3387 Borrisokane Road Community Transportation Study / Transportation Impact Study

Prepared for:
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Prepared by:
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Project No. 163601067

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1.0 INTRODUCTION

1.1 STUDY PURPOSE

Glenview Homes (Cedarview) Ltd. (Glenview) is preparing a development application for a proposed residential development in the Barrhaven South Community of Ottawa, Ontario. As part of the approvals process a combined Community Transportation Study (CTS) / Transportation Impact Study (TIS) is required to support the application.

This CTS / TIS has been prepared to assess the potential transportation implications of the proposed residential development and to determine whether transportation improvements are required to support it.

1.2 PROPOSED DEVELOPMENT

Figure 1 illustrates the location of the subject development.

The proposed development is located at 3387 Borrisokane Road in the City of Ottawa's south end. The site is bound by the Jock River to the north, Mattamy's Half Moon Bay West development to the east and south, and Borrisokane Road to the west. It should be noted that prior to June 2016, Borrisokane Road was called Cedarview Road.

The proposed Glenview development is anticipated to be constructed by 2022 which coincides with the timing of the adjacent Half Moon Bay West development. This provides the opportunity for transportation infrastructure to be implemented consistently and concurrently between the two adjacent developments.

1.2.1 Site Plan Concepts

Glenview is considering three separate concepts for their subdivision, each with varying quantities of residential units. All three concepts are planned to access the boundary road network (i.e. Borrisokane Road) at the same location, which is located approximately 400m north of Cambrian Road.

The first concept includes a stormwater management pond, a school block, and 211 residential units. The second concept includes a school block and 222 residential units but no stormwater management pond. The third concept includes 288 residential units but no stormwater management pond or school block. The unit counts shown in the concepts are approximate and may be refined through the subdivision design process to accommodate servicing requirements (i.e. easements, grading, etc.), that would in turn trigger minor revisions to the proposed lot fabric and consequently unit counts.

All three concepts include the same road network and are planned to access Borrisokane Road at the same location. In addition, all three concepts are proposed to have three internal connections to Mattamy's Half Moon Bay West development.

From a transportation perspective, the third concept represents the most conservative concept in that it has the highest number of residential units and will therefore generate the highest volume of vehicular trips. For this reason, the subject CTS / TIS will be based on the third concept which includes 288 residential homes, consisting of 179 single family homes and 109 townhomes.

Figure 2 depicts the site plan for the proposed concept 3.

Figure 1 Site Location

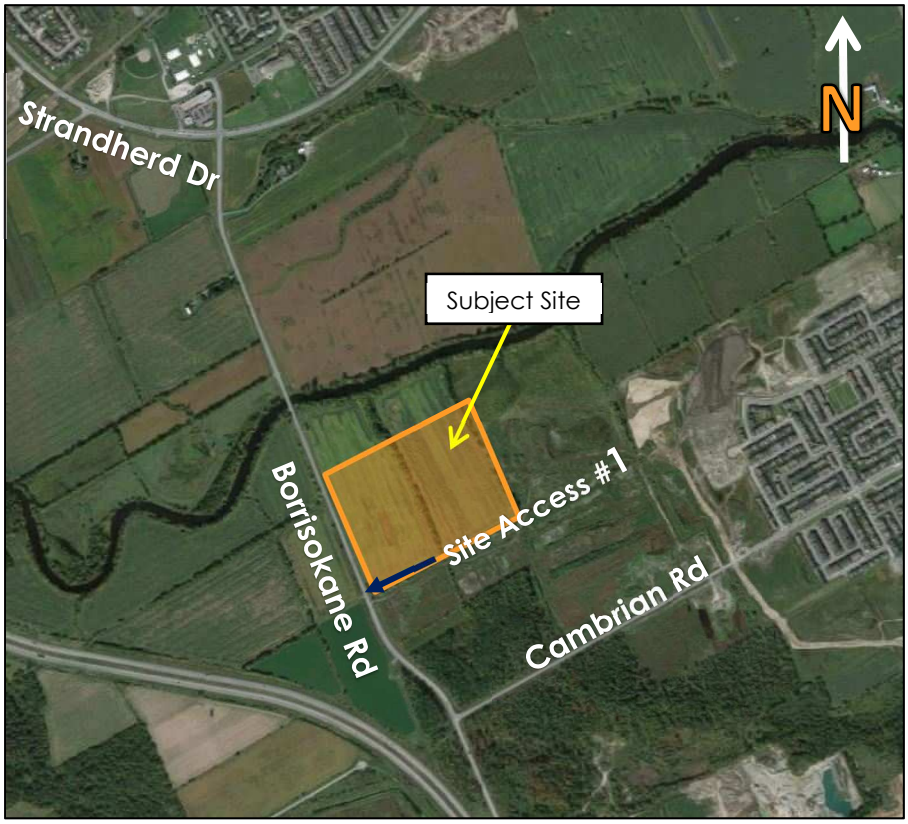
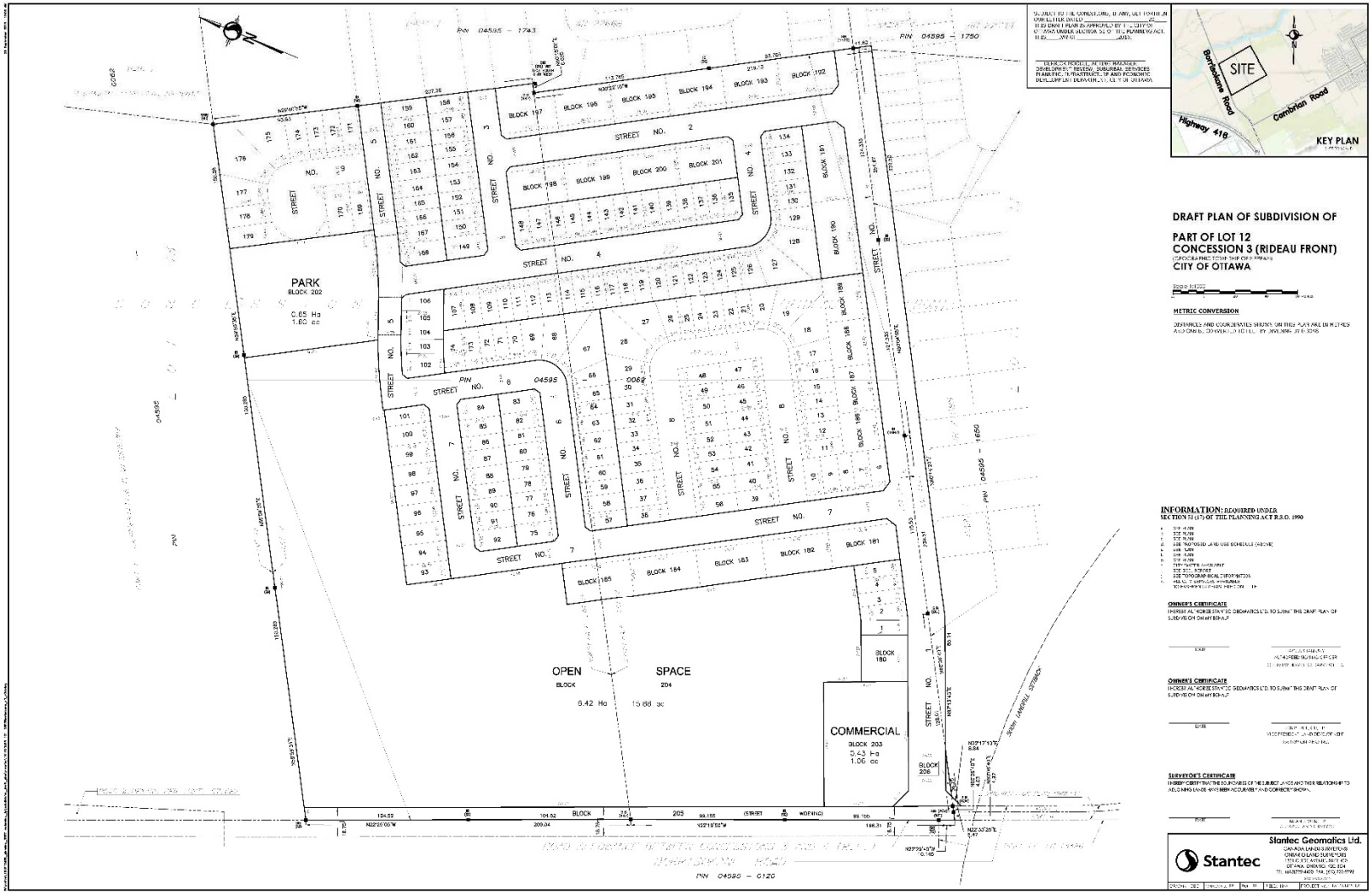


Figure 2 Proposed Site Plan



1.3 SCOPE OF THE ASSESSMENT

This CTS / TIS has been carried out in accordance with the City of Ottawa's *2006 Transportation Impact Assessment (TIA) Guidelines* and is based on a pre-consultation meeting with City of Ottawa staff. The scope of the transportation assessment, which was discussed with City staff, includes the following:

- Study area intersections include:
    - Borrisokane Road at Strandherd Drive;
    - Borrisokane Road at Proposed Site Access #1; and
    - Borrisokane Road at Cambrian Road.
- Study horizons include:
    - 2016 existing conditions;
    - 2022 future background conditions;
    - 2022 total future conditions (site build-out); and
    - 2027 total future conditions (5 years beyond build-out).
- Jock River screenline analysis from Borrisokane Road to Prince of Wales Drive
- Analysis time periods include the weekday AM and PM peak hours

The methodology used in the TIS includes:

- The net increase in site traffic from the proposed development will be estimated;
- Background traffic growth will be explicitly accounted for based on known developments in the study area;
- Future background traffic volumes will be combined with the net increase in site traffic volumes to determine total future traffic volumes;
- Intersection analyses will be performed to determine the operating characteristics of the study area intersections under each study horizon; and
- Where operational deficiencies are identified mitigation measures will be examined.

2.0 EXISTING TRANSPORTATION ENVIRONMENT

2.1 ROADS AND TRAFFIC CONTROL

The roadways under consideration in the study area are described below:

Borrisokane Road	Within the vicinity of the subject site Borrisokane Road is a two-lane rural arterial road. It has a posted speed limit of 80 km/h and gravel shoulders are provided along both sides.
Strandherd Drive	Strandherd Drive is a two-lane rural arterial road with a posted speed limit of 80 km/h. Gravel shoulders are provided along both sides of the road and the intersection with Borrisokane Road is signalized.
Cambrian Road	West of Seeley's Bay Street Cambrian Road is a two-lane rural arterial road with a posted speed limit of 70 km/h. The intersection with Borrisokane Road is currently stop controlled along the minor approach (i.e. along Cambrian Road).

The road classifications noted above are referenced from Map 5 of the City of Ottawa's *2013 Transportation Master Plan*.

Figure 3 illustrates the existing intersection control and lane configuration for the study area intersections.

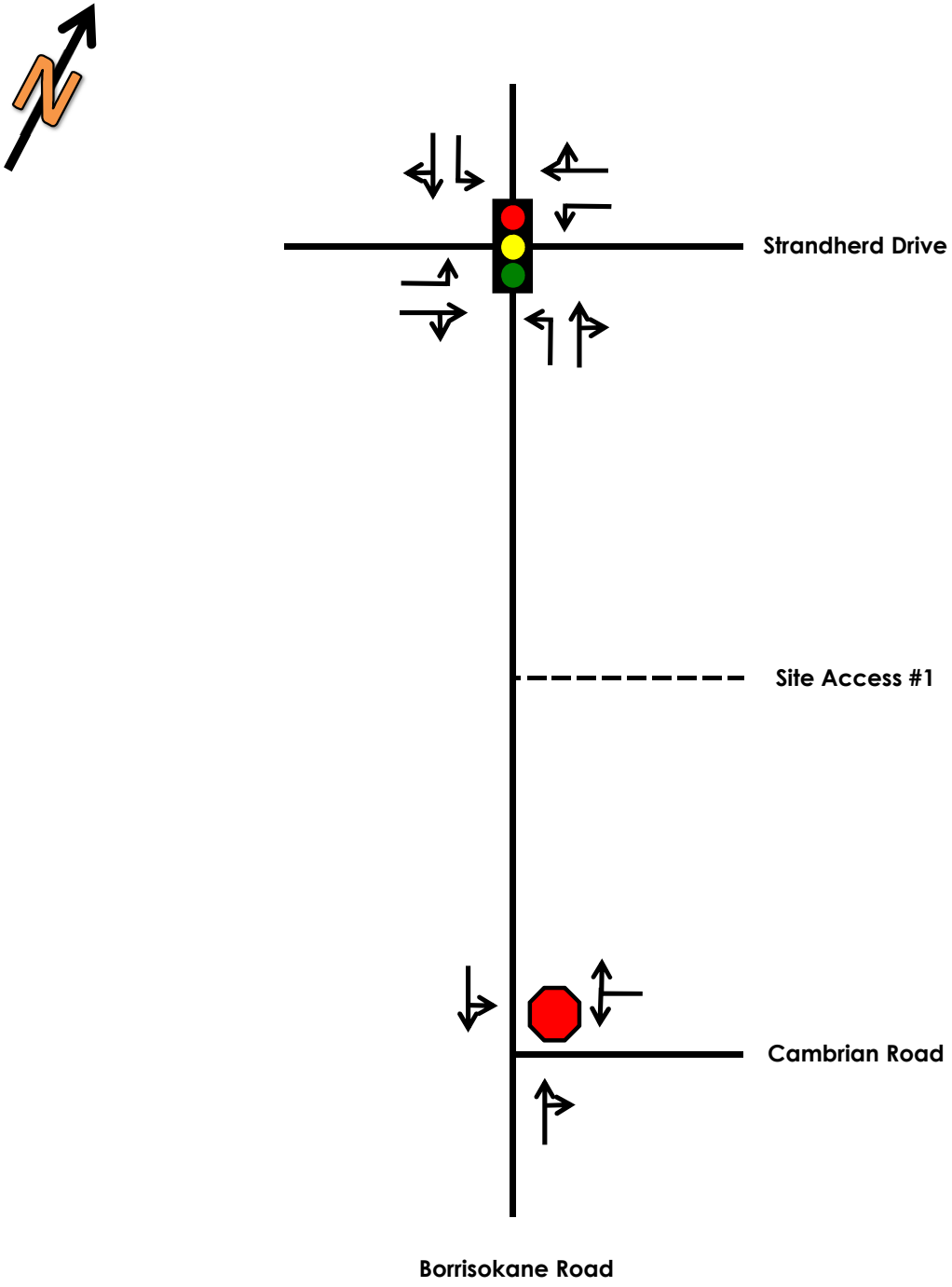


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Figure 3: 2016 Existing Intersection Control and Lane Configuration

2.2 TRANSIT

Transit service is not currently provided in the immediate vicinity of the proposed development, however, it is located nearby along Cambrian Road and Strandherd Drive via routes 73, 170, 173, and 177. Route 73 is a peak direction route that runs between Mackenzie King Station and Barrhaven. Route 170 is a regular route that runs from Barrhaven Centre to Fallowfield Station. Route 173 is a regular route that runs from Bayshore Shopping Centre to Barrhaven Centre. Route 177 is a regular route that runs from Barrhaven Centre to Cambrian Road.

Figure 4 illustrates the study area transit routes.

Figure 4 Study Area Transit

(Source: OC Transpo System Map, Accessed April 11th, 2016)

2.3 WALKING AND CYCLING

As the proposed development is currently surrounded by greenfield and undeveloped land, there are currently no existing sidewalks or bicycle lanes in the immediate vicinity of the site. There are, however, sidewalks along Cambrian Road within Mattamy's Half Moon Bay North community.

2.4 TRAFFIC VOLUMES

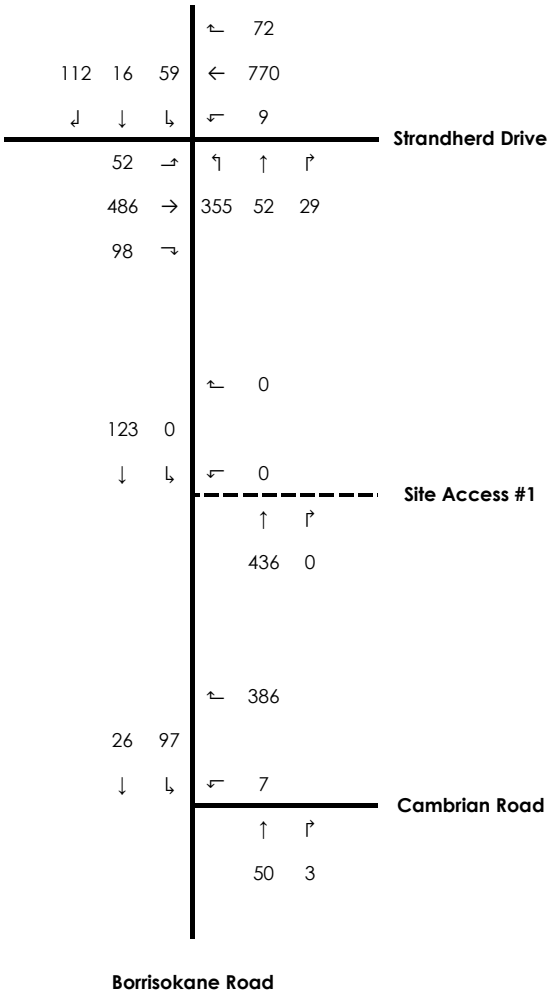
Traffic counts were provided by the City of Ottawa at the Borrisokane Road at Strandherd Drive intersection (2015). Stantec performed intersection turning movement counts at the Borrisokane Road at Cambrian Road intersection in 2015.

As the intersection counts were collected prior to 2016, the data required adjustments to reflect the current existing condition. In order to calculate the anticipated growth rate between the 2015 and 2016 horizons, volumes from the City of Ottawa's TRANS regional transportation model were used. Using the provided 2011 volumes and the 2031 projections from the TRANS model, the annual growth rate was calculated to be 4% during the AM peak hour and 5% during the PM peak hour between 2011 and 2031. Using these annual growth rates, the 2015 volumes were increased to represent 2016 conditions.

Figure 5 illustrates 2016 existing AM and PM peak hour traffic volumes at the study area intersections.

Appendix A contains the traffic data and is provided for reference.

AM Peak Hour



PM Peak Hour

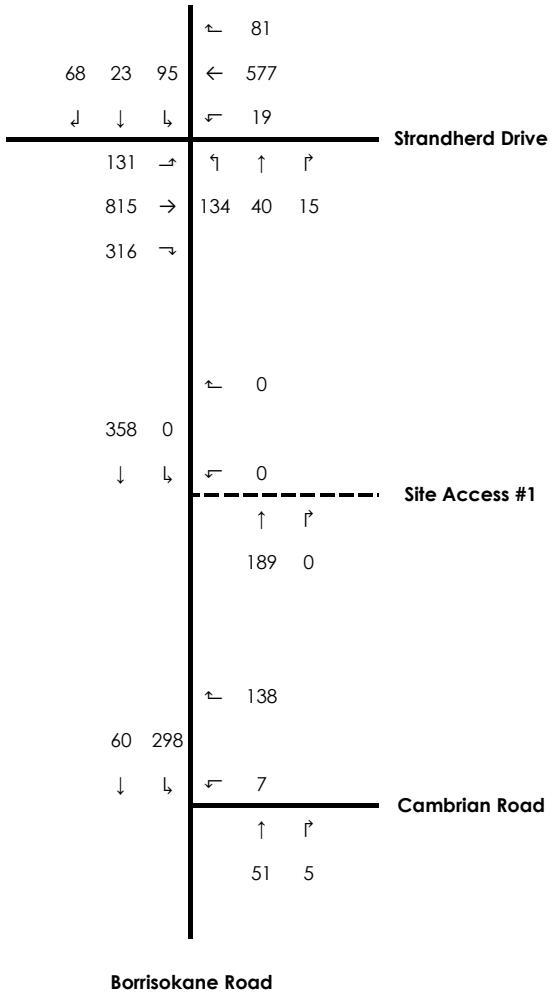


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Figure 5 2016 Existing Traffic Volumes

3.0 FUTURE TRANSPORTATION ENVIRONMENT

3.1 FUTURE NETWORK UPGRADES

3.1.1 Road Network Improvements

Several significant transportation improvements have been noted in the City of Ottawa's 2013 *Transportation Master Plan* (TMP) in the vicinity of the proposed site and are outlined in **Table 1** below.

Table 1 2013 Transportation Master Plan Scheduled Upgrades

Project	Description	TMP Phase
Realigned Greenbank Road	New four lane road from near Jockvale Road to Cambrian Road, includes Jock River Bridge	Phase 1 (2014 – 2019)
Strandherd Drive Widening	Widen from two to four lanes between Fallowfield Road and Jockvale Road	Phase 2 (2022 – 2025)
Chapman Mills Drive	New four lane arterial road from Longfields Drive to Strandherd Drive, includes Bus Rapid Transit	Phase 2 (2022 – 2025)
Cambrian Road Widening	Widen from two to four lanes from Realigned Greenbank Road to Jockvale Road	Network Concept (i.e. beyond 2031)
Southwest Transitway	From Barrhaven Centre to Cambrian Road	Network Concept (i.e. beyond 2031)

It should be noted that although the TMP suggests that Realigned Greenbank Road will be constructed during Phase 1 (2014 – 2019) of the TMP, based on the current status of the project it is believed that the timing will be shifted and that this section of Realigned Greenbank Road will be constructed and operational before 2022.

3.1.2 Future Background Developments

The Barrhaven South community has experienced substantial growth over the past few years and that growth is anticipated to continue well into the future. There are numerous developments scheduled to occur in the vicinity of the subject site, as outlined in **Table 2** below. These background developments were explicitly accounted for and added to the roadway network as background traffic volumes.

Table 2 Background Developments

Development	Location	Development Size	Assumed Build-Out
Mattamy's Half Moon Bay South Phase 4	South of Half Moon Bay south Phase 3, between Realigned Greenbank and Existing Greenbank	265 Residential Units	2017
Mattamy's Half Moon Bay North	North and South of Cambrian Road, west of Greenbank Road	471 Residential Units	2019
Mattamy's Half Moon Bay West	North of Cambrian Road between Cedarview Road and Realigned Greenbank Road	1,006 Residential Units	2021
Minto's Quinn's Pointe	West of Existing Greenbank Road, South of Half Moon Bay South	475 Residential Units	2019
Citi Gate Highway 416 Employment Lands	Between Highway 416 and Strandherd Drive, south of Fallowfield, north of the train tracks	350,000 ft² GFA 95 hectares of Business Park	Interim Phase: 2019[1] Ultimate Phase: 2029

Notes: 1. Only the interim 2019 phase for the Citi Gate development was considered as the ultimate 2029 phase occurs beyond the horizons of the subject study

3.2 2022 FUTURE BACKGROUND CONDITIONS

Future background conditions are assessed to differentiate between the transportation improvements that may be required to address background traffic growth and those that may be required to accommodate traffic generated by the subject development. Any improvements identified to address future background conditions are not the responsibility of the developer.

In addition to the future background developments that were explicitly accounted for, a nominal 2% annual growth rate was applied to the Borrisokane Road and Cambrian Road traffic volumes and a 3% annual growth rate was applied to the Strandherd Drive volumes. These rates of growth are consistent with industry standards and those that were applied in previously approved studies (i.e. *Citi Gate Highway 416 Employment Lands Community Transportation Study,* Novatech 2012).

By 2022, Realigned Greenbank Road is assumed to be constructed and operational from Jockvale Road to Cambrian Road, which will include Bus Rapid Transit (BRT). This BRT will provide the residents of Barrhaven South with an increased transit service which will attract more residents to use transit as their primary means of transportation. As more residents choose to use transit, the transit modal share in the area will increase, and, conversely, the auto modal share will decrease. To reflect this shift in modal share for future transit, the 2022 future background traffic volumes were adjusted to reflect a higher transit modal share in the future.

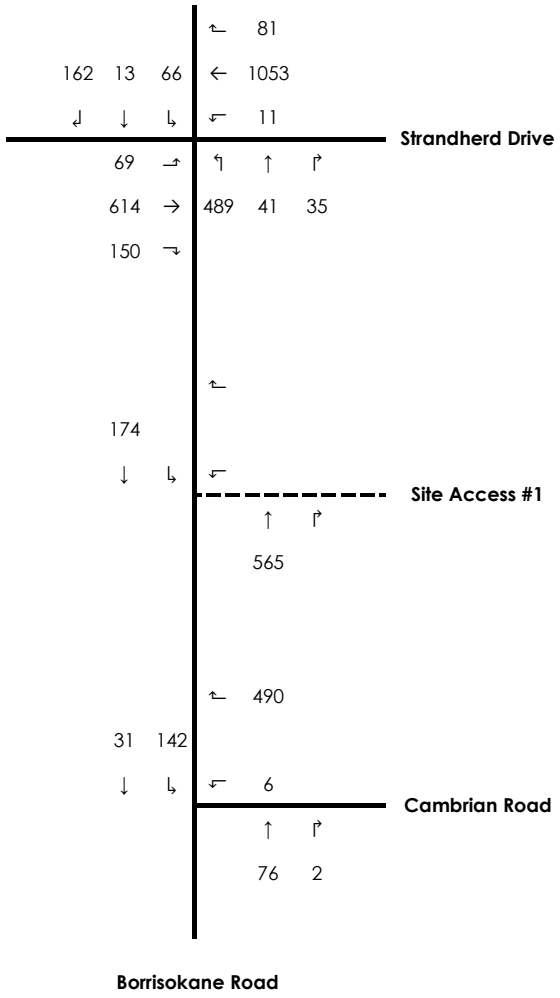
Given that the Barrhaven South community is only being serviced by one existing transit route, and given the limited amount of pedestrian facilities crossing the Jock River, the current transit

and active modal shares are assumed to be approximately 10% combined. Conversely, this means that the current auto modal share is roughly 90%.

The TRANS Committee's *2011 Origin-Destination (O-D)* Survey indicates that the modal shares for the overall South Nepean District are 60% auto, 30% transit, and 10% active modes. As the current auto modal share for the Barrhaven South community is assumed to be approximately 90%, in order to reflect the target of 60% the 2022 future background traffic volumes were reduced by 30% to account for the increase in future transit facilities in the Barrhaven South community.

Figure 6 illustrates 2022 future background traffic volumes at the study area intersections.

AM Peak Hour



PM Peak Hour

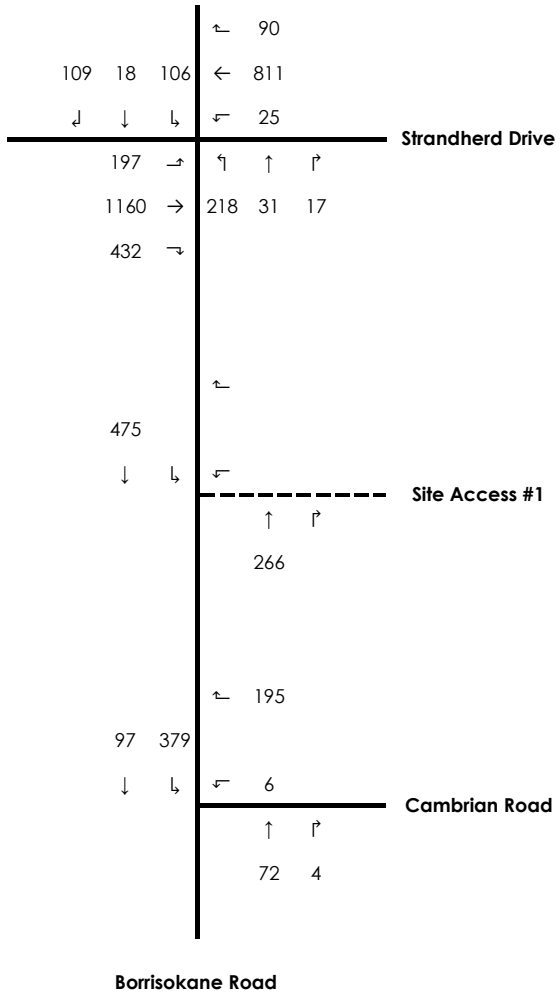


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Figure 6 2022 Future Background Traffic Volumes

3.3 SITE TRAFFIC GENERATION

3.3.1 Land Use and Trip Generation Rates

The *Institute of Transportation Engineers (ITE) Trip Generation Manual (9th Edition)* was used to estimate traffic generated by the subject site. The ITE land use codes 210 – Single Family Homes and 230 – Condo / Townhomes were thought to be most representative of the proposed land uses.

Table 3 summarizes the trip rates obtained from the *ITE Trip Generation Manual* and the ensuing sections describe the methodology used to convert these trips to person trips across all modes.

Table 3 Trips Generated by the Proposed Residential Development

ITE Land Use			Morning Peak Hour			Afternoon Peak Hour		
			In	Out	Total	In	Out	Total
Step 1: ITE Trip Generation Rates								
210 – Single Family Homes	Units	179	25%	75%	0.75	63%	37%	0.99
230 – Condo / Townhomes	Units	109	17%	83%	0.51	67%	33%	0.59
Step 2: Conversion From Auto Trips to Person Trips								
Total Development	Trip Gen		43	147	190	156	86	242
	Transit Share	10%	4	15	19	16	8	24
	Auto Occupancy	1.1	4	15	19	16	8	24
	Total Person Trips		51	177	228	188	102	290
Step 3: Person Trips by Modal Share								
Total Development	Auto	60%	31	106	137	113	61	174
	Passenger	10%	5	18	23	19	10	29
	Transit	30%	15	53	68	56	31	87
	Walk / Bike	0%	0	0	0	0	0	0

3.3.2 Conversion of ITE Rates to Person Trips

The notion of quantifying the volume of "person" trips expected to be generated by a given development is becoming a commonly accepted practice. It is aimed at quantifying the expected demands across the primary modes of transportation.

In order to convert ITE rates to person trips, the rates obtained from the ITE Trip Generation Manual were adjusted to account for the transit modal share and auto occupancy thought to be inherent within the ITE rates. An assumed transit share of 10% was thought to be inherent within the ITE rates and an auto occupancy rate of 1.1 persons per vehicle was also assumed to be inherent within the ITE rates.

Step 2 of **Table 3** outlines the conversion from auto trips to person trips.

3.3.3 Net New Site Trips

To reflect local Ottawa travel characteristics, the person trips were assigned to the four primary modal shares (i.e. auto, passenger, transit, and active moves) according to the TRANS Committee's 2011 Origin-Destination (O-D) Survey for the South Nepean District. The proposed residential development is anticipated to generate 228 and 290 person trips during the AM and PM peak hours, respectively. In terms of vehicle trips, the proposed residential development is anticipated to generate 137 and 174 net new auto trips (two-way) during the AM and PM peak hours, respectively.

Step 3 of **Table 3** summarizes the expected person trips by modal share.

3.3.4 Traffic Distribution and Assignment

The distribution of traffic to / from the study area was determined through examination of the TRANS Committee's 2011 Origin-Destination (O-D) Survey for the South Nepean District.

Table 4 provides a summary of the estimated distribution for the traffic generated by the proposed development.

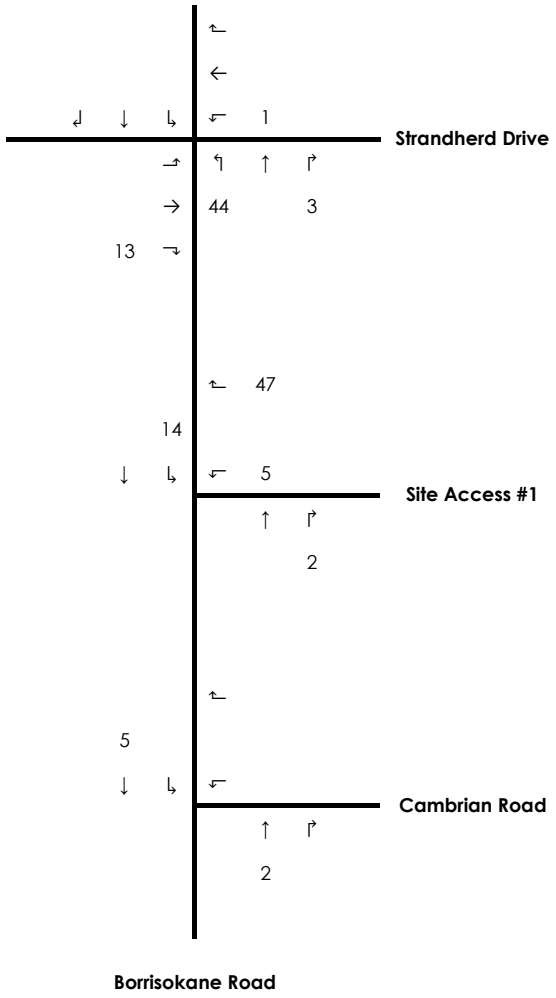
The anticipated site traffic generated by the proposed residential development was assigned to the boundary road network using a logical pattern of primary roads (i.e. along arterials and collectors) and in consideration of the future road network (i.e. the future Realigned Greenbank Road) which can be seen in **Table 4** below.

Table 4 Traffic Distribution from the South Nepean District

Cardinal Direction	Via (to / from)			
	% Distribution	Borrisokane North	Borrisokane South	Realigned Greenbank North
North	25%	20%		5%
East	25%	8%		17%
South	5%		5%	
West	5%	5%		
Internal (South Nepean)	40%	12%		28%
Total	100%	45%	5%	50%

Figure 7 illustrates the assignment of total site traffic volumes to the boundary road network.

AM Peak Hour



PM Peak Hour

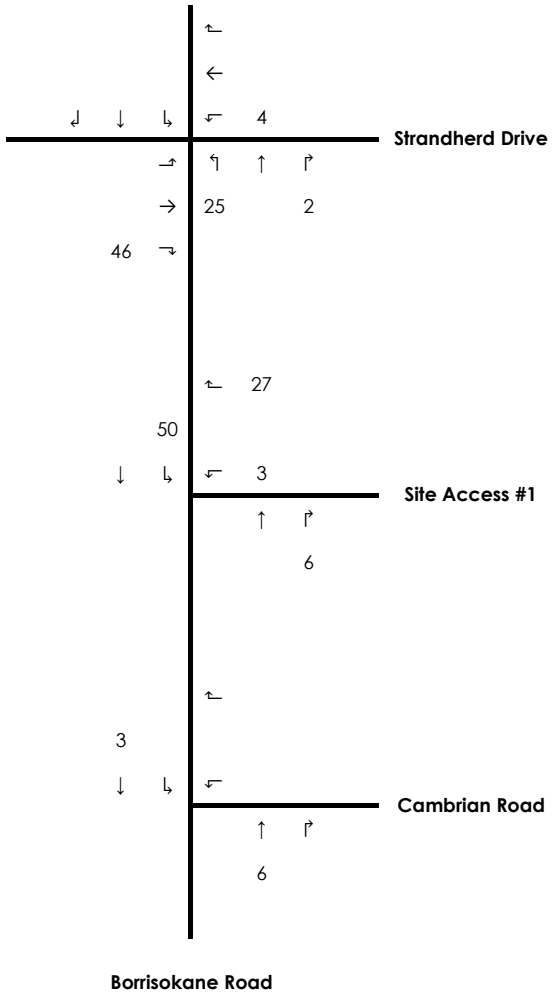


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Figure 7 3387 Borrisokane Road Site Traffic

3.4 2022 TOTAL FUTURE CONDITIONS

Total future conditions are examined to determine improvements that may be required as a direct result of the development of the site. It is anticipated that by 2022 the residential development will be fully built and occupied.

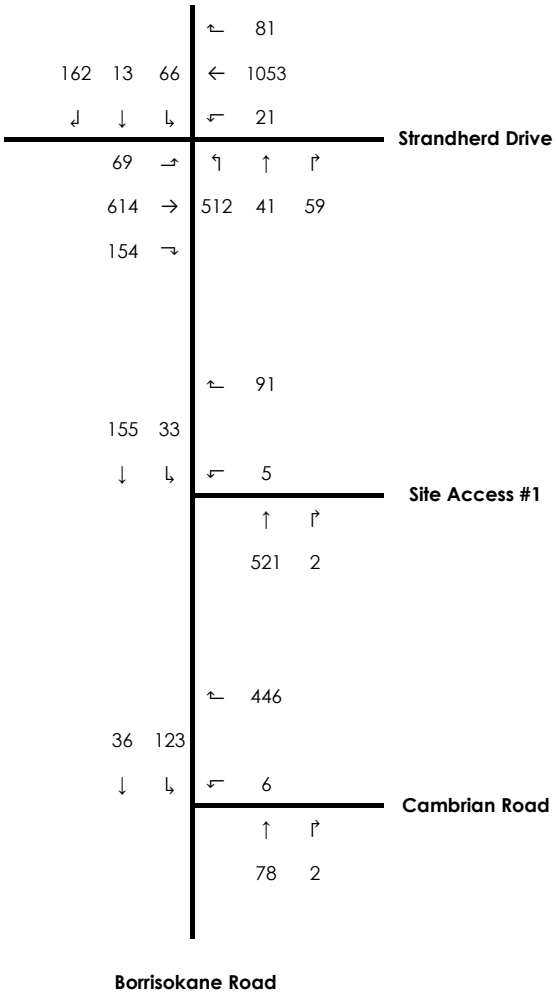
The 2022 total future traffic volumes were derived by adding 3387 Borrisokane Road site generated trips to future background volumes anticipated for 2022.

Mattamy's adjacent Half Moon Bay West development is anticipated to be built-out prior to the subject Glenview development. The Half Moon Bay West development is proposed to include one direct connection to Cambrian Road, one direct connection to Realigned Greenbank Road, and one connection to Borrisokane Road that will be shared with the subject Glenview development. It was assumed that once Glenview's development is built, some of Mattamy's Half Moon Bay West traffic will infiltrate through Glenview's development in order to reach Borrisokane Road. As such, the Half Moon Bay West site traffic that is assigned to Borrisokane Road was split 50/50 between Cambrian Road at Glenview's Site Access #1.

Figure 8 illustrates 2022 total future traffic volumes at the study area intersections during the AM and PM peaks.

An assessment of 2022 total future traffic conditions is outlined in **Section 4.3**.

AM Peak Hour



PM Peak Hour

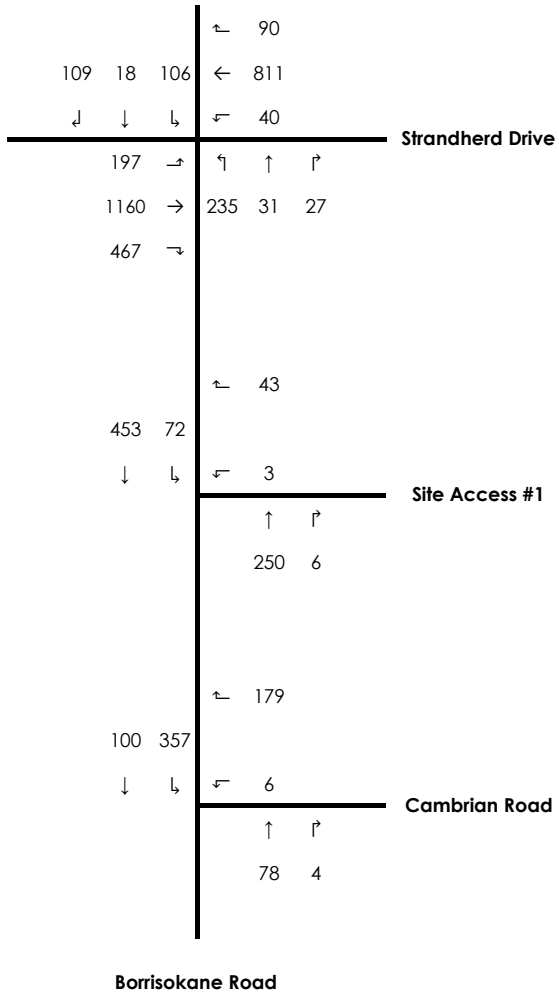


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Figure 8 2022 Total Future Traffic Volumes

3.5 2027 ULTIMATE CONDITIONS

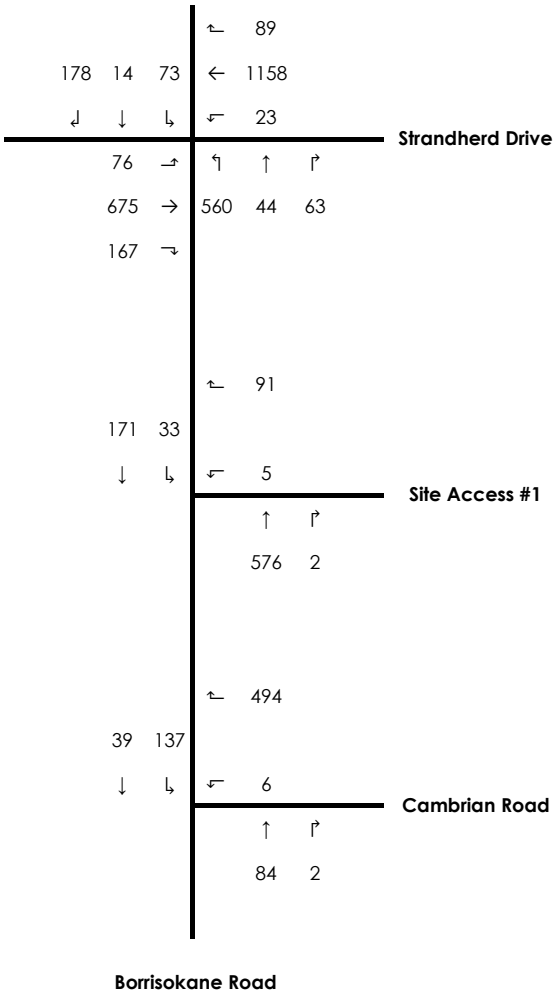
Ultimate conditions for the 2027 horizon were examined to determine if other improvements may be required due to additional growth in background traffic volumes 5 years beyond the expected build-out of the subject site.

In order to calculate the anticipated growth rate between the 2022 and 2027 horizons, volumes from the City of Ottawa's TRANS regional transportation model was used. Using the calculated 2022 volumes and the provided 2031 projections from the TRANS model, the annual growth rate was calculated to be 3% between 2022 and 2031. Using this growth rate, the 2022 volumes were adjusted to 2027 ultimate traffic volumes.

Figure 9 illustrates 2027 ultimate traffic volume at the study area intersections during the AM and PM peaks.

An assessment of 2027 ultimate traffic conditions is outlined in **Section 4.4**.

AM Peak Hour



PM Peak Hour

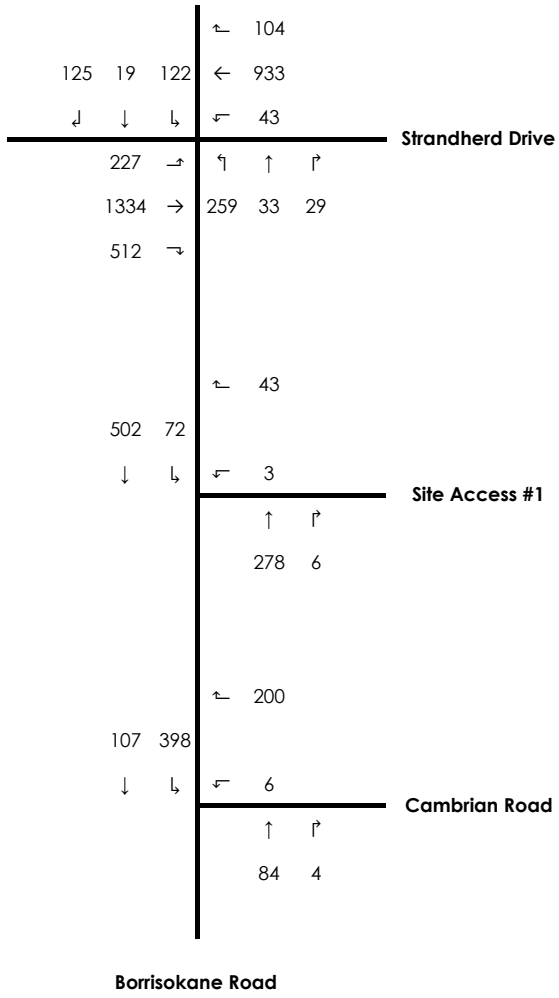


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Figure 9: 2027 Ultimate Traffic Volumes

4.0 TRANSPORTATION ASSESSMENT

4.1 2016 EXISTING CONDITIONS

Figure 3 (**Section 2.1**) illustrates the 2016 existing intersection controls and lane configuration at the study area intersections.

4.1.1 Jock River Screenline Analysis

A screenline is an imaginary line that is drawn along the boundary of an area of interest, in this case, the Jock River. System capacity across a screenline is determined by the number of roads and travel lanes which cross the screenline. Traffic demands are then compared to the available capacity to determine if there is a surplus or shortfall in system capacity.

Screenline data from the TRANS regional transportation model for the Jock River screenline (screenline 49) was obtained from the City of Ottawa's Transportation Modeling department for the years 2011 and 2031.

Annual growth rates were calculated for the entire screenline and at each station between Borrisokane Road and Prince of Wales Drive between 2011 and 2031 (assuming a straight line growth assumption), which is outlined in **Table 5** below. The inbound movements represent vehicles traveling towards the urban core (i.e. leaving Barrhaven South by traveling north across the screenline) and outbound movements represent vehicles traveling away from the urban core (i.e. entering Barrhaven South by travelling south across the screenline).

As we have updated 2015 counts at the Borrisokane Road screenline station, these volumes replaced the 2011 volumes and were used in calculating the annual growth rate to 2031.

Total annual growth across the entire screenline is forecasted to be 6% during the AM peak (predominant direction being "inbound") and 6% during the PM peak (predominant direction being "outbound"). At individual stations the majority of the screenline growth is anticipated to occur at the Borrisokane Road and Greenbank Road location.

Table 5 Screenline Growth from 2011 to 2031

Station	Direction	2011		2031		Annual Growth 2011 to 2031	
		AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
Borrisokane	Inbound	420[1]	181[1]	694	165	4%	-1%
Borrisokane	Outbound	119[1]	342[1]	67	637	-3%	5%
Greenbank[2]	Inbound	414	137	1338	310	11%	6%
Greenbank[2]	Outbound	74	320	117	1012	3%	11%
Jockvale	Inbound	544	335	1411	381	8%	1%
Jockvale	Outbound	194	562	175	1202	0%	6%
Prince of Wales	Inbound	931	507	1751	971	4%	5%
Prince of Wales	Outbound	525	833	551	1736	0%	5%
Total	Inbound	2103	1018	5194	1827	6%	3%
Total	Outbound	811	1902	910	4587	0%	6%

Notes: 1. Taken from 2015 turning movement counts at Borrisokane / Cambrian
2. Greenbank refers to Existing Greenbank Road in 2011 and Realigned Greenbank Road in 2031

Using the annual growth rates from **Table 5**, the screenline data was interpolated to the existing 2016 condition and can be seen in **Table 6** below.

Table 6 2016 Existing Jock River Screenline Analysis

Station	Direction	2016 Existing Conditions					
		AM Peak Hour	PM Peak Hour	Lanes	Capacity (Veh/hr)	AM Peak v/c[2]	PM Peak v/c
Borrisokane	Inbound	432	186	1	1000	0.43	0.19
Borrisokane	Outbound	122	352	1	1000	0.12	0.35
Greenbank	Inbound	645	180	1	1000	0.65	0.18
Greenbank	Outbound	85	493	1	1000	0.09	0.49
Jockvale	Inbound	761	347	2	2000	0.38	0.17
Jockvale	Outbound	189	722	2	2000	0.09	0.36
Prince of Wales	Inbound	1136	623	2	2000	0.57	0.31
Prince of Wales	Outbound	532	1059	2	2000	0.27	0.53
Total	Inbound	2974	1336	6	6000	0.50	0.22
Total	Outbound	928	2626	6	6000	0.15	0.44

Notes: 1. Volume to capacity ratio: compares roadway demand (vehicle volumes) with roadway supply (carrying capacity).

As shown in **Table 6**, the volumes fall well below the capacities at all four stations along the Jock River screenline under 2016 existing conditions. In addition, the total volume across the entire screenline is less than half of the existing available capacity which suggests that significant residual capacity exists to accommodate future growth. During the AM peak, where predominant direction is inbound, the screenline currently operates at v/c 0.50. During the PM peak, where the predominant direction is outbound, the screenline currently operates at v/c 0.44.

4.1.2 Intersection Operational Analysis

An assessment of the study area intersections was undertaken to determine the operational characteristics of these intersections. Intersection operations were facilitated by Synchro 9.1™ software package and analyzed using the following methodologies:

- Highway Capacity Manual 2010 edition (HCM 2010) for two-way stop controlled intersections; and
- Highway Capacity Manual 2000 edition (HCM 2000) for signalized intersections.

Table 7 provides a summary of 2016 existing intersection operations.

The Borrisokane Road at Strandherd Drive intersection currently operates at or above capacity for the peak directional movements along Strandherd Drive (i.e. westbound through during the AM peak hour and eastbound through during the PM peak hour). In addition, there is little residual capacity for the northbound left turn movement to accommodate future growth. As the Strandherd Drive widening is part of the City's TMP Affordable Network (Phase 2, 2020 – 2025), no improvements are recommended to supplement existing conditions.

The intersection of Borrisokane Road at Cambrian Road is expected to operate acceptably under 2016 existing conditions.

Appendix B contains detailed intersection performance worksheets.

Table 7 2016 Existing Intersection Operations

Intersection	Intersection Control	Approach/Movement		AM Peak Hour			PM Peak Hour		
				LOS	v/c[1]	Delay (s)	LOS	v/c[1]	Delay (s)
Borrisokane Road at Cambrian Road	Two-Way Stop Control	WB	Left / Right	B	0.43	11.2	A	0.18	9.9
		NB	Through / Right	A	0.0	0.0	A	0.0	0.0
		SB	Left / Through	A	0.07	5.9	A	0.21	6.6
		Overall Intersection		***A***	**-**	***9.0***	***A***	**-**	***6.8***
Borrisokane Road at Strandherd Drive	Traffic Signals	**Approach/Movement**		**LOS**	**v/c[1]**	**Q[2]**	**LOS**	**v/c[1]**	**Q[2]**
		EB	Left	C	0.78	#32.8	C	0.78	#56.6
			Through / Right	B	0.70	125.5	F	1.38	#385.4
		WB	Left	A	0.04	3.6	A	0.29	9.0
			Through / Right	F	1.01	#253.4	C	0.79	153.5
		NB	Left	D	0.90	#122.2	A	0.33	35.3
			Through / Right	A	0.11	17.1	A	0.08	13.4
		SB	Left	A	0.14	17.2	A	0.22	25.7
			Through / Right	A	0.11	13.9	A	0.09	13.4
		Overall Intersection		***E***	***0.96***	**-**	***E***	***0.95***	**-**

Notes:
1. v/c – represents the anticipated volume divided by the predicted capacity
2. 95th Percentile Queue (m)

4.2 2022 FUTURE BACKGROUND CONDITIONS

Future background conditions for the 2022 horizon were assessed to determine transportation improvements that may be required to address growth in traffic exclusive from improvements that may be required to accommodate traffic generated by the proposed development.

The background development assumptions and distributions outlined in **Section 3.1.2** and **Section 3.2** were applied to existing traffic volumes to predict 2022 future background traffic volumes.

4.2.1 Intersection Operational Analysis

Table 8 summarizes the operational characteristics of the study area intersections under 2022 future background conditions.

Consistent with the findings from the 2016 intersection capacity analysis, the Borrisokane Road at Strandherd Drive intersection is anticipated to operate at or above capacity during the 2022 future background horizon. As the widening of Strandherd Drive is part of the City of Ottawa's 2013 *Transportation Master Plan* Affordable Network (Phase 2, 2020 – 2025), this intersection was reanalyzed assuming the widening is in place. The intersection configuration reflected in the

analysis is consistent with the *Preliminary Design Report Strandherd Drive Widening Fallowfield Road to Jockvale Road (*Delcan 2006), which includes dual northbound lefts, dual westbound lefts, and a channelized eastbound right turn lane. As depicted in **Table 8** below, with the widening of Strandherd Drive and the intersection upgrades, the intersection of Borrisokane Road at Strandherd Drive intersection is anticipated to operate acceptably under 2022 future background conditions.

The intersection of Borrisokane Road at Cambrian Road is also expected to operate acceptably under 2022 future background conditions.

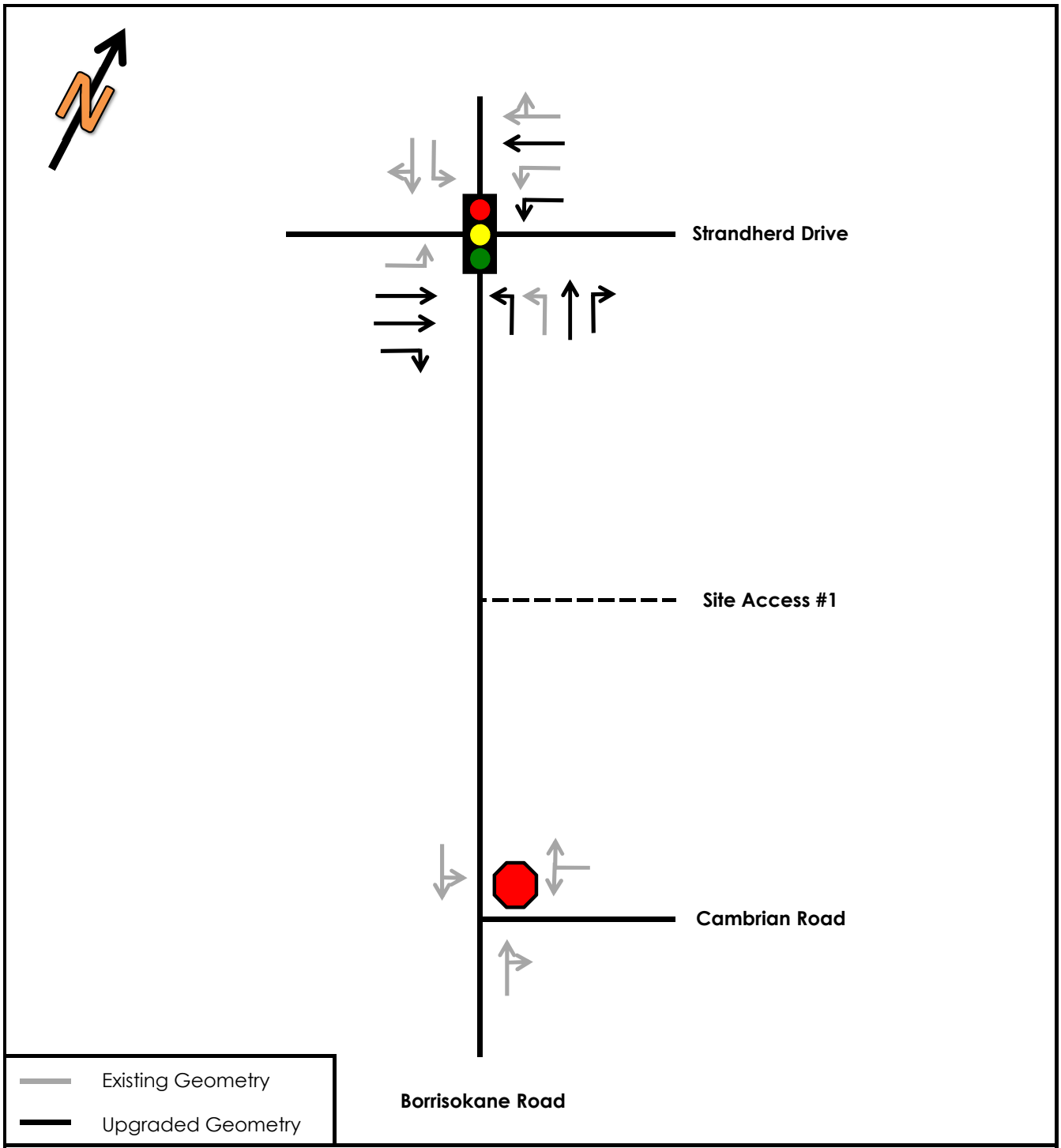
Figure 10 illustrates the intersection control and lane requirements for the 2022 future background horizon with the Strandherd Drive widening in place.

Appendix B contains detailed intersection performance worksheets.

Table 8 2022 Future Background Intersection Operations

Intersection	Intersection Control	Approach/Movement		AM Peak Hour			PM Peak Hour		
				LOS	v/c[1]	Delay (s)	LOS	v/c[1]	Delay (s)
Borrisokane Road at Cambrian Road	Two-Way Stop Control	WB	Left / Right	B	0.51	12.5	B	0.23	10.2
		NB	Through / Right	A	0.0	0.0	A	0.0	0.0
		SB	Left / Through	A	0.09	6.2	A	0.25	6.5
		Overall Intersection		***A***	**-**	**9.7**	***A***	**-**	**6.8**
Borrisokane Road at Strandherd Drive	Traffic Signals	**Approach/Movement**		**LOS**	**v/c[1]**	**Q[2]**	**LOS**	**v/c[1]**	**Q[2]**
		EB	Left	F	1.17	#42.6	B	0.65	#84.2
			Through / Right	D	0.82	#268.3	F	1.27	#650.2
		WB	Left	A	0.07	5.1	A	0.42	#19.6
			Through / Right	F	1.21	#477.9	B	0.70	193.4
		NB	Left	F	1.22	#238.6	F	1.18	#126.7
			Through / Right	A	0.09	19.1	A	0.12	19.5
		SB	Left	A	0.14	23.0	A	0.49	46.6
			Through / Right	A	0.22	38.4	A	0.14	26.3
		Overall Intersection		***F***	***1.21***	**-**	***F***	***1.25***	**-**
TMP Upgrades (Strandherd Drive widening from two to four lanes)									
Borrisokane Road at Strandherd Drive	Traffic Signals	EB	Left	A	0.51	16.8	B	0.65	46.3
			Through	A	0.42	76.5	C	0.77	157.5
			Right	A	0.10	15.5	A	0.28	27.7
		WB	Dual Lefts	A	0.42	4.9	A	0.40	8.3
			Through / Right	D	0.84	173.3	C	0.77	129.1
		NB	Dual Lefts	D	0.84	#92.4	A	0.59	41.5
			Through	A	0.06	15.0	A	0.05	13.3
			Right	A	0.02	2.3	A	0.01	0.0
		SB	Left	A	0.26	31.5	A	0.37	45.8
			Through / Right	A	0.30	45.4	A	0.12	26.0
		Overall Intersection		***B***	***0.69***	**-**	***B***	***0.65***	**-**

Notes:
1. v/c – represents the anticipated volume divided by the predicted capacity
2. 95th Percentile Queue (m)



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3387 Borrisokane Road

Figure 10: 2022 Future Background Intersection Control and Lane Configuration

4.3 2022 TOTAL FUTURE CONDITIONS

Total future conditions are assessed to determine transportation improvements that may be required to accommodate traffic generated by the proposed development. The site trip generation, distribution, and assignment assumptions outlined in **Section 3.3** were applied to 2022 future background traffic volumes to predict total future traffic volumes.

4.3.1 Jock River Screenline Analysis

The Jock River screenline was assessed under 2022 total future conditions. Although Realigned Greenbank Road is assumed to be in place by the 2022 total future horizon, the construction staging is unknown at this time. In order to remain conservative, it was assumed that by 2022 Realigned Greenbank Road will have one lane for vehicle travel in both directions (the ultimate design includes two travel lanes for vehicles in both directions).

As seen in **Table 9**, the Jock River screenline is anticipated to operate well below capacity under 2022 total future conditions. With Realigned Greenbank Road having an assumed capacity of 1,000 vehicles per hour per direction, this station along the Jock River screenline is projected to approach capacity during the AM peak hour in the inbound direction (i.e. vehicles traveling towards the urban core) during the 2022 total future horizon.

Table 9 2022 Total Future Jock River Screenline Analysis

Station	Direction	2022 Total Future Conditions					
		AM Peak Hour	PM Peak Hour	Lanes	Capacity (Veh/hr)	AM Peak v/c[2]	PM Peak v/c
Borrisokane	Inbound	612	293	1	1000	0.61	0.29
Borrisokane	Outbound	188	526	1	1000	0.19	0.53
Greenbank	Inbound	922	232	1	1000	0.92	0.23
Greenbank	Outbound	98	701	1	1000	0.10	0.70
Jockvale	Inbound	1021	360	2	2000	0.51	0.18
Jockvale	Outbound	184	914	2	2000	0.09	0.46
Prince of Wales	Inbound	1382	762	2	2000	0.69	0.38
Prince of Wales	Outbound	539	1330	2	2000	0.27	0.67
Total	Inbound	3937	1647	6	6000	0.66	0.27
Total	Outbound	1009	3471	6	6000	0.17	0.58

Notes: 1. Volume to capacity ratio: compares roadway demand (vehicle volumes) with roadway supply (carrying capacity).

4.3.2 Auxiliary Left Turn Lane Warrants at Site Access #1

The need for a southbound left turn auxiliary lane was reviewed at the Borrisokane Road at Site Access #1 intersection using the standards outlined in the *Geometric Design Standards for Ontario Highways*. Based on an assumed design speed of 90 km/hr along Borrisokane Road, it was found that this intersection meets the warrant for the implementation of a southbound left turn auxiliary lane into the development with a storage length of 25m.

Appendix C contains the detailed left turn auxiliary lane warrant worksheets.

4.3.3 Intersection Operational Analysis

Table 10 summarizes the operational characteristics of the study area intersections under 2022 total future conditions.

Consistent with the findings from the 2022 future background intersection capacity analysis, the Borrisokane Road at Strandherd Drive intersection is anticipated to operate at or above capacity during the 2022 total future horizon and therefore this intersection was also assessed assuming the Strandherd Drive widening is in place. As depicted in **Table 10** below, with the widening of Strandherd Drive, the intersection of Borrisokane Road at Strandherd Drive intersection is anticipated to operate acceptably.

The intersection of Borrisokane Road at Cambrian Road is also expected to operate acceptably under 2022 total future conditions.

Figure 11 illustrates the intersection control and lane requirements for the 2022 total future horizon.

Appendix B contains detailed intersection performance worksheets.

Table 10 2022 Total Future Intersection Operations

Intersection	Intersection Control	Approach/Movement		AM Peak Hour			PM Peak Hour		
				LOS	v/c[1]	Delay (s)	LOS	v/c[1]	Delay (s)
Borrisokane Road at Cambrian Road	Two-Way Stop Control	WB	Left / Right	B	0.47	11.9	B	0.21	10.1
		NB	Through / Right	A	0.0	0.0	A	0.0	0.0
		SB	Left / Through	A	0.08	5.9	A	0.24	6.3
		Overall Intersection		***A***	***-***	***9.1***	***A***	***-***	***6.6***
Borrisokane Road at Site Access #1	Two-Way Stop Control	WB	Left / Right	B	0.18	13.1	B	0.06	10.4
		NB	Through / Right	A	0.0	0.0	A	0.0	0.0
		SB	Left	A	0.03	8.6	A	0.06	7.9
			Through	A	0.00	0.0	A	0.0	0.0
		Overall Intersection		***A***	***-***	***1.9***	***A***	***-***	***1.3***
Borrisokane Road at Strandherd Drive	Traffic Signals	**Approach/Movement**		**LOS**	**v/c[1]**	**Q[2]**	**LOS**	**v/c[1]**	**Q[2]**
		EB	Left	F	1.17	#42.6	B	0.69	#44.5
			Through / Right	D	0.84	#274.7	F	1.46	#708.5
		WB	Left	A	0.14	8.8	A	0.35	6.9
			Through / Right	F	1.23	#481.6	D	0.85	#315.4
		NB	Left	F	1.24	#249.7	F	1.19	#134.6
			Through / Right	A	0.10	20.7	A	0.12	20.9
		SB	Left	A	0.14	22.8	A	0.46	46.2
			Through / Right	A	0.23	38.4	A	0.14	26.0
		Overall Intersection		***F***	***1.23***	***-***	***F***	***1.39***	***-***
TMP Upgrades (Strandherd Drive widening from two to four lanes)									
Borrisokane Road at Strandherd Drive	Traffic Signals	EB	Left	A	0.47	15.8	B	0.66	46.5
			Through	A	0.43	72.9	C	0.79	157.8
			Right	A	0.08	13.4	A	0.31	30.1
		WB	Dual Lefts	A	0.30	8.4	A	0.41	11.6
			Through / Right	D	0.84	167.5	C	0.77	129.4
		NB	Dual Lefts	C	0.80	#85.6	B	0.61	44.6
			Through	A	0.06	15.7	A	0.05	13.3
			Right	A	0.05	13.0	A	0.02	0.0
		SB	Left	A	0.26	31.5	A	0.38	45.9
			Through / Right	A	0.29	44.3	A	0.12	26.0
		Overall Intersection		***B***	***0.68***	***-***	***B***	***0.66***	***-***

Notes:
1. v/c – represents the anticipated volume divided by the predicted capacity
2. 95th Percentile Queue (m)

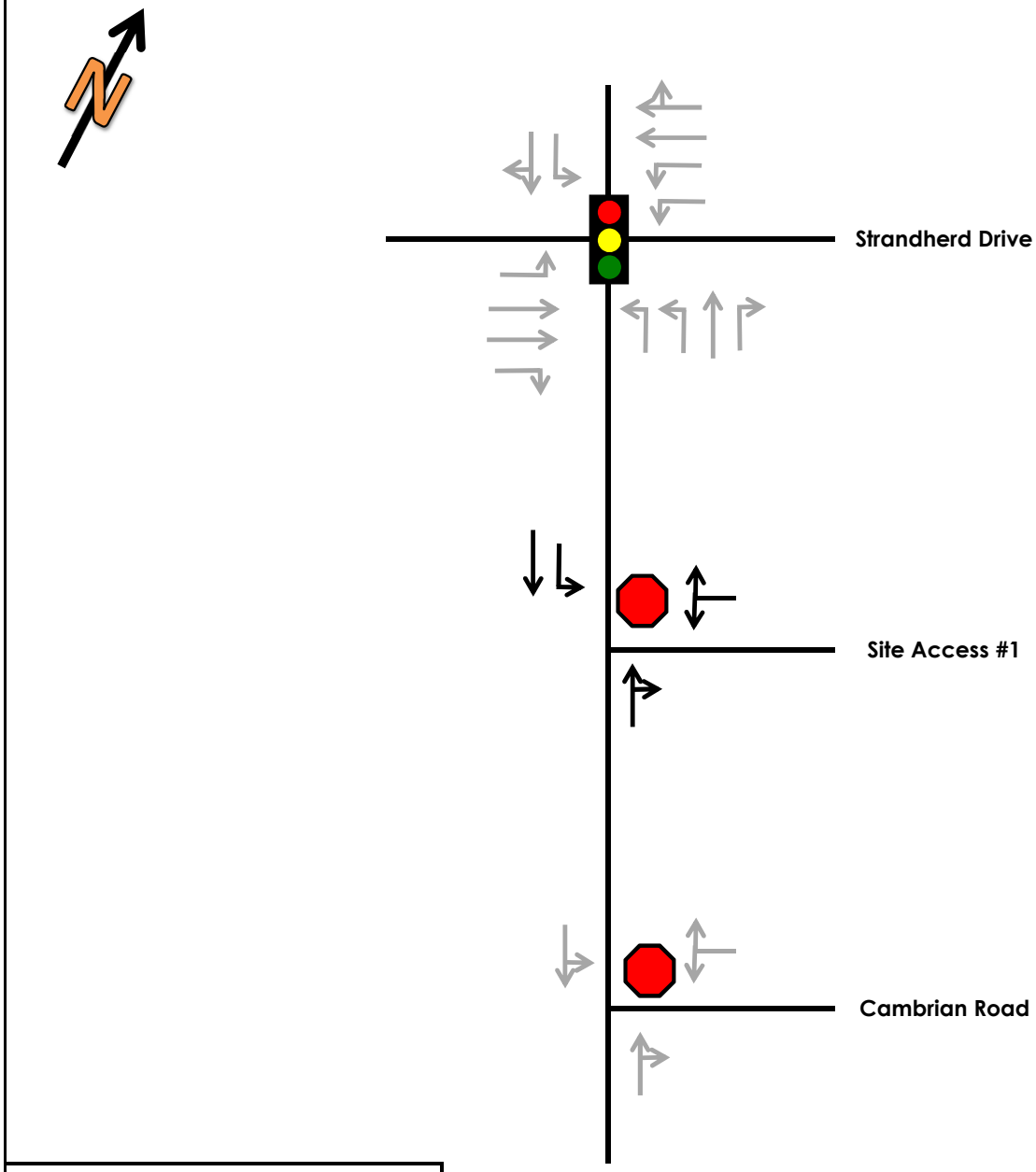

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Figure 11: 2022 Total Future Intersection Control and Lane Configuration

4.4 2027 ULTIMATE CONDITIONS

Ultimate future conditions for the 2027 horizon were examined to determine if other improvements may be required due to growth in background traffic volumes 5 years beyond the anticipated build-out horizon of the site.

4.4.1 Jock River Screenline Analysis

The Jock River screenline was assessed under 2027 ultimate conditions. Consistent with the analysis of 2022 total future, although Realigned Greenbank Road is assumed to be in place by the 2022 total future horizon, the construction staging is unknown at this time. In order to remain conservative, it was assumed that by 2027 Realigned Greenbank Road will have one lane for vehicle travel in both directions.

As seen in **Table 11**, the overall Jock River screenline is anticipated to operate below capacity under 2027 ultimate conditions. Despite this, the Greenbank Road station is projected to operate above capacity for the inbound movement (i.e. towards the urban core) during the AM peak hour. Constructing Realigned Greenbank to its ultimate cross-section (i.e. two vehicle lanes of travel in both directions) will be beneficial to alleviate the projected congestion that will occur at the Realigned Greenbank Road station along the Jock River screenline.

Table 11 2027 Total Future Jock River Screenline Analysis

Station	Direction	2027 Ultimate Conditions					
		AM Peak Hour	PM Peak Hour	Lanes	Capacity (Veh/hr)	AM Peak v/c²	PM Peak v/c
Borrisokane	Inbound	657	316	1	1000	0.66	0.32
Borrisokane	Outbound	202	567	1	1000	0.20	0.57
Greenbank	Inbound	1153	275	1	1000	1.15	0.28
Greenbank	Outbound	108	874	1	1000	0.11	0.87
Jockvale	Inbound	1238	372	2	2000	0.62	0.19
Jockvale	Outbound	179	1074	2	2000	0.09	0.54
Prince of Wales	Inbound	1587	878	2	2000	0.79	0.44
Prince of Wales	Outbound	546	1555	2	2000	0.27	0.78
Total	Inbound	4635	1841	6	6000	0.77	0.31
Total	Outbound	1035	4070	6	6000	0.17	0.68

Notes: 1. Volume to capacity ratio: compares roadway demand (vehicle volumes) with roadway supply (carrying capacity).

4.4.2 Intersection Operational Analysis

Table 12 summarizes the operational characteristics of the study area intersections under 2027 ultimate conditions.

The widening of Strandherd Drive from two to four lanes was assumed to be in place by the 2027 ultimate horizon. All study area intersections are expected to operate acceptably under 2022 total future conditions.

Appendix B contains detailed intersection operation summaries.

Table 12 2027 Ultimate Intersection Operations

Intersection	Intersection Control	Approach/Movement		AM Peak Hour			PM Peak Hour		
				LOS	v/c[1]	Delay (s)	LOS	v/c[1]	Delay (s)
Borrisokane Road at Cambrian Road	Two-Way Stop Control	WB	Left / Right	B	0.52	12.7	B	0.24	10.4
		NB	Through / Right	A	0.0	0.0	A	0.0	0.0
		SB	Left / Through	A	0.09	7.6	A	0.26	8.2
		Overall Intersection		**A**	**-**	**9.7**	**A**	**-**	**6.8**
Borrisokane Road at Site Access #1	Two-Way Stop Control	WB	Left / Right	B	0.19	13.9	B	0.07	10.7
		NB	Through / Right	A	0.0	0.0	A	0.0	0.0
		SB	Left	A	0.03	8.7	A	0.06	8.0
			Through	A	0.0	0.0	A	0.0	0.0
		Overall Intersection		**A**	**-**	***1.8***	**A**	**-**	***1.2***
Borrisokane Road at Strandherd Drive	Traffic Signals	**Approach/Movement**		**LOS**	**v/c[1]**	**Q[2]**	**LOS**	**v/c[1]**	**Q[2]**
		EB	Left	A	0.59	#22.3	C	0.77	#73.2
			Through	A	0.46	83.6	D	0.82	188.3
			Right	A	0.11	16.1	A	0.35	33.1
		WB	Dual Lefts	A	0.28	7.9	A	0.51	12.4
			Through / Right	D	0.88	#213.3	D	0.81	153.5
		NB	Dual Lefts	E	0.93	#120.8	B	0.69	#53.3
			Through	A	0.06	16.1	A	0.05	14.7
			Right	A	0.04	9.6	A	0.02	0.0
		SB	Left	A	0.33	34.1	A	0.51	#60.0
			Through / Right	A	0.43	54.8	A	0.15	28.8
		Overall Intersection		**C**	***0.78***	**-**	**C**	***0.75***	**-**

Notes:
1. v/c – represents the anticipated volume divided by the predicted capacity
2. 95th Percentile Queue (m)

5.0 SUMMARY AND CONCLUSIONS

Proposed Development

- The proposed Glenview development is located at 3387 Borrisokane Road in the City of Ottawa's south end. The site is bound by the Jock River to the north, Mattamy's Half Moon Bay West development to the east and south, and Borrisokane Road to the west. It should be noted that prior to June 2016, Borrisokane Road was called Cedarview Road.

- Glenview is considering three separate concepts for their draft plan, each with varying number of residential units. From a transportation perspective, the most conservative concept is the one that produces the greatest number of vehicular trips (concept 3). The subject CTS / TIS is based on this concept, which includes 288 residential homes, which consists of 179 single family homes and 109 townhomes.

- Transportation access to the site will be facilitated through a proposed Site Access to Borrisokane Road, approximately 400m north of Cambrian Road. It should be noted that all three concepts that Glenview is exploring contain the same internal road network and site access to Borrisokane Road.

- The proposed residential development is anticipated to generate 228 and 290 person trips during the AM and PM peak hours, respectively. In terms of vehicle trips, the proposed residential development is anticipated to generate 137 and 174 net new auto trips (two-way) during the AM and PM peak hours, respectively.

2016 Existing Conditions

- The Jock River screenline, between Borrisokane Road and Prince of Wales Drive, was examined under 2016 existing conditions. It was found that every station (Borrisokane, Greenbank, Jockvale, and Prince of Wales) is operating below the available capacity.

- The Borrisokane Road at Strandherd Drive intersection currently operates at or above capacity for the peak directional movements along Strandherd Drive (i.e. westbound through during the AM peak hour and eastbound through during the PM peak hour). As the Strandherd Drive widening is part of the City's TMP Affordable Network (Phase 2, 2020 – 2025), no improvements are recommended to supplement existing conditions.

- The Borrisokane Road at Cambrian Road intersection currently operates satisfactorily under 2016 existing conditions.

2022 Future Background Conditions

- For the 2022 future background horizon, Realigned Greenbank Road was assumed to be completed and operational with one lane of vehicle traffic in both directions.

- Consistent with the findings from the 2016 intersection capacity analysis, the Borrisokane Road at Strandherd Drive intersection is anticipated to operate at or above capacity during the 2022 future background horizon. As the widening of Strandherd Drive is part of the City of Ottawa's 2013 *Transportation Master Plan* Affordable Network (Phase 2, 2020 – 2022), this intersection was reanalyzed assuming the widening is in place. The assumed intersection configuration is consistent with the previously approved *Preliminary Design Report Strandherd Drive Widening Fallowfield Road to Jockvale Road (*Delcan 2006), which includes dual northbound lefts, dual westbound lefts, and a channelized eastbound right turn lane. With the widening of Strandherd Drive, the intersection of Borrisokane Road at Strandherd Drive is anticipated to operate acceptably under 2022 future background conditions.

- The intersection of Borrisokane Road at Cambrian Road is expected to operate acceptably under 2022 future background conditions.

2022 Total Future Conditions

- The Jock River screenline is anticipated to operate well below capacity under 2022 total future conditions.

- The need for a southbound left turn auxiliary lane was reviewed at the Borrisokane Road at Site Access #1 intersection. Using an assumed design speed of 90 km/hr along Borrisokane Road, it was found that this intersection meets the warrants to implement a southbound left turn lane with a storage length of 25m.

- Consistent with the findings from the 2022 future background intersection capacity analysis, the Borrisokane Road at Strandherd Drive intersection is anticipated to operate at or above capacity during the 2022 total future horizon. With the widening of Strandherd Drive, the intersection is anticipated to operate acceptably.

2027 Ultimate Conditions

- While the overall Jock River screenline is anticipated to operate below capacity under 2027 ultimate conditions, the Greenbank Road station is projected to operate at or above capacity for the inbound movement during the AM peak hour (i.e. towards the urban core). Constructing Realigned Greenbank to its ultimate cross-section (i.e. two vehicle lanes of travel in both directions) will be beneficial to alleviate the projected congestion that will occur at the Realigned Greenbank Road station along the Jock River screenline.

- The widening of Strandherd Drive from two to four lanes was assumed to be in place by the 2027 ultimate horizon. All study area intersections are expected to operate acceptably under 2022 total future conditions.

Based on the transportation evaluation and improvements recommended in this study, Glenview's proposed residential development located at 3387 Borrisokane Road should be permitted to proceed.

*****

STANTEC CONSULTING LTD.

(Original signed and stamped)

Robert Vastag, RPP
Project Manager, Senior Transportation Planner

Lauren O'Grady, B.A.Sc.
Transportation Engineering Intern

Appendix A TRAFFIC DATA

Intersection: Cambrian at Borrisokane
Date: 21-Jul-15

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	Total	Hour
7:15 - 7:30	0	5	0	19	4	0	0	0	0	1	0	83	112	
7:30 -7:45	0	7	1	21	3	0	0	0	0	1	0	83	116	
7:45 - 8:00	0	7	0	18	10	0	0	0	0	0	0	82	117	
8:00 - 8:15	0	5	2	24	5	0	0	0	0	2	0	74	112	457
8:15 - 8:30	0	14	1	20	5	0	0	0	0	1	0	69	110	455
8:30 - 8:45	0	9	0	20	8	0	0	0	0	1	0	71	109	448
Peak Hour	**0**	**24**	**3**	**82**	**22**	**0**	**0**	**0**	**0**	**4**	**0**	**322**		

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	Total	Hour
3:30 - 3:45	0	10	1	48	9	0	0	0	0	1	0	31	100	
3:45 - 4:00	0	12	1	53	11	0	0	0	0	2	0	33	112	
4:00 - 4:15	0	9	2	56	14	0	0	0	0	2	0	34	117	
4:15 - 4:30	0	19	1	67	11	0	0	0	0	1	0	22	121	450
4:30 - 4:45	0	4	1	60	11	0	0	0	0	2	0	31	109	459
4:45 - 5:00	0	3	1	57	5	0	0	0	0	3	0	28	97	444
Peak Hour	**0**	**44**	**5**	**236**	**47**	**0**	**0**	**0**	**0**	**7**	**0**	**120**		

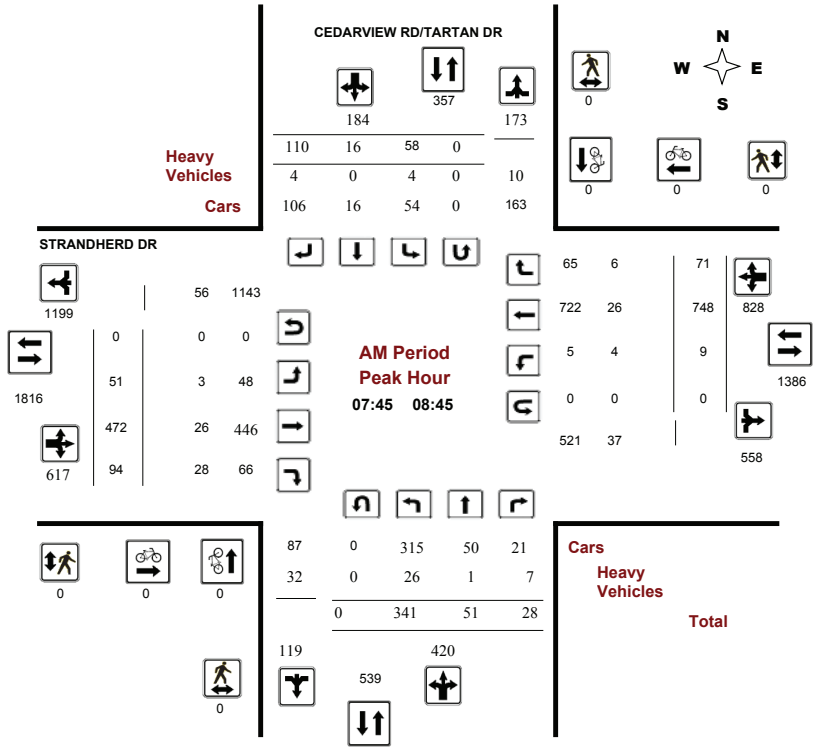
Public Works - Traffic Services

Turning Movement Count - Peak Hour Diagram

STRANDHERD DR @ CEDARVIEW RD/TARTAN DR

Survey Date: Thursday, December 17, 2015 **WO No:** 35623

Start Time: 07:00 **Device:** Miovision



Comments

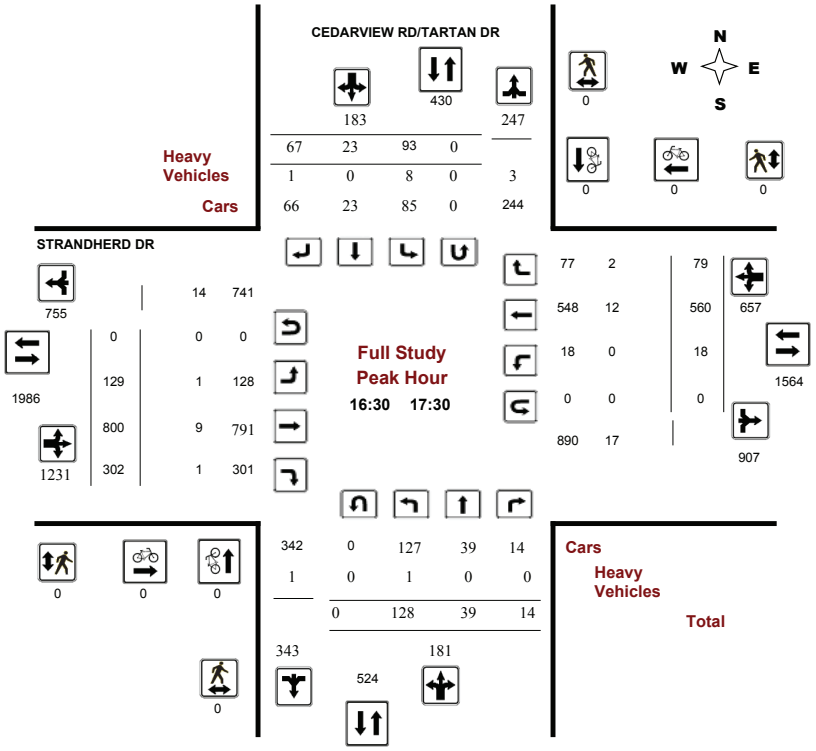
Public Works - Traffic Services

Turning Movement Count - Peak Hour Diagram

STRANDHERD DR @ CEDARVIEW RD/TARTAN DR

Survey Date: Thursday, December 17, 2015 **WO No:** 35623

Start Time: 07:00 **Device:** Miovision



Comments

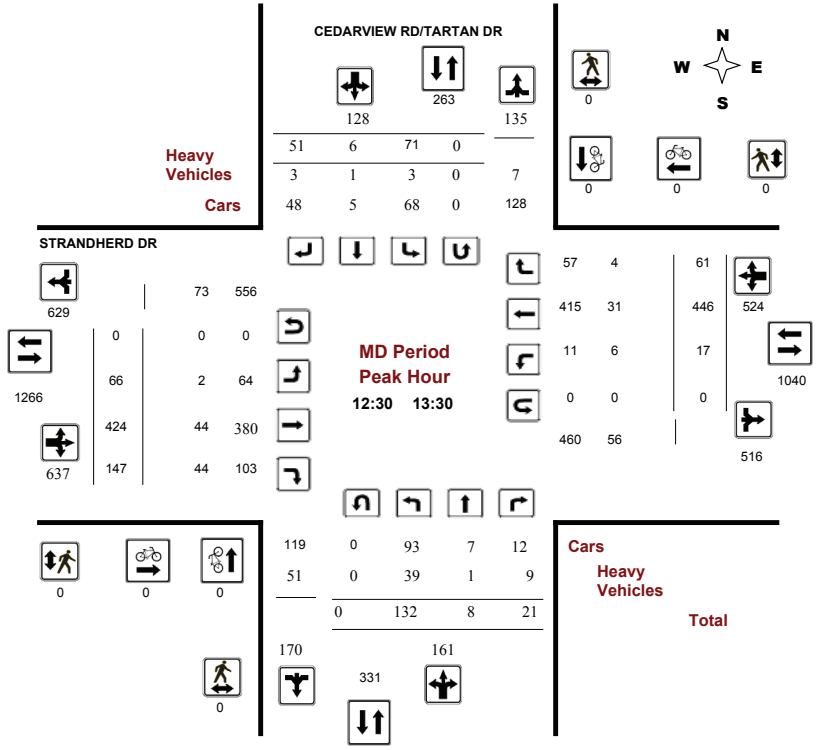
Public Works - Traffic Services

Turning Movement Count - Peak Hour Diagram

STRANDHERD DR @ CEDARVIEW RD/TARTAN DR

Survey Date: Thursday, December 17, 2015 **WO No:** 35623

Start Time: 07:00 **Device:** Miovision



Comments

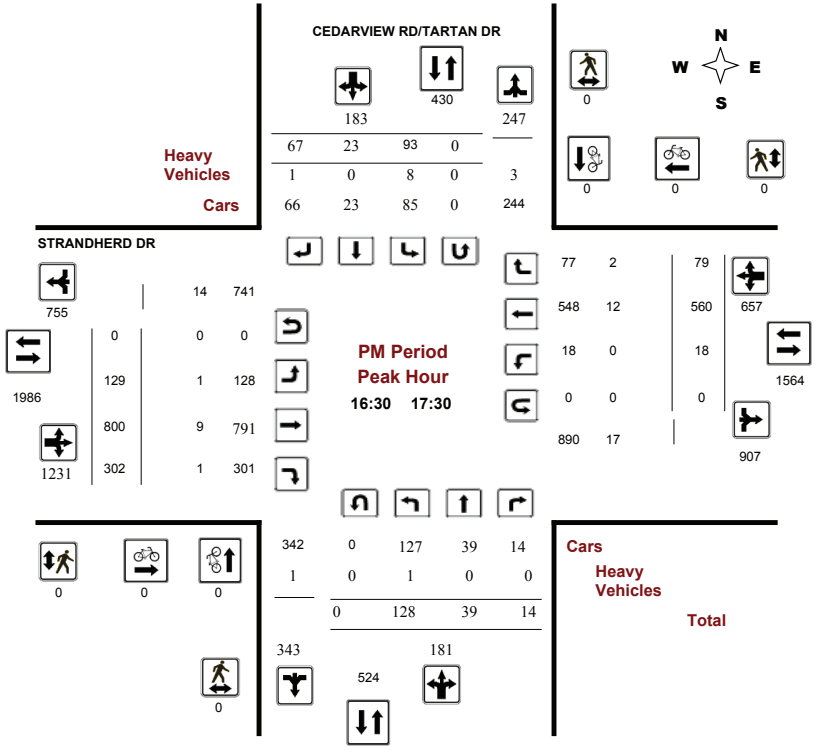
Public Works - Traffic Services

Turning Movement Count - Peak Hour Diagram

STRANDHERD DR @ CEDARVIEW RD/TARTAN DR

Survey Date: Thursday, December 17, 2015 **WO No:** 35623

Start Time: 07:00 **Device:** Miovision



Comments

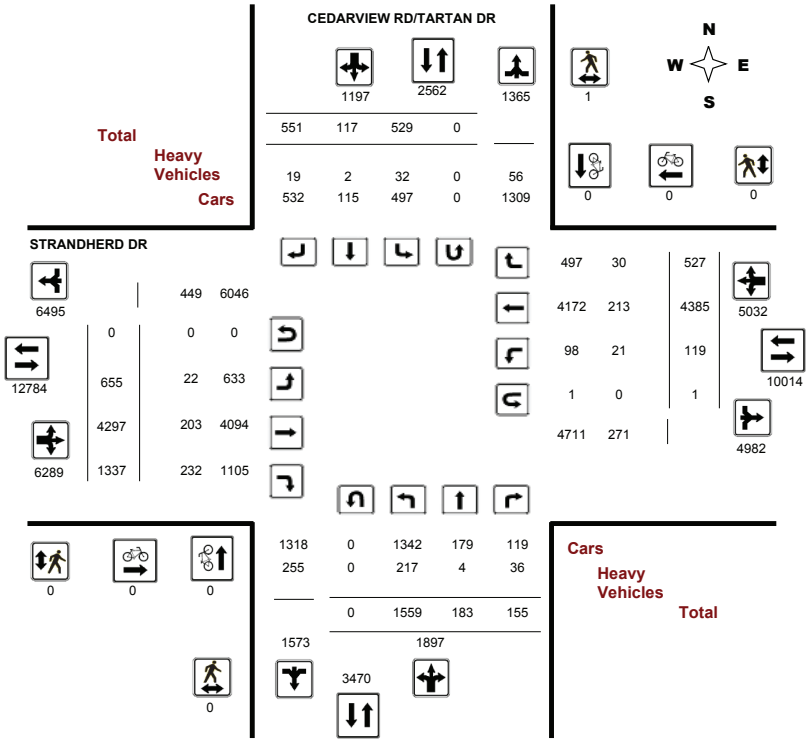
Public Works - Traffic Services

Turning Movement Count - Full Study Diagram

STRANDHERD DR @ CEDARVIEW RD/TARTAN DR

Survey Date: Thursday, December 17, 2015 **WO#:** 35623

Device: Miovision



Comments

Public Works - Traffic Services

Work Order 35623

Turning Movement Count - Full Study Summary Report

STRANDHERD DR @ CEDARVIEW RD/TARTAN DR

Survey Date: Thursday, December 17, 2015

Total Observed U-Turns

Northbound: 0 Southbound: 0

Eastbound: 0 Westbound: 1

AADT Factor 1.00

Full Study

	CEDARVIEW RD/TARTAN DR								STRANDHERD DR									
	Northbound				Southbound				Eastbound				Westbound					
Period	LT	ST	RT	NB TOT	LT	ST	RT	SB TOT	STR TOT	LT	ST	RT	EB TOT	LT	ST	RT	WB TOT	STR TOT	Grand Total
07:00 08:00	319	20	19	**358**	32	1	108	**141**	**499**	50	446	88	**584**	14	592	25	**631**	**1215**	**1714**
08:00 09:00	300	48	29	**377**	58	21	100	**179**	**556**	63	456	110	**629**	9	745	72	**826**	**1455**	**2011**
09:00 10:00	234	13	17	**264**	33	4	51	**88**	**352**	61	346	110	**517**	8	496	57	**561**	**1078**	**1430**
11:30 12:30	149	7	20	**176**	69	6	51	**126**	**302**	50	426	113	**589**	17	407	77	**501**	**1090**	**1392**
12:30 13:30	132	8	21	**161**	71	6	51	**128**	**289**	66	424	147	**637**	17	446	61	**524**	**1161**	**1450**
15:00 16:00	145	26	17	**188**	90	28	80	**198**	**386**	109	630	214	**953**	20	579	79	**678**	**1631**	**2017**
16:00 17:00	139	31	14	**184**	84	33	63	**180**	**364**	126	797	279	**1202**	19	591	75	**685**	**1887**	**2251**
17:00 18:00	141	30	18	**189**	92	18	47	**157**	**346**	130	772	276	**1178**	15	529	81	**625**	**1803**	**2149**
Sub Total	1559	183	155	**1897**	529	117	551	**1197**	**3094**	655	4297	1337	**6289**	119	4385	527	**5031**	**11320**	**14414**
U Turns				**0**				**0**	**0**				**0**				**1**	**1**	**1**
Total	1559	183	155	**1897**	529	117	551	**1197**	**3094**	655	4297	1337	**6289**	119	4385	527	**5032**	**11321**	**14415**
EQ 12Hr	2167	254	215	**2637**	735	163	766	**1664**	**4301**	910	5973	1858	**8742**	165	6095	733	**6994**	**15736**	**20037**
Note: These values are calculated by multiplying the totals by the appropriate expansion factor. **1.39**																			
AVG 12Hr	2167	254	215	**2637**	735	163	766	**1664**	**4301**	910	5973	1858	**8742**	165	6095	733	**6994**	**15736**	**20037**
Note: These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor. **1.00**																			
AVG 24Hr	2839	333	282	**3454**	963	213	1003	**2180**	**5634**	1193	7824	2435	**11452**	217	7985	960	**9163**	**20615**	**26249**
Note: These volumes are calculated by multiplying the Average Daily 12 hr. totals by 12 to 24 expansion factor. **1.31**																			

Comments:

Note: U-Turns provided for approach totals. Refer to 'U-Turn' Report for specific breakdown.

Public Works - Traffic Services

W.O. 35623

Turning Movement Count - 15 Minute Summary Report

STRANDHERD DR @ CEDARVIEW RD/TARTAN DR

Survey Date: Thursday, December 17, 2015

Total Observed U-Turns

Northbound: 0 Southbound: 0

Eastbound: 0 Westbound: 1

		CEDARVIEW RD/TARTAN DR								STRANDHERD DR									
		Northbound				Southbound				Eastbound				Westbound					
Time Period		LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT	W TOT	STR TOT	Grand Total
07:00	07:15	80	1	2	**83**	5	0	25	**30**	**113**	16	85	25	**126**	4	106	1	**111**	**237**	**350**
07:15	07:30	62	6	4	**72**	6	0	24	**30**	**102**	14	112	21	**147**	2	139	6	**147**	**294**	**396**
07:30	07:45	81	6	8	**95**	13	0	32	**45**	**140**	13	117	27	**157**	6	171	6	**183**	**340**	**480**
07:45	08:00	96	7	5	**108**	8	1	27	**36**	**144**	7	132	15	**154**	2	176	12	**190**	**344**	**488**
08:00	08:15	85	13	7	**105**	12	3	22	**37**	**142**	12	122	21	**155**	1	187	15	**203**	**358**	**500**
08:15	08:30	76	24	8	**108**	24	9	37	**70**	**178**	15	100	33	**148**	2	189	28	**219**	**367**	**545**
08:30	08:45	84	7	8	**99**	14	3	24	**41**	**140**	17	118	25	**160**	4	196	16	**216**	**376**	**516**
08:45	09:00	55	4	6	**65**	8	6	17	**31**	**96**	19	116	31	**166**	2	173	13	**189**	**355**	**451**
09:00	09:15	94	6	4	**104**	14	1	16	**31**	**135**	14	79	27	**120**	0	151	14	**165**	**285**	**420**
09:15	09:30	56	3	4	**63**	5	0	16	**21**	**84**	15	101	26	**142**	1	119	14	**134**	**276**	**360**
09:30	09:45	43	1	5	**49**	9	2	10	**21**	**70**	13	106	35	**154**	3	120	7	**130**	**284**	**354**
09:45	10:00	41	3	4	**48**	5	1	9	**15**	**63**	19	60	22	**101**	4	106	22	**132**	**233**	**296**
11:30	11:45	49	1	5	**55**	25	4	15	**44**	**99**	9	112	26	**147**	9	108	19	**136**	**283**	**382**
11:45	12:00	27	2	4	**33**	24	2	6	**32**	**65**	18	103	32	**153**	1	92	25	**118**	**271**	**336**
12:00	12:15	38	2	4	**44**	11	0	11	**22**	**66**	11	98	25	**134**	5	104	12	**121**	**255**	**321**
12:15	12:30	35	2	7	**44**	9	0	19	**28**	**72**	12	113	30	**155**	2	103	21	**126**	**281**	**353**
12:30	12:45	27	3	8	**38**	23	0	10	**33**	**71**	16	112	37	**165**	1	121	13	**135**	**300**	**371**
12:45	13:00	30	3	2	**35**	16	0	9	**25**	**60**	19	96	38	**153**	2	100	18	**120**	**273**	**333**
13:00	13:15	40	2	6	**48**	14	2	19	**35**	**83**	11	98	32	**141**	11	112	15	**138**	**279**	**362**
13:15	13:30	35	0	5	**40**	18	4	13	**35**	**75**	20	118	40	**178**	3	113	15	**131**	**309**	**384**
15:00	15:15	37	13	1	**51**	16	6	15	**37**	**88**	29	144	36	**209**	7	129	22	**158**	**367**	**455**
15:15	15:30	38	8	4	**50**	20	8	22	**50**	**100**	24	152	48	**224**	5	111	28	**144**	**368**	**468**
15:30	15:45	25	0	5	**30**	29	10	21	**60**	**90**	27	176	62	**265**	4	196	14	**214**	**479**	**569**
15:45	16:00	45	5	7	**57**	25	4	22	**51**	**108**	29	158	68	**255**	4	143	15	**162**	**417**	**525**
16:00	16:15	38	5	4	**47**	18	10	9	**37**	**84**	31	189	62	**282**	3	157	21	**181**	**463**	**547**
16:15	16:30	35	6	4	**45**	19	10	11	**40**	**85**	33	201	74	**308**	4	145	13	**162**	**470**	**555**
16:30	16:45	30	10	5	**45**	19	5	23	**47**	**92**	31	207	68	**306**	7	149	20	**176**	**482**	**574**
16:45	17:00	36	10	1	**47**	28	8	20	**56**	**103**	31	200	75	**306**	5	140	21	**166**	**472**	**575**
17:00	17:15	24	12	4	**40**	24	3	9	**36**	**76**	31	203	67	**301**	1	142	24	**167**	**468**	**544**
17:15	17:30	38	7	4	**49**	22	7	15	**44**	**93**	36	190	92	**318**	5	129	14	**148**	**466**	**559**
17:30	17:45	49	5	7	**61**	26	5	9	**40**	**101**	31	205	72	**308**	5	131	18	**154**	**462**	**563**
17:45	18:00	30	6	3	**39**	20	3	14	**37**	**76**	32	174	45	**251**	4	127	25	**156**	**407**	**483**
TOTAL:		1559	183	155	**1897**	529	117	551	**1197**	**3094**	655	4297	1337	**6289**	119	4385	527	**5032**	**11321**	**14415**

Note: U-Turns are included in Totals.

Comment:

Public Works - Traffic Services

Turning Movement Count - Cyclist Volume Report

Work Order 35623

STRANDHERD DR @ CEDARVIEW RD/TARTAN DR

Count Date: Thursday, December 17, 2015 **Start Time:** 07:00

	CEDARVIEW RD/TARTAN DR			STRANDHERD DR			
Time Period	Northbound	Southbound	Street Total	Eastbound	Westbound	Street Total	Grand Total
07:00 08:00	0	0	**0**	0	0	**0**	**0**
08:00 09:00	0	0	**0**	0	0	**0**	**0**
09:00 10:00	0	0	**0**	0	0	**0**	**0**
11:30 12:30	0	0	**0**	0	0	**0**	**0**
12:30 13:30	0	0	**0**	0	0	**0**	**0**
15:00 16:00	0	0	**0**	0	0	**0**	**0**
16:00 17:00	0	0	**0**	0	0	**0**	**0**
17:00 18:00	0	0	**0**	0	0	**0**	**0**
Total	0	0	**0**	0	0	**0**	**0**

Comment:

Note: These volumes consists of bicycles only (no mopeds or motorcycles) and ARE NOT included in the Turning Movement Count Summary.

Public Works - Traffic Services

W.O. 35623

Turning Movement Count - Heavy Vehicle Report

STRANDHERD DR @ CEDARVIEW RD/TARTAN DR

Survey Date: Thursday, December 17, 2015

		CEDARVIEW RD/TARTAN DR									STRANDHERD DR									
		Northbound				Southbound					Eastbound				Westbound					
Time Period		LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT	W TOT	STR TOT	Grand Total
07:00	08:00	24	1	4	**29**	3	0	1	**4**	**33**	6	34	30	**70**	3	20	6	**29**	**99**	**132**
08:00	09:00	29	1	7	**37**	3	0	6	**9**	**46**	2	33	35	**70**	4	26	5	**35**	**105**	**151**
09:00	10:00	29	0	7	**36**	2	0	2	**4**	**40**	3	33	35	**71**	2	42	4	**48**	**119**	**159**
11:30	12:30	42	0	3	**45**	3	0	1	**4**	**49**	3	27	40	**70**	5	37	3	**45**	**115**	**164**
12:30	13:30	39	1	9	**49**	3	1	3	**7**	**56**	2	44	44	**90**	6	31	4	**41**	**131**	**187**
15:00	16:00	35	0	4	**39**	4	1	2	**7**	**46**	3	18	36	**57**	1	33	3	**37**	**94**	**140**
16:00	17:00	15	1	2	**18**	8	0	4	**12**	**30**	3	6	11	**20**	0	20	2	**22**	**42**	**72**
17:00	18:00	4	0	0	**4**	6	0	0	**6**	**10**	0	8	1	**9**	0	4	3	**7**	**16**	**26**
Sub Total		217	4	36	**257**	32	2	19	**53**	**310**	22	203	232	**457**	21	213	30	**264**	**721**	**1031**
U-Turns (Heavy Vehicles)					**0**				**0**	**0**				**0**				**0**	**0**	**0**
Total		217	4	36	**0**	32	2	19	**53**	**310**	22	203	232	**457**	21	213	30	**264**	**721**	**1031**

Heavy Vehicles are vehicles having one rear axle with four or more wheels, or having two or more rear axles. These vehicles include most O.C. Transpo, school and inter-city buses. Further, they ARE included in the Turning Movement Count Summary.

Public Works - Traffic Services

Work Order 35623

Turning Movement Count - Pedestrian Volume Report

STRANDHERD DR @ CEDARVIEW RD/TARTAN DR

Count Date: Thursday, December 17, 2015 **Start Time:** 07:00

Time Period		NB Approach (E or W Crossing)	SB Approach (E or W Crossing)	Total	EB Approach (N or S Crossing)	WB Approach (N or S Crossing)	Total	Grand Total
07:00	07:15	0	0	**0**	0	0	**0**	**0**
07:15	07:30	0	0	**0**	0	0	**0**	**0**
07:30	07:45	0	0	**0**	0	0	**0**	**0**
07:45	08:00	0	0	**0**	0	0	**0**	**0**
07:00	08:00	0	0	**0**	0	0	**0**	**0**
08:00	08:15	0	0	**0**	0	0	**0**	**0**
08:15	08:30	0	0	**0**	0	0	**0**	**0**
08:30	08:45	0	0	**0**	0	0	**0**	**0**
08:45	09:00	0	0	**0**	0	0	**0**	**0**
08:00	09:00	0	0	**0**	0	0	**0**	**0**
09:00	09:15	0	0	**0**	0	0	**0**	**0**
09:15	09:30	0	0	**0**	0	0	**0**	**0**
09:30	09:45	0	0	**0**	0	0	**0**	**0**
09:45	10:00	0	0	**0**	0	0	**0**	**0**
09:00	10:00	0	0	**0**	0	0	**0**	**0**
11:30	11:45	0	0	**0**	0	0	**0**	**0**
11:45	12:00	0	0	**0**	0	0	**0**	**0**
12:00	12:15	0	1	**1**	0	0	**0**	**1**
12:15	12:30	0	0	**0**	0	0	**0**	**0**
11:30	12:30	0	1	**1**	0	0	**0**	**1**
12:30	12:45	0	0	**0**	0	0	**0**	**0**
12:45	13:00	0	0	**0**	0	0	**0**	**0**
13:00	13:15	0	0	**0**	0	0	**0**	**0**
13:15	13:30	0	0	**0**	0	0	**0**	**0**
12:30	13:30	0	0	**0**	0	0	**0**	**0**
15:00	15:15	0	0	**0**	0	0	**0**	**0**
15:15	15:30	0	0	**0**	0	0	**0**	**0**
15:30	15:45	0	0	**0**	0	0	**0**	**0**
15:45	16:00	0	0	**0**	0	0	**0**	**0**
15:00	16:00	0	0	**0**	0	0	**0**	**0**
16:00	16:15	0	0	**0**	0	0	**0**	**0**
16:15	16:30	0	0	**0**	0	0	**0**	**0**
16:30	16:45	0	0	**0**	0	0	**0**	**0**
16:45	17:00	0	0	**0**	0	0	**0**	**0**
16:00	17:00	0	0	**0**	0	0	**0**	**0**
17:00	17:15	0	0	**0**	0	0	**0**	**0**
17:15	17:30	0	0	**0**	0	0	**0**	**0**
17:30	17:45	0	0	**0**	0	0	**0**	**0**
17:45	18:00	0	0	**0**	0	0	**0**	**0**
17:00	18:00	0	0	**0**	0	0	**0**	**0**
Total	.....	0	1	**1**	0	0	**0**	**1**

Comment:

Public Works - Traffic Services

Work Order
35623

Turning Movement Count - 15 Min U-Turn Total Report

STRANDHERD DR @ CEDARVIEW RD/TARTAN DR

Survey Date: Thursday, December 17, 2015

Time Period		Northbound U-Turn Total	Southbound U-Turn Total	Eastbound U-Turn Total	Westbound U-Turn Total	Total
07:00	07:15	0	0	0	0	0
07:15	07:30	0	0	0	0	0
07:30	07:45	0	0	0	0	0
07:45	08:00	0	0	0	0	0
08:00	08:15	0	0	0	0	0
08:15	08:30	0	0	0	0	0
08:30	08:45	0	0	0	0	0
08:45	09:00	0	0	0	1	1
09:00	09:15	0	0	0	0	0
09:15	09:30	0	0	0	0	0
09:30	09:45	0	0	0	0	0
09:45	10:00	0	0	0	0	0
11:30	11:45	0	0	0	0	0
11:45	12:00	0	0	0	0	0
12:00	12:15	0	0	0	0	0
12:15	12:30	0	0	0	0	0
12:30	12:45	0	0	0	0	0
12:45	13:00	0	0	0	0	0
13:00	13:15	0	0	0	0	0
13:15	13:30	0	0	0	0	0
15:00	15:15	0	0	0	0	0
15:15	15:30	0	0	0	0	0
15:30	15:45	0	0	0	0	0
15:45	16:00	0	0	0	0	0
16:00	16:15	0	0	0	0	0
16:15	16:30	0	0	0	0	0
16:30	16:45	0	0	0	0	0
16:45	17:00	0	0	0	0	0
17:00	17:15	0	0	0	0	0
17:15	17:30	0	0	0	0	0
17:30	17:45	0	0	0	0	0
17:45	18:00	0	0	0	0	0
Total		0	0	0	1	1

Appendix B INTERSECTION PERFORMANCE WORKSHEETS

B.1 2016 EXISTING CONDITIONS

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	57	635	10	915	386	89	64	139
v/c Ratio	0.78	0.70	0.04	1.01	0.90	0.14	0.14	0.22
Control Delay	84.1	22.8	12.4	56.4	55.7	14.8	22.2	6.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	84.1	22.8	12.4	56.4	55.7	14.8	22.2	6.3
Queue Length 50th (m)	8.3	84.7	0.9	~166.7	67.8	7.0	8.0	2.1
Queue Length 95th (m)	#32.8	125.5	3.6	#253.4	#122.2	17.1	17.2	13.9
Internal Link Dist (m)		124.7		145.0		270.9		84.5
Turn Bay Length (m)	120.0		130.0		80.0		37.5	
Base Capacity (vph)	73	902	238	909	429	628	449	635
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.78	0.70	0.04	1.01	0.90	0.14	0.14	0.22

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	52	486	98	9	770	72	355	52	29	59	16	112
Future Volume (vph)	52	486	98	9	770	72	355	52	29	59	16	112
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.4	6.4		6.4	6.4		5.8	5.8		5.8	5.8	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	0.99		1.00	0.95		1.00	0.87	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1695	1739		1695	1761		1695	1688		1695	1549	
Flt Permitted	0.08	1.00		0.26	1.00		0.67	1.00		0.70	1.00	
Satd. Flow (perm)	143	1739		464	1761		1192	1688		1248	1549	
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)	57	528	107	10	837	78	386	57	32	64	17	122
RTOR Reduction (vph)	0	7	0	0	3	0	0	20	0	0	78	0
Lane Group Flow (vph)	57	628	0	10	912	0	386	69	0	64	61	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	50.0	50.0		50.0	50.0		35.0	35.0		35.0	35.0	
Effective Green, g (s)	50.0	50.0		50.0	50.0		35.0	35.0		35.0	35.0	
Actuated g/C Ratio	0.51	0.51		0.51	0.51		0.36	0.36		0.36	0.36	
Clearance Time (s)	6.4	6.4		6.4	6.4		5.8	5.8		5.8	5.8	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	73	894		238	905		429	607		449	557	
v/s Ratio Prot		0.36			c0.52			0.04			0.04	
v/s Ratio Perm	0.40			0.02			c0.32			0.05		
v/c Ratio	0.78	0.70		0.04	1.01		0.90	0.11		0.14	0.11	
Uniform Delay, d1	19.2	17.9		11.7	23.6		29.4	20.7		21.0	20.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	40.6	2.5		0.1	31.7		24.4	0.4		0.7	0.4	
Delay (s)	59.7	20.5		11.8	55.3		53.9	21.1		21.6	21.1	
Level of Service	E	C		B	E		D	C		C	C	
Approach Delay (s)		23.7			54.8			47.7			21.3	
Approach LOS		C			D			D			C	

Intersection Summary				
HCM 2000 Control Delay	41.0	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.96			
Actuated Cycle Length (s)	97.2	Sum of lost time (s)	12.2	
Intersection Capacity Utilization	91.3%	ICU Level of Service	F	
Analysis Period (min)	15			

c Critical Lane Group

Intersection	
Int Delay, s/veh	9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Vol, veh/h	7	386	50	3	97	26
Future Vol, veh/h	7	386	50	3	97	26
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	8	420	54	3	105	28

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	295	56	0	0	58	0
Stage 1	56	-	-	-	-	-
Stage 2	239	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	696	1011	-	-	1546	-
Stage 1	967	-	-	-	-	-
Stage 2	801	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	648	1011	-	-	1546	-
Mov Cap-2 Maneuver	648	-	-	-	-	-
Stage 1	967	-	-	-	-	-
Stage 2	746	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.2	0	5.9
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	1001	1546	-
HCM Lane V/C Ratio	-	-	0.427	0.068	-
HCM Control Delay (s)	-	-	11.2	7.5	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	2.2	0.2	-

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	142	1229	21	715	146	59	103	99
v/c Ratio	0.78	1.38	0.29	0.79	0.33	0.09	0.22	0.16
Control Delay	51.0	200.3	26.3	26.8	25.2	16.6	23.3	8.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.0	200.3	26.3	26.8	25.2	16.6	23.3	8.4
Queue Length 50th (m)	20.6	~307.8	2.2	103.3	19.7	5.3	13.3	3.0
Queue Length 95th (m)	#56.6	#385.4	9.0	153.5	35.3	13.4	25.7	13.4
Internal Link Dist (m)		124.6		144.9		270.9		84.5
Turn Bay Length (m)	120.1		130.1		79.9		37.5	
Base Capacity (vph)	182	893	73	906	445	626	461	617
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.78	1.38	0.29	0.79	0.33	0.09	0.22	0.16

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	131	815	316	19	577	81	134	40	15	95	23	68
Future Volume (vph)	131	815	316	19	577	81	134	40	15	95	23	68
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.4	6.4		6.4	6.4		5.8	5.8		5.8	5.8	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.96		1.00	0.98		1.00	0.96		1.00	0.89	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1695	1710		1695	1751		1695	1712		1695	1584	
Flt Permitted	0.20	1.00		0.08	1.00		0.69	1.00		0.72	1.00	
Satd. Flow (perm)	355	1710		143	1751		1236	1712		1282	1584	
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	886	343	21	627	88	146	43	16	103	25	74
RTOR Reduction (vph)	0	15	0	0	5	0	0	10	0	0	47	0
Lane Group Flow (vph)	142	1214	0	21	710	0	146	49	0	103	52	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	50.0	50.0		50.0	50.0		35.0	35.0		35.0	35.0	
Effective Green, g (s)	50.0	50.0		50.0	50.0		35.0	35.0		35.0	35.0	
Actuated g/C Ratio	0.51	0.51		0.51	0.51		0.36	0.36		0.36	0.36	
Clearance Time (s)	6.4	6.4		6.4	6.4		5.8	5.8		5.8	5.8	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	182	879		73	900		445	616		461	570	
v/s Ratio Prot		c0.71			0.41			0.03			0.03	
v/s Ratio Perm	0.40			0.15			c0.12			0.08		
v/c Ratio	0.78	1.38		0.29	0.79		0.33	0.08		0.22	0.09	
Uniform Delay, d1	19.1	23.6		13.5	19.3		22.6	20.5		21.6	20.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	19.2	178.8		2.2	4.6		2.0	0.3		1.1	0.3	
Delay (s)	38.3	202.4		15.6	23.9		24.5	20.7		22.8	20.9	
Level of Service	D	F		B	C		C	C		C	C	
Approach Delay (s)		185.4			23.7			23.4			21.8	
Approach LOS		F			C			C			C	

Intersection Summary					
HCM 2000 Control Delay	111.7	HCM 2000 Level of Service	F		
HCM 2000 Volume to Capacity ratio	0.95				
Actuated Cycle Length (s)	97.2	Sum of lost time (s)	12.2		
Intersection Capacity Utilization	99.8%	ICU Level of Service	F		
Analysis Period (min)	15				

c Critical Lane Group

Intersection	
Int Delay, s/veh	6.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Vol, veh/h	7	138	51	5	298	60
Future Vol, veh/h	7	138	51	5	298	60
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	8	150	55	5	324	65

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	771	58	0	0	61	0
Stage 1	58	-	-	-	-	-
Stage 2	713	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	368	1008	-	-	1542	-
Stage 1	965	-	-	-	-	-
Stage 2	486	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	288	1008	-	-	1542	-
Mov Cap-2 Maneuver	288	-	-	-	-	-
Stage 1	965	-	-	-	-	-
Stage 2	380	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.9	0	6.6
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	899	1542	-
HCM Lane V/C Ratio	-	-	0.175	0.21	-
HCM Control Delay (s)	-	-	9.9	8	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.6	0.8	-

B.2 2022 FUTURE BACKGROUND CONDITIONS

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	69	764	11	1134	489	76	66	175
v/c Ratio	1.17	0.83	0.07	1.21	1.22	0.12	0.14	0.29
Control Delay	480.1	32.9	15.4	416.9	447.8	15.2	26.4	16.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	480.1	32.9	15.4	416.9	447.8	15.2	26.4	16.0
Queue Length 50th (m)	~19.3	142.1	1.2	~326.9	~141.1	6.2	10.3	15.4
Queue Length 95th (m)	#42.6	#268.3	5.1	#477.9	#238.6	19.1	23.0	38.4
Internal Link Dist (m)		124.7		145.0		270.9		84.5
Turn Bay Length (m)	120.0		130.0		80.0		37.5	
Base Capacity (vph)	59	926	159	937	402	633	465	614
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.17	0.83	0.07	1.21	1.22	0.12	0.14	0.29

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	69	614	150	11	1053	81	489	41	35	66	13	162
Future Volume (vph)	69	614	150	11	1053	81	489	41	35	66	13	162
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.4	6.4		6.4	6.4		5.8	5.8		5.8	5.8	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	0.99		1.00	0.93		1.00	0.86	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1695	1732		1695	1765		1695	1661		1695	1537	
Flt Permitted	0.06	1.00		0.17	1.00		0.61	1.00		0.71	1.00	
Satd. Flow (perm)	112	1732		300	1765		1092	1661		1263	1537	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	69	614	150	11	1053	81	489	41	35	66	13	162
RTOR Reduction (vph)	0	8	0	0	2	0	0	22	0	0	49	0
Lane Group Flow (vph)	69	756	0	11	1132	0	489	54	0	66	126	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	63.6	63.6		63.6	63.6		44.2	44.2		44.2	44.2	
Effective Green, g (s)	63.6	63.6		63.6	63.6		44.2	44.2		44.2	44.2	
Actuated g/C Ratio	0.53	0.53		0.53	0.53		0.37	0.37		0.37	0.37	
Clearance Time (s)	6.4	6.4		6.4	6.4		5.8	5.8		5.8	5.8	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	59	917		159	935		402	611		465	566	
v/s Ratio Prot		0.44			c0.64			0.03			0.08	
v/s Ratio Perm	0.61			0.04			c0.45			0.05		
v/c Ratio	1.17	0.82		0.07	1.21		1.22	0.09		0.14	0.22	
Uniform Delay, d1	28.2	23.6		13.8	28.2		37.9	24.7		25.3	26.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	448.3	6.5		0.2	389.3		413.3	0.3		0.6	0.9	
Delay (s)	476.5	30.0		13.9	417.5		451.2	25.0		25.9	27.0	
Level of Service	F	C		B	F		F	C		C	C	
Approach Delay (s)		67.0			413.7			393.9			26.7	
Approach LOS		E			F			F			C	

Intersection Summary				
HCM 2000 Control Delay	272.4	HCM 2000 Level of Service	F	
HCM 2000 Volume to Capacity ratio	1.21			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.2	
Intersection Capacity Utilization	118.6%	ICU Level of Service	H	
Analysis Period (min)	60			

c Critical Lane Group

Intersection	
Int Delay, s/veh	9.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Vol, veh/h	6	490	76	2	142	31
Future Vol, veh/h	6	490	76	2	142	31
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	6	490	76	2	142	31

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	392	77	0	0	78	0
Stage 1	77	-	-	-	-	-
Stage 2	315	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	612	984	-	-	1520	-
Stage 1	946	-	-	-	-	-
Stage 2	740	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	554	984	-	-	1520	-
Mov Cap-2 Maneuver	554	-	-	-	-	-
Stage 1	946	-	-	-	-	-
Stage 2	670	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12.5	0	6.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	975	1520	-
HCM Lane V/C Ratio	-	-	0.509	0.093	-
HCM Control Delay (s)	-	-	12.5	7.6	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	3.1	0.3	-

Queues
1: Borrisokane Road & Strandherd Drive

3387 Cedarview Road
2022 FBG PM

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	197	1592	25	901	218	48	106	127
v/c Ratio	0.65	1.26	0.42	0.70	1.18	0.16	0.49	0.36
Control Delay	21.4	500.8	33.2	12.6	430.2	32.0	54.0	14.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.4	500.8	33.2	12.6	430.2	32.0	54.0	14.2
Queue Length 50th (m)	21.0	~471.3	2.0	101.4	~61.5	6.3	22.9	3.6
Queue Length 95th (m)	#84.2	#650.2	#19.6	193.4	#126.7	19.5	46.6	26.3
Internal Link Dist (m)		124.6		144.9		270.9		84.5
Turn Bay Length (m)	120.1		130.1		79.9		37.5	
Base Capacity (vph)	302	1260	59	1286	184	298	217	352
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.65	1.26	0.42	0.70	1.18	0.16	0.49	0.36

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

HCM Signalized Intersection Capacity Analysis
1: Borrisokane Road & Strandherd Drive

3387 Cedarview Road
2022 FBG PM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	197	1160	432	25	811	90	218	31	17	106	18	109
Future Volume (vph)	197	1160	432	25	811	90	218	31	17	106	18	109
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.4	6.4		6.4	6.4		5.8	5.8		5.8	5.8	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.96		1.00	0.99		1.00	0.95		1.00	0.87	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1695	1712		1695	1758		1695	1690		1695	1555	
Flt Permitted	0.23	1.00		0.05	1.00		0.62	1.00		0.73	1.00	
Satd. Flow (perm)	414	1712		81	1758		1099	1690		1295	1555	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	197	1160	432	25	811	90	218	31	17	106	18	109
RTOR Reduction (vph)	0	11	0	0	3	0	0	14	0	0	91	0
Lane Group Flow (vph)	197	1581	0	25	898	0	218	34	0	106	36	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	87.6	87.6		87.6	87.6		20.2	20.2		20.2	20.2	
Effective Green, g (s)	87.6	87.6		87.6	87.6		20.2	20.2		20.2	20.2	
Actuated g/C Ratio	0.73	0.73		0.73	0.73		0.17	0.17		0.17	0.17	
Clearance Time (s)	6.4	6.4		6.4	6.4		5.8	5.8		5.8	5.8	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	302	1249		59	1283		184	284		217	261	
v/s Ratio Prot		c0.92			0.51			0.02			0.02	
v/s Ratio Perm	0.48			0.31			c0.20			0.08		
v/c Ratio	0.65	1.27		0.42	0.70		1.18	0.12		0.49	0.14	
Uniform Delay, d1	8.4	16.2		6.3	8.9		49.9	42.4		45.2	42.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	5.1	485.1		4.9	1.7		386.6	0.9		7.9	1.1	
Delay (s)	13.5	501.3		11.2	10.6		436.5	43.2		53.1	43.6	
Level of Service	B	F		B	B		F	D		D	D	
Approach Delay (s)		447.6			10.7			365.5			47.9	
Approach LOS		F			B			F			D	

Intersection Summary				
HCM 2000 Control Delay	285.9	HCM 2000 Level of Service	F	
HCM 2000 Volume to Capacity ratio	1.25			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.2	
Intersection Capacity Utilization	137.5%	ICU Level of Service	H	
Analysis Period (min)	60			

c Critical Lane Group

Intersection	
Int Delay, s/veh	6.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Vol, veh/h	6	195	72	4	379	97
Future Vol, veh/h	6	195	72	4	379	97
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	6	195	72	4	379	97

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	929	74	0	0	76	0
Stage 1	74	-	-	-	-	-
Stage 2	855	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	297	988	-	-	1523	-
Stage 1	949	-	-	-	-	-
Stage 2	417	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	219	988	-	-	1523	-
Mov Cap-2 Maneuver	219	-	-	-	-	-
Stage 1	949	-	-	-	-	-
Stage 2	307	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.2	0	6.5
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	894	1523	-
HCM Lane V/C Ratio	-	-	0.225	0.249	-
HCM Control Delay (s)	-	-	10.2	8.1	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.9	1	-

B.3 2022 FUTURE BACKGROUND CONDITIONS – TMP MODIFICATIONS

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	69	614	150	11	1134	489	41	35	66	175
v/c Ratio	0.44	0.41	0.20	0.07	0.86	0.81	0.05	0.05	0.25	0.45
Control Delay	23.4	21.3	3.7	55.7	38.5	56.3	22.6	0.8	46.5	23.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.4	21.3	3.7	55.7	38.5	56.3	22.6	0.8	46.5	23.1
Queue Length 50th (m)	7.7	43.6	0.0	1.2	118.0	53.7	5.5	0.0	12.9	13.4
Queue Length 95th (m)	16.8	76.5	15.5	4.9	173.3	#92.4	15.0	2.3	31.5	45.4
Internal Link Dist (m)		124.7			145.0		270.9			84.5
Turn Bay Length (m)	120.0			130.0		80.0			37.5	
Base Capacity (vph)	157	1697	834	154	1598	711	759	687	261	392
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.44	0.36	0.18	0.07	0.71	0.69	0.05	0.05	0.25	0.45

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	69	614	150	11	1053	81	489	41	35	66	13	162
Future Volume (vph)	69	614	150	11	1053	81	489	41	35	66	13	162
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	4.5	6.4	6.4	4.5	6.4		4.5	5.8	5.8	5.8	5.8	
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95		0.97	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	0.86	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1695	3390	1517	3288	3354		3288	1784	1517	1695	1537	
Flt Permitted	0.09	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.73	1.00	
Satd. Flow (perm)	169	3390	1517	3288	3354		3288	1784	1517	1303	1537	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	69	614	150	11	1053	81	489	41	35	66	13	162
RTOR Reduction (vph)	0	0	85	0	5	0	0	0	21	0	85	0
Lane Group Flow (vph)	69	614	65	11	1129	0	489	41	14	66	90	0
Turn Type	pm+pt	NA	Perm	Prot	NA		Prot	NA	Perm	Perm	NA	
Protected Phases	5	2		1	6		7	4			8	
Permitted Phases	2		2						4	8		
Actuated Green, G (s)	53.2	49.0	49.0	0.9	45.7		20.2	46.8	46.8	22.1	22.1	
Effective Green, g (s)	53.2	49.0	49.0	0.9	45.7		20.2	46.8	46.8	22.1	22.1	
Actuated g/C Ratio	0.47	0.43	0.43	0.01	0.40		0.18	0.41	0.41	0.19	0.19	
Clearance Time (s)	4.5	6.4	6.4	4.5	6.4		4.5	5.8	5.8	5.8	5.8	
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)	135	1464	655	26	1351		585	736	626	253	299	
v/s Ratio Prot	c0.02	0.18		0.00	c0.34		c0.15	0.02			c0.06	
v/s Ratio Perm	0.22		0.04						0.01	0.05		
v/c Ratio	0.51	0.42	0.10	0.42	0.84		0.84	0.06	0.02	0.26	0.30	
Uniform Delay, d1	21.5	22.3	19.1	56.0	30.5		45.0	20.0	19.7	38.7	39.0	
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	3.3	0.2	0.1	11.1	4.9		11.0	0.1	0.1	2.5	2.6	
Delay (s)	24.8	22.5	19.2	67.0	35.3		56.0	20.2	19.8	41.2	41.6	
Level of Service	C	C	B	E	D		E	C	B	D	D	
Approach Delay (s)		22.1			35.6			51.2			41.5	
Approach LOS		C			D			D			D	

Intersection Summary				
HCM 2000 Control Delay	35.2	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.69			
Actuated Cycle Length (s)	113.4	Sum of lost time (s)	21.2	
Intersection Capacity Utilization	81.3%	ICU Level of Service	D	
Analysis Period (min)	60			

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	197	1160	432	25	901	218	31	17	106	127
v/c Ratio	0.64	0.75	0.47	0.14	0.82	0.58	0.05	0.03	0.36	0.29
Control Delay	25.1	26.4	3.5	51.8	38.2	50.4	24.0	0.1	42.1	12.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.1	26.4	3.5	51.8	38.2	50.4	24.0	0.1	42.1	12.7
Queue Length 50th (m)	20.1	87.4	0.0	2.4	84.2	20.8	3.7	0.0	17.6	2.8
Queue Length 95th (m)	46.3	157.5	27.7	8.3	129.1	41.5	13.3	0.0	45.8	26.0
Internal Link Dist (m)		124.6			144.9		270.9			84.5
Turn Bay Length (m)	120.1			130.1		79.9			37.5	
Base Capacity (vph)	367	2012	1076	180	1620	476	684	651	293	431
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.54	0.58	0.40	0.14	0.56	0.46	0.05	0.03	0.36	0.29

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	197	1160	432	25	811	90	218	31	17	106	18	109
Future Volume (vph)	197	1160	432	25	811	90	218	31	17	106	18	109
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	4.5	6.4	6.4	4.5	6.4		4.5	5.8	5.8	5.8	5.8	
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95		0.97	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	0.87	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1695	3390	1517	3288	3339		3288	1784	1517	1695	1555	
Flt Permitted	0.14	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.74	1.00	
Satd. Flow (perm)	251	3390	1517	3288	3339		3288	1784	1517	1315	1555	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	197	1160	432	25	811	90	218	31	17	106	18	109
RTOR Reduction (vph)	0	0	239	0	8	0	0	0	11	0	85	0
Lane Group Flow (vph)	197	1160	193	25	893	0	218	31	6	106	42	0
Turn Type	pm+pt	NA	Perm	Prot	NA		Prot	NA	Perm	Perm	NA	
Protected Phases	5	2		1	6		7	4			8	
Permitted Phases	2		2						4	8		
Actuated Green, G (s)	52.9	46.4	46.4	2.0	35.9		11.7	38.8	38.8	22.6	22.6	
Effective Green, g (s)	52.9	46.4	46.4	2.0	35.9		11.7	38.8	38.8	22.6	22.6	
Actuated g/C Ratio	0.51	0.45	0.45	0.02	0.35		0.11	0.37	0.37	0.22	0.22	
Clearance Time (s)	4.5	6.4	6.4	4.5	6.4		4.5	5.8	5.8	5.8	5.8	
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)	301	1513	677	63	1153		370	666	566	286	338	
v/s Ratio Prot	c0.08	c0.34		0.01	0.27		c0.07	0.02			0.03	
v/s Ratio Perm	0.25		0.13						0.00	c0.08		
v/c Ratio	0.65	0.77	0.28	0.40	0.77		0.59	0.05	0.01	0.37	0.12	
Uniform Delay, d1	17.9	24.2	18.2	50.4	30.4		43.8	20.8	20.5	34.6	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	5.2	2.4	0.2	4.1	3.4		2.4	0.1	0.0	3.7	0.7	
Delay (s)	23.0	26.6	18.5	54.5	33.8		46.2	20.9	20.5	38.3	33.4	
Level of Service	C	C	B	D	C		D	C	C	D	C	
Approach Delay (s)		24.3			34.3			41.6			35.6	
Approach LOS		C			C			D			D	

Intersection Summary				
HCM 2000 Control Delay	29.4	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.65			
Actuated Cycle Length (s)	103.9	Sum of lost time (s)	21.2	
Intersection Capacity Utilization	70.5%	ICU Level of Service	C	
Analysis Period (min)	60			

c Critical Lane Group

B.4 2022 TOTAL FUTURE CONDITIONS

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	69	768	21	1134	512	100	66	175
v/c Ratio	1.17	0.84	0.14	1.23	1.24	0.15	0.14	0.28
Control Delay	480.4	35.3	18.0	449.7	491.9	12.0	25.8	16.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	480.4	35.3	18.0	449.7	491.9	12.0	25.8	16.0
Queue Length 50th (m)	~19.2	146.5	2.5	~330.7	~149.7	6.1	10.1	15.7
Queue Length 95th (m)	#42.6	#274.7	8.7	#481.6	#249.7	20.7	22.8	38.4
Internal Link Dist (m)		124.7		145.0		270.9		84.5
Turn Bay Length (m)	120.0		130.0		80.0		37.5	
Base Capacity (vph)	59	910	146	923	412	649	465	624
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.17	0.84	0.14	1.23	1.24	0.15	0.14	0.28

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	69	614	154	21	1053	81	512	41	59	66	13	162
Future Volume (vph)	69	614	154	21	1053	81	512	41	59	66	13	162
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.4	6.4		6.4	6.4		5.8	5.8		5.8	5.8	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	0.99		1.00	0.91		1.00	0.86	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1695	1731		1695	1765		1695	1626		1695	1537	
Flt Permitted	0.06	1.00		0.16	1.00		0.61	1.00		0.69	1.00	
Satd. Flow (perm)	114	1731		281	1765		1096	1626		1235	1537	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	69	614	154	21	1053	81	512	41	59	66	13	162
RTOR Reduction (vph)	0	8	0	0	2	0	0	37	0	0	46	0
Lane Group Flow (vph)	69	760	0	21	1132	0	512	63	0	66	129	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	62.6	62.6		62.6	62.6		45.2	45.2		45.2	45.2	
Effective Green, g (s)	62.6	62.6		62.6	62.6		45.2	45.2		45.2	45.2	
Actuated g/C Ratio	0.52	0.52		0.52	0.52		0.38	0.38		0.38	0.38	
Clearance Time (s)	6.4	6.4		6.4	6.4		5.8	5.8		5.8	5.8	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	59	903		146	920		412	612		465	578	
v/s Ratio Prot		0.44			c0.64			0.04			0.08	
v/s Ratio Perm	0.61			0.07			c0.47			0.05		
v/c Ratio	1.17	0.84		0.14	1.23		1.24	0.10		0.14	0.22	
Uniform Delay, d1	28.7	24.5		14.8	28.7		37.4	24.3		24.6	25.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	448.3	7.7		0.5	424.2		458.2	0.3		0.6	0.9	
Delay (s)	477.0	32.2		15.3	452.9		495.6	24.6		25.3	26.3	
Level of Service	F	C		B	F		F	C		C	C	
Approach Delay (s)		68.9			445.0			418.7			26.0	
Approach LOS		E			F			F			C	

Intersection Summary					
HCM 2000 Control Delay	293.2	HCM 2000 Level of Service	F		
HCM 2000 Volume to Capacity ratio	1.23				
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.2		
Intersection Capacity Utilization	119.9%	ICU Level of Service	H		
Analysis Period (min)	60				

c Critical Lane Group

Intersection	
Int Delay, s/veh	1.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Vol, veh/h	5	91	521	2	33	155
Future Vol, veh/h	5	91	521	2	33	155
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	250	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	91	521	2	33	155

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	743	522	0	0	523	0
Stage 1	522	-	-	-	-	-
Stage 2	221	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	383	555	-	-	1043	-
Stage 1	595	-	-	-	-	-
Stage 2	816	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	371	555	-	-	1043	-
Mov Cap-2 Maneuver	371	-	-	-	-	-
Stage 1	595	-	-	-	-	-
Stage 2	790	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13.1	0	1.5
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	- 541	1043	-
HCM Lane V/C Ratio	-	- 0.177	0.032	-
HCM Control Delay (s)	-	- 13.1	8.6	-
HCM Lane LOS	-	- B	A	-
HCM 95th %tile Q(veh)	-	- 0.6	0.1	-

Intersection	
Int Delay, s/veh	9.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Vol, veh/h	6	446	78	2	123	36
Future Vol, veh/h	6	446	78	2	123	36
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	6	446	78	2	123	36

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	361	79	0	0	80	0
Stage 1	79	-	-	-	-	-
Stage 2	282	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	638	981	-	-	1518	-
Stage 1	944	-	-	-	-	-
Stage 2	766	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	585	981	-	-	1518	-
Mov Cap-2 Maneuver	585	-	-	-	-	-
Stage 1	944	-	-	-	-	-
Stage 2	702	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.9	0	5.9
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	- 972	1518	-
HCM Lane V/C Ratio	-	- 0.465	0.081	-
HCM Control Delay (s)	-	- 11.9	7.6	0
HCM Lane LOS	-	- B	A	A
HCM 95th %tile Q(veh)	-	- 2.6	0.3	-

Queues
1: Borrisokane Road & Strandherd Drive

3387 Cedarview Road
2022 Total PM

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	197	1628	40	901	235	58	106	127
v/c Ratio	0.68	1.44	0.30	0.85	1.18	0.18	0.46	0.35
Control Delay	20.6	826.2	11.5	29.6	415.9	27.3	51.7	13.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.6	826.2	11.5	29.6	415.9	27.3	51.7	13.8
Queue Length 50th (m)	12.0	~527.1	2.2	160.2	~67.0	6.2	22.6	3.6
Queue Length 95th (m)	#44.5	#708.5	6.9	#315.4	#134.6	20.9	46.2	26.0
Internal Link Dist (m)		124.6		144.9		270.9		84.5
Turn Bay Length (m)	120.1		130.1		79.9		37.5	
Base Capacity (vph)	303	1128	133	1080	199	320	230	368
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.65	1.44	0.30	0.83	1.18	0.18	0.46	0.35

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

HCM Signalized Intersection Capacity Analysis
1: Borrisokane Road & Strandherd Drive

3387 Cedarview Road
2022 Total PM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	197	1160	468	40	811	90	235	31	27	106	18	109
Future Volume (vph)	197	1160	468	40	811	90	235	31	27	106	18	109
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	4.5	6.4		4.5	6.4		5.8	5.8		5.8	5.8	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.96		1.00	0.99		1.00	0.93		1.00	0.87	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1695	1707		1695	1758		1695	1660		1695	1555	
Flt Permitted	0.13	1.00		0.06	1.00		0.62	1.00		0.72	1.00	
Satd. Flow (perm)	240	1707		99	1758		1113	1660		1283	1555	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	197	1160	468	40	811	90	235	31	27	106	18	109
RTOR Reduction (vph)	0	12	0	0	3	0	0	22	0	0	90	0
Lane Group Flow (vph)	197	1616	0	40	898	0	235	36	0	106	37	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	85.6	77.2		75.8	71.9		21.2	21.2		21.2	21.2	
Effective Green, g (s)	85.6	77.2		75.8	71.9		21.2	21.2		21.2	21.2	
Actuated g/C Ratio	0.72	0.65		0.64	0.60		0.18	0.18		0.18	0.18	
Clearance Time (s)	4.5	6.4		4.5	6.4		5.8	5.8		5.8	5.8	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	285	1107		115	1062		198	295		228	277	
v/s Ratio Prot	c0.05	c0.95		0.01	0.51			0.02			0.02	
v/s Ratio Perm	0.44			0.21			c0.21			0.08		
v/c Ratio	0.69	1.46		0.35	0.85		1.19	0.12		0.46	0.14	
Uniform Delay, d1	18.3	20.9		27.8	19.1		48.9	41.1		43.8	41.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	7.3	832.9		1.8	6.7		386.6	0.8		6.8	1.0	
Delay (s)	25.6	853.8		29.7	25.8		435.5	41.9		50.6	42.2	
Level of Service	C	F		C	C		F	D		D	D	
Approach Delay (s)		764.4			26.0			357.6			46.0	
Approach LOS		F			C			F			D	

Intersection Summary				
HCM 2000 Control Delay	466.2	HCM 2000 Level of Service	F	
HCM 2000 Volume to Capacity ratio	1.39			
Actuated Cycle Length (s)	119.0	Sum of lost time (s)	16.7	
Intersection Capacity Utilization	139.3%	ICU Level of Service	H	
Analysis Period (min)	60			

c Critical Lane Group

Intersection	
Int Delay, s/veh	1.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Vol, veh/h	3	43	250	6	72	453
Future Vol, veh/h	3	43	250	6	72	453
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	250	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	3	43	250	6	72	453

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	850	253	0	0	256	0
Stage 1	253	-	-	-	-	-
Stage 2	597	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	331	786	-	-	1309	-
Stage 1	789	-	-	-	-	-
Stage 2	550	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	313	786	-	-	1309	-
Mov Cap-2 Maneuver	313	-	-	-	-	-
Stage 1	789	-	-	-	-	-
Stage 2	520	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.4	0	1.1
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	- 715	1309	-
HCM Lane V/C Ratio	-	- 0.064	0.055	-
HCM Control Delay (s)	-	- 10.4	7.9	-
HCM Lane LOS	-	- B	A	-
HCM 95th %tile Q(veh)	-	- 0.2	0.2	-

Intersection	
Int Delay, s/veh	6.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Vol, veh/h	6	179	78	4	357	100
Future Vol, veh/h	6	179	78	4	357	100
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	6	179	78	4	357	100

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	894	80	0	0	82	0
Stage 1	80	-	-	-	-	-
Stage 2	814	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	312	980	-	-	1515	-
Stage 1	943	-	-	-	-	-
Stage 2	436	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	234	980	-	-	1515	-
Mov Cap-2 Maneuver	234	-	-	-	-	-
Stage 1	943	-	-	-	-	-
Stage 2	327	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.1	0	6.3
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	- 888	1515	-
HCM Lane V/C Ratio	-	- 0.208	0.236	-
HCM Control Delay (s)	-	- 10.1	8.1	0
HCM Lane LOS	-	- B	A	A
HCM 95th %tile Q(veh)	-	- 0.8	0.9	-

B.5 2022 TOTAL FUTURE CONDITIONS – TMP MODIFICATIONS

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	69	614	122	25	1134	433	41	82	66	175
v/c Ratio	0.40	0.43	0.17	0.16	0.85	0.79	0.06	0.12	0.25	0.45
Control Delay	20.1	22.6	4.0	56.0	36.4	55.9	23.7	6.1	45.9	22.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.1	22.6	4.0	56.0	36.4	55.9	23.7	6.1	45.9	22.0
Queue Length 50th (m)	7.2	49.1	0.0	2.7	114.0	46.1	5.5	0.0	12.6	12.3
Queue Length 95th (m)	15.8	72.9	13.4	8.4	167.5	#85.6	15.7	13.0	31.5	44.3
Internal Link Dist (m)		124.7			145.0		270.9			84.5
Turn Bay Length (m)	120.0			130.0		80.0		25.0	37.5	
Base Capacity (vph)	175	1765	848	158	1706	638	730	669	259	393
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.39	0.35	0.14	0.16	0.66	0.68	0.06	0.12	0.25	0.45

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	69	614	122	25	1053	81	433	41	82	66	13	162
Future Volume (vph)	69	614	122	25	1053	81	433	41	82	66	13	162
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	4.5	6.4	6.4	4.5	6.4		4.5	5.8	5.8	5.8	5.8	
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95		0.97	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	0.86	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1695	3390	1517	3288	3354		3288	1784	1517	1695	1537	
Flt Permitted	0.10	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.73	1.00	
Satd. Flow (perm)	171	3390	1517	3288	3354		3288	1784	1517	1303	1537	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	69	614	122	25	1053	81	433	41	82	66	13	162
RTOR Reduction (vph)	0	0	71	0	5	0	0	0	49	0	88	0
Lane Group Flow (vph)	69	614	51	25	1129	0	433	41	33	66	87	0
Turn Type	pm+pt	NA	Perm	Prot	NA		Prot	NA	Perm	Perm	NA	
Protected Phases	5	2		1	6		7	4			8	
Permitted Phases	2		2						4	8		
Actuated Green, G (s)	50.5	45.6	45.6	2.8	43.5		18.0	43.9	43.9	21.4	21.4	
Effective Green, g (s)	50.5	45.6	45.6	2.8	43.5		18.0	43.9	43.9	21.4	21.4	
Actuated g/C Ratio	0.46	0.42	0.42	0.03	0.40		0.17	0.40	0.40	0.20	0.20	
Clearance Time (s)	4.5	6.4	6.4	4.5	6.4		4.5	5.8	5.8	5.8	5.8	
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)	147	1418	634	84	1338		542	718	610	255	301	
v/s Ratio Prot	c0.02	0.18		0.01	c0.34		c0.13	0.02			c0.06	
v/s Ratio Perm	0.20		0.03						0.02	0.05		
v/c Ratio	0.47	0.43	0.08	0.30	0.84		0.80	0.06	0.05	0.26	0.29	
Uniform Delay, d1	20.7	22.5	19.1	52.1	29.7		43.8	19.9	19.9	37.1	37.3	
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	2.4	0.2	0.1	2.0	5.3		8.6	0.2	0.2	2.5	2.4	
Delay (s)	23.1	22.7	19.1	54.1	35.0		52.3	20.0	20.0	39.5	39.7	
Level of Service	C	C	B	D	C		D	C	C	D	D	
Approach Delay (s)		22.2			35.4			45.2			39.7	
Approach LOS		C			D			D			D	

Intersection Summary				
HCM 2000 Control Delay	33.9	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.68			
Actuated Cycle Length (s)	109.0	Sum of lost time (s)	21.2	
Intersection Capacity Utilization	79.6%	ICU Level of Service	D	
Analysis Period (min)	60			

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	197	1160	468	40	901	235	31	27	106	127
v/c Ratio	0.65	0.77	0.50	0.22	0.81	0.60	0.05	0.04	0.37	0.30
Control Delay	25.7	28.7	3.7	53.4	37.0	51.1	24.2	0.1	43.0	12.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.7	28.7	3.7	53.4	37.0	51.1	24.2	0.1	43.0	12.9
Queue Length 50th (m)	20.2	107.1	0.0	4.0	82.5	23.2	3.9	0.0	18.4	2.9
Queue Length 95th (m)	46.5	157.8	30.1	11.6	129.4	44.6	13.3	0.0	45.9	26.0
Internal Link Dist (m)		124.6			144.9		270.9			84.5
Turn Bay Length (m)	120.1			130.1		79.9		25.0	37.5	
Base Capacity (vph)	366	1995	1085	179	1607	476	681	649	287	424
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.54	0.58	0.43	0.22	0.56	0.49	0.05	0.04	0.37	0.30

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	197	1160	468	40	811	90	235	31	27	106	18	109
Future Volume (vph)	197	1160	468	40	811	90	235	31	27	106	18	109
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	4.5	6.4	6.4	4.5	6.4		4.5	5.8	5.8	5.8	5.8	
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95		0.97	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	0.87	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1695	3390	1517	3288	3339		3288	1784	1517	1695	1555	
Flt Permitted	0.14	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.74	1.00	
Satd. Flow (perm)	252	3390	1517	3288	3339		3288	1784	1517	1315	1555	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	197	1160	468	40	811	90	235	31	27	106	18	109
RTOR Reduction (vph)	0	0	265	0	8	0	0	0	17	0	86	0
Lane Group Flow (vph)	197	1160	203	40	893	0	235	31	10	106	41	0
Turn Type	pm+pt	NA	Perm	Prot	NA		Prot	NA	Perm	Perm	NA	
Protected Phases	5	2		1	6		7	4			8	
Permitted Phases	2		2						4	8		
Actuated Green, G (s)	52.6	45.0	45.0	3.1	35.9		12.1	38.9	38.9	22.3	22.3	
Effective Green, g (s)	52.6	45.0	45.0	3.1	35.9		12.1	38.9	38.9	22.3	22.3	
Actuated g/C Ratio	0.51	0.43	0.43	0.03	0.35		0.12	0.38	0.38	0.22	0.22	
Clearance Time (s)	4.5	6.4	6.4	4.5	6.4		4.5	5.8	5.8	5.8	5.8	
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)	297	1471	658	98	1155		383	669	569	282	334	
v/s Ratio Prot	c0.08	c0.34		0.01	0.27		c0.07	0.02			0.03	
v/s Ratio Perm	0.26		0.13						0.01	c0.08		
v/c Ratio	0.66	0.79	0.31	0.41	0.77		0.61	0.05	0.02	0.38	0.12	
Uniform Delay, d1	17.9	25.3	19.2	49.4	30.3		43.6	20.6	20.4	34.8	32.8	
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	5.6	3.0	0.3	2.8	3.4		2.9	0.1	0.1	3.8	0.8	
Delay (s)	23.6	28.2	19.5	52.2	33.6		46.5	20.7	20.4	38.6	33.6	
Level of Service	C	C	B	D	C		D	C	C	D	C	
Approach Delay (s)		25.5			34.4			41.4			35.9	
Approach LOS		C			C			D			D	

Intersection Summary				
HCM 2000 Control Delay	30.2	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.66			
Actuated Cycle Length (s)	103.7	Sum of lost time (s)	21.2	
Intersection Capacity Utilization	71.1%	ICU Level of Service	C	
Analysis Period (min)	60			

c Critical Lane Group

B.6 2027 ULTIMATE CONDITIONS

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	76	675	167	23	1247	560	44	63	73	192
v/c Ratio	0.50	0.45	0.22	0.15	0.89	0.91	0.06	0.10	0.32	0.55
Control Delay	25.8	23.3	3.7	57.6	40.1	71.8	24.2	5.1	49.2	30.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.8	23.3	3.7	57.6	40.1	71.8	24.2	5.1	49.2	30.5
Queue Length 50th (m)	8.2	56.7	0.0	2.7	134.5	67.4	6.5	0.0	15.4	20.8
Queue Length 95th (m)	#22.3	83.6	16.1	7.9	#213.3	#120.8	16.1	9.6	34.1	54.8
Internal Link Dist (m)		124.7			145.0		270.9			84.5
Turn Bay Length (m)	120.0			130.0		80.0		25.0	37.5	
Base Capacity (vph)	152	1641	820	150	1588	635	717	653	226	346
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.50	0.41	0.20	0.15	0.79	0.88	0.06	0.10	0.32	0.55

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	76	675	167	23	1158	89	560	44	63	73	14	178
Future Volume (vph)	76	675	167	23	1158	89	560	44	63	73	14	178
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	4.5	6.4	6.4	4.5	6.4		4.5	5.8	5.8	5.8	5.8	
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95		0.97	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	0.86	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1695	3390	1517	3288	3354		3288	1784	1517	1695	1536	
Flt Permitted	0.08	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.73	1.00	
Satd. Flow (perm)	144	3390	1517	3288	3354		3288	1784	1517	1300	1536	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	76	675	167	23	1158	89	560	44	63	73	14	178
RTOR Reduction (vph)	0	0	95	0	5	0	0	0	38	0	79	0
Lane Group Flow (vph)	76	675	72	23	1242	0	560	44	25	73	113	0
Turn Type	pm+pt	NA	Perm	Prot	NA		Prot	NA	Perm	Perm	NA	
Protected Phases	5	2		1	6		7	4			8	
Permitted Phases	2		2						4	8		
Actuated Green, G (s)	54.1	49.6	49.6	2.9	48.0		21.1	45.3	45.3	19.7	19.7	
Effective Green, g (s)	54.1	49.6	49.6	2.9	48.0		21.1	45.3	45.3	19.7	19.7	
Actuated g/C Ratio	0.47	0.43	0.43	0.03	0.42		0.18	0.40	0.40	0.17	0.17	
Clearance Time (s)	4.5	6.4	6.4	4.5	6.4		4.5	5.8	5.8	5.8	5.8	
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)	128	1468	657	83	1406		605	705	600	223	264	
v/s Ratio Prot	c0.02	0.20		0.01	c0.37		c0.17	0.02			c0.07	
v/s Ratio Perm	0.26		0.05						0.02	0.06		
v/c Ratio	0.59	0.46	0.11	0.28	0.88		0.93	0.06	0.04	0.33	0.43	
Uniform Delay, d1	22.6	23.0	19.3	54.8	30.7		45.9	21.4	21.3	41.6	42.4	
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	7.4	0.2	0.1	1.8	7.6		26.9	0.2	0.1	3.9	5.1	
Delay (s)	30.0	23.2	19.4	56.6	38.3		72.8	21.6	21.4	45.5	47.5	
Level of Service	C	C	B	E	D		E	C	C	D	D	
Approach Delay (s)		23.1			38.6			64.6			46.9	
Approach LOS		C			D			E			D	

Intersection Summary				
HCM 2000 Control Delay	40.3	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.78			
Actuated Cycle Length (s)	114.5	Sum of lost time (s)	21.2	
Intersection Capacity Utilization	88.1%	ICU Level of Service	E	
Analysis Period (min)	60			

c Critical Lane Group

Intersection	
Int Delay, s/veh	1.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Vol, veh/h	5	91	576	2	33	171
Future Vol, veh/h	5	91	576	2	33	171
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	250	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	91	576	2	33	171

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	814	577	0	0	578	0
Stage 1	577	-	-	-	-	-
Stage 2	237	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	347	516	-	-	996	-
Stage 1	562	-	-	-	-	-
Stage 2	802	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	336	516	-	-	996	-
Mov Cap-2 Maneuver	336	-	-	-	-	-
Stage 1	562	-	-	-	-	-
Stage 2	775	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13.9	0	1.4
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	502	996	-
HCM Lane V/C Ratio	-	-	0.191	0.033	-
HCM Control Delay (s)	-	-	13.9	8.7	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	0.7	0.1	-

Intersection	
Int Delay, s/veh	9.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Vol, veh/h	6	494	84	2	137	39
Future Vol, veh/h	6	494	84	2	137	39
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	6	494	84	2	137	39

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	398	85	0	0	86	0
Stage 1	85	-	-	-	-	-
Stage 2	313	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	607	974	-	-	1510	-
Stage 1	938	-	-	-	-	-
Stage 2	741	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	551	974	-	-	1510	-
Mov Cap-2 Maneuver	551	-	-	-	-	-
Stage 1	938	-	-	-	-	-
Stage 2	672	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12.7	0	5.9
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	965	1510	-
HCM Lane V/C Ratio	-	-	0.518	0.091	-
HCM Control Delay (s)	-	-	12.7	7.6	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	3.2	0.3	-

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	227	1334	512	43	1037	259	33	29	122	144
v/c Ratio	0.76	0.81	0.51	0.27	0.84	0.68	0.05	0.05	0.50	0.37
Control Delay	38.1	27.9	3.6	57.5	37.1	56.7	27.7	0.1	51.0	13.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.1	27.9	3.6	57.5	37.1	56.7	27.7	0.1	51.0	13.8
Queue Length 50th (m)	25.5	126.9	1.4	4.6	98.1	27.2	4.7	0.0	24.0	3.4
Queue Length 95th (m)	#73.2	188.3	33.1	12.4	153.5	#55.3	14.7	0.0	#60.0	28.8
Internal Link Dist (m)		124.6			144.9		270.9			84.5
Turn Bay Length (m)	120.1			130.1		79.9		25.0	37.5	
Base Capacity (vph)	347	2013	1103	157	1621	424	617	599	245	392
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.65	0.66	0.46	0.27	0.64	0.61	0.05	0.05	0.50	0.37

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	227	1334	512	43	933	104	259	33	29	122	19	125
Future Volume (vph)	227	1334	512	43	933	104	259	33	29	122	19	125
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	4.5	6.4	6.4	4.5	6.4		4.5	5.8	5.8	5.8	5.8	
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95		0.97	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	0.87	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1695	3390	1517	3288	3339		3288	1784	1517	1695	1552	
Flt Permitted	0.11	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.74	1.00	
Satd. Flow (perm)	201	3390	1517	3288	3339		3288	1784	1517	1313	1552	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	227	1334	512	43	933	104	259	33	29	122	19	125
RTOR Reduction (vph)	0	0	260	0	7	0	0	0	19	0	102	0
Lane Group Flow (vph)	227	1334	252	43	1030	0	259	33	10	122	42	0
Turn Type	pm+pt	NA	Perm	Prot	NA		Prot	NA	Perm	Perm	NA	
Protected Phases	5	2		1	6		7	4			8	
Permitted Phases	2		2						4	8		
Actuated Green, G (s)	58.9	51.6	51.6	2.8	41.2		12.3	36.6	36.6	19.8	19.8	
Effective Green, g (s)	58.9	51.6	51.6	2.8	41.2		12.3	36.6	36.6	19.8	19.8	
Actuated g/C Ratio	0.55	0.48	0.48	0.03	0.38		0.11	0.34	0.34	0.18	0.18	
Clearance Time (s)	4.5	6.4	6.4	4.5	6.4		4.5	5.8	5.8	5.8	5.8	
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)	293	1624	726	85	1277		375	606	515	241	285	
v/s Ratio Prot	c0.09	c0.39		0.01	0.31		c0.08	0.02			0.03	
v/s Ratio Perm	0.33		0.17						0.01	c0.09		
v/c Ratio	0.77	0.82	0.35	0.51	0.81		0.69	0.05	0.02	0.51	0.15	
Uniform Delay, d1	21.7	24.1	17.5	51.8	29.7		45.9	23.9	23.6	39.6	36.9	
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	13.1	3.6	0.3	4.7	3.9		5.6	0.2	0.1	7.6	1.1	
Delay (s)	34.7	27.7	17.8	56.5	33.6		51.4	24.1	23.7	47.1	38.0	
Level of Service	C	C	B	E	C		D	C	C	D	D	
Approach Delay (s)		26.0			34.5			46.1			42.2	
Approach LOS		C			C			D			D	

Intersection Summary				
HCM 2000 Control Delay	31.4	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.75			
Actuated Cycle Length (s)	107.7	Sum of lost time (s)	21.2	
Intersection Capacity Utilization	78.7%	ICU Level of Service	D	
Analysis Period (min)	60			

c Critical Lane Group

Intersection	
Int Delay, s/veh	1.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Vol, veh/h	3	43	278	6	72	502
Future Vol, veh/h	3	43	278	6	72	502
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	250	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	3	43	278	6	72	502

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	927	281	0	0	284	0
Stage 1	281	-	-	-	-	-
Stage 2	646	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	298	758	-	-	1278	-
Stage 1	767	-	-	-	-	-
Stage 2	522	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	281	758	-	-	1278	-
Mov Cap-2 Maneuver	281	-	-	-	-	-
Stage 1	767	-	-	-	-	-
Stage 2	493	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.7	0	1
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	- 682	1278	-
HCM Lane V/C Ratio	-	- 0.067	0.056	-
HCM Control Delay (s)	-	- 10.7	8	-
HCM Lane LOS	-	- B	A	-
HCM 95th %tile Q(veh)	-	- 0.2	0.2	-

Intersection	
Int Delay, s/veh	6.8

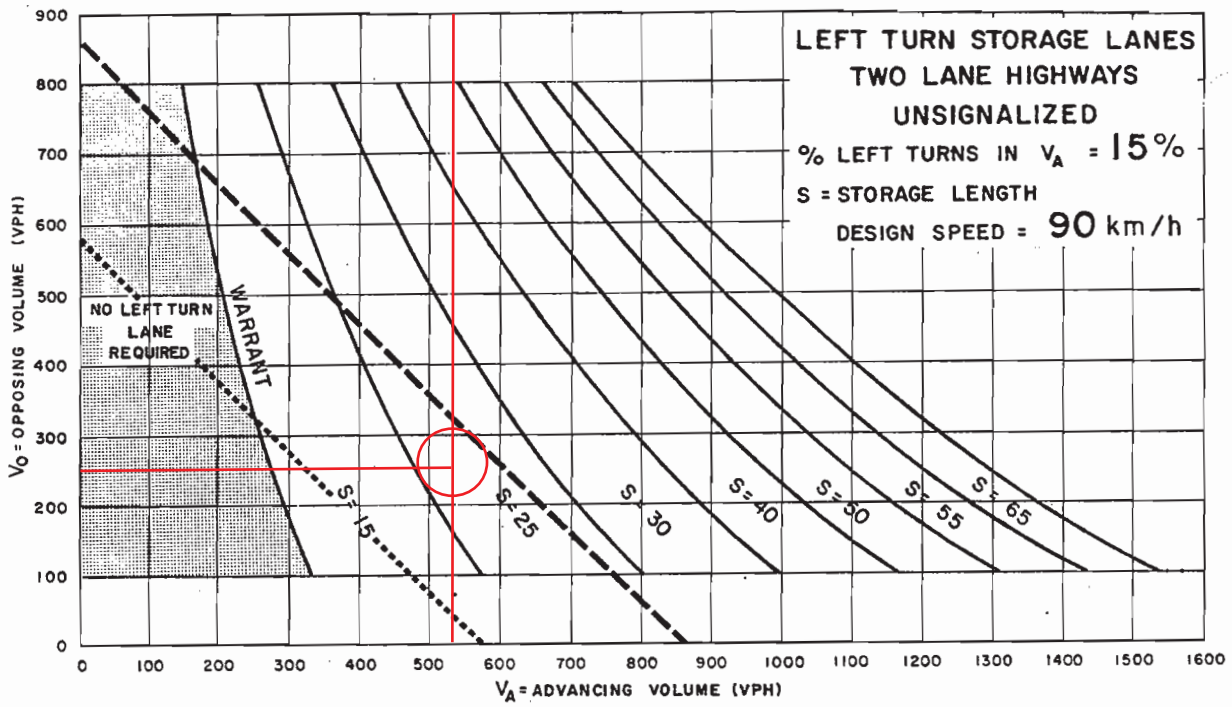
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Vol, veh/h	6	200	84	4	398	107
Future Vol, veh/h	6	200	84	4	398	107
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	6	200	84	4	398	107

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	989	86	0	0	88	0
Stage 1	86	-	-	-	-	-
Stage 2	903	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	274	973	-	-	1508	-
Stage 1	937	-	-	-	-	-
Stage 2	396	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	197	973	-	-	1508	-
Mov Cap-2 Maneuver	197	-	-	-	-	-
Stage 1	937	-	-	-	-	-
Stage 2	285	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.4	0	6.5
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	- 873	1508	-
HCM Lane V/C Ratio	-	- 0.236	0.264	-
HCM Control Delay (s)	-	- 10.4	8.2	0
HCM Lane LOS	-	- B	A	A
HCM 95th %tile Q(veh)	-	- 0.9	1.1	-

Appendix C AUXILIARY LANE WARRANTS



TRAFFIC SIGNALS MAY BE WARRANTED IN RURAL AREAS OR URBAN AREAS WITH RESTRICTED FLOW

TRAFFIC SIGNALS MAY BE WARRANTED IN "FREE FLOW" URBAN AREAS