45
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												
Frt		0.975			0.907			0.999			0.977	
Flt Protected		0.971						0.990			0.995	
Satd. Flow (prot)	0	1642	0	0	1573	0	0	1716	0	0	1686	0
Flt Permitted		0.971						0.990			0.995	
Satd. Flow (perm)	0	1642	0	0	1573	0	0	1716	0	0	1686	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		265.5			209.0			181.2			264.5	
Travel Time (s)		19.1			15.0			13.0			19.0	
Confl. Peds. (#/hr)	5		13	16		8	13		16	8		5
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
Adj. Flow (vph)	32	12	10	0	4	9	49	196	1	32	244	58
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	54	0	0	13	0	0	246	0	0	334	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Stop			Stop			Free			Free	

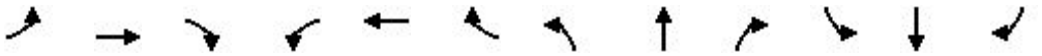
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 36.7%		ICU Level of Service A	
Analysis Period (min) 15			



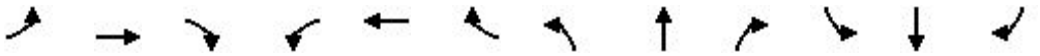
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	25	9	8	0	3	7	38	151	1	25	188	45
Future Volume (Veh/h)	25	9	8	0	3	7	38	151	1	25	188	45
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
Hourly flow rate (vph)	32	12	10	0	4	9	49	196	1	32	244	58
Pedestrians		13			16			16			8	
Lane Width (m)		3.7			3.7			3.7			3.7	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		1			1			1			1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	664	661	302	680	690	220	315			213		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	664	661	302	680	690	220	315			213		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	90	97	99	100	99	99	96			98		
cM capacity (veh/h)	337	350	719	319	337	802	1231			1339		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	54	13	246	334
Volume Left	32	0	49	32
Volume Right	10	9	1	58
cSH	377	563	1231	1339
Volume to Capacity	0.14	0.02	0.04	0.02
Queue Length 95th (m)	3.8	0.5	0.9	0.6
Control Delay (s)	16.1	11.5	1.9	0.9
Lane LOS	C	B	A	A
Approach Delay (s)	16.1	11.5	1.9	0.9
Approach LOS	C	B		

Intersection Summary				
Average Delay	2.8			
Intersection Capacity Utilization	36.7%	ICU Level of Service	A	
Analysis Period (min)	15			



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	352	34	49	1	27	36	45	345	5	76	202	193
Future Volume (vph)	352	34	49	1	27	36	45	345	5	76	202	193
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	25.0		0.0	0.0		15.0	20.0		0.0	20.0		15.0
Storage Lanes	1		0	0		1	0		0	1		1
Taper Length (m)	25.0			25.0			25.0			25.0		
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	0.98	0.98			1.00	0.97		1.00		1.00		0.96
Frt		0.912				0.850		0.998				0.850
Flt Protected	0.950				0.998			0.994		0.950		
Satd. Flow (prot)	1648	1396	0	0	1731	1406	0	1663	0	1648	1669	1380
Flt Permitted	0.559				0.989			0.930		0.354		
Satd. Flow (perm)	954	1396	0	0	1715	1360	0	1554	0	612	1669	1329
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		54				142		1				170
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		140.4			117.0			399.6			174.8	
Travel Time (s)		10.1			8.4			28.8			12.6	
Confl. Peds. (#/hr)	9		7	4		6	7		4	6		9
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	2%	15%	12%	2%	2%	7%	2%	6%	2%	2%	6%	9%
Adj. Flow (vph)	391	38	54	1	30	40	50	383	6	84	224	214
Shared Lane Traffic (%)												
Lane Group Flow (vph)	391	92	0	0	31	40	0	439	0	84	224	214
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	1		1	1	1	1	1		1	1	1
Detector Template				Left			Left					Right
Leading Detector (m)	10.0	10.0		6.1	10.0	10.0	6.1	10.0		10.0	10.0	10.0
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	10.0	10.0		6.1	10.0	10.0	6.1	10.0		10.0	10.0	10.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8		8	2			6		6
Detector Phase	7	4		8	8	8	2	2		1	6	6
Switch Phase												

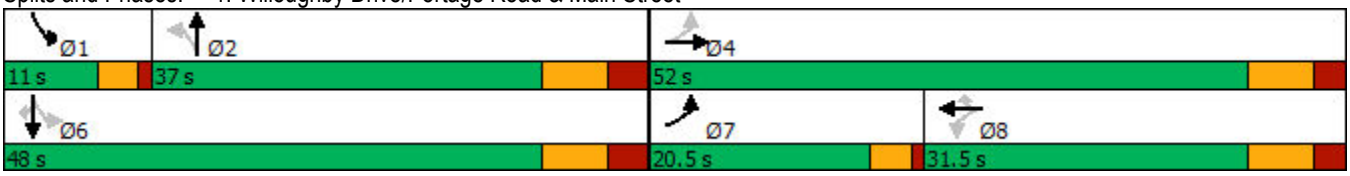


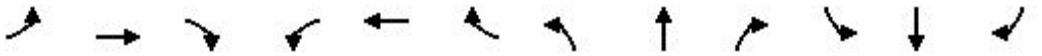
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	7.0	10.0		10.0	10.0	10.0	20.0	20.0		7.0	20.0	20.0
Minimum Split (s)	11.0	31.5		31.5	31.5	31.5	34.0	34.0		11.0	34.0	34.0
Total Split (s)	20.5	52.0		31.5	31.5	31.5	37.0	37.0		11.0	48.0	48.0
Total Split (%)	20.5%	52.0%		31.5%	31.5%	31.5%	37.0%	37.0%		11.0%	48.0%	48.0%
Maximum Green (s)	16.5	44.5		24.0	24.0	24.0	29.0	29.0		7.0	40.0	40.0
Yellow Time (s)	3.0	5.0		5.0	5.0	5.0	5.0	5.0		3.0	5.0	5.0
All-Red Time (s)	1.0	2.5		2.5	2.5	2.5	3.0	3.0		1.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0			0.0	0.0		0.0		0.0	0.0	0.0
Total Lost Time (s)	4.0	7.5			7.5	7.5		8.0		4.0	8.0	8.0
Lead/Lag	Lead			Lag	Lag	Lag	Lag	Lag		Lead		
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes	Yes		Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Recall Mode	None	Min		Min	Min	Min	Min	Min		None	Min	Min
Walk Time (s)		9.0		9.0	9.0	9.0	10.0	10.0			10.0	10.0
Flash Dont Walk (s)		15.0		15.0	15.0	15.0	16.0	16.0			16.0	16.0
Pedestrian Calls (#/hr)		3		4	4	4	0	0			2	2
Act Effct Green (s)	36.6	33.0			12.5	12.5		28.2		40.7	36.7	36.7
Actuated g/C Ratio	0.43	0.39			0.15	0.15		0.33		0.48	0.43	0.43
v/c Ratio	0.72	0.16			0.12	0.12		0.85		0.22	0.31	0.32
Control Delay	28.1	9.6			33.5	0.8		46.0		14.6	18.1	6.1
Queue Delay	0.0	0.0			0.0	0.0		0.0		0.0	0.0	0.0
Total Delay	28.1	9.6			33.5	0.8		46.0		14.6	18.1	6.1
LOS	C	A			C	A		D		B	B	A
Approach Delay		24.6			15.1			46.0			12.6	
Approach LOS		C			B			D			B	
Queue Length 50th (m)	49.8	4.1			4.7	0.0		65.7		6.7	21.9	3.9
Queue Length 95th (m)	75.3	13.0			11.9	0.0		#145.0		18.3	47.8	20.1
Internal Link Dist (m)		116.4			93.0			375.6			150.8	
Turn Bay Length (m)	25.0					15.0				20.0		15.0
Base Capacity (vph)	544	763			488	488		535		378	792	720
Starvation Cap Reductn	0	0			0	0		0		0	0	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	0.72	0.12			0.06	0.08		0.82		0.22	0.28	0.30

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 85.4			
Natural Cycle: 90			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.85			
Intersection Signal Delay: 26.2		Intersection LOS: C	
Intersection Capacity Utilization 88.1%		ICU Level of Service E	
Analysis Period (min) 15			

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

Splits and Phases: 1: Willoughby Drive/Portage Road & Main Street

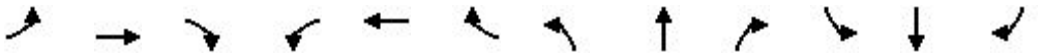




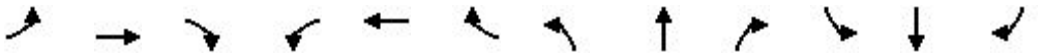
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	352	34	49	1	27	36	45	345	5	76	202	193
Future Volume (vph)	352	34	49	1	27	36	45	345	5	76	202	193
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	7.5			7.5	7.5		8.0		4.0	8.0	8.0
Lane Util. Factor	1.00	1.00			1.00	1.00		1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98			1.00	0.97		1.00		1.00	1.00	0.97
Flpb, ped/bikes	0.99	1.00			1.00	1.00		1.00		1.00	1.00	1.00
Frt	1.00	0.91			1.00	0.85		1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00			1.00	1.00		0.99		0.95	1.00	1.00
Satd. Flow (prot)	1635	1398			1732	1363		1663		1646	1669	1332
Flt Permitted	0.56	1.00			0.99	1.00		0.93		0.35	1.00	1.00
Satd. Flow (perm)	963	1398			1715	1363		1555		613	1669	1332
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	391	38	54	1	30	40	50	383	6	84	224	214
RTOR Reduction (vph)	0	33	0	0	0	34	0	1	0	0	0	96
Lane Group Flow (vph)	391	59	0	0	31	6	0	438	0	84	224	118
Confl. Peds. (#/hr)	9		7	4		6	7		4	6		9
Heavy Vehicles (%)	2%	15%	12%	2%	2%	7%	2%	6%	2%	2%	6%	9%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8		8	2			6		6
Actuated Green, G (s)	33.0	33.0			12.6	12.6		28.2		37.6	37.6	37.6
Effective Green, g (s)	33.0	33.0			12.6	12.6		28.2		37.6	37.6	37.6
Actuated g/C Ratio	0.38	0.38			0.15	0.15		0.33		0.44	0.44	0.44
Clearance Time (s)	4.0	7.5			7.5	7.5		8.0		4.0	8.0	8.0
Vehicle Extension (s)	3.0	3.0			3.0	3.0		3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	497	535			250	199		509		332	728	581
v/s Ratio Prot	c0.15	0.04								0.02	c0.13	
v/s Ratio Perm	c0.15				0.02	0.00		c0.28		0.09		0.09
v/c Ratio	0.79	0.11			0.12	0.03		0.86		0.25	0.31	0.20
Uniform Delay, d1	21.7	17.1			32.0	31.5		27.1		15.9	15.8	15.0
Progression Factor	1.00	1.00			1.00	1.00		1.00		1.00	1.00	1.00
Incremental Delay, d2	8.0	0.1			0.2	0.1		13.9		0.4	0.2	0.2
Delay (s)	29.8	17.2			32.2	31.6		41.0		16.3	16.0	15.2
Level of Service	C	B			C	C		D		B	B	B
Approach Delay (s)		27.4			31.8			41.0			15.7	
Approach LOS		C			C			D			B	

Intersection Summary			
HCM 2000 Control Delay	27.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	86.1	Sum of lost time (s)	23.5
Intersection Capacity Utilization	88.1%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	281	66	69	4	53	36	54	376	8	159	374	420
Future Volume (vph)	281	66	69	4	53	36	54	376	8	159	374	420
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	25.0		0.0	0.0		15.0	20.0		0.0	20.0		15.0
Storage Lanes	1		0	0		1	0		0	1		1
Taper Length (m)	25.0			25.0			25.0			25.0		
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	0.97	0.98			1.00	0.95		1.00		0.99		0.95
Frt		0.923				0.850		0.997				0.850
Flt Protected	0.950				0.997			0.994		0.950		
Satd. Flow (prot)	1616	1539	0	0	1730	1406	0	1702	0	1648	1701	1475
Flt Permitted	0.543				0.970			0.893		0.362		
Satd. Flow (perm)	895	1539	0	0	1681	1329	0	1527	0	621	1701	1395
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		62				142		1				219
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		140.4			117.0			399.6			174.8	
Travel Time (s)		10.1			8.4			28.8			12.6	
Confl. Peds. (#/hr)	18		10	9		17	10		9	17		18
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	4%	6%	2%	2%	2%	7%	3%	3%	2%	2%	4%	2%
Adj. Flow (vph)	302	71	74	4	57	39	58	404	9	171	402	452
Shared Lane Traffic (%)												
Lane Group Flow (vph)	302	145	0	0	61	39	0	471	0	171	402	452
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	1		1	1	1	1	1		1	1	1
Detector Template				Left			Left					Right
Leading Detector (m)	10.0	10.0		6.1	10.0	10.0	6.1	10.0		10.0	10.0	10.0
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	10.0	10.0		6.1	10.0	10.0	6.1	10.0		10.0	10.0	10.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8		8	2			6		6
Detector Phase	7	4		8	8	8	2	2		1	6	6
Switch Phase												

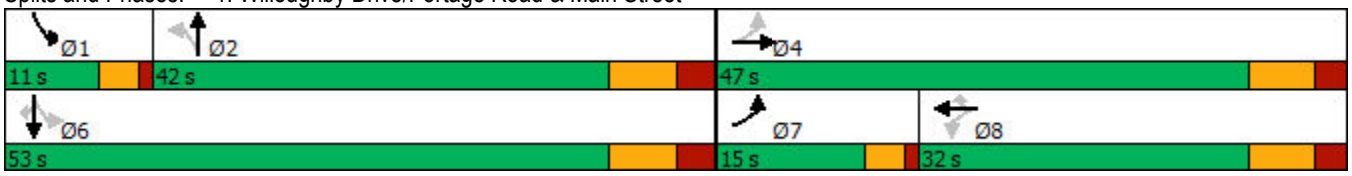


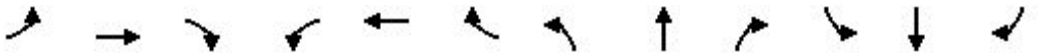
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	7.0	10.0		10.0	10.0	10.0	20.0	20.0		7.0	20.0	20.0
Minimum Split (s)	11.0	31.5		31.5	31.5	31.5	34.0	34.0		11.0	34.0	34.0
Total Split (s)	15.0	47.0		32.0	32.0	32.0	42.0	42.0		11.0	53.0	53.0
Total Split (%)	15.0%	47.0%		32.0%	32.0%	32.0%	42.0%	42.0%		11.0%	53.0%	53.0%
Maximum Green (s)	11.0	39.5		24.5	24.5	24.5	34.0	34.0		7.0	45.0	45.0
Yellow Time (s)	3.0	5.0		5.0	5.0	5.0	5.0	5.0		3.0	5.0	5.0
All-Red Time (s)	1.0	2.5		2.5	2.5	2.5	3.0	3.0		1.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0			0.0	0.0		0.0		0.0	0.0	0.0
Total Lost Time (s)	4.0	7.5			7.5	7.5		8.0		4.0	8.0	8.0
Lead/Lag	Lead			Lag	Lag	Lag	Lag	Lag		Lead		
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes	Yes		Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Recall Mode	None	Min		Min	Min	Min	Min	Min		None	Min	Min
Walk Time (s)		9.0		9.0	9.0	9.0	10.0	10.0			10.0	10.0
Flash Dont Walk (s)		15.0		15.0	15.0	15.0	16.0	16.0			16.0	16.0
Pedestrian Calls (#/hr)		3		9	9	9	3	3			4	4
Act Effct Green (s)	31.1	27.6			12.5	12.5		30.7		45.8	41.8	41.8
Actuated g/C Ratio	0.37	0.32			0.15	0.15		0.36		0.54	0.49	0.49
v/c Ratio	0.72	0.27			0.25	0.12		0.85		0.41	0.48	0.57
Control Delay	32.8	14.3			35.3	0.8		42.4		14.1	17.4	11.0
Queue Delay	0.0	0.0			0.0	0.0		0.0		0.0	0.0	0.0
Total Delay	32.8	14.3			35.3	0.8		42.4		14.1	17.4	11.0
LOS	C	B			D	A		D		B	B	B
Approach Delay		26.8			21.8			42.4			14.0	
Approach LOS		C			C			D			B	
Queue Length 50th (m)	40.0	10.1			9.3	0.0		65.3		12.3	38.4	21.0
Queue Length 95th (m)	62.5	23.0			19.7	0.0		#144.2		30.4	81.0	62.7
Internal Link Dist (m)		116.4			93.0			375.6			150.8	
Turn Bay Length (m)	25.0					15.0				20.0		15.0
Base Capacity (vph)	422	754			488	487		616		419	908	846
Starvation Cap Reductn	0	0			0	0		0		0	0	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	0.72	0.19			0.13	0.08		0.76		0.41	0.44	0.53

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 85			
Natural Cycle: 90			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.85			
Intersection Signal Delay: 23.8		Intersection LOS: C	
Intersection Capacity Utilization 89.9%		ICU Level of Service E	
Analysis Period (min) 15			

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

Splits and Phases: 1: Willoughby Drive/Portage Road & Main Street



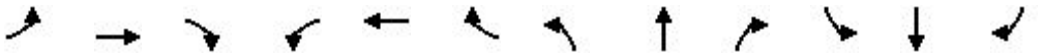


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	281	66	69	4	53	36	54	376	8	159	374	420
Future Volume (vph)	281	66	69	4	53	36	54	376	8	159	374	420
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	7.5			7.5	7.5		8.0		4.0	8.0	8.0
Lane Util. Factor	1.00	1.00			1.00	1.00		1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98			1.00	0.95		1.00		1.00	1.00	0.95
Flpb, ped/bikes	0.99	1.00			1.00	1.00		1.00		1.00	1.00	1.00
Frt	1.00	0.92			1.00	0.85		1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00			1.00	1.00		0.99		0.95	1.00	1.00
Satd. Flow (prot)	1594	1542			1728	1336		1700		1642	1701	1403
Flt Permitted	0.54	1.00			0.97	1.00		0.89		0.36	1.00	1.00
Satd. Flow (perm)	912	1542			1682	1336		1527		626	1701	1403
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	302	71	74	4	57	39	58	404	9	171	402	452
RTOR Reduction (vph)	0	42	0	0	0	33	0	1	0	0	0	111
Lane Group Flow (vph)	302	103	0	0	61	6	0	470	0	171	402	341
Confl. Peds. (#/hr)	18		10	9		17	10		9	17		18
Heavy Vehicles (%)	4%	6%	2%	2%	2%	7%	3%	3%	2%	2%	4%	2%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8		8	2			6		6
Actuated Green, G (s)	27.6	27.6			12.5	12.5		30.7		41.8	41.8	41.8
Effective Green, g (s)	27.6	27.6			12.5	12.5		30.7		41.8	41.8	41.8
Actuated g/C Ratio	0.33	0.33			0.15	0.15		0.36		0.49	0.49	0.49
Clearance Time (s)	4.0	7.5			7.5	7.5		8.0		4.0	8.0	8.0
Vehicle Extension (s)	3.0	3.0			3.0	3.0		3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	385	501			247	196		552		393	837	690
v/s Ratio Prot	c0.10	0.07								0.04	0.24	
v/s Ratio Perm	c0.15				0.04	0.00		c0.31		0.18		c0.24
v/c Ratio	0.78	0.21			0.25	0.03		0.85		0.44	0.48	0.49
Uniform Delay, d1	24.7	20.7			32.0	31.0		25.0		13.8	14.3	14.5
Progression Factor	1.00	1.00			1.00	1.00		1.00		1.00	1.00	1.00
Incremental Delay, d2	10.1	0.2			0.5	0.1		12.1		0.8	0.4	0.6
Delay (s)	34.7	20.9			32.6	31.1		37.1		14.6	14.8	15.0
Level of Service	C	C			C	C		D		B	B	B
Approach Delay (s)		30.2			32.0			37.1			14.8	
Approach LOS		C			C			D			B	

Intersection Summary			
HCM 2000 Control Delay	24.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	84.9	Sum of lost time (s)	23.5
Intersection Capacity Utilization	89.9%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	364	36	51	1	28	37	47	359	5	80	211	201
Future Volume (vph)	364	36	51	1	28	37	47	359	5	80	211	201
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	25.0		0.0	0.0		15.0	20.0		0.0	20.0		15.0
Storage Lanes	1		0	0		1	0		0	1		1
Taper Length (m)	25.0			25.0			25.0			25.0		
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	0.98	0.98			1.00	0.97		1.00		1.00		0.96
Frt		0.912				0.850		0.998				0.850
Flt Protected	0.950				0.998			0.994		0.950		
Satd. Flow (prot)	1648	1396	0	0	1731	1406	0	1663	0	1648	1669	1380
Flt Permitted	0.558				0.989			0.928		0.348		
Satd. Flow (perm)	952	1396	0	0	1715	1360	0	1551	0	601	1669	1329
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		57				142		1				170
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		140.4			117.0			399.6			174.8	
Travel Time (s)		10.1			8.4			28.8			12.6	
Confl. Peds. (#/hr)	9		7	4		6	7		4	6		9
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	2%	15%	12%	2%	2%	7%	2%	6%	2%	2%	6%	9%
Adj. Flow (vph)	404	40	57	1	31	41	52	399	6	89	234	223
Shared Lane Traffic (%)												
Lane Group Flow (vph)	404	97	0	0	32	41	0	457	0	89	234	223
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	1		1	1	1	1	1		1	1	1
Detector Template				Left			Left					Right
Leading Detector (m)	10.0	10.0		6.1	10.0	10.0	6.1	10.0		10.0	10.0	10.0
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	10.0	10.0		6.1	10.0	10.0	6.1	10.0		10.0	10.0	10.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8		8	2			6		6
Detector Phase	7	4		8	8	8	2	2		1	6	6
Switch Phase												

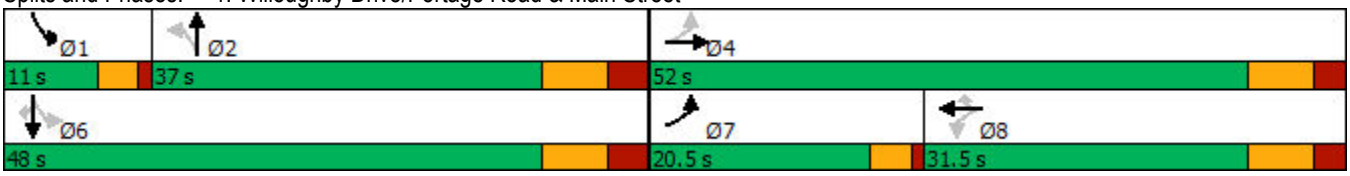


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	7.0	10.0		10.0	10.0	10.0	20.0	20.0		7.0	20.0	20.0
Minimum Split (s)	11.0	31.5		31.5	31.5	31.5	34.0	34.0		11.0	34.0	34.0
Total Split (s)	20.5	52.0		31.5	31.5	31.5	37.0	37.0		11.0	48.0	48.0
Total Split (%)	20.5%	52.0%		31.5%	31.5%	31.5%	37.0%	37.0%		11.0%	48.0%	48.0%
Maximum Green (s)	16.5	44.5		24.0	24.0	24.0	29.0	29.0		7.0	40.0	40.0
Yellow Time (s)	3.0	5.0		5.0	5.0	5.0	5.0	5.0		3.0	5.0	5.0
All-Red Time (s)	1.0	2.5		2.5	2.5	2.5	3.0	3.0		1.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0			0.0	0.0		0.0		0.0	0.0	0.0
Total Lost Time (s)	4.0	7.5			7.5	7.5		8.0		4.0	8.0	8.0
Lead/Lag	Lead			Lag	Lag	Lag	Lag	Lag		Lead		
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes	Yes		Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Recall Mode	None	Min		Min	Min	Min	Min	Min		None	Min	Min
Walk Time (s)		9.0		9.0	9.0	9.0	10.0	10.0			10.0	10.0
Flash Dont Walk (s)		15.0		15.0	15.0	15.0	16.0	16.0			16.0	16.0
Pedestrian Calls (#/hr)		3		4	4	4	0	0			2	2
Act Effct Green (s)	36.5	33.0			12.5	12.5		29.2		41.8	37.8	37.8
Actuated g/C Ratio	0.42	0.38			0.14	0.14		0.34		0.48	0.44	0.44
v/c Ratio	0.76	0.17			0.13	0.13		0.87		0.24	0.32	0.33
Control Delay	30.2	9.5			33.6	0.8		47.6		14.8	18.1	6.4
Queue Delay	0.0	0.0			0.0	0.0		0.0		0.0	0.0	0.0
Total Delay	30.2	9.5			33.6	0.8		47.6		14.8	18.1	6.4
LOS	C	A			C	A		D		B	B	A
Approach Delay		26.2			15.2			47.6			12.8	
Approach LOS		C			B			D			B	
Queue Length 50th (m)	52.1	4.3			4.8	0.0		69.6		7.2	23.0	4.7
Queue Length 95th (m)	78.4	13.5			12.2	0.0		#153.5		19.2	49.9	22.0
Internal Link Dist (m)		116.4			93.0			375.6			150.8	
Turn Bay Length (m)	25.0					15.0				20.0		15.0
Base Capacity (vph)	536	752			480	482		525		376	779	711
Starvation Cap Reductn	0	0			0	0		0		0	0	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	0.75	0.13			0.07	0.09		0.87		0.24	0.30	0.31

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 86.4			
Natural Cycle: 90			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.87			
Intersection Signal Delay: 27.3		Intersection LOS: C	
Intersection Capacity Utilization 89.8%		ICU Level of Service E	
Analysis Period (min) 15			

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

Splits and Phases: 1: Willoughby Drive/Portage Road & Main Street



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	364	36	51	1	28	37	47	359	5	80	211	201
Future Volume (vph)	364	36	51	1	28	37	47	359	5	80	211	201
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	7.5			7.5	7.5		8.0		4.0	8.0	8.0
Lane Util. Factor	1.00	1.00			1.00	1.00		1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98			1.00	0.97		1.00		1.00	1.00	0.97
Flpb, ped/bikes	0.99	1.00			1.00	1.00		1.00		1.00	1.00	1.00
Frt	1.00	0.91			1.00	0.85		1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00			1.00	1.00		0.99		0.95	1.00	1.00
Satd. Flow (prot)	1635	1398			1732	1363		1663		1646	1669	1332
Flt Permitted	0.56	1.00			0.99	1.00		0.93		0.35	1.00	1.00
Satd. Flow (perm)	960	1398			1715	1363		1552		603	1669	1332
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	404	40	57	1	31	41	52	399	6	89	234	223
RTOR Reduction (vph)	0	35	0	0	0	35	0	1	0	0	0	95
Lane Group Flow (vph)	404	62	0	0	32	6	0	456	0	89	234	128
Confl. Peds. (#/hr)	9		7	4		6	7		4	6		9
Heavy Vehicles (%)	2%	15%	12%	2%	2%	7%	2%	6%	2%	2%	6%	9%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8		8	2			6		6
Actuated Green, G (s)	33.0	33.0			12.5	12.5		29.3		38.7	38.7	38.7
Effective Green, g (s)	33.0	33.0			12.5	12.5		29.3		38.7	38.7	38.7
Actuated g/C Ratio	0.38	0.38			0.14	0.14		0.34		0.44	0.44	0.44
Clearance Time (s)	4.0	7.5			7.5	7.5		8.0		4.0	8.0	8.0
Vehicle Extension (s)	3.0	3.0			3.0	3.0		3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	491	529			245	195		521		332	740	591
v/s Ratio Prot	c0.16	0.04								0.02	c0.14	
v/s Ratio Perm	c0.16				0.02	0.00		c0.29		0.10		0.10
v/c Ratio	0.82	0.12			0.13	0.03		0.88		0.27	0.32	0.22
Uniform Delay, d1	22.8	17.6			32.6	32.1		27.2		15.8	15.7	14.9
Progression Factor	1.00	1.00			1.00	1.00		1.00		1.00	1.00	1.00
Incremental Delay, d2	10.7	0.1			0.2	0.1		15.2		0.4	0.2	0.2
Delay (s)	33.5	17.7			32.8	32.2		42.4		16.3	15.9	15.1
Level of Service	C	B			C	C		D		B	B	B
Approach Delay (s)		30.4			32.5			42.4			15.7	
Approach LOS		C			C			D			B	

Intersection Summary			
HCM 2000 Control Delay	28.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	87.2	Sum of lost time (s)	23.5
Intersection Capacity Utilization	89.8%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

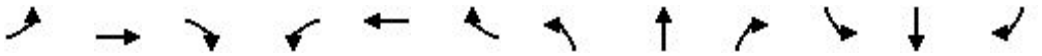
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	22	134	217	38	88	136
Future Volume (vph)	22	134	217	38	88	136
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.884		0.980			
Flt Protected	0.993					0.981
Satd. Flow (prot)	1523	0	1643	0	0	1685
Flt Permitted	0.993					0.981
Satd. Flow (perm)	1523	0	1643	0	0	1685
Link Speed (k/h)	50		50			50
Link Distance (m)	112.0		177.9			249.8
Travel Time (s)	8.1		12.8			18.0
Confl. Peds. (#/hr)	30	2		30	2	
Peak Hour Factor	0.66	0.66	0.66	0.66	0.66	0.66
Heavy Vehicles (%)	2%	2%	6%	3%	3%	3%
Adj. Flow (vph)	33	203	329	58	133	206
Shared Lane Traffic (%)						
Lane Group Flow (vph)	236	0	387	0	0	339
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.7		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.9		4.9			4.9
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24	14		14	24	
Sign Control	Stop		Stop			Stop

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	49.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	22	134	217	38	88	136
Future Volume (vph)	22	134	217	38	88	136
Peak Hour Factor	0.66	0.66	0.66	0.66	0.66	0.66
Hourly flow rate (vph)	33	203	329	58	133	206

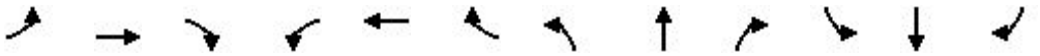
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	236	387	339
Volume Left (vph)	33	0	133
Volume Right (vph)	203	58	0
Hadj (s)	-0.45	0.00	0.13
Departure Headway (s)	5.3	5.1	5.2
Degree Utilization, x	0.34	0.54	0.49
Capacity (veh/h)	624	679	660
Control Delay (s)	11.0	13.9	13.2
Approach Delay (s)	11.0	13.9	13.2
Approach LOS	B	B	B

Intersection Summary			
Delay	12.9		
Level of Service	B		
Intersection Capacity Utilization	49.0%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	47	4	22	5	8	17	11	179	2	5	83	33
Future Volume (vph)	47	4	22	5	8	17	11	179	2	5	83	33
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												
Frt		0.959			0.925			0.999			0.963	
Flt Protected		0.969			0.992			0.997			0.998	
Satd. Flow (prot)	0	1520	0	0	1388	0	0	1721	0	0	1645	0
Flt Permitted		0.969			0.992			0.997			0.998	
Satd. Flow (perm)	0	1520	0	0	1388	0	0	1721	0	0	1645	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		265.5			209.0			181.2			264.5	
Travel Time (s)		19.1			15.0			13.0			19.0	
Confl. Peds. (#/hr)	4		4	5		5	4		5	5		4
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Heavy Vehicles (%)	3%	100%	2%	75%	2%	7%	2%	2%	50%	2%	2%	7%
Adj. Flow (vph)	57	5	27	6	10	20	13	216	2	6	100	40
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	89	0	0	36	0	0	231	0	0	146	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 33.1%		ICU Level of Service A	
Analysis Period (min) 15			

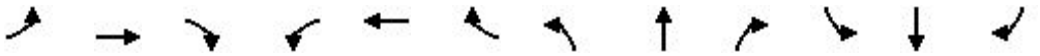


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	47	4	22	5	8	17	11	179	2	5	83	33
Future Volume (Veh/h)	47	4	22	5	8	17	11	179	2	5	83	33
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Hourly flow rate (vph)	57	5	27	6	10	20	13	216	2	6	100	40
Pedestrians		4			5			5			5	
Lane Width (m)		3.7			3.7			3.7			3.7	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		0			0			0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	409	385	129	414	404	227	144			223		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	409	385	129	414	404	227	144			223		
tC, single (s)	7.1	7.5	6.2	7.8	6.5	6.3	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.9	3.3	4.2	4.0	3.4	2.2			2.2		
p0 queue free %	89	99	97	99	98	97	99			100		
cM capacity (veh/h)	517	414	914	413	524	793	1434			1340		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	89	36	231	146
Volume Left	57	6	13	6
Volume Right	27	20	2	40
cSH	586	612	1434	1340
Volume to Capacity	0.15	0.06	0.01	0.00
Queue Length 95th (m)	4.0	1.4	0.2	0.1
Control Delay (s)	12.2	11.3	0.5	0.4
Lane LOS	B	B	A	A
Approach Delay (s)	12.2	11.3	0.5	0.4
Approach LOS	B	B		

Intersection Summary				
Average Delay	3.3			
Intersection Capacity Utilization	33.1%	ICU Level of Service	A	
Analysis Period (min)	15			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	292	69	72	4	56	37	56	390	8	167	389	435
Future Volume (vph)	292	69	72	4	56	37	56	390	8	167	389	435
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	25.0		0.0	0.0		15.0	20.0		0.0	20.0		15.0
Storage Lanes	1		0	0		1	0		0	1		1
Taper Length (m)	25.0			25.0			25.0			25.0		
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	0.97	0.98			1.00	0.95		1.00		0.99		0.95
Frt		0.924				0.850		0.998				0.850
Flt Protected	0.950				0.997			0.994		0.950		
Satd. Flow (prot)	1616	1540	0	0	1730	1406	0	1703	0	1648	1701	1475
Flt Permitted	0.542				0.971			0.890		0.359		
Satd. Flow (perm)	893	1540	0	0	1683	1329	0	1523	0	616	1701	1395
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		62				142		1				218
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		140.4			117.0			399.6			174.8	
Travel Time (s)		10.1			8.4			28.8			12.6	
Confl. Peds. (#/hr)	18		10	9		17	10		9	17		18
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	4%	6%	2%	2%	2%	7%	3%	3%	2%	2%	4%	2%
Adj. Flow (vph)	314	74	77	4	60	40	60	419	9	180	418	468
Shared Lane Traffic (%)												
Lane Group Flow (vph)	314	151	0	0	64	40	0	488	0	180	418	468
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	1		1	1	1	1	1		1	1	1
Detector Template				Left			Left					Right
Leading Detector (m)	10.0	10.0		6.1	10.0	10.0	6.1	10.0		10.0	10.0	10.0
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	10.0	10.0		6.1	10.0	10.0	6.1	10.0		10.0	10.0	10.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8		8	2			6		6
Detector Phase	7	4		8	8	8	2	2		1	6	6
Switch Phase												

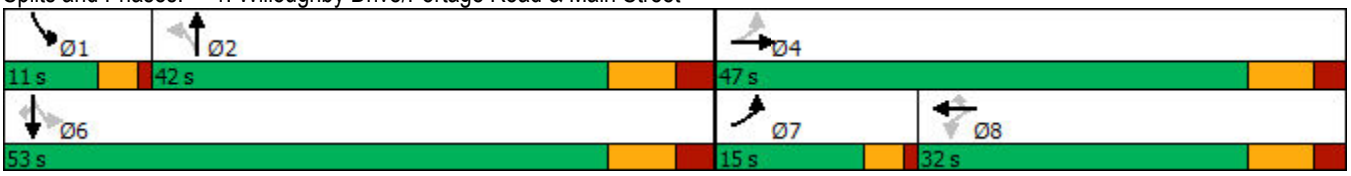


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	7.0	10.0		10.0	10.0	10.0	20.0	20.0		7.0	20.0	20.0
Minimum Split (s)	11.0	31.5		31.5	31.5	31.5	34.0	34.0		11.0	34.0	34.0
Total Split (s)	15.0	47.0		32.0	32.0	32.0	42.0	42.0		11.0	53.0	53.0
Total Split (%)	15.0%	47.0%		32.0%	32.0%	32.0%	42.0%	42.0%		11.0%	53.0%	53.0%
Maximum Green (s)	11.0	39.5		24.5	24.5	24.5	34.0	34.0		7.0	45.0	45.0
Yellow Time (s)	3.0	5.0		5.0	5.0	5.0	5.0	5.0		3.0	5.0	5.0
All-Red Time (s)	1.0	2.5		2.5	2.5	2.5	3.0	3.0		1.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0			0.0	0.0		0.0		0.0	0.0	0.0
Total Lost Time (s)	4.0	7.5			7.5	7.5		8.0		4.0	8.0	8.0
Lead/Lag	Lead			Lag	Lag	Lag	Lag	Lag		Lead		
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes	Yes		Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Recall Mode	None	Min		Min	Min	Min	Min	Min		None	Min	Min
Walk Time (s)		9.0		9.0	9.0	9.0	10.0	10.0			10.0	10.0
Flash Dont Walk (s)		15.0		15.0	15.0	15.0	16.0	16.0			16.0	16.0
Pedestrian Calls (#/hr)		3		9	9	9	3	3			4	4
Act Effct Green (s)	31.1	27.6			12.5	12.5		32.2		47.3	43.3	43.3
Actuated g/C Ratio	0.36	0.32			0.14	0.14		0.37		0.55	0.50	0.50
v/c Ratio	0.76	0.28			0.26	0.13		0.86		0.43	0.49	0.58
Control Delay	36.0	14.8			35.9	0.8		42.6		14.4	17.5	11.5
Queue Delay	0.0	0.0			0.0	0.0		0.0		0.0	0.0	0.0
Total Delay	36.0	14.8			35.9	0.8		42.6		14.4	17.5	11.5
LOS	D	B			D	A		D		B	B	B
Approach Delay		29.1			22.4			42.6			14.4	
Approach LOS		C			C			D			B	
Queue Length 50th (m)	42.0	10.9			9.8	0.0		68.9		13.0	40.4	23.3
Queue Length 95th (m)	65.2	24.3			20.5	0.0		#152.3		32.0	85.1	67.6
Internal Link Dist (m)		116.4			93.0			375.6			150.8	
Turn Bay Length (m)	25.0					15.0				20.0		15.0
Base Capacity (vph)	413	741			480	480		603		420	891	834
Starvation Cap Reductn	0	0			0	0		0		0	0	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	0.76	0.20			0.13	0.08		0.81		0.43	0.47	0.56

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 86.5			
Natural Cycle: 90			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.86			
Intersection Signal Delay: 24.5		Intersection LOS: C	
Intersection Capacity Utilization 92.2%		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.

Splits and Phases: 1: Willoughby Drive/Portage Road & Main Street



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	292	69	72	4	56	37	56	390	8	167	389	435
Future Volume (vph)	292	69	72	4	56	37	56	390	8	167	389	435
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	7.5			7.5	7.5		8.0		4.0	8.0	8.0
Lane Util. Factor	1.00	1.00			1.00	1.00		1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98			1.00	0.95		1.00		1.00	1.00	0.95
Flpb, ped/bikes	0.99	1.00			1.00	1.00		1.00		1.00	1.00	1.00
Frt	1.00	0.92			1.00	0.85		1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00			1.00	1.00		0.99		0.95	1.00	1.00
Satd. Flow (prot)	1594	1542			1728	1335		1700		1643	1701	1402
Flt Permitted	0.54	1.00			0.97	1.00		0.89		0.36	1.00	1.00
Satd. Flow (perm)	909	1542			1683	1335		1523		621	1701	1402
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	314	74	77	4	60	40	60	419	9	180	418	468
RTOR Reduction (vph)	0	42	0	0	0	34	0	1	0	0	0	109
Lane Group Flow (vph)	314	109	0	0	64	6	0	487	0	180	418	359
Confl. Peds. (#/hr)	18		10	9		17	10		9	17		18
Heavy Vehicles (%)	4%	6%	2%	2%	2%	7%	3%	3%	2%	2%	4%	2%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8		8	2			6		6
Actuated Green, G (s)	27.6	27.6			12.5	12.5		32.3		43.3	43.3	43.3
Effective Green, g (s)	27.6	27.6			12.5	12.5		32.3		43.3	43.3	43.3
Actuated g/C Ratio	0.32	0.32			0.14	0.14		0.37		0.50	0.50	0.50
Clearance Time (s)	4.0	7.5			7.5	7.5		8.0		4.0	8.0	8.0
Vehicle Extension (s)	3.0	3.0			3.0	3.0		3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	378	492			243	193		569		394	852	702
v/s Ratio Prot	c0.11	0.07								0.04	0.25	
v/s Ratio Perm	c0.16				0.04	0.00		c0.32		0.19		c0.26
v/c Ratio	0.83	0.22			0.26	0.03		0.86		0.46	0.49	0.51
Uniform Delay, d1	26.0	21.5			32.9	31.7		24.9		13.8	14.3	14.5
Progression Factor	1.00	1.00			1.00	1.00		1.00		1.00	1.00	1.00
Incremental Delay, d2	14.3	0.2			0.6	0.1		12.1		0.8	0.4	0.6
Delay (s)	40.3	21.8			33.4	31.8		37.0		14.6	14.7	15.1
Level of Service	D	C			C	C		D		B	B	B
Approach Delay (s)		34.3			32.8			37.0			14.9	
Approach LOS		C			C			D			B	

Intersection Summary			
HCM 2000 Control Delay	25.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	86.4	Sum of lost time (s)	23.5
Intersection Capacity Utilization	92.2%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

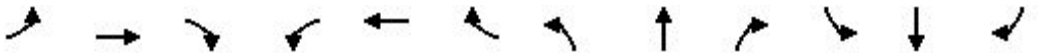
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	39	75	190	43	119	280
Future Volume (vph)	39	75	190	43	119	280
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.911		0.975			
Flt Protected	0.983					0.985
Satd. Flow (prot)	1553	0	1691	0	0	1709
Flt Permitted	0.983					0.985
Satd. Flow (perm)	1553	0	1691	0	0	1709
Link Speed (k/h)	50		50			50
Link Distance (m)	112.0		177.9			249.8
Travel Time (s)	8.1		12.8			18.0
Confl. Peds. (#/hr)	21	4		21	4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	42	82	207	47	129	304
Shared Lane Traffic (%)						
Lane Group Flow (vph)	124	0	254	0	0	433
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.7		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.9		4.9			4.9
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24	14		14	24	
Sign Control	Stop		Stop			Stop

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 55.6%		ICU Level of Service B	
Analysis Period (min) 15			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	39	75	190	43	119	280
Future Volume (vph)	39	75	190	43	119	280
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	42	82	207	47	129	304

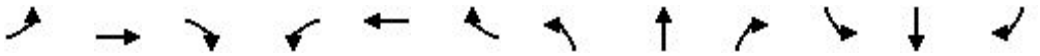
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	124	254	433
Volume Left (vph)	42	0	129
Volume Right (vph)	82	47	0
Hadj (s)	-0.30	-0.08	0.09
Departure Headway (s)	5.2	4.7	4.6
Degree Utilization, x	0.18	0.33	0.56
Capacity (veh/h)	620	740	755
Control Delay (s)	9.3	9.9	13.3
Approach Delay (s)	9.3	9.9	13.3
Approach LOS	A	A	B

Intersection Summary			
Delay	11.6		
Level of Service	B		
Intersection Capacity Utilization	55.6%	ICU Level of Service	B
Analysis Period (min)	15		



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	27	10	8	0	4	7	40	155	1	27	192	47
Future Volume (vph)	27	10	8	0	4	7	40	155	1	27	192	47
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												
Frt		0.977			0.913			0.999			0.976	
Flt Protected		0.971						0.990			0.995	
Satd. Flow (prot)	0	1646	0	0	1584	0	0	1716	0	0	1685	0
Flt Permitted		0.971						0.990			0.995	
Satd. Flow (perm)	0	1646	0	0	1584	0	0	1716	0	0	1685	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		265.5			209.0			181.2			264.5	
Travel Time (s)		19.1			15.0			13.0			19.0	
Confl. Peds. (#/hr)	5		13	16		8	13		16	8		5
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
Adj. Flow (vph)	35	13	10	0	5	9	52	201	1	35	249	61
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	58	0	0	14	0	0	254	0	0	345	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 37.2%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	27	10	8	0	4	7	40	155	1	27	192	47
Future Volume (Veh/h)	27	10	8	0	4	7	40	155	1	27	192	47
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
Hourly flow rate (vph)	35	13	10	0	5	9	52	201	1	35	249	61
Pedestrians		13			16			16			8	
Lane Width (m)		3.7			3.7			3.7			3.7	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		1			1			1			1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	688	684	308	704	714	226	323			218		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	688	684	308	704	714	226	323			218		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	89	96	99	100	98	99	96			97		
cM capacity (veh/h)	322	337	713	305	324	797	1223			1333		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	58	14	254	345
Volume Left	35	0	52	35
Volume Right	10	9	1	61
cSH	360	524	1223	1333
Volume to Capacity	0.16	0.03	0.04	0.03
Queue Length 95th (m)	4.3	0.6	1.0	0.6
Control Delay (s)	16.9	12.1	2.0	1.0
Lane LOS	C	B	A	A
Approach Delay (s)	16.9	12.1	2.0	1.0
Approach LOS	C	B		

Intersection Summary				
Average Delay	3.0			
Intersection Capacity Utilization	37.2%	ICU Level of Service	A	
Analysis Period (min)	15			

Appendix G:
ITE Land-use Definitions

Land Use: 215
Single-Family Attached Housing

Description

Single-family attached housing includes any single-family housing unit that shares a wall with an adjoining dwelling unit, whether the walls are for living space, a vehicle garage, or storage space.

Additional Data

The database for this land use includes duplexes (defined as a single structure with two distinct dwelling units, typically joined side-by-side and each with at least one outside entrance) and townhouses/rowhouses (defined as a single structure with three or more distinct dwelling units, joined side-by-side in a row and each with an outside entrance).

The technical appendices provide supporting information on time-of-day distributions for this land use. The appendices can be accessed through either the ITETripGen web app or the trip generation resource page on the ITE website (https://www.ite.org/technical-resources/topics/trip-and-parking-generation/).

The sites were surveyed in the 1980s, the 1990s, the 2000s, and the 2010s in British Columbia (CAN), California, Georgia, Illinois, Maryland, Massachusetts, Minnesota, New Jersey, Ontario (CAN), Oregon, Pennsylvania, South Dakota, Utah, Virginia, and Wisconsin.

Source Numbers

168, 204, 211, 237, 305, 306, 319, 321, 357, 390, 418, 525, 571, 583, 638, 735, 868, 869, 870, 896, 912, 959, 1009, 1046, 1056, 1058, 1077

Land Use: 220
Multifamily Housing (Low-Rise)

Description

Low-rise multifamily housing includes apartments, townhouses, and condominiums located within the same building with at least three other dwelling units and that have two or three floors (levels). Various configurations fit this description, including walkup apartment, mansion apartment, and stacked townhouse.

- A walkup apartment typically is two or three floors in height with dwelling units that are accessed by a single or multiple entrances with stairways and hallways.

- A mansion apartment is a single structure that contains several apartments within what appears to be a single-family dwelling unit.

- A fourplex is a single two-story structure with two matching dwelling units on the ground and second floors. Access to the individual units is typically internal to the structure and provided through a central entry and stairway.

- A stacked townhouse is designed to match the external appearance of a townhouse. But, unlike a townhouse dwelling unit that only shares walls with an adjoining unit, the stacked townhouse units share both floors and walls. Access to the individual units is typically internal to the structure and provided through a central entry and stairway.

Multifamily housing (mid-rise) (Land Use 221), multifamily housing (high-rise) (Land Use 222), affordable housing (Land Use 223), and off-campus student apartment (low-rise) (Land Use 225) are related land uses.

Land Use Subcategory

Data are presented for two subcategories for this land use: (1) not close to rail transit and (2) close to rail transit. A site is considered close to rail transit if the walking distance between the residential site entrance and the closest rail transit station entrance is ½ mile or less.

Additional Data

For the three sites for which both the number of residents and the number of occupied dwelling units were available, there were an average of 2.72 residents per occupied dwelling unit.

For the two sites for which the numbers of both total dwelling units and occupied dwelling units were available, an average of 96.2 percent of the total dwelling units were occupied.

The technical appendices provide supporting information on time-of-day distributions for this land use. The appendices can be accessed through either the ITETripGen web app or the trip

generation resource page on the ITE website (https://www.ite.org/technical-resources/topics/trip-and-parking-generation/).

For the three sites for which data were provided for both occupied dwelling units and residents, there was an average of 2.72 residents per occupied dwelling unit.

It is expected that the number of bedrooms and number of residents are likely correlated to the trips generated by a residential site. To assist in future analysis, trip generation studies of all multifamily housing should attempt to obtain information on occupancy rate and on the mix of residential unit sizes (i.e., number of units by number of bedrooms at the site complex).

The sites were surveyed in the 1980s, the 1990s, the 2000s, the 2010s, and the 2020s in British Columbia (CAN), California, Delaware, Florida, Georgia, Illinois, Indiana, Maine, Maryland, Massachusetts, Minnesota, New Jersey, Ontario (CAN), Oregon, Pennsylvania, South Carolina, South Dakota, Tennessee, Texas, Utah, and Washington.

Source Numbers

188, 204, 237, 300, 305, 306, 320, 321, 357, 390, 412, 525, 530, 579, 583, 638, 864, 866, 896, 901, 903, 904, 936, 939, 944, 946, 947, 948, 963, 964, 966, 967, 1012, 1013, 1014, 1036, 1047, 1056, 1071, 1076

Land Use: 221
Multifamily Housing (Mid-Rise)

Description

Mid-rise multifamily housing includes apartments and condominiums located in a building that has between four and 10 floors of living space. Access to individual dwelling units is through an outside building entrance, a lobby, elevator, and a set of hallways.

Multifamily housing (low-rise) (Land Use 220), multifamily housing (high-rise) (Land Use 222), off-campus student apartment (mid-rise) (Land Use 226), and mid-rise residential with ground-floor commercial (Land Use 231) are related land uses.

Land Use Subcategory

Data are presented for two subcategories for this land use: (1) not close to rail transit and (2) close to rail transit. A site is considered close to rail transit if the walking distance between the residential site entrance and the closest rail transit station entrance is ½ mile or less.

Additional Data

For the six sites for which both the number of residents and the number of occupied dwelling units were available, there were an average of 2.5 residents per occupied dwelling unit.

For the five sites for which the numbers of both total dwelling units and occupied dwelling units were available, an average of 96 percent of the total dwelling units were occupied.

The technical appendices provide supporting information on time-of-day distributions for this land use. The appendices can be accessed through either the ITETripGen web app or the trip generation resource page on the ITE website (https://www.ite.org/technical-resources/topics/trip-and-parking-generation/).

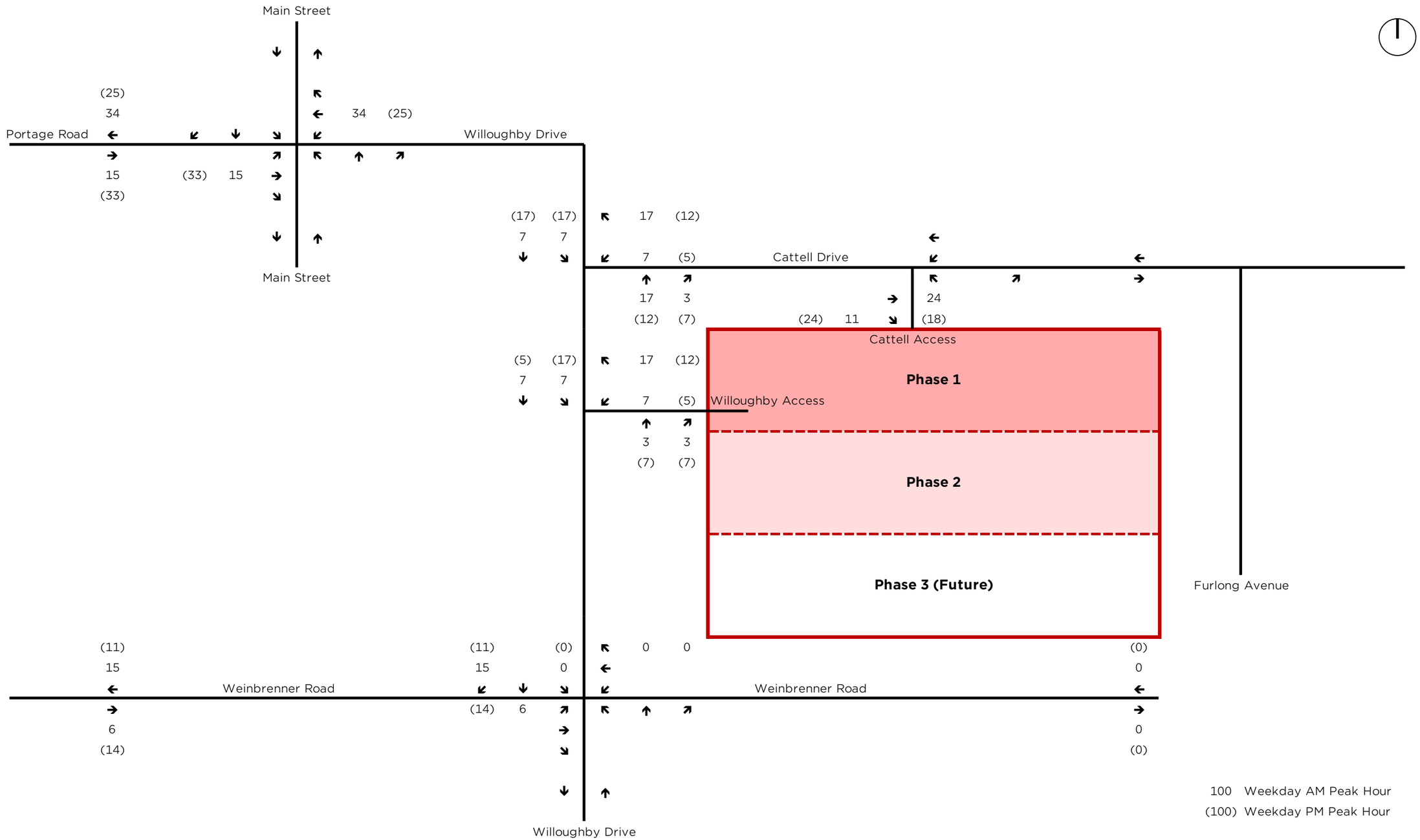
It is expected that the number of bedrooms and number of residents are likely correlated to the trips generated by a residential site. To assist in future analysis, trip generation studies of all multifamily housing should attempt to obtain information on occupancy rate and on the mix of residential unit sizes (i.e., number of units by number of bedrooms at the site complex).

The sites were surveyed in the 1990s, the 2000s, the 2010s, and the 2020s in Alberta (CAN), California, District of Columbia, Florida, Georgia, Illinois, Maryland, Massachusetts, Minnesota, Montana, New Jersey, New York, Ontario (CAN), Oregon, Utah, and Virginia.

Source Numbers

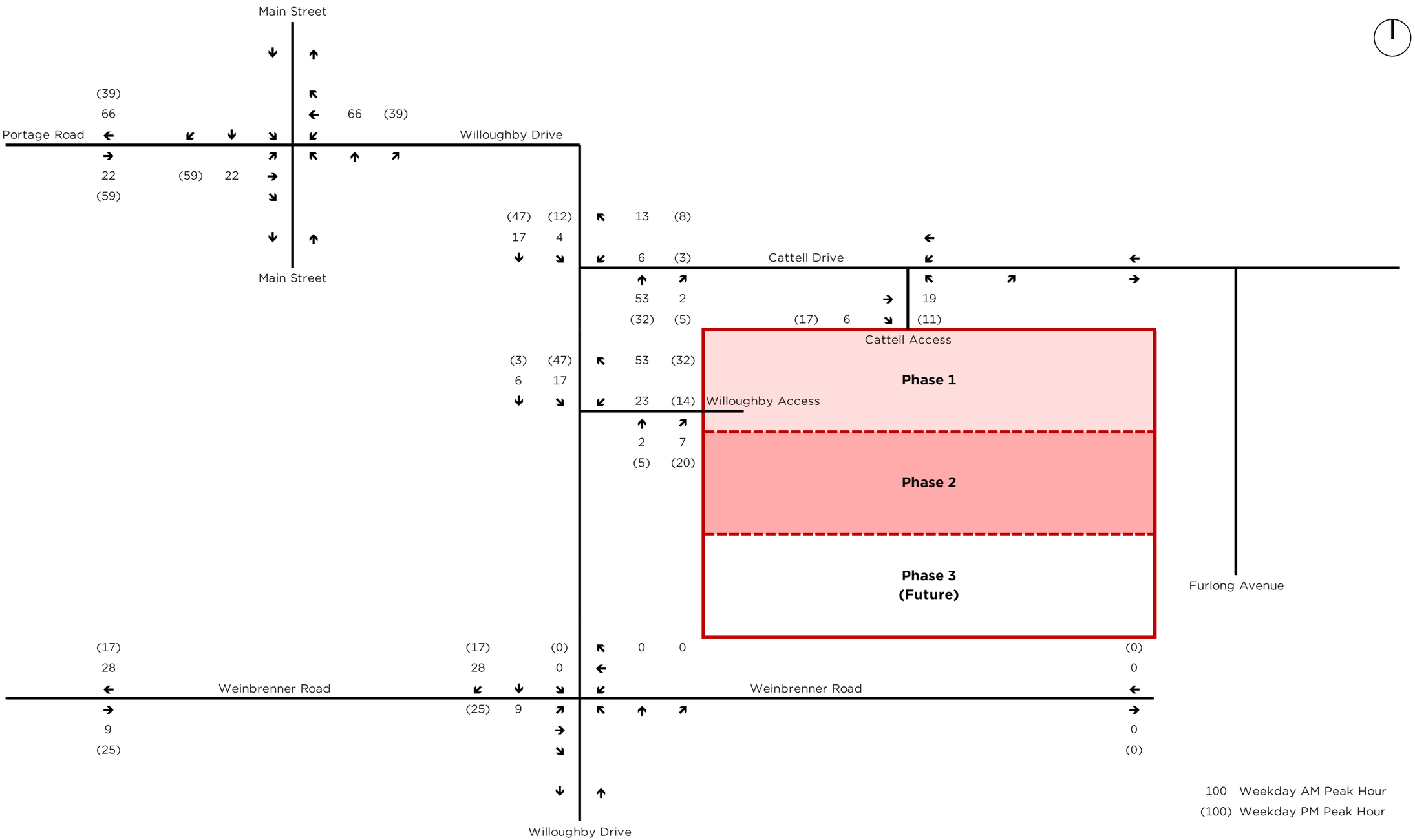
168, 188, 204, 305, 306, 321, 818, 857, 862, 866, 901, 904, 910, 949, 951, 959, 963, 964, 966, 967, 969, 970, 1004, 1014, 1022, 1023, 1025, 1031, 1032, 1035, 1047, 1056, 1057, 1058, 1071, 1076

Appendix H:
Site Trip Assignment



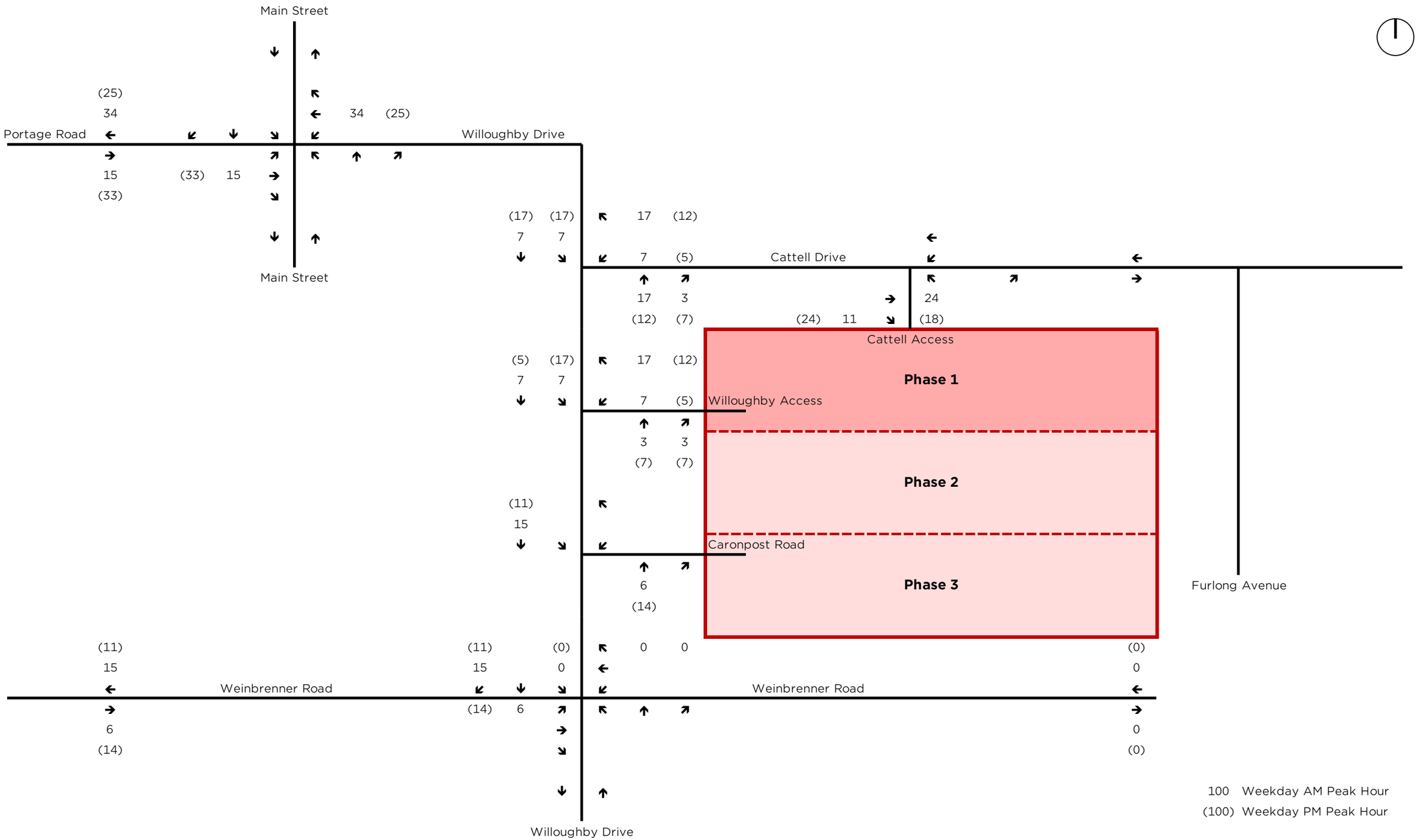
WILLOUGHBY DRIVE DEVELOPMENT TIS – APPENDIX H

Figure 1: 2027 Site Traffic – Phase 1



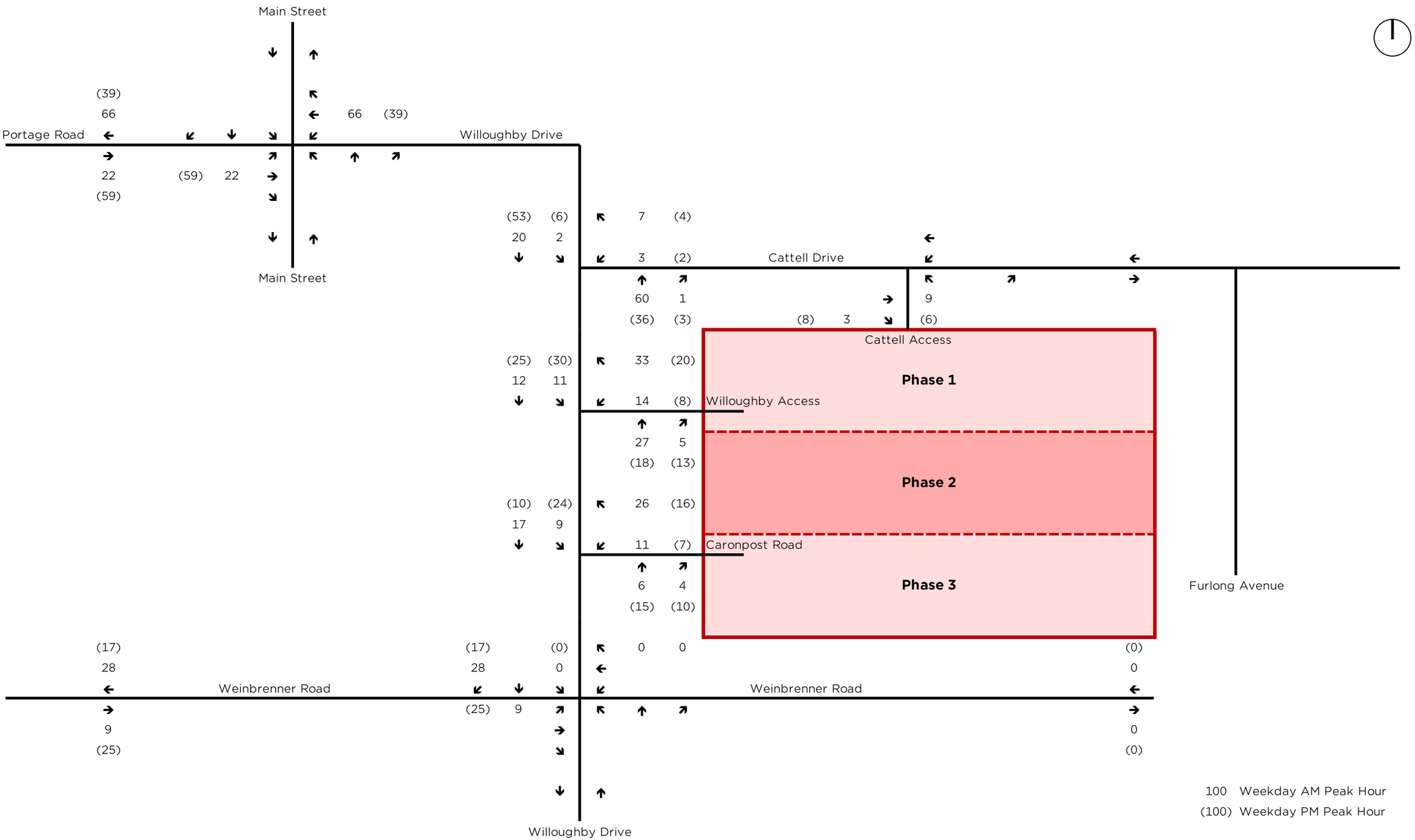
WILLOUGHBY DRIVE DEVELOPMENT TIS – APPENDIX H

Figure 2: 2027 Site Traffic – Phase 2



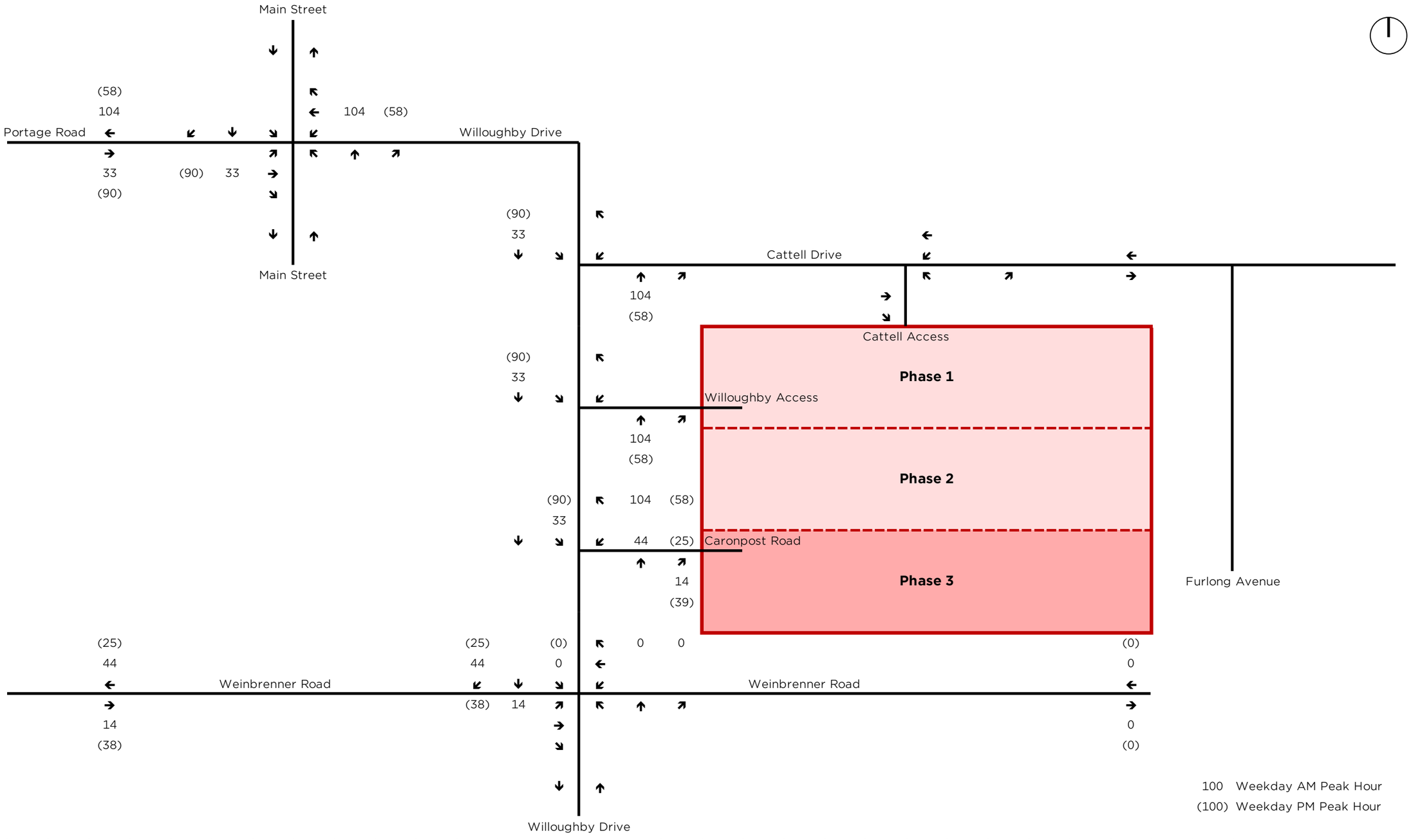
WILLOUGHBY DRIVE DEVELOPMENT TIS – APPENDIX H

Figure 3: 2030 Site Traffic – Phase 1



WILLOUGHBY DRIVE DEVELOPMENT TIS – APPENDIX H

Figure 4: 2030 Site Traffic – Phase 2



WILLOUGHBY DRIVE DEVELOPMENT TIS – APPENDIX H

Figure 5: 2030 Site Traffic – Phase 3

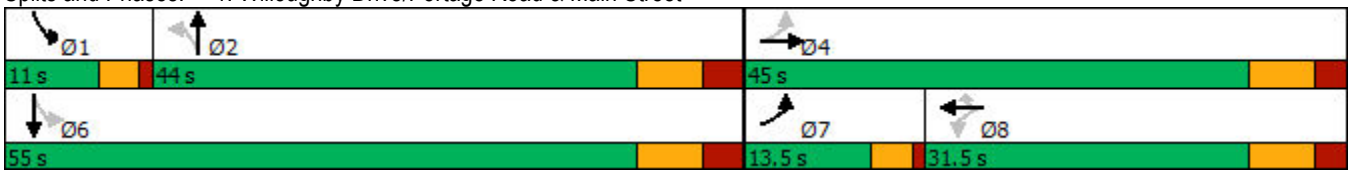
Appendix I:
Total Operations Worksheets

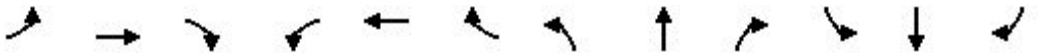
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	293	32	44	1	25	33	38	403	5	72	218	169
Future Volume (vph)	293	32	44	1	25	33	38	403	5	72	218	169
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	25.0		0.0	0.0		15.0	0.0		0.0	20.0		0.0
Storage Lanes	1		0	0		1	0		0	1		0
Taper Length (m)	25.0			25.0			25.0			25.0		
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	0.98	0.98			1.00	0.97		1.00		1.00	0.98	
Frt		0.914				0.850		0.998			0.934	
Flt Protected	0.950				0.998			0.996		0.950		
Satd. Flow (prot)	1648	1400	0	0	1731	1406	0	1665	0	1648	1515	0
Flt Permitted	0.561				0.989			0.927		0.349		
Satd. Flow (perm)	957	1400	0	0	1715	1360	0	1549	0	603	1515	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		49				142		1			53	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		140.4			117.0			399.6			174.8	
Travel Time (s)		10.1			8.4			28.8			12.6	
Confl. Peds. (#/hr)	9		7	4		6	7		4	6		9
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	2%	15%	12%	2%	2%	7%	2%	6%	2%	2%	6%	9%
Adj. Flow (vph)	326	36	49	1	28	37	42	448	6	80	242	188
Shared Lane Traffic (%)												
Lane Group Flow (vph)	326	85	0	0	29	37	0	496	0	80	430	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	1		1	1	1	1	0		1	0	
Detector Template	Left			Left		Right	Left			Left		
Leading Detector (m)	6.1	1.8		6.1	1.8	6.1	6.1	0.0		6.1	0.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8	6.1	6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8		8	2			6		
Detector Phase	7	4		8	8	8	2	2		1	6	
Switch Phase												

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	7.0	10.0		10.0	10.0	10.0	20.0	20.0		7.0	20.0	
Minimum Split (s)	11.0	31.5		31.5	31.5	31.5	34.0	34.0		11.0	34.0	
Total Split (s)	13.5	45.0		31.5	31.5	31.5	44.0	44.0		11.0	55.0	
Total Split (%)	13.5%	45.0%		31.5%	31.5%	31.5%	44.0%	44.0%		11.0%	55.0%	
Maximum Green (s)	9.5	37.5		24.0	24.0	24.0	36.0	36.0		7.0	47.0	
Yellow Time (s)	3.0	5.0		5.0	5.0	5.0	5.0	5.0		3.0	5.0	
All-Red Time (s)	1.0	2.5		2.5	2.5	2.5	3.0	3.0		1.0	3.0	
Lost Time Adjust (s)	0.0	0.0			0.0	0.0		0.0		0.0	0.0	
Total Lost Time (s)	4.0	7.5			7.5	7.5		8.0		4.0	8.0	
Lead/Lag	Lead			Lag	Lag	Lag	Lag	Lag		Lead		
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes	Yes		Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	Min		Min	Min	Min	Min	Min		None	Min	
Walk Time (s)		9.0		9.0	9.0	9.0	10.0	10.0			10.0	
Flash Dont Walk (s)		15.0		15.0	15.0	15.0	16.0	16.0			16.0	
Pedestrian Calls (#/hr)		3		4	4	4	0	0			2	
Act Effct Green (s)	30.1	26.5			12.6	12.6		30.8		43.2	39.1	
Actuated g/C Ratio	0.37	0.32			0.15	0.15		0.38		0.53	0.48	
v/c Ratio	0.75	0.17			0.11	0.11		0.85		0.19	0.57	
Control Delay	35.6	12.3			32.8	0.7		39.5		10.9	16.6	
Queue Delay	0.0	0.0			0.0	0.0		0.0		0.0	0.0	
Total Delay	35.6	12.3			32.8	0.7		39.5		10.9	16.6	
LOS	D	B			C	A		D		B	B	
Approach Delay		30.8			14.8			39.5			15.7	
Approach LOS		C			B			D			B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 81.6			
Natural Cycle: 90			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.85			
Intersection Signal Delay: 27.8		Intersection LOS: C	
Intersection Capacity Utilization 93.6%		ICU Level of Service F	
Analysis Period (min) 15			

Splits and Phases: 1: Willoughby Drive/Portage Road & Main Street





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	293	32	44	1	25	33	38	403	5	72	218	169
Future Volume (vph)	293	32	44	1	25	33	38	403	5	72	218	169
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	7.5			7.5	7.5		8.0		4.0	8.0	
Lane Util. Factor	1.00	1.00			1.00	1.00		1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.98			1.00	0.97		1.00		1.00	0.99	
Flpb, ped/bikes	0.99	1.00			1.00	1.00		1.00		1.00	1.00	
Frt	1.00	0.91			1.00	0.85		1.00		1.00	0.93	
Flt Protected	0.95	1.00			1.00	1.00		1.00		0.95	1.00	
Satd. Flow (prot)	1636	1401			1731	1363		1664		1646	1518	
Flt Permitted	0.56	1.00			0.99	1.00		0.93		0.35	1.00	
Satd. Flow (perm)	967	1401			1715	1363		1549		604	1518	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	326	36	49	1	28	37	42	448	6	80	242	188
RTOR Reduction (vph)	0	33	0	0	0	31	0	1	0	0	27	0
Lane Group Flow (vph)	326	52	0	0	29	6	0	495	0	80	403	0
Confl. Peds. (#/hr)	9		7	4		6	7		4	6		9
Heavy Vehicles (%)	2%	15%	12%	2%	2%	7%	2%	6%	2%	2%	6%	9%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	26.5	26.5			12.7	12.7		30.8		40.1	40.1	
Effective Green, g (s)	26.5	26.5			12.7	12.7		30.8		40.1	40.1	
Actuated g/C Ratio	0.32	0.32			0.15	0.15		0.38		0.49	0.49	
Clearance Time (s)	4.0	7.5			7.5	7.5		8.0		4.0	8.0	
Vehicle Extension (s)	3.0	3.0			3.0	3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)	391	452			265	210		581		362	741	
v/s Ratio Prot	c0.10	0.04								0.01	c0.27	
v/s Ratio Perm	c0.17				0.02	0.00		c0.32		0.09		
v/c Ratio	0.83	0.11			0.11	0.03		0.85		0.22	0.54	
Uniform Delay, d1	24.9	19.6			29.8	29.5		23.6		12.8	14.6	
Progression Factor	1.00	1.00			1.00	1.00		1.00		1.00	1.00	
Incremental Delay, d2	14.1	0.1			0.2	0.1		11.6		0.3	0.8	
Delay (s)	39.0	19.7			30.0	29.5		35.2		13.1	15.4	
Level of Service	D	B			C	C		D		B	B	
Approach Delay (s)		35.0			29.7			35.2			15.1	
Approach LOS		C			C			D			B	

Intersection Summary			
HCM 2000 Control Delay	28.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	82.1	Sum of lost time (s)	23.5
Intersection Capacity Utilization	93.6%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

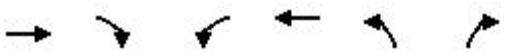
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	35	164	229	43	100	137
Future Volume (vph)	35	164	229	43	100	137
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.889		0.979			
Flt Protected	0.991					0.979
Satd. Flow (prot)	1528	0	1642	0	0	1682
Flt Permitted	0.991					0.979
Satd. Flow (perm)	1528	0	1642	0	0	1682
Link Speed (k/h)	50		50			50
Link Distance (m)	112.0		177.9			249.8
Travel Time (s)	8.1		12.8			18.0
Confl. Peds. (#/hr)	30	2		30	2	
Peak Hour Factor	0.66	0.66	0.66	0.66	0.66	0.66
Heavy Vehicles (%)	2%	2%	6%	3%	3%	3%
Adj. Flow (vph)	53	248	347	65	152	208
Shared Lane Traffic (%)						
Lane Group Flow (vph)	301	0	412	0	0	360
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.7		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.9		4.9			4.9
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24	14		14	24	
Sign Control	Stop		Stop			Stop

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	53.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	35	164	229	43	100	137
Future Volume (vph)	35	164	229	43	100	137
Peak Hour Factor	0.66	0.66	0.66	0.66	0.66	0.66
Hourly flow rate (vph)	53	248	347	65	152	208

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	301	412	360
Volume Left (vph)	53	0	152
Volume Right (vph)	248	65	0
Hadj (s)	-0.43	0.00	0.14
Departure Headway (s)	5.5	5.4	5.6
Degree Utilization, x	0.46	0.61	0.56
Capacity (veh/h)	606	643	622
Control Delay (s)	13.1	16.5	15.3
Approach Delay (s)	13.1	16.5	15.3
Approach LOS	B	C	C

Intersection Summary			
Delay	15.1		
Level of Service	C		
Intersection Capacity Utilization	53.5%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	126	17	0	156	43	0
Future Volume (vph)	126	17	0	156	43	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.984					
Flt Protected					0.950	
Satd. Flow (prot)	1692	0	0	1735	1648	0
Flt Permitted					0.950	
Satd. Flow (perm)	1692	0	0	1735	1648	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	112.0			89.3	73.5	
Travel Time (s)	8.1			6.4	5.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	2%	2%	2%	2%	2%
Adj. Flow (vph)	137	18	0	170	47	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	155	0	0	170	47	0
Enter Blocked Intersection	Yes	Yes	Yes	Yes	Yes	Yes
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)		14	24		24	14
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 18.9%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	126	17	0	156	43	0
Future Volume (Veh/h)	126	17	0	156	43	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	137	18	0	170	47	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			155		316	146
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			155		316	146
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		93	100
cM capacity (veh/h)			1425		677	901

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	155	170	47
Volume Left	0	0	47
Volume Right	18	0	0
cSH	1700	1425	677
Volume to Capacity	0.09	0.00	0.07
Queue Length 95th (m)	0.0	0.0	1.7
Control Delay (s)	0.0	0.0	10.7
Lane LOS			B
Approach Delay (s)	0.0	0.0	10.7
Approach LOS			B

Intersection Summary			
Average Delay	1.4		
Intersection Capacity Utilization	18.9%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	30	70	202	11	25	147
Future Volume (vph)	30	70	202	11	25	147
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.906		0.993			
Flt Protected	0.985					0.993
Satd. Flow (prot)	1548	0	1676	0	0	1708
Flt Permitted	0.985					0.993
Satd. Flow (perm)	1548	0	1676	0	0	1708
Link Speed (k/h)	50		50			50
Link Distance (m)	58.2		160.0			177.9
Travel Time (s)	4.2		11.5			12.8
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	5%	2%	2%	3%
Adj. Flow (vph)	33	76	220	12	27	160
Shared Lane Traffic (%)						
Lane Group Flow (vph)	109	0	232	0	0	187
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.7		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	1.6		1.6			1.6
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24	14		14	24	
Sign Control	Stop		Free			Free

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 38.6%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	30	70	202	11	25	147
Future Volume (Veh/h)	30	70	202	11	25	147
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	33	76	220	12	27	160
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	440	226			232	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	440	226			232	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	94	91			98	
cM capacity (veh/h)	563	813			1336	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	109	232	187
Volume Left	33	0	27
Volume Right	76	12	0
cSH	717	1700	1336
Volume to Capacity	0.15	0.14	0.02
Queue Length 95th (m)	4.1	0.0	0.5
Control Delay (s)	10.9	0.0	1.3
Lane LOS	B		A
Approach Delay (s)	10.9	0.0	1.3
Approach LOS	B		

Intersection Summary			
Average Delay	2.7		
Intersection Capacity Utilization	38.6%	ICU Level of Service	A
Analysis Period (min)	15		

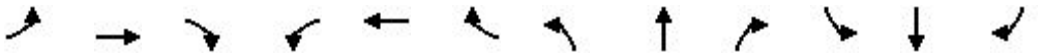
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	0	212	0	0	177
Future Volume (vph)	0	0	212	0	0	177
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						
Flt Protected						
Satd. Flow (prot)	1735	0	1685	0	0	1718
Flt Permitted						
Satd. Flow (perm)	1735	0	1685	0	0	1718
Link Speed (k/h)	50		50			50
Link Distance (m)	124.2		264.5			160.0
Travel Time (s)	8.9		19.0			11.5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	5%	2%	2%	3%
Adj. Flow (vph)	0	0	230	0	0	192
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	230	0	0	192
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.7		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.9		4.9			4.9
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24	14		14	24	
Sign Control	Stop		Free			Free

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 15.4%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	212	0	0	177
Future Volume (Veh/h)	0	0	212	0	0	177
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)	0	0	230	0	0	192
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	422	230			230	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	422	230			230	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	588	809			1338	

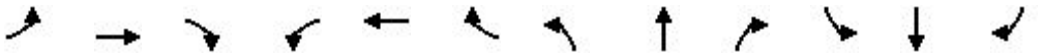
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	0	230	192
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	1700	1338
Volume to Capacity	0.00	0.14	0.00
Queue Length 95th (m)	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0
Lane LOS	A		
Approach Delay (s)	0.0	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	15.4%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	58	3	19	4	8	15	10	125	2	4	65	72
Future Volume (vph)	58	3	19	4	8	15	10	125	2	4	65	72
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												
Frt		0.968			0.926			0.998			0.931	
Flt Protected		0.965			0.992			0.996			0.999	
Satd. Flow (prot)	0	1548	0	0	1404	0	0	1715	0	0	1574	0
Flt Permitted		0.965			0.992			0.996			0.999	
Satd. Flow (perm)	0	1548	0	0	1404	0	0	1715	0	0	1574	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		265.5			209.0			181.2			264.5	
Travel Time (s)		19.1			15.0			13.0			19.0	
Confl. Peds. (#/hr)	4		4	5		5	4		5	5		4
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Heavy Vehicles (%)	3%	100%	2%	75%	2%	7%	2%	2%	50%	2%	2%	7%
Adj. Flow (vph)	70	4	23	5	10	18	12	151	2	5	78	87
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	97	0	0	33	0	0	165	0	0	170	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	31.0%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	58	3	19	4	8	15	10	125	2	4	65	72
Future Volume (Veh/h)	58	3	19	4	8	15	10	125	2	4	65	72
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Hourly flow rate (vph)	70	4	23	5	10	18	12	151	2	5	78	87
Pedestrians		4			5			5			5	
Lane Width (m)		3.7			3.7			3.7			3.7	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		0			0			0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	340	318	130	342	360	162	169			158		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	340	318	130	342	360	162	169			158		
tC, single (s)	7.1	7.5	6.2	7.8	6.5	6.3	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.9	3.3	4.2	4.0	3.4	2.2			2.2		
p0 queue free %	88	99	97	99	98	98	99			100		
cM capacity (veh/h)	578	458	912	468	556	863	1404			1416		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	97	33	165	170
Volume Left	70	5	12	5
Volume Right	23	18	2	87
cSH	626	666	1404	1416
Volume to Capacity	0.16	0.05	0.01	0.00
Queue Length 95th (m)	4.1	1.2	0.2	0.1
Control Delay (s)	11.8	10.7	0.6	0.3
Lane LOS	B	B	A	A
Approach Delay (s)	11.8	10.7	0.6	0.3
Approach LOS	B	B		

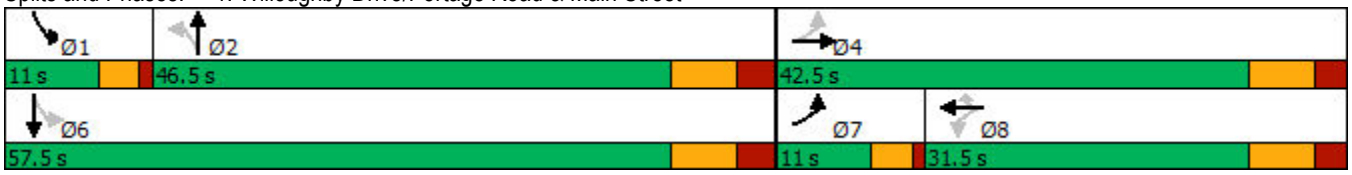
Intersection Summary				
Average Delay	3.5			
Intersection Capacity Utilization	31.0%	ICU Level of Service	A	
Analysis Period (min)	15			

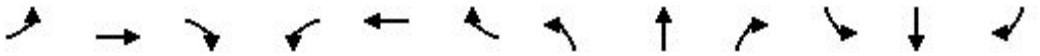
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	239	62	60	4	50	33	46	383	7	149	412	352
Future Volume (vph)	239	62	60	4	50	33	46	383	7	149	412	352
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	25.0		0.0	0.0		15.0	0.0		0.0	20.0		0.0
Storage Lanes	1		0	0		1	0		0	1		0
Taper Length (m)	25.0			25.0			25.0			25.0		
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	0.97	0.98			1.00	0.95		1.00		0.99	0.98	
Frt		0.926				0.850		0.998			0.931	
Flt Protected	0.950				0.997			0.995		0.950		
Satd. Flow (prot)	1616	1544	0	0	1730	1406	0	1705	0	1648	1558	0
Flt Permitted	0.546				0.970			0.699		0.402		
Satd. Flow (perm)	899	1544	0	0	1681	1329	0	1197	0	689	1558	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		54				142		1			61	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		140.4			117.0			399.6			174.8	
Travel Time (s)		10.1			8.4			28.8			12.6	
Confl. Peds. (#/hr)	18		10	9		17	10		9	17		18
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	4%	6%	2%	2%	2%	7%	3%	3%	2%	2%	4%	2%
Adj. Flow (vph)	257	67	65	4	54	35	49	412	8	160	443	378
Shared Lane Traffic (%)												
Lane Group Flow (vph)	257	132	0	0	58	35	0	469	0	160	821	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	1		1	1	1	1	0		1	0	
Detector Template	Left			Left		Right	Left			Left		
Leading Detector (m)	6.1	1.8		6.1	1.8	6.1	6.1	0.0		6.1	0.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8	6.1	6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8		8	2			6		
Detector Phase	7	4		8	8	8	2	2		1	6	
Switch Phase												

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	7.0	10.0		10.0	10.0	10.0	20.0	20.0		7.0	20.0	
Minimum Split (s)	11.0	31.5		31.5	31.5	31.5	34.0	34.0		11.0	34.0	
Total Split (s)	11.0	42.5		31.5	31.5	31.5	46.5	46.5		11.0	57.5	
Total Split (%)	11.0%	42.5%		31.5%	31.5%	31.5%	46.5%	46.5%		11.0%	57.5%	
Maximum Green (s)	7.0	35.0		24.0	24.0	24.0	38.5	38.5		7.0	49.5	
Yellow Time (s)	3.0	5.0		5.0	5.0	5.0	5.0	5.0		3.0	5.0	
All-Red Time (s)	1.0	2.5		2.5	2.5	2.5	3.0	3.0		1.0	3.0	
Lost Time Adjust (s)	0.0	0.0			0.0	0.0		0.0		0.0	0.0	
Total Lost Time (s)	4.0	7.5			7.5	7.5		8.0		4.0	8.0	
Lead/Lag	Lead			Lag	Lag	Lag	Lag	Lag		Lead		
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes	Yes		Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	Min		Min	Min	Min	Min	Min		None	Min	
Walk Time (s)		9.0		9.0	9.0	9.0	10.0	10.0			10.0	
Flash Dont Walk (s)		15.0		15.0	15.0	15.0	16.0	16.0			16.0	
Pedestrian Calls (#/hr)		3		9	9	9	3	3			4	
Act Effct Green (s)	27.1	23.6			12.5	12.5		38.6		53.7	49.7	
Actuated g/C Ratio	0.31	0.27			0.14	0.14		0.43		0.60	0.56	
v/c Ratio	0.78	0.29			0.24	0.11		0.90		0.33	0.91	
Control Delay	43.5	17.1			35.8	0.7		47.1		10.5	33.9	
Queue Delay	0.0	0.0			0.0	0.0		0.0		0.0	0.0	
Total Delay	43.5	17.1			35.8	0.7		47.1		10.5	33.9	
LOS	D	B			D	A		D		B	C	
Approach Delay		34.6			22.6			47.1			30.1	
Approach LOS		C			C			D			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 88.8			
Natural Cycle: 110			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.91			
Intersection Signal Delay: 34.8		Intersection LOS: C	
Intersection Capacity Utilization 98.2%		ICU Level of Service F	
Analysis Period (min) 15			

Splits and Phases: 1: Willoughby Drive/Portage Road & Main Street





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	239	62	60	4	50	33	46	383	7	149	412	352
Future Volume (vph)	239	62	60	4	50	33	46	383	7	149	412	352
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	7.5			7.5	7.5		8.0		4.0	8.0	
Lane Util. Factor	1.00	1.00			1.00	1.00		1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.98			1.00	0.95		1.00		1.00	0.98	
Flpb, ped/bikes	0.99	1.00			1.00	1.00		1.00		1.00	1.00	
Frt	1.00	0.93			1.00	0.85		1.00		1.00	0.93	
Flt Protected	0.95	1.00			1.00	1.00		0.99		0.95	1.00	
Satd. Flow (prot)	1593	1546			1727	1334		1704		1641	1561	
Flt Permitted	0.55	1.00			0.97	1.00		0.70		0.40	1.00	
Satd. Flow (perm)	915	1546			1681	1334		1196		694	1561	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	257	67	65	4	54	35	49	412	8	160	443	378
RTOR Reduction (vph)	0	40	0	0	0	30	0	1	0	0	27	0
Lane Group Flow (vph)	257	92	0	0	58	5	0	468	0	160	794	0
Confl. Peds. (#/hr)	18		10	9		17	10		9	17		18
Heavy Vehicles (%)	4%	6%	2%	2%	2%	7%	3%	3%	2%	2%	4%	2%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	23.6	23.6			12.6	12.6		38.7		49.7	49.7	
Effective Green, g (s)	23.6	23.6			12.6	12.6		38.7		49.7	49.7	
Actuated g/C Ratio	0.27	0.27			0.14	0.14		0.44		0.56	0.56	
Clearance Time (s)	4.0	7.5			7.5	7.5		8.0		4.0	8.0	
Vehicle Extension (s)	3.0	3.0			3.0	3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)	296	410			238	189		521		463	873	
v/s Ratio Prot	c0.07	0.06								0.03	c0.51	
v/s Ratio Perm	c0.16				0.03	0.00		0.39		0.17		
v/c Ratio	0.87	0.23			0.24	0.03		0.90		0.35	0.91	
Uniform Delay, d1	30.7	25.5			33.9	32.8		23.2		10.7	17.5	
Progression Factor	1.00	1.00			1.00	1.00		1.00		1.00	1.00	
Incremental Delay, d2	22.5	0.3			0.5	0.1		18.1		0.5	13.2	
Delay (s)	53.2	25.7			34.4	32.9		41.4		11.2	30.7	
Level of Service	D	C			C	C		D		B	C	
Approach Delay (s)		43.9			33.8			41.4			27.5	
Approach LOS		D			C			D			C	

Intersection Summary			
HCM 2000 Control Delay	34.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	88.8	Sum of lost time (s)	23.5
Intersection Capacity Utilization	98.2%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	48	95	192	55	148	282
Future Volume (vph)	48	95	192	55	148	282
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	0.910		0.970			
Flt Protected	0.984					0.983
Satd. Flow (prot)	1553	0	1683	0	0	1705
Flt Permitted	0.984					0.983
Satd. Flow (perm)	1553	0	1683	0	0	1705
Link Speed (k/h)	50		50			50
Link Distance (m)	112.0		177.9			249.8
Travel Time (s)	8.1		12.8			18.0
Confl. Peds. (#/hr)	21	4		21	4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	52	103	209	60	161	307
Shared Lane Traffic (%)						
Lane Group Flow (vph)	155	0	269	0	0	468
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.7		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.9		4.9			4.9
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24	14		14	24	
Sign Control	Stop		Stop			Stop

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 60.0%		ICU Level of Service B	
Analysis Period (min) 15			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	48	95	192	55	148	282
Future Volume (vph)	48	95	192	55	148	282
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	52	103	209	60	161	307

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	155	269	468
Volume Left (vph)	52	0	161
Volume Right (vph)	103	60	0
Hadj (s)	-0.30	-0.10	0.10
Departure Headway (s)	5.3	4.8	4.8
Degree Utilization, x	0.23	0.36	0.62
Capacity (veh/h)	604	715	733
Control Delay (s)	9.9	10.5	15.3
Approach Delay (s)	9.9	10.5	15.3
Approach LOS	A	B	C

Intersection Summary			
Delay	12.9		
Level of Service	B		
Intersection Capacity Utilization	60.0%	ICU Level of Service	B
Analysis Period (min)	15		

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	162	41	0	114	29	0
Future Volume (vph)	162	41	0	114	29	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.973					
Flt Protected					0.950	
Satd. Flow (prot)	1688	0	0	1735	1648	0
Flt Permitted					0.950	
Satd. Flow (perm)	1688	0	0	1735	1648	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	112.0			89.3	73.5	
Travel Time (s)	8.1			6.4	5.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	176	45	0	124	32	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	221	0	0	124	32	0
Enter Blocked Intersection	Yes	Yes	Yes	Yes	Yes	Yes
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)		97	97		97	97
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 22.0%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	162	41	0	114	29	0
Future Volume (Veh/h)	162	41	0	114	29	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	176	45	0	124	32	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			221		322	198
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			221		322	198
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		95	100
cM capacity (veh/h)			1348		671	843

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	221	124	32
Volume Left	0	0	32
Volume Right	45	0	0
cSH	1700	1348	671
Volume to Capacity	0.13	0.00	0.05
Queue Length 95th (m)	0.0	0.0	1.1
Control Delay (s)	0.0	0.0	10.6
Lane LOS			B
Approach Delay (s)	0.0	0.0	10.6
Approach LOS			B

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	22.0%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	19	44	203	27	64	266
Future Volume (vph)	19	44	203	27	64	266
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.906		0.984			
Flt Protected	0.985					0.990
Satd. Flow (prot)	1548	0	1707	0	0	1717
Flt Permitted	0.985					0.990
Satd. Flow (perm)	1548	0	1707	0	0	1717
Link Speed (k/h)	50		50			50
Link Distance (m)	58.2		160.0			177.9
Travel Time (s)	4.2		11.5			12.8
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	21	48	221	29	70	289
Shared Lane Traffic (%)						
Lane Group Flow (vph)	69	0	250	0	0	359
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.7		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	1.6		1.6			1.6
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24	14		14	24	
Sign Control	Stop		Free			Free

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 46.5%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	19	44	203	27	64	266
Future Volume (Veh/h)	19	44	203	27	64	266
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)	21	48	221	29	70	289
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	664	236			250	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	664	236			250	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	95	94			95	
cM capacity (veh/h)	403	804			1316	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	69	250	359
Volume Left	21	0	70
Volume Right	48	29	0
cSH	617	1700	1316
Volume to Capacity	0.11	0.15	0.05
Queue Length 95th (m)	2.9	0.0	1.3
Control Delay (s)	11.6	0.0	1.9
Lane LOS	B		A
Approach Delay (s)	11.6	0.0	1.9
Approach LOS	B		

Intersection Summary			
Average Delay	2.2		
Intersection Capacity Utilization	46.5%	ICU Level of Service	A
Analysis Period (min)	15		

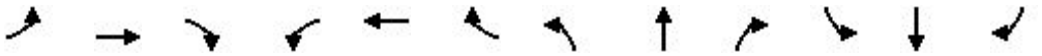
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	0	230	0	0	285
Future Volume (vph)	0	0	230	0	0	285
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						
Flt Protected						
Satd. Flow (prot)	1735	0	1735	0	0	1735
Flt Permitted						
Satd. Flow (perm)	1735	0	1735	0	0	1735
Link Speed (k/h)	50		50			50
Link Distance (m)	124.2		264.5			160.0
Travel Time (s)	8.9		19.0			11.5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	250	0	0	310
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	250	0	0	310
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.7		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.9		4.9			4.9
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24	14		14	24	
Sign Control	Stop		Free			Free

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 19.6%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	230	0	0	285
Future Volume (Veh/h)	0	0	230	0	0	285
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)	0	0	250	0	0	310
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	560	250			250	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	560	250			250	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	489	789			1316	

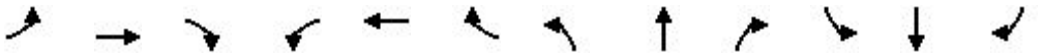
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	0	250	310
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	1700	1316
Volume to Capacity	0.00	0.15	0.00
Queue Length 95th (m)	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0
Lane LOS	A		
Approach Delay (s)	0.0	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	19.6%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	63	9	8	0	3	7	36	116	1	24	139	70
Future Volume (vph)	63	9	8	0	3	7	36	116	1	24	139	70
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												
Frt		0.987			0.907			0.999			0.959	
Flt Protected		0.962						0.988			0.995	
Satd. Flow (prot)	0	1647	0	0	1573	0	0	1712	0	0	1655	0
Flt Permitted		0.962						0.988			0.995	
Satd. Flow (perm)	0	1647	0	0	1573	0	0	1712	0	0	1655	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		265.5			209.0			181.2			264.5	
Travel Time (s)		19.1			15.0			13.0			19.0	
Confl. Peds. (#/hr)	5		13	16		8	13		16	8		5
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
Adj. Flow (vph)	82	12	10	0	4	9	47	151	1	31	181	91
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	104	0	0	13	0	0	199	0	0	303	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Stop			Stop			Free			Free	

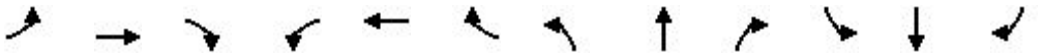
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 35.4%		ICU Level of Service A	
Analysis Period (min) 15			



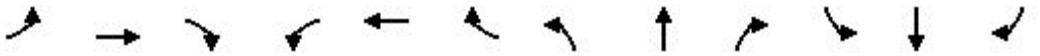
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	63	9	8	0	3	7	36	116	1	24	139	70
Future Volume (Veh/h)	63	9	8	0	3	7	36	116	1	24	139	70
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
Hourly flow rate (vph)	82	12	10	0	4	9	47	151	1	31	181	91
Pedestrians		13			16			16			8	
Lane Width (m)		3.7			3.7			3.7			3.7	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		1			1			1			1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	566	564	256	582	608	176	285			168		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	566	564	256	582	608	176	285			168		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	79	97	99	100	99	99	96			98		
cM capacity (veh/h)	393	399	764	373	376	850	1263			1390		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	104	13	199	303
Volume Left	82	0	47	31
Volume Right	10	9	1	91
cSH	413	613	1263	1390
Volume to Capacity	0.25	0.02	0.04	0.02
Queue Length 95th (m)	7.5	0.5	0.9	0.5
Control Delay (s)	16.6	11.0	2.1	1.0
Lane LOS	C	B	A	A
Approach Delay (s)	16.6	11.0	2.1	1.0
Approach LOS	C	B		

Intersection Summary				
Average Delay	4.2			
Intersection Capacity Utilization	35.4%	ICU Level of Service	A	
Analysis Period (min)	15			



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	352	34	49	1	27	36	45	549	5	76	272	193
Future Volume (vph)	352	34	49	1	27	36	45	549	5	76	272	193
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	25.0		0.0	0.0		15.0	20.0		0.0	20.0		15.0
Storage Lanes	1		0	0		1	0		0	1		1
Taper Length (m)	25.0			25.0			25.0			25.0		
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	0.98	0.98			1.00	0.97		1.00		1.00		0.96
Frt		0.912				0.850		0.999				0.850
Flt Protected	0.950				0.998			0.996		0.950		
Satd. Flow (prot)	1648	1396	0	0	1731	1406	0	1666	0	1648	1669	1380
Flt Permitted	0.558				0.989			0.949		0.345		
Satd. Flow (perm)	952	1396	0	0	1715	1360	0	1586	0	597	1669	1329
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		54				98		1				133
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		140.4			117.0			399.6			174.8	
Travel Time (s)		10.1			8.4			28.8			12.6	
Confl. Peds. (#/hr)	9		7	4		6	7		4	6		9
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	2%	15%	12%	2%	2%	7%	2%	6%	2%	2%	6%	9%
Adj. Flow (vph)	391	38	54	1	30	40	50	610	6	84	302	214
Shared Lane Traffic (%)												
Lane Group Flow (vph)	391	92	0	0	31	40	0	666	0	84	302	214
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	1		1	1	1	1	1		1	1	1
Detector Template				Left			Left					Right
Leading Detector (m)	10.0	10.0		6.1	10.0	10.0	6.1	10.0		10.0	10.0	10.0
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	10.0	10.0		6.1	10.0	10.0	6.1	10.0		10.0	10.0	10.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	7	4			8			2			6	
Permitted Phases	4			8		8	2			6		6
Detector Phase	7	4		8	8	8	2	2		6	6	6
Switch Phase												

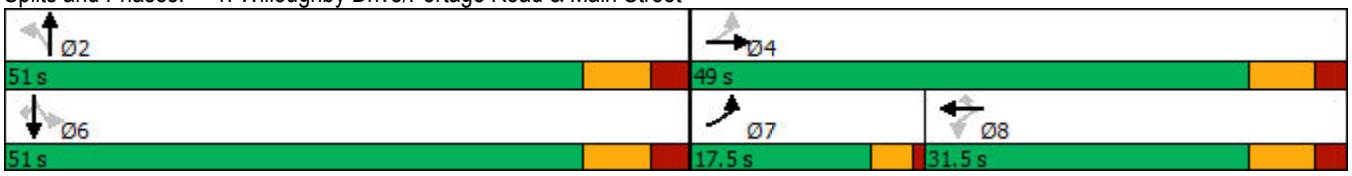


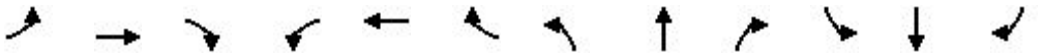
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	7.0	10.0		10.0	10.0	10.0	20.0	20.0		20.0	20.0	20.0
Minimum Split (s)	11.0	31.5		31.5	31.5	31.5	34.0	34.0		34.0	34.0	34.0
Total Split (s)	17.5	49.0		31.5	31.5	31.5	51.0	51.0		51.0	51.0	51.0
Total Split (%)	17.5%	49.0%		31.5%	31.5%	31.5%	51.0%	51.0%		51.0%	51.0%	51.0%
Maximum Green (s)	13.5	41.5		24.0	24.0	24.0	43.0	43.0		43.0	43.0	43.0
Yellow Time (s)	3.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
All-Red Time (s)	1.0	2.5		2.5	2.5	2.5	3.0	3.0		3.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0			0.0	0.0		0.0		0.0	0.0	0.0
Total Lost Time (s)	4.0	7.5			7.5	7.5		8.0		8.0	8.0	8.0
Lead/Lag	Lead			Lag	Lag	Lag						
Lead-Lag Optimize?	Yes			Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Recall Mode	None	Min		Min	Min	Min	Min	Min		Min	Min	Min
Walk Time (s)		9.0		9.0	9.0	9.0	10.0	10.0		10.0	10.0	10.0
Flash Dont Walk (s)		15.0		15.0	15.0	15.0	16.0	16.0		16.0	16.0	16.0
Pedestrian Calls (#/hr)		3		4	4	4	0	0		2	2	2
Act Effct Green (s)	33.6	30.1			12.5	12.5		41.8		41.8	41.8	41.8
Actuated g/C Ratio	0.38	0.34			0.14	0.14		0.48		0.48	0.48	0.48
v/c Ratio	0.83	0.18			0.13	0.14		0.88		0.29	0.38	0.30
Control Delay	38.8	10.6			33.6	1.1		36.4		18.8	17.1	7.4
Queue Delay	0.0	0.0			0.0	0.0		0.0		0.0	0.0	0.0
Total Delay	38.8	10.6			33.6	1.1		36.4		18.8	17.1	7.4
LOS	D	B			C	A		D		B	B	A
Approach Delay		33.5			15.3			36.4			13.9	
Approach LOS		C			B			D			B	
Queue Length 50th (m)	53.1	4.3			4.7	0.0		89.6		7.6	28.8	6.7
Queue Length 95th (m)	#81.5	13.8			11.9	0.0		#198.9		23.0	61.8	24.6
Internal Link Dist (m)		116.4			93.0			375.6			150.8	
Turn Bay Length (m)	25.0					15.0				20.0		15.0
Base Capacity (vph)	473	693			472	446		784		294	824	724
Starvation Cap Reductn	0	0			0	0		0		0	0	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	0.83	0.13			0.07	0.09		0.85		0.29	0.37	0.30

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 87.5			
Natural Cycle: 90			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.88			
Intersection Signal Delay: 27.4		Intersection LOS: C	
Intersection Capacity Utilization 99.8%		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.

Splits and Phases: 1: Willoughby Drive/Portage Road & Main Street



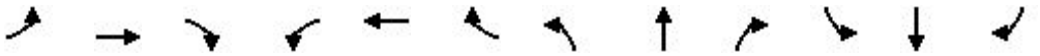


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	352	34	49	1	27	36	45	549	5	76	272	193
Future Volume (vph)	352	34	49	1	27	36	45	549	5	76	272	193
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	7.5			7.5	7.5		8.0		8.0	8.0	8.0
Lane Util. Factor	1.00	1.00			1.00	1.00		1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98			1.00	0.97		1.00		1.00	1.00	0.97
Flpb, ped/bikes	0.99	1.00			1.00	1.00		1.00		1.00	1.00	1.00
Frt	1.00	0.91			1.00	0.85		1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00			1.00	1.00		1.00		0.95	1.00	1.00
Satd. Flow (prot)	1635	1398			1732	1362		1665		1643	1669	1332
Flt Permitted	0.56	1.00			0.99	1.00		0.95		0.35	1.00	1.00
Satd. Flow (perm)	961	1398			1715	1362		1587		597	1669	1332
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	391	38	54	1	30	40	50	610	6	84	302	214
RTOR Reduction (vph)	0	35	0	0	0	34	0	1	0	0	0	69
Lane Group Flow (vph)	391	57	0	0	31	6	0	665	0	84	302	145
Confl. Peds. (#/hr)	9		7	4		6	7		4	6		9
Heavy Vehicles (%)	2%	15%	12%	2%	2%	7%	2%	6%	2%	2%	6%	9%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	7	4			8			2			6	
Permitted Phases	4			8		8	2			6		6
Actuated Green, G (s)	30.1	30.1			12.5	12.5		41.8		41.8	41.8	41.8
Effective Green, g (s)	30.1	30.1			12.5	12.5		41.8		41.8	41.8	41.8
Actuated g/C Ratio	0.34	0.34			0.14	0.14		0.48		0.48	0.48	0.48
Clearance Time (s)	4.0	7.5			7.5	7.5		8.0		8.0	8.0	8.0
Vehicle Extension (s)	3.0	3.0			3.0	3.0		3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	435	481			245	194		759		285	798	637
v/s Ratio Prot	c0.14	0.04									0.18	
v/s Ratio Perm	c0.17				0.02	0.00		c0.42		0.14		0.11
v/c Ratio	0.90	0.12			0.13	0.03		0.88		0.29	0.38	0.23
Uniform Delay, d1	25.9	19.6			32.7	32.2		20.5		13.8	14.5	13.3
Progression Factor	1.00	1.00			1.00	1.00		1.00		1.00	1.00	1.00
Incremental Delay, d2	20.8	0.1			0.2	0.1		11.1		0.6	0.3	0.2
Delay (s)	46.7	19.7			32.9	32.3		31.6		14.4	14.8	13.5
Level of Service	D	B			C	C		C		B	B	B
Approach Delay (s)		41.5			32.6			31.6			14.3	
Approach LOS		D			C			C			B	

Intersection Summary			
HCM 2000 Control Delay	28.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	87.4	Sum of lost time (s)	19.5
Intersection Capacity Utilization	99.8%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	352	34	49	1	27	36	45	549	5	76	272	193
Future Volume (vph)	352	34	49	1	27	36	45	549	5	76	272	193
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	25.0		0.0	0.0		15.0	20.0		0.0	20.0		15.0
Storage Lanes	1		0	0		1	0		0	1		1
Taper Length (m)	25.0			25.0			25.0			25.0		
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	0.98	0.98			1.00	0.97		1.00		1.00		0.96
Frt		0.912				0.850		0.999				0.850
Flt Protected	0.950				0.998			0.996		0.950		
Satd. Flow (prot)	1648	1396	0	0	1731	1406	0	1666	0	1648	1669	1380
Flt Permitted	0.558				0.989			0.947		0.275		
Satd. Flow (perm)	952	1396	0	0	1715	1360	0	1583	0	476	1669	1329
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		54				142		1				140
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		140.4			117.0			399.6			174.8	
Travel Time (s)		10.1			8.4			28.8			12.6	
Confl. Peds. (#/hr)	9		7	4		6	7		4	6		9
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	2%	15%	12%	2%	2%	7%	2%	6%	2%	2%	6%	9%
Adj. Flow (vph)	391	38	54	1	30	40	50	610	6	84	302	214
Shared Lane Traffic (%)												
Lane Group Flow (vph)	391	92	0	0	31	40	0	666	0	84	302	214
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	1		1	1	1	1	1		1	1	1
Detector Template				Left			Left					Right
Leading Detector (m)	10.0	10.0		6.1	10.0	10.0	6.1	10.0		10.0	10.0	10.0
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	10.0	10.0		6.1	10.0	10.0	6.1	10.0		10.0	10.0	10.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8		8	2			6		6
Detector Phase	7	4		8	8	8	2	2		1	6	6
Switch Phase												



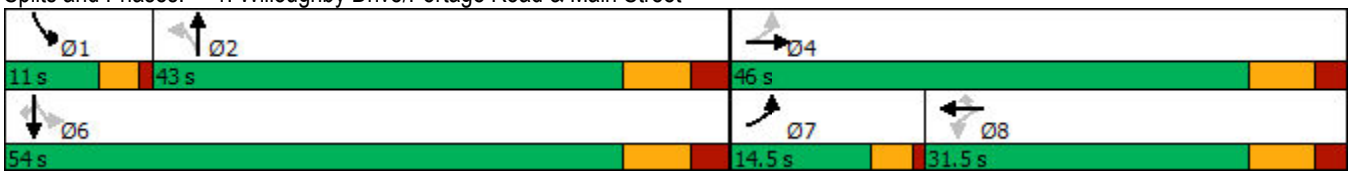
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	7.0	10.0		10.0	10.0	10.0	20.0	20.0		7.0	20.0	20.0
Minimum Split (s)	11.0	31.5		31.5	31.5	31.5	34.0	34.0		11.0	34.0	34.0
Total Split (s)	14.5	46.0		31.5	31.5	31.5	43.0	43.0		11.0	54.0	54.0
Total Split (%)	14.5%	46.0%		31.5%	31.5%	31.5%	43.0%	43.0%		11.0%	54.0%	54.0%
Maximum Green (s)	10.5	38.5		24.0	24.0	24.0	35.0	35.0		7.0	46.0	46.0
Yellow Time (s)	3.0	5.0		5.0	5.0	5.0	5.0	5.0		3.0	5.0	5.0
All-Red Time (s)	1.0	2.5		2.5	2.5	2.5	3.0	3.0		1.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0			0.0	0.0		0.0		0.0	0.0	0.0
Total Lost Time (s)	4.0	7.5			7.5	7.5		8.0		4.0	8.0	8.0
Lead/Lag	Lead			Lag	Lag	Lag	Lag	Lag		Lead		
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes	Yes		Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Recall Mode	None	Min		Min	Min	Min	Min	Min		None	Min	Min
Walk Time (s)		9.0		9.0	9.0	9.0	10.0	10.0			10.0	10.0
Flash Dont Walk (s)		15.0		15.0	15.0	15.0	16.0	16.0			16.0	16.0
Pedestrian Calls (#/hr)		3		4	4	4	0	0			2	2
Act Effct Green (s)	30.7	27.1			12.5	12.5		35.3		47.9	43.8	43.8
Actuated g/C Ratio	0.35	0.31			0.14	0.14		0.41		0.55	0.51	0.51
v/c Ratio	0.93	0.19			0.13	0.13		1.03		0.23	0.36	0.29
Control Delay	56.8	11.9			33.5	0.8		72.7		11.7	15.1	6.2
Queue Delay	0.0	0.0			0.0	0.0		0.0		0.0	0.0	0.0
Total Delay	56.8	11.9			33.5	0.8		72.7		11.7	15.1	6.2
LOS	E	B			C	A		E		B	B	A
Approach Delay		48.2			15.1			72.7			11.4	
Approach LOS		D			B			E			B	
Queue Length 50th (m)	56.3	4.6			4.7	0.0		~119.1		5.6	26.5	5.6
Queue Length 95th (m)	#100.1	14.6			11.9	0.0		#225.9		16.1	58.2	22.0
Internal Link Dist (m)		116.4			93.0			375.6			150.8	
Turn Bay Length (m)	25.0					15.0				20.0		15.0
Base Capacity (vph)	421	655			479	482		645		358	893	776
Starvation Cap Reductn	0	0			0	0		0		0	0	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	0.93	0.14			0.06	0.08		1.03		0.23	0.34	0.28

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 86.6			
Natural Cycle: 100			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 1.03			
Intersection Signal Delay: 43.7		Intersection LOS: D	
Intersection Capacity Utilization 99.8%		ICU Level of Service F	
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.

Splits and Phases: 1: Willoughby Drive/Portage Road & Main Street



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	352	34	49	1	27	36	45	549	5	76	272	193
Future Volume (vph)	352	34	49	1	27	36	45	549	5	76	272	193
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	7.5			7.5	7.5		8.0		4.0	8.0	8.0
Lane Util. Factor	1.00	1.00			1.00	1.00		1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98			1.00	0.97		1.00		1.00	1.00	0.97
Flpb, ped/bikes	0.99	1.00			1.00	1.00		1.00		1.00	1.00	1.00
Frt	1.00	0.91			1.00	0.85		1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00			1.00	1.00		1.00		0.95	1.00	1.00
Satd. Flow (prot)	1635	1398			1732	1362		1665		1647	1669	1332
Flt Permitted	0.56	1.00			0.99	1.00		0.95		0.27	1.00	1.00
Satd. Flow (perm)	961	1398			1715	1362		1583		477	1669	1332
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	391	38	54	1	30	40	50	610	6	84	302	214
RTOR Reduction (vph)	0	37	0	0	0	34	0	1	0	0	0	68
Lane Group Flow (vph)	391	55	0	0	31	6	0	665	0	84	302	146
Confl. Peds. (#/hr)	9		7	4		6	7		4	6		9
Heavy Vehicles (%)	2%	15%	12%	2%	2%	7%	2%	6%	2%	2%	6%	9%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8		8	2			6		6
Actuated Green, G (s)	27.1	27.1			12.5	12.5		35.3		44.7	44.7	44.7
Effective Green, g (s)	27.1	27.1			12.5	12.5		35.3		44.7	44.7	44.7
Actuated g/C Ratio	0.31	0.31			0.14	0.14		0.40		0.51	0.51	0.51
Clearance Time (s)	4.0	7.5			7.5	7.5		8.0		4.0	8.0	8.0
Vehicle Extension (s)	3.0	3.0			3.0	3.0		3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	380	433			245	195		640		316	854	682
v/s Ratio Prot	c0.12	0.04								0.02	c0.18	
v/s Ratio Perm	c0.19				0.02	0.00		c0.42		0.12		0.11
v/c Ratio	1.03	0.13			0.13	0.03		1.04		0.27	0.35	0.21
Uniform Delay, d1	29.3	21.6			32.6	32.2		26.0		13.4	12.7	11.7
Progression Factor	1.00	1.00			1.00	1.00		1.00		1.00	1.00	1.00
Incremental Delay, d2	53.8	0.1			0.2	0.1		46.3		0.5	0.3	0.2
Delay (s)	83.1	21.7			32.9	32.2		72.3		13.9	12.9	11.8
Level of Service	F	C			C	C		E		B	B	B
Approach Delay (s)		71.4			32.5			72.3			12.7	
Approach LOS		E			C			E			B	

Intersection Summary			
HCM 2000 Control Delay	50.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	87.3	Sum of lost time (s)	23.5
Intersection Capacity Utilization	99.8%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

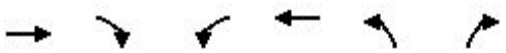
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	32	158	392	42	98	191
Future Volume (vph)	32	158	392	42	98	191
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.888		0.987			
Flt Protected	0.992					0.983
Satd. Flow (prot)	1528	0	1652	0	0	1689
Flt Permitted	0.992					0.983
Satd. Flow (perm)	1528	0	1652	0	0	1689
Link Speed (k/h)	50		50			50
Link Distance (m)	112.0		177.9			249.8
Travel Time (s)	8.1		12.8			18.0
Confl. Peds. (#/hr)	30	2		30	2	
Peak Hour Factor	0.66	0.66	0.66	0.66	0.66	0.66
Heavy Vehicles (%)	2%	2%	6%	3%	3%	3%
Adj. Flow (vph)	48	239	594	64	148	289
Shared Lane Traffic (%)						
Lane Group Flow (vph)	287	0	658	0	0	437
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.7		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.9		4.9			4.9
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24	14		14	24	
Sign Control	Stop		Stop			Stop

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	65.0%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	32	158	392	42	98	191
Future Volume (vph)	32	158	392	42	98	191
Peak Hour Factor	0.66	0.66	0.66	0.66	0.66	0.66
Hourly flow rate (vph)	48	239	594	64	148	289

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	287	658	437
Volume Left (vph)	48	0	148
Volume Right (vph)	239	64	0
Hadj (s)	-0.43	0.04	0.12
Departure Headway (s)	6.2	5.7	6.0
Degree Utilization, x	0.50	1.04	0.72
Capacity (veh/h)	560	640	589
Control Delay (s)	15.2	69.6	23.0
Approach Delay (s)	15.2	69.6	23.0
Approach LOS	C	F	C

Intersection Summary			
Delay	43.6		
Level of Service	E		
Intersection Capacity Utilization	65.0%	ICU Level of Service	C
Analysis Period (min)	15		



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	126	14	0	156	34	0
Future Volume (vph)	126	14	0	156	34	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.987					
Flt Protected					0.950	
Satd. Flow (prot)	1712	0	0	1735	1648	0
Flt Permitted					0.950	
Satd. Flow (perm)	1712	0	0	1735	1648	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	112.0			73.3	63.3	
Travel Time (s)	8.1			5.3	4.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	137	15	0	170	37	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	152	0	0	170	37	0
Enter Blocked Intersection	Yes	Yes	Yes	Yes	Yes	Yes
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)		97	97		97	97
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 18.9%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	126	14	0	156	34	0
Future Volume (Veh/h)	126	14	0	156	34	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	137	15	0	170	37	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			152		314	144
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			152		314	144
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		95	100
cM capacity (veh/h)			1429		678	903

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	152	170	37
Volume Left	0	0	37
Volume Right	15	0	0
cSH	1700	1429	678
Volume to Capacity	0.09	0.00	0.05
Queue Length 95th (m)	0.0	0.0	1.3
Control Delay (s)	0.0	0.0	10.6
Lane LOS			B
Approach Delay (s)	0.0	0.0	10.6
Approach LOS			B

Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	18.9%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	21	50	384	8	18	205
Future Volume (vph)	21	50	384	8	18	205
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.905		0.997			
Flt Protected	0.985					0.996
Satd. Flow (prot)	1546	0	1681	0	0	1712
Flt Permitted	0.985					0.996
Satd. Flow (perm)	1546	0	1681	0	0	1712
Link Speed (k/h)	50		50			50
Link Distance (m)	58.2		160.0			177.9
Travel Time (s)	4.2		11.5			12.8
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	5%	2%	2%	3%
Adj. Flow (vph)	23	54	417	9	20	223
Shared Lane Traffic (%)						
Lane Group Flow (vph)	77	0	426	0	0	243
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.7		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	1.6		1.6			1.6
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24	14		14	24	
Sign Control	Stop		Free			Free

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 39.2%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	21	50	384	8	18	205
Future Volume (Veh/h)	21	50	384	8	18	205
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)	23	54	417	9	20	223
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	684	422			426	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	684	422			426	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	94	91			98	
cM capacity (veh/h)	407	632			1133	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	77	426	243
Volume Left	23	0	20
Volume Right	54	9	0
cSH	542	1700	1133
Volume to Capacity	0.14	0.25	0.02
Queue Length 95th (m)	3.7	0.0	0.4
Control Delay (s)	12.7	0.0	0.8
Lane LOS	B		A
Approach Delay (s)	12.7	0.0	0.8
Approach LOS	B		

Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	39.2%	ICU Level of Service	A
Analysis Period (min)	15		

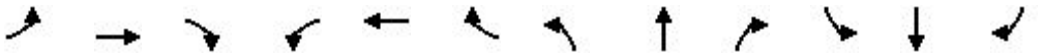
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	56	130	262	18	42	184
Future Volume (vph)	56	130	262	18	42	184
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.906		0.991			
Flt Protected	0.985					0.991
Satd. Flow (prot)	1548	0	1673	0	0	1706
Flt Permitted	0.985					0.991
Satd. Flow (perm)	1548	0	1673	0	0	1706
Link Speed (k/h)	50		50			50
Link Distance (m)	124.2		264.5			160.0
Travel Time (s)	8.9		19.0			11.5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	5%	2%	2%	3%
Adj. Flow (vph)	61	141	285	20	46	200
Shared Lane Traffic (%)						
Lane Group Flow (vph)	202	0	305	0	0	246
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.7		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.9		4.9			4.9
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24	14		14	24	
Sign Control	Stop		Free			Free

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 51.2%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	56	130	262	18	42	184
Future Volume (Veh/h)	56	130	262	18	42	184
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)	61	141	285	20	46	200
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	587	295			305	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	587	295			305	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	87	81			96	
cM capacity (veh/h)	455	744			1256	

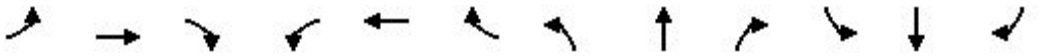
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	202	305	246
Volume Left	61	0	46
Volume Right	141	20	0
cSH	624	1700	1256
Volume to Capacity	0.32	0.18	0.04
Queue Length 95th (m)	10.6	0.0	0.9
Control Delay (s)	13.5	0.0	1.8
Lane LOS	B		A
Approach Delay (s)	13.5	0.0	1.8
Approach LOS	B		

Intersection Summary			
Average Delay	4.2		
Intersection Capacity Utilization	51.2%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	74	3	21	5	8	16	10	176	2	5	80	118
Future Volume (vph)	74	3	21	5	8	16	10	176	2	5	80	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												
Frt		0.971			0.927			0.999			0.921	
Flt Protected		0.964			0.992			0.997			0.999	
Satd. Flow (prot)	0	1561	0	0	1388	0	0	1721	0	0	1552	0
Flt Permitted		0.964			0.992			0.997			0.999	
Satd. Flow (perm)	0	1561	0	0	1388	0	0	1721	0	0	1552	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		265.5			209.0			181.2			264.5	
Travel Time (s)		19.1			15.0			13.0			19.0	
Confl. Peds. (#/hr)	4		4	5		5	4		5	5		4
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Heavy Vehicles (%)	3%	100%	2%	75%	2%	7%	2%	2%	50%	2%	2%	7%
Adj. Flow (vph)	89	4	25	6	10	19	12	212	2	6	96	142
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	118	0	0	35	0	0	226	0	0	244	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Stop			Stop			Free			Free	

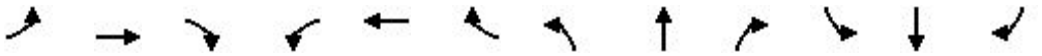
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 34.9%		ICU Level of Service A	
Analysis Period (min) 15			



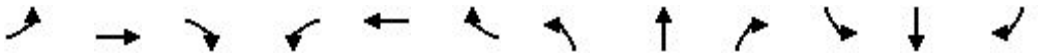
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	74	3	21	5	8	16	10	176	2	5	80	118
Future Volume (Veh/h)	74	3	21	5	8	16	10	176	2	5	80	118
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Hourly flow rate (vph)	89	4	25	6	10	19	12	212	2	6	96	142
Pedestrians		4			5			5			5	
Lane Width (m)		3.7			3.7			3.7			3.7	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		0			0			0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	449	426	176	453	496	223	242			219		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	449	426	176	453	496	223	242			219		
tC, single (s)	7.1	7.5	6.2	7.8	6.5	6.3	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.9	3.3	4.2	4.0	3.4	2.2			2.2		
p0 queue free %	82	99	97	98	98	98	99			100		
cM capacity (veh/h)	486	390	861	388	465	797	1320			1345		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	118	35	226	244
Volume Left	89	6	12	6
Volume Right	25	19	2	142
cSH	531	576	1320	1345
Volume to Capacity	0.22	0.06	0.01	0.00
Queue Length 95th (m)	6.4	1.5	0.2	0.1
Control Delay (s)	13.7	11.7	0.5	0.2
Lane LOS	B	B	A	A
Approach Delay (s)	13.7	11.7	0.5	0.2
Approach LOS	B	B		

Intersection Summary				
Average Delay	3.5			
Intersection Capacity Utilization	34.9%	ICU Level of Service	A	
Analysis Period (min)	15			



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	281	66	69	4	53	36	54	498	8	159	557	420
Future Volume (vph)	281	66	69	4	53	36	54	498	8	159	557	420
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	25.0		0.0	0.0		15.0	20.0		0.0	20.0		15.0
Storage Lanes	1		0	0		1	0		0	1		1
Taper Length (m)	25.0			25.0			25.0			25.0		
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	0.97	0.98			1.00	0.95		1.00		0.99		0.95
Frt		0.923				0.850		0.998				0.850
Flt Protected	0.950				0.997			0.995		0.950		
Satd. Flow (prot)	1616	1539	0	0	1730	1406	0	1705	0	1648	1701	1475
Flt Permitted	0.544				0.970			0.886		0.306		
Satd. Flow (perm)	896	1539	0	0	1681	1329	0	1517	0	527	1701	1395
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		61				142		1				150
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		140.4			117.0			399.6			174.8	
Travel Time (s)		10.1			8.4			28.8			12.6	
Confl. Peds. (#/hr)	18		10	9		17	10		9	17		18
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	4%	6%	2%	2%	2%	7%	3%	3%	2%	2%	4%	2%
Adj. Flow (vph)	302	71	74	4	57	39	58	535	9	171	599	452
Shared Lane Traffic (%)												
Lane Group Flow (vph)	302	145	0	0	61	39	0	602	0	171	599	452
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	1		1	1	1	1	1		1	1	1
Detector Template				Left			Left					Right
Leading Detector (m)	10.0	10.0		6.1	10.0	10.0	6.1	10.0		10.0	10.0	10.0
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	10.0	10.0		6.1	10.0	10.0	6.1	10.0		10.0	10.0	10.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8		8	2			6		6
Detector Phase	7	4		8	8	8	2	2		1	6	6
Switch Phase												

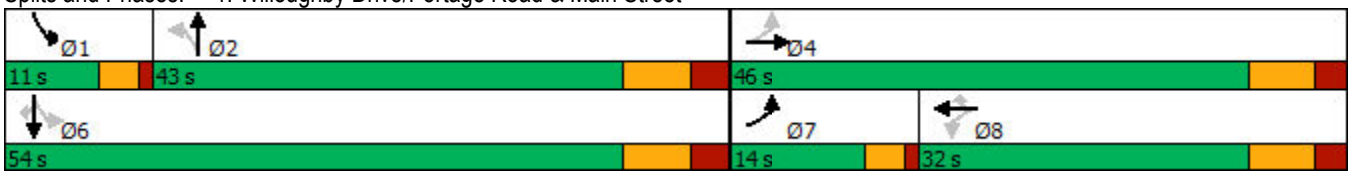


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	7.0	10.0		10.0	10.0	10.0	20.0	20.0		7.0	20.0	20.0
Minimum Split (s)	11.0	31.5		31.5	31.5	31.5	34.0	34.0		11.0	34.0	34.0
Total Split (s)	14.0	46.0		32.0	32.0	32.0	43.0	43.0		11.0	54.0	54.0
Total Split (%)	14.0%	46.0%		32.0%	32.0%	32.0%	43.0%	43.0%		11.0%	54.0%	54.0%
Maximum Green (s)	10.0	38.5		24.5	24.5	24.5	35.0	35.0		7.0	46.0	46.0
Yellow Time (s)	3.0	5.0		5.0	5.0	5.0	5.0	5.0		3.0	5.0	5.0
All-Red Time (s)	1.0	2.5		2.5	2.5	2.5	3.0	3.0		1.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0			0.0	0.0		0.0		0.0	0.0	0.0
Total Lost Time (s)	4.0	7.5			7.5	7.5		8.0		4.0	8.0	8.0
Lead/Lag	Lead			Lag	Lag	Lag	Lag	Lag		Lead		
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes	Yes		Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Recall Mode	None	Min		Min	Min	Min	Min	Min		None	Min	Min
Walk Time (s)		9.0		9.0	9.0	9.0	10.0	10.0			10.0	10.0
Flash Dont Walk (s)		15.0		15.0	15.0	15.0	16.0	16.0			16.0	16.0
Pedestrian Calls (#/hr)		3		9	9	9	3	3			4	4
Act Effct Green (s)	30.1	26.6			12.5	12.5		35.1		50.2	46.2	46.2
Actuated g/C Ratio	0.34	0.30			0.14	0.14		0.40		0.57	0.52	0.52
v/c Ratio	0.78	0.29			0.26	0.13		1.00		0.44	0.67	0.56
Control Delay	39.4	15.1			35.8	0.8		64.9		14.2	21.3	13.1
Queue Delay	0.0	0.0			0.0	0.0		0.0		0.0	0.0	0.0
Total Delay	39.4	15.1			35.8	0.8		64.9		14.2	21.3	13.1
LOS	D	B			D	A		E		B	C	B
Approach Delay		31.5			22.2			64.9			17.3	
Approach LOS		C			C			E			B	
Queue Length 50th (m)	40.8	10.4			9.3	0.0		93.6		11.9	65.4	28.8
Queue Length 95th (m)	63.8	23.6			19.7	0.0		#201.0		29.7	136.9	74.9
Internal Link Dist (m)		116.4			93.0			375.6			150.8	
Turn Bay Length (m)	25.0					15.0				20.0		15.0
Base Capacity (vph)	387	707			467	472		604		388	889	800
Starvation Cap Reductn	0	0			0	0		0		0	0	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	0.78	0.21			0.13	0.08		1.00		0.44	0.67	0.56

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 88.3			
Natural Cycle: 100			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 1.00			
Intersection Signal Delay: 32.3		Intersection LOS: C	
Intersection Capacity Utilization 107.2%		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.

Splits and Phases: 1: Willoughby Drive/Portage Road & Main Street



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	281	66	69	4	53	36	54	498	8	159	557	420
Future Volume (vph)	281	66	69	4	53	36	54	498	8	159	557	420
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	7.5			7.5	7.5		8.0		4.0	8.0	8.0
Lane Util. Factor	1.00	1.00			1.00	1.00		1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98			1.00	0.95		1.00		1.00	1.00	0.95
Flpb, ped/bikes	0.99	1.00			1.00	1.00		1.00		1.00	1.00	1.00
Frt	1.00	0.92			1.00	0.85		1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00			1.00	1.00		1.00		0.95	1.00	1.00
Satd. Flow (prot)	1593	1541			1728	1334		1704		1644	1701	1401
Flt Permitted	0.54	1.00			0.97	1.00		0.89		0.31	1.00	1.00
Satd. Flow (perm)	913	1541			1682	1334		1517		530	1701	1401
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	302	71	74	4	57	39	58	535	9	171	599	452
RTOR Reduction (vph)	0	43	0	0	0	33	0	1	0	0	0	72
Lane Group Flow (vph)	302	102	0	0	61	6	0	601	0	171	599	380
Confl. Peds. (#/hr)	18		10	9		17	10		9	17		18
Heavy Vehicles (%)	4%	6%	2%	2%	2%	7%	3%	3%	2%	2%	4%	2%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8		8	2			6		6
Actuated Green, G (s)	26.6	26.6			12.6	12.6		35.2		46.2	46.2	46.2
Effective Green, g (s)	26.6	26.6			12.6	12.6		35.2		46.2	46.2	46.2
Actuated g/C Ratio	0.30	0.30			0.14	0.14		0.40		0.52	0.52	0.52
Clearance Time (s)	4.0	7.5			7.5	7.5		8.0		4.0	8.0	8.0
Vehicle Extension (s)	3.0	3.0			3.0	3.0		3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	352	464			240	190		604		365	889	733
v/s Ratio Prot	c0.10	0.07								0.04	c0.35	
v/s Ratio Perm	c0.16				0.04	0.00		c0.40		0.21		0.27
v/c Ratio	0.86	0.22			0.25	0.03		1.00		0.47	0.67	0.52
Uniform Delay, d1	28.1	23.1			33.7	32.6		26.5		13.5	15.5	13.8
Progression Factor	1.00	1.00			1.00	1.00		1.00		1.00	1.00	1.00
Incremental Delay, d2	18.3	0.2			0.6	0.1		35.3		1.0	2.0	0.6
Delay (s)	46.3	23.3			34.2	32.6		61.8		14.5	17.5	14.4
Level of Service	D	C			C	C		E		B	B	B
Approach Delay (s)		38.9			33.6			61.8			15.9	
Approach LOS		D			C			E			B	

Intersection Summary			
HCM 2000 Control Delay	32.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	88.3	Sum of lost time (s)	23.5
Intersection Capacity Utilization	107.2%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

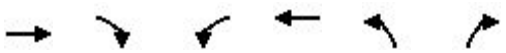
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	46	91	289	53	142	432
Future Volume (vph)	46	91	289	53	142	432
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.910		0.979			
Flt Protected	0.983					0.988
Satd. Flow (prot)	1552	0	1698	0	0	1714
Flt Permitted	0.983					0.988
Satd. Flow (perm)	1552	0	1698	0	0	1714
Link Speed (k/h)	50		50			50
Link Distance (m)	112.0		177.9			249.8
Travel Time (s)	8.1		12.8			18.0
Confl. Peds. (#/hr)	21	4		21	4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	50	99	314	58	154	470
Shared Lane Traffic (%)						
Lane Group Flow (vph)	149	0	372	0	0	624
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.7		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.9		4.9			4.9
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24	14		14	24	
Sign Control	Stop		Stop			Stop

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 73.2%		ICU Level of Service D	
Analysis Period (min) 15			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	46	91	289	53	142	432
Future Volume (vph)	46	91	289	53	142	432
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	50	99	314	58	154	470

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	149	372	624
Volume Left (vph)	50	0	154
Volume Right (vph)	99	58	0
Hadj (s)	-0.30	-0.06	0.08
Departure Headway (s)	6.0	5.1	5.0
Degree Utilization, x	0.25	0.53	0.86
Capacity (veh/h)	563	681	718
Control Delay (s)	10.9	13.7	30.3
Approach Delay (s)	10.9	13.7	30.3
Approach LOS	B	B	D

Intersection Summary			
Delay	22.4		
Level of Service	C		
Intersection Capacity Utilization	73.2%	ICU Level of Service	D
Analysis Period (min)	15		



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	162	32	0	114	23	0
Future Volume (vph)	162	32	0	114	23	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.978					
Flt Protected					0.950	
Satd. Flow (prot)	1697	0	0	1735	1648	0
Flt Permitted					0.950	
Satd. Flow (perm)	1697	0	0	1735	1648	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	112.0			73.3	63.3	
Travel Time (s)	8.1			5.3	4.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	176	35	0	124	25	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	211	0	0	124	25	0
Enter Blocked Intersection	Yes	Yes	Yes	Yes	Yes	Yes
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)		97	97		97	97
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 21.4%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	162	32	0	114	23	0
Future Volume (Veh/h)	162	32	0	114	23	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	176	35	0	124	25	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			211		318	194
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			211		318	194
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		96	100
cM capacity (veh/h)			1360		676	848

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	211	124	25
Volume Left	0	0	25
Volume Right	35	0	0
cSH	1700	1360	676
Volume to Capacity	0.12	0.00	0.04
Queue Length 95th (m)	0.0	0.0	0.9
Control Delay (s)	0.0	0.0	10.5
Lane LOS			B
Approach Delay (s)	0.0	0.0	10.5
Approach LOS			B

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	21.4%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	14	32	310	20	46	431
Future Volume (vph)	14	32	310	20	46	431
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.905		0.992			
Flt Protected	0.985					0.995
Satd. Flow (prot)	1546	0	1721	0	0	1726
Flt Permitted	0.985					0.995
Satd. Flow (perm)	1546	0	1721	0	0	1726
Link Speed (k/h)	50		50			50
Link Distance (m)	58.2		160.0			177.9
Travel Time (s)	4.2		11.5			12.8
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	15	35	337	22	50	468
Shared Lane Traffic (%)						
Lane Group Flow (vph)	50	0	359	0	0	518
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.7		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	1.6		1.6			1.6
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24	14		14	24	
Sign Control	Stop		Free			Free

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 59.8%		ICU Level of Service B	
Analysis Period (min) 15			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	14	32	310	20	46	431
Future Volume (Veh/h)	14	32	310	20	46	431
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)	15	35	337	22	50	468
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	916	348			359	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	916	348			359	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	95	95			96	
cM capacity (veh/h)	290	695			1200	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	50	359	518
Volume Left	15	0	50
Volume Right	35	22	0
cSH	490	1700	1200
Volume to Capacity	0.10	0.21	0.04
Queue Length 95th (m)	2.6	0.0	1.0
Control Delay (s)	13.2	0.0	1.2
Lane LOS	B		A
Approach Delay (s)	13.2	0.0	1.2
Approach LOS	B		

Intersection Summary			
Average Delay	1.4		
Intersection Capacity Utilization	59.8%	ICU Level of Service	B
Analysis Period (min)	15		

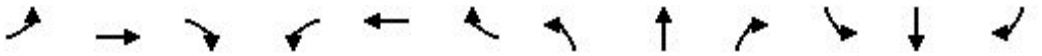
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	31	73	257	49	114	332
Future Volume (vph)	31	73	257	49	114	332
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.906		0.978			
Flt Protected	0.985					0.987
Satd. Flow (prot)	1548	0	1697	0	0	1712
Flt Permitted	0.985					0.987
Satd. Flow (perm)	1548	0	1697	0	0	1712
Link Speed (k/h)	50		50			50
Link Distance (m)	124.2		264.5			160.0
Travel Time (s)	8.9		19.0			11.5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	34	79	279	53	124	361
Shared Lane Traffic (%)						
Lane Group Flow (vph)	113	0	332	0	0	485
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.7		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.9		4.9			4.9
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24	14		14	24	
Sign Control	Stop		Free			Free

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 60.5%		ICU Level of Service B	
Analysis Period (min) 15			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	31	73	257	49	114	332
Future Volume (Veh/h)	31	73	257	49	114	332
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)	34	79	279	53	124	361
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	914	306			332	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	914	306			332	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	88	89			90	
cM capacity (veh/h)	272	734			1227	

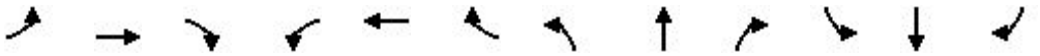
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	113	332	485
Volume Left	34	0	124
Volume Right	79	53	0
cSH	486	1700	1227
Volume to Capacity	0.23	0.20	0.10
Queue Length 95th (m)	6.8	0.0	2.6
Control Delay (s)	14.6	0.0	2.9
Lane LOS	B		A
Approach Delay (s)	14.6	0.0	2.9
Approach LOS	B		

Intersection Summary			
Average Delay		3.3	
Intersection Capacity Utilization		60.5%	ICU Level of Service
Analysis Period (min)		15	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	103	9	8	0	3	7	38	151	1	25	188	97
Future Volume (vph)	103	9	8	0	3	7	38	151	1	25	188	97
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												
Frt		0.991			0.907			0.999			0.958	
Flt Protected		0.959						0.990			0.996	
Satd. Flow (prot)	0	1649	0	0	1573	0	0	1716	0	0	1655	0
Flt Permitted		0.959						0.990			0.996	
Satd. Flow (perm)	0	1649	0	0	1573	0	0	1716	0	0	1655	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		265.5			209.0			181.2			264.5	
Travel Time (s)		19.1			15.0			13.0			19.0	
Confl. Peds. (#/hr)	5		13	16		8	13		16	8		5
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
Adj. Flow (vph)	134	12	10	0	4	9	49	196	1	32	244	126
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	156	0	0	13	0	0	246	0	0	402	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	41.6%	ICU Level of Service	A
Analysis Period (min)	15		

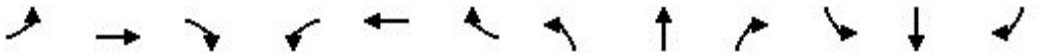


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	103	9	8	0	3	7	38	151	1	25	188	97
Future Volume (Veh/h)	103	9	8	0	3	7	38	151	1	25	188	97
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
Hourly flow rate (vph)	134	12	10	0	4	9	49	196	1	32	244	126
Pedestrians		13			16			16			8	
Lane Width (m)		3.7			3.7			3.7			3.7	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		1			1			1			1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	698	695	336	714	758	220	383			213		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	698	695	336	714	758	220	383			213		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	58	96	99	100	99	99	96			98		
cM capacity (veh/h)	319	334	689	301	307	802	1162			1339		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	156	13	246	402
Volume Left	134	0	49	32
Volume Right	10	9	1	126
cSH	331	536	1162	1339
Volume to Capacity	0.47	0.02	0.04	0.02
Queue Length 95th (m)	18.3	0.6	1.0	0.6
Control Delay (s)	25.2	11.9	2.0	0.8
Lane LOS	D	B	A	A
Approach Delay (s)	25.2	11.9	2.0	0.8
Approach LOS	D	B		

Intersection Summary				
Average Delay	6.0			
Intersection Capacity Utilization	41.6%	ICU Level of Service	A	
Analysis Period (min)	15			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	364	36	51	1	28	37	47	563	5	80	281	201
Future Volume (vph)	364	36	51	1	28	37	47	563	5	80	281	201
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	25.0		0.0	0.0		15.0	20.0		0.0	20.0		15.0
Storage Lanes	1		0	0		1	0		0	1		1
Taper Length (m)	25.0			25.0			25.0			25.0		
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	0.98	0.98			1.00	0.97		1.00		1.00		0.96
Frt		0.912				0.850		0.999				0.850
Flt Protected	0.950				0.998			0.996		0.950		
Satd. Flow (prot)	1648	1396	0	0	1731	1406	0	1666	0	1648	1669	1380
Flt Permitted	0.558				0.989			0.947		0.334		
Satd. Flow (perm)	952	1396	0	0	1715	1360	0	1583	0	578	1669	1329
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		57				98		1				132
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		140.4			117.0			399.6			174.8	
Travel Time (s)		10.1			8.4			28.8			12.6	
Confl. Peds. (#/hr)	9		7	4		6	7		4	6		9
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	2%	15%	12%	2%	2%	7%	2%	6%	2%	2%	6%	9%
Adj. Flow (vph)	404	40	57	1	31	41	52	626	6	89	312	223
Shared Lane Traffic (%)												
Lane Group Flow (vph)	404	97	0	0	32	41	0	684	0	89	312	223
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	1		1	1	1	1	1		1	1	1
Detector Template				Left			Left					Right
Leading Detector (m)	10.0	10.0		6.1	10.0	10.0	6.1	10.0		10.0	10.0	10.0
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	10.0	10.0		6.1	10.0	10.0	6.1	10.0		10.0	10.0	10.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	7	4			8			2			6	
Permitted Phases	4			8		8	2			6		6
Detector Phase	7	4		8	8	8	2	2		6	6	6
Switch Phase												

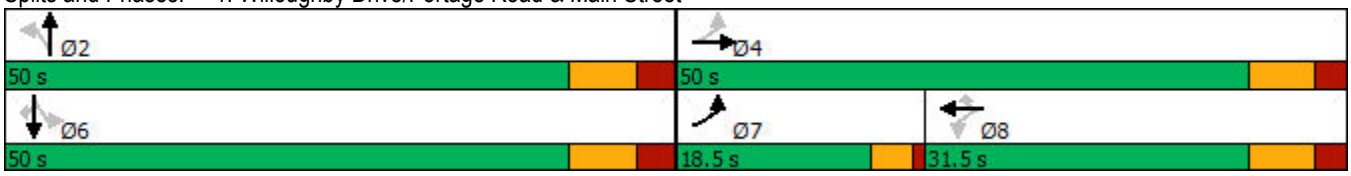


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	7.0	10.0		10.0	10.0	10.0	20.0	20.0		20.0	20.0	20.0
Minimum Split (s)	11.0	31.5		31.5	31.5	31.5	34.0	34.0		34.0	34.0	34.0
Total Split (s)	18.5	50.0		31.5	31.5	31.5	50.0	50.0		50.0	50.0	50.0
Total Split (%)	18.5%	50.0%		31.5%	31.5%	31.5%	50.0%	50.0%		50.0%	50.0%	50.0%
Maximum Green (s)	14.5	42.5		24.0	24.0	24.0	42.0	42.0		42.0	42.0	42.0
Yellow Time (s)	3.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
All-Red Time (s)	1.0	2.5		2.5	2.5	2.5	3.0	3.0		3.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0			0.0	0.0		0.0		0.0	0.0	0.0
Total Lost Time (s)	4.0	7.5			7.5	7.5		8.0		8.0	8.0	8.0
Lead/Lag	Lead			Lag	Lag	Lag						
Lead-Lag Optimize?	Yes			Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Recall Mode	None	Min		Min	Min	Min	Min	Min		Min	Min	Min
Walk Time (s)		9.0		9.0	9.0	9.0	10.0	10.0		10.0	10.0	10.0
Flash Dont Walk (s)		15.0		15.0	15.0	15.0	16.0	16.0		16.0	16.0	16.0
Pedestrian Calls (#/hr)		3		4	4	4	0	0		2	2	2
Act Effct Green (s)	34.6	31.1			12.5	12.5		42.2		42.2	42.2	42.2
Actuated g/C Ratio	0.39	0.35			0.14	0.14		0.48		0.48	0.48	0.48
v/c Ratio	0.83	0.18			0.13	0.15		0.91		0.32	0.39	0.32
Control Delay	38.8	10.2			33.7	1.1		40.9		20.2	17.9	8.0
Queue Delay	0.0	0.0			0.0	0.0		0.0		0.0	0.0	0.0
Total Delay	38.8	10.2			33.7	1.1		40.9		20.2	17.9	8.0
LOS	D	B			C	A		D		C	B	A
Approach Delay		33.3			15.4			40.9			14.7	
Approach LOS		C			B			D			B	
Queue Length 50th (m)	54.3	4.5			4.8	0.0		96.6		8.5	30.8	7.9
Queue Length 95th (m)	#82.8	14.0			12.2	0.0		#210.4		25.2	65.0	27.3
Internal Link Dist (m)		116.4			93.0			375.6			150.8	
Turn Bay Length (m)	25.0					15.0				20.0		15.0
Base Capacity (vph)	484	700			465	440		751		274	792	700
Starvation Cap Reductn	0	0			0	0		0		0	0	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	0.83	0.14			0.07	0.09		0.91		0.32	0.39	0.32

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 88.8			
Natural Cycle: 90			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.91			
Intersection Signal Delay: 29.2		Intersection LOS: C	
Intersection Capacity Utilization 101.4%		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.

Splits and Phases: 1: Willoughby Drive/Portage Road & Main Street



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	364	36	51	1	28	37	47	563	5	80	281	201
Future Volume (vph)	364	36	51	1	28	37	47	563	5	80	281	201
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	7.5			7.5	7.5		8.0		8.0	8.0	8.0
Lane Util. Factor	1.00	1.00			1.00	1.00		1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98			1.00	0.97		1.00		1.00	1.00	0.96
Flpb, ped/bikes	0.99	1.00			1.00	1.00		1.00		1.00	1.00	1.00
Frt	1.00	0.91			1.00	0.85		1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00			1.00	1.00		1.00		0.95	1.00	1.00
Satd. Flow (prot)	1635	1397			1732	1362		1665		1643	1669	1331
Flt Permitted	0.56	1.00			0.99	1.00		0.95		0.33	1.00	1.00
Satd. Flow (perm)	960	1397			1715	1362		1583		578	1669	1331
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	404	40	57	1	31	41	52	626	6	89	312	223
RTOR Reduction (vph)	0	37	0	0	0	35	0	1	0	0	0	69
Lane Group Flow (vph)	404	60	0	0	32	6	0	683	0	89	312	154
Confl. Peds. (#/hr)	9		7	4		6	7		4	6		9
Heavy Vehicles (%)	2%	15%	12%	2%	2%	7%	2%	6%	2%	2%	6%	9%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	7	4			8			2			6	
Permitted Phases	4			8		8	2			6		6
Actuated Green, G (s)	31.1	31.1			12.5	12.5		42.2		42.2	42.2	42.2
Effective Green, g (s)	31.1	31.1			12.5	12.5		42.2		42.2	42.2	42.2
Actuated g/C Ratio	0.35	0.35			0.14	0.14		0.48		0.48	0.48	0.48
Clearance Time (s)	4.0	7.5			7.5	7.5		8.0		8.0	8.0	8.0
Vehicle Extension (s)	3.0	3.0			3.0	3.0		3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	447	489			241	191		752		274	793	632
v/s Ratio Prot	c0.15	0.04									0.19	
v/s Ratio Perm	c0.17				0.02	0.00		c0.43		0.15		0.12
v/c Ratio	0.90	0.12			0.13	0.03		0.91		0.32	0.39	0.24
Uniform Delay, d1	26.0	19.6			33.4	32.9		21.5		14.5	15.0	13.8
Progression Factor	1.00	1.00			1.00	1.00		1.00		1.00	1.00	1.00
Incremental Delay, d2	21.3	0.1			0.3	0.1		14.7		0.7	0.3	0.2
Delay (s)	47.3	19.7			33.7	33.0		36.3		15.2	15.4	14.0
Level of Service	D	B			C	C		D		B	B	B
Approach Delay (s)		42.0			33.3			36.3			14.9	
Approach LOS		D			C			D			B	

Intersection Summary			
HCM 2000 Control Delay	30.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	88.8	Sum of lost time (s)	19.5
Intersection Capacity Utilization	101.4%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

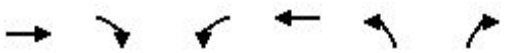
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	32	158	397	42	98	196
Future Volume (vph)	32	158	397	42	98	196
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.888		0.987			
Flt Protected	0.992					0.984
Satd. Flow (prot)	1528	0	1652	0	0	1690
Flt Permitted	0.992					0.984
Satd. Flow (perm)	1528	0	1652	0	0	1690
Link Speed (k/h)	50		50			50
Link Distance (m)	112.0		177.9			249.8
Travel Time (s)	8.1		12.8			18.0
Confl. Peds. (#/hr)	30	2		30	2	
Peak Hour Factor	0.66	0.66	0.66	0.66	0.66	0.66
Heavy Vehicles (%)	2%	2%	6%	3%	3%	3%
Adj. Flow (vph)	48	239	602	64	148	297
Shared Lane Traffic (%)						
Lane Group Flow (vph)	287	0	666	0	0	445
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.7		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.9		4.9			4.9
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24	14		14	24	
Sign Control	Stop		Stop			Stop

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	65.5%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	32	158	397	42	98	196
Future Volume (vph)	32	158	397	42	98	196
Peak Hour Factor	0.66	0.66	0.66	0.66	0.66	0.66
Hourly flow rate (vph)	48	239	602	64	148	297

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	287	666	445
Volume Left (vph)	48	0	148
Volume Right (vph)	239	64	0
Hadj (s)	-0.43	0.04	0.12
Departure Headway (s)	6.2	5.7	6.0
Degree Utilization, x	0.50	1.06	0.74
Capacity (veh/h)	558	640	590
Control Delay (s)	15.3	74.8	23.9
Approach Delay (s)	15.3	74.8	23.9
Approach LOS	C	F	C

Intersection Summary			
Delay	46.4		
Level of Service	E		
Intersection Capacity Utilization	65.5%	ICU Level of Service	C
Analysis Period (min)	15		



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	126	14	0	156	34	0
Future Volume (vph)	126	14	0	156	34	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.987					
Flt Protected					0.950	
Satd. Flow (prot)	1712	0	0	1735	1648	0
Flt Permitted					0.950	
Satd. Flow (perm)	1712	0	0	1735	1648	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	112.0			73.3	63.3	
Travel Time (s)	8.1			5.3	4.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	137	15	0	170	37	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	152	0	0	170	37	0
Enter Blocked Intersection	Yes	Yes	Yes	Yes	Yes	Yes
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)		14	24		24	14
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 18.9%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	126	14	0	156	34	0
Future Volume (Veh/h)	126	14	0	156	34	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	137	15	0	170	37	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			152		314	144
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			152		314	144
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		95	100
cM capacity (veh/h)			1429		678	903

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	152	170	37
Volume Left	0	0	37
Volume Right	15	0	0
cSH	1700	1429	678
Volume to Capacity	0.09	0.00	0.05
Queue Length 95th (m)	0.0	0.0	1.3
Control Delay (s)	0.0	0.0	10.6
Lane LOS			B
Approach Delay (s)	0.0	0.0	10.6
Approach LOS			B

Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	18.9%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	21	50	389	8	18	210
Future Volume (vph)	21	50	389	8	18	210
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.905		0.997			
Flt Protected	0.985					0.996
Satd. Flow (prot)	1546	0	1681	0	0	1712
Flt Permitted	0.985					0.996
Satd. Flow (perm)	1546	0	1681	0	0	1712
Link Speed (k/h)	50		50			50
Link Distance (m)	58.2		160.0			177.9
Travel Time (s)	4.2		11.5			12.8
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	5%	2%	2%	3%
Adj. Flow (vph)	23	54	423	9	20	228
Shared Lane Traffic (%)						
Lane Group Flow (vph)	77	0	432	0	0	248
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.7		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	1.6		1.6			1.6
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24	14		14	24	
Sign Control	Stop		Free			Free

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 39.4%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	21	50	389	8	18	210
Future Volume (Veh/h)	21	50	389	8	18	210
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)	23	54	423	9	20	228
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	696	428			432	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	696	428			432	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	94	91			98	
cM capacity (veh/h)	401	627			1128	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	77	432	248
Volume Left	23	0	20
Volume Right	54	9	0
cSH	537	1700	1128
Volume to Capacity	0.14	0.25	0.02
Queue Length 95th (m)	3.8	0.0	0.4
Control Delay (s)	12.8	0.0	0.8
Lane LOS	B		A
Approach Delay (s)	12.8	0.0	0.8
Approach LOS	B		

Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	39.4%	ICU Level of Service	A
Analysis Period (min)	15		

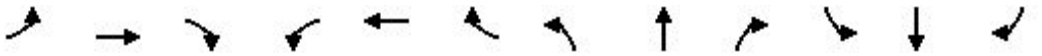
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	56	130	267	18	42	189
Future Volume (vph)	56	130	267	18	42	189
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.906		0.991			
Flt Protected	0.985					0.991
Satd. Flow (prot)	1548	0	1673	0	0	1705
Flt Permitted	0.985					0.991
Satd. Flow (perm)	1548	0	1673	0	0	1705
Link Speed (k/h)	50		50			50
Link Distance (m)	124.2		264.5			160.0
Travel Time (s)	8.9		19.0			11.5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	5%	2%	2%	3%
Adj. Flow (vph)	61	141	290	20	46	205
Shared Lane Traffic (%)						
Lane Group Flow (vph)	202	0	310	0	0	251
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.7		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.9		4.9			4.9
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24	14		14	24	
Sign Control	Stop		Free			Free

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 51.8%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	56	130	267	18	42	189
Future Volume (Veh/h)	56	130	267	18	42	189
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)	61	141	290	20	46	205
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	597	300			310	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	597	300			310	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	86	81			96	
cM capacity (veh/h)	449	740			1250	

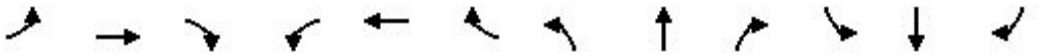
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	202	310	251
Volume Left	61	0	46
Volume Right	141	20	0
cSH	618	1700	1250
Volume to Capacity	0.33	0.18	0.04
Queue Length 95th (m)	10.8	0.0	0.9
Control Delay (s)	13.6	0.0	1.7
Lane LOS	B		A
Approach Delay (s)	13.6	0.0	1.7
Approach LOS	B		

Intersection Summary			
Average Delay	4.2		
Intersection Capacity Utilization	51.8%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	77	4	22	5	8	17	11	179	2	5	83	120
Future Volume (vph)	77	4	22	5	8	17	11	179	2	5	83	120
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												
Frt		0.971			0.925			0.999			0.922	
Flt Protected		0.964			0.992			0.997			0.999	
Satd. Flow (prot)	0	1553	0	0	1388	0	0	1721	0	0	1554	0
Flt Permitted		0.964			0.992			0.997			0.999	
Satd. Flow (perm)	0	1553	0	0	1388	0	0	1721	0	0	1554	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		265.5			209.0			181.2			264.5	
Travel Time (s)		19.1			15.0			13.0			19.0	
Confl. Peds. (#/hr)	4		4	5		5	4		5	5		4
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Heavy Vehicles (%)	3%	100%	2%	75%	2%	7%	2%	2%	50%	2%	2%	7%
Adj. Flow (vph)	93	5	27	6	10	20	13	216	2	6	100	145
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	125	0	0	36	0	0	231	0	0	251	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Stop			Stop			Free			Free	

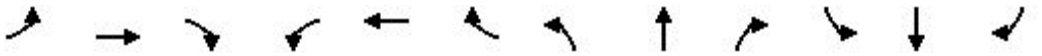
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 36.0%		ICU Level of Service A	
Analysis Period (min) 15			



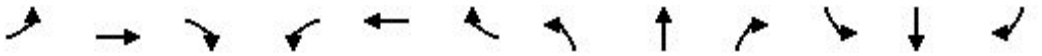
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	77	4	22	5	8	17	11	179	2	5	83	120
Future Volume (Veh/h)	77	4	22	5	8	17	11	179	2	5	83	120
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Hourly flow rate (vph)	93	5	27	6	10	20	13	216	2	6	100	145
Pedestrians		4			5			5			5	
Lane Width (m)		3.7			3.7			3.7			3.7	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		0			0			0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	462	438	182	467	509	227	249			223		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	462	438	182	467	509	227	249			223		
tC, single (s)	7.1	7.5	6.2	7.8	6.5	6.3	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.9	3.3	4.2	4.0	3.4	2.2			2.2		
p0 queue free %	80	99	97	98	98	97	99			100		
cM capacity (veh/h)	476	383	854	377	457	793	1312			1340		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	125	36	231	251
Volume Left	93	6	13	6
Volume Right	27	20	2	145
cSH	521	571	1312	1340
Volume to Capacity	0.24	0.06	0.01	0.00
Queue Length 95th (m)	7.1	1.5	0.2	0.1
Control Delay (s)	14.1	11.7	0.5	0.2
Lane LOS	B	B	A	A
Approach Delay (s)	14.1	11.7	0.5	0.2
Approach LOS	B	B		

Intersection Summary				
Average Delay	3.7			
Intersection Capacity Utilization	36.0%	ICU Level of Service	A	
Analysis Period (min)	15			



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	292	69	72	4	56	37	56	512	8	167	571	435
Future Volume (vph)	292	69	72	4	56	37	56	512	8	167	571	435
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	25.0		0.0	0.0		15.0	20.0		0.0	20.0		15.0
Storage Lanes	1		0	0		1	0		0	1		1
Taper Length (m)	25.0			25.0			25.0			25.0		
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	0.97	0.98			1.00	0.94		1.00		0.99		0.94
Frt		0.924				0.850		0.998				0.850
Flt Protected	0.950				0.997			0.995		0.950		
Satd. Flow (prot)	1616	1539	0	0	1730	1406	0	1705	0	1648	1701	1475
Flt Permitted	0.544				0.971			0.885		0.323		
Satd. Flow (perm)	894	1539	0	0	1683	1324	0	1516	0	556	1701	1390
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		53				129		1				148
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		140.4			117.0			399.6			174.8	
Travel Time (s)		10.1			8.4			28.8			12.6	
Confl. Peds. (#/hr)	18		10	9		17	10		9	17		18
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	4%	6%	2%	2%	2%	7%	3%	3%	2%	2%	4%	2%
Adj. Flow (vph)	314	74	77	4	60	40	60	551	9	180	614	468
Shared Lane Traffic (%)												
Lane Group Flow (vph)	314	151	0	0	64	40	0	620	0	180	614	468
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	1		1	1	1	1	1		1	1	1
Detector Template				Left			Left					Right
Leading Detector (m)	10.0	10.0		6.1	10.0	10.0	6.1	10.0		10.0	10.0	10.0
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	10.0	10.0		6.1	10.0	10.0	6.1	10.0		10.0	10.0	10.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8		8	2			6		6
Detector Phase	7	4		8	8	8	2	2		1	6	6
Switch Phase												



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	7.0	10.0		10.0	10.0	10.0	20.0	20.0		7.0	20.0	20.0
Minimum Split (s)	11.0	31.5		31.5	31.5	31.5	34.0	34.0		11.0	34.0	34.0
Total Split (s)	15.5	47.0		31.5	31.5	31.5	52.0	52.0		11.0	63.0	63.0
Total Split (%)	14.1%	42.7%		28.6%	28.6%	28.6%	47.3%	47.3%		10.0%	57.3%	57.3%
Maximum Green (s)	11.5	39.5		24.0	24.0	24.0	44.0	44.0		7.0	55.0	55.0
Yellow Time (s)	3.0	5.0		5.0	5.0	5.0	5.0	5.0		3.0	5.0	5.0
All-Red Time (s)	1.0	2.5		2.5	2.5	2.5	3.0	3.0		1.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0			0.0	0.0		0.0		0.0	0.0	0.0
Total Lost Time (s)	4.0	7.5			7.5	7.5		8.0		4.0	8.0	8.0
Lead/Lag	Lead			Lag	Lag	Lag	Lag	Lag		Lead		
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes	Yes		Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Recall Mode	None	Min		Min	Min	Min	Min	Min		None	Min	Min
Walk Time (s)		9.0		9.0	9.0	9.0	10.0	10.0			10.0	10.0
Flash Dont Walk (s)		15.0		15.0	15.0	15.0	16.0	16.0			16.0	16.0
Pedestrian Calls (#/hr)		3		9	9	9	3	3			4	4
Act Effct Green (s)	31.7	28.2			12.6	12.6		44.1		59.2	55.2	55.2
Actuated g/C Ratio	0.32	0.29			0.13	0.13		0.45		0.60	0.56	0.56
v/c Ratio	0.85	0.32			0.30	0.14		0.92		0.44	0.65	0.56
Control Delay	51.1	19.2			42.1	1.1		46.7		13.6	20.1	12.9
Queue Delay	0.0	0.0			0.0	0.0		0.0		0.0	0.0	0.0
Total Delay	51.1	19.2			42.1	1.1		46.7		13.6	20.1	12.9
LOS	D	B			D	A		D		B	C	B
Approach Delay		40.8			26.3			46.7			16.5	
Approach LOS		D			C			D			B	
Queue Length 50th (m)	50.2	14.2			11.2	0.0		101.8		13.3	71.1	32.9
Queue Length 95th (m)	#78.4	29.4			22.8	0.0		#209.7		31.4	142.9	80.5
Internal Link Dist (m)		116.4			93.0			375.6			150.8	
Turn Bay Length (m)	25.0					15.0				20.0		15.0
Base Capacity (vph)	370	648			409	419		677		410	949	841
Starvation Cap Reductn	0	0			0	0		0		0	0	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	0.85	0.23			0.16	0.10		0.92		0.44	0.65	0.56

Intersection Summary			
Area Type:	Other		
Cycle Length: 110			
Actuated Cycle Length: 98.9			
Natural Cycle: 100			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.92			
Intersection Signal Delay: 29.2		Intersection LOS: C	
Intersection Capacity Utilization 109.6%		ICU Level of Service H	
Analysis Period (min) 15			

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

Splits and Phases: 1: Willoughby Drive/Portage Road & Main Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	292	69	72	4	56	37	56	512	8	167	571	435
Future Volume (vph)	292	69	72	4	56	37	56	512	8	167	571	435
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	7.5			7.5	7.5		8.0		4.0	8.0	8.0
Lane Util. Factor	1.00	1.00			1.00	1.00		1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98			1.00	0.95		1.00		1.00	1.00	0.95
Flpb, ped/bikes	0.98	1.00			1.00	1.00		1.00		1.00	1.00	1.00
Frt	1.00	0.92			1.00	0.85		1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00			1.00	1.00		1.00		0.95	1.00	1.00
Satd. Flow (prot)	1590	1540			1728	1329		1704		1644	1701	1396
Flt Permitted	0.54	1.00			0.97	1.00		0.88		0.32	1.00	1.00
Satd. Flow (perm)	911	1540			1683	1329		1515		559	1701	1396
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	314	74	77	4	60	40	60	551	9	180	614	468
RTOR Reduction (vph)	0	38	0	0	0	35	0	1	0	0	0	65
Lane Group Flow (vph)	314	113	0	0	64	5	0	619	0	180	614	403
Confl. Peds. (#/hr)	18		10	9		17	10		9	17		18
Heavy Vehicles (%)	4%	6%	2%	2%	2%	7%	3%	3%	2%	2%	4%	2%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8		8	2			6		6
Actuated Green, G (s)	28.2	28.2			12.7	12.7		44.2		55.2	55.2	55.2
Effective Green, g (s)	28.2	28.2			12.7	12.7		44.2		55.2	55.2	55.2
Actuated g/C Ratio	0.29	0.29			0.13	0.13		0.45		0.56	0.56	0.56
Clearance Time (s)	4.0	7.5			7.5	7.5		8.0		4.0	8.0	8.0
Vehicle Extension (s)	3.0	3.0			3.0	3.0		3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	338	439			216	170		677		388	949	779
v/s Ratio Prot	c0.11	0.07								0.03	c0.36	
v/s Ratio Perm	c0.16				0.04	0.00		c0.41		0.23		0.29
v/c Ratio	0.93	0.26			0.30	0.03		0.91		0.46	0.65	0.52
Uniform Delay, d1	33.2	27.3			39.1	37.7		25.6		13.1	15.1	13.6
Progression Factor	1.00	1.00			1.00	1.00		1.00		1.00	1.00	1.00
Incremental Delay, d2	30.9	0.3			0.8	0.1		17.0		0.9	1.5	0.6
Delay (s)	64.1	27.6			39.8	37.8		42.6		14.0	16.6	14.2
Level of Service	E	C			D	D		D		B	B	B
Approach Delay (s)		52.3			39.0			42.6			15.3	
Approach LOS		D			D			D			B	

Intersection Summary			
HCM 2000 Control Delay	30.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	98.9	Sum of lost time (s)	23.5
Intersection Capacity Utilization	109.6%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

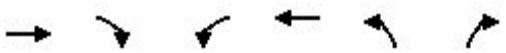
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	46	91	295	53	142	440
Future Volume (vph)	46	91	295	53	142	440
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.910		0.979			
Flt Protected	0.983					0.988
Satd. Flow (prot)	1552	0	1698	0	0	1714
Flt Permitted	0.983					0.988
Satd. Flow (perm)	1552	0	1698	0	0	1714
Link Speed (k/h)	50		50			50
Link Distance (m)	112.0		177.9			249.8
Travel Time (s)	8.1		12.8			18.0
Confl. Peds. (#/hr)	21	4		21	4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	50	99	321	58	154	478
Shared Lane Traffic (%)						
Lane Group Flow (vph)	149	0	379	0	0	632
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.7		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.9		4.9			4.9
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24	14		14	24	
Sign Control	Stop		Stop			Stop

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 74.0%		ICU Level of Service D	
Analysis Period (min) 15			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	46	91	295	53	142	440
Future Volume (vph)	46	91	295	53	142	440
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	50	99	321	58	154	478

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	149	379	632
Volume Left (vph)	50	0	154
Volume Right (vph)	99	58	0
Hadj (s)	-0.30	-0.06	0.08
Departure Headway (s)	6.0	5.1	5.0
Degree Utilization, x	0.25	0.54	0.87
Capacity (veh/h)	562	669	717
Control Delay (s)	11.0	14.0	32.0
Approach Delay (s)	11.0	14.0	32.0
Approach LOS	B	B	D

Intersection Summary			
Delay	23.4		
Level of Service	C		
Intersection Capacity Utilization	74.0%	ICU Level of Service	D
Analysis Period (min)	15		



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	162	32	0	114	23	0
Future Volume (vph)	162	32	0	114	23	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.978					
Flt Protected					0.950	
Satd. Flow (prot)	1697	0	0	1735	1648	0
Flt Permitted					0.950	
Satd. Flow (perm)	1697	0	0	1735	1648	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	112.0			73.3	63.3	
Travel Time (s)	8.1			5.3	4.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	176	35	0	124	25	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	211	0	0	124	25	0
Enter Blocked Intersection	Yes	Yes	Yes	Yes	Yes	Yes
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)		97	97		97	97
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 21.4%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	162	32	0	114	23	0
Future Volume (Veh/h)	162	32	0	114	23	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	176	35	0	124	25	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			211		318	194
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			211		318	194
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		96	100
cM capacity (veh/h)			1360		676	848

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	211	124	25
Volume Left	0	0	25
Volume Right	35	0	0
cSH	1700	1360	676
Volume to Capacity	0.12	0.00	0.04
Queue Length 95th (m)	0.0	0.0	0.9
Control Delay (s)	0.0	0.0	10.5
Lane LOS			B
Approach Delay (s)	0.0	0.0	10.5
Approach LOS			B

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	21.4%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	14	32	316	20	46	440
Future Volume (vph)	14	32	316	20	46	440
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.905		0.992			
Flt Protected	0.985					0.995
Satd. Flow (prot)	1546	0	1721	0	0	1726
Flt Permitted	0.985					0.995
Satd. Flow (perm)	1546	0	1721	0	0	1726
Link Speed (k/h)	50		50			50
Link Distance (m)	58.2		160.0			177.9
Travel Time (s)	4.2		11.5			12.8
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	15	35	343	22	50	478
Shared Lane Traffic (%)						
Lane Group Flow (vph)	50	0	365	0	0	528
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.7		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	1.6		1.6			1.6
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24	14		14	24	
Sign Control	Stop		Free			Free

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 60.6%		ICU Level of Service B	
Analysis Period (min) 15			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	14	32	316	20	46	440
Future Volume (Veh/h)	14	32	316	20	46	440
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)	15	35	343	22	50	478
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	932	354			365	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	932	354			365	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	95	95			96	
cM capacity (veh/h)	283	690			1194	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	50	365	528
Volume Left	15	0	50
Volume Right	35	22	0
cSH	482	1700	1194
Volume to Capacity	0.10	0.21	0.04
Queue Length 95th (m)	2.6	0.0	1.0
Control Delay (s)	13.3	0.0	1.2
Lane LOS	B		A
Approach Delay (s)	13.3	0.0	1.2
Approach LOS	B		

Intersection Summary			
Average Delay	1.4		
Intersection Capacity Utilization	60.6%	ICU Level of Service	B
Analysis Period (min)	15		

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	31	73	262	49	114	340
Future Volume (vph)	31	73	262	49	114	340
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.906		0.979			
Flt Protected	0.985					0.988
Satd. Flow (prot)	1548	0	1698	0	0	1714
Flt Permitted	0.985					0.988
Satd. Flow (perm)	1548	0	1698	0	0	1714
Link Speed (k/h)	50		50			50
Link Distance (m)	124.2		264.5			160.0
Travel Time (s)	8.9		19.0			11.5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	34	79	285	53	124	370
Shared Lane Traffic (%)						
Lane Group Flow (vph)	113	0	338	0	0	494
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.7		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.9		4.9			4.9
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24	14		14	24	
Sign Control	Stop		Free			Free

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 61.2%		ICU Level of Service B	
Analysis Period (min) 15			

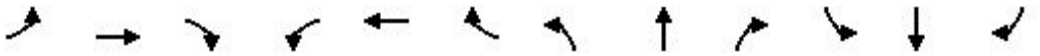
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	31	73	262	49	114	340
Future Volume (Veh/h)	31	73	262	49	114	340
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	34	79	285	53	124	370
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	930	312			338	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	930	312			338	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	87	89			90	
cM capacity (veh/h)	267	729			1221	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	113	338	494
Volume Left	34	0	124
Volume Right	79	53	0
cSH	479	1700	1221
Volume to Capacity	0.24	0.20	0.10
Queue Length 95th (m)	6.9	0.0	2.6
Control Delay (s)	14.8	0.0	2.9
Lane LOS	B		A
Approach Delay (s)	14.8	0.0	2.9
Approach LOS	B		

Intersection Summary			
Average Delay		3.3	
Intersection Capacity Utilization		61.2%	ICU Level of Service B
Analysis Period (min)		15	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	104	10	8	0	4	8	40	155	1	27	192	99
Future Volume (vph)	104	10	8	0	4	8	40	155	1	27	192	99
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												
Frt		0.991			0.910			0.999			0.958	
Flt Protected		0.959						0.990			0.996	
Satd. Flow (prot)	0	1649	0	0	1579	0	0	1716	0	0	1655	0
Flt Permitted		0.959						0.990			0.996	
Satd. Flow (perm)	0	1649	0	0	1579	0	0	1716	0	0	1655	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		265.5			209.0			181.2			264.5	
Travel Time (s)		19.1			15.0			13.0			19.0	
Confl. Peds. (#/hr)	5		13	16		8	13		16	8		5
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
Adj. Flow (vph)	135	13	10	0	5	10	52	201	1	35	249	129
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	158	0	0	15	0	0	254	0	0	413	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 42.3%		ICU Level of Service A	
Analysis Period (min) 15			

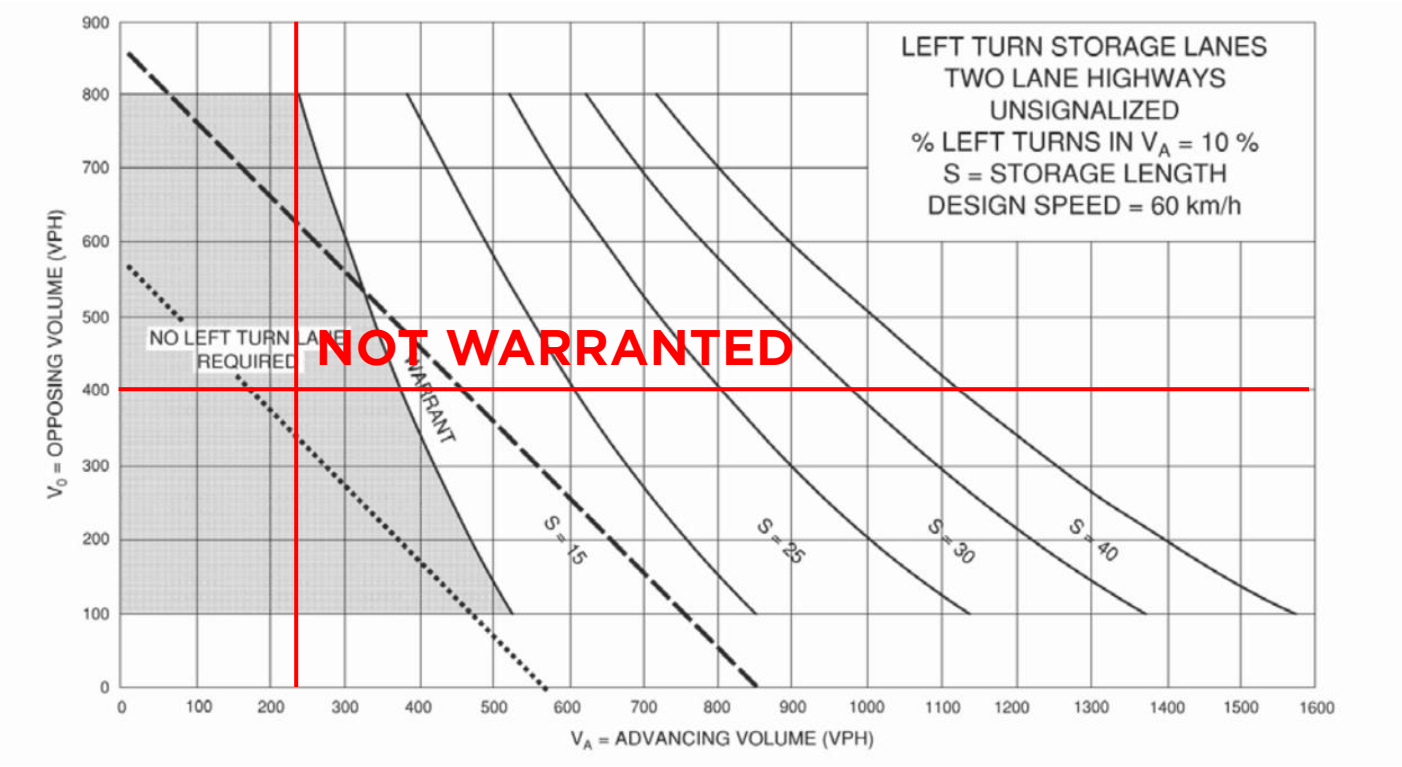


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	104	10	8	0	4	8	40	155	1	27	192	99
Future Volume (Veh/h)	104	10	8	0	4	8	40	155	1	27	192	99
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
Hourly flow rate (vph)	135	13	10	0	5	10	52	201	1	35	249	129
Pedestrians		13			16			16			8	
Lane Width (m)		3.7			3.7			3.7			3.7	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		1			1			1			1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	722	718	342	738	782	226	391			218		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	722	718	342	738	782	226	391			218		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	56	96	99	100	98	99	95			97		
cM capacity (veh/h)	304	322	683	288	295	797	1155			1333		

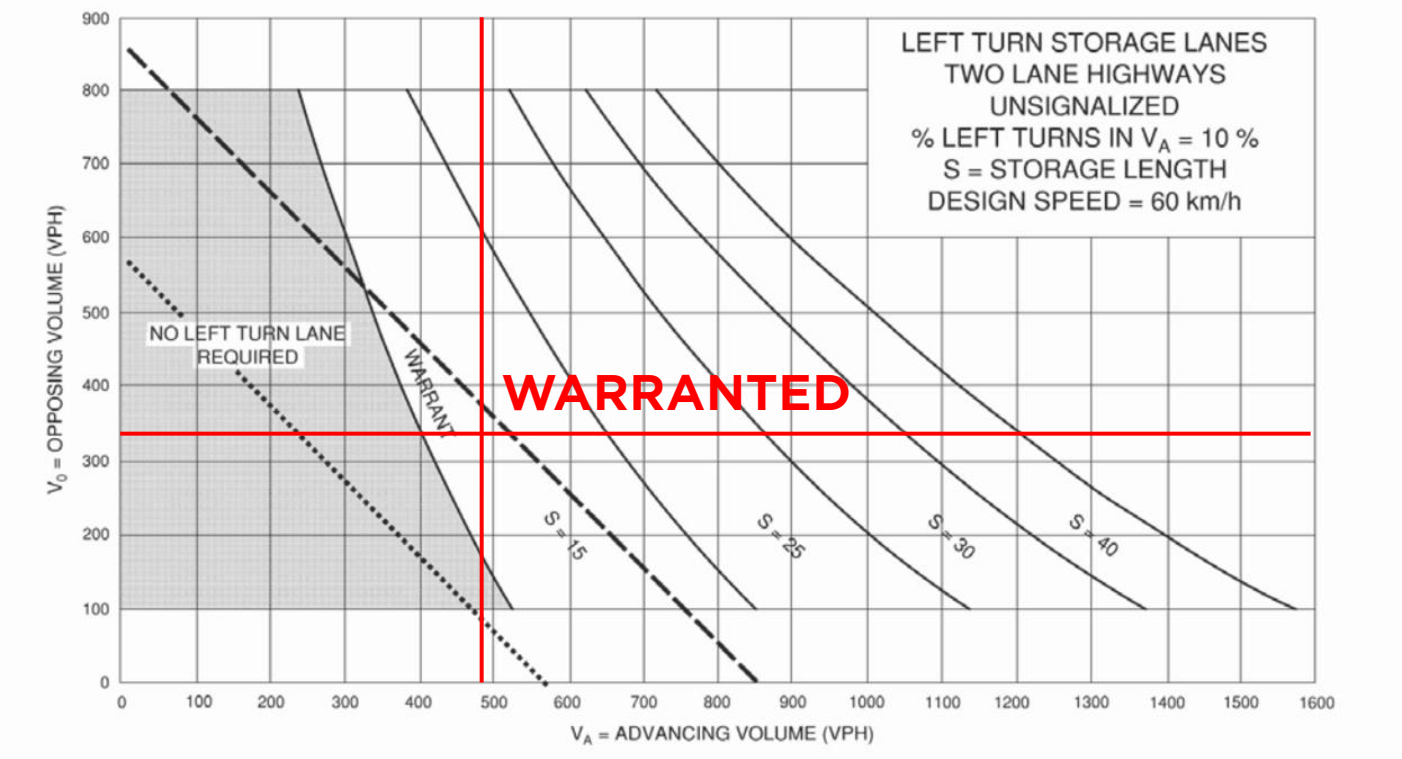
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	158	15	254	413
Volume Left	135	0	52	35
Volume Right	10	10	1	129
cSH	316	509	1155	1333
Volume to Capacity	0.50	0.03	0.05	0.03
Queue Length 95th (m)	20.1	0.7	1.1	0.6
Control Delay (s)	27.2	12.3	2.0	0.9
Lane LOS	D	B	A	A
Approach Delay (s)	27.2	12.3	2.0	0.9
Approach LOS	D	B		

Intersection Summary				
Average Delay	6.4			
Intersection Capacity Utilization	42.3%	ICU Level of Service	A	
Analysis Period (min)	15			

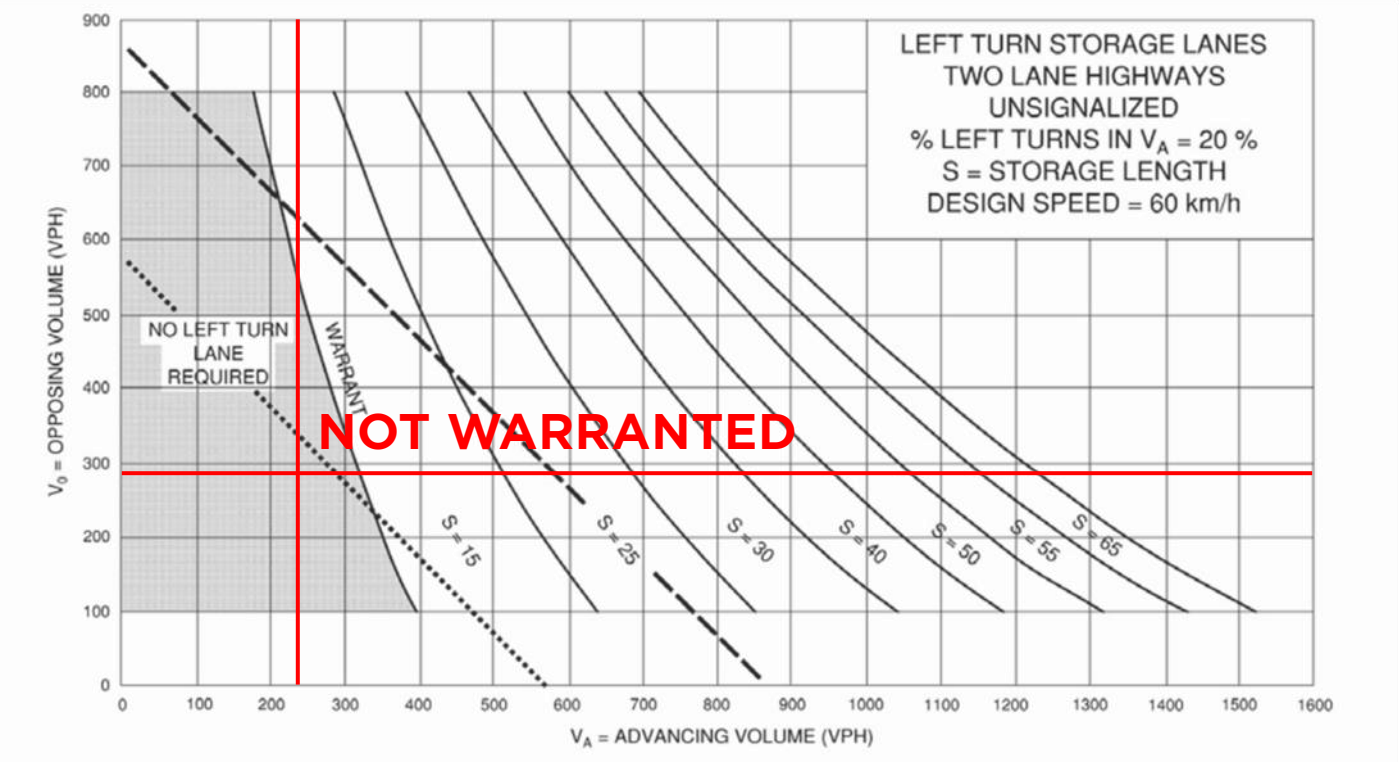
Appendix J:
Left Turn Lane Warrants



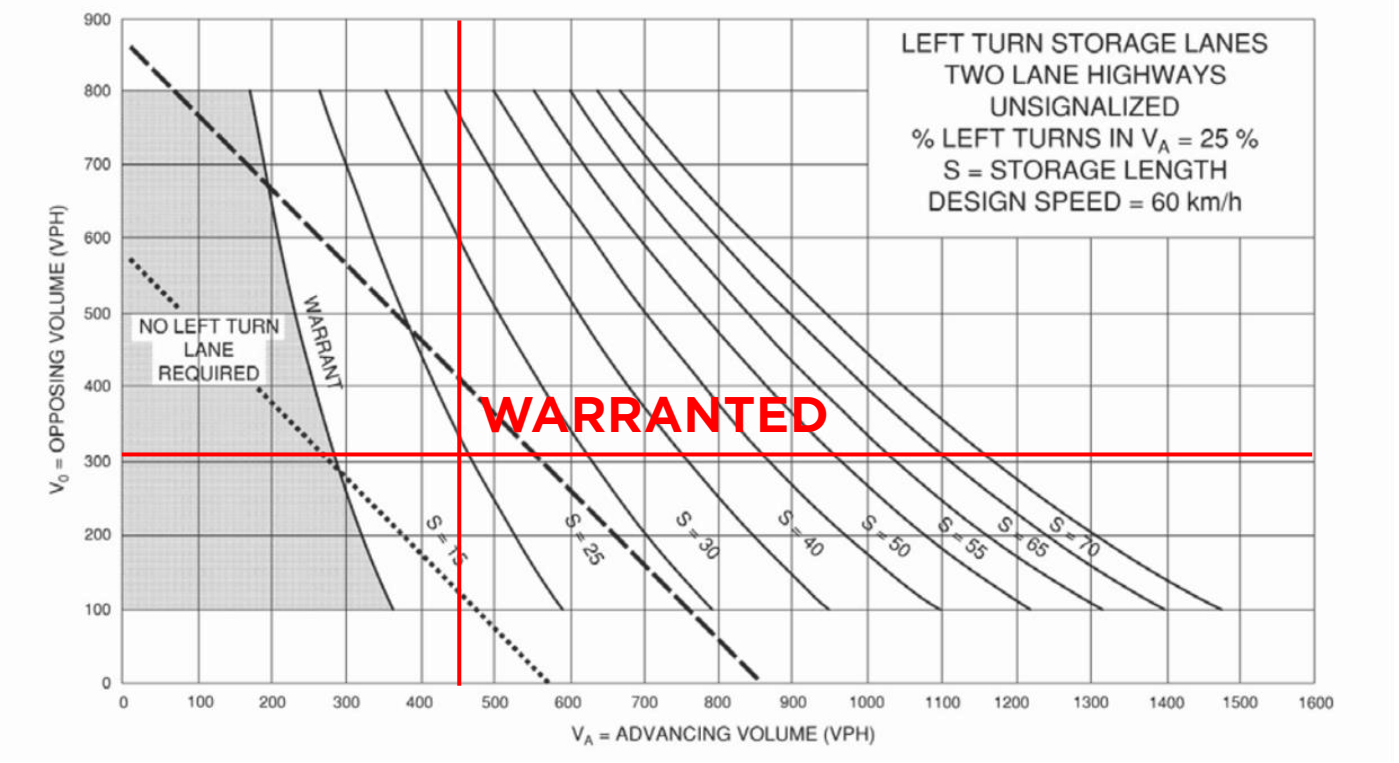
Weekday AM Peak Hour – 2035 Total



Weekday PM Peak Hour – 2035 Total



Weekday AM Peak Hour – 2035 Total



Weekday PM Peak Hour – 2035 Total