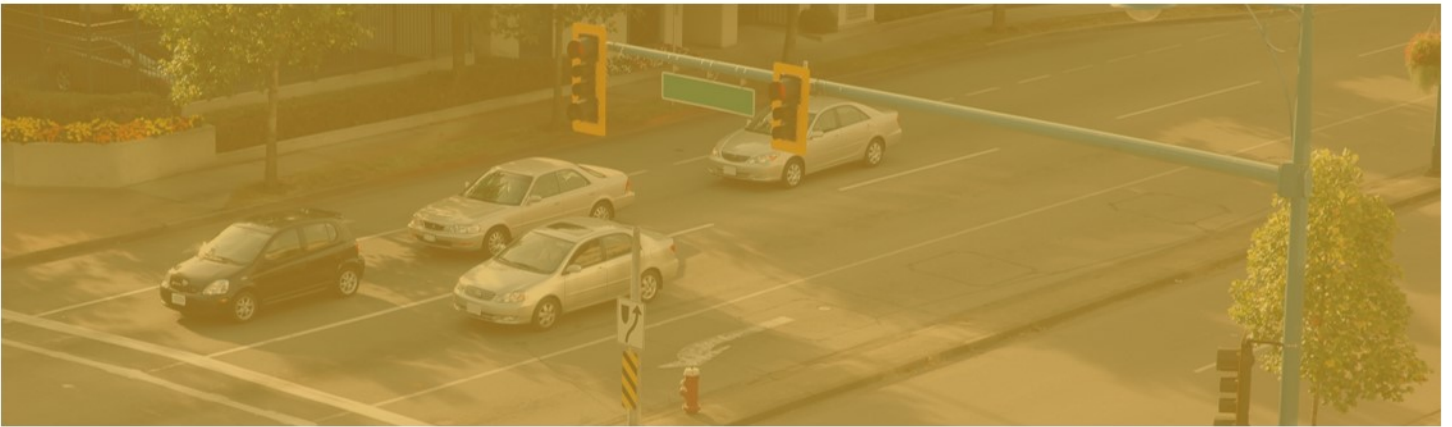




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15 Harvie Road

TRAFFIC IMPACT STUDY

Barrie-Bryne Developments Limited

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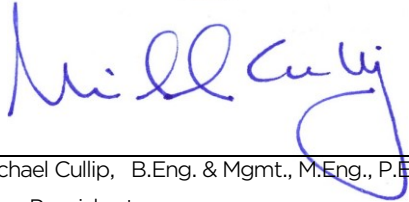
March
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1	March 18, 2022	First Submission

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1 Introduction

Tatham Engineering Limited was retained by Barrie-Bryne Developments Ltd. to address the traffic impacts associated with the proposed mixed-use development located on the 82-acre property immediately west of Highway 400 and south of Harvie Road in the City of Barrie, as illustrated in Figure 1.

The Terms of Reference for this study have been established in context of the pre-consultation comments provided by the City, and through subsequent correspondence with City transportation staff (pre-consultation and email correspondence are provided in Appendix A).

The purpose of this Traffic Impact Study is to review the requirements of the City of Barrie with respect to the potential transportation impacts of the development on the local 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 estimated to generate;
- the operations of the study area road system upon completion of the development; and
- the anticipated traffic impacts and proposed mitigating measures (if required) to ensure acceptable overall road operations;

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), and the expected growth in traffic levels and the resulting operating conditions
- Chapter 4: proposed development and associated details including land use, access, traffic volumes and parking
- Chapter 5: future conditions, with completion of the proposed development (referred to as future total conditions)
- Chapter 6: summary of the report and key findings



2 Existing Conditions

This chapter will describe the road network, traffic volumes and operations for the existing conditions.

2.1 ROAD NETWORK

A description of the road network is provided below. Photographs of the study area road network are provided in Figure 2.

2.1.1 Roads

The road sections considered in this study are summarized in Table 1.

Table 1: Road Sections

ROAD	CLASSIFICATION		CROSS SECTION	SPEED (km/h)	CAPACITY ¹ (vphpl)	DIRECTION
	Current OP	Draft OP				
Harvie Road	arterial	arterial	5-lane	50	850	E-W
Bryne Drive	future collector	arterial	5-lane	50	850	N-S
Essa Road	arterial	arterial	5-lane	50	850	N-S
Mapleview Drive	arterial	arterial	7-lane	60	850	E-W
Veterans Drive	arterial	arterial	5-lane	60	850	N-S
Fairview Road	arterial	arterial	2-lane	50	750	N-S
Caplan Avenue	local	minor collector	2-lane	50	400	E-W
Mapleton Avenue	local	local	2-lane	50	400	E-W
Cranberry Lane	local	local	2-lane	50	400	E-W
Thrushwood Drive	local	local	2-lane	50	400	N-S

¹ capacity is denoted as vehicles per hour per lane as per the *City of Barrie Transportation Master Plan*



The road classifications noted in the current *City of Barrie Official Plan*¹ (*Schedule D – Roads Plan*) and in the draft new *City of Barrie Official Plan 2051*² (*Map 4b: Mobility Network*) are both referenced in Table 1. The draft new *Official Plan* has been adopted by City Council and has been sent to the Province’s Ministry of Municipal Affairs and Housing for approval. The road classifications are relatively consistent between the current Official Plan and draft new Official Plan, although there are recommended changes to the classifications of Bryne Drive (collector to arterial) and Caplan Avenue (local to minor collector). The changes are informed by the recommendations contained in the *City of Barrie Transportation Master Plan*³. For the purpose of this report, the Bryne Drive extension has been considered as an arterial road recognizing that it will be designed as such given the recommendations in the *Transportation Master Plan*.

2.1.2 Intersections

The following intersections have been considered in the study:

- Bryne Drive with Essa Road (signalized);
- Bryne Drive with Caplan Avenue (signalized);
- Bryne Drive with Mapleview Drive (signalized);
- Harvie Road with Veterans Drive (signalized);
- Harvie Road with Thrushwood Drive (two-way stop control);
- Harvie Road with Fairview Road (signalized);
- Veterans Drive with Mapleton Avenue/Brookwood Drive (signalized); and
- Cranberry Lane with Thrushwood Drive (two-way stop control).

2.2 TRANSIT & ACTIVE TRANSPORTATION

2.2.1 Transit Service

There is currently no transit service provided along the road network in the immediate study area; however, there are routes operated along the boundary road network. Barrie Transit currently operates the following routes on Veterans Drive and Essa Road to the west of the site:

- 2A: Dunlop (northbound on Veterans Drive);
- 2B: Park Place (southbound on Veterans Drive);

¹ *City of Barrie Official Plan*. City of Barrie. April 2010 (Office consolidated January 2018).

² *The City of Barrie Official Plan 2051*. City of Barrie. January 2022.

³ *The City of Barrie Transportation Master Plan*. WSP. June 2019.



- 8A-NB: RVH (northbound on Essa Road); and
- 8B-SB: Essa (southbound on Essa Road).

Routes 2A and 2B operate on a 60-minute service Monday through Sunday, providing connection between downtown and Park Place. Routes 8A-NB and 8A-SB operate on a 30-minute schedule during weekdays and Saturdays, and on a 60-minute service during the evening hours and Sundays. These routes provide connectivity to most of the City through connections with the Barrie Downtown Terminal, the Allandale Waterfront Station and the Barrie South GO Station.

2.2.2 Active Transportation

Sidewalks are provided on one or both sides of most the roads within the study area, including along the street serving the residential subdivision to the west of the subject site. Controlled pedestrian crossings are provided at all of the signalized intersections within the study area.

In terms of bicycle infrastructure, there are buffered bicycle lanes on Harvie Road and bicycle lanes on Veterans Drive.

2.3 TRAFFIC VOLUMES

Existing traffic volumes were determined from turning movement counts conducted at the noted study area intersections. A summary of the turning movement counts is provided in Table 2, whereas traffic count details are provided in Appendix B.

Table 2: Turning Movement Counts

INTERSECTION	DATE OF COUNT
Bryne Drive with Essa Road	Wednesday October 14, 2020
Bryne Drive with Caplan Avenue	Tuesday December 14, 2021
Bryne Drive with Mapleview Drive	Thursday July 18, 2019
Harvie Road with Veterans Drive	Tuesday December 14, 2021
Harvie Road with Thrushwood Drive	Tuesday December 14, 2021
Harvie Road with Fairview Road	Tuesday December 14, 2021
Veterans Drive with Brookwood Drive	Tuesday December 14, 2021
Cranberry Lane with Thrushwood Drive	Tuesday December 14, 2021



To reflect 2022 conditions, the traffic volumes were adjusted based on background growth rates provided by the City (growth rates are discussed in further detail in Section 3.3.3). The resulting 2022 peak hour volumes are illustrated Figure 3.

2.4 TRAFFIC OPERATIONS

2.4.1 Intersection Operations

The assessment of existing conditions provides the baseline from which the future traffic volumes and operations (both with and without the subject development) can be assessed. The capacity, and hence operations, of a road system is effectively dictated by its intersections. As such, the analysis focused on the operations of the noted key intersections. The analysis is based on:

- the peak 2022 traffic volumes;
- the existing intersection configuration and control (existing signal timing plans have been obtained from the City for consideration in the assessment); and
- procedures outlined in the *2000 Highway Capacity Manual*⁴ (using Synchro v.10 software).

For signalized intersections, the review considers the average delay (measured in seconds), level of service (LOS) and volume to capacity (v/c) for each approach and the overall intersection (additional details are provided on the detailed worksheets). For unsignalized intersections, the same metrics are assessed, albeit for the critical movements only (i.e. the stop controlled movements). 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 (level of service definitions and thresholds for signalized and unsignalized intersections are provided in Appendix C); and
- a v/c ratio of less than 1.0 indicates the intersection movement/approach is operating at less than capacity while v/c of 1.0 indicates capacity has been reached.

A summary of the existing traffic conditions analyses is provided in Table 3; detailed operations worksheets are included in Appendix D.

⁴ *Highway Capacity Manual*. Transportation Research Board, Washington DC, 2000.



Table 3: Intersection Operations - 2022 Conditions

INTERSECTION, APPROACH & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			Delay	LOS	V/C	Delay	LOS	V/C
Bryne Drive & Essa Road	EB	signal	29	C	0.68	42	D	0.75
	WB	signal	46	D	0.22	61	E	0.78
	NB	signal	30	C	0.59	28	C	0.63
	SB	signal	32	C	0.70	31	C	0.76
	overall	signal	32	C	0.63	36	D	0.68
Harvie Road & Veterans Drive	EB	signal	18	B	0.17	25	C	0.31
	WB	signal	19	B	0.17	28	C	0.65
	NB	signal	28	C	0.34	34	C	0.80
	SB	signal	28	C	0.64	33	C	0.88
	overall	signal	24	C	0.37	31	C	0.76
Harvie Road & Thrushwood Drive	NB	stop	12	B	0.14	13	B	0.14
Harvie Road & Fairview Road	EB	signal	6	A	0.15	8	A	0.25
	WB	signal	9	A	0.19	14	B	0.44
	SB	signal	33	C	0.66	34	C	0.75
	overall	signal	13	B	0.30	16	B	0.52
Cranberry Lane & Thrushwood Drive	EB	stop	9	A	0.01	9	A	0.00
Veterans Drive & Brookwood Drive	EB	signal	25	C	0.17	26	C	0.14
	WB	signal	31	C	0.49	34	C	0.54
	NB	signal	9	A	0.20	13	B	0.55
	SB	signal	13	B	0.38	16	B	0.42



INTERSECTION, APPROACH & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			Delay	LOS	V/C	Delay	LOS	V/C
	overall	signal	15	B	0.39	16	B	0.56
Bryne Drive & Caplan Avenue	EB	signal	32	C	0.73	43	D	0.87
	WB	signal	23	C	0.37	27	C	0.66
	NB	signal	12	B	0.17	16	B	0.49
	SB	signal	16	B	0.04	19	B	0.07
	overall	signal	23	C	0.38	28	C	0.65
Bryne Drive & Mapleview Drive	EB	signal	19	B	0.46	27	C	0.67
	WB	signal	18	B	0.88	26	C	0.85
	NB	signal	37	D	0.20	55	E	1.01
	SB	signal	34	C	0.26	53	D	0.89
	overall	signal	21	C	0.77	34	C	0.91

As indicated, the study area intersections are providing acceptable overall operations (LOS D or better) with average delays given the existing traffic volumes and intersection configuration and control. All approaches and individual movements operated with LOS E or better (as indicated in the detailed worksheets provided in Appendix D). It is noted that the northbound approach at the intersection of Bryne Drive with Mapleview Drive operates at capacity under existing conditions, primarily due to the volume of right turning traffic from Bryne Drive to Mapleview Drive which causes the existing through-right turn lane to operate as a defacto right turn lane (and thus limiting the northbound through volume to a single through lane). These capacity issues can be addressed through signal timing optimization (as further considered and discussed under the future background and future total conditions).



3 Future Background Conditions

This chapter will describe the road network and background traffic volumes expected for the years 2028, 2033, 2038 and 2043. The 2028 horizon year has been adopted as an interim phase to consider partial completion of the development, whereas the 2033 horizon considers full build-out. As per City TIS guidelines, the 2038 and 2043 horizons have been considered to address the longer-term impacts to the road network (5 and 10 years beyond build-out).

3.1 ROAD NETWORK

3.1.1 Roads

Bryne Drive Extension

Bryne Drive is to be extended from its south terminus (north of Caplan Avenue) to its north terminus (south of Essa Road). Upon completion of the extension, Bryne Drive will provide complete north-south service between Essa Road in the north to Commerce Park Drive in the south and will bisect the subject development site. As per the *Environmental Study Report - Harvie Road, Essa Road and Bryne Drive Class EA Study, Phases 3 & 4⁵*, Bryne Drive will be constructed to a 5-lane cross-section providing two lanes of travel per direction, a continuous two-way centre turn lane, 1.5 metre bike lanes and sidewalks on both sides of the road. Construction of the road is to be completed in two segments as following:

- south segment (Harvie Road to Caplan Avenue) - construction to commence in 2022; and
- north segment (Harvie Road to Essa Road) - construction scheduled for 2027.

For the purpose of this study, it has been assumed that the Bryne Drive extension will be complete by the 2028 horizon.

Beacon Road Extension

The extension of Beacon Road is a developer initiated improvement to be completed in conjunction with the proposed residential development to be located at 108, 116 and 122 Harvie Road. Beacon Road currently provides service from Essa Road to Montserrand Street, and will be extended from Montserrand Street to Harvie Road, connecting opposite Thrushwood Drive to create a 4-leg intersection. The Beacon Road extension has been assumed to be complete by the 2028 horizon.

⁵ *Environmental Study Report - Harvie Road, Essa Road and Bryne Drive Class EA Study, Phases 3 & 4.*
Hatch Corporation. October 2017.



3.1.2 Intersections

Harvie Road & Bryne Drive

The extension of Bryne Drive will create a new 4-leg intersection with Harvie Road. The north and south approaches (Bryne Drive) were constructed as part of the Harvie Road improvements and Highway 400 crossing. Upon completion of the Bryne Drive extension, each approach to the signalized intersection will consist of an exclusive left turn lane, two through lanes and an exclusive right turn lane.

Harvie Road & Thrushwood Drive/Beacon Road

The proposed extension of Beacon Road will convert the existing 3-leg intersection of Harvie Road with Thrushwood Drive to a 4-leg intersection, with Beacon Road forming the north leg. The north and south legs (Beacon Road and Thrushwood Drive, respectively) will each have of single lane approach with a shared left-through-right lane. The east and west approaches (Harvie Road) will each consist of an exclusive left turn lane, a through lane and a shared through-right lane. It is understood that the City, in completing the Harvie Road improvements, has installed the underground conduit to support the future signalization of this intersection. The timing for the installation of traffic signals has not been confirmed but will occur when traffic volumes at the intersection satisfy the appropriate traffic signal justification warrants. For the purpose of this study, the study has been considered to operate under stop control with signalization to be considered when (and if) the future operations dictate.

Notwithstanding the noted road and intersection improvements, the remainder of the study area road network as described in Section 2.1 has been maintained for the future horizons.

3.2 TRANSIT & ACTIVE TRANSPORTATION

3.2.1 Transit

As identified in the City's *Transportation Master Plan*, a new transit strategy has been identified for implementation by 2041 which includes a core transit route along Mapleview Drive and Essa Road, connecting south, central and north Barrie. In conjunction with the new transit strategy, high occupancy vehicle (HOV) lanes are proposed for Essa Road by 2041 to support improved transit service delivery. The proposed HOV lanes are to be provided via conversion of the existing curb lane from general purpose to HOV (rather than widening the road).

The transit strategy also proposes transit support routes along Bryne Drive, Veterans Drive, Caplan Avenue, Harvie Road and Fairview Road that will support the core service routes.

The transit improvements and implementation of HOV lanes on Essa Road are proposed by the 2041 horizon



3.2.2 Active Transportation

With respect to active transportation improvements, the following have been recommended in the *Transportation Master Plan*:

- Bryne Drive Extension – buffered bicycle lanes and sidewalks on both sides of the road;
- Essa Road – in boulevard pathway; and
- Caplan Avenue – buffered bicycle lanes.

The specific timings of the noted active transportation improvements are not identified other than being proposed by the 2041 horizon.

3.3 TRAFFIC VOLUMES

3.3.1 Base Volumes

The *Harvie Road, Essa Road and Bryne Drive Class EA Study* included traffic projections within the Harvie Road and Bryne Drive corridors for the ultimate horizon year of 2031., which in turn were derived from traffic volumes provided in the following studies:

- *Harvie Road/Big Bay Point Road/Highway 400 Transportation Improvements (Bryne Drive to Bayview Drive) Environmental Study Report*⁶; and
- *Bryne Drive (Caplan to Essa Road) Master Plan Update – Addendum #1*⁷.

The *Harvie Road, Essa Road and Bryne Drive Class EA Study* concluded that the traffic projections in the *Harvie Road/Big Bay Point Road/Highway 400* study were representative of typical peak conditions; whereas the volumes in the *Bryne Drive Master Plan Update* considered a “worst case scenario”.

For the purpose of this study, the 2031 volumes as per the *Harvie Road, Essa Road and Bryne Drive Class EA Study* were used as a base condition from which the traffic volumes for the 2028, 2033, 2038 and 2041 horizons could be established. These 2031 base volumes are illustrated in Figure 4.

3.3.2 Adjustments

As the referenced 2031 traffic projections were based on the City’s 2014 EMME model (which was current at the time of the noted studies), several adjustments have been considered to better reflect current conditions.

⁶ *Harvie Road/Big Bay Point Road/Highway 400 Transportation Improvements (Bryne Drive to Bayview Drive) Environmental Study Report*. Morrison Hershfield Ltd. September 2015.

⁷ *Bryne Drive (Caplan to Essa Road) Master Plan Update – Addendum #1*. Ainley Group. March 2016.



The 2014 EMME model considered a partial interchange at the Harvie Road/Highway 400 crossing which is no longer being considered at this time (a simple overpass has been resolved). As such, the intersection volumes (as identified in Appendix C of the *Harvie Road, Essa Road and Bryne Drive Class EA Study*) were tracked through the study area based on assumed traffic patterns and removed from the 2031 traffic projection. The resulting interchange volumes to be removed from the 2031 base volumes are illustrated in Figure 5.

In addition, the 2031 volumes were reviewed in context of the traffic projections provided from the City's current (2016) EMME traffic model, with consideration also given to anticipated traffic patterns. The turning movements at the various study area intersections were adjusted as needed to ensure that the midblock volumes were somewhat consistent with the City's current 2031 traffic model projections. Having said that, there are instances where the resulting midblock volumes are greater than those provided in the City's traffic model. This not unexpected recognizing that the nature of the EMME traffic model is to provide macro projections rather than to simulate the micro conditions considered in a traffic impact study.

The resulting 2031 volumes, which have been used as a reference scenario from which the 2028, 2033, 2038 and 2041 background volumes have been established, are provided in Figure 6.

3.3.3 Background Growth Rates

The growth rates as per Table 4 (as resolved with the City and derived from their current EMME traffic model) have been considered in establishing future background traffic volumes.

Table 4: Annual Growth Rates

ROAD	2022 TO 2031	2031 TO 2041
Harvie Road	3.5%	3.2%
Bryne Drive	2.5%	2.0%
Essa Road	2.0%	1.0%
Mapleview Drive	2.0%	1.0%
Veterans Drive	2.0%	1.0%
Fairview Road	2.0%	2.0%
Caplan Avenue	2.0%	2.0%
Mapleton Avenue	1.0%	1.0%
Other Local Roads	0%	0%



No growth has been applied to the existing local roads within the study area (Thrushwood Drive, Brookwood Drive, Cranberry Lane, etc.) recognizing that they serve built-out residential areas and are not intended to convey through traffic that would otherwise experience year over year growth.

The noted growth rates have been applied to the 2031 reference scenario volumes to establish the future background traffic volumes for the various horizon years. For the 2028 horizon year, the volumes were interpolated based on the 2022 existing volumes, the 2031 reference scenario and the noted background growth rates.

3.3.4 Background Development Growth

There will be significant future development along Bryne Drive, specifically as it relates to the development of 40 Harvie Road – a large industrial/commercial subdivision. While the site is draft plan approved, a detailed site plan is not available and timing for the development of the land is currently unknown. Recognizing that the future background traffic volumes have ultimately been established in context of the City’s EMME model projections and traffic volumes considered in studies completed in support of the planning and development of the Harvie Road and Bryne Drive corridors, the development of lands within the area and the traffic generation associated with such development has inherently been considered in the projections. As such, individual developments have not been explicitly considered in the report as such may result in an overestimation of the traffic projections. Having said that, no adjustments were made to the traffic projections to remove the anticipated traffic volumes associated with the subject development that have otherwise been considered in some form or another in the City’s EMME model based. This ensures a conservative approach and allows for flexibility in the development of the site plan.

Notwithstanding the above, consideration was given to two background developments in the area, namely:

- 108, 116 and 122 Harvie Road; and
- 175-199 Essa Road.

The development at 108, 116, and 122 Harvie Road has been considered in that its construction includes the extension of Beacon Road. The 175-199 Essa Road development has been included in that it is a sizeable development that is progressing towards construction and, while located outside of the considered study area, is expected contribute volumes to the study area within the study horizon. Details of the noted developments are provided below.



108, 116 & 122 Harvie Road

As per the City of Barrie development map, there is currently a site plan agreement for a proposed residential development located at 108, 116 and 122 Harvie Road. The development will consist of 50 units in a 4-storey apartment building, 65 townhouse units, 12 single detached units. Trip generation and assignment for the site is provided in the *108,116 & 122 Harvie Road Traffic Impact Study*⁸. For the purpose of this study, full build-out of the mixed-use development has been assumed by 2028. The resulting traffic volumes are illustrated in Figure 7.

As previously noted, the development of this site will include the extension of Beacon Road. The future volumes on Beacon Road have been established based on the projections in the respective traffic study, distributed through the study area road network based on the trip distribution assumptions discussed in Section 4.4.2.

175-199 Essa Road

There is currently a site plan agreement for a proposed mixed-use development to be located at 175-199 Essa Road. The development will consist of 2 phases. The first phase will provide 225 seniors residential units, 597 residential units, 8,400m² of office space, and 3,072m² of retail space. The second phase will provide 77 residential units. Trip generation and assignment for the site as provided in the *175-199 Essa Road and 50 Wood Street Traffic Impact Study*⁹ has been applied. For the purpose of this study, full build-out of both phases has been assumed by 2028. The resulting traffic volumes are illustrated in Figure 8.

Total Development Traffic

The total traffic volumes associated with the noted background developments are illustrated in Figure 9.

3.3.5 Background Traffic Volumes

Background traffic volumes (i.e. prior to consideration for the subject development) for the 2028, 2033, 2038 and 2043 horizon years have been determined based on the following:

- the adjusted 2031 volumes (Figure 6);
- the noted annual background growth rate; and
- the additional traffic volumes associated with the background developments (Figure 9).

⁸ *108, 116 & 122 Harvie Road Traffic Impact Study*. JD Northcote Engineering Inc. September 2021.

⁹ *175-199 Essa Road and 50 Wood Street Proposed Mixed-Use Development Urban Transportation Considerations*. BA Group. September 2019.



The resulting background traffic volumes are illustrated in Figure 10 through Figure 13.

3.4 TRAFFIC OPERATIONS

The key intersections were again analyzed for each horizon year given the projected background volumes and the existing intersection configurations. The signal timings have been optimized where appropriate to ensure optimal intersection operations are maintained. The signal plans for the new intersection of Harvie Road with Bryne Drive reflect the typical base plans provided for the other intersections in the area, including consideration for advanced left turn phases for all left turn movements at the intersection. The results of the assessment are summarized in Table 5 through Table 8 (detailed worksheets are provided in Appendix E).

Table 5: Intersection Operations - 2028 Background Conditions

INTERSECTION, APPROACH & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			Delay	LOS	V/C	Delay	LOS	V/C
Bryne Drive & Essa Road	EB	signal	33	C	0.60	45	D	0.72
	WB	signal	42	D	0.39	40	D	0.70
	NB	signal	26	C	0.62	31	C	0.63
	SB	signal	27	C	0.72	29	C	0.72
	overall	signal	30	C	0.58	34	C	0.68
Harvie Road & Veterans Drive	EB	signal	23	C	0.36	27	C	0.48
	WB	signal	19	B	0.37	27	C	0.68
	NB	signal	31	C	0.41	32	C	0.71
	SB	signal	30	C	0.74	40	D	0.87
	overall	signal	26	C	0.57	32	C	0.76
Harvie Road & Thrushwood Drive	NB	stop	16	C	0.22	17	C	0.22
	SB	stop	14	B	0.17	19	C	0.21
Bryne Drive & Harvie Road	EB	signal	18	B	0.36	22	C	0.48
	WB	signal	15	B	0.33	19	C	0.45
	NB	signal	37	D	0.32	36	D	0.59



INTERSECTION, APPROACH & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			Delay	LOS	V/C	Delay	LOS	V/C
		SB	signal	29	C	0.53	38	D
	overall	signal	22	C	0.44	28	C	0.52
Harvie Road & Fairview Road	EB	signal	8	A	0.36	9	A	0.39
	WB	signal	12	B	0.33	17	B	0.53
	SB	signal	34	C	0.72	34	C	0.78
	overall	signal	14	B	0.48	18	B	0.61
	Cranberry Lane & Thrushwood Drive	EB	stop	9	A	0.01	9	A
Veterans Drive & Brookwood Drive	EB	signal	24	C	0.18	26	C	0.14
	WB	signal	30	C	0.48	34	C	0.54
	NB	signal	9	A	0.28	16	B	0.76
	SB	signal	15	B	0.53	19	B	0.66
	overall	signal	16	B	0.49	19	B	0.73
Bryne Drive & Caplan Avenue	EB	signal	37	D	0.83	23	C	0.54
	WB	signal	25	C	0.55	30	C	0.75
	NB	signal	13	B	0.22	19	B	0.37
	SB	signal	18	B	0.28	22	C	0.44
	overall	signal	24	C	0.46	23	C	0.55
Bryne Drive & Mapleview Drive	EB	signal	26	C	0.62	35	D	0.70
	WB	signal	27	C	0.96	32	C	0.88
	NB	signal	38	D	0.21	47	D	0.94
	SB	signal	37	D	0.60	43	D	0.75
	overall	signal	29	C	0.91	37	D	0.86



Table 6: Intersection Operations - 2033 Background Conditions

INTERSECTION, APPROACH & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			Delay	LOS	V/C	Delay	LOS	V/C
Bryne Drive & Essa Road	EB	signal	33	C	0.62	46	D	0.74
	WB	signal	42	D	0.45	41	D	0.78
	NB	signal	27	C	0.56	33	C	0.60
	SB	signal	30	C	0.78	33	C	0.76
	overall	signal	31	C	0.62	37	D	0.76
Harvie Road & Veterans Drive	EB	signal	24	C	0.42	27	C	0.51
	WB	signal	19	B	0.43	29	C	0.75
	NB	signal	31	C	0.43	34	C	0.78
	SB	signal	34	C	0.83	44	D	0.94
	overall	signal	28	C	0.66	34	C	0.86
Harvie Road & Thrushwood Drive	NB	stop	17	C	0.24	18	C	0.24
	SB	stop	14	B	0.18	20	C	0.23
Bryne Drive & Harvie Road	EB	signal	19	B	0.44	25	C	0.58
	WB	signal	16	B	0.41	22	C	0.55
	NB	signal	37	D	0.35	36	D	0.61
	SB	signal	30	C	0.58	39	D	0.75
	overall	signal	23	C	0.51	29	C	0.60
Harvie Road & Fairview Road	EB	signal	9	A	0.42	12	B	0.47
	WB	signal	13	B	0.39	22	C	0.66
	SB	signal	34	C	0.74	36	D	0.81
	overall	signal	14	B	0.54	21	C	0.69



INTERSECTION, APPROACH & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			Delay	LOS	V/C	Delay	LOS	V/C
Cranberry Lane & Thrushwood Drive	EB	stop	9	A	0.01	9	A	0.00
Veterans Drive & Brookwood Drive	EB	signal	24	C	0.19	26	C	0.15
	WB	signal	30	C	0.48	34	C	0.54
	NB	signal	9	A	0.31	19	B	0.87
	SB	signal	16	B	0.58	21	C	0.72
	overall	signal	16	B	0.53	21	C	0.81
Bryne Drive & Caplan Avenue	EB	signal	40	D	0.86	26	C	0.60
	WB	signal	25	C	0.56	34	C	0.82
	NB	signal	15	B	0.27	19	B	0.42
	SB	signal	19	B	0.33	24	C	0.50
	overall	signal	25	C	0.51	26	C	0.61
Bryne Drive & Mapleview Drive	EB	signal	34	C	0.82	43	D	0.83
	WB	signal	21	C	0.86	36	D	0.91
	NB	signal	37	D	0.24	49	D	0.99
	SB	signal	37	D	0.66	45	D	0.81
	overall	signal	29	C	0.86	42	D	0.91



Table 7: Intersection Operations - 2038 Background Conditions

INTERSECTION, APPROACH & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			Delay	LOS	V/C	Delay	LOS	V/C
Bryne Drive & Essa Road	EB	signal	33	C	0.65	47	D	0.77
	WB	signal	43	D	0.51	45	D	0.87
	NB	signal	28	C	0.58	36	D	0.65
	SB	signal	32	C	0.83	35	C	0.79
	overall	signal	32	C	0.65	39	D	0.83
Harvie Road & Veterans Drive	EB	signal	25	C	0.47	31	C	0.59
	WB	signal	19	B	0.49	33	C	0.81
	NB	signal	31	C	0.44	42	D	0.81
	SB	signal	39	D	0.92	46	D	0.94
	overall	signal	30	C	0.74	38	C	0.90
Harvie Road & Thrushwood Drive	NB	stop	19	C	0.27	20	C	0.26
	SB	stop	16	C	0.19	21	C	0.24
Bryne Drive & Harvie Road	EB	signal	21	C	0.51	30	C	0.70
	WB	signal	19	B	0.50	25	C	0.65
	NB	signal	39	D	0.37	36	D	0.62
	SB	signal	31	C	0.64	39	D	0.76
	overall	signal	24	C	0.59	31	C	0.69
Harvie Road & Fairview Road	EB	signal	9	A	0.50	14	B	0.56
	WB	signal	15	B	0.46	26	C	0.78
	SB	signal	34	C	0.76	38	D	0.84
	overall	signal	16	B	0.60	24	C	0.79



INTERSECTION, APPROACH & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			Delay	LOS	V/C	Delay	LOS	V/C
Cranberry Lane & Thrushwood Drive	EB	stop	9	A	0.01	9	A	0.00
Veterans Drive & Brookwood Drive	EB	signal	24	C	0.19	25	C	0.15
	WB	signal	30	C	0.49	34	C	0.54
	NB	signal	9	A	0.35	36	D	0.96
	SB	signal	16	B	0.61	23	C	0.76
	overall	signal	16	B	0.55	25	C	0.88
Bryne Drive & Caplan Avenue	EB	signal	42	D	0.89	28	C	0.69
	WB	signal	25	C	0.58	38	D	0.86
	NB	signal	16	B	0.32	21	C	0.50
	SB	signal	20	B	0.37	25	C	0.56
	overall	signal	27	C	0.56	28	C	0.68
Bryne Drive & Mapleview Drive	EB	signal	37	D	0.86	50	D	0.90
	WB	signal	23	C	0.90	39	D	0.94
	NB	signal	37	D	0.25	52	D	1.04
	SB	signal	38	D	0.70	49	D	0.86
	overall	signal	31	C	0.91	46	D	0.93



Table 8: Intersection Operations - 2043 Background Conditions

INTERSECTION, APPROACH & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			Delay	LOS	V/C	Delay	LOS	V/C
Bryne Drive & Essa Road	EB	signal	36	D	0.71	47	D	0.79
	WB	signal	45	D	0.52	49	D	0.91
	NB	signal	28	C	0.59	40	D	0.69
	SB	signal	33	C	0.86	39	D	0.84
	overall	signal	34	C	0.69	42	D	0.87
Harvie Road & Veterans Drive	EB	signal	26	C	0.17	39	D	0.72
	WB	signal	21	C	0.61	44	D	0.94
	NB	signal	34	C	0.56	45	D	0.82
	SB	signal	36	D	0.92	46	D	0.95
	overall	signal	30	C	0.81	44	D	0.96
Harvie Road & Thrushwood Drive	NB	stop	21	C	0.29	21	C	0.27
	SB	stop	16	C	0.20	23	C	0.26
Bryne Drive & Harvie Road	EB	signal	22	C	0.61	32	C	0.77
	WB	signal	18	B	0.59	26	C	0.70
	NB	signal	38	D	0.42	41	D	0.77
	SB	signal	34	C	0.73	43	D	0.80
	overall	signal	25	C	0.68	34	C	0.77
Harvie Road & Fairview Road	EB	signal	12	B	0.58	19	B	0.71
	WB	signal	17	B	0.54	28	C	0.84
	SB	signal	36	C	0.78	43	D	0.88
	overall	signal	17	B	0.68	27	C	0.85



INTERSECTION, APPROACH & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			Delay	LOS	V/C	Delay	LOS	V/C
Cranberry Lane & Thrushwood Drive	EB	stop	9	A	0.01	9	A	0.00
Veterans Drive & Brookwood Drive	EB	signal	24	C	0.20	27	C	0.16
	WB	signal	30	C	0.48	35	C	0.54
	NB	signal	10	B	0.39	23	C	0.87
	SB	signal	17	B	0.64	38	D	0.84
	overall	signal	17	B	0.58	25	C	0.82
Bryne Drive & Caplan Avenue	EB	signal	54	D	0.96	33	C	0.78
	WB	signal	26	C	0.59	46	D	0.93
	NB	signal	17	B	0.37	24	C	0.61
	SB	signal	24	C	0.43	27	C	0.64
	overall	signal	32	C	0.62	32	C	0.76
Bryne Drive & Mapleview Drive	EB	signal	40	D	0.91	47	D	0.79
	WB	signal	27	C	0.95	47	D	1.03
	NB	signal	38	D	0.27	72	E	1.14
	SB	signal	40	D	0.75	66	E	0.96
	overall	signal	34	C	0.96	54	D	1.04

As indicated, the study area intersections will provide acceptable overall operations (LOS D or better) with average delays given the future background traffic volumes. All approaches and individual movements operate with LOS E or better (as indicated in the detailed worksheets provided in Appendix E). The exception is the intersection of Bryne Drive with Mapleview Drive, as discussed below.

As previously noted, the northbound approach at the intersection of Bryne Drive with Mapleview Drive is operating at capacity under existing conditions. Optimization of the signal timing



addresses the capacity concerns in the short term; however, the approach begins to operate above capacity again during the PM peak hour under the 2038 horizon. The conditions deteriorate by 2043 with the westbound and northbound approaches and the overall intersection operating above capacity. Despite the capacity, the approaches and overall intersection still provide acceptable conditions in level of service (LOS E or better). It is further noted that the northbound and southbound left turn movements experience a LOS F during the PM peak hour in 2043. This is simply due to the volume of traffic on Mapleview Drive. Recognizing that the intersection is relatively built out, no improvements are recommended to address the operations. The conditions are typical of intersection operations in built up urban areas and commercial corridors.



4 Proposed Development

This chapter will provide additional details with respect to the proposed development, including its location, the projected site generated traffic volumes and the assignment of such to the adjacent road network.

4.1 LOCATION

As illustrated in Figure 1, the proposed development is to be located on the south side of Harvie Road, east of Thrushwood Drive and west of Highway 400 within the City of Barrie.

4.2 LAND-USE & PHASING

The proposed development will consist of both residential and employment parcels, with the residential component located on the west side of Bryne Drive and the employment lands located on the east side of Bryne Drive. The following development details have been employed:

- 66 semi-detached units;
- 148 street townhouses;
- 34 back-to-back townhouses;
- 539 mid-rise residential units; and
- 47,514 m² (508,000 ft²) employment gross floor area (GFA).

A draft plan is provided in Figure 14. As noted, only the low-rise units (i.e. semi-detached and townhouse units) are identified on the draft plan. The mid-rise unit counts and employment GFA estimates were provided by the developer and reflect typical development assumptions. It is recognized that these estimates may change through development of the final site plan, but they are nonetheless considered reflective of the development intent for the subject lands and appropriate for the purposes of this study.

Full build-out of the development has been assumed by 2033. While a phasing plan has not yet been established, it is expected that the site will be developed in phases. As such, an interim horizon of 2028 has been considered to assess the traffic impacts associated with partial development of the site. Based on discussions with the developer, the phasing plan identified in Table 9 has been assumed.



Table 9: Phasing Plan

LAND USE	% COMPLETION	
	2028	2033
semi-detached units	100%	100%
townhouse units (street & back-to-back)	25%	100%
mid-rise residential units	25%	100%
employment lands	50%	100%

4.3 SITE ACCESS & ON-SITE CIRCULATION

As previously noted, the development will be bisected by the Bryne Drive extension, with the residential development located to the west of Bryne Drive and the employment lands located on the east side of Bryne Drive. Cranberry Lane, an east-west local road located to the west of the site, will be extended to the east through the residential portion of the site (identified as Street A on the draft plan) and will create a new intersection with Bryne Drive. Cranberry Lane will therefore provide access to the proposed residential units. As per the draft plan, a new local street network (Streets C, D, E, F and G) will be constructed to further serve the residential development. Connection to the existing residential development to the west will be provided via two road connections (Street A and Street B) to Thrushwood Drive.

To the east of Bryne Drive, and opposite the Street A connection, a new cul-de-sac (Street H) will be constructed to provide access to the employment lands. As indicated on the draft plan, employment Block 67 is separated from the other employment blocks located to the north; as such, Block 67 will be provided access via the future Bryne Court to the south. The extension of Bryne Drive includes realignment from its existing location, which will sever the existing Bryne Drive cul-de-sac to create Bryne Court.

While not identified on the draft plan, it is understood that additional access from Bryne Drive to the mid-rise residential blocks and employment lands south of the Cranberry Lane extension may be sought as development of the site plan progresses. Given the arterial status of the future Bryne Drive extension, it is acknowledged that access to the road will be controlled; however, the opportunity for secondary access via a right-in/right-out access configuration or similar movement restricted access may be appropriate.



The proposed internal road network will be designed to the appropriate City standards and thus will accommodate the necessary design vehicles (i.e. fire truck, waste collection vehicle, snow plow, etc.) and anticipated traffic volumes.

4.4 SITE TRAFFIC

4.4.1 Trip Generation

The number of vehicle trips to be generated by the proposed development for the weekday AM and PM peak hours has been determined based on type of use, development size, and trip generation rates as per the *ITE Trip Generation Manual, 10th Edition*. Based on the proposed development, trip rates for the following ITE land use categories have been employed:

- *single family detached* (ITE code 210);
- *multifamily housing - low-rise* (ITE code 220);
- *multifamily housing - mid-rise* (ITE code 221); and
- *office park* (ITE code 750).

The associated trip rates and resulting trip estimates are provided in Table 10 and Table 11 respectively. The *single family detached* rates have been applied to the semi-detached units, the *multifamily housing - low-rise* rates applied to the townhouse units and the *multifamily housing - mid-rise* rates applied to the mid-rise units.

As indicated, upon full build-out the development is expected to generate 1,058 new trips during the AM peak hour and 948 new trips during the PM peak hour.

Table 10: Trip Generation Rates

LAND USE	VARIABLE	WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
		In	Out	Total	In	Out	Total
single family detached (ITE 210)	units	0.19	0.56	0.74	0.62	0.37	0.99
multifamily low-rise (ITE 220)	units	0.11	0.35	0.46	0.35	0.21	0.56
multifamily mid-rise (ITE 221)	units	0.09	0.27	0.36	0.27	0.17	0.44
office park (ITE 750)	1,000 ft ² GFA	1.28	0.16	1.44	0.07	1.00	1.07



Table 11: Trip Estimates

LAND USE	UNITS/ SIZE	WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
		In	Out	Total	In	Out	Total
semi-detached units	66 units	12	37	49	41	24	65
townhouse units	182 units	19	64	83	64	38	102
mid-rise units	539 units	50	144	194	145	92	237
employment lands	508,000 ft ²	651	81	732	38	506	544
Total		732	326	1058	288	660	948

4.4.2 Trip Distribution & Assignment

The distribution of site generated trips has been based on trip distribution data provided in the 2016 *Transportation Tomorrow Survey*. The TTS is a comprehensive travel survey conducted in the Greater Golden Horseshoe Area once every five years. As per the *TTS 2016 Data Guide*, the development site resides in Traffic Boundary Zone 8524. As such, the trip data was filtered to show all trips to/from the respective traffic zone. The following distribution was established:

- to/from locations within Barrie - 74%;
- to/from the north of Barrie - 4%;
- to/from the south of Barrie - 19%;
- to/from the east of Barrie - 2%; and
- to/from the west of Barrie - 1%.

As indicated, 74% of the trips remain wholly within Barrie whereas only 26% originate from, or are destined to, areas outside of the City. The trips that remain within Barrie were distributed based on additional TTS trip data for the traffic zone within which the development is located. The resulting trip distribution is provided below. Separate trip distribution was identified for the residential and employment uses recognizing that existing and future (i.e. Hewitt and Salem Secondary Plan areas) residential development to the east and south of the site will influence the distribution of employment trips.



Residential Distribution

- to/from the north - 45%;
- to/from the south - 40%;
- to/from the east - 10%; and
- to/from the west - 5%.

Employment Distribution

- to/from the north - 40%;
- to/from the south - 35%;
- to/from the east - 20%; and
- to/from the west - 5%.

The assignment of the trips generated by the development to the area road network and site access points has been based on the trip distribution noted above with consideration given to the expected travel routes.

The assignment of the residential and employment trips to the road network for the 2028 interim horizon are provided in Figure 15 and Figure 16, with the total trips for 2028 illustrated in Figure 17. Similarly, the assignment of trips for the 2033 horizon are illustrated in Figure 18, Figure 19 and Figure 20.



5 Future Total Conditions

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

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

5.1 TRAFFIC VOLUMES

To assess the impacts of the increased traffic volumes resulting from the proposed development, the site generated traffic was combined with the 2028, 2033, 2038 and 2043 background traffic volumes. A portion of the traffic generated by the existing residential development to the west of the site will redistribute given the extension of Cranberry Lane through to Bryne Drive. To account for this, it has been assumed that 20% of the existing traffic volumes turning to/from the north and south along on Veterans Drive from Brookwood Drive will divert to Cranberry Lane to access Bryne Drive. The resulting redistribution of traffic is illustrated in Figure 21.

The total traffic volumes are illustrated Figure 22 through Figure 25.

5.2 TRAFFIC OPERATIONS

The operations of the key intersections were again investigated considering the total traffic volumes for each horizon year. In addition to this, the operations at the new intersections (i.e. Cranberry Lane with Bryne Drive and Bryne Drive with Bryne Court) have also been reviewed. The intersection of Cranberry Lane with Bryne Drive has been initially assessed as operating under stop control on the minor approaches. The need for and timing of traffic signals will be dictated by the resulting traffic operations under future horizons. The intersection of Street B with Thrushwood Drive, along with the intersections internal to the site have not been considered in the assessment recognizing that they will be low volume intersections that will operate without issue or concern (as is typical with most local road intersections within a subdivision). The results of the operational review are provided in Table 12 through Table 16 (detailed worksheets are provided Appendix F).



Table 12: Intersection Operations – 2028 Total Conditions

INTERSECTION, APPROACH & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			Delay	LOS	V/C	Delay	LOS	V/C
Bryne Drive & Essa Road	EB	signal	33	C	0.60	46	D	0.72
	WB	signal	42	D	0.39	41	D	0.70
	NB	signal	27	C	0.62	31	C	0.64
	SB	signal	29	C	0.78	30	C	0.75
	overall	signal	31	C	0.60	34	C	0.68
Harvie Road & Veterans Drive	EB	signal	23	C	0.36	27	C	0.48
	WB	signal	19	B	0.37	27	C	0.68
	NB	signal	31	C	0.40	32	C	0.70
	SB	signal	31	C	0.78	41	D	0.88
	overall	signal	26	C	0.59	32	C	0.76
Harvie Road & Thrushwood Drive	NB	stop	17	C	0.24	17	C	0.23
	SB	stop	14	B	0.17	19	C	0.21
Bryne Drive & Harvie Road	EB	signal	19	B	0.37	24	C	0.49
	WB	signal	15	B	0.53	19	B	0.46
	NB	signal	38	D	0.39	26	C	0.65
	SB	signal	31	C	0.54	39	D	0.73
	overall	signal	23	C	0.58	29	C	0.55
Harvie Road & Fairview Road	EB	signal	8	A	0.36	11	B	0.43
	WB	signal	13	B	0.35	19	C	0.56
	SB	signal	33	C	0.71	36	D	0.79
	overall	signal	14	B	0.48	19	B	0.62



INTERSECTION, APPROACH & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			Delay	LOS	V/C	Delay	LOS	V/C
Cranberry Lane & Thrushwood Drive	EB	stop	9	A	0.02	9	A	0.02
	WB	stop	9	A	0.04	9	A	0.06
Bryne Drive & Cranberry Lane	EB	stop	17	C	0.25	16	C	0.17
	WB	stop	13	B	0.07	23	C	0.52
Veterans Drive & Brookwood Drive	EB	signal	25	C	0.20	26	C	0.15
	WB	signal	31	C	0.51	34	C	0.54
	NB	signal	9	A	0.28	16	B	0.76
	SB	signal	15	B	0.53	19	B	0.66
	overall	signal	16	B	0.50	19	B	0.73
Bryne Drive & Bryne Court	WB	stop	12	B	0.01	12	B	0.07
Bryne Drive & Caplan Avenue	EB	signal	36	D	0.83	23	C	0.54
	WB	signal	25	C	0.55	30	C	0.75
	NB	signal	14	B	0.25	19	B	0.46
	SB	signal	18	B	0.33	24	C	0.60
	overall	signal	23	C	0.49	24	C	0.62
Bryne Drive & Mapleview Drive	EB	signal	25	C	0.62	46	D	0.84
	WB	signal	26	C	0.96	39	D	0.91
	NB	signal	38	D	0.21	48	D	0.98
	SB	signal	43	D	0.80	44	D	0.87
	overall	signal	29	C	0.97	43	D	0.94



Table 13: Intersection Operations – 2033 Total Conditions

INTERSECTION, APPROACH & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			Delay	LOS	V/C	Delay	LOS	V/C
Bryne Drive & Essa Road	EB	signal	37	D	0.69	46	D	0.74
	WB	signal	44	D	0.43	45	D	0.79
	NB	signal	31	C	0.59	36	D	0.63
	SB	signal	30	C	0.73	33	C	0.78
	overall	signal	34	C	0.67	38	D	0.75
Harvie Road & Veterans Drive	EB	signal	24	C	0.42	29	C	0.52
	WB	signal	19	B	0.43	29	C	0.73
	NB	signal	31	C	0.42	39	D	0.77
	SB	signal	38	D	0.91	43	D	0.92
	overall	signal	29	C	0.70	36	D	0.84
Harvie Road & Thrushwood Drive	NB	stop	19	C	0.30	20	C	0.27
	SB	stop	14	B	0.18	20	C	0.23
Bryne Drive & Harvie Road	EB	signal	21	C	0.45	29	C	0.62
	WB	signal	22	C	0.86	24	C	0.66
	NB	signal	38	D	0.48	28	C	0.63
	SB	signal	33	C	0.61	40	D	0.77
	overall	signal	27	C	0.83	32	C	0.71
Harvie Road & Fairview Road	EB	signal	8	A	0.43	14	B	0.72
	WB	signal	16	B	0.45	24	C	0.70
	SB	signal	33	C	0.74	36	D	0.81
	overall	signal	16	B	0.54	23	C	0.77



INTERSECTION, APPROACH & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			Delay	LOS	V/C	Delay	LOS	V/C
Cranberry Lane & Thrushwood Drive	EB	stop	9	A	0.02	9	A	0.02
	WB	stop	9	A	0.09	9	A	0.10
Bryne Drive & Cranberry Lane	EB	stop	154	F	1.14	47	E	0.65
	WB	stop	29	D	0.32	236	F	1.41
Veterans Drive & Brookwood Drive	EB	signal	24	C	0.22	25	C	0.16
	WB	signal	31	C	0.56	36	D	0.60
	NB	signal	12	B	0.34	22	C	0.90
	SB	signal	18	B	0.61	22	C	0.73
	overall	signal	18	B	0.57	23	C	0.85
Bryne Drive & Bryne Court	WB	stop	12	B	0.02	13	B	0.15
Bryne Drive & Caplan Avenue	EB	signal	33	C	0.82	26	C	0.60
	WB	signal	26	C	0.58	34	C	0.82
	NB	signal	18	B	0.41	22	C	0.60
	SB	signal	21	C	0.44	31	C	0.81
	overall	signal	24	C	0.58	29	C	0.76
Bryne Drive & Mapleview Drive	EB	signal	44	D	0.89	69	E	0.99
	WB	signal	24	C	0.86	51	E	0.97
	NB	signal	42	D	0.26	54	E	1.08
	SB	signal	45	D	0.87	58	E	0.99
	overall	signal	34	C	0.92	57	E	1.02



Table 14: Intersection Operations – Bryne Drive & Cranberry Lane (signalized)

INTERSECTION, APPROACH & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			Delay	LOS	V/C	Delay	LOS	V/C
Bryne Drive & Cranberry Lane	EB	signal	23	C	0.47	27	C	0.39
	WB	signal	25	C	0.21	28	C	0.72
	NB	signal	15	B	0.37	15	B	0.51
	SB	signal	9	A	0.64	9	A	0.43
	overall	signal	13	B	0.71	16	B	0.66

Table 15: Intersection Operations – 2038 Total Conditions

INTERSECTION, APPROACH & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			Delay	LOS	V/C	Delay	LOS	V/C
Bryne Drive & Essa Road	EB	signal	34	C	0.68	47	D	0.75
	WB	signal	43	D	0.46	50	D	0.87
	NB	signal	33	C	0.66	37	D	0.66
	SB	signal	31	C	0.73	38	D	0.86
	overall	signal	34	C	0.71	41	D	0.84
Harvie Road & Veterans Drive	EB	signal	27	C	0.49	32	C	0.58
	WB	signal	22	C	0.54	33	C	0.78
	NB	signal	36	D	0.54	48	D	0.83
	SB	signal	31	C	0.85	47	D	0.94
	overall	signal	29	C	0.74	40	D	0.88
Harvie Road & Thrushwood Drive	NB	stop	21	C	0.33	22	C	0.30
	SB	stop	16	C	0.19	22	C	0.25



INTERSECTION, APPROACH & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			Delay	LOS	V/C	Delay	LOS	V/C
Bryne Drive & Harvie Road	EB	signal	24	C	0.55	34	C	0.74
	WB	signal	28	C	0.93	29	C	0.81
	NB	signal	40	D	0.49	39	D	0.73
	SB	signal	36	D	0.69	41	D	0.79
	overall	signal	30	C	0.91	34	C	0.81
Harvie Road & Fairview Road	EB	signal	9	A	0.50	19	B	0.85
	WB	signal	17	B	0.53	30	C	0.83
	SB	signal	34	C	0.76	37	D	0.83
	overall	signal	17	B	0.61	28	C	0.87
Cranberry Lane & Thrushwood Drive	EB	stop	9	A	0.02	9	A	0.02
	WB	stop	9	A	0.09	9	A	0.10
Bryne Drive & Cranberry Lane	EB	signal	23	C	0.47	27	C	0.39
	WB	signal	25	C	0.21	28	C	0.72
	NB	signal	15	B	0.39	15	B	0.56
	SB	signal	9	A	0.66	9	A	0.47
	overall	signal	13	B	0.73	16	B	0.69
Veterans Drive & Brookwood Drive	EB	signal	24	C	0.22	27	C	0.17
	WB	signal	31	C	0.56	37	D	0.60
	NB	signal	12	B	0.38	22	C	0.86
	SB	signal	19	B	0.64	27	C	0.80
	overall	signal	18	B	0.59	25	C	0.82



INTERSECTION, APPROACH & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			Delay	LOS	V/C	Delay	LOS	V/C
Bryne Drive & Bryne Court	WB	stop	12	B	0.02	14	B	0.16
Bryne Drive & Caplan Avenue	EB	signal	37	D	0.87	28	C	0.70
	WB	signal	26	C	0.60	38	D	0.86
	NB	signal	19	B	0.44	24	C	0.67
	SB	signal	22	C	0.49	36	D	0.88
	overall	signal	26	C	0.62	32	C	0.83
Bryne Drive & Mapleview Drive	EB	signal	50	D	0.96	48	D	0.79
	WB	signal	31	C	0.95	62	E	1.18
	NB	signal	41	D	0.28	81	F	1.24
	SB	signal	40	D	0.82	122	F	1.25
	overall	signal	40	D	0.97	71	E	1.25

Table 16: Intersection Operations – 2043 Total Conditions

INTERSECTION, APPROACH & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			Delay	LOS	V/C	Delay	LOS	V/C
Bryne Drive & Essa Road	EB	signal	41	D	0.76	44	D	0.76
	WB	signal	47	D	0.64	44	D	0.93
	NB	signal	33	C	0.66	43	D	0.81
	SB	signal	31	C	0.76	37	D	0.80
	overall	signal	36	D	0.74	41	D	0.91
	EB	signal	29	C	0.55	38	D	0.68



INTERSECTION, APPROACH & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			Delay	LOS	V/C	Delay	LOS	V/C
Harvie Road & Veterans Drive	WB	signal	23	C	0.63	42	D	0.91
	NB	signal	37	D	0.57	48	D	0.83
	SB	signal	34	C	0.92	50	D	0.98
	overall	signal	31	C	0.82	45	D	0.96
Harvie Road & Thrushwood Drive	NB	stop	24	C	0.36	23	C	0.31
	SB	stop	17	C	0.20	23	C	0.26
Bryne Drive & Harvie Road	EB	signal	29	C	0.68	43	D	0.89
	WB	signal	29	C	0.93	32	C	0.84
	NB	signal	39	D	0.43	44	D	0.84
	SB	signal	51	D	0.93	47	D	0.85
	overall	signal	34	C	0.99	41	D	0.87
Harvie Road & Fairview Road	EB	signal	12	B	0.59	25	C	0.89
	WB	signal	19	B	0.61	40	D	0.93
	SB	signal	34	C	0.78	47	D	0.89
	overall	signal	19	B	0.68	36	D	0.91
Cranberry Lane & Thrushwood Drive	EB	stop	9	A	0.02	9	A	0.02
	WB	stop	9	A	0.09	9	A	0.10
Bryne Drive & Cranberry Lane	EB	signal	23	C	0.47	27	C	0.39
	WB	signal	25	C	0.21	28	C	0.72
	NB	signal	15	B	0.44	16	B	0.61
	SB	signal	9	A	0.69	9	A	0.50
	overall	signal	14	B	0.75	16	B	0.73



INTERSECTION, APPROACH & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			Delay	LOS	V/C	Delay	LOS	V/C
Veterans Drive & Brookwood Drive	EB	signal	24	C	0.23	27	C	0.17
	WB	signal	31	C	0.56	37	D	0.59
	NB	signal	12	B	0.42	24	C	0.91
	SB	signal	19	B	0.68	29	C	0.84
	overall	signal	19	B	0.62	27	C	0.85
Bryne Drive & Bryne Court	WB	stop	12	B	0.02	14	B	0.17
Bryne Drive & Caplan Avenue	EB	signal	44	D	0.91	40	D	0.88
	WB	signal	27	C	0.59	47	D	0.93
	NB	signal	21	C	0.46	29	C	0.81
	SB	signal	27	C	0.55	36	D	0.87
	overall	signal	29	C	0.67	37	D	0.89
Bryne Drive & Mapleview Drive	EB	signal	43	D	0.92	48	D	0.80
	WB	signal	29	C	0.94	72	E	1.28
	NB	signal	42	D	0.28	91	F	1.31
	SB	signal	47	D	0.90	139	F	1.33
	overall	signal	37	D	0.99	79	E	1.35

As indicated, the new intersection of Bryne Drive with Cranberry Lane will provide acceptable operations with stop control on the minor approaches under the 2028 interim conditions; however, upon full build-out in 2033, the intersection will experience poor operating conditions (LOS F) with long delays. In consideration of the poor operating conditions, traffic signals are recommended by 2033. The 2033 volumes at the noted intersection satisfy the MTO warrant criteria for traffic signal justification (completed warrants are provided in Appendix G). The intersection operations were reviewed again under 2033 total conditions to consider the



recommended traffic signals. The results of the assessment are summarized in Table 14. As noted, the intersection will provide excellent overall operations (LOS B) with signalization.

The intersection of Cranberry Lane with Thrushwood Drive (which will become a 4-leg intersection with development of the site), will provide excellent operations under two-way stop control (i.e. stop control on Cranberry Lane).

The remaining study area intersections will provide acceptable overall operations (LOS D or better) with average delays given the future total traffic volumes. Notwithstanding traffic signal optimization exercises, no additional improvements are required to address the future total traffic volumes. All approaches and individual movements operate with LOS E or better (as indicated in the detailed worksheets provided in Appendix F). Similar to the background conditions, the exception is the intersection of Bryne Drive with Mapleview Drive, as discussed below.

The intersection of Bryne Drive with Mapleview Drive will experience poor operations (LOS F) on the north and south approaches during the PM peak hour in 2038. This is not unexpected given the capacity concerns experienced under background conditions in 2038 and 2043. The overall operation of the intersection will remain acceptable (LOS E); however, long delays will be experienced on the north and south approaches, with the intersection as a whole operating above capacity. While the operations are poor, the conditions are not unexpected given the high volumes on Mapleview Drive and the close proximity of adjacent signalized intersections along the Mapleview Drive corridor. Additional through and/or turn lanes at the intersection would not fully address the operations given the overall peak hour congestion along Mapleview Drive. Regardless, Mapleview Drive has a 7-lane profile and is considered built out in terms of lane provision (added lanes would increase pedestrian crossing phases and thus offset any improvements gained by the additional capacity).

5.3 TURN LANE REQUIREMENTS

Despite the otherwise acceptable operations provided at the site access, the need for exclusive right turn lanes on Bryne Drive at Cranberry Lane to serve site traffic has been reviewed based on MTO warrants. Given the proposed two way left turn lane along Bryne Drive, a review of left turn lane warrants is not required (in that left turn lanes will be provided).

TAC guidelines suggest that an exclusive right turn lane be considered where right turn volumes exceed 60 vehicles per hour and/or impede the operations of through traffic. The volume of right turning traffic at Cranberry Lane surpasses the 60 vehicle threshold (238 northbound vehicles during the AM peak hour and 119 southbound vehicles during the PM peak hour). While these volumes do satisfy the TAC guidelines, the proposed cross-section of Bryne Drive (5-lanes) will limit the impact of right turning vehicles on through traffic. As previously noted, Bryne Drive



will have an assumed lane capacity of 850 vehicles per hour, or 1,700 vehicles per direction. Under the 2043 total conditions, Bryne Drive will be operating at 55% of capacity or less on approach to the intersection with Cranberry Lane. As such, Bryne Drive will have sufficient through capacity so as to mitigate the impact of the right turning volumes on through traffic. In this respect, right turn lanes are not considered necessary to accommodate the site traffic.

5.4 NEIGHBOURHOOD TRAFFIC CALMING MANAGEMENT PLAN

The implementation of traffic calming measures has been considered to address/mitigate:

- the impact of new (but legitimate) site generated traffic on the existing residential streets in the area; and
- the potential for cut through/short cutting traffic on the existing and proposed residential streets.

It is acknowledged that the proposed development will generate new traffic that will utilize the existing residential road network to the west (i.e. Thrushwood Drive, Brookwood Drive, Cranberry Lane, etc.) to access the wider road network. While this new traffic will have a legitimate reason for accessing the existing road network (i.e. it is not considered cut-through traffic), it will nonetheless have an impact (albeit minor) on the existing road network. In this respect, traffic calming measures can be considered to ensure that site traffic accessing the adjacent neighborhood be directed or encouraged to utilize a specific route to mitigate the impacts to the overall neighbourhood. It should be noted that the reverse is also true for the proposed site in that traffic from the existing residential development will divert to Cranberry Lane to access Bryne Drive. The connection can be considered a benefit to both the existing residential development and the subject development in that it provides flexibility in accessing the road network. The intent of traffic calming is to ensure that the benefit is realized for legitimate road users in the area and not motorists passing through the area.

In terms of cut through traffic, the Cranberry Lane extension has the potential to introduce cut through traffic to area (i.e. traffic on Mapleton Avenue or Veterans Drive cutting through the neighbourhood via the existing residential streets to access Bryne Drive or vice versa).

In consideration of the above, the draft plan and wider residential area have been reviewed with respect to traffic calming and the potential to implement traffic calming features to mitigate the impact of site traffic and deter potential cut through traffic.

To deter short cutting traffic, the traffic calming measures should be sufficient enough to make the route undesirable to potential motorists. In this respect, physical measures, such as vertical or horizontal deflections, could be implemented. In considering deflection type traffic calming



measures already in place within the City of Barrie, speed humps are most widely used and thus recommended for the subject site.

Aside from deterring short cutting traffic, the traffic calming measures should also be implemented so as to direct legitimate site traffic to a preferred route through the adjacent residential streets. Again, this can be achieved through the use of speed humps. With respect to the local road network, site traffic would ideally use Thrushwood Drive and Brookwood Drive to access the wider road network to the west (as illustrated in Figure 26).

Traffic calming on Streets B, C, D, and E is not considered necessary. These streets are primarily short in length and do not provide an obvious or tangible advantage with respect to short cut traffic. As such, these streets will not experience traffic infiltration and operating speeds will be mitigated by the limited length of each road segment. Thus, traffic calming measures are not recommended on the noted internal local streets serving the site.

A recommended Neighbourhood Traffic Calming Management Plan is illustrated Figure 26.

5.5 CONSTRUCTION STAGING

A construction staging plan is typically prepared to illustrate the potential impacts of construction activities on the adjacent road network. Given the location and size of the subject site, it is anticipated that all construction activities, including parking area for trades people, will be accommodated wholly within the site. Construction access to the site will be provided via the proposed site access locations on Bryne Drive.

A detailed construction staging plan will be provided in advance of construction; however, minimal impacts to the adjacent road network are anticipated.



6 Summary

Proposed Development

This study has addressed the transportation impacts associated with the proposed mixed-use development to be located at 15 Harvie Road within the City of Barrie. The proposed development will consist of 66 semi-detached units, 148 street townhouses, 24 back-to-back townhouses, mid-rise buildings and employment blocks. Upon full build-out, the development is expected to generate 1,058 new trips during the AM peak hour and 948 new trips during the PM peak hour.

Traffic Operations

In addressing the study area traffic operations, the key intersections were analysed under existing (2022) and future (2028, 2033, 2038 and 2043) horizon periods. The site access points were also reviewed under the noted future horizons.

Based on the intersection operations assessment, traffic signals are recommended and warranted at the intersection of Bryne Drive with Cranberry Lane by 2033 under future total conditions to support full build-out of the site.

Notwithstanding periodic traffic signal optimization, no other road or intersection improvements are required to support the future background and future total traffic volumes.

Turn Lane Requirements

The need for exclusive right turn lanes on Bryne Drive at Cranberry Lane was reviewed in consideration of TAC guidelines. While the projected volume of right turning vehicles accessing the site satisfy the TAC volume threshold for right turn lanes, the available capacity on Bryne Drive under the ultimate 2043 horizon suggests that exclusive turn lanes are not necessary (in that there is sufficient capacity along Bryne Drive to accommodate the total traffic volumes).

Construction Staging Plan

Given the location and size of the subject site, it is anticipated that all construction activities, including parking provision for trades people, will be accommodated wholly within the site. In this regard, minimal impacts are anticipated to Bryne Drive and the adjacent local road network during the construction period.



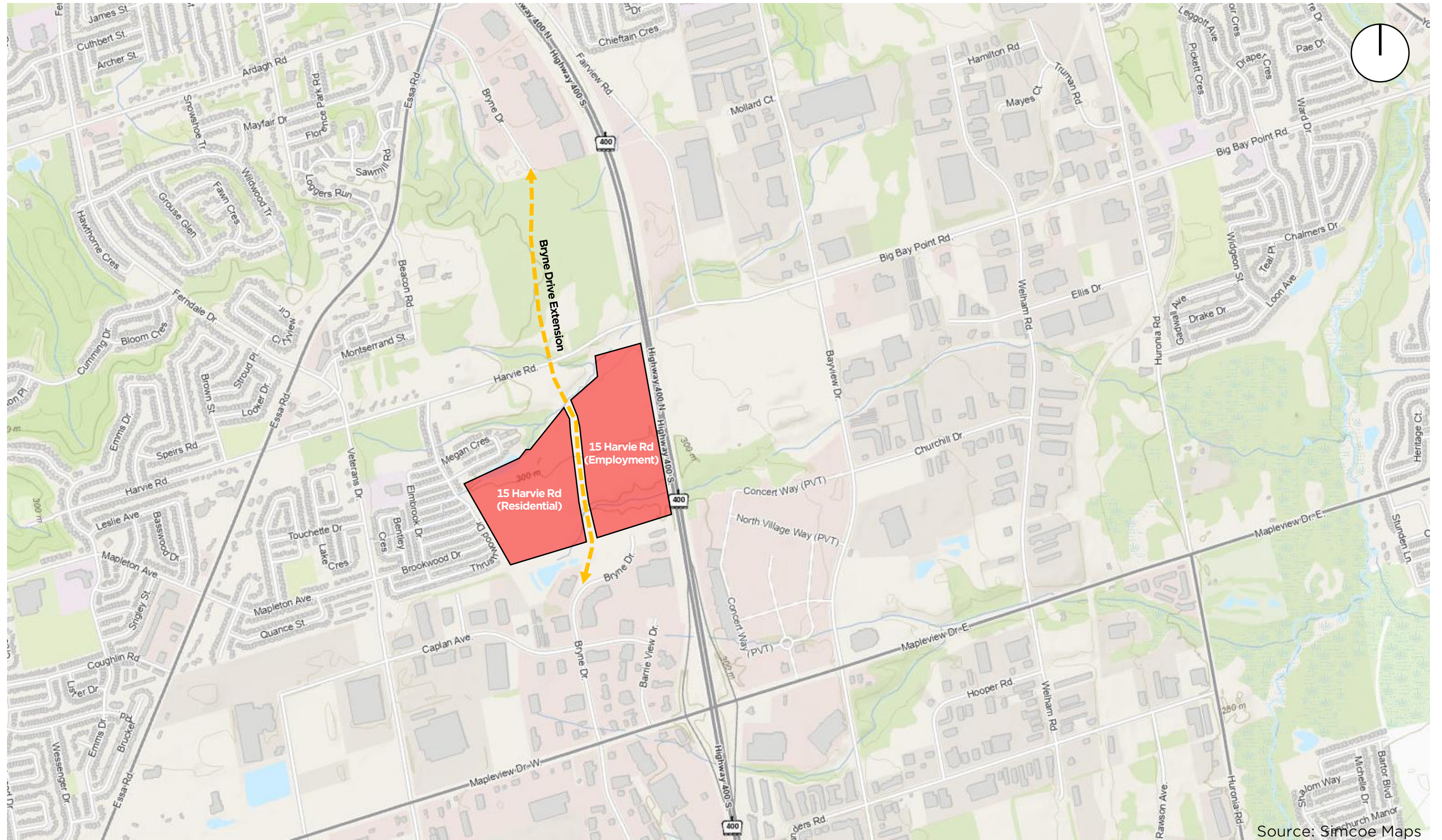
Neighbourhood Traffic Calming Management Plan

Recognizing that the site will result in additional volumes on the existing local road network, and further noting that the Cranberry Lane extension will introduce the potential for cut through traffic, a Neighbourhood Traffic Calming Management Plan has been prepared for consideration.

Summary Statement

In context of the projected background traffic volumes, and in consideration of the proposed improvements recommended herein, the study area road network will readily accommodate the additional traffic volumes generated by the development and will continue to provide acceptable operations.





Source: Simcoe Maps

15 HARVIE ROAD
Figure 1: Site Location

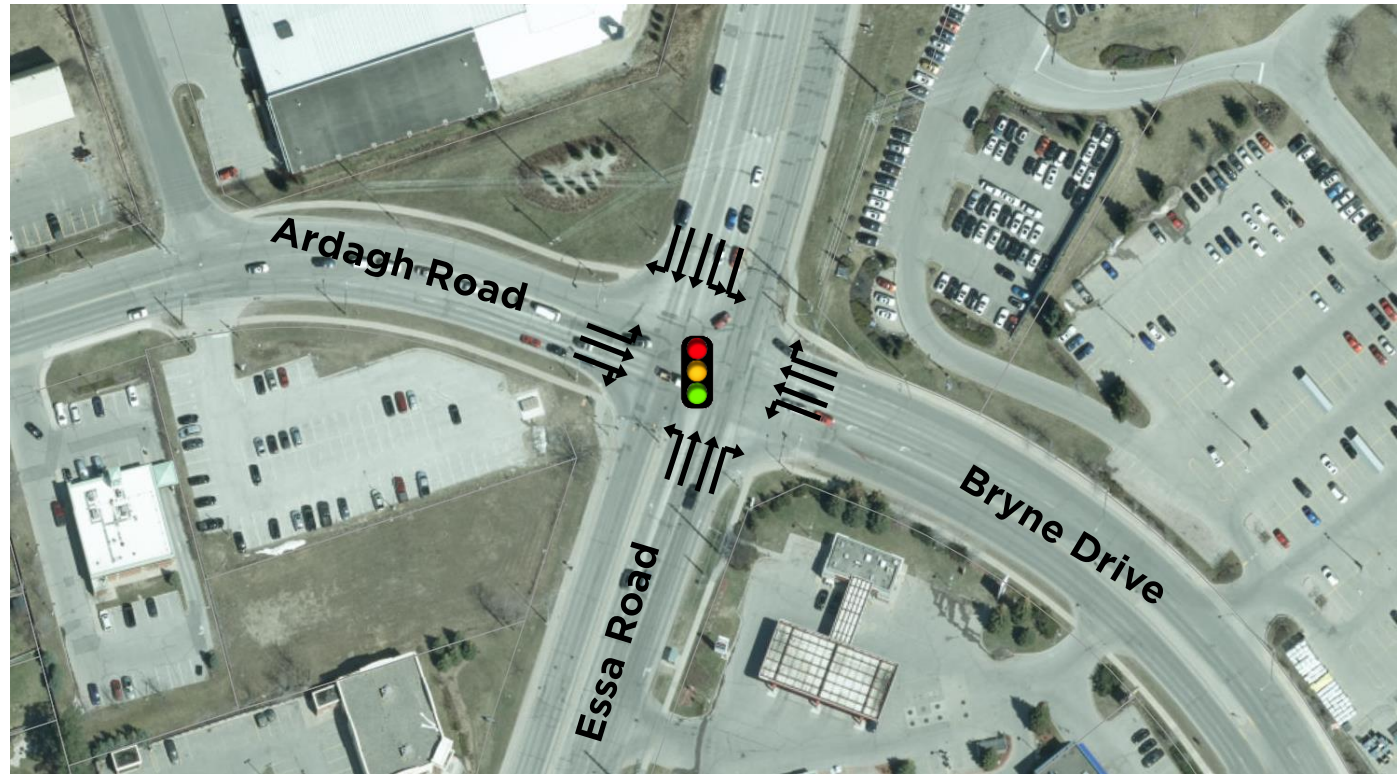




Source: Simcoe Maps

15 HARVIE ROAD
Figure 2A: Area Road Network

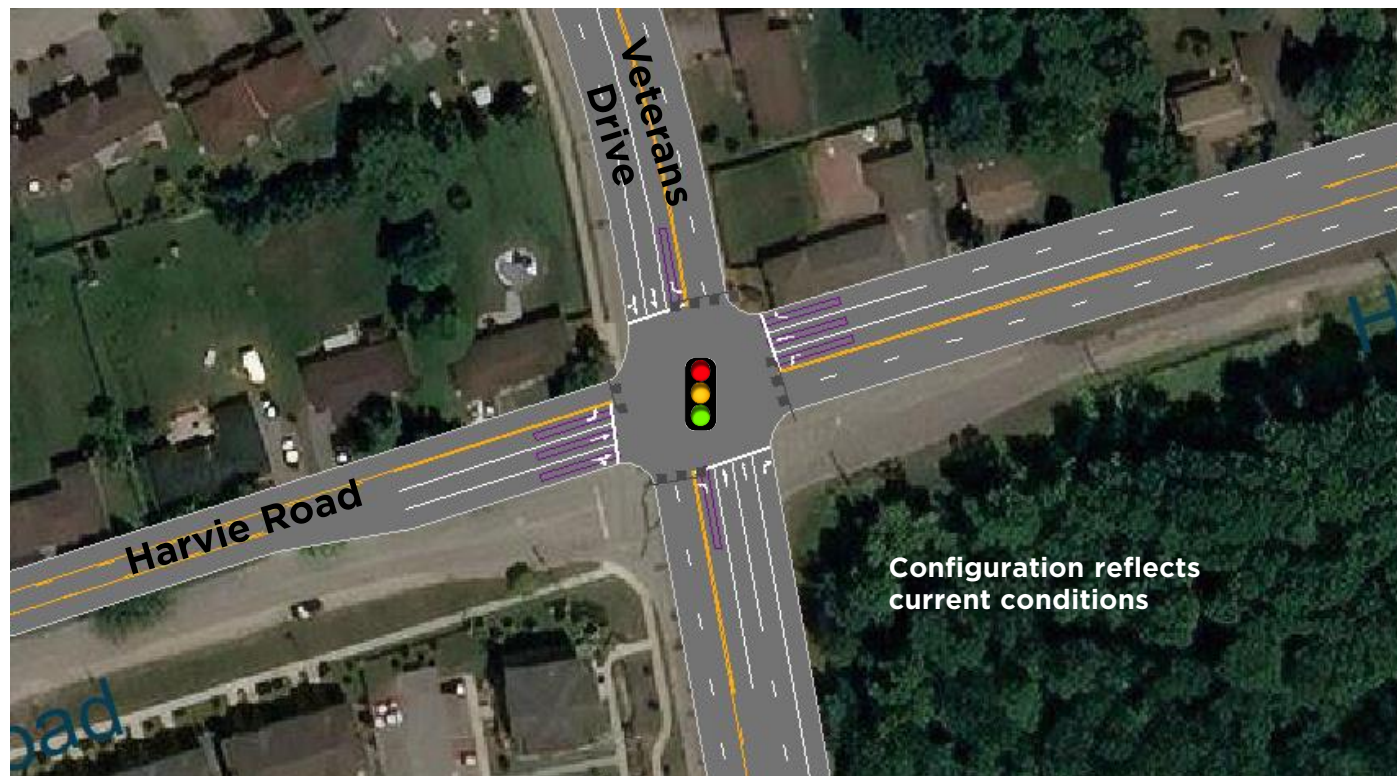




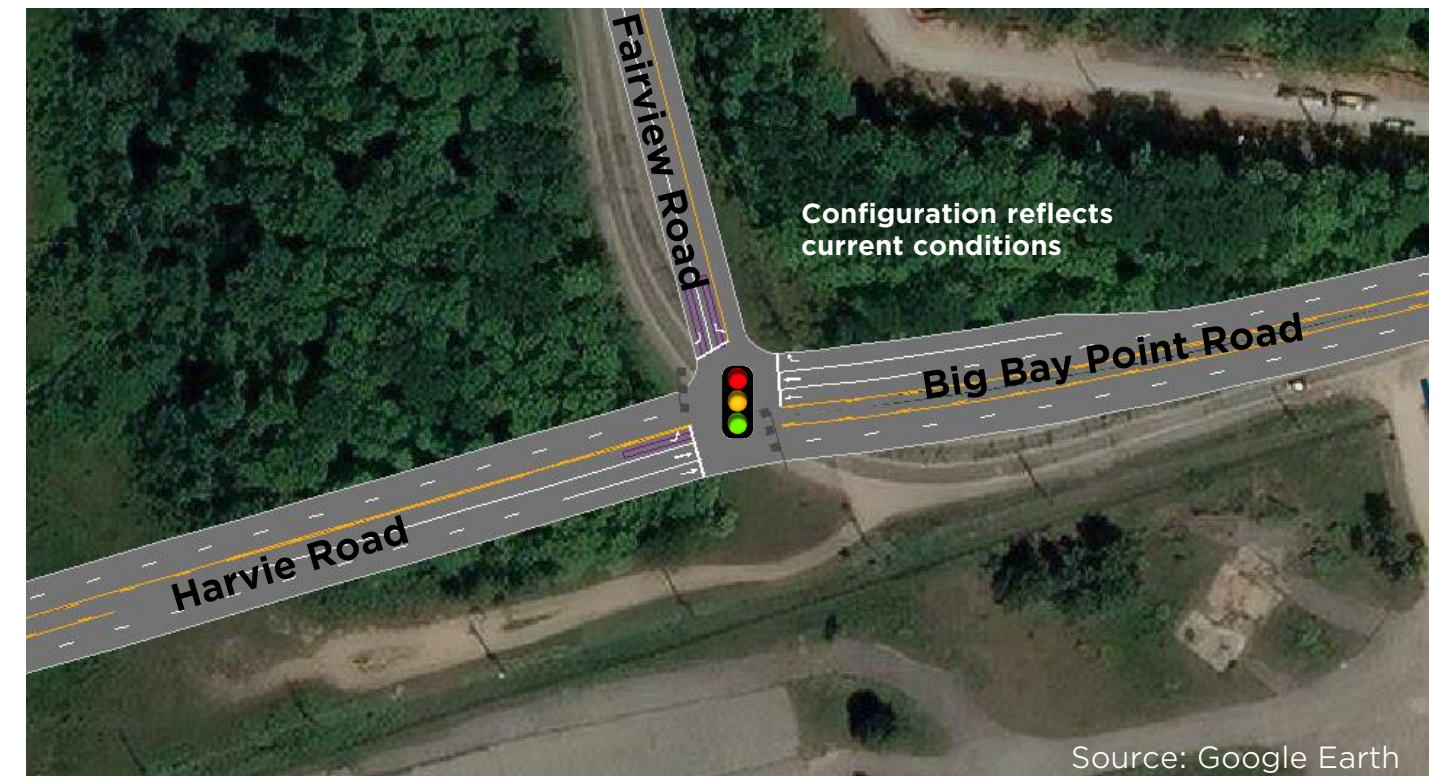
Intersection of Essa Road & Ardagh Road/Bryne Drive



Intersection of Harvie Road & Thrushwood Drive



Intersection of Harvie Road & Veterans Drive



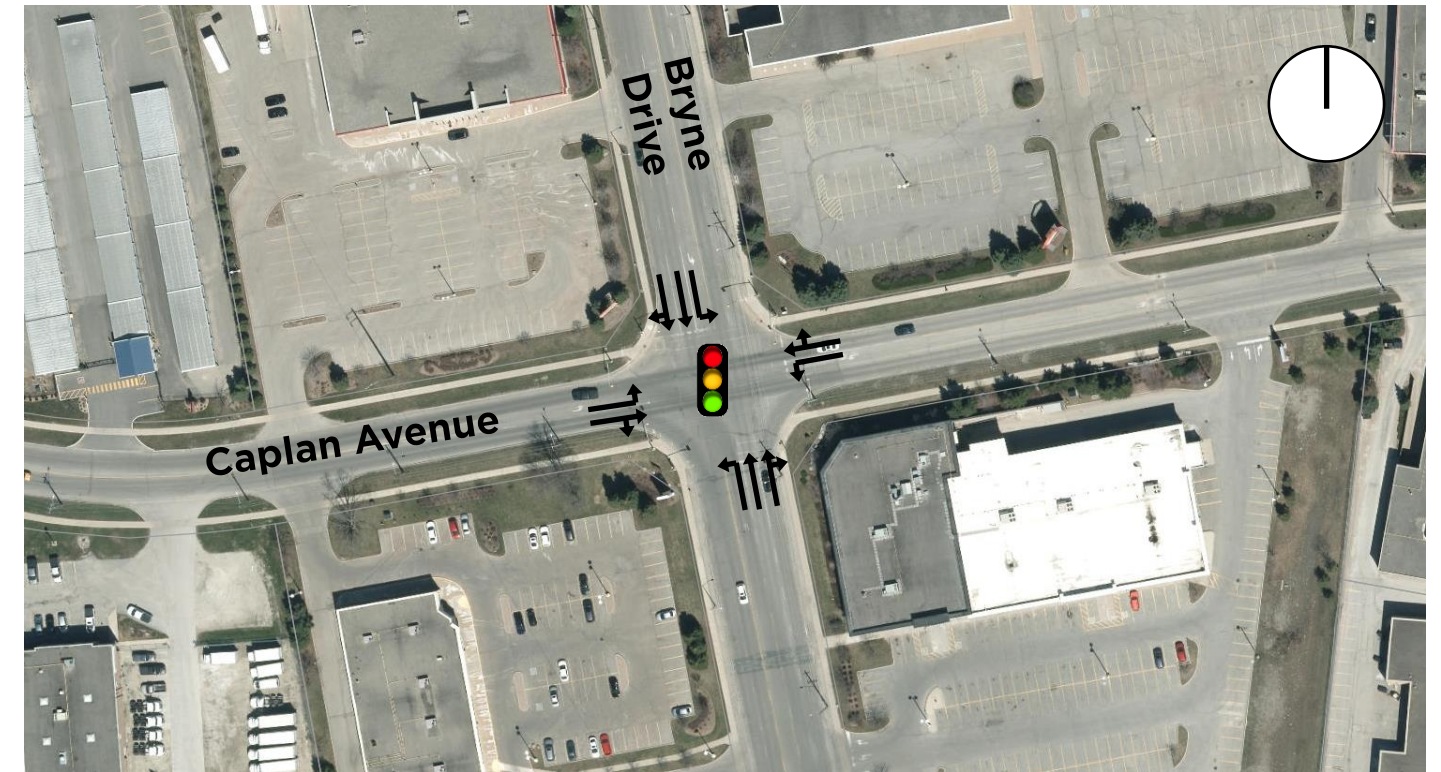
Intersection of Harvie Road/Big Bay Point Road & Fairview Road

15 HARVIE ROAD
Figure 2B: Area Road Network

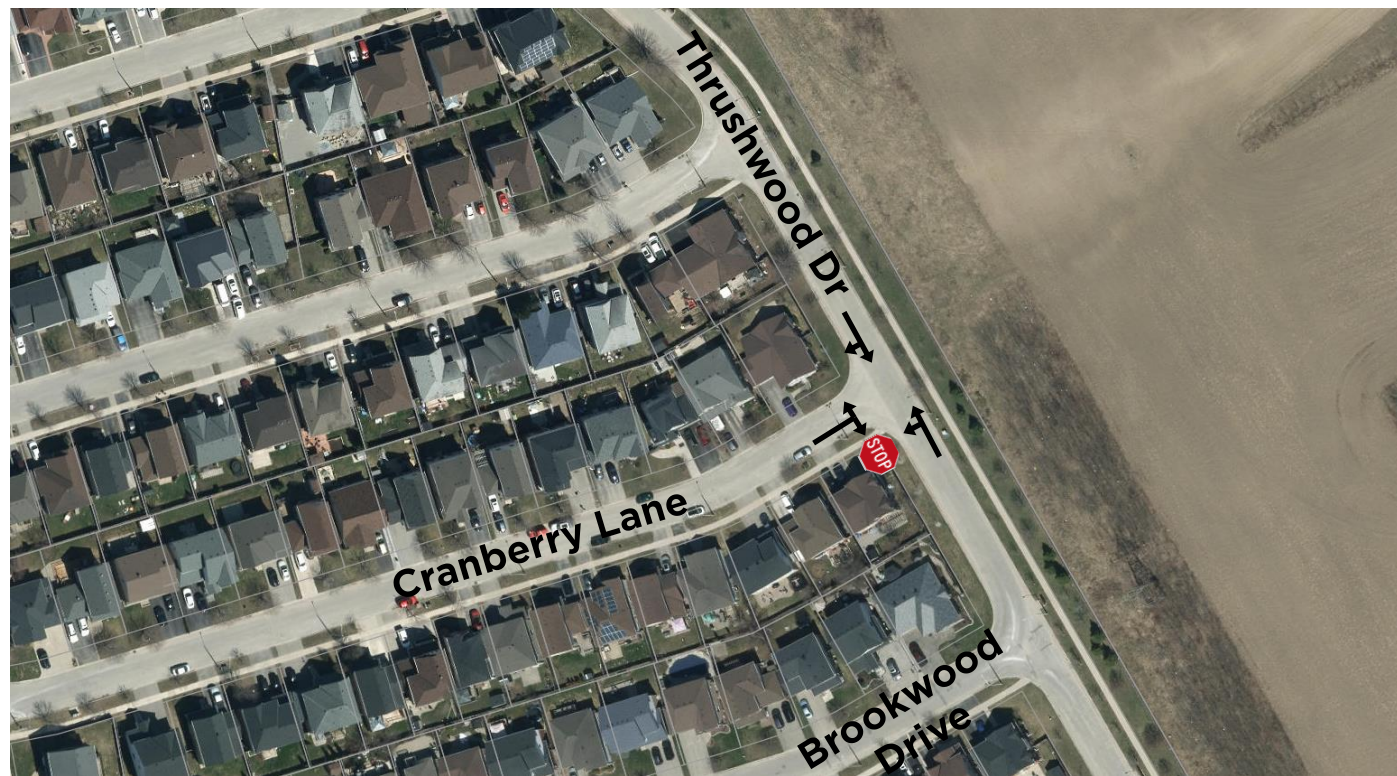




Intersection of Veterans Drive & Mapleton Avenue/Brookwood Drive



Intersection of Bryne Drive & Caplan Avenue



Intersection of Thrushwood Drive & Cranberry Lane

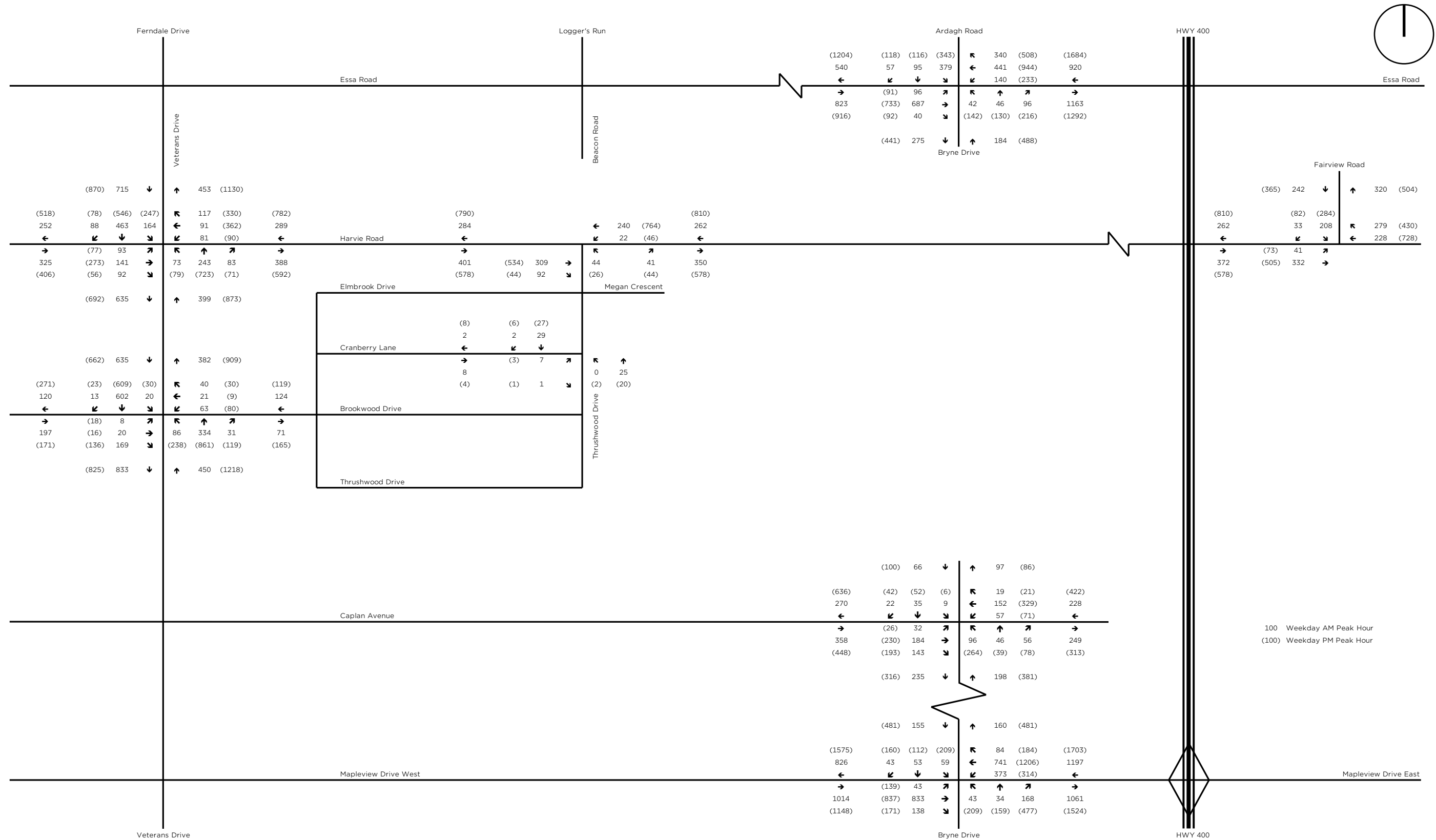


Intersection of Mapleview Drive & Bryne Drive

15 HARVIE ROAD

Figure 2C: Area Road Network

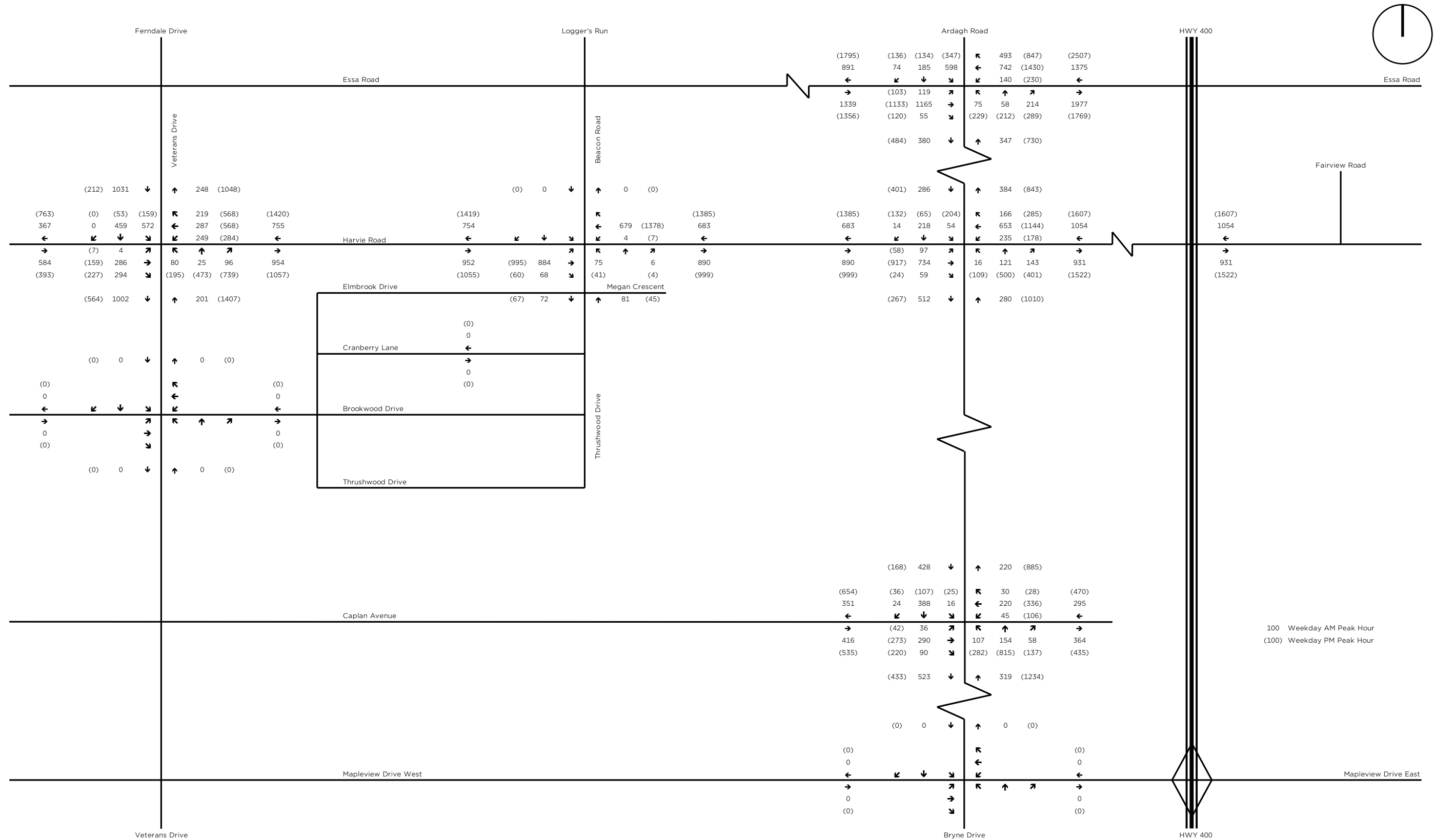




100 Weekday AM Peak Hour
 (100) Weekday PM Peak Hour

15 HARVIE ROAD
 Figure 3: 2022 Existing Traffic Volumes

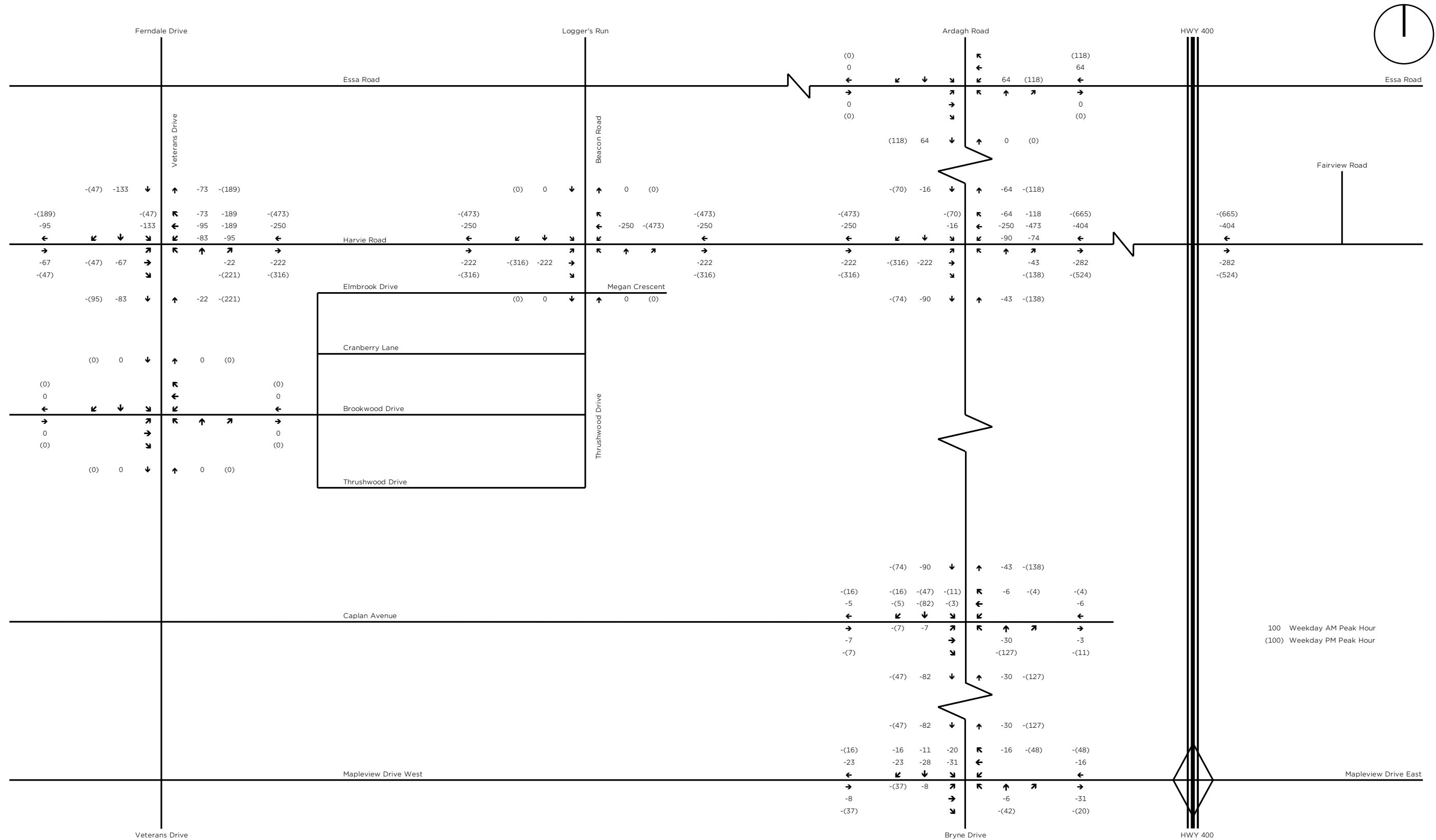




15 HARVIE ROAD

Figure 4: 2031 Base Volumes (from Harvie Road, Essa Road & Bryne Drive EA Study)

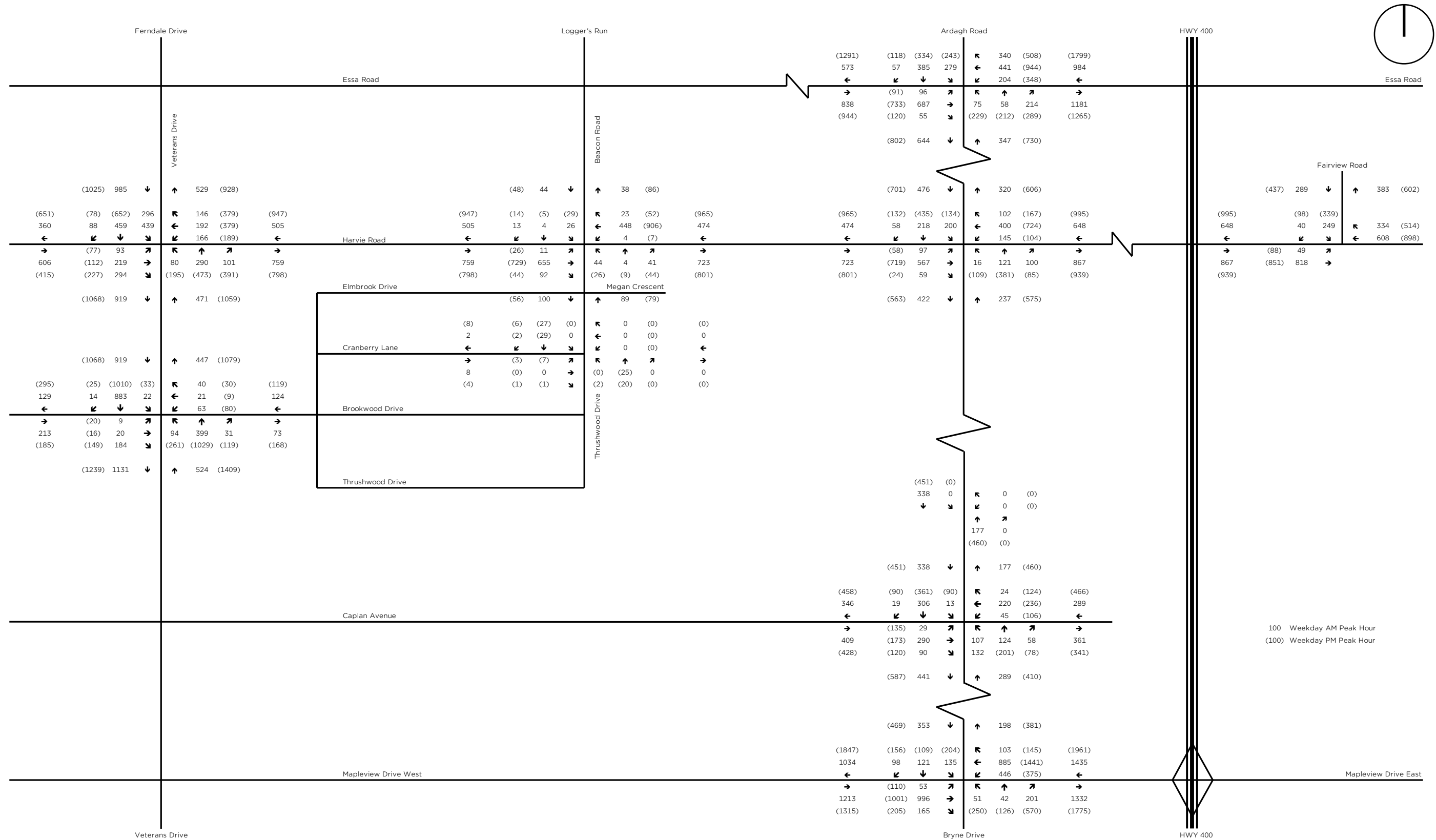




15 HARVIE ROAD

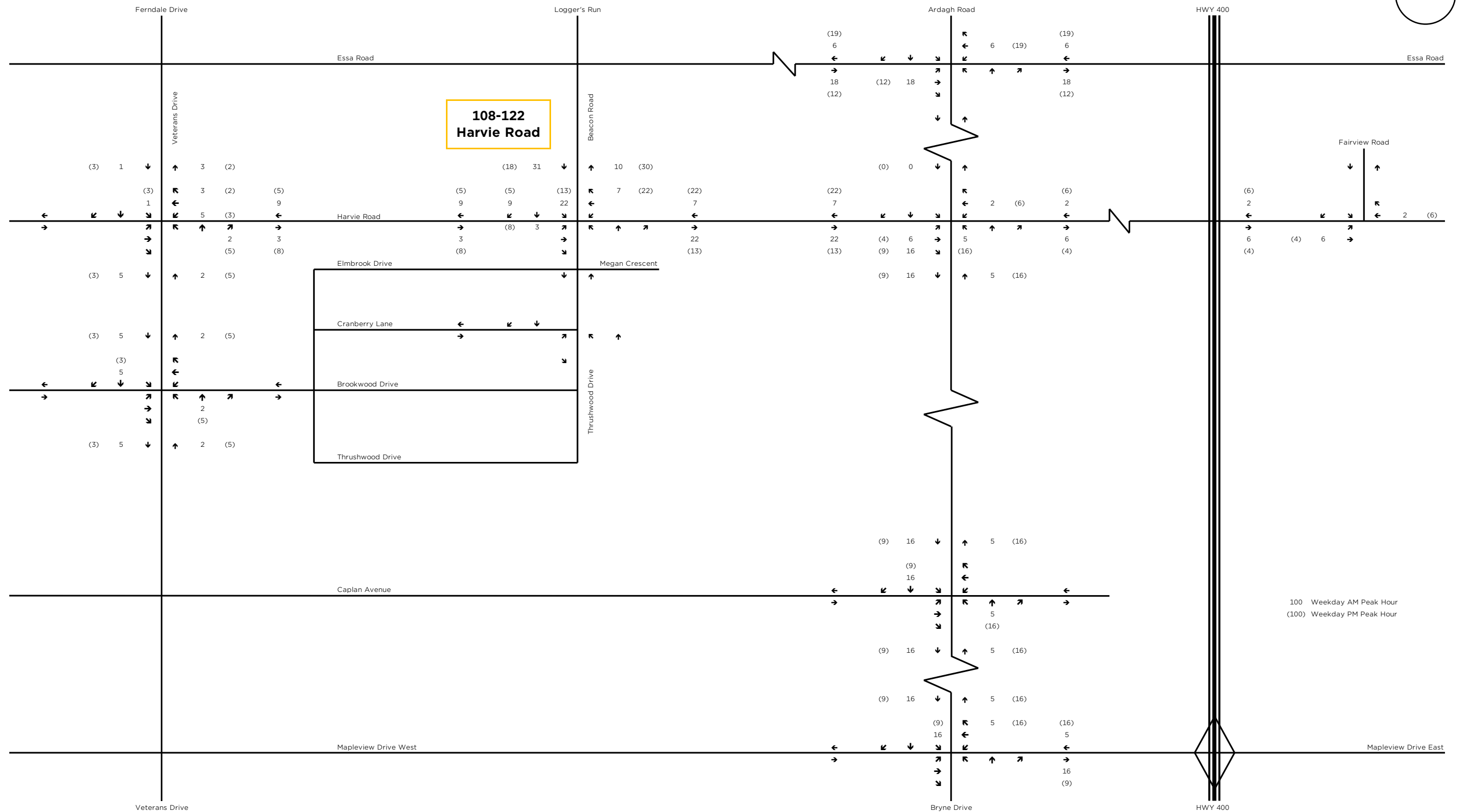
Figure 5: Highway 400/Harvie Road Interchange Volumes





15 HARVIE ROAD
Figure 6: 2031 Reference Scenario

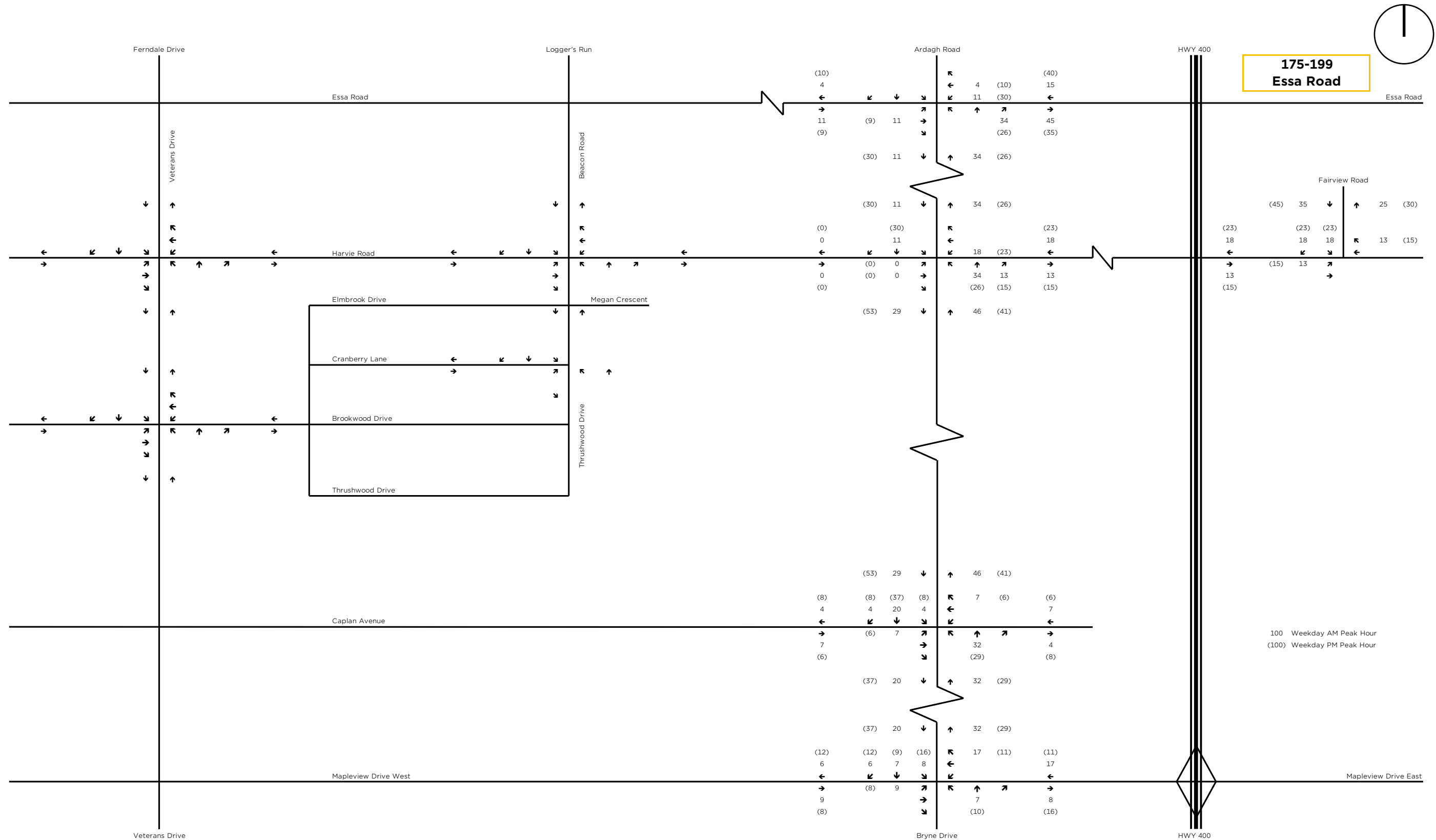




15 HARVIE ROAD

Figure 7: Background Development Volumes - 108, 116 & 122 Harvie Road

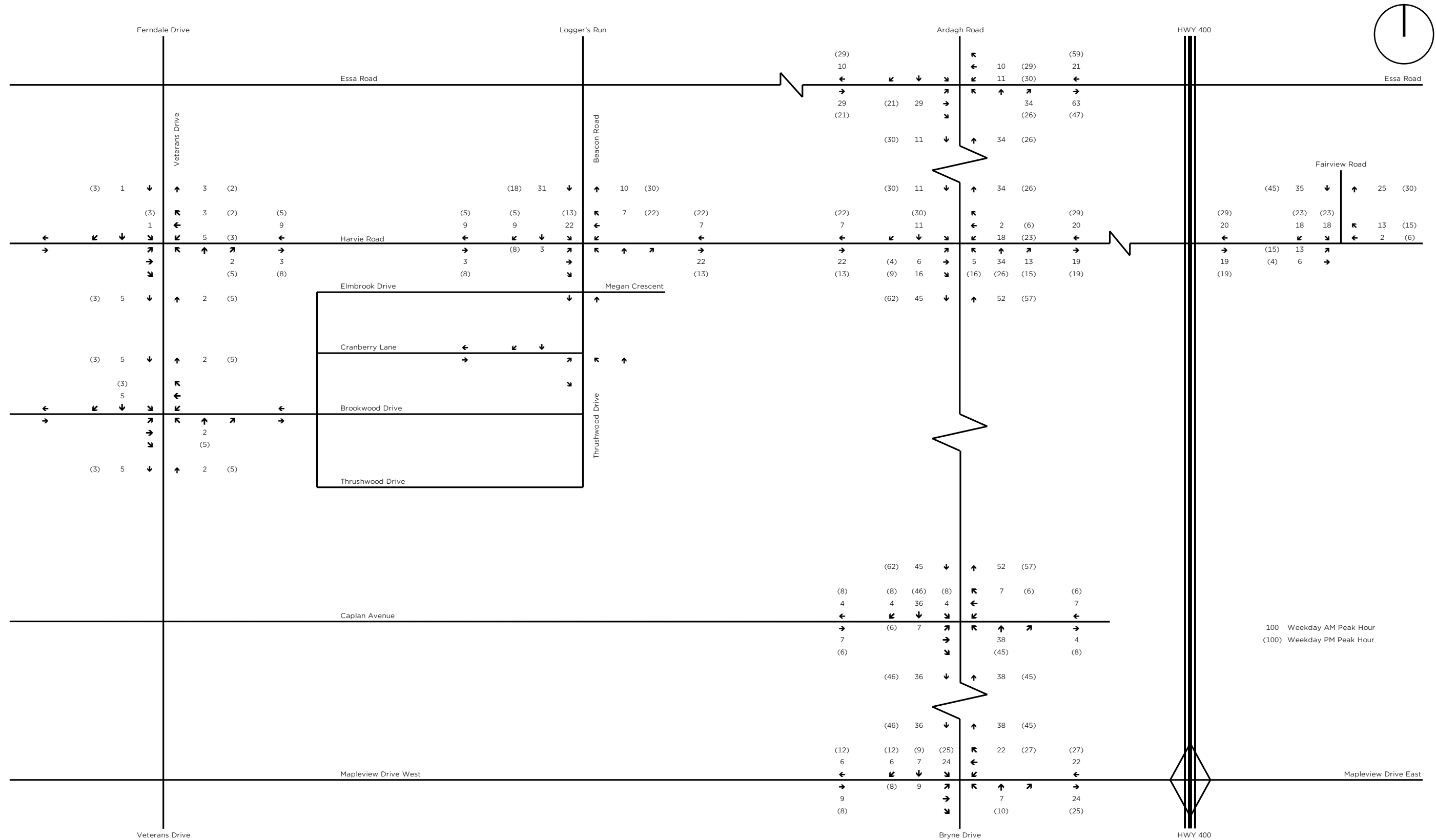




15 HARVIE ROAD

Figure 8: Background Development Volumes - 175-199 Essa Road

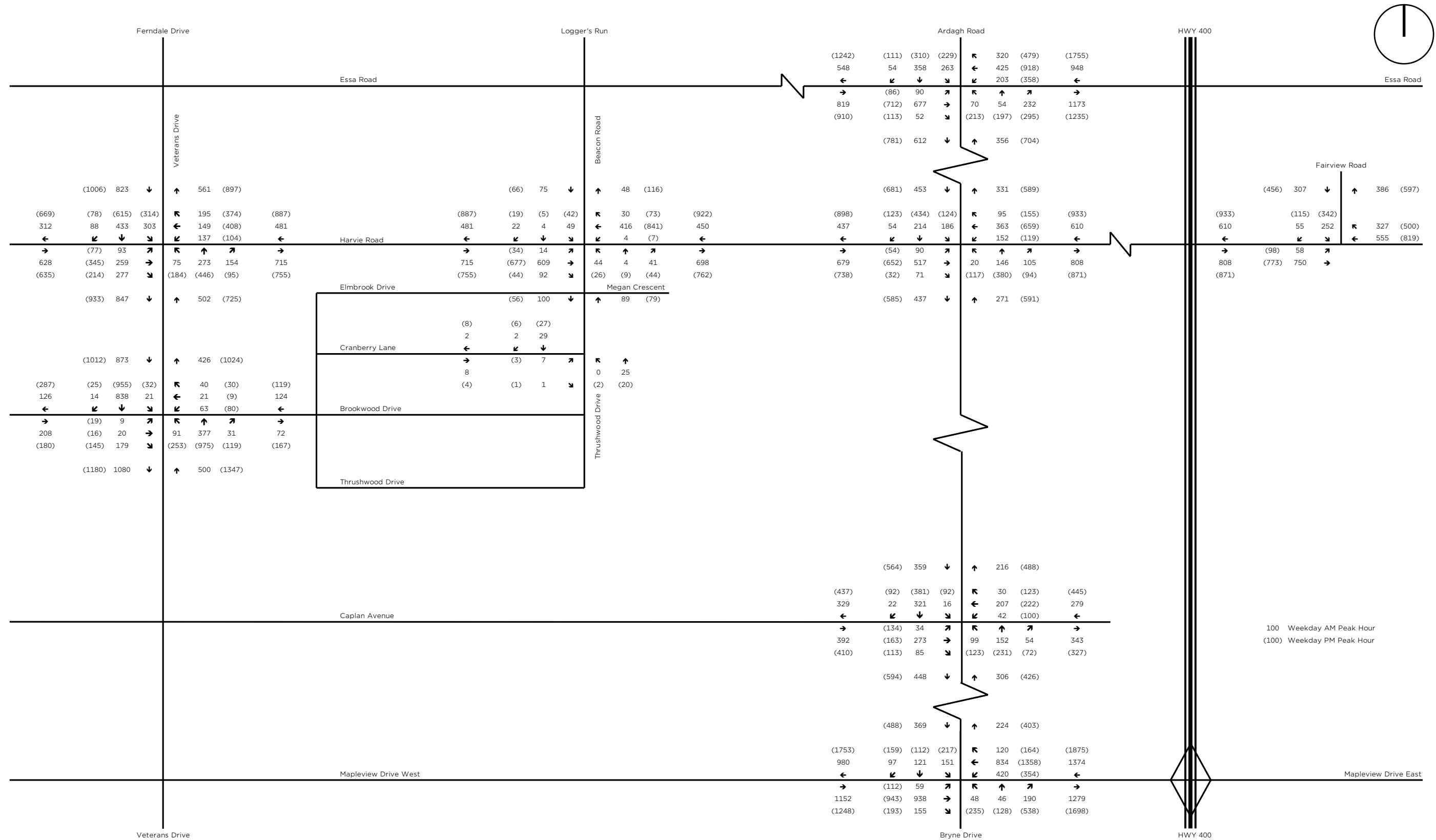




15 HARVIE ROAD

Figure 9: Background Development Volumes - Total

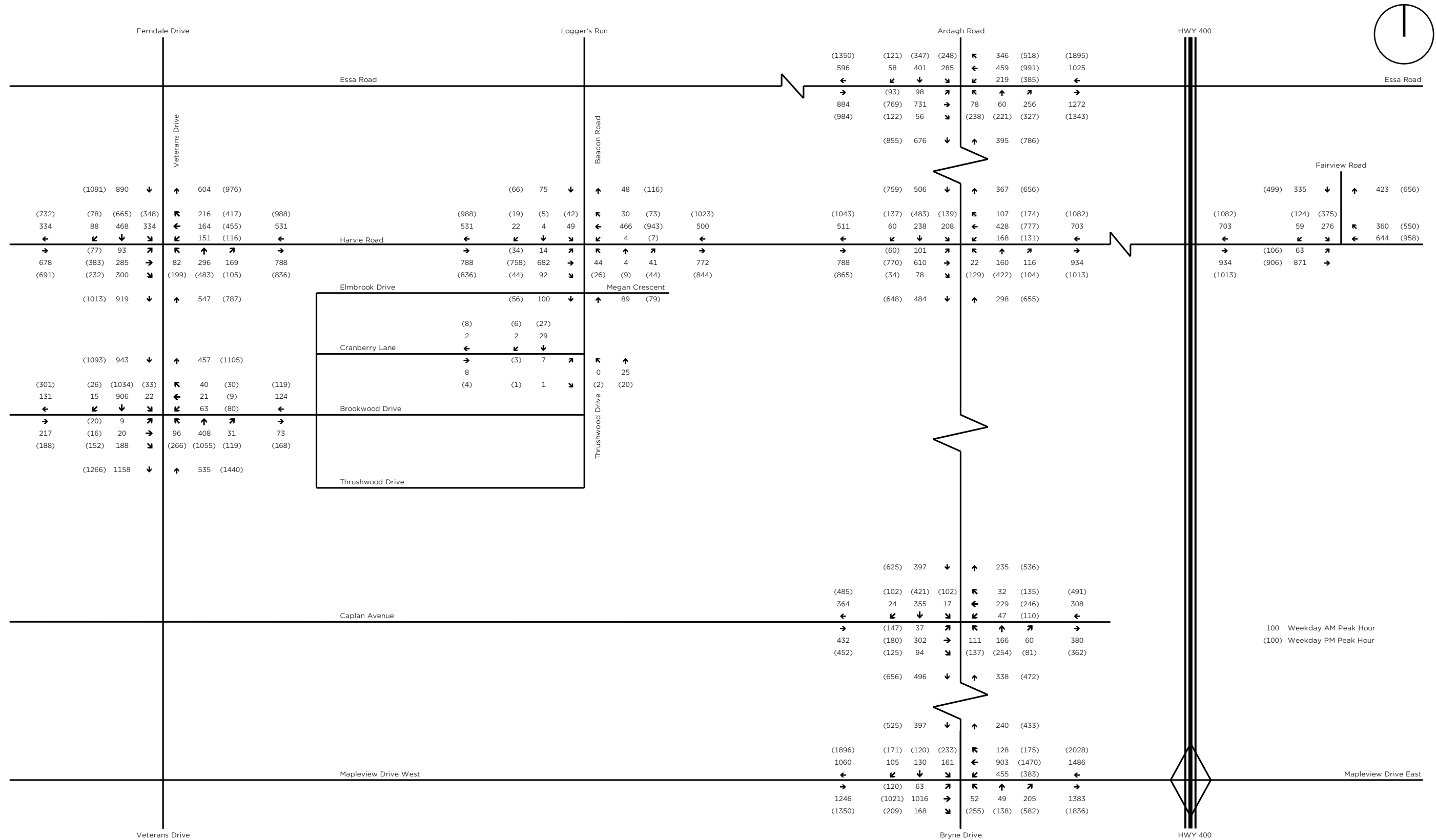




15 HARVIE ROAD

Figure 10: 2028 Background Traffic Volumes

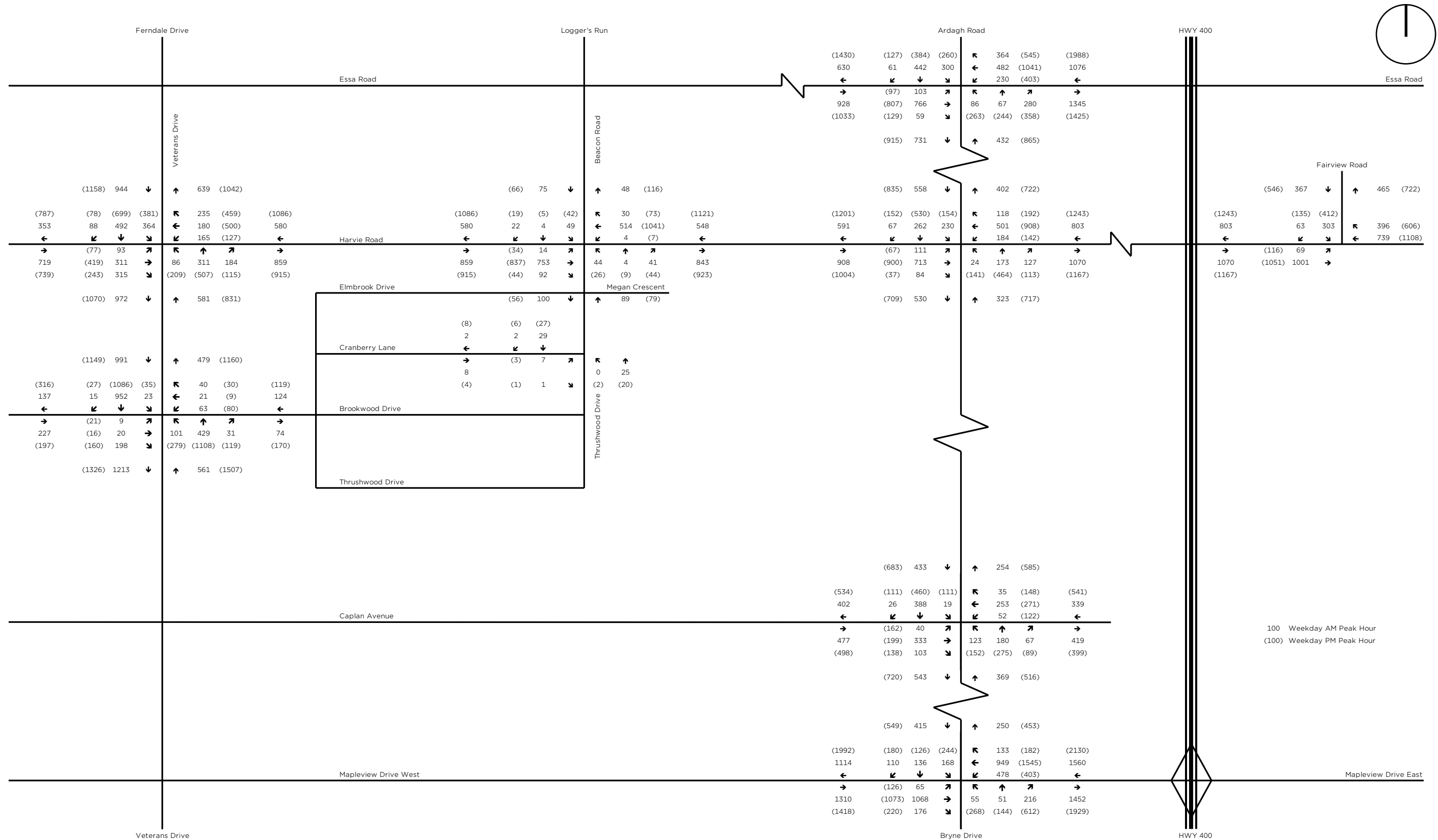




15 HARVIE ROAD

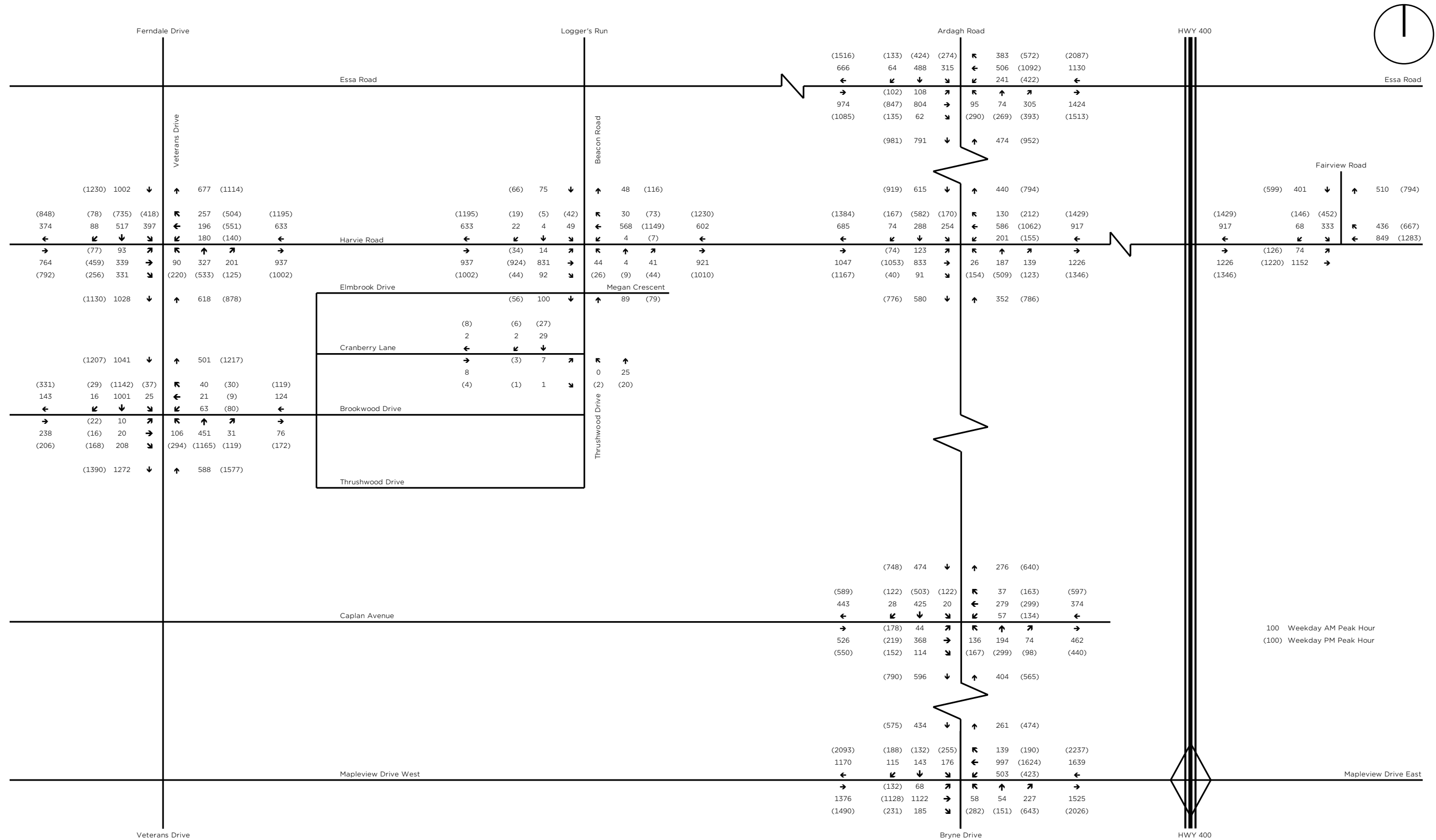
Figure 11: 2033 Background Traffic Volumes





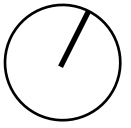
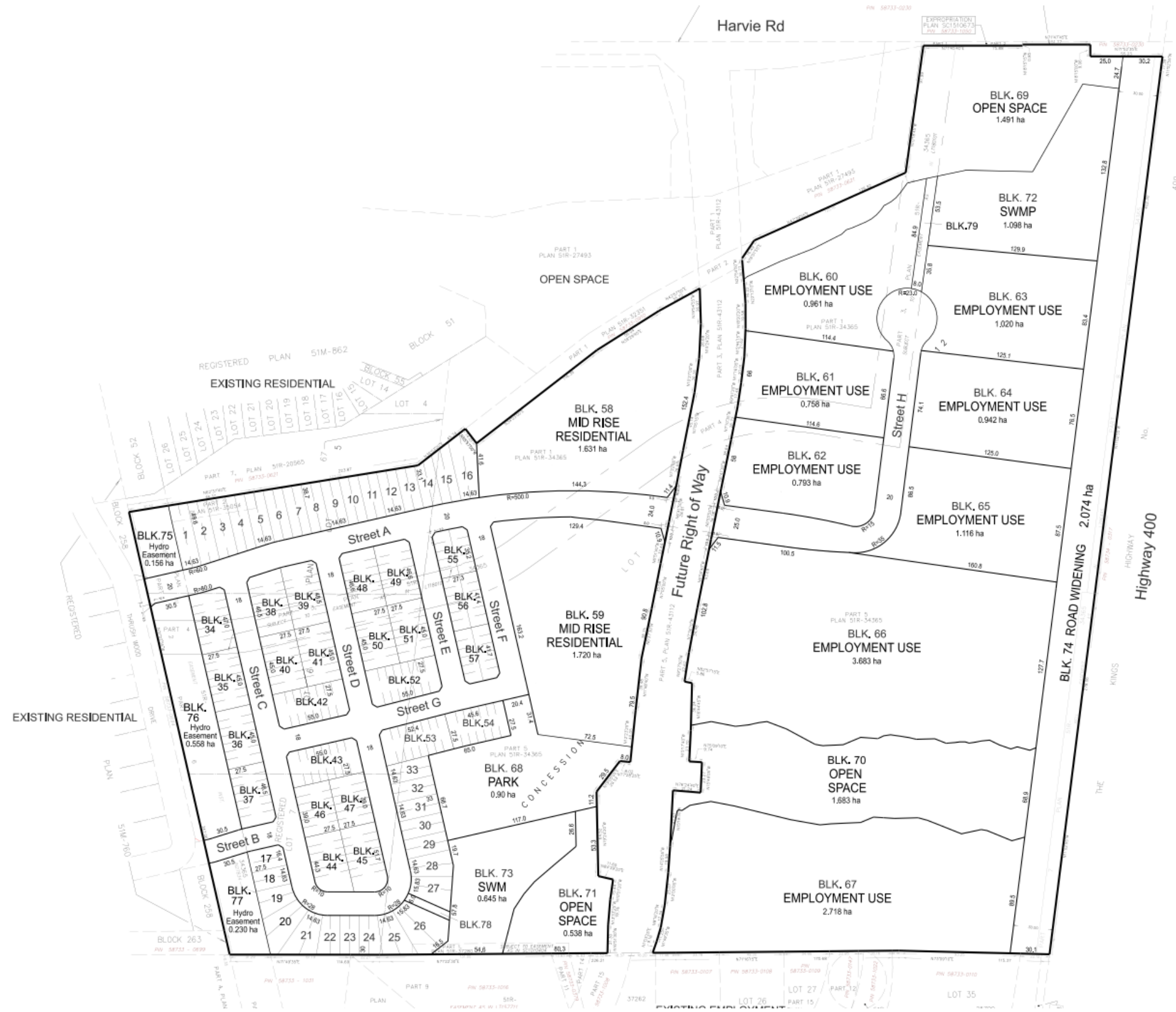
15 HARVIE ROAD
 Figure 12: 2038 Background Traffic Volumes





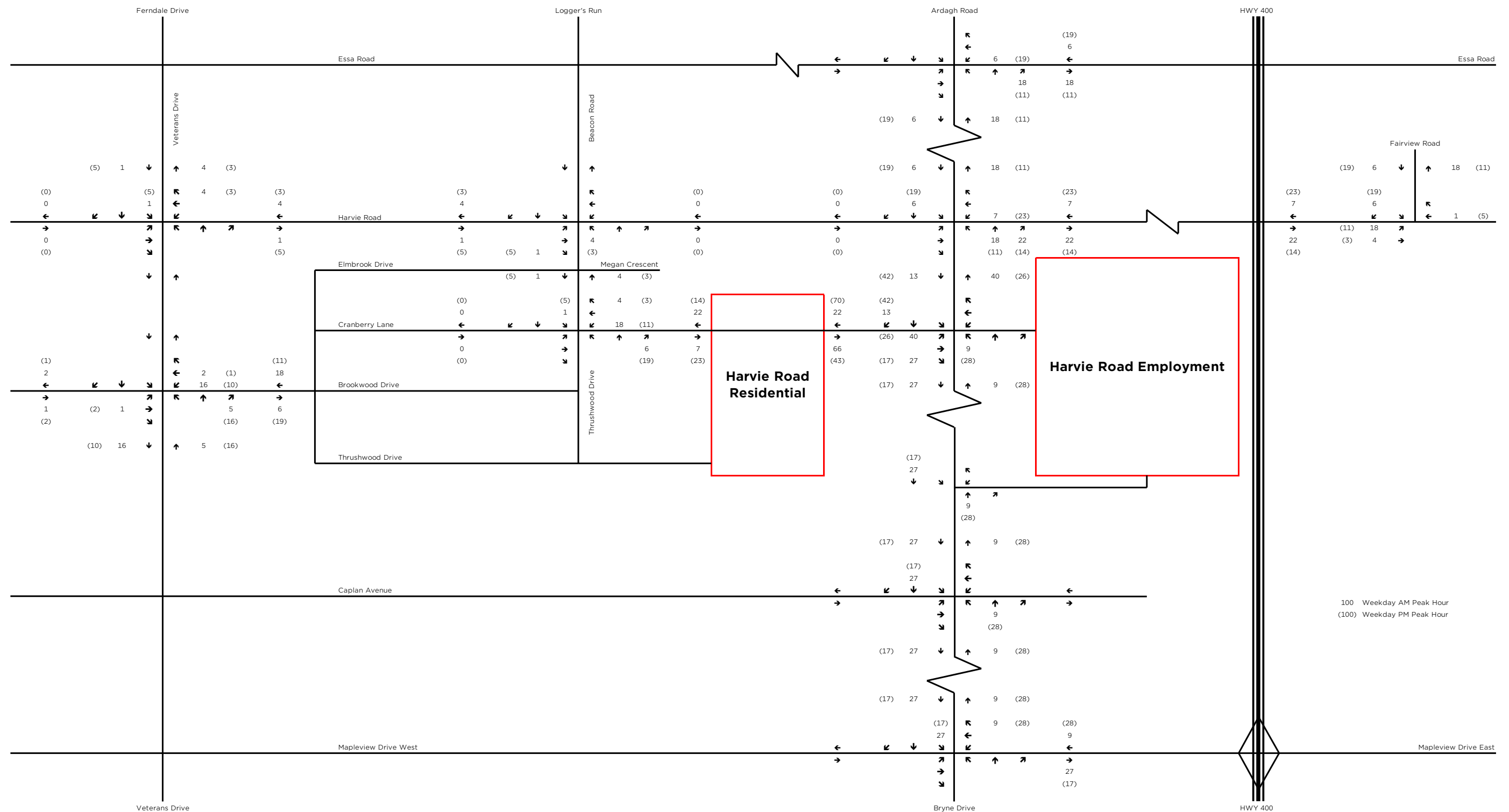
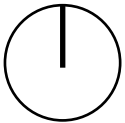
15 HARVIE ROAD
 Figure 13: 2043 Background Traffic Volumes





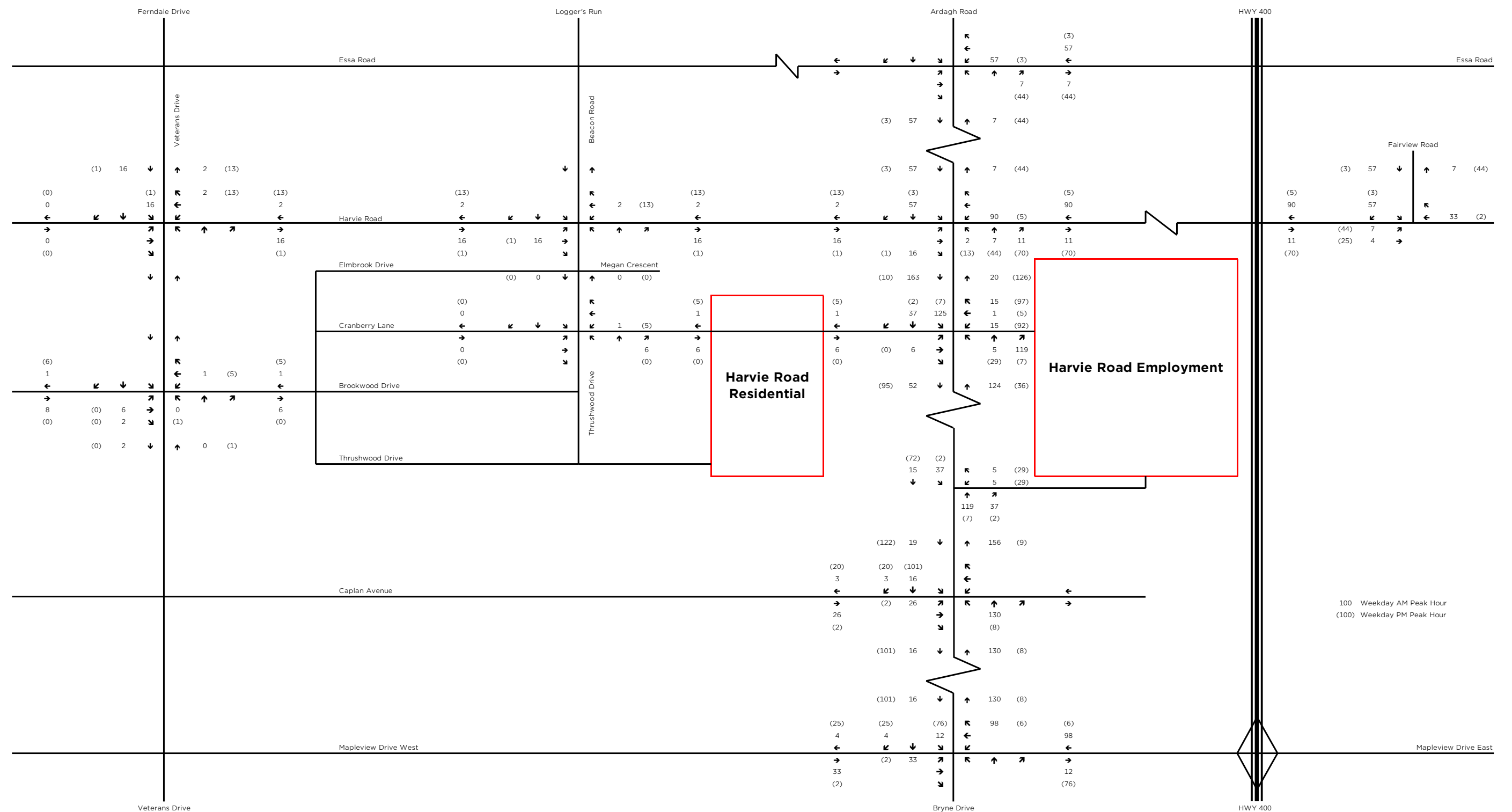
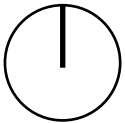
15 HARVIE ROAD
Figure 14: Draft Plan





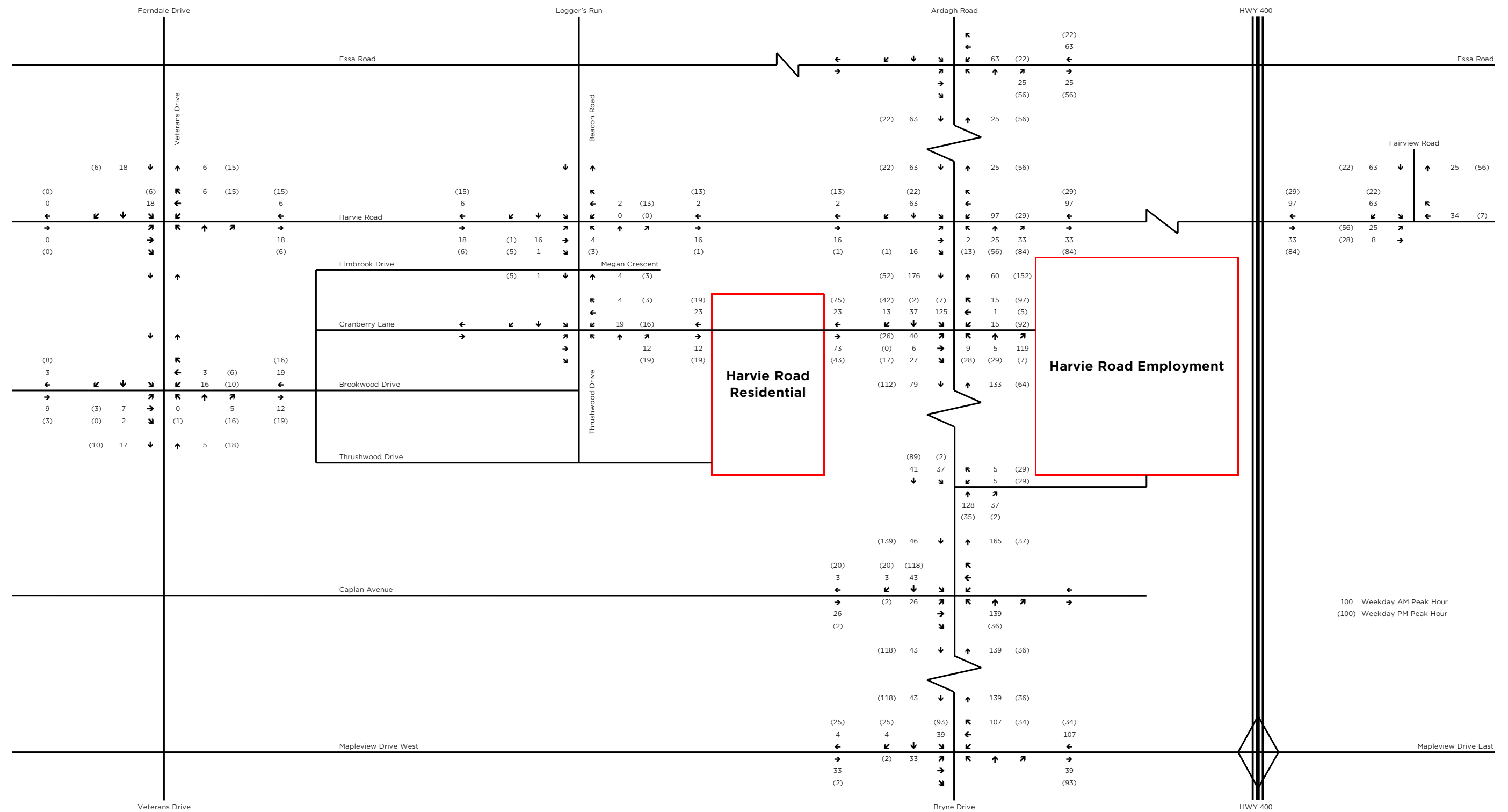
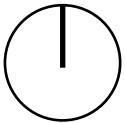
15 HARVIE ROAD
 Figure 15: Site Traffic - 2028 (Residential)





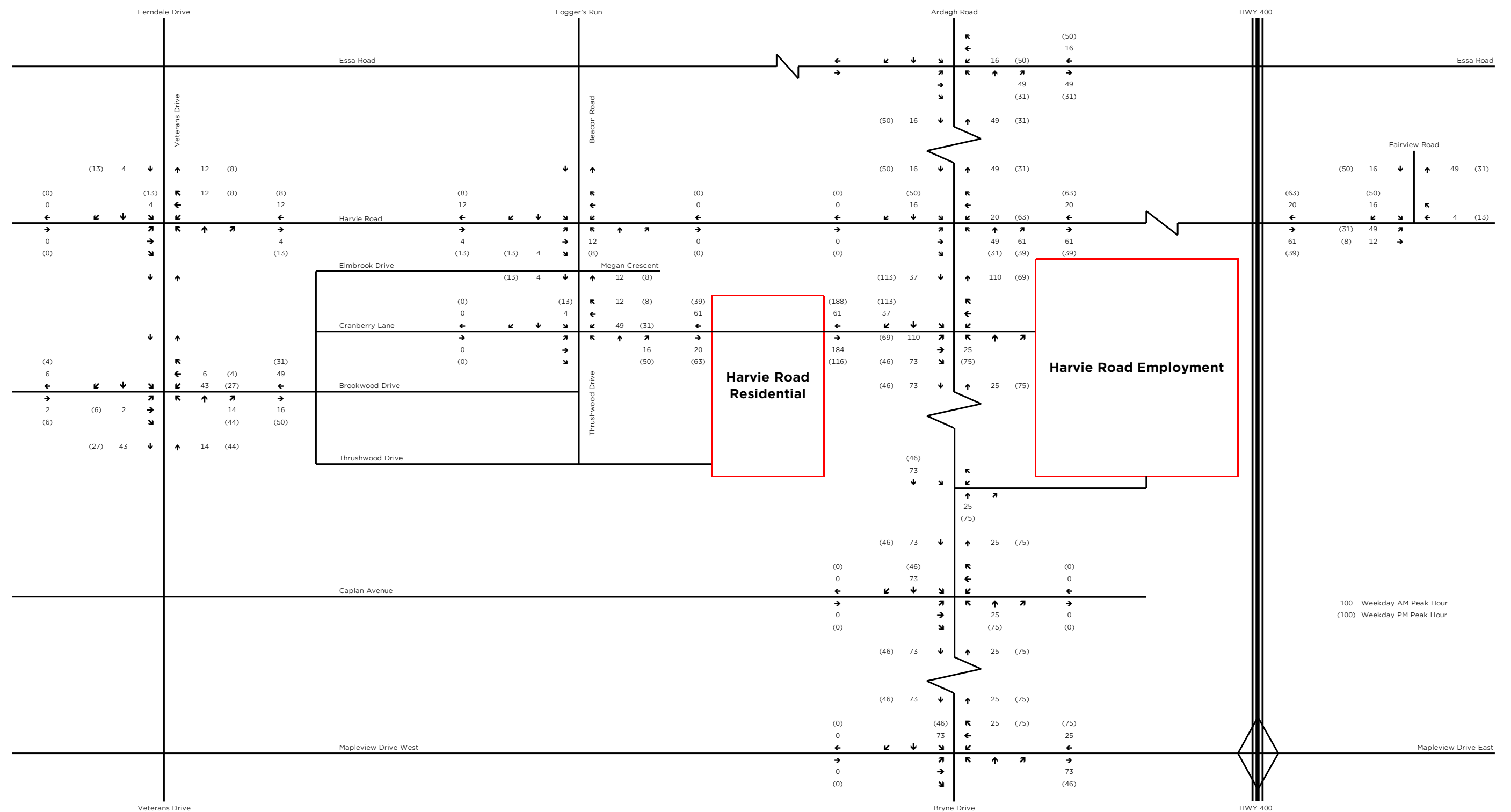
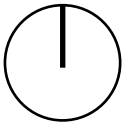
15 HARVIE ROAD
 Figure 16: Site Traffic - 2028 (Employment)





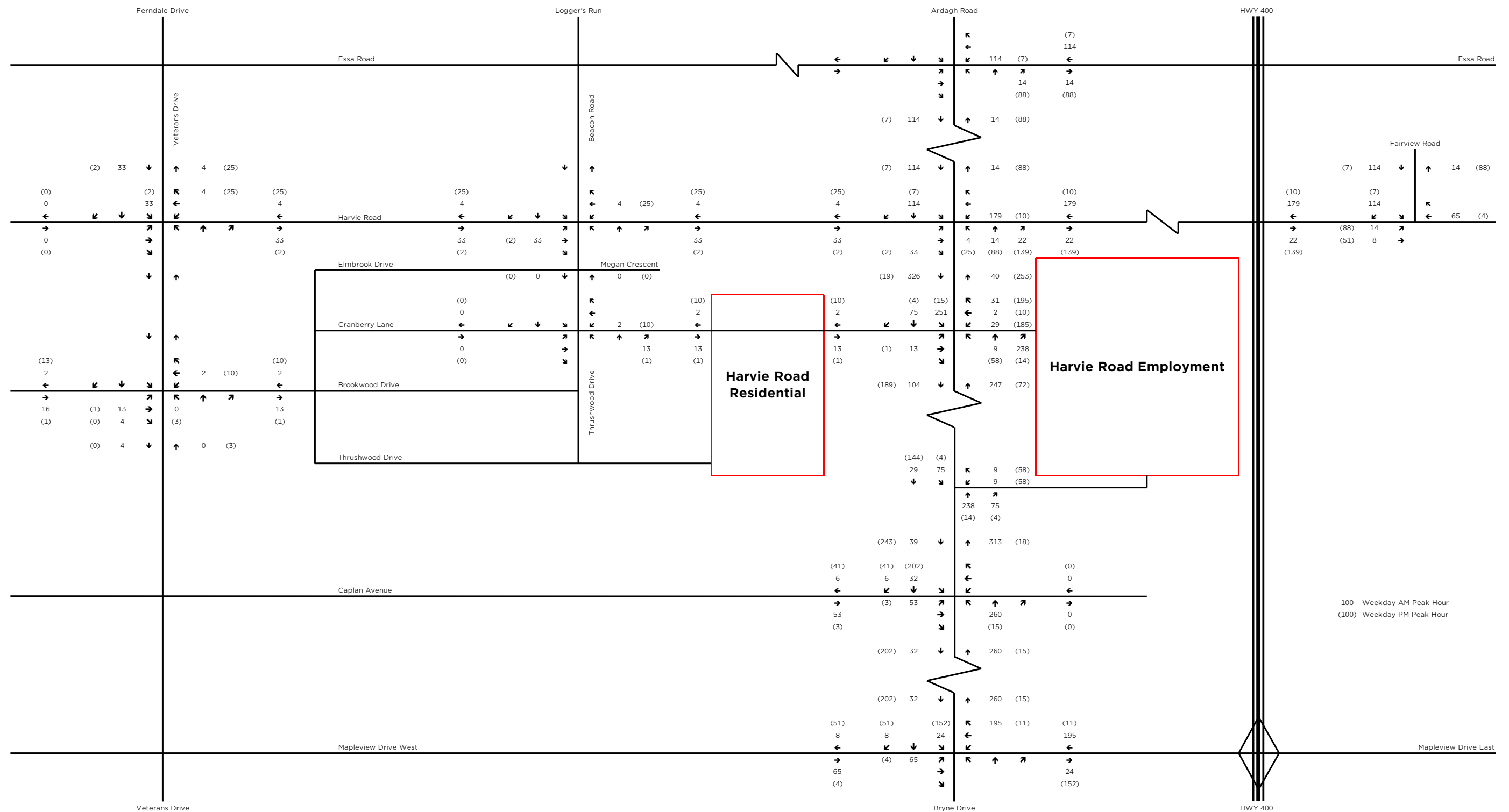
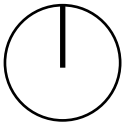
15 HARVIE ROAD
 Figure 17: Site Traffic - 2028 (Total Interim)





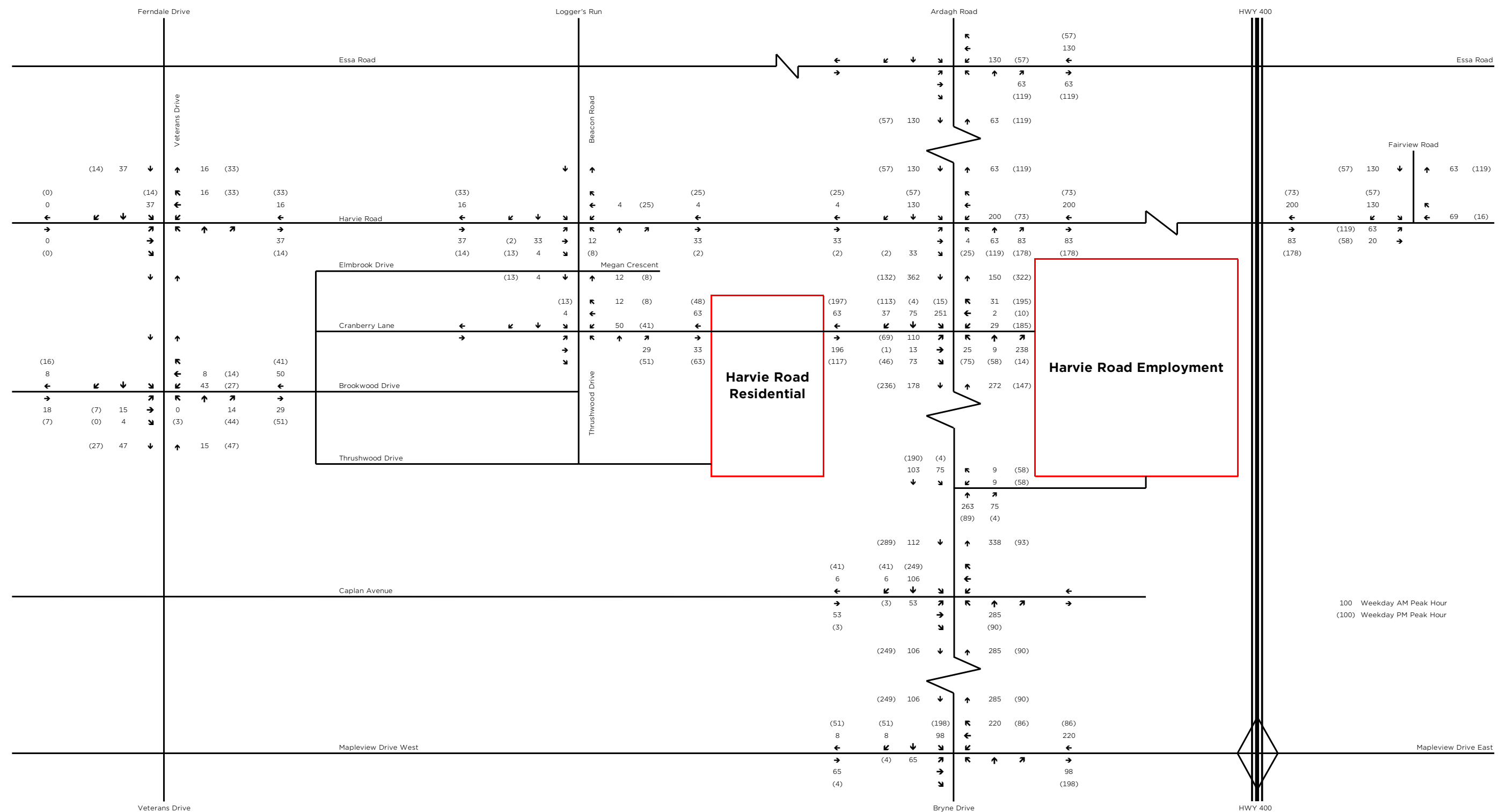
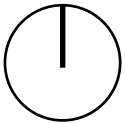
15 HARVIE ROAD
Figure 18: Site Traffic - 2033 (Residential)





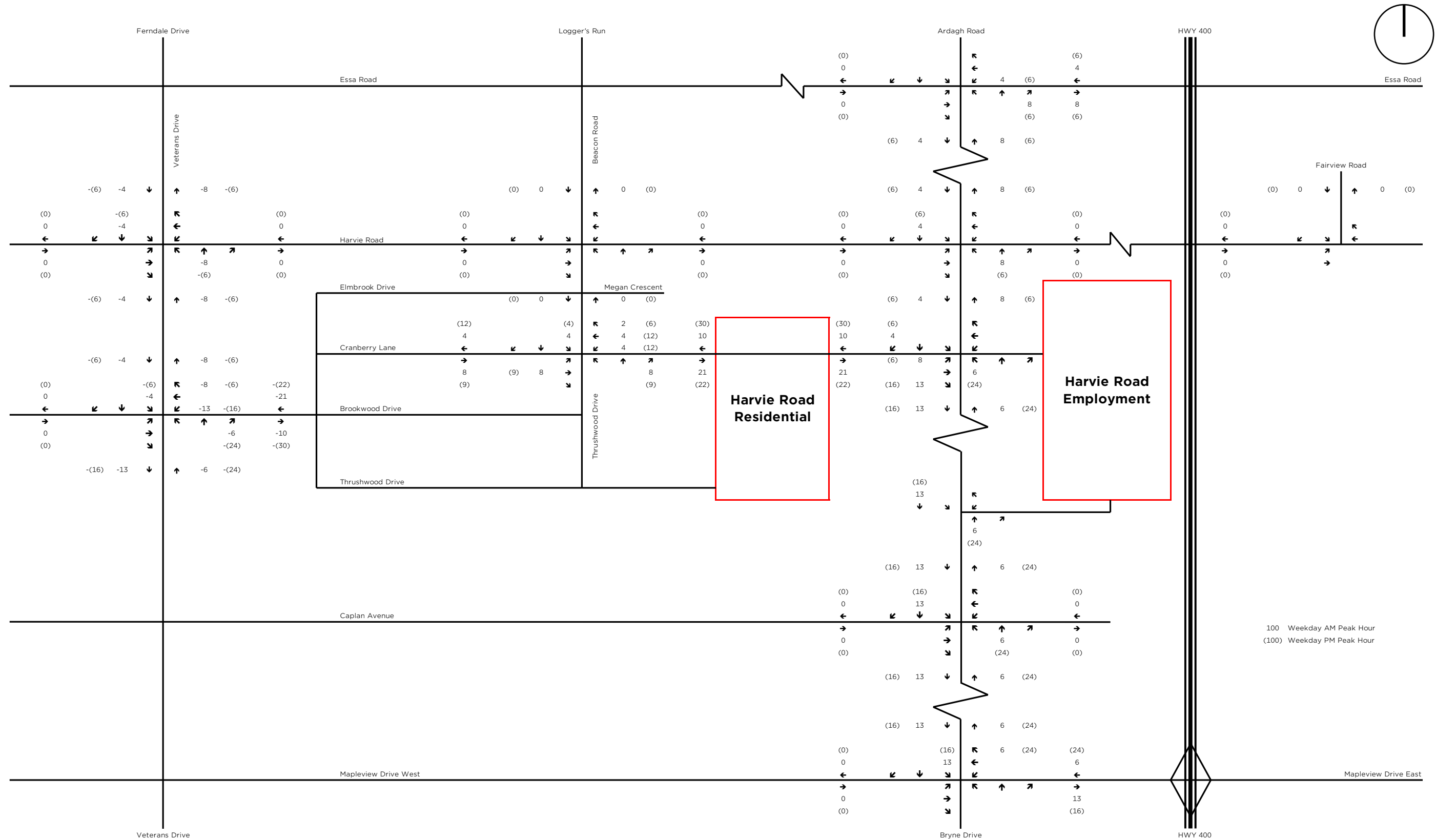
15 HARVIE ROAD
 Figure 19: Site Traffic - 2033 (Employment)





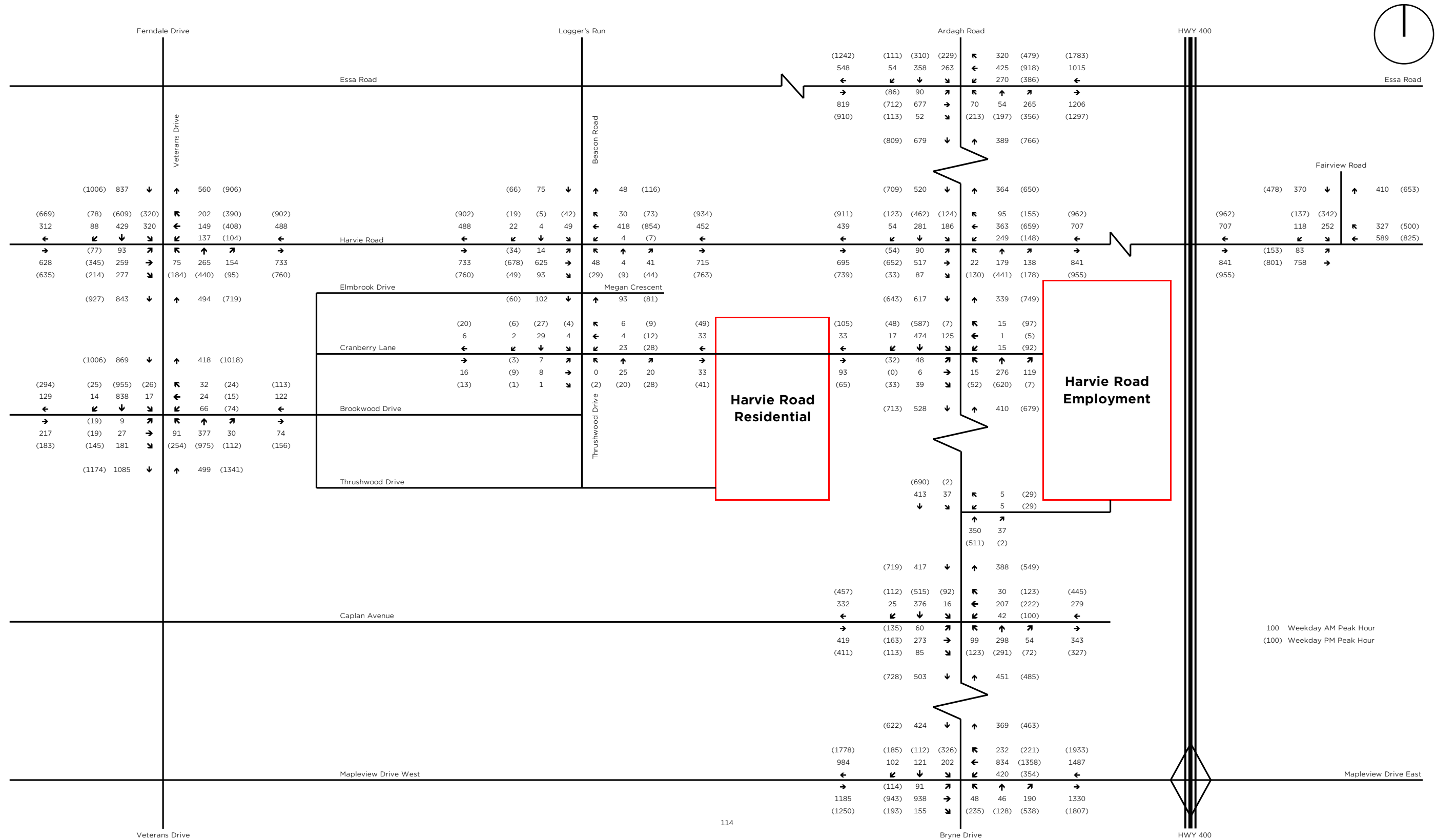
15 HARVIE ROAD
 Figure 20: Site Traffic - 2033 (Full Build-Out)





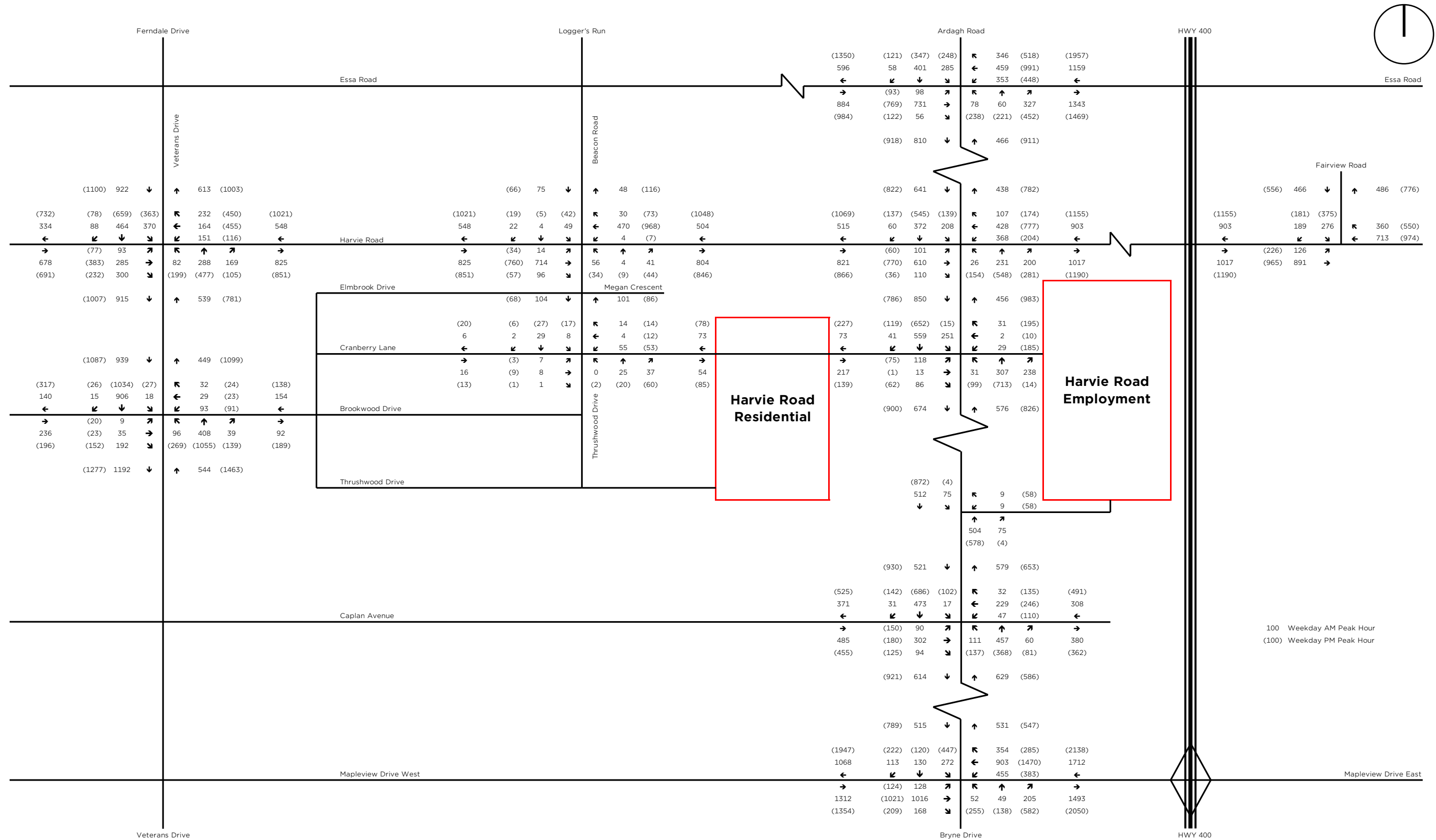
15 HARVIE ROAD
 Figure 21: Traffic Redistribution





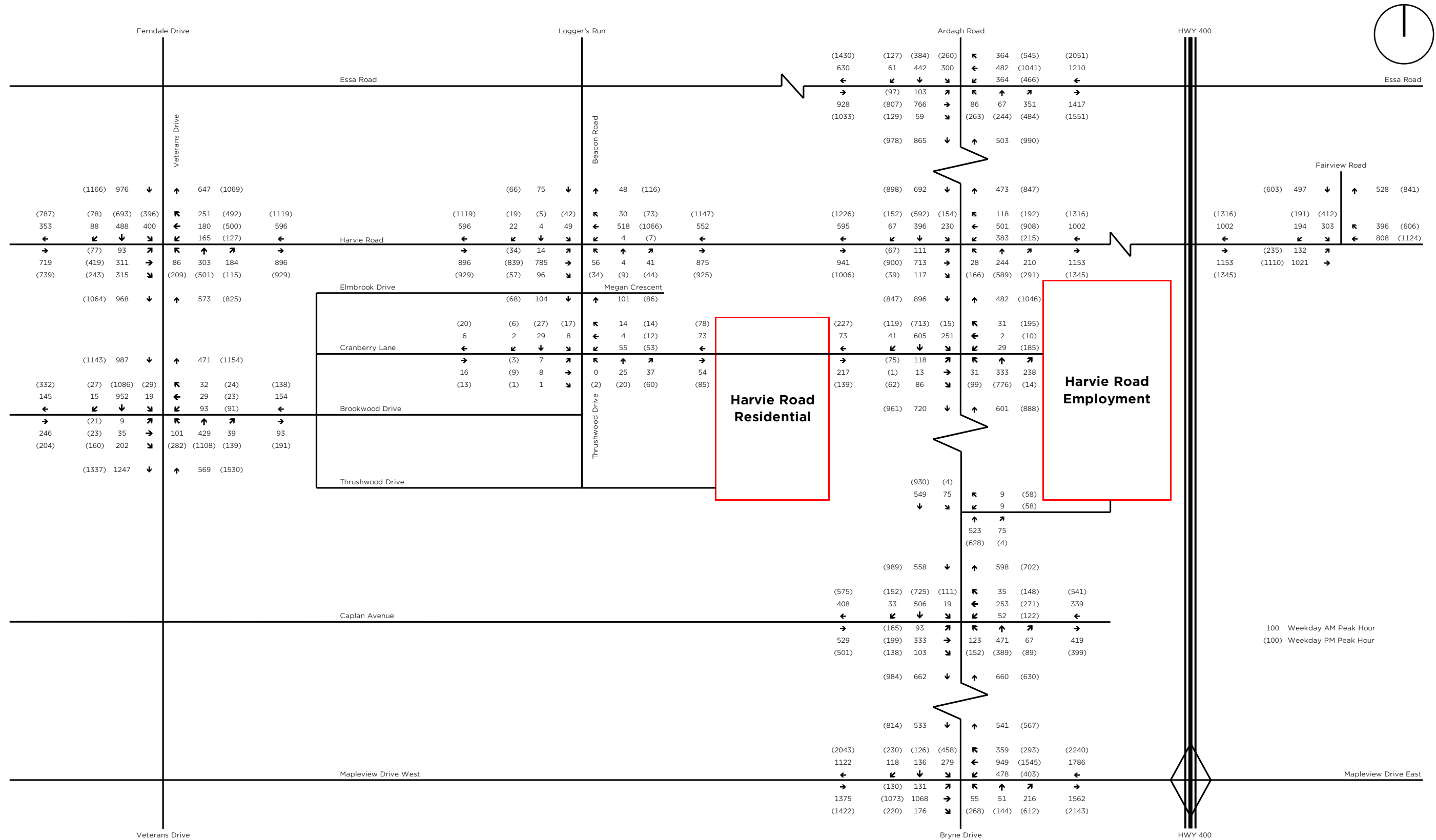
15 HARVIE ROAD
Figure 22: 2028 Total Traffic Volumes





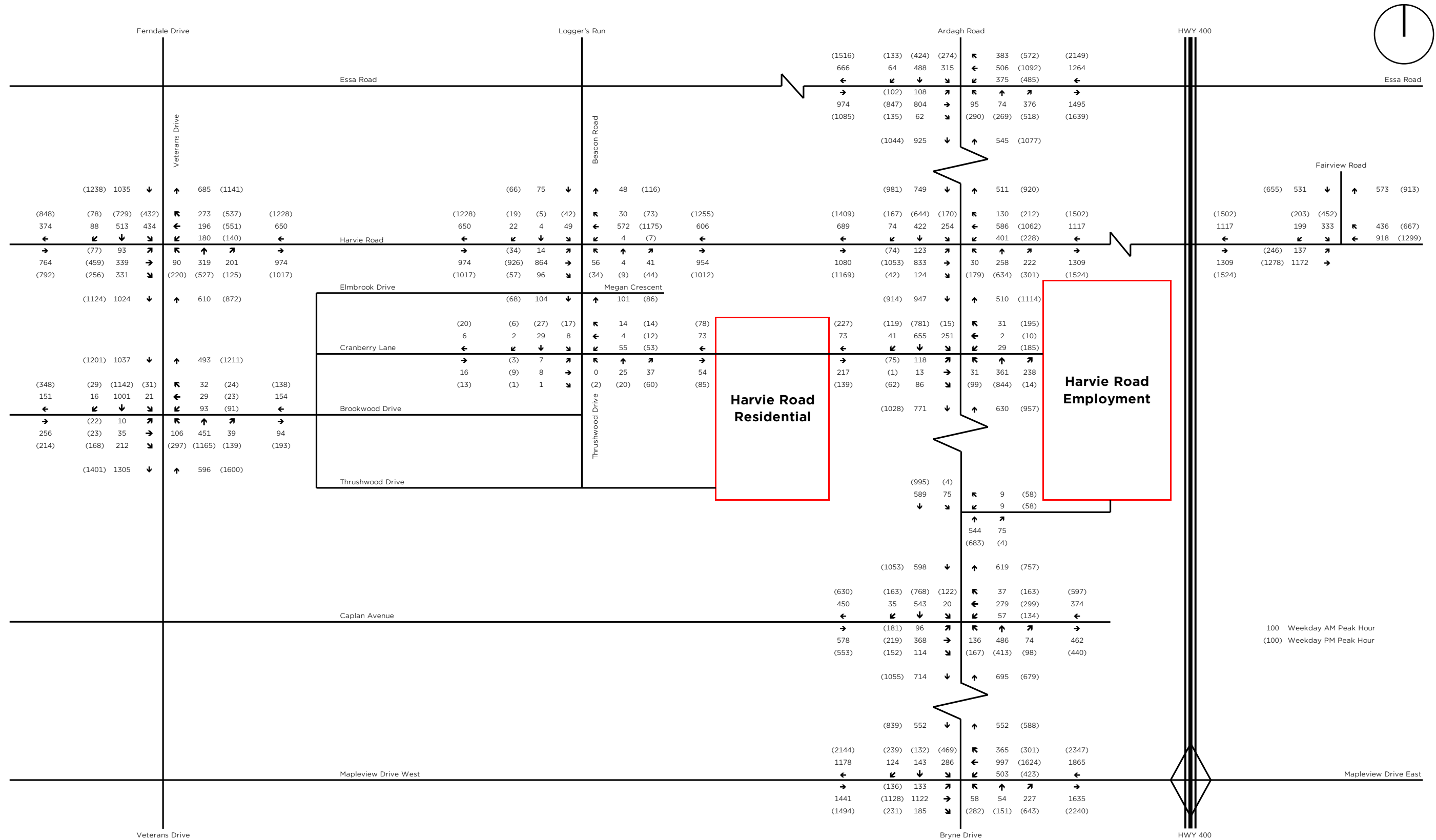
15 HARVIE ROAD
Figure 23: 2033 Total Traffic Volumes





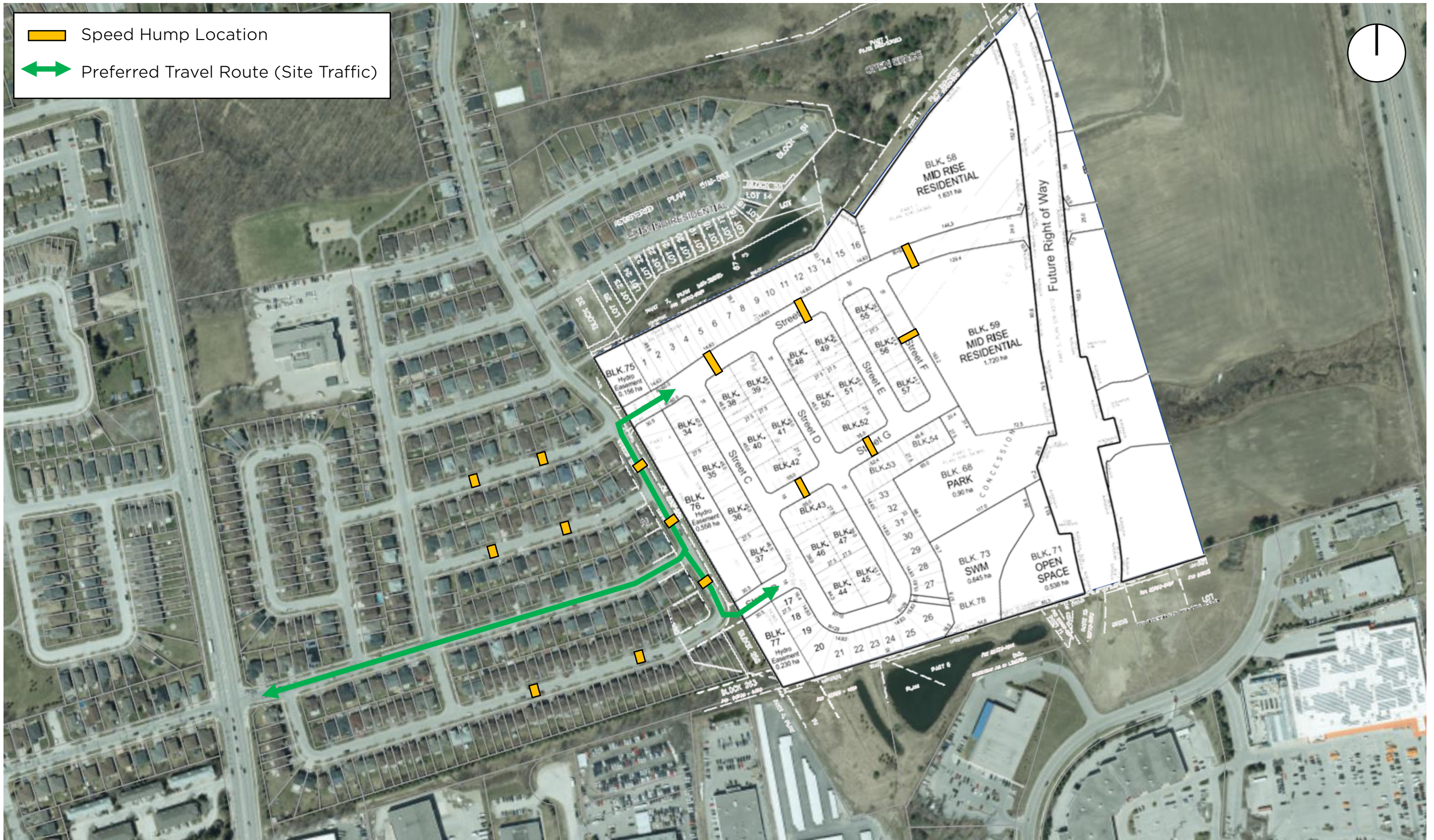
15 HARVIE ROAD
Figure 24: 2038 Total Traffic Volumes





15 HARVIE ROAD
Figure 25: 2043 Total Traffic Volumes





15 HARVIE ROAD
 Figure 26: Neighbourhood Traffic Calming Management Plan



Appendix A: Terms of Reference



Transportation Planning Pre-Consultation Site Plan Application

To: B. Perreault, C.E.T., Manager of Development Services

From: J. MacDonald C.E.T., Senior Transportation Operations Technologist (Ext. 5178)

Date: September 9, 2020

Re: D28-041-2020 – 15 Harvie Road

Development Stage: Pre-Consultation

Introductory Statement:

Staff reviewed the proposed site plan (D28-041-2020) for 15 Harvie Road submitted to the City as part of the pre-consultation process. The purpose of this review is to outline provide high-level comments for the proposal based on the supplied information and identify requirements to support a subsequent site plan application.

The comments are not intended to address granular details as that will be completed as part of the site plan review process. Professionals completing the site design and traffic impact study must adhere to the following City guidelines.

- Urban Design Guideline ([Link](#))
- Transportation Development Manual ([link](#))
- Transportation Association of Canada Geometric Design Guide
- Relevant Ontario Traffic Manuals
- ITE

Traffic Impact Study:

1. The applicant shall be required to prepare a Traffic Impact Study (TIS) in accordance with the City of Barrie Terms of Reference and Urban Design Manual. Staff recommend the retained traffic consultant provide Transportation Planning with a proposed TIS scope for review prior to commencing the report.
2. The Traffic Impact Study shall conduct a review for the requirements for turning lanes in accordance with Transportation Association of Canada Geometric Design Guide based on a design speed of 70km/h to accommodate the anticipated site generated traffic.
3. The TIS shall also include any nearby proposed site plans, including residential developments regarding the impacts the existing roadway network. Please consult with the Planning Department to confirm any nearby proposed site plans.
4. The TIS is to also include a construction staging plan as it relates to parking of trades people, delivery of construction material, impacts to existing on-street parking, maintenance of adjacent property access, pedestrian movements, City infrastructure, etc.
5. The owner/applicant is responsible for the removal and salvage of City infrastructure including but not limited to roadway and parking lot illumination, pay & display machine, parking meters, parking lot signage, etc. The Owner/Applicant shall coordinate the removal with the appropriate City Staff.
6. The owner/applicant is responsible for maintaining the existing roadway lighting levels adjacent to the proposed site. If the existing roadway illumination is to be removed or altered in any way due

to construction the owner/applicant is responsible to provide temporary illumination to meet preexisting conditions.

Property Conveyance / Corridor Protection:

1. The City is currently completing a detail design of the Bryne Drive extension; to this regard the applicant shall be required to dedicate a 34.0 metre right of way. Please contact Alvaro Alumina at alvaro.almuina@barrie.ca for information regarding the detail design and alignment of Bryne Drive realignment.
2. In accordance with Schedule E of the Official Plan the ultimate roadway allowance for Harvie Road would transition from 41m roadway allowance west of the Highway 400 overpass to a 34m roadway allowance at the future Bryne Drive intersection. The applicant would be required to convey a roadway allowance widening along the frontage of Harvie Road to adhere to the required increase in roadway allowance; these limits shall be confirmed by an updated legal land survey. Please contact Todd Comfort (todd.comfort@barrie.ca) regarding detail design.
3. All local residential roadways shall be designed in accordance with BSD-301 and shall conform with the Transportation Design Manual.
4. All local industrial roadways shall be designed in accordance with BSD-302 and shall conform with the Transportation Design Manual.
5. In accordance with City of Barrie standards and guidelines, the owner shall dedicate:
 - a. A 10 x 10 m daylighting triangle at Bryne Drive and Harvie Road;
 - b. A 5 x 10 m daylighting triangle at Bryne Drive and the extension of Cranberry Lane;
 - c. A 3 x 3 m daylighting triangle at all intersections of local roadways.
6. Transportation Planning are in support of the proposed cul-de-sac as it minimizes local roadway connections to Bryne Drive and maintains desired offset between the proposed intersection to Bryne Drive and the intersection of Bryne Drive and Harvie Road.
7. The proposed right of way for east/west local roadway shall be increased to a 24m right of way to accommodate a modified cross section of BSD 303 to permit the implementation of an eastbound left turn lane. It is anticipated this increased right of way would extend from Bryne Drive and transition to an 18 m right of way west of the mixed used block.
8. The proposed right of way for east/west industrial roadway shall be increased to a 24m right of way to accommodate a modified cross section of BSD 303 to permit the implementation of an westbound left turn lane. It is anticipated this increased right of way would extend from Bryne Drive and transition to a 20m right of way east of the curve.

Conformity Review

9. The applicant shall complete a review of the local roadways to ensure it adheres with the City of Barrie – Transportation Design Manual. It is understood deviations may be required to address unique situations and will be considered on a case-by-case basis. Any deviation must include a deviation technical memo explaining why the deviation is required, the proposed solution and include an assessment to verify the proposed solution provides a equivalent level of service/safety/lifecycle cost/etc.. This deviation memo shall be prepared and stamped by a professional engineer.

Traffic Calming:

10. A Neighbourhood Traffic Calming Management Plan is required to identify locations and potential applications for permanent traffic calming measures to the satisfaction of the Director of Development Services.

Active Transportation:

11. The design and location of sidewalks, access blocks/walkways and major pedestrian linkages associated with transit routes, schools, parks and valley lands shall be generally consistent with the Pedestrian Circulation Plan to the satisfaction of the Director of Development Services.

Improvements within the Municipal ROW:

12. Should the Traffic Impact Study conclude turning lanes are required the applicant shall be required to design and construct the intersection improvements. The intersection improvements shall be in accordance with Transportation Association of Canada Geometric Design Guide based on a design speed of 70km/h.

Exterior Lighting and Photometric Plan

13. All municipal street lighting design shall utilize current City standards and in accordance with ANSI/IES RP-8-18: Design Of Roadway Facility Lighting.



Justin MacDonald, C.E.T.
Senior Transportation Operations Technologist

David Perks

From: Justin MacDonald <Justin.MacDonald@barrie.ca>
Sent: Monday, October 4, 2021 3:55 PM
To: David Perks
Cc: Celeste Kitsemetry
Subject: RE: Harvie Road Development

CAUTION: This email originated from outside of Tatham Engineering. Do not click on links or open attachments unless you know the sender and have verified the sender's email address and know the content is safe.

Good afternoon, David,

Given the scale of the development staff are requiring the review the following intersections:

1. Bryne Drive at Essa Road
2. Bryne Drive at Mapleview Drive
3. Bryne Drive and Cranberry Lane
4. Veteran's Drive and Brookwood Drive / Mapleton Avenue
5. Cranberry Lane and Thurshwood Drive
6. Bryne Drive and Cranberry Lane extension / Industrial Roadway

I also just wanted to flag a few comments as part of pre-consultation that would result in changes to the provided concept plan.

1. The proposed right of way for east/west local roadway shall be increased to a 25m right of way to accommodate a modified cross section of BSD 303 to permit the implementation of an eastbound left turn lane. It is anticipated this increased right of way would extend from Bryne Drive and transition to an 18 m right of way west of the mixed used block. 8.
2. The proposed right of way for east/west industrial roadway shall be increased to a 25m right of way to accommodate a modified cross section of BSD 303 to permit the implementation of an westbound left turn lane. It is anticipated this increased right of way would extend from Bryne Drive and transition to a 20m right of way east of the curve.

I also wanted to flag a few other times that shall be included within the TIS.

1. The applicant shall complete a review of the local roadways to ensure it adheres with the City of Barrie – Transportation Design Manual. It is understood deviations may be required to address unique situations and will be considered on a case-by-case basis. Any deviation must include a deviation technical memo explaining why the deviation is required, the proposed solution and include an assessment to verify the proposed solution provides a equivalent level of service/safety/lifecycle cost/etc.. This deviation memo shall be prepared and stamped by a professional engineer.
2. Provide a sweep path analysis utilizing the required design vehicle in accordance with the Transportation Design Manual for the easterly curve along the industrial roadway.
3. Comprehensive Neighbourhood Traffic Calming review for the existing and proposed neighbourhood bounded by Veteran's Drive and Harvie Road:
 - a. Traffic Calming feature at Thurshwood and Cranberry (consideration for either a traffic circle or roundabout)
 - b. Gateway feature on Cranberry extension west of the mix-used block.
 - c. Cut through concerns and mitigation.

4. Concerns regarding the number of single access connections to Cranberry extension, consideration to convert the semi-detached dwellings to mix-use or medium density.
5. Pedestrian circulation and connectivity to the adjacent subdivision.

If needed I would be happy to set up quick call to discuss this further.

Thanks.

Justin MacDonald, C.E.T.
Senior Transportation Technologist – Transportation Planning, Development Services
The City of Barrie
Mobile 705-734-8020
Please consider the environment before printing this email.

From: David Perks <dperks@tathameng.com>
Sent: Wednesday, September 29, 2021 2:37 PM
To: Justin MacDonald <Justin.MacDonald@barrie.ca>
Subject: Harvie Road Development

Hi Justin,

We are preparing a proposal to conduct a traffic impact study for a proposed development on Harvie Road/Bryne Drive (preliminary concept plan is attached). I reviewed the pre-consultation notes you provided to the proponent but wanted to confirm the study area intersections. We have recommended the following intersections:

- 1) Harvie Rd & Veterans
- 2) Harvie Rd & Bryne (future)
- 3) Harvie Rd & Fairview
- 4) Harvie Rd & Thrushwood
- 5) Bryne Dr & Caplan

The other intersection I thought of was Bryne & Essa, but while the proposed development will require Bryne be extended from north of Caplan to Harvie, I'm not sure of the City's timing for connecting Bryne from Harvie to Essa.

Can you confirm that the above study area is acceptable, and if you think Bryne/Essa should be included?

Thanks Justin.

David

David Perks, M.Sc.
Transportation Planner, Project Manager

Tatham Engineering Limited
41 King Street, Unit 4 | Barrie | Ontario | L4N 6B5
T 705-733-9037 x2066 | dperks@tathameng.com | tathameng.com

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1. Electronic documents made available by Tatham Engineering Limited are supplied for the recipient's use only under authorization from the current owner and with the consent of Tatham Engineering Limited. It is the responsibility of the recipient to determine the accuracy, completeness and the appropriateness of the information provided.

2. It is agreed that only those hard copy documents bearing the professional seal and signature of the Tatham Engineering Limited project engineer will govern the work of the project. In the event of any dispute concerning an electronic document, the appropriately dated hard copy will be the document used by Tatham Engineering Limited to govern and resolve the dispute.

David Perks

From: Justin MacDonald <Justin.MacDonald@barrie.ca>
Sent: Tuesday, December 7, 2021 10:40 AM
To: Andrea Piitz
Cc: David Perks
Subject: RE: Harvie Road Traffic Study

Good morning Andrea

As per your request, please refer to the summary list below for the requested growth rates.

Bryne Drive - 2.5%/year to a horizon year of 2031; 2.0%/year from 2031 to 2041
Essa Road - 2.0%/year to a horizon year of 2031; 1.0%/year from 2031 to 2041
Mapleview Drive - 2.0%/year to a horizon year of 2031; 1.0%/year from 2031 to 2041
Veterans Drive - 2.0%/year to a horizon year of 2031; 1.0%/year from 2031 to 2041
Mapleton Ave / Brookwood - 1.0%/year to a horizon year of 2031; 1.0%/year from 2031 to 2041
Thrushwood Drive - 1.0%/year to a horizon year of 2031; 1.0%/year from 2031 to 2041
Harvie Road - 3.5%/year to a horizon year of 2031; 3.2%/year from 2031 to 2041
Fairview Road - 2.0%/year to a horizon year of 2031; 2.0%/year from 2031 to 2041
Caplan Avenue - 2.0%/year to a horizon year of 2031; 2.0%/year from 2031 to 2041

Justin MacDonald, C.E.T.
Senior Transportation Technologist – Transportation Planning, Development Services
The City of Barrie
Mobile 705-734-8020
Please consider the environment before printing this email.

From: Andrea Piitz <apiitz@tathameng.com>
Sent: Tuesday, November 30, 2021 10:19 AM
To: Justin MacDonald <Justin.MacDonald@barrie.ca>
Cc: David Perks <dperks@tathameng.com>
Subject: RE: Harvie Road Traffic Study

Hello Justin,

If you have them, could you also provide growth rates for our study area? We are looking at the following roads:

Bryne Drive
Essa Road
Mapleview Drive
Veterans Drive
Mapleton Ave / Brookwood
Thrushwood Drive
Harvie Road
Fairview Road
Caplan Avenue

I have also attached a map, indicating the sections if that helps.

Thanks again!

Andrea Piitz, B.Eng
Intern Engineer, Transportation

Tatham Engineering Limited

41 King Street, Unit 4 | Barrie | Ontario | L4N 6B5

T 705-733-9037 x2168 | C 647-406-6343 | apiitz@tathameng.com | tathameng.com



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From: Andrea Piitz
Sent: Monday, November 29, 2021 9:21 AM
To: Justin MacDonald <Justin.MacDonald@barrie.ca>
Subject: RE: Harvie Road Traffic Study

Thanks Justin!

If you could provide any signal timing plans you have, that would be much appreciated.

Andrea Piitz, B.Eng
Intern Engineer, Transportation

Tatham Engineering Limited

41 King Street, Unit 4 | Barrie | Ontario | L4N 6B5

T 705-733-9037 x2168 | C 647-406-6343 | apiitz@tathameng.com | tathameng.com



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From: Justin MacDonald <Justin.MacDonald@barrie.ca>
Sent: Tuesday, November 16, 2021 9:12 AM
To: Andrea Piitz <apiitz@tathameng.com>
Subject: RE: Harvie Road Traffic Study

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Good morning, Andrea,

I only counts for Bryne at Essa and Bryne at Mapleview, please find attached.

Do you require the signal timing plans as well?

Justin MacDonald, C.E.T.

Senior Transportation Technologist – Transportation Planning, Development Services
The City of Barrie

Mobile 705-734-8020

Please consider the environment before printing this email.

From: Andrea Piitz <apiitz@tathameng.com>
Sent: Thursday, October 21, 2021 10:50 AM
To: Justin MacDonald <Justin.MacDonald@barrie.ca>
Cc: David Perks <dperks@tathameng.com>
Subject: Harvie Road Traffic Study

Good Morning Justin,

We are conducting a traffic study on Harvie Road just west of the 400.

The following intersections will be included in the study:

- 1) Bryne & Essa
- 2) Bryne & Mapleview
- 3) Veteran's & Brookwood/Mapleton
- 4) Cranberry & Thrushwood
- 5) Harvie & Veterans
- 6) Harvie & Thrushwood
- 7) Harvie & Fairview
- 8) Bryne & Caplan

I understand traffic count data will need to be purchased from the City, I'm wondering what data you have available and the dates? Additionally, do you have the details of any background developments that should be included?

Any help is much appreciated.

Thanks!
Andrea

Andrea Piitz, B.Eng
Intern Engineer, Transportation

Tatham Engineering Limited

41 King Street, Unit 4 | Barrie | Ontario | L4N 6B5

T 705-733-9037 x2168 | C 647-406-6343 | apiitz@tathameng.com | tathameng.com



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Appendix B: Traffic Counts



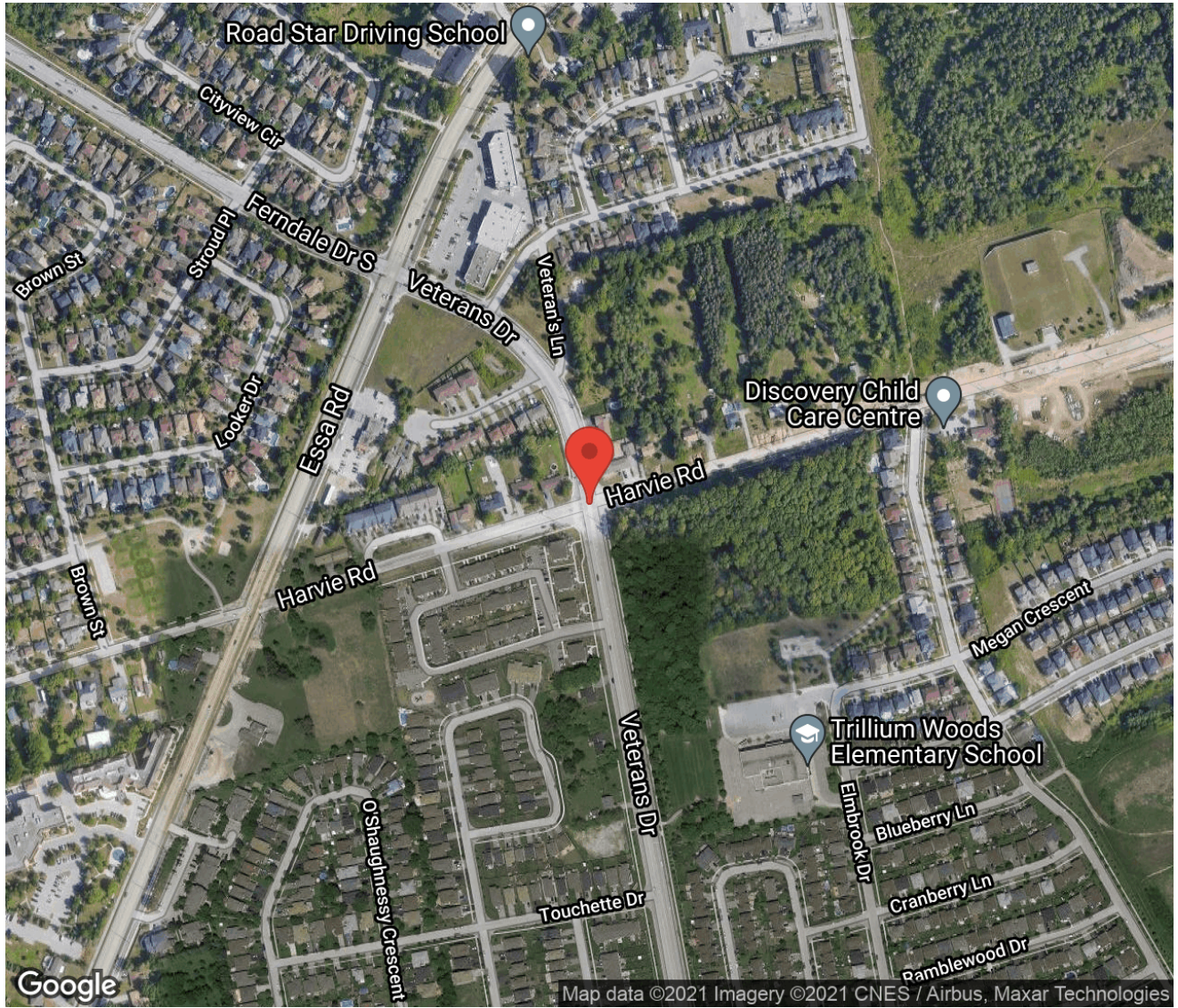
Project #21-281 - Tatham Engineering Ltd

Intersection Count Report

Intersection:	Harvie Rd & Veterans Dr
Municipality:	Barrie
Count Date:	Dec 14, 2021
Site Code:	2128100001
Count Categories:	Cars, Trucks, Bicycles, Pedestrians
Count Period:	07:00-10:00, 15:00-18:00
Weather:	Clear

Traffic Count Map

Intersection: Harvie Rd & Veterans Dr
Site Code: 2128100001
Municipality: Barrie
Count Date: Dec 14, 2021



Traffic Count Summary

Intersection: Harvie Rd & Veterans Dr
 Site Code: 2128100001
 Municipality: Barrie
 Count Date: Dec 14, 2021

Veterans Dr - Traffic Summary

Hour	North Approach Totals						South Approach Totals						Total
	Includes Cars, Trucks, Bicycles						Includes Cars, Trucks, Bicycles						
	Left	Thru	Right	U-Turn	Total	Peds	Left	Thru	Right	U-Turn	Total	Peds	
07:00 - 08:00	164	321	72	0	557	0	42	107	46	0	195	0	752
08:00 - 09:00	156	413	88	0	657	0	63	243	74	0	380	0	1037
09:00 - 10:00	140	450	75	0	665	0	59	227	63	0	349	0	1014
BREAK													
15:00 - 16:00	215	389	85	0	689	0	50	591	69	0	710	0	1399
16:00 - 17:00	244	499	71	0	814	0	82	661	71	0	814	0	1628
17:00 - 18:00	202	331	61	0	594	0	67	606	77	0	750	0	1344
GRAND TOTAL	1121	2403	452	0	3976	0	363	2435	400	0	3198	0	7174

Traffic Count Summary

Intersection: Harvie Rd & Veterans Dr
 Site Code: 2128100001
 Municipality: Barrie
 Count Date: Dec 14, 2021

Harvie Rd - Traffic Summary

Hour	East Approach Totals						West Approach Totals						Total
	Includes Cars, Trucks, Bicycles						Includes Cars, Trucks, Bicycles						
	Left	Thru	Right	U-Turn	Total	Peds	Left	Thru	Right	U-Turn	Total	Peds	
07:00 - 08:00	79	59	114	0	252	2	78	146	85	0	309	0	561
08:00 - 09:00	86	85	115	0	286	0	93	142	93	0	328	0	614
09:00 - 10:00	55	102	141	0	298	0	76	120	62	0	258	0	556
BREAK													
15:00 - 16:00	97	282	259	0	638	0	97	226	69	0	392	0	1030
16:00 - 17:00	96	351	329	0	776	0	77	255	60	0	392	0	1168
17:00 - 18:00	78	299	272	0	649	0	54	248	58	0	360	0	1009
GRAND TOTAL	491	1178	1230	0	2899	2	475	1137	427	0	2039	0	4938



Traffic Count Data

Intersection: Harvie Rd & Veterans Dr
 Site Code: 2128100001
 Municipality: Barrie
 Count Date: Dec 14, 2021

North Approach - Veterans Dr

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↻	Total	←	↑	→	↻	Total	←	↑	→	↻	Total	
07:00	37	50	17	0	104	0	1	1	0	2	0	0	0	0	0	0
07:15	36	77	20	0	133	0	5	1	0	6	0	0	0	0	0	0
07:30	45	67	14	0	126	3	6	0	0	9	0	0	0	0	0	0
07:45	43	113	18	0	174	0	2	1	0	3	0	0	0	0	0	0
08:00	26	86	20	0	132	2	2	1	0	5	0	0	0	0	0	0
08:15	39	96	24	0	159	0	6	0	0	6	0	0	0	0	0	0
08:30	59	90	22	0	171	0	7	0	0	7	0	0	0	0	0	0
08:45	29	123	16	0	168	1	3	5	0	9	0	0	0	0	0	0
09:00	31	127	18	0	176	2	2	1	0	5	0	0	0	0	0	0
09:15	35	124	15	0	174	2	4	0	0	6	0	0	0	0	0	0
09:30	35	97	21	0	153	2	5	1	0	8	0	0	0	0	0	0
09:45	33	86	17	0	136	0	5	2	0	7	0	0	0	0	0	0
SUBTOTAL	448	1136	222	0	1806	12	48	13	0	73	0	0	0	0	0	0



Traffic Count Data

Intersection: Harvie Rd & Veterans Dr
 Site Code: 2128100001
 Municipality: Barrie
 Count Date: Dec 14, 2021

North Approach - Veterans Dr

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↻	Total	←	↑	→	↻	Total	←	↑	→	↻	Total	
15:00	48	84	23	0	155	3	4	0	0	7	0	0	0	0	0	0
15:15	51	98	16	0	165	1	2	2	0	5	0	0	0	0	0	0
15:30	51	106	22	0	179	2	2	0	0	4	0	0	0	0	0	0
15:45	58	87	16	0	161	1	6	6	0	13	0	0	0	0	0	0
16:00	55	95	14	0	164	3	3	1	0	7	0	0	0	0	0	0
16:15	62	119	18	0	199	4	2	1	0	7	0	0	0	0	0	0
16:30	61	115	21	0	197	0	3	0	0	3	0	0	0	0	0	0
16:45	57	153	16	0	226	2	9	0	0	11	0	0	0	0	0	0
17:00	56	133	19	0	208	0	1	1	0	2	0	0	0	0	0	0
17:15	56	87	15	0	158	0	3	1	0	4	0	0	0	0	0	0
17:30	44	49	11	0	104	2	1	0	0	3	0	0	0	0	0	0
17:45	41	56	14	0	111	3	1	0	0	4	0	0	0	0	0	0
SUBTOTAL	640	1182	205	0	2027	21	37	12	0	70	0	0	0	0	0	0
GRAND TOTAL	1088	2318	427	0	3833	33	85	25	0	143	0	0	0	0	0	0



Traffic Count Data

Intersection: Harvie Rd & Veterans Dr
 Site Code: 2128100001
 Municipality: Barrie
 Count Date: Dec 14, 2021

South Approach - Veterans Dr

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↻	Total	←	↑	→	↻	Total	←	↑	→	↻	Total	
07:00	7	10	9	0	26	1	3	0	0	4	0	0	0	0	0	0
07:15	10	15	7	0	32	0	4	1	0	5	0	0	0	0	0	0
07:30	13	32	17	0	62	1	4	0	0	5	0	0	0	0	0	0
07:45	9	37	11	0	57	1	2	1	0	4	0	0	0	0	0	0
08:00	14	56	16	0	86	0	3	1	0	4	0	0	0	0	0	0
08:15	19	44	23	0	86	0	4	0	0	4	0	0	0	0	0	0
08:30	13	54	16	0	83	2	5	0	0	7	0	0	0	0	0	0
08:45	14	75	15	0	104	1	2	3	0	6	0	0	0	0	0	0
09:00	21	53	21	0	95	2	1	3	0	6	0	0	0	0	0	0
09:15	11	65	11	0	87	1	1	0	0	2	0	0	0	0	0	0
09:30	12	54	12	0	78	1	4	0	0	5	0	0	0	0	0	0
09:45	10	46	16	0	72	1	3	0	0	4	0	0	0	0	0	0
SUBTOTAL	153	541	174	0	868	11	36	9	0	56	0	0	0	0	0	0



Traffic Count Data

Intersection: Harvie Rd & Veterans Dr
 Site Code: 2128100001
 Municipality: Barrie
 Count Date: Dec 14, 2021

South Approach - Veterans Dr

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↻	Total	←	↑	→	↻	Total	←	↑	→	↻	Total	
15:00	11	141	22	0	174	1	3	0	0	4	0	0	0	0	0	0
15:15	19	152	13	0	184	1	1	0	0	2	0	0	0	0	0	0
15:30	6	155	17	0	178	0	2	0	0	2	0	0	0	0	0	0
15:45	11	135	17	0	163	1	2	0	0	3	0	0	0	0	0	0
16:00	21	147	21	0	189	2	8	0	0	10	0	0	0	0	0	0
16:15	18	157	14	0	189	0	6	0	0	6	0	0	0	0	0	0
16:30	21	172	18	0	211	1	3	1	0	5	0	0	0	0	0	0
16:45	19	163	16	0	198	0	5	1	0	6	0	0	0	0	0	0
17:00	18	200	19	0	237	0	3	1	0	4	0	0	0	0	0	0
17:15	18	201	19	0	238	0	1	2	0	3	0	0	0	0	0	0
17:30	18	93	21	0	132	0	2	0	0	2	0	0	0	0	0	0
17:45	12	103	15	0	130	1	3	0	0	4	0	0	0	0	0	0
SUBTOTAL	192	1819	212	0	2223	7	39	5	0	51	0	0	0	0	0	0
GRAND TOTAL	345	2360	386	0	3091	18	75	14	0	107	0	0	0	0	0	0



Traffic Count Data

Intersection: Harvie Rd & Veterans Dr
 Site Code: 2128100001
 Municipality: Barrie
 Count Date: Dec 14, 2021

East Approach - Harvie Rd

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↻	Total	←	↑	→	↻	Total	←	↑	→	↻	Total	
07:00	14	9	20	0	43	1	2	5	0	8	0	0	0	0	0	0
07:15	19	13	21	0	53	0	3	2	0	5	0	0	0	0	0	0
07:30	27	16	25	0	68	1	0	4	0	5	0	0	0	0	0	0
07:45	15	15	35	0	65	2	1	2	0	5	0	0	0	0	0	2
08:00	22	14	22	0	58	0	3	2	0	5	0	0	0	0	0	0
08:15	20	17	25	0	62	2	1	1	0	4	0	0	0	0	0	0
08:30	25	17	30	0	72	0	5	1	0	6	0	0	0	0	0	0
08:45	17	25	31	0	73	0	3	3	0	6	0	0	0	0	0	0
09:00	14	21	24	0	59	1	0	0	0	1	0	0	0	0	0	0
09:15	13	17	32	0	62	1	2	1	0	4	0	0	0	0	0	0
09:30	15	27	38	0	80	0	2	2	0	4	0	0	0	0	0	0
09:45	11	30	42	0	83	0	3	2	0	5	0	0	0	0	0	0
SUBTOTAL	212	221	345	0	778	8	25	25	0	58	0	0	0	0	0	2



Traffic Count Data

Intersection: Harvie Rd & Veterans Dr
 Site Code: 2128100001
 Municipality: Barrie
 Count Date: Dec 14, 2021

West Approach - Harvie Rd

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↻	Total	←	↑	→	↻	Total	←	↑	→	↻	Total	
07:00	13	25	16	0	54	2	0	0	0	2	0	0	0	0	0	0
07:15	19	26	18	0	63	2	1	0	0	3	0	0	0	0	0	0
07:30	16	47	24	0	87	0	0	1	0	1	0	0	0	0	0	0
07:45	25	45	24	0	94	1	2	2	0	5	0	0	0	0	0	0
08:00	18	33	23	0	74	0	0	1	0	1	0	0	0	0	0	0
08:15	22	34	22	0	78	2	1	0	0	3	0	0	0	0	0	0
08:30	19	37	26	0	82	1	3	2	0	6	0	0	0	0	0	0
08:45	27	33	18	0	78	4	1	1	0	6	0	0	0	0	0	0
09:00	15	29	21	0	65	1	0	0	0	1	0	0	0	0	0	0
09:15	18	29	12	0	59	0	1	0	0	1	0	0	0	0	0	0
09:30	22	31	13	0	66	2	1	1	0	4	0	0	0	0	0	0
09:45	17	28	15	0	60	1	1	0	0	2	0	0	0	0	0	0
SUBTOTAL	231	397	232	0	860	16	11	8	0	35	0	0	0	0	0	0



Traffic Count Data

Intersection: Harvie Rd & Veterans Dr
 Site Code: 2128100001
 Municipality: Barrie
 Count Date: Dec 14, 2021

West Approach - Harvie Rd

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↻	Total	←	↑	→	↻	Total	←	↑	→	↻	Total	
15:00	29	57	12	0	98	2	0	1	0	3	0	0	0	0	0	0
15:15	21	58	20	0	99	1	2	0	0	3	0	0	0	0	0	0
15:30	18	48	16	0	82	3	3	1	0	7	0	0	0	0	0	0
15:45	22	56	17	0	95	1	2	2	0	5	0	0	0	0	0	0
16:00	16	59	14	0	89	2	3	2	0	7	0	0	0	0	0	0
16:15	14	66	18	0	98	0	4	1	0	5	0	0	0	0	0	0
16:30	19	63	12	0	94	0	1	0	0	1	0	0	0	0	0	0
16:45	25	58	13	0	96	1	1	0	0	2	0	0	0	0	0	0
17:00	16	73	11	0	100	0	2	0	0	2	0	0	0	0	0	0
17:15	13	61	22	0	96	2	4	0	0	6	0	0	0	0	0	0
17:30	10	56	16	0	82	1	3	0	0	4	0	0	0	0	0	0
17:45	12	46	9	0	67	0	3	0	0	3	0	0	0	0	0	0
SUBTOTAL	215	701	180	0	1096	13	28	7	0	48	0	0	0	0	0	0
GRAND TOTAL	446	1098	412	0	1956	29	39	15	0	83	0	0	0	0	0	0

Peak Hour Diagram

Specified Period

From: 07:00:00
To: 10:00:00

One Hour Peak

From: 08:15:00
To: 09:15:00

Intersection: Harvie Rd & Veterans Dr
Site Code: 2128100001
Count Date: Dec 14, 2021

Weather conditions: Clear

**** Signalized Intersection ****

Major Road: Veterans Dr runs N/S

North Approach

	Out	In	Total
	674	419	1093
	27	25	52
	0	0	0
Totals	701	444	1145

Veterans Dr

	0	0	0	0
	6	18	3	0
	80	436	158	0
Totals	86	454	161	0

East Approach

	Out	In	Total
	266	366	632
	17	14	31
	0	0	0
Totals	283	380	663

Harvie Rd

	Out	In	Total
	0	0	0
	0	8	83
	0	5	133
Totals	0	91	138
	0	3	87
			90

Peds: 0

Peds: 0



Peds: 0

Peds: 0

Harvie Rd

Totals	Out	In	Total
0	0	0	0
115	110	5	0
89	80	9	0
79	76	3	0

West Approach

	Out	In	Total
	303	227	530
	16	20	36
	0	0	0
Totals	319	247	566

Totals	72	238	81	0
	67	226	75	0
	5	12	6	0
	0	0	0	0

Veterans Dr

South Approach

	Out	In	Total
	368	599	967
	23	24	47
	0	0	0
Totals	391	623	1014

- Cars

- Trucks

- Bicycles

Comments



Peak Hour Summary

Intersection: Harvie Rd & Veterans Dr
 Site Code: 2128100001
 Count Date: Dec 14, 2021
 Period: 07:00 - 10:00

Peak Hour Data (08:15 - 09:15)

Start Time	North Approach Veterans Dr						South Approach Veterans Dr						East Approach Harvie Rd						West Approach Harvie Rd						Total Vehic es
	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	
08:15	39	102	24	0	0	165	19	48	23	0	0	90	22	18	26	0	0	66	24	35	22	0	0	81	402
08:30	59	97	22	0	0	178	15	59	16	0	0	90	25	22	31	0	0	78	20	40	28	0	0	88	434
08:45	30	126	21	0	0	177	15	77	18	0	0	110	17	28	34	0	0	79	31	34	19	0	0	84	450
09:00	33	129	19	0	0	181	23	54	24	0	0	101	15	21	24	0	0	60	16	29	21	0	0	66	408
Grand Total	161	454	86	0	0	701	72	238	81	0	0	391	79	89	115	0	0	283	91	138	90	0	0	319	1694
Approach %	23	64.8	12.3	0	-	-	18.4	60.9	20.7	0	-	-	27.9	31.4	40.6	0	-	-	28.5	43.3	28.2	0	-	-	-
Totals %	9.5	26.8	5.1	0	41.4	23.1	4.3	14	4.8	0	23.1	4.7	5.3	6.8	0	16.7	5.4	8.1	5.3	0	18.8	18.8	-		
PHF	0.68	0.88	0.9	0	0.97	0.89	0.78	0.77	0.84	0	0.89	0.79	0.79	0.85	0	0.9	0.73	0.86	0.8	0	0.91	0.94	0.94		
Cars	158	436	80	0	674	368	67	226	75	0	368	76	80	110	0	266	83	133	87	0	303	1611			
% Cars	98.1	96	93	0	96.1	94.1	93.1	95	92.6	0	94.1	96.2	89.9	95.7	0	94	91.2	96.4	96.7	0	95	95.1			
Trucks	3	18	6	0	27	23	5	12	6	0	23	3	9	5	0	17	8	5	3	0	16	83			
% Trucks	1.9	4	7	0	3.9	5.9	6.9	5	7.4	0	5.9	3.8	10.1	4.3	0	6	8.8	3.6	3.3	0	5	4.9			
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
% Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
Peds					0	-					0	-					0	-					0	-	
% Peds					0	-					0	-					0	-					0	-	

Peak Hour Diagram

Specified Period

From: 15:00:00
To: 18:00:00

One Hour Peak

From: 16:15:00
To: 17:15:00

Intersection: Harvie Rd & Veterans Dr
Site Code: 2128100001
Count Date: Dec 14, 2021

Weather conditions: Clear

**** Signalized Intersection ****

Major Road: Veterans Dr runs N/S

North Approach

	Out	In	Total
	830	1087	1917
	23	21	44
	0	0	0
Totals	853	1108	1961

Veterans Dr

	0	0	0	0
	2	15	6	0
	74	520	236	0
Totals	76	535	242	0

East Approach

	Out	In	Total
	754	563	1317
	13	17	30
	0	0	0
Totals	767	580	1347

Harvie Rd

				Totals
	0	0	0	0
	0	1	74	75
	0	8	260	268
	0	1	54	55

Peds: 0

Peds: 0



Peds: 0

Peds: 0

Harvie Rd

Totals			
0	0	0	0
324	321	3	0
355	348	7	0
88	85	3	0

West Approach

	Out	In	Total
	388	498	886
	10	10	20
	0	0	0
Totals	398	508	906

Totals	77	709	70	0
	76	692	67	0
	1	17	3	0
	0	0	0	0

Veterans Dr

South Approach

	Out	In	Total
	835	659	1494
	21	19	40
	0	0	0
Totals	856	678	1534

- Cars

- Trucks

- Bicycles

Comments

Peak Hour Summary

Intersection: Harvie Rd & Veterans Dr
 Site Code: 2128100001
 Count Date: Dec 14, 2021
 Period: 15:00 - 18:00

Peak Hour Data (16:15 - 17:15)

Start Time	North Approach Veterans Dr						South Approach Veterans Dr						East Approach Harvie Rd						West Approach Harvie Rd						Total Vehic es
	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	
16:15	66	121	19	0	0	206	18	163	14	0	0	195	19	100	86	0	0	205	14	70	19	0	0	103	709
16:30	61	118	21	0	0	200	22	175	19	0	0	216	29	84	81	0	0	194	19	64	12	0	0	95	705
16:45	59	162	16	0	0	237	19	168	17	0	0	204	22	88	81	0	0	191	26	59	13	0	0	98	730
17:00	56	134	20	0	0	210	18	203	20	0	0	241	18	83	76	0	0	177	16	75	11	0	0	102	730
Grand Total	242	535	76	0	0	853	77	709	70	0	0	856	88	355	324	0	0	767	75	268	55	0	0	398	2874
Approach %	28.4	62.7	8.9	0	-	-	9	82.8	8.2	0	-	-	11.5	46.3	42.2	0	-	-	18.8	67.3	13.8	0	-	-	-
Totals %	8.4	18.6	2.6	0	29.7	-	2.7	24.7	2.4	0	29.8	-	3.1	12.4	11.3	0	26.7	-	2.6	9.3	1.9	0	13.8	-	-
PHF	0.92	0.83	0.9	0	0.9	0.88	0.87	0.88	0	0.89	0.76	0.89	0.94	0	0.94	0.72	0.89	0.72	0	0.97	0.98	0.97	0.97	0.98	0.98
Cars	236	520	74	0	830	76	692	67	0	835	85	348	321	0	754	74	260	54	0	388	2807				
% Cars	97.5	97.2	97.4	0	97.3	98.7	97.6	95.7	0	97.5	96.6	98	99.1	0	98.3	98.7	97	98.2	0	97.5	97.7				
Trucks	6	15	2	0	23	1	17	3	0	21	3	7	3	0	13	1	8	1	0	10	67				
% Trucks	2.5	2.8	2.6	0	2.7	1.3	2.4	4.3	0	2.5	3.4	2	0.9	0	1.7	1.3	3	1.8	0	2.5	2.3				
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
% Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
Peds					0	-				0	-				0	-				0	-			0	-
% Peds					0	-				0	-				0	-				0	-			0	-



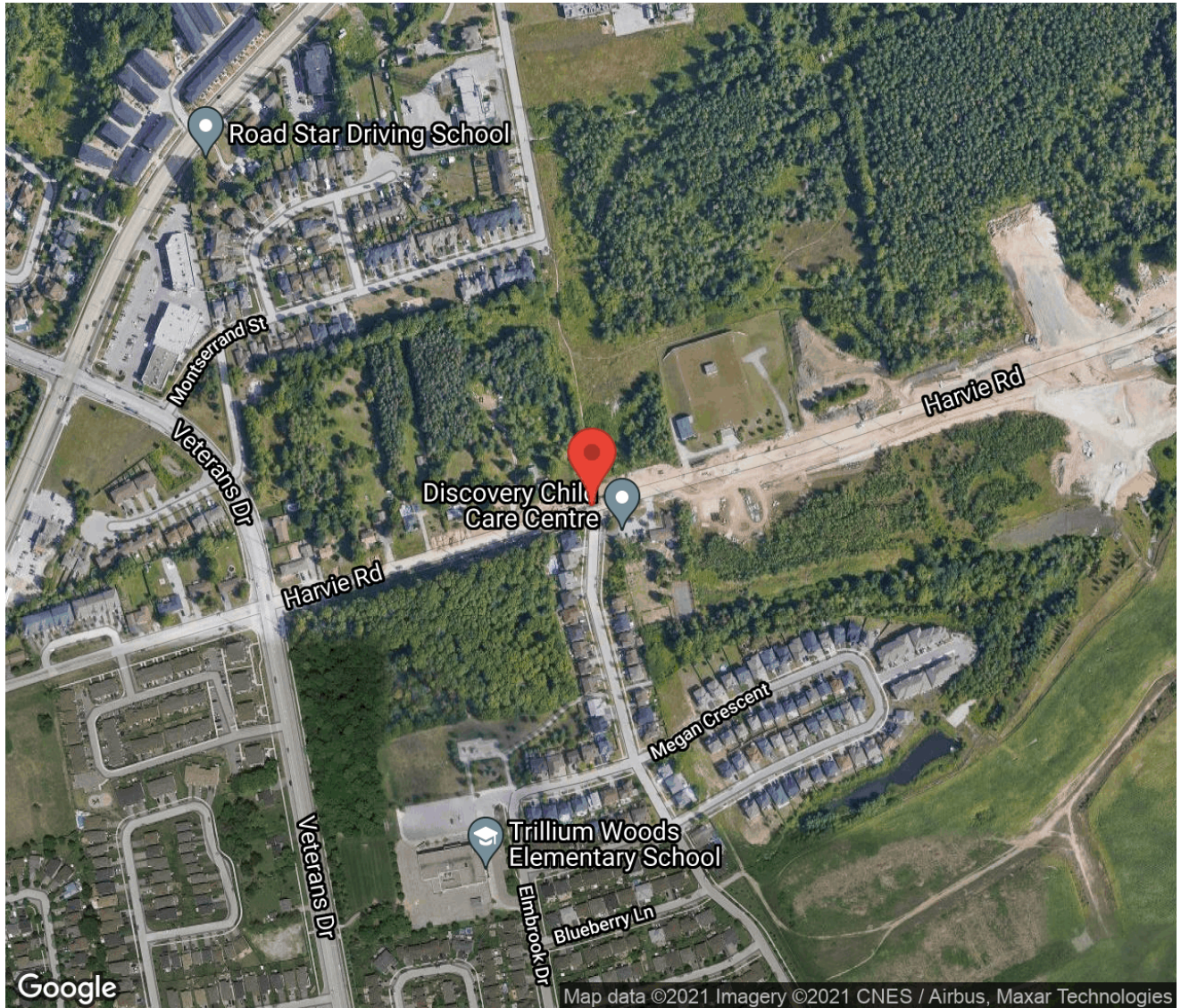
Project #21-281 - Tatham Engineering Ltd

Intersection Count Report

Intersection:	Harvie Rd & Thrushwood Dr
Municipality:	Barrie
Count Date:	Dec 14, 2021
Site Code:	2128100002
Count Categories:	Cars, Trucks, Bicycles, Pedestrians
Count Period:	07:00-10:00, 15:00-18:00
Weather:	Clear

Traffic Count Map

Intersection: Harvie Rd & Thrushwood Dr
Site Code: 2128100002
Municipality: Barrie
Count Date: Dec 14, 2021





Traffic Count Summary

Intersection: Harvie Rd & Thrushwood Dr
 Site Code: 2128100002
 Municipality: Barrie
 Count Date: Dec 14, 2021

Thrushwood Dr - Traffic Summary

Hour	North Approach Totals						South Approach Totals						Total
	Includes Cars, Trucks, Bicycles						Includes Cars, Trucks, Bicycles						
	Left	Thru	Right	U-Turn	Total	Peds	Left	Thru	Right	U-Turn	Total	Peds	
07:00 - 08:00	0	0	0	0	0	0	19	0	25	0	44	0	44
08:00 - 09:00	0	0	0	0	0	0	51	0	42	0	93	6	93
09:00 - 10:00	0	0	0	0	0	0	19	0	20	0	39	2	39
BREAK													
15:00 - 16:00	0	0	0	0	0	0	50	0	27	0	77	3	77
16:00 - 17:00	0	0	0	0	0	0	26	0	44	0	70	7	70
17:00 - 18:00	0	0	0	0	0	0	28	0	30	0	58	4	58
GRAND TOTAL	0	0	0	0	0	0	193	0	188	0	381	22	381

Traffic Count Summary

Intersection: Harvie Rd & Thrushwood Dr
 Site Code: 2128100002
 Municipality: Barrie
 Count Date: Dec 14, 2021

Harvie Rd - Traffic Summary

Hour	East Approach Totals						West Approach Totals						Total
	Includes Cars, Trucks, Bicycles						Includes Cars, Trucks, Bicycles						
	Left	Thru	Right	U-Turn	Total	Peds	Left	Thru	Right	U-Turn	Total	Peds	
07:00 - 08:00	10	234	0	0	244	0	0	332	27	0	359	0	603
08:00 - 09:00	24	233	0	0	257	9	0	283	88	0	371	0	628
09:00 - 10:00	9	278	0	0	287	1	0	293	30	0	323	0	610
BREAK													
15:00 - 16:00	27	590	0	0	617	4	0	469	40	0	509	0	1126
16:00 - 17:00	46	749	0	0	795	0	0	524	44	0	568	1	1363
17:00 - 18:00	17	619	0	0	636	1	0	493	35	0	528	0	1164
GRAND TOTAL	133	2703	0	0	2836	15	0	2394	264	0	2658	1	5494



Traffic Count Data

Intersection: Harvie Rd & Thrushwood Dr
 Site Code: 2128100002
 Municipality: Barrie
 Count Date: Dec 14, 2021

South Approach - Thrushwood Dr

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↻	Total	←	↑	→	↻	Total	←	↑	→	↻	Total	
07:00	3	0	2	0	5	0	0	0	0	0	0	0	0	0	0	0
07:15	4	0	4	0	8	0	0	0	0	0	0	0	0	0	0	0
07:30	4	0	11	0	15	0	0	0	0	0	0	0	0	0	0	0
07:45	8	0	8	0	16	0	0	0	0	0	0	0	0	0	0	0
08:00	3	0	7	0	10	2	0	0	0	2	0	0	0	0	0	0
08:15	9	0	11	0	20	0	0	0	0	0	0	0	0	0	0	2
08:30	20	0	15	0	35	2	0	0	0	2	0	0	0	0	0	2
08:45	15	0	9	0	24	0	0	0	0	0	0	0	0	0	0	2
09:00	6	0	4	0	10	0	0	0	0	0	0	0	0	0	0	1
09:15	8	0	7	0	15	0	0	0	0	0	0	0	0	0	0	0
09:30	2	0	5	0	7	0	0	0	0	0	0	0	0	0	0	0
09:45	3	0	4	0	7	0	0	0	0	0	0	0	0	0	0	1
SUBTOTAL	85	0	87	0	172	4	0	0	0	4	0	0	0	0	0	8



Traffic Count Data

Intersection: Harvie Rd & Thrushwood Dr
 Site Code: 2128100002
 Municipality: Barrie
 Count Date: Dec 14, 2021

South Approach - Thrushwood Dr

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↻	Total	←	↑	→	↻	Total	←	↑	→	↻	Total	
15:00	33	0	13	0	46	0	0	0	0	0	0	0	0	0	0	1
15:15	5	0	3	0	8	0	0	0	0	0	0	0	0	0	0	0
15:30	7	0	5	0	12	0	0	0	0	0	0	0	0	0	0	0
15:45	4	0	5	0	9	1	0	0	0	1	0	0	1	0	1	2
16:00	6	0	14	0	20	0	0	1	0	1	0	0	1	0	1	3
16:15	6	0	7	0	13	0	0	0	0	0	0	0	0	0	0	0
16:30	7	0	9	0	16	0	0	0	0	0	0	0	0	0	0	4
16:45	7	0	9	0	16	0	0	2	0	2	0	0	1	0	1	0
17:00	8	0	10	0	18	0	0	0	0	0	0	0	0	0	0	1
17:15	5	0	3	0	8	0	0	0	0	0	0	0	0	0	0	0
17:30	7	0	8	0	15	0	0	0	0	0	0	0	0	0	0	3
17:45	8	0	9	0	17	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL	103	0	95	0	198	1	0	3	0	4	0	0	3	0	3	14
GRAND TOTAL	188	0	182	0	370	5	0	3	0	8	0	0	3	0	3	22



Traffic Count Data

Intersection: Harvie Rd & Thrushwood Dr
 Site Code: 2128100002
 Municipality: Barrie
 Count Date: Dec 14, 2021

East Approach - Harvie Rd

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↺	Total	←	↑	→	↺	Total	←	↑	→	↺	Total	
07:00	2	39	0	0	41	0	8	0	0	8	0	0	0	0	0	0
07:15	0	50	0	0	50	0	5	0	0	5	0	0	0	0	0	0
07:30	5	62	0	0	67	0	4	0	0	4	0	0	0	0	0	0
07:45	3	59	0	0	62	0	7	0	0	7	0	0	0	0	0	0
08:00	2	54	0	0	56	0	2	0	0	2	0	0	0	0	0	0
08:15	6	51	0	0	57	0	4	0	0	4	0	0	0	0	0	5
08:30	10	54	0	0	64	1	4	0	0	5	0	0	0	0	0	3
08:45	4	58	0	0	62	1	6	0	0	7	0	0	0	0	0	1
09:00	4	53	0	0	57	0	1	0	0	1	0	0	0	0	0	0
09:15	1	55	0	0	56	0	4	0	0	4	0	0	0	0	0	0
09:30	2	77	0	0	79	0	4	0	0	4	0	0	0	0	0	0
09:45	2	79	0	0	81	0	5	0	0	5	0	0	0	0	0	1
SUBTOTAL	41	691	0	0	732	2	54	0	0	56	0	0	0	0	0	10



Traffic Count Data

Intersection: Harvie Rd & Thrushwood Dr
 Site Code: 2128100002
 Municipality: Barrie
 Count Date: Dec 14, 2021

East Approach - Harvie Rd

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↻	Total	←	↑	→	↻	Total	←	↑	→	↻	Total	
15:00	8	129	0	0	137	0	3	0	0	3	0	0	0	0	0	3
15:15	7	130	0	0	137	0	3	0	0	3	0	0	0	0	0	1
15:30	6	161	0	0	167	0	1	0	0	1	0	0	0	0	0	0
15:45	6	158	0	0	164	0	5	0	0	5	0	0	0	0	0	0
16:00	8	179	0	0	187	0	3	0	0	3	0	0	0	0	0	0
16:15	9	194	0	0	203	0	3	0	0	3	0	0	0	0	0	0
16:30	15	186	0	0	201	0	3	0	0	3	0	0	0	0	0	0
16:45	14	178	0	0	192	0	3	0	0	3	0	0	0	0	0	0
17:00	6	165	0	0	171	0	3	0	0	3	0	0	0	0	0	1
17:15	4	187	0	0	191	0	2	0	0	2	0	0	0	0	0	0
17:30	3	136	0	0	139	0	0	0	0	0	0	0	0	0	0	0
17:45	4	122	0	0	126	0	4	0	0	4	0	0	0	0	0	0
SUBTOTAL	90	1925	0	0	2015	0	33	0	0	33	0	0	0	0	0	5
GRAND TOTAL	131	2616	0	0	2747	2	87	0	0	89	0	0	0	0	0	15



Traffic Count Data

Intersection: Harvie Rd & Thrushwood Dr
 Site Code: 2128100002
 Municipality: Barrie
 Count Date: Dec 14, 2021

West Approach - Harvie Rd

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↻	Total	←	↑	→	↻	Total	←	↑	→	↻	Total	
07:00	0	68	3	0	71	0	0	0	0	0	0	0	0	0	0	0
07:15	0	69	2	0	71	0	1	0	0	1	0	0	0	0	0	0
07:30	0	98	10	0	108	0	2	1	0	3	0	0	0	0	0	0
07:45	0	91	10	0	101	0	3	1	0	4	0	0	0	0	0	0
08:00	0	61	14	0	75	0	2	1	0	3	0	0	0	0	0	0
08:15	0	60	34	0	94	0	2	0	0	2	0	0	0	0	0	0
08:30	0	81	32	0	113	0	3	0	0	3	0	0	0	0	0	0
08:45	0	72	5	0	77	0	2	2	0	4	0	0	0	0	0	0
09:00	0	70	11	0	81	0	4	1	0	5	0	0	0	0	0	0
09:15	0	66	7	0	73	0	3	0	0	3	0	0	0	0	0	0
09:30	0	72	6	0	78	0	3	0	0	3	0	0	0	0	0	0
09:45	0	73	5	0	78	0	2	0	0	2	0	0	0	0	0	0
SUBTOTAL	0	881	139	0	1020	0	27	6	0	33	0	0	0	0	0	0



Traffic Count Data

Intersection: Harvie Rd & Thrushwood Dr
 Site Code: 2128100002
 Municipality: Barrie
 Count Date: Dec 14, 2021

West Approach - Harvie Rd

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↺	Total	←	↑	→	↺	Total	←	↑	→	↺	Total	
15:00	0	115	12	0	127	0	3	0	0	3	0	0	0	0	0	0
15:15	0	111	8	0	119	0	3	0	0	3	0	0	0	0	0	0
15:30	0	110	9	0	119	0	4	0	0	4	0	0	0	0	0	0
15:45	0	121	11	0	132	0	2	0	0	2	0	0	0	0	0	0
16:00	0	125	12	0	137	0	8	0	0	8	0	0	0	0	0	0
16:15	0	125	13	0	138	0	8	0	0	8	0	0	0	0	0	1
16:30	0	129	10	0	139	0	2	0	0	2	0	0	0	0	0	0
16:45	0	123	9	0	132	0	4	0	0	4	0	0	0	0	0	0
17:00	0	138	10	0	148	0	4	1	0	5	0	0	0	0	0	0
17:15	0	128	8	0	136	0	5	0	0	5	0	0	0	0	0	0
17:30	0	114	9	0	123	0	5	0	0	5	0	0	0	0	0	0
17:45	0	94	7	0	101	0	5	0	0	5	0	0	0	0	0	0
SUBTOTAL	0	1433	118	0	1551	0	53	1	0	54	0	0	0	0	0	1
GRAND TOTAL	0	2314	257	0	2571	0	80	7	0	87	0	0	0	0	0	1

Peak Hour Diagram

Specified Period

From: 07:00:00
To: 10:00:00

One Hour Peak

From: 07:45:00
To: 08:45:00

Intersection: Harvie Rd & Thrushwood Dr
Site Code: 2128100002
Count Date: Dec 14, 2021

Weather conditions: Clear

**** Unsignalized Intersection ****

Major Road: Harvie Rd runs E/W

East Approach

	Out	In	Total
	239	334	573
	18	10	28
	0	0	0
	257	344	601

Harvie Rd

			Totals
0	0	0	0
0	10	293	303
0	2	90	92

Peds: 0

Peds: 0



Peds: 8

Peds: 4

Harvie Rd

Totals			
0	0	0	0
235	218	17	0
22	21	1	0

West Approach

Out	In	Total
383	258	641
12	21	33
0	0	0
395	279	674

Totals			
44	41	0	0
	40	41	0
	4	0	0
	0	0	0

Thrushwood Dr

South Approach

Out	In	Total
81	111	192
4	3	7
0	0	0
85	114	199

- Cars

- Trucks

- Bicycles

Comments



Peak Hour Summary

Intersection: Harvie Rd & Thrushwood Dr
 Site Code: 2128100002
 Count Date: Dec 14, 2021
 Period: 07:00 - 10:00

Peak Hour Data (07:45 - 08:45)

Start Time	North Approach				South Approach Thrushwood Dr				East Approach Harvie Rd				West Approach Harvie Rd				Total Vehicles									
	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	←	↑	→	↻		Peds	Total							
07:45					0		8		8	0	0	16	3	66			0	0	69		94	11	0	0	105	190
08:00					0		5		7	0	0	12	2	56			0	0	58		63	15	0	0	78	148
08:15					0		9		11	0	2	20	6	55			0	5	61		62	34	0	0	96	177
08:30					0		22		15	0	2	37	11	58			0	3	69		84	32	0	0	116	222
Grand Total					0	0	44	41	0	4	85	22	235	0	8	257	303	92	0	0	395	737				
Approach %					-		51.8	48.2	0	-		8.6	91.4	0	-		76.7	23.3	0	-						
Totals %					0		6	5.6	0	11.5		3	31.9	0	34.9		41.1	12.5	0	53.6						
PHF					0	0.5	0.68	0	0.57	0.5	0.89	0	0.93	0.81	0.68	0	0.85	0.83								
Cars					0		40	41	0	81		21	218	0	239		293	90	0	383		703				
% Cars					0		90.9	100	0	95.3		95.5	92.8	0	93		96.7	97.8	0	97		95.4				
Trucks					0		4	0	0	4		1	17	0	18		10	2	0	12		34				
% Trucks					0		9.1	0	0	4.7		4.5	7.2	0	7		3.3	2.2	0	3		4.6				
Bicycles					0		0	0	0	0		0	0	0	0		0	0	0	0		0				
% Bicycles					0		0	0	0	0		0	0	0	0		0	0	0	0		0				
Peds					0	-				4	-				8	-				0	-	12				
% Peds					0	-				33.3	-				66.7	-				0	-					

Peak Hour Diagram

Specified Period

From: 15:00:00
To: 18:00:00

One Hour Peak

From: 16:00:00
To: 17:00:00




Intersection: Harvie Rd & Thrushwood Dr
Site Code: 2128100002
Count Date: Dec 14, 2021

Weather conditions: Clear




**** Unsignalized Intersection ****

Major Road: Harvie Rd runs E/W

East Approach

	Out	In	Total
	783	541	1324
	12	25	37
	0	2	2
	795	568	1363

Harvie Rd

			Totals
0	0	0	0
0	22	502	524
0	0	44	44




Peds: 1

Peds: 0






Peds: 0







Harvie Rd

Totals			
0	0	0	0
749	737	12	0
46	46	0	0

Peds: 7




West Approach

	Out	In	Total
	546	763	1309
	22	12	34
	0	0	0
	568	775	1343


Totals			
26	44	0	
	26	39	0
	0	3	0
	0	2	0

Thrushwood Dr

South Approach

	Out	In	Total
	65	90	155
	3	0	3
	2	0	2
	70	90	160

 - Cars

 - Trucks

 - Bicycles

Comments



Peak Hour Summary

Intersection: Harvie Rd & Thrushwood Dr
 Site Code: 2128100002
 Count Date: Dec 14, 2021
 Period: 15:00 - 18:00

Peak Hour Data (16:00 - 17:00)

Start Time	North Approach				South Approach Thrushwood Dr				East Approach Harvie Rd				West Approach Harvie Rd				Total Vehicles										
	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	←	↑	→	↻		Peds	Total								
16:00					0		6		16	0	3	22	8	182			0	0	190			133	12	0	0	145	357
16:15					0		6		7	0	0	13	9	197			0	0	206			133	13	0	1	146	365
16:30					0		7		9	0	4	16	15	189			0	0	204			131	10	0	0	141	361
16:45					0		7		12	0	0	19	14	181			0	0	195			127	9	0	0	136	350
Grand Total					0	0	26	44	0	7	70	46	749	0	0	795	524	44	0	1	568	1433					
Approach %					-		37.1	62.9	0	-		5.8	94.2	0	-		92.3	7.7	0	-							
Totals %					0		1.8	3.1	0	4.9		3.2	52.3	0	55.5		36.6	3.1	0	39.6							
PHF					0	0.93	0.69	0	0.8	0.77	0.95	0	0.96	0.98	0.85	0	0.97	0.98	0.85	0	0.97	0.98					
Cars					0		26	39	0	65		46	737	0	783		502	44	0	546	1394						
% Cars					0		100	88.6	0	92.9		100	98.4	0	98.5		95.8	100	0	96.1	97.3						
Trucks					0		0	3	0	3		0	12	0	12		22	0	0	22	37						
% Trucks					0		0	6.8	0	4.3		0	1.6	0	1.5		4.2	0	0	3.9	2.6						
Bicycles					0		0	2	0	2		0	0	0	0		0	0	0	0	2						
% Bicycles					0		0	4.5	0	2.9		0	0	0	0		0	0	0	0	0.1						
Peds					0	-			7	-				0	-				1	-		8					
% Peds					0	-			87.5	-				0	-				12.5	-							



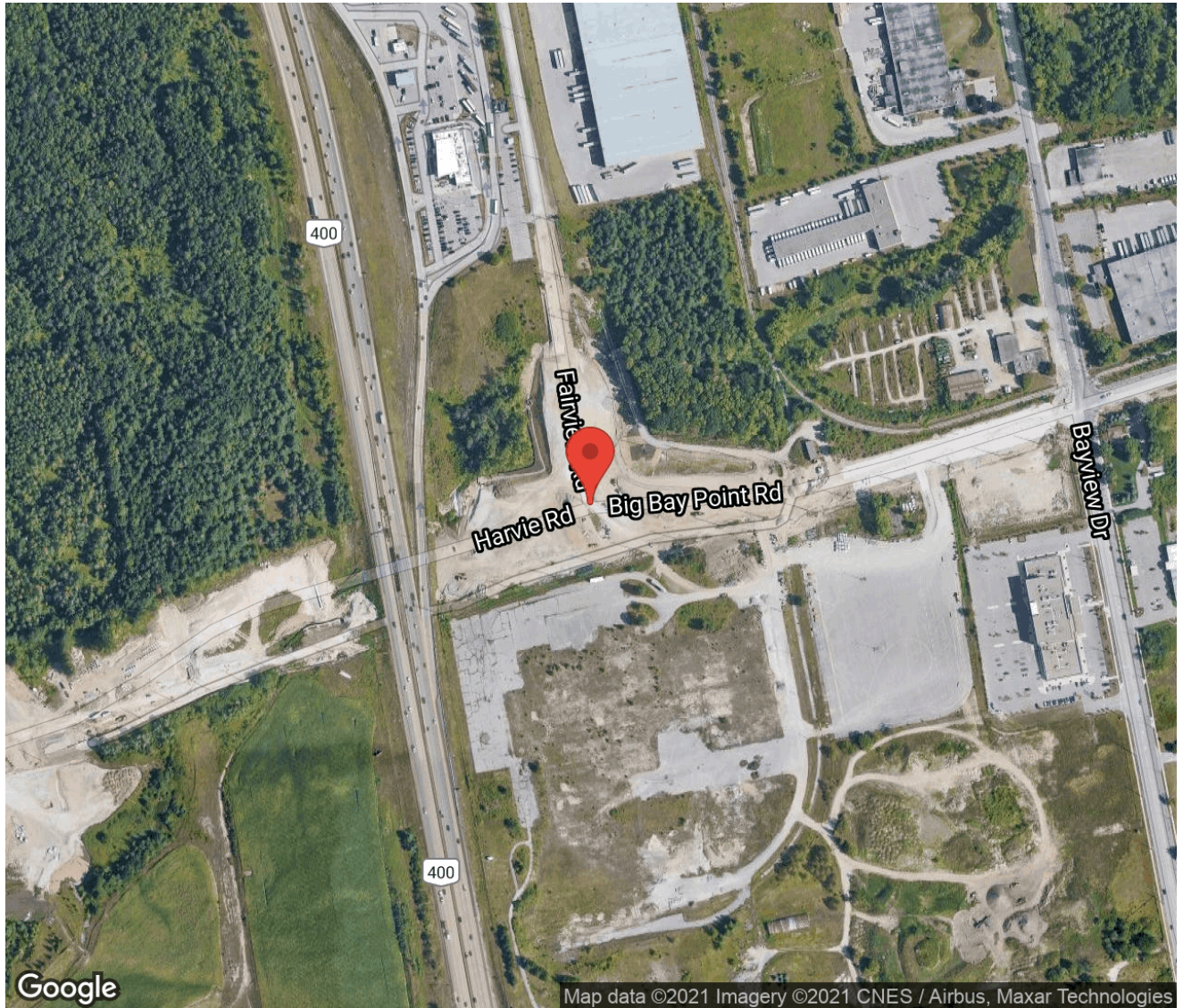
Project #21-281 - Tatham Engineering Ltd

Intersection Count Report

Intersection:	Harvie Rd & Fairview Dr
Municipality:	Barrie
Count Date:	Dec 14, 2021
Site Code:	2128100003
Count Categories:	Cars, Trucks, Bicycles, Pedestrians
Count Period:	07:00-10:00, 15:00-18:00
Weather:	Clear

Traffic Count Map

Intersection: Harvie Rd & Fairview Dr
Site Code: 2128100003
Municipality: Barrie
Count Date: Dec 14, 2021



Traffic Count Summary

Intersection: Harvie Rd & Fairview Dr
 Site Code: 2128100003
 Municipality: Barrie
 Count Date: Dec 14, 2021

Harvie Rd - Traffic Summary

Hour	East Approach Totals						West Approach Totals						Total
	Includes Cars, Trucks, Bicycles						Includes Cars, Trucks, Bicycles						
	Left	Thru	Right	U-Turn	Total	Peds	Left	Thru	Right	U-Turn	Total	Peds	
07:00 - 08:00	0	238	173	0	411	0	33	331	0	0	364	0	775
08:00 - 09:00	0	264	239	0	503	0	46	341	0	0	387	0	890
09:00 - 10:00	0	248	260	0	508	0	25	281	0	0	306	0	814
BREAK													
15:00 - 16:00	0	480	402	0	882	0	54	330	0	0	384	0	1266
16:00 - 17:00	0	508	422	0	930	0	51	351	0	0	402	0	1332
17:00 - 18:00	0	396	453	0	849	0	51	293	0	0	344	0	1193
GRAND TOTAL	0	2134	1949	0	4083	0	260	1927	0	0	2187	0	6270



Traffic Count Data

Intersection: Harvie Rd & Fairview Dr
 Site Code: 2128100003
 Municipality: Barrie
 Count Date: Dec 14, 2021

North Approach - Fairview Dr

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↻	Total	←	↑	→	↻	Total	←	↑	→	↻	Total	
07:00	60	0	6	0	66	7	0	0	0	7	0	0	0	0	0	0
07:15	36	0	8	0	44	3	0	1	0	4	0	0	0	0	0	0
07:30	52	0	7	0	59	4	0	0	0	4	0	0	0	0	0	0
07:45	70	0	5	0	75	2	0	0	0	2	0	0	0	0	0	0
08:00	45	0	9	0	54	6	0	0	0	6	0	0	0	0	0	0
08:15	26	0	11	0	37	4	0	0	0	4	0	0	0	0	0	0
08:30	48	0	10	0	58	4	0	1	0	5	0	0	0	0	0	0
08:45	63	0	6	0	69	3	0	0	0	3	0	0	0	0	0	0
09:00	49	0	12	0	61	7	0	0	0	7	0	0	0	0	0	1
09:15	39	0	7	0	46	4	0	0	0	4	0	0	0	0	0	0
09:30	38	0	2	0	40	5	0	0	0	5	0	0	0	0	0	0
09:45	30	0	8	0	38	7	0	0	0	7	0	0	0	0	0	0
SUBTOTAL	556	0	91	0	647	56	0	2	0	58	0	0	0	0	0	1



Traffic Count Data

Intersection: Harvie Rd & Fairview Dr
 Site Code: 2128100003
 Municipality: Barrie
 Count Date: Dec 14, 2021

North Approach - Fairview Dr

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↻	Total	←	↑	→	↻	Total	←	↑	→	↻	Total	
15:00	54	0	18	0	72	4	0	0	0	4	0	0	0	0	0	0
15:15	52	0	22	0	74	7	0	1	0	8	0	0	0	0	0	0
15:30	59	0	30	0	89	9	0	1	0	10	0	0	0	0	0	0
15:45	51	0	13	0	64	2	0	0	0	2	0	0	0	0	0	0
16:00	67	0	16	0	83	8	0	0	0	8	0	0	0	0	0	0
16:15	48	0	12	0	60	5	0	0	0	5	0	0	0	0	0	0
16:30	78	0	13	0	91	3	0	0	0	3	0	0	0	0	0	0
16:45	60	0	15	0	75	9	0	1	0	10	0	0	0	0	0	0
17:00	53	0	21	0	74	3	0	0	0	3	0	0	0	0	0	0
17:15	50	0	15	0	65	2	0	1	0	3	0	0	0	0	0	0
17:30	61	0	16	0	77	7	0	1	0	8	0	0	0	0	0	0
17:45	56	0	14	0	70	8	0	0	0	8	0	0	0	0	0	0
SUBTOTAL	689	0	205	0	894	67	0	5	0	72	0	0	0	0	0	0
GRAND TOTAL	1245	0	296	0	1541	123	0	7	0	130	0	0	0	0	0	1



Traffic Count Data

Intersection: Harvie Rd & Fairview Dr
 Site Code: 2128100003
 Municipality: Barrie
 Count Date: Dec 14, 2021

East Approach - Harvie Rd

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↻	Total	←	↑	→	↻	Total	←	↑	→	↻	Total	
07:00	0	52	31	0	83	0	5	6	0	11	0	0	0	0	0	0
07:15	0	51	33	0	84	0	7	10	0	17	0	0	0	0	0	0
07:30	0	61	34	0	95	0	6	9	0	15	0	0	0	0	0	0
07:45	0	48	45	0	93	0	8	5	0	13	0	0	0	0	0	0
08:00	0	57	35	0	92	0	1	5	0	6	0	0	0	0	0	0
08:15	0	79	46	0	125	0	6	5	0	11	0	0	0	0	0	0
08:30	0	53	55	0	108	0	6	10	0	16	0	0	0	0	0	0
08:45	0	55	64	0	119	0	7	19	0	26	0	0	0	0	0	0
09:00	0	62	61	0	123	0	5	14	0	19	0	0	0	0	0	0
09:15	0	49	51	0	100	0	5	11	0	16	0	0	0	0	0	0
09:30	0	60	52	0	112	0	4	9	0	13	0	0	0	0	0	0
09:45	0	62	50	0	112	0	1	12	0	13	0	0	0	0	0	0
SUBTOTAL	0	689	557	0	1246	0	61	115	0	176	0	0	0	0	0	0



Traffic Count Data

Intersection: Harvie Rd & Fairview Dr
 Site Code: 2128100003
 Municipality: Barrie
 Count Date: Dec 14, 2021

East Approach - Harvie Rd

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↻	Total	←	↑	→	↻	Total	←	↑	→	↻	Total	
15:00	0	112	93	0	205	0	3	6	0	9	0	0	0	0	0	0
15:15	0	118	99	0	217	0	5	5	0	10	0	0	0	0	0	0
15:30	0	115	96	0	211	0	6	7	0	13	0	0	0	0	0	0
15:45	0	113	90	0	203	0	8	6	0	14	0	0	0	0	0	0
16:00	0	133	110	0	243	0	4	6	0	10	0	0	0	0	0	0
16:15	0	94	95	0	189	0	1	3	0	4	0	0	0	0	0	0
16:30	0	139	102	0	241	0	6	5	0	11	0	0	0	0	0	0
16:45	0	126	95	0	221	0	5	6	0	11	0	0	0	0	0	0
17:00	0	126	112	0	238	0	2	3	0	5	0	0	0	0	0	0
17:15	0	97	123	0	220	0	3	3	0	6	0	0	0	0	0	0
17:30	0	76	112	0	188	0	5	3	0	8	0	0	0	0	0	0
17:45	0	83	93	0	176	0	4	4	0	8	0	0	0	0	0	0
SUBTOTAL	0	1332	1220	0	2552	0	52	57	0	109	0	0	0	0	0	0
GRAND TOTAL	0	2021	1777	0	3798	0	113	172	0	285	0	0	0	0	0	0



Traffic Count Data

Intersection: Harvie Rd & Fairview Dr
 Site Code: 2128100003
 Municipality: Barrie
 Count Date: Dec 14, 2021

West Approach - Harvie Rd

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↻	Total	←	↑	→	↻	Total	←	↑	→	↻	Total	
07:00	5	42	0	0	47	0	1	0	0	1	0	0	0	0	0	0
07:15	9	76	0	0	85	0	3	0	0	3	0	0	0	0	0	0
07:30	8	88	0	0	96	0	3	0	0	3	0	0	0	0	0	0
07:45	11	118	0	0	129	0	0	0	0	0	0	0	0	0	0	0
08:00	13	82	0	0	95	0	0	0	0	0	0	0	0	0	0	0
08:15	3	77	0	0	80	1	1	0	0	2	0	0	0	0	0	0
08:30	15	73	0	0	88	0	4	0	0	4	0	0	0	0	0	0
08:45	14	103	0	0	117	0	1	0	0	1	0	0	0	0	0	0
09:00	7	63	0	0	70	0	3	0	0	3	0	0	0	0	0	0
09:15	10	77	0	0	87	0	2	0	0	2	0	0	0	0	0	0
09:30	2	48	0	0	50	0	3	0	0	3	0	0	0	0	0	0
09:45	6	84	0	0	90	0	1	0	0	1	0	0	0	0	0	0
SUBTOTAL	103	931	0	0	1034	1	22	0	0	23	0	0	0	0	0	0



Traffic Count Data

Intersection: Harvie Rd & Fairview Dr
 Site Code: 2128100003
 Municipality: Barrie
 Count Date: Dec 14, 2021

West Approach - Harvie Rd

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↻	Total	←	↑	→	↻	Total	←	↑	→	↻	Total	
15:00	9	68	0	0	77	0	5	0	0	5	0	0	0	0	0	0
15:15	11	72	0	0	83	0	6	0	0	6	0	0	0	0	0	0
15:30	19	79	0	0	98	0	8	0	0	8	0	0	0	0	0	0
15:45	14	85	0	0	99	1	7	0	0	8	0	0	0	0	0	0
16:00	14	83	0	0	97	0	8	0	0	8	0	0	0	0	0	0
16:15	5	89	0	0	94	0	5	0	0	5	0	0	0	0	0	0
16:30	17	74	0	0	91	0	7	0	0	7	0	0	0	0	0	0
16:45	15	77	0	0	92	0	8	0	0	8	0	0	0	0	0	0
17:00	10	63	0	0	73	1	3	0	0	4	0	0	0	0	0	0
17:15	13	74	0	0	87	0	2	0	0	2	0	0	0	0	0	0
17:30	14	74	0	0	88	1	2	0	0	3	0	0	0	0	0	0
17:45	12	71	0	0	83	0	4	0	0	4	0	0	0	0	0	0
SUBTOTAL	153	909	0	0	1062	3	65	0	0	68	0	0	0	0	0	0
GRAND TOTAL	256	1840	0	0	2096	4	87	0	0	91	0	0	0	0	0	0

Peak Hour Diagram

Specified Period

From: 07:00:00
To: 10:00:00

One Hour Peak

From: 08:15:00
To: 09:15:00




Intersection: Harvie Rd & Fairview Dr
Site Code: 2128100003
Count Date: Dec 14, 2021

Weather conditions: Clear




**** Unsignalized Intersection ****




Major Road: Harvie Rd runs E/W

North Approach




	Out	In	Total
	225	265	490
	19	49	68
	0	0	0
Totals	244	314	558

Fairview Dr







	0	0	0
	1	18	0
	39	186	0
Totals	40	204	0

East Approach

	Out	In	Total
	475	502	977
	72	27	99
	0	0	0
Totals	547	529	1076

Harvie Rd

				Totals
	0	0	0	0
	0	1	39	40
	0	9	316	325

Peds: 1




Peds: 0






Peds: 0

Peds: 0


Harvie Rd

Totals			
0	0	0	0
274	226	48	0
273	249	24	0

West Approach

	Out	In	Total
	355	288	643
	10	25	35
	0	0	0
Totals	365	313	678

 - Cars

 - Trucks

 - Bicycles

Comments



Peak Hour Summary

Intersection: Harvie Rd & Fairview Dr
 Site Code: 2128100003
 Count Date: Dec 14, 2021
 Period: 07:00 - 10:00

Peak Hour Data (08:15 - 09:15)

Start Time	North Approach Fairview Dr						South Approach				East Approach Harvie Rd						West Approach Harvie Rd						Total Vehic es		
	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	←	↑	→	↻		Peds	Total
08:15	30		11	0	0	41					0		85	51	0	0	136	4	78			0	0	82	259
08:30	52		11	0	0	63					0		59	65	0	0	124	15	77			0	0	92	279
08:45	66		6	0	0	72					0		62	83	0	0	145	14	104			0	0	118	335
09:00	56		12	0	1	68					0		67	75	0	0	142	7	66			0	0	73	283
Grand Total	204		40	0	1	244					0	0	273	274	0	0	547	40	325			0	0	365	1156
Approach %	83.6		16.4	0	-	-					-	-	49.9	50.1	0	-	-	11	89			0	-	-	-
Totals %	17.6		3.5	0	21.1						0		23.6	23.7	0	47.3		3.5	28.1			0		31.6	
PHF	0.77		0.83	0	0.85						0		0.8	0.83	0	0.94		0.67	0.78			0		0.77	0.86
Cars	186		39	0		225					0		249	226	0	475		39	316			0		355	1055
% Cars	91.2		97.5	0		92.2					0		91.2	82.5	0	86.8		97.5	97.2			0		97.3	91.3
Trucks	18		1	0		19					0		24	48	0	72		1	9			0		10	101
% Trucks	8.8		2.5	0		7.8					0		8.8	17.5	0	13.2		2.5	2.8			0		2.7	8.7
Bicycles	0		0	0		0					0		0	0	0	0		0	0			0		0	0
% Bicycles	0		0	0		0					0		0	0	0	0		0	0			0		0	0
Peds					1	-					0	-				0	-					0	-		1
% Peds					100	-					0	-				0	-					0	-		

Peak Hour Diagram

Specified Period

From: 15:00:00
To: 18:00:00

One Hour Peak

From: 16:00:00
To: 17:00:00

Intersection: Harvie Rd & Fairview Dr
Site Code: 2128100003
Count Date: Dec 14, 2021

Weather conditions: Clear

**** Unsignalized Intersection ****

Major Road: Harvie Rd runs E/W

North Approach

	Out	In	Total
	309	453	762
	26	20	46
	0	0	0
Totals	335	473	808

Fairview Dr

	0	0	0
	1	25	0
	56	253	0
Totals	57	278	0

East Approach

	Out	In	Total
	894	576	1470
	36	53	89
	0	0	0
Totals	930	629	1559

Harvie Rd

				Totals
	0	0	0	0
	0	0	51	51
	0	28	323	351

Peds: 0

Peds: 0



Peds: 0

Peds: 0

Harvie Rd

Totals			
0	0	0	0
422	402	20	0
508	492	16	0

West Approach

	Out	In	Total
	374	548	922
	28	17	45
	0	0	0
Totals	402	565	967

- Cars

- Trucks

- Bicycles

Comments



Peak Hour Summary

Intersection: Harvie Rd & Fairview Dr
 Site Code: 2128100003
 Count Date: Dec 14, 2021
 Period: 15:00 - 18:00

Peak Hour Data (16:00 - 17:00)

Start Time	North Approach Fairview Dr						South Approach				East Approach Harvie Rd						West Approach Harvie Rd						Total Vehi cles			
	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	←	↑	→	↻		Peds	Total	
16:00	75		16	0	0	91					0			137	116	0	0	253	14	91			0	0	105	449
16:15	53		12	0	0	65					0			95	98	0	0	193	5	94			0	0	99	357
16:30	81		13	0	0	94					0			145	107	0	0	252	17	81			0	0	98	444
16:45	69		16	0	0	85					0			131	101	0	0	232	15	85			0	0	100	417
Grand Total	278		57	0	0	335					0	0		508	422	0	0	930	51	351			0	0	402	1667
Approach %	83		17	0	-	-					-	-		54.6	45.4	0	-	-	12.7	87.3			0	-	-	
Totals %	16.7		3.4	0	20.1						0			30.5	25.3	0	55.8		3.1	21.1			0	24.1		
PHF	0.86		0.89	0	0.89						0			0.88	0.91	0	0.92		0.75	0.93			0	0.96	0.93	
Cars	253		56	0		309					0			492	402	0	894		51	323			0	374	1577	
% Cars	91		98.2	0		92.2					0			96.9	95.3	0	96.1		100	92			0	93	94.6	
Trucks	25		1	0		26					0			16	20	0	36		0	28			0	28	90	
% Trucks	9		1.8	0		7.8					0			3.1	4.7	0	3.9		0	8			0	7	5.4	
Bicycles	0		0	0		0					0			0	0	0	0		0	0			0	0	0	
% Bicycles	0		0	0		0					0			0	0	0	0		0	0			0	0	0	
Peds					0	-					0	-					0	-					0	-	0	
% Peds					0	-					0	-					0	-					0	-	0	



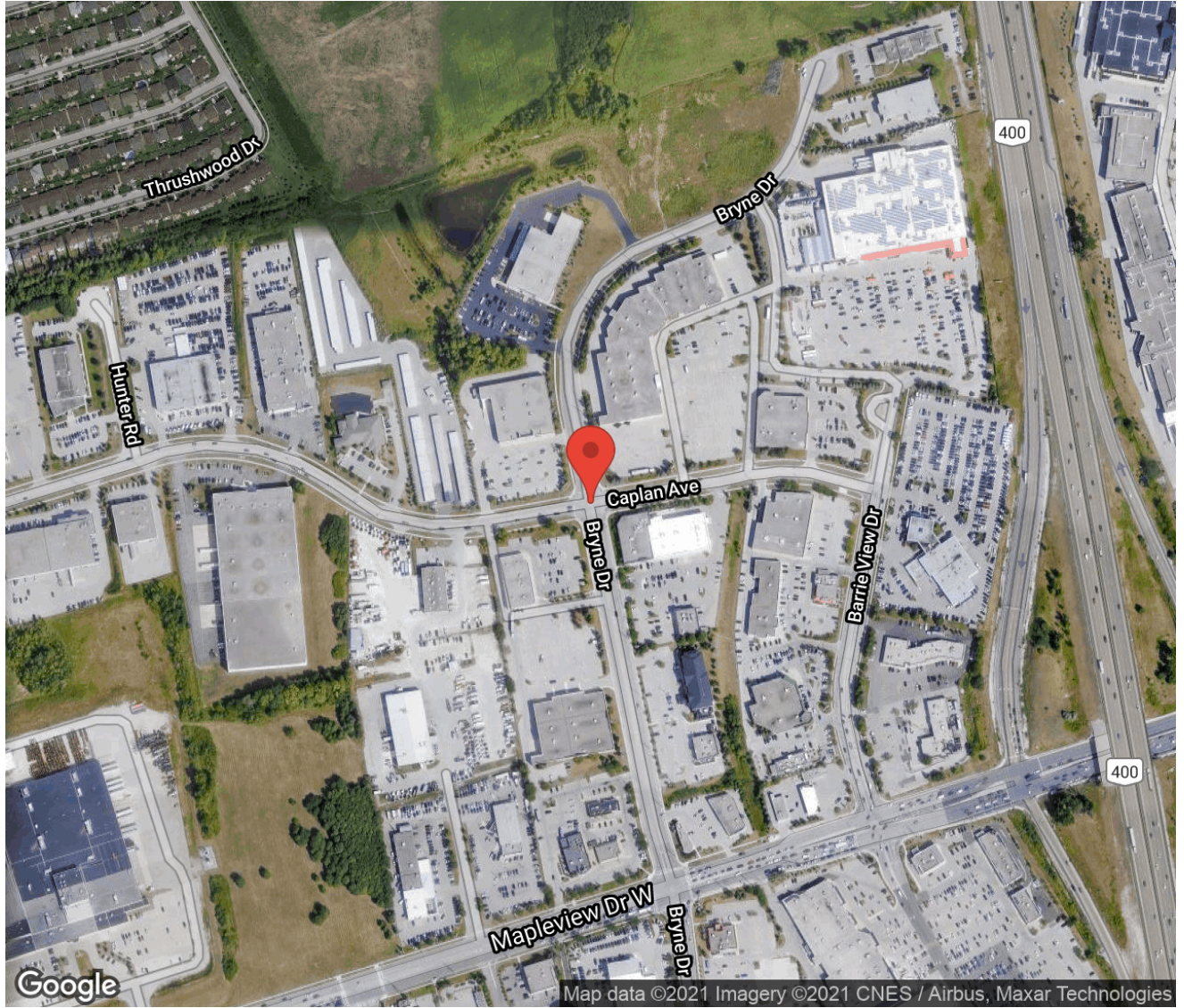
Project #21-281 - Tatham Engineering Ltd

Intersection Count Report

Intersection:	Bryne Dr & Caplan Ave
Municipality:	Barrie
Count Date:	Dec 14, 2021
Site Code:	2128100004
Count Categories:	Cars, Trucks, Bicycles, Pedestrians
Count Period:	07:00-10:00, 15:00-18:00
Weather:	Clear

Traffic Count Map

Intersection: Bryne Dr & Caplan Ave
Site Code: 2128100004
Municipality: Barrie
Count Date: Dec 14, 2021



Traffic Count Summary

Intersection: Bryne Dr & Caplan Ave
 Site Code: 2128100004
 Municipality: Barrie
 Count Date: Dec 14, 2021

Bryne Dr - Traffic Summary

Hour	North Approach Totals						South Approach Totals						Total
	Includes Cars, Trucks, Bicycles						Includes Cars, Trucks, Bicycles						
	Left	Thru	Right	U-Turn	Total	Peds	Left	Thru	Right	U-Turn	Total	Peds	
07:00 - 08:00	0	6	2	0	8	0	36	9	20	0	65	0	73
08:00 - 09:00	7	23	7	0	37	3	43	31	26	0	100	0	137
09:00 - 10:00	9	35	22	0	66	1	94	46	55	0	195	1	261
BREAK													
15:00 - 16:00	16	84	44	0	144	2	252	63	71	0	386	5	530
16:00 - 17:00	10	62	34	0	106	3	230	45	72	0	347	4	453
17:00 - 18:00	6	40	41	0	87	1	254	37	77	0	368	0	455
GRAND TOTAL	48	250	150	0	448	10	909	231	321	0	1461	10	1909

Traffic Count Summary

Intersection: Bryne Dr & Caplan Ave
 Site Code: 2128100004
 Municipality: Barrie
 Count Date: Dec 14, 2021

Caplan Ave - Traffic Summary

Hour	East Approach Totals						West Approach Totals						Total
	Includes Cars, Trucks, Bicycles						Includes Cars, Trucks, Bicycles						
	Left	Thru	Right	U-Turn	Total	Peds	Left	Thru	Right	U-Turn	Total	Peds	
07:00 - 08:00	8	75	2	0	85	0	5	78	17	0	100	0	185
08:00 - 09:00	20	125	9	0	154	0	23	171	84	0	278	1	432
09:00 - 10:00	56	149	19	0	224	1	32	180	140	0	352	0	576
BREAK													
15:00 - 16:00	65	281	33	0	379	0	32	230	152	0	414	5	793
16:00 - 17:00	58	308	19	0	385	4	27	200	177	0	404	2	789
17:00 - 18:00	73	325	22	0	420	0	25	206	183	0	414	3	834
GRAND TOTAL	280	1263	104	0	1647	5	144	1065	753	0	1962	11	3609



Traffic Count Data

Intersection: Bryne Dr & Caplan Ave
 Site Code: 2128100004
 Municipality: Barrie
 Count Date: Dec 14, 2021

North Approach - Bryne Dr

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↻	Total	←	↑	→	↻	Total	←	↑	→	↻	Total	
07:00	0	1	0	0	1	0	1	0	0	1	0	0	0	0	0	0
07:15	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0
07:30	0	1	2	0	3	0	0	0	0	0	0	0	0	0	0	0
07:45	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0
08:00	3	1	1	0	5	0	0	0	0	0	0	0	0	0	0	2
08:15	1	5	4	0	10	0	0	0	0	0	0	0	0	0	0	1
08:30	1	6	2	0	9	0	1	0	0	1	0	0	0	0	0	0
08:45	2	9	0	0	11	0	1	0	0	1	0	0	0	0	0	0
09:00	2	1	3	0	6	0	1	0	0	1	0	0	0	0	0	0
09:15	4	12	5	0	21	0	0	1	0	1	0	0	0	0	0	0
09:30	3	9	9	0	21	0	0	0	0	0	0	0	0	0	0	0
09:45	0	11	4	0	15	0	1	0	0	1	0	0	0	0	0	1
SUBTOTAL	16	59	30	0	105	0	5	1	0	6	0	0	0	0	0	4



Traffic Count Data

Intersection: Bryne Dr & Caplan Ave
 Site Code: 2128100004
 Municipality: Barrie
 Count Date: Dec 14, 2021

North Approach - Bryne Dr

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↻	Total	←	↑	→	↻	Total	←	↑	→	↻	Total	
15:00	5	18	9	0	32	0	1	1	0	2	0	1	0	0	1	0
15:15	4	27	9	0	40	0	2	0	0	2	0	0	0	0	0	1
15:30	4	15	15	0	34	0	0	1	0	1	0	0	0	0	0	0
15:45	3	20	8	0	31	0	0	1	0	1	0	0	0	0	0	1
16:00	3	18	12	0	33	0	2	0	0	2	0	0	0	0	0	0
16:15	4	16	8	0	28	0	0	0	0	0	0	0	0	0	0	0
16:30	2	18	11	0	31	0	0	0	0	0	0	0	0	0	0	0
16:45	1	8	3	0	12	0	0	0	0	0	0	0	0	0	0	3
17:00	1	12	7	0	20	0	0	0	0	0	0	0	0	0	0	1
17:15	2	14	21	0	37	0	0	0	0	0	0	0	0	0	0	0
17:30	2	8	7	0	17	0	0	0	0	0	0	0	0	0	0	0
17:45	1	6	6	0	13	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL	32	180	116	0	328	0	5	3	0	8	0	1	0	0	1	6
GRAND TOTAL	48	239	146	0	433	0	10	4	0	14	0	1	0	0	1	10



Traffic Count Data

Intersection: Bryne Dr & Caplan Ave
 Site Code: 2128100004
 Municipality: Barrie
 Count Date: Dec 14, 2021

South Approach - Bryne Dr

Start Time	Cars					Trucks					Bicycles					Total Peds	
	←	↑	→	↻	Total	←	↑	→	↻	Total	←	↑	→	↻	Total		
07:00	4	2	2	0	8	0	0	0	0	0	0	0	0	0	0	0	0
07:15	5	0	5	0	10	0	0	0	0	0	0	0	0	0	0	0	0
07:30	12	0	6	0	18	2	0	1	0	3	0	0	0	0	0	0	0
07:45	12	6	6	0	24	1	1	0	0	2	0	0	0	0	0	0	0
08:00	5	6	3	0	14	2	0	0	0	2	0	0	0	0	0	0	0
08:15	12	7	5	0	24	4	0	1	0	5	0	0	0	0	0	0	0
08:30	6	7	10	0	23	0	0	1	0	1	0	0	0	0	0	0	0
08:45	13	10	5	0	28	1	1	1	0	3	0	0	0	0	0	0	0
09:00	13	7	9	0	29	0	0	0	0	0	0	0	0	0	0	0	0
09:15	20	13	12	0	45	0	1	0	0	1	0	0	0	0	0	0	0
09:30	31	11	14	0	56	1	1	0	0	2	0	0	0	0	0	0	1
09:45	29	12	20	0	61	0	1	0	0	1	0	0	0	0	0	0	0
SUBTOTAL	162	81	97	0	340	11	5	4	0	20	0	0	0	0	0	0	1



Traffic Count Data

Intersection: Bryne Dr & Caplan Ave
 Site Code: 2128100004
 Municipality: Barrie
 Count Date: Dec 14, 2021

South Approach - Bryne Dr

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↻	Total	←	↑	→	↻	Total	←	↑	→	↻	Total	
15:00	70	19	13	0	102	1	1	0	0	2	0	0	0	0	0	1
15:15	58	13	22	0	93	0	0	0	0	0	0	0	0	0	0	0
15:30	57	13	16	0	86	0	1	0	0	1	0	0	0	0	0	2
15:45	65	16	20	0	101	1	0	0	0	1	0	0	0	0	0	2
16:00	53	12	21	0	86	1	0	1	0	2	0	0	0	0	0	3
16:15	58	12	11	0	81	1	0	0	0	1	0	0	0	0	0	1
16:30	51	12	16	0	79	1	0	0	0	1	0	0	0	0	0	0
16:45	64	9	23	0	96	1	0	0	0	1	0	0	0	0	0	0
17:00	69	6	20	0	95	0	0	0	0	0	0	0	0	0	0	0
17:15	73	11	17	0	101	0	1	0	0	1	0	0	0	0	0	0
17:30	47	9	24	0	80	0	1	0	0	1	0	0	0	0	0	0
17:45	63	9	16	0	88	2	0	0	0	2	0	0	0	0	0	0
SUBTOTAL	728	141	219	0	1088	8	4	1	0	13	0	0	0	0	0	9
GRAND TOTAL	890	222	316	0	1428	19	9	5	0	33	0	0	0	0	0	10



Traffic Count Data

Intersection: Bryne Dr & Caplan Ave
 Site Code: 2128100004
 Municipality: Barrie
 Count Date: Dec 14, 2021

East Approach - Caplan Ave

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↻	Total	←	↑	→	↻	Total	←	↑	→	↻	Total	
07:00	1	5	1	0	7	0	1	0	0	1	0	0	0	0	0	0
07:15	3	19	0	0	22	0	0	0	0	0	0	0	0	0	0	0
07:30	1	25	1	0	27	0	1	0	0	1	0	0	0	0	0	0
07:45	3	24	0	0	27	0	0	0	0	0	0	0	0	0	0	0
08:00	3	29	1	0	33	0	0	0	0	0	0	0	0	0	0	0
08:15	3	31	3	0	37	0	0	0	0	0	0	0	0	0	0	0
08:30	10	39	4	0	53	0	0	0	0	0	0	0	0	0	0	0
08:45	4	26	1	0	31	0	0	0	0	0	0	0	0	0	0	0
09:00	16	27	1	0	44	1	1	0	0	2	0	0	0	0	0	0
09:15	12	31	5	0	48	0	1	0	0	1	0	0	0	0	0	0
09:30	20	50	6	0	76	0	1	0	0	1	0	0	0	0	0	1
09:45	6	38	7	0	51	1	0	0	0	1	0	0	0	0	0	0
SUBTOTAL	82	344	30	0	456	2	5	0	0	7	0	0	0	0	0	1



Traffic Count Data

Intersection: Bryne Dr & Caplan Ave
 Site Code: 2128100004
 Municipality: Barrie
 Count Date: Dec 14, 2021

East Approach - Caplan Ave

Start Time	Cars					Trucks					Bicycles					Total Peds	
	←	↑	→	↻	Total	←	↑	→	↻	Total	←	↑	→	↻	Total		
15:00	13	79	4	0	96	0	0	0	0	0	0	0	0	0	0	0	0
15:15	23	65	5	0	93	0	1	0	0	1	0	0	0	0	0	0	0
15:30	11	74	16	0	101	1	0	0	0	1	0	0	0	0	0	0	0
15:45	17	61	8	0	86	0	1	0	0	1	0	0	0	0	0	0	0
16:00	12	84	9	0	105	0	3	0	0	3	0	0	0	0	0	0	0
16:15	14	79	1	0	94	0	0	0	0	0	0	0	0	0	0	0	0
16:30	16	76	7	0	99	0	1	0	0	1	0	0	0	0	0	0	1
16:45	16	65	2	0	83	0	0	0	0	0	0	0	0	0	0	0	3
17:00	23	90	6	0	119	0	0	0	0	0	0	0	0	0	0	0	0
17:15	15	90	6	0	111	0	1	0	0	1	0	0	0	0	0	0	0
17:30	16	86	2	0	104	0	0	0	0	0	0	0	0	0	0	0	0
17:45	19	58	8	0	85	0	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL	195	907	74	0	1176	1	7	0	0	8	0	0	0	0	0	0	4
GRAND TOTAL	277	1251	104	0	1632	3	12	0	0	15	0	0	0	0	0	0	5



Traffic Count Data

Intersection: Bryne Dr & Caplan Ave
 Site Code: 2128100004
 Municipality: Barrie
 Count Date: Dec 14, 2021

West Approach - Caplan Ave

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↻	Total	←	↑	→	↻	Total	←	↑	→	↻	Total	
07:00	0	20	4	0	24	0	2	0	0	2	0	0	0	0	0	0
07:15	2	15	2	0	19	0	0	1	0	1	0	0	0	0	0	0
07:30	0	15	2	0	17	0	1	0	0	1	0	0	0	0	0	0
07:45	3	24	7	0	34	0	1	1	0	2	0	0	0	0	0	0
08:00	6	30	8	0	44	1	1	1	0	3	0	0	0	0	0	0
08:15	4	50	17	0	71	0	1	4	0	5	0	0	0	0	0	1
08:30	9	43	27	0	79	0	0	0	0	0	0	0	0	0	0	0
08:45	3	46	26	0	75	0	0	1	0	1	0	0	0	0	0	0
09:00	4	44	27	0	75	0	0	1	0	1	1	0	0	0	1	0
09:15	8	43	31	0	82	0	2	2	0	4	0	0	0	0	0	0
09:30	10	42	27	0	79	0	4	1	0	5	0	0	0	0	0	0
09:45	9	45	49	0	103	0	0	2	0	2	0	0	0	0	0	0
SUBTOTAL	58	417	227	0	702	1	12	14	0	27	1	0	0	0	1	1



Traffic Count Data

Intersection: Bryne Dr & Caplan Ave
 Site Code: 2128100004
 Municipality: Barrie
 Count Date: Dec 14, 2021

West Approach - Caplan Ave

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↻	Total	←	↑	→	↻	Total	←	↑	→	↻	Total	
15:00	11	51	30	0	92	0	0	2	0	2	0	0	0	0	0	1
15:15	12	70	46	0	128	0	3	1	0	4	0	0	0	0	0	2
15:30	5	44	29	0	78	0	1	0	0	1	0	0	0	0	0	2
15:45	4	60	44	0	108	0	1	0	0	1	0	0	0	0	0	0
16:00	10	37	39	0	86	0	0	2	0	2	0	0	0	0	0	1
16:15	7	55	37	0	99	0	0	4	0	4	0	0	0	0	0	1
16:30	6	50	50	0	106	0	0	0	0	0	0	0	0	0	0	0
16:45	4	58	45	0	107	0	0	0	0	0	0	0	0	0	0	0
17:00	8	65	45	0	118	0	0	0	0	0	0	1	0	0	1	1
17:15	8	51	49	0	108	0	0	0	0	0	0	0	0	0	0	0
17:30	3	52	43	0	98	0	0	1	0	1	0	0	0	0	0	0
17:45	6	37	44	0	87	0	0	1	0	1	0	0	0	0	0	2
SUBTOTAL	84	630	501	0	1215	0	5	11	0	16	0	1	0	0	1	10
GRAND TOTAL	142	1047	728	0	1917	1	17	25	0	43	1	1	0	0	2	11

Peak Hour Diagram

Specified Period

From: 07:00:00
To: 10:00:00

One Hour Peak

From: 09:00:00
To: 10:00:00

Intersection: Bryne Dr & Caplan Ave
Site Code: 2128100004
Count Date: Dec 14, 2021

Weather conditions: Clear

**** Signalized Intersection ****

Major Road: Caplan Ave runs E/W

North Approach

	Out	In	Total
	63	93	156
	3	3	6
	0	1	1
Totals	66	97	163

Bryne Dr

	0	0	0	0
	1	2	0	0
	21	33	9	0
Totals	22	35	9	0

East Approach

	Out	In	Total
	219	238	457
	5	6	11
	0	0	0
Totals	224	244	468

Caplan Ave

				Totals
	0	0	0	0
	1	0	31	32
	0	6	174	180
	0	6	134	140

Peds: 1

Peds: 0



Peds: 1

Caplan Ave

Totals			
	0	0	0
	19	19	0
	149	146	3
	56	54	2

Peds: 1

West Approach

	Out	In	Total
	339	260	599
	12	5	17
	1	0	1
Totals	352	265	617

Totals				
	94	46	55	0
	1	3	0	0
	0	0	0	0

Bryne Dr

South Approach

	Out	In	Total
	191	221	412
	4	10	14
	0	0	0
Totals	195	231	426

- Cars

- Trucks

- Bicycles

Comments



Peak Hour Summary

Intersection: Bryne Dr & Caplan Ave
 Site Code: 2128100004
 Count Date: Dec 14, 2021
 Period: 07:00 - 10:00

Peak Hour Data (09:00 - 10:00)

Start Time	North Approach Bryne Dr						South Approach Bryne Dr						East Approach Caplan Ave						West Approach Caplan Ave						Total Vehicles
	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	
09:00	2	2	3	0	0	7	13	7	9	0	0	29	17	28	1	0	0	46	5	44	28	0	0	77	159
09:15	4	12	6	0	0	22	20	14	12	0	0	46	12	32	5	0	0	49	8	45	33	0	0	86	203
09:30	3	9	9	0	0	21	32	12	14	0	1	58	20	51	6	0	1	77	10	46	28	0	0	84	240
09:45	0	12	4	0	1	16	29	13	20	0	0	62	7	38	7	0	0	52	9	45	51	0	0	105	235
Grand Total	9	35	22	0	1	66	94	46	55	0	1	195	56	149	19	0	1	224	32	180	140	0	0	352	837
Approach %	13.6	53	33.3	0	-	-	48.2	23.6	28.2	0	-	-	25	66.5	8.5	0	-	-	9.1	51.1	39.8	0	-	-	-
Totals %	1.1	4.2	2.6	0	7.9	11.2	5.5	6.6	0	23.3	6.7	17.8	2.3	0	26.8	3.8	21.5	16.7	0	42.1	-	-	-	-	
PHF	0.56	0.73	0.61	0	0.75	0.73	0.82	0.69	0	0.79	0.7	0.73	0.68	0	0.73	0.8	0.98	0.69	0	0.84	0.87	0.87	0.87	0.87	
Cars	9	33	21	0	63	93	43	55	0	191	54	146	19	0	219	31	174	134	0	339	812	812	812		
% Cars	100	94.3	95.5	0	95.5	98.9	93.5	100	0	97.9	96.4	98	100	0	97.8	96.9	96.7	95.7	0	96.3	97	97	97		
Trucks	0	2	1	0	3	1	3	0	0	4	2	3	0	0	5	0	6	6	0	12	24	24	24		
% Trucks	0	5.7	4.5	0	4.5	1.1	6.5	0	0	2.1	3.6	2	0	0	2.2	0	3.3	4.3	0	3.4	2.9	2.9	2.9		
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	1	1		
% Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.1	0	0	0	0.3	0.1	0.1	0.1		
Peds					1	-				1	-				1	-				0	-	3	3	3	
% Peds					33.3	-				33.3	-				33.3	-				0	-	-	-	-	

Peak Hour Diagram

Specified Period

From: 15:00:00
To: 18:00:00

One Hour Peak

From: 16:30:00
To: 17:30:00

Intersection: Bryne Dr & Caplan Ave
Site Code: 2128100004
Count Date: Dec 14, 2021

Weather conditions: Clear

**** Signalized Intersection ****

Major Road: Caplan Ave runs E/W

North Approach

	Out	In	Total
	100	85	185
	0	1	1
	0	0	0
Totals	100	86	186

Bryne Dr

	0	0	0	0
	0	0	0	0
	42	52	6	0
Totals	42	52	6	0

East Approach

	Out	In	Total
	412	306	718
	2	0	2
	0	1	1
Totals	414	307	721

Caplan Ave

				Totals
	0	0	0	0
	0	0	26	26
	1	0	224	225
Totals	0	0	189	189

Peds: 4

Peds: 1



Peds: 4

Peds: 0

Caplan Ave

Totals			
	0	0	0
	21	0	0
	323	2	0
Totals	70	0	0

West Approach

	Out	In	Total
	439	620	1059
	0	4	4
	1	0	1
Totals	440	624	1064

Totals				
	257	38	76	0
	2	1	0	0
	0	0	0	0

Bryne Dr

South Approach

	Out	In	Total
	371	311	682
	3	0	3
	0	0	0
Totals	374	311	685

- Cars

- Trucks

- Bicycles

Comments



Peak Hour Summary

Intersection: Bryne Dr & Caplan Ave
 Site Code: 2128100004
 Count Date: Dec 14, 2021
 Period: 15:00 - 18:00

Peak Hour Data (16:30 - 17:30)

Start Time	North Approach Bryne Dr						South Approach Bryne Dr						East Approach Caplan Ave						West Approach Caplan Ave						Total Vehic es
	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	
16:30	2	18	11	0	0	31	52	12	16	0	0	80	16	77	7	0	1	100	6	50	50	0	0	106	317
16:45	1	8	3	0	3	12	65	9	23	0	0	97	16	65	2	0	3	83	4	58	45	0	0	107	299
17:00	1	12	7	0	1	20	69	6	20	0	0	95	23	90	6	0	0	119	8	66	45	0	1	119	353
17:15	2	14	21	0	0	37	73	12	17	0	0	102	15	91	6	0	0	112	8	51	49	0	0	108	359
Grand Total	6	52	42	0	4	100	259	39	76	0	0	374	70	323	21	0	4	414	26	225	189	0	1	440	1328
Approach %	6	52	42	0	-	-	69.3	10.4	20.3	0	-	-	16.9	78	5.1	0	-	-	5.9	51.1	43	0	-	-	
Totals %	0.5	3.9	3.2	0	7.5	19.5	2.9	5.7	0	28.2	5.3	24.3	1.6	0	31.2	2	16.9	14.2	0	33.1					
PHF	0.75	0.72	0.5	0	0.68	0.89	0.81	0.83	0	0.92	0.76	0.89	0.75	0	0.87	0.81	0.85	0.95	0	0.92	0.92				
Cars	6	52	42	0	100	257	38	76	0	371	70	321	21	0	412	26	224	189	0	439	1322				
% Cars	100	100	100	0	100	99.2	97.4	100	0	99.2	100	99.4	100	0	99.5	100	99.6	100	0	99.8	99.5				
Trucks	0	0	0	0	0	2	1	0	0	3	0	2	0	0	2	0	0	0	0	0	5				
% Trucks	0	0	0	0	0	0.8	2.6	0	0	0.8	0	0.6	0	0	0.5	0	0	0	0	0	0.4				
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1			
% Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0	0	0.2	0.1			
Peds					4	-				0	-				4	-				1	-	9			
% Peds					44.4	-				0	-				44.4	-				11.1	-				



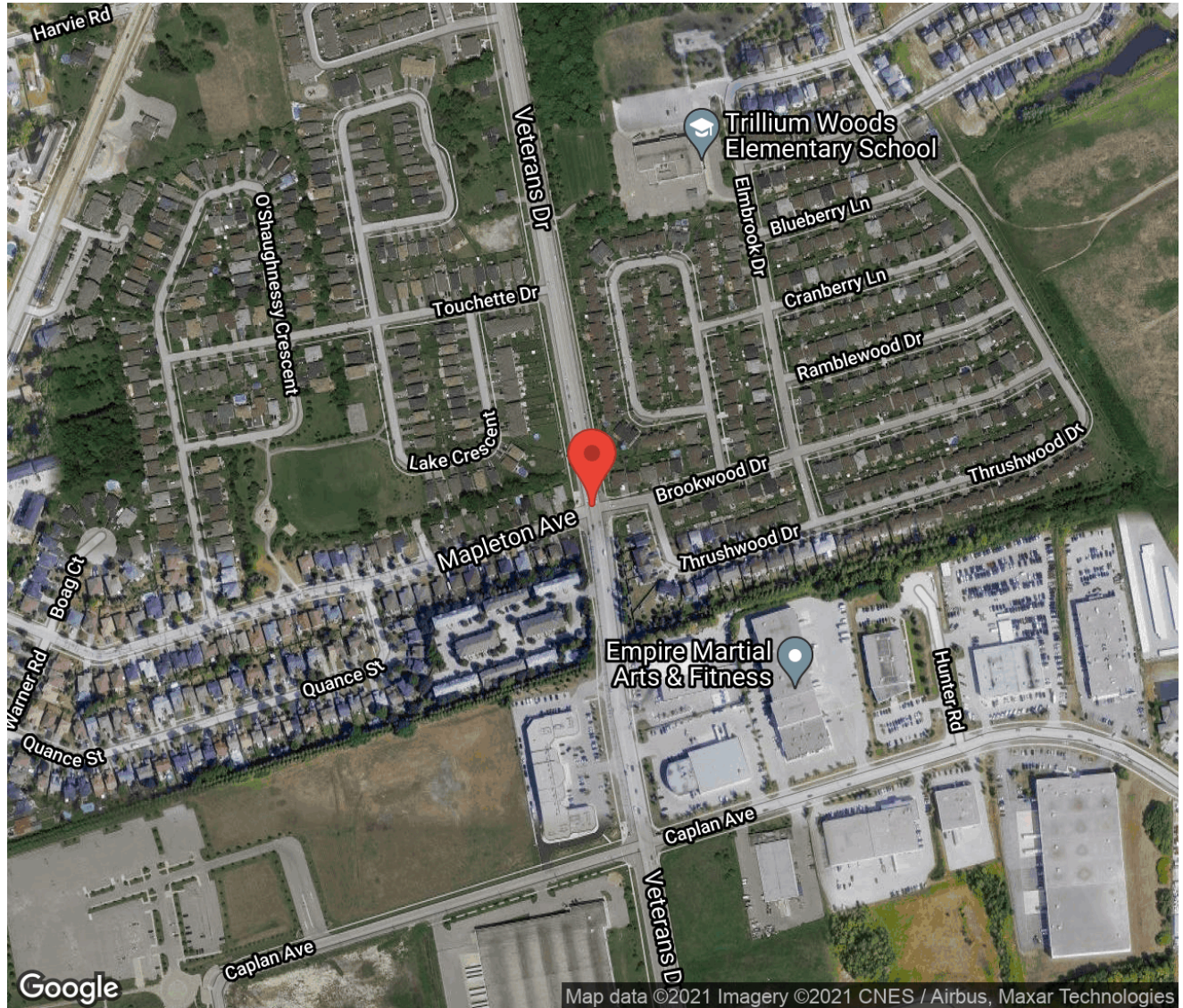
Project #21-281 - Tatham Engineering Ltd

Intersection Count Report

Intersection: Veterans Dr & Mapleton Ave-Brookwood Dr
Municipality: Barrie
Count Date: Dec 14, 2021
Site Code: 2128100005
Count Categories: Cars, Trucks, Bicycles, Pedestrians
Count Period: 07:00-10:00, 15:00-18:00
Weather: Clear

Traffic Count Map

Intersection: Veterans Dr & Mapleton Ave-Brookwood Dr
Site Code: 2128100005
Municipality: Barrie
Count Date: Dec 14, 2021



Traffic Count Summary

Intersection: Veterans Dr & Mapleton Ave-Brookwood Dr
 Site Code: 2128100005
 Municipality: Barrie
 Count Date: Dec 14, 2021

Veterans Dr - Traffic Summary

Hour	North Approach Totals						South Approach Totals						Total
	Includes Cars, Trucks, Bicycles						Includes Cars, Trucks, Bicycles						
	Left	Thru	Right	U-Turn	Total	Peds	Left	Thru	Right	U-Turn	Total	Peds	
07:00 - 08:00	9	455	9	0	473	2	28	148	22	0	198	0	671
08:00 - 09:00	23	542	13	0	578	8	69	315	30	0	414	12	992
09:00 - 10:00	9	543	8	0	560	0	90	302	21	0	413	2	973
BREAK													
15:00 - 16:00	14	506	16	0	536	9	162	666	58	0	886	4	1422
16:00 - 17:00	23	604	21	0	648	4	214	750	109	0	1073	3	1721
17:00 - 18:00	27	421	15	0	463	0	192	704	111	0	1007	2	1470
GRAND TOTAL	105	3071	82	0	3258	23	755	2885	351	0	3991	23	7249



Traffic Count Summary

Intersection: Veterans Dr & Mapleton Ave-Brookwood Dr
 Site Code: 2128100005
 Municipality: Barrie
 Count Date: Dec 14, 2021

Brookwood Dr - Traffic Summary

Hour	East Approach Totals						West Approach Totals						Total
	Includes Cars, Trucks, Bicycles						Includes Cars, Trucks, Bicycles						
	Left	Thru	Right	U-Turn	Total	Peds	Left	Thru	Right	U-Turn	Total	Peds	
07:00 - 08:00	85	19	22	0	126	2	14	10	119	0	143	2	269
08:00 - 09:00	67	30	41	0	138	7	14	27	144	0	185	11	323
09:00 - 10:00	41	14	21	0	76	2	10	13	145	0	168	4	244
BREAK													
15:00 - 16:00	58	20	26	0	104	3	16	29	177	0	222	9	326
16:00 - 17:00	75	10	27	0	112	6	16	17	147	0	180	3	292
17:00 - 18:00	49	5	24	0	78	6	17	15	107	0	139	0	217
GRAND TOTAL	375	98	161	0	634	26	87	111	839	0	1037	29	1671



Traffic Count Data

Intersection: Veterans Dr & Mapleton Ave-Brookwood Dr
 Site Code: 2128100005
 Municipality: Barrie
 Count Date: Dec 14, 2021

North Approach - Veterans Dr

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↻	Total	←	↑	→	↻	Total	←	↑	→	↻	Total	
07:00	1	76	2	0	79	0	1	0	0	1	0	0	0	0	0	0
07:15	3	105	1	0	109	2	4	1	0	7	0	0	0	0	0	1
07:30	1	109	2	0	112	0	4	1	0	5	0	0	0	0	0	0
07:45	1	151	2	0	154	1	5	0	0	6	0	0	0	0	0	1
08:00	3	127	1	0	131	0	1	0	0	1	0	0	0	0	0	0
08:15	7	127	1	0	135	1	4	3	0	8	0	0	0	0	0	6
08:30	9	128	1	0	138	1	6	1	0	8	0	0	0	0	0	0
08:45	2	145	6	0	153	0	3	0	0	3	0	1	0	0	1	2
09:00	3	158	2	0	163	0	4	0	0	4	0	0	0	0	0	0
09:15	5	140	3	0	148	0	4	0	0	4	0	1	0	0	1	0
09:30	1	121	2	0	124	0	4	0	0	4	0	0	0	0	0	0
09:45	0	107	1	0	108	0	4	0	0	4	0	0	0	0	0	0
SUBTOTAL	36	1494	24	0	1554	5	44	6	0	55	0	2	0	0	2	10



Traffic Count Data

Intersection: Veterans Dr & Mapleton Ave-Brookwood Dr
 Site Code: 2128100005
 Municipality: Barrie
 Count Date: Dec 14, 2021

North Approach - Veterans Dr

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↻	Total	←	↑	→	↻	Total	←	↑	→	↻	Total	
15:00	8	110	2	0	120	0	4	0	0	4	0	0	0	0	0	2
15:15	2	132	1	0	135	0	2	0	0	2	0	0	0	0	0	7
15:30	1	129	9	0	139	1	1	0	0	2	0	0	0	0	0	0
15:45	2	119	4	0	125	0	8	0	0	8	0	1	0	0	1	0
16:00	6	122	3	0	131	0	3	0	0	3	0	0	0	0	0	2
16:15	5	149	3	0	157	0	2	0	0	2	0	0	0	0	0	2
16:30	8	138	6	0	152	0	3	0	0	3	0	0	0	0	0	0
16:45	4	179	8	0	191	0	8	1	0	9	0	0	0	0	0	0
17:00	8	147	4	0	159	0	1	0	0	1	0	0	0	0	0	0
17:15	10	115	4	0	129	0	6	0	0	6	0	0	0	0	0	0
17:30	5	77	4	0	86	0	0	0	0	0	0	0	0	0	0	0
17:45	4	72	3	0	79	0	3	0	0	3	0	0	0	0	0	0
SUBTOTAL	63	1489	51	0	1603	1	41	1	0	43	0	1	0	0	1	13
GRAND TOTAL	99	2983	75	0	3157	6	85	7	0	98	0	3	0	0	3	23



Traffic Count Data

Intersection: Veterans Dr & Mapleton Ave-Brookwood Dr
 Site Code: 2128100005
 Municipality: Barrie
 Count Date: Dec 14, 2021

South Approach - Veterans Dr

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↻	Total	←	↑	→	↻	Total	←	↑	→	↻	Total	
07:00	1	23	4	0	28	0	3	1	0	4	0	0	0	0	0	0
07:15	10	20	3	0	33	0	3	0	0	3	0	0	0	0	0	0
07:30	6	44	8	0	58	0	2	0	0	2	0	0	0	0	0	0
07:45	10	50	6	0	66	1	3	0	0	4	0	0	0	0	0	0
08:00	14	76	8	0	98	0	4	0	0	4	0	0	0	0	0	0
08:15	17	71	9	0	97	0	2	0	0	2	0	0	0	0	0	6
08:30	21	64	5	0	90	1	5	0	0	6	0	0	0	0	0	4
08:45	16	89	8	0	113	0	4	0	0	4	0	0	0	0	0	2
09:00	18	81	14	0	113	0	4	0	0	4	0	0	0	0	0	0
09:15	29	78	3	0	110	0	2	1	0	3	0	0	0	0	0	0
09:30	23	67	2	0	92	0	4	0	0	4	0	0	0	0	0	0
09:45	20	64	1	0	85	0	2	0	0	2	0	0	0	0	0	2
SUBTOTAL	185	727	71	0	983	2	38	2	0	42	0	0	0	0	0	14



Traffic Count Data

Intersection: Veterans Dr & Mapleton Ave-Brookwood Dr
 Site Code: 2128100005
 Municipality: Barrie
 Count Date: Dec 14, 2021

South Approach - Veterans Dr

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↻	Total	←	↑	→	↻	Total	←	↑	→	↻	Total	
15:00	35	156	12	0	203	2	1	1	0	4	0	0	0	0	0	0
15:15	48	174	15	0	237	0	2	1	0	3	0	0	0	0	0	2
15:30	42	171	15	0	228	0	2	1	0	3	0	0	0	0	0	2
15:45	35	158	13	0	206	0	1	0	0	1	0	1	0	0	1	0
16:00	45	175	24	0	244	1	7	0	0	8	0	1	0	0	1	2
16:15	56	175	22	0	253	1	3	0	0	4	0	0	0	0	0	0
16:30	49	202	28	0	279	0	3	0	0	3	0	0	0	0	0	1
16:45	61	179	34	0	274	1	5	1	0	7	0	0	0	0	0	0
17:00	56	229	27	0	312	0	4	0	0	4	0	0	0	0	0	0
17:15	68	221	29	0	318	1	1	0	0	2	0	0	0	0	0	0
17:30	34	128	28	0	190	0	1	0	0	1	0	1	0	0	1	0
17:45	33	117	27	0	177	0	2	0	0	2	0	0	0	0	0	2
SUBTOTAL	562	2085	274	0	2921	6	32	4	0	42	0	3	0	0	3	9
GRAND TOTAL	747	2812	345	0	3904	8	70	6	0	84	0	3	0	0	3	23



Traffic Count Data

Intersection: Veterans Dr & Mapleton Ave-Brookwood Dr
 Site Code: 2128100005
 Municipality: Barrie
 Count Date: Dec 14, 2021

East Approach - Brookwood Dr

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↻	Total	←	↑	→	↻	Total	←	↑	→	↻	Total	
07:00	13	2	1	0	16	0	1	0	0	1	0	0	0	0	0	1
07:15	20	4	7	0	31	0	1	1	0	2	0	0	0	0	0	1
07:30	26	4	12	0	42	2	0	0	0	2	0	0	0	0	0	0
07:45	24	6	1	0	31	0	1	0	0	1	0	0	0	0	0	0
08:00	16	4	5	0	25	0	0	0	0	0	0	0	0	0	0	0
08:15	9	7	11	0	27	0	0	0	0	0	0	0	0	0	0	3
08:30	26	12	13	0	51	0	0	0	0	0	0	0	0	0	0	4
08:45	16	7	11	0	34	0	0	1	0	1	0	0	0	0	0	0
09:00	14	2	11	0	27	0	0	0	0	0	0	0	0	0	0	0
09:15	7	0	4	0	11	0	0	0	0	0	0	0	0	0	0	0
09:30	11	7	4	0	22	0	0	0	0	0	0	0	0	0	0	0
09:45	9	5	2	0	16	0	0	0	0	0	0	0	0	0	0	2
SUBTOTAL	191	60	82	0	333	2	3	2	0	7	0	0	0	0	0	11



Traffic Count Data

Intersection: Veterans Dr & Mapleton Ave-Brookwood Dr
 Site Code: 2128100005
 Municipality: Barrie
 Count Date: Dec 14, 2021

East Approach - Brookwood Dr

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↻	Total	←	↑	→	↻	Total	←	↑	→	↻	Total	
15:00	18	11	14	0	43	0	0	1	0	1	0	0	0	0	0	0
15:15	18	1	5	0	24	0	0	0	0	0	0	0	0	0	0	1
15:30	11	6	5	0	22	0	0	0	0	0	0	0	0	0	0	1
15:45	10	2	1	0	13	1	0	0	0	1	0	0	0	0	0	1
16:00	10	2	6	0	18	0	0	0	0	0	0	0	0	0	0	2
16:15	22	2	7	0	31	0	0	1	0	1	0	0	0	0	0	3
16:30	20	2	4	0	26	0	0	0	0	0	0	0	0	0	0	0
16:45	22	4	9	0	35	1	0	0	0	1	0	0	0	0	0	1
17:00	18	2	9	0	29	0	0	0	0	0	0	0	0	0	0	4
17:15	18	1	8	0	27	1	0	0	0	1	0	0	0	0	0	0
17:30	7	1	4	0	12	0	0	0	0	0	0	0	0	0	0	0
17:45	5	1	3	0	9	0	0	0	0	0	0	0	0	0	0	2
SUBTOTAL	179	35	75	0	289	3	0	2	0	5	0	0	0	0	0	15
GRAND TOTAL	370	95	157	0	622	5	3	4	0	12	0	0	0	0	0	26



Traffic Count Data

Intersection: Veterans Dr & Mapleton Ave-Brookwood Dr
 Site Code: 2128100005
 Municipality: Barrie
 Count Date: Dec 14, 2021

West Approach - Mapleton Ave

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↻	Total	←	↑	→	↻	Total	←	↑	→	↻	Total	
07:00	3	2	27	0	32	1	1	0	0	2	0	0	0	0	0	0
07:15	3	1	31	0	35	0	0	0	0	0	0	0	0	0	0	0
07:30	3	3	26	0	32	0	0	0	0	0	0	0	0	0	0	1
07:45	4	3	35	0	42	0	0	0	0	0	0	0	0	0	0	1
08:00	4	3	28	0	35	0	0	1	0	1	0	0	0	0	0	0
08:15	4	12	33	0	49	0	0	0	0	0	0	0	0	0	0	8
08:30	5	6	37	0	48	0	0	0	0	0	0	0	0	0	0	2
08:45	1	5	44	0	50	0	0	1	0	1	0	1	0	0	1	1
09:00	1	4	44	0	49	0	0	1	0	1	0	0	0	0	0	2
09:15	1	3	39	0	43	0	0	1	0	1	0	1	0	0	1	2
09:30	6	3	31	0	40	0	0	0	0	0	0	0	0	0	0	0
09:45	2	2	29	0	33	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL	37	47	404	0	488	1	1	4	0	6	0	2	0	0	2	17



Traffic Count Data

Intersection: Veterans Dr & Mapleton Ave-Brookwood Dr
 Site Code: 2128100005
 Municipality: Barrie
 Count Date: Dec 14, 2021

West Approach - Mapleton Ave

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↻	Total	←	↑	→	↻	Total	←	↑	→	↻	Total	
15:00	4	7	44	0	55	0	0	2	0	2	0	0	0	0	0	2
15:15	5	7	40	0	52	0	0	0	0	0	0	0	0	0	0	5
15:30	3	7	43	0	53	1	0	1	0	2	0	0	0	0	0	2
15:45	2	8	47	0	57	1	0	0	0	1	0	0	0	0	0	0
16:00	4	4	42	0	50	1	0	0	0	1	0	0	0	0	0	1
16:15	2	3	30	0	35	1	0	0	0	1	0	0	0	0	0	1
16:30	3	4	32	0	39	0	0	0	0	0	0	0	0	0	0	1
16:45	5	6	43	0	54	0	0	0	0	0	0	0	0	0	0	0
17:00	4	2	32	0	38	0	0	0	0	0	0	0	0	0	0	0
17:15	6	4	28	0	38	0	0	0	0	0	0	0	0	0	0	0
17:30	4	5	25	0	34	0	0	0	0	0	0	0	0	0	0	0
17:45	3	4	22	0	29	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL	45	61	428	0	534	4	0	3	0	7	0	0	0	0	0	12
GRAND TOTAL	82	108	832	0	1022	5	1	7	0	13	0	2	0	0	2	29

Peak Hour Diagram

Specified Period

From: 07:00:00
To: 10:00:00

One Hour Peak

From: 08:30:00
To: 09:30:00

Intersection: Veterans Dr & Mapleton Ave-Brookwood Dr
Site Code: 2128100005
Count Date: Dec 14, 2021

Weather conditions: Clear

**** Signalized Intersection ****

Major Road: Veterans Dr runs N/S

North Approach

	Out	In	Total
	602	359	961
	19	16	35
	2	0	2
Totals	623	375	998

Veterans Dr

	0	2	0	0
	1	17	1	0
	12	571	19	0
Totals	13	590	20	0

East Approach

	Out	In	Total
	123	67	190
	1	2	3
	0	2	2
Totals	124	71	195

Mapleton Ave

				Totals
	0	0	0	0
	0	0	8	8
	2	0	18	20
	0	3	164	167

Peds: 2

Peds: 7



Peds: 4

Brookwood Dr

Totals			
0	0	0	0
40	39	1	0
21	21	0	0
63	63	0	0

Peds: 6

West Approach

	Out	In	Total
	190	117	307
	3	2	5
	2	0	2
Totals	195	119	314

Totals				
85	327	31	0	
	84	312	30	0
	1	15	1	0
	0	0	0	0

Veterans Dr

South Approach

Out	In	Total	
	426	798	1224
	17	20	37
	0	2	2
Totals	443	820	1263

- Cars

- Trucks

- Bicycles

Comments



Peak Hour Summary

Intersection: Veterans Dr & Mapleton Ave-Brookwood Dr
 Site Code: 2128100005
 Count Date: Dec 14, 2021
 Period: 07:00 - 10:00

Peak Hour Data (08:30 - 09:30)

Start Time	North Approach Veterans Dr						South Approach Veterans Dr						East Approach Brookwood Dr						West Approach Mapleton Ave						Total Vehi cles
	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	
08:30	10	134	2	0	0	146	22	69	5	0	4	96	26	12	13	0	4	51	5	6	37	0	2	48	341
08:45	2	149	6	0	2	157	16	93	8	0	2	117	16	7	12	0	0	35	1	6	45	0	1	52	361
09:00	3	162	2	0	0	167	18	85	14	0	0	117	14	2	11	0	0	27	1	4	45	0	2	50	361
09:15	5	145	3	0	0	153	29	80	4	0	0	113	7	0	4	0	0	11	1	4	40	0	2	45	322
Grand Total	20	590	13	0	2	623	85	327	31	0	6	443	63	21	40	0	4	124	8	20	167	0	7	195	1385
Approach %	3.2	94.7	2.1	0	-	-	19.2	73.8	7	0	-	-	50.8	16.9	32.3	0	-	-	4.1	10.3	85.6	0	-	-	-
Totals %	1.4	42.6	0.9	0	45	6.1	23.6	2.2	0	32	4.5	1.5	2.9	0	9	0.6	1.4	12.1	0	14.1					
PHF	0.5	0.91	0.54	0	0.93	0.73	0.88	0.55	0	0.95	0.61	0.44	0.77	0	0.61	0.4	0.83	0.93	0	0.94	0.96				
Cars	19	571	12	0	602	84	312	30	0	426	63	21	39	0	123	8	18	164	0	190	1341				
% Cars	95	96.8	92.3	0	96.6	98.8	95.4	96.8	0	96.2	100	100	97.5	0	99.2	100	90	98.2	0	97.4	96.8				
Trucks	1	17	1	0	19	1	15	1	0	17	0	0	1	0	1	0	0	3	0	3	40				
% Trucks	5	2.9	7.7	0	3	1.2	4.6	3.2	0	3.8	0	0	2.5	0	0.8	0	0	1.8	0	1.5	2.9				
Bicycles	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	4				
% Bicycles	0	0.3	0	0	0.3	0	0	0	0	0	0	0	0	0	0	0	10	0	0	1	0.3				
Peds					2	-				6	-				4	-				7	-			19	
% Peds					10.5	-				31.6	-				21.1	-				36.8	-				

Peak Hour Diagram

Specified Period

From: 15:00:00
To: 18:00:00

One Hour Peak

From: 16:30:00
To: 17:30:00

Intersection: Veterans Dr & Mapleton Ave-Brookwood Dr
Site Code: 2128100005
Count Date: Dec 14, 2021

Weather conditions: Clear

**** Signalized Intersection ****

Major Road: Veterans Dr runs N/S

North Approach

	Out	In	Total
	631	879	1510
	19	13	32
	0	0	0
Totals	650	892	1542

Veterans Dr

	0	0	0	0
	1	18	0	0
	22	579	30	0
Totals	23	597	30	0

East Approach

	Out	In	Total
	117	164	281
	2	1	3
	0	0	0
Totals	119	165	284

Mapleton Ave

	Out	In	Total
	0	0	0
	0	0	0
	0	18	18
	0	16	16
	0	135	135
Totals	0	153	153

Peds: 0

Peds: 1



Peds: 5

Peds: 1

Brookwood Dr

Totals	Out	In	Total
	0	0	0
	30	0	0
	9	0	0
	80	78	2
Totals	119	78	2

West Approach

	Out	In	Total
	169	265	434
	0	3	3
	0	0	0
Totals	169	268	437

Totals	Out	In	Total
	234	831	118
	2	13	1
	0	0	0
Totals	236	844	119

Veterans Dr

South Approach

	Out	In	Total
	1183	792	1975
	16	20	36
	0	0	0
Totals	1199	812	2011

- Cars

- Trucks

- Bicycles

Comments



Peak Hour Summary

Intersection: Veterans Dr & Mapleton Ave-Brookwood Dr
 Site Code: 2128100005
 Count Date: Dec 14, 2021
 Period: 15:00 - 18:00

Peak Hour Data (16:30 - 17:30)

Start Time	North Approach Veterans Dr						South Approach Veterans Dr						East Approach Brookwood Dr						West Approach Mapleton Ave						Total Vehicles
	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	
16:30	8	141	6	0	0	155	49	205	28	0	1	282	20	2	4	0	0	26	3	4	32	0	1	39	502
16:45	4	187	9	0	0	200	62	184	35	0	0	281	23	4	9	0	1	36	5	6	43	0	0	54	571
17:00	8	148	4	0	0	160	56	233	27	0	0	316	18	2	9	0	4	29	4	2	32	0	0	38	543
17:15	10	121	4	0	0	135	69	222	29	0	0	320	19	1	8	0	0	28	6	4	28	0	0	38	521
Grand Total	30	597	23	0	0	650	236	844	119	0	1	1199	80	9	30	0	5	119	18	16	135	0	1	169	2137
Approach %	4.6	91.8	3.5	0	-	-	19.7	70.4	9.9	0	-	-	67.2	7.6	25.2	0	-	-	10.7	9.5	79.9	0	-	-	-
Totals %	1.4	27.9	1.1	0	30.4	30.4	11	39.5	5.6	0	56.1	56.1	3.7	0.4	1.4	0	5.6	5.6	0.8	0.7	6.3	0	7.9	7.9	7.9
PHF	0.75	0.8	0.64	0	0.81	0.81	0.86	0.91	0.85	0	0.94	0.94	0.87	0.56	0.83	0	0.83	0.83	0.75	0.67	0.78	0	0.78	0.78	0.94
Cars	30	579	22	0	631	631	234	831	118	0	1183	1183	78	9	30	0	117	117	18	16	135	0	169	169	2100
% Cars	100	97	95.7	0	97.1	97.1	99.2	98.5	99.2	0	98.7	98.7	97.5	100	100	0	98.3	98.3	100	100	100	0	100	100	98.3
Trucks	0	18	1	0	19	19	2	13	1	0	16	16	2	0	0	0	2	2	0	0	0	0	0	0	37
% Trucks	0	3	4.3	0	2.9	2.9	0.8	1.5	0.8	0	1.3	1.3	2.5	0	0	0	1.7	1.7	0	0	0	0	0	0	1.7
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peds					0	-					1	-					5	-					1	-	7
% Peds					0	-					14.3	-					71.4	-					14.3	-	14.3



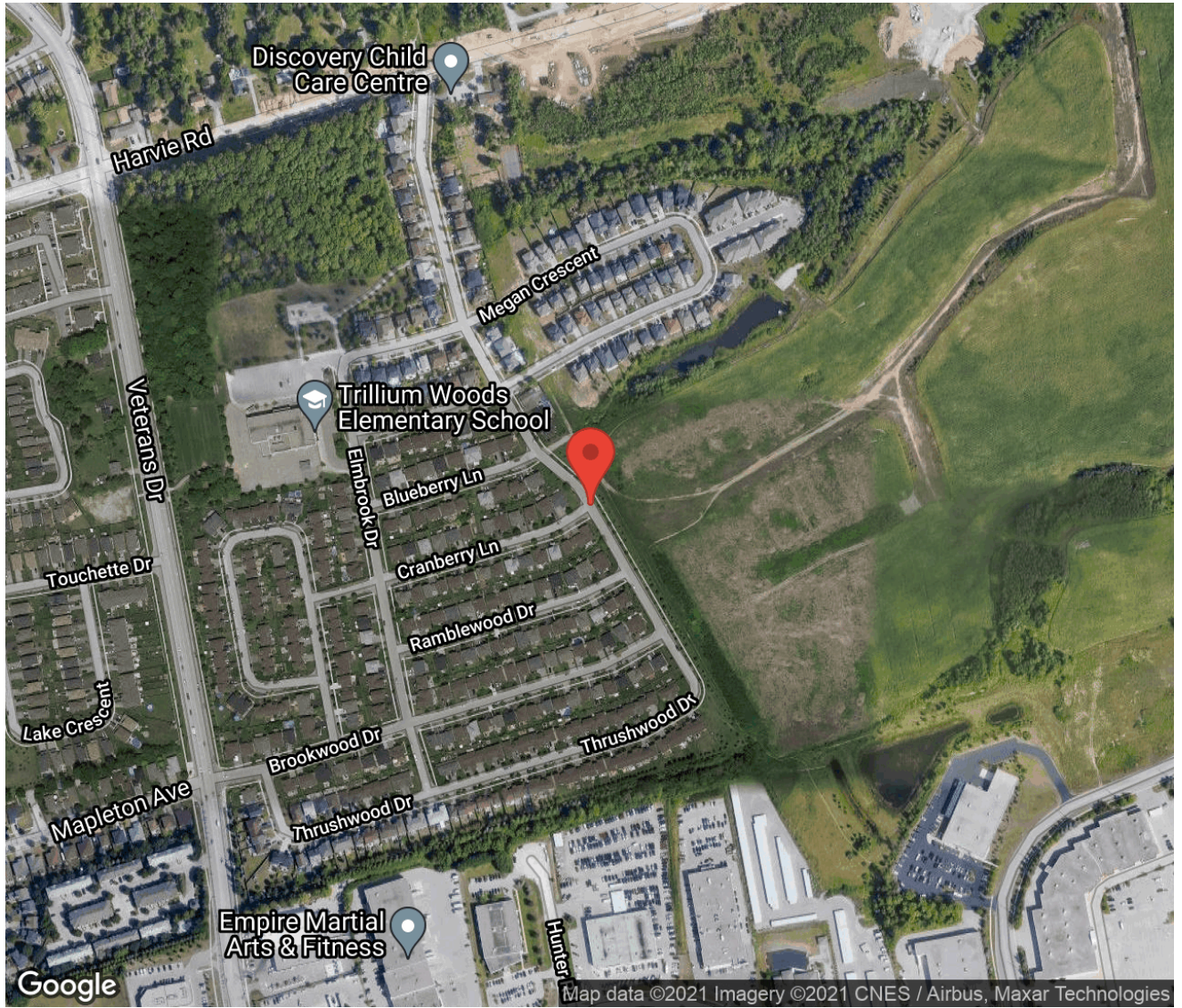
Project #21-281 - Tatham Engineering Ltd

Intersection Count Report

Intersection:	Cranberry Ln & Thrushwood Dr
Municipality:	Barrie
Count Date:	Dec 14, 2021
Site Code:	2128100006
Count Categories:	Cars, Trucks, Bicycles, Pedestrians
Count Period:	07:00-10:00, 15:00-18:00
Weather:	Clear

Traffic Count Map

Intersection: Cranberry Ln & Thrushwood Dr
Site Code: 2128100006
Municipality: Barrie
Count Date: Dec 14, 2021



Traffic Count Summary

Intersection: Cranberry Ln & Thrushwood Dr
 Site Code: 2128100006
 Municipality: Barrie
 Count Date: Dec 14, 2021

Thrushwood Dr - Traffic Summary

Hour	North Approach Totals						South Approach Totals						Total
	Includes Cars, Trucks, Bicycles						Includes Cars, Trucks, Bicycles						
	Left	Thru	Right	U-Turn	Total	Peds	Left	Thru	Right	U-Turn	Total	Peds	
07:00 - 08:00	0	14	0	0	14	0	0	20	0	0	20	0	34
08:00 - 09:00	0	27	1	0	28	0	1	25	0	0	26	0	54
09:00 - 10:00	0	15	2	0	17	0	1	7	0	0	8	0	25
BREAK													
15:00 - 16:00	0	27	5	0	32	0	1	19	0	0	20	0	52
16:00 - 17:00	0	21	6	0	27	0	2	17	0	0	19	0	46
17:00 - 18:00	0	10	3	0	13	0	0	9	0	0	9	0	22
GRAND TOTAL	0	114	17	0	131	0	5	97	0	0	102	0	233



Traffic Count Summary

Intersection: Cranberry Ln & Thrushwood Dr
 Site Code: 2128100006
 Municipality: Barrie
 Count Date: Dec 14, 2021

Cranberry Ln - Traffic Summary

Hour	East Approach Totals						West Approach Totals						Total
	Includes Cars, Trucks, Bicycles						Includes Cars, Trucks, Bicycles						
	Left	Thru	Right	U-Turn	Total	Peds	Left	Thru	Right	U-Turn	Total	Peds	
07:00 - 08:00	0	0	0	0	0	0	3	0	1	0	4	0	4
08:00 - 09:00	0	0	0	0	0	0	6	0	1	0	7	0	7
09:00 - 10:00	0	0	0	0	0	0	4	0	0	0	4	0	4
BREAK													
15:00 - 16:00	0	0	0	0	0	0	3	0	2	0	5	0	5
16:00 - 17:00	0	0	0	0	0	0	1	0	1	0	2	0	2
17:00 - 18:00	0	0	0	0	0	0	0	0	0	0	0	0	0
GRAND TOTAL	0	0	0	0	0	0	17	0	5	0	22	0	22



Traffic Count Data

Intersection: Cranberry Ln & Thrushwood Dr
 Site Code: 2128100006
 Municipality: Barrie
 Count Date: Dec 14, 2021

North Approach - Thrushwood Dr

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↻	Total	←	↑	→	↻	Total	←	↑	→	↻	Total	
07:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15	0	5	0	0	5	0	0	0	0	0	0	0	0	0	0	0
07:30	0	5	0	0	5	0	1	0	0	1	0	0	0	0	0	0
07:45	0	3	0	0	3	0	0	0	0	0	0	0	0	0	0	0
08:00	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0
08:15	0	4	1	0	5	0	0	0	0	0	0	0	0	0	0	0
08:30	0	16	0	0	16	0	0	0	0	0	0	0	0	0	0	0
08:45	0	4	0	0	4	0	1	0	0	1	0	0	0	0	0	0
09:00	0	4	1	0	5	0	0	0	0	0	0	0	0	0	0	0
09:15	0	4	0	0	4	0	0	0	0	0	0	0	0	0	0	0
09:30	0	5	1	0	6	0	0	0	0	0	0	0	0	0	0	0
09:45	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL	0	54	3	0	57	0	2	0	0	2	0	0	0	0	0	0



Traffic Count Data

Intersection: Cranberry Ln & Thrushwood Dr
 Site Code: 2128100006
 Municipality: Barrie
 Count Date: Dec 14, 2021

North Approach - Thrushwood Dr

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↻	Total	←	↑	→	↻	Total	←	↑	→	↻	Total	
15:00	0	4	0	0	4	0	1	0	0	1	0	0	0	0	0	0
15:15	0	6	1	0	7	0	1	0	0	1	0	0	0	0	0	0
15:30	0	8	3	0	11	0	0	0	0	0	0	0	0	0	0	0
15:45	0	7	1	0	8	0	0	0	0	0	0	0	0	0	0	0
16:00	0	5	1	0	6	0	0	0	0	0	0	0	0	0	0	0
16:15	0	6	2	0	8	0	0	0	0	0	0	0	0	0	0	0
16:30	0	5	1	0	6	0	0	0	0	0	0	0	0	0	0	0
16:45	0	5	2	0	7	0	0	0	0	0	0	0	0	0	0	0
17:00	0	4	1	0	5	0	0	0	0	0	0	0	0	0	0	0
17:15	0	3	1	0	4	0	0	0	0	0	0	0	0	0	0	0
17:30	0	2	1	0	3	0	0	0	0	0	0	0	0	0	0	0
17:45	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL	0	56	14	0	70	0	2	0	0	2	0	0	0	0	0	0
GRAND TOTAL	0	110	17	0	127	0	4	0	0	4	0	0	0	0	0	0



Traffic Count Data

Intersection: Cranberry Ln & Thrushwood Dr
 Site Code: 2128100006
 Municipality: Barrie
 Count Date: Dec 14, 2021

South Approach - Thrushwood Dr

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↻	Total	←	↑	→	↻	Total	←	↑	→	↻	Total	
07:00	0	3	0	0	3	0	0	0	0	0	0	0	0	0	0	0
07:15	0	9	0	0	9	0	2	0	0	2	0	0	0	0	0	0
07:30	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0
07:45	0	4	0	0	4	0	0	0	0	0	0	0	0	0	0	0
08:00	1	3	0	0	4	0	0	0	0	0	0	0	0	0	0	0
08:15	0	8	0	0	8	0	0	0	0	0	0	0	0	0	0	0
08:30	0	8	0	0	8	0	1	0	0	1	0	0	0	0	0	0
08:45	0	5	0	0	5	0	0	0	0	0	0	0	0	0	0	0
09:00	0	3	0	0	3	0	0	0	0	0	0	0	0	0	0	0
09:15	1	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0
09:30	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0
09:45	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL	2	49	0	0	51	0	3	0	0	3	0	0	0	0	0	0



Traffic Count Data

Intersection: Cranberry Ln & Thrushwood Dr
 Site Code: 2128100006
 Municipality: Barrie
 Count Date: Dec 14, 2021

South Approach - Thrushwood Dr

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↻	Total	←	↑	→	↻	Total	←	↑	→	↻	Total	
15:00	0	3	0	0	3	0	0	0	0	0	0	0	0	0	0	0
15:15	0	4	0	0	4	0	0	0	0	0	0	0	0	0	0	0
15:30	0	6	0	0	6	0	0	0	0	0	0	0	0	0	0	0
15:45	1	6	0	0	7	0	0	0	0	0	0	0	0	0	0	0
16:00	1	4	0	0	5	0	0	0	0	0	0	0	0	0	0	0
16:15	0	5	0	0	5	0	0	0	0	0	0	0	0	0	0	0
16:30	1	4	0	0	5	0	0	0	0	0	0	0	0	0	0	0
16:45	0	4	0	0	4	0	0	0	0	0	0	0	0	0	0	0
17:00	0	3	0	0	3	0	0	0	0	0	0	0	0	0	0	0
17:15	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0
17:30	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0
17:45	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL	3	45	0	0	48	0	0	0	0	0	0	0	0	0	0	0
GRAND TOTAL	5	94	0	0	99	0	3	0	0	3	0	0	0	0	0	0



Traffic Count Data

Intersection: Cranberry Ln & Thrushwood Dr
 Site Code: 2128100006
 Municipality: Barrie
 Count Date: Dec 14, 2021

West Approach - Cranberry Ln

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↺	Total	←	↑	→	↺	Total	←	↑	→	↺	Total	
07:00	0	0	0	0	0	1	0	1	0	2	0	0	0	0	0	0
07:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
08:00	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
08:15	3	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0
08:30	1	0	1	0	2	0	0	0	0	0	0	0	0	0	0	0
08:45	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
09:00	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
09:15	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
09:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL	12	0	1	0	13	1	0	1	0	2	0	0	0	0	0	0



Traffic Count Data

Intersection: Cranberry Ln & Thrushwood Dr
 Site Code: 2128100006
 Municipality: Barrie
 Count Date: Dec 14, 2021

West Approach - Cranberry Ln

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↻	Total	←	↑	→	↻	Total	←	↑	→	↻	Total	
15:00	1	0	0	0	1	0	0	1	0	1	0	0	0	0	0	0
15:15	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
15:30	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0
15:45	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
16:00	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
16:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:45	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0
17:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL	4	0	2	0	6	0	0	1	0	1	0	0	0	0	0	0
GRAND TOTAL	16	0	3	0	19	1	0	2	0	3	0	0	0	0	0	0

Peak Hour Diagram

Specified Period

From: 07:00:00
To: 10:00:00

One Hour Peak

From: 08:15:00
To: 09:15:00




Intersection: Cranberry Ln & Thrushwood Dr
Site Code: 2128100006
Count Date: Dec 14, 2021

Weather conditions: Clear




**** Unsignalized Intersection ****

Major Road: Thrushwood Dr runs N/S

North Approach

	Out	In	Total
	30	31	61
	1	1	2
	0	0	0
Totals	31	32	63







Thrushwood Dr

	0	0	0
	0	1	0
	2	28	0
Totals	2	29	0



Peds: 0

Cranberry Ln

			Totals	
0	0	0	0	
0	0	7	7	
0	0	1	1	




Peds: 0









Peds: 0

Peds: 0




West Approach

	Out	In	Total
	8	2	10
	0	0	0
	0	0	0
Totals	8	2	10


Totals			
	0	24	0
	0	1	0
	0	0	0

Thrushwood Dr

South Approach

	Out	In	Total
	24	29	53
	1	1	2
	0	0	0
Totals	25	30	55

 - Cars

 - Trucks

 - Bicycles

Comments



Peak Hour Summary

Intersection: Cranberry Ln & Thrushwood Dr
 Site Code: 2128100006
 Count Date: Dec 14, 2021
 Period: 07:00 - 10:00

Peak Hour Data (08:15 - 09:15)

Start Time	North Approach Thrushwood Dr						South Approach Thrushwood Dr						East Approach						West Approach Cranberry Ln						Total Vehicles
	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	
08:15		4	1	0	0	5	0	8		0	0	8					0		3		0	0	0	3	16
08:30		16	0	0	0	16	0	9		0	0	9					0		1		1	0	0	2	27
08:45		5	0	0	0	5	0	5		0	0	5					0		1		0	0	0	1	11
09:00		4	1	0	0	5	0	3		0	0	3					0		2		0	0	0	2	10
Grand Total		29	2	0	0	31	0	25		0	0	25					0	0	7		1	0	0	8	64
Approach %		93.5	6.5	0	-	-	0	100		0	-	-					-	-	87.5		12.5	0	-	-	
Totals %		45.3	3.1	0	-	48.4	0	39.1		0	-	39.1					0	0	10.9		1.6	0	-	12.5	
PHF		0.45	0.5	0	0	0.48	0	0.69		0	0	0.69					0	0	0.58		0.25	0	0	0.67	0.59
Cars		28	2	0	-	30	0	24		0	-	24					0	0	7		1	0	-	8	62
% Cars		96.6	100	0	-	96.8	0	96		0	-	96					0	0	100		100	0	-	100	96.9
Trucks		1	0	0	-	1	0	1		0	-	1					0	0	0		0	0	0	0	2
% Trucks		3.4	0	0	-	3.2	0	4		0	-	4					0	0	0		0	0	0	0	3.1
Bicycles		0	0	0	-	0	0	0		0	-	0					0	0	0		0	0	0	0	0
% Bicycles		0	0	0	-	0	0	0		0	-	0					0	0	0		0	0	0	0	0
Peds					0	-					0	-					0	-					0	-	0
% Peds					0	-					0	-					0	-					0	-	0

Peak Hour Diagram

Specified Period

From: 15:00:00
To: 18:00:00

One Hour Peak

From: 15:15:00
To: 16:15:00




Intersection: Cranberry Ln & Thrushwood Dr
Site Code: 2128100006
Count Date: Dec 14, 2021

Weather conditions: Clear




**** Unsignalized Intersection ****

Major Road: Thrushwood Dr runs N/S

North Approach







	Out	In	Total
	32	23	55
	1	0	1
	0	0	0
Totals	33	23	56

Thrushwood Dr

	0	0	0
	0	1	0
	6	26	0
Totals	6	27	0

Peds: 0

Cranberry Ln

			Totals
0	0	0	0 
0	0	3	3 
0	0	1	1 




Peds: 0









Peds: 0

Peds: 0




West Approach

	Out	In	Total
	4	8	12
	0	0	0
	0	0	0
Totals	4	8	12


Totals			
	2	20	0
	0	0	0
	0	0	0

Thrushwood Dr

South Approach

	Out	In	Total
	22	27	49
	0	1	1
	0	0	0
Totals	22	28	50

 - Cars

 - Trucks

 - Bicycles

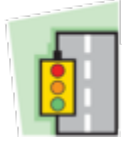
Comments

Peak Hour Summary

Intersection: Cranberry Ln & Thrushwood Dr
 Site Code: 2128100006
 Count Date: Dec 14, 2021
 Period: 15:00 - 18:00

Peak Hour Data (15:15 - 16:15)

Start Time	North Approach Thrushwood Dr						South Approach Thrushwood Dr						East Approach						West Approach Cranberry Ln						Total Vehic es
	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	
15:15		7	1	0	0	8	0	4		0	0	4					0		1		0	0	0	1	13
15:30		8	3	0	0	11	0	6		0	0	6					0		0		1	0	0	1	18
15:45		7	1	0	0	8	1	6		0	0	7					0		1		0	0	0	1	16
16:00		5	1	0	0	6	1	4		0	0	5					0		1		0	0	0	1	12
Grand Total		27	6	0	0	33	2	20		0	0	22					0		3		1	0	0	4	59
Approach %		81.8	18.2	0	-	-	9.1	90.9		0	-	-					-		75		25	0	-	-	
Totals %		45.8	10.2	0	-	55.9	3.4	33.9		0	-	37.3					0		5.1		1.7	0	-	6.8	
PHF		0.84	0.5	0	0.75	0.75	0.5	0.83		0	0.79	0.79					0		0.75		0.25	0	1	0.82	
Cars		26	6	0	-	32	2	20		0	-	22					0		3		1	0	-	4	58
% Cars		96.3	100	0	-	97	100	100		0	-	100					0		100		100	0	-	100	98.3
Trucks		1	0	0	-	1	0	0		0	-	0					0		0		0	0	-	0	1
% Trucks		3.7	0	0	-	3	0	0		0	-	0					0		0		0	0	-	0	1.7
Bicycles		0	0	0	-	0	0	0		0	-	0					0		0		0	0	-	0	0
% Bicycles		0	0	0	-	0	0	0		0	-	0					0		0		0	0	-	0	0
Peds					0	-				0	-						0	-			0	-	-		0
% Peds					0	-				0	-						0	-			0	-	-		0



Ontario Traffic Inc.
TRAFFIC MONITORING  SERVICES & PRODUCTS

Project #20-013 - City of Barrie

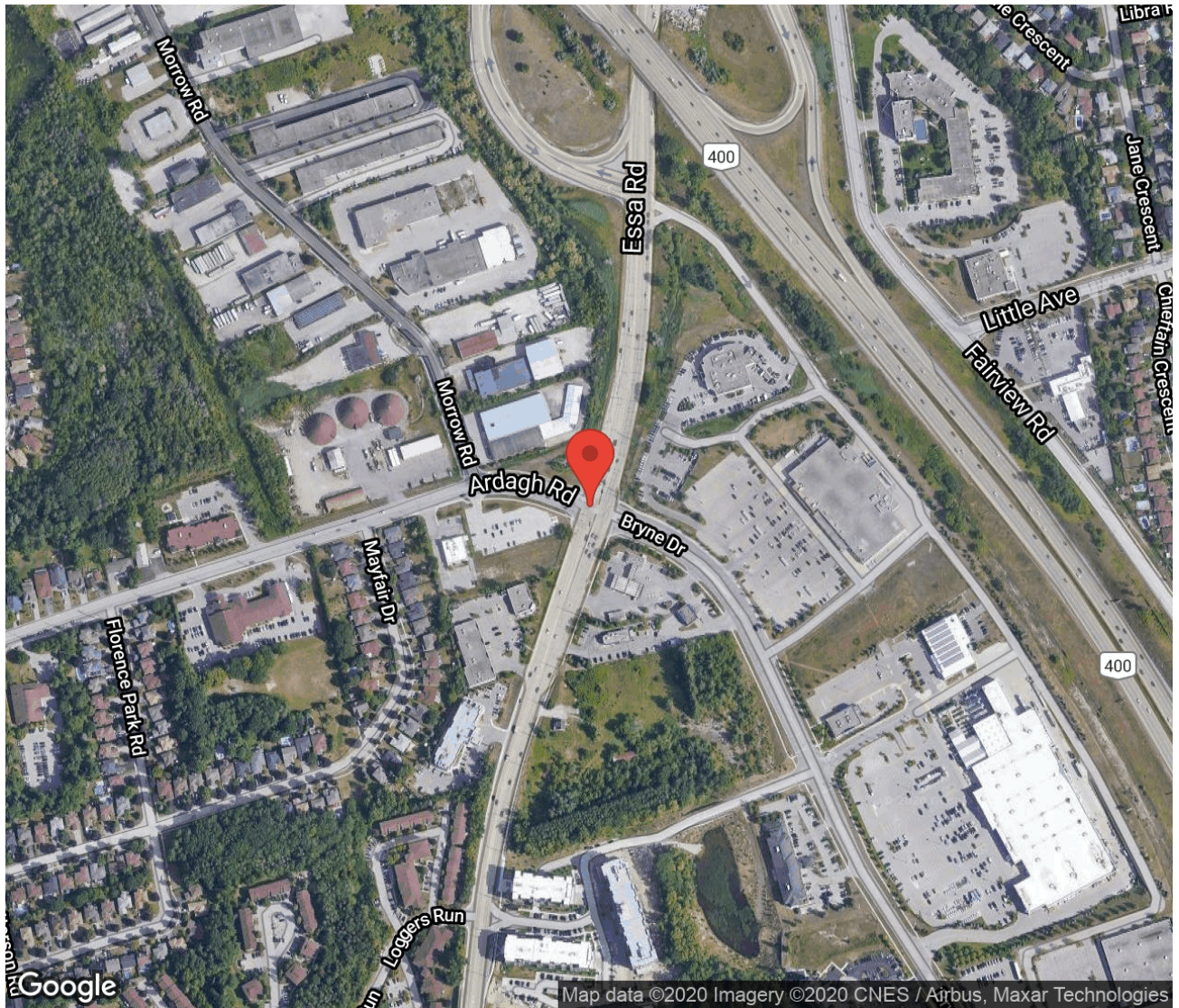
Intersection Count Report

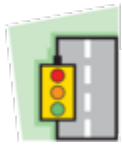
Intersection: Essa Rd & Ardagh Rd-Bryne Dr
Municipality: Barrie
Count Date: Oct 14, 2020
Site Code: 2001300078
Count Categories: Cars, Trucks, Bicycles, Pedestrians
Count Period: 07:00-09:00, 11:00-14:00, 15:00-18:00
Weather: Clear



Traffic Count Map

Intersection: Essa Rd & Ardagh Rd-Bryne Dr
Municipality: Barrie
Count Date: Oct 14, 2020



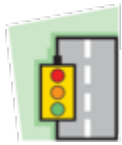


Traffic Count Summary

Intersection: Essa Rd & Ardagh Rd-Bryne Dr
Municipality: Barrie
Count Date: Oct 14, 2020

Essa Rd - Traffic Summary

Hour	North Approach Totals						South Approach Totals					
	Includes Cars, Trucks, Bicycles						Includes Cars, Trucks, Bicycles					
	Left	Thru	Right	U-Turn	Total	Peds	Left	Thru	Right	U-Turn	Total	Peds
07:00 - 08:00	102	384	263	0	749	0	71	586	35	1	693	12
08:00 - 09:00	140	432	333	1	906	0	94	674	40	1	809	8
BREAK												
11:00 - 12:00	197	513	231	0	941	0	97	597	94	0	788	11
12:00 - 13:00	207	561	323	1	1092	0	98	617	75	0	790	7
13:00 - 14:00	196	652	310	0	1158	1	109	666	90	1	866	12
BREAK												
15:00 - 16:00	218	722	433	0	1373	1	80	674	106	0	860	7
16:00 - 17:00	233	925	498	2	1658	1	89	719	92	0	900	13
17:00 - 18:00	212	797	446	0	1455	2	78	758	97	0	933	1
GRAND TOTAL	1505	4986	2837	4	9332	5	716	5291	629	3	6639	71



Ontario Traffic Inc.
TRAFFIC MONITORING + SERVICES & PRODUCTS

Traffic Count Summary

Intersection: Essa Rd & Ardagh Rd-Bryne Dr
Municipality: Barrie
Count Date: Oct 14, 2020

Bryne Dr - Traffic Summary

Hour	East Approach Totals						West Approach Totals					
	Includes Cars, Trucks, Bicycles						Includes Cars, Trucks, Bicycles					
	Left	Thru	Right	U-Turn	Total	Peds	Left	Thru	Right	U-Turn	Total	Peds
07:00 - 08:00	28	29	55	0	112	0	327	94	32	0	453	7
08:00 - 09:00	42	46	96	0	184	2	372	95	56	0	523	1
BREAK												
11:00 - 12:00	134	97	181	0	412	8	208	104	89	0	401	0
12:00 - 13:00	104	94	223	0	421	3	255	130	94	0	479	1
13:00 - 14:00	125	105	163	0	393	6	266	101	94	0	461	2
BREAK												
15:00 - 16:00	111	129	229	0	469	8	311	113	97	0	521	0
16:00 - 17:00	142	130	216	0	488	6	336	116	116	0	568	7
17:00 - 18:00	119	130	204	0	453	6	272	132	74	0	478	5
GRAND TOTAL	805	760	1367	0	2932	39	2347	885	652	0	3884	23



Ontario Traffic Inc.
TRAFFIC MONITORING SERVICES & PRODUCTS

Traffic Count Data

Intersection: Essa Rd & Ardagh Rd-Bryne Dr
Municipality: Barrie
Count Date: Oct 14, 2020

North Approach - Essa Rd

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↻	Total	←	↑	→	↻	Total	←	↑	→	↻	Total	
07:00	16	53	53	0	122	12	17	2	0	31	0	0	0	0	0	0
07:15	18	77	37	0	132	2	12	5	0	19	0	0	0	0	0	0
07:30	13	82	59	0	154	5	23	15	0	43	0	0	0	0	0	0
07:45	31	104	76	0	211	5	16	16	0	37	0	0	0	0	0	0
08:00	27	107	70	0	204	9	14	17	0	40	0	0	0	0	0	0
08:15	27	94	65	1	187	8	12	12	0	32	0	0	0	0	0	0
08:30	26	82	69	0	177	8	16	12	0	36	0	0	0	0	0	0
08:45	25	95	77	0	197	10	12	11	0	33	0	0	0	0	0	0
SUBTOTAL	183	694	506	1	1384	59	122	90	0	271	0	0	0	0	0	0



Ontario Traffic Inc.
TRAFFIC MONITORING + SERVICES & PRODUCTS

Traffic Count Data

Intersection: Essa Rd & Ardagh Rd-Bryne Dr
Municipality: Barrie
Count Date: Oct 14, 2020

North Approach - Essa Rd

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↻	Total	←	↑	→	↻	Total	←	↑	→	↻	Total	
11:00	36	104	35	0	175	6	12	7	0	25	0	0	0	0	0	0
11:15	50	124	49	0	223	10	15	10	0	35	0	0	0	0	0	0
11:30	37	101	43	0	181	4	19	14	0	37	0	0	0	0	0	0
11:45	46	122	52	0	220	8	16	21	0	45	0	0	0	0	0	0
12:00	33	124	60	1	218	6	18	11	0	35	0	0	0	0	0	0
12:15	60	124	75	0	259	10	14	13	0	37	0	0	0	0	0	0
12:30	37	131	69	0	237	6	13	15	0	34	0	0	0	0	0	0
12:45	44	122	71	0	237	11	15	9	0	35	0	0	0	0	0	0
13:00	32	137	69	0	238	8	18	13	0	39	0	0	0	0	0	0
13:15	45	154	65	0	264	11	17	14	0	42	0	0	0	0	0	0
13:30	40	139	59	0	238	5	15	13	0	33	0	0	0	0	0	0
13:45	48	151	65	0	264	7	21	12	0	40	0	0	0	0	0	1
SUBTOTAL	508	1533	712	1	2754	92	193	152	0	437	0	0	0	0	0	1



Ontario Traffic Inc.
TRAFFIC MONITORING SERVICES & PRODUCTS

Traffic Count Data

Intersection: Essa Rd & Ardagh Rd-Bryne Dr
Municipality: Barrie
Count Date: Oct 14, 2020

North Approach - Essa Rd

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↻	Total	←	↑	→	↻	Total	←	↑	→	↻	Total	
15:00	45	159	88	0	292	8	19	17	0	44	0	0	0	0	0	1
15:15	57	143	91	0	291	9	18	12	0	39	0	0	0	0	0	0
15:30	39	168	104	0	311	6	20	11	0	37	0	0	0	0	0	0
15:45	45	170	93	0	308	9	25	17	0	51	0	0	0	0	0	0
16:00	43	196	89	0	328	9	25	15	0	49	0	0	0	0	0	1
16:15	45	224	120	2	391	10	21	13	0	44	0	0	0	0	0	0
16:30	64	197	107	0	368	14	26	23	0	63	0	0	0	0	0	0
16:45	35	218	118	0	371	13	18	13	0	44	0	0	0	0	0	0
17:00	44	169	89	0	302	11	21	12	0	44	0	0	0	0	0	2
17:15	48	214	120	0	382	13	22	13	0	48	0	0	0	0	0	0
17:30	48	165	108	0	321	4	21	15	0	40	0	0	0	0	0	0
17:45	35	167	78	0	280	9	18	11	0	38	0	0	0	0	0	0
SUBTOTAL	548	2190	1205	2	3945	115	254	172	0	541	0	0	0	0	0	4
GRAND TOTAL	1239	4417	2423	4	8083	266	569	414	0	1249	0	0	0	0	0	5



Ontario Traffic Inc.
TRAFFIC MONITORING + SERVICES & PRODUCTS

Traffic Count Data

Intersection: Essa Rd & Ardagh Rd-Bryne Dr
Municipality: Barrie
Count Date: Oct 14, 2020

South Approach - Essa Rd

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↻	Total	←	↑	→	↻	Total	←	↑	→	↻	Total	
07:00	9	81	2	0	92	5	14	2	0	21	0	0	0	0	0	1
07:15	13	121	5	0	139	5	31	0	0	36	0	0	0	0	0	0
07:30	13	108	12	1	134	3	30	3	0	36	0	0	0	0	0	5
07:45	15	167	9	0	191	8	34	2	0	44	0	0	0	0	0	6
08:00	16	108	3	0	127	2	20	1	0	23	0	0	0	0	0	4
08:15	18	151	6	1	176	6	32	1	0	39	0	0	0	0	0	0
08:30	14	131	6	0	151	8	30	4	0	42	0	0	0	0	0	3
08:45	21	173	16	0	210	9	28	3	0	40	0	1	0	0	1	1
SUBTOTAL	119	1040	59	2	1220	46	219	16	0	281	0	1	0	0	1	20



Ontario Traffic Inc.
TRAFFIC MONITORING SERVICES & PRODUCTS

Traffic Count Data

Intersection: Essa Rd & Ardagh Rd-Bryne Dr
Municipality: Barrie
Count Date: Oct 14, 2020

South Approach - Essa Rd

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↻	Total	←	↑	→	↻	Total	←	↑	→	↻	Total	
11:00	15	106	17	0	138	1	31	10	0	42	0	0	0	0	0	2
11:15	22	135	12	0	169	6	30	2	0	38	0	0	0	0	0	4
11:30	18	112	20	0	150	4	29	3	0	36	0	0	0	0	0	1
11:45	24	128	26	0	178	7	26	4	0	37	0	0	0	0	0	4
12:00	12	136	14	0	162	9	23	0	0	32	0	0	0	0	0	3
12:15	16	137	20	0	173	7	15	3	0	25	0	0	0	0	0	1
12:30	15	129	15	0	159	6	22	5	0	33	0	0	0	0	0	0
12:45	22	134	17	0	173	11	21	1	0	33	0	0	0	0	0	3
13:00	20	148	21	0	189	7	21	2	0	30	0	0	0	0	0	5
13:15	23	139	20	0	182	6	21	3	0	30	0	0	0	0	0	3
13:30	21	131	11	0	163	9	28	4	0	41	0	0	0	0	0	0
13:45	15	150	25	1	191	8	28	4	0	40	0	0	0	0	0	4
SUBTOTAL	223	1585	218	1	2027	81	295	41	0	417	0	0	0	0	0	30



Ontario Traffic Inc.
TRAFFIC MONITORING SERVICES & PRODUCTS

Traffic Count Data

Intersection: Essa Rd & Ardagh Rd-Bryne Dr
Municipality: Barrie
Count Date: Oct 14, 2020

South Approach - Essa Rd

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↻	Total	←	↑	→	↻	Total	←	↑	→	↻	Total	
15:00	16	128	20	0	164	7	24	1	0	32	0	0	0	0	0	3
15:15	22	135	23	0	180	9	21	5	0	35	0	0	0	0	0	1
15:30	6	177	28	0	211	2	40	4	0	46	0	0	0	0	0	2
15:45	11	128	21	0	160	7	21	4	0	32	0	0	0	0	0	1
16:00	16	152	20	0	188	6	28	0	0	34	0	0	0	0	0	3
16:15	21	153	22	0	196	2	18	3	0	23	0	0	0	0	0	6
16:30	18	153	22	0	193	6	32	4	0	42	0	0	0	0	0	1
16:45	15	158	20	0	193	5	25	1	0	31	0	0	0	0	0	3
17:00	18	158	20	0	196	1	34	4	0	39	0	0	0	0	0	0
17:15	15	180	26	0	221	5	33	5	0	43	0	0	0	0	0	0
17:30	21	161	14	0	196	0	24	3	0	27	0	0	0	0	0	0
17:45	14	143	20	0	177	4	25	5	0	34	0	0	0	0	0	1
SUBTOTAL	193	1826	256	0	2275	54	325	39	0	418	0	0	0	0	0	21
GRAND TOTAL	535	4451	533	3	5522	181	839	96	0	1116	0	1	0	0	1	71



Ontario Traffic Inc.
TRAFFIC MONITORING SERVICES & PRODUCTS

Traffic Count Data

Intersection: Essa Rd & Ardagh Rd-Bryne Dr
Municipality: Barrie
Count Date: Oct 14, 2020

East Approach - Bryne Dr

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↻	Total	←	↑	→	↻	Total	←	↑	→	↻	Total	
07:00	2	1	6	0	9	1	1	1	0	3	0	0	0	0	0	0
07:15	7	4	8	0	19	0	2	5	0	7	0	0	0	0	0	0
07:30	6	7	9	0	22	5	2	6	0	13	0	0	0	0	0	0
07:45	6	9	18	0	33	1	3	2	0	6	0	0	0	0	0	0
08:00	13	4	18	0	35	0	2	6	0	8	0	1	0	0	1	0
08:15	7	5	24	0	36	1	6	5	0	12	0	0	0	0	0	1
08:30	11	13	12	0	36	3	4	5	0	12	0	0	0	0	0	0
08:45	6	8	17	0	31	1	3	9	0	13	0	0	0	0	0	1
SUBTOTAL	58	51	112	0	221	12	23	39	0	74	0	1	0	0	1	2



Ontario Traffic Inc.
TRAFFIC MONITORING SERVICES & PRODUCTS

Traffic Count Data

Intersection: Essa Rd & Ardagh Rd-Bryne Dr
Municipality: Barrie
Count Date: Oct 14, 2020

East Approach - Bryne Dr

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↻	Total	←	↑	→	↻	Total	←	↑	→	↻	Total	
11:00	39	19	38	0	96	7	2	10	0	19	0	0	0	0	0	1
11:15	20	29	29	0	78	7	4	11	0	22	0	0	0	0	0	2
11:30	28	17	34	0	79	5	4	4	0	13	0	0	0	0	0	1
11:45	26	18	51	0	95	2	4	4	0	10	0	0	0	0	0	4
12:00	30	17	43	0	90	3	1	12	0	16	0	0	0	0	0	0
12:15	27	20	41	0	88	5	5	10	0	20	0	0	0	0	0	1
12:30	17	21	49	0	87	2	2	9	0	13	0	0	1	0	1	1
12:45	19	22	47	0	88	1	6	11	0	18	0	0	0	0	0	1
13:00	24	26	41	0	91	0	3	14	0	17	0	0	0	0	0	1
13:15	25	26	28	0	79	6	5	8	0	19	0	0	0	0	0	3
13:30	34	19	23	0	76	3	7	6	0	16	0	0	0	0	0	0
13:45	27	17	35	0	79	6	2	8	0	16	0	0	0	0	0	2
SUBTOTAL	316	251	459	0	1026	47	45	107	0	199	0	0	1	0	1	17



Ontario Traffic Inc.
TRAFFIC MONITORING + SERVICES & PRODUCTS

Traffic Count Data

Intersection: Essa Rd & Ardagh Rd-Bryne Dr
Municipality: Barrie
Count Date: Oct 14, 2020

East Approach - Bryne Dr

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↻	Total	←	↑	→	↻	Total	←	↑	→	↻	Total	
15:00	25	21	45	0	91	4	3	10	0	17	0	0	0	0	0	0
15:15	19	33	55	0	107	4	8	9	0	21	0	0	0	0	0	1
15:30	26	24	46	0	96	4	2	10	0	16	0	0	0	0	0	4
15:45	26	33	47	0	106	3	5	7	0	15	0	0	0	0	0	3
16:00	31	26	44	0	101	6	5	6	0	17	0	0	0	0	0	2
16:15	27	23	50	0	100	6	6	9	0	21	1	0	0	0	1	1
16:30	26	34	44	0	104	2	6	6	0	14	0	0	0	0	0	1
16:45	36	25	48	0	109	7	5	9	0	21	0	0	0	0	0	2
17:00	33	28	32	0	93	3	7	10	0	20	0	0	0	0	0	2
17:15	16	34	55	0	105	10	4	0	0	14	0	0	0	0	0	0
17:30	29	25	43	0	97	2	2	18	0	22	0	0	0	0	0	4
17:45	21	26	34	0	81	5	4	12	0	21	0	0	0	0	0	0
SUBTOTAL	315	332	543	0	1190	56	57	106	0	219	1	0	0	0	1	20
GRAND TOTAL	689	634	1114	0	2437	115	125	252	0	492	1	1	1	0	3	39



Ontario Traffic Inc.
TRAFFIC MONITORING SERVICES & PRODUCTS

Traffic Count Data

Intersection: Essa Rd & Ardagh Rd-Bryne Dr
Municipality: Barrie
Count Date: Oct 14, 2020

West Approach - Ardagh Rd

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↻	Total	←	↑	→	↻	Total	←	↑	→	↻	Total	
07:00	59	19	6	0	84	21	3	0	0	24	0	0	0	0	0	0
07:15	53	19	5	0	77	13	9	0	0	22	0	0	0	0	0	0
07:30	66	17	8	0	91	14	6	5	0	25	0	0	0	0	0	2
07:45	76	15	6	0	97	25	4	2	0	31	0	2	0	0	2	5
08:00	70	13	7	0	90	20	6	4	0	30	0	0	0	0	0	0
08:15	58	17	8	0	83	13	8	5	0	26	0	0	0	0	0	1
08:30	77	18	6	0	101	23	5	2	0	30	0	0	0	0	0	0
08:45	83	22	20	0	125	28	6	4	0	38	0	0	0	0	0	0
SUBTOTAL	542	140	66	0	748	157	47	22	0	226	0	2	0	0	2	8



Ontario Traffic Inc.
TRAFFIC MONITORING SERVICES & PRODUCTS

Traffic Count Data

Intersection: Essa Rd & Ardagh Rd-Bryne Dr
Municipality: Barrie
Count Date: Oct 14, 2020

West Approach - Ardagh Rd

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↻	Total	←	↑	→	↻	Total	←	↑	→	↻	Total	
11:00	43	23	17	0	83	5	3	8	0	16	0	0	0	0	0	0
11:15	41	16	15	0	72	11	4	4	0	19	0	1	0	0	1	0
11:30	46	22	16	0	84	9	6	6	0	21	0	0	0	0	0	0
11:45	46	24	18	0	88	7	5	5	0	17	0	0	0	0	0	0
12:00	45	27	19	0	91	7	8	9	0	24	0	0	0	0	0	1
12:15	49	26	14	0	89	13	9	6	0	28	0	0	0	0	0	0
12:30	51	25	18	0	94	15	5	5	0	25	0	0	0	0	0	0
12:45	61	22	16	0	99	14	8	7	0	29	0	0	0	0	0	0
13:00	57	33	22	0	112	10	4	5	0	19	0	0	0	0	0	0
13:15	65	14	24	0	103	13	6	8	0	27	0	0	0	0	0	1
13:30	49	16	13	0	78	15	5	8	0	28	0	0	0	0	0	1
13:45	44	21	10	0	75	13	2	4	0	19	0	0	0	0	0	0
SUBTOTAL	597	269	202	0	1068	132	65	75	0	272	0	1	0	0	1	3



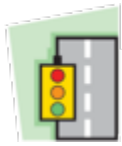
Ontario Traffic Inc.
TRAFFIC MONITORING + SERVICES & PRODUCTS

Traffic Count Data

Intersection: Essa Rd & Ardagh Rd-Bryne Dr
Municipality: Barrie
Count Date: Oct 14, 2020

West Approach - Ardagh Rd

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↻	Total	←	↑	→	↻	Total	←	↑	→	↻	Total	
15:00	56	23	17	0	96	13	6	5	0	24	0	0	0	0	0	0
15:15	51	13	29	0	93	27	7	7	0	41	0	0	0	0	0	0
15:30	64	20	21	0	105	15	8	0	0	23	0	0	0	0	0	0
15:45	75	27	14	0	116	10	9	4	0	23	0	0	0	0	0	0
16:00	66	18	19	0	103	13	7	9	0	29	0	0	0	0	0	1
16:15	78	24	19	0	121	18	6	7	0	31	0	0	0	0	0	4
16:30	60	32	29	0	121	20	1	6	0	27	0	1	0	0	1	0
16:45	66	19	18	0	103	15	8	7	0	30	0	0	2	0	2	2
17:00	53	25	22	0	100	18	7	7	0	32	0	1	0	0	1	4
17:15	51	30	19	0	100	13	6	0	0	19	0	1	0	0	1	0
17:30	55	27	12	0	94	23	7	1	0	31	1	0	0	0	1	1
17:45	51	25	12	0	88	7	3	1	0	11	0	0	0	0	0	0
SUBTOTAL	726	283	231	0	1240	192	75	54	0	321	1	3	2	0	6	12
GRAND TOTAL	1865	692	499	0	3056	481	187	151	0	819	1	6	2	0	9	23



Peak Hour Diagram

Specified Period

From: 07:00:00
To: 09:00:00

One Hour Peak

From: 08:00:00
To: 09:00:00

Intersection: Essa Rd & Ardagh Rd-Bryne Dr
Site ID: 2001300078
Count Date: Oct 14, 2020

Weather conditions:

**** Signalized Intersection ****

Major Road: Essa Rd runs N/S

North Approach

	Out	In	Total
	765	923	1688
	141	219	360
	0	1	1
Totals	906	1143	2049

Essa Rd

	0	0	0	0
	52	54	35	0
	281	378	105	1
Totals	333	432	140	1

East Approach

	Out	In	Total
	138	206	344
	45	69	114
	1	0	1
Totals	184	275	459

Ardagh Rd

				Totals
	0	0	0	0
	0	84	288	372
	0	25	70	95
	0	15	41	56

Peds: 0



Peds: 1

Peds: 2

Bryne Dr

Totals			
0	0	0	0
96	71	25	0
46	30	15	1
42	37	5	0

Peds: 8

West Approach

	Out	In	Total
	399	380	779
	124	92	216
	0	1	1
Totals	523	473	996

Totals				
94	69	563	31	1
	25	110	9	0
	0	1	0	0

Essa Rd

South Approach

	Out	In	Total
	664	457	1121
	144	74	218
	1	0	1
Totals	809	531	1340

- Cars

- Trucks

- Bicycles

Comments



Ontario Traffic Inc.
TRAFFIC MONITORING SERVICES & PRODUCTS

Peak Hour Summary

Intersection: Essa Rd & Ardagh Rd-Bryne Dr
Count Date: Oct 14, 2020
Period: 07:00 - 09:00

Peak Hour Data (08:00 - 09:00)

Start Time	North Approach Essa Rd						South Approach Essa Rd						East Approach Bryne Dr						West Approach Ardagh Rd						Total Vehicles
	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	
08:00	36	121	87	0	0	244	18	128	4	0	4	150	13	7	24	0	0	44	90	19	11	0	0	120	558
08:15	35	106	77	1	0	219	24	183	7	1	0	215	8	11	29	0	1	48	71	25	13	0	1	109	591
08:30	34	98	81	0	0	213	22	161	10	0	3	193	14	17	17	0	0	48	100	23	8	0	0	131	585
08:45	35	107	88	0	0	230	30	202	19	0	1	251	7	11	26	0	1	44	111	28	24	0	0	163	688
Grand Total	140	432	333	1	0	906	94	674	40	1	8	809	42	46	96	0	2	184	372	95	56	0	1	523	2422
Approach %	15.5	47.7	36.8	0.1	-	-	11.6	83.3	4.9	0.1	-	-	22.8	25	52.2	0	-	-	71.1	18.2	10.7	0	-	-	-
Totals %	5.8	17.8	13.7	0	-	37.4	3.9	27.8	1.7	0	-	33.4	1.7	1.9	4	0	-	7.6	15.4	3.9	2.3	0	-	21.6	-
PHF	0.97	0.89	0.95	0.25	-	0.93	0.78	0.83	0.53	0.25	-	0.81	0.75	0.68	0.83	0	-	0.96	0.84	0.85	0.58	0	-	0.8	0.88
Cars	105	378	281	1	-	765	69	563	31	1	-	664	37	30	71	0	-	138	288	70	41	0	-	399	1966
% Cars	75	87.5	84.4	100	-	84.4	73.4	83.5	77.5	100	-	82.1	88.1	65.2	74	0	-	75	77.4	73.7	73.2	0	-	76.3	81.2
Trucks	35	54	52	0	-	141	25	110	9	0	-	144	5	15	25	0	-	45	84	25	15	0	-	124	454
% Trucks	25	12.5	15.6	0	-	15.6	26.6	16.3	22.5	0	-	17.8	11.9	32.6	26	0	-	24.5	22.6	26.3	26.8	0	-	23.7	18.7
Bicycles	0	0	0	0	-	0	0	1	0	0	-	1	0	1	0	0	-	1	0	0	0	0	-	0	2
% Bicycles	0	0	0	0	-	0	0	0.1	0	0	-	0.1	0	2.2	0	0	-	0.5	0	0	0	0	-	0	0.1
Peds	-	-	-	-	0	-	-	-	-	-	8	-	-	-	-	-	2	-	-	-	-	-	1	-	11
% Peds	-	-	-	-	0	-	-	-	-	72.7	-	-	-	-	-	-	18.2	-	-	-	-	-	9.1	-	-



Peak Hour Diagram

Specified Period

From: 11:00:00
To: 14:00:00

One Hour Peak

From: 13:00:00
To: 14:00:00

Intersection: Essa Rd & Ardagh Rd-Bryne Dr
Site ID: 2001300078
Count Date: Oct 14, 2020

Weather conditions:

**** Signalized Intersection ****

Major Road: Essa Rd runs N/S

North Approach

	Out	In	Total
	1004	910	1914
	154	185	339
	0	0	0
Totals	1158	1095	2253

Essa Rd

	0	0	0	0
	52	71	31	0
	258	581	165	0
Totals	310	652	196	0

East Approach

	Out	In	Total
	325	326	651
	68	61	129
	0	0	0
Totals	393	387	780

Ardagh Rd

				Totals
	0	0	0	0
	0	51	215	266
	0	17	84	101
	0	25	69	94

Peds: 1



Peds: 2

Peds: 6

Peds: 12

Bryne Dr

Totals			
0	0	0	0
163	127	36	0
105	88	17	0
125	110	15	0

West Approach

	Out	In	Total
	368	425	793
	93	99	192
	0	0	0
Totals	461	524	985

Totals				
109	666	90	1	
	79	568	77	1
	30	98	13	0
	0	0	0	0

Essa Rd

South Approach

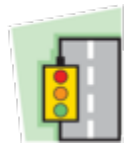
	Out	In	Total
	725	761	1486
	141	111	252
	0	0	0
Totals	866	872	1738

- Cars

- Trucks

- Bicycles

Comments

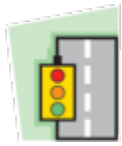


Peak Hour Summary

Intersection: Essa Rd & Ardagh Rd-Bryne Dr
 Count Date: Oct 14, 2020
 Period: 11:00 - 14:00

Peak Hour Data (13:00 - 14:00)

Start Time	North Approach Essa Rd						South Approach Essa Rd						East Approach Bryne Dr						West Approach Ardagh Rd						Total Vehicles	
	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total		
13:00	40	155	82	0	0	277	27	169	23	0	5	219	24	29	55	0	1	108	67	37	27	0	0	131	735	
13:15	56	171	79	0	0	306	29	160	23	0	3	212	31	31	36	0	3	98	78	20	32	0	1	130	746	
13:30	45	154	72	0	0	271	30	159	15	0	0	204	37	26	29	0	0	92	64	21	21	0	1	106	673	
13:45	55	172	77	0	1	304	23	178	29	1	4	231	33	19	43	0	2	95	57	23	14	0	0	94	724	
Grand Total	196	652	310	0	1	1158	109	666	90	1	12	866	125	105	163	0	6	393	266	101	94	0	2	461	2878	
Approach %	16.9	56.3	26.8	0	-	-	12.6	76.9	10.4	0.1	-	-	31.8	26.7	41.5	0	-	-	57.7	21.9	20.4	0	-	-	-	
Totals %	6.8	22.7	10.8	0	-	40.2	3.8	23.1	3.1	0	-	30.1	4.3	3.6	5.7	0	-	13.7	9.2	3.5	3.3	0	-	16	-	
PHF	0.88	0.95	0.95	0	0.95	0.95	0.91	0.94	0.78	0.25	0.94	0.94	0.84	0.85	0.74	0	0.91	0.91	0.85	0.68	0.73	0	0.88	0.88	0.96	
Cars	165	581	258	0	-	1004	79	568	77	1	-	725	110	88	127	0	-	325	215	84	69	0	-	368	2422	
% Cars	84.2	89.1	83.2	0	-	86.7	72.5	85.3	85.6	100	-	83.7	88	83.8	77.9	0	-	82.7	80.8	83.2	73.4	0	-	79.8	84.2	
Trucks	31	71	52	0	-	154	30	98	13	0	-	141	15	17	36	0	-	68	51	17	25	0	-	93	456	
% Trucks	15.8	10.9	16.8	0	-	13.3	27.5	14.7	14.4	0	-	16.3	12	16.2	22.1	0	-	17.3	19.2	16.8	26.6	0	-	20.2	15.8	
Bicycles	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	0	-	0	0
% Bicycles	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	0	-	0	0
Peds	-	-	-	-	1	-	-	-	-	-	12	-	-	-	-	-	6	-	-	-	-	-	2	-	-	21
% Peds	-	-	-	-	4.8	-	-	-	-	-	57.1	-	-	-	-	-	28.6	-	-	-	-	-	9.5	-	-	-



Peak Hour Diagram

Specified Period

From: 15:00:00
To: 18:00:00

One Hour Peak

From: 16:00:00
To: 17:00:00

Intersection: Essa Rd & Ardagh Rd-Bryne Dr
Site ID: 2001300078
Count Date: Oct 14, 2020

Weather conditions:

**** Signalized Intersection ****

Major Road: Essa Rd runs N/S

North Approach

	Out	In	Total
	1458	1074	2532
	200	199	399
	0	0	0
Totals	1658	1273	2931

Essa Rd

	0	0	0	0
	64	90	46	0
	434	835	187	2
Totals	498	925	233	2

East Approach

	Out	In	Total
	414	364	778
	73	76	149
	1	1	2
Totals	488	441	929

Ardagh Rd

				Totals
	0	0	0	0
	0	66	270	336
	1	22	93	116
	2	29	85	116

Peds: 1

Peds: 7



Peds: 6

Peds: 13

Bryne Dr

Totals			
0	0	0	0
216	186	30	0
130	108	22	0
142	120	21	1

West Approach

	Out	In	Total
	448	612	1060
	117	105	222
	3	0	3
Totals	568	717	1285

Totals				
89	719	92	0	
	70	616	84	0
	19	103	8	0
	0	0	0	0

Essa Rd

South Approach

	Out	In	Total
	770	1040	1810
	130	140	270
	0	3	3
Totals	900	1183	2083

- Cars

- Trucks

- Bicycles

Comments



Ontario Traffic Inc.
TRAFFIC MONITORING SERVICES & PRODUCTS

Peak Hour Summary

Intersection: Essa Rd & Ardagh Rd-Bryne Dr
Count Date: Oct 14, 2020
Period: 15:00 - 18:00

Peak Hour Data (16:00 - 17:00)

Start Time	North Approach Essa Rd						South Approach Essa Rd						East Approach Bryne Dr						West Approach Ardagh Rd						Total Vehicles
	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	
16:00	52	221	104	0	1	377	22	180	20	0	3	222	37	31	50	0	2	118	79	25	28	0	1	132	849
16:15	55	245	133	2	0	435	23	171	25	0	6	219	34	29	59	0	1	122	96	30	26	0	4	152	928
16:30	78	223	130	0	0	431	24	185	26	0	1	235	28	40	50	0	1	118	80	34	35	0	0	149	933
16:45	48	236	131	0	0	415	20	183	21	0	3	224	43	30	57	0	2	130	81	27	27	0	2	135	904
Grand Total	233	925	498	2	1	1658	89	719	92	0	13	900	142	130	216	0	6	488	336	116	116	0	7	568	3614
Approach %	14.1	55.8	30	0.1	-	-	9.9	79.9	10.2	0	-	-	29.1	26.6	44.3	0	-	-	59.2	20.4	20.4	0	-	-	-
Totals %	6.4	25.6	13.8	0.1	-	45.9	2.5	19.9	2.5	0	-	24.9	3.9	3.6	6	0	-	13.5	9.3	3.2	3.2	0	-	15.7	-
PHF	0.75	0.94	0.94	0.25	-	0.95	0.93	0.97	0.88	0	-	0.96	0.83	0.81	0.92	0	-	0.94	0.88	0.85	0.83	0	-	0.93	0.97
Cars	187	835	434	2	-	1458	70	616	84	0	-	770	120	108	186	0	-	414	270	93	85	0	-	448	3090
% Cars	80.3	90.3	87.1	100	-	87.9	78.7	85.7	91.3	0	-	85.6	84.5	83.1	86.1	0	-	84.8	80.4	80.2	73.3	0	-	78.9	85.5
Trucks	46	90	64	0	-	200	19	103	8	0	-	130	21	22	30	0	-	73	66	22	29	0	-	117	520
% Trucks	19.7	9.7	12.9	0	-	12.1	21.3	14.3	8.7	0	-	14.4	14.8	16.9	13.9	0	-	15	19.6	19	25	0	-	20.6	14.4
Bicycles	0	0	0	0	-	0	0	0	0	0	-	0	1	0	0	0	-	1	0	1	2	0	-	3	4
% Bicycles	0	0	0	0	-	0	0	0	0	0	-	0	0.7	0	0	0	-	0.2	0	0.9	1.7	0	-	0.5	0.1
Peds	-	-	-	-	1	-	-	-	-	-	13	-	-	-	-	-	6	-	-	-	-	-	7	-	27
% Peds	-	-	-	-	3.7	-	-	-	-	-	48.1	-	-	-	-	-	22.2	-	-	-	-	-	25.9	-	-



Turning Movement Count Diagram

Intersection: Mapleview Drive W and Bryne Drive
 Municipality: Barrie, Ontario

Intersection ID:
 Date: July 18, 2019

AM Peak Hour: 8:00 to 9:00

		Bryne Drive						
North Total	331				East Total	2344		
North Entering	163	Cyclists	0	0	0	East Entering	1237	
North Receiving	168	Truck	0	3	8	East Receiving	1107	
North Peds	10	Cars	42	52	58	East Peds	3	
		←	↓	→				
Mapleview Drive W		0	0	42	↑	82	9	0
		0	41	817	→	726	41	0
		0	3	135	↓	366	13	0
		←	↑	→				
West Total	1901	42	33	165	South Total	844		
West Entering	1038	12	1	18	South Entering	272		
West Receiving	863	0	1	0	South Receiving	572		
West Peds	7				South Peds	6		

MD Peak Hour: 12:30 to 13:30

		Bryne Drive						
North Total	1050				East Total	2994		
North Entering	530	Cyclists	0	0	0	East Entering	1445	
North Receiving	520	Truck	1	5	10	East Receiving	1549	
North Peds	9	Cars	144	139	231	East Peds	8	
		←	↓	→				
Mapleview Drive W		0	2	132	↑	201	8	0
		0	35	830	→	869	39	0
		0	3	194	↓	323	5	0
		←	↑	→				
West Total	2401	151	172	427	South Total	1441		
West Entering	1196	1	5	16	South Entering	772		
West Receiving	1205	0	0	0	South Receiving	669		
West Peds	6				South Peds	12		

PM Peak Hour: 16:45 to 17:45

		Bryne Drive						
North Total	960				East Total	3243		
North Entering	480	Cyclists	0	0	0	East Entering	1708	
North Receiving	480	Truck	1	3	4	East Receiving	1535	
North Peds	3	Cars	157	110	205	East Peds	8	
		←	↓	→				
Mapleview Drive W		0	2	136	↑	180	4	0
		0	29	821	→	1182	29	0
		1	1	168	↓	308	5	0
		←	↑	→				
West Total	2732	205	156	468	South Total	1435		
West Entering	1158	0	2	8	South Entering	839		
West Receiving	1574	0	0	0	South Receiving	596		
West Peds	5				South Peds	11		

Total 8-Hour Count

		Bryne Drive						
North Total	6222				East Total	22179		
North Entering	3017	Cyclists	0	1	0	East Entering	11115	
North Receiving	3205	Truck	9	26	45	East Receiving	11064	
North Peds	52	Cars	838	769	1329	East Peds	31	
		←	↓	→				
Mapleview Drive W		0	7	850	↑	1351	44	0
		0	277	6554	→	6923	272	0
		1	15	1163	↓	2467	58	0
		←	↑	→				
West Total	17903	972	932	2754	South Total	9306		
West Entering	8867	22	20	105	South Entering	4806		
West Receiving	9036	0	1	0	South Receiving	4500		
West Peds	55				South Peds	69		

Appendix C: LOS Definitions

CAPACITY ANALYSIS AT SIGNALIZED INTERSECTIONS

Highway Capacity Manual Methodology

The capacity of signalized intersections has been determined in terms of delay taken from Chapter 9 of the Highway Capacity Manual, Special Report 209, by the Transportation Research Board, 2000.

To assist in clarifying the arithmetic analysis associated with traffic engineering, it is often useful to refer to "Level of Service". 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:

Level of Service	Expected Delay to Minor Street Traffic	Average Control Delay 'd' (sec/veh)
A	Describes operations with very low control delay, up to 10 seconds/vehicle. 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.	$d \leq 10$
B	Describes operations with control delay greater than 10 seconds and up to 20 seconds/vehicle. 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.	$10 \leq d \leq 20$
C	Describes operations with control delay greater than 20 seconds and up to 35 seconds/vehicle. 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.	$20 \leq d \leq 35$
D	Describes operations with control delay greater than 35 seconds and up to 55 seconds/vehicle. At level D, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavourable progression, long cycle lengths, or high v/c ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures become noticeable.	$35 \leq d \leq 55$
E	Describes operations with control delay greater than 55 seconds and up to 80 seconds/vehicle. 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.	$55 \leq d \leq 80$
F	LOS F describes operations with control delay in excess of 80 seconds/vehicle. This <i>oversaturation</i> , considered to be unacceptable to most drivers, 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.	$d > 80$

CAPACITY ANALYSIS AT UNSIGNALIZED INTERSECTIONS

Highway Capacity Manual Methodology

The level of service at an unsignalized intersection is determined on the basis of control delay for each critical lane. This method of analysis is taken from the Highway Capacity Manual, Special Report 209, by the Transportation Research Board, 1997.

The average control delay for any particular critical movement (control delay includes initial deceleration, queue move-up time, stopped delay, and final acceleration delay) is a function of the service rate or capacity of the approach and degree of saturation. The level of service criteria for unsignalized intersections is outlined below and is related to ranges in vehicle delay.

Level of Service	Expected Delay to Minor Street Traffic	Average Control Delay 'd' (sec/veh)
A	Little or no delays	$0 < d \leq 10$
B	Short traffic delays	$10 \leq d \leq 15$
C	Average traffic delays	$15 \leq d \leq 25$
D	Long traffic delays	$25 \leq d \leq 35$
E	Very long traffic delays	$35 \leq d \leq 50$
F	Extreme delays with queuing which may cause congestion affecting other traffic movements in the intersection	$d > 50$

Appendix D: Existing Operations

HCM Signalized Intersection Capacity Analysis
 1: Essa Road & Ardagh Road/Bryne Drive

2022 Existing Conditions
 Weekday AM Peak Hour
























Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	379	95	57	42	46	96	96	687	40	140	441	340	
Future Volume (vph)	379	95	57	42	46	96	96	687	40	140	441	340	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00	
Frt	1.00	0.94		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1789	3377		1789	3579	1601	1789	3579	1601	3471	3579	1601	
Flt Permitted	0.53	1.00		0.65	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (perm)	996	3377		1220	3579	1601	1789	3579	1601	3471	3579	1601	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	412	103	62	46	50	104	104	747	43	152	479	370	
RTOR Reduction (vph)	0	43	0	0	0	94	0	0	26	0	0	237	
Lane Group Flow (vph)	412	122	0	46	50	10	104	747	17	152	479	133	
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	
Protected Phases	7	4		3	8		5	2		1	6		
Permitted Phases	4			8		8			2			6	
Actuated Green, G (s)	44.6	35.1		16.4	10.9	10.9	11.0	44.2	44.2	7.0	40.2	40.2	
Effective Green, g (s)	44.6	35.1		16.4	10.9	10.9	11.0	44.2	44.2	7.0	40.2	40.2	
Actuated g/C Ratio	0.40	0.31		0.15	0.10	0.10	0.10	0.40	0.40	0.06	0.36	0.36	
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	607	1060		206	348	156	176	1414	632	217	1286	575	
v/s Ratio Prot	c0.18	0.04		0.01	0.01		c0.06	c0.21		0.04	0.13		
v/s Ratio Perm	c0.09			0.02		0.01			0.01			0.08	
v/c Ratio	0.68	0.12		0.22	0.14	0.06	0.59	0.53	0.03	0.70	0.37	0.23	
Uniform Delay, d1	26.3	27.3		41.8	46.2	45.8	48.2	25.8	20.7	51.4	26.5	25.0	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	3.0	0.0		0.6	0.2	0.2	5.2	1.4	0.1	9.8	0.8	0.9	
Delay (s)	29.4	27.3		42.3	46.4	46.0	53.5	27.2	20.7	61.1	27.3	25.9	
Level of Service	C	C		D	D	D	D	C	C	E	C	C	
Approach Delay (s)		28.8			45.2			30.0			31.9		
Approach LOS		C			D			C			C		
Intersection Summary													
HCM 2000 Control Delay			31.6									HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.63										
Actuated Cycle Length (s)			111.8									Sum of lost time (s)	20.0
Intersection Capacity Utilization			72.7%									ICU Level of Service	C
Analysis Period (min)			15										

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

2: Veterans Drive & Harvie Road

2022 Existing Conditions
Weekday AM Peak Hour

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	93	141	92	81	91	117	73	243	83	164	463	88	
Future Volume (vph)	93	141	92	81	91	117	73	243	83	164	463	88	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0		
Lane Util. Factor	1.00	0.95		1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95		
Frt	1.00	0.94		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1789	3366		1789	1883	1601	1789	3579	1601	1789	3493		
Flt Permitted	0.69	1.00		0.60	1.00	1.00	0.34	1.00	1.00	0.49	1.00		
Satd. Flow (perm)	1292	3366		1121	1883	1601	637	3579	1601	927	3493		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	101	153	100	88	99	127	79	264	90	178	503	96	
RTOR Reduction (vph)	0	64	0	0	0	82	0	0	70	0	16	0	
Lane Group Flow (vph)	101	189	0	88	99	45	79	264	20	178	583	0	
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		
Protected Phases	7	4		3	8		5	2		1	6		
Permitted Phases	4			8		8	2		2	6			
Actuated Green, G (s)	37.5	30.8		36.9	30.5	30.5	25.6	18.9	18.9	33.0	22.6		
Effective Green, g (s)	37.5	30.8		36.9	30.5	30.5	25.6	18.9	18.9	33.0	22.6		
Actuated g/C Ratio	0.43	0.36		0.43	0.35	0.35	0.30	0.22	0.22	0.38	0.26		
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	598	1198		527	663	564	277	782	349	457	912		
v/s Ratio Prot	c0.01	0.06		0.01	0.05		0.02	0.07		c0.05	c0.17		
v/s Ratio Perm	c0.06			0.06		0.03	0.06		0.01	0.10			
v/c Ratio	0.17	0.16		0.17	0.15	0.08	0.29	0.34	0.06	0.39	0.64		
Uniform Delay, d1	14.7	19.0		15.0	19.1	18.6	22.5	28.5	26.7	18.5	28.3		
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
Incremental Delay, d2	0.1	0.3		0.2	0.5	0.3	0.6	0.3	0.1	0.6	1.5		
Delay (s)	14.8	19.3		15.1	19.6	18.9	23.1	28.8	26.8	19.0	29.8		
Level of Service	B	B		B	B	B	C	C	C	B	C		
Approach Delay (s)		18.0			18.1			27.3			27.4		
Approach LOS		B			B			C			C		
Intersection Summary													
HCM 2000 Control Delay			24.0									HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.37										
Actuated Cycle Length (s)			86.5									Sum of lost time (s)	20.0
Intersection Capacity Utilization			69.1%									ICU Level of Service	C
Analysis Period (min)			15										

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis

3: Thrushwood Drive & Harvie Road

2022 Existing Conditions
Weekday AM Peak Hour



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↵	↑↑	↵	
Traffic Volume (veh/h)	309	92	22	240	44	41
Future Volume (Veh/h)	309	92	22	240	44	41
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)	336	100	24	261	48	45
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	TWLTL		TWLTL			
Median storage veh	2		2			
Upstream signal (m)	318		401			
pX, platoon unblocked						
vC, conflicting volume			436		564	218
vC1, stage 1 conf vol					386	
vC2, stage 2 conf vol					178	
vCu, unblocked vol			436		564	218
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)			2.2		3.5	3.3
p0 queue free %			98		92	94
cM capacity (veh/h)			1120		606	786
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1
Volume Total	224	212	24	130	130	93
Volume Left	0	0	24	0	0	48
Volume Right	0	100	0	0	0	45
cSH	1700	1700	1120	1700	1700	681
Volume to Capacity	0.13	0.12	0.02	0.08	0.08	0.14
Queue Length 95th (m)	0.0	0.0	0.5	0.0	0.0	3.6
Control Delay (s)	0.0	0.0	8.3	0.0	0.0	11.1
Lane LOS	A			B		
Approach Delay (s)	0.0		0.7	11.1		
Approach LOS				B		
Intersection Summary						
Average Delay			1.5			
Intersection Capacity Utilization			29.8%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis

5: Harvie Road & Fairview Road

2022 Existing Conditions
Weekday AM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↗	↑↑	↑↑	↗	↗	↗
Traffic Volume (vph)	41	332	228	279	208	33
Future Volume (vph)	41	332	228	279	208	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1789	3579	3579	1601	1789	1601
Flt Permitted	0.55	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1028	3579	3579	1601	1789	1601
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	45	361	248	303	226	36
RTOR Reduction (vph)	0	0	0	137	0	29
Lane Group Flow (vph)	45	361	248	166	226	7
Turn Type	pm+pt	NA	NA	Perm	Perm	Perm
Protected Phases	7	4	8			
Permitted Phases	4			8	6	6
Actuated Green, G (s)	50.2	50.2	42.1	42.1	14.7	14.7
Effective Green, g (s)	50.2	50.2	42.1	42.1	14.7	14.7
Actuated g/C Ratio	0.65	0.65	0.55	0.55	0.19	0.19
Clearance Time (s)	4.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	711	2336	1959	876	341	306
v/s Ratio Prot	0.00	c0.10	0.07			
v/s Ratio Perm	0.04			c0.10	c0.13	0.00
v/c Ratio	0.06	0.15	0.13	0.19	0.66	0.02
Uniform Delay, d1	4.9	5.2	8.5	8.8	28.8	25.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.0	0.1	0.1	0.5	4.8	0.0
Delay (s)	4.9	5.3	8.6	9.3	33.6	25.3
Level of Service	A	A	A	A	C	C
Approach Delay (s)		5.3	9.0		32.5	
Approach LOS		A	A		C	

Intersection Summary

HCM 2000 Control Delay	12.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.30		
Actuated Cycle Length (s)	76.9	Sum of lost time (s)	16.0
Intersection Capacity Utilization	55.6%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis

6: Thrushwood Drive & Cranberry Lane























2022 Existing Conditions
Weekday AM Peak Hour



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	7	1	0	25	29	2
Future Volume (Veh/h)	7	1	0	25	29	2
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)	8	1	0	27	32	2
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	60	33	34			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	60	33	34			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	100	100			
cM capacity (veh/h)	947	1041	1578			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	9	27	34			
Volume Left	8	0	0			
Volume Right	1	0	2			
cSH	956	1578	1700			
Volume to Capacity	0.01	0.00	0.02			
Queue Length 95th (m)	0.2	0.0	0.0			
Control Delay (s)	8.8	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	8.8	0.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			1.1			
Intersection Capacity Utilization			13.3%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis
 8: Veterans Drive & Mapleton Drive/Brookwood Drive

2022 Existing Conditions
 Weekday AM Peak Hour

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	8	20	169	63	21	40	86	334	31	20	602	13	
Future Volume (vph)	8	20	169	63	21	40	86	334	31	20	602	13	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	4.0	6.0			6.0	6.0	4.0	6.0		4.0	6.0		
Lane Util. Factor	1.00	1.00			1.00	1.00	1.00	0.95		1.00	0.95		
Frt	1.00	0.87			1.00	0.85	1.00	0.99		1.00	1.00		
Flt Protected	0.95	1.00			0.96	1.00	0.95	1.00		0.95	1.00		
Satd. Flow (prot)	1789	1631			1816	1601	1789	3533		1789	3567		
Flt Permitted	0.52	1.00			0.65	1.00	0.33	1.00		0.52	1.00		
Satd. Flow (perm)	975	1631			1231	1601	615	3533		975	3567		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	9	22	184	68	23	43	93	363	34	22	654	14	
RTOR Reduction (vph)	0	144	0	0	0	36	0	5	0	0	1	0	
Lane Group Flow (vph)	9	62	0	0	91	7	93	392	0	22	667	0	
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA		
Protected Phases	7	4		3	8		5	2		1	6		
Permitted Phases	4			8		8	2			6			
Actuated Green, G (s)	16.6	16.6			11.5	11.5	47.1	42.0		38.2	37.1		
Effective Green, g (s)	16.6	16.6			11.5	11.5	47.1	42.0		38.2	37.1		
Actuated g/C Ratio	0.22	0.22			0.15	0.15	0.62	0.55		0.50	0.49		
Clearance Time (s)	4.0	6.0			6.0	6.0	4.0	6.0		4.0	6.0		
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0		3.0	3.0		
Lane Grp Cap (vph)	225	357			187	243	475	1960		503	1748		
v/s Ratio Prot	0.00	c0.04					c0.02	0.11		0.00	c0.19		
v/s Ratio Perm	0.01				c0.07	0.00	0.11			0.02			
v/c Ratio	0.04	0.17			0.49	0.03	0.20	0.20		0.04	0.38		
Uniform Delay, d1	23.3	24.0			29.4	27.3	6.1	8.4		9.4	12.1		
Progression Factor	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00		
Incremental Delay, d2	0.1	0.2			2.0	0.0	0.2	0.2		0.0	0.6		
Delay (s)	23.4	24.2			31.4	27.4	6.3	8.7		9.4	12.7		
Level of Service	C	C			C	C	A	A		A	B		
Approach Delay (s)		24.2			30.1			8.2			12.6		
Approach LOS		C			C			A			B		
Intersection Summary													
HCM 2000 Control Delay			14.4		HCM 2000 Level of Service						B		
HCM 2000 Volume to Capacity ratio			0.39										
Actuated Cycle Length (s)			75.7		Sum of lost time (s)						20.0		
Intersection Capacity Utilization			72.3%		ICU Level of Service						C		
Analysis Period (min)			15										

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 10: Bryne Drive & Caplan Avenue

2022 Existing Conditions
 Weekday AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↕		↖	↗	
Traffic Volume (vph)	32	184	143	57	152	19	96	46	56	9	35	22
Future Volume (vph)	32	184	143	57	152	19	96	46	56	9	35	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.93		1.00	0.98		1.00	0.92		1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1760		1789	1852		1789	3284		1789	3371	
Flt Permitted	0.64	1.00		0.29	1.00		0.62	1.00		0.68	1.00	
Satd. Flow (perm)	1206	1760		556	1852		1175	3284		1284	3371	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	35	200	155	62	165	21	104	50	61	10	38	24
RTOR Reduction (vph)	0	36	0	0	6	0	0	35	0	0	15	0
Lane Group Flow (vph)	35	319	0	62	180	0	104	76	0	10	47	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	20.9	18.5		23.5	19.8		36.7	31.5		28.7	27.5	
Effective Green, g (s)	20.9	18.5		23.5	19.8		36.7	31.5		28.7	27.5	
Actuated g/C Ratio	0.28	0.25		0.31	0.26		0.49	0.42		0.38	0.37	
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	355	434		235	489		618	1381		500	1237	
v/s Ratio Prot	0.00	c0.18		c0.01	0.10		c0.01	0.02		0.00	0.01	
v/s Ratio Perm	0.02			0.07			c0.07			0.01		
v/c Ratio	0.10	0.73		0.26	0.37		0.17	0.05		0.02	0.04	
Uniform Delay, d1	19.9	25.9		18.9	22.5		10.5	12.9		14.3	15.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	6.3		0.6	0.5		0.1	0.1		0.0	0.1	
Delay (s)	20.0	32.3		19.5	22.9		10.6	12.9		14.3	15.3	
Level of Service	B	C		B	C		B	B		B	B	
Approach Delay (s)		31.2			22.1			11.8			15.1	
Approach LOS		C			C			B			B	

Intersection Summary		
HCM 2000 Control Delay	23.0	HCM 2000 Level of Service C
HCM 2000 Volume to Capacity ratio	0.38	
Actuated Cycle Length (s)	74.9	Sum of lost time (s) 20.0
Intersection Capacity Utilization	57.6%	ICU Level of Service B
Analysis Period (min)	15	

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 11: Bryne Drive & Mapleview Drive

2022 Existing Conditions
 Weekday AM Peak Hour































Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↖↖		↖	↖↖↖		↖	↖↖		↖	↖↖	
Traffic Volume (vph)	43	833	138	373	741	84	43	34	168	59	53	43
Future Volume (vph)	43	833	138	373	741	84	43	34	168	59	53	43
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	0.98		1.00	0.98		1.00	0.88		1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	5032		1789	5063		1789	3132		1789	3338	
Flt Permitted	0.31	1.00		0.19	1.00		0.69	1.00		0.54	1.00	
Satd. Flow (perm)	576	5032		358	5063		1292	3132		1016	3338	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	47	905	150	405	805	91	47	37	183	64	58	47
RTOR Reduction (vph)	0	18	0	0	10	0	0	162	0	0	41	0
Lane Group Flow (vph)	47	1037	0	405	886	0	47	58	0	64	64	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	45.9	41.8		60.8	52.7		15.3	10.8		18.3	12.3	
Effective Green, g (s)	45.9	41.8		60.8	52.7		15.3	10.8		18.3	12.3	
Actuated g/C Ratio	0.49	0.45		0.65	0.56		0.16	0.12		0.20	0.13	
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	335	2247		461	2850		235	361		248	438	
v/s Ratio Prot	0.01	0.21		c0.14	0.18		0.01	0.02		c0.02	0.02	
v/s Ratio Perm	0.06			c0.43			0.02			c0.03		
v/c Ratio	0.14	0.46		0.88	0.31		0.20	0.16		0.26	0.15	
Uniform Delay, d1	12.5	18.1		13.8	10.8		33.6	37.3		31.4	36.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	0.7		17.0	0.3		0.4	0.2		0.6	0.2	
Delay (s)	12.7	18.7		30.8	11.1		34.1	37.5		32.0	36.2	
Level of Service	B	B		C	B		C	D		C	D	
Approach Delay (s)		18.5			17.3			36.9			34.6	
Approach LOS		B			B			D			C	

Intersection Summary		
HCM 2000 Control Delay	20.6	HCM 2000 Level of Service C
HCM 2000 Volume to Capacity ratio	0.77	
Actuated Cycle Length (s)	93.6	Sum of lost time (s) 20.0
Intersection Capacity Utilization	74.8%	ICU Level of Service D
Analysis Period (min)	15	

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 1: Essa Road & Ardagh Road/Bryne Drive

2022 Existing Conditions
 Weekday PM Peak Hour




























													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations		 			 			 		 	 		
Traffic Volume (vph)	343	116	118	142	130	216	91	733	92	233	944	508	
Future Volume (vph)	343	116	118	142	130	216	91	733	92	233	944	508	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00	
Frt	1.00	0.92		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1789	3308		1789	3579	1601	1789	3579	1601	3471	3579	1601	
Flt Permitted	0.48	1.00		0.60	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (perm)	897	3308		1133	3579	1601	1789	3579	1601	3471	3579	1601	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	
Adj. Flow (vph)	354	120	122	146	134	223	94	756	95	240	973	524	
RTOR Reduction (vph)	0	94	0	0	0	205	0	0	51	0	0	276	
Lane Group Flow (vph)	354	148	0	146	134	18	94	756	44	240	973	248	
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	
Protected Phases	7	4		3	8		5	2		1	6		
Permitted Phases	4			8		8			2			6	
Actuated Green, G (s)	40.3	29.3		17.0	10.0	10.0	10.6	59.1	59.1	11.6	60.1	60.1	
Effective Green, g (s)	40.3	29.3		17.0	10.0	10.0	10.6	59.1	59.1	11.6	60.1	60.1	
Actuated g/C Ratio	0.32	0.23		0.13	0.08	0.08	0.08	0.47	0.47	0.09	0.47	0.47	
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	469	763		187	281	126	149	1665	745	317	1693	757	
v/s Ratio Prot	c0.16	0.04		0.04	0.04		0.05	0.21		c0.07	c0.27		
v/s Ratio Perm	c0.08			0.06		0.01			0.03			0.15	
v/c Ratio	0.75	0.19		0.78	0.48	0.14	0.63	0.45	0.06	0.76	0.57	0.33	
Uniform Delay, d1	37.0	39.3		52.1	56.0	54.5	56.3	23.0	18.7	56.3	24.2	20.9	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	6.8	0.1		18.8	1.3	0.5	8.4	0.9	0.2	9.9	1.4	1.2	
Delay (s)	43.8	39.5		70.9	57.3	55.0	64.7	23.9	18.8	66.2	25.6	22.0	
Level of Service	D	D		E	E	D	E	C	B	E	C	C	
Approach Delay (s)		42.0			60.2			27.5			30.1		
Approach LOS		D			E			C			C		
Intersection Summary													
HCM 2000 Control Delay			35.3									HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio			0.68										
Actuated Cycle Length (s)			127.0									Sum of lost time (s)	20.0
Intersection Capacity Utilization			75.9%									ICU Level of Service	D
Analysis Period (min)			15										

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

2: Veterans Drive & Harvie Road

2022 Existing Conditions
Weekday PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 				 		 			 	
Traffic Volume (vph)	77	273	56	90	362	330	79	723	71	247	546	78
Future Volume (vph)	77	273	56	90	362	330	79	723	71	247	546	78
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1789	3487		1789	1883	1601	1789	3579	1601	1789	3511	
Flt Permitted	0.33	1.00		0.50	1.00	1.00	0.33	1.00	1.00	0.13	1.00	
Satd. Flow (perm)	614	3487		946	1883	1601	613	3579	1601	254	3511	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	84	297	61	98	393	359	86	786	77	268	593	85
RTOR Reduction (vph)	0	16	0	0	0	243	0	0	56	0	10	0
Lane Group Flow (vph)	84	342	0	98	393	116	86	786	21	268	668	0
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)	37.0	30.4		37.8	30.8	30.8	32.9	26.2	26.2	42.2	31.5	
Effective Green, g (s)	37.0	30.4		37.8	30.8	30.8	32.9	26.2	26.2	42.2	31.5	
Actuated g/C Ratio	0.39	0.32		0.40	0.32	0.32	0.34	0.27	0.27	0.44	0.33	
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	318	1108		435	606	515	293	980	438	304	1156	
v/s Ratio Prot	c0.02	0.10		0.02	c0.21		0.02	0.22		c0.11	0.19	
v/s Ratio Perm	0.08			0.07		0.07	0.08		0.01	c0.28		
v/c Ratio	0.26	0.31		0.23	0.65	0.22	0.29	0.80	0.05	0.88	0.58	
Uniform Delay, d1	19.6	24.7		18.5	27.8	23.7	21.7	32.3	25.5	21.6	26.5	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.4	0.7		0.3	5.3	1.0	0.6	4.8	0.0	24.4	0.7	
Delay (s)	20.1	25.4		18.8	33.1	24.7	22.3	37.1	25.6	46.1	27.2	
Level of Service	C	C		B	C	C	C	D	C	D	C	
Approach Delay (s)		24.4			27.9			34.8			32.6	
Approach LOS		C			C			C			C	
Intersection Summary												
HCM 2000 Control Delay			30.9	HCM 2000 Level of Service				C				
HCM 2000 Volume to Capacity ratio			0.76									
Actuated Cycle Length (s)			95.6	Sum of lost time (s)				20.0				
Intersection Capacity Utilization			81.2%	ICU Level of Service				D				
Analysis Period (min)			15									

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
 3: Thrushwood Drive & Harvie Road

2022 Existing Conditions
 Weekday PM Peak Hour



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↵	↑↑	↵	
Traffic Volume (veh/h)	534	44	46	764	26	44
Future Volume (Veh/h)	534	44	46	764	26	44
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)	580	48	50	830	28	48
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	TWLTL		TWLTL			
Median storage veh	2		2			
Upstream signal (m)	318		401			
pX, platoon unblocked						
vC, conflicting volume			628		1119	314
vC1, stage 1 conf vol					604	
vC2, stage 2 conf vol					515	
vCu, unblocked vol			628		1119	314
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)			2.2		3.5	3.3
p0 queue free %			95		93	93
cM capacity (veh/h)			950		401	682
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1
Volume Total	387	241	50	415	415	76
Volume Left	0	0	50	0	0	28
Volume Right	0	48	0	0	0	48
cSH	1700	1700	950	1700	1700	542
Volume to Capacity	0.23	0.14	0.05	0.24	0.24	0.14
Queue Length 95th (m)	0.0	0.0	1.3	0.0	0.0	3.7
Control Delay (s)	0.0	0.0	9.0	0.0	0.0	12.7
Lane LOS	A			B		
Approach Delay (s)	0.0		0.5			12.7
Approach LOS				B		
Intersection Summary						
Average Delay			0.9			
Intersection Capacity Utilization			33.6%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis
5: Harvie Road & Fairview Road

2022 Existing Conditions
Weekday PM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	73	505	728	430	284	82
Future Volume (vph)	73	505	728	430	284	82
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1789	3579	3579	1601	1789	1601
Flt Permitted	0.27	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	510	3579	3579	1601	1789	1601
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	79	549	791	467	309	89
RTOR Reduction (vph)	0	0	0	235	0	68
Lane Group Flow (vph)	79	549	791	232	309	21
Turn Type	pm+pt	NA	NA	Perm	Perm	Perm
Protected Phases	7	4	8			
Permitted Phases	4			8	6	6
Actuated Green, G (s)	50.9	50.9	40.7	40.7	18.9	18.9
Effective Green, g (s)	50.9	50.9	40.7	40.7	18.9	18.9
Actuated g/C Ratio	0.62	0.62	0.50	0.50	0.23	0.23
Clearance Time (s)	4.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	414	2227	1780	796	413	369
v/s Ratio Prot	0.01	c0.15	c0.22			
v/s Ratio Perm	0.10			0.15	c0.17	0.01
v/c Ratio	0.19	0.25	0.44	0.29	0.75	0.06
Uniform Delay, d1	6.9	6.9	13.3	12.1	29.2	24.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	0.3	0.8	0.9	7.3	0.1
Delay (s)	7.1	7.2	14.1	13.0	36.5	24.6
Level of Service	A	A	B	B	D	C
Approach Delay (s)		7.1	13.7		33.8	
Approach LOS		A	B		C	

Intersection Summary

HCM 2000 Control Delay	15.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	81.8	Sum of lost time (s)	16.0
Intersection Capacity Utilization	68.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
6: Thrushwood Drive & Cranberry Lane

2022 Existing Conditions
Weekday PM Peak Hour



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	3	1	2	20	27	6
Future Volume (Veh/h)	3	1	2	20	27	6
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)	3	1	2	22	29	7
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	58	32	36			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	58	32	36			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	947	1041	1575			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	4	24	36			
Volume Left	3	2	0			
Volume Right	1	0	7			
cSH	969	1575	1700			
Volume to Capacity	0.00	0.00	0.02			
Queue Length 95th (m)	0.1	0.0	0.0			
Control Delay (s)	8.7	0.6	0.0			
Lane LOS	A	A				
Approach Delay (s)	8.7	0.6	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			0.8			
Intersection Capacity Utilization			13.3%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis

8: Veterans Drive & Mapleton Drive/Brookwood Drive

2022 Existing Conditions
Weekday PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	18	16	136	80	9	30	238	861	119	30	609	23
Future Volume (vph)	18	16	136	80	9	30	238	861	119	30	609	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0			6.0	6.0	4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00			1.00	1.00	1.00	0.95		1.00	0.95	
Frt	1.00	0.87			1.00	0.85	1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00			0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1630			1803	1601	1789	3514		1789	3559	
Flt Permitted	0.52	1.00			0.64	1.00	0.30	1.00		0.24	1.00	
Satd. Flow (perm)	987	1630			1198	1601	571	3514		456	3559	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	20	17	148	87	10	33	259	936	129	33	662	25
RTOR Reduction (vph)	0	114	0	0	0	28	0	8	0	0	2	0
Lane Group Flow (vph)	20	51	0	0	97	5	259	1057	0	33	685	0
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	18.8	18.8			12.3	12.3	50.8	44.3		39.6	37.1	
Effective Green, g (s)	18.8	18.8			12.3	12.3	50.8	44.3		39.6	37.1	
Actuated g/C Ratio	0.23	0.23			0.15	0.15	0.62	0.54		0.49	0.45	
Clearance Time (s)	4.0	6.0			6.0	6.0	4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	251	375			180	241	500	1907		262	1618	
v/s Ratio Prot	0.00	c0.03					c0.06	c0.30		0.00	0.19	
v/s Ratio Perm	0.02				c0.08	0.00	0.26			0.06		
v/c Ratio	0.08	0.14			0.54	0.02	0.52	0.55		0.13	0.42	
Uniform Delay, d1	24.5	24.9			32.0	29.5	7.6	12.2		11.1	15.0	
Progression Factor	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.2			3.1	0.0	0.9	1.2		0.2	0.8	
Delay (s)	24.7	25.1			35.1	29.6	8.5	13.4		11.3	15.8	
Level of Service	C	C			D	C	A	B		B	B	
Approach Delay (s)		25.1			33.7			12.4			15.6	
Approach LOS		C			C			B			B	























Intersection Summary

HCM 2000 Control Delay	15.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	81.6	Sum of lost time (s)	20.0
Intersection Capacity Utilization	77.4%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
10: Bryne Drive & Caplan Avenue

2022 Existing Conditions
Weekday PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	26	230	193	71	329	21	264	39	78	6	52	42
Future Volume (vph)	26	230	193	71	329	21	264	39	78	6	52	42
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.93		1.00	0.99		1.00	0.90		1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1754		1789	1866		1789	3219		1789	3339	
Flt Permitted	0.38	1.00		0.16	1.00		0.60	1.00		0.67	1.00	
Satd. Flow (perm)	716	1754		307	1866		1130	3219		1265	3339	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	28	250	210	77	358	23	287	42	85	7	57	46
RTOR Reduction (vph)	0	38	0	0	3	0	0	51	0	0	31	0
Lane Group Flow (vph)	28	422	0	77	378	0	287	76	0	7	72	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	25.6	23.0		31.0	25.7		38.7	33.4		28.9	27.6	
Effective Green, g (s)	25.6	23.0		31.0	25.7		38.7	33.4		28.9	27.6	
Actuated g/C Ratio	0.31	0.28		0.37	0.31		0.47	0.40		0.35	0.33	
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	254	486		209	577		583	1295		448	1110	
v/s Ratio Prot	0.00	c0.24		c0.02	0.20		c0.04	0.02		0.00	0.02	
v/s Ratio Perm	0.03			0.11			c0.19			0.01		
v/c Ratio	0.11	0.87		0.37	0.66		0.49	0.06		0.02	0.07	
Uniform Delay, d1	20.4	28.6		19.0	24.8		14.7	15.2		17.7	18.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	15.2		1.1	2.7		0.7	0.1		0.0	0.1	
Delay (s)	20.6	43.7		20.1	27.5		15.3	15.3		17.7	19.0	
Level of Service	C	D		C	C		B	B		B	B	
Approach Delay (s)		42.4			26.3			15.3			18.9	
Approach LOS		D			C			B			B	
Intersection Summary												
HCM 2000 Control Delay			28.0			HCM 2000 Level of Service		C				
HCM 2000 Volume to Capacity ratio			0.65									
Actuated Cycle Length (s)			83.0			Sum of lost time (s)		20.0				
Intersection Capacity Utilization			64.4%			ICU Level of Service		C				
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
 11: Bryne Drive & Mapleview Drive

2022 Existing Conditions
 Weekday PM Peak Hour































Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↗	↑↑↑		↗	↑↑↑		↗	↑↑		↗	↑↑	
Traffic Volume (vph)	139	837	171	314	1206	184	209	159	477	209	112	160
Future Volume (vph)	139	837	171	314	1206	184	209	159	477	209	112	160
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	0.97		1.00	0.98		1.00	0.89		1.00	0.91	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	5011		1789	5040		1789	3176		1789	3263	
Flt Permitted	0.13	1.00		0.18	1.00		0.58	1.00		0.15	1.00	
Satd. Flow (perm)	245	5011		336	5040		1086	3176		288	3263	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	146	881	180	331	1269	194	220	167	502	220	118	168
RTOR Reduction (vph)	0	23	0	0	15	0	0	214	0	0	133	0
Lane Group Flow (vph)	146	1038	0	331	1448	0	220	455	0	220	153	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	61.5	53.6		74.0	62.1		31.2	22.2		39.2	26.2	
Effective Green, g (s)	61.5	53.6		74.0	62.1		31.2	22.2		39.2	26.2	
Actuated g/C Ratio	0.49	0.43		0.59	0.50		0.25	0.18		0.31	0.21	
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	217	2145		388	2499		321	563		246	682	
v/s Ratio Prot	0.04	0.21		c0.11	0.29		0.05	0.14		c0.09	0.05	
v/s Ratio Perm	0.29			c0.39			0.12			c0.19		
v/c Ratio	0.67	0.48		0.85	0.58		0.69	1.01dr		0.89	0.22	
Uniform Delay, d1	18.8	25.8		16.8	22.3		40.6	49.5		35.9	41.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	8.0	0.8		16.4	1.0		6.0	8.4		30.9	0.2	
Delay (s)	26.7	26.6		33.2	23.3		46.6	57.8		66.8	41.2	
Level of Service	C	C		C	C		D	E		E	D	
Approach Delay (s)		26.6			25.1			55.0			52.4	
Approach LOS		C			C			E			D	

Intersection Summary		
HCM 2000 Control Delay	34.7	HCM 2000 Level of Service C
HCM 2000 Volume to Capacity ratio	0.91	
Actuated Cycle Length (s)	125.2	Sum of lost time (s) 20.0
Intersection Capacity Utilization	88.8%	ICU Level of Service E
Analysis Period (min)	15	
dr Defacto Right Lane. Recode with 1 though lane as a right lane.		
c Critical Lane Group		

Appendix E: Future Background Operations

HCM Signalized Intersection Capacity Analysis
 1: Essa Road & Ardagh Road/Bryne Drive

2028 Background Conditions
 Weekday AM Peak Hour




























												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 		 	 	
Traffic Volume (vph)	263	358	54	70	54	232	90	677	52	203	425	320
Future Volume (vph)	263	358	54	70	54	232	90	677	52	203	425	320
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00
Frt	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1789	3508		1789	3579	1601	1789	3579	1601	3471	3579	1601
Flt Permitted	0.52	1.00		0.49	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	985	3508		928	3579	1601	1789	3579	1601	3471	3579	1601
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	286	389	59	76	59	252	98	736	57	221	462	348
RTOR Reduction (vph)	0	11	0	0	0	225	0	0	33	0	0	201
Lane Group Flow (vph)	286	437	0	76	59	27	98	736	24	221	462	147
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8			2			6
Actuated Green, G (s)	33.8	24.3		16.3	10.8	10.8	9.0	42.9	42.9	9.0	42.9	42.9
Effective Green, g (s)	33.8	24.3		16.3	10.8	10.8	9.0	42.9	42.9	9.0	42.9	42.9
Actuated g/C Ratio	0.33	0.24		0.16	0.11	0.11	0.09	0.42	0.42	0.09	0.42	0.42
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	477	838		195	380	170	158	1509	675	307	1509	675
v/s Ratio Prot	c0.11	0.12		0.02	0.02		0.05	c0.21		c0.06	0.13	
v/s Ratio Perm	c0.09			0.04		0.02			0.02			0.09
v/c Ratio	0.60	0.52		0.39	0.16	0.16	0.62	0.49	0.04	0.72	0.31	0.22
Uniform Delay, d1	27.1	33.6		37.4	41.3	41.3	44.7	21.4	17.3	45.1	19.5	18.7
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.0	0.6		1.3	0.2	0.4	7.4	1.1	0.1	7.9	0.5	0.7
Delay (s)	29.1	34.2		38.7	41.5	41.7	52.1	22.5	17.4	53.0	20.0	19.5
Level of Service	C	C		D	D	D	D	C	B	D	C	B
Approach Delay (s)		32.2			41.1			25.4			26.9	
Approach LOS		C			D			C			C	

Intersection Summary		
HCM 2000 Control Delay	29.6	HCM 2000 Level of Service C
HCM 2000 Volume to Capacity ratio	0.58	
Actuated Cycle Length (s)	101.7	Sum of lost time (s) 20.0
Intersection Capacity Utilization	66.2%	ICU Level of Service C
Analysis Period (min)	15	

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
2: Veterans Drive & Harvie Road




















2028 Background Conditions
Weekday AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 				 		 			 	
Traffic Volume (vph)	93	259	277	137	149	195	75	273	154	303	433	88
Future Volume (vph)	93	259	277	137	149	195	75	273	154	303	433	88
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00	0.92		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1789	3301		1789	1883	1601	1789	3579	1601	1789	3488	
Flt Permitted	0.65	1.00		0.32	1.00	1.00	0.38	1.00	1.00	0.45	1.00	
Satd. Flow (perm)	1233	3301		603	1883	1601	720	3579	1601	839	3488	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	101	282	301	149	162	212	82	297	167	329	471	96
RTOR Reduction (vph)	0	172	0	0	0	134	0	0	133	0	17	0
Lane Group Flow (vph)	101	411	0	149	162	78	82	297	34	329	550	0
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)	37.9	31.0		42.7	33.4	33.4	25.3	18.3	18.3	34.3	23.3	
Effective Green, g (s)	37.9	31.0		42.7	33.4	33.4	25.3	18.3	18.3	34.3	23.3	
Actuated g/C Ratio	0.42	0.34		0.47	0.37	0.37	0.28	0.20	0.20	0.38	0.26	
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	558	1129		405	694	590	283	722	323	443	897	
v/s Ratio Prot	0.01	0.12		c0.04	0.09		0.02	0.08		c0.10	0.16	
v/s Ratio Perm	0.06			c0.14		0.05	0.06		0.02	c0.18		
v/c Ratio	0.18	0.36		0.37	0.23	0.13	0.29	0.41	0.10	0.74	0.61	
Uniform Delay, d1	16.2	22.4		14.3	19.8	19.0	24.7	31.5	29.5	21.9	29.7	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.2	0.9		0.6	0.8	0.5	0.6	0.4	0.1	6.6	1.3	
Delay (s)	16.4	23.3		14.9	20.5	19.4	25.3	31.8	29.6	28.5	30.9	
Level of Service	B	C		B	C	B	C	C	C	C	C	
Approach Delay (s)		22.3			18.5			30.2			30.0	
Approach LOS		C			B			C			C	
Intersection Summary												
HCM 2000 Control Delay			25.8	HCM 2000 Level of Service				C				
HCM 2000 Volume to Capacity ratio			0.57									
Actuated Cycle Length (s)			90.6	Sum of lost time (s)				20.0				
Intersection Capacity Utilization			78.5%	ICU Level of Service				D				
Analysis Period (min)			15									

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
3: Thrushwood Drive & Harvie Road

2028 Background Conditions
Weekday AM Peak Hour

																		
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR						
Lane Configurations																		
Traffic Volume (veh/h)	14	609	92	4	416	30	44	4	41	49	4	22						
Future Volume (Veh/h)	14	609	92	4	416	30	44	4	41	49	4	22						
Sign Control		Free			Free			Stop			Stop							
Grade		0%			0%			0%			0%							
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92						
Hourly flow rate (vph)	15	662	100	4	452	33	48	4	45	53	4	24						
Pedestrians																		
Lane Width (m)																		
Walking Speed (m/s)																		
Percent Blockage																		
Right turn flare (veh)																		
Median type																		
	TWLTL					TWLTL												
Median storage veh	2					2												
Upstream signal (m)	318					401												
pX, platoon unblocked																		
vC, conflicting volume	485			762			1002		1235		381		884		1268		242	
vC1, stage 1 conf vol							742		742				476		476			
vC2, stage 2 conf vol							260		493				408		792			
vCu, unblocked vol	485			762			1002		1235		381		884		1268		242	
tC, single (s)	4.1			4.1			7.5		6.5		6.9		7.5		6.5		6.9	
tC, 2 stage (s)							6.5		5.5				6.5		5.5			
tF (s)	2.2			2.2			3.5		4.0		3.3		3.5		4.0		3.3	
p0 queue free %	99			100			86		99		93		87		99		97	
cM capacity (veh/h)	1074			846			343		353		617		418		341		758	
Direction, Lane #																		
	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1										
Volume Total	15	441	321	4	301	184	97	81										
Volume Left	15	0	0	4	0	0	48	53										
Volume Right	0	0	100	0	0	33	45	24										
cSH	1074	1700	1700	846	1700	1700	433	476										
Volume to Capacity	0.01	0.26	0.19	0.00	0.18	0.11	0.22	0.17										
Queue Length 95th (m)	0.3	0.0	0.0	0.1	0.0	0.0	6.5	4.6										
Control Delay (s)	8.4	0.0	0.0	9.3	0.0	0.0	15.7	14.1										
Lane LOS	A			A			C		B									
Approach Delay (s)	0.2			0.1			15.7		14.1									
Approach LOS							C		B									
Intersection Summary																		
Average Delay	2.0																	
Intersection Capacity Utilization	32.5%			ICU Level of Service					A									
Analysis Period (min)	15																	

HCM Signalized Intersection Capacity Analysis
4: Bryne Drive & Harvie Road

2028 Background Conditions
Weekday AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	90	517	71	152	363	95	20	146	105	186	214	54
Future Volume (vph)	90	517	71	152	363	95	20	146	105	186	214	54
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91	0.91
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1789	3579	1601	1789	3579	1601	1789	3579	1601	1789	3415	1457
Flt Permitted	0.52	1.00	1.00	0.37	1.00	1.00	0.60	1.00	1.00	0.50	1.00	1.00
Satd. Flow (perm)	977	3579	1601	690	3579	1601	1125	3579	1601	936	3415	1457
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	98	562	77	165	395	103	22	159	114	202	233	59
RTOR Reduction (vph)	0	0	44	0	0	55	0	0	98	0	2	41
Lane Group Flow (vph)	98	562	33	165	395	48	22	159	16	202	237	12
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)	47.1	40.8	40.8	52.9	43.7	43.7	15.7	12.9	12.9	28.2	21.4	21.4
Effective Green, g (s)	47.1	40.8	40.8	52.9	43.7	43.7	15.7	12.9	12.9	28.2	21.4	21.4
Actuated g/C Ratio	0.50	0.43	0.43	0.56	0.46	0.46	0.17	0.14	0.14	0.30	0.23	0.23
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	542	1550	693	494	1660	742	207	490	219	382	775	330
v/s Ratio Prot	0.01	c0.16		c0.03	0.11		0.00	0.04		c0.06	0.07	
v/s Ratio Perm	0.08		0.02	0.15		0.03	0.01		0.01	c0.09		0.01
v/c Ratio	0.18	0.36	0.05	0.33	0.24	0.06	0.11	0.32	0.07	0.53	0.31	0.04
Uniform Delay, d1	12.5	18.0	15.5	10.3	15.2	14.0	33.1	36.7	35.4	26.2	30.2	28.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	0.7	0.1	0.4	0.3	0.2	0.2	0.4	0.1	1.3	0.2	0.0
Delay (s)	12.6	18.6	15.6	10.7	15.6	14.1	33.3	37.1	35.6	27.5	30.5	28.4
Level of Service	B	B	B	B	B	B	C	D	D	C	C	C
Approach Delay (s)		17.5			14.1			36.2			29.0	
Approach LOS		B			B			D			C	
Intersection Summary												
HCM 2000 Control Delay			21.6	HCM 2000 Level of Service				C				
HCM 2000 Volume to Capacity ratio			0.44									
Actuated Cycle Length (s)			94.2	Sum of lost time (s)				20.0				
Intersection Capacity Utilization			77.1%	ICU Level of Service				D				
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

5: Harvie Road & Fairview Road

2028 Background Conditions
Weekday AM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	58	750	555	327	252	55
Future Volume (vph)	58	750	555	327	252	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1789	3579	3579	1601	1789	1601
Flt Permitted	0.36	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	686	3579	3579	1601	1789	1601
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	63	815	603	355	274	60
RTOR Reduction (vph)	0	0	0	173	0	47
Lane Group Flow (vph)	63	815	603	182	274	13
Turn Type	pm+pt	NA	NA	Perm	Perm	Perm
Protected Phases	7	4	8			
Permitted Phases	4			8	6	6
Actuated Green, G (s)	50.7	50.7	40.9	40.9	17.1	17.1
Effective Green, g (s)	50.7	50.7	40.9	40.9	17.1	17.1
Actuated g/C Ratio	0.64	0.64	0.51	0.51	0.21	0.21
Clearance Time (s)	4.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	516	2273	1834	820	383	343
v/s Ratio Prot	0.01	c0.23	0.17			
v/s Ratio Perm	0.07			0.11	c0.15	0.01
v/c Ratio	0.12	0.36	0.33	0.22	0.72	0.04
Uniform Delay, d1	5.8	6.9	11.4	10.7	29.1	24.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.1	0.4	0.5	0.6	6.2	0.0
Delay (s)	5.9	7.3	11.9	11.3	35.3	24.9
Level of Service	A	A	B	B	D	C
Approach Delay (s)		7.2	11.7		33.5	
Approach LOS		A	B		C	

Intersection Summary

HCM 2000 Control Delay	13.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	79.8	Sum of lost time (s)	16.0
Intersection Capacity Utilization	66.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
6: Thrushwood Drive & Cranberry Lane

2028 Background Conditions
Weekday AM Peak Hour



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	7	1	0	25	29	2
Future Volume (Veh/h)	7	1	0	25	29	2
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)	8	1	0	27	32	2
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	60	33	34			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	60	33	34			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	100	100			
cM capacity (veh/h)	947	1041	1578			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	9	27	34			
Volume Left	8	0	0			
Volume Right	1	0	2			
cSH	956	1578	1700			
Volume to Capacity	0.01	0.00	0.02			
Queue Length 95th (m)	0.2	0.0	0.0			
Control Delay (s)	8.8	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	8.8	0.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			1.1			
Intersection Capacity Utilization			13.3%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis

8: Veterans Drive & Mapleton Drive/Brookwood Drive

2028 Background Conditions
Weekday AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	20	179	63	21	40	91	377	31	21	838	14
Future Volume (vph)	9	20	179	63	21	40	91	377	31	21	838	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0			6.0	6.0	4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00			1.00	1.00	1.00	0.95		1.00	0.95	
Frt	1.00	0.87			1.00	0.85	1.00	0.99		1.00	1.00	
Flt Protected	0.95	1.00			0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1630			1816	1601	1789	3537		1789	3570	
Flt Permitted	0.52	1.00			0.65	1.00	0.22	1.00		0.49	1.00	
Satd. Flow (perm)	978	1630			1220	1601	409	3537		932	3570	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	10	22	195	68	23	43	99	410	34	23	911	15
RTOR Reduction (vph)	0	152	0	0	0	36	0	5	0	0	1	0
Lane Group Flow (vph)	10	65	0	0	91	7	99	439	0	23	925	0
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	16.7	16.7			11.6	11.6	45.6	39.7		38.8	36.3	
Effective Green, g (s)	16.7	16.7			11.6	11.6	45.6	39.7		38.8	36.3	
Actuated g/C Ratio	0.22	0.22			0.15	0.15	0.61	0.53		0.52	0.48	
Clearance Time (s)	4.0	6.0			6.0	6.0	4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	229	363			188	247	357	1874		511	1730	
v/s Ratio Prot	0.00	c0.04					c0.02	0.12		0.00	c0.26	
v/s Ratio Perm	0.01				c0.07	0.00	0.15			0.02		
v/c Ratio	0.04	0.18			0.48	0.03	0.28	0.23		0.05	0.53	
Uniform Delay, d1	22.8	23.6			28.9	26.9	7.2	9.4		8.8	13.4	
Progression Factor	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.2			2.0	0.0	0.4	0.3		0.0	1.2	
Delay (s)	22.9	23.8			30.9	26.9	7.6	9.7		8.8	14.6	
Level of Service	C	C			C	C	A	A		A	B	
Approach Delay (s)		23.8			29.6			9.3			14.5	
Approach LOS		C			C			A			B	

Intersection Summary

HCM 2000 Control Delay	15.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	74.9	Sum of lost time (s)	20.0
Intersection Capacity Utilization	72.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 10: Bryne Drive & Caplan Avenue

2028 Background Conditions
 Weekday AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↕	↗	↖	↕	↗
Traffic Volume (vph)	34	273	85	42	207	30	99	152	54	16	321	22
Future Volume (vph)	34	273	85	42	207	30	99	152	54	16	321	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.96		1.00	0.98		1.00	0.96		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1817		1789	1847		1789	3437		1789	3544	
Flt Permitted	0.49	1.00		0.26	1.00		0.46	1.00		0.61	1.00	
Satd. Flow (perm)	922	1817		490	1847		872	3437		1152	3544	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	37	297	92	46	225	33	108	165	59	17	349	24
RTOR Reduction (vph)	0	14	0	0	7	0	0	34	0	0	6	0
Lane Group Flow (vph)	37	375	0	46	251	0	108	190	0	17	367	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	22.4	18.7		22.4	18.7		36.7	31.5		28.7	27.5	
Effective Green, g (s)	22.4	18.7		22.4	18.7		36.7	31.5		28.7	27.5	
Actuated g/C Ratio	0.30	0.25		0.30	0.25		0.49	0.42		0.38	0.37	
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	317	452		210	459		489	1441		450	1297	
v/s Ratio Prot	0.01	c0.21		c0.01	0.14		c0.02	0.06		0.00	c0.10	
v/s Ratio Perm	0.03			0.05			0.09			0.01		
v/c Ratio	0.12	0.83		0.22	0.55		0.22	0.13		0.04	0.28	
Uniform Delay, d1	19.0	26.7		19.6	24.5		10.6	13.4		14.5	16.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	11.9		0.5	1.3		0.2	0.2		0.0	0.5	
Delay (s)	19.1	38.6		20.1	25.9		10.8	13.6		14.5	17.4	
Level of Service	B	D		C	C		B	B		B	B	
Approach Delay (s)		36.9			25.0			12.7			17.3	
Approach LOS		D			C			B			B	

Intersection Summary

HCM 2000 Control Delay	23.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	75.1	Sum of lost time (s)	20.0
Intersection Capacity Utilization	67.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 11: Bryne Drive & Mapleview Drive

2028 Background Conditions
 Weekday AM Peak Hour


























Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↖↖		↖	↖↖↖		↖	↖↖		↖	↖↖	
Traffic Volume (vph)	59	938	155	420	834	120	48	46	190	151	121	97
Future Volume (vph)	59	938	155	420	834	120	48	46	190	151	121	97
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	0.98		1.00	0.98		1.00	0.88		1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	5033		1789	5045		1789	3146		1789	3341	
Flt Permitted	0.26	1.00		0.13	1.00		0.60	1.00		0.47	1.00	
Satd. Flow (perm)	497	5033		244	5045		1138	3146		889	3341	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	64	1020	168	457	907	130	52	50	207	164	132	105
RTOR Reduction (vph)	0	19	0	0	14	0	0	182	0	0	90	0
Lane Group Flow (vph)	64	1169	0	457	1023	0	52	75	0	164	147	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	41.6	35.8		59.8	50.0		17.5	11.4		21.3	13.3	
Effective Green, g (s)	41.6	35.8		59.8	50.0		17.5	11.4		21.3	13.3	
Actuated g/C Ratio	0.44	0.38		0.63	0.53		0.18	0.12		0.22	0.14	
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	295	1892		477	2649		250	376		274	466	
v/s Ratio Prot	0.01	0.23		c0.20	0.20		0.01	0.02		c0.05	0.04	
v/s Ratio Perm	0.08			c0.40			0.02			c0.08		
v/c Ratio	0.22	0.62		0.96	0.39		0.21	0.20		0.60	0.31	
Uniform Delay, d1	15.6	24.1		24.5	13.5		32.7	37.8		31.6	36.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.4	1.5		30.4	0.4		0.4	0.3		3.5	0.4	
Delay (s)	16.0	25.7		54.9	13.9		33.1	38.0		35.1	37.2	
Level of Service	B	C		D	B		C	D		D	D	
Approach Delay (s)		25.2			26.4			37.2			36.4	
Approach LOS		C			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	28.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	95.2	Sum of lost time (s)	20.0
Intersection Capacity Utilization	80.0%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 1: Essa Road & Ardagh Road/Bryne Drive

2028 Background Conditions
 Weekday PM Peak Hour



























												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	229	310	111	213	197	295	86	712	113	358	918	479
Future Volume (vph)	229	310	111	213	197	295	86	712	113	358	918	479
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00
Frt	1.00	0.96		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1789	3438		1789	3579	1601	1789	3579	1601	3471	3579	1601
Flt Permitted	0.62	1.00		0.27	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1176	3438		500	3579	1601	1789	3579	1601	3471	3579	1601
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	236	320	114	220	203	304	89	734	116	369	946	494
RTOR Reduction (vph)	0	31	0	0	0	250	0	0	71	0	0	269
Lane Group Flow (vph)	236	403	0	220	203	54	89	734	45	369	946	225
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8			2			6
Actuated Green, G (s)	30.9	18.3		34.1	19.9	19.9	8.9	43.7	43.7	16.6	51.4	51.4
Effective Green, g (s)	30.9	18.3		34.1	19.9	19.9	8.9	43.7	43.7	16.6	51.4	51.4
Actuated g/C Ratio	0.27	0.16		0.30	0.18	0.18	0.08	0.39	0.39	0.15	0.46	0.46
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	390	557		313	631	282	141	1386	620	510	1630	729
v/s Ratio Prot	0.07	0.12		c0.09	0.06		0.05	0.21		c0.11	c0.26	
v/s Ratio Perm	0.10			c0.12		0.03			0.03			0.14
v/c Ratio	0.61	0.72		0.70	0.32	0.19	0.63	0.53	0.07	0.72	0.58	0.31
Uniform Delay, d1	34.2	44.8		31.8	40.6	39.6	50.4	26.6	21.8	45.9	22.7	19.4
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.6	4.6		7.0	0.3	0.3	8.9	1.5	0.2	5.0	1.5	1.1
Delay (s)	36.9	49.5		38.8	40.9	39.9	59.2	28.1	22.0	51.0	24.2	20.5
Level of Service	D	D		D	D	D	E	C	C	D	C	C
Approach Delay (s)		45.0			39.8			30.3			28.7	
Approach LOS		D			D			C			C	
Intersection Summary												
HCM 2000 Control Delay			33.6	HCM 2000 Level of Service				C				
HCM 2000 Volume to Capacity ratio			0.68									
Actuated Cycle Length (s)			112.8	Sum of lost time (s)				20.0				
Intersection Capacity Utilization			71.8%	ICU Level of Service				C				
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

2: Veterans Drive & Harvie Road

2028 Background Conditions
Weekday PM Peak Hour




















													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations		 						 			 		
Traffic Volume (vph)	77	345	214	104	408	374	184	446	95	314	615	78	
Future Volume (vph)	77	345	214	104	408	374	184	446	95	314	615	78	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0		
Lane Util. Factor	1.00	0.95		1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95		
Frt	1.00	0.94		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1789	3373		1789	1883	1601	1789	3579	1601	1789	3518		
Flt Permitted	0.31	1.00		0.29	1.00	1.00	0.17	1.00	1.00	0.34	1.00		
Satd. Flow (perm)	583	3373		546	1883	1601	317	3579	1601	643	3518		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	84	375	233	113	443	407	200	485	103	341	668	85	
RTOR Reduction (vph)	0	88	0	0	0	265	0	0	77	0	10	0	
Lane Group Flow (vph)	84	520	0	113	443	142	200	485	26	341	743	0	
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		
Protected Phases	7	4		3	8		5	2		1	6		
Permitted Phases	4			8		8	2		2	6			
Actuated Green, G (s)	37.7	31.0		42.5	33.4	33.4	34.8	23.8	23.8	37.0	24.9		
Effective Green, g (s)	37.7	31.0		42.5	33.4	33.4	34.8	23.8	23.8	37.0	24.9		
Actuated g/C Ratio	0.39	0.32		0.44	0.35	0.35	0.36	0.25	0.25	0.39	0.26		
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	313	1089		359	655	557	283	887	396	392	912		
v/s Ratio Prot	0.02	0.15		c0.03	c0.24		0.08	0.14		c0.11	0.21		
v/s Ratio Perm	0.09			0.11		0.09	0.18		0.02	c0.23			
v/c Ratio	0.27	0.48		0.31	0.68	0.25	0.71	0.55	0.06	0.87	0.82		
Uniform Delay, d1	19.4	26.0		16.6	26.7	22.4	23.2	31.4	27.6	23.8	33.4		
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
Incremental Delay, d2	0.5	1.5		0.5	5.5	1.1	7.8	0.7	0.1	18.2	5.7		
Delay (s)	19.9	27.5		17.1	32.2	23.5	31.0	32.1	27.7	42.0	39.1		
Level of Service	B	C		B	C	C	C	C	C	D	D		
Approach Delay (s)		26.6			26.8			31.2			40.0		
Approach LOS		C			C			C			D		
Intersection Summary													
HCM 2000 Control Delay			31.8									HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.76										
Actuated Cycle Length (s)			96.0									Sum of lost time (s)	20.0
Intersection Capacity Utilization			77.4%									ICU Level of Service	D
Analysis Period (min)			15										

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis

3: Thrushwood Drive & Harvie Road

2028 Background Conditions
Weekday PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	34	677	44	7	841	73	26	9	44	42	5	19
Future Volume (Veh/h)	34	677	44	7	841	73	26	9	44	42	5	19
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	37	736	48	8	914	79	28	10	48	46	5	21
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type												
	TWLTL					TWLTL						
Median storage veh	2					2						
Upstream signal (m)	318					401						
pX, platoon unblocked	0.88						0.88	0.88		0.88	0.88	0.88
vC, conflicting volume	993			784			1330	1843	392	1464	1828	496
vC1, stage 1 conf vol							834	834		970	970	
vC2, stage 2 conf vol							496	1009		495	858	
vCu, unblocked vol	727			784			1109	1690	392	1261	1672	165
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	95			99			90	96	92	84	98	97
cM capacity (veh/h)	770			830			291	249	607	280	262	751
Direction, Lane #												
	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1				
Volume Total	37	491	293	8	609	384	86	72				
Volume Left	37	0	0	8	0	0	28	46				
Volume Right	0	0	48	0	0	79	48	21				
cSH	770	1700	1700	830	1700	1700	399	341				
Volume to Capacity	0.05	0.29	0.17	0.01	0.36	0.23	0.22	0.21				
Queue Length 95th (m)	1.1	0.0	0.0	0.2	0.0	0.0	6.1	6.0				
Control Delay (s)	9.9	0.0	0.0	9.4	0.0	0.0	16.5	18.4				
Lane LOS	A			A			C	C				
Approach Delay (s)	0.4			0.1			16.5	18.4				
Approach LOS							C	C				
Intersection Summary												
Average Delay			1.6									
Intersection Capacity Utilization			41.8%			ICU Level of Service		A				
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

4: Bryne Drive & Harvie Road

2028 Background Conditions
Weekday PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	54	652	32	119	659	155	117	381	95	124	434	123
Future Volume (vph)	54	652	32	119	659	155	117	381	95	124	434	123
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91	0.91
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1789	3579	1601	1789	3579	1601	1789	3579	1601	1789	3414	1457
Flt Permitted	0.33	1.00	1.00	0.27	1.00	1.00	0.28	1.00	1.00	0.38	1.00	1.00
Satd. Flow (perm)	616	3579	1601	516	3579	1601	527	3579	1601	708	3414	1457
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	59	709	35	129	716	168	127	414	103	135	472	134
RTOR Reduction (vph)	0	0	21	0	0	94	0	0	83	0	2	97
Lane Group Flow (vph)	59	709	14	129	716	74	127	414	20	135	483	24
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)	47.2	41.2	41.2	53.4	44.3	44.3	29.8	19.7	19.7	30.0	19.8	19.8
Effective Green, g (s)	47.2	41.2	41.2	53.4	44.3	44.3	29.8	19.7	19.7	30.0	19.8	19.8
Actuated g/C Ratio	0.47	0.41	0.41	0.53	0.44	0.44	0.30	0.20	0.20	0.30	0.20	0.20
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	360	1471	658	390	1582	707	283	703	314	322	674	287
v/s Ratio Prot	0.01	c0.20		c0.03	0.20		c0.05	0.12		0.04	c0.14	
v/s Ratio Perm	0.07		0.01	0.15		0.05	0.09		0.01	0.08		0.02
v/c Ratio	0.16	0.48	0.02	0.33	0.45	0.11	0.45	0.59	0.06	0.42	0.72	0.08
Uniform Delay, d1	14.7	21.7	17.5	12.7	19.5	16.4	27.0	36.6	32.8	26.8	37.6	32.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	1.1	0.1	0.5	0.9	0.3	1.1	1.3	0.1	0.9	3.6	0.1
Delay (s)	14.9	22.8	17.6	13.2	20.4	16.7	28.1	37.8	32.8	27.6	41.2	32.9
Level of Service	B	C	B	B	C	B	C	D	C	C	D	C
Approach Delay (s)		22.0			18.9			35.1			37.4	
Approach LOS		C			B			D			D	
Intersection Summary												
HCM 2000 Control Delay			27.2		HCM 2000 Level of Service					C		
HCM 2000 Volume to Capacity ratio			0.52									
Actuated Cycle Length (s)			100.2		Sum of lost time (s)					20.0		
Intersection Capacity Utilization			76.4%		ICU Level of Service					D		
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

5: Harvie Road & Fairview Road

2028 Background Conditions
Weekday PM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↖	↑↑	↑↑	↘	↖	↘
Traffic Volume (vph)	98	774	819	500	342	115
Future Volume (vph)	98	774	819	500	342	115
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1789	3579	3579	1601	1789	1601
Flt Permitted	0.22	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	411	3579	3579	1601	1789	1601
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	107	841	890	543	372	125
RTOR Reduction (vph)	0	0	0	288	0	92
Lane Group Flow (vph)	107	841	890	255	372	33
Turn Type	pm+pt	NA	NA	Perm	Perm	Perm
Protected Phases	7	4	8			
Permitted Phases	4			8	6	6
Actuated Green, G (s)	51.8	51.8	40.8	40.8	23.2	23.2
Effective Green, g (s)	51.8	51.8	40.8	40.8	23.2	23.2
Actuated g/C Ratio	0.60	0.60	0.47	0.47	0.27	0.27
Clearance Time (s)	4.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	355	2130	1678	750	477	426
v/s Ratio Prot	0.02	c0.24	c0.25			
v/s Ratio Perm	0.16			0.16	c0.21	0.02
v/c Ratio	0.30	0.39	0.53	0.34	0.78	0.08
Uniform Delay, d1	9.0	9.3	16.3	14.6	29.5	23.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.5	0.6	1.2	1.2	7.9	0.1
Delay (s)	9.5	9.9	17.5	15.8	37.4	24.0
Level of Service	A	A	B	B	D	C
Approach Delay (s)		9.8	16.9		34.0	
Approach LOS		A	B		C	

Intersection Summary

HCM 2000 Control Delay	17.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	87.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	71.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
6: Thrushwood Drive & Cranberry Lane

2028 Background Conditions
Weekday PM Peak Hour



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	3	1	2	20	27	6
Future Volume (Veh/h)	3	1	2	20	27	6
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)	3	1	2	22	29	7
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	58	32	36			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	58	32	36			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	947	1041	1575			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	4	24	36			
Volume Left	3	2	0			
Volume Right	1	0	7			
cSH	969	1575	1700			
Volume to Capacity	0.00	0.00	0.02			
Queue Length 95th (m)	0.1	0.0	0.0			
Control Delay (s)	8.7	0.6	0.0			
Lane LOS	A	A				
Approach Delay (s)	8.7	0.6	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			0.8			
Intersection Capacity Utilization			13.3%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis
 8: Veterans Drive & Mapleton Drive/Brookwood Drive

2028 Background Conditions
 Weekday PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗			↖	↗	↖	↕	↗	↖	↕	
Traffic Volume (vph)	19	16	145	80	9	30	253	975	119	32	955	25
Future Volume (vph)	19	16	145	80	9	30	253	975	119	32	955	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0			6.0	6.0	4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00			1.00	1.00	1.00	0.95		1.00	0.95	
Frt	1.00	0.86			1.00	0.85	1.00	0.98		1.00	1.00	
Flt Protected	0.95	1.00			0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1628			1803	1601	1789	3520		1789	3565	
Flt Permitted	0.52	1.00			0.63	1.00	0.15	1.00		0.20	1.00	
Satd. Flow (perm)	987	1628			1187	1601	280	3520		371	3565	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	21	17	158	87	10	33	275	1060	129	35	1038	27
RTOR Reduction (vph)	0	122	0	0	0	28	0	7	0	0	2	0
Lane Group Flow (vph)	21	53	0	0	97	5	275	1182	0	35	1063	0
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	18.8	18.8			12.3	12.3	51.1	44.6		39.5	37.0	
Effective Green, g (s)	18.8	18.8			12.3	12.3	51.1	44.6		39.5	37.0	
Actuated g/C Ratio	0.23	0.23			0.15	0.15	0.62	0.54		0.48	0.45	
Clearance Time (s)	4.0	6.0			6.0	6.0	4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	251	373			178	240	360	1916		222	1610	
v/s Ratio Prot	0.00	c0.03					c0.09	0.34		0.00	0.30	
v/s Ratio Perm	0.02				c0.08	0.00	c0.38			0.07		
v/c Ratio	0.08	0.14			0.54	0.02	0.76	0.62		0.16	0.66	
Uniform Delay, d1	24.7	25.1			32.2	29.7	11.3	12.8		11.5	17.5	
Progression Factor	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.2			3.4	0.0	9.3	1.5		0.3	2.1	
Delay (s)	24.8	25.3			35.6	29.7	20.6	14.3		11.8	19.7	
Level of Service	C	C			D	C	C	B		B	B	
Approach Delay (s)		25.3			34.1			15.5			19.4	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	18.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	81.9	Sum of lost time (s)	20.0
Intersection Capacity Utilization	78.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 10: Bryne Drive & Caplan Avenue

2028 Background Conditions
 Weekday PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	134	163	113	100	222	123	123	233	72	92	381	92
Future Volume (vph)	134	163	113	100	222	123	123	233	72	92	381	92
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.94		1.00	0.95		1.00	0.96		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1768		1789	1782		1789	3452		1789	3474	
Flt Permitted	0.27	1.00		0.49	1.00		0.40	1.00		0.55	1.00	
Satd. Flow (perm)	517	1768		914	1782		753	3452		1040	3474	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	146	177	123	109	241	134	134	253	78	100	414	100
RTOR Reduction (vph)	0	31	0	0	26	0	0	34	0	0	25	0
Lane Group Flow (vph)	146	269	0	109	349	0	134	297	0	100	489	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	29.0	21.9		25.4	20.1		29.7	24.4		29.7	24.4	
Effective Green, g (s)	29.0	21.9		25.4	20.1		29.7	24.4		29.7	24.4	
Actuated g/C Ratio	0.38	0.28		0.33	0.26		0.39	0.32		0.39	0.32	
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	312	503		362	465		362	1095		453	1102	
v/s Ratio Prot	c0.04	0.15		0.02	c0.20		c0.03	0.09		0.02	c0.14	
v/s Ratio Perm	0.13			0.08			0.12			0.07		
v/c Ratio	0.47	0.54		0.30	0.75		0.37	0.27		0.22	0.44	
Uniform Delay, d1	17.1	23.2		18.4	26.1		15.7	19.6		15.3	20.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.1	1.1		0.5	6.7		0.6	0.6		0.2	1.3	
Delay (s)	18.2	24.3		18.9	32.8		16.4	20.2		15.6	22.2	
Level of Service	B	C		B	C		B	C		B	C	
Approach Delay (s)		22.3			29.7			19.1			21.1	
Approach LOS		C			C			B			C	

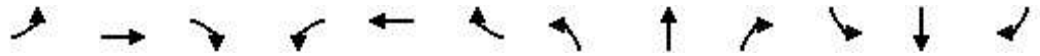
Intersection Summary

HCM 2000 Control Delay	23.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	76.9	Sum of lost time (s)	20.0
Intersection Capacity Utilization	70.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 11: Bryne Drive & Mapleview Drive

2028 Background Conditions
 Weekday PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↗		↖	↖↗		↖	↖↗		↖	↖↗	
Traffic Volume (vph)	112	943	193	354	1358	164	235	126	538	217	112	159
Future Volume (vph)	112	943	193	354	1358	164	235	126	538	217	112	159
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	0.97		1.00	0.98		1.00	0.88		1.00	0.91	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	5011		1789	5059		1789	3144		1789	3264	
Flt Permitted	0.11	1.00		0.10	1.00		0.53	1.00		0.20	1.00	
Satd. Flow (perm)	198	5011		196	5059		992	3144		384	3264	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	118	993	203	373	1429	173	247	133	566	228	118	167
RTOR Reduction (vph)	0	21	0	0	10	0	0	349	0	0	139	0
Lane Group Flow (vph)	118	1175	0	373	1592	0	247	350	0	228	146	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	47.7	38.6		65.5	52.4		32.9	18.5		35.1	19.6	
Effective Green, g (s)	47.7	38.6		65.5	52.4		32.9	18.5		35.1	19.6	
Actuated g/C Ratio	0.41	0.33		0.57	0.45		0.28	0.16		0.30	0.17	
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	207	1674		426	2295		381	503		305	553	
v/s Ratio Prot	0.04	0.23		c0.17	0.31		0.08	0.11		c0.10	0.04	
v/s Ratio Perm	0.19			c0.32			0.10			c0.13		
v/c Ratio	0.57	0.70		0.88	0.69		0.65	0.94dr		0.75	0.26	
Uniform Delay, d1	22.2	33.4		31.1	25.1		34.3	45.8		33.3	41.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.8	2.5		17.9	1.8		3.8	4.1		9.6	0.3	
Delay (s)	25.9	35.9		49.0	26.9		38.1	50.0		42.9	41.9	
Level of Service	C	D		D	C		D	D		D	D	
Approach Delay (s)		35.0			31.1			46.9			42.4	
Approach LOS		D			C			D			D	

Intersection Summary

HCM 2000 Control Delay	36.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	115.5	Sum of lost time (s)	20.0
Intersection Capacity Utilization	92.5%	ICU Level of Service	F
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 1: Essa Road & Ardagh Road/Bryne Drive

2033 Background Conditions
 Weekday AM Peak Hour



























Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	285	401	58	78	60	256	98	731	56	219	459	346	
Future Volume (vph)	285	401	58	78	60	256	98	731	56	219	459	346	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00	
Frt	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1789	3511		1789	3579	1601	1789	3579	1601	3471	3579	1601	
Flt Permitted	0.52	1.00		0.47	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (perm)	979	3511		884	3579	1601	1789	3579	1601	3471	3579	1601	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	310	436	63	85	65	278	107	795	61	238	499	376	
RTOR Reduction (vph)	0	11	0	0	0	249	0	0	36	0	0	228	
Lane Group Flow (vph)	310	488	0	85	65	29	107	795	25	238	499	148	
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	
Protected Phases	7	4		3	8		5	2		1	6		
Permitted Phases	4			8		8			2			6	
Actuated Green, G (s)	35.1	25.6		16.3	10.8	10.8	10.9	42.1	42.1	9.0	40.2	40.2	
Effective Green, g (s)	35.1	25.6		16.3	10.8	10.8	10.9	42.1	42.1	9.0	40.2	40.2	
Actuated g/C Ratio	0.34	0.25		0.16	0.11	0.11	0.11	0.41	0.41	0.09	0.39	0.39	
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	497	879		189	378	169	190	1474	659	305	1407	629	
v/s Ratio Prot	c0.12	0.14		0.02	0.02		0.06	c0.22		c0.07	0.14		
v/s Ratio Perm	c0.09			0.05		0.02			0.02			0.09	
v/c Ratio	0.62	0.55		0.45	0.17	0.17	0.56	0.54	0.04	0.78	0.35	0.24	
Uniform Delay, d1	26.7	33.3		37.9	41.6	41.6	43.4	22.7	18.0	45.6	21.9	20.7	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	2.4	0.8		1.7	0.2	0.5	3.8	1.4	0.1	12.2	0.7	0.9	
Delay (s)	29.2	34.1		39.6	41.8	42.1	47.2	24.1	18.1	57.8	22.6	21.6	
Level of Service	C	C		D	D	D	D	C	B	E	C	C	
Approach Delay (s)		32.2			41.6			26.3			29.8		
Approach LOS		C			D			C			C		
Intersection Summary													
HCM 2000 Control Delay			30.9									HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.62										
Actuated Cycle Length (s)			102.2									Sum of lost time (s)	20.0
Intersection Capacity Utilization			67.9%									ICU Level of Service	C
Analysis Period (min)			15										

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

2: Veterans Drive & Harvie Road




















2033 Background Conditions
Weekday AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 						 			 	
Traffic Volume (vph)	93	285	300	151	164	216	82	296	169	334	468	88
Future Volume (vph)	93	285	300	151	164	216	82	296	169	334	468	88
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00	0.92		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1789	3303		1789	1883	1601	1789	3579	1601	1789	3493	
Flt Permitted	0.64	1.00		0.28	1.00	1.00	0.34	1.00	1.00	0.42	1.00	
Satd. Flow (perm)	1215	3303		529	1883	1601	640	3579	1601	799	3493	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	101	310	326	164	178	235	89	322	184	363	509	96
RTOR Reduction (vph)	0	170	0	0	0	149	0	0	145	0	15	0
Lane Group Flow (vph)	101	466	0	164	178	86	89	322	39	363	590	0
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)	37.9	31.0		43.3	33.7	33.7	26.6	19.3	19.3	35.4	24.1	
Effective Green, g (s)	37.9	31.0		43.3	33.7	33.7	26.6	19.3	19.3	35.4	24.1	
Actuated g/C Ratio	0.41	0.34		0.47	0.37	0.37	0.29	0.21	0.21	0.38	0.26	
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	543	1112		380	689	586	276	750	335	437	915	
v/s Ratio Prot	0.01	0.14		c0.04	0.09		0.03	0.09		c0.11	0.17	
v/s Ratio Perm	0.06			c0.16		0.05	0.07		0.02	c0.21		
v/c Ratio	0.19	0.42		0.43	0.26	0.15	0.32	0.43	0.12	0.83	0.64	
Uniform Delay, d1	16.9	23.6		15.0	20.4	19.5	24.6	31.6	29.4	23.1	30.1	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.2	1.2		0.8	0.9	0.5	0.7	0.4	0.2	12.6	1.6	
Delay (s)	17.0	24.7		15.8	21.3	20.1	25.2	32.0	29.6	35.7	31.7	
Level of Service	B	C		B	C	C	C	C	C	D	C	
Approach Delay (s)		23.7			19.2			30.2			33.2	
Approach LOS		C			B			C			C	
Intersection Summary												
HCM 2000 Control Delay			27.3	HCM 2000 Level of Service				C				
HCM 2000 Volume to Capacity ratio			0.66									
Actuated Cycle Length (s)			92.0	Sum of lost time (s)				20.0				
Intersection Capacity Utilization			81.0%	ICU Level of Service				D				
Analysis Period (min)			15									

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
3: Thrushwood Drive & Harvie Road

2033 Background Conditions
Weekday AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	14	682	92	4	466	30	44	4	41	49	4	22
Future Volume (Veh/h)	14	682	92	4	466	30	44	4	41	49	4	22
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	15	741	100	4	507	33	48	4	45	53	4	24
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type												
	TWLTL					TWLTL						
Median storage veh	2					2						
Upstream signal (m)	318					401						
pX, platoon unblocked	0.98						0.98	0.98		0.98	0.98	0.98
vC, conflicting volume	540			841			1108	1369	420	979	1402	270
vC1, stage 1 conf vol							821	821		532	532	
vC2, stage 2 conf vol							288	548		448	871	
vCu, unblocked vol	488			841			1068	1334	420	936	1369	212
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			85	99	92	87	99	97
cM capacity (veh/h)	1049			790			311	327	582	395	315	777
Direction, Lane #												
	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1				
Volume Total	15	494	347	4	338	202	97	81				
Volume Left	15	0	0	4	0	0	48	53				
Volume Right	0	0	100	0	0	33	45	24				
cSH	1049	1700	1700	790	1700	1700	397	456				
Volume to Capacity	0.01	0.29	0.20	0.01	0.20	0.12	0.24	0.18				
Queue Length 95th (m)	0.3	0.0	0.0	0.1	0.0	0.0	7.2	4.9				
Control Delay (s)	8.5	0.0	0.0	9.6	0.0	0.0	17.0	14.6				
Lane LOS	A			A			C	B				
Approach Delay (s)	0.1			0.1			17.0	14.6				
Approach LOS							C	B				
Intersection Summary												
Average Delay			1.9									
Intersection Capacity Utilization		34.5%		ICU Level of Service				A				
Analysis Period (min)		15										

HCM Signalized Intersection Capacity Analysis

4: Bryne Drive & Harvie Road

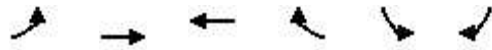
2033 Background Conditions
Weekday AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	101	610	78	168	428	107	22	160	116	208	238	60
Future Volume (vph)	101	610	78	168	428	107	22	160	116	208	238	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91	0.91
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1789	3579	1601	1789	3579	1601	1789	3579	1601	1789	3414	1457
Flt Permitted	0.48	1.00	1.00	0.32	1.00	1.00	0.58	1.00	1.00	0.49	1.00	1.00
Satd. Flow (perm)	898	3579	1601	597	3579	1601	1094	3579	1601	925	3414	1457
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	110	663	85	183	465	116	24	174	126	226	259	65
RTOR Reduction (vph)	0	0	49	0	0	65	0	0	109	0	2	45
Lane Group Flow (vph)	110	663	36	183	465	51	24	174	17	226	264	13
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)	48.0	40.0	40.0	51.2	41.6	41.6	15.8	13.0	13.0	28.6	21.8	21.8
Effective Green, g (s)	48.0	40.0	40.0	51.2	41.6	41.6	15.8	13.0	13.0	28.6	21.8	21.8
Actuated g/C Ratio	0.51	0.42	0.42	0.54	0.44	0.44	0.17	0.14	0.14	0.30	0.23	0.23
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	533	1519	679	445	1580	707	204	493	220	387	790	337
v/s Ratio Prot	0.02	c0.19		c0.04	0.13		0.00	0.05		c0.07	0.08	
v/s Ratio Perm	0.09		0.02	0.18		0.03	0.02		0.01	c0.11		0.01
v/c Ratio	0.21	0.44	0.05	0.41	0.29	0.07	0.12	0.35	0.08	0.58	0.33	0.04
Uniform Delay, d1	12.1	19.1	16.0	11.5	16.9	15.2	33.1	36.8	35.4	26.2	30.2	28.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	0.9	0.1	0.6	0.5	0.2	0.3	0.4	0.2	2.2	0.3	0.0
Delay (s)	12.3	20.1	16.1	12.1	17.4	15.4	33.3	37.2	35.5	28.5	30.4	28.1
Level of Service	B	C	B	B	B	B	C	D	D	C	C	C
Approach Delay (s)		18.7			15.8			36.3			29.4	
Approach LOS		B			B			D			C	
Intersection Summary												
HCM 2000 Control Delay			22.4			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.51									
Actuated Cycle Length (s)			94.2			Sum of lost time (s)			20.0			
Intersection Capacity Utilization			79.2%			ICU Level of Service			D			
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
5: Harvie Road & Fairview Road

2033 Background Conditions
Weekday AM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	63	871	644	360	276	59
Future Volume (vph)	63	871	644	360	276	59
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1789	3579	3579	1601	1789	1601
Flt Permitted	0.31	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	590	3579	3579	1601	1789	1601
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	68	947	700	391	300	64
RTOR Reduction (vph)	0	0	0	195	0	49
Lane Group Flow (vph)	68	947	700	196	300	15
Turn Type	pm+pt	NA	NA	Perm	Perm	Perm
Protected Phases	7	4	8			
Permitted Phases	4			8	6	6
Actuated Green, G (s)	50.5	50.5	40.6	40.6	18.4	18.4
Effective Green, g (s)	50.5	50.5	40.6	40.6	18.4	18.4
Actuated g/C Ratio	0.62	0.62	0.50	0.50	0.23	0.23
Clearance Time (s)	4.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	455	2234	1796	803	406	364
v/s Ratio Prot	0.01	c0.26	0.20			
v/s Ratio Perm	0.08			0.12	c0.17	0.01
v/c Ratio	0.15	0.42	0.39	0.24	0.74	0.04
Uniform Delay, d1	6.4	7.8	12.5	11.4	29.0	24.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	0.6	0.6	0.7	6.9	0.0
Delay (s)	6.6	8.4	13.1	12.2	35.9	24.4
Level of Service	A	A	B	B	D	C
Approach Delay (s)		8.2	12.8		33.9	
Approach LOS		A	B		C	

Intersection Summary			
HCM 2000 Control Delay	14.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	80.9	Sum of lost time (s)	16.0
Intersection Capacity Utilization	67.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis

6: Thrushwood Drive & Cranberry Lane

2033 Background Conditions
Weekday AM Peak Hour



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	7	1	0	25	29	2
Future Volume (Veh/h)	7	1	0	25	29	2
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)	8	1	0	27	32	2
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	60	33	34			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	60	33	34			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	100	100			
cM capacity (veh/h)	947	1041	1578			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	9	27	34			
Volume Left	8	0	0			
Volume Right	1	0	2			
cSH	956	1578	1700			
Volume to Capacity	0.01	0.00	0.02			
Queue Length 95th (m)	0.2	0.0	0.0			
Control Delay (s)	8.8	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	8.8	0.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			1.1			
Intersection Capacity Utilization			13.3%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis

8: Veterans Drive & Mapleton Drive/Brookwood Drive

2033 Background Conditions
Weekday AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗			↖	↗	↖	↕		↖	↗	
Traffic Volume (vph)	9	20	188	63	21	40	96	408	31	22	906	15
Future Volume (vph)	9	20	188	63	21	40	96	408	31	22	906	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0			6.0	6.0	4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00			1.00	1.00	1.00	0.95		1.00	0.95	
Frt	1.00	0.86			1.00	0.85	1.00	0.99		1.00	1.00	
Flt Protected	0.95	1.00			0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1628			1816	1601	1789	3540		1789	3570	
Flt Permitted	0.52	1.00			0.64	1.00	0.19	1.00		0.48	1.00	
Satd. Flow (perm)	980	1628			1210	1601	356	3540		903	3570	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	10	22	204	68	23	43	104	443	34	24	985	16
RTOR Reduction (vph)	0	158	0	0	0	36	0	4	0	0	1	0
Lane Group Flow (vph)	10	68	0	0	91	7	104	473	0	24	1000	0
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	16.8	16.8			11.7	11.7	45.8	39.8		38.8	36.3	
Effective Green, g (s)	16.8	16.8			11.7	11.7	45.8	39.8		38.8	36.3	
Actuated g/C Ratio	0.22	0.22			0.16	0.16	0.61	0.53		0.52	0.48	
Clearance Time (s)	4.0	6.0			6.0	6.0	4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	231	364			188	249	331	1876		496	1725	
v/s Ratio Prot	0.00	c0.04					c0.03	0.13		0.00	c0.28	
v/s Ratio Perm	0.01				c0.08	0.00	0.17			0.02		
v/c Ratio	0.04	0.19			0.48	0.03	0.31	0.25		0.05	0.58	
Uniform Delay, d1	22.9	23.6			28.9	26.9	7.6	9.6		8.9	13.9	
Progression Factor	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.2			2.0	0.0	0.5	0.3		0.0	1.4	
Delay (s)	22.9	23.9			30.9	26.9	8.1	9.9		8.9	15.4	
Level of Service	C	C			C	C	A	A		A	B	
Approach Delay (s)		23.8			29.6			9.6			15.2	
Approach LOS		C			C			A			B	

Intersection Summary

HCM 2000 Control Delay	15.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	75.1	Sum of lost time (s)	20.0
Intersection Capacity Utilization	73.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 10: Bryne Drive & Caplan Avenue

2033 Background Conditions
 Weekday AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	37	302	94	47	229	32	111	166	60	17	355	24
Future Volume (vph)	37	302	94	47	229	32	111	166	60	17	355	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.96		1.00	0.98		1.00	0.96		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1816		1789	1849		1789	3436		1789	3545	
Flt Permitted	0.46	1.00		0.22	1.00		0.45	1.00		0.60	1.00	
Satd. Flow (perm)	862	1816		418	1849		849	3436		1129	3545	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	40	328	102	51	249	35	121	180	65	18	386	26
RTOR Reduction (vph)	0	14	0	0	7	0	0	39	0	0	5	0
Lane Group Flow (vph)	40	416	0	51	277	0	121	206	0	18	407	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	23.9	20.2		23.9	20.2		34.6	29.4		29.2	26.7	
Effective Green, g (s)	23.9	20.2		23.9	20.2		34.6	29.4		29.2	26.7	
Actuated g/C Ratio	0.32	0.27		0.32	0.27		0.46	0.39		0.39	0.35	
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	317	483		198	492		452	1332		456	1248	
v/s Ratio Prot	0.01	c0.23		c0.01	0.15		c0.02	0.06		0.00	c0.11	
v/s Ratio Perm	0.03			0.07			0.10			0.01		
v/c Ratio	0.13	0.86		0.26	0.56		0.27	0.15		0.04	0.33	
Uniform Delay, d1	18.3	26.5		19.2	24.0		12.1	15.1		14.5	18.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	14.6		0.7	1.5		0.3	0.2		0.0	0.7	
Delay (s)	18.5	41.0		19.9	25.5		12.4	15.4		14.5	18.7	
Level of Service	B	D		B	C		B	B		B	B	
Approach Delay (s)		39.1			24.6			14.4			18.5	
Approach LOS		D			C			B			B	
Intersection Summary												
HCM 2000 Control Delay			24.9				HCM 2000 Level of Service				C	
HCM 2000 Volume to Capacity ratio			0.51									
Actuated Cycle Length (s)			75.8				Sum of lost time (s)			20.0		
Intersection Capacity Utilization			70.3%				ICU Level of Service			C		
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 11: Bryne Drive & Mapleview Drive

2033 Background Conditions
 Weekday AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↖↖		↖	↖↖↖		↖	↖↖		↖	↖↖	
Traffic Volume (vph)	63	1016	168	455	903	128	52	49	205	161	130	105
Future Volume (vph)	63	1016	168	455	903	128	52	49	205	161	130	105
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	0.98		1.00	0.98		1.00	0.88		1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	5032		1789	5046		1789	3145		1789	3339	
Flt Permitted	0.24	1.00		0.12	1.00		0.59	1.00		0.42	1.00	
Satd. Flow (perm)	455	5032		230	5046		1119	3145		798	3339	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	68	1104	183	495	982	139	57	53	223	175	141	114
RTOR Reduction (vph)	0	19	0	0	14	0	0	197	0	0	98	0
Lane Group Flow (vph)	68	1268	0	495	1107	0	57	79	0	175	157	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	34.4	28.8		58.8	49.2		16.7	11.1		21.5	13.5	
Effective Green, g (s)	34.4	28.8		58.8	49.2		16.7	11.1		21.5	13.5	
Actuated g/C Ratio	0.37	0.31		0.63	0.52		0.18	0.12		0.23	0.14	
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	246	1543		575	2643		238	371		267	480	
v/s Ratio Prot	0.02	0.25		c0.24	0.22		0.01	0.03		c0.06	0.05	
v/s Ratio Perm	0.08			c0.30			0.03			c0.09		
v/c Ratio	0.28	0.82		0.86	0.42		0.24	0.21		0.66	0.33	
Uniform Delay, d1	19.6	30.2		23.6	13.6		32.8	37.5		31.0	36.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.6	5.1		12.5	0.5		0.5	0.3		5.7	0.4	
Delay (s)	20.2	35.2		36.1	14.1		33.3	37.7		36.7	36.5	
Level of Service	C	D		D	B		C	D		D	D	
Approach Delay (s)		34.5			20.9			37.0			36.6	
Approach LOS		C			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	29.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	93.9	Sum of lost time (s)	20.0
Intersection Capacity Utilization	82.5%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 1: Essa Road & Ardagh Road/Bryne Drive

2033 Background Conditions
 Weekday PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	248	347	121	238	221	327	93	769	122	385	991	518	
Future Volume (vph)	248	347	121	238	221	327	93	769	122	385	991	518	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00	
Frt	1.00	0.96		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1789	3440		1789	3579	1601	1789	3579	1601	3471	3579	1601	
Flt Permitted	0.61	1.00		0.23	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (perm)	1148	3440		434	3579	1601	1789	3579	1601	3471	3579	1601	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	
Adj. Flow (vph)	256	358	125	245	228	337	96	793	126	397	1022	534	
RTOR Reduction (vph)	0	30	0	0	0	263	0	0	79	0	0	296	
Lane Group Flow (vph)	256	453	0	245	228	74	96	793	47	397	1022	238	
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	
Protected Phases	7	4		3	8		5	2		1	6		
Permitted Phases	4			8		8			2			6	
Actuated Green, G (s)	33.3	20.5		37.3	22.5	22.5	10.8	42.7	42.7	17.4	49.3	49.3	
Effective Green, g (s)	33.3	20.5		37.3	22.5	22.5	10.8	42.7	42.7	17.4	49.3	49.3	
Actuated g/C Ratio	0.29	0.18		0.32	0.19	0.19	0.09	0.37	0.37	0.15	0.43	0.43	
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	402	611		314	697	312	167	1324	592	523	1528	683	
v/s Ratio Prot	0.07	0.13		c0.10	0.06		0.05	0.22		c0.11	c0.29		
v/s Ratio Perm	0.11			c0.15		0.05			0.03			0.15	
v/c Ratio	0.64	0.74		0.78	0.33	0.24	0.57	0.60	0.08	0.76	0.67	0.35	
Uniform Delay, d1	34.1	44.9		31.4	39.9	39.2	50.1	29.4	23.6	47.0	26.5	22.2	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	3.3	4.8		11.9	0.3	0.4	4.7	2.0	0.3	6.3	2.3	1.4	
Delay (s)	37.4	49.8		43.3	40.2	39.6	54.8	31.4	23.8	53.2	28.8	23.7	
Level of Service	D	D		D	D	D	D	C	C	D	C	C	
Approach Delay (s)		45.5			40.9			32.7			32.4		
Approach LOS		D			D			C			C		
Intersection Summary													
HCM 2000 Control Delay			36.1									HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio			0.76										
Actuated Cycle Length (s)			115.4									Sum of lost time (s)	20.0
Intersection Capacity Utilization			76.5%									ICU Level of Service	D
Analysis Period (min)			15										

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
2: Veterans Drive & Harvie Road




















2033 Background Conditions
Weekday PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	77	383	232	116	455	417	199	483	105	348	665	78	
Future Volume (vph)	77	383	232	116	455	417	199	483	105	348	665	78	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0		
Lane Util. Factor	1.00	0.95		1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95		
Frt	1.00	0.94		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1789	3376		1789	1883	1601	1789	3579	1601	1789	3522		
Flt Permitted	0.24	1.00		0.27	1.00	1.00	0.18	1.00	1.00	0.27	1.00		
Satd. Flow (perm)	452	3376		504	1883	1601	332	3579	1601	510	3522		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	84	416	252	126	495	453	216	525	114	378	723	85	
RTOR Reduction (vph)	0	87	0	0	0	259	0	0	87	0	9	0	
Lane Group Flow (vph)	84	581	0	126	495	194	216	525	27	378	799	0	
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		
Protected Phases	7	4		3	8		5	2		1	6		
Permitted Phases	4			8		8	2		2	6			
Actuated Green, G (s)	37.5	32.0		40.5	33.5	33.5	33.3	22.7	22.7	40.1	26.1		
Effective Green, g (s)	37.5	32.0		40.5	33.5	33.5	33.3	22.7	22.7	40.1	26.1		
Actuated g/C Ratio	0.39	0.33		0.42	0.35	0.35	0.35	0.24	0.24	0.42	0.27		
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	253	1128		307	659	560	276	848	379	400	960		
v/s Ratio Prot	0.02	0.17		c0.03	c0.26		0.09	0.15		c0.14	0.23		
v/s Ratio Perm	0.11			0.14		0.12	0.19		0.02	c0.26			
v/c Ratio	0.33	0.51		0.41	0.75	0.35	0.78	0.62	0.07	0.94	0.83		
Uniform Delay, d1	20.1	25.6		17.9	27.4	23.0	24.2	32.6	28.3	22.2	32.7		
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
Incremental Delay, d2	0.8	1.7		0.9	7.7	1.7	13.5	1.4	0.1	31.0	6.2		
Delay (s)	20.8	27.3		18.8	35.1	24.7	37.7	34.0	28.4	53.2	39.0		
Level of Service	C	C		B	D	C	D	C	C	D	D		
Approach Delay (s)		26.6			28.8			34.2			43.5		
Approach LOS		C			C			C			D		
Intersection Summary													
HCM 2000 Control Delay			34.1									HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.86										
Actuated Cycle Length (s)			95.7									Sum of lost time (s)	20.0
Intersection Capacity Utilization			80.7%									ICU Level of Service	D
Analysis Period (min)			15										

c Critical Lane Group





























HCM Unsignalized Intersection Capacity Analysis
3: Thrushwood Drive & Harvie Road

2033 Background Conditions
Weekday PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	34	758	44	7	943	73	26	9	44	42	5	19
Future Volume (Veh/h)	34	758	44	7	943	73	26	9	44	42	5	19
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	37	824	48	8	1025	79	28	10	48	46	5	21
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type												
	TWLTL					TWLTL						
Median storage veh	2					2						
Upstream signal (m)	318					401						
pX, platoon unblocked	0.84						0.84	0.84		0.84	0.84	0.84
vC, conflicting volume	1104			872			1474	2042	436	1620	2026	552
vC1, stage 1 conf vol							922	922		1080	1080	
vC2, stage 2 conf vol							552	1120		539	946	
vCu, unblocked vol	740			872			1181	1858	436	1355	1840	83
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	95			99			89	96	92	82	98	97
cM capacity (veh/h)	723			769			260	225	568	258	236	806
Direction, Lane #												
	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1				
Volume Total	37	549	323	8	683	421	86	72				
Volume Left	37	0	0	8	0	0	28	46				
Volume Right	0	0	48	0	0	79	48	21				
cSH	723	1700	1700	769	1700	1700	363	319				
Volume to Capacity	0.05	0.32	0.19	0.01	0.40	0.25	0.24	0.23				
Queue Length 95th (m)	1.2	0.0	0.0	0.2	0.0	0.0	6.9	6.5				
Control Delay (s)	10.2	0.0	0.0	9.7	0.0	0.0	18.0	19.6				
Lane LOS	B			A			C	C				
Approach Delay (s)	0.4			0.1			18.0	19.6				
Approach LOS							C	C				
Intersection Summary												
Average Delay			1.6									
Intersection Capacity Utilization		41.9%		ICU Level of Service				A				
Analysis Period (min)		15										

HCM Signalized Intersection Capacity Analysis
4: Bryne Drive & Harvie Road

2033 Background Conditions
Weekday PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 			 	
Traffic Volume (vph)	60	770	34	131	777	174	129	423	105	139	483	137
Future Volume (vph)	60	770	34	131	777	174	129	423	105	139	483	137
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91	0.91
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1789	3579	1601	1789	3579	1601	1789	3579	1601	1789	3414	1457
Flt Permitted	0.25	1.00	1.00	0.21	1.00	1.00	0.24	1.00	1.00	0.34	1.00	1.00
Satd. Flow (perm)	478	3579	1601	390	3579	1601	449	3579	1601	634	3414	1457
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	65	837	37	142	845	189	140	460	114	151	525	149
RTOR Reduction (vph)	0	0	22	0	0	92	0	0	90	0	2	106
Lane Group Flow (vph)	65	837	15	142	845	97	140	460	24	151	538	28
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)	47.5	41.3	41.3	53.9	44.5	44.5	32.0	21.6	21.6	32.2	21.7	21.7
Effective Green, g (s)	47.5	41.3	41.3	53.9	44.5	44.5	32.0	21.6	21.6	32.2	21.7	21.7
Actuated g/C Ratio	0.46	0.40	0.40	0.52	0.43	0.43	0.31	0.21	0.21	0.31	0.21	0.21
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	299	1437	643	332	1549	693	275	752	336	316	720	307
v/s Ratio Prot	0.01	c0.23		c0.04	0.24		c0.05	0.13		0.05	c0.16	
v/s Ratio Perm	0.09		0.01	0.18		0.06	0.11		0.01	0.10		0.02
v/c Ratio	0.22	0.58	0.02	0.43	0.55	0.14	0.51	0.61	0.07	0.48	0.75	0.09
Uniform Delay, d1	16.0	24.0	18.6	14.5	21.6	17.6	27.0	36.8	32.6	26.7	38.0	32.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4	1.7	0.1	0.9	1.4	0.4	1.5	1.5	0.1	1.1	4.3	0.1
Delay (s)	16.3	25.7	18.6	15.4	23.0	18.0	28.5	38.3	32.6	27.9	42.2	32.8
Level of Service	B	C	B	B	C	B	C	D	C	C	D	C
Approach Delay (s)		24.8			21.3			35.5			38.1	
Approach LOS		C			C			D			D	
Intersection Summary												
HCM 2000 Control Delay			28.8	HCM 2000 Level of Service				C				
HCM 2000 Volume to Capacity ratio			0.60									
Actuated Cycle Length (s)			102.8	Sum of lost time (s)				20.0				
Intersection Capacity Utilization			79.2%	ICU Level of Service				D				
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

5: Harvie Road & Fairview Road

2033 Background Conditions
Weekday PM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↰	↕↕	↕↕	↰	↰	↰
Traffic Volume (vph)	106	908	958	550	375	124
Future Volume (vph)	106	908	958	550	375	124
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1789	3579	3579	1601	1789	1601
Flt Permitted	0.15	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	283	3579	3579	1601	1789	1601
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	115	987	1041	598	408	135
RTOR Reduction (vph)	0	0	0	286	0	97
Lane Group Flow (vph)	115	987	1041	312	408	38
Turn Type	pm+pt	NA	NA	Perm	Perm	Perm
Protected Phases	7	4	8			
Permitted Phases	4			8	6	6
Actuated Green, G (s)	53.5	53.5	40.5	40.5	25.8	25.8
Effective Green, g (s)	53.5	53.5	40.5	40.5	25.8	25.8
Actuated g/C Ratio	0.59	0.59	0.44	0.44	0.28	0.28
Clearance Time (s)	4.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	314	2097	1587	710	505	452
v/s Ratio Prot	0.04	c0.28	c0.29			
v/s Ratio Perm	0.18			0.19	c0.23	0.02
v/c Ratio	0.37	0.47	0.66	0.44	0.81	0.08
Uniform Delay, d1	11.2	10.8	19.9	17.6	30.4	24.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.7	0.8	2.1	2.0	9.2	0.1
Delay (s)	12.0	11.6	22.1	19.5	39.7	24.2
Level of Service	B	B	C	B	D	C
Approach Delay (s)		11.6	21.1		35.8	
Approach LOS		B	C		D	

Intersection Summary

HCM 2000 Control Delay	20.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	91.3	Sum of lost time (s)	16.0
Intersection Capacity Utilization	73.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
6: Thrushwood Drive & Cranberry Lane























2033 Background Conditions
Weekday PM Peak Hour



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	3	1	2	20	27	6
Future Volume (Veh/h)	3	1	2	20	27	6
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)	3	1	2	22	29	7
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	58	32	36			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	58	32	36			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	947	1041	1575			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	4	24	36			
Volume Left	3	2	0			
Volume Right	1	0	7			
cSH	969	1575	1700			
Volume to Capacity	0.00	0.00	0.02			
Queue Length 95th (m)	0.1	0.0	0.0			
Control Delay (s)	8.7	0.6	0.0			
Lane LOS	A	A				
Approach Delay (s)	8.7	0.6	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			0.8			
Intersection Capacity Utilization			13.3%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis
 8: Veterans Drive & Mapleton Drive/Brookwood Drive























2033 Background Conditions
 Weekday PM Peak Hour

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	20	16	152	80	9	30	266	1055	119	33	1034	26	
Future Volume (vph)	20	16	152	80	9	30	266	1055	119	33	1034	26	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	4.0	6.0			6.0	6.0	4.0	6.0		4.0	6.0		
Lane Util. Factor	1.00	1.00			1.00	1.00	1.00	0.95		1.00	0.95		
Frt	1.00	0.86			1.00	0.85	1.00	0.98		1.00	1.00		
Flt Protected	0.95	1.00			0.96	1.00	0.95	1.00		0.95	1.00		
Satd. Flow (prot)	1789	1627			1803	1601	1789	3524		1789	3565		
Flt Permitted	0.52	1.00			0.63	1.00	0.12	1.00		0.17	1.00		
Satd. Flow (perm)	989	1627			1179	1601	228	3524		314	3565		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	22	17	165	87	10	33	289	1147	129	36	1124	28	
RTOR Reduction (vph)	0	127	0	0	0	28	0	6	0	0	2	0	
Lane Group Flow (vph)	22	55	0	0	97	5	289	1270	0	36	1150	0	
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA		
Protected Phases	7	4		3	8		5	2		1	6		
Permitted Phases	4			8		8	2			6			
Actuated Green, G (s)	18.9	18.9			12.4	12.4	51.1	44.6		39.5	37.0		
Effective Green, g (s)	18.9	18.9			12.4	12.4	51.1	44.6		39.5	37.0		
Actuated g/C Ratio	0.23	0.23			0.15	0.15	0.62	0.54		0.48	0.45		
Clearance Time (s)	4.0	6.0			6.0	6.0	4.0	6.0		4.0	6.0		
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0		3.0	3.0		
Lane Grp Cap (vph)	252	375			178	242	334	1916		196	1608		
v/s Ratio Prot	0.00	c0.03					c0.11	0.36		0.01	0.32		
v/s Ratio Perm	0.02				c0.08	0.00	c0.43			0.08			
v/c Ratio	0.09	0.15			0.54	0.02	0.87	0.66		0.18	0.72		
Uniform Delay, d1	24.7	25.1			32.2	29.6	17.2	13.3		11.7	18.2		
Progression Factor	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00		
Incremental Delay, d2	0.2	0.2			3.4	0.0	20.2	1.8		0.5	2.8		
Delay (s)	24.8	25.3			35.6	29.7	37.4	15.2		12.2	21.0		
Level of Service	C	C			D	C	D	B		B	C		
Approach Delay (s)		25.3			34.1			19.3			20.7		
Approach LOS		C			C			B			C		
Intersection Summary													
HCM 2000 Control Delay			20.8		HCM 2000 Level of Service						C		
HCM 2000 Volume to Capacity ratio			0.81										
Actuated Cycle Length (s)			82.0		Sum of lost time (s)						20.0		
Intersection Capacity Utilization			81.0%		ICU Level of Service						D		
Analysis Period (min)			15										

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 10: Bryne Drive & Caplan Avenue

2033 Background Conditions
 Weekday PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations								 			 	
Traffic Volume (vph)	147	180	125	110	246	135	137	255	81	102	421	102
Future Volume (vph)	147	180	125	110	246	135	137	255	81	102	421	102
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.94		1.00	0.95		1.00	0.96		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1768		1789	1783		1789	3449		1789	3474	
Flt Permitted	0.22	1.00		0.42	1.00		0.33	1.00		0.53	1.00	
Satd. Flow (perm)	420	1768		785	1783		620	3449		1006	3474	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	160	196	136	120	267	147	149	277	88	111	458	111
RTOR Reduction (vph)	0	31	0	0	25	0	0	36	0	0	26	0
Lane Group Flow (vph)	160	301	0	120	389	0	149	329	0	111	543	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	30.0	23.0		27.0	21.5		33.5	26.5		30.5	25.0	
Effective Green, g (s)	30.0	23.0		27.0	21.5		33.5	26.5		30.5	25.0	
Actuated g/C Ratio	0.37	0.29		0.34	0.27		0.42	0.33		0.38	0.31	
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	275	505		331	476		359	1135		434	1078	
v/s Ratio Prot	c0.05	0.17		0.02	c0.22		c0.04	0.10		0.02	c0.16	
v/s Ratio Perm	0.17			0.10			0.14			0.08		
v/c Ratio	0.58	0.60		0.36	0.82		0.42	0.29		0.26	0.50	
Uniform Delay, d1	18.7	24.8		19.3	27.7		15.3	20.0		16.6	22.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.1	1.9		0.7	10.5		0.8	0.6		0.3	1.7	
Delay (s)	21.8	26.7		19.9	38.1		16.1	20.7		16.9	24.4	
Level of Service	C	C		B	D		B	C		B	C	
Approach Delay (s)		25.1			34.0			19.3			23.1	
Approach LOS		C			C			B			C	
Intersection Summary												
HCM 2000 Control Delay			25.3			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.61									
Actuated Cycle Length (s)			80.5			Sum of lost time (s)			20.0			
Intersection Capacity Utilization			73.6%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
 11: Bryne Drive & Mapleview Drive

2033 Background Conditions
 Weekday PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↗	↗↗↗		↗	↗↗↗		↗	↗↗		↗	↗↗	
Traffic Volume (vph)	120	1021	209	383	1470	175	255	138	582	233	120	171
Future Volume (vph)	120	1021	209	383	1470	175	255	138	582	233	120	171
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	0.97		1.00	0.98		1.00	0.88		1.00	0.91	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	5011		1789	5060		1789	3144		1789	3263	
Flt Permitted	0.11	1.00		0.10	1.00		0.51	1.00		0.18	1.00	
Satd. Flow (perm)	205	5011		185	5060		965	3144		332	3263	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	126	1075	220	403	1547	184	268	145	613	245	126	180
RTOR Reduction (vph)	0	22	0	0	11	0	0	335	0	0	146	0
Lane Group Flow (vph)	126	1273	0	403	1720	0	268	423	0	245	160	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	46.0	36.7		66.0	52.7		35.7	21.2		38.7	22.7	
Effective Green, g (s)	46.0	36.7		66.0	52.7		35.7	21.2		38.7	22.7	
Actuated g/C Ratio	0.39	0.31		0.55	0.44		0.30	0.18		0.32	0.19	
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	202	1542		442	2237		389	559		303	621	
v/s Ratio Prot	0.05	0.25		c0.19	0.34		0.08	0.13		c0.11	0.05	
v/s Ratio Perm	0.19			c0.31			0.12			c0.15		
v/c Ratio	0.62	0.83		0.91	0.77		0.69	0.99dr		0.81	0.26	
Uniform Delay, d1	25.5	38.3		34.5	28.1		34.4	46.6		33.2	41.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	5.9	5.2		22.9	2.6		5.0	5.8		14.6	0.2	
Delay (s)	31.4	43.5		57.4	30.7		39.5	52.4		47.8	41.3	
Level of Service	C	D		E	C		D	D		D	D	
Approach Delay (s)		42.4			35.8			49.0			44.2	
Approach LOS		D			D			D			D	

Intersection Summary





























HCM 2000 Control Delay	41.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	119.2	Sum of lost time (s)	20.0
Intersection Capacity Utilization	97.8%	ICU Level of Service	F
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 1: Essa Road & Ardagh Road/Bryne Drive

2038 Background Conditions
 Weekday AM Peak Hour
























													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations		 			 			 		 	 		
Traffic Volume (vph)	300	442	61	86	67	280	103	766	59	230	482	364	
Future Volume (vph)	300	442	61	86	67	280	103	766	59	230	482	364	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00	
Frt	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1789	3514		1789	3579	1601	1789	3579	1601	3471	3579	1601	
Flt Permitted	0.52	1.00		0.45	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (perm)	972	3514		844	3579	1601	1789	3579	1601	3471	3579	1601	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	326	480	66	93	73	304	112	833	64	250	524	396	
RTOR Reduction (vph)	0	10	0	0	0	270	0	0	38	0	0	242	
Lane Group Flow (vph)	326	536	0	93	73	34	112	833	26	250	524	154	
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	
Protected Phases	7	4		3	8		5	2		1	6		
Permitted Phases	4			8		8			2			6	
Actuated Green, G (s)	35.8	26.3		16.3	10.8	10.8	11.1	42.1	42.1	9.0	40.0	40.0	
Effective Green, g (s)	35.8	26.3		16.3	10.8	10.8	11.1	42.1	42.1	9.0	40.0	40.0	
Actuated g/C Ratio	0.35	0.26		0.16	0.10	0.10	0.11	0.41	0.41	0.09	0.39	0.39	
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	504	898		184	375	168	192	1464	655	303	1391	622	
v/s Ratio Prot	c0.13	0.15		0.03	0.02		0.06	c0.23		c0.07	0.15		
v/s Ratio Perm	c0.09			0.05		0.02			0.02			0.10	
v/c Ratio	0.65	0.60		0.51	0.19	0.20	0.58	0.57	0.04	0.83	0.38	0.25	
Uniform Delay, d1	26.9	33.6		38.4	42.1	42.1	43.7	23.4	18.3	46.2	22.5	21.3	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	2.9	1.1		2.2	0.3	0.6	4.5	1.6	0.1	16.5	0.8	0.9	
Delay (s)	29.7	34.7		40.6	42.3	42.7	48.2	25.0	18.4	62.7	23.3	22.2	
Level of Service	C	C		D	D	D	D	C	B	E	C	C	
Approach Delay (s)		32.8			42.2			27.2			31.3		
Approach LOS		C			D			C			C		
Intersection Summary													
HCM 2000 Control Delay			32.0									HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.65										
Actuated Cycle Length (s)			102.9									Sum of lost time (s)	20.0
Intersection Capacity Utilization			69.4%									ICU Level of Service	C
Analysis Period (min)			15										

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

2: Veterans Drive & Harvie Road




















2038 Background Conditions
Weekday AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	93	311	315	165	180	235	86	311	184	364	492	88
Future Volume (vph)	93	311	315	165	180	235	86	311	184	364	492	88
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00	0.92		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1789	3309		1789	1883	1601	1789	3579	1601	1789	3497	
Flt Permitted	0.63	1.00		0.25	1.00	1.00	0.31	1.00	1.00	0.41	1.00	
Satd. Flow (perm)	1195	3309		471	1883	1601	590	3579	1601	773	3497	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	101	338	342	179	196	255	93	338	200	396	535	96
RTOR Reduction (vph)	0	165	0	0	0	162	0	0	157	0	15	0
Lane Group Flow (vph)	101	515	0	179	196	93	93	338	43	396	616	0
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)	38.1	31.1		44.1	34.1	34.1	27.4	20.0	20.0	36.1	24.7	
Effective Green, g (s)	38.1	31.1		44.1	34.1	34.1	27.4	20.0	20.0	36.1	24.7	
Actuated g/C Ratio	0.41	0.33		0.47	0.37	0.37	0.29	0.21	0.21	0.39	0.27	
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	533	1104		364	688	585	268	768	343	431	926	
v/s Ratio Prot	0.01	0.16		c0.05	0.10		0.03	0.09		c0.12	0.18	
v/s Ratio Perm	0.06			c0.18		0.06	0.07		0.03	c0.24		
v/c Ratio	0.19	0.47		0.49	0.28	0.16	0.35	0.44	0.13	0.92	0.67	
Uniform Delay, d1	17.3	24.5		15.5	20.9	19.9	24.6	31.7	29.5	24.7	30.6	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.2	1.4		1.0	1.0	0.6	0.8	0.4	0.2	24.3	1.8	
Delay (s)	17.4	25.9		16.5	22.0	20.5	25.4	32.1	29.7	49.0	32.4	
Level of Service	B	C		B	C	C	C	C	C	D	C	
Approach Delay (s)		24.8			19.8			30.4			38.8	
Approach LOS		C			B			C			D	
Intersection Summary												
HCM 2000 Control Delay			29.6	HCM 2000 Level of Service				C				
HCM 2000 Volume to Capacity ratio			0.74									
Actuated Cycle Length (s)			93.2	Sum of lost time (s)				20.0				
Intersection Capacity Utilization			83.5%	ICU Level of Service				E				
Analysis Period (min)			15									

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
3: Thrushwood Drive & Harvie Road





























2038 Background Conditions
Weekday AM Peak Hour

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (veh/h)	14	753	92	4	514	30	44	4	41	49	4	22	
Future Volume (Veh/h)	14	753	92	4	514	30	44	4	41	49	4	22	
Sign Control		Free			Free			Stop			Stop		
Grade		0%			0%			0%			0%		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly flow rate (vph)	15	818	100	4	559	33	48	4	45	53	4	24	
Pedestrians													
Lane Width (m)													
Walking Speed (m/s)													
Percent Blockage													
Right turn flare (veh)													
Median type													
	TWLTL					TWLTL							
Median storage veh	2					2							
Upstream signal (m)	318					401							
pX, platoon unblocked	0.96						0.96	0.96		0.96	0.96	0.96	
vC, conflicting volume	592			918			1212	1498	459	1070	1532	296	
vC1, stage 1 conf vol							898	898		584	584		
vC2, stage 2 conf vol							314	600		486	948		
vCu, unblocked vol	498			918			1142	1439	459	994	1474	190	
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9	
tC, 2 stage (s)							6.5	5.5		6.5	5.5		
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3	
p0 queue free %	99			99			83	99	92	86	99	97	
cM capacity (veh/h)	1022			739			281	302	549	373	290	788	
Direction, Lane #													
	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1					
Volume Total	15	545	373	4	373	219	97	81					
Volume Left	15	0	0	4	0	0	48	53					
Volume Right	0	0	100	0	0	33	45	24					
cSH	1022	1700	1700	739	1700	1700	364	435					
Volume to Capacity	0.01	0.32	0.22	0.01	0.22	0.13	0.27	0.19					
Queue Length 95th (m)	0.3	0.0	0.0	0.1	0.0	0.0	8.0	5.1					
Control Delay (s)	8.6	0.0	0.0	9.9	0.0	0.0	18.4	15.2					
Lane LOS	A			A			C						
Approach Delay (s)	0.1			0.1			18.4 15.2						
Approach LOS							C C						
Intersection Summary													
Average Delay	1.9												
Intersection Capacity Utilization	36.4%			ICU Level of Service					A				
Analysis Period (min)	15												

HCM Signalized Intersection Capacity Analysis

4: Bryne Drive & Harvie Road

2038 Background Conditions
Weekday AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 			 	
Traffic Volume (vph)	111	713	84	184	501	118	24	173	127	230	262	67
Future Volume (vph)	111	713	84	184	501	118	24	173	127	230	262	67
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91	0.91
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1789	3579	1601	1789	3579	1601	1789	3579	1601	1789	3416	1457
Flt Permitted	0.42	1.00	1.00	0.26	1.00	1.00	0.57	1.00	1.00	0.49	1.00	1.00
Satd. Flow (perm)	794	3579	1601	483	3579	1601	1066	3579	1601	919	3416	1457
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	121	775	91	200	545	128	26	188	138	250	285	73
RTOR Reduction (vph)	0	0	53	0	0	72	0	0	119	0	2	51
Lane Group Flow (vph)	121	775	38	200	545	56	26	188	19	250	290	15
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)	48.3	40.0	40.0	51.7	41.7	41.7	16.3	13.4	13.4	29.1	22.2	22.2
Effective Green, g (s)	48.3	40.0	40.0	51.7	41.7	41.7	16.3	13.4	13.4	29.1	22.2	22.2
Actuated g/C Ratio	0.51	0.42	0.42	0.54	0.44	0.44	0.17	0.14	0.14	0.31	0.23	0.23
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	490	1505	673	399	1569	702	204	504	225	388	797	340
v/s Ratio Prot	0.02	0.22		c0.05	0.15		0.00	0.05		c0.08	0.09	
v/s Ratio Perm	0.10		0.02	c0.22		0.04	0.02		0.01	c0.12		0.01
v/c Ratio	0.25	0.51	0.06	0.50	0.35	0.08	0.13	0.37	0.09	0.64	0.36	0.05
Uniform Delay, d1	12.4	20.4	16.4	12.2	17.7	15.5	33.1	37.0	35.5	26.7	30.5	28.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	1.3	0.2	1.0	0.6	0.2	0.3	0.5	0.2	3.6	0.3	0.1
Delay (s)	12.7	21.6	16.5	13.2	18.3	15.8	33.4	37.5	35.7	30.4	30.8	28.3
Level of Service	B	C	B	B	B	B	C	D	D	C	C	C
Approach Delay (s)		20.1			16.8			36.5			30.4	
Approach LOS		C			B			D			C	
Intersection Summary												
HCM 2000 Control Delay			23.3	HCM 2000 Level of Service				C				
HCM 2000 Volume to Capacity ratio			0.59									
Actuated Cycle Length (s)			95.1	Sum of lost time (s)				20.0				
Intersection Capacity Utilization			81.3%	ICU Level of Service				D				
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
5: Harvie Road & Fairview Road

2038 Background Conditions
Weekday AM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↖	↑↑	↗	↑	↙	↘
Traffic Volume (vph)	69	1001	739	396	303	63
Future Volume (vph)	69	1001	739	396	303	63
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1789	3579	3579	1601	1789	1601
Flt Permitted	0.26	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	496	3579	3579	1601	1789	1601
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	75	1088	803	430	329	68
RTOR Reduction (vph)	0	0	0	219	0	52
Lane Group Flow (vph)	75	1088	803	211	329	16
Turn Type	pm+pt	NA	NA	Perm	Perm	Perm
Protected Phases	7	4	8			
Permitted Phases	4			8	6	6
Actuated Green, G (s)	50.8	50.8	40.7	40.7	20.0	20.0
Effective Green, g (s)	50.8	50.8	40.7	40.7	20.0	20.0
Actuated g/C Ratio	0.61	0.61	0.49	0.49	0.24	0.24
Clearance Time (s)	4.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	399	2195	1759	786	432	386
v/s Ratio Prot	0.01	c0.30	0.22			
v/s Ratio Perm	0.10			0.13	c0.18	0.01
v/c Ratio	0.19	0.50	0.46	0.27	0.76	0.04
Uniform Delay, d1	7.3	8.9	13.8	12.3	29.2	24.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	0.8	0.9	0.8	7.7	0.0
Delay (s)	7.5	9.7	14.7	13.2	36.9	24.1
Level of Service	A	A	B	B	D	C
Approach Delay (s)		9.5	14.1		34.7	
Approach LOS		A	B		C	

Intersection Summary			
HCM 2000 Control Delay	15.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	82.8	Sum of lost time (s)	16.0
Intersection Capacity Utilization	69.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
6: Thrushwood Drive & Cranberry Lane

2038 Background Conditions
Weekday AM Peak Hour



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	7	1	0	25	29	2
Future Volume (Veh/h)	7	1	0	25	29	2
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)	8	1	0	27	32	2
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	60	33	34			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	60	33	34			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	100	100			
cM capacity (veh/h)	947	1041	1578			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	9	27	34			
Volume Left	8	0	0			
Volume Right	1	0	2			
cSH	956	1578	1700			
Volume to Capacity	0.01	0.00	0.02			
Queue Length 95th (m)	0.2	0.0	0.0			
Control Delay (s)	8.8	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	8.8	0.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			1.1			
Intersection Capacity Utilization			13.3%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis
 8: Veterans Drive & Mapleton Drive/Brookwood Drive

2038 Background Conditions
 Weekday AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗			↖	↗	↖	↕		↖	↗	
Traffic Volume (vph)	9	20	198	63	21	40	101	429	31	23	952	15
Future Volume (vph)	9	20	198	63	21	40	101	429	31	23	952	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0			6.0	6.0	4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00			1.00	1.00	1.00	0.95		1.00	0.95	
Frt	1.00	0.86			1.00	0.85	1.00	0.99		1.00	1.00	
Flt Protected	0.95	1.00			0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1627			1816	1601	1789	3542		1789	3570	
Flt Permitted	0.52	1.00			0.64	1.00	0.17	1.00		0.47	1.00	
Satd. Flow (perm)	982	1627			1199	1601	321	3542		883	3570	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	10	22	215	68	23	43	110	466	34	25	1035	16
RTOR Reduction (vph)	0	167	0	0	0	36	0	4	0	0	1	0
Lane Group Flow (vph)	10	70	0	0	91	7	110	496	0	25	1050	0
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	16.9	16.9			11.8	11.8	46.0	39.9		38.8	36.3	
Effective Green, g (s)	16.9	16.9			11.8	11.8	46.0	39.9		38.8	36.3	
Actuated g/C Ratio	0.22	0.22			0.16	0.16	0.61	0.53		0.52	0.48	
Clearance Time (s)	4.0	6.0			6.0	6.0	4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	232	365			187	250	315	1876		485	1720	
v/s Ratio Prot	0.00	c0.04					c0.03	0.14		0.00	c0.29	
v/s Ratio Perm	0.01				c0.08	0.00	0.18			0.02		
v/c Ratio	0.04	0.19			0.49	0.03	0.35	0.26		0.05	0.61	
Uniform Delay, d1	22.9	23.7			29.0	26.9	8.0	9.7		9.0	14.3	
Progression Factor	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.3			2.0	0.0	0.7	0.3		0.0	1.6	
Delay (s)	23.0	23.9			31.0	26.9	8.6	10.0		9.0	15.9	
Level of Service	C	C			C	C	A	B		A	B	
Approach Delay (s)		23.9			29.7			9.8			15.8	
Approach LOS		C			C			A			B	

Intersection Summary			
HCM 2000 Control Delay	15.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	75.3	Sum of lost time (s)	20.0
Intersection Capacity Utilization	74.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 10: Bryne Drive & Caplan Avenue

2038 Background Conditions
 Weekday AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	40	333	103	52	253	35	123	180	67	19	388	26
Future Volume (vph)	40	333	103	52	253	35	123	180	67	19	388	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.96		1.00	0.98		1.00	0.96		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1817		1789	1849		1789	3433		1789	3545	
Flt Permitted	0.42	1.00		0.18	1.00		0.42	1.00		0.59	1.00	
Satd. Flow (perm)	798	1817		345	1849		782	3433		1104	3545	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	43	362	112	57	275	38	134	196	73	21	422	28
RTOR Reduction (vph)	0	14	0	0	6	0	0	41	0	0	5	0
Lane Group Flow (vph)	43	460	0	57	307	0	134	228	0	21	445	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	25.8	22.0		25.8	22.0		34.4	29.1		28.8	26.3	
Effective Green, g (s)	25.8	22.0		25.8	22.0		34.4	29.1		28.8	26.3	
Actuated g/C Ratio	0.33	0.28		0.33	0.28		0.44	0.38		0.37	0.34	
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	314	516		185	525		416	1290		432	1204	
v/s Ratio Prot	0.01	c0.25		c0.02	0.17		c0.02	0.07		0.00	c0.13	
v/s Ratio Perm	0.04			0.09			0.12			0.02		
v/c Ratio	0.14	0.89		0.31	0.58		0.32	0.18		0.05	0.37	
Uniform Delay, d1	17.8	26.6		19.1	23.8		13.1	16.1		15.4	19.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	17.5		1.0	1.7		0.5	0.3		0.0	0.9	
Delay (s)	18.0	44.1		20.0	25.4		13.5	16.4		15.5	20.2	
Level of Service	B	D		C	C		B	B		B	C	
Approach Delay (s)		41.9			24.6			15.5			20.0	
Approach LOS		D			C			B			B	
Intersection Summary												
HCM 2000 Control Delay			26.3				HCM 2000 Level of Service				C	
HCM 2000 Volume to Capacity ratio			0.56									
Actuated Cycle Length (s)			77.4				Sum of lost time (s)				20.0	
Intersection Capacity Utilization			73.1%				ICU Level of Service				D	
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 11: Bryne Drive & Mapleview Drive

2038 Background Conditions
 Weekday AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↗		↖	↖↗		↖	↖↗		↖	↖↗	
Traffic Volume (vph)	65	1068	176	478	949	133	55	51	216	168	136	110
Future Volume (vph)	65	1068	176	478	949	133	55	51	216	168	136	110
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	0.98		1.00	0.98		1.00	0.88		1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	5033		1789	5047		1789	3144		1789	3338	
Flt Permitted	0.23	1.00		0.12	1.00		0.59	1.00		0.40	1.00	
Satd. Flow (perm)	429	5033		230	5047		1105	3144		758	3338	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	71	1161	191	520	1032	145	60	55	235	183	148	120
RTOR Reduction (vph)	0	19	0	0	14	0	0	207	0	0	103	0
Lane Group Flow (vph)	71	1333	0	520	1163	0	60	83	0	183	165	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	34.4	28.8		58.8	49.2		16.8	11.2		21.6	13.6	
Effective Green, g (s)	34.4	28.8		58.8	49.2		16.8	11.2		21.6	13.6	
Actuated g/C Ratio	0.37	0.31		0.63	0.52		0.18	0.12		0.23	0.14	
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	238	1542		575	2641		238	374		261	482	
v/s Ratio Prot	0.02	0.26		c0.25	0.23		0.02	0.03		c0.06	0.05	
v/s Ratio Perm	0.09			c0.32			0.03			c0.10		
v/c Ratio	0.30	0.86		0.90	0.44		0.25	0.22		0.70	0.34	
Uniform Delay, d1	19.7	30.8		24.6	13.9		32.8	37.5		31.3	36.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.7	6.7		17.6	0.5		0.6	0.3		8.2	0.4	
Delay (s)	20.4	37.4		42.3	14.4		33.4	37.8		39.5	36.6	
Level of Service	C	D		D	B		C	D		D	D	
Approach Delay (s)		36.6			22.9			37.0			37.8	
Approach LOS		D			C			D			D	





























Intersection Summary

HCM 2000 Control Delay	30.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	94.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	85.4%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 1: Essa Road & Ardagh Road/Bryne Drive

2038 Background Conditions
 Weekday PM Peak Hour



























												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 		 	 	
Traffic Volume (vph)	260	384	127	263	244	358	97	807	129	403	1041	545
Future Volume (vph)	260	384	127	263	244	358	97	807	129	403	1041	545
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00
Frt	1.00	0.96		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1789	3445		1789	3579	1601	1789	3579	1601	3471	3579	1601
Flt Permitted	0.60	1.00		0.20	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1122	3445		378	3579	1601	1789	3579	1601	3471	3579	1601
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	268	396	131	271	252	369	100	832	133	415	1073	562
RTOR Reduction (vph)	0	27	0	0	0	252	0	0	85	0	0	285
Lane Group Flow (vph)	268	500	0	271	252	117	100	832	48	415	1073	277
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8			2			6
Actuated Green, G (s)	35.3	22.4		40.3	24.9	24.9	11.0	42.4	42.4	18.0	49.4	49.4
Effective Green, g (s)	35.3	22.4		40.3	24.9	24.9	11.0	42.4	42.4	18.0	49.4	49.4
Actuated g/C Ratio	0.30	0.19		0.34	0.21	0.21	0.09	0.36	0.36	0.15	0.42	0.42
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	407	652		312	753	337	166	1283	574	528	1495	669
v/s Ratio Prot	0.07	0.15		c0.11	0.07		0.06	0.23		c0.12	c0.30	
v/s Ratio Perm	0.12			c0.18		0.07			0.03			0.17
v/c Ratio	0.66	0.77		0.87	0.33	0.35	0.60	0.65	0.08	0.79	0.72	0.41
Uniform Delay, d1	34.2	45.4		31.5	39.6	39.7	51.5	31.7	25.1	48.2	28.6	24.2
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.8	5.4		21.7	0.3	0.6	6.0	2.5	0.3	7.6	3.0	1.9
Delay (s)	38.1	50.8		53.1	39.9	40.4	57.5	34.2	25.3	55.8	31.6	26.1
Level of Service	D	D		D	D	D	E	C	C	E	C	C
Approach Delay (s)		46.5			44.1			35.3			35.0	
Approach LOS		D			D			D			C	
Intersection Summary												
HCM 2000 Control Delay			38.7				HCM 2000 Level of Service				D	
HCM 2000 Volume to Capacity ratio			0.83									
Actuated Cycle Length (s)			118.2				Sum of lost time (s)			20.0		
Intersection Capacity Utilization			80.5%				ICU Level of Service			D		
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

2: Veterans Drive & Harvie Road

2038 Background Conditions
Weekday PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 						 			 	
Traffic Volume (vph)	77	419	243	127	500	459	209	507	115	381	699	78
Future Volume (vph)	77	419	243	127	500	459	209	507	115	381	699	78
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00	0.94		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1789	3381		1789	1883	1601	1789	3579	1601	1789	3525	
Flt Permitted	0.19	1.00		0.22	1.00	1.00	0.18	1.00	1.00	0.21	1.00	
Satd. Flow (perm)	361	3381		410	1883	1601	347	3579	1601	386	3525	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	84	455	264	138	543	499	227	551	125	414	760	85
RTOR Reduction (vph)	0	73	0	0	0	294	0	0	99	0	8	0
Lane Group Flow (vph)	84	646	0	138	543	205	227	551	26	414	837	0
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)	39.5	34.1		45.7	37.2	37.2	33.8	21.7	21.7	45.8	29.7	
Effective Green, g (s)	39.5	34.1		45.7	37.2	37.2	33.8	21.7	21.7	45.8	29.7	
Actuated g/C Ratio	0.38	0.33		0.44	0.36	0.36	0.32	0.21	0.21	0.44	0.28	
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	210	1104		291	670	570	279	743	332	439	1002	
v/s Ratio Prot	0.02	0.19		c0.04	c0.29		0.09	0.15		c0.18	0.24	
v/s Ratio Perm	0.13			0.17		0.13	0.17		0.02	c0.23		
v/c Ratio	0.40	0.59		0.47	0.81	0.36	0.81	0.74	0.08	0.94	0.84	
Uniform Delay, d1	23.3	29.3		19.4	30.4	24.8	28.1	38.7	33.3	24.5	35.1	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.3	2.3		1.2	10.3	1.8	16.4	4.0	0.1	28.9	6.1	
Delay (s)	24.5	31.5		20.6	40.7	26.6	44.5	42.7	33.4	53.3	41.2	
Level of Service	C	C		C	D	C	D	D	C	D	D	
Approach Delay (s)		30.8			32.4			41.9			45.2	
Approach LOS		C			C			D			D	




















Intersection Summary

HCM 2000 Control Delay	38.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	104.4	Sum of lost time (s)	20.0
Intersection Capacity Utilization	83.9%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
3: Thrushwood Drive & Harvie Road

2038 Background Conditions
Weekday PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	34	837	44	7	1041	73	26	9	44	42	5	19
Future Volume (Veh/h)	34	837	44	7	1041	73	26	9	44	42	5	19
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	37	910	48	8	1132	79	28	10	48	46	5	21
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type												
	TWLTL					TWLTL						
Median storage veh	2					2						
Upstream signal (m)	318					401						
pX, platoon unblocked	0.79						0.79	0.79		0.79	0.79	0.79
vC, conflicting volume	1211			958			1614	2235	479	1770	2220	606
vC1, stage 1 conf vol							1008	1008		1188	1188	
vC2, stage 2 conf vol							606	1227		582	1032	
vCu, unblocked vol	749			958			1256	2038	479	1452	2018	0
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	95			99			88	95	91	81	98	98
cM capacity (veh/h)	680			714			232	203	533	237	214	862
Direction, Lane #												
	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1				
Volume Total	37	607	351	8	755	456	86	72				
Volume Left	37	0	0	8	0	0	28	46				
Volume Right	0	0	48	0	0	79	48	21				
cSH	680	1700	1700	714	1700	1700	330	298				
Volume to Capacity	0.05	0.36	0.21	0.01	0.44	0.27	0.26	0.24				
Queue Length 95th (m)	1.3	0.0	0.0	0.3	0.0	0.0	7.8	7.0				
Control Delay (s)	10.6	0.0	0.0	10.1	0.0	0.0	19.7	20.9				
Lane LOS	B			B			C	C				
Approach Delay (s)	0.4			0.1			19.7	20.9				
Approach LOS							C	C				
Intersection Summary												
Average Delay			1.5									
Intersection Capacity Utilization			44.7%		ICU Level of Service			A				
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis
4: Bryne Drive & Harvie Road

2038 Background Conditions
Weekday PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	67	900	37	142	908	192	141	465	114	154	530	152
Future Volume (vph)	67	900	37	142	908	192	141	465	114	154	530	152
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91	0.91
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1789	3579	1601	1789	3579	1601	1789	3579	1601	1789	3413	1457
Flt Permitted	0.18	1.00	1.00	0.14	1.00	1.00	0.21	1.00	1.00	0.31	1.00	1.00
Satd. Flow (perm)	342	3579	1601	262	3579	1601	395	3579	1601	577	3413	1457
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	73	978	40	154	987	209	153	505	124	167	576	165
RTOR Reduction (vph)	0	0	24	0	0	89	0	0	96	0	2	114
Lane Group Flow (vph)	73	978	16	154	987	120	153	505	28	167	591	34
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)	47.6	41.2	41.2	54.6	44.7	44.7	34.9	24.1	24.1	35.1	24.2	24.2
Effective Green, g (s)	47.6	41.2	41.2	54.6	44.7	44.7	34.9	24.1	24.1	35.1	24.2	24.2
Actuated g/C Ratio	0.45	0.39	0.39	0.51	0.42	0.42	0.33	0.23	0.23	0.33	0.23	0.23
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	240	1389	621	277	1507	674	271	812	363	315	778	332
v/s Ratio Prot	0.02	c0.27		c0.05	0.28		c0.06	0.14		0.05	c0.17	
v/s Ratio Perm	0.12		0.01	0.23		0.07	0.13		0.02	0.12		0.02
v/c Ratio	0.30	0.70	0.03	0.56	0.65	0.18	0.56	0.62	0.08	0.53	0.76	0.10
Uniform Delay, d1	18.1	27.3	20.0	17.3	24.5	19.2	27.0	36.9	32.3	26.6	38.2	32.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.7	3.0	0.1	2.4	2.2	0.6	2.7	1.5	0.1	1.7	4.4	0.1
Delay (s)	18.8	30.3	20.1	19.7	26.8	19.8	29.7	38.4	32.3	28.3	42.6	32.5
Level of Service	B	C	C	B	C	B	C	D	C	C	D	C
Approach Delay (s)		29.2			24.9			35.7			38.4	
Approach LOS		C			C			D			D	
Intersection Summary												
HCM 2000 Control Delay			31.0		HCM 2000 Level of Service			C				
HCM 2000 Volume to Capacity ratio			0.69									
Actuated Cycle Length (s)			106.1		Sum of lost time (s)			20.0				
Intersection Capacity Utilization			81.9%		ICU Level of Service			D				
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

5: Harvie Road & Fairview Road

2038 Background Conditions
Weekday PM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	116	1053	1108	606	412	135
Future Volume (vph)	116	1053	1108	606	412	135
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1789	3579	3579	1601	1789	1601
Flt Permitted	0.09	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	171	3579	3579	1601	1789	1601
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	126	1145	1204	659	448	147
RTOR Reduction (vph)	0	0	0	279	0	103
Lane Group Flow (vph)	126	1145	1204	380	448	44
Turn Type	pm+pt	NA	NA	Perm	Perm	Perm
Protected Phases	7	4	8			
Permitted Phases	4			8	6	6
Actuated Green, G (s)	53.8	53.8	40.4	40.4	28.2	28.2
Effective Green, g (s)	53.8	53.8	40.4	40.4	28.2	28.2
Actuated g/C Ratio	0.57	0.57	0.43	0.43	0.30	0.30
Clearance Time (s)	4.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	259	2048	1538	688	536	480
v/s Ratio Prot	0.05	c0.32	c0.34			
v/s Ratio Perm	0.23			0.24	c0.25	0.03
v/c Ratio	0.49	0.56	0.78	0.55	0.84	0.09
Uniform Delay, d1	14.7	12.6	23.0	20.0	30.7	23.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.4	1.1	4.1	3.2	10.9	0.1
Delay (s)	16.2	13.7	27.1	23.2	41.6	23.8
Level of Service	B	B	C	C	D	C
Approach Delay (s)		14.0	25.7		37.2	
Approach LOS		B	C		D	

Intersection Summary

HCM 2000 Control Delay	23.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	94.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	75.9%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
6: Thrushwood Drive & Cranberry Lane























2038 Background Conditions
Weekday PM Peak Hour



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	3	1	2	20	27	6
Future Volume (Veh/h)	3	1	2	20	27	6
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)	3	1	2	22	29	7
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	58	32	36			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	58	32	36			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	947	1041	1575			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	4	24	36			
Volume Left	3	2	0			
Volume Right	1	0	7			
cSH	969	1575	1700			
Volume to Capacity	0.00	0.00	0.02			
Queue Length 95th (m)	0.1	0.0	0.0			
Control Delay (s)	8.7	0.6	0.0			
Lane LOS	A	A				
Approach Delay (s)	8.7	0.6	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			0.8			
Intersection Capacity Utilization			13.3%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis
 8: Veterans Drive & Mapleton Drive/Brookwood Drive

2038 Background Conditions
 Weekday PM Peak Hour

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	21	16	160	80	9	30	279	1108	119	35	1086	27	
Future Volume (vph)	21	16	160	80	9	30	279	1108	119	35	1086	27	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	4.0	6.0			6.0	6.0	4.0	6.0		4.0	6.0		
Lane Util. Factor	1.00	1.00			1.00	1.00	1.00	0.95		1.00	0.95		
Frt	1.00	0.86			1.00	0.85	1.00	0.99		1.00	1.00		
Flt Protected	0.95	1.00			0.96	1.00	0.95	1.00		0.95	1.00		
Satd. Flow (prot)	1789	1626			1803	1601	1789	3527		1789	3566		
Flt Permitted	0.53	1.00			0.62	1.00	0.10	1.00		0.13	1.00		
Satd. Flow (perm)	992	1626			1168	1601	191	3527		249	3566		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	23	17	174	87	10	33	303	1204	129	38	1180	29	
RTOR Reduction (vph)	0	133	0	0	0	28	0	6	0	0	2	0	
Lane Group Flow (vph)	23	58	0	0	97	5	303	1327	0	38	1207	0	
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA		
Protected Phases	7	4		3	8		5	2		1	6		
Permitted Phases	4			8		8	2			6			
Actuated Green, G (s)	19.1	19.1			12.6	12.6	50.3	42.3		40.2	36.2		
Effective Green, g (s)	19.1	19.1			12.6	12.6	50.3	42.3		40.2	36.2		
Actuated g/C Ratio	0.23	0.23			0.15	0.15	0.62	0.52		0.49	0.44		
Clearance Time (s)	4.0	6.0			6.0	6.0	4.0	6.0		4.0	6.0		
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0		3.0	3.0		
Lane Grp Cap (vph)	257	381			180	247	316	1832		198	1585		
v/s Ratio Prot	0.00	c0.04					c0.12	0.38		0.01	0.34		
v/s Ratio Perm	0.02				c0.08	0.00	c0.47			0.09			
v/c Ratio	0.09	0.15			0.54	0.02	0.96	0.72		0.19	0.76		
Uniform Delay, d1	24.3	24.7			31.7	29.2	21.5	15.1		11.8	19.0		
Progression Factor	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00		
Incremental Delay, d2	0.2	0.2			3.1	0.0	39.2	2.5		0.5	3.5		
Delay (s)	24.4	24.9			34.8	29.2	60.7	17.6		12.3	22.5		
Level of Service	C	C			C	C	E	B		B	C		
Approach Delay (s)		24.9			33.4			25.6			22.2		
Approach LOS		C			C			C			C		
Intersection Summary													
HCM 2000 Control Delay			24.5		HCM 2000 Level of Service						C		
HCM 2000 Volume to Capacity ratio			0.88										
Actuated Cycle Length (s)			81.4		Sum of lost time (s)						20.0		
Intersection Capacity Utilization			83.7%		ICU Level of Service						E		
Analysis Period (min)			15										

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 10: Bryne Drive & Caplan Avenue

2038 Background Conditions
 Weekday PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	162	199	138	122	271	148	152	277	89	111	460	111
Future Volume (vph)	162	199	138	122	271	148	152	277	89	111	460	111
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.94		1.00	0.95		1.00	0.96		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1768		1789	1784		1789	3448		1789	3474	
Flt Permitted	0.18	1.00		0.37	1.00		0.29	1.00		0.52	1.00	
Satd. Flow (perm)	344	1768		704	1784		543	3448		974	3474	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	176	216	150	133	295	161	165	301	97	121	500	121
RTOR Reduction (vph)	0	30	0	0	24	0	0	37	0	0	25	0
Lane Group Flow (vph)	176	336	0	133	432	0	165	361	0	121	596	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	31.4	24.4		28.4	22.9		33.4	26.4		30.4	24.9	
Effective Green, g (s)	31.4	24.4		28.4	22.9		33.4	26.4		30.4	24.9	
Actuated g/C Ratio	0.38	0.30		0.35	0.28		0.41	0.32		0.37	0.30	
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	255	527		317	499		328	1112		416	1057	
v/s Ratio Prot	c0.06	0.19		0.03	c0.24		c0.04	0.10		0.02	c0.17	
v/s Ratio Perm	0.21			0.12			0.16			0.09		
v/c Ratio	0.69	0.64		0.42	0.86		0.50	0.33		0.29	0.56	
Uniform Delay, d1	19.0	24.9		19.2	28.0		16.3	21.0		17.3	23.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	7.8	2.5		0.9	14.5		1.2	0.8		0.4	2.2	
Delay (s)	26.8	27.4		20.1	42.4		17.5	21.7		17.7	26.1	
Level of Service	C	C		C	D		B	C		B	C	
Approach Delay (s)		27.2			37.4			20.5			24.7	
Approach LOS		C			D			C			C	

Intersection Summary

HCM 2000 Control Delay	27.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	81.8	Sum of lost time (s)	20.0
Intersection Capacity Utilization	77.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 120: Bryne Drive & Mapleview Drive

2038 Background Conditions
 Weekday PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↗	↑↑↑		↗	↑↑↑		↗	↑↑		↗	↑↑	
Traffic Volume (vph)	126	1073	220	403	1545	182	268	144	612	244	126	180
Future Volume (vph)	126	1073	220	403	1545	182	268	144	612	244	126	180
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	0.97		1.00	0.98		1.00	0.88		1.00	0.91	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	5010		1789	5060		1789	3144		1789	3263	
Flt Permitted	0.11	1.00		0.10	1.00		0.46	1.00		0.17	1.00	
Satd. Flow (perm)	204	5010		184	5060		860	3144		319	3263	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	133	1129	232	424	1626	192	282	152	644	257	133	189
RTOR Reduction (vph)	0	23	0	0	11	0	0	316	0	0	150	0
Lane Group Flow (vph)	133	1338	0	424	1807	0	282	480	0	257	172	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	45.6	36.9		67.9	55.2		39.7	23.4		40.1	23.6	
Effective Green, g (s)	45.6	36.9		67.9	55.2		39.7	23.4		40.1	23.6	
Actuated g/C Ratio	0.37	0.30		0.55	0.45		0.32	0.19		0.32	0.19	
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	186	1493		450	2256		398	594		299	622	
v/s Ratio Prot	0.05	0.27		c0.21	0.36		0.09	0.15		c0.11	0.05	
v/s Ratio Perm	0.21			c0.31			0.13			c0.16		
v/c Ratio	0.72	0.90		0.94	0.80		0.71	1.04dr		0.86	0.28	
Uniform Delay, d1	28.3	41.6		37.0	29.6		34.0	48.0		34.8	42.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	12.3	8.8		28.3	3.1		5.7	7.9		21.0	0.2	
Delay (s)	40.6	50.4		65.2	32.7		39.7	56.0		55.8	43.1	
Level of Service	D	D		E	C		D	E		E	D	
Approach Delay (s)		49.5			38.8			51.7			48.7	
Approach LOS		D			D			D			D	

Intersection Summary





























HCM 2000 Control Delay	45.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	123.8	Sum of lost time (s)	20.0
Intersection Capacity Utilization	101.9%	ICU Level of Service	G
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 1: Essa Road & Ardagh Road/Bryne Drive




























2043 Background Conditions
 Weekday AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 		 	 	
Traffic Volume (vph)	315	488	64	95	74	305	108	804	62	241	506	383
Future Volume (vph)	315	488	64	95	74	305	108	804	62	241	506	383
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00
Frt	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1789	3516		1789	3579	1601	1789	3579	1601	3471	3579	1601
Flt Permitted	0.50	1.00		0.43	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	945	3516		801	3579	1601	1789	3579	1601	3471	3579	1601
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	342	530	70	103	80	332	117	874	67	262	550	416
RTOR Reduction (vph)	0	10	0	0	0	261	0	0	39	0	0	255
Lane Group Flow (vph)	342	590	0	103	80	71	117	874	28	262	550	161
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8			2			6
Actuated Green, G (s)	35.4	24.4		17.0	10.0	10.0	11.4	42.2	42.2	9.0	39.8	39.8
Effective Green, g (s)	35.4	24.4		17.0	10.0	10.0	11.4	42.2	42.2	9.0	39.8	39.8
Actuated g/C Ratio	0.35	0.24		0.17	0.10	0.10	0.11	0.41	0.41	0.09	0.39	0.39
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	502	836		200	348	156	198	1472	658	304	1388	621
v/s Ratio Prot	c0.14	c0.17		0.04	0.02		0.07	c0.24		c0.08	0.15	
v/s Ratio Perm	0.09			0.05		0.04			0.02			0.10
v/c Ratio	0.68	0.71		0.52	0.23	0.46	0.59	0.59	0.04	0.86	0.40	0.26
Uniform Delay, d1	27.3	35.8		37.9	42.7	43.7	43.4	23.5	18.1	46.2	22.7	21.4
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.8	2.7		2.2	0.3	2.1	4.7	1.8	0.1	21.3	0.8	1.0
Delay (s)	31.1	38.5		40.1	43.1	45.8	48.0	25.3	18.2	67.5	23.6	22.4
Level of Service	C	D		D	D	D	D	C	B	E	C	C
Approach Delay (s)		35.8			44.3			27.4			32.5	
Approach LOS		D			D			C			C	
Intersection Summary												
HCM 2000 Control Delay			33.5									HCM 2000 Level of Service C
HCM 2000 Volume to Capacity ratio			0.69									
Actuated Cycle Length (s)			102.6									Sum of lost time (s) 20.0
Intersection Capacity Utilization			71.9%									ICU Level of Service C
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
2: Veterans Drive & Harvie Road

2043 Background Conditions
Weekday AM Peak Hour




















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 				 		 			 	
Traffic Volume (vph)	93	339	331	180	196	257	90	327	201	397	517	88
Future Volume (vph)	93	339	331	180	196	257	90	327	201	397	517	88
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00	0.93		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1789	3313		1789	1883	1601	1789	3579	1601	1789	3500	
Flt Permitted	0.62	1.00		0.22	1.00	1.00	0.40	1.00	1.00	0.36	1.00	
Satd. Flow (perm)	1177	3313		414	1883	1601	757	3579	1601	678	3500	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	101	368	360	196	213	279	98	355	218	432	562	96
RTOR Reduction (vph)	0	159	0	0	0	177	0	0	179	0	15	0
Lane Group Flow (vph)	101	569	0	196	213	102	98	355	39	432	643	0
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)	36.4	30.8		43.0	34.1	34.1	22.2	16.6	16.6	37.3	27.7	
Effective Green, g (s)	36.4	30.8		43.0	34.1	34.1	22.2	16.6	16.6	37.3	27.7	
Actuated g/C Ratio	0.39	0.33		0.46	0.37	0.37	0.24	0.18	0.18	0.40	0.30	
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	497	1097		323	690	587	242	638	285	471	1042	
v/s Ratio Prot	0.01	0.17		c0.06	0.11		0.02	0.10		c0.16	0.18	
v/s Ratio Perm	0.07			c0.22		0.06	0.07		0.02	c0.20		
v/c Ratio	0.20	0.52		0.61	0.31	0.17	0.40	0.56	0.14	0.92	0.62	
Uniform Delay, d1	18.3	25.1		16.6	21.0	19.9	28.5	34.8	32.2	22.9	28.1	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.2	1.8		3.2	1.2	0.6	1.1	1.1	0.2	22.6	1.1	
Delay (s)	18.5	26.9		19.8	22.2	20.6	29.6	35.9	32.4	45.4	29.2	
Level of Service	B	C		B	C	C	C	D	C	D	C	
Approach Delay (s)		25.9			20.9			33.8			35.6	
Approach LOS		C			C			C			D	
Intersection Summary												
HCM 2000 Control Delay			29.7	HCM 2000 Level of Service				C				
HCM 2000 Volume to Capacity ratio			0.81									
Actuated Cycle Length (s)			93.0	Sum of lost time (s)				20.0				
Intersection Capacity Utilization			86.1%	ICU Level of Service				E				
Analysis Period (min)			15									

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis

3: Thrushwood Drive & Harvie Road

2043 Background Conditions
Weekday AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	14	831	92	4	568	30	44	4	41	49	4	22
Future Volume (Veh/h)	14	831	92	4	568	30	44	4	41	49	4	22
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	15	903	100	4	617	33	48	4	45	53	4	24
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type												
	TWLTL					TWLTL						
Median storage veh	2					2						
Upstream signal (m)	318					401						
pX, platoon unblocked	0.94						0.94	0.94		0.94	0.94	0.94
vC, conflicting volume	650			1003			1326	1641	502	1170	1674	325
vC1, stage 1 conf vol							983	983		642	642	
vC2, stage 2 conf vol							342	658		528	1033	
vCu, unblocked vol	512			1003			1227	1561	502	1063	1597	168
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			99			81	99	91	85	98	97
cM capacity (veh/h)	991			686			250	276	515	349	265	799
Direction, Lane #												
	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1				
Volume Total	15	602	401	4	411	239	97	81				
Volume Left	15	0	0	4	0	0	48	53				
Volume Right	0	0	100	0	0	33	45	24				
cSH	991	1700	1700	686	1700	1700	330	411				
Volume to Capacity	0.02	0.35	0.24	0.01	0.24	0.14	0.29	0.20				
Queue Length 95th (m)	0.4	0.0	0.0	0.1	0.0	0.0	9.1	5.5				
Control Delay (s)	8.7	0.0	0.0	10.3	0.0	0.0	20.4	15.9				
Lane LOS	A			B			C	C				
Approach Delay (s)	0.1			0.1			20.4	15.9				
Approach LOS							C	C				
Intersection Summary												
Average Delay			1.9									
Intersection Capacity Utilization			38.6%		ICU Level of Service			A				
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis
4: Bryne Drive & Harvie Road

2043 Background Conditions
Weekday AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	123	833	91	201	586	130	26	187	139	254	288	74	
Future Volume (vph)	123	833	91	201	586	130	26	187	139	254	288	74	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91	0.91	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1789	3579	1601	1789	3579	1601	1789	3579	1601	1789	3415	1457	
Flt Permitted	0.37	1.00	1.00	0.19	1.00	1.00	0.55	1.00	1.00	0.48	1.00	1.00	
Satd. Flow (perm)	706	3579	1601	357	3579	1601	1036	3579	1601	898	3415	1457	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	134	905	99	218	637	141	28	203	151	276	313	80	
RTOR Reduction (vph)	0	0	57	0	0	78	0	0	131	0	2	57	
Lane Group Flow (vph)	134	905	42	218	637	63	28	203	20	276	319	15	
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	
Protected Phases	7	4		3	8		5	2		1	6		
Permitted Phases	4		4	8		8	2		2	6		6	
Actuated Green, G (s)	48.6	40.0	40.0	54.2	42.8	42.8	17.3	12.9	12.9	28.9	20.5	20.5	
Effective Green, g (s)	48.6	40.0	40.0	54.2	42.8	42.8	17.3	12.9	12.9	28.9	20.5	20.5	
Actuated g/C Ratio	0.50	0.42	0.42	0.56	0.44	0.44	0.18	0.13	0.13	0.30	0.21	0.21	
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	453	1486	665	370	1590	711	220	479	214	380	726	310	
v/s Ratio Prot	0.03	0.25		c0.07	0.18		0.01	0.06		c0.09	0.09		
v/s Ratio Perm	0.12		0.03	c0.26		0.04	0.02		0.01	c0.13		0.01	
v/c Ratio	0.30	0.61	0.06	0.59	0.40	0.09	0.13	0.42	0.09	0.73	0.44	0.05	
Uniform Delay, d1	12.8	22.0	16.9	12.9	18.1	15.5	32.9	38.3	36.6	28.1	32.9	30.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.4	1.9	0.2	2.4	0.8	0.2	0.3	0.6	0.2	6.8	0.4	0.1	
Delay (s)	13.2	23.9	17.1	15.3	18.8	15.7	33.2	38.9	36.8	34.9	33.3	30.2	
Level of Service	B	C	B	B	B	B	C	D	D	C	C	C	
Approach Delay (s)		22.0			17.6			37.6			33.6		
Approach LOS		C			B			D			C		
Intersection Summary													
HCM 2000 Control Delay			25.0		HCM 2000 Level of Service						C		
HCM 2000 Volume to Capacity ratio			0.68										
Actuated Cycle Length (s)			96.3		Sum of lost time (s)						20.0		
Intersection Capacity Utilization			83.5%		ICU Level of Service						E		
Analysis Period (min)			15										

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

5: Harvie Road & Fairview Road

2043 Background Conditions
Weekday AM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	74	1152	849	436	333	68
Future Volume (vph)	74	1152	849	436	333	68
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1789	3579	3579	1601	1789	1601
Flt Permitted	0.21	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	395	3579	3579	1601	1789	1601
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	80	1252	923	474	362	74
RTOR Reduction (vph)	0	0	0	239	0	55
Lane Group Flow (vph)	80	1252	923	235	362	19
Turn Type	pm+pt	NA	NA	Perm	Perm	Perm
Protected Phases	7	4	8			
Permitted Phases	4			8	6	6
Actuated Green, G (s)	51.1	51.1	40.8	40.8	22.1	22.1
Effective Green, g (s)	51.1	51.1	40.8	40.8	22.1	22.1
Actuated g/C Ratio	0.60	0.60	0.48	0.48	0.26	0.26
Clearance Time (s)	4.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	339	2146	1713	766	464	415
v/s Ratio Prot	0.02	c0.35	0.26			
v/s Ratio Perm	0.12			0.15	c0.20	0.01
v/c Ratio	0.24	0.58	0.54	0.31	0.78	0.05
Uniform Delay, d1	8.6	10.5	15.6	13.6	29.3	23.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4	1.2	1.2	1.0	8.3	0.0
Delay (s)	8.9	11.7	16.8	14.6	37.6	23.7
Level of Service	A	B	B	B	D	C
Approach Delay (s)		11.5	16.1		35.2	
Approach LOS		B	B		D	

Intersection Summary

HCM 2000 Control Delay	16.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	85.2	Sum of lost time (s)	16.0
Intersection Capacity Utilization	70.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
6: Thrushwood Drive & Cranberry Lane

2043 Background Conditions
Weekday AM Peak Hour



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	7	1	0	25	29	2
Future Volume (Veh/h)	7	1	0	25	29	2
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)	8	1	0	27	32	2
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	60	33	34			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	60	33	34			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	100	100			
cM capacity (veh/h)	947	1041	1578			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	9	27	34			
Volume Left	8	0	0			
Volume Right	1	0	2			
cSH	956	1578	1700			
Volume to Capacity	0.01	0.00	0.02			
Queue Length 95th (m)	0.2	0.0	0.0			
Control Delay (s)	8.8	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	8.8	0.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			1.1			
Intersection Capacity Utilization			13.3%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis

8: Veterans Drive & Mapleton Drive/Brookwood Drive

2043 Background Conditions
Weekday AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	20	208	63	21	40	106	451	31	25	1001	16
Future Volume (vph)	10	20	208	63	21	40	106	451	31	25	1001	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0			6.0	6.0	4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00			1.00	1.00	1.00	0.95		1.00	0.95	
Frt	1.00	0.86			1.00	0.85	1.00	0.99		1.00	1.00	
Flt Protected	0.95	1.00			0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1626			1816	1601	1789	3544		1789	3570	
Flt Permitted	0.52	1.00			0.63	1.00	0.15	1.00		0.46	1.00	
Satd. Flow (perm)	986	1626			1187	1601	286	3544		862	3570	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	11	22	226	68	23	43	115	490	34	27	1088	17
RTOR Reduction (vph)	0	175	0	0	0	36	0	4	0	0	1	0
Lane Group Flow (vph)	11	73	0	0	91	7	115	520	0	27	1104	0
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	17.1	17.1			12.0	12.0	46.2	40.0		38.8	36.3	
Effective Green, g (s)	17.1	17.1			12.0	12.0	46.2	40.0		38.8	36.3	
Actuated g/C Ratio	0.23	0.23			0.16	0.16	0.61	0.53		0.51	0.48	
Clearance Time (s)	4.0	6.0			6.0	6.0	4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	234	367			188	254	298	1875		473	1714	
v/s Ratio Prot	0.00	c0.04					c0.03	0.15		0.00	c0.31	
v/s Ratio Perm	0.01				c0.08	0.00	0.20			0.03		
v/c Ratio	0.05	0.20			0.48	0.03	0.39	0.28		0.06	0.64	
Uniform Delay, d1	22.9	23.7			29.0	26.9	8.5	9.8		9.1	14.8	
Progression Factor	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.3			2.0	0.0	0.8	0.4		0.1	1.9	
Delay (s)	23.0	24.0			30.9	26.9	9.3	10.2		9.1	16.7	
Level of Service	C	C			C	C	A	B		A	B	
Approach Delay (s)		23.9			29.6			10.0			16.5	
Approach LOS		C			C			B			B	

Intersection Summary

HCM 2000 Control Delay	16.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	75.6	Sum of lost time (s)	20.0
Intersection Capacity Utilization	74.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 10: Bryne Drive & Caplan Avenue

2043 Background Conditions
 Weekday AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	44	368	114	57	279	37	136	194	74	20	425	28
Future Volume (vph)	44	368	114	57	279	37	136	194	74	20	425	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.96		1.00	0.98		1.00	0.96		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1817		1789	1850		1789	3431		1789	3546	
Flt Permitted	0.41	1.00		0.16	1.00		0.36	1.00		0.57	1.00	
Satd. Flow (perm)	777	1817		292	1850		670	3431		1081	3546	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	48	400	124	62	303	40	148	211	80	22	462	30
RTOR Reduction (vph)	0	13	0	0	6	0	0	43	0	0	5	0
Lane Group Flow (vph)	48	511	0	62	337	0	148	248	0	22	487	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	28.6	24.5		31.2	25.8		37.6	30.9		29.3	26.6	
Effective Green, g (s)	28.6	24.5		31.2	25.8		37.6	30.9		29.3	26.6	
Actuated g/C Ratio	0.34	0.29		0.37	0.31		0.45	0.37		0.35	0.32	
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	315	533		205	571		395	1269		402	1129	
v/s Ratio Prot	0.01	c0.28		c0.02	0.18		c0.03	0.07		0.00	c0.14	
v/s Ratio Perm	0.04			0.09			0.14			0.02		
v/c Ratio	0.15	0.96		0.30	0.59		0.37	0.20		0.05	0.43	
Uniform Delay, d1	18.8	29.0		19.4	24.4		14.2	17.9		17.8	22.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	28.3		0.8	1.6		0.6	0.3		0.1	1.2	
Delay (s)	19.0	57.3		20.2	26.0		14.8	18.2		17.9	23.7	
Level of Service	B	E		C	C		B	B		B	C	
Approach Delay (s)		54.1			25.1			17.0			23.4	
Approach LOS		D			C			B			C	
Intersection Summary												
HCM 2000 Control Delay			31.4				HCM 2000 Level of Service				C	
HCM 2000 Volume to Capacity ratio			0.62									
Actuated Cycle Length (s)			83.5				Sum of lost time (s)			20.0		
Intersection Capacity Utilization			76.3%				ICU Level of Service			D		
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 11: Bryne Drive & Mapleview Drive

2043 Background Conditions
 Weekday AM Peak Hour


























Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↖↖		↖	↖↖↖		↖	↖↖		↖	↖↖	
Traffic Volume (vph)	68	1122	185	503	997	139	58	54	227	176	143	115
Future Volume (vph)	68	1122	185	503	997	139	58	54	227	176	143	115
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	0.98		1.00	0.98		1.00	0.88		1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	5033		1789	5047		1789	3145		1789	3339	
Flt Permitted	0.21	1.00		0.12	1.00		0.58	1.00		0.38	1.00	
Satd. Flow (perm)	404	5033		230	5047		1092	3145		712	3339	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	74	1220	201	547	1084	151	63	59	247	191	155	125
RTOR Reduction (vph)	0	19	0	0	14	0	0	217	0	0	107	0
Lane Group Flow (vph)	74	1402	0	547	1221	0	63	89	0	191	173	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	34.4	28.8		58.8	49.2		16.9	11.3		21.7	13.7	
Effective Green, g (s)	34.4	28.8		58.8	49.2		16.9	11.3		21.7	13.7	
Actuated g/C Ratio	0.37	0.31		0.62	0.52		0.18	0.12		0.23	0.15	
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	230	1540		574	2638		237	377		255	486	
v/s Ratio Prot	0.02	0.28		c0.26	0.24		0.02	0.03		c0.06	0.05	
v/s Ratio Perm	0.10			c0.33			0.03			c0.11		
v/c Ratio	0.32	0.91		0.95	0.46		0.27	0.24		0.75	0.36	
Uniform Delay, d1	19.8	31.4		25.8	14.1		32.8	37.5		31.6	36.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.8	9.6		26.1	0.6		0.6	0.3		11.4	0.5	
Delay (s)	20.6	41.0		51.9	14.7		33.4	37.8		43.1	36.7	
Level of Service	C	D		D	B		C	D		D	D	
Approach Delay (s)		40.0			26.1			37.1			39.3	
Approach LOS		D			C			D			D	

Intersection Summary		
HCM 2000 Control Delay	33.6	HCM 2000 Level of Service C
HCM 2000 Volume to Capacity ratio	0.96	
Actuated Cycle Length (s)	94.1	Sum of lost time (s) 20.0
Intersection Capacity Utilization	88.9%	ICU Level of Service E
Analysis Period (min)	15	

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 1: Essa Road & Ardagh Road/Bryne Drive

2043 Background Conditions
 Weekday PM Peak Hour




























												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	274	424	133	290	269	393	102	847	135	422	1092	572
Future Volume (vph)	274	424	133	290	269	393	102	847	135	422	1092	572
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00
Frt	1.00	0.96		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1789	3450		1789	3579	1601	1789	3579	1601	3471	3579	1601
Flt Permitted	0.54	1.00		0.19	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1011	3450		358	3579	1601	1789	3579	1601	3471	3579	1601
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	282	437	137	299	277	405	105	873	139	435	1126	590
RTOR Reduction (vph)	0	25	0	0	0	245	0	0	92	0	0	293
Lane Group Flow (vph)	282	549	0	299	277	160	105	873	47	435	1126	297
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8			2			6
Actuated Green, G (s)	41.2	24.5		42.4	25.1	25.1	10.4	41.4	41.4	18.2	49.2	49.2
Effective Green, g (s)	41.2	24.5		42.4	25.1	25.1	10.4	41.4	41.4	18.2	49.2	49.2
Actuated g/C Ratio	0.34	0.20		0.35	0.21	0.21	0.09	0.34	0.34	0.15	0.41	0.41
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	450	696		328	739	331	153	1220	545	520	1450	648
v/s Ratio Prot	0.09	0.16		c0.13	0.08		0.06	0.24		c0.13	c0.31	
v/s Ratio Perm	0.13			c0.19		0.10			0.03			0.19
v/c Ratio	0.63	0.79		0.91	0.37	0.48	0.69	0.72	0.09	0.84	0.78	0.46
Uniform Delay, d1	31.5	46.0		32.2	41.4	42.4	53.9	34.9	27.2	50.2	31.3	26.4
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.7	5.9		28.3	0.3	1.1	12.0	3.6	0.3	11.2	4.1	2.3
Delay (s)	34.2	51.9		60.5	41.7	43.5	66.0	38.5	27.5	61.3	35.5	28.7
Level of Service	C	D		E	D	D	E	D	C	E	D	C
Approach Delay (s)		46.1			48.2			39.7			38.9	
Approach LOS		D			D			D			D	
Intersection Summary												
HCM 2000 Control Delay			42.0				HCM 2000 Level of Service				D	
HCM 2000 Volume to Capacity ratio			0.87									
Actuated Cycle Length (s)			121.4				Sum of lost time (s)				20.0	
Intersection Capacity Utilization			84.7%				ICU Level of Service				E	
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

2: Veterans Drive & Harvie Road

2043 Background Conditions
Weekday PM Peak Hour




















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 				 		 			 	
Traffic Volume (vph)	77	459	256	140	551	504	220	533	125	418	735	78
Future Volume (vph)	77	459	256	140	551	504	220	533	125	418	735	78
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00	0.95		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1789	3386		1789	1883	1601	1789	3579	1601	1789	3527	
Flt Permitted	0.13	1.00		0.15	1.00	1.00	0.19	1.00	1.00	0.18	1.00	
Satd. Flow (perm)	236	3386		287	1883	1601	350	3579	1601	341	3527	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	84	499	278	152	599	548	239	579	136	454	799	85
RTOR Reduction (vph)	0	60	0	0	0	282	0	0	108	0	7	0
Lane Group Flow (vph)	84	717	0	152	599	266	239	579	28	454	877	0
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)	37.3	31.9		46.2	36.8	36.8	35.9	22.7	22.7	50.6	33.4	
Effective Green, g (s)	37.3	31.9		46.2	36.8	36.8	35.9	22.7	22.7	50.6	33.4	
Actuated g/C Ratio	0.34	0.29		0.42	0.34	0.34	0.33	0.21	0.21	0.47	0.31	
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	157	992		264	636	541	290	746	334	476	1082	
v/s Ratio Prot	0.03	0.21		c0.05	c0.32		0.10	0.16		c0.21	0.25	
v/s Ratio Perm	0.16			0.19		0.17	0.17		0.02	c0.23		
v/c Ratio	0.54	0.72		0.58	0.94	0.49	0.82	0.78	0.08	0.95	0.81	
Uniform Delay, d1	27.8	34.5		22.2	35.0	28.6	28.9	40.7	34.7	27.9	34.8	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	3.5	4.6		3.0	23.9	3.2	17.0	5.1	0.1	29.6	4.7	
Delay (s)	31.2	39.0		25.2	58.9	31.8	45.9	45.7	34.8	57.5	39.5	
Level of Service	C	D		C	E	C	D	D	C	E	D	
Approach Delay (s)		38.3			43.5			44.2			45.6	
Approach LOS		D			D			D			D	
Intersection Summary												
HCM 2000 Control Delay			43.3	HCM 2000 Level of Service				D				
HCM 2000 Volume to Capacity ratio			0.96									
Actuated Cycle Length (s)			108.8	Sum of lost time (s)				20.0				
Intersection Capacity Utilization			89.4%	ICU Level of Service				E				
Analysis Period (min)			15									

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis





























3: Thrushwood Drive & Harvie Road

2043 Background Conditions
Weekday PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	34	924	44	7	1149	73	26	9	44	42	5	19
Future Volume (Veh/h)	34	924	44	7	1149	73	26	9	44	42	5	19
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	37	1004	48	8	1249	79	28	10	48	46	5	21
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type												
	TWLTL					TWLTL						
Median storage veh	2					2						
Upstream signal (m)	318					401						
pX, platoon unblocked	0.76			0.97			0.78	0.78	0.97	0.78	0.78	0.76
vC, conflicting volume	1328			1052			1766	2446	526	1934	2430	664
vC1, stage 1 conf vol							1102	1102		1304	1304	
vC2, stage 2 conf vol							664	1344		629	1126	
vCu, unblocked vol	800			987			1223	2099	443	1439	2079	0
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	94			99			87	95	91	79	97	97
cM capacity (veh/h)	622			673			215	185	544	222	196	824
Direction, Lane #												
	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1				
Volume Total	37	669	383	8	833	495	86	72				
Volume Left	37	0	0	8	0	0	28	46				
Volume Right	0	0	48	0	0	79	48	21				
cSH	622	1700	1700	673	1700	1700	315	279				
Volume to Capacity	0.06	0.39	0.23	0.01	0.49	0.29	0.27	0.26				
Queue Length 95th (m)	1.4	0.0	0.0	0.3	0.0	0.0	8.2	7.6				
Control Delay (s)	11.2	0.0	0.0	10.4	0.0	0.0	20.7	22.4				
Lane LOS	B			B			C	C				
Approach Delay (s)	0.4			0.1			20.7	22.4				
Approach LOS							C	C				
Intersection Summary												
Average Delay			1.5									
Intersection Capacity Utilization			47.6%		ICU Level of Service			A				
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis
4: Bryne Drive & Harvie Road

2043 Background Conditions
Weekday PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 			 	
Traffic Volume (vph)	74	1053	40	155	1062	212	154	510	125	170	582	167
Future Volume (vph)	74	1053	40	155	1062	212	154	510	125	170	582	167
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91	0.91
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1789	3579	1601	1789	3579	1601	1789	3579	1601	1789	3414	1457
Flt Permitted	0.14	1.00	1.00	0.09	1.00	1.00	0.17	1.00	1.00	0.27	1.00	1.00
Satd. Flow (perm)	262	3579	1601	178	3579	1601	319	3579	1601	502	3414	1457
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	80	1145	43	168	1154	230	167	554	136	185	633	182
RTOR Reduction (vph)	0	0	25	0	0	94	0	0	104	0	2	125
Lane Group Flow (vph)	80	1145	18	168	1154	136	167	554	32	185	649	39
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)	52.2	46.7	46.7	61.2	51.7	51.7	35.7	26.8	26.8	35.9	26.9	26.9
Effective Green, g (s)	52.2	46.7	46.7	61.2	51.7	51.7	35.7	26.8	26.8	35.9	26.9	26.9
Actuated g/C Ratio	0.46	0.41	0.41	0.54	0.46	0.46	0.32	0.24	0.24	0.32	0.24	0.24
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	195	1479	661	246	1637	732	216	848	379	261	812	346
v/s Ratio Prot	0.02	c0.32		c0.06	0.32		c0.06	0.15		0.06	c0.19	
v/s Ratio Perm	0.17		0.01	0.31		0.09	0.18		0.02	0.17		0.03
v/c Ratio	0.41	0.77	0.03	0.68	0.70	0.19	0.77	0.65	0.09	0.71	0.80	0.11
Uniform Delay, d1	19.3	28.6	19.7	19.9	24.5	18.2	30.5	38.9	33.6	30.0	40.5	33.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.4	4.0	0.1	7.6	2.6	0.6	15.7	1.8	0.1	8.5	5.6	0.1
Delay (s)	20.7	32.6	19.7	27.5	27.1	18.7	46.2	40.7	33.7	38.5	46.1	33.9
Level of Service	C	C	B	C	C	B	D	D	C	D	D	C
Approach Delay (s)		31.4			25.9			40.7			42.7	
Approach LOS		C			C			D			D	
Intersection Summary												
HCM 2000 Control Delay			33.7		HCM 2000 Level of Service			C				
HCM 2000 Volume to Capacity ratio			0.77									
Actuated Cycle Length (s)			113.0		Sum of lost time (s)			20.0				
Intersection Capacity Utilization			85.0%		ICU Level of Service			E				
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

5: Harvie Road & Fairview Road

2043 Background Conditions
Weekday PM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	126	1222	1283	667	452	146
Future Volume (vph)	126	1222	1283	667	452	146
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1789	3579	3579	1601	1789	1601
Flt Permitted	0.08	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	144	3579	3579	1601	1789	1601
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	137	1328	1395	725	491	159
RTOR Reduction (vph)	0	0	0	273	0	104
Lane Group Flow (vph)	137	1328	1395	452	491	55
Turn Type	pm+pt	NA	NA	Perm	Perm	Perm
Protected Phases	7	4	8			
Permitted Phases	4			8	6	6
Actuated Green, G (s)	59.2	59.2	48.2	48.2	32.5	32.5
Effective Green, g (s)	59.2	59.2	48.2	48.2	32.5	32.5
Actuated g/C Ratio	0.57	0.57	0.46	0.46	0.31	0.31
Clearance Time (s)	4.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	193	2043	1663	744	560	501
v/s Ratio Prot	0.05	c0.37	c0.39			
v/s Ratio Perm	0.36			0.28	c0.27	0.03
v/c Ratio	0.71	0.65	0.84	0.61	0.88	0.11
Uniform Delay, d1	19.3	15.2	24.3	20.7	33.7	25.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	11.3	1.6	5.3	3.7	14.4	0.1
Delay (s)	30.6	16.8	29.6	24.4	48.1	25.4
Level of Service	C	B	C	C	D	C
Approach Delay (s)		18.1	27.8		42.5	
Approach LOS		B	C		D	

Intersection Summary

HCM 2000 Control Delay	26.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	103.7	Sum of lost time (s)	16.0
Intersection Capacity Utilization	80.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis

6: Thrushwood Drive























2043 Background Conditions
Weekday PM Peak Hour



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	3	1	2	20	27	6
Future Volume (Veh/h)	3	1	2	20	27	6
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)	3	1	2	22	29	7
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	58	32	36			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	58	32	36			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	947	1041	1575			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	4	24	36			
Volume Left	3	2	0			
Volume Right	1	0	7			
cSH	969	1575	1700			
Volume to Capacity	0.00	0.00	0.02			
Queue Length 95th (m)	0.1	0.0	0.0			
Control Delay (s)	8.7	0.6	0.0			
Lane LOS	A	A				
Approach Delay (s)	8.7	0.6	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			0.8			
Intersection Capacity Utilization			13.3%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis
 8: Veterans Drive & Mapleton Drive/Brookwood Drive

2043 Background Conditions
 Weekday PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	22	16	168	80	9	30	294	1165	119	37	1142	29
Future Volume (vph)	22	16	168	80	9	30	294	1165	119	37	1142	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0			6.0	6.0	4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00			1.00	1.00	1.00	0.95		1.00	0.95	
Frt	1.00	0.86			1.00	0.85	1.00	0.99		1.00	1.00	
Flt Protected	0.95	1.00			0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1625			1803	1601	1789	3529		1789	3565	
Flt Permitted	0.53	1.00			0.61	1.00	0.10	1.00		0.13	1.00	
Satd. Flow (perm)	1002	1625			1158	1601	188	3529		242	3565	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	24	17	183	87	10	33	320	1266	129	40	1241	32
RTOR Reduction (vph)	0	141	0	0	0	28	0	6	0	0	2	0
Lane Group Flow (vph)	24	59	0	0	97	5	320	1389	0	40	1271	0
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	19.6	19.6			13.1	13.1	53.3	45.3		40.1	36.1	
Effective Green, g (s)	19.6	19.6			13.1	13.1	53.3	45.3		40.1	36.1	
Actuated g/C Ratio	0.23	0.23			0.15	0.15	0.63	0.53		0.47	0.43	
Clearance Time (s)	4.0	6.0			6.0	6.0	4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	254	375			178	247	366	1882		187	1515	
v/s Ratio Prot	0.00	c0.04					c0.14	0.39		0.01	0.36	
v/s Ratio Perm	0.02				c0.08	0.00	c0.41			0.09		
v/c Ratio	0.09	0.16			0.54	0.02	0.87	0.74		0.21	0.84	
Uniform Delay, d1	25.5	26.1			33.1	30.5	22.7	15.2		13.1	21.8	
Progression Factor	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	0.2			3.4	0.0	20.0	2.6		0.6	5.7	
Delay (s)	25.7	26.3			36.5	30.5	42.7	17.9		13.6	27.5	
Level of Service	C	C			D	C	D	B		B	C	
Approach Delay (s)		26.2			35.0			22.5			27.1	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	25.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	84.9	Sum of lost time (s)	20.0
Intersection Capacity Utilization	86.7%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 10: Bryne Drive & Caplan Avenue

2043 Background Conditions
 Weekday PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	178	219	152	134	299	163	167	302	98	122	503	122
Future Volume (vph)	178	219	152	134	299	163	167	302	98	122	503	122
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.94		1.00	0.95		1.00	0.96		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1768		1789	1784		1789	3447		1789	3474	
Flt Permitted	0.17	1.00		0.28	1.00		0.26	1.00		0.45	1.00	
Satd. Flow (perm)	323	1768		533	1784		487	3447		848	3474	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	193	238	165	146	325	177	182	328	107	133	547	133
RTOR Reduction (vph)	0	31	0	0	24	0	0	38	0	0	26	0
Lane Group Flow (vph)	193	372	0	146	478	0	182	397	0	133	654	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	30.3	23.3		30.3	23.3		31.0	24.0		31.0	24.0	
Effective Green, g (s)	30.3	23.3		30.3	23.3		31.0	24.0		31.0	24.0	
Actuated g/C Ratio	0.37	0.29		0.37	0.29		0.38	0.30		0.38	0.30	
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	246	506		306	511		297	1017		404	1025	
v/s Ratio Prot	c0.07	0.21		0.04	c0.27		c0.05	0.12		0.03	c0.19	
v/s Ratio Perm	0.22			0.14			0.18			0.10		
v/c Ratio	0.78	0.74		0.48	0.93		0.61	0.39		0.33	0.64	
Uniform Delay, d1	19.9	26.2		18.2	28.3		17.9	22.8		16.8	24.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	15.0	5.5		1.2	24.5		3.7	1.1		0.5	3.0	
Delay (s)	35.0	31.7		19.4	52.7		21.6	24.0		17.3	27.9	
Level of Service	C	C		B	D		C	C		B	C	
Approach Delay (s)		32.8			45.2			23.3			26.2	
Approach LOS		C			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	31.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	81.3	Sum of lost time (s)	20.0
Intersection Capacity Utilization	81.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 11: Bryne Drive & Mapleview Drive

2043 Background Conditions
 Weekday PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↗	↗↗↗		↗	↗↗↗		↗	↗↗		↗	↗↗	
Traffic Volume (vph)	132	1128	231	423	1624	190	282	151	643	255	132	188
Future Volume (vph)	132	1128	231	423	1624	190	282	151	643	255	132	188
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	5.0		3.0	5.0		3.0	5.0		3.0	5.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	0.97		1.00	0.98		1.00	0.88		1.00	0.91	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	5011		1789	5061		1789	3144		1789	3263	
Flt Permitted	0.08	1.00		0.07	1.00		0.48	1.00		0.12	1.00	
Satd. Flow (perm)	142	5011		135	5061		904	3144		233	3263	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	139	1187	243	445	1709	200	297	159	677	268	139	198
RTOR Reduction (vph)	0	21	0	0	9	0	0	279	0	0	154	0
Lane Group Flow (vph)	139	1409	0	445	1900	0	297	557	0	268	183	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	65.1	53.0		88.0	72.9		44.4	29.4		51.4	33.4	
Effective Green, g (s)	65.1	53.0		88.0	72.9		44.4	29.4		51.4	33.4	
Actuated g/C Ratio	0.44	0.35		0.59	0.49		0.30	0.20		0.34	0.22	
Clearance Time (s)	3.0	5.0		3.0	5.0		3.0	5.0		3.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	195	1777		433	2469		357	618		278	729	
v/s Ratio Prot	0.06	0.28		c0.22	0.38		0.08	0.18		c0.12	0.06	
v/s Ratio Perm	0.25			c0.39			0.16			c0.21		
v/c Ratio	0.71	0.79		1.03	0.77		0.83	1.14dr		0.96	0.25	
Uniform Delay, d1	29.9	43.3		48.6	31.4		45.9	58.6		44.3	47.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	11.6	3.7		50.5	2.4		15.1	16.4		43.8	0.2	
Delay (s)	41.5	47.0		99.1	33.7		61.1	75.0		88.1	47.9	
Level of Service	D	D		F	C		E	E		F	D	
Approach Delay (s)		46.5			46.1			71.3			65.7	
Approach LOS		D			D			E			E	

Intersection Summary			
HCM 2000 Control Delay	53.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	149.4	Sum of lost time (s)	16.0
Intersection Capacity Utilization	123.2%	ICU Level of Service	H
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.
 c Critical Lane Group

Appendix F: Future Total Operations

HCM Signalized Intersection Capacity Analysis
 1: Essa Road & Ardagh Road/Bryne Drive
























2028 Total Conditions
 Weekday AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	263	358	54	70	54	265	90	677	52	270	425	320	
Future Volume (vph)	263	358	54	70	54	265	90	677	52	270	425	320	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00	
Frt	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1789	3508		1789	3579	1601	1789	3579	1601	3471	3579	1601	
Flt Permitted	0.52	1.00		0.49	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (perm)	985	3508		928	3579	1601	1789	3579	1601	3471	3579	1601	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	286	389	59	76	59	288	98	736	57	293	462	348	
RTOR Reduction (vph)	0	11	0	0	0	257	0	0	34	0	0	201	
Lane Group Flow (vph)	286	437	0	76	59	31	98	736	23	293	462	147	
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	
Protected Phases	7	4		3	8		5	2		1	6		
Permitted Phases	4			8		8			2			6	
Actuated Green, G (s)	33.8	24.3		16.3	10.8	10.8	9.0	40.9	40.9	11.0	42.9	42.9	
Effective Green, g (s)	33.8	24.3		16.3	10.8	10.8	9.0	40.9	40.9	11.0	42.9	42.9	
Actuated g/C Ratio	0.33	0.24		0.16	0.11	0.11	0.09	0.40	0.40	0.11	0.42	0.42	
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	477	838		195	380	170	158	1439	643	375	1509	675	
v/s Ratio Prot	c0.11	0.12		0.02	0.02		0.05	c0.21		c0.08	0.13		
v/s Ratio Perm	c0.09			0.04		0.02			0.01			0.09	
v/c Ratio	0.60	0.52		0.39	0.16	0.18	0.62	0.51	0.04	0.78	0.31	0.22	
Uniform Delay, d1	27.1	33.6		37.4	41.3	41.4	44.7	22.9	18.4	44.2	19.5	18.7	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	2.0	0.6		1.3	0.2	0.5	7.4	1.3	0.1	10.1	0.5	0.7	
Delay (s)	29.1	34.2		38.7	41.5	41.9	52.1	24.2	18.5	54.3	20.0	19.5	
Level of Service	C	C		D	D	D	D	C	B	D	C	B	
Approach Delay (s)		32.2			41.3			26.9			29.0		
Approach LOS		C			D			C			C		
Intersection Summary													
HCM 2000 Control Delay			30.8									HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.60										
Actuated Cycle Length (s)			101.7									Sum of lost time (s)	20.0
Intersection Capacity Utilization			68.1%									ICU Level of Service	C
Analysis Period (min)			15										

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
2: Veterans Drive & Harvie Road




















2028 Total Conditions
Weekday AM Peak Hour

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	93	259	277	137	149	201	75	265	154	320	429	88	
Future Volume (vph)	93	259	277	137	149	201	75	265	154	320	429	88	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0		
Lane Util. Factor	1.00	0.95		1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95		
Frt	1.00	0.92		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97		
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1789	3301		1789	1883	1601	1789	3579	1601	1789	3487		
Flt Permitted	0.65	1.00		0.32	1.00	1.00	0.39	1.00	1.00	0.46	1.00		
Satd. Flow (perm)	1233	3301		603	1883	1601	730	3579	1601	858	3487		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	101	282	301	149	162	218	82	288	167	348	466	96	
RTOR Reduction (vph)	0	172	0	0	0	138	0	0	133	0	17	0	
Lane Group Flow (vph)	101	411	0	149	162	80	82	288	34	348	545	0	
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		
Protected Phases	7	4		3	8		5	2		1	6		
Permitted Phases	4			8		8	2		2	6			
Actuated Green, G (s)	37.9	31.0		42.7	33.4	33.4	25.3	18.3	18.3	34.3	23.3		
Effective Green, g (s)	37.9	31.0		42.7	33.4	33.4	25.3	18.3	18.3	34.3	23.3		
Actuated g/C Ratio	0.42	0.34		0.47	0.37	0.37	0.28	0.20	0.20	0.38	0.26		
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	558	1129		405	694	590	285	722	323	448	896		
v/s Ratio Prot	0.01	0.12		c0.04	0.09		0.02	0.08		c0.10	0.16		
v/s Ratio Perm	0.06			c0.14		0.05	0.06		0.02	c0.19			
v/c Ratio	0.18	0.36		0.37	0.23	0.14	0.29	0.40	0.10	0.78	0.61		
Uniform Delay, d1	16.2	22.4		14.3	19.8	19.0	24.7	31.4	29.5	22.4	29.6		
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
Incremental Delay, d2	0.2	0.9		0.6	0.8	0.5	0.6	0.4	0.1	8.2	1.2		
Delay (s)	16.4	23.3		14.9	20.5	19.5	25.3	31.7	29.6	30.7	30.8		
Level of Service	B	C		B	C	B	C	C	C	C	C		
Approach Delay (s)		22.3			18.5			30.1			30.8		
Approach LOS		C			B			C			C		
Intersection Summary													
HCM 2000 Control Delay			26.0									HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.59										
Actuated Cycle Length (s)			90.6									Sum of lost time (s)	20.0
Intersection Capacity Utilization			79.5%									ICU Level of Service	D
Analysis Period (min)			15										

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
3: Thrushwood Drive & Harvie Road

2028 Total Conditions
Weekday AM Peak Hour

																		
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR						
Lane Configurations																		
Traffic Volume (veh/h)	14	625	93	4	418	30	48	4	41	49	4	22						
Future Volume (Veh/h)	14	625	93	4	418	30	48	4	41	49	4	22						
Sign Control		Free			Free			Stop			Stop							
Grade		0%			0%			0%			0%							
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92						
Hourly flow rate (vph)	15	679	101	4	454	33	52	4	45	53	4	24						
Pedestrians																		
Lane Width (m)																		
Walking Speed (m/s)																		
Percent Blockage																		
Right turn flare (veh)																		
Median type																		
	TWLTL					TWLTL												
Median storage veh	2					2												
Upstream signal (m)	318					401												
pX, platoon unblocked																		
vC, conflicting volume	487			780			1020		1254		390		895		1288		244	
vC1, stage 1 conf vol							760		760				478		478			
vC2, stage 2 conf vol							261		495				416		810			
vCu, unblocked vol	487			780			1020		1254		390		895		1288		244	
tC, single (s)	4.1			4.1			7.5		6.5		6.9		7.5		6.5		6.9	
tC, 2 stage (s)							6.5		5.5				6.5		5.5			
tF (s)	2.2			2.2			3.5		4.0		3.3		3.5		4.0		3.3	
p0 queue free %	99			100			85		99		93		87		99		97	
cM capacity (veh/h)	1072			833			336		348		609		414		336		757	
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1										
Volume Total	15	453	327	4	303	184	101	81										
Volume Left	15	0	0	4	0	0	52	53										
Volume Right	0	0	101	0	0	33	45	24										
cSH	1072	1700	1700	833	1700	1700	420	472										
Volume to Capacity	0.01	0.27	0.19	0.00	0.18	0.11	0.24	0.17										
Queue Length 95th (m)	0.3	0.0	0.0	0.1	0.0	0.0	7.1	4.7										
Control Delay (s)	8.4	0.0	0.0	9.3	0.0	0.0	16.3	14.2										
Lane LOS	A			A			C		B									
Approach Delay (s)	0.2			0.1			16.3		14.2									
Approach LOS							C		B									
Intersection Summary																		
Average Delay	2.0																	
Intersection Capacity Utilization	32.8%			ICU Level of Service					A									
Analysis Period (min)	15																	

HCM Signalized Intersection Capacity Analysis
4: Bryne Drive & Harvie Road

2028 Total Conditions
Weekday AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	90	517	87	249	363	95	22	178	137	186	280	54
Future Volume (vph)	90	517	87	249	363	95	22	178	137	186	280	54
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91	0.91
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1789	3579	1601	1789	3579	1601	1789	3579	1601	1789	3418	1457
Flt Permitted	0.52	1.00	1.00	0.35	1.00	1.00	0.56	1.00	1.00	0.49	1.00	1.00
Satd. Flow (perm)	977	3579	1601	665	3579	1601	1047	3579	1601	916	3418	1457
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	98	562	95	271	395	103	24	193	149	202	304	59
RTOR Reduction (vph)	0	0	55	0	0	55	0	0	128	0	2	41
Lane Group Flow (vph)	98	562	40	271	395	48	24	193	21	202	308	12
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)	47.4	41.0	41.0	56.0	45.6	45.6	16.4	13.5	13.5	28.9	22.0	22.0
Effective Green, g (s)	47.4	41.0	41.0	56.0	45.6	45.6	16.4	13.5	13.5	28.9	22.0	22.0
Actuated g/C Ratio	0.49	0.42	0.42	0.58	0.47	0.47	0.17	0.14	0.14	0.30	0.23	0.23
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	531	1514	677	511	1684	753	199	498	223	375	776	330
v/s Ratio Prot	0.01	0.16		c0.06	0.11		0.00	0.05		c0.06	0.09	
v/s Ratio Perm	0.08		0.03	c0.25		0.03	0.02		0.01	c0.10		0.01
v/c Ratio	0.18	0.37	0.06	0.53	0.23	0.06	0.12	0.39	0.09	0.54	0.40	0.04
Uniform Delay, d1	13.4	19.1	16.5	10.8	15.3	14.0	33.9	37.9	36.4	27.0	31.8	29.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	0.7	0.2	1.1	0.3	0.2	0.3	0.5	0.2	1.5	0.3	0.0
Delay (s)	13.5	19.8	16.7	11.9	15.6	14.2	34.2	38.4	36.5	28.5	32.2	29.2
Level of Service	B	B	B	B	B	B	C	D	D	C	C	C
Approach Delay (s)		18.6			14.1			37.4			30.6	
Approach LOS		B			B			D			C	
Intersection Summary												
HCM 2000 Control Delay			22.7			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.58									
Actuated Cycle Length (s)			96.9	Sum of lost time (s)				20.0				
Intersection Capacity Utilization			82.4%	ICU Level of Service			E					
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

5: Harvie Road & Fairview Road

2028 Total Conditions
Weekday AM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	83	758	589	327	252	118
Future Volume (vph)	83	758	589	327	252	118
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1789	3579	3579	1601	1789	1601
Flt Permitted	0.34	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	647	3579	3579	1601	1789	1601
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	90	824	640	355	274	128
RTOR Reduction (vph)	0	0	0	175	0	100
Lane Group Flow (vph)	90	824	640	180	274	28
Turn Type	pm+pt	NA	NA	Perm	Perm	Perm
Protected Phases	7	4	8			
Permitted Phases	4			8	6	6
Actuated Green, G (s)	51.0	51.0	40.7	40.7	17.3	17.3
Effective Green, g (s)	51.0	51.0	40.7	40.7	17.3	17.3
Actuated g/C Ratio	0.64	0.64	0.51	0.51	0.22	0.22
Clearance Time (s)	4.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	500	2273	1814	811	385	344
v/s Ratio Prot	0.01	c0.23	0.18			
v/s Ratio Perm	0.10			0.11	c0.15	0.02
v/c Ratio	0.18	0.36	0.35	0.22	0.71	0.08
Uniform Delay, d1	6.0	6.9	11.9	11.0	29.2	25.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	0.4	0.5	0.6	6.1	0.1
Delay (s)	6.2	7.4	12.4	11.6	35.3	25.2
Level of Service	A	A	B	B	D	C
Approach Delay (s)		7.3	12.1		32.1	
Approach LOS		A	B		C	

Intersection Summary

















HCM 2000 Control Delay	13.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	80.3	Sum of lost time (s)	16.0
Intersection Capacity Utilization	66.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis




















6: Thrushwood Drive & Cranberry Lane

2028 Total Conditions
Weekday AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	7	8	1	22	4	6	0	25	20	4	29	2
Future Volume (Veh/h)	7	8	1	22	4	6	0	25	20	4	29	2
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	9	1	24	4	7	0	27	22	4	32	2
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type												
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	88	90	33	84	80	38	34			49		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	88	90	33	84	80	38	34			49		
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 %	99	99	100	97	100	99	100			100		
cM capacity (veh/h)	886	798	1041	892	808	1034	1578			1558		
Direction, Lane #												
	EB 1	WB 1	NB 1	SB 1								
Volume Total	18	35	49	38								
Volume Left	8	24	0	4								
Volume Right	1	7	22	2								
cSH	846	906	1578	1558								
Volume to Capacity	0.02	0.04	0.00	0.00								
Queue Length 95th (m)	0.5	0.9	0.0	0.1								
Control Delay (s)	9.3	9.1	0.0	0.8								
Lane LOS	A	A		A								
Approach Delay (s)	9.3	9.1	0.0	0.8								
Approach LOS	A	A										
Intersection Summary												
Average Delay			3.7									
Intersection Capacity Utilization			15.0%	ICU Level of Service	A							
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 7: Bryne Drive & Cranberry Lane

2028 Total Conditions
 Weekday AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	46	6	38	15	1	15	15	276	119	125	474	17
Future Volume (Veh/h)	46	6	38	15	1	15	15	276	119	125	474	17
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	50	7	41	16	1	16	16	300	129	136	515	18
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type												
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	994	1257	266	970	1202	214	533			429		
vC1, stage 1 conf vol	796	796		396	396							
vC2, stage 2 conf vol	198	461		574	805							
vCu, unblocked vol	994	1257	266	970	1202	214	533			429		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)	6.5	5.5		6.5	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	83	98	94	95	100	98	98			88		
cM capacity (veh/h)	290	293	732	334	305	790	1031			1127		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3				
Volume Total	98	33	16	200	229	136	343	190				
Volume Left	50	16	16	0	0	136	0	0				
Volume Right	41	16	0	0	129	0	0	18				
cSH	388	462	1031	1700	1700	1127	1700	1700				
Volume to Capacity	0.25	0.07	0.02	0.12	0.13	0.12	0.20	0.11				
Queue Length 95th (m)	7.5	1.7	0.4	0.0	0.0	3.1	0.0	0.0				
Control Delay (s)	17.4	13.4	8.5	0.0	0.0	8.6	0.0	0.0				
Lane LOS	C	B	A			A						
Approach Delay (s)	17.4	13.4	0.3			1.8						
Approach LOS	C	B										
Intersection Summary												
Average Delay			2.8									
Intersection Capacity Utilization			35.0%		ICU Level of Service			A				
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

8: Veterans Drive & Mapleton Drive/Brookwood Drive

2028 Total Conditions
Weekday AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	27	181	65	24	32	91	377	30	17	838	14
Future Volume (vph)	9	27	181	65	24	32	91	377	30	17	838	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0			6.0	6.0	4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00			1.00	1.00	1.00	0.95		1.00	0.95	
Frt	1.00	0.87			1.00	0.85	1.00	0.99		1.00	1.00	
Flt Protected	0.95	1.00			0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1637			1817	1601	1789	3539		1789	3570	
Flt Permitted	0.52	1.00			0.65	1.00	0.21	1.00		0.50	1.00	
Satd. Flow (perm)	981	1637			1219	1601	403	3539		933	3570	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	10	29	197	71	26	35	99	410	33	18	911	15
RTOR Reduction (vph)	0	153	0	0	0	29	0	4	0	0	1	0
Lane Group Flow (vph)	10	73	0	0	97	6	99	439	0	18	925	0
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	17.1	17.1			12.0	12.0	47.2	42.1		38.2	37.1	
Effective Green, g (s)	17.1	17.1			12.0	12.0	47.2	42.1		38.2	37.1	
Actuated g/C Ratio	0.22	0.22			0.16	0.16	0.62	0.55		0.50	0.49	
Clearance Time (s)	4.0	6.0			6.0	6.0	4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	231	366			191	251	360	1952		479	1735	
v/s Ratio Prot	0.00	c0.04					c0.02	0.12		0.00	c0.26	
v/s Ratio Perm	0.01				c0.08	0.00	0.15			0.02		
v/c Ratio	0.04	0.20			0.51	0.02	0.28	0.22		0.04	0.53	
Uniform Delay, d1	23.2	24.0			29.4	27.2	7.1	8.8		9.6	13.6	
Progression Factor	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.3			2.1	0.0	0.4	0.3		0.0	1.2	
Delay (s)	23.3	24.3			31.6	27.2	7.5	9.0		9.6	14.8	
Level of Service	C	C			C	C	A	A		A	B	
Approach Delay (s)		24.3			30.4			8.7			14.7	
Approach LOS		C			C			A			B	

Intersection Summary

HCM 2000 Control Delay	15.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	76.3	Sum of lost time (s)	20.0
Intersection Capacity Utilization	73.4%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
 9: Bryne Drive & Bryne Court

2028 Total Conditions
 Weekday AM Peak Hour



Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations							
Traffic Volume (veh/h)	5	5	350	37	37	412	
Future Volume (Veh/h)	5	5	350	37	37	412	
Sign Control	Stop		Free		Free		
Grade	0%		0%		0%		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly flow rate (vph)	5	5	380	40	40	448	
Pedestrians							
Lane Width (m)							
Walking Speed (m/s)							
Percent Blockage							
Right turn flare (veh)							
Median type			TWLTL		TWLTL		
Median storage veh			2		2		
Upstream signal (m)			251				
pX, platoon unblocked							
vC, conflicting volume	704	210			420		
vC1, stage 1 conf vol	400						
vC2, stage 2 conf vol	304						
vCu, unblocked vol	704	210			420		
tC, single (s)	6.8	6.9			4.1		
tC, 2 stage (s)	5.8						
tF (s)	3.5	3.3			2.2		
p0 queue free %	99	99			96		
cM capacity (veh/h)	552	796			1136		
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	5	5	253	167	40	224	224
Volume Left	5	0	0	0	40	0	0
Volume Right	0	5	0	40	0	0	0
cSH	552	796	1700	1700	1136	1700	1700
Volume to Capacity	0.01	0.01	0.15	0.10	0.04	0.13	0.13
Queue Length 95th (m)	0.2	0.1	0.0	0.0	0.8	0.0	0.0
Control Delay (s)	11.6	9.6	0.0	0.0	8.3	0.0	0.0
Lane LOS	B	A			A		
Approach Delay (s)	10.6		0.0		0.7		
Approach LOS	B						
Intersection Summary							
Average Delay	0.5						
Intersection Capacity Utilization	27.5%		ICU Level of Service			A	
Analysis Period (min)	15						

HCM Signalized Intersection Capacity Analysis
 10: Bryne Drive & Caplan Avenue

2028 Total Conditions
 Weekday AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↕		↖	↗	
Traffic Volume (vph)	60	273	85	42	207	30	99	297	54	16	375	25
Future Volume (vph)	60	273	85	42	207	30	99	297	54	16	375	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.96		1.00	0.98		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1817		1789	1847		1789	3496		1789	3545	
Flt Permitted	0.49	1.00		0.26	1.00		0.42	1.00		0.53	1.00	
Satd. Flow (perm)	922	1817		490	1847		793	3496		990	3545	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	65	297	92	46	225	33	108	323	59	17	408	27
RTOR Reduction (vph)	0	14	0	0	7	0	0	15	0	0	5	0
Lane Group Flow (vph)	65	375	0	46	251	0	108	367	0	17	430	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	22.4	18.7		22.4	18.7		36.7	31.5		28.7	27.5	
Effective Green, g (s)	22.4	18.7		22.4	18.7		36.7	31.5		28.7	27.5	
Actuated g/C Ratio	0.30	0.25		0.30	0.25		0.49	0.42		0.38	0.37	
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	317	452		210	459		456	1466		391	1298	
v/s Ratio Prot	0.01	c0.21		c0.01	0.14		c0.02	0.10		0.00	c0.12	
v/s Ratio Perm	0.05			0.05			0.10			0.02		
v/c Ratio	0.21	0.83		0.22	0.55		0.24	0.25		0.04	0.33	
Uniform Delay, d1	19.3	26.7		19.6	24.5		10.6	14.1		14.5	17.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	11.9		0.5	1.3		0.3	0.4		0.0	0.7	
Delay (s)	19.6	38.6		20.1	25.9		10.9	14.6		14.5	17.9	
Level of Service	B	D		C	C		B	B		B	B	
Approach Delay (s)		35.9			25.0			13.7			17.7	
Approach LOS		D			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	22.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	75.1	Sum of lost time (s)	20.0
Intersection Capacity Utilization	67.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 11: Bryne Drive & Mapleview Drive

2028 Total Conditions
 Weekday AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↗	↗↗↗		↗	↗↗↗		↗	↗↗		↗	↗↗	
Traffic Volume (vph)	91	938	155	420	834	232	48	46	190	201	121	102
Future Volume (vph)	91	938	155	420	834	232	48	46	190	201	121	102
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	0.98		1.00	0.97		1.00	0.88		1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	5033		1789	4974		1789	3146		1789	3333	
Flt Permitted	0.23	1.00		0.13	1.00		0.60	1.00		0.47	1.00	
Satd. Flow (perm)	438	5033		244	4974		1132	3146		889	3333	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	99	1020	168	457	907	252	52	50	207	218	132	111
RTOR Reduction (vph)	0	19	0	0	38	0	0	182	0	0	95	0
Lane Group Flow (vph)	99	1169	0	457	1121	0	52	75	0	218	148	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	41.8	35.8		59.8	49.8		17.5	11.4		21.3	13.3	
Effective Green, g (s)	41.8	35.8		59.8	49.8		17.5	11.4		21.3	13.3	
Actuated g/C Ratio	0.44	0.38		0.63	0.52		0.18	0.12		0.22	0.14	
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	277	1892		477	2601		250	376		274	465	
v/s Ratio Prot	0.02	0.23		c0.20	0.23		0.01	0.02		c0.07	0.04	
v/s Ratio Perm	0.13			c0.40			0.02			c0.11		
v/c Ratio	0.36	0.62		0.96	0.43		0.21	0.20		0.80	0.32	
Uniform Delay, d1	15.9	24.1		24.5	14.0		32.7	37.8		33.4	36.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.8	1.5		30.4	0.5		0.4	0.3		14.7	0.4	
Delay (s)	16.6	25.7		54.9	14.5		33.1	38.0		48.1	37.3	
Level of Service	B	C		D	B		C	D		D	D	
Approach Delay (s)		25.0			25.9			37.2			42.4	
Approach LOS		C			C			D			D	

Intersection Summary		
HCM 2000 Control Delay	28.6	HCM 2000 Level of Service C
HCM 2000 Volume to Capacity ratio	0.97	
Actuated Cycle Length (s)	95.2	Sum of lost time (s) 20.0
Intersection Capacity Utilization	82.7%	ICU Level of Service E
Analysis Period (min)	15	

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 1: Essa Road & Ardagh Road/Bryne Drive

2028 Total Conditions
 Weekday PM Peak Hour




























Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	229	310	111	213	197	356	86	712	113	385	918	479
Future Volume (vph)	229	310	111	213	197	356	86	712	113	385	918	479
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00
Frt	1.00	0.96		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1789	3438		1789	3579	1601	1789	3579	1601	3471	3579	1601
Flt Permitted	0.62	1.00		0.27	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1176	3438		500	3579	1601	1789	3579	1601	3471	3579	1601
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	236	320	114	220	203	367	89	734	116	397	946	494
RTOR Reduction (vph)	0	31	0	0	0	281	0	0	72	0	0	269
Lane Group Flow (vph)	236	403	0	220	203	86	89	734	44	397	946	225
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8			2			6
Actuated Green, G (s)	31.1	18.4		34.3	20.0	20.0	8.9	43.3	43.3	17.2	51.6	51.6
Effective Green, g (s)	31.1	18.4		34.3	20.0	20.0	8.9	43.3	43.3	17.2	51.6	51.6
Actuated g/C Ratio	0.27	0.16		0.30	0.18	0.18	0.08	0.38	0.38	0.15	0.46	0.46
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	391	558		314	632	282	140	1368	612	527	1631	729
v/s Ratio Prot	0.07	0.12		c0.09	0.06		0.05	0.21		c0.11	c0.26	
v/s Ratio Perm	0.10			c0.12		0.05			0.03			0.14
v/c Ratio	0.60	0.72		0.70	0.32	0.31	0.64	0.54	0.07	0.75	0.58	0.31
Uniform Delay, d1	34.3	45.0		31.9	40.7	40.6	50.6	27.2	22.2	46.0	22.8	19.5
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.6	4.6		6.9	0.3	0.6	9.1	1.5	0.2	6.0	1.5	1.1
Delay (s)	36.9	49.6		38.8	41.0	41.2	59.7	28.7	22.4	52.0	24.3	20.6
Level of Service	D	D		D	D	D	E	C	C	D	C	C
Approach Delay (s)		45.1			40.4			30.8			29.3	
Approach LOS		D			D			C			C	
Intersection Summary												
HCM 2000 Control Delay			34.2				HCM 2000 Level of Service				C	
HCM 2000 Volume to Capacity ratio			0.68									
Actuated Cycle Length (s)			113.2			Sum of lost time (s)				20.0		
Intersection Capacity Utilization			72.4%			ICU Level of Service				C		
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

2: Veterans Drive & Harvie Road




















2028 Total Conditions
Weekday PM Peak Hour

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations		 				 		 			 		
Traffic Volume (vph)	77	345	214	104	408	390	184	440	95	320	609	78	
Future Volume (vph)	77	345	214	104	408	390	184	440	95	320	609	78	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0		
Lane Util. Factor	1.00	0.95		1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95		
Frt	1.00	0.94		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1789	3373		1789	1883	1601	1789	3579	1601	1789	3517		
Flt Permitted	0.31	1.00		0.29	1.00	1.00	0.17	1.00	1.00	0.35	1.00		
Satd. Flow (perm)	584	3373		546	1883	1601	320	3579	1601	653	3517		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	84	375	233	113	443	424	200	478	103	348	662	85	
RTOR Reduction (vph)	0	88	0	0	0	276	0	0	78	0	10	0	
Lane Group Flow (vph)	84	520	0	113	443	148	200	478	25	348	737	0	
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		
Protected Phases	7	4		3	8		5	2		1	6		
Permitted Phases	4			8		8	2		2	6			
Actuated Green, G (s)	37.7	31.0		42.5	33.4	33.4	34.7	23.7	23.7	36.9	24.8		
Effective Green, g (s)	37.7	31.0		42.5	33.4	33.4	34.7	23.7	23.7	36.9	24.8		
Actuated g/C Ratio	0.39	0.32		0.44	0.35	0.35	0.36	0.25	0.25	0.38	0.26		
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	313	1090		359	655	557	284	884	395	394	909		
v/s Ratio Prot	0.02	0.15		c0.03	c0.24		0.08	0.13		c0.11	0.21		
v/s Ratio Perm	0.09			0.11		0.09	0.17		0.02	c0.23			
v/c Ratio	0.27	0.48		0.31	0.68	0.27	0.70	0.54	0.06	0.88	0.81		
Uniform Delay, d1	19.4	26.0		16.5	26.6	22.4	23.2	31.4	27.6	24.1	33.4		
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
Incremental Delay, d2	0.5	1.5		0.5	5.5	1.2	7.7	0.7	0.1	20.2	5.6		
Delay (s)	19.8	27.5		17.0	32.2	23.6	30.9	32.0	27.7	44.3	38.9		
Level of Service	B	C		B	C	C	C	C	C	D	D		
Approach Delay (s)		26.5			26.7			31.2			40.6		
Approach LOS		C			C			C			D		
Intersection Summary													
HCM 2000 Control Delay			32.0		HCM 2000 Level of Service						C		
HCM 2000 Volume to Capacity ratio			0.76										
Actuated Cycle Length (s)			95.9		Sum of lost time (s)						20.0		
Intersection Capacity Utilization			77.7%		ICU Level of Service						D		
Analysis Period (min)			15										

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
3: Thrushwood Drive & Harvie Road

2028 Total Conditions
Weekday PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	34	678	48	7	854	73	29	9	44	42	5	19
Future Volume (Veh/h)	34	678	48	7	854	73	29	9	44	42	5	19
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	37	737	52	8	928	79	32	10	48	46	5	21
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type												
	TWLTL					TWLTL						
Median storage veh	2					2						
Upstream signal (m)	318					401						
pX, platoon unblocked	0.88						0.88	0.88		0.88	0.88	0.88
vC, conflicting volume	1007			789			1340	1860	394	1479	1846	504
vC1, stage 1 conf vol							837	837		984	984	
vC2, stage 2 conf vol							504	1023		496	863	
vCu, unblocked vol	738			789			1116	1706	394	1273	1691	166
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	95			99			89	96	92	83	98	97
cM capacity (veh/h)	761			827			289	247	605	277	259	748
Direction, Lane #												
	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1				
Volume Total	37	491	298	8	619	388	90	72				
Volume Left	37	0	0	8	0	0	32	46				
Volume Right	0	0	52	0	0	79	48	21				
cSH	761	1700	1700	827	1700	1700	390	337				
Volume to Capacity	0.05	0.29	0.18	0.01	0.36	0.23	0.23	0.21				
Queue Length 95th (m)	1.2	0.0	0.0	0.2	0.0	0.0	6.7	6.0				
Control Delay (s)	10.0	0.0	0.0	9.4	0.0	0.0	17.0	18.6				
Lane LOS	A			A			C	C				
Approach Delay (s)	0.4			0.1			17.0	18.6				
Approach LOS							C	C				
Intersection Summary												
Average Delay			1.7									
Intersection Capacity Utilization		41.5%			ICU Level of Service			A				
Analysis Period (min)		15										

HCM Signalized Intersection Capacity Analysis
4: Bryne Drive & Harvie Road

2028 Total Conditions
Weekday PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	54	652	33	147	659	155	130	442	178	124	461	123
Future Volume (vph)	54	652	33	147	659	155	130	442	178	124	461	123
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91	0.91
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1789	3579	1601	1789	3579	1601	1789	3579	1601	1789	3415	1457
Flt Permitted	0.33	1.00	1.00	0.27	1.00	1.00	0.25	1.00	1.00	0.32	1.00	1.00
Satd. Flow (perm)	620	3579	1601	501	3579	1601	475	3579	1601	597	3415	1457
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	59	709	36	160	716	168	141	480	193	135	501	134
RTOR Reduction (vph)	0	0	21	0	0	94	0	0	153	0	2	96
Lane Group Flow (vph)	59	709	15	160	716	74	141	480	40	135	512	25
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)	47.2	41.2	41.2	54.6	44.9	44.9	31.5	21.1	21.1	31.1	20.9	20.9
Effective Green, g (s)	47.2	41.2	41.2	54.6	44.9	44.9	31.5	21.1	21.1	31.1	20.9	20.9
Actuated g/C Ratio	0.46	0.40	0.40	0.53	0.44	0.44	0.31	0.21	0.21	0.30	0.20	0.20
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	354	1442	645	389	1572	703	280	738	330	300	698	297
v/s Ratio Prot	0.01	c0.20		c0.04	0.20		c0.05	0.13		0.04	c0.15	
v/s Ratio Perm	0.07		0.01	0.18		0.05	0.10		0.02	0.09		0.02
v/c Ratio	0.17	0.49	0.02	0.41	0.46	0.10	0.50	0.65	0.12	0.45	0.73	0.08
Uniform Delay, d1	15.5	22.7	18.4	13.3	20.1	16.8	27.1	37.2	33.0	27.0	38.0	32.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	1.2	0.1	0.7	1.0	0.3	1.4	2.1	0.2	1.1	4.0	0.1
Delay (s)	15.7	23.9	18.4	14.1	21.0	17.1	28.5	39.2	33.2	28.1	42.1	33.0
Level of Service	B	C	B	B	C	B	C	D	C	C	D	C
Approach Delay (s)		23.1			19.3			35.9			38.2	
Approach LOS		C			B			D			D	
Intersection Summary												
HCM 2000 Control Delay			28.4			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.55									
Actuated Cycle Length (s)			102.2			Sum of lost time (s)			20.0			
Intersection Capacity Utilization			79.4%			ICU Level of Service			D			
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

5: Harvie Road & Fairview Road

2028 Total Conditions
Weekday PM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↖	↗↗	↗↗	↖	↖	↖
Traffic Volume (vph)	153	802	825	500	342	136
Future Volume (vph)	153	802	825	500	342	136
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1789	3579	3579	1601	1789	1601
Flt Permitted	0.21	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	387	3579	3579	1601	1789	1601
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	166	872	897	543	372	148
RTOR Reduction (vph)	0	0	0	299	0	109
Lane Group Flow (vph)	166	872	897	244	372	39
Turn Type	pm+pt	NA	NA	Perm	Perm	Perm
Protected Phases	7	4	8			
Permitted Phases	4			8	6	6
Actuated Green, G (s)	54.3	54.3	40.4	40.4	23.8	23.8
Effective Green, g (s)	54.3	54.3	40.4	40.4	23.8	23.8
Actuated g/C Ratio	0.60	0.60	0.45	0.45	0.26	0.26
Clearance Time (s)	4.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	387	2156	1604	717	472	422
v/s Ratio Prot	0.05	c0.24	c0.25			
v/s Ratio Perm	0.21			0.15	c0.21	0.02
v/c Ratio	0.43	0.40	0.56	0.34	0.79	0.09
Uniform Delay, d1	9.7	9.4	18.3	16.2	30.8	25.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.8	0.6	1.4	1.3	8.5	0.1
Delay (s)	10.5	10.0	19.7	17.5	39.3	25.1
Level of Service	B	A	B	B	D	C
Approach Delay (s)		10.1	18.9		35.3	
Approach LOS		B	B		D	

Intersection Summary

















HCM 2000 Control Delay	18.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	90.1	Sum of lost time (s)	16.0
Intersection Capacity Utilization	74.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis

6: Thrushwood Drive & Cranberry Lane




















2028 Total Conditions
Weekday PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	3	9	1	28	12	9	2	20	27	4	27	6
Future Volume (Veh/h)	3	9	1	28	12	9	2	20	27	4	27	6
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	10	1	30	13	10	2	22	29	4	29	7
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	98	96	32	87	84	36	36			51		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	98	96	32	87	84	36	36			51		
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 %	100	99	100	97	98	99	100			100		
cM capacity (veh/h)	863	791	1041	887	803	1036	1575			1555		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	14	53	53	40								
Volume Left	3	30	2	4								
Volume Right	1	10	29	7								
cSH	820	888	1575	1555								
Volume to Capacity	0.02	0.06	0.00	0.00								
Queue Length 95th (m)	0.4	1.4	0.0	0.1								
Control Delay (s)	9.5	9.3	0.3	0.7								
Lane LOS	A	A	A	A								
Approach Delay (s)	9.5	9.3	0.3	0.7								
Approach LOS	A	A										
Intersection Summary												
Average Delay			4.2									
Intersection Capacity Utilization			16.0%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

7: Bryne Drive & Cranberry Lane

2028 Total Conditions
Weekday PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	31	0	32	92	5	97	51	622	7	7	587	46
Future Volume (Veh/h)	31	0	32	92	5	97	51	622	7	7	587	46
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	34	0	35	100	5	105	55	676	8	8	638	50
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type												
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1234	1473	344	1160	1494	342	688			684		
vC1, stage 1 conf vol	679	679		790	790							
vC2, stage 2 conf vol	556	794		370	704							
vCu, unblocked vol	1234	1473	344	1160	1494	342	688			684		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)	6.5	5.5		6.5	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	88	100	95	66	98	84	94			99		
cM capacity (veh/h)	284	297	652	294	282	654	902			905		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3				
Volume Total	69	210	55	451	233	8	425	263				
Volume Left	34	100	55	0	0	8	0	0				
Volume Right	35	105	0	0	8	0	0	50				
cSH	398	405	902	1700	1700	905	1700	1700				
Volume to Capacity	0.17	0.52	0.06	0.27	0.14	0.01	0.25	0.15				
Queue Length 95th (m)	4.7	21.9	1.5	0.0	0.0	0.2	0.0	0.0				
Control Delay (s)	15.9	23.1	9.3	0.0	0.0	9.0	0.0	0.0				
Lane LOS	C	C	A			A						
Approach Delay (s)	15.9	23.1	0.7			0.1						
Approach LOS	C	C										
Intersection Summary												
Average Delay			3.8									
Intersection Capacity Utilization			45.0%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis
 8: Veterans Drive & Mapleton Drive/Brookwood Drive

2028 Total Conditions
 Weekday PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	19	19	145	74	15	24	254	975	111	26	955	25	
Future Volume (vph)	19	19	145	74	15	24	254	975	111	26	955	25	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	4.0	6.0			6.0	6.0	4.0	6.0		4.0	6.0		
Lane Util. Factor	1.00	1.00			1.00	1.00	1.00	0.95		1.00	0.95		
Frt	1.00	0.87			1.00	0.85	1.00	0.98		1.00	1.00		
Flt Protected	0.95	1.00			0.96	1.00	0.95	1.00		0.95	1.00		
Satd. Flow (prot)	1789	1634			1808	1601	1789	3524		1789	3565		
Flt Permitted	0.52	1.00			0.64	1.00	0.15	1.00		0.20	1.00		
Satd. Flow (perm)	984	1634			1214	1601	281	3524		378	3565		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	21	21	158	80	16	26	276	1060	121	28	1038	27	
RTOR Reduction (vph)	0	122	0	0	0	22	0	6	0	0	2	0	
Lane Group Flow (vph)	21	57	0	0	96	4	276	1175	0	28	1063	0	
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA		
Protected Phases	7	4		3	8		5	2		1	6		
Permitted Phases	4			8		8	2			6			
Actuated Green, G (s)	18.6	18.6			12.1	12.1	51.1	44.6		39.5	37.0		
Effective Green, g (s)	18.6	18.6			12.1	12.1	51.1	44.6		39.5	37.0		
Actuated g/C Ratio	0.23	0.23			0.15	0.15	0.63	0.55		0.48	0.45		
Clearance Time (s)	4.0	6.0			6.0	6.0	4.0	6.0		4.0	6.0		
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0		3.0	3.0		
Lane Grp Cap (vph)	248	372			179	237	362	1923		225	1614		
v/s Ratio Prot	0.00	c0.03					c0.09	0.33		0.00	0.30		
v/s Ratio Perm	0.02				c0.08	0.00	c0.38			0.06			
v/c Ratio	0.08	0.15			0.54	0.02	0.76	0.61		0.12	0.66		
Uniform Delay, d1	24.8	25.2			32.2	29.7	11.2	12.6		11.3	17.4		
Progression Factor	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00		
Incremental Delay, d2	0.1	0.2			3.1	0.0	9.2	1.5		0.2	2.1		
Delay (s)	24.9	25.4			35.3	29.7	20.4	14.1		11.6	19.6		
Level of Service	C	C			D	C	C	B		B	B		
Approach Delay (s)		25.4			34.1			15.3			19.3		
Approach LOS		C			C			B			B		
Intersection Summary													
HCM 2000 Control Delay			18.3		HCM 2000 Level of Service						B		
HCM 2000 Volume to Capacity ratio			0.73										
Actuated Cycle Length (s)			81.7		Sum of lost time (s)						20.0		
Intersection Capacity Utilization			79.0%		ICU Level of Service						D		
Analysis Period (min)			15										

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
 9: Bryne Drive & Bryne Court

2028 Total Conditions
 Weekday PM Peak Hour



Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations							
Traffic Volume (veh/h)	29	29	512	2	2	689	
Future Volume (Veh/h)	29	29	512	2	2	689	
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)	32	32	557	2	2	749	
Pedestrians							
Lane Width (m)							
Walking Speed (m/s)							
Percent Blockage							
Right turn flare (veh)							
Median type							
			TWLTL		TWLTL		
Median storage veh)			2		2		
Upstream signal (m)			251				
pX, platoon unblocked							
vC, conflicting volume	936	280			559		
vC1, stage 1 conf vol	558						
vC2, stage 2 conf vol	378						
vCu, unblocked vol	936	280			559		
tC, single (s)	6.8	6.9			4.1		
tC, 2 stage (s)	5.8						
tF (s)	3.5	3.3			2.2		
p0 queue free %	93	96			100		
cM capacity (veh/h)	465	718			1008		
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	32	32	371	188	2	374	374
Volume Left	32	0	0	0	2	0	0
Volume Right	0	32	0	2	0	0	0
cSH	465	718	1700	1700	1008	1700	1700
Volume to Capacity	0.07	0.04	0.22	0.11	0.00	0.22	0.22
Queue Length 95th (m)	1.7	1.1	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	13.3	10.3	0.0	0.0	8.6	0.0	0.0
Lane LOS	B	B			A		
Approach Delay (s)	11.8	0.0		0.0			
Approach LOS	B						
Intersection Summary							
Average Delay			0.6				
Intersection Capacity Utilization			29.0%		ICU Level of Service		A
Analysis Period (min)			15				

HCM Signalized Intersection Capacity Analysis
 10: Bryne Drive & Caplan Avenue

2028 Total Conditions
 Weekday PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	135	163	113	100	222	123	123	291	72	92	514	112
Future Volume (vph)	135	163	113	100	222	123	123	291	72	92	514	112
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.94		1.00	0.95		1.00	0.97		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1768		1789	1782		1789	3472		1789	3482	
Flt Permitted	0.27	1.00		0.49	1.00		0.28	1.00		0.50	1.00	
Satd. Flow (perm)	517	1768		914	1782		526	3472		945	3482	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	147	177	123	109	241	134	134	316	78	100	559	122
RTOR Reduction (vph)	0	31	0	0	26	0	0	26	0	0	22	0
Lane Group Flow (vph)	147	269	0	109	349	0	134	368	0	100	659	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	29.0	21.9		25.4	20.1		29.7	24.4		29.7	24.4	
Effective Green, g (s)	29.0	21.9		25.4	20.1		29.7	24.4		29.7	24.4	
Actuated g/C Ratio	0.38	0.28		0.33	0.26		0.39	0.32		0.39	0.32	
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	312	503		362	465		290	1101		423	1104	
v/s Ratio Prot	c0.04	0.15		0.02	c0.20		c0.03	0.11		0.02	c0.19	
v/s Ratio Perm	0.13			0.08			0.15			0.08		
v/c Ratio	0.47	0.54		0.30	0.75		0.46	0.33		0.24	0.60	
Uniform Delay, d1	17.1	23.2		18.4	26.1		16.1	20.0		15.3	22.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.1	1.1		0.5	6.7		1.2	0.8		0.3	2.4	
Delay (s)	18.3	24.3		18.9	32.8		17.2	20.9		15.6	24.5	
Level of Service	B	C		B	C		B	C		B	C	
Approach Delay (s)		22.3			29.7			19.9			23.4	
Approach LOS		C			C			B			C	
Intersection Summary												
HCM 2000 Control Delay			23.7			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.62									
Actuated Cycle Length (s)			76.9			Sum of lost time (s)			20.0			
Intersection Capacity Utilization			70.1%			ICU Level of Service			C			
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 11: Bryne Drive & Mapleview Drive

2028 Total Conditions
 Weekday PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↖↖		↖	↖↖↖		↖	↖↖		↖	↖↖	
Traffic Volume (vph)	114	943	193	354	1358	220	235	128	538	326	112	185
Future Volume (vph)	114	943	193	354	1358	220	235	128	538	326	112	185
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	0.97		1.00	0.98		1.00	0.88		1.00	0.91	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	5011		1789	5034		1789	3145		1789	3244	
Flt Permitted	0.12	1.00		0.11	1.00		0.56	1.00		0.16	1.00	
Satd. Flow (perm)	227	5011		203	5034		1058	3145		308	3244	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	120	993	203	373	1429	232	247	135	566	343	118	195
RTOR Reduction (vph)	0	22	0	0	16	0	0	300	0	0	149	0
Lane Group Flow (vph)	120	1174	0	373	1645	0	247	401	0	343	164	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	41.1	33.2		60.2	48.3		34.7	20.5		46.4	28.2	
Effective Green, g (s)	41.1	33.2		60.2	48.3		34.7	20.5		46.4	28.2	
Actuated g/C Ratio	0.35	0.28		0.51	0.41		0.29	0.17		0.39	0.24	
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	182	1402		410	2050		397	543		393	771	
v/s Ratio Prot	0.04	0.23		c0.18	0.33		0.07	0.13		c0.16	0.05	
v/s Ratio Perm	0.18			c0.29			0.11			c0.18		
v/c Ratio	0.66	0.84		0.91	0.80		0.62	0.98dr		0.87	0.21	
Uniform Delay, d1	28.4	40.2		33.9	30.9		34.4	46.5		31.3	36.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	8.4	6.1		23.5	3.4		3.0	5.2		18.7	0.1	
Delay (s)	36.8	46.3		57.4	34.4		37.5	51.7		50.0	36.4	
Level of Service	D	D		E	C		D	D		D	D	
Approach Delay (s)		45.4			38.6			48.0			43.5	
Approach LOS		D			D			D			D	

Intersection Summary			
HCM 2000 Control Delay	42.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	118.6	Sum of lost time (s)	20.0
Intersection Capacity Utilization	98.6%	ICU Level of Service	F
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 1: Essa Road & Ardagh Road/Bryne Drive

2033 Total Conditions
 Weekday AM Peak Hour
























Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	285	401	58	78	60	326	98	731	56	353	459	346	
Future Volume (vph)	285	401	58	78	60	326	98	731	56	353	459	346	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00	
Frt	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1789	3511		1789	3579	1601	1789	3579	1601	3471	3579	1601	
Flt Permitted	0.55	1.00		0.47	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (perm)	1030	3511		884	3579	1601	1789	3579	1601	3471	3579	1601	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	310	436	63	85	65	354	107	795	61	384	499	376	
RTOR Reduction (vph)	0	10	0	0	0	287	0	0	38	0	0	215	
Lane Group Flow (vph)	310	489	0	85	65	67	107	795	23	384	499	161	
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	
Protected Phases	7	4		3	8		5	2		1	6		
Permitted Phases	4			8		8			2			6	
Actuated Green, G (s)	34.6	25.1		18.7	13.2	13.2	11.1	40.9	40.9	16.4	46.2	46.2	
Effective Green, g (s)	34.6	25.1		18.7	13.2	13.2	11.1	40.9	40.9	16.4	46.2	46.2	
Actuated g/C Ratio	0.32	0.23		0.17	0.12	0.12	0.10	0.38	0.38	0.15	0.43	0.43	
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	452	816		199	437	195	184	1356	606	527	1532	685	
v/s Ratio Prot	c0.11	0.14		0.02	0.02		0.06	c0.22		c0.11	0.14		
v/s Ratio Perm	c0.11			0.05		0.04			0.01			0.10	
v/c Ratio	0.69	0.60		0.43	0.15	0.34	0.58	0.59	0.04	0.73	0.33	0.24	
Uniform Delay, d1	30.2	36.9		38.7	42.3	43.4	46.2	26.7	21.1	43.6	20.5	19.6	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	4.3	1.2		1.5	0.2	1.1	4.6	1.9	0.1	5.0	0.6	0.8	
Delay (s)	34.5	38.1		40.2	42.5	44.4	50.8	28.6	21.2	48.6	21.1	20.4	
Level of Service	C	D		D	D	D	D	C	C	D	C	C	
Approach Delay (s)		36.7			43.5			30.6			29.3		
Approach LOS		D			D			C			C		
Intersection Summary													
HCM 2000 Control Delay			33.4									HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.67										
Actuated Cycle Length (s)			107.9									Sum of lost time (s)	20.0
Intersection Capacity Utilization			71.7%									ICU Level of Service	C
Analysis Period (min)			15										

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

2: Veterans Drive & Harvie Road




















2033 Total Conditions
Weekday AM Peak Hour

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	93	285	300	151	164	231	82	288	169	370	464	88	
Future Volume (vph)	93	285	300	151	164	231	82	288	169	370	464	88	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0		
Lane Util. Factor	1.00	0.95		1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95		
Frt	1.00	0.92		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1789	3303		1789	1883	1601	1789	3579	1601	1789	3493		
Flt Permitted	0.64	1.00		0.28	1.00	1.00	0.34	1.00	1.00	0.43	1.00		
Satd. Flow (perm)	1215	3303		530	1883	1601	649	3579	1601	815	3493		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	101	310	326	164	178	251	89	313	184	402	504	96	
RTOR Reduction (vph)	0	170	0	0	0	159	0	0	146	0	16	0	
Lane Group Flow (vph)	101	466	0	164	178	92	89	313	38	402	584	0	
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		
Protected Phases	7	4		3	8		5	2		1	6		
Permitted Phases	4			8		8	2		2	6			
Actuated Green, G (s)	37.9	31.0		43.3	33.7	33.7	26.5	19.2	19.2	35.3	24.0		
Effective Green, g (s)	37.9	31.0		43.3	33.7	33.7	26.5	19.2	19.2	35.3	24.0		
Actuated g/C Ratio	0.41	0.34		0.47	0.37	0.37	0.29	0.21	0.21	0.38	0.26		
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	544	1114		381	690	587	277	747	334	441	912		
v/s Ratio Prot	0.01	0.14		c0.04	0.09		0.03	0.09		c0.12	0.17		
v/s Ratio Perm	0.06			c0.16		0.06	0.07		0.02	c0.23			
v/c Ratio	0.19	0.42		0.43	0.26	0.16	0.32	0.42	0.12	0.91	0.64		
Uniform Delay, d1	16.8	23.5		14.9	20.4	19.6	24.6	31.5	29.5	24.5	30.1		
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
Incremental Delay, d2	0.2	1.2		0.8	0.9	0.6	0.7	0.4	0.2	22.9	1.5		
Delay (s)	17.0	24.7		15.7	21.3	20.1	25.2	31.9	29.6	47.4	31.7		
Level of Service	B	C		B	C	C	C	C	C	D	C		
Approach Delay (s)		23.6			19.2			30.2			38.0		
Approach LOS		C			B			C			D		
Intersection Summary													
HCM 2000 Control Delay			29.0									HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.70										
Actuated Cycle Length (s)			91.9									Sum of lost time (s)	20.0
Intersection Capacity Utilization			83.0%									ICU Level of Service	E
Analysis Period (min)			15										

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
3: Thrushwood Drive & Harvie Road





























2033 Total Conditions
Weekday AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	14	714	96	4	470	30	56	4	41	49	4	22
Future Volume (Veh/h)	14	714	96	4	470	30	56	4	41	49	4	22
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	15	776	104	4	511	33	61	4	45	53	4	24
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type												
	TWLTL					TWLTL						
Median storage veh	2					2						
Upstream signal (m)	318					401						
pX, platoon unblocked	0.98						0.98	0.98		0.98	0.98	0.98
vC, conflicting volume	544			880			1148	1410	440	1000	1446	272
vC1, stage 1 conf vol							858	858		536	536	
vC2, stage 2 conf vol							290	552		465	910	
vCu, unblocked vol	482			880			1101	1370	440	950	1406	203
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			79	99	92	86	99	97
cM capacity (veh/h)	1050			764			296	317	565	389	304	784
Direction, Lane #												
	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1				
Volume Total	15	517	363	4	341	203	110	81				
Volume Left	15	0	0	4	0	0	61	53				
Volume Right	0	0	104	0	0	33	45	24				
cSH	1050	1700	1700	764	1700	1700	369	450				
Volume to Capacity	0.01	0.30	0.21	0.01	0.20	0.12	0.30	0.18				
Queue Length 95th (m)	0.3	0.0	0.0	0.1	0.0	0.0	9.3	4.9				
Control Delay (s)	8.5	0.0	0.0	9.7	0.0	0.0	18.9	14.7				
Lane LOS	A			A			C	B				
Approach Delay (s)	0.1			0.1			18.9	14.7				
Approach LOS							C	B				
Intersection Summary												
Average Delay			2.1									
Intersection Capacity Utilization			36.0%		ICU Level of Service			A				
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

4: Bryne Drive & Harvie Road

2033 Total Conditions
Weekday AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 			 	
Traffic Volume (vph)	101	610	110	367	428	107	26	229	198	208	372	60
Future Volume (vph)	101	610	110	367	428	107	26	229	198	208	372	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91	0.91
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1789	3579	1601	1789	3579	1601	1789	3579	1601	1789	3419	1457
Flt Permitted	0.48	1.00	1.00	0.29	1.00	1.00	0.50	1.00	1.00	0.45	1.00	1.00
Satd. Flow (perm)	913	3579	1601	552	3579	1601	946	3579	1601	845	3419	1457
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	110	663	120	399	465	116	28	249	215	226	404	65
RTOR Reduction (vph)	0	0	71	0	0	64	0	0	183	0	1	45
Lane Group Flow (vph)	110	663	49	399	465	52	28	249	32	226	410	13
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)	48.4	40.1	40.1	55.8	43.8	43.8	18.7	14.4	14.4	30.1	21.8	21.8
Effective Green, g (s)	48.4	40.1	40.1	55.8	43.8	43.8	18.7	14.4	14.4	30.1	21.8	21.8
Actuated g/C Ratio	0.49	0.41	0.41	0.57	0.45	0.45	0.19	0.15	0.15	0.31	0.22	0.22
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	524	1461	653	464	1596	714	217	524	234	371	759	323
v/s Ratio Prot	0.02	0.19		c0.10	0.13		0.01	0.07		c0.07	0.12	
v/s Ratio Perm	0.09		0.03	c0.38		0.03	0.02		0.02	c0.11		0.01
v/c Ratio	0.21	0.45	0.08	0.86	0.29	0.07	0.13	0.48	0.13	0.61	0.54	0.04
Uniform Delay, d1	13.5	21.1	17.7	13.4	17.3	15.6	32.7	38.4	36.5	27.2	33.8	30.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	1.0	0.2	14.7	0.5	0.2	0.3	0.7	0.3	2.8	0.8	0.1
Delay (s)	13.7	22.1	18.0	28.1	17.8	15.8	33.0	39.1	36.7	30.0	34.6	30.0
Level of Service	B	C	B	C	B	B	C	D	D	C	C	C
Approach Delay (s)		20.5			21.7			37.7			32.7	
Approach LOS		C			C			D			C	
Intersection Summary												
HCM 2000 Control Delay			26.4	HCM 2000 Level of Service				C				
HCM 2000 Volume to Capacity ratio			0.83									
Actuated Cycle Length (s)			98.2	Sum of lost time (s)				20.0				
Intersection Capacity Utilization			90.2%	ICU Level of Service				E				
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

5: Harvie Road & Fairview Road

2033 Total Conditions
Weekday AM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↗	↑↑	↑↑	↗	↗	↗
Traffic Volume (vph)	125	891	713	360	276	189
Future Volume (vph)	125	891	713	360	276	189
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1789	3579	3579	1601	1789	1601
Flt Permitted	0.27	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	507	3579	3579	1601	1789	1601
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	136	968	775	391	300	205
RTOR Reduction (vph)	0	0	0	205	0	158
Lane Group Flow (vph)	136	968	775	186	300	47
Turn Type	pm+pt	NA	NA	Perm	Perm	Perm
Protected Phases	7	4	8			
Permitted Phases	4			8	6	6
Actuated Green, G (s)	53.4	53.4	40.3	40.3	19.2	19.2
Effective Green, g (s)	53.4	53.4	40.3	40.3	19.2	19.2
Actuated g/C Ratio	0.63	0.63	0.48	0.48	0.23	0.23
Clearance Time (s)	4.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	457	2259	1704	762	406	363
v/s Ratio Prot	0.03	c0.27	0.22			
v/s Ratio Perm	0.16			0.12	c0.17	0.03
v/c Ratio	0.30	0.43	0.45	0.24	0.74	0.13
Uniform Delay, d1	7.1	7.9	14.8	13.1	30.4	26.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4	0.6	0.9	0.8	6.9	0.2
Delay (s)	7.5	8.5	15.7	13.9	37.3	26.2
Level of Service	A	A	B	B	D	C
Approach Delay (s)		8.4	15.1		32.8	
Approach LOS		A	B		C	

Intersection Summary

















HCM 2000 Control Delay	15.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	84.6	Sum of lost time (s)	16.0
Intersection Capacity Utilization	68.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis

6: Thrushwood Drive & Cranberry Lane

















2033 Total Conditions
Weekday AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	7	8	1	53	4	14	0	25	37	8	29	2
Future Volume (Veh/h)	7	8	1	53	4	14	0	25	37	8	29	2
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	9	1	58	4	15	0	27	40	9	32	2
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	115	118	33	104	99	47	34			67		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	115	118	33	104	99	47	34			67		
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 %	99	99	100	93	99	99	100			99		
cM capacity (veh/h)	842	768	1041	864	786	1022	1578			1535		
Direction, Lane #												
	EB 1	WB 1	NB 1	SB 1								
Volume Total	18	77	67	43								
Volume Left	8	58	0	9								
Volume Right	1	15	40	2								
cSH	811	886	1578	1535								
Volume to Capacity	0.02	0.09	0.00	0.01								
Queue Length 95th (m)	0.5	2.2	0.0	0.1								
Control Delay (s)	9.5	9.4	0.0	1.6								
Lane LOS	A	A		A								
Approach Delay (s)	9.5	9.4	0.0	1.6								
Approach LOS	A	A										
Intersection Summary												
Average Delay			4.7									
Intersection Capacity Utilization			21.9%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis





















7: Bryne Drive & Cranberry Lane

2033 Total Conditions
Weekday AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	115	13	84	29	2	31	30	307	238	251	559	40
Future Volume (Veh/h)	115	13	84	29	2	31	30	307	238	251	559	40
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	125	14	91	32	2	34	33	334	259	273	608	43
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type												
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1444	1834	326	1478	1726	296	651			593		
vC1, stage 1 conf vol	1176	1176		530	530							
vC2, stage 2 conf vol	268	659		948	1197							
vCu, unblocked vol	1444	1834	326	1478	1726	296	651			593		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)	6.5	5.5		6.5	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	10	89	86	74	99	95	96			72		
cM capacity (veh/h)	139	133	670	124	146	700	931			979		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3				
Volume Total	230	68	33	223	370	273	405	246				
Volume Left	125	32	33	0	0	273	0	0				
Volume Right	91	34	0	0	259	0	0	43				
cSH	202	212	931	1700	1700	979	1700	1700				
Volume to Capacity	1.14	0.32	0.04	0.13	0.22	0.28	0.24	0.14				
Queue Length 95th (m)	85.1	10.0	0.8	0.0	0.0	8.7	0.0	0.0				
Control Delay (s)	154.3	29.8	9.0	0.0	0.0	10.1	0.0	0.0				
Lane LOS	F	D	A			B						
Approach Delay (s)	154.3	29.8	0.5			3.0						
Approach LOS	F	D										
Intersection Summary												
Average Delay			21.9									
Intersection Capacity Utilization			56.4%		ICU Level of Service					B		
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis
 8: Veterans Drive & Mapleton Drive/Brookwood Drive

2033 Total Conditions
 Weekday AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	35	192	92	28	32	96	408	39	18	906	15
Future Volume (vph)	9	35	192	92	28	32	96	408	39	18	906	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0			6.0	6.0	4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00			1.00	1.00	1.00	0.95		1.00	0.95	
Frt	1.00	0.87			1.00	0.85	1.00	0.99		1.00	1.00	
Flt Protected	0.95	1.00			0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1644			1814	1601	1789	3532		1789	3570	
Flt Permitted	0.54	1.00			0.62	1.00	0.18	1.00		0.48	1.00	
Satd. Flow (perm)	1011	1644			1176	1601	332	3532		896	3570	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	10	38	209	100	30	35	104	443	42	20	985	16
RTOR Reduction (vph)	0	155	0	0	0	28	0	5	0	0	1	0
Lane Group Flow (vph)	10	92	0	0	130	7	104	480	0	20	1000	0
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	20.8	20.8			15.7	15.7	46.8	40.6		39.2	36.8	
Effective Green, g (s)	20.8	20.8			15.7	15.7	46.8	40.6		39.2	36.8	
Actuated g/C Ratio	0.26	0.26			0.20	0.20	0.59	0.51		0.49	0.46	
Clearance Time (s)	4.0	6.0			6.0	6.0	4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	274	428			231	314	307	1796		466	1646	
v/s Ratio Prot	0.00	c0.06					c0.03	0.14		0.00	c0.28	
v/s Ratio Perm	0.01				c0.11	0.00	0.17			0.02		
v/c Ratio	0.04	0.22			0.56	0.02	0.34	0.27		0.04	0.61	
Uniform Delay, d1	22.0	23.1			28.9	25.9	9.1	11.1		10.4	16.1	
Progression Factor	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.3			3.1	0.0	0.7	0.4		0.0	1.7	
Delay (s)	22.1	23.4			32.1	25.9	9.8	11.5		10.5	17.8	
Level of Service	C	C			C	C	A	B		B	B	
Approach Delay (s)		23.3			30.8			11.2			17.6	
Approach LOS		C			C			B			B	
Intersection Summary												
HCM 2000 Control Delay			17.6				HCM 2000 Level of Service				B	
HCM 2000 Volume to Capacity ratio			0.57									
Actuated Cycle Length (s)			79.8				Sum of lost time (s)			20.0		
Intersection Capacity Utilization			74.5%				ICU Level of Service			D		
Analysis Period (min)			15									

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
 9: Bryne Drive & Bryne Court























2033 Total Conditions
 Weekday AM Peak Hour



Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations	↰	↰	↕↰		↰	↕↕	
Traffic Volume (veh/h)	9	9	503	75	75	510	
Future Volume (Veh/h)	9	9	503	75	75	510	
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)	10	10	547	82	82	554	
Pedestrians							
Lane Width (m)							
Walking Speed (m/s)							
Percent Blockage							
Right turn flare (veh)							
Median type	TWLTL			TWLTL			
Median storage veh	2			2			
Upstream signal (m)	251						
pX, platoon unblocked	0.93	0.93			0.93		
vC, conflicting volume	1029	314			629		
vC1, stage 1 conf vol	588						
vC2, stage 2 conf vol	441						
vCu, unblocked vol	881	113			451		
tC, single (s)	6.8	6.9			4.1		
tC, 2 stage (s)	5.8						
tF (s)	3.5	3.3			2.2		
p0 queue free %	98	99			92		
cM capacity (veh/h)	457	855			1029		
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	10	10	365	264	82	277	277
Volume Left	10	0	0	0	82	0	0
Volume Right	0	10	0	82	0	0	0
cSH	457	855	1700	1700	1029	1700	1700
Volume to Capacity	0.02	0.01	0.21	0.16	0.08	0.16	0.16
Queue Length 95th (m)	0.5	0.3	0.0	0.0	2.0	0.0	0.0
Control Delay (s)	13.0	9.3	0.0	0.0	8.8	0.0	0.0
Lane LOS	B	A			A		
Approach Delay (s)	11.2		0.0		1.1		
Approach LOS	B						
Intersection Summary							
Average Delay			0.7				
Intersection Capacity Utilization			33.8%	ICU Level of Service	A		
Analysis Period (min)			15				

HCM Signalized Intersection Capacity Analysis
 10: Bryne Drive & Caplan Avenue

2033 Total Conditions
 Weekday AM Peak Hour

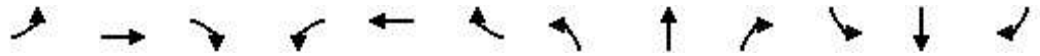
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	90	302	94	47	229	32	111	457	60	17	471	31
Future Volume (vph)	90	302	94	47	229	32	111	457	60	17	471	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.96		1.00	0.98		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1816		1789	1849		1789	3516		1789	3545	
Flt Permitted	0.42	1.00		0.26	1.00		0.35	1.00		0.43	1.00	
Satd. Flow (perm)	786	1816		486	1849		663	3516		810	3545	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	98	328	102	51	249	35	121	497	65	18	512	34
RTOR Reduction (vph)	0	14	0	0	7	0	0	11	0	0	5	0
Lane Group Flow (vph)	98	416	0	51	277	0	121	551	0	18	541	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	26.7	21.5		23.7	20.0		34.5	29.3		29.1	26.6	
Effective Green, g (s)	26.7	21.5		23.7	20.0		34.5	29.3		29.1	26.6	
Actuated g/C Ratio	0.35	0.28		0.31	0.26		0.45	0.38		0.38	0.35	
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	340	507		212	480		373	1337		337	1224	
v/s Ratio Prot	c0.02	c0.23		0.01	0.15		c0.02	c0.16		0.00	0.15	
v/s Ratio Perm	0.08			0.06			0.12			0.02		
v/c Ratio	0.29	0.82		0.24	0.58		0.32	0.41		0.05	0.44	
Uniform Delay, d1	17.7	26.0		19.7	24.8		12.9	17.5		15.1	19.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.5	10.3		0.6	1.7		0.5	0.9		0.1	1.2	
Delay (s)	18.1	36.2		20.3	26.5		13.4	18.5		15.1	20.6	
Level of Service	B	D		C	C		B	B		B	C	
Approach Delay (s)		32.9			25.6			17.6			20.4	
Approach LOS		C			C			B			C	

Intersection Summary			
HCM 2000 Control Delay	23.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	77.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	70.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 11: Bryne Drive & Mapleview Drive

2033 Total Conditions
 Weekday AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↑↑↑		↖	↑↑↑		↖	↑↑		↖	↑↑	
Traffic Volume (vph)	128	1016	168	455	903	353	52	49	205	269	130	113
Future Volume (vph)	128	1016	168	455	903	353	52	49	205	269	130	113
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	0.98		1.00	0.96		1.00	0.88		1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	5032		1789	4925		1789	3145		1789	3328	
Flt Permitted	0.19	1.00		0.12	1.00		0.59	1.00		0.35	1.00	
Satd. Flow (perm)	352	5032		228	4925		1109	3145		656	3328	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	139	1104	183	495	982	384	57	53	223	292	141	123
RTOR Reduction (vph)	0	18	0	0	51	0	0	199	0	0	100	0
Lane Group Flow (vph)	139	1269	0	495	1315	0	57	77	0	292	164	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	36.0	29.0		62.0	51.0		16.7	11.1		28.9	19.3	
Effective Green, g (s)	36.0	29.0		62.0	51.0		16.7	11.1		28.9	19.3	
Actuated g/C Ratio	0.35	0.28		0.60	0.50		0.16	0.11		0.28	0.19	
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	220	1418		577	2440		216	339		336	624	
v/s Ratio Prot	0.04	0.25		c0.24	0.27		0.01	0.02		c0.12	0.05	
v/s Ratio Perm	0.18			c0.27			0.03			c0.13		
v/c Ratio	0.63	0.89		0.86	0.54		0.26	0.23		0.87	0.26	
Uniform Delay, d1	23.6	35.5		26.2	17.9		37.3	42.0		32.3	35.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	5.8	9.1		12.0	0.9		0.7	0.3		20.5	0.2	
Delay (s)	29.4	44.6		38.3	18.7		37.9	42.3		52.8	35.9	
Level of Service	C	D		D	B		D	D		D	D	
Approach Delay (s)		43.1			23.9			41.6			44.8	
Approach LOS		D			C			D			D	

Intersection Summary		
HCM 2000 Control Delay	34.6	HCM 2000 Level of Service C
HCM 2000 Volume to Capacity ratio	0.92	
Actuated Cycle Length (s)	102.9	Sum of lost time (s) 20.0
Intersection Capacity Utilization	88.5%	ICU Level of Service E
Analysis Period (min)	15	

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 1: Essa Road & Ardagh Road/Bryne Drive

2033 Total Conditions
 Weekday PM Peak Hour



























Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	248	347	121	238	221	451	93	769	122	446	991	518
Future Volume (vph)	248	347	121	238	221	451	93	769	122	446	991	518
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00
Frt	1.00	0.96		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1789	3440		1789	3579	1601	1789	3579	1601	3471	3579	1601
Flt Permitted	0.61	1.00		0.24	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1148	3440		448	3579	1601	1789	3579	1601	3471	3579	1601
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	256	358	125	245	228	465	96	793	126	460	1022	534
RTOR Reduction (vph)	0	30	0	0	0	298	0	0	81	0	0	289
Lane Group Flow (vph)	256	453	0	245	228	167	96	793	45	460	1022	245
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8			2			6
Actuated Green, G (s)	34.5	20.9		37.1	22.2	22.2	10.0	41.5	41.5	19.8	51.3	51.3
Effective Green, g (s)	34.5	20.9		37.1	22.2	22.2	10.0	41.5	41.5	19.8	51.3	51.3
Actuated g/C Ratio	0.29	0.18		0.32	0.19	0.19	0.09	0.35	0.35	0.17	0.44	0.44
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	412	613		312	678	303	152	1268	567	586	1567	701
v/s Ratio Prot	0.07	0.13		c0.10	0.06		0.05	0.22		c0.13	c0.29	
v/s Ratio Perm	0.11			c0.15		0.10			0.03			0.15
v/c Ratio	0.62	0.74		0.79	0.34	0.55	0.63	0.63	0.08	0.78	0.65	0.35
Uniform Delay, d1	34.0	45.5		32.4	41.1	42.9	51.8	31.4	25.1	46.6	25.9	21.8
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.9	4.7		12.2	0.3	2.2	8.3	2.3	0.3	6.8	2.1	1.4
Delay (s)	36.9	50.2		44.6	41.4	45.1	60.0	33.7	25.4	53.4	28.0	23.2
Level of Service	D	D		D	D	D	E	C	C	D	C	C
Approach Delay (s)		45.6			44.1			35.2			32.5	
Approach LOS		D			D			D			C	
Intersection Summary												
HCM 2000 Control Delay			37.4				HCM 2000 Level of Service			D		
HCM 2000 Volume to Capacity ratio			0.75									
Actuated Cycle Length (s)			117.1			Sum of lost time (s)			20.0			
Intersection Capacity Utilization			77.3%			ICU Level of Service			D			
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

2: Veterans Drive & Harvie Road




















2033 Total Conditions
Weekday PM Peak Hour

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations		 						 			 		
Traffic Volume (vph)	77	383	232	116	455	450	199	477	105	362	659	78	
Future Volume (vph)	77	383	232	116	455	450	199	477	105	362	659	78	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0		
Lane Util. Factor	1.00	0.95		1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95		
Frt	1.00	0.94		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1789	3376		1789	1883	1601	1789	3579	1601	1789	3522		
Flt Permitted	0.26	1.00		0.25	1.00	1.00	0.18	1.00	1.00	0.24	1.00		
Satd. Flow (perm)	487	3376		478	1883	1601	347	3579	1601	447	3522		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	84	416	252	126	495	489	216	518	114	393	716	85	
RTOR Reduction (vph)	0	79	0	0	0	280	0	0	90	0	9	0	
Lane Group Flow (vph)	84	589	0	126	495	209	216	518	24	393	792	0	
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		
Protected Phases	7	4		3	8		5	2		1	6		
Permitted Phases	4			8		8	2		2	6			
Actuated Green, G (s)	39.8	34.3		45.6	37.2	37.2	33.5	21.7	21.7	43.9	28.1		
Effective Green, g (s)	39.8	34.3		45.6	37.2	37.2	33.5	21.7	21.7	43.9	28.1		
Actuated g/C Ratio	0.39	0.33		0.44	0.36	0.36	0.33	0.21	0.21	0.43	0.27		
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	258	1128		319	682	580	279	756	338	429	964		
v/s Ratio Prot	0.02	0.17		c0.03	c0.26		0.09	0.14		c0.16	0.22		
v/s Ratio Perm	0.11			0.14		0.13	0.16		0.02	c0.23			
v/c Ratio	0.33	0.52		0.39	0.73	0.36	0.77	0.69	0.07	0.92	0.82		
Uniform Delay, d1	21.5	27.5		18.1	28.3	24.0	27.2	37.3	32.4	22.9	34.9		
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
Incremental Delay, d2	0.7	1.7		0.8	6.6	1.7	12.6	2.6	0.1	24.0	5.7		
Delay (s)	22.3	29.3		18.9	34.9	25.7	39.8	39.9	32.5	46.9	40.6		
Level of Service	C	C		B	C	C	D	D	C	D	D		
Approach Delay (s)		28.5			29.0			38.9			42.7		
Approach LOS		C			C			D			D		
Intersection Summary													
HCM 2000 Control Delay			35.2									HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio			0.84										
Actuated Cycle Length (s)			102.6									Sum of lost time (s)	20.0
Intersection Capacity Utilization			81.3%									ICU Level of Service	D
Analysis Period (min)			15										

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
3: Thrushwood Drive & Harvie Road





























2033 Total Conditions
Weekday PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	34	760	56	7	968	73	33	9	44	42	5	19
Future Volume (Veh/h)	34	760	56	7	968	73	33	9	44	42	5	19
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	37	826	61	8	1052	79	36	10	48	46	5	21
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type												
	TWLTL					TWLTL						
Median storage veh	2					2						
Upstream signal (m)	318					401						
pX, platoon unblocked	0.83						0.83	0.83		0.83	0.83	0.83
vC, conflicting volume	1131			887			1496	2078	444	1648	2068	566
vC1, stage 1 conf vol							930	930		1108	1108	
vC2, stage 2 conf vol							566	1147		540	961	
vCu, unblocked vol	760			887			1197	1894	444	1379	1884	82
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	95			99			86	95	91	82	98	97
cM capacity (veh/h)	707			759			256	219	562	251	231	802
Direction, Lane #												
	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1				
Volume Total	37	551	336	8	701	430	94	72				
Volume Left	37	0	0	8	0	0	36	46				
Volume Right	0	0	61	0	0	79	48	21				
cSH	707	1700	1700	759	1700	1700	346	312				
Volume to Capacity	0.05	0.32	0.20	0.01	0.41	0.25	0.27	0.23				
Queue Length 95th (m)	1.3	0.0	0.0	0.2	0.0	0.0	8.2	6.7				
Control Delay (s)	10.4	0.0	0.0	9.8	0.0	0.0	19.2	20.0				
Lane LOS	B			A			C	C				
Approach Delay (s)	0.4			0.1			19.2	20.0				
Approach LOS							C	C				
Intersection Summary												
Average Delay			1.7									
Intersection Capacity Utilization			41.9%		ICU Level of Service			A				
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

4: Bryne Drive & Harvie Road

2033 Total Conditions
Weekday PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 			 	
Traffic Volume (vph)	60	770	36	202	777	174	154	548	281	139	544	137
Future Volume (vph)	60	770	36	202	777	174	154	548	281	139	544	137
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91	0.91
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1789	3579	1601	1789	3579	1601	1789	3579	1601	1789	3415	1457
Flt Permitted	0.26	1.00	1.00	0.19	1.00	1.00	0.20	1.00	1.00	0.24	1.00	1.00
Satd. Flow (perm)	485	3579	1601	356	3579	1601	368	3579	1601	446	3415	1457
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	65	837	39	220	845	189	167	596	305	151	591	149
RTOR Reduction (vph)	0	0	24	0	0	93	0	0	226	0	2	103
Lane Group Flow (vph)	65	837	15	220	845	96	167	596	79	151	604	31
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)	47.5	41.2	41.2	56.5	46.2	46.2	36.4	25.4	25.4	35.6	25.0	25.0
Effective Green, g (s)	47.5	41.2	41.2	56.5	46.2	46.2	36.4	25.4	25.4	35.6	25.0	25.0
Actuated g/C Ratio	0.44	0.38	0.38	0.52	0.43	0.43	0.34	0.23	0.23	0.33	0.23	0.23
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	288	1359	607	334	1523	681	267	837	374	277	786	335
v/s Ratio Prot	0.01	0.23		c0.07	0.24		c0.06	0.17		0.05	c0.18	
v/s Ratio Perm	0.09		0.01	c0.27		0.06	0.15		0.05	0.13		0.02
v/c Ratio	0.23	0.62	0.02	0.66	0.55	0.14	0.63	0.71	0.21	0.55	0.77	0.09
Uniform Delay, d1	18.3	27.2	21.1	17.0	23.4	19.0	27.5	38.2	33.5	27.5	39.0	32.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4	2.1	0.1	4.6	1.5	0.4	4.5	2.9	0.3	2.2	4.6	0.1
Delay (s)	18.7	29.3	21.1	21.6	24.9	19.5	32.0	41.1	33.8	29.6	43.6	32.9
Level of Service	B	C	C	C	C	B	C	D	C	C	D	C
Approach Delay (s)		28.3			23.5			37.6			39.6	
Approach LOS		C			C			D			D	
Intersection Summary												
HCM 2000 Control Delay			31.7	HCM 2000 Level of Service				C				
HCM 2000 Volume to Capacity ratio			0.71									
Actuated Cycle Length (s)			108.5	Sum of lost time (s)				20.0				
Intersection Capacity Utilization			86.2%	ICU Level of Service				E				
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

5: Harvie Road & Fairview Road

2033 Total Conditions
Weekday PM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↗	↑↑	↑↑	↗	↗	↗
Traffic Volume (vph)	225	966	974	550	375	179
Future Volume (vph)	225	966	974	550	375	179
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1789	3579	3579	1601	1789	1601
Flt Permitted	0.13	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	250	3579	3579	1601	1789	1601
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	245	1050	1059	598	408	195
RTOR Reduction (vph)	0	0	0	292	0	140
Lane Group Flow (vph)	245	1050	1059	306	408	55
Turn Type	pm+pt	NA	NA	Perm	Perm	Perm
Protected Phases	7	4	8			
Permitted Phases	4			8	6	6
Actuated Green, G (s)	56.2	56.2	40.3	40.3	26.9	26.9
Effective Green, g (s)	56.2	56.2	40.3	40.3	26.9	26.9
Actuated g/C Ratio	0.59	0.59	0.42	0.42	0.28	0.28
Clearance Time (s)	4.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	340	2115	1516	678	506	452
v/s Ratio Prot	c0.09	0.29	0.30			
v/s Ratio Perm	c0.34			0.19	c0.23	0.03
v/c Ratio	0.72	0.50	0.70	0.45	0.81	0.12
Uniform Delay, d1	14.4	11.3	22.4	19.5	31.7	25.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	7.3	0.8	2.7	2.2	9.1	0.1
Delay (s)	21.7	12.1	25.1	21.7	40.8	25.5
Level of Service	C	B	C	C	D	C
Approach Delay (s)		13.9	23.9		35.8	
Approach LOS		B	C		D	

Intersection Summary

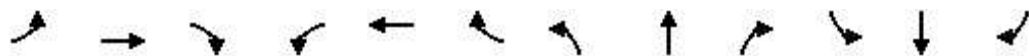
HCM 2000 Control Delay	22.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	95.1	Sum of lost time (s)	16.0
Intersection Capacity Utilization	79.9%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis

6: Thrushwood Drive & Cranberry Lane

2033 Total Conditions
Weekday PM Peak Hour























Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (veh/h)	3	9	1	52	12	13	2	20	58	17	27	6
Future Volume (Veh/h)	3	9	1	52	12	13	2	20	58	17	27	6
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	10	1	57	13	14	2	22	63	18	29	7
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	146	158	32	132	130	54	36			85		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	146	158	32	132	130	54	36			85		
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 %	100	99	100	93	98	99	100			99		
cM capacity (veh/h)	792	725	1041	822	751	1014	1575			1512		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	14	84	87	54								
Volume Left	3	57	2	18								
Volume Right	1	14	63	7								
cSH	755	836	1575	1512								
Volume to Capacity	0.02	0.10	0.00	0.01								
Queue Length 95th (m)	0.4	2.5	0.0	0.3								
Control Delay (s)	9.9	9.8	0.2	2.5								
Lane LOS	A	A	A	A								
Approach Delay (s)	9.9	9.8	0.2	2.5								
Approach LOS	A	A										
Intersection Summary												
Average Delay			4.7									
Intersection Capacity Utilization			26.6%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

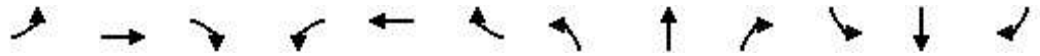
7: Bryne Drive & Cranberry Lane

2033 Total Conditions
Weekday PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	73	1	61	185	10	195	96	716	14	15	652	115
Future Volume (Veh/h)	73	1	61	185	10	195	96	716	14	15	652	115
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	79	1	66	201	11	212	104	778	15	16	709	125
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type												
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1618	1804	417	1446	1860	396	834			793		
vC1, stage 1 conf vol	804	804		994	994							
vC2, stage 2 conf vol	814	1001		453	866							
vCu, unblocked vol	1618	1804	417	1446	1860	396	834			793		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)	6.5	5.5		6.5	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	47	100	89	0	94	65	87			98		
cM capacity (veh/h)	148	219	585	201	194	603	795			824		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3				
Volume Total	146	424	104	519	274	16	473	361				
Volume Left	79	201	104	0	0	16	0	0				
Volume Right	66	212	0	0	15	0	0	125				
cSH	225	301	795	1700	1700	824	1700	1700				
Volume to Capacity	0.65	1.41	0.13	0.31	0.16	0.02	0.28	0.21				
Queue Length 95th (m)	30.2	170.8	3.4	0.0	0.0	0.5	0.0	0.0				
Control Delay (s)	46.6	236.0	10.2	0.0	0.0	9.5	0.0	0.0				
Lane LOS	E	F	B			A						
Approach Delay (s)	46.6	236.0	1.2			0.2						
Approach LOS	E	F										
Intersection Summary												
Average Delay			46.7									
Intersection Capacity Utilization			63.8%		ICU Level of Service				B			
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis
 8: Veterans Drive & Mapleton Drive/Brookwood Drive

2033 Total Conditions
 Weekday PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	23	152	90	22	24	269	1055	138	27	1034	26
Future Volume (vph)	20	23	152	90	22	24	269	1055	138	27	1034	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0			6.0	6.0	4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00			1.00	1.00	1.00	0.95		1.00	0.95	
Frt	1.00	0.87			1.00	0.85	1.00	0.98		1.00	1.00	
Flt Protected	0.95	1.00			0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1638			1811	1601	1789	3516		1789	3565	
Flt Permitted	0.53	1.00			0.65	1.00	0.12	1.00		0.16	1.00	
Satd. Flow (perm)	996	1638			1218	1601	219	3516		292	3565	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	25	165	98	24	26	292	1147	150	29	1124	28
RTOR Reduction (vph)	0	125	0	0	0	22	0	7	0	0	2	0
Lane Group Flow (vph)	22	65	0	0	122	4	292	1290	0	29	1150	0
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	20.5	20.5			14.1	14.1	51.2	44.8		39.5	37.1	
Effective Green, g (s)	20.5	20.5			14.1	14.1	51.2	44.8		39.5	37.1	
Actuated g/C Ratio	0.24	0.24			0.17	0.17	0.61	0.54		0.47	0.44	
Clearance Time (s)	4.0	6.0			6.0	6.0	4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	266	401			205	269	323	1881		180	1580	
v/s Ratio Prot	0.00	c0.04					c0.11	0.37		0.00	0.32	
v/s Ratio Perm	0.02				c0.10	0.00	c0.44			0.07		
v/c Ratio	0.08	0.16			0.60	0.02	0.90	0.69		0.16	0.73	
Uniform Delay, d1	24.3	24.9			32.2	29.0	18.9	14.3		12.5	19.2	
Progression Factor	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.2			4.6	0.0	27.1	2.1		0.4	3.0	
Delay (s)	24.4	25.0			36.7	29.0	46.0	16.3		12.9	22.1	
Level of Service	C	C			D	C	D	B		B	C	
Approach Delay (s)		25.0			35.4			21.8			21.9	
Approach LOS		C			D			C			C	

Intersection Summary		
HCM 2000 Control Delay	22.7	HCM 2000 Level of Service C
HCM 2000 Volume to Capacity ratio	0.85	
Actuated Cycle Length (s)	83.7	Sum of lost time (s) 20.0
Intersection Capacity Utilization	81.6%	ICU Level of Service D
Analysis Period (min)	15	

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
 9: Bryne Drive & Bryne Court























2033 Total Conditions
 Weekday PM Peak Hour



Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations							
Traffic Volume (veh/h)	58	58	577	4	4	870	
Future Volume (Veh/h)	58	58	577	4	4	870	
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)	63	63	627	4	4	946	
Pedestrians							
Lane Width (m)							
Walking Speed (m/s)							
Percent Blockage							
Right turn flare (veh)							
Median type			TWLTL			TWLTL	
Median storage veh			2			2	
Upstream signal (m)			251				
pX, platoon unblocked	0.99	0.99			0.99		
vC, conflicting volume	1110	316			631		
vC1, stage 1 conf vol	629						
vC2, stage 2 conf vol	481						
vCu, unblocked vol	1087	282			602		
tC, single (s)	6.8	6.9			4.1		
tC, 2 stage (s)	5.8						
tF (s)	3.5	3.3			2.2		
p0 queue free %	85	91			100		
cM capacity (veh/h)	418	706			960		
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	63	63	418	213	4	473	473
Volume Left	63	0	0	0	4	0	0
Volume Right	0	63	0	4	0	0	0
cSH	418	706	1700	1700	960	1700	1700
Volume to Capacity	0.15	0.09	0.25	0.13	0.00	0.28	0.28
Queue Length 95th (m)	4.0	2.2	0.0	0.0	0.1	0.0	0.0
Control Delay (s)	15.1	10.6	0.0	0.0	8.8	0.0	0.0
Lane LOS	C	B			A		
Approach Delay (s)	12.9		0.0		0.0		
Approach LOS	B						
Intersection Summary							
Average Delay			1.0				
Intersection Capacity Utilization			34.0%	ICU Level of Service	A		
Analysis Period (min)			15				

HCM Signalized Intersection Capacity Analysis
 10: Bryne Drive & Caplan Avenue

2033 Total Conditions
 Weekday PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	150	180	125	110	246	135	137	367	81	102	684	142
Future Volume (vph)	150	180	125	110	246	135	137	367	81	102	684	142
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.94		1.00	0.95		1.00	0.97		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1768		1789	1783		1789	3482		1789	3486	
Flt Permitted	0.22	1.00		0.42	1.00		0.15	1.00		0.45	1.00	
Satd. Flow (perm)	420	1768		785	1783		284	3482		841	3486	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	163	196	136	120	267	147	149	399	88	111	743	154
RTOR Reduction (vph)	0	31	0	0	25	0	0	22	0	0	21	0
Lane Group Flow (vph)	163	301	0	120	389	0	149	465	0	111	876	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	30.0	23.0		27.0	21.5		33.5	26.5		30.5	25.0	
Effective Green, g (s)	30.0	23.0		27.0	21.5		33.5	26.5		30.5	25.0	
Actuated g/C Ratio	0.37	0.29		0.34	0.27		0.42	0.33		0.38	0.31	
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	275	505		331	476		249	1146		383	1082	
v/s Ratio Prot	c0.05	0.17		0.02	c0.22		c0.05	0.13		0.02	c0.25	
v/s Ratio Perm	0.17			0.10			0.20			0.09		
v/c Ratio	0.59	0.60		0.36	0.82		0.60	0.41		0.29	0.81	
Uniform Delay, d1	18.7	24.8		19.3	27.7		16.8	20.9		16.6	25.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.4	1.9		0.7	10.5		3.8	1.1		0.4	6.6	
Delay (s)	22.1	26.7		19.9	38.1		20.7	22.0		17.0	32.1	
Level of Service	C	C		B	D		C	C		B	C	
Approach Delay (s)		25.2			34.0			21.7			30.5	
Approach LOS		C			C			C			C	
Intersection Summary												
HCM 2000 Control Delay			28.1	HCM 2000 Level of Service				C				
HCM 2000 Volume to Capacity ratio			0.76									
Actuated Cycle Length (s)			80.5	Sum of lost time (s)				20.0				
Intersection Capacity Utilization			77.2%	ICU Level of Service				D				
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
 11: Bryne Drive & Mapleview Drive

2033 Total Conditions
 Weekday PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↗	↗↗↗		↗	↗↗↗		↗	↗↗		↗	↗↗	
Traffic Volume (vph)	124	1021	209	383	1470	283	255	138	582	446	120	222
Future Volume (vph)	124	1021	209	383	1470	283	255	138	582	446	120	222
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	5.0		3.0	5.0		3.0	5.0		3.0	5.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	0.97		1.00	0.98		1.00	0.88		1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	5011		1789	5017		1789	3144		1789	3230	
Flt Permitted	0.12	1.00		0.11	1.00		0.54	1.00		0.15	1.00	
Satd. Flow (perm)	235	5011		215	5017		1011	3144		285	3230	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	131	1075	220	403	1547	298	268	145	613	469	126	234
RTOR Reduction (vph)	0	24	0	0	21	0	0	272	0	0	141	0
Lane Group Flow (vph)	131	1271	0	403	1824	0	268	486	0	469	219	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	40.1	32.1		60.1	49.1		39.4	23.4		55.4	36.4	
Effective Green, g (s)	40.1	32.1		60.1	49.1		39.4	23.4		55.4	36.4	
Actuated g/C Ratio	0.32	0.26		0.48	0.39		0.31	0.19		0.44	0.29	
Clearance Time (s)	3.0	5.0		3.0	5.0		3.0	5.0		3.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	174	1281		416	1962		416	586		473	936	
v/s Ratio Prot	0.05	0.25		c0.19	0.36		0.08	0.15		c0.23	0.07	
v/s Ratio Perm	0.19			c0.27			0.12			c0.21		
v/c Ratio	0.75	0.99		0.97	0.93		0.64	1.08dr		0.99	0.23	
Uniform Delay, d1	34.0	46.6		38.0	36.5		34.7	49.1		37.0	33.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	16.7	23.4		35.6	9.3		3.4	9.5		39.0	0.1	
Delay (s)	50.7	70.0		73.5	45.9		38.1	58.6		76.0	34.1	
Level of Service	D	E		E	D		D	E		E	C	
Approach Delay (s)		68.2			50.8			53.3			57.8	
Approach LOS		E			D			D			E	

Intersection Summary























HCM 2000 Control Delay	56.8	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	125.5	Sum of lost time (s)	16.0
Intersection Capacity Utilization	108.0%	ICU Level of Service	G
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
7: Bryne Drive & Cranberry Lane

2033 Total Conditions w/signals
Weekday AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations								 			 	
Traffic Volume (vph)	115	13	84	29	2	31	30	307	238	251	559	40
Future Volume (vph)	115	13	84	29	2	31	30	307	238	251	559	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.87		1.00	0.86		1.00	0.93		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1639		1789	1617		1789	3344		1789	3543	
Flt Permitted	0.77	1.00		1.00	1.00		0.40	1.00		0.30	1.00	
Satd. Flow (perm)	1449	1639		1883	1617		762	3344		564	3543	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	125	14	91	32	2	34	33	334	259	273	608	43
RTOR Reduction (vph)	0	82	0	0	32	0	0	169	0	0	6	0
Lane Group Flow (vph)	125	23	0	32	4	0	33	424	0	273	645	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		pm+pt	NA	
Protected Phases	7	4		3	8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	9.3	5.2		4.5	2.8		19.2	19.2		30.4	30.4	
Effective Green, g (s)	9.3	5.2		4.5	2.8		19.2	19.2		30.4	30.4	
Actuated g/C Ratio	0.17	0.09		0.08	0.05		0.35	0.35		0.55	0.55	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	268	154		150	81		264	1161		425	1947	
v/s Ratio Prot	c0.03	0.01		0.01	0.00			0.13		c0.06	0.18	
v/s Ratio Perm	c0.04			0.01			0.04			c0.29		
v/c Ratio	0.47	0.15		0.21	0.05		0.12	0.37		0.64	0.33	
Uniform Delay, d1	20.6	23.0		23.8	25.0		12.3	13.5		7.4	6.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.3	0.4		0.7	0.2		1.0	0.9		3.3	0.5	
Delay (s)	21.9	23.5		24.5	25.2		13.3	14.4		10.7	7.3	
Level of Service	C	C		C	C		B	B		B	A	
Approach Delay (s)		22.6			24.9			14.3			8.3	
Approach LOS		C			C			B			A	
Intersection Summary												
HCM 2000 Control Delay			12.7				HCM 2000 Level of Service				B	
HCM 2000 Volume to Capacity ratio			0.71									
Actuated Cycle Length (s)			55.3				Sum of lost time (s)			24.0		
Intersection Capacity Utilization			58.1%				ICU Level of Service			B		
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 7: Bryne Drive & Cranberry Drive

2033 Total Conditions w/signals
 Weekday PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↕	↗	↖	↕	↗
Traffic Volume (vph)	73	1	61	185	10	195	96	716	14	15	652	115
Future Volume (vph)	73	1	61	185	10	195	96	716	14	15	652	115
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.85		1.00	0.86		1.00	1.00		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1605		1789	1615		1789	3568		1789	3498	
Flt Permitted	0.87	1.00		0.56	1.00		0.34	1.00		0.24	1.00	
Satd. Flow (perm)	1638	1605		1046	1615		636	3568		448	3498	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	79	1	66	201	11	212	104	778	15	16	709	125
RTOR Reduction (vph)	0	61	0	0	187	0	0	2	0	0	16	0
Lane Group Flow (vph)	79	6	0	201	36	0	104	791	0	16	818	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		pm+pt	NA	
Protected Phases	7	4		3	8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	7.3	4.6		12.5	7.2		26.4	26.4		33.2	33.2	
Effective Green, g (s)	7.3	4.6		12.5	7.2		26.4	26.4		33.2	33.2	
Actuated g/C Ratio	0.12	0.08		0.20	0.12		0.43	0.43		0.54	0.54	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	202	120		278	190		274	1541		260	1900	
v/s Ratio Prot	0.02	0.00		c0.06	0.02			c0.22		0.00	c0.23	
v/s Ratio Perm	0.03			c0.09			0.16			0.03		
v/c Ratio	0.39	0.05		0.72	0.19		0.38	0.51		0.06	0.43	
Uniform Delay, d1	24.8	26.2		22.2	24.3		11.8	12.7		7.3	8.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.3	0.2		9.0	0.5		4.0	1.2		0.1	0.7	
Delay (s)	26.0	26.4		31.1	24.8		15.7	13.9		7.4	9.0	
Level of Service	C	C		C	C		B	B		A	A	
Approach Delay (s)		26.2			27.8			14.1			9.0	
Approach LOS		C			C			B			A	

Intersection Summary			
HCM 2000 Control Delay	15.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	61.1	Sum of lost time (s)	24.0
Intersection Capacity Utilization	63.6%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 1: Essa Road & Ardagh Road/Bryne Drive

2038 Total Conditions
 Weekday AM Peak Hour



























Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	300	442	61	86	67	349	103	766	59	363	482	364	
Future Volume (vph)	300	442	61	86	67	349	103	766	59	363	482	364	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00	
Frt	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1789	3514		1789	3579	1601	1789	3579	1601	3471	3579	1601	
Flt Permitted	0.55	1.00		0.45	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (perm)	1036	3514		844	3579	1601	1789	3579	1601	3471	3579	1601	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	326	480	66	93	73	379	112	833	64	395	524	396	
RTOR Reduction (vph)	0	10	0	0	0	287	0	0	41	0	0	238	
Lane Group Flow (vph)	326	536	0	93	73	92	112	833	23	395	524	158	
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	
Protected Phases	7	4		3	8		5	2		1	6		
Permitted Phases	4			8		8			2			6	
Actuated Green, G (s)	36.1	26.6		19.5	14.0	14.0	11.5	37.3	37.3	16.5	42.3	42.3	
Effective Green, g (s)	36.1	26.6		19.5	14.0	14.0	11.5	37.3	37.3	16.5	42.3	42.3	
Actuated g/C Ratio	0.34	0.25		0.18	0.13	0.13	0.11	0.35	0.35	0.16	0.40	0.40	
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	481	882		204	473	211	194	1260	563	540	1429	639	
v/s Ratio Prot	c0.12	0.15		0.02	0.02		0.06	c0.23		c0.11	0.15		
v/s Ratio Perm	c0.12			0.06		0.06			0.01			0.10	
v/c Ratio	0.68	0.61		0.46	0.15	0.43	0.58	0.66	0.04	0.73	0.37	0.25	
Uniform Delay, d1	28.2	35.0		37.2	40.7	42.3	44.9	29.0	22.5	42.6	22.4	21.2	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	3.8	1.2		1.6	0.2	1.4	4.1	2.7	0.1	5.1	0.7	0.9	
Delay (s)	32.0	36.2		38.8	40.9	43.7	49.0	31.7	22.7	47.7	23.1	22.1	
Level of Service	C	D		D	D	D	D	C	C	D	C	C	
Approach Delay (s)		34.7			42.5			33.0			30.2		
Approach LOS		C			D			C			C		
Intersection Summary													
HCM 2000 Control Delay			33.8									HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.71										
Actuated Cycle Length (s)			105.9									Sum of lost time (s)	20.0
Intersection Capacity Utilization			73.2%									ICU Level of Service	D
Analysis Period (min)			15										

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

2: Veterans Drive & Harvie Road

2038 Total Conditions
Weekday AM Peak Hour




















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 						 			 	
Traffic Volume (vph)	93	311	315	165	180	251	86	303	184	400	488	88
Future Volume (vph)	93	311	315	165	180	251	86	303	184	400	488	88
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00	0.92		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1789	3309		1789	1883	1601	1789	3579	1601	1789	3496	
Flt Permitted	0.63	1.00		0.23	1.00	1.00	0.41	1.00	1.00	0.38	1.00	
Satd. Flow (perm)	1195	3309		440	1883	1601	781	3579	1601	711	3496	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	101	338	342	179	196	273	93	329	200	435	530	96
RTOR Reduction (vph)	0	156	0	0	0	174	0	0	166	0	15	0
Lane Group Flow (vph)	101	524	0	179	196	99	93	329	34	435	611	0
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)	36.5	31.0		44.3	34.9	34.9	22.0	16.5	16.5	40.1	30.6	
Effective Green, g (s)	36.5	31.0		44.3	34.9	34.9	22.0	16.5	16.5	40.1	30.6	
Actuated g/C Ratio	0.38	0.32		0.46	0.36	0.36	0.23	0.17	0.17	0.42	0.32	
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	485	1062		333	681	579	235	611	273	514	1108	
v/s Ratio Prot	0.01	0.16		c0.05	0.10		0.02	0.09		c0.17	0.17	
v/s Ratio Perm	0.07			c0.19		0.06	0.07		0.02	c0.18		
v/c Ratio	0.21	0.49		0.54	0.29	0.17	0.40	0.54	0.13	0.85	0.55	
Uniform Delay, d1	19.8	26.4		17.1	21.9	21.0	30.3	36.5	33.9	22.2	27.3	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.2	1.6		1.7	1.1	0.6	1.1	0.9	0.2	12.2	0.6	
Delay (s)	20.0	28.1		18.7	23.0	21.6	31.4	37.4	34.1	34.3	27.9	
Level of Service	B	C		B	C	C	C	D	C	C	C	
Approach Delay (s)		27.0			21.2			35.5			30.5	
Approach LOS		C			C			D			C	
Intersection Summary												
HCM 2000 Control Delay			28.7	HCM 2000 Level of Service				C				
HCM 2000 Volume to Capacity ratio			0.74									
Actuated Cycle Length (s)			96.5	Sum of lost time (s)				20.0				
Intersection Capacity Utilization			85.5%	ICU Level of Service				E				
Analysis Period (min)			15									

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis

3: Thrushwood Drive & Harvie Road

2038 Total Conditions
Weekday AM Peak Hour

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (veh/h)	14	785	96	4	518	30	56	4	41	49	4	22	
Future Volume (Veh/h)	14	785	96	4	518	30	56	4	41	49	4	22	
Sign Control	Free			Free			Stop			Stop			
Grade	0%			0%			0%			0%			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly flow rate (vph)	15	853	104	4	563	33	61	4	45	53	4	24	
Pedestrians													
Lane Width (m)													
Walking Speed (m/s)													
Percent Blockage													
Right turn flare (veh)													
Median type													
	TWLTL					TWLTL							
Median storage veh	2					2							
Upstream signal (m)	318					401							
pX, platoon unblocked	0.96						0.96	0.96		0.96	0.96	0.96	
vC, conflicting volume	596			957			1250	1539	478	1091	1574	298	
vC1, stage 1 conf vol							935	935		588	588		
vC2, stage 2 conf vol							316	604		504	987		
vCu, unblocked vol	491			957			1174	1475	478	1008	1512	180	
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9	
tC, 2 stage (s)							6.5	5.5		6.5	5.5		
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3	
p0 queue free %	99			99			77	99	92	86	99	97	
cM capacity (veh/h)	1024			714			267	292	533	367	280	797	
Direction, Lane #													
	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1					
Volume Total	15	569	388	4	375	221	110	81					
Volume Left	15	0	0	4	0	0	61	53					
Volume Right	0	0	104	0	0	33	45	24					
cSH	1024	1700	1700	714	1700	1700	337	429					
Volume to Capacity	0.01	0.33	0.23	0.01	0.22	0.13	0.33	0.19					
Queue Length 95th (m)	0.3	0.0	0.0	0.1	0.0	0.0	10.5	5.2					
Control Delay (s)	8.6	0.0	0.0	10.1	0.0	0.0	20.8	15.3					
Lane LOS	A			B			C			C			
Approach Delay (s)	0.1			0.1			20.8			15.3			
Approach LOS							C			C			
Intersection Summary													
Average Delay	2.1												
Intersection Capacity Utilization	37.9%			ICU Level of Service					A				
Analysis Period (min)	15												

HCM Signalized Intersection Capacity Analysis

4: Bryne Drive & Harvie Road

2038 Total Conditions
Weekday AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	111	713	117	383	501	118	28	242	208	230	396	67
Future Volume (vph)	111	713	117	383	501	118	28	242	208	230	396	67
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91	0.91
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1789	3579	1601	1789	3579	1601	1789	3579	1601	1789	3420	1457
Flt Permitted	0.45	1.00	1.00	0.23	1.00	1.00	0.49	1.00	1.00	0.43	1.00	1.00
Satd. Flow (perm)	845	3579	1601	426	3579	1601	921	3579	1601	810	3420	1457
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	121	775	127	416	545	128	30	263	226	250	430	73
RTOR Reduction (vph)	0	0	72	0	0	70	0	0	192	0	1	51
Lane Group Flow (vph)	121	775	55	416	545	58	30	263	34	250	436	15
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)	48.7	40.1	40.1	59.1	46.5	46.5	19.8	15.4	15.4	31.3	22.9	22.9
Effective Green, g (s)	48.7	40.1	40.1	59.1	46.5	46.5	19.8	15.4	15.4	31.3	22.9	22.9
Actuated g/C Ratio	0.48	0.39	0.39	0.58	0.45	0.45	0.19	0.15	0.15	0.31	0.22	0.22
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	481	1401	626	445	1625	727	215	538	240	361	764	325
v/s Ratio Prot	0.02	0.22		c0.14	0.15		0.01	0.07		c0.08	0.13	
v/s Ratio Perm	0.10		0.03	c0.40		0.04	0.02		0.02	c0.13		0.01
v/c Ratio	0.25	0.55	0.09	0.93	0.34	0.08	0.14	0.49	0.14	0.69	0.57	0.05
Uniform Delay, d1	15.1	24.2	19.6	15.3	18.0	15.8	33.9	39.9	37.8	28.9	35.4	31.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	1.6	0.3	26.9	0.6	0.2	0.3	0.7	0.3	5.7	1.0	0.1
Delay (s)	15.4	25.8	19.9	42.2	18.6	16.0	34.2	40.6	38.0	34.5	36.4	31.2
Level of Service	B	C	B	D	B	B	C	D	D	C	D	C
Approach Delay (s)		23.8			27.3			39.1			35.3	
Approach LOS		C			C			D			D	
Intersection Summary												
HCM 2000 Control Delay			29.8			HCM 2000 Level of Service		C				
HCM 2000 Volume to Capacity ratio			0.91									
Actuated Cycle Length (s)			102.4			Sum of lost time (s)		20.0				
Intersection Capacity Utilization			92.3%			ICU Level of Service		F				
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

5: Harvie Road & Fairview Road

2038 Total Conditions
Weekday AM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	130	1021	808	396	303	193
Future Volume (vph)	130	1021	808	396	303	193
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1789	3579	3579	1601	1789	1601
Flt Permitted	0.22	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	417	3579	3579	1601	1789	1601
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	141	1110	878	430	329	210
RTOR Reduction (vph)	0	0	0	230	0	159
Lane Group Flow (vph)	141	1110	878	200	329	51
Turn Type	pm+pt	NA	NA	Perm	Perm	Perm
Protected Phases	7	4	8			
Permitted Phases	4			8	6	6
Actuated Green, G (s)	53.7	53.7	40.4	40.4	21.1	21.1
Effective Green, g (s)	53.7	53.7	40.4	40.4	21.1	21.1
Actuated g/C Ratio	0.62	0.62	0.47	0.47	0.24	0.24
Clearance Time (s)	4.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	404	2214	1665	745	434	389
v/s Ratio Prot	0.04	c0.31	0.25			
v/s Ratio Perm	0.18			0.13	c0.18	0.03
v/c Ratio	0.35	0.50	0.53	0.27	0.76	0.13
Uniform Delay, d1	8.3	9.1	16.4	14.2	30.5	25.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.5	0.8	1.2	0.9	7.4	0.2
Delay (s)	8.9	10.0	17.6	15.1	37.9	25.8
Level of Service	A	A	B	B	D	C
Approach Delay (s)		9.8	16.8		33.2	
Approach LOS		A	B		C	

Intersection Summary

HCM 2000 Control Delay	16.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	86.8	Sum of lost time (s)	16.0
Intersection Capacity Utilization	70.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis

6: Thrushwood Drive & Cranberry Lane

2038 Total Conditions
Weekday AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (veh/h)	7	8	1	53	4	14	0	25	37	8	29	2
Future Volume (Veh/h)	7	8	1	53	4	14	0	25	37	8	29	2
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	9	1	58	4	15	0	27	40	9	32	2
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	115	118	33	104	99	47	34			67		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	115	118	33	104	99	47	34			67		
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 %	99	99	100	93	99	99	100			99		
cM capacity (veh/h)	842	768	1041	864	786	1022	1578			1535		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	18	77	67	43								
Volume Left	8	58	0	9								
Volume Right	1	15	40	2								
cSH	811	886	1578	1535								
Volume to Capacity	0.02	0.09	0.00	0.01								
Queue Length 95th (m)	0.5	2.2	0.0	0.1								
Control Delay (s)	9.5	9.4	0.0	1.6								
Lane LOS	A	A		A								
Approach Delay (s)	9.5	9.4	0.0	1.6								
Approach LOS	A	A										
Intersection Summary												
Average Delay			4.7									
Intersection Capacity Utilization			21.9%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

2038 Total Conditions

7: Bryne Drive

Weekday AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	115	13	84	29	2	31	30	333	238	251	605	40
Future Volume (vph)	115	13	84	29	2	31	30	333	238	251	605	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.87		1.00	0.86		1.00	0.94		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1639		1789	1617		1789	3355		1789	3546	
Flt Permitted	0.77	1.00		1.00	1.00		0.39	1.00		0.28	1.00	
Satd. Flow (perm)	1449	1639		1883	1617		725	3355		535	3546	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	125	14	91	32	2	34	33	362	259	273	658	43
RTOR Reduction (vph)	0	82	0	0	32	0	0	163	0	0	5	0
Lane Group Flow (vph)	125	23	0	32	4	0	33	458	0	273	696	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		pm+pt	NA	
Protected Phases	7	4		3	8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	9.3	5.2		4.5	2.8		19.2	19.2		30.4	30.4	
Effective Green, g (s)	9.3	5.2		4.5	2.8		19.2	19.2		30.4	30.4	
Actuated g/C Ratio	0.17	0.09		0.08	0.05		0.35	0.35		0.55	0.55	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	268	154		150	81		251	1164		412	1949	
v/s Ratio Prot	c0.03	0.01		0.01	0.00			0.14		c0.06	0.20	
v/s Ratio Perm	c0.04			0.01			0.05			c0.30		
v/c Ratio	0.47	0.15		0.21	0.05		0.13	0.39		0.66	0.36	
Uniform Delay, d1	20.6	23.0		23.8	25.0		12.3	13.6		7.5	7.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.3	0.4		0.7	0.2		1.1	1.0		4.0	0.5	
Delay (s)	21.9	23.5		24.5	25.2		13.4	14.7		11.5	7.5	
Level of Service	C	C		C	C		B	B		B	A	
Approach Delay (s)		22.6			24.9			14.6			8.6	
Approach LOS		C			C			B			A	























Intersection Summary

HCM 2000 Control Delay	12.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	55.3	Sum of lost time (s)	24.0
Intersection Capacity Utilization	58.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 8: Veterans Drive & Mapleton Drive/Brookwood Drive

2038 Total Conditions
 Weekday AM Peak Hour

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	9	35	202	92	28	32	101	429	39	19	952	15	
Future Volume (vph)	9	35	202	92	28	32	101	429	39	19	952	15	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	4.0	6.0			6.0	6.0	4.0	6.0		4.0	6.0		
Lane Util. Factor	1.00	1.00			1.00	1.00	1.00	0.95		1.00	0.95		
Frt	1.00	0.87			1.00	0.85	1.00	0.99		1.00	1.00		
Flt Protected	0.95	1.00			0.96	1.00	0.95	1.00		0.95	1.00		
Satd. Flow (prot)	1789	1643			1814	1601	1789	3534		1789	3570		
Flt Permitted	0.54	1.00			0.62	1.00	0.16	1.00		0.47	1.00		
Satd. Flow (perm)	1014	1643			1164	1601	297	3534		876	3570		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	10	38	220	100	30	35	110	466	42	21	1035	16	
RTOR Reduction (vph)	0	162	0	0	0	28	0	5	0	0	1	0	
Lane Group Flow (vph)	10	96	0	0	130	7	110	503	0	21	1050	0	
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA		
Protected Phases	7	4		3	8		5	2		1	6		
Permitted Phases	4			8		8	2			6			
Actuated Green, G (s)	21.0	21.0			15.9	15.9	46.9	40.6		39.1	36.7		
Effective Green, g (s)	21.0	21.0			15.9	15.9	46.9	40.6		39.1	36.7		
Actuated g/C Ratio	0.26	0.26			0.20	0.20	0.59	0.51		0.49	0.46		
Clearance Time (s)	4.0	6.0			6.0	6.0	4.0	6.0		4.0	6.0		
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0		3.0	3.0		
Lane Grp Cap (vph)	276	431			231	318	291	1793		455	1637		
v/s Ratio Prot	0.00	c0.06					c0.03	0.14		0.00	c0.29		
v/s Ratio Perm	0.01				c0.11	0.00	0.19			0.02			
v/c Ratio	0.04	0.22			0.56	0.02	0.38	0.28		0.05	0.64		
Uniform Delay, d1	22.0	23.1			28.9	25.8	9.6	11.3		10.6	16.6		
Progression Factor	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00		
Incremental Delay, d2	0.1	0.3			3.1	0.0	0.8	0.4		0.0	1.9		
Delay (s)	22.0	23.4			32.0	25.8	10.4	11.7		10.6	18.5		
Level of Service	C	C			C	C	B	B		B	B		
Approach Delay (s)		23.3			30.7			11.5			18.4		
Approach LOS		C			C			B			B		
Intersection Summary													
HCM 2000 Control Delay			18.0									HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.59										
Actuated Cycle Length (s)			80.0									Sum of lost time (s)	20.0
Intersection Capacity Utilization			75.1%									ICU Level of Service	D
Analysis Period (min)			15										

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
 9: Bryne Drive & Bryne Court

2038 Total Conditions
 Weekday AM Peak Hour



Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations	↶	↷	↕	↷	↶	↕	
Traffic Volume (veh/h)	9	9	523	75	75	546	
Future Volume (Veh/h)	9	9	523	75	75	546	
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)	10	10	568	82	82	593	
Pedestrians							
Lane Width (m)							
Walking Speed (m/s)							
Percent Blockage							
Right turn flare (veh)							
Median type			TWLTL			TWLTL	
Median storage veh			2			2	
Upstream signal (m)			251				
pX, platoon unblocked	0.92	0.92			0.92		
vC, conflicting volume	1070	325			650		
vC1, stage 1 conf vol	609						
vC2, stage 2 conf vol	460						
vCu, unblocked vol	905	97			449		
tC, single (s)	6.8	6.9			4.1		
tC, 2 stage (s)	5.8						
tF (s)	3.5	3.3			2.2		
p0 queue free %	98	99			92		
cM capacity (veh/h)	448	867			1020		
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	10	10	379	271	82	296	296
Volume Left	10	0	0	0	82	0	0
Volume Right	0	10	0	82	0	0	0
cSH	448	867	1700	1700	1020	1700	1700
Volume to Capacity	0.02	0.01	0.22	0.16	0.08	0.17	0.17
Queue Length 95th (m)	0.5	0.3	0.0	0.0	2.0	0.0	0.0
Control Delay (s)	13.2	9.2	0.0	0.0	8.8	0.0	0.0
Lane LOS	B	A			A		
Approach Delay (s)	11.2		0.0		1.1		
Approach LOS	B						
Intersection Summary							
Average Delay			0.7				
Intersection Capacity Utilization			34.3%	ICU Level of Service	A		
Analysis Period (min)			15				

HCM Signalized Intersection Capacity Analysis
 10: Bryne Drive & Caplan Avenue

2038 Total Conditions
 Weekday AM Peak Hour



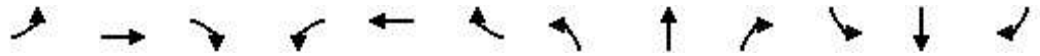
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↕	↗	↖	↕	
Traffic Volume (vph)	93	333	103	52	253	35	123	470	67	19	504	33
Future Volume (vph)	93	333	103	52	253	35	123	470	67	19	504	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.96		1.00	0.98		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1817		1789	1849		1789	3511		1789	3545	
Flt Permitted	0.39	1.00		0.21	1.00		0.32	1.00		0.41	1.00	
Satd. Flow (perm)	730	1817		393	1849		606	3511		769	3545	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	101	362	112	57	275	38	134	511	73	21	548	36
RTOR Reduction (vph)	0	13	0	0	7	0	0	12	0	0	5	0
Lane Group Flow (vph)	101	461	0	57	306	0	134	572	0	21	579	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	28.1	22.9		25.3	21.5		34.2	29.0		28.8	26.3	
Effective Green, g (s)	28.1	22.9		25.3	21.5		34.2	29.0		28.8	26.3	
Actuated g/C Ratio	0.36	0.29		0.32	0.27		0.44	0.37		0.37	0.34	
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	332	532		194	508		343	1302		315	1192	
v/s Ratio Prot	c0.02	c0.25		0.01	0.17		c0.03	0.16		0.00	c0.16	
v/s Ratio Perm	0.09			0.08			0.14			0.02		
v/c Ratio	0.30	0.87		0.29	0.60		0.39	0.44		0.07	0.49	
Uniform Delay, d1	17.4	26.2		19.5	24.6		13.8	18.5		15.8	20.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.5	13.8		0.8	2.0		0.7	1.1		0.1	1.4	
Delay (s)	17.9	40.0		20.4	26.7		14.5	19.6		15.9	22.0	
Level of Service	B	D		C	C		B	B		B	C	
Approach Delay (s)		36.1			25.7			18.6			21.8	
Approach LOS		D			C			B			C	

Intersection Summary			
HCM 2000 Control Delay	25.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	78.2	Sum of lost time (s)	20.0
Intersection Capacity Utilization	73.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 11: Bryne Drive & Mapleview Drive

2038 Total Conditions
 Weekday AM Peak Hour


























Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↗	↗↗↗		↗	↗↗↗		↗	↗↗		↗	↗↗	
Traffic Volume (vph)	131	1068	176	478	949	358	55	51	216	276	136	118
Future Volume (vph)	131	1068	176	478	949	358	55	51	216	276	136	118
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	0.98		1.00	0.96		1.00	0.88		1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	5033		1789	4931		1789	3144		1789	3330	
Flt Permitted	0.18	1.00		0.12	1.00		0.58	1.00		0.33	1.00	
Satd. Flow (perm)	332	5033		235	4931		1096	3144		625	3330	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	142	1161	191	520	1032	389	60	55	235	300	148	128
RTOR Reduction (vph)	0	18	0	0	47	0	0	209	0	0	102	0
Lane Group Flow (vph)	142	1334	0	520	1374	0	60	81	0	300	174	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	37.5	28.0		59.0	45.5		16.7	11.1		30.5	20.9	
Effective Green, g (s)	37.5	28.0		59.0	45.5		16.7	11.1		30.5	20.9	
Actuated g/C Ratio	0.37	0.28		0.58	0.45		0.16	0.11		0.30	0.21	
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	259	1388		549	2210		218	343		364	685	
v/s Ratio Prot	0.05	0.27		c0.25	0.28		0.02	0.03		c0.12	0.05	
v/s Ratio Perm	0.15			c0.30			0.03			c0.12		
v/c Ratio	0.55	0.96		0.95	0.62		0.28	0.24		0.82	0.25	
Uniform Delay, d1	21.9	36.2		28.1	21.4		36.7	41.3		30.1	33.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.4	16.5		25.6	1.3		0.7	0.4		14.0	0.2	
Delay (s)	24.3	52.7		53.7	22.7		37.3	41.7		44.1	34.0	
Level of Service	C	D		D	C		D	D		D	C	
Approach Delay (s)		50.0			31.0			40.9			39.3	
Approach LOS		D			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	39.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	101.5	Sum of lost time (s)	20.0
Intersection Capacity Utilization	91.4%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 1: Essa Road & Ardagh Road/Bryne Drive

2038 Total Conditions
 Weekday PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	260	384	127	263	244	483	97	807	129	464	1041	545
Future Volume (vph)	260	384	127	263	244	483	97	807	129	464	1041	545
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00
Frt	1.00	0.96		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1789	3445		1789	3579	1601	1789	3579	1601	3471	3579	1601
Flt Permitted	0.60	1.00		0.21	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1122	3445		390	3579	1601	1789	3579	1601	3471	3579	1601
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	268	396	131	271	252	498	100	832	133	478	1073	562
RTOR Reduction (vph)	0	27	0	0	0	251	0	0	86	0	0	284
Lane Group Flow (vph)	268	500	0	271	252	247	100	832	47	478	1073	278
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8			2			6
Actuated Green, G (s)	36.3	23.3		41.1	25.7	25.7	11.0	42.2	42.2	19.3	50.5	50.5
Effective Green, g (s)	36.3	23.3		41.1	25.7	25.7	11.0	42.2	42.2	19.3	50.5	50.5
Actuated g/C Ratio	0.30	0.19		0.34	0.21	0.21	0.09	0.35	0.35	0.16	0.42	0.42
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	410	667		312	765	342	163	1256	562	557	1503	672
v/s Ratio Prot	0.07	0.15		c0.11	0.07		0.06	0.23		c0.14	c0.30	
v/s Ratio Perm	0.13			c0.19		0.15			0.03			0.17
v/c Ratio	0.65	0.75		0.87	0.33	0.72	0.61	0.66	0.08	0.86	0.71	0.41
Uniform Delay, d1	34.5	45.7		31.9	40.0	43.9	52.6	33.0	26.1	49.1	28.9	24.5
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.7	4.7		21.7	0.3	7.4	6.7	2.8	0.3	12.4	2.9	1.9
Delay (s)	38.2	50.4		53.5	40.2	51.3	59.2	35.7	26.4	61.6	31.8	26.3
Level of Service	D	D		D	D	D	E	D	C	E	C	C
Approach Delay (s)		46.3			49.2			36.8			37.1	
Approach LOS		D			D			D			D	
Intersection Summary												
HCM 2000 Control Delay			41.0				HCM 2000 Level of Service			D		
HCM 2000 Volume to Capacity ratio			0.84									
Actuated Cycle Length (s)			120.2				Sum of lost time (s)			20.0		
Intersection Capacity Utilization			81.5%				ICU Level of Service			D		
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
2: Veterans Drive & Harvie Road

2038 Total Conditions
Weekday PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	77	419	243	127	500	491	209	501	115	395	693	78
Future Volume (vph)	77	419	243	127	500	491	209	501	115	395	693	78
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00	0.94		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1789	3381		1789	1883	1601	1789	3579	1601	1789	3524	
Flt Permitted	0.20	1.00		0.22	1.00	1.00	0.21	1.00	1.00	0.19	1.00	
Satd. Flow (perm)	386	3381		410	1883	1601	387	3579	1601	352	3524	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	84	455	264	138	543	534	227	545	125	429	753	85
RTOR Reduction (vph)	0	66	0	0	0	304	0	0	101	0	8	0
Lane Group Flow (vph)	84	653	0	138	543	230	227	545	24	429	830	0
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)	42.8	37.4		50.2	41.1	41.1	34.1	21.8	21.8	49.2	32.9	
Effective Green, g (s)	42.8	37.4		50.2	41.1	41.1	34.1	21.8	21.8	49.2	32.9	
Actuated g/C Ratio	0.38	0.33		0.45	0.37	0.37	0.31	0.20	0.20	0.44	0.29	
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	215	1132		296	692	589	272	698	312	456	1037	
v/s Ratio Prot	0.02	0.19		c0.04	c0.29		0.09	0.15		c0.20	0.24	
v/s Ratio Perm	0.13			0.17		0.14	0.16		0.02	c0.22		
v/c Ratio	0.39	0.58		0.47	0.78	0.39	0.83	0.78	0.08	0.94	0.80	
Uniform Delay, d1	24.4	30.6		20.0	31.4	26.1	31.4	42.7	36.7	28.4	36.4	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.2	2.1		1.2	8.7	1.9	19.3	5.7	0.1	27.8	4.5	
Delay (s)	25.6	32.8		21.2	40.1	28.0	50.7	48.3	36.8	56.2	40.9	
Level of Service	C	C		C	D	C	D	D	D	E	D	
Approach Delay (s)		32.0			32.6			47.3			46.1	
Approach LOS		C			C			D			D	
Intersection Summary												
HCM 2000 Control Delay			39.7								HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio			0.88									
Actuated Cycle Length (s)			111.7								Sum of lost time (s)	20.0
Intersection Capacity Utilization			84.5%								ICU Level of Service	E
Analysis Period (min)			15									

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis

3: Thrushwood Drive & Harvie Road

2038 Total Conditions
Weekday PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	34	839	56	7	1066	73	33	9	44	42	5	19
Future Volume (Veh/h)	34	839	56	7	1066	73	33	9	44	42	5	19
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	37	912	61	8	1159	79	36	10	48	46	5	21
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type												
	TWLTL					TWLTL						
Median storage veh	2					2						
Upstream signal (m)	318					401						
pX, platoon unblocked	0.79						0.79	0.79		0.79	0.79	0.79
vC, conflicting volume	1238			973			1636	2270	486	1798	2262	619
vC1, stage 1 conf vol							1016	1016		1214	1214	
vC2, stage 2 conf vol							619	1254		583	1047	
vCu, unblocked vol	772			973			1275	2078	486	1480	2066	0
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	94			99			84	95	91	80	98	98
cM capacity (veh/h)	663			704			228	198	527	231	208	858
Direction, Lane #												
	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1				
Volume Total	37	608	365	8	773	465	94	72				
Volume Left	37	0	0	8	0	0	36	46				
Volume Right	0	0	61	0	0	79	48	21				
cSH	663	1700	1700	704	1700	1700	314	291				
Volume to Capacity	0.06	0.36	0.21	0.01	0.45	0.27	0.30	0.25				
Queue Length 95th (m)	1.3	0.0	0.0	0.3	0.0	0.0	9.3	7.3				
Control Delay (s)	10.7	0.0	0.0	10.2	0.0	0.0	21.3	21.4				
Lane LOS	B			B			C	C				
Approach Delay (s)	0.4			0.1			21.3	21.4				
Approach LOS							C	C				
Intersection Summary												
Average Delay			1.7									
Intersection Capacity Utilization			44.7%		ICU Level of Service			A				
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis
4: Bryne Drive & Harvie Road

2038 Total Conditions
Weekday PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	67	900	39	213	908	192	166	589	291	154	591	152	
Future Volume (vph)	67	900	39	213	908	192	166	589	291	154	591	152	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91	0.91	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1789	3579	1601	1789	3579	1601	1789	3579	1601	1789	3415	1457	
Flt Permitted	0.18	1.00	1.00	0.12	1.00	1.00	0.17	1.00	1.00	0.21	1.00	1.00	
Satd. Flow (perm)	347	3579	1601	231	3579	1601	322	3579	1601	399	3415	1457	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	73	978	42	232	987	209	180	640	316	167	642	165	
RTOR Reduction (vph)	0	0	27	0	0	90	0	0	206	0	2	112	
Lane Group Flow (vph)	73	978	15	232	987	119	180	640	110	167	657	36	
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	
Protected Phases	7	4		3	8		5	2		1	6		
Permitted Phases	4		4	8		8	2		2	6		6	
Actuated Green, G (s)	47.7	41.1	41.1	57.1	46.5	46.5	38.7	27.5	27.5	38.3	27.3	27.3	
Effective Green, g (s)	47.7	41.1	41.1	57.1	46.5	46.5	38.7	27.5	27.5	38.3	27.3	27.3	
Actuated g/C Ratio	0.43	0.37	0.37	0.51	0.42	0.42	0.35	0.25	0.25	0.34	0.24	0.24	
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	233	1318	589	285	1491	667	258	881	394	273	835	356	
v/s Ratio Prot	0.02	0.27		c0.09	0.28		c0.07	0.18		0.06	c0.19		
v/s Ratio Perm	0.12		0.01	c0.33		0.07	0.17		0.07	0.15		0.02	
v/c Ratio	0.31	0.74	0.03	0.81	0.66	0.18	0.70	0.73	0.28	0.61	0.79	0.10	
Uniform Delay, d1	20.2	30.6	22.5	20.7	26.2	20.5	27.9	38.6	34.0	27.5	39.4	32.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.8	3.8	0.1	16.1	2.3	0.6	8.0	3.0	0.4	4.0	4.9	0.1	
Delay (s)	21.0	34.4	22.6	36.9	28.5	21.1	35.9	41.6	34.4	31.6	44.4	32.8	
Level of Service	C	C	C	D	C	C	D	D	C	C	D	C	
Approach Delay (s)		33.1			28.8			38.7			40.4		
Approach LOS		C			C			D			D		
Intersection Summary													
HCM 2000 Control Delay			34.7		HCM 2000 Level of Service					C			
HCM 2000 Volume to Capacity ratio			0.81										
Actuated Cycle Length (s)			111.6		Sum of lost time (s)					20.0			
Intersection Capacity Utilization			88.9%		ICU Level of Service					E			
Analysis Period (min)			15										

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

5: Harvie Road & Fairview Road

2038 Total Conditions
Weekday PM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	234	1111	1124	606	412	190
Future Volume (vph)	234	1111	1124	606	412	190
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1789	3579	3579	1601	1789	1601
Flt Permitted	0.09	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	170	3579	3579	1601	1789	1601
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	254	1208	1222	659	448	207
RTOR Reduction (vph)	0	0	0	284	0	145
Lane Group Flow (vph)	254	1208	1222	375	448	62
Turn Type	pm+pt	NA	NA	Perm	Perm	Perm
Protected Phases	7	4	8			
Permitted Phases	4			8	6	6
Actuated Green, G (s)	56.3	56.3	40.2	40.2	29.3	29.3
Effective Green, g (s)	56.3	56.3	40.2	40.2	29.3	29.3
Actuated g/C Ratio	0.58	0.58	0.41	0.41	0.30	0.30
Clearance Time (s)	4.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	298	2064	1474	659	537	480
v/s Ratio Prot	c0.11	0.34	0.34			
v/s Ratio Perm	c0.38			0.23	c0.25	0.04
v/c Ratio	0.85	0.59	0.83	0.57	0.83	0.13
Uniform Delay, d1	25.4	13.2	25.6	22.0	31.9	24.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	20.3	1.2	5.5	3.5	10.7	0.1
Delay (s)	45.7	14.4	31.2	25.6	42.6	25.0
Level of Service	D	B	C	C	D	C
Approach Delay (s)		19.8	29.2		37.0	
Approach LOS		B	C		D	

Intersection Summary

















HCM 2000 Control Delay	27.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	97.6	Sum of lost time (s)	16.0
Intersection Capacity Utilization	82.5%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis

6: Thrushwood Drive & Cranberry Lane























2038 Total Conditions
Weekday PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	3	9	1	52	12	13	2	20	58	17	27	6
Future Volume (Veh/h)	3	9	1	52	12	13	2	20	58	17	27	6
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	10	1	57	13	14	2	22	63	18	29	7
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	146	158	32	132	130	54	36			85		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	146	158	32	132	130	54	36			85		
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 %	100	99	100	93	98	99	100			99		
cM capacity (veh/h)	792	725	1041	822	751	1014	1575			1512		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	14	84	87	54								
Volume Left	3	57	2	18								
Volume Right	1	14	63	7								
cSH	755	836	1575	1512								
Volume to Capacity	0.02	0.10	0.00	0.01								
Queue Length 95th (m)	0.4	2.5	0.0	0.3								
Control Delay (s)	9.9	9.8	0.2	2.5								
Lane LOS	A	A	A	A								
Approach Delay (s)	9.9	9.8	0.2	2.5								
Approach LOS	A	A										
Intersection Summary												
Average Delay			4.7									
Intersection Capacity Utilization			26.6%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

7: Bryne Drive

2038 Total Conditions
Weekday PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations								 			 	
Traffic Volume (vph)	73	1	61	185	10	195	96	778	14	15	713	115
Future Volume (vph)	73	1	61	185	10	195	96	778	14	15	713	115
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.85		1.00	0.86		1.00	1.00		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1605		1789	1615		1789	3569		1789	3504	
Flt Permitted	0.87	1.00		0.56	1.00		0.32	1.00		0.21	1.00	
Satd. Flow (perm)	1638	1605		1046	1615		596	3569		396	3504	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	79	1	66	201	11	212	104	846	15	16	775	125
RTOR Reduction (vph)	0	61	0	0	187	0	0	1	0	0	14	0
Lane Group Flow (vph)	79	6	0	201	36	0	104	860	0	16	886	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		pm+pt	NA	
Protected Phases	7	4		3	8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	7.3	4.6		12.5	7.2		26.4	26.4		33.2	33.2	
Effective Green, g (s)	7.3	4.6		12.5	7.2		26.4	26.4		33.2	33.2	
Actuated g/C Ratio	0.12	0.08		0.20	0.12		0.43	0.43		0.54	0.54	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	202	120		278	190		257	1542		233	1903	
v/s Ratio Prot	0.02	0.00		c0.06	0.02			c0.24		0.00	c0.25	
v/s Ratio Perm	0.03			c0.09			0.17			0.04		
v/c Ratio	0.39	0.05		0.72	0.19		0.40	0.56		0.07	0.47	
Uniform Delay, d1	24.8	26.2		22.2	24.3		11.9	13.0		7.6	8.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.3	0.2		9.0	0.5		4.7	1.5		0.1	0.8	
Delay (s)	26.0	26.4		31.1	24.8		16.6	14.4		7.7	9.3	
Level of Service	C	C		C	C		B	B		A	A	
Approach Delay (s)		26.2			27.8			14.7			9.3	
Approach LOS		C			C			B			A	
Intersection Summary												
HCM 2000 Control Delay			15.6				HCM 2000 Level of Service				B	
HCM 2000 Volume to Capacity ratio			0.69									
Actuated Cycle Length (s)			61.1				Sum of lost time (s)			24.0		
Intersection Capacity Utilization			65.3%				ICU Level of Service			C		
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 8: Veterans Drive & Mapleton Drive/Brookwood Drive

2038 Total Conditions
 Weekday PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	21	23	160	90	22	24	282	1108	138	29	1086	27
Future Volume (vph)	21	23	160	90	22	24	282	1108	138	29	1086	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0			6.0	6.0	4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00			1.00	1.00	1.00	0.95		1.00	0.95	
Frt	1.00	0.87			1.00	0.85	1.00	0.98		1.00	1.00	
Flt Protected	0.95	1.00			0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1636			1811	1601	1789	3519		1789	3566	
Flt Permitted	0.54	1.00			0.64	1.00	0.10	1.00		0.15	1.00	
Satd. Flow (perm)	1008	1636			1208	1601	183	3519		285	3566	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	23	25	174	98	24	26	307	1204	150	32	1180	29
RTOR Reduction (vph)	0	132	0	0	0	22	0	7	0	0	2	0
Lane Group Flow (vph)	23	67	0	0	122	4	307	1347	0	32	1207	0
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	21.3	21.3			14.9	14.9	54.3	47.9		39.5	37.1	
Effective Green, g (s)	21.3	21.3			14.9	14.9	54.3	47.9		39.5	37.1	
Actuated g/C Ratio	0.24	0.24			0.17	0.17	0.62	0.55		0.45	0.42	
Clearance Time (s)	4.0	6.0			6.0	6.0	4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	266	397			205	272	355	1924		169	1510	
v/s Ratio Prot	0.00	c0.04					c0.13	0.38		0.01	0.34	
v/s Ratio Perm	0.02				c0.10	0.00	c0.40			0.08		
v/c Ratio	0.09	0.17			0.60	0.02	0.86	0.70		0.19	0.80	
Uniform Delay, d1	25.5	26.2			33.6	30.3	23.0	14.6		14.0	22.0	
Progression Factor	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.2			4.6	0.0	19.1	2.1		0.5	4.5	
Delay (s)	25.7	26.4			38.1	30.3	42.2	16.7		14.5	26.5	
Level of Service	C	C			D	C	D	B		B	C	
Approach Delay (s)		26.3			36.8			21.4			26.2	
Approach LOS		C			D			C			C	

Intersection Summary		
HCM 2000 Control Delay	24.3	HCM 2000 Level of Service C
HCM 2000 Volume to Capacity ratio	0.82	
Actuated Cycle Length (s)	87.6	Sum of lost time (s) 20.0
Intersection Capacity Utilization	84.3%	ICU Level of Service E
Analysis Period (min)	15	

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
 9: Bryne Drive & Bryne Court

2038 Total Conditions
 Weekday PM Peak Hour



Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations							
Traffic Volume (veh/h)	58	58	627	4	4	929	
Future Volume (Veh/h)	58	58	627	4	4	929	
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)	63	63	682	4	4	1010	
Pedestrians							
Lane Width (m)							
Walking Speed (m/s)							
Percent Blockage							
Right turn flare (veh)							
Median type	TWLTL			TWLTL			
Median storage veh	2			2			
Upstream signal (m)	251						
pX, platoon unblocked	0.97	0.97			0.97		
vC, conflicting volume	1197	343			686		
vC1, stage 1 conf vol	684						
vC2, stage 2 conf vol	513						
vCu, unblocked vol	1147	269			621		
tC, single (s)	6.8	6.9			4.1		
tC, 2 stage (s)	5.8						
tF (s)	3.5	3.3			2.2		
p0 queue free %	84	91			100		
cM capacity (veh/h)	398	710			929		
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	63	63	455	231	4	505	505
Volume Left	63	0	0	0	4	0	0
Volume Right	0	63	0	4	0	0	0
cSH	398	710	1700	1700	929	1700	1700
Volume to Capacity	0.16	0.09	0.27	0.14	0.00	0.30	0.30
Queue Length 95th (m)	4.2	2.2	0.0	0.0	0.1	0.0	0.0
Control Delay (s)	15.7	10.6	0.0	0.0	8.9	0.0	0.0
Lane LOS	C	B			A		
Approach Delay (s)	13.1	0.0		0.0			
Approach LOS	B						
Intersection Summary							
Average Delay			0.9				
Intersection Capacity Utilization			35.7%		ICU Level of Service		A
Analysis Period (min)			15				

HCM Signalized Intersection Capacity Analysis
 10: Bryne Drive & Caplan Avenue

2038 Total Conditions
 Weekday PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	165	199	138	122	271	148	152	389	89	111	723	152
Future Volume (vph)	165	199	138	122	271	148	152	389	89	111	723	152
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.94		1.00	0.95		1.00	0.97		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1768		1789	1784		1789	3478		1789	3485	
Flt Permitted	0.18	1.00		0.37	1.00		0.15	1.00		0.41	1.00	
Satd. Flow (perm)	344	1768		704	1784		285	3478		781	3485	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	179	216	150	133	295	161	165	423	97	121	786	165
RTOR Reduction (vph)	0	30	0	0	24	0	0	23	0	0	21	0
Lane Group Flow (vph)	179	336	0	133	432	0	165	497	0	121	930	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	31.4	24.4		28.4	22.9		33.4	26.4		30.4	24.9	
Effective Green, g (s)	31.4	24.4		28.4	22.9		33.4	26.4		30.4	24.9	
Actuated g/C Ratio	0.38	0.30		0.35	0.28		0.41	0.32		0.37	0.30	
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	255	527		317	499		245	1122		358	1060	
v/s Ratio Prot	c0.06	0.19		0.03	c0.24		c0.06	0.14		0.02	c0.27	
v/s Ratio Perm	0.21			0.12			0.22			0.10		
v/c Ratio	0.70	0.64		0.42	0.86		0.67	0.44		0.34	0.88	
Uniform Delay, d1	19.1	24.9		19.2	28.0		18.1	21.9		17.4	27.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	8.4	2.5		0.9	14.5		7.1	1.3		0.6	10.3	
Delay (s)	27.5	27.4		20.1	42.4		25.2	23.2		17.9	37.3	
Level of Service	C	C		C	D		C	C		B	D	
Approach Delay (s)		27.4			37.4			23.6			35.1	
Approach LOS		C			D			C			D	

Intersection Summary

HCM 2000 Control Delay	31.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	81.8	Sum of lost time (s)	20.0
Intersection Capacity Utilization	82.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 11: Bryne Drive & Mapleview Drive

2038 Total Conditions
 Weekday PM Peak Hour































Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↗		↖	↖↗		↖	↖↗		↖	↖↗	
Traffic Volume (vph)	130	1073	220	403	1545	290	268	144	612	457	126	230
Future Volume (vph)	130	1073	220	403	1545	290	268	144	612	457	126	230
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	5.0		3.0	5.0		3.0	5.0		3.0	5.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	0.97		1.00	0.98		1.00	0.88		1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	5010		1789	5020		1789	3144		1789	3232	
Flt Permitted	0.08	1.00		0.07	1.00		0.51	1.00		0.13	1.00	
Satd. Flow (perm)	145	5010		137	5020		955	3144		243	3232	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	137	1129	232	424	1626	305	282	152	644	481	133	242
RTOR Reduction (vph)	0	21	0	0	18	0	0	220	0	0	141	0
Lane Group Flow (vph)	137	1340	0	424	1913	0	282	576	0	481	234	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	62.4	52.0		81.0	67.6		48.1	28.0		59.0	35.9	
Effective Green, g (s)	62.4	52.0		81.0	67.6		48.1	28.0		59.0	35.9	
Actuated g/C Ratio	0.42	0.35		0.54	0.45		0.32	0.19		0.39	0.24	
Clearance Time (s)	3.0	5.0		3.0	5.0		3.0	5.0		3.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	174	1736		360	2262		417	586		384	773	
v/s Ratio Prot	0.05	0.27		c0.20	0.38		0.09	0.18		c0.23	0.07	
v/s Ratio Perm	0.27			c0.43			0.13			c0.26		
v/c Ratio	0.79	0.77		1.18	0.85		0.68	1.24dr		1.25	0.30	
Uniform Delay, d1	33.2	43.7		49.2	36.6		41.1	60.8		47.0	46.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	20.6	3.4		105.2	4.1		4.3	32.5		133.5	0.2	
Delay (s)	53.8	47.1		154.4	40.7		45.4	93.2		180.5	47.0	
Level of Service	D	D		F	D		D	F		F	D	
Approach Delay (s)		47.7			61.2			80.7			122.0	
Approach LOS		D			E			F			F	

Intersection Summary		
HCM 2000 Control Delay	70.3	HCM 2000 Level of Service
HCM 2000 Volume to Capacity ratio	1.25	E
Actuated Cycle Length (s)	150.0	Sum of lost time (s)
Intersection Capacity Utilization	129.8%	ICU Level of Service
Analysis Period (min)	15	H

dr Defacto Right Lane. Recode with 1 though lane as a right lane.
 c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 1: Essa Road & Ardagh Road/Bryne Drive

2043 Total Conditions
 Weekday AM Peak Hour

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations		 			 			 		 	 		
Traffic Volume (vph)	315	488	64	95	74	375	108	804	62	375	506	383	
Future Volume (vph)	315	488	64	95	74	375	108	804	62	375	506	383	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00	
Frt	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1789	3516		1789	3579	1601	1789	3579	1601	3471	3579	1601	
Flt Permitted	0.56	1.00		0.34	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (perm)	1054	3516		645	3579	1601	1789	3579	1601	3471	3579	1601	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	342	530	70	103	80	408	117	874	67	408	550	416	
RTOR Reduction (vph)	0	9	0	0	0	260	0	0	42	0	0	243	
Lane Group Flow (vph)	342	591	0	103	80	148	117	874	25	408	550	173	
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	
Protected Phases	7	4		3	8		5	2		1	6		
Permitted Phases	4			8		8			2			6	
Actuated Green, G (s)	35.5	24.5		22.7	15.7	15.7	11.8	40.2	40.2	16.7	45.1	45.1	
Effective Green, g (s)	35.5	24.5		22.7	15.7	15.7	11.8	40.2	40.2	16.7	45.1	45.1	
Actuated g/C Ratio	0.33	0.23		0.21	0.14	0.14	0.11	0.37	0.37	0.15	0.42	0.42	
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	452	794		208	518	231	194	1327	593	534	1489	666	
v/s Ratio Prot	c0.11	0.17		0.03	0.02		0.07	c0.24		c0.12	0.15		
v/s Ratio Perm	c0.14			0.07		0.09			0.02			0.11	
v/c Ratio	0.76	0.74		0.50	0.15	0.64	0.60	0.66	0.04	0.76	0.37	0.26	
Uniform Delay, d1	30.7	39.0		36.0	40.5	43.7	46.1	28.4	21.8	44.0	21.8	20.7	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	7.1	3.8		1.9	0.1	6.0	5.2	2.6	0.1	6.4	0.7	0.9	
Delay (s)	37.8	42.8		37.8	40.7	49.6	51.3	31.0	21.9	50.4	22.5	21.7	
Level of Service	D	D		D	D	D	D	C	C	D	C	C	
Approach Delay (s)		41.0			46.4			32.6			30.5		
Approach LOS		D			D			C			C		
Intersection Summary													
HCM 2000 Control Delay			35.9									HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio			0.74										
Actuated Cycle Length (s)			108.4									Sum of lost time (s)	20.0
Intersection Capacity Utilization			76.2%									ICU Level of Service	D
Analysis Period (min)			15										

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

2: Veterans Drive & Harvie Road




















2043 Total Conditions
Weekday AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	93	339	331	180	196	273	90	319	201	434	513	88	
Future Volume (vph)	93	339	331	180	196	273	90	319	201	434	513	88	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0		
Lane Util. Factor	1.00	0.95		1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95		
Frt	1.00	0.93		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1789	3313		1789	1883	1601	1789	3579	1601	1789	3500		
Flt Permitted	0.62	1.00		0.20	1.00	1.00	0.40	1.00	1.00	0.36	1.00		
Satd. Flow (perm)	1177	3313		381	1883	1601	759	3579	1601	671	3500		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	101	368	360	196	213	297	98	347	218	472	558	96	
RTOR Reduction (vph)	0	152	0	0	0	190	0	0	181	0	14	0	
Lane Group Flow (vph)	101	576	0	196	213	107	98	347	37	472	640	0	
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		
Protected Phases	7	4		3	8		5	2		1	6		
Permitted Phases	4			8		8	2		2	6			
Actuated Green, G (s)	36.3	30.8		44.5	35.0	35.0	22.2	16.7	16.7	41.0	31.5		
Effective Green, g (s)	36.3	30.8		44.5	35.0	35.0	22.2	16.7	16.7	41.0	31.5		
Actuated g/C Ratio	0.37	0.32		0.46	0.36	0.36	0.23	0.17	0.17	0.42	0.32		
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	472	1046		313	675	574	230	613	274	514	1130		
v/s Ratio Prot	0.01	0.17		c0.06	0.11		0.02	0.10		c0.19	0.18		
v/s Ratio Perm	0.07			c0.22		0.07	0.07		0.02	c0.19			
v/c Ratio	0.21	0.55		0.63	0.32	0.19	0.43	0.57	0.14	0.92	0.57		
Uniform Delay, d1	20.4	27.6		18.0	22.6	21.5	30.8	37.1	34.3	22.7	27.3		
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
Incremental Delay, d2	0.2	2.1		3.9	1.2	0.7	1.3	1.2	0.2	21.3	0.7		
Delay (s)	20.6	29.7		21.9	23.8	22.2	32.0	38.3	34.5	44.0	28.0		
Level of Service	C	C		C	C	C	C	D	C	D	C		
Approach Delay (s)		28.6			22.6			36.1			34.7		
Approach LOS		C			C			D			C		
Intersection Summary													
HCM 2000 Control Delay			30.9									HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.82										
Actuated Cycle Length (s)			97.5									Sum of lost time (s)	20.0
Intersection Capacity Utilization			88.2%									ICU Level of Service	E
Analysis Period (min)			15										

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
3: Thrushwood Drive & Harvie Road





























2043 Total Conditions
Weekday AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	14	864	96	4	572	30	56	4	41	49	4	22
Future Volume (Veh/h)	14	864	96	4	572	30	56	4	41	49	4	22
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	15	939	104	4	622	33	61	4	45	53	4	24
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type												
	TWLTL					TWLTL						
Median storage veh	2					2						
Upstream signal (m)	318					401						
pX, platoon unblocked	0.95						0.95	0.95		0.95	0.95	0.95
vC, conflicting volume	655			1043			1366	1684	522	1193	1720	328
vC1, stage 1 conf vol							1021	1021		646	646	
vC2, stage 2 conf vol							345	663		546	1073	
vCu, unblocked vol	532			1043			1280	1615	522	1098	1652	187
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			99			74	98	91	84	98	97
cM capacity (veh/h)	980			663			237	266	500	339	254	782
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1				
Volume Total	15	626	417	4	415	240	110	81				
Volume Left	15	0	0	4	0	0	61	53				
Volume Right	0	0	104	0	0	33	45	24				
cSH	980	1700	1700	663	1700	1700	304	399				
Volume to Capacity	0.02	0.37	0.25	0.01	0.24	0.14	0.36	0.20				
Queue Length 95th (m)	0.4	0.0	0.0	0.1	0.0	0.0	12.1	5.7				
Control Delay (s)	8.7	0.0	0.0	10.5	0.0	0.0	23.4	16.3				
Lane LOS	A			B			C	C				
Approach Delay (s)	0.1			0.1			23.4	16.3				
Approach LOS							C	C				
Intersection Summary												
Average Delay			2.1									
Intersection Capacity Utilization			40.1%		ICU Level of Service			A				
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

4: Bryne Drive & Harvie Road

2043 Total Conditions
Weekday AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 			 	
Traffic Volume (vph)	123	833	124	400	586	130	30	257	220	254	422	74
Future Volume (vph)	123	833	124	400	586	130	30	257	220	254	422	74
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91	0.91
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1789	3579	1601	1789	3579	1601	1789	3579	1601	1789	3419	1457
Flt Permitted	0.41	1.00	1.00	0.16	1.00	1.00	0.35	1.00	1.00	0.46	1.00	1.00
Satd. Flow (perm)	772	3579	1601	292	3579	1601	658	3579	1601	859	3419	1457
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	134	905	135	435	637	141	33	279	239	276	459	80
RTOR Reduction (vph)	0	0	85	0	0	70	0	0	196	0	1	57
Lane Group Flow (vph)	134	905	50	435	637	71	33	279	43	276	466	15
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)	47.1	40.1	40.1	65.2	54.2	54.2	23.6	19.6	19.6	29.6	22.6	22.6
Effective Green, g (s)	47.1	40.1	40.1	65.2	54.2	54.2	23.6	19.6	19.6	29.6	22.6	22.6
Actuated g/C Ratio	0.44	0.37	0.37	0.60	0.50	0.50	0.22	0.18	0.18	0.27	0.21	0.21
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	403	1331	595	469	1799	804	186	650	291	296	716	305
v/s Ratio Prot	0.02	0.25		c0.18	0.18		0.01	0.08		c0.06	0.14	
v/s Ratio Perm	0.12		0.03	c0.38		0.04	0.03		0.03	c0.20		0.01
v/c Ratio	0.33	0.68	0.08	0.93	0.35	0.09	0.18	0.43	0.15	0.93	0.65	0.05
Uniform Delay, d1	18.5	28.5	21.9	25.0	16.2	13.9	33.6	39.1	37.1	37.2	39.0	34.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.5	2.8	0.3	24.5	0.5	0.2	0.5	0.5	0.2	34.8	2.1	0.1
Delay (s)	19.0	31.3	22.2	49.5	16.8	14.2	34.1	39.6	37.3	72.0	41.1	34.1
Level of Service	B	C	C	D	B	B	C	D	D	E	D	C
Approach Delay (s)		28.8			28.2			38.3			51.0	
Approach LOS		C			C			D			D	
Intersection Summary												
HCM 2000 Control Delay			34.8	HCM 2000 Level of Service				C				
HCM 2000 Volume to Capacity ratio			0.99									
Actuated Cycle Length (s)			107.8	Sum of lost time (s)				20.0				
Intersection Capacity Utilization			94.6%	ICU Level of Service				F				
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

5: Harvie Road & Fairview Road

2043 Total Conditions
Weekday AM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↗	↑↑	↑↑	↗	↗	↗
Traffic Volume (vph)	136	1172	918	436	333	198
Future Volume (vph)	136	1172	918	436	333	198
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1789	3579	3579	1601	1789	1601
Flt Permitted	0.17	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	322	3579	3579	1601	1789	1601
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	148	1274	998	474	362	215
RTOR Reduction (vph)	0	0	0	232	0	159
Lane Group Flow (vph)	148	1274	998	242	362	56
Turn Type	pm+pt	NA	NA	Perm	Perm	Perm
Protected Phases	7	4	8			
Permitted Phases	4			8	6	6
Actuated Green, G (s)	54.0	54.0	40.5	40.5	23.1	23.1
Effective Green, g (s)	54.0	54.0	40.5	40.5	23.1	23.1
Actuated g/C Ratio	0.61	0.61	0.45	0.45	0.26	0.26
Clearance Time (s)	4.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	351	2169	1626	727	463	415
v/s Ratio Prot	0.04	c0.36	0.28			
v/s Ratio Perm	0.21			0.15	c0.20	0.03
v/c Ratio	0.42	0.59	0.61	0.33	0.78	0.13
Uniform Delay, d1	10.0	10.7	18.4	15.6	30.7	25.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.8	1.2	1.7	1.2	8.4	0.1
Delay (s)	10.9	11.9	20.1	16.9	39.0	25.5
Level of Service	B	B	C	B	D	C
Approach Delay (s)		11.8	19.1		34.0	
Approach LOS		B	B		C	

















Intersection Summary

HCM 2000 Control Delay	18.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	89.1	Sum of lost time (s)	16.0
Intersection Capacity Utilization	72.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
6: Thrushwood Drive & Cranberry Lane

2043 Total Conditions
Weekday AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	7	8	1	53	4	14	0	25	37	8	29	2
Future Volume (Veh/h)	7	8	1	53	4	14	0	25	37	8	29	2
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	9	1	58	4	15	0	27	40	9	32	2
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	115	118	33	104	99	47	34			67		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	115	118	33	104	99	47	34			67		
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 %	99	99	100	93	99	99	100			99		
cM capacity (veh/h)	842	768	1041	864	786	1022	1578			1535		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	18	77	67	43								
Volume Left	8	58	0	9								
Volume Right	1	15	40	2								
cSH	811	886	1578	1535								
Volume to Capacity	0.02	0.09	0.00	0.01								
Queue Length 95th (m)	0.5	2.2	0.0	0.1								
Control Delay (s)	9.5	9.4	0.0	1.6								
Lane LOS	A	A		A								
Approach Delay (s)	9.5	9.4	0.0	1.6								
Approach LOS	A	A										
Intersection Summary												
Average Delay			4.7									
Intersection Capacity Utilization			21.9%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

2043 Total Conditions

7: Bryne Drive

Weekday AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	115	13	84	29	2	31	30	361	238	251	655	40
Future Volume (vph)	115	13	84	29	2	31	30	361	238	251	655	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.87		1.00	0.86		1.00	0.94		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1639		1789	1617		1789	3365		1789	3548	
Flt Permitted	0.77	1.00		1.00	1.00		0.37	1.00		0.27	1.00	
Satd. Flow (perm)	1449	1639		1883	1617		688	3365		505	3548	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	125	14	91	32	2	34	33	392	259	273	712	43
RTOR Reduction (vph)	0	82	0	0	32	0	0	139	0	0	5	0
Lane Group Flow (vph)	125	23	0	32	4	0	33	512	0	273	750	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		pm+pt	NA	
Protected Phases	7	4		3	8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	9.3	5.2		4.5	2.8		19.2	19.2		30.4	30.4	
Effective Green, g (s)	9.3	5.2		4.5	2.8		19.2	19.2		30.4	30.4	
Actuated g/C Ratio	0.17	0.09		0.08	0.05		0.35	0.35		0.55	0.55	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	268	154		150	81		238	1168		398	1950	
v/s Ratio Prot	c0.03	0.01		0.01	0.00			0.15		c0.06	0.21	
v/s Ratio Perm	c0.04			0.01			0.05			c0.31		
v/c Ratio	0.47	0.15		0.21	0.05		0.14	0.44		0.69	0.38	
Uniform Delay, d1	20.6	23.0		23.8	25.0		12.4	13.9		7.6	7.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.3	0.4		0.7	0.2		1.2	1.2		4.9	0.6	
Delay (s)	21.9	23.5		24.5	25.2		13.6	15.1		12.5	7.7	
Level of Service	C	C		C	C		B	B		B	A	
Approach Delay (s)		22.6			24.9			15.0			9.0	
Approach LOS		C			C			B			A	























Intersection Summary

HCM 2000 Control Delay	13.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	55.3	Sum of lost time (s)	24.0
Intersection Capacity Utilization	59.6%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 8: Veterans Drive & Mapleton Drive/Brookwood Drive

2043 Total Conditions
 Weekday AM Peak Hour

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	10	35	212	92	28	32	106	451	39	21	1001	16	
Future Volume (vph)	10	35	212	92	28	32	106	451	39	21	1001	16	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	4.0	6.0			6.0	6.0	4.0	6.0		4.0	6.0		
Lane Util. Factor	1.00	1.00			1.00	1.00	1.00	0.95		1.00	0.95		
Frt	1.00	0.87			1.00	0.85	1.00	0.99		1.00	1.00		
Flt Protected	0.95	1.00			0.96	1.00	0.95	1.00		0.95	1.00		
Satd. Flow (prot)	1789	1641			1814	1601	1789	3536		1789	3570		
Flt Permitted	0.54	1.00			0.61	1.00	0.14	1.00		0.45	1.00		
Satd. Flow (perm)	1018	1641			1154	1601	261	3536		856	3570		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	11	38	230	100	30	35	115	490	42	23	1088	17	
RTOR Reduction (vph)	0	169	0	0	0	28	0	5	0	0	1	0	
Lane Group Flow (vph)	11	99	0	0	130	7	115	527	0	23	1104	0	
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA		
Protected Phases	7	4		3	8		5	2		1	6		
Permitted Phases	4			8		8	2			6			
Actuated Green, G (s)	21.3	21.3			16.2	16.2	47.1	40.7		39.1	36.7		
Effective Green, g (s)	21.3	21.3			16.2	16.2	47.1	40.7		39.1	36.7		
Actuated g/C Ratio	0.26	0.26			0.20	0.20	0.59	0.51		0.49	0.46		
Clearance Time (s)	4.0	6.0			6.0	6.0	4.0	6.0		4.0	6.0		
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0		3.0	3.0		
Lane Grp Cap (vph)	280	434			232	322	274	1789		444	1629		
v/s Ratio Prot	0.00	c0.06					c0.03	0.15		0.00	c0.31		
v/s Ratio Perm	0.01				c0.11	0.00	0.21			0.02			
v/c Ratio	0.04	0.23			0.56	0.02	0.42	0.29		0.05	0.68		
Uniform Delay, d1	22.0	23.1			28.9	25.7	10.3	11.5		10.7	17.2		
Progression Factor	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00		
Incremental Delay, d2	0.1	0.3			3.1	0.0	1.0	0.4		0.0	2.3		
Delay (s)	22.0	23.4			32.0	25.8	11.3	11.9		10.8	19.5		
Level of Service	C	C			C	C	B	B		B	B		
Approach Delay (s)		23.3			30.7			11.8			19.3		
Approach LOS		C			C			B			B		
Intersection Summary													
HCM 2000 Control Delay			18.5		HCM 2000 Level of Service						B		
HCM 2000 Volume to Capacity ratio			0.62										
Actuated Cycle Length (s)			80.4		Sum of lost time (s)						20.0		
Intersection Capacity Utilization			75.8%		ICU Level of Service						D		
Analysis Period (min)			15										

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
 9: Bryne Drive & Bryne Court

2043 Total Conditions
 Weekday AM Peak Hour



Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations							
Traffic Volume (veh/h)	9	9	544	75	75	587	
Future Volume (Veh/h)	9	9	544	75	75	587	
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)	10	10	591	82	82	638	
Pedestrians							
Lane Width (m)							
Walking Speed (m/s)							
Percent Blockage							
Right turn flare (veh)							
Median type			TWLTL			TWLTL	
Median storage veh			2			2	
Upstream signal (m)			251				
pX, platoon unblocked	0.91	0.91			0.91		
vC, conflicting volume	1115	336			673		
vC1, stage 1 conf vol	632						
vC2, stage 2 conf vol	483						
vCu, unblocked vol	925	68			439		
tC, single (s)	6.8	6.9			4.1		
tC, 2 stage (s)	5.8						
tF (s)	3.5	3.3			2.2		
p0 queue free %	98	99			92		
cM capacity (veh/h)	439	891			1015		
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	10	10	394	279	82	319	319
Volume Left	10	0	0	0	82	0	0
Volume Right	0	10	0	82	0	0	0
cSH	439	891	1700	1700	1015	1700	1700
Volume to Capacity	0.02	0.01	0.23	0.16	0.08	0.19	0.19
Queue Length 95th (m)	0.5	0.3	0.0	0.0	2.0	0.0	0.0
Control Delay (s)	13.4	9.1	0.0	0.0	8.9	0.0	0.0
Lane LOS	B	A			A		
Approach Delay (s)	11.2		0.0		1.0		
Approach LOS	B						
Intersection Summary							
Average Delay			0.7				
Intersection Capacity Utilization			34.9%	ICU Level of Service	A		
Analysis Period (min)			15				

HCM Signalized Intersection Capacity Analysis
 10: Bryne Drive & Caplan Avenue

2043 Total Conditions
 Weekday AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↕	↗	↖	↕	
Traffic Volume (vph)	96	368	114	57	279	37	136	485	74	20	541	35
Future Volume (vph)	96	368	114	57	279	37	136	485	74	20	541	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.96		1.00	0.98		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1817		1789	1850		1789	3508		1789	3546	
Flt Permitted	0.39	1.00		0.15	1.00		0.27	1.00		0.40	1.00	
Satd. Flow (perm)	727	1817		280	1850		504	3508		757	3546	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	104	400	124	62	303	40	148	527	80	22	588	38
RTOR Reduction (vph)	0	13	0	0	6	0	0	12	0	0	5	0
Lane Group Flow (vph)	104	511	0	62	337	0	148	595	0	22	621	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	32.2	26.9		32.2	26.9		39.0	32.4		30.5	27.9	
Effective Green, g (s)	32.2	26.9		32.2	26.9		39.0	32.4		30.5	27.9	
Actuated g/C Ratio	0.37	0.31		0.37	0.31		0.45	0.37		0.35	0.32	
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	333	560		195	570		330	1303		295	1134	
v/s Ratio Prot	0.02	c0.28		c0.02	0.18		c0.04	0.17		0.00	c0.18	
v/s Ratio Perm	0.10			0.10			0.16			0.02		
v/c Ratio	0.31	0.91		0.32	0.59		0.45	0.46		0.07	0.55	
Uniform Delay, d1	18.8	29.0		20.1	25.5		15.4	20.7		18.7	24.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.5	19.2		0.9	1.7		1.0	1.2		0.1	1.9	
Delay (s)	19.4	48.2		21.1	27.2		16.4	21.9		18.8	26.4	
Level of Service	B	D		C	C		B	C		B	C	
Approach Delay (s)		43.5			26.2			20.8			26.1	
Approach LOS		D			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	29.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	87.2	Sum of lost time (s)	20.0
Intersection Capacity Utilization	76.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 11: Bryne Drive & Mapleview Drive

2043 Total Conditions
 Weekday AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↖↖		↖	↖↖↖		↖	↖↖		↖	↖↖	
Traffic Volume (vph)	133	1122	185	503	997	364	58	54	227	284	143	124
Future Volume (vph)	133	1122	185	503	997	364	58	54	227	284	143	124
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	5.0		3.0	5.0		3.0	5.0		3.0	5.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	0.98		1.00	0.96		1.00	0.88		1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	5033		1789	4935		1789	3145		1789	3329	
Flt Permitted	0.17	1.00		0.12	1.00		0.57	1.00		0.29	1.00	
Satd. Flow (perm)	312	5033		221	4935		1082	3145		538	3329	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	145	1220	201	547	1084	396	63	59	247	309	155	135
RTOR Reduction (vph)	0	17	0	0	45	0	0	221	0	0	108	0
Lane Group Flow (vph)	145	1404	0	547	1435	0	63	85	0	309	182	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	40.8	31.1		63.1	50.4		17.2	11.0		29.5	20.3	
Effective Green, g (s)	40.8	31.1		63.1	50.4		17.2	11.0		29.5	20.3	
Actuated g/C Ratio	0.40	0.30		0.62	0.49		0.17	0.11		0.29	0.20	
Clearance Time (s)	3.0	5.0		3.0	5.0		3.0	5.0		3.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	263	1525		579	2424		224	337		343	658	
v/s Ratio Prot	0.05	0.28		c0.27	0.29		0.02	0.03		c0.14	0.05	
v/s Ratio Perm	0.17			c0.31			0.03			c0.12		
v/c Ratio	0.55	0.92		0.94	0.59		0.28	0.25		0.90	0.28	
Uniform Delay, d1	20.3	34.6		28.3	18.7		36.8	42.0		31.8	34.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.5	10.5		24.3	1.1		0.7	0.4		25.5	0.2	
Delay (s)	22.7	45.1		52.6	19.8		37.5	42.4		57.3	35.1	
Level of Service	C	D		D	B		D	D		E	D	
Approach Delay (s)		43.0			28.7			41.6			46.6	
Approach LOS		D			C			D			D	
























Intersection Summary

HCM 2000 Control Delay	37.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	102.6	Sum of lost time (s)	16.0
Intersection Capacity Utilization	93.2%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 1: Essa Road & Ardagh Road/Bryne Drive

2043 Total Conditions
 Weekday PM Peak Hour
























													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	274	424	133	290	269	517	102	847	135	483	1092	572	
Future Volume (vph)	274	424	133	290	269	517	102	847	135	483	1092	572	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00	
Frt	1.00	0.96		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1789	3450		1789	3579	1601	1789	3579	1601	3471	3579	1601	
Flt Permitted	0.58	1.00		0.18	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (perm)	1095	3450		348	3579	1601	1789	3579	1601	3471	3579	1601	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	
Adj. Flow (vph)	282	437	137	299	277	533	105	873	139	498	1126	590	
RTOR Reduction (vph)	0	27	0	0	0	287	0	0	97	0	0	278	
Lane Group Flow (vph)	282	547	0	299	277	246	105	873	42	498	1126	312	
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	
Protected Phases	7	4		3	8		5	2		1	6		
Permitted Phases	4			8		8			2			6	
Actuated Green, G (s)	33.1	23.1		41.8	27.8	27.8	9.5	33.1	33.1	19.6	43.2	43.2	
Effective Green, g (s)	33.1	23.1		41.8	27.8	27.8	9.5	33.1	33.1	19.6	43.2	43.2	
Actuated g/C Ratio	0.30	0.21		0.38	0.25	0.25	0.09	0.30	0.30	0.18	0.39	0.39	
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	390	721		323	900	402	153	1072	479	615	1399	625	
v/s Ratio Prot	0.07	0.16		c0.12	0.08		0.06	0.24		c0.14	c0.31		
v/s Ratio Perm	0.15			c0.23		0.15			0.03			0.19	
v/c Ratio	0.72	0.76		0.93	0.31	0.61	0.69	0.81	0.09	0.81	0.80	0.50	
Uniform Delay, d1	32.6	41.1		27.4	33.5	36.6	49.1	35.9	27.8	43.7	29.9	25.5	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	6.5	4.6		31.3	0.2	2.8	12.0	6.8	0.4	7.8	5.0	2.8	
Delay (s)	39.1	45.7		58.7	33.7	39.4	61.1	42.7	28.2	51.4	34.9	28.3	
Level of Service	D	D		E	C	D	E	D	C	D	C	C	
Approach Delay (s)		43.5			43.2			42.6			36.9		
Approach LOS		D			D			D			D		
Intersection Summary													
HCM 2000 Control Delay			40.5		HCM 2000 Level of Service						D		
HCM 2000 Volume to Capacity ratio			0.91										
Actuated Cycle Length (s)			110.5		Sum of lost time (s)						20.0		
Intersection Capacity Utilization			85.9%		ICU Level of Service						E		
Analysis Period (min)			15										

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

2: Veterans Drive & Harvie Road




















2043 Total Conditions
Weekday PM Peak Hour

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	77	459	256	140	551	537	220	527	125	432	729	78	
Future Volume (vph)	77	459	256	140	551	537	220	527	125	432	729	78	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0		
Lane Util. Factor	1.00	0.95		1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95		
Frt	1.00	0.95		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1789	3386		1789	1883	1601	1789	3579	1601	1789	3527		
Flt Permitted	0.11	1.00		0.17	1.00	1.00	0.19	1.00	1.00	0.17	1.00		
Satd. Flow (perm)	213	3386		312	1883	1601	363	3579	1601	322	3527		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	84	499	278	152	599	584	239	573	136	470	792	85	
RTOR Reduction (vph)	0	61	0	0	0	306	0	0	109	0	7	0	
Lane Group Flow (vph)	84	716	0	152	599	278	239	573	27	470	870	0	
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		
Protected Phases	7	4		3	8		5	2		1	6		
Permitted Phases	4			8		8	2		2	6			
Actuated Green, G (s)	40.7	35.3		49.3	39.9	39.9	36.5	22.8	22.8	52.5	34.8		
Effective Green, g (s)	40.7	35.3		49.3	39.9	39.9	36.5	22.8	22.8	52.5	34.8		
Actuated g/C Ratio	0.36	0.31		0.43	0.35	0.35	0.32	0.20	0.20	0.46	0.31		
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	150	1050		264	660	561	288	717	320	479	1078		
v/s Ratio Prot	0.03	0.21		c0.05	c0.32		0.10	0.16		c0.22	0.25		
v/s Ratio Perm	0.17			0.20		0.17	0.17		0.02	c0.23			
v/c Ratio	0.56	0.68		0.58	0.91	0.50	0.83	0.80	0.09	0.98	0.81		
Uniform Delay, d1	28.0	34.3		22.5	35.2	29.0	30.9	43.3	37.0	31.0	36.4		
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
Incremental Delay, d2	4.7	3.6		3.0	18.5	3.1	17.6	6.2	0.1	36.1	4.5		
Delay (s)	32.7	37.9		25.5	53.7	32.2	48.6	49.5	37.1	67.1	40.9		
Level of Service	C	D		C	D	C	D	D	D	E	D		
Approach Delay (s)		37.4			41.1			47.5			50.0		
Approach LOS		D			D			D			D		
Intersection Summary													
HCM 2000 Control Delay			44.4									HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio			0.96										
Actuated Cycle Length (s)			113.8									Sum of lost time (s)	20.0
Intersection Capacity Utilization			90.0%									ICU Level of Service	E
Analysis Period (min)			15										

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
3: Thrushwood Drive & Harvie Road

2043 Total Conditions
Weekday PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	34	926	56	7	1175	73	33	9	44	42	5	19
Future Volume (Veh/h)	34	926	56	7	1175	73	33	9	44	42	5	19
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	37	1007	61	8	1277	79	36	10	48	46	5	21
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type												
	TWLTL					TWLTL						
Median storage veh	2					2						
Upstream signal (m)	318					401						
pX, platoon unblocked	0.75			0.96			0.77	0.77	0.96	0.77	0.77	0.75
vC, conflicting volume	1356			1068			1790	2484	534	1963	2474	678
vC1, stage 1 conf vol							1112	1112		1332	1332	
vC2, stage 2 conf vol							678	1372		630	1142	
vCu, unblocked vol	801			996			1208	2114	442	1434	2102	0
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	94			99			83	94	91	79	97	97
cM capacity (veh/h)	611			666			213	182	543	219	193	811
Direction, Lane #												
	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1				
Volume Total	37	671	397	8	851	505	94	72				
Volume Left	37	0	0	8	0	0	36	46				
Volume Right	0	0	61	0	0	79	48	21				
cSH	611	1700	1700	666	1700	1700	301	275				
Volume to Capacity	0.06	0.39	0.23	0.01	0.50	0.30	0.31	0.26				
Queue Length 95th (m)	1.5	0.0	0.0	0.3	0.0	0.0	9.9	7.8				
Control Delay (s)	11.3	0.0	0.0	10.5	0.0	0.0	22.3	22.6				
Lane LOS	B			B			C	C				
Approach Delay (s)	0.4			0.1			22.3	22.6				
Approach LOS							C	C				
Intersection Summary												
Average Delay			1.6									
Intersection Capacity Utilization		47.7%			ICU Level of Service			A				
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

4: Bryne Drive & Harvie Road

2043 Total Conditions
Weekday PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	74	1053	42	226	1062	212	179	635	301	170	643	167
Future Volume (vph)	74	1053	42	226	1062	212	179	635	301	170	643	167
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91	0.91
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1789	3579	1601	1789	3579	1601	1789	3579	1601	1789	3415	1457
Flt Permitted	0.14	1.00	1.00	0.09	1.00	1.00	0.14	1.00	1.00	0.17	1.00	1.00
Satd. Flow (perm)	257	3579	1601	166	3579	1601	263	3579	1601	329	3415	1457
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	80	1145	46	246	1154	230	195	690	327	185	699	182
RTOR Reduction (vph)	0	0	29	0	0	97	0	0	197	0	2	124
Lane Group Flow (vph)	80	1145	17	246	1154	133	195	690	130	185	715	40
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)	47.5	41.5	41.5	60.3	50.3	50.3	39.6	28.7	28.7	39.0	28.4	28.4
Effective Green, g (s)	47.5	41.5	41.5	60.3	50.3	50.3	39.6	28.7	28.7	39.0	28.4	28.4
Actuated g/C Ratio	0.41	0.36	0.36	0.52	0.44	0.44	0.34	0.25	0.25	0.34	0.25	0.25
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	185	1284	574	294	1557	696	233	888	397	244	838	357
v/s Ratio Prot	0.02	c0.32		c0.11	0.32		c0.08	0.19		0.07	c0.21	
v/s Ratio Perm	0.16		0.01	0.33		0.08	0.21		0.08	0.19		0.03
v/c Ratio	0.43	0.89	0.03	0.84	0.74	0.19	0.84	0.78	0.33	0.76	0.85	0.11
Uniform Delay, d1	22.8	34.9	24.0	31.3	27.2	20.1	30.1	40.5	35.6	29.7	41.6	33.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.6	9.6	0.1	18.3	3.2	0.6	22.2	4.3	0.5	12.6	8.4	0.1
Delay (s)	24.4	44.6	24.1	49.6	30.4	20.7	52.2	44.8	36.0	42.4	50.1	34.0
Level of Service	C	D	C	D	C	C	D	D	D	D	D	C
Approach Delay (s)		42.6			32.0			43.6			46.3	
Approach LOS		D			C			D			D	
Intersection Summary												
HCM 2000 Control Delay			40.2		HCM 2000 Level of Service					D		
HCM 2000 Volume to Capacity ratio			0.87									
Actuated Cycle Length (s)			115.6		Sum of lost time (s)					20.0		
Intersection Capacity Utilization			92.0%		ICU Level of Service					F		
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

5: Harvie Road & Fairview Road

2043 Total Conditions
Weekday PM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↗	↑↑	↑↑	↗	↗	↗
Traffic Volume (vph)	245	1280	1299	667	452	201
Future Volume (vph)	245	1280	1299	667	452	201
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1789	3579	3579	1601	1789	1601
Flt Permitted	0.08	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	144	3579	3579	1601	1789	1601
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	266	1391	1412	725	491	218
RTOR Reduction (vph)	0	0	0	247	0	151
Lane Group Flow (vph)	266	1391	1412	478	491	67
Turn Type	pm+pt	NA	NA	Perm	Perm	Perm
Protected Phases	7	4	8			
Permitted Phases	4			8	6	6
Actuated Green, G (s)	67.2	67.2	48.3	48.3	35.1	35.1
Effective Green, g (s)	67.2	67.2	48.3	48.3	35.1	35.1
Actuated g/C Ratio	0.59	0.59	0.42	0.42	0.31	0.31
Clearance Time (s)	4.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	299	2104	1512	676	549	491
v/s Ratio Prot	c0.12	0.39	0.39			
v/s Ratio Perm	c0.41			0.30	c0.27	0.04
v/c Ratio	0.89	0.66	0.93	0.71	0.89	0.14
Uniform Delay, d1	34.4	15.9	31.5	27.2	37.8	28.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	25.8	1.7	12.0	6.1	16.9	0.1
Delay (s)	60.2	17.5	43.5	33.3	54.7	28.8
Level of Service	E	B	D	C	D	C
Approach Delay (s)		24.4	40.0		46.7	
Approach LOS		C	D		D	

Intersection Summary

















HCM 2000 Control Delay	35.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	114.3	Sum of lost time (s)	16.0
Intersection Capacity Utilization	87.9%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis

6: Thrushwood Drive & Cranberry Lane

2043 Total Conditions
Weekday PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	3	9	1	52	12	13	2	20	58	17	27	6
Future Volume (Veh/h)	3	9	1	52	12	13	2	20	58	17	27	6
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	10	1	57	13	14	2	22	63	18	29	7
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	146	158	32	132	130	54	36			85		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	146	158	32	132	130	54	36			85		
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 %	100	99	100	93	98	99	100			99		
cM capacity (veh/h)	792	725	1041	822	751	1014	1575			1512		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	14	84	87	54								
Volume Left	3	57	2	18								
Volume Right	1	14	63	7								
cSH	755	836	1575	1512								
Volume to Capacity	0.02	0.10	0.00	0.01								
Queue Length 95th (m)	0.4	2.5	0.0	0.3								
Control Delay (s)	9.9	9.8	0.2	2.5								
Lane LOS	A	A	A	A								
Approach Delay (s)	9.9	9.8	0.2	2.5								
Approach LOS	A	A										
Intersection Summary												
Average Delay			4.7									
Intersection Capacity Utilization			26.6%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis
7: Bryne Drive & Cranberry Lane

2043 Total Conditions
Weekday PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	73	1	61	185	10	195	96	847	14	15	781	115
Future Volume (vph)	73	1	61	185	10	195	96	847	14	15	781	115
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.85		1.00	0.86		1.00	1.00		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1605		1789	1615		1789	3570		1789	3510	
Flt Permitted	0.87	1.00		0.56	1.00		0.29	1.00		0.18	1.00	
Satd. Flow (perm)	1638	1605		1046	1615		554	3570		343	3510	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	79	1	66	201	11	212	104	921	15	16	849	125
RTOR Reduction (vph)	0	61	0	0	187	0	0	1	0	0	13	0
Lane Group Flow (vph)	79	6	0	201	36	0	104	935	0	16	961	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		pm+pt	NA	
Protected Phases	7	4		3	8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	7.3	4.6		12.5	7.2		26.4	26.4		33.2	33.2	
Effective Green, g (s)	7.3	4.6		12.5	7.2		26.4	26.4		33.2	33.2	
Actuated g/C Ratio	0.12	0.08		0.20	0.12		0.43	0.43		0.54	0.54	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	202	120		278	190		239	1542		205	1907	
v/s Ratio Prot	0.02	0.00		c0.06	0.02			c0.26		0.00	c0.27	
v/s Ratio Perm	0.03			c0.09			0.19			0.04		
v/c Ratio	0.39	0.05		0.72	0.19		0.44	0.61		0.08	0.50	
Uniform Delay, d1	24.8	26.2		22.2	24.3		12.1	13.4		7.9	8.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.3	0.2		9.0	0.5		5.7	1.8		0.2	1.0	
Delay (s)	26.0	26.4		31.1	24.8		17.8	15.1		8.0	9.7	
Level of Service	C	C		C	C		B	B		A	A	
Approach Delay (s)		26.2			27.8			15.4			9.7	
Approach LOS		C			C			B			A	

Intersection Summary

HCM 2000 Control Delay	15.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	61.1	Sum of lost time (s)	24.0
Intersection Capacity Utilization	67.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

8: Veterans Drive & Mapleton Drive/Brookwood Drive

2043 Total Conditions
Weekday PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	22	23	168	90	22	24	297	1165	138	31	1142	29
Future Volume (vph)	22	23	168	90	22	24	297	1165	138	31	1142	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0			6.0	6.0	4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00			1.00	1.00	1.00	0.95		1.00	0.95	
Frt	1.00	0.87			1.00	0.85	1.00	0.98		1.00	1.00	
Flt Protected	0.95	1.00			0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1635			1811	1601	1789	3522		1789	3565	
Flt Permitted	0.54	1.00			0.64	1.00	0.10	1.00		0.13	1.00	
Satd. Flow (perm)	1011	1635			1198	1601	183	3522		246	3565	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	24	25	183	98	24	26	323	1266	150	34	1241	32
RTOR Reduction (vph)	0	138	0	0	0	22	0	7	0	0	2	0
Lane Group Flow (vph)	24	70	0	0	122	4	323	1409	0	34	1271	0
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	21.5	21.5			15.1	15.1	54.3	47.9		39.5	37.1	
Effective Green, g (s)	21.5	21.5			15.1	15.1	54.3	47.9		39.5	37.1	
Actuated g/C Ratio	0.24	0.24			0.17	0.17	0.62	0.55		0.45	0.42	
Clearance Time (s)	4.0	6.0			6.0	6.0	4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	268	400			206	275	354	1921		152	1506	
v/s Ratio Prot	0.00	c0.04					c0.14	0.40		0.01	0.36	
v/s Ratio Perm	0.02				c0.10	0.00	c0.43			0.09		
v/c Ratio	0.09	0.17			0.59	0.02	0.91	0.73		0.22	0.84	
Uniform Delay, d1	25.5	26.2			33.5	30.2	24.4	15.1		14.4	22.8	
Progression Factor	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.2			4.5	0.0	26.9	2.5		0.7	6.0	
Delay (s)	25.6	26.4			38.0	30.2	51.3	17.6		15.1	28.7	
Level of Service	C	C			D	C	D	B		B	C	
Approach Delay (s)		26.3			36.6			23.9			28.4	
Approach LOS		C			D			C			C	

Intersection Summary

HCM 2000 Control Delay	26.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	87.8	Sum of lost time (s)	20.0
Intersection Capacity Utilization	87.2%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis

9: Bryne Drive & Bryne Court

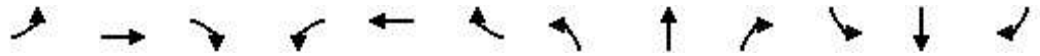
2043 Total Conditions
Weekday PM Peak Hour



Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations							
Traffic Volume (veh/h)	58	58	682	4	4	994	
Future Volume (Veh/h)	58	58	682	4	4	994	
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)	63	63	741	4	4	1080	
Pedestrians							
Lane Width (m)							
Walking Speed (m/s)							
Percent Blockage							
Right turn flare (veh)							
Median type			TWLTL		TWLTL		
Median storage veh)			2		2		
Upstream signal (m)			251				
pX, platoon unblocked	0.95	0.95			0.95		
vC, conflicting volume	1291	372			745		
vC1, stage 1 conf vol	743						
vC2, stage 2 conf vol	548						
vCu, unblocked vol	1207	243			634		
tC, single (s)	6.8	6.9			4.1		
tC, 2 stage (s)	5.8						
tF (s)	3.5	3.3			2.2		
p0 queue free %	83	91			100		
cM capacity (veh/h)	379	722			901		
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	63	63	494	251	4	540	540
Volume Left	63	0	0	0	4	0	0
Volume Right	0	63	0	4	0	0	0
cSH	379	722	1700	1700	901	1700	1700
Volume to Capacity	0.17	0.09	0.29	0.15	0.00	0.32	0.32
Queue Length 95th (m)	4.5	2.2	0.0	0.0	0.1	0.0	0.0
Control Delay (s)	16.4	10.5	0.0	0.0	9.0	0.0	0.0
Lane LOS	C	B			A		
Approach Delay (s)	13.4		0.0		0.0		
Approach LOS	B						
Intersection Summary							
Average Delay			0.9				
Intersection Capacity Utilization			37.5%		ICU Level of Service		A
Analysis Period (min)			15				

HCM Signalized Intersection Capacity Analysis
 10: Bryne Drive & Caplan Avenue

2043 Total Conditions
 Weekday PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	181	219	152	134	299	163	167	413	98	122	767	163
Future Volume (vph)	181	219	152	134	299	163	167	413	98	122	767	163
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.94		1.00	0.95		1.00	0.97		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1768		1789	1784		1789	3475		1789	3485	
Flt Permitted	0.16	1.00		0.28	1.00		0.14	1.00		0.36	1.00	
Satd. Flow (perm)	292	1768		522	1784		260	3475		674	3485	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	197	238	165	146	325	177	182	449	107	133	834	177
RTOR Reduction (vph)	0	28	0	0	22	0	0	23	0	0	20	0
Lane Group Flow (vph)	197	375	0	146	480	0	182	533	0	133	991	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	32.8	25.8		32.8	25.8		36.0	29.0		36.0	29.0	
Effective Green, g (s)	32.8	25.8		32.8	25.8		36.0	29.0		36.0	29.0	
Actuated g/C Ratio	0.37	0.29		0.37	0.29		0.41	0.33		0.41	0.33	
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	225	513		292	518		225	1134		361	1138	
v/s Ratio Prot	c0.07	0.21		0.04	c0.27		c0.06	0.15		0.03	c0.28	
v/s Ratio Perm	0.25			0.14			0.26			0.12		
v/c Ratio	0.88	0.73		0.50	0.93		0.81	0.47		0.37	0.87	
Uniform Delay, d1	22.2	28.4		20.2	30.6		20.2	23.8		17.2	28.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	29.3	5.3		1.3	22.7		18.9	1.4		0.6	9.2	
Delay (s)	51.5	33.7		21.6	53.3		39.1	25.2		17.8	37.4	
Level of Service	D	C		C	D		D	C		B	D	
Approach Delay (s)		39.5			46.1			28.6			35.1	
Approach LOS		D			D			C			D	

Intersection Summary

HCM 2000 Control Delay	36.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	88.8	Sum of lost time (s)	20.0
Intersection Capacity Utilization	88.0%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 11: Bryne Drive & Mapleview Drive

2043 Total Conditions
 Weekday PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↗	↗↗↗		↗	↗↗↗		↗	↗↗		↗	↗↗	
Traffic Volume (vph)	136	1128	231	423	1624	298	282	151	643	468	132	239
Future Volume (vph)	136	1128	231	423	1624	298	282	151	643	468	132	239
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	5.0		3.0	5.0		3.0	5.0		3.0	5.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	0.97		1.00	0.98		1.00	0.88		1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	5011		1789	5022		1789	3144		1789	3233	
Flt Permitted	0.08	1.00		0.07	1.00		0.46	1.00		0.12	1.00	
Satd. Flow (perm)	142	5011		135	5022		874	3144		235	3233	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	143	1187	243	445	1709	314	297	159	677	493	139	252
RTOR Reduction (vph)	0	21	0	0	18	0	0	209	0	0	145	0
Lane Group Flow (vph)	143	1409	0	445	2005	0	297	627	0	493	246	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	64.1	53.0		81.0	66.9		49.4	29.0		59.0	35.6	
Effective Green, g (s)	64.1	53.0		81.0	66.9		49.4	29.0		59.0	35.6	
Actuated g/C Ratio	0.43	0.35		0.54	0.45		0.33	0.19		0.39	0.24	
Clearance Time (s)	3.0	5.0		3.0	5.0		3.0	5.0		3.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	182	1770		348	2239		412	607		372	767	
v/s Ratio Prot	0.06	0.28		c0.21	0.40		0.10	0.20		c0.24	0.08	
v/s Ratio Perm	0.28			c0.48			0.14			c0.28		
v/c Ratio	0.79	0.80		1.28	0.90		0.72	1.31dr		1.33	0.32	
Uniform Delay, d1	33.9	43.6		49.4	38.3		40.5	60.5		47.1	47.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	19.6	3.8		145.8	6.1		6.1	45.3		164.0	0.2	
Delay (s)	53.5	47.5		195.2	44.4		46.6	105.8		211.1	47.5	
Level of Service	D	D		F	D		D	F		F	D	
Approach Delay (s)		48.0			71.6			90.3			138.7	
Approach LOS		D			E			F			F	

Intersection Summary

HCM 2000 Control Delay	78.8	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.35		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	132.7%	ICU Level of Service	H
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

c Critical Lane Group

Appendix G: Traffic Signal Warrants

GENERAL INFORMATION			
Analyst	Matt Buttrum	Jurisdiction/Area	Barrie, ON
Agency or Company	Tatham Engineering	East-West Street	Cranberry Lane
Analysis Period	2033 Total Conditions	North-South Street	Bryne Drive
Flow Conditions	Restricted flow (urban)	Major Street	Bryne Drive
T Intersection	No	Approach Lanes per Direction	2
Additional Comments		Hours of Traffic Volume Data	AM & PM peaks only

JUSTIFICATION 1 - MINIMUM VEHICLE VOLUME													
JUSTIFICATION	GUIDANCE	HOURLY ENDING								No. of hours with compliance			
		AM Peak	Hour 2	Hour 3	Hour 4	Hour 5	Hour 6	Hour 7	PM Peak				
1A	TOTAL TRAFFIC VOLUME ENTERING INTERSECTION (vph) (2 way Total)	1706	962	962	962	962	962	962	962	2140	100%	80%+	Average Compliance
	COMPLIANCE % $\frac{VOL \times 100}{720}$ OR $\frac{VOL \times 100}{900}$ <small>(1 lane approach on main road) (2 or more lane approach on main road)</small>	100%	100%	100%	100%	100%	100%	100%	100%	100%	8	8	100%
1B	TRAFFIC VOLUME ON MINOR STREET (vph) (2 way Total)	279	202	202	202	202	202	202	202	528	100%	80%+	Average Compliance
	COMPLIANCE % $\frac{VOL \times 100}{170}$ OR $\frac{VOL \times 100}{255}$ <small>(full intersection) (tee intersection)</small>	100%	100%	100%	100%	100%	100%	100%	100%	100%	8	8	100%
(RESTRICTED FLOW)		BOTH 1A AND 1B 100% FULFILLED EACH OF 8 HOURS										YES	
SIGNAL JUSTIFICATION 1:		LESSER OF 1A OR 1B AT LEAST 80% FULFILLED EACH OF 8 HOURS										YES	

JUSTIFICATION 2 - DELAY TO CROSS TRAFFIC													
JUSTIFICATION	GUIDANCE	HOURLY ENDING								No. of hours with compliance			
		Hour 1	Hour 2	Hour 3	Hour 4	Hour 5	Hour 6	Hour 7	Hour 8				
2A	MAIN ROAD TRAFFIC VOLUME (vph) (2 way Total)	1427	760	760	760	760	760	760	760	1612	100%	80%+	Average Compliance
	COMPLIANCE % $\frac{VOL \times 100}{720}$ OR $\frac{VOL \times 100}{900}$ <small>(1 lane approach on main road) (2 or more lane approach on main road)</small>	100%	84%	84%	84%	84%	84%	84%	84%	100%	2	8	88%
2B	CROSSING TRAFFIC VOLUME (vph) (2 way Total)	160	108	108	108	108	108	108	108	270	100%	80%+	Average Compliance
	COMPLIANCE % $\frac{VOL \times 100}{75}$	100%	100%	100%	100%	100%	100%	100%	100%	100%	8	8	100%
(RESTRICTED FLOW)		BOTH 2A AND 2B 100% FULFILLED EACH OF 8 HOURS										NO	
SIGNAL JUSTIFICATION 2:		LESSER OF 2A OR 2B AT LEAST 80% FULFILLED EACH OF 8 HOURS										YES	

JUSTIFICATION 3 - COLLISION EXPERIENCE			
A. Number of reportable collisions susceptible to prevention by a traffic signal.	Preceding Months	Number of Collisions	% Fulfillment
	1 - 12	-	-
	13 - 24	-	-
	25 - 36	-	-
	annual average	-	-
B. Adequate trial of less restrictive remedies has failed to reduce collision frequency.	<input type="checkbox"/> YES	<input type="checkbox"/> NO	n/a
C. Either Justification 1 (Minimum Vehicular Volume) or Justification 2 (Delay to Cross Traffic) satisfied to 80% or more.	<input type="checkbox"/> YES	<input type="checkbox"/> NO	n/a
SIGNAL JUSTIFICATION 3:	ALL OF 3A, 3B & 3C FULFILLED TO 100%?		NO

JUSTIFICATION 4 - COMBINATION JUSTIFICATION		
JUSTIFICATION SATISFIED 80% OR MORE		Two Justifications Satisfied 80% or more
Justification 1 - Minimum Vehicle Volume	YES	YES
Justification 2 - Delay to Cross Traffic	YES	
Justification 3 - Collision Experience	-	

JUSTIFICATION SUMMARY	
ARE TRAFFIC SIGNALS JUSTIFIED FOR THE INTERSECTION IN QUESTION?	YES