

Mill Valley Estates Transportation Impact Assessment

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1 Introduction

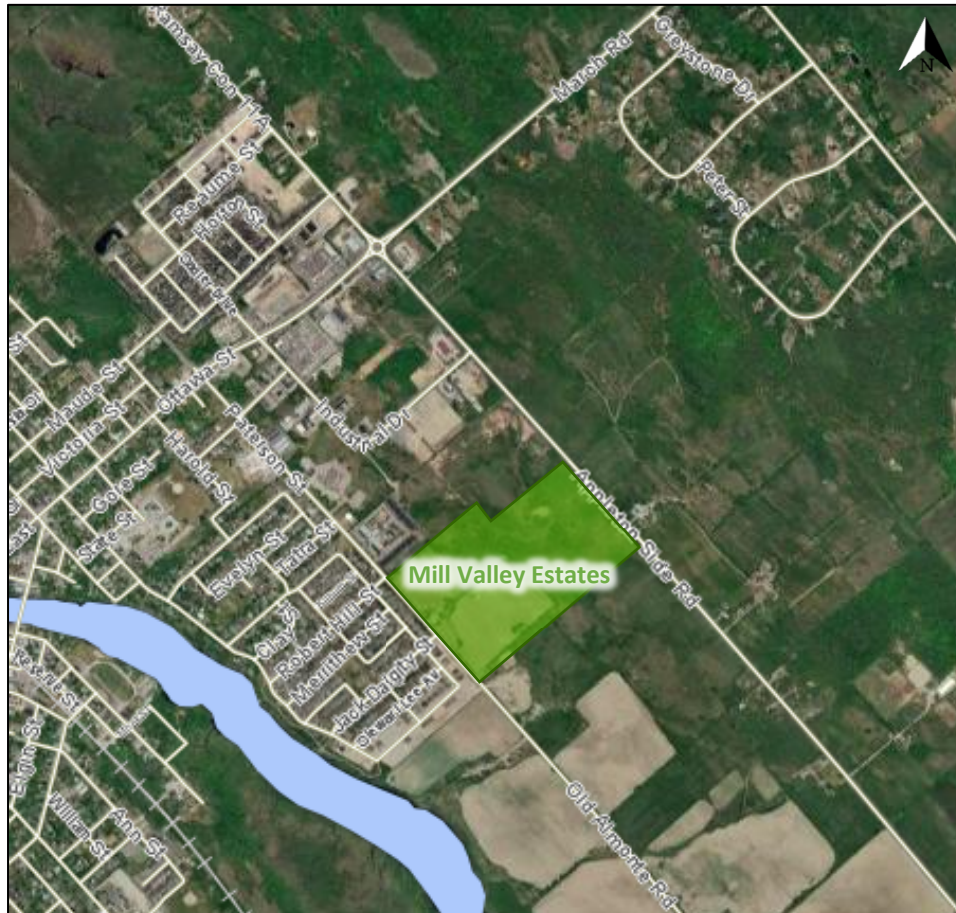
This Transportation Impact Assessment has been prepared to support the draft plan subdivision for the proposed development of Mill Valley Estates in the Ward of Almonte in the Municipality of Mississippi Mills, Ontario. The subject site is bounded by Paterson Road, County Road 17, the existing Orchard View Retirement and future Mill Valley Living, and rural lands to the south and is currently zoned as Development (D) Zone. The residential subdivision is proposed to include a total of 253 detached homes and 282 townhomes.

The proposed development will connect to the intersection of Jack Dalgity Street at Paterson Street via a new local road on the east leg, to Appleton Side Road (County Road 17) via a new local road, and to Industrial Drive.

The proposed development is anticipated to have a full build-out and occupancy year of 2027. The analysis will therefore include 2022 existing conditions, 2027 and 2032 future background conditions, and 2027 and 2032 future total conditions. The requirements for this TIA have been confirmed with staff from both Lanark County and the Municipality of Mississippi Mills via a pre-consultation meeting held virtually on July 20, 2022.

Figure 1 illustrates the study area context. Figure 2 illustrates the concept plan.

Figure 1: Area Context Plan



Source: <http://cgis.com/cpal/Default.aspx?CLIENT=MMILLS&MAPTYPE=Zoning> Accessed: November 16, 2022

1.1 Existing Conditions

1.1.1 Area Road Network

Ottawa Street: Ottawa Street is a Municipality of Mississippi Mills arterial road with a two-lane urban cross-section west of Menzie Street/Paterson Street and a four-lane urban cross-section east of Menzie Street/Paterson Street. The posted speed limit is 50 km/h within the study area. Sidewalks are present on both sides of the road west of Industrial Drive. Bike lanes are present on both sides of the road west of Menzie Street/Paterson Street and a mixed-use path (MUP) is present on both sides of the road between Industrial Drive and 175 metres to the east where a half-signal permits a MUP crossing, from which point a MUP continues on the north side of the road to the east. The Municipality of Mississippi Mills Transportation Master Plan reserves a minimum 30.0 right-of-way for arterial roadways.

Mach Road (County Road 49): March Road is a County of Lanark arterial road with a two-lane rural cross-section with gravel shoulders on both sides of the road. About 275 metres east of Appleton Side Road (Country Road 17), the posted speed limit transitions from 50 km/h to 70 km/h. A measured right-of-way taken from the Municipality of Mississippi Mills Mapping Application of 30.0 metres is noted.

Appleton Side Road (Country Road 17): Appleton Side Road (Country Road 17) is a County of Lanark collector road. It has a two-lane rural cross-section with paved shoulders north of Industrial Drive where the posted speed limit is 50 km/h and gravel shoulders to the south where the posted speed limit is 80 km/h. The measured right-of-way taken from the Municipality of Mississippi Mills Mapping Application of 26.5 metres is noted.

Paterson Street: Paterson Street is a Municipality of Mississippi Mills collector road with a two-lane urban cross-section with sidewalks on both sides of the road. The posted speed limit is 40 km/h north of Jack Dalgity Street and 50 km/h to the south. The Municipality of Mississippi Mills Transportation Master Plan reserves a minimum 24.0 metre right-of-way for collector roadways.

Industrial Drive: Industrial Drive is a Municipality of Mississippi Mills collector road with a two-lane rural cross-section. Based on the Municipality of Mississippi Mills Transportation Master Plan, a speed limit of 50 km/h is assumed for urban collector roadways. An asphalt sidewalk is present on the west side of the road between Ottawa Street and Stoneridge Plaza south access. The Municipality of Mississippi Mills Transportation Master Plan reserves a minimum 24.0 metre right-of-way for collector roadways.

Ramsay Concession 11A: Ramsay Concession 11A is a Municipality of Mississippi Mills local road with a two-lane rural cross-section including paved shoulders within the study area. No posted speed limit is present; however, the Municipality of Mississippi Mills Transportation Master Plan indicates a speed limit of 50 km/h can be assumed for urban local roadways. The Municipality of Mississippi Mills Transportation Master Plan reserves a minimum 20.0 metre right-of-way for local roadways.

Menzie Street: Menzie Street is a Municipality of Mississippi Mills collector road with a two-lane urban cross-section with a sidewalk on the west side of the road. Based on the Municipality of Mississippi Mills Transportation Master Plan, a speed limit of 50 km/h is assumed for urban collector roadways. The Municipality of Mississippi Mills Transportation Master Plan reserves a minimum 24.0 metre right-of-way for collector roadways.

Jack Dalgity Street: Jack Dalgity Street is a Municipality of Mississippi Mills local road with a two-lane urban cross-section with a sidewalk on the north side of the road. Based on the Municipality of Mississippi Mills Transportation Master Plan, a speed limit of 50 km/h is assumed for urban local roadways. The Municipality of Mississippi Mills Transportation Master Plan reserves a minimum 20.0 right-of-way of way for local roadways.

1.1.2 Existing Intersections

The existing key intersections have been summarized below, and aerial images and photos from a site visit are provided for illustrative purposes in Appendix A:

Ottawa Street/March Road (County Road 49) at Appleton Side Road (County Road 17)/Ramsay Concession 11A The intersection of Ottawa Street/March Road (County Road 49) and Appleton Side Road (County Road 17)/Ramsay Concession 11A is a four-legged roundabout intersection.

The northbound and southbound approaches each consists of a shared all-movement lane. The eastbound and westbound approaches each consists of a shared left-turn/through lane and a shared through/right-turn lane. Pedestrian crossovers are provided on each leg. No turn restrictions were noted.

Ottawa Street and Paterson Street /Menzie Street The intersection of Ottawa Street and Paterson Street/Menzie Street is a signalized intersection. The northbound, southbound, and eastbound approaches each consists of a shared all-movement lane. The westbound approach consists of a left-turn lane, a through lane, and an auxiliary right-turn lane. No turning restrictions were noted at this intersection.

Ottawa Street and Industrial Drive The intersection of Ottawa Street and Ottawa Street and Industrial Drive is a signalized intersection. The northbound approach consists of a shared left-turn/through lane and a channelized auxiliary right-turn lane, and the southbound approach consists of an auxiliary left-turn lane and a shared through/right-turn lane. The eastbound and westbound approaches each consists of an auxiliary left-turn lane, a through lane, and a shared through/right-turn lane. No turning restrictions were noted at this intersection.

Industrial Drive and Appleton Side Road (County Road 17) The intersection of Industrial Drive and Appleton Side Road (County Road 17) is an unsignalized T-intersection, stop-controlled on the minor approach of Industrial Drive. Each approach consists of a shared all-movement lane. No turning restrictions were noted at this intersection.

Jack Dalgity Street and Paterson Street The intersection of Jack Dalgity Street and Paterson Street is an unsignalized T-intersection, stop-controlled on the minor approach of Jack Dalgity Street. Each approach consists of a shared all-movement lane. No turning restrictions were noted at this intersection.

1.1.3 Existing Driveways

Within 400 metres of the proposed site accesses, two accesses to a retirement home with surrounding townhomes, two driveways to single detached homes are present on Paterson Street, one driveway to a single detached home is present on Appleton Side Road, and field accesses are present on both Paterson Street and Appleton Side Road. None are anticipated to generate significant traffic volumes.

1.1.4 Cycling and Pedestrian Facilities

Sidewalks are present on the north side of Jack Dalgity Street, on the west side of Industrial Drive between Ottawa Street and Stoneridge Plaza south access and of Menzie Street, and on both sides of Paterson Road. A pedestrian

crossing is provided on Appleton Side Road (County Road 17) about 245 metres south of Ottawa Street connecting to the Appleton Trail.

Bike lanes are present on both sides of Ottawa Street west of Menzie Street/Paterson Street, and a mixed-use path is present on both sides of Ottawa Street between Industrial Drive and 175 metres to the east where a half-signal permits a MUP crossing, and a MUP continues on the north side of the road to the east.

The Trans Canada Trail partly comprises the paved shoulders on Appleton Side Road (County Road 17) and the MUPs on Ottawa Street through the study area. The Lanark Link of the Trail is cited to be popular for cycling, per its description at tctrail.ca, and is stated to permit walking/hiking and road cycling. Figure 3 shows the trail located within the study area.

Figure 3: Trans Canada Trail



Source: <https://tctrail.ca/explore-the-map/> Accessed: November 16, 2022

1.1.5 Existing Transit

There is no existing transit service along the boundary road that would serve the proposed development.

1.1.6 Existing Peak Hour Travel Demand

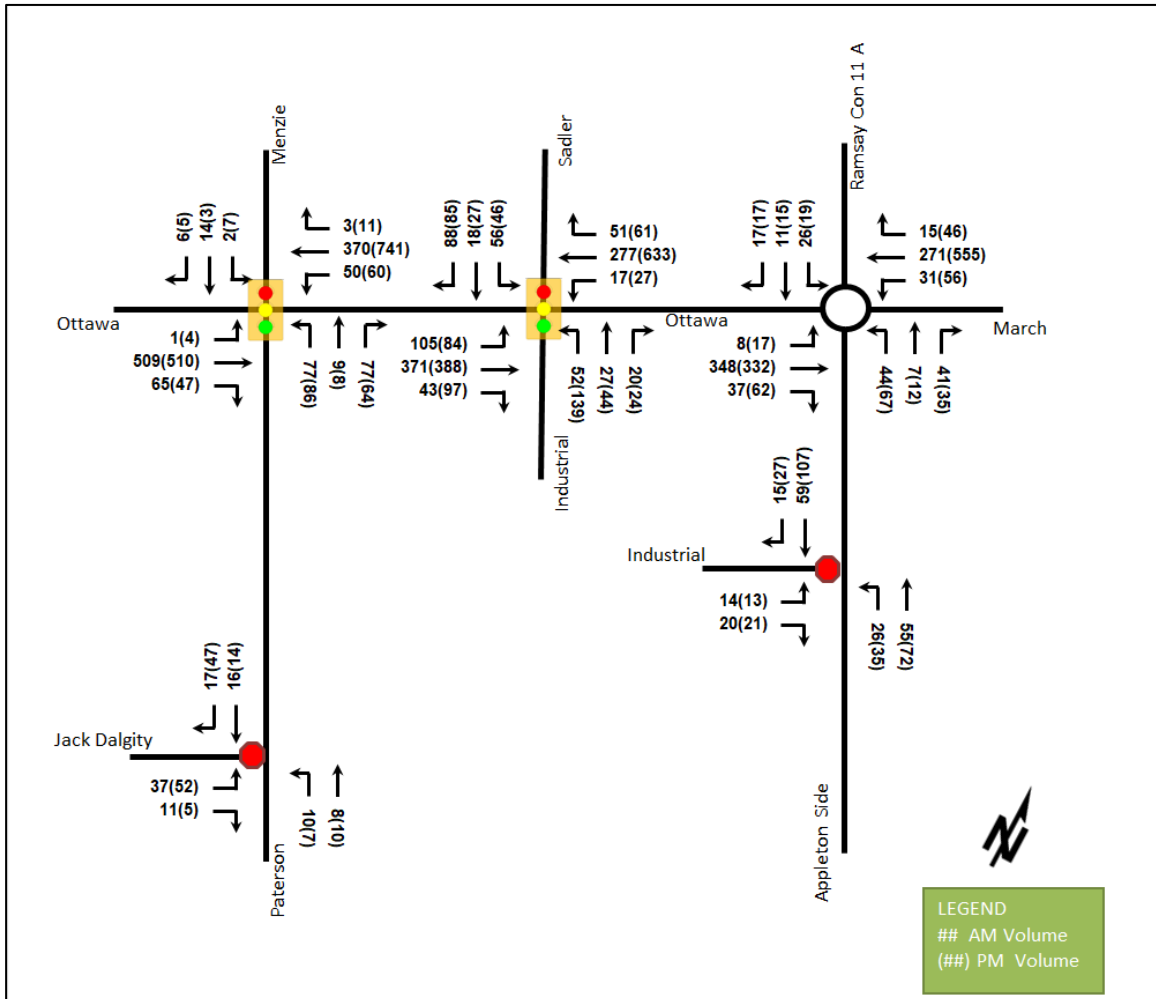
Table 1 summarizes the count locations, count dates, identified peak hour hours, and data sources. Existing study area turning movement counts, with the exception of Ottawa Street at Industrial Drive/Sadler Drive were collected for this study. The Ottawa Street at Industrial Drive/Sadler Drive intersection turning volumes were acquired from Mill Valley Living Gerry Emon Road Traffic Impact Study (July 29, 2021).

Table 1: Turning Movement Count Data Dates

Location	Count Date	AM Peak Hour (PM Peak Hour)	Data Source
Ottawa St/March Rd (CR 49) at Appleton Side Rd (CR 17)/Ramsay Con 11A	Wednesday, November 02, 2022	8:45 – 9:45 (16:00 – 17:00)	The Traffic Specialist
Ottawa St at Paterson St/Menzie St	Wednesday, November 02, 2022	9:00 – 10:00 (15:45 – 16:45)	
Industrial Dr at Appleton Side Rd (CR 17)	Wednesday, November 02, 2022	8:45 – 9:45 (16:15 – 17:15)	
Jack Dalgity St at Paterson St	Wednesday, November 02, 2022	8:30 – 9:30 (15:45 – 16:45)	
Ottawa St at Industrial Dr/Sadler Dr	2019	-	Mill Valley Living Gerry Emon Road Traffic Impact Study (July 29, 2021)

Figure 4 illustrates the 2022 existing horizon traffic volumes. Detailed turning movement count data and AADT counts can be found in Appendix B. Estimated AADTs from the existing volumes were confirmed to be commensurate with the AADT on the segments from the County Road traffic volume database.

Figure 4: 2022 Existing Traffic Volumes



Pedestrian and cyclist volumes included in study area intersection counts are illustrated in Figure 5 and Figure 6, respectively. Only the intersections of Ottawa Street/March Road (Country Road 49) at Appleton Side Road (Country Road 17)/ Ramsay Concession 11A, Ottawa Street at Paterson Street/Menzie Street, Industrial Drive at Appleton Side Road (County Road 17), and Jack Dalgity Street at Paterson Street had pedestrian and cyclist volumes available.

Figure 5: Existing Pedestrian Volumes

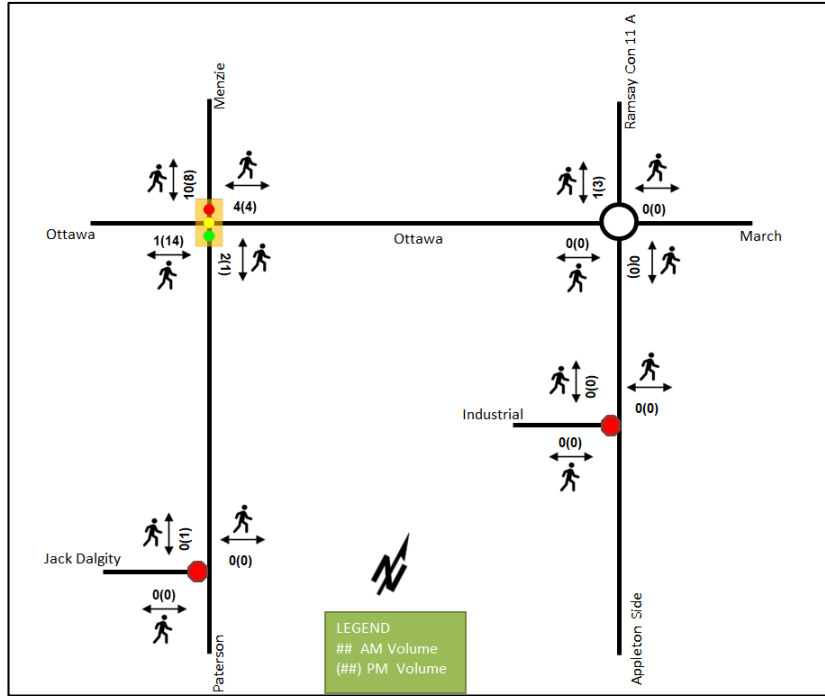
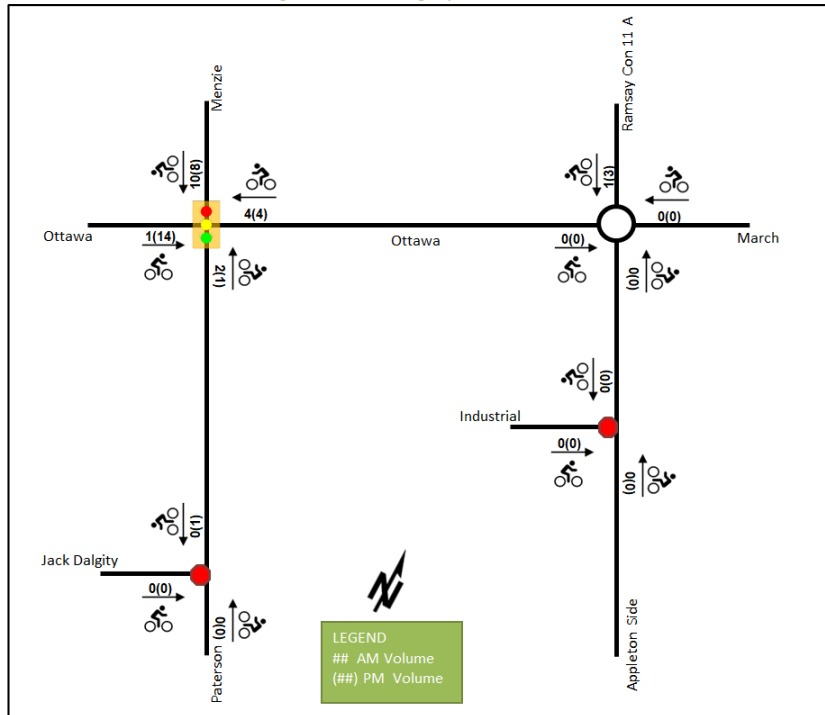


Figure 6: Existing Cyclist Volumes



2 Future Background Conditions

2.1 Planned Conditions

2.1.1 Changes to the Area Transportation Network

The Municipality of Mississippi Mills Active Transportation Plan indicates Paterson Street as a future primary cycling urban route, Ottawa Street, March Road (County Road 49), and Appleton Side Road (County Road 17) as future spine routes. While no specific timing information has been indicated for these improvements and they may be assumed to occur beyond the future analysis horizon, no changes in traffic patterns or network capacity are anticipated to be resultant from these improvements.

No other changes to the area transportation network are anticipated.

2.1.2 Other Study Area Developments

Mill Valley Living

The proposed development application includes a site plan for the construction of 12 townhouse blocks for a total of 45 units, and an apartment building which would provide 48 apartment units. The development is anticipated to be built out in 2023 and is predicted to generate 7 new AM two-way peak-hour auto trips and 10 new PM two-way peak-hour auto trips. (D. J. Halpenny & Associates Ltd, 2021)

2.1.3 Background Growth

To generate 2027 and 2032 future background traffic volumes, a 1.5% compound annual growth rate was assumed to be applied to the existing 2022 traffic counts. This growth rate has been applied to Appleton Side Road, Ottawa Street, March Road, and Paterson Street's mainline volumes and to the major turning movements at intersections.

2.1.4 Future Background Traffic Volumes

Applying the background development discussed in Section 2.1.2 and background growth rate discussed in Section 2.1.3 above to the 2022 existing traffic volumes, the future background traffic volumes were projected. The background development volumes within the study area have been provided in Appendix C.

Figure 7 and Figure 8 illustrate the 2027 and 2032 future background traffic volumes, respectively. All intersection lane configurations have been carried forward from the 2022 existing conditions as there are no anticipated changes for the 2027 and 2032 future horizons.

Figure 7: 2027 Future Background Traffic Volumes

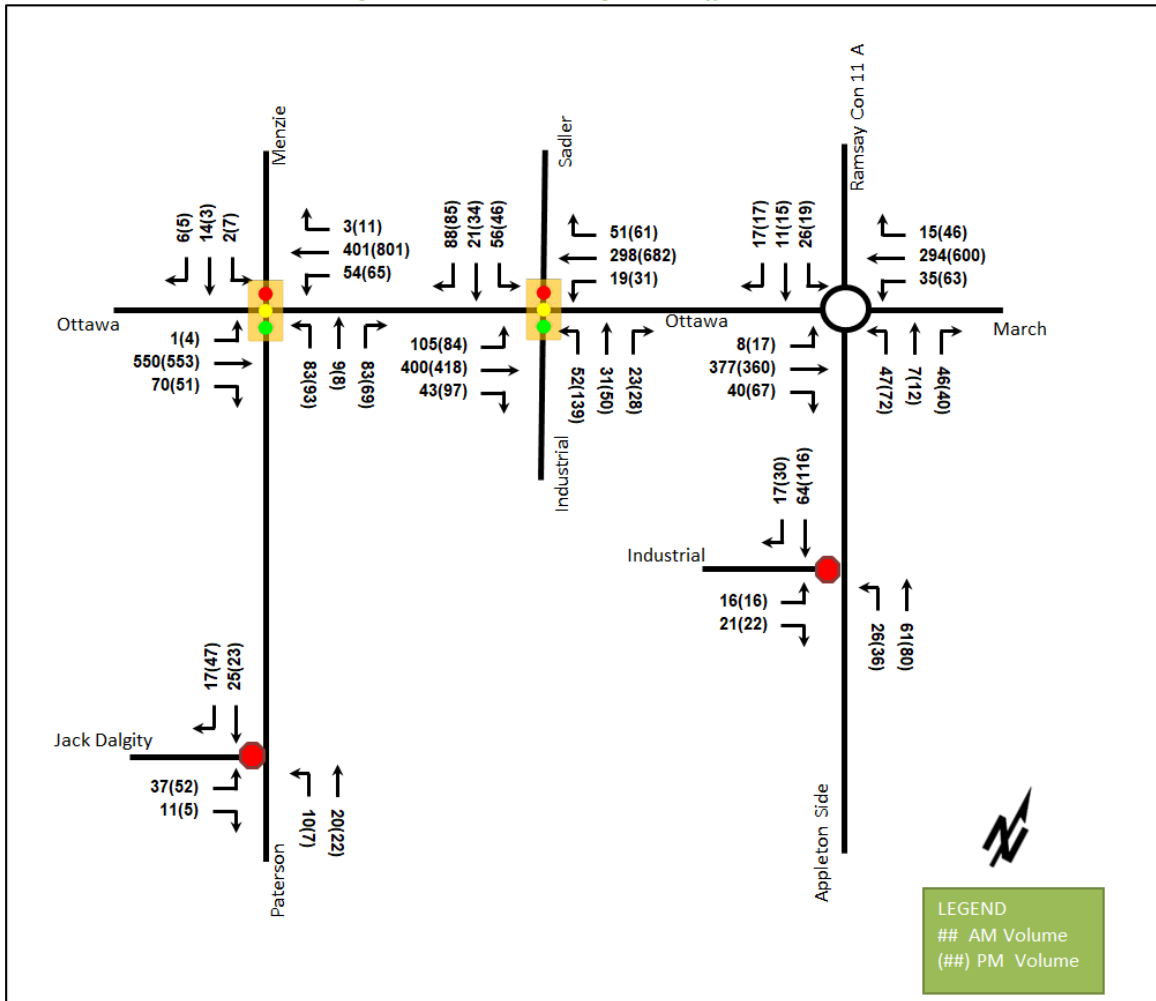
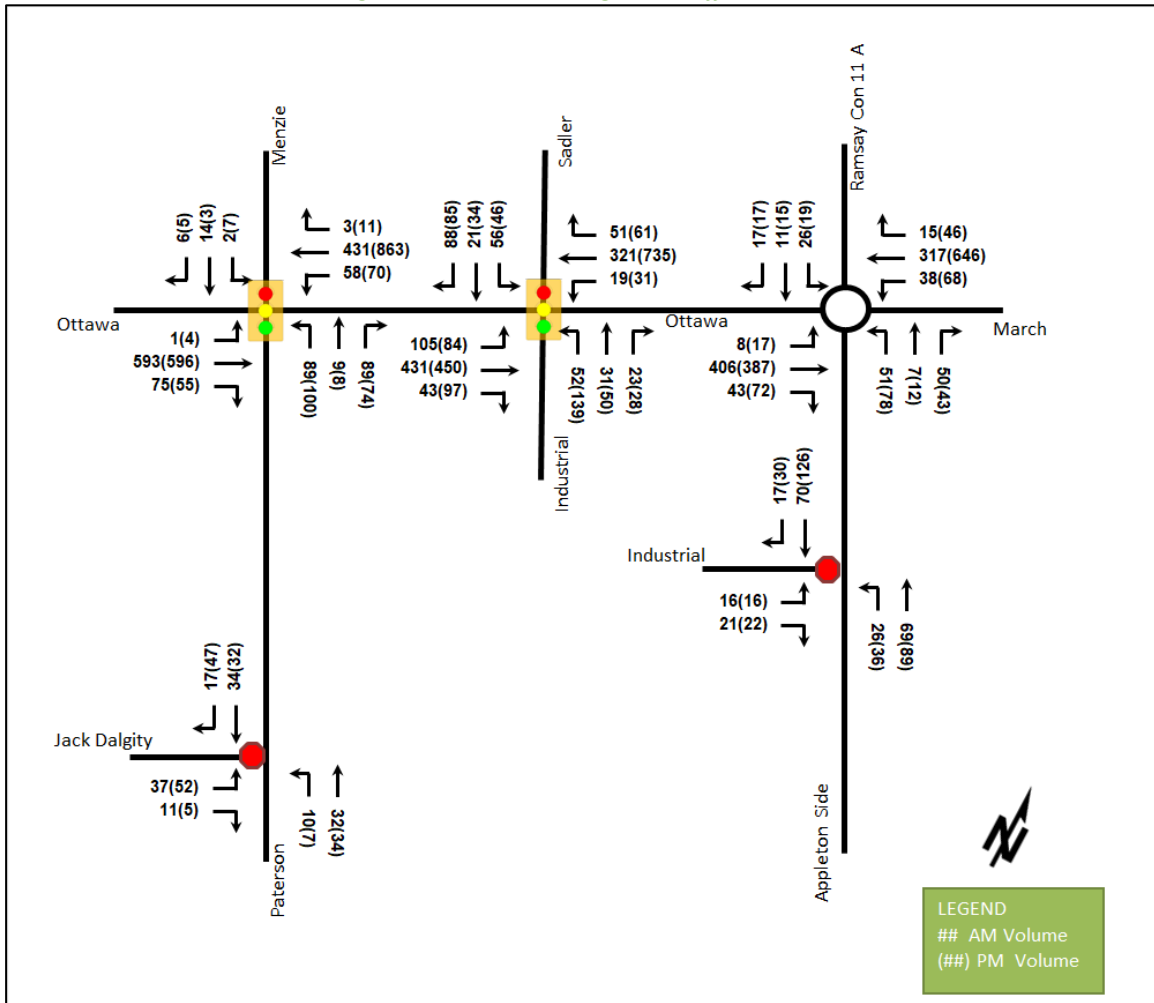


Figure 8: 2032 Future Background Traffic Volumes



3 Demand Forecasting

3.1 Site Trip Generation

The proposed development will include 253 single family detached units and 282 low-rise multifamily housing units. The *ITE Trip Generation Manual 11th Edition* has been reviewed to determine the appropriate trip generation rate equations for the proposed land uses and are summarized in Table 2.

Table 2: ITE Trip Generation Rate

Land Use	Data Source	Trip Rates	
		AM Peak	PM Peak
Single Family Detached	LUC 210	$T = 0.91(X) + 0.12$	$T = 0.94(X) + 0.27$
Multifamily Housing (Low-Rise)	LUC 220	$T = 0.31(X) + 22.85$	$T = 0.43(X) + 20.55$

Notes: T = Average Vehicle Trip Ends, X = Number of Dwelling Units

Using the above vehicle trip rate equations, the total vehicle trip generation during the weekday AM peak hour and weekday PM peak hour are summarized in Table 3. Given that the proposed development consists of only residential uses and this analysis is for full occupancy of the subject development, all trips are considered primary, and no synergy effects or pass-by trips have been considered.

Table 3: Vehicle Site Trip Generation

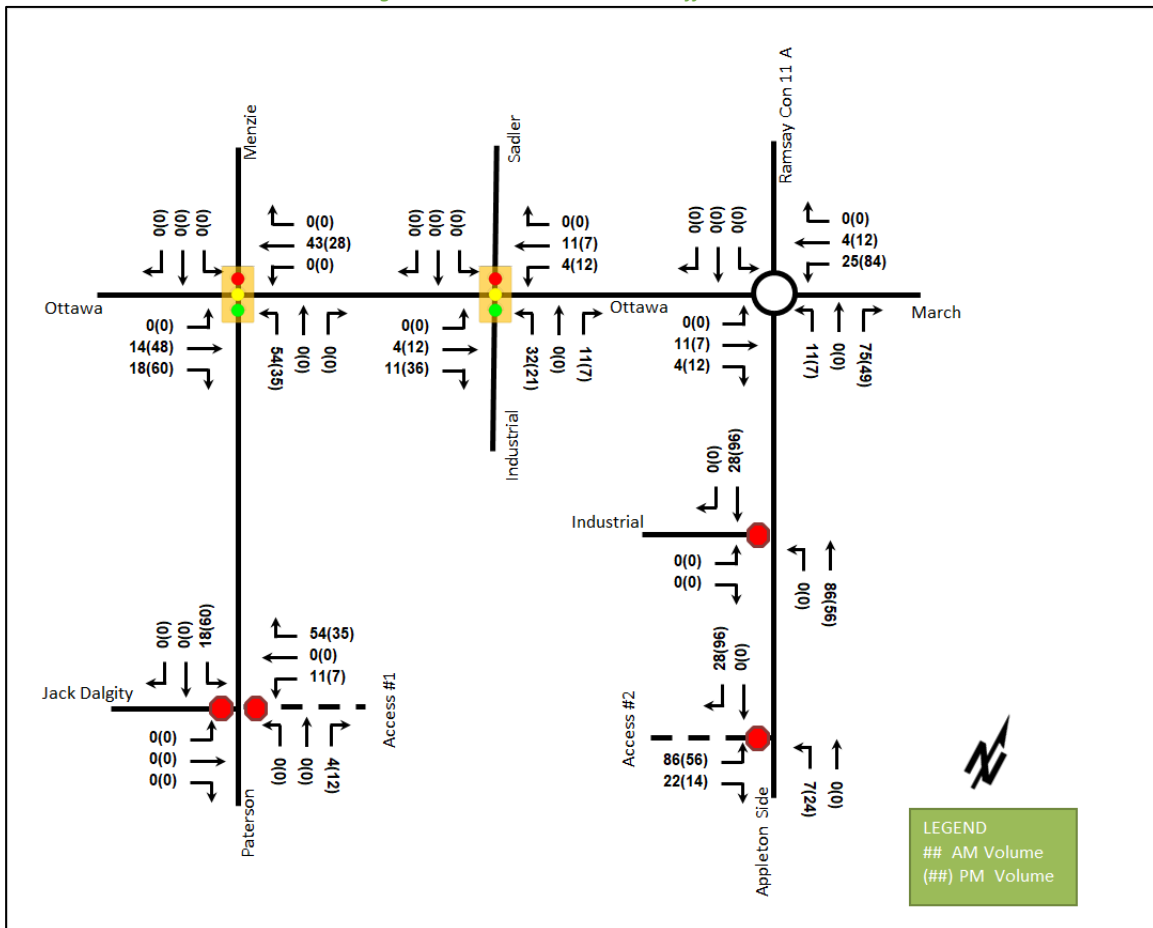
Land Use	Units	AM Peak (veh/hr)			PM Peak (veh/hr)		
		In	Out	Total	In	Out	Total
Single Family Detached	253	45	130	175	150	88	238
Multifamily Housing (Low-Rise)	282	26	84	110	89	53	142
Total		71	214	285	239	141	380

As shown above, a total of 285 AM and 380 PM new peak hour two-way vehicle trips are projected as a result of proposed development.

3.2 Vehicle Traffic Distribution and Assignment

Traffic distribution was based on the existing volume splits at study area intersections and a knowledge of the area travel. Based on these factors, new site-generated trips were assigned to study area intersections, which is illustrated in Figure 9. Section 5.2 provides further information regarding proposed access configurations.

Figure 9: New Site-Generated Traffic Volumes



3.3 Future Total Travel Demands

The 2027 and 2032 site-generated traffic has been combined with the 2027 and 2032 future background traffic volumes to estimate the 2027 and 2032 future total traffic volumes. Figure 10 and Figure 11 illustrate the 2027 and 2032 future total traffic volumes, respectively. Access configuration details are presented in Section 5.2.

Figure 10: 2027 Future Total Traffic

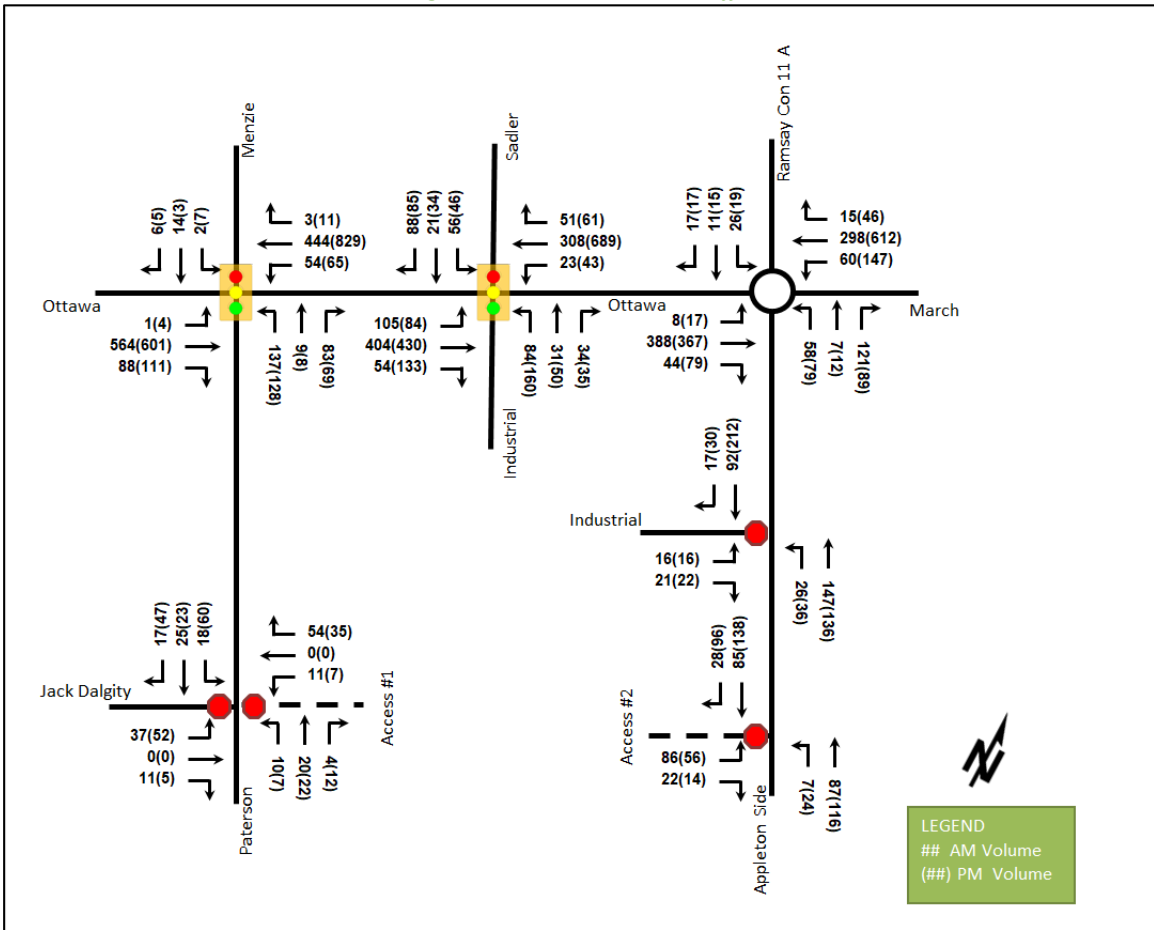
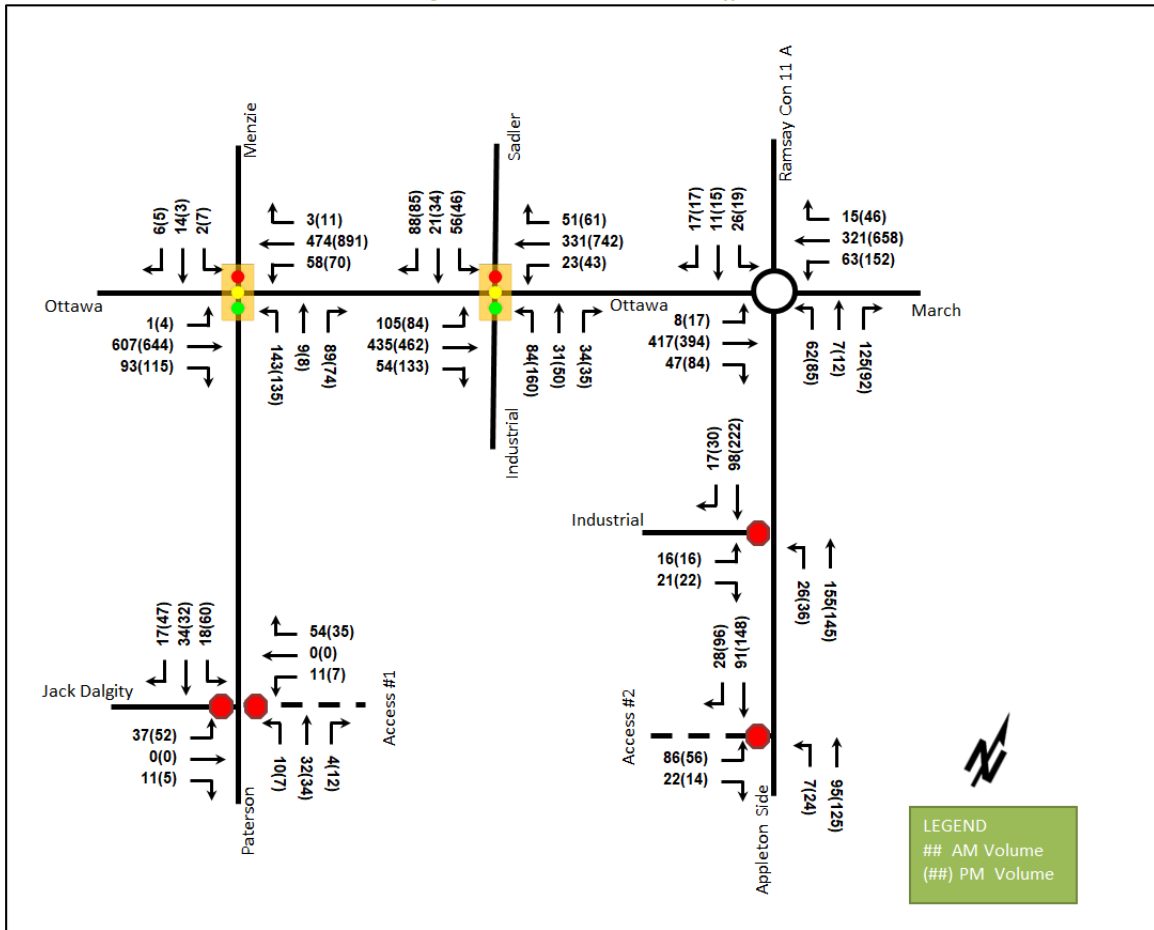


Figure 11: 2032 Future Total Traffic



4 Operational Analysis

To understand the operational characteristics of the study area intersections, a Synchro model has been created using Synchro Version 11 and Sidra Version 9 has been used to model the study area roundabouts.

Since the signal timing plan of the intersections along of Ottawa Street are not available at this time, a cycles length of 90 seconds has been assumed for both AM and PM peak hours at all horizons and optimized splits have been applied.

Heavy Vehicle percentages (HV%) have been calculated for each movement based on the existing turning movement counts for the study area intersections and have been applied to both the existing and future analysis horizons. A minimum HV% of 2% was used in Synchro to ensure a conservative analysis.

With the exception of the Ottawa Street and Industrial Drive/ Sadler Drive intersection, cyclist and pedestrian volumes were provided for all intersections with turning movement count information collected in 2022 and have been applied to the existing and future conditions analysis.

Peak Hour Factors (PHF) have been entered for each intersection based on the turning movement counts provided. The Peak Hour Factors used for each intersection are shown below in Table 4. The peak hour factor for the site access on Appleton Side Road will be taken from the adjacent intersection at Industrial Drive. All other parameters have been coded using accepted best practices and default parameters, where applicable.

Table 4: Peak Hour Factors

Intersection	Peak Hour Factor	
	AM	PM
Ottawa St/March Rd (CR 49) at Appleton Side Rd (CR 17)/Ramsay Con 11A	0.91	0.97
Ottawa St at Paterson St/Menzie St	0.93	0.95
Ottawa St and Industrial Dr/ Sadler Dr	0.92	0.92
Industrial Dr at Appleton Side Rd (CR 17)	0.86	0.96
Jack Dalgity St at Paterson St	0.71	0.94

LOS has been determined using the HCM definitions for LOS at signalized and unsignalized intersections which are summarized in Table 5 below.

Table 5: Level of Service Criteria for Signalized/Unsignalized Intersections

LOS	Signalized Intersection Delay (s)	Unsignalized Intersection Delay (s)
A	≤10	≤10
B	>10 and ≤20	>10 and ≤15
C	>20 and ≤35	>15 and ≤25
D	>35 and ≤55	>25 and ≤35
E	>55 and ≤80	>35 and ≤50
F	>80	>50

Critical movements and critical intersections have been defined as individual movements with LOS F or a V/C ratio of 1.00 or greater, and intersections with an overall LOS F. Critical movements and critical intersections will be indicated in red within operational result tables below and may require mitigation measures.

4.1 2022 Existing Operational Analysis

Table 6 summarizes the operational analysis for the 2022 existing conditions during both the AM and PM peak hours. If present, critical movements, as defined above, have been identified in red. Synchro and Sidra worksheets for the 2022 existing traffic conditions are included in Appendix D.

Table 6: 2022 Existing Intersections Operational Analysis

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95 th)	LOS	V/C	Delay	Q (95 th)
Ottawa St/March Rd (CR 49) and Appleton Side Rd (CR 17)/Ramsay Con 11A Roundabout	EB	A	0.14	2.4	5.3	A	0.14	2.6	5.3
	WB	A	0.11	2.8	4.4	A	0.22	2.9	9.6
	NB	A	0.10	6.1	2.7	A	0.12	6.6	3.2
	SB	A	0.06	5.9	1.5	A	0.06	6.2	1.6
	Overall	A	0.14	3.2	5.3	A	0.22	3.3	9.6
Ottawa St and Paterson St/Menzie St Signalized	EB	A	0.55	9.0	98.1	C	0.72	24.5	122.4
	WBL	A	0.11	5.3	9.3	B	0.17	10.4	9.4
	WBT	A	0.36	6.7	53.8	B	0.76	19.3	144.2
	WBR	A	0.00	4.5	0.0	A	0.01	7.7	0.5
	NB	C	0.58	34.5	35.8	C	0.38	27.5	35.8
	SB	C	0.06	28.2	7.6	C	0.03	24.4	5.8
	Overall	B	0.56	12.0	-	C	0.70	21.6	-

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95 th)	LOS	V/C	Delay	Q (95 th)
Ottawa St and Industrial Dr/ Sadler Dr Signalized	EBL	A	0.17	3.7	9.8	A	0.23	7.4	13.1
	EBT/R	A	0.21	6.0	26.2	B	0.30	10.9	41.8
	WBL	A	0.03	6.2	2.5	A	0.07	9.8	5.5
	WBT/R	A	0.18	7.6	20.5	B	0.48	15.1	69.6
	NBL/T	D	0.57	36.1	22.9	D	0.73	37.1	48.0
	NBR	C	0.01	28.8	0.0	C	0.02	23.5	0.0
	SBL	C	0.42	32.3	17.5	C	0.22	25.1	14.5
	SBT/R	C	0.17	29.8	14.8	C	0.14	24.3	15.0
	Overall	B	0.28	12.4	-	B	0.53	16.8	-
Industrial Dr and Appleton Side Rd (CR 17) Unsignalized	EB	A	0.05	9.4	0.8	A	0.04	9.6	0.8
	NB	A	0.02	7.5	0.8	A	0.03	7.6	0.8
	SB	-	-	-	-	-	-	-	-
	Overall	A	-	2.7	-	A	-	2.2	-
Jack Dalgity St and Paterson St Unsignalized	EB	A	0.07	9.2	1.5	A	0.07	9.2	1.5
	NB	A	0.01	7.6	0.0	A	0.01	7.4	0.0
	SB	-	-	-	-	-	-	-	-
	Overall	A	-	5.2	-	A	-	4.3	-

Notes: Saturation flow rate of 1800 veh/h/lane
Queue is measured in metres

Delay = average vehicle delay in seconds
= volume for the 95th %ile cycle exceeds capacity

Generally, the study area intersections are shown to operate with good overall LOS and low delays and no additional operational constraints (V/C ratio greater than 0.90 or LOS E or worse) are noted.

4.2 Future Background Conditions

4.2.1 Future Background Traffic Control Warrants

Using Ontario Traffic Manual (OTM) Book 12 Justification 7 methodology for examining traffic control signal warrants, the unsignalized study area intersections have been analyzed. In the future background horizons signalization is not warranted at any currently unsignalized study area intersections. Traffic control warrant sheets have been included in Appendix E.

4.2.2 2027 Future Background Conditions

The 2027 future background intersection volumes have been analyzed to allow for a comparison of the future volumes with and without the proposed development.

Table 7 summarizes the operational analysis for the 2027 future background conditions in both the AM and PM peak hours. Critical movements, as defined above, have been identified in red where applicable. The intersections have been analyzed based on the identified signal control and intersection configurations in Section 4.2.1. Synchro and Sidra worksheets for the 2027 future background traffic conditions are included in Appendix F.

Table 7: 2027 Future Background Conditions Operational Analysis

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95 th)	LOS	V/C	Delay	Q (95 th)
Ottawa St/March Rd (CR 49) and Appleton Side Rd (CR 17)/Ramsa/y Con 11A Roundabout	EB	A	0.15	2.5	5.8	A	0.15	2.7	5.8
	WB	A	0.12	2.8	4.8	A	0.24	3.0	10.7
	NB	A	0.11	6.2	3.0	A	0.13	6.7	3.6
	SB	A	0.06	6.0	1.5	A	0.06	6.3	1.7
	Overall	A	0.15	3.2	5.8	A	0.24	3.3	10.7
Ottawa St and Paterson St/Menzie St Signalized	EB	B	0.60	10.0	111.6	C	0.78	27.4	#152.5
	WBL	A	0.13	5.6	10.0	B	0.20	10.8	10.1
	WBT	A	0.39	7.2	59.4	C	0.82	22.4	#177.3
	WBR	A	0.00	4.6	0.0	A	0.01	7.7	0.5
	NB	D	0.61	35.8	38.4	C	0.41	27.9	38.7
	SB	C	0.06	28.0	7.6	C	0.03	24.4	5.8
Overall	B	0.60	12.8	-	C	0.75	24.3	-	
Ottawa St and Industrial Dr/ Sadler Dr Signalized	EBL	A	0.18	3.7	9.9	A	0.25	7.8	13.3
	EBT/R	A	0.23	6.1	28.5	B	0.32	11.3	45.5
	WBL	A	0.04	6.3	2.8	A	0.08	9.9	6.3
	WBT/R	A	0.20	7.7	22.1	B	0.52	15.6	76.5
	NBL/T	D	0.59	37.0	23.8	D	0.74	37.6	49.4
	NBR	C	0.02	28.8	0.0	C	0.02	23.3	0.0
	SBL	C	0.42	32.3	17.3	C	0.22	24.9	14.5
	SBT/R	C	0.19	29.9	15.4	C	0.16	24.3	16.5
Overall	B	0.29	12.4	-	B	0.56	17.2	-	
Industrial Dr and Appleton Side Rd (CR 17) Unsignalized	EB	A	0.05	9.4	0.8	A	0.05	9.8	1.5
	NB	A	0.02	7.5	0.8	A	0.03	7.6	0.8
	SB	-	-	-	-	-	-	-	-
	Overall	A	-	2.6	-	A	-	2.2	-
Jack Dalgity St and Paterson St Unsignalized	EB	A	0.08	9.4	1.5	A	0.07	9.3	1.5
	NB	A	0.01	7.6	0.0	A	0.01	7.4	0.0
	SB	-	-	-	-	-	-	-	-
	Overall	A	-	4.4	-	A	-	3.7	-

Notes: Saturation flow rate of 1800 veh/h/lane
Queue is measured in metres

Delay = average vehicle delay in seconds
= volume for the 95th %ile cycle exceeds capacity

The intersection operations for the 2027 future background horizon in the study area generally operate similarly to the existing conditions. No additional operational constraints (V/C ratio greater than 0.90 or LOS E or worse) are noted.

The intersection of Ottawa Street at Paterson Street/Menzie Street may exhibit extended queues on the eastbound and westbound through movement during the PM peak hour due to background growth.

4.2.3 2032 Future Background Conditions

The 2032 future background intersection volumes have been analyzed to allow for a comparison of the future volumes with and without the proposed development.

Table 8 summarizes the operational analysis for the 2032 future background conditions in both the AM and PM peak hours. Critical movements, as defined above, have been identified in red where applicable. The intersections have been analyzed based on the identified signal control and intersection configurations in Section 4.2.1. Synchro and Sidra worksheets for the 2032 future background traffic conditions are included in Appendix G.

Table 8: 2032 Future Background Conditions Operational Analysis

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95 th)	LOS	V/C	Delay	Q (95 th)
Ottawa St/March Rd (CR 49) and Appleton Side Rd (CR 17)/Ramsay Con 11A Roundabout	EB	A	0.16	2.5	6.3	A	0.16	2.7	6.3
	WB	A	0.13	2.9	5.3	A	0.26	3.0	11.8
	NB	A	0.12	6.3	3.4	A	0.14	6.8	3.9
	SB	A	0.06	6.1	1.6	A	0.06	6.4	1.7
	Overall	A	0.16	3.2	6.3	A	0.26	3.4	11.8
Ottawa St and Paterson St/Menzie St Signalized	EB	B	0.65	11.4	128.5	C	0.85	31.4	#172.3
	WBL	A	0.15	6.0	10.8	B	0.23	11.2	10.7
	WBT	A	0.42	7.8	65.2	C	0.89	27.5	#215.8
	WBR	A	0.00	4.8	0.0	A	0.01	7.7	0.5
	NB	D	0.65	37.1	42.0	C	0.45	28.3	41.9
	SB	C	0.06	27.6	7.6	C	0.03	24.4	5.8
Overall	B	0.65	13.8	-	C	0.81	28.2	-	
Ottawa St and Industrial Dr/Sadler Dr Signalized	EBL	A	0.18	3.7	9.9	A	0.26	8.0	13.3
	EBT/R	A	0.25	6.2	30.7	B	0.35	11.5	49.1
	WBL	A	0.04	6.3	2.8	A	0.08	9.9	6.3
	WBT/R	A	0.21	7.8	23.7	B	0.56	16.2	83.7
	NBL/T	D	0.59	37.0	23.8	D	0.74	37.6	49.4
	NBR	C	0.02	28.8	0.0	C	0.02	23.3	0.0
	SBL	C	0.42	32.3	17.3	C	0.22	24.9	14.5
	SBT/R	C	0.19	29.9	15.4	C	0.16	24.3	16.5
Overall	B	0.31	12.2	-	B	0.58	17.4	-	
Industrial Dr and Appleton Side Rd (CR 17) Unsignalized	EB	A	0.05	9.5	0.8	A	0.05	9.8	0.8
	NB	A	0.02	7.5	0.8	A	0.03	7.6	0.8
	SB	-	-	-	-	-	-	-	-
	Overall	A	-	2.4	-	A	-	1.9	-
Jack Dalgity St and Paterson St Unsignalized	EB	A	0.08	9.5	2.3	A	0.07	9.4	1.5
	NB	A	0.01	7.7	0.0	A	0.01	7.4	0.0
	SB	-	-	-	-	-	-	-	-
	Overall	A	-	3.8	-	A	-	3.3	-

Notes: Saturation flow rate of 1800 veh/h/lane
Queue is measured in metres

Delay = average vehicle delay in seconds
= volume for the 95th %ile cycle exceeds capacity

The intersection operations for the 2032 future background horizon in the study area generally operate similarly to the existing and 2027 future background conditions. No additional operational constraints (V/C ratio greater than 0.90 or LOS E or worse) are noted.

4.3 Future Total Conditions

4.3.1 Future Total Traffic Control Warrants

Using Ontario Traffic Manual (OTM) Book 12 Justification 7 methodology for examining traffic control signal warrants the unsignalized study area intersections, as well as the intersection of Site Access #2 and Appleton Side Road (County Road 17) and have been analyzed. In the future total horizon, signalization is not warranted at any of the currently unsignalized or future study area intersections. Traffic control warrant sheets have been included in Appendix E.

4.3.2 2027 Future Total Conditions

The proposed development’s trip generation has been added to the 2027 future background traffic volumes to project the impact of the new traffic on the future road network.

Table 9 summarizes the operational analysis for the 2027 future total conditions in both the AM and PM peak hours. Critical movements, as defined above, have been identified in red where applicable. The intersections have been analyzed based on the identified signal control and intersection configurations in Section 4.3.1. Synchro and Sidra worksheets for the 2027 future total traffic conditions are included in Appendix H.

Table 9: 2027 Future Total Conditions Operational Analysis

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95 th)	LOS	V/C	Delay	Q (95 th)
Ottawa St/March Rd (CR 49) and Appleton Side Rd (CR 17)/Ramsay Con 11A Roundabout	EB	A	0.16	2.6	6.1	A	0.17	3.0	6.8
	WB	A	0.13	3.2	5.4	A	0.27	3.5	12.7
	NB	A	0.21	5.6	6.2	A	0.19	6.1	5.7
	SB	A	0.06	6.2	1.6	A	0.07	6.6	1.8
	Overall	A	0.21	3.5	6.2	A	0.27	3.8	12.7
Ottawa St and Paterson St/Menzie St Signalized	EB	B	0.67	13.5	126.0	D	0.93	41.4	#198.7
	WBL	A	0.14	7.1	10.4	B	0.22	11.6	10.1
	WBT	A	0.46	9.6	69.8	C	0.85	24.5	#202.0
	WBR	A	0.00	5.8	0.0	A	0.01	7.7	0.5
	NB	D	0.78	43.9	57.6	C	0.54	30.0	50.3
	SB	C	0.05	25.7	7.6	C	0.03	24.4	5.8
Overall	B	0.70	17.1	-	C	0.84	31.1	-	
Ottawa St and Industrial Dr/ Sadler Dr Signalized	EBL	A	0.18	4.6	11.9	A	0.26	9.1	14.1
	EBT/R	A	0.25	7.4	33.0	B	0.38	13.5	52.6
	WBL	A	0.05	6.4	3.8	B	0.11	10.0	8.4
	WBT/R	A	0.21	8.5	25.4	B	0.55	16.9	81.0
	NBL/T	D	0.72	44.7	31.4	D	0.76	37.9	55.4
	NBR	C	0.03	27.9	0.0	C	0.03	22.2	0.0
	SBL	C	0.37	30.6	17.1	C	0.22	23.8	14.5
	SBT/R	C	0.17	28.8	15.0	C	0.15	23.1	16.2
Overall	B	0.34	14.3	-	B	0.58	18.4	-	
Industrial Dr and Appleton Side Rd (CR 17) Unsignalized	EB	B	0.06	10.1	1.5	B	0.06	10.7	1.5
	NB	A	0.02	7.5	0.8	A	0.03	7.8	0.8
	SB	-	-	-	-	-	-	-	-
	Overall	A	-	1.8	-	A	-	1.5	-
Jack Dalgity St/ Access #1 and Paterson St Unsignalized	EB	B	0.09	10.1	2.3	B	0.09	10.9	2.3
	WB	A	0.07	8.9	1.5	A	0.05	8.9	0.8
	NB	A	0.01	7.6	0.0	A	0.01	7.4	0.0
	SB	A	0.01	7.3	0.0	A	0.04	7.4	0.8
	Overall	A	-	5.9	-	A	-	5.5	-
Access #2 and Appleton Side Rd (CR 17) Unsignalized	EB	B	0.14	10.3	3.8	B	0.12	11.3	3.0
	NB	A	0.01	7.5	0.0	A	0.02	7.8	0.8
	SB	-	-	-	-	-	-	-	-
	Overall	A	-	3.7	-	A	-	2.2	-

Notes: Saturation flow rate of 1800 veh/h/lane
Queue is measured in metres

Delay = average vehicle delay in seconds
= volume for the 95th %ile cycle exceeds capacity

The intersection operations for the 2027 future total horizon in the study area generally operate similarly to the 2027 future background conditions and the site access intersections operate well. Since no additional operational constraints (V/C ratio greater than 0.90 or LOS E or worse) are noted, no mitigation is required.

4.3.3 2032 Future Total Conditions

The proposed development’s trip generation has been added to the 2032 future background traffic volumes to project the impact of the new traffic on the future road network.

Table 10 summarizes the operational analysis for the 2032 future total conditions in both the AM and PM peak hours. Critical movements, as defined above, have been identified in red where applicable. The intersections have been analyzed based on the identified signal control and intersection configurations in Section 4.3.1. Synchro and Sidra worksheets for the 2032 future total traffic conditions are included in Appendix I.

Table 10: 2032 Future Total Conditions Operational Analysis

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95 th)	LOS	V/C	Delay	Q (95 th)
Ottawa St/March Rd (CR 49) and Appleton Side Rd (CR 17)/Ramsay Con 11A Roundabout	EB	A	0.17	2.6	6.7	A	0.18	3.0	7.4
	WB	A	0.14	3.2	5.9	A	0.29	3.5	13.9
	NB	A	0.22	5.7	6.6	A	0.20	6.2	6.1
	SB	A	0.06	6.2	1.6	A	0.07	6.7	1.8
	Overall	A	0.22	3.5	6.7	A	0.29	3.8	13.9
Ottawa St and Paterson St/Menzie St Signalized	EB	B	0.73	15.6	145.0	D	0.99	54.1	#218.1
	WBL	A	0.17	7.7	11.3	B	0.26	12.1	10.7
	WBT	B	0.49	10.4	76.7	C	0.92	30.9	#227.1
	WBR	A	0.00	6.1	0.0	A	0.01	7.7	0.5
	NB	D	0.80	45.2	61.5	C	0.57	30.8	53.3
	SB	C	0.05	25.3	7.6	C	0.03	24.4	5.8
	Overall	B	0.75	18.6	-	D	0.89	39.0	-
Ottawa St and Industrial Dr/ Sadler Dr Signalized	EBL	A	0.18	4.4	11.3	A	0.28	9.3	14.1
	EBT/R	A	0.27	7.4	34.2	B	0.40	13.8	56.7
	WBL	A	0.05	6.3	3.5	B	0.12	10.0	8.4
	WBT/R	A	0.22	8.4	26.4	B	0.58	17.5	88.4
	NBL/T	D	0.75	48.4	31.5	D	0.76	37.9	55.4
	NBR	C	0.02	28.0	0.0	C	0.03	22.2	0.0
	SBL	C	0.39	31.0	17.2	C	0.22	23.8	14.5
	SBT/R	C	0.17	28.9	15.1	C	0.15	23.1	16.2
Overall	B	0.36	14.4	-	B	0.61	18.6	-	
Industrial Dr and Appleton Side Rd (CR 17) Unsignalized	EB	B	0.06	10.2	1.5	B	0.06	10.9	1.5
	NB	A	0.02	7.6	0.8	A	0.03	7.9	0.8
	SB	-	-	-	-	-	-	-	-
	Overall	A	-	1.7	-	A	-	1.5	-
Jack Dalgity St/ Access #1 and Paterson St Unsignalized	EB	B	0.09	10.4	2.3	B	0.09	11.2	2.3
	WB	A	0.07	9.0	1.5	A	0.05	9.0	0.8
	NB	A	0.01	7.7	0.0	A	0.01	7.4	0.0
	SB	A	0.01	7.3	0.0	A	0.04	7.4	0.8
	Overall	A	-	5.4	-	A	-	5.2	-

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95 th)	LOS	V/C	Delay	Q (95 th)
Access #2 and Appleton Side Rd (CR 17) <i>Unsignalized</i>	EB	B	0.15	10.4	3.8	B	0.12	11.5	3.0
	NB	A	0.01	7.5	0.0	A	0.02	7.8	0.8
	SB	-	-	-	-	-	-	-	-
	Overall	A	-	3.5	-	A	-	2.2	-

Notes: Saturation flow rate of 1800 veh/h/lane
Queue is measured in metres

Delay = average vehicle delay in seconds
= volume for the 95th %ile cycle exceeds capacity

The intersection operations for the 2032 future total horizon in the study area generally operate similarly to the 2032 future background conditions and the site access intersections operate well. Since no additional operational constraints (V/C ratio greater than 0.90 or LOS E or worse) are noted, no mitigation is required.

5 Plan of Subdivision Review

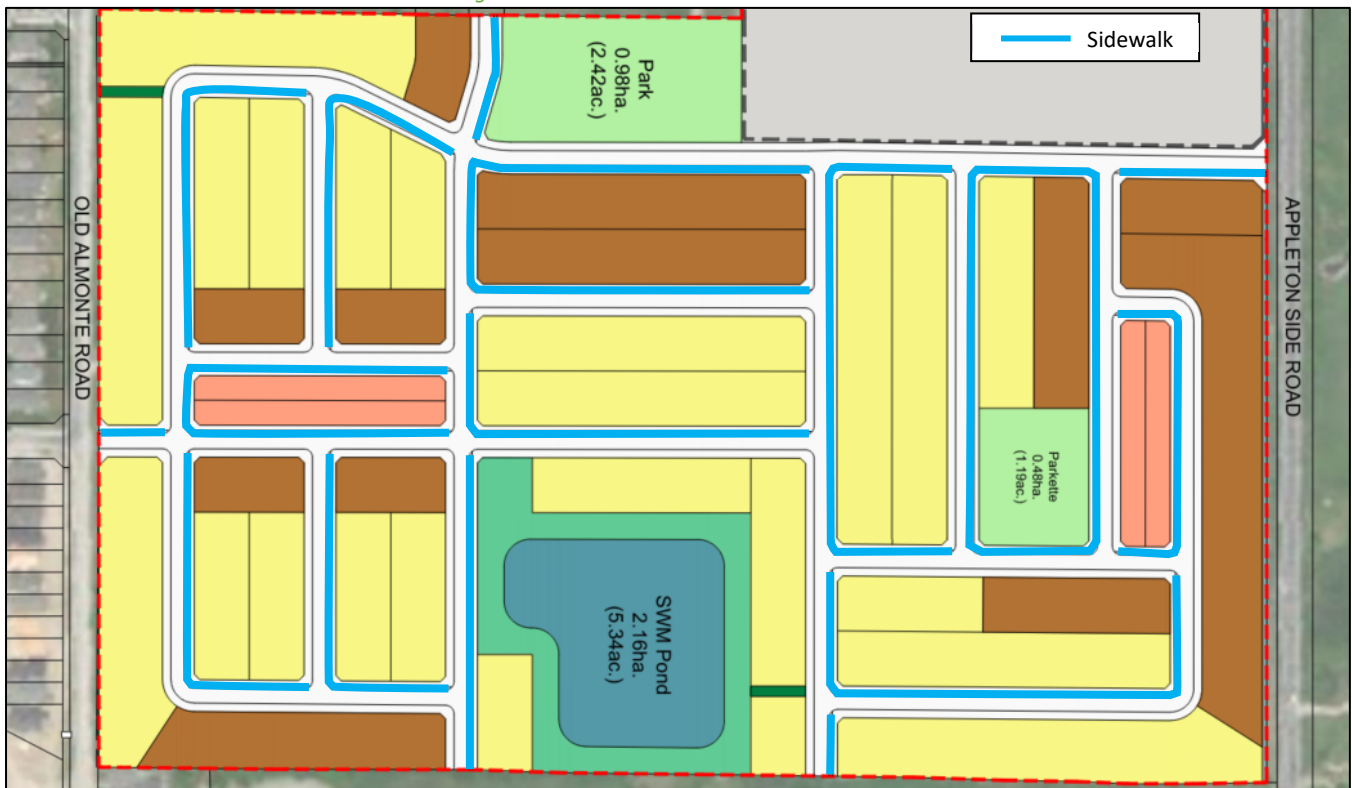
This section provides an overview of community access, street network, parking, and active mode facilities. The proposed Subdivision Concept Plan was previously illustrated in Figure 2.

5.1 Design for Sustainable Modes

The proposed residential subdivision consists of detached and townhouse dwelling will include a driveway and garage. Bicycle parking is assumed to be within the individual units.

Pedestrian facilities are recommended to be provided within the proposed development between the site accesses, along potential routes of high pedestrian travel demand, and fronting the major recreational draws of the parkland and stormwater management facility. The preliminary recommended sidewalk layout is illustrated in Figure 12.

Figure 12: Recommended Sidewalk Provision



5.2 New Streets Network

The new streets proposed include 20.0-metre local roads, consistent with the Municipality of Mississippi Mills Transportation Master Plan. The local roads are proposed to be posted as 50 km/h at the gateways to the communities, and the internal roads are proposed as having unposted speed limits of 50 km/h.

No turn lanes are proposed for the internal intersections and will be controlled by minor stop control.

5.2.1 Access Intersection Design Elements

The proposed development will connect to the intersection of Jack Dalgity Street at Paterson Street via a new local road east leg and to Appleton Side Road (County Road 17) via a new local road intersection.

Turn lane warrants from the Transportation Association of Canada's Geometric Design Guides for Canadian Roads Section 9.17 were examined for Paterson Street and Appleton Side Road to the new community local roads. Neither access intersection was found to warrant a new left-turn lane on the existing road. The results of the turn lane warrants are provided in Appendix J.

The operations are summarized in Section 4.3 for future conditions. No capacity issues were noted at the intersections of Jack Dalgity Street/Access #1 at Paterson Street and Access #2 at Appleton Side Road (County Road 17) with these assumptions.

The signal warrant analysis has been conducted for the 2032 future total horizon using the OTM Book 12 Justification 7 criteria. Using these criteria, a signal was not found to be warranted at the site access intersections. Appendix E includes the signal warrants for the access.

5.3 Parking Supply

The inclusion of a garage and driveway of each detached and townhouse unit satisfies the parking for the freehold dwellings.

6 Findings and Recommendations

- a) The Mill Valley Estates development is proposed to include 253 detached homes and 282 townhomes.
- b) The proposed development will connect to the intersection of Jack Dalgity Street at Paterson Street via a new local road on the east leg, to Appleton Side Road (County Road 17) via a new local road, and to Industrial Drive.
- c) The full build-out horizon year of 2027 and the full build-out plus five years horizon year of 2032 have been analyzed.
- d) No significant planned changes to the area transportation network, and Mill Valley Living has been included in the background conditions.
- e) The proposed development is projected to a total of 285 AM and 380 PM new peak hour two-way vehicle trips during weekdays.
- f) A 1.5% compound annual growth rate was selected to generate the 2027 and 2032 future background traffic volumes.
- g) No capacity constraints or high delays were noted in the 2022 existing condition, therefore no mitigation was required.
- h) The 2027 and 2032 future background traffic volumes, including the background growth were analyzed and operate in a similar manner as existing conditions.
- i) With the addition of site traffic volumes to the study area intersections, a slight increase to the intersection capacities and delays are expected and remain similar to the background conditions.

- j) Signal warrants are not met at the site access intersections on Paterson Street or Appleton Side Road.
- k) Neither intersection was found to warrant a new left-turn lane on either Paterson Street or Appleton Side Road.
- l) The site access intersections operate well in both the 2027 and 2032 horizons with stop control on the minor approach.
- m) Within the subdivision, no turn lanes are proposed for the internal intersections and will be controlled by minor stop control.
- n) Pedestrian facilities are recommended to be provided within the proposed development between the site accesses, along potential routes of high pedestrian travel demand, and fronting the major recreational draws of the parkland and stormwater management facility.
- o) The inclusion of a garage and driveway of each detached and townhouse unit satisfies the parking for the freehold dwellings.

The Mill Valley Estates development will have a minor impact on the study area road network. The proposed access will operate with reasonable LOS and delay on the turning movements into and out of the site. Additionally, through the provision of on-site facilities, this development will be supportive of active mode transportation. It is recommended that, from a transportation perspective, the proposed development application proceed.

Prepared By:

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Appendix A

Aerial Images and Photos









Appendix B

Traffic Data and AADT



Turning Movement Count Summary Report Including Peak Hours, AADT and Expansion Factors All Vehicles Except Bicycles



Appleton Side Road/Ramsay Concession 11A & March Road/Ottawa Street **Almonte, ON**

Survey Date: Tuesday, November 01, 2022 Start Time: 0700 AADT Factor: 1.0
 Weather AM: Overcast 10° C Survey Duration: 8 Hrs. Survey Hours: 0700-1000, 1130-1330 & 1500-1800
 Weather PM: Mostly Sunny 16° C Surveyor(s): T. Carmody

Time Period	Ottawa St.				March Rd.				Appleton Side Rd.				Ramsay Conc. 11A				S/B Tot	Street Total	Grand Total				
	Eastbound		Westbound		Northbound		Southbound		Eastbound		Westbound		Northbound		Southbound								
	LT	ST	RT	UT	LT	ST	RT	UT	LT	ST	RT	UT	LT	ST	RT	UT							
0700-0800	7	413	39	3	462	20	193	10	0	223	685	45	5	43	0	93	52	12	9	0	73	166	851
0800-0900	1	360	34	2	397	28	247	13	0	288	685	42	9	46	0	97	29	8	11	0	48	145	830
0900-1000	9	333	37	2	381	22	271	13	1	307	688	43	6	33	0	82	28	16	20	0	64	146	834
1130-1230	8	270	44	0	322	22	242	12	0	276	598	52	12	24	0	88	17	16	18	0	51	139	737
1230-1330	14	233	42	5	294	21	271	16	0	308	602	61	13	40	0	114	21	10	21	0	52	166	768
1500-1600	16	271	42	9	338	46	449	24	0	519	857	70	13	46	0	129	15	10	14	0	39	168	1025
1600-1700	11	332	62	6	411	56	555	46	0	657	1068	67	12	35	0	114	19	15	17	0	51	165	1233
1700-1800	12	267	41	5	325	39	441	45	0	525	850	90	13	36	0	139	17	13	14	0	44	183	1033
Totals	78	2479	341	32	2930	254	2669	179	1	3103	6033	470	83	303	0	856	198	100	124	0	422	1278	7311

Equivalent 12 & 24-hour Vehicle Volumes Including the Annual Average Daily Traffic (AADT) Factor
Applicable to the Day and Month of the Turning Movement Count
 Expansion factors are applied exclusively to standard weekday 8-hour turning movement counts conducted during the hours of 0700h - 1000h, 1130h - 1330h and 1500h - 1800h

Equivalent 12-hour vehicle volumes. These volumes are calculated by multiplying the 8-hour totals by the 8 → 12 expansion factor of 1.39																							
Equ. 12 Hr	108	3446	474	44	4073	353	3710	249	1	4313	8386	653	115	421	0	1190	275	139	172	0	587	1776	10162

Average daily 12-hour vehicle volumes. These volumes are calculated by multiplying the equivalent 12-hour totals by the AADT factor of 1.0																							
AADT 12-hr	108	3446	474	44	4073	353	3710	249	1	4313	8386	653	115	421	0	1190	275	139	172	0	587	1776	10162

24-Hour AADT. These volumes are calculated by multiplying the average daily 12-hour vehicle volumes by the 12 → 24 expansion factor of 1.31																							
AADT 24 Hr	142	4514	621	58	5335	463	4860	326	2	5650	10985	856	151	552	0	1559	361	182	226	0	768	2327	13313

AADT and expansion factors provided by the City of Ottawa

AM Peak Hour Factor → 0.91																							
AM Peak Hr	LT	ST	RT	UT	Total	LT	ST	RT	UT	Total	Str. Tot.	LT	ST	RT	UT	Total	Str. Tot.	Gr. Tot.					
0845-0945	5	348	37	3	393	30	271	15	1	317	710	44	7	41	0	92	26	11	17	0	54	146	856
OFF Peak Hour Factor → 0.98																							
OFF Peak Hr	LT	ST	RT	UT	Total	LT	ST	RT	UT	Total	Str. Tot.	LT	ST	RT	UT	Total	Str. Tot.	Gr. Tot.					
1200-1300	11	262	44	2	319	22	273	10	0	305	624	61	16	28	0	105	19	16	17	0	52	157	781
PM Peak Hour Factor → 0.97																							
PM Peak Hr	LT	ST	RT	UT	Total	LT	ST	RT	UT	Total	Str. Tot.	LT	ST	RT	UT	Total	Str. Tot.	Gr. Tot.					
1600-1700	11	332	62	6	411	56	555	46	0	657	1068	67	12	35	0	114	19	15	17	0	51	165	1233

Comments:
 School buses comprise 6.90% of the heavy vehicle traffic. There were a few minor conflicts during the day.

Notes:
 1. Includes all vehicle types except bicycles, electric bicycles, and electric scooters.
 2. When expansion and AADT factors are applied, the results will differ slightly due to rounding.

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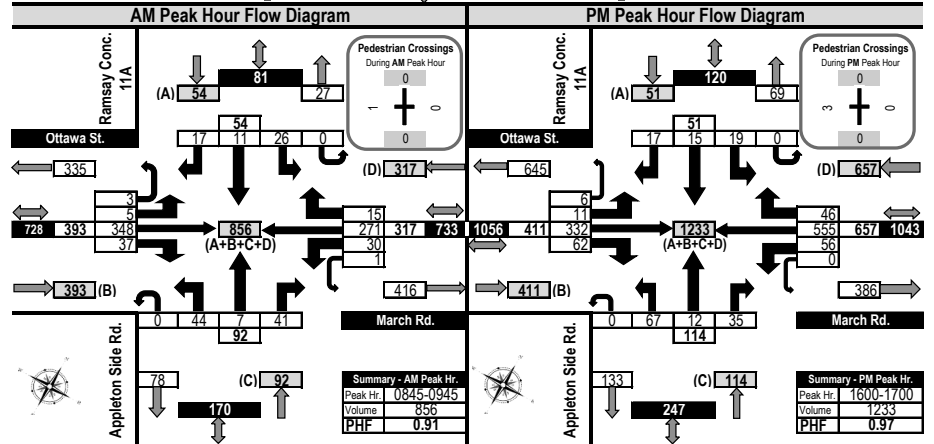
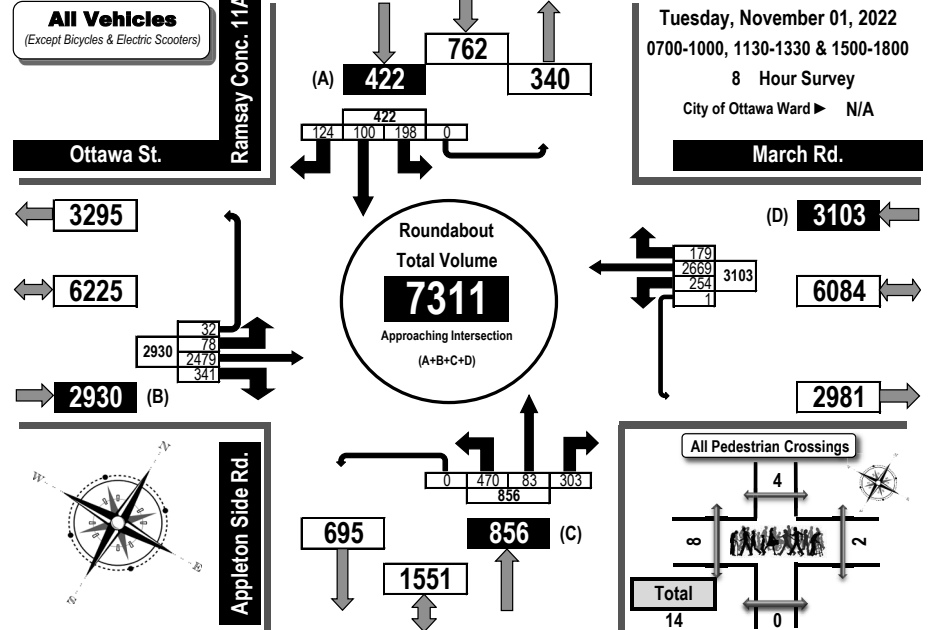
Summary: All Vehicles



Turning Movement Count Summary, AM and PM Peak Hour Flow Diagrams All Vehicles Except Bicycles



Appleton Side Road/Ramsay Concession 11A & March Road/Ottawa Street **Almonte, ON**



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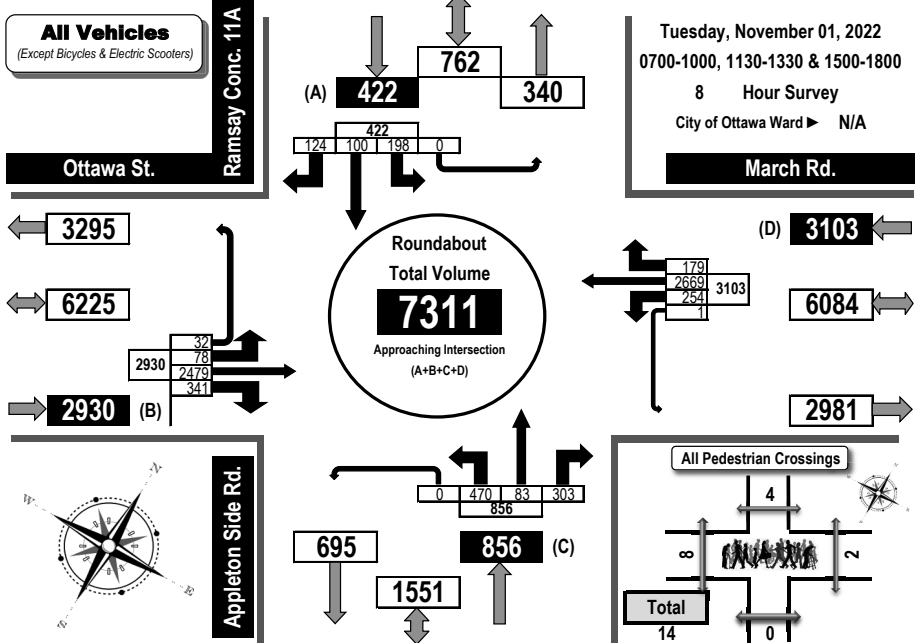
Flow Diagrams: AM PM Peak



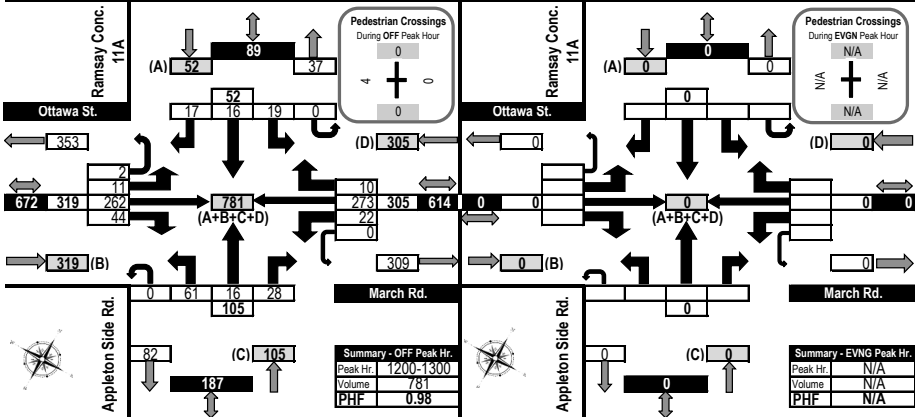
Turning Movement Count Summary, OFF and EVENING Peak Hour Flow Diagrams



Appleton Side Road/Ramsay Concession 11A & March Road/Ottawa Street **Almonte, ON**



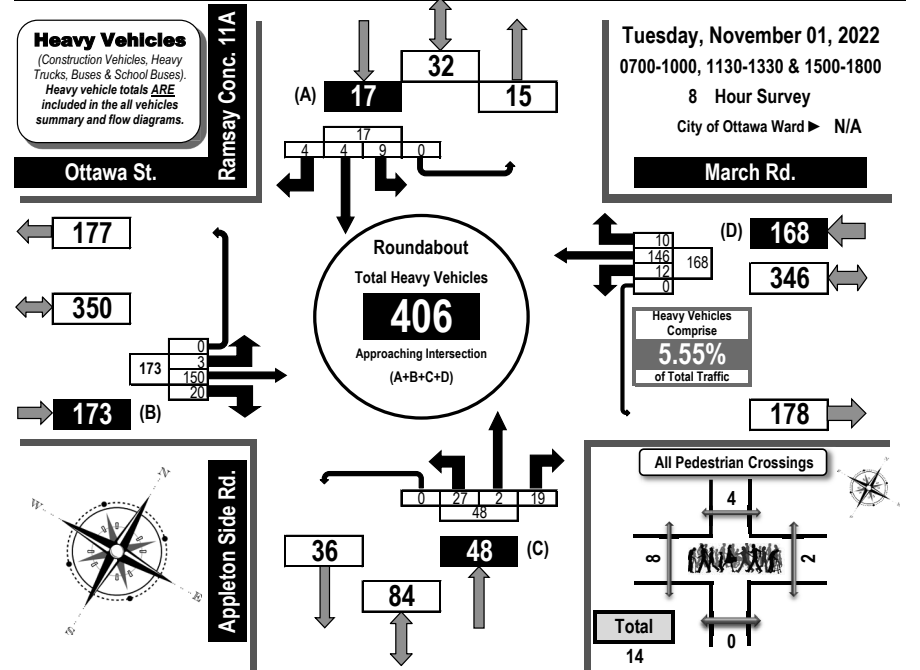
Off Peak Hour Flow Diagram | Evening Peak Hour Flow Diagram



Turning Movement Count Heavy Vehicle Summary (FHWA Class 4-13) Flow Diagram



Appleton Side Road/Ramsay Concession 11A & March Road/Ottawa Street **Almonte, ON**



Ottawa St. | March Rd. | Appleton Side Rd. | Ramsay Concession 11A

Time Period	Eastbound				Westbound				Northbound				Southbound				SB Tot	GR Tot			
	LT	ST	RT	UT	EB Tot	LT	ST	RT	UT	WB Tot	LT	ST	RT	UT	NB Tot	LT			ST	RT	UT
0700-0800	1	20	5	0	26	1	21	2	0	24	3	1	4	0	8	3	0	1	0	4	62
0800-0900	0	28	4	0	32	1	22	2	0	25	5	0	5	0	10	2	0	0	0	2	69
0900-1000	1	23	1	0	25	1	24	2	0	27	1	0	4	0	5	2	1	0	0	3	60
1130-1230	1	16	3	0	20	2	18	1	0	21	3	1	0	0	4	0	1	1	0	2	47
1230-1330	0	22	2	0	24	1	18	0	0	19	7	0	2	0	9	0	1	0	0	1	53
1500-1600	0	20	2	0	22	3	16	1	0	20	5	0	1	0	6	1	0	2	0	3	51
1600-1700	0	16	1	0	17	3	19	2	0	24	3	0	1	0	4	1	1	0	0	2	47
1700-1800	0	5	2	0	7	0	8	0	0	8	0	0	2	0	2	0	0	0	0	0	17
Totals	3	150	20	0	173	12	146	10	0	168	27	2	19	0	48	9	4	4	0	17	406

Comments:

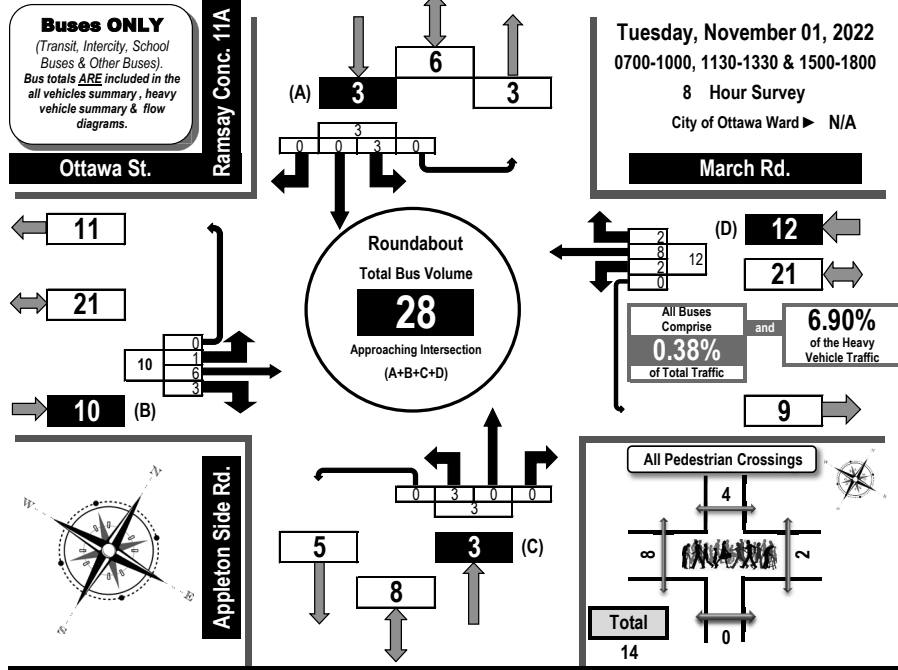
School buses comprise 6.90% of the heavy vehicle traffic. There were a few minor conflicts during the day.



Turning Movement Count All Buses Summary (FHWA Class 4 ONLY) Flow Diagram



Appleton Side Road/Ramsay Concession 11A & March Road/Ottawa Street Almonte, ON



Time Period	Ottawa St. Eastbound				March Rd. Westbound				Appleton Side Rd. Northbound				Ramsay Conc. 11A Southbound				GR Tot					
	LT	ST	RT	UT	EB Tot	LT	ST	RT	UT	WB Tot	LT	ST	RT	UT	NB Tot	LT		ST	RT	UT	SB Tot	
0700-0800	1	1	1	0	3	0	2	0	0	2	0	0	0	0	0	1	0	0	0	1	6	
0800-0900	0	3	1	0	4	0	0	0	0	0	1	0	0	0	1	1	0	0	0	0	1	6
0900-1000	0	2	0	0	2	0	3	1	0	4	0	0	0	0	0	0	0	0	0	0	0	6
1130-1230	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1230-1330	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1500-1600	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	2
1600-1700	0	0	0	0	0	2	3	1	0	6	2	0	0	0	2	0	0	0	0	0	0	8
1700-1800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	1	6	3	0	10	2	8	2	0	12	3	0	0	0	3	3	0	0	0	3	28	

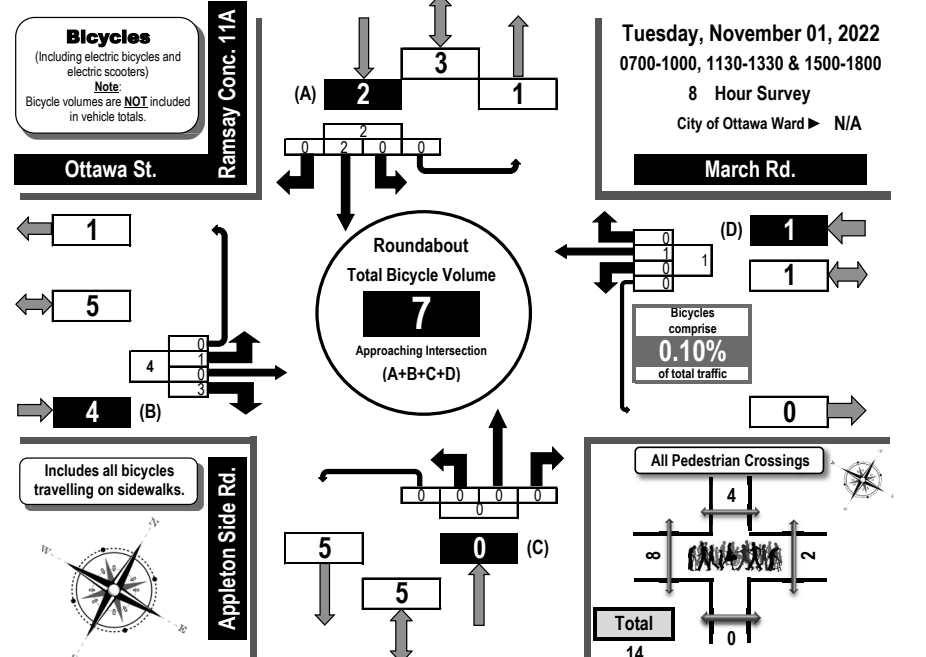
Comments:
School buses comprise 6.90% of the heavy vehicle traffic. There were a few minor conflicts during the day.



Turning Movement Count Bicycle Summary Flow Diagram



Appleton Side Road/Ramsay Concession 11A & March Road/Ottawa Street Almonte, ON



Time Period	Ottawa St. Eastbound				March Rd. Westbound				Appleton Side Rd. Northbound				Ramsay Conc. 11A Southbound				GR Tot					
	LT	ST	RT	UT	EB Tot	LT	ST	RT	UT	WB Tot	LT	ST	RT	UT	NB Tot	LT		ST	RT	UT	SB Tot	
0700-0800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0800-0900	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
0900-1000	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
1130-1230	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	4
1230-1330	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1500-1600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1600-1700	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
1700-1800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	1	0	3	0	4	0	1	0	0	1	0	0	0	0	0	2	0	0	0	2	7	

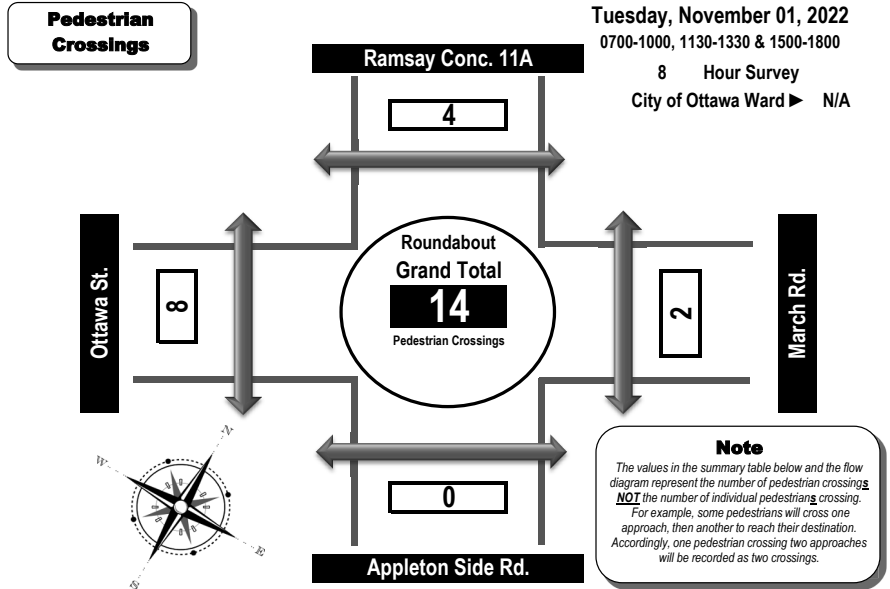
Comments:
School buses comprise 6.90% of the heavy vehicle traffic. There were a few minor conflicts during the day.



Turning Movement Count Pedestrian Crossings Summary and Flow Diagram



Appleton Side Road/Ramsay Concession 11A & March Road/Ottawa Street **Almonte, ON**



Tuesday, November 01, 2022
0700-1000, 1130-1330 & 1500-1800
8 Hour Survey
City of Ottawa Ward ▶ N/A

Time Period	West Side Crossing Ottawa St.	East Side Crossing March Rd.	Street Total	South Side Crossing Appleton Side Rd.	North Side Crossing Ramsay Conc. 11A	Street Total	Grand Total
0700-0800	0	0	0	0	0	0	0
0800-0900	0	0	0	0	2	2	2
0900-1000	1	0	1	0	0	0	1
1130-1230	4	0	4	0	0	0	4
1230-1330	0	0	0	0	0	0	0
1500-1600	0	2	2	0	2	2	4
1600-1700	3	0	3	0	0	0	3
1700-1800	0	0	0	0	0	0	0
Totals	8	2	10	0	4	4	14

Comments:
School buses comprise 6.90% of the heavy vehicle traffic. There were a few minor conflicts during the day.



Turning Movement Count Summary Report Including Peak Hours, AADT and Expansion Factors All Vehicles Except Bicycles



Ottawa Street & Menzie Road/Paterson Street **Almonte, ON**

Survey Date: Tuesday, November 01, 2022 Start Time: 0700 AADT Factor: 1.0
Weather AM: Overcast 10° C Survey Duration: 8 Hrs. Survey Hours: 0700-1000, 1130-1330 & 1500-1800
Weather PM: Mostly Sunny 16° C Surveyor(s): T. Carmody

Time Period	Ottawa St. Eastbound					Ottawa St. Westbound					Paterson St. Northbound					Menzie Rd. Southbound							
	LT	ST	RT	UT	E/B Tot	LT	ST	RT	UT	W/B Tot	LT	ST	RT	UT	N/B Tot	LT	ST	RT	UT	S/B Tot			
	Street Total																						
0700-0800	0	487	35	0	522	30	238	1	0	269	791	30	4	58	0	92	8	7	2	0	17	109	900
0800-0900	3	459	63	0	525	60	293	2	0	355	880	26	4	62	0	92	4	12	7	0	23	115	995
0900-1000	1	509	65	0	575	50	370	3	0	423	998	77	9	77	0	163	2	14	6	0	22	185	1183
1130-1230	5	471	26	0	502	40	444	5	0	489	991	45	3	52	0	100	4	2	6	0	12	112	1103
1230-1330	5	431	29	0	465	40	430	8	0	478	943	45	1	33	0	79	3	4	12	0	19	98	1041
1500-1600	8	485	68	0	561	62	606	7	0	675	1236	79	18	44	0	141	9	6	6	0	21	162	1398
1600-1700	4	496	46	0	546	65	744	7	0	816	1362	76	8	57	0	141	7	4	6	0	17	158	1520
1700-1800	2	431	25	0	458	64	634	3	0	701	1159	59	6	30	0	95	3	6	2	0	11	106	1265
Totals	28	3769	357	0	4154	411	3759	36	0	4206	8360	437	53	413	0	903	40	55	47	0	142	1045	9405

Equivalent 12 & 24-hour Vehicle Volumes Including the Annual Average Daily Traffic (AADT) Factor
Applicable to the Day and Month of the Turning Movement Count
Expansion factors are applied exclusively to standard weekday 8-hour turning movement counts
conducted during the hours of 0700h - 1000h, 1130h - 1330h and 1500h - 1800h

Equivalent 12-hour vehicle volumes. These volumes are calculated by multiplying the 8-hour totals by the 8 → 12 expansion factor of 1.39

Equ. 12 Hr	39	5239	496	0	5774	571	5225	50	0	5846	11620	607	74	574	0	1255	56	76	65	0	197	1453	13073
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Average daily 12-hour vehicle volumes. These volumes are calculated by multiplying the equivalent 12-hour totals by the AADT factor of: 1.0

AADT 12-hr	39	5239	496	0	5774	571	5225	50	0	5846	11620	607	74	574	0	1255	56	76	65	0	197	1453	13073
------------	----	------	-----	---	------	-----	------	----	---	------	-------	-----	----	-----	---	------	----	----	----	---	-----	------	-------

24-Hour AADT. These volumes are calculated by multiplying the average daily 12-hour vehicle volumes by the 12 → 24 expansion factor of 1.31

AADT 24 Hr	51	6863	650	0	7564	748	6845	66	0	7659	15223	796	97	752	0	1644	73	100	86	0	259	1903	17126
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AADT and expansion factors provided by the City of Ottawa

AM Peak Hour Factor	Highest Hourly Vehicle Volume Between 0700h & 1000h																							
OFF Peak Hour Factor	Highest Hourly Vehicle Volume Between 1130h & 1330h																							
PM Peak Hour Factor	Highest Hourly Vehicle Volume Between 1500h & 1800h																							
0.93	LT	ST	RT	UT	Total	Str. Tot.	LT	ST	RT	UT	Total	Str. Tot.	LT	ST	RT	UT	Total	Str. Tot.	LT	ST	RT	UT	Total	Str. Tot.
0.97	1	509	65	0	575	998	50	370	3	0	423	998	77	9	77	0	163	2	14	6	0	22	185	1183
0.95	3	476	28	0	507	996	45	439	5	0	489	996	47	3	51	0	101	1	1	9	0	11	112	1108
1545-1645	4	510	47	0	561	1373	60	741	11	0	812	1373	86	8	64	0	158	7	3	5	0	15	173	1546

Comments:
School buses comprise 15.83% of the heavy vehicle traffic. A crossing guard assisted pedestrians crossing Ottawa Street and Paterson Street before and after school.

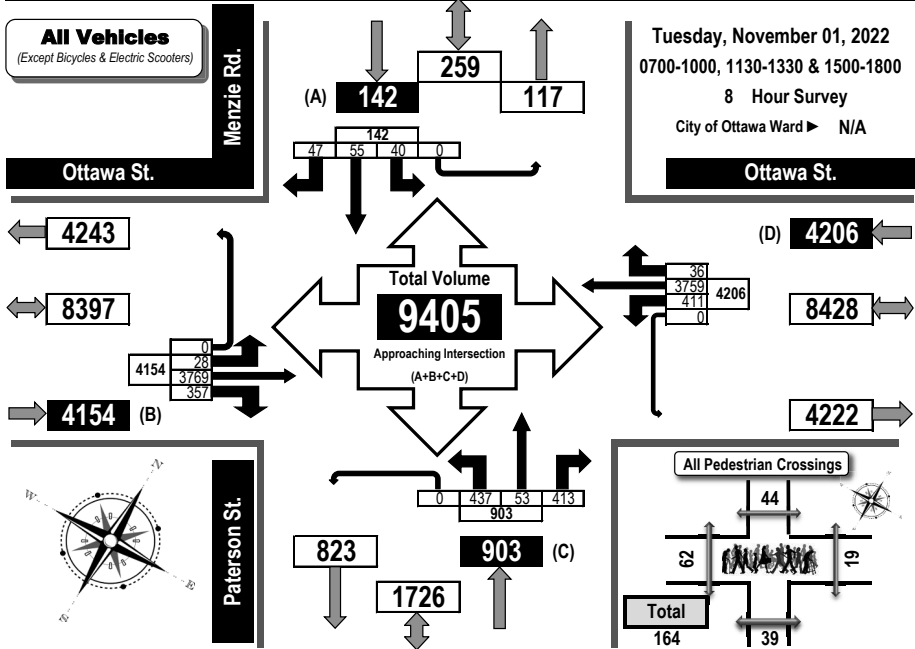
Notes:
1. Includes all vehicle types except bicycles, electric bicycles, and electric scooters.
2. When expansion and AADT factors are applied, the results will differ slightly due to rounding.



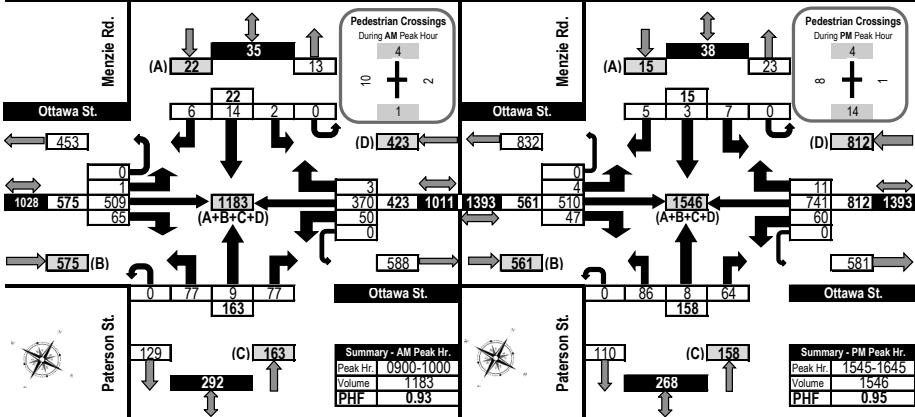
Turning Movement Count
Summary, AM and PM Peak Hour
Flow Diagrams
All Vehicles Except Bicycles



Ottawa Street & Menzie Road/Paterson Street **Almonte, ON**



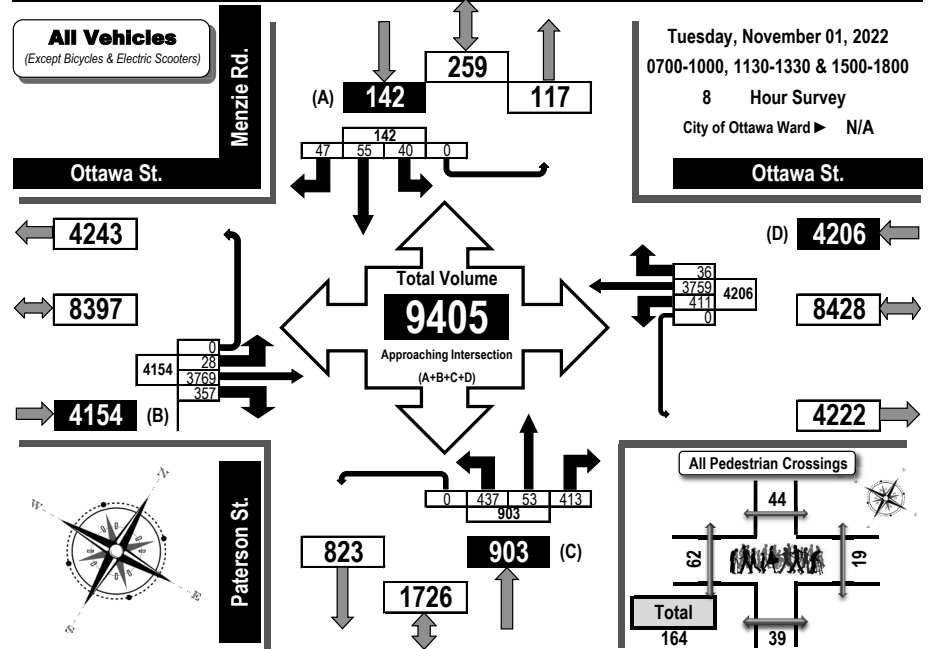
AM Peak Hour Flow Diagram **PM Peak Hour Flow Diagram**



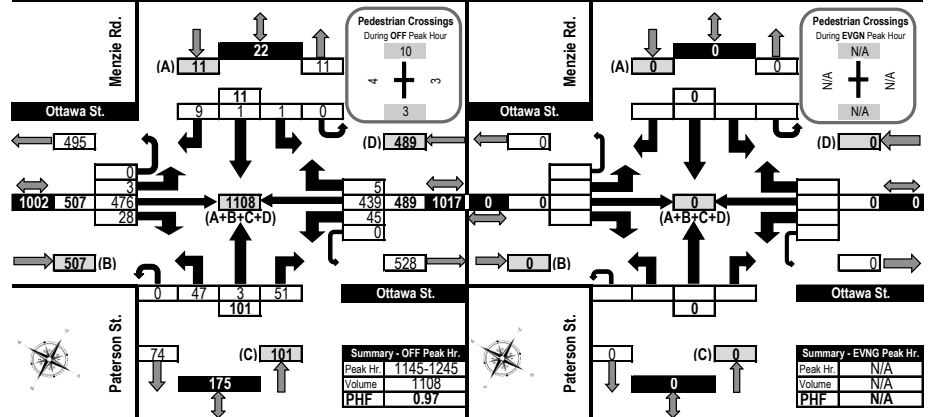
Turning Movement Count
Summary, OFF and EVENING Peak Hour
Flow Diagrams
All Vehicles Except Bicycles



Ottawa Street & Menzie Road/Paterson Street **Almonte, ON**

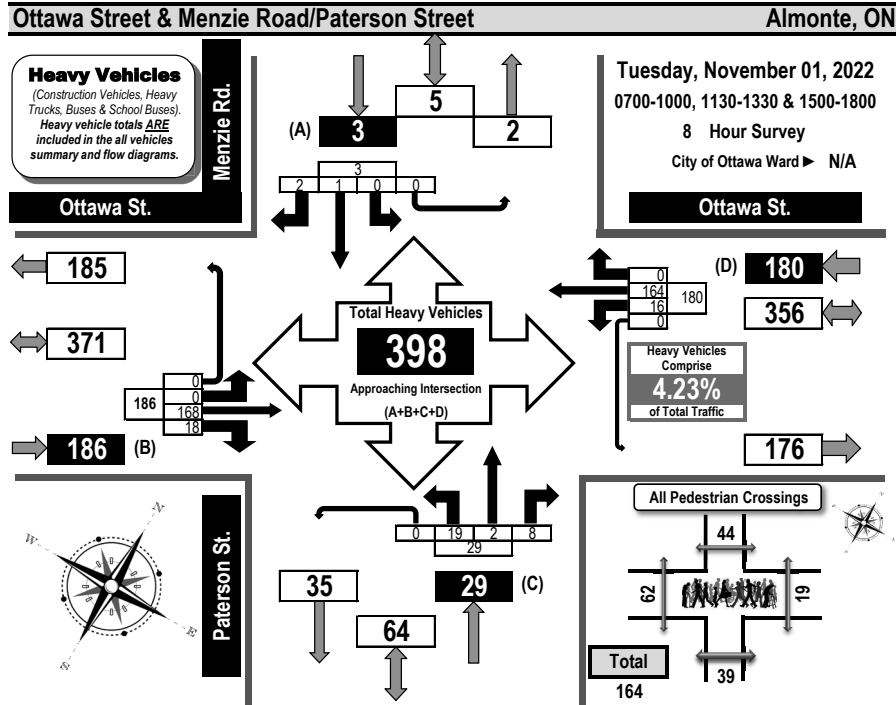


Off Peak Hour Flow Diagram **Evening Peak Hour Flow Diagram**





Turning Movement Count Heavy Vehicle Summary (FHWA Class 4-13) Flow Diagram

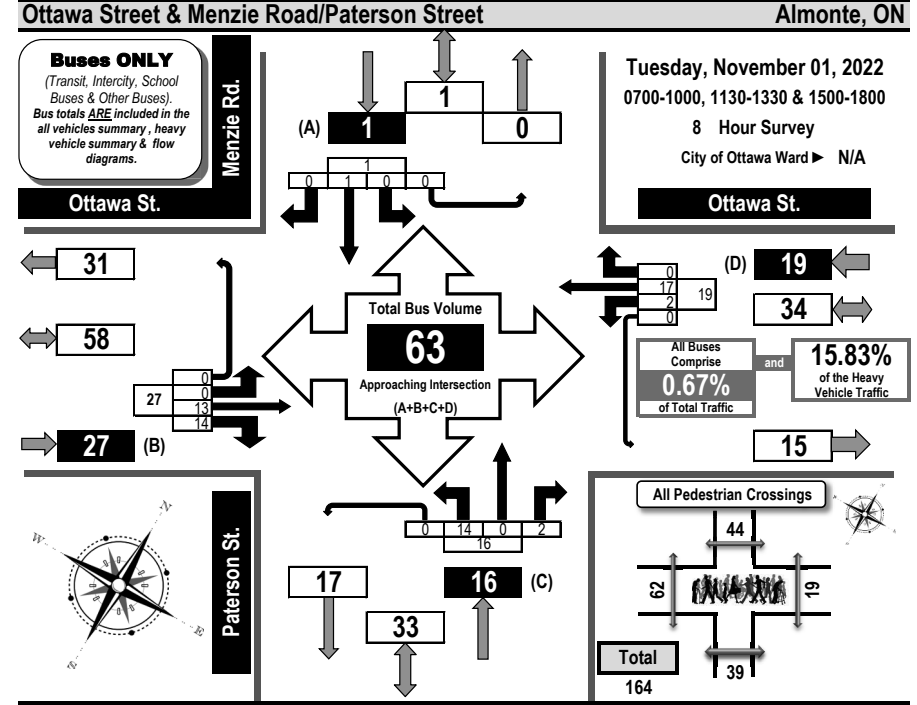


Time Period	Ottawa St. Eastbound				Ottawa St. Westbound				Paterson St. Northbound				Menzie Rd. Southbound				SB Tot	GR Tot	
	LT	ST	RT	UT	LT	ST	RT	UT	LT	ST	RT	UT	LT	ST	RT	UT			
0700-0800	0	28	2	0	30	3	23	0	26	3	0	0	3	0	0	1	0	1	60
0800-0900	0	30	2	0	32	5	20	0	25	2	0	1	3	0	1	0	0	1	61
0900-1000	0	24	6	0	30	2	27	0	29	6	0	3	9	0	0	0	0	0	68
1130-1230	0	16	0	0	16	2	21	0	23	1	0	2	3	0	0	0	0	0	42
1230-1330	0	25	0	0	25	1	22	0	23	0	0	1	1	0	0	0	0	0	49
1500-1600	0	24	8	0	32	2	22	0	24	7	2	0	9	0	0	0	0	0	65
1600-1700	0	15	0	0	15	1	23	0	24	0	0	1	1	0	0	0	0	0	40
1700-1800	0	6	0	0	6	0	6	0	6	0	0	0	0	0	0	1	0	1	13
Totals	0	168	18	0	186	16	164	0	180	19	2	8	29	0	1	2	0	3	398

Comments:
School buses comprise 15.83% of the heavy vehicle traffic. A crossing guard assisted pedestrians crossing Ottawa Street and Paterson Street before and after school.



Turning Movement Count All Buses Summary (FHWA Class 4 ONLY) Flow Diagram

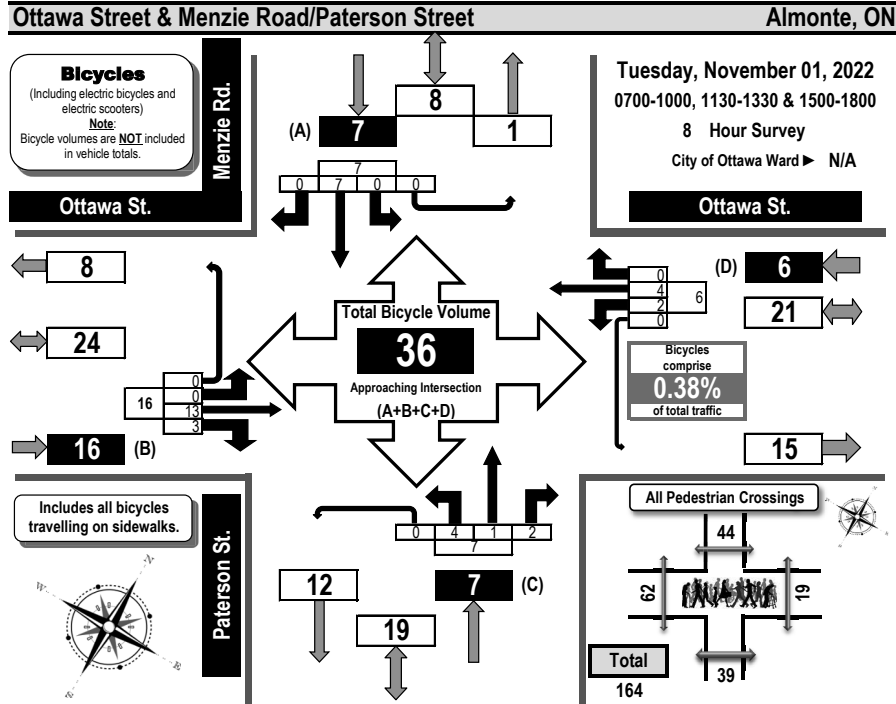


Time Period	Ottawa St. Eastbound				Ottawa St. Westbound				Paterson St. Northbound				Menzie Rd. Southbound				SB Tot	GR Tot	
	LT	ST	RT	UT	LT	ST	RT	UT	LT	ST	RT	UT	LT	ST	RT	UT			
0700-0800	0	4	1	0	5	0	2	0	2	1	0	0	1	0	0	0	0	0	8
0800-0900	0	3	2	0	5	0	1	0	1	0	0	0	0	0	1	0	0	1	7
0900-1000	0	2	5	0	7	1	5	0	6	6	0	2	8	0	0	0	0	0	21
1130-1230	0	1	0	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	2
1230-1330	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
1500-1600	0	2	6	0	8	1	3	0	4	7	0	0	7	0	0	0	0	0	19
1600-1700	0	0	0	0	0	0	5	0	5	0	0	0	0	0	0	0	0	0	5
1700-1800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	0	13	14	0	27	2	17	0	19	14	0	2	16	0	1	0	0	1	63

Comments:
School buses comprise 15.83% of the heavy vehicle traffic. A crossing guard assisted pedestrians crossing Ottawa Street and Paterson Street before and after school.



Turning Movement Count Bicycle Summary Flow Diagram

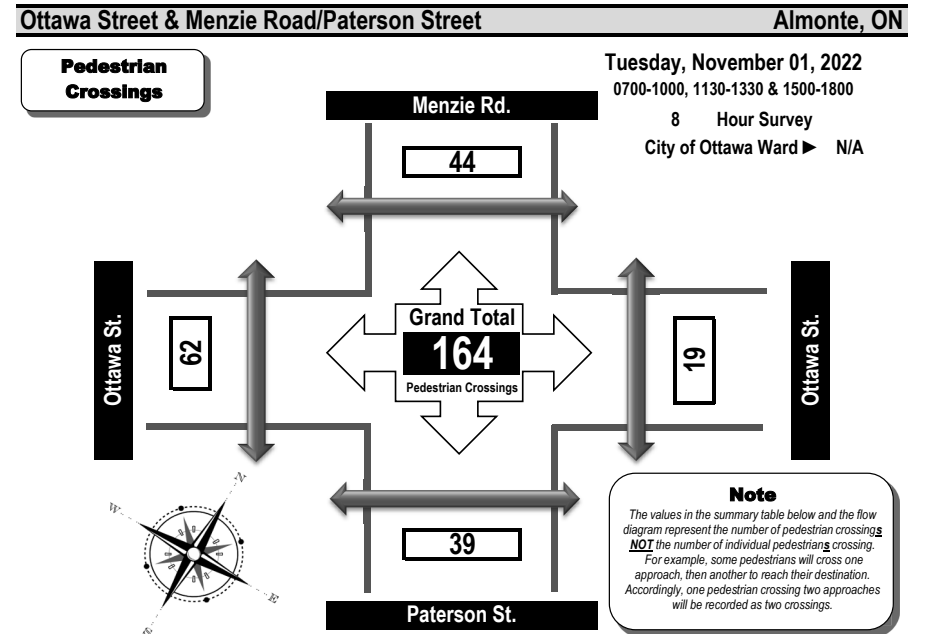


Time Period	Ottawa St. Eastbound				Ottawa St. Westbound				Paterson St. Northbound				Menzie Rd. Southbound				GR Tot		
	LT	ST	RT	UT	LT	ST	RT	UT	LT	ST	RT	UT	LT	ST	RT	UT			
	EB Tot				WB Tot				NB Tot				SB Tot						
0700-0800	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
0800-0900	0	2	0	0	2	0	0	0	0	0	1	0	0	0	1	0	0	0	3
0900-1000	0	1	1	0	2	0	2	0	0	2	0	0	0	0	0	2	0	0	6
1130-1230	0	2	0	0	2	0	1	0	0	1	0	0	0	0	0	0	0	0	3
1230-1330	0	3	1	0	4	0	0	0	0	0	1	0	0	0	1	0	0	0	5
1500-1600	0	2	1	0	3	0	0	0	0	0	1	1	0	0	2	0	1	0	6
1600-1700	0	2	0	0	2	2	1	0	0	3	0	0	2	0	2	0	2	0	9
1700-1800	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	2	0	3
Totals	0	13	3	0	16	2	4	0	0	6	4	1	2	0	7	0	7	0	36

Comments:
School buses comprise 15.83% of the heavy vehicle traffic. A crossing guard assisted pedestrians crossing Ottawa Street and Paterson Street before and after school.



Turning Movement Count Pedestrian Crossings Summary and Flow Diagram



Time Period	West Side Crossing				Street Total	East Side Crossing				Street Total	Grand Total
	Ottawa St.					Menzie Rd.					
0700-0800	3	1	0	0	4	3	0	0	0	6	10
0800-0900	3	0	0	0	3	2	0	0	0	8	11
0900-1000	10	2	0	0	12	1	0	0	0	5	17
1130-1230	9	4	0	0	13	5	0	0	0	17	30
1230-1330	4	3	0	0	7	3	0	0	0	7	14
1500-1600	28	4	0	0	32	12	0	0	0	14	46
1600-1700	2	1	0	0	3	7	0	0	0	13	16
1700-1800	3	4	0	0	7	6	0	0	0	13	20
Totals	62	19	0	0	81	39	0	0	0	83	164

Comments:
School buses comprise 15.83% of the heavy vehicle traffic. A crossing guard assisted pedestrians crossing Ottawa Street and Paterson Street before and after school.

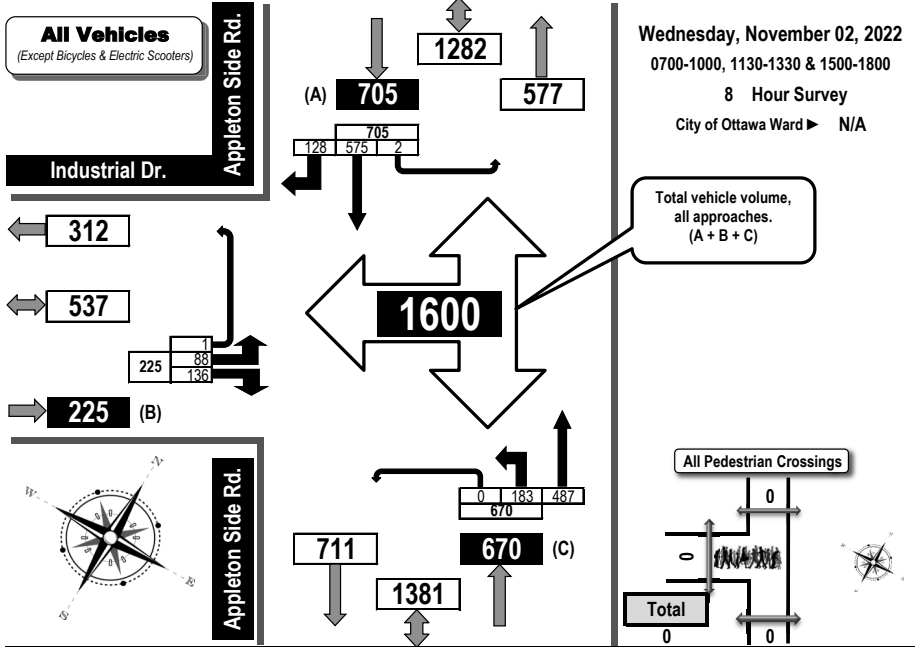


Turning Movement Count Summary, AM and PM Peak Hour Flow Diagrams

All Vehicles Except Bicycles

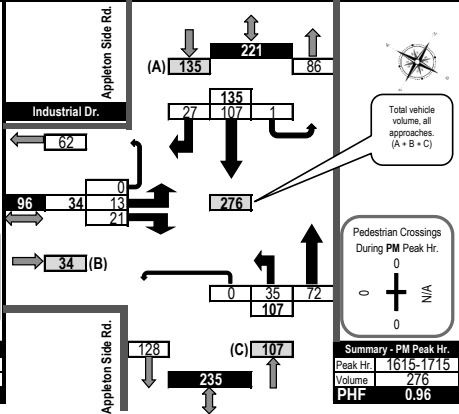
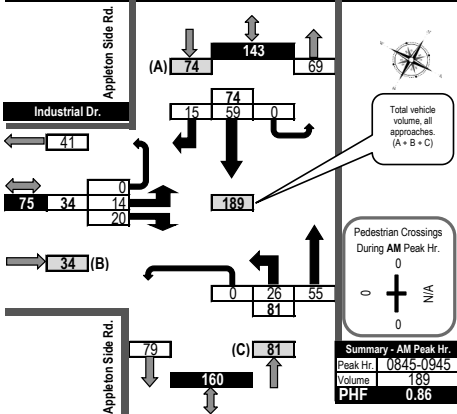


Appleton Side Road & Industrial Drive Almonte, ON



AM Peak Hour Flow Diagram

PM Peak Hour Flow Diagram

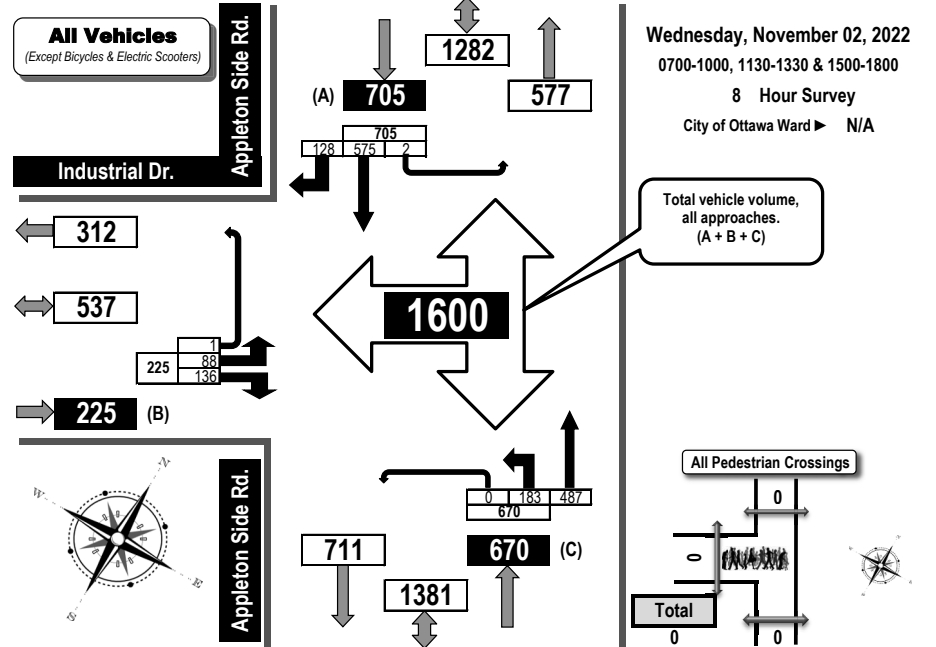


Turning Movement Count Summary, OFF and EVGN Peak Hour Flow Diagrams

All Vehicles Except Bicycles

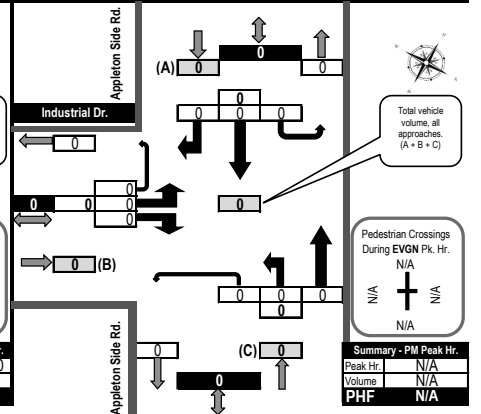
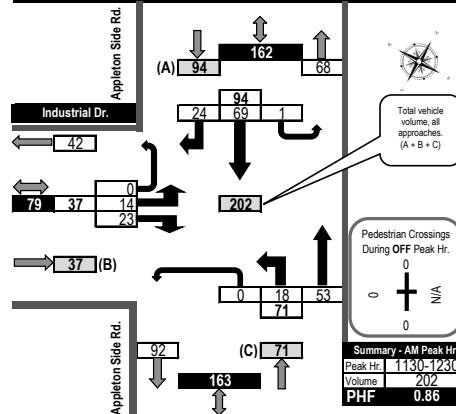


Appleton Side Road & Industrial Drive Almonte, ON



OFF Peak Hour Flow Diagram

EVENING Peak Hour Flow Diagram





Turning Movement Count Summary Report Including Peak Hours, AADT and Expansion Factors All Vehicles Except Bicycles



Appleton Side Road & Industrial Drive Almonte, ON

Survey Date: Wednesday, November 02, 2022 **Start Time:** 0700 **AADT Factor:** 0.9
Weather AM: Sunny 5° C **Survey Duration:** 8 Hrs. **Survey Hours:** 0700-1000, 1130-1330 & 1500-1800
Weather PM: Sunny 15° C **Surveyor(s):** J. Mousseau

Time Period	Industrial Dr.					N/A					Appleton Side Rd.					Appleton Side Rd.					Grand Total				
	Eastbound					Westbound					Northbound					Southbound									
	LT	ST	RT	UT	E/B Tot	LT	ST	RT	UT	W/B Tot	LT	ST	RT	UT	N/B Tot	LT	ST	RT	UT	S/B Tot		Street Total	Street Total		
0700-0800	5	12	1	18							18	13	45	0	58					64	9	0	73	131	149
0800-0900	8	15	0	23							23	27	53	0	80					58	19	0	77	157	180
0900-1000	10	15	0	25							25	22	49	0	71					61	8	0	69	140	165
1130-1230	14	23	0	37							37	18	53	0	71					69	24	1	94	165	202
1230-1330	18	6	0	24							24	17	68	0	85					65	18	0	83	168	192
1500-1600	9	26	0	35							35	30	82	0	112					85	15	0	100	212	247
1600-1700	11	19	0	30							30	30	71	0	101					106	26	0	132	233	263
1700-1800	13	20	0	33							33	26	66	0	92					67	9	1	77	169	202
Totals	88	136	1	225							225	183	487	0	670					575	128	2	705	1375	1600

Equivalent 12 & 24-hour Vehicle Volumes Including the Annual Average Daily Traffic (AADT) Factor
Applicable to the Day and Month of the Turning Movement Count
Expansion factors are applied exclusively to standard weekday 8-hour turning movement counts
conducted during the hours of 0700h - 1000h, 1130h - 1330h and 1500h - 1800h

Equivalent 12-hour vehicle volumes. These volumes are calculated by multiplying the 8-hour totals by the 8 → 12 expansion factor of 1.39																								
Equ. 12 Hr	122	0	189	1	313	0	0	0	0	0	313	254	677	0	0	931	0	799	178	3	980	1911	2224	

Average daily 12-hour vehicle volumes. These volumes are calculated by multiplying the equivalent 12-hour totals by the AADT factor of: 0.9																								
AADT 12-hr	110	0	170	1	281	0	0	0	0	0	281	229	609	0	0	838	0	719	160	3	882	1720	2002	

24-Hour AADT. These volumes are calculated by multiplying the average daily 12-hour vehicle volumes by the 12 → 24 expansion factor of 1.31																								
AADT 24 Hr	144	0	223	2	369	0	0	0	0	0	369	300	798	0	0	1098	0	942	210	3	1155	2253	2622	

AADT and expansion factors provided by the City of Ottawa

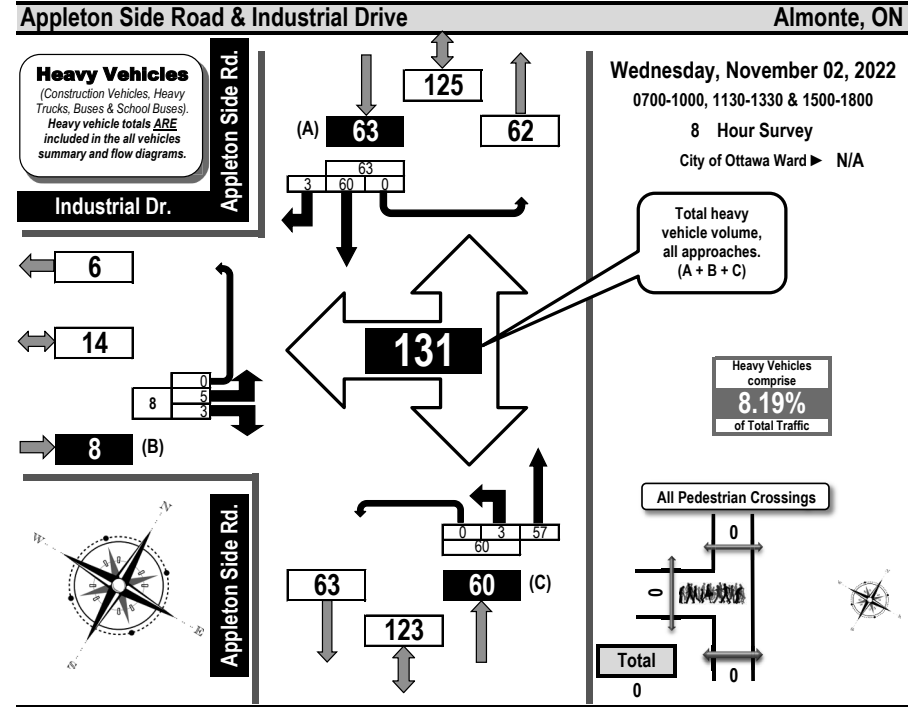
AM Peak Hour Factor → 0.86					Highest Hourly Vehicle Volume Between 0700h & 1000h																				
AM Peak Hr	LT	ST	RT	UT	Total	Str. Tot.	LT	ST	RT	UT	Total	Str. Tot.	LT	ST	RT	UT	Total	Str. Tot.	LT	ST	RT	UT	Total	Str. Tot.	Gr. Tot.
0845-0945	14	0	20	0	34	0	0	0	0	0	34	26	55	0	0	81	0	59	15	0	74	155	189		
OFF Peak Hour Factor → 0.81					Highest Hourly Vehicle Volume Between 1130h & 1330h																				
OFF Peak Hr	LT	ST	RT	UT	Total	Str. Tot.	LT	ST	RT	UT	Total	Str. Tot.	LT	ST	RT	UT	Total	Str. Tot.	LT	ST	RT	UT	Total	Str. Tot.	Gr. Tot.
1130-1230	14	0	23	0	37	0	0	0	0	0	37	18	53	0	0	71	0	69	24	1	94	165	202		
PM Peak Hour Factor → 0.96					Highest Hourly Vehicle Volume Between 1500h & 1800h																				
PM Peak Hr	LT	ST	RT	UT	Total	Str. Tot.	LT	ST	RT	UT	Total	Str. Tot.	LT	ST	RT	UT	Total	Str. Tot.	LT	ST	RT	UT	Total	Str. Tot.	Gr. Tot.
1615-1715	13	0	21	0	34	0	0	0	0	0	34	35	72	0	0	107	0	107	27	1	135	242	276		

Comments:
 School buses comprise 7.63% of the heavy vehicle traffic.

- Notes:**
1. Includes all vehicle types except bicycles, electric bicycles, and electric scooters.
 2. When expansion and AADT factors are applied, the results will differ slightly due to rounding.



Turning Movement Count Heavy Vehicle Summary (FHWA Class 4 to 13) Flow Diagram

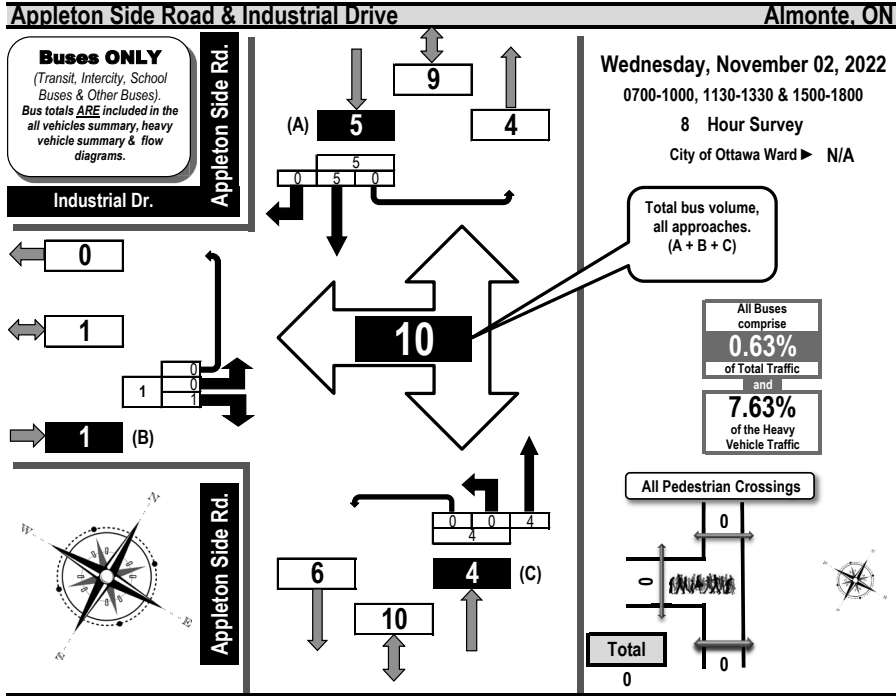


Time Period	Industrial Dr.					N/A					Appleton Side Rd.					Appleton Side Rd.					
	Eastbound					Westbound					Northbound					Southbound					
	LT	ST	RT	UT	EB Tot	LT	ST	RT	UT	WB Tot	LT	ST	RT	UT	NB Tot	LT	ST	RT	UT	SB Tot	gr Tot
0700-0800	1		1	0	2						0	8		0	8		5	0	0	5	15
0800-0900	0		1	0	1						0	5		0	5		6	1	0	7	13
0900-1000	3		0	0	3						1	5		0	6		6	0	0	6	15
1130-1230	0		0	0	0						0	7		0	7		8	0	0	8	15
1230-1330	1		0	0	1						1	11		0	12		9	0	0	9	22
1500-1600	0		0	0	0						0	14		0	14		9	0	0	9	23
1600-1700	0		1	0	1						1	5		0	6		13	1	0	14	21
1700-1800	0		0	0	0						0	2		0	2		4	1	0	5	7
Totals	5		3	0	8						3	57		0	60		60	3	0	63	131

Comments:
 School buses comprise 7.63% of the heavy vehicle traffic.



Turning Movement Count All Buses Summary (FHWA Class 4 ONLY) Flow Diagram

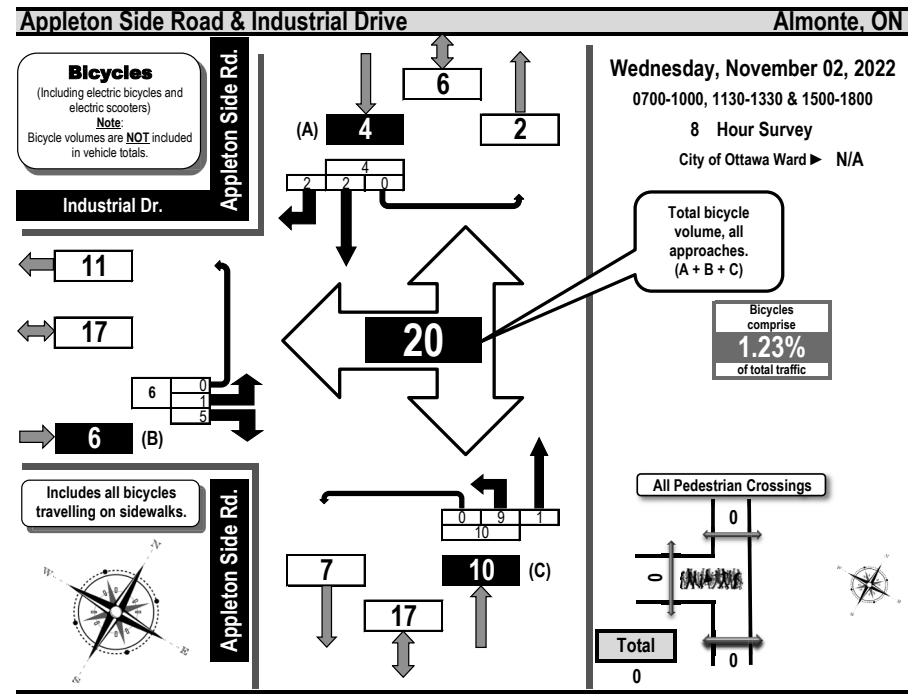


Time Period	Industrial Dr.				N/A				Appleton Side Rd.				Appleton Side Rd.									
	Eastbound		Westbound		Northbound		Southbound		Eastbound		Westbound		Northbound		Southbound							
	LT	ST	RT	UT	LT	ST	RT	UT	LT	ST	RT	UT	LT	ST	RT	UT						
0700-0800	0		1	0	1										1	0	0	1	0	0	1	2
0800-0900	0		0	0	0						0	1			1	0	0	0	0	1	1	2
0900-1000	0		0	0	0						0	0			0	0	0	0	0	0	0	0
1130-1230	0		0	0	0						0	0			0	0	0	0	0	0	0	0
1230-1330	0		0	0	0						0	1			0	0	0	0	0	0	1	1
1500-1600	0		0	0	0						0	0			1	0	0	0	0	1	1	1
1600-1700	0		0	0	0						0	2			2	0	0	2	0	2	4	4
1700-1800	0		0	0	0						0	0			0	0	0	0	0	0	0	0
Totals	0		1	0	1						0	4			5	0	0	5	0	5	10	10

Comments:
School buses comprise 7.63% of the heavy vehicle traffic.



Turning Movement Count Bicycle Summary Flow Diagram



Time Period	Industrial Dr.				N/A				Appleton Side Rd.				Appleton Side Rd.									
	Eastbound		Westbound		Northbound		Southbound		Eastbound		Westbound		Northbound		Southbound							
	LT	ST	RT	UT	LT	ST	RT	UT	LT	ST	RT	UT	LT	ST	RT	UT						
0700-0800	0		0	0	0						0	0			0	0	0	0	0	0	0	0
0800-0900	0		0	0	0						1	0			0	1	0	0	0	0	0	1
0900-1000	0		2	0	2						0	0			0	0	0	0	0	0	0	2
1130-1230	1		1	0	2						2	0			0	1	0	1	0	1	5	5
1230-1330	0		0	0	0						1	0			0	1	2	0	0	2	3	3
1500-1600	0		2	0	2						4	0			4	0	0	0	0	0	6	6
1600-1700	0		0	0	0						1	0			0	1	0	1	0	1	2	2
1700-1800	0		0	0	0						0	1			0	1	0	0	0	0	1	1
Totals	1		5	0	6						9	1			10	0	2	2	0	4	20	20

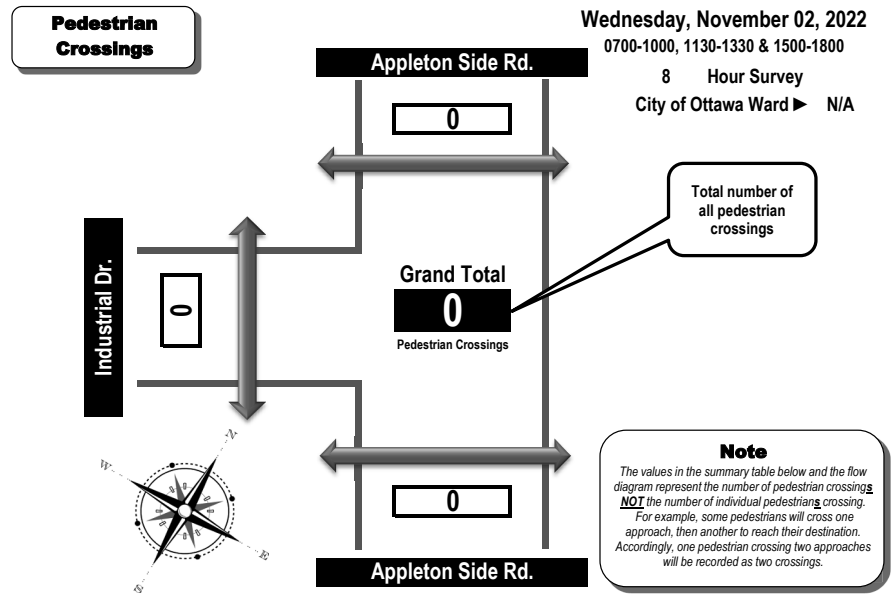
Comments:
School buses comprise 7.63% of the heavy vehicle traffic.



Turning Movement Count Pedestrian Crossings Summary and Flow Diagram



Appleton Side Road & Industrial Drive Almonte, ON



Time Period	West Side Crossing Industrial Dr.	East Side Crossing N/A	Street Total	South Side Crossing Appleton Side Rd.	North Side Crossing Appleton Side Rd.	Street Total	Grand Total
0700-0800	0		0	0	0	0	0
0800-0900	0		0	0	0	0	0
0900-1000	0		0	0	0	0	0
1130-1230	0		0	0	0	0	0
1230-1330	0		0	0	0	0	0
1500-1600	0		0	0	0	0	0
1600-1700	0		0	0	0	0	0
1700-1800	0		0	0	0	0	0
Totals	0		0	0	0	0	0

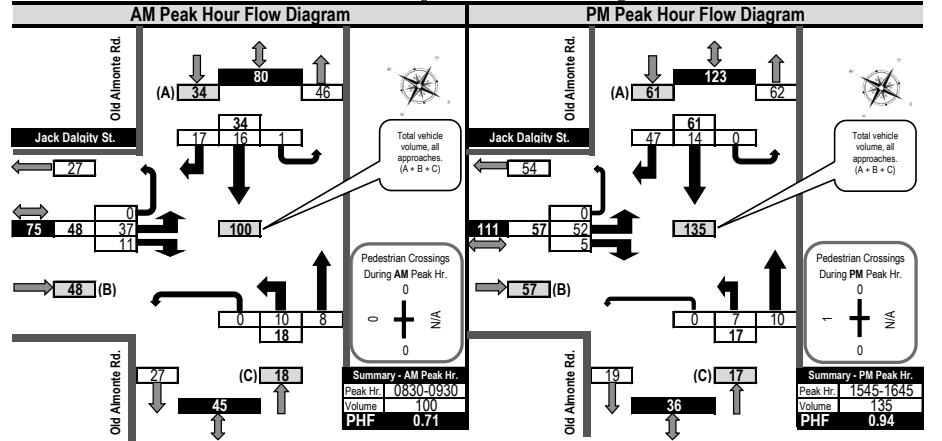
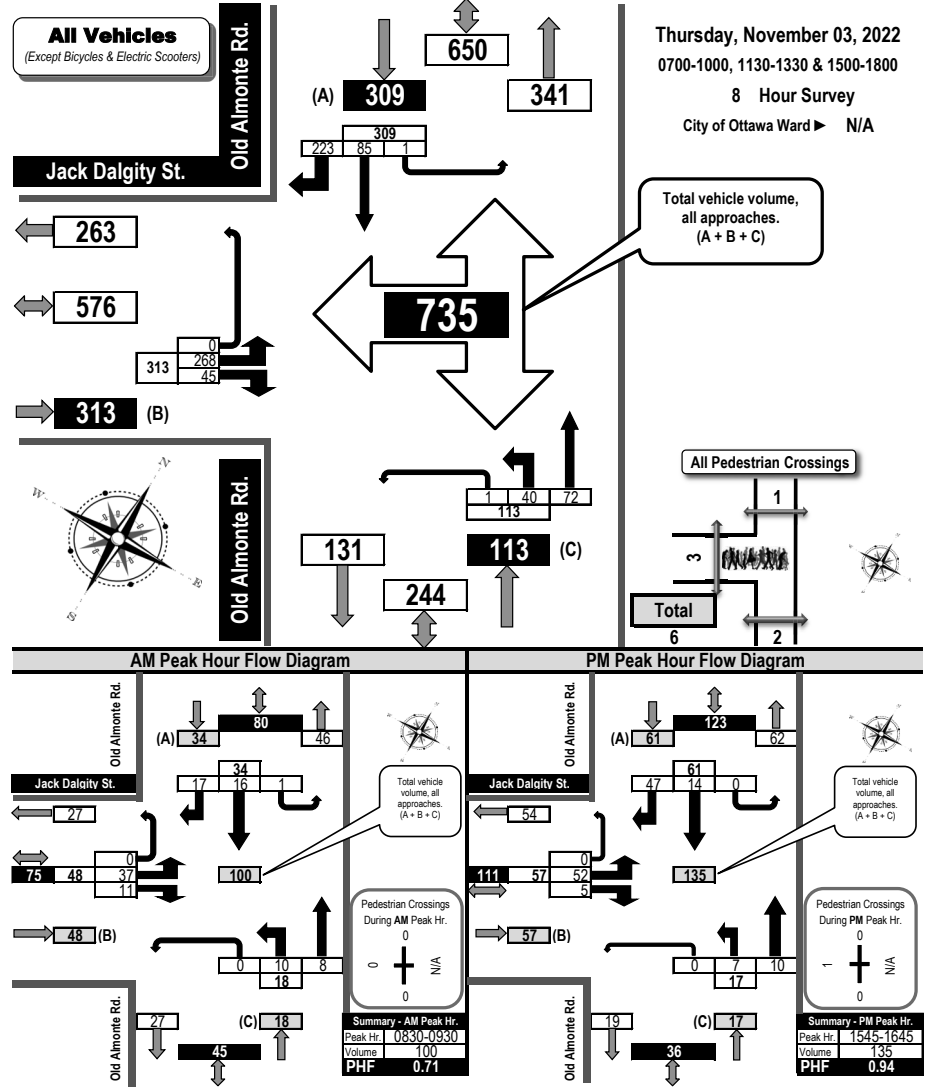
Comments:
School buses comprise 7.63% of the heavy vehicle traffic.



Turning Movement Count Summary, AM and PM Peak Hour Flow Diagrams



Jack Dalgity Street & Old Almonte Road Almonte, ON

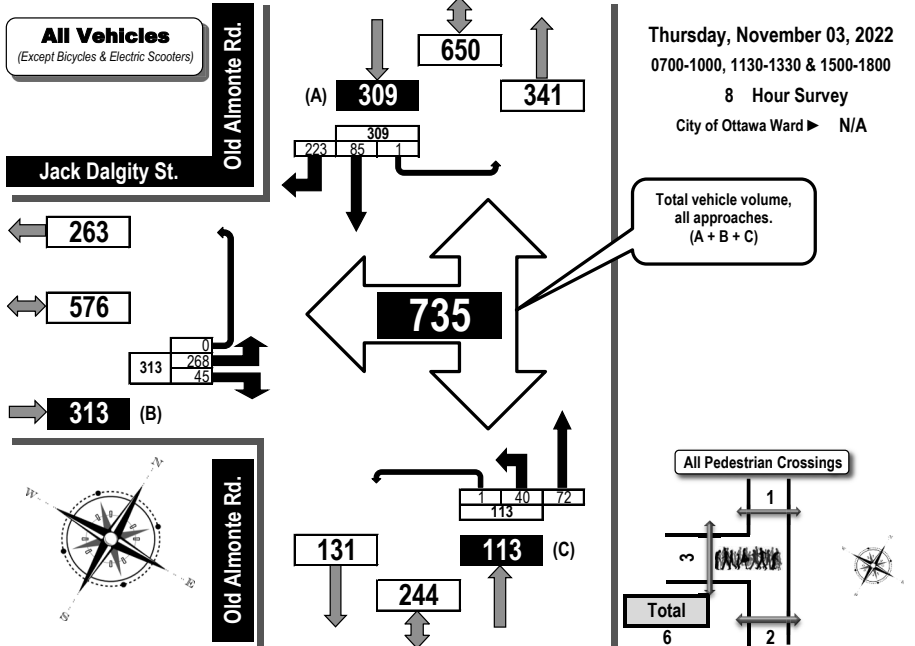




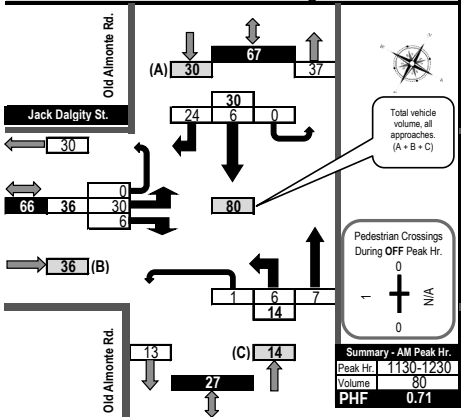
Turning Movement Count Summary, OFF and EVGN Peak Hour Flow Diagrams All Vehicles Except Bicycles



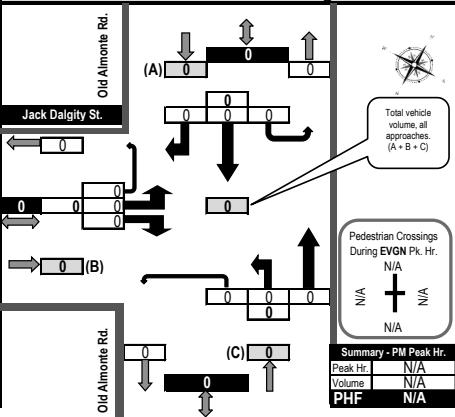
Jack Dalgity Street & Old Almonte Road Almonte, ON



OFF Peak Hour Flow Diagram



EVENING Peak Hour Flow Diagram



Turning Movement Count Summary Report Including Peak Hours, AADT and Expansion Factors All Vehicles Except Bicycles



Jack Dalgity Street & Old Almonte Road Almonte, ON

Survey Date: Thursday, November 03, 2022 Start Time: 0700 AADT Factor: 0.9
Weather AM: Clear & Sunny +1°C Survey Duration: 8 Hrs. Survey Hours: 0700-1000, 1130-1330 & 1500-1800
Weather PM: Mainly Clear 17°C Surveyor(s): J. Mousseau

Time Period	Jack Dalgity St.					N/A					Old Almonte Rd.				Old Almonte Rd.				Street Total	Grand Total
	Eastbound		Westbound			Northbound		Southbound		S/B Tot	Street Total	Grand Total								
	LT	ST	RT	UT	E/B Tot	W/B Tot	Street Total	LT	ST				RT	UT	N/B Tot					
0700-0800	29		4	0	33					33	3	6	0	9	5	14	0	19	28	61
0800-0900	22		10	0	32					32	9	7	0	16	9	16	0	25	41	73
0900-1000	45		6	0	51					51	4	8	0	12	12	18	1	31	43	94
1130-1230	30		6	0	36					36	6	7	1	14	6	24	0	30	44	80
1230-1330	30		4	0	34					34	0	9	0	9	9	23	0	32	41	75
1500-1600	38		5	0	43					43	3	16	0	19	18	40	0	58	77	120
1600-1700	45		6	0	51					51	9	11	0	20	12	51	0	63	83	134
1700-1800	29		4	0	33					33	6	8	0	14	14	37	0	51	65	98
Totals	268		45	0	313					313	40	72	1	113	85	223	1	309	422	735

Equivalent 12 & 24-hour Vehicle Volumes Including the Annual Average Daily Traffic (AADT) Factor
Applicable to the Day and Month of the Turning Movement Count
Expansion factors are applied exclusively to standard weekday 8-hour turning movement counts
conducted during the hours of 0700h - 1000h, 1130h - 1330h and 1500h - 1800h

Equivalent 12-hour vehicle volumes. These volumes are calculated by multiplying the 8-hour totals by the 8 → 12 expansion factor of 1.39																							
Equ. 12 Hr	373	0	63	0	435	0	0	0	0	0	435	56	100	0	1	157	0	118	310	1	430	587	1022
Average daily 12-hour vehicle volumes. These volumes are calculated by multiplying the equivalent 12-hour totals by the AADT factor of: 0.9																							
AADT 12-hr	335	0	56	0	392	0	0	0	0	0	392	50	90	0	1	141	0	106	279	1	387	528	919
24-Hour AADT. These volumes are calculated by multiplying the average daily 12-hour vehicle volumes by the 12 → 24 expansion factor of 1.31																							
AADT 24 Hr	439	0	74	0	513	0	0	0	0	0	513	66	118	0	2	185	0	139	365	2	506	692	1205

AADT and expansion factors provided by the City of Ottawa

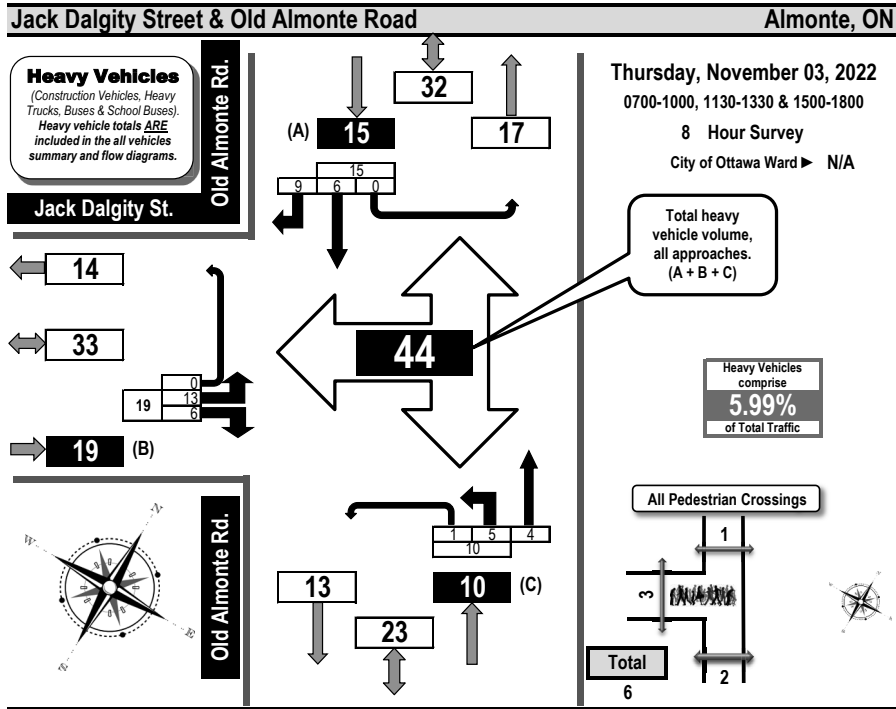
AM Peak Hour Factor	0.71					Highest Hourly Vehicle Volume Between 0700h & 1000h																
AM Peak Hr	LT	ST	RT	UT	Total	LT	ST	RT	UT	Total	LT	ST	RT	UT	Total	LT	ST	RT	UT	Total	Str. Tot.	Gr. Tot.
0830-0930	37	0	11	0	48	0	0	0	0	0	48	10	8	0	18	0	16	17	1	34	52	100
OFF Peak Hour Factor	0.83					Highest Hourly Vehicle Volume Between 1130h & 1330h																
OFF Peak Hr	LT	ST	RT	UT	Total	LT	ST	RT	UT	Total	LT	ST	RT	UT	Total	LT	ST	RT	UT	Total	Str. Tot.	Gr. Tot.
1130-1230	30	0	6	0	36	0	0	0	0	0	36	6	7	0	14	0	6	24	0	30	44	80
PM Peak Hour Factor	0.94					Highest Hourly Vehicle Volume Between 1500h & 1800h																
PM Peak Hr	LT	ST	RT	UT	Total	LT	ST	RT	UT	Total	LT	ST	RT	UT	Total	LT	ST	RT	UT	Total	Str. Tot.	Gr. Tot.
1545-1645	52	0	5	0	57	0	0	0	0	0	57	7	10	0	17	0	14	47	0	61	78	135

Comments:
School buses comprise 15.91% of the heavy vehicle traffic. There were 10 construction related heavy vehicles.

Notes:
1. Includes all vehicle types except bicycles, electric bicycles, and electric scooters.
2. When expansion and AADT factors are applied, the results will differ slightly due to rounding.



Turning Movement Count Heavy Vehicle Summary (FHWA Class 4 to 13) Flow Diagram

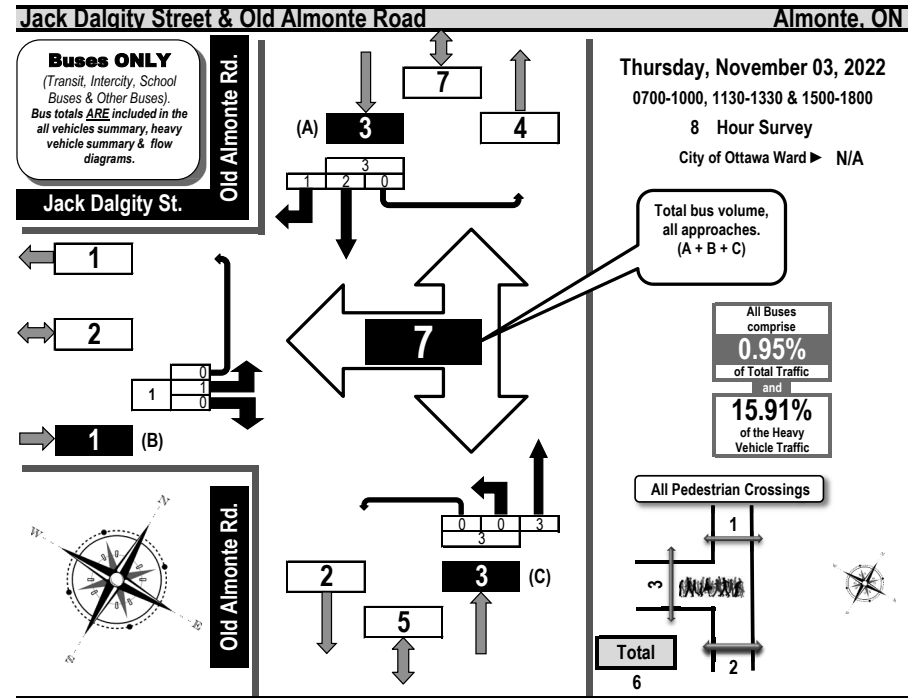


Time Period	Jack Dalgity St.				N/A				Old Almonte Rd.				Old Almonte Rd.				GR Tot							
	Eastbound		Westbound		Northbound		Southbound		Eastbound		Westbound		Northbound		Southbound									
	LT	ST	RT	UT	EB Tot	LT	ST	RT	UT	WB Tot	LT	ST	RT	UT	NB Tot	LT		ST	RT	UT	SB Tot			
0700-0800	2		0	0	2										1	1		0	2	2	1	0	3	7
0800-0900	2		0	0	2										0	0		0	0	0	1	0	1	3
0900-1000	1		5	0	6										0	3	1	1	0	2	1	0	2	11
1130-1230	2		0	0	2										1	0		1	2	0	2	0	2	6
1230-1330	1		0	0	1										0	0		0	0	0	1	0	1	2
1500-1600	0		1	0	1										0	2		0	2	1	1	0	2	5
1600-1700	5		0	0	5										0	0		0	0	1	2	0	3	8
1700-1800	0		0	0	0										0	1		0	1	1	0	0	1	2
Totals	13		6	0	19									5	4		1	10	6	9	0	15	44	

Comments:
School buses comprise 15.91% of the heavy vehicle traffic. There were 10 construction related heavy vehicles.



Turning Movement Count All Buses Summary (FHWA Class 4 ONLY) Flow Diagram

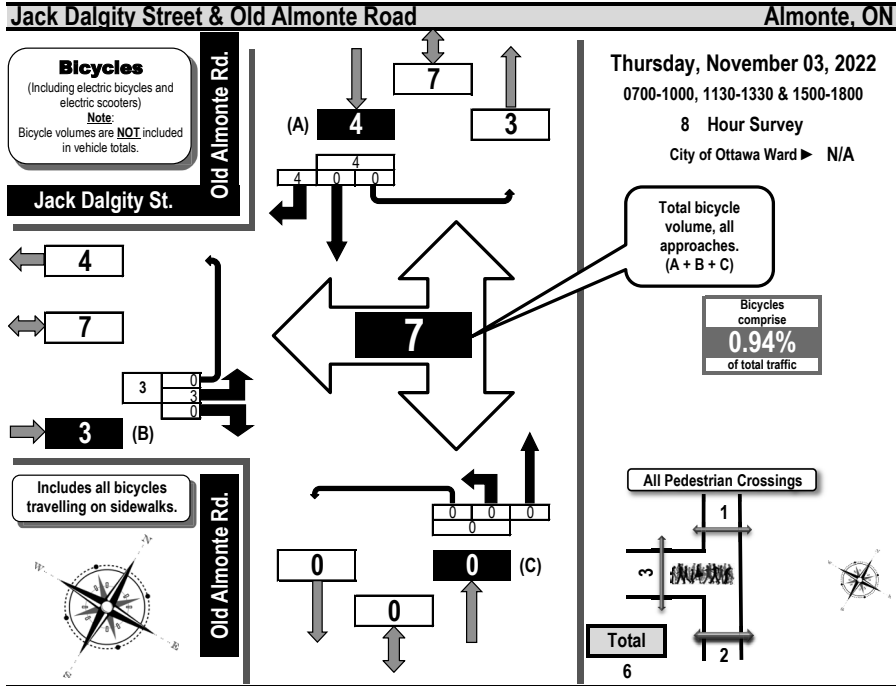


Time Period	Jack Dalgity St.				N/A				Old Almonte Rd.				Old Almonte Rd.				GR Tot							
	Eastbound		Westbound		Northbound		Southbound		Eastbound		Westbound		Northbound		Southbound									
	LT	ST	RT	UT	EB Tot	LT	ST	RT	UT	WB Tot	LT	ST	RT	UT	NB Tot	LT		ST	RT	UT	SB Tot			
0700-0800	0		0	0	0										0	1		0	1	1	0	0	1	2
0800-0900	0		0	0	0										0	0		0	0	0	0	0	0	0
0900-1000	1		0	0	1										0	0		0	0	1	0	0	1	2
1130-1230	0		0	0	0										0	0		0	0	0	0	0	0	0
1230-1330	0		0	0	0										0	0		0	0	0	0	0	0	0
1500-1600	0		0	0	0										0	2		0	2	0	1	0	1	3
1600-1700	0		0	0	0										0	0		0	0	0	0	0	0	0
1700-1800	0		0	0	0										0	0		0	0	0	0	0	0	0
Totals	1		0	0	1									0	3		0	3	2	1	0	3	7	

Comments:
School buses comprise 15.91% of the heavy vehicle traffic. There were 10 construction related heavy vehicles.



Turning Movement Count Bicycle Summary Flow Diagram

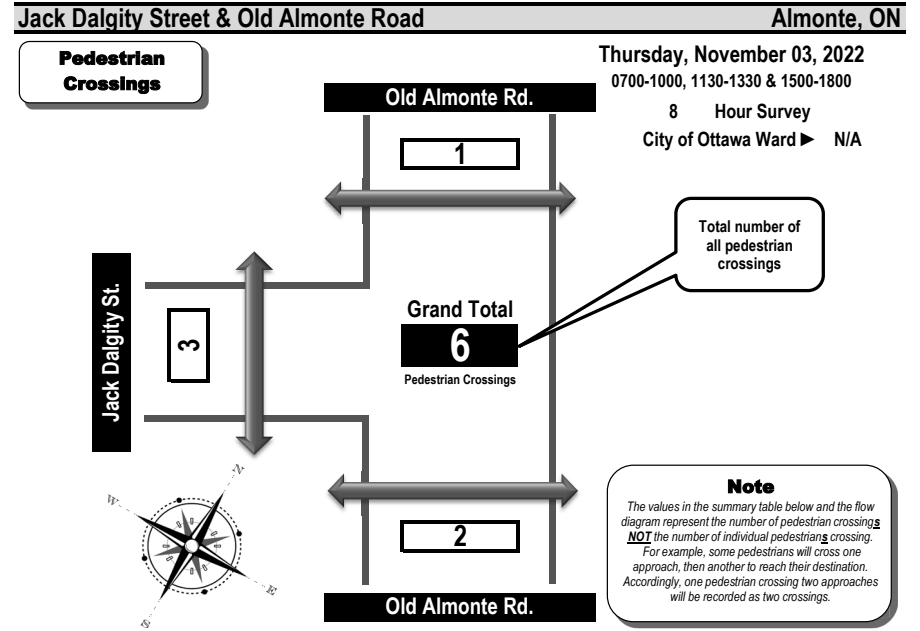


Time Period	Jack Dalgity St.				N/A				Old Almonte Rd.				Old Almonte Rd.				GR Tot				
	Eastbound				Westbound				Northbound				Southbound								
	LT	ST	RT	UT	LT	ST	RT	UT	LT	ST	RT	UT	LT	ST	RT	UT					
0700-0800	1		0	0	1				0	0	0	0	0	0	0	0	0	0	0	0	1
0800-0900	1		0	0	1				0	0	0	0	0	0	0	0	0	0	0	0	1
0900-1000	0		0	0	0				0	0	0	0	0	0	0	0	0	0	0	0	0
1130-1230	0		0	0	0				0	0	0	0	0	0	0	0	0	0	0	0	0
1230-1330	0		0	0	0				0	0	0	0	0	0	0	0	0	0	0	0	0
1500-1600	1		0	0	1				0	0	0	0	0	0	0	0	0	0	0	0	1
1600-1700	0		0	0	0				0	0	0	0	0	3	0	0	0	3	0	0	3
1700-1800	0		0	0	0				0	0	0	0	0	1	0	0	0	1	0	0	1
Totals	3		0	0	3				0	0	0	0	0	4	0	0	0	4	0	7	

Comments:
School buses comprise 15.91% of the heavy vehicle traffic. There were 10 construction related heavy vehicles.



Turning Movement Count Pedestrian Crossings Summary and Flow Diagram



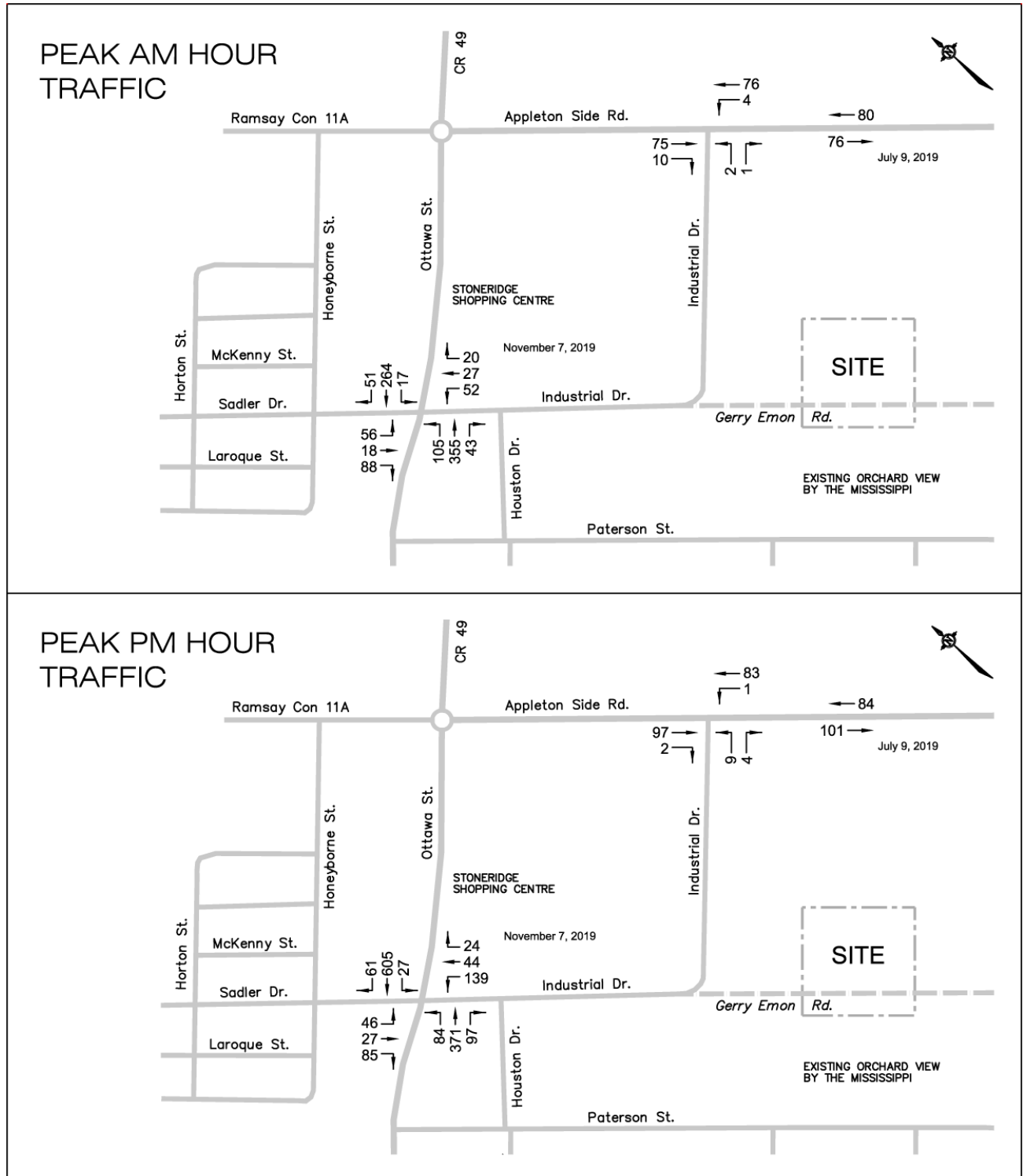
Time Period	West Side Crossing Jack Dalgity St.	East Side Crossing N/A	Street Total	South Side Crossing Old Almonte Rd.	North Side Crossing Old Almonte Rd.	Street Total	Grand Total
0700-0800	1		1	1	0	1	2
0800-0900	0		0	0	0	0	0
0900-1000	0		0	0	0	0	0
1130-1230	1		1	1	0	1	2
1230-1330	0		0	0	0	0	0
1500-1600	1		1	0	0	0	1
1600-1700	0		0	0	1	1	1
1700-1800	0		0	0	0	0	0
Totals	3		3	2	1	3	6

Comments:
School buses comprise 15.91% of the heavy vehicle traffic. There were 10 construction related heavy vehicles.

ROAD NAME	FROM:	TO:	AADT	SPEED	MAINTENANCE CLASS	LOWER TIER MUNICIPALITY
16-South Lavant Road	PIN #2264 (Poland)	Hwy 511 (Co Rd 511)	350	80	4	Lanark Highlands
16-Wolf Grove Road	Hwy 511 (Co Rd 511)	Hopetown Hamlet Limit (60 Max Sign)	1100	60	4	Lanark Highlands
16-Wolf Grove Road	Hopetown Hamlet Limit (60 Max Sign)	PIN #4248 (Middleville)	1100	80	3	Lanark Highlands
16-Wolf Grove Road	PIN #4248 (Middleville)	Co Rd 8 (6th Con C Lanark)	1100	60	4	Lanark Highlands
16-Wolf Grove Road	Co Rd 8 (6th Con C Lanark)	PIN #4132 East Ent (Middleville)	1400	60	4	Lanark Highlands
16-Wolf Grove Road	PIN #4132 East Ent (Middleville)	Ramsay Con 1	1400	80	3	Lanark Highlands
16-Wolf Grove Road	Ramsay Con 1	Tatlock Road	1400	80	3	Mississippi Mills
16-Wolf Grove Road	Tatlock Road	Civitan Hall Ent (Almonte)	3000	80	3	Mississippi Mills
16-Almonte Street	Civitan Hall Ent (Almonte)	Christian Street (Co Rd 29)	3200	60	3	Mississippi Mills
16A-Perth Street	Christian Street (Co Rd 29)	Bridge Street	4500	50	3	Mississippi Mills
16A-Bridge Street	Perth Street	Centre of Maclan Bridge	4500	50	3	Mississippi Mills
16A-Queen Street	Centre of Maclan Bridge	Martin Street South	8000	50	3	Mississippi Mills
16A-Martin Street South	Queen Street	Ottawa Street	8000	50	3	Mississippi Mills
17-Derry Side Road	Richmond Road (Co Rd 10)	9th Line Beckwith	650	80	4	Beckwith
17-Cemetery Side Road	9th Line Beckwith	Hwy. #7	1200	50/70	3	Beckwith
17-Appleton Side Road	Hwy. #7	River Road (Co Rd 11)	800	80	4	Beckwith/ Mississippi Mills
17-Appleton Side Road	River Road (Co Rd 11)	March Road (Co Rd 49)	1100	80	3	Mississippi Mills
17-Martin Street North	Ottawa Street	Brookdale Street	2200	50/40	4	Mississippi Mills
17-Martin Street North	Brookdale Street	Railway Crossing	1100	80	3	Mississippi Mills
17-Martin Street North	Railway Crossing	PIN #6466 (Blakeney)	1100	80	3	Mississippi Mills
17-Martin Street North	PIN #6466 (Blakeney)	Blakeney Road (Co Rd 17)	1100	60	4	Mississippi Mills
17-Blakeney Road	Blakeney Road (Co Rd 17)	Ridge Road	650	60	4	Mississippi Mills
17-Blakeney Road	Ridge Road	Panmure Road	650	80	4	Mississippi Mills
17-Panmure Road	Blakeney Road (South)	Blakeney Road (North)	300	80	4	Mississippi Mills
17-Blakeney Road	Panmure Road	Kinburn Sideroad (Co Rd 20)	300	80/60	4	Mississippi Mills
18-Port Elmsley Road	Rideau Ferry Road (Co Rd 1)	PIN #310 DNE Township Office	1150	80	3	Drummond North Elmsley
18-Port Elmsley Road	PIN #310 DNE Township Office	Co. Rd. #43	1150	60	4	Drummond North Elmsley
19-Bennett Lake Road	Fallbrook Road (Co Rd 7)	PIN #155 (Fallbrook)	450	50	5	Tay Valley
19-Bennett Lake Road	PIN #155 (Fallbrook)	Osprey Road	450	80	4	Tay Valley
19-Bennett Lake Road	Osprey Road	Start of Gravel	120	80	4	Tay Valley
19-Bennett Lake Road	Start of Gravel	End of Gravel	120	80	4	Tay Valley
19-Bennett Lake Road	End of Gravel	Maberly Elphin Rd. (Co Rd 36)	150	80	4	Tay Valley
20-Kinburn Side Road	Timmins Road (Ottawa Bndry)	Blakeney Rd. (Co Rd 17)	1900	80	3	Mississippi Mills
20-Kinburn Side Road	Blakeney Rd. (Co Rd 17)	Co Rd 29 North	1900	60	4	Mississippi Mills
20-Waba Road	Co. Rd. #29 North	Five Arches Drive	1650	50	4	Mississippi Mills
20-Waba Road	Five Arches Drive	Shaw Road (Co. Rd. #22)	1650	80	3	Mississippi Mills
20-Waba Road	Shaw Road (Co. Rd. #22)	Campbell Side Rd. (Co. Rd. #24)	1000	80	3	Mississippi Mills
20-Waba Road	Campbell Side Rd. (Co. Rd. #24)	Robertson Line (Renfrew Bndry)	1000	80	3	Mississippi Mills
21-Lally Road	Narrows Lock Rd. (Co. Rd. #14)	Lally Lake Drive	100	60	5	Tay Valley
21-Elm Grove Road	Lally Lake Drive	Tay Valley Sign	600	60	4	Tay Valley
21-Elm Grove Road	Tay Valley Sign	Rideau Ferry Rd. (Co. Rd. #1)	1600	60	4	Drummond North Elmsley

ROAD NAME	FROM:	TO:	AADT	SPEED	MAINTENANCE CLASS	LOWER TIER MUNICIPALITY
22-Shaw Road	Waba Road (Co. Rd. #20)	Lunney Road (Ottawa Bndry)	500	80	4	Mississippi Mills
23-Rosedale Road South	Co. Rd. #43	Guthrie Road	600	80	4	Montague
23-Rosedale Road South	Guthrie Road	Roger Stevens Drive (Co. Rd. #4)	600	60/80	4	Montague
24-Peneshula Road	Snye Road	Bellamy Road	800	60	4	Lanark Highlands/ Mississippi Mills
24-Bellamy Road	Peneshula Road	4th Con. Pakenham	900	80	4	Mississippi Mills
24-4th Con. Pakenham	Bellamy Road	Campbell Side Road	900	80	4	Mississippi Mills
24-Campbell Side Road	4th Con. Pakenham	Waba Road (Co. Rd. #20)	600	80	4	Mississippi Mills
29-McNeely Avenue	Hwy. #7	Lake Avenue	12000	80	2	Town of Carleton Place
29-McNeely Avenue	Lake Avenue	Town Line Rd. East (Co. Rd. #29)	11000	60	3	Town of Carleton Place
29-Town Line Road East	McNeely Avenue	Ramsay Con. 8	9000	50	3	Town of Carleton Place
29-County Rd. #29 South	Ramsay Con. 8	Wilson Street (Co. Rd. #11)	8000	80	2	Mississippi Mills
29-County Rd. #29 South	Wilson Street (Co. Rd. #11)	Perth Street (Co. Rd. #16A)	6000	80	2	Mississippi Mills
29-Christian Street	Perth Street (Co. Rd. #16A)	Almonte Street (Co. Rd. #16)	5000	70	3	Mississippi Mills
29-Christian Street	Almonte Street (Co. Rd. #16)	Gleeson Road	3700	70	3	Mississippi Mills
29-County Rd. #29 North	Gleeson Road	Snedden Road	3700	80	3	Mississippi Mills
29-County Rd. #29 North	Snedden Road	McWatty Road	3700	80	3	Mississippi Mills
29-County Rd. #29 North	McWatty Road	Waba Road (Co. Rd. #20)	3700	50	4	Mississippi Mills
29-County Rd. #29 North	Waba Road (Co. Rd. #20)	Kinburn Sideroad (Co. Rd. #20)	2800	50	4	Mississippi Mills
29-County Rd. #29 North	Kinburn Sideroad (Co. Rd. #20)	Walter Bradley Road	2800	80	3	Mississippi Mills
29-County Rd. #29 North	Walter Bradley Road	Lanark County Sign (Ottawa Bndry)	2800	80	3	Mississippi Mills/ City of Ottawa
36-Bolingbroke Road	Leeds Bndry	Althorpe Road (Co. Rd. #6)	800	80	4	Tay Valley
36-Bolingbroke Road	Althorpe Road (Co. Rd. #6)	Hanna Road	750	80	4	Tay Valley
36-Bolingbroke Road	Hanna Road	Maberly Station Road	500	80	4	Tay Valley
36-Bolingbroke Road	Maberly Station Road	Hwy. #7	500	60	4	Tay Valley
36-Maberly Elphin Road	Hwy. #7	PIN #400 (Maberly)	600	60	4	Tay Valley
36-Maberly Elphin Road	PIN #400 (Maberly)	Bennett Lake Rd. (Co. Rd. #19)	600	80	4	Tay Valley
36-Maberly Elphin Road	Bennett Lake Rd. (Co. Rd. #19)	LDNS Sign (Twp Bndry)	600	80	4	Tay Valley
36-Elphin Maberly Road	LDNS Sign (Twp Bndry)	Elphin Hamlet Sign West	600	80	4	Lanark Highlands
36-Elphin Maberly Road	Elphin Hamlet Sign West	Co Rd 12 (McDonalds Corners Rd)	500	60	4	Lanark Highlands
36-Elphin Maberly Road	Co Rd 12 (McDonalds Corners Rd)	Elphin Hamlet Sign North	500	60	4	Lanark Highlands
36-Elphin Maberly Road	Elphin Hamlet Sign North	PIN #3923 (Frontenac Bndry)	500	60/80	4	Lanark Highlands
43-Hwy 43	Merrickville Bndry (West)	Rosedale Rd. S (Co. Rd. #23)	3600	80	3	Montague
43-Hwy 43	Rosedale Rd. S (Co. Rd. #23)	New Smiths Falls Boundary	4800	80	3	Montague
43-Hwy 43	Mazie Street (SFalls Bndry)	Station Road	9000	80	2	Drummond North Elmsley
43-Hwy 43	Station Road	Port Elmsley Rd. (Co. Rd. #18)	9000	60	3	Drummond North Elmsley
43-Hwy 43	Port Elmsley Rd. (Co. Rd. #18)	Meadow Lane	8500	60	3	Drummond North Elmsley
43-Hwy 43	Meadow Lane	Irwin Street	7000	80	3	Drummond North Elmsley/ Town of Perth
49-March Road	Ottawa Bndry	Appleton Side Rd. (Co. Rd. #17)	7500	80	2	Mississippi Mills
511-Lanark Road	Hwy. #7	PIN #40 (Perth Bndry)	8000	60	3	Tay Valley/ Town of Perth
511-Hwy 511	PIN #40 (Perth Bndry)	Clarchris Road	8000	70	3	Tay Valley/ Drummond North Elmsley
511-Hwy 511	Clarchris Road	PIN #1325 (Balderson South)	8000	80	2	Tay Valley/ Drummond North Elmsley

FIGURE 2.3
2019 PEAK AM AND PM HOUR TRAFFIC COUNTS

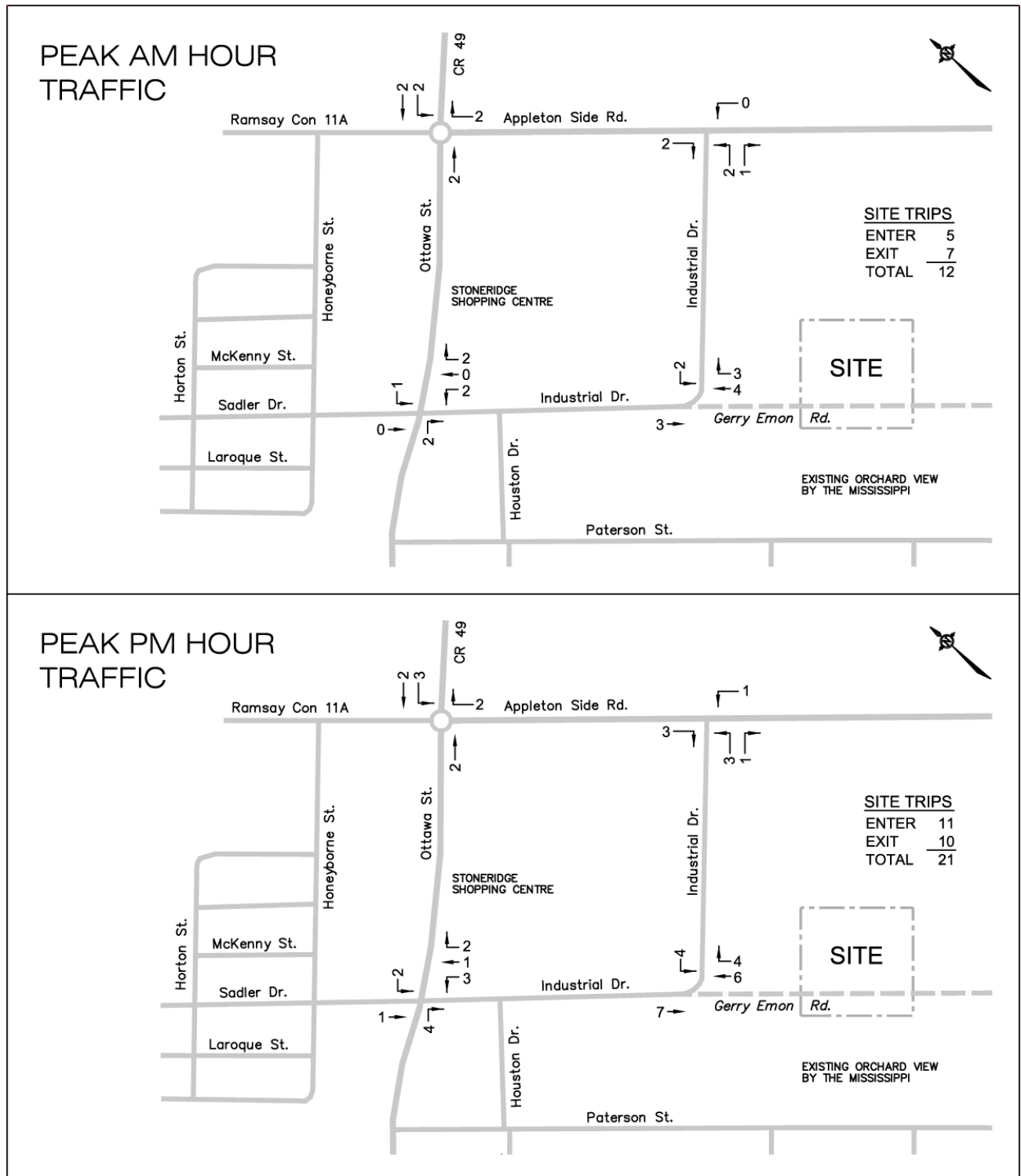


NOT TO SCALE

Appendix C

Background Development Volumes

**FIGURE 4.1
 PEAK AM AND PM HOUR SITE GENERATED TRIPS**



NOT TO SCALE

Appendix D

2022 Existing Synchro and Sidra Worksheets

HCM Signalized Intersection Capacity Analysis
 2: Paterson Street/Menzie Street & Ottawa Street

Existing
 AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔		↔	↔	↔		↔		↔	↔	
Traffic Volume (vph)	1	509	65	50	370	3	77	9	77	2	14	6
Future Volume (vph)	1	509	65	50	370	3	77	9	77	2	14	6
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		6.3		6.3	6.3	6.3		6.0		6.0		6.0
Lane Util. Factor		1.00		1.00	1.00	1.00		1.00		1.00		1.00
Frbp, ped/bikes		1.00		1.00	1.00	0.97		0.99		0.99		0.99
Flpb, ped/bikes		1.00		1.00	1.00	1.00		0.99		1.00		1.00
Frt		0.98		1.00	1.00	0.85		0.94		0.96		0.96
Flt Protected		1.00		0.95	1.00	1.00		0.98		1.00		1.00
Satd. Flow (prot)		1658		1625	1664	1440		1518		1659		1659
Flt Permitted		1.00		0.43	1.00	1.00		0.84		0.97		0.97
Satd. Flow (perm)		1657		730	1664	1440		1302		1619		1619
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	1	547	70	54	398	3	83	10	83	2	15	6
RTOR Reduction (vph)	0	4	0	0	0	1	0	41	0	0	5	0
Lane Group Flow (vph)	0	614	0	54	398	2	0	135	0	0	18	0
Confl. Peds. (#/hr)	4		1	1		4	10		2	2		10
Confl. Bikes (#/hr)			2			2						2
Heavy Vehicles (%)	2%	5%	9%	4%	7%	2%	8%	2%	4%	2%	2%	2%
Turn Type	Perm	NA		Perm	NA	Perm	NA		Perm	NA		NA
Protected Phases		2			6		8			4		4
Permitted Phases	2			6		6	8			4		
Actuated Green, G (s)		55.5		55.5	55.5	55.5		14.8		14.8		14.8
Effective Green, g (s)		55.5		55.5	55.5	55.5		14.8		14.8		14.8
Actuated g/C Ratio		0.67		0.67	0.67	0.67		0.18		0.18		0.18
Clearance Time (s)		6.3		6.3	6.3	6.3		6.0		6.0		6.0
Vehicle Extension (s)		3.0		3.0	3.0	3.0		3.0		3.0		3.0
Lane Grp Cap (vph)		1113		490	1118	967		233		290		290
v/s Ratio Prot					0.24							
v/s Ratio Perm		c0.37		0.07		0.00		c0.10		0.01		0.01
v/c Ratio		0.55		0.11	0.36	0.00		0.58		0.06		0.06
Uniform Delay, d1		7.1		4.8	5.8	4.5		31.0		28.1		28.1
Progression Factor		1.00		1.00	1.00	1.00		1.00		1.00		1.00
Incremental Delay, d2		2.0		0.5	0.9	0.0		3.5		0.1		0.1
Delay (s)		9.0		5.3	6.7	4.5		34.5		28.2		28.2
Level of Service		A		A	A	A		C		C		C
Approach Delay (s)		9.0			6.5			34.5		28.2		28.2
Approach LOS		A			A			C		C		C

Intersection Summary			
HCM 2000 Control Delay	12.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	82.6	Sum of lost time (s)	12.3
Intersection Capacity Utilization	75.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM 2010 TWSC
 3: Appleton Side Road (Country Road 17) & Industrial Drive

Existing
 AM Peak Hour

Intersection						
Int Delay, s/veh	2.7					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔			↔	↔	
Traffic Vol, veh/h	14	20	26	55	59	15
Future Vol, veh/h	14	20	26	55	59	15
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	86	86	86	86	86	86
Heavy Vehicles, %	21	2	4	9	10	2
Mvmt Flow	16	23	30	64	69	17

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	202	78	86
Stage 1	78	-	-
Stage 2	124	-	-
Critical Hdwy	6.61	6.22	4.14
Critical Hdwy Stg 1	5.61	-	-
Critical Hdwy Stg 2	5.61	-	-
Follow-up Hdwy	3.689	3.318	2.236
Pot Cap-1 Maneuver	746	983	1498
Stage 1	899	-	-
Stage 2	857	-	-
Platoon blocked, %			
Mov Cap-1 Maneuver	730	983	1498
Mov Cap-2 Maneuver	730	-	-
Stage 1	880	-	-
Stage 2	857	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.4	2.4	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1498	-	860	-	-
HCM Lane V/C Ratio	0.02	-	0.046	-	-
HCM Control Delay (s)	7.5	0	9.4	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0.1	-	0.1	-	-


HCM 2010 TWSC
4: Paterson Street & Jack Dalgity Street

Existing
AM Peak Hour

Intersection						
Int Delay, s/veh	5.2					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔		↕		↔	
Traffic Vol, veh/h	37	11	10	8	16	17
Future Vol, veh/h	37	11	10	8	16	17
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	71	71	71	71	71	71
Heavy Vehicles, %	3	45	30	2	6	6
Mvmt Flow	52	15	14	11	23	24
Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	74	35	47	0	-	0
Stage 1	35	-	-	-	-	-
Stage 2	39	-	-	-	-	-
Critical Hdwy	6.43	6.65	4.4	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.705	2.47	-	-	-
Pot Cap-1 Maneuver	927	927	1398	-	-	-
Stage 1	985	-	-	-	-	-
Stage 2	981	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	918	927	1398	-	-	-
Mov Cap-2 Maneuver	918	-	-	-	-	-
Stage 1	975	-	-	-	-	-
Stage 2	981	-	-	-	-	-
Approach	EB	NB	SB			
HCM Control Delay, s	9.2	4.2	0			
HCM LOS	A					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1398	-	920	-	-	
HCM Lane V/C Ratio	0.01	-	0.073	-	-	
HCM Control Delay (s)	7.6	0	9.2	-	-	
HCM Lane LOS	A	A	A	-	-	
HCM 95th %tile Q(veh)	0	-	0.2	-	-	

HCM Signalized Intersection Capacity Analysis
6: Industrial Drive/Sadler Drive & Ottawa Street


Existing
AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔		↕		↔		↕		↔		↕	
Traffic Volume (vph)	105	371	43	17	276	51	52	27	20	56	18	88
Future Volume (vph)	105	371	43	17	276	51	52	27	20	56	18	88
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.0	6.2		5.0	6.2		6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00
Fr't	1.00	0.98		1.00	0.98		1.00	0.85	1.00	0.88		
Flt Protected	0.95	1.00		0.95	1.00		0.97	1.00	0.95	1.00		
Sat'd. Flow (prot)	1658	3264		1658	3239		1689	1483	1658	1528		
Flt Permitted	0.49	1.00		0.49	1.00		0.73	1.00	0.70	1.00		
Sat'd. Flow (perm)	857	3264		859	3239		1275	1483	1224	1528		
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)	114	403	47	18	300	55	57	29	22	61	20	96
RTOR Reduction (vph)	0	6	0	0	12	0	0	0	19	0	85	0
Lane Group Flow (vph)	114	444	0	18	343	0	0	86	3	61	31	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8		8	4		
Actuated Green, G (s)	52.2	46.8		43.8	42.6		8.7	8.7	8.7	8.7		
Effective Green, g (s)	52.2	46.8		43.8	42.6		8.7	8.7	8.7	8.7		
Actuated g/C Ratio	0.71	0.63		0.59	0.58		0.12	0.12	0.12	0.12		
Clearance Time (s)	5.0	6.2		5.0	6.2		6.0	6.0	6.0	6.0		
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	663	2067		522	1867		150	174	144	179		
v/s Ratio Prot	c0.01	c0.14		0.00	0.11						0.02	
v/s Ratio Perm	0.11			0.02			c0.07	0.00	0.05			
v/c Ratio	0.17	0.21		0.03	0.18		0.57	0.01	0.42	0.17		
Uniform Delay, d1	3.6	5.8		6.2	7.4		30.8	28.8	30.3	29.4		
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00		
Incremental Delay, d2	0.1	0.2		0.0	0.2		5.2	0.0	2.0	0.5		
Delay (s)	3.7	6.0		6.2	7.6		36.1	28.8	32.3	29.8		
Level of Service	A	A		A	A		D	C	C	C		
Approach Delay (s)	5.5				7.6		34.6				30.7	
Approach LOS	A				A		C				C	
Intersection Summary												
HCM 2000 Control Delay	12.4		HCM 2000 Level of Service		B							
HCM 2000 Volume to Capacity ratio	0.28											
Actuated Cycle Length (s)	73.9		Sum of lost time (s)		17.2							
Intersection Capacity Utilization	44.1%		ICU Level of Service		A							
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
 2: Paterson Street/Menzie Street & Ottawa Street

Existing
 PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔		↔	↔	↔		↔		↔	↔	
Traffic Volume (vph)	4	510	47	60	741	11	86	8	64	7	3	5
Future Volume (vph)	4	510	47	60	741	11	86	8	64	7	3	5
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		6.3		6.3	6.3	6.3		6.0		6.0		6.0
Lane Util. Factor		1.00		1.00	1.00	1.00		1.00		1.00		1.00
Frbp. ped/bikes		1.00		1.00	1.00	0.97		0.99		0.99		0.99
Fipb. ped/bikes		1.00		1.00	1.00	1.00		0.99		1.00		1.00
Frt		0.99		1.00	1.00	0.85		0.95		0.95		0.95
Flt Protected		1.00		0.95	1.00	1.00		0.97		0.98		0.98
Satd. Flow (prot)		1702		1655	1728	1438		1584		1608		1608
Flt Permitted		1.00		0.31	1.00	1.00		0.82		0.89		0.89
Satd. Flow (perm)		1695		542	1728	1438		1336		1459		1459
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	4	537	49	63	780	12	91	8	67	7	3	5
RTOR Reduction (vph)	0	4	0	0	0	5	0	27	0	0	4	0
Lane Group Flow (vph)	0	586	0	63	780	7	0	139	0	0	11	0
Confl. Peds. (#/hr)	4		14	14		4	8		1	1		8
Confl. Bikes (#/hr)			2			3			2			2
Heavy Vehicles (%)	2%	3%	2%	2%	3%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2		1	6			8				4
Permitted Phases	2			6		6	8			4		
Actuated Green, G (s)		43.7		54.0	54.0	54.0		25.0		25.0		25.0
Effective Green, g (s)		43.7		54.0	54.0	54.0		25.0		25.0		25.0
Actuated g/C Ratio		0.48		0.59	0.59	0.59		0.27		0.27		0.27
Clearance Time (s)		6.3		6.3	6.3	6.3		6.0		6.0		6.0
Vehicle Extension (s)		3.0		3.0	3.0	3.0		3.0		3.0		3.0
Lane Grp Cap (vph)		811		369	1022	850		365		399		399
v/s Ratio Prot				0.01	c0.45							
v/s Ratio Perm		0.35		0.09		0.00		c0.10				0.01
v/c Ratio		0.72		0.17	0.76	0.01		0.38				0.03
Uniform Delay, d1		19.0		10.2	13.9	7.7		26.9				24.3
Progression Factor		1.00		1.00	1.00	1.00		1.00				1.00
Incremental Delay, d2		5.5		0.2	5.4	0.0		0.7				0.1
Delay (s)		24.5		10.4	19.3	7.7		27.5				24.4
Level of Service		C		B	B	A		C				C
Approach Delay (s)		24.5			18.5			27.5				24.4
Approach LOS		C			B			C				C

Intersection Summary			
HCM 2000 Control Delay	21.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	91.3	Sum of lost time (s)	18.6
Intersection Capacity Utilization	78.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM 2010 TWSC
 3: Appleton Side Road (Country Road 17) & Industrial Drive

Existing
 PM Peak Hour

Intersection						
Int Delay, s/veh	2.2					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔			↔	↔	
Traffic Vol, veh/h	13	21	35	72	107	27
Future Vol, veh/h	13	21	35	72	107	27
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	96	96	96	96	96	96
Heavy Vehicles, %	2	5	3	7	12	4
Mvmt Flow	14	22	36	75	111	28

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	272	125	139
Stage 1	125	-	-
Stage 2	147	-	-
Critical Hdwy	6.42	6.25	4.13
Critical Hdwy Stg 1	5.42	-	-
Critical Hdwy Stg 2	5.42	-	-
Follow-up Hdwy	3.518	3.345	2.227
Pot Cap-1 Maneuver	717	918	1438
Stage 1	901	-	-
Stage 2	880	-	-
Platoon blocked, %			
Mov Cap-1 Maneuver	698	918	1438
Mov Cap-2 Maneuver	698	-	-
Stage 1	878	-	-
Stage 2	880	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.6	2.5	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1438	-	819	-	-
HCM Lane V/C Ratio	0.025	-	0.043	-	-
HCM Control Delay (s)	7.6	0	9.6	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0.1	-	0.1	-	-

HCM 2010 TWSC
4: Paterson Street & Jack Dalgity Street

Existing
PM Peak Hour

Intersection						
Int Delay, s/veh	4.3					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔		↕		↔	
Traffic Vol, veh/h	52	5	7	10	14	47
Future Vol, veh/h	52	5	7	10	14	47
Conflicting Peds, #/hr	0	0	1	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	94	94	94	94	94	94
Heavy Vehicles, %	10	2	2	2	7	4
Mvmt Flow	55	5	7	11	15	50
Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	66	41	66	0	-	0
Stage 1	41	-	-	-	-	-
Stage 2	25	-	-	-	-	-
Critical Hdwy	6.5	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.5	-	-	-	-	-
Critical Hdwy Stg 2	5.5	-	-	-	-	-
Follow-up Hdwy	3.59	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	920	1030	1536	-	-	-
Stage 1	961	-	-	-	-	-
Stage 2	977	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	914	1029	1535	-	-	-
Mov Cap-2 Maneuver	914	-	-	-	-	-
Stage 1	955	-	-	-	-	-
Stage 2	976	-	-	-	-	-
Approach	EB	NB	SB			
HCM Control Delay, s	9.2	3	0			
HCM LOS	A					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1535	-	923	-	-	
HCM Lane V/C Ratio	0.005	-	0.066	-	-	
HCM Control Delay (s)	7.4	0	9.2	-	-	
HCM Lane LOS	A	A	A	-	-	
HCM 95th %tile Q(veh)	0	-	0.2	-	-	

HCM Signalized Intersection Capacity Analysis
6: Industrial Drive/Sadler Drive & Ottawa Street

Existing
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↕		↕		↕		↕		↕		↕	
Traffic Volume (vph)	84	388	97	27	633	61	139	44	24	46	27	85
Future Volume (vph)	84	388	97	27	633	61	139	44	24	46	27	85
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.0	6.2		5.0	6.2		6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00
Fr't	1.00	0.97		1.00	0.99		1.00	0.85	1.00	0.89		
Flt Protected	0.95	1.00		0.95	1.00		0.96	1.00	0.95	1.00		
Satd. Flow (prot)	1658	3217		1658	3272		1681	1483	1658	1546		
Flt Permitted	0.28	1.00		0.46	1.00		0.70	1.00	0.58	1.00		
Satd. Flow (perm)	492	3217		797	3272		1222	1483	1010	1546		
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)	91	422	105	29	688	66	151	48	26	50	29	92
RTOR Reduction (vph)	0	18	0	0	7	0	0	0	20	0	71	0
Lane Group Flow (vph)	91	509	0	29	747	0	0	199	6	50	50	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8		8	4		
Actuated Green, G (s)	46.9	40.6		39.1	36.7		17.4	17.4	17.4	17.4		
Effective Green, g (s)	46.9	40.6		39.1	36.7		17.4	17.4	17.4	17.4		
Actuated g/C Ratio	0.60	0.52		0.50	0.47		0.22	0.22	0.22	0.22		
Clearance Time (s)	5.0	6.2		5.0	6.2		6.0	6.0	6.0	6.0		
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	392	1683		428	1547		274	332	226	346		
v/s Ratio Prot	c0.02	c0.16		0.00	c0.23					0.03		
v/s Ratio Perm				0.12			c0.16	0.00	0.05			
v/c Ratio	0.23	0.30		0.07	0.48		0.73	0.02	0.22	0.14		
Uniform Delay, d1	7.1	10.5		9.7	14.0		27.9	23.4	24.6	24.1		
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00		
Incremental Delay, d2	0.3	0.5		0.1	1.1		9.2	0.0	0.5	0.2		
Delay (s)	7.4	10.9		9.8	15.1		37.1	23.5	25.1	24.3		
Level of Service	A	B		A	B		D	C	C	C		
Approach Delay (s)	10.4			14.9			35.5		24.5			
Approach LOS	B			B			D		C			
Intersection Summary												
HCM 2000 Control Delay	16.8		HCM 2000 Level of Service				B					
HCM 2000 Volume to Capacity ratio	0.53											
Actuated Cycle Length (s)	77.6		Sum of lost time (s)				17.2					
Intersection Capacity Utilization	57.0%		ICU Level of Service				B					
Analysis Period (min)	15											
c Critical Lane Group												

MOVEMENT SUMMARY

Site: 101 [Ottawa/CR49 & Appleton/Ramsay Existing AM (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
		[Total veh/h	HV %	[Total veh/h	HV %				[Veh. veh	Dist] m				
South: Appleton														
1	L2	44	2.0	48	2.0	0.101	8.9	LOS A	0.4	2.7	0.41	0.59	0.41	48.4
2	T1	7	2.0	8	2.0	0.101	3.4	LOS A	0.4	2.7	0.41	0.59	0.41	47.8
3	R2	41	2.0	45	2.0	0.101	3.7	LOS A	0.4	2.7	0.41	0.59	0.41	46.4
Approach		92	2.0	101	2.0	0.101	6.1	LOS A	0.4	2.7	0.41	0.59	0.41	47.5
East: CR 49														
4	L2	31	2.0	34	2.0	0.111	7.7	LOS A	0.6	4.3	0.20	0.35	0.20	49.8
5	T1	271	2.0	298	2.0	0.111	2.2	LOS A	0.6	4.4	0.20	0.30	0.20	49.6
6	R2	15	2.0	16	2.0	0.111	2.7	LOS A	0.6	4.4	0.19	0.26	0.19	48.3
Approach		317	2.0	348	2.0	0.111	2.8	LOS A	0.6	4.4	0.20	0.30	0.20	49.5
North: Ramsay														
7	L2	26	2.0	29	2.0	0.058	8.7	LOS A	0.2	1.5	0.38	0.55	0.38	48.5
8	T1	11	2.0	12	2.0	0.058	3.2	LOS A	0.2	1.5	0.38	0.55	0.38	47.9
9	R2	17	2.0	19	2.0	0.058	3.5	LOS A	0.2	1.5	0.38	0.55	0.38	46.5
Approach		54	2.0	59	2.0	0.058	5.9	LOS A	0.2	1.5	0.38	0.55	0.38	47.7
West: Ottawa														
10	L2	8	2.0	9	2.0	0.138	7.8	LOS A	0.7	5.2	0.22	0.29	0.22	50.3
11	T1	348	2.0	382	2.0	0.138	2.3	LOS A	0.7	5.3	0.21	0.28	0.21	49.7
12	R2	37	2.0	41	2.0	0.138	2.7	LOS A	0.7	5.3	0.20	0.28	0.20	48.3
Approach		393	2.0	432	2.0	0.138	2.4	LOS A	0.7	5.3	0.21	0.28	0.21	49.6
All Vehicles		856	2.0	941	2.0	0.138	3.2	LOS A	0.7	5.3	0.24	0.34	0.24	49.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Ottawa/CR49 & Appleton/Ramsay Existing PM (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
		[Total veh/h	HV %	[Total veh/h	HV %				[Veh. veh	Dist] m				
South: Appleton														
1	L2	67	2.0	69	2.0	0.116	8.8	LOS A	0.5	3.2	0.41	0.60	0.41	48.1
2	T1	12	2.0	12	2.0	0.116	3.3	LOS A	0.5	3.2	0.41	0.60	0.41	47.5
3	R2	35	2.0	36	2.0	0.116	3.6	LOS A	0.5	3.2	0.41	0.60	0.41	46.2
Approach		114	2.0	118	2.0	0.116	6.6	LOS A	0.5	3.2	0.41	0.60	0.41	47.4
East: CR 49														
4	L2	56	2.0	58	2.0	0.221	7.9	LOS A	1.3	9.4	0.28	0.36	0.28	49.6
5	T1	555	2.0	572	2.0	0.221	2.4	LOS A	1.3	9.6	0.27	0.32	0.27	49.3
6	R2	46	2.0	47	2.0	0.221	2.8	LOS A	1.3	9.6	0.26	0.28	0.26	48.0
Approach		657	2.0	677	2.0	0.221	2.9	LOS A	1.3	9.6	0.27	0.32	0.27	49.2
North: Ramsay														
7	L2	19	2.0	20	2.0	0.060	9.5	LOS A	0.2	1.6	0.50	0.61	0.50	48.4
8	T1	15	2.0	15	2.0	0.060	4.0	LOS A	0.2	1.6	0.50	0.61	0.50	47.8
9	R2	17	2.0	18	2.0	0.060	4.3	LOS A	0.2	1.6	0.50	0.61	0.50	46.4
Approach		51	2.0	53	2.0	0.060	6.2	LOS A	0.2	1.6	0.50	0.61	0.50	47.5
West: Ottawa														
10	L2	17	2.0	18	2.0	0.138	7.9	LOS A	0.7	5.2	0.24	0.31	0.24	50.0
11	T1	332	2.0	342	2.0	0.138	2.4	LOS A	0.7	5.3	0.23	0.30	0.23	49.6
12	R2	62	2.0	64	2.0	0.138	2.8	LOS A	0.7	5.3	0.22	0.29	0.22	48.2
Approach		411	2.0	424	2.0	0.138	2.6	LOS A	0.7	5.3	0.23	0.30	0.23	49.4
All Vehicles		1233	2.0	1271	2.0	0.221	3.3	LOS A	1.3	9.6	0.28	0.35	0.28	49.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Appendix E

Signal Warrants

Jack Dalgity Stree @ Paterson Street
2027 Future Background

Justification #7

Justification	Description	Minimum Requirement		Minimum Requirement		Compliance		Entire %	Signal
		1 Lane Highway		2 or More Lanes		Sectional			
		Free Flow	Restr. Flow	Free Flow	Restr. Flow	Numerical	%		
1. Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	480	720	600	900	69	10%	10%	No
	B. Vehicle volume, along minor streets (average hour)	120	170	120	170	39	23%		
2. Delay to Cross Traffic	A. Vehicle volumes, major street (average hour)	480	720	600	900	43	6%	6%	No
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50	75	50	75	22	30%		

- Notes
1. Refer to OTM Book 12, pg 92, Mar 2012
 2. Lowest section percentage governs justification
 3. Average hourly volumes estimated from peak hour volumes, $AHV = PM/2$ or $(AM + PM) / 4$, including amplification factors
 4. T-intersection factor corrected, applies only to 1B

Jack Dalgity Stree @ Paterson Street
2032 Future Background

Justification #7

Justification	Description	Minimum Requirement		Minimum Requirement		Compliance		Entire %	Signal
		1 Lane Highway		2 or More Lanes		Sectional			
		Free Flow	Restr. Flow	Free Flow	Restr. Flow	Numerical	%		
1. Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	480	720	600	900	80	11%	11%	No
	B. Vehicle volume, along minor streets (average hour)	120	170	120	170	39	23%		
2. Delay to Cross Traffic	A. Vehicle volumes, major street (average hour)	480	720	600	900	53	7%	7%	No
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50	75	50	75	22	30%		

- Notes
1. Refer to OTM Book 12, pg 92, Mar 2012
 2. Lowest section percentage governs justification
 3. Average hourly volumes estimated from peak hour volumes, $AHV = PM/2$ or $(AM + PM) / 4$, including amplification factors
 4. T-intersection factor corrected, applies only to 1B

Jack Dalgity Stree/Access #1 @ Paterson Street
2027 Future Total

Justification #7

Justification	Description	Minimum Requirement		Minimum Requirement		Compliance		Entire %	Signal
		1 Lane Highway		2 or More Lanes		Sectional			
		Free Flow	Restr. Flow	Free Flow	Restr. Flow	Numerical	%		
1. Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	480	720	600	900	119	17%	17%	No
	B. Vehicle volume, along minor streets (average hour)	120	170	120	170	53	31%		
2. Delay to Cross Traffic	A. Vehicle volumes, major street (average hour)	480	720	600	900	66	9%	9%	No
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50	75	50	75	27	36%		

- Notes
1. Refer to OTM Book 12, pg 92, Mar 2012
 2. Lowest section percentage governs justification
 3. Average hourly volumes estimated from peak hour volumes, AHV = PM/2 or (AM + PM) / 4, including amplification factors
 4. T-intersection factor corrected, applies only to 1B

Jack Dalgity Stree/Access #1 @ Paterson Street
2032 Future Total

Justification #7

Justification	Description	Minimum Requirement		Minimum Requirement		Compliance		Entire %	Signal
		1 Lane Highway		2 or More Lanes		Sectional			
		Free Flow	Restr. Flow	Free Flow	Restr. Flow	Numerical	%		
1. Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	480	720	600	900	130	18%	18%	No
	B. Vehicle volume, along minor streets (average hour)	120	170	120	170	53	31%		
2. Delay to Cross Traffic	A. Vehicle volumes, major street (average hour)	480	720	600	900	77	11%	11%	No
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50	75	50	75	27	36%		

- Notes
1. Refer to OTM Book 12, pg 92, Mar 2012
 2. Lowest section percentage governs justification
 3. Average hourly volumes estimated from peak hour volumes, AHV = PM/2 or (AM + PM) / 4, including amplification factors
 4. T-intersection factor corrected, applies only to 1B

Access #2 @ Appleton Side Road
2027 Future Total

Justification #7

Justification	Description	Minimum Requirement		Minimum Requirement		Compliance		Entire %	Signal
		1 Lane Highway		2 or More Lanes		Sectional			
		Free Flow	Restr. Flow	Free Flow	Restr. Flow	Numerical	%		
1. Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	480	720	600	900	190	26%	26%	No
	B. Vehicle volume, along minor streets (average hour)	120	170	120	170	67	39%		
2. Delay to Cross Traffic	A. Vehicle volumes, major street (average hour)	480	720	600	900	145	20%	20%	No
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50	75	50	75	36	47%		

- Notes
1. Refer to OTM Book 12, pg 92, Mar 2012
 2. Lowest section percentage governs justification
 3. Average hourly volumes estimated from peak hour volumes, AHV = PM/2 or (AM + PM) / 4, including amplification factors
 4. T-intersection factor corrected, applies only to 1B

Access #2 @ Appleton Side Road
2032 Future Total

Justification #7

Justification	Description	Minimum Requirement		Minimum Requirement		Compliance		Entire %	Signal
		1 Lane Highway		2 or More Lanes		Sectional			
		Free Flow	Restr. Flow	Free Flow	Restr. Flow	Numerical	%		
1. Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	480	720	600	900	198	28%	28%	No
	B. Vehicle volume, along minor streets (average hour)	120	170	120	170	67	39%		
2. Delay to Cross Traffic	A. Vehicle volumes, major street (average hour)	480	720	600	900	154	21%	21%	No
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50	75	50	75	36	47%		

- Notes
1. Refer to OTM Book 12, pg 92, Mar 2012
 2. Lowest section percentage governs justification
 3. Average hourly volumes estimated from peak hour volumes, AHV = PM/2 or (AM + PM) / 4, including amplification factors
 4. T-intersection factor corrected, applies only to 1B

Ottawa St/March Rd (CR 49) and Appleton Side Rd (CR 17)/Ramsay Con 11A
2027 Future Background

Justification #7

Justification	Description	Minimum Requirement		Minimum Requirement		Compliance		Entire %	Signal
		1 Lane Highway		2 or More Lanes		Sectional			
		Free Flow	Restr. Flow	Free Flow	Restr. Flow	Numerical	%		
1. Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	480	720	600	900	563	78%	48%	No
	B. Vehicle volume, along minor streets (average hour)	120	170	120	170	82	48%		
2. Delay to Cross Traffic	A. Vehicle volumes, major street (average hour)	480	720	600	900	481	67%	63%	No
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50	75	50	75	48	63%		

- Notes
1. Refer to OTM Book 12, pg 92, Mar 2012
 2. Lowest section percentage governs justification
 3. Average hourly volumes estimated from peak hour volumes, AHV = PM/2 or (AM + PM) / 4, including amplification factors
 4. T-intersection factor corrected, applies only to 1B

Ottawa St/March Rd (CR 49) and Appleton Side Rd (CR 17)/Ramsay Con 11A
2032 Future Background

Justification #7

Justification	Description	Minimum Requirement		Minimum Requirement		Compliance		Entire %	Signal
		1 Lane Highway		2 or More Lanes		Sectional			
		Free Flow	Restr. Flow	Free Flow	Restr. Flow	Numerical	%		
1. Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	480	720	600	900	602	84%	51%	No
	B. Vehicle volume, along minor streets (average hour)	120	170	120	170	87	51%		
2. Delay to Cross Traffic	A. Vehicle volumes, major street (average hour)	480	720	600	900	516	72%	67%	No
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50	75	50	75	50	67%		

- Notes
1. Refer to OTM Book 12, pg 92, Mar 2012
 2. Lowest section percentage governs justification
 3. Average hourly volumes estimated from peak hour volumes, AHV = PM/2 or (AM + PM) / 4, including amplification factors
 4. T-intersection factor corrected, applies only to 1B

Ottawa St/March Rd (CR 49) and Appleton Side Rd (CR 17)/Ramsay Con 11A
2027 Future Total

Justification #7

Justification	Description	Minimum Requirement		Minimum Requirement		Compliance		Entire %	Signal
		1 Lane Highway		2 or More Lanes		Sectional			
		Free Flow	Restr. Flow	Free Flow	Restr. Flow	Numerical	%		
1. Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	480	720	600	900	638	89%	69%	No
	B. Vehicle volume, along minor streets (average hour)	120	170	120	170	118	69%		
2. Delay to Cross Traffic	A. Vehicle volumes, major street (average hour)	480	720	600	900	520	72%	69%	No
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50	75	50	75	52	69%		

- Notes
1. Refer to OTM Book 12, pg 92, Mar 2012
 2. Lowest section percentage governs justification
 3. Average hourly volumes estimated from peak hour volumes, AHV = PM/2 or (AM + PM) / 4, including amplification factors
 4. T-intersection factor corrected, applies only to 1B

Ottawa St/March Rd (CR 49) and Appleton Side Rd (CR 17)/Ramsay Con 11A
2032 Future Total

Justification #7

Justification	Description	Minimum Requirement		Minimum Requirement		Compliance		Entire %	Signal
		1 Lane Highway		2 or More Lanes		Sectional			
		Free Flow	Restr. Flow	Free Flow	Restr. Flow	Numerical	%		
1. Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	480	720	600	900	678	94%	72%	No
	B. Vehicle volume, along minor streets (average hour)	120	170	120	170	122	72%		
2. Delay to Cross Traffic	A. Vehicle volumes, major street (average hour)	480	720	600	900	556	77%	73%	No
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50	75	50	75	55	73%		

- Notes
1. Refer to OTM Book 12, pg 92, Mar 2012
 2. Lowest section percentage governs justification
 3. Average hourly volumes estimated from peak hour volumes, AHV = PM/2 or (AM + PM) / 4, including amplification factors
 4. T-intersection factor corrected, applies only to 1B

Appendix F

2027 Future Background Synchro and Sidra Worksheets

HCM Signalized Intersection Capacity Analysis
2: Paterson Street/Menzie Street & Ottawa Street

2027 Future Background
AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔		↔	↔	↔		↔		↔		↔
Traffic Volume (vph)	1	550	70	54	401	3	83	9	83	2	14	6
Future Volume (vph)	1	550	70	54	401	3	83	9	83	2	14	6
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		6.3		6.3	6.3	6.3		6.0				6.0
Lane Util. Factor		1.00		1.00	1.00	1.00		1.00				1.00
Frbp, ped/bikes		1.00		1.00	1.00	0.97		0.99				0.99
Flpb, ped/bikes		1.00		1.00	1.00	1.00		0.99				1.00
Frt		0.98		1.00	1.00	0.85		0.94				0.96
Flt Protected		1.00		0.95	1.00	1.00		0.98				1.00
Satd. Flow (prot)		1658		1625	1664	1440		1517				1659
Flt Permitted		1.00		0.40	1.00	1.00		0.84				0.97
Satd. Flow (perm)		1658		689	1664	1440		1301				1618
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	1	591	75	58	431	3	89	10	89	2	15	6
RTOR Reduction (vph)	0	4	0	0	0	1	0	42	0	0	5	0
Lane Group Flow (vph)	0	663	0	58	431	2	0	146	0	0	18	0
Conf. Peds. (#/hr)	4		1	1		4	10		2	2		10
Conf. Bikes (#/hr)			2			2						2
Heavy Vehicles (%)	2%	5%	9%	4%	7%	2%	8%	2%	4%	2%	2%	2%
Turn Type	Perm	NA		Perm	NA	Perm	NA		Perm	NA		NA
Protected Phases		2			6			8				4
Permitted Phases	2			6		6	8			4		
Actuated Green, G (s)		55.3		55.3	55.3	55.3		15.2				15.2
Effective Green, g (s)		55.3		55.3	55.3	55.3		15.2				15.2
Actuated g/C Ratio		0.67		0.67	0.67	0.67		0.18				0.18
Clearance Time (s)		6.3		6.3	6.3	6.3		6.0				6.0
Vehicle Extension (s)		3.0		3.0	3.0	3.0		3.0				3.0
Lane Grp Cap (vph)		1107		460	1111	961		238				297
v/s Ratio Prot					0.26							
v/s Ratio Perm		0.40		0.08		0.00		c0.11				0.01
v/c Ratio		0.60		0.13	0.39	0.00		0.61				0.06
Uniform Delay, d1		7.6		5.0	6.2	4.6		31.1				27.9
Progression Factor		1.00		1.00	1.00	1.00		1.00				1.00
Incremental Delay, d2		2.4		0.6	1.0	0.0		4.7				0.1
Delay (s)		10.0		5.6	7.2	4.6		35.8				28.0
Level of Service		B		A	A	A		D				C
Approach Delay (s)		10.0			7.0			35.8				28.0
Approach LOS		B			A			D				C

Intersection Summary			
HCM 2000 Control Delay	12.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	82.8	Sum of lost time (s)	12.3
Intersection Capacity Utilization	78.7%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM 2010 TWSC
3: Appleton Side Road (Country Road 17) & Industrial Drive

2027 Future Background
AM Peak Hour

Intersection						
Int Delay, s/veh	2.6					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔			↔	↔	
Traffic Vol, veh/h	16	21	26	61	64	17
Future Vol, veh/h	16	21	26	61	64	17
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	86	86	86	86	86	86
Heavy Vehicles, %	21	2	4	9	10	2
Mvmt Flow	19	24	30	71	74	20
Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	215	84	94	0	-	0
Stage 1	84	-	-	-	-	-
Stage 2	131	-	-	-	-	-
Critical Hdwy	6.61	6.22	4.14	-	-	-
Critical Hdwy Stg 1	5.61	-	-	-	-	-
Critical Hdwy Stg 2	5.61	-	-	-	-	-
Follow-up Hdwy	3.689	3.318	2.236	-	-	-
Pot Cap-1 Maneuver	733	975	1488	-	-	-
Stage 1	894	-	-	-	-	-
Stage 2	850	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	718	975	1488	-	-	-
Mov Cap-2 Maneuver	718	-	-	-	-	-
Stage 1	875	-	-	-	-	-
Stage 2	850	-	-	-	-	-
Approach	EB	NB	SB			
HCM Control Delay, s	9.5	2.2	0			
HCM LOS	A					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1488	-	844	-	-	
HCM Lane V/C Ratio	0.02	-	0.051	-	-	
HCM Control Delay (s)	7.5	0	9.5	-	-	
HCM Lane LOS	A	A	A	-	-	
HCM 95th %tile Q(veh)	0.1	-	0.2	-	-	

HCM 2010 TWSC
4: Paterson Street & Jack Dalgity Street

2027 Future Background
AM Peak Hour

Intersection						
Int Delay, s/veh	4.4					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔		↕		↔	
Traffic Vol, veh/h	37	11	10	20	25	17
Future Vol, veh/h	37	11	10	20	25	17
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	71	71	71	71	71	71
Heavy Vehicles, %	3	45	30	2	6	6
Mvmt Flow	52	15	14	28	35	24
Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	103	47	59	0	-	0
Stage 1	47	-	-	-	-	-
Stage 2	56	-	-	-	-	-
Critical Hdwy	6.43	6.65	4.4	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.705	2.47	-	-	-
Pot Cap-1 Maneuver	893	913	1384	-	-	-
Stage 1	973	-	-	-	-	-
Stage 2	964	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	884	913	1384	-	-	-
Mov Cap-2 Maneuver	884	-	-	-	-	-
Stage 1	963	-	-	-	-	-
Stage 2	964	-	-	-	-	-
Approach	EB	NB	SB			
HCM Control Delay, s	9.4	2.5	0			
HCM LOS	A					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1384	-	890	-	-	
HCM Lane V/C Ratio	0.01	-	0.076	-	-	
HCM Control Delay (s)	7.6	0	9.4	-	-	
HCM Lane LOS	A	A	A	-	-	
HCM 95th %tile Q(veh)	0	-	0.2	-	-	


HCM Signalized Intersection Capacity Analysis
6: Industrial Drive/Sadler Drive & Ottawa Street

2027 Future Background
AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔		↕		↔		↕		↔		↕	
Traffic Volume (vph)	105	400	43	19	297	51	52	31	23	56	21	88
Future Volume (vph)	105	400	43	19	297	51	52	31	23	56	21	88
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.0	6.2		5.0	6.2		6.0	6.0	6.0	6.0		6.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00	1.00	1.00		1.00
Friction	1.00	0.99		1.00	0.98		1.00	0.85	1.00	0.88		1.00
Fit Protected	0.95	1.00		0.95	1.00		0.97	1.00	0.95	1.00		1.00
Satd. Flow (prot)	1658	3267		1658	3243		1692	1483	1658	1534		1534
Fit Permitted	0.48	1.00		0.48	1.00		0.74	1.00	0.70	1.00		1.00
Satd. Flow (perm)	838	3267		832	3243		1291	1483	1218	1534		1534
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)	114	435	47	21	323	55	57	34	25	61	23	96
RTOR Reduction (vph)	0	6	0	0	11	0	0	0	22	0	85	0
Lane Group Flow (vph)	114	476	0	21	367	0	0	91	3	61	34	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8		8	4		
Actuated Green, G (s)	52.2	46.8		43.8	42.6		8.8	8.8	8.8	8.8		8.8
Effective Green, g (s)	52.2	46.8		43.8	42.6		8.8	8.8	8.8	8.8		8.8
Actuated g/C Ratio	0.71	0.63		0.59	0.58		0.12	0.12	0.12	0.12		0.12
Clearance Time (s)	5.0	6.2		5.0	6.2		6.0	6.0	6.0	6.0		6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0		3.0
Lane Grp Cap (vph)	650	2066		505	1866		153	176	144	182		182
v/s Ratio Prot	c0.01	c0.15		0.00	0.11							0.02
v/s Ratio Perm	0.11			0.02			c0.07	0.00	0.05			
v/c Ratio	0.18	0.23		0.04	0.20		0.59	0.02	0.42	0.19		0.19
Uniform Delay, d1	3.6	5.9		6.2	7.5		30.9	28.8	30.2	29.4		29.4
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00		1.00
Incremental Delay, d2	0.1	0.3		0.0	0.2		6.1	0.0	2.0	0.5		0.5
Delay (s)	3.7	6.1		6.3	7.7		37.0	28.8	32.3	29.9		29.9
Level of Service	A	A		A	A		D	C	C	C		C
Approach Delay (s)		5.7			7.7		35.2			30.7		
Approach LOS		A			A		D			C		
Intersection Summary												
HCM 2000 Control Delay	12.4		HCM 2000 Level of Service				B					
HCM 2000 Volume to Capacity ratio	0.29											
Actuated Cycle Length (s)	74.0				Sum of lost time (s)				17.2			
Intersection Capacity Utilization	45.0%		ICU Level of Service				A					
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
2: Paterson Street/Menzie Street & Ottawa Street

2027 Future Background
PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔		↔	↔	↔		↔		↔	↔	
Traffic Volume (vph)	4	553	51	65	801	11	93	8	69	7	3	5
Future Volume (vph)	4	553	51	65	801	11	93	8	69	7	3	5
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		6.3		6.3	6.3	6.3		6.0		6.0		6.0
Lane Util. Factor		1.00		1.00	1.00	1.00		1.00		1.00		1.00
Frbp, ped/bikes		1.00		1.00	1.00	0.97		0.99		0.99		0.99
Fipb, ped/bikes		1.00		1.00	1.00	1.00		0.99		1.00		1.00
Frt		0.99		1.00	1.00	0.85		0.94		0.95		0.95
Flt Protected		1.00		0.95	1.00	1.00		0.97		0.98		0.98
Satd. Flow (prot)		1702		1658	1728	1438		1583		1608		1608
Flt Permitted		1.00		0.29	1.00	1.00		0.82		0.88		0.88
Satd. Flow (perm)		1695		503	1728	1438		1336		1455		1455
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	4	582	54	68	843	12	98	8	73	7	3	5
RTOR Reduction (vph)	0	4	0	0	0	5	0	28	0	0	4	0
Lane Group Flow (vph)	0	636	0	68	843	7	0	151	0	0	11	0
Confl. Peds. (#/hr)	4		14	14		4	8		1	1		8
Confl. Bikes (#/hr)			2			3			2			2
Heavy Vehicles (%)	2%	3%	2%	2%	3%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2		1	6			8				4
Permitted Phases		2		6		6	8			4		
Actuated Green, G (s)		43.7		54.0	54.0	54.0		25.0		25.0		25.0
Effective Green, g (s)		43.7		54.0	54.0	54.0		25.0		25.0		25.0
Actuated g/C Ratio		0.48		0.59	0.59	0.59		0.27		0.27		0.27
Clearance Time (s)		6.3		6.3	6.3	6.3		6.0		6.0		6.0
Vehicle Extension (s)		3.0		3.0	3.0	3.0		3.0		3.0		3.0
Lane Grp Cap (vph)		811		348	1022	850		365		398		398
v/s Ratio Prot				0.01	c0.49							
v/s Ratio Perm		0.38		0.11		0.00		c0.11		0.01		0.01
v/c Ratio		0.78		0.20	0.82	0.01		0.41		0.03		0.03
Uniform Delay, d1		19.9		10.5	14.9	7.7		27.2		24.3		24.3
Progression Factor		1.00		1.00	1.00	1.00		1.00		1.00		1.00
Incremental Delay, d2		7.5		0.3	7.6	0.0		0.8		0.1		0.1
Delay (s)		27.4		10.8	22.4	7.7		27.9		24.4		24.4
Level of Service		C		B	C	A		C		C		C
Approach Delay (s)		27.4			21.4			27.9		24.4		24.4
Approach LOS		C			C			C		C		C

Intersection Summary			
HCM 2000 Control Delay	24.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	91.3	Sum of lost time (s)	18.6
Intersection Capacity Utilization	83.0%	ICU Level of Service	E
Analysis Period (min)	15		

HCM 2010 TWSC
3: Appleton Side Road (Country Road 17) & Industrial Drive

2027 Future Background
PM Peak Hour

Intersection						
Int Delay, s/veh	2.2					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔			↔	↔	
Traffic Vol, veh/h	16	22	36	80	116	30
Future Vol, veh/h	16	22	36	80	116	30
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	96	96	96	96	96	96
Heavy Vehicles, %	2	5	3	7	12	4
Mvmt Flow	17	23	38	83	121	31

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	296	137	152
Stage 1	137	-	-
Stage 2	159	-	-
Critical Hdwy	6.42	6.25	4.13
Critical Hdwy Stg 1	5.42	-	-
Critical Hdwy Stg 2	5.42	-	-
Follow-up Hdwy	3.518	3.345	2.227
Pot Cap-1 Maneuver	695	904	1423
Stage 1	890	-	-
Stage 2	870	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	676	904	1423
Mov Cap-2 Maneuver	676	-	-
Stage 1	865	-	-
Stage 2	870	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.8	2.4	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1423	-	792	-	-
HCM Lane V/C Ratio	0.026	-	0.05	-	-
HCM Control Delay (s)	7.6	0	9.8	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0.1	-	0.2	-	-

HCM 2010 TWSC
4: Paterson Street & Jack Dalgity Street

2027 Future Background
PM Peak Hour

Intersection						
Int Delay, s/veh	3.7					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔		↕		↔	
Traffic Vol, veh/h	52	5	7	22	23	47
Future Vol, veh/h	52	5	7	22	23	47
Conflicting Peds, #/hr	0	0	1	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	94	94	94	94	94	94
Heavy Vehicles, %	10	2	2	2	7	4
Mvmt Flow	55	5	7	23	24	50
Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	87	50	75	0	-	0
Stage 1	50	-	-	-	-	-
Stage 2	37	-	-	-	-	-
Critical Hdwy	6.5	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.5	-	-	-	-	-
Critical Hdwy Stg 2	5.5	-	-	-	-	-
Follow-up Hdwy	3.59	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	895	1018	1524	-	-	-
Stage 1	952	-	-	-	-	-
Stage 2	965	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	889	1017	1523	-	-	-
Mov Cap-2 Maneuver	889	-	-	-	-	-
Stage 1	946	-	-	-	-	-
Stage 2	964	-	-	-	-	-
Approach	EB	NB	SB			
HCM Control Delay, s	9.3	1.8	0			
HCM LOS	A					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1523	-	899	-	-	
HCM Lane V/C Ratio	0.005	-	0.067	-	-	
HCM Control Delay (s)	7.4	0	9.3	-	-	
HCM Lane LOS	A	A	A	-	-	
HCM 95th %tile Q(veh)	0	-	0.2	-	-	

HCM Signalized Intersection Capacity Analysis
6: Industrial Drive/Sadler Drive & Ottawa Street

2027 Future Background
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕	↔	↔	↕	↔	↔	↕	↔	↔	↕	↔
Traffic Volume (vph)	84	418	97	31	682	61	139	50	28	46	34	85
Future Volume (vph)	84	418	97	31	682	61	139	50	28	46	34	85
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.0	6.2		5.0	6.2		6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00
Fr't	1.00	0.97		1.00	0.99		1.00	0.85	1.00	0.89		
Flt Protected	0.95	1.00		0.95	1.00		0.96	1.00	0.95	1.00		
Satd. Flow (prot)	1658	3222		1658	3275		1683	1483	1658	1558		
Flt Permitted	0.26	1.00		0.44	1.00		0.70	1.00	0.57	1.00		
Satd. Flow (perm)	453	3222		772	3275		1224	1483	991	1558		
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)	91	454	105	34	741	66	151	54	30	50	37	92
RTOR Reduction (vph)	0	17	0	0	6	0	0	0	23	0	71	0
Lane Group Flow (vph)	91	542	0	34	801	0	0	205	7	50	58	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8		8	4		
Actuated Green, G (s)	46.5	40.3		39.1	36.6		17.6	17.6	17.6	17.6		
Effective Green, g (s)	46.5	40.3		39.1	36.6		17.6	17.6	17.6	17.6		
Actuated g/C Ratio	0.60	0.52		0.50	0.47		0.23	0.23	0.23	0.23		
Clearance Time (s)	5.0	6.2		5.0	6.2		6.0	6.0	6.0	6.0		
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	367	1673		417	1544		277	336	224	353		
v/s Ratio Prot	c0.02	c0.17		0.00	c0.24					0.04		
v/s Ratio Perm				0.04			c0.17	0.00	0.05			
v/c Ratio	0.25	0.32		0.08	0.52		0.74	0.02	0.22	0.16		
Uniform Delay, d1	7.4	10.8		9.8	14.3		27.9	23.3	24.4	24.1		
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00		
Incremental Delay, d2	0.4	0.5		0.1	1.2		10.1	0.0	0.5	0.2		
Delay (s)	7.7	11.3		9.8	15.6		38.0	23.3	24.9	24.3		
Level of Service	A	B		A	B		D	C	C	C		
Approach Delay (s)		10.8			15.4		36.1			24.5		
Approach LOS		B			B		D			C		
Intersection Summary												
HCM 2000 Control Delay	17.2		HCM 2000 Level of Service				B					
HCM 2000 Volume to Capacity ratio	0.56											
Actuated Cycle Length (s)	77.6		Sum of lost time (s)				17.2					
Intersection Capacity Utilization	58.8%		ICU Level of Service				B					
Analysis Period (min)	15											
c Critical Lane Group												

MOVEMENT SUMMARY

Site: 101 [Ottawa/CR49 & Appleton/Ramsay FB2027 AM (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed	
		[Total HV]	%	[Total HV]	%				[Veh.]	Dist]					
		veh/h	%	veh/h	%	v/c	sec			m				km/h	
South: Appleton															
1	L2	All MCs	52	2.0	52	2.0	0.111	9.0	LOS A	0.4	3.0	0.43	0.59	0.43	45.3
2	T1	All MCs	8	2.0	8	2.0	0.111	3.5	LOS A	0.4	3.0	0.43	0.59	0.43	45.8
3	R2	All MCs	51	2.0	51	2.0	0.111	3.8	LOS A	0.4	3.0	0.43	0.59	0.43	45.7
Approach			110	2.0	110	2.0	0.111	6.2	LOS A	0.4	3.0	0.43	0.59	0.43	45.5
East: CR 49															
4	L2	All MCs	38	2.0	38	2.0	0.121	7.7	LOS A	0.7	4.7	0.21	0.35	0.21	46.5
5	T1	All MCs	323	2.0	323	2.0	0.121	2.3	LOS A	0.7	4.8	0.20	0.30	0.20	47.4
6	R2	All MCs	16	2.0	16	2.0	0.121	2.7	LOS A	0.7	4.8	0.20	0.26	0.20	47.4
Approach			378	2.0	378	2.0	0.121	2.8	LOS A	0.7	4.8	0.20	0.30	0.20	47.3
North: Ramsay															
7	L2	All MCs	29	2.0	29	2.0	0.059	8.8	LOS A	0.2	1.5	0.40	0.56	0.40	45.3
8	T1	All MCs	12	2.0	12	2.0	0.059	3.3	LOS A	0.2	1.5	0.40	0.56	0.40	45.9
9	R2	All MCs	19	2.0	19	2.0	0.059	3.6	LOS A	0.2	1.5	0.40	0.56	0.40	45.7
Approach			59	2.0	59	2.0	0.059	6.0	LOS A	0.2	1.5	0.40	0.56	0.40	45.5
West: Ottawa															
10	L2	All MCs	9	2.0	9	2.0	0.150	7.8	LOS A	0.8	5.7	0.23	0.29	0.23	46.9
11	T1	All MCs	414	2.0	414	2.0	0.150	2.3	LOS A	0.8	5.8	0.22	0.28	0.22	47.6
12	R2	All MCs	44	2.0	44	2.0	0.150	2.7	LOS A	0.8	5.8	0.21	0.28	0.21	47.4
Approach			467	2.0	467	2.0	0.150	2.5	LOS A	0.8	5.8	0.22	0.28	0.22	47.5
All Vehicles			1014	2.0	1014	2.0	0.150	3.2	LOS A	0.8	5.8	0.25	0.34	0.25	47.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akgelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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MOVEMENT SUMMARY

Site: 101 [Ottawa/CR49 & Appleton/Ramsay FB2027 PM (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed	
		[Total HV]	%	[Total HV]	%				[Veh.]	Dist]					
		veh/h	%	veh/h	%	v/c	sec			m				km/h	
South: Appleton															
1	L2	All MCs	74	2.0	74	2.0	0.128	8.9	LOS A	0.5	3.6	0.42	0.59	0.42	45.0
2	T1	All MCs	12	2.0	12	2.0	0.128	3.4	LOS A	0.5	3.6	0.42	0.59	0.42	45.5
3	R2	All MCs	41	2.0	41	2.0	0.128	3.7	LOS A	0.5	3.6	0.42	0.59	0.42	45.4
Approach			128	2.0	128	2.0	0.128	6.7	LOS A	0.5	3.6	0.42	0.59	0.42	45.2
East: CR 49															
4	L2	All MCs	65	2.0	65	2.0	0.240	8.0	LOS A	1.5	10.4	0.30	0.36	0.30	46.3
5	T1	All MCs	619	2.0	619	2.0	0.240	2.4	LOS A	1.5	10.7	0.29	0.32	0.29	47.2
6	R2	All MCs	47	2.0	47	2.0	0.240	2.9	LOS A	1.5	10.7	0.28	0.29	0.28	47.1
Approach			731	2.0	731	2.0	0.240	3.0	LOS A	1.5	10.7	0.29	0.32	0.29	47.1
North: Ramsay															
7	L2	All MCs	20	2.0	20	2.0	0.062	9.6	LOS A	0.2	1.7	0.51	0.62	0.51	45.2
8	T1	All MCs	15	2.0	15	2.0	0.062	4.2	LOS A	0.2	1.7	0.51	0.62	0.51	45.7
9	R2	All MCs	18	2.0	18	2.0	0.062	4.4	LOS A	0.2	1.7	0.51	0.62	0.51	45.6
Approach			53	2.0	53	2.0	0.062	6.3	LOS A	0.2	1.7	0.51	0.62	0.51	45.5
West: Ottawa															
10	L2	All MCs	18	2.0	18	2.0	0.150	7.9	LOS A	0.8	5.7	0.26	0.31	0.26	46.7
11	T1	All MCs	371	2.0	371	2.0	0.150	2.4	LOS A	0.8	5.8	0.25	0.30	0.25	47.4
12	R2	All MCs	69	2.0	69	2.0	0.150	2.8	LOS A	0.8	5.8	0.24	0.29	0.24	47.3
Approach			458	2.0	458	2.0	0.150	2.7	LOS A	0.8	5.8	0.25	0.30	0.25	47.3
All Vehicles			1369	2.0	1369	2.0	0.240	3.3	LOS A	1.5	10.7	0.29	0.35	0.29	46.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akgelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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Appendix G

2032 Future Background Synchro and Sidra Worksheets

HCM Signalized Intersection Capacity Analysis
2: Paterson Street/Menzie Street & Ottawa Street

2032 Future Background
AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔		↔	↔	↔		↔		↔		↔
Traffic Volume (vph)	1	593	75	58	431	3	89	9	89	2	14	6
Future Volume (vph)	1	593	75	58	431	3	89	9	89	2	14	6
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		6.3		6.3	6.3	6.3		6.0				6.0
Lane Util. Factor		1.00		1.00	1.00	1.00		1.00				1.00
Frbp, ped/bikes		1.00		1.00	1.00	0.97		0.99				0.99
Flpb, ped/bikes		1.00		1.00	1.00	1.00		0.99				1.00
Frt		0.98		1.00	1.00	0.85		0.94				0.96
Flt Protected		1.00		0.95	1.00	1.00		0.98				1.00
Satd. Flow (prot)		1658		1625	1664	1440		1516				1659
Flt Permitted		1.00		0.38	1.00	1.00		0.84				0.97
Satd. Flow (perm)		1658		646	1664	1440		1299				1618
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	1	638	81	62	463	3	96	10	96	2	15	6
RTOR Reduction (vph)	0	4	0	0	0	1	0	41	0	0	5	0
Lane Group Flow (vph)	0	716	0	62	463	2	0	161	0	0	18	0
Confl. Peds. (#/hr)	4		1	1		4	10		2	2		10
Confl. Bikes (#/hr)			2			2						2
Heavy Vehicles (%)	2%	5%	9%	4%	7%	2%	8%	2%	4%	2%	2%	2%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			8				4
Permitted Phases	2			6		6	8			4		
Actuated Green, G (s)		54.9		54.9	54.9	54.9		15.8				15.8
Effective Green, g (s)		54.9		54.9	54.9	54.9		15.8				15.8
Actuated g/C Ratio		0.66		0.66	0.66	0.66		0.19				0.19
Clearance Time (s)		6.3		6.3	6.3	6.3		6.0				6.0
Vehicle Extension (s)		3.0		3.0	3.0	3.0		3.0				3.0
Lane Grp Cap (vph)		1096		427	1100	952		247				308
v/s Ratio Prot					0.28							
v/s Ratio Perm		0.43		0.10		0.00		c0.12				0.01
v/c Ratio		0.65		0.15	0.42	0.00		0.65				0.06
Uniform Delay, d1		8.4		5.3	6.6	4.8		31.0				27.5
Progression Factor		1.00		1.00	1.00	1.00		1.00				1.00
Incremental Delay, d2		3.0		0.7	1.2	0.0		6.0				0.1
Delay (s)		11.4		6.0	7.8	4.8		37.1				27.6
Level of Service		B		A	A	A		D				C
Approach Delay (s)		11.4			7.5			37.1				27.6
Approach LOS		B			A			D				C

Intersection Summary			
HCM 2000 Control Delay	13.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	83.0	Sum of lost time (s)	12.3
Intersection Capacity Utilization	82.1%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM 2010 TWSC
3: Appleton Side Road (Country Road 17) & Industrial Drive

2032 Future Background
AM Peak Hour

Intersection						
Int Delay, s/veh	2.5					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔			↔	↔	
Traffic Vol, veh/h	16	21	26	69	70	17
Future Vol, veh/h	16	21	26	69	70	17
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	86	86	86	86	86	86
Heavy Vehicles, %	21	2	4	9	10	2
Mvmt Flow	19	24	30	80	81	20
Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	231	91	101	0	-	0
Stage 1	91	-	-	-	-	-
Stage 2	140	-	-	-	-	-
Critical Hdwy	6.61	6.22	4.14	-	-	-
Critical Hdwy Stg 1	5.61	-	-	-	-	-
Critical Hdwy Stg 2	5.61	-	-	-	-	-
Follow-up Hdwy	3.689	3.318	2.236	-	-	-
Pot Cap-1 Maneuver	717	967	1479	-	-	-
Stage 1	887	-	-	-	-	-
Stage 2	842	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	702	967	1479	-	-	-
Mov Cap-2 Maneuver	702	-	-	-	-	-
Stage 1	868	-	-	-	-	-
Stage 2	842	-	-	-	-	-
Approach	EB	NB	SB			
HCM Control Delay, s	9.6	2	0			
HCM LOS	A					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1479	-	831	-	-	
HCM Lane V/C Ratio	0.02	-	0.052	-	-	
HCM Control Delay (s)	7.5	0	9.6	-	-	
HCM Lane LOS	A	A	A	-	-	
HCM 95th %tile Q(veh)	0.1	-	0.2	-	-	

HCM 2010 TWSC
4: Paterson Street & Jack Dalgity Street

2032 Future Background
AM Peak Hour

Intersection						
Int Delay, s/veh	3.8					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔		↕		↔	
Traffic Vol, veh/h	37	11	10	32	34	17
Future Vol, veh/h	37	11	10	32	34	17
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	71	71	71	71	71	71
Heavy Vehicles, %	3	45	30	2	6	6
Mvmt Flow	52	15	14	45	48	24
Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	133	60	72	0	-	0
Stage 1	60	-	-	-	-	-
Stage 2	73	-	-	-	-	-
Critical Hdwy	6.43	6.65	4.4	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.705	2.47	-	-	-
Pot Cap-1 Maneuver	858	897	1368	-	-	-
Stage 1	960	-	-	-	-	-
Stage 2	947	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	849	897	1368	-	-	-
Mov Cap-2 Maneuver	849	-	-	-	-	-
Stage 1	950	-	-	-	-	-
Stage 2	947	-	-	-	-	-
Approach	EB	NB	SB			
HCM Control Delay, s	9.5	1.8	0			
HCM LOS	A					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1368	-	860	-	-	
HCM Lane V/C Ratio	0.01	-	0.079	-	-	
HCM Control Delay (s)	7.7	0	9.5	-	-	
HCM Lane LOS	A	A	A	-	-	
HCM 95th %tile Q(veh)	0	-	0.3	-	-	


HCM Signalized Intersection Capacity Analysis
6: Industrial Drive/Sadler Drive & Ottawa Street

2032 Future Background
AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔		↕		↔		↕		↔		↕	
Traffic Volume (vph)	105	431	43	19	320	51	52	31	23	56	21	88
Future Volume (vph)	105	431	43	19	320	51	52	31	23	56	21	88
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.0	6.2		5.0	6.2		6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00
Fr't	1.00	0.99		1.00	0.98		1.00	0.85	1.00	0.88		
Flt Protected	0.95	1.00		0.95	1.00		0.97	1.00	0.95	1.00		
Sat'd. Flow (prot)	1658	3270		1658	3248		1692	1483	1658	1534		
Flt Permitted	0.47	1.00		0.46	1.00		0.74	1.00	0.70	1.00		
Sat'd. Flow (perm)	818	3270		806	3248		1291	1483	1218	1534		
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)	114	468	47	21	348	55	57	34	25	61	23	96
RTOR Reduction (vph)	0	5	0	0	10	0	0	0	22	0	85	0
Lane Group Flow (vph)	114	510	0	21	393	0	0	91	3	61	34	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8		8	4		
Actuated Green, G (s)	52.2	46.8		43.8	42.6		8.8	8.8	8.8	8.8		
Effective Green, g (s)	52.2	46.8		43.8	42.6		8.8	8.8	8.8	8.8		
Actuated g/C Ratio	0.71	0.63		0.59	0.58		0.12	0.12	0.12	0.12		
Clearance Time (s)	5.0	6.2		5.0	6.2		6.0	6.0	6.0	6.0		
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	638	2068		490	1869		153	176	144	182		
v/s Ratio Prot	c0.01	c0.16		0.00	0.12						0.02	
v/s Ratio Perm	0.11			0.02			c0.07	0.00	0.05			
v/c Ratio	0.18	0.25		0.04	0.21		0.59	0.02	0.42	0.19		
Uniform Delay, d1	3.6	5.9		6.2	7.6		30.9	28.8	30.2	29.4		
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00		
Incremental Delay, d2	0.1	0.3		0.0	0.3		6.1	0.0	2.0	0.5		
Delay (s)	3.7	6.2		6.3	7.8		37.0	28.8	32.3	29.9		
Level of Service	A	A		A	A		D	C	C	C		
Approach Delay (s)		5.8			7.8		35.2			30.7		
Approach LOS		A			A		D			C		
Intersection Summary												
HCM 2000 Control Delay	12.2		HCM 2000 Level of Service				B					
HCM 2000 Volume to Capacity ratio	0.31											
Actuated Cycle Length (s)	74.0				Sum of lost time (s)				17.2			
Intersection Capacity Utilization	45.9%		ICU Level of Service				A					
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
 2: Paterson Street/Menzie Street & Ottawa Street

2032 Future Background
 PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔		↔	↔	↔		↔		↔		↔
Traffic Volume (vph)	4	596	55	70	863	11	100	8	74	7	3	5
Future Volume (vph)	4	596	55	70	863	11	100	8	74	7	3	5
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		6.3		6.3	6.3	6.3		6.0		6.0		6.0
Lane Util. Factor		1.00		1.00	1.00	1.00		1.00		1.00		1.00
Frbp, ped/bikes		1.00		1.00	1.00	0.97		0.99		0.99		0.99
Flpb, ped/bikes		1.00		1.00	1.00	1.00		0.99		1.00		1.00
Frt		0.99		1.00	1.00	0.85		0.94		0.95		0.95
Flt Protected		1.00		0.95	1.00	1.00		0.97		0.98		0.98
Satd. Flow (prot)		1702		1658	1728	1438		1583		1608		1608
Flt Permitted		1.00		0.27	1.00	1.00		0.82		0.88		0.88
Satd. Flow (perm)		1695		467	1728	1438		1335		1450		1450
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	4	627	58	74	908	12	105	8	78	7	3	5
RTOR Reduction (vph)	0	4	0	0	0	5	0	28	0	0	4	0
Lane Group Flow (vph)	0	685	0	74	908	7	0	163	0	0	11	0
Confl. Peds. (#/hr)	4		14	14		4	8		1	1		8
Confl. Bikes (#/hr)			2			3			2			2
Heavy Vehicles (%)	2%	3%	2%	2%	3%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA		Perm		NA
Protected Phases		2		1	6			8				4
Permitted Phases		2		6		6	8			4		
Actuated Green, G (s)		43.7		54.0	54.0	54.0		25.0		25.0		25.0
Effective Green, g (s)		43.7		54.0	54.0	54.0		25.0		25.0		25.0
Actuated g/C Ratio		0.48		0.59	0.59	0.59		0.27		0.27		0.27
Clearance Time (s)		6.3		6.3	6.3	6.3		6.0		6.0		6.0
Vehicle Extension (s)		3.0		3.0	3.0	3.0		3.0		3.0		3.0
Lane Grp Cap (vph)		811		328	1022	850		365		397		397
v/s Ratio Prot				0.01	c0.53							
v/s Ratio Perm		0.40		0.12		0.00		c0.12		0.01		0.01
v/c Ratio		0.85		0.23	0.89	0.01		0.45		0.03		0.03
Uniform Delay, d1		20.8		10.9	16.1	7.7		27.4		24.3		24.3
Progression Factor		1.00		1.00	1.00	1.00		1.00		1.00		1.00
Incremental Delay, d2		10.5		0.4	11.4	0.0		0.9		0.1		0.1
Delay (s)		31.4		11.2	27.5	7.7		28.3		24.4		24.4
Level of Service		C		B	C	A		C		C		C
Approach Delay (s)		31.4		26.0				28.3		24.4		24.4
Approach LOS		C		C				C		C		C

Intersection Summary			
HCM 2000 Control Delay	28.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	91.3	Sum of lost time (s)	18.6
Intersection Capacity Utilization	87.3%	ICU Level of Service	E
Analysis Period (min)	15		

HCM 2010 TWSC
 3: Appleton Side Road (Country Road 17) & Industrial Drive

2032 Future Background
 PM Peak Hour

Intersection						
Int Delay, s/veh	2					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔			↔	↔	
Traffic Vol, veh/h	16	22	36	89	126	30
Future Vol, veh/h	16	22	36	89	126	30
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	96	96	96	96	96	96
Heavy Vehicles, %	2	5	3	7	12	4
Mvmt Flow	17	23	38	93	131	31

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	316	147	162
Stage 1	147	-	-
Stage 2	169	-	-
Critical Hdwy	6.42	6.25	4.13
Critical Hdwy Stg 1	5.42	-	-
Critical Hdwy Stg 2	5.42	-	-
Follow-up Hdwy	3.518	3.345	2.227
Pot Cap-1 Maneuver	677	892	1411
Stage 1	880	-	-
Stage 2	861	-	-
Platoon blocked, %			
Mov Cap-1 Maneuver	658	892	1411
Mov Cap-2 Maneuver	658	-	-
Stage 1	855	-	-
Stage 2	861	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.9	2.2	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1411	-	776	-	-
HCM Lane V/C Ratio	0.027	-	0.051	-	-
HCM Control Delay (s)	7.6	0	9.9	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0.1	-	0.2	-	-

HCM 2010 TWSC
4: Paterson Street & Jack Dalgity Street

2032 Future Background
PM Peak Hour

Intersection						
Int Delay, s/veh	3.3					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔
Traffic Vol, veh/h	52	5	7	34	32	47
Future Vol, veh/h	52	5	7	34	32	47
Conflicting Peds, #/hr	0	0	1	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	94	94	94	94	94	94
Heavy Vehicles, %	10	2	2	2	7	4
Mvmt Flow	55	5	7	36	34	50
Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	110	60	85	0	-	0
Stage 1	60	-	-	-	-	-
Stage 2	50	-	-	-	-	-
Critical Hdwy	6.5	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.5	-	-	-	-	-
Critical Hdwy Stg 2	5.5	-	-	-	-	-
Follow-up Hdwy	3.59	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	868	1005	1512	-	-	-
Stage 1	943	-	-	-	-	-
Stage 2	952	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	862	1004	1511	-	-	-
Mov Cap-2 Maneuver	862	-	-	-	-	-
Stage 1	937	-	-	-	-	-
Stage 2	951	-	-	-	-	-
Approach	EB	NB	SB			
HCM Control Delay, s	9.4	1.3	0			
HCM LOS	A					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1511	-	873	-	-	
HCM Lane V/C Ratio	0.005	-	0.069	-	-	
HCM Control Delay (s)	7.4	0	9.4	-	-	
HCM Lane LOS	A	A	A	-	-	
HCM 95th %tile Q(veh)	0	-	0.2	-	-	

HCM Signalized Intersection Capacity Analysis
6: Industrial Drive/Sadler Drive & Ottawa Street

2032 Future Background
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕	↔	↔	↕	↔	↔	↕	↔	↔	↕	↔
Traffic Volume (vph)	84	450	97	31	735	61	139	50	28	46	34	85
Future Volume (vph)	84	450	97	31	735	61	139	50	28	46	34	85
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.0	6.2		5.0	6.2		6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00
Fr't	1.00	0.97		1.00	0.99		1.00	0.85	1.00	0.89		
Flt Protected	0.95	1.00		0.95	1.00		0.96	1.00	0.95	1.00		
Satd. Flow (prot)	1658	3228		1658	3278		1683	1483	1658	1558		
Flt Permitted	0.23	1.00		0.43	1.00		0.70	1.00	0.57	1.00		
Satd. Flow (perm)	410	3228		746	3278		1224	1483	992	1558		
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)	91	489	105	34	799	66	151	54	30	50	37	92
RTOR Reduction (vph)	0	15	0	0	6	0	0	0	23	0	71	0
Lane Group Flow (vph)	91	579	0	34	859	0	205	7	50	58	0	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	5	2		1	6		8	8	8	4	4	
Permitted Phases	2			6			8		8	4		
Actuated Green, G (s)	46.5	40.3		39.1	36.6		17.7	17.7	17.7	17.7		
Effective Green, g (s)	46.5	40.3		39.1	36.6		17.7	17.7	17.7	17.7		
Actuated g/C Ratio	0.60	0.52		0.50	0.47		0.23	0.23	0.23	0.23		
Clearance Time (s)	5.0	6.2		5.0	6.2		6.0	6.0	6.0	6.0		
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	344	1674		404	1544		278	337	225	354		
v/s Ratio Prot	c0.02	c0.18		0.00	c0.26					0.04		
v/s Ratio Perm				0.04			c0.17	0.00	0.05			
v/c Ratio	0.26	0.35		0.08	0.56		0.74	0.02	0.22	0.16		
Uniform Delay, d1	7.6	11.0		9.8	14.7		27.8	23.3	24.4	24.1		
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00		
Incremental Delay, d2	0.4	0.6		0.1	1.5		9.8	0.0	0.5	0.2		
Delay (s)	8.0	11.5		9.9	16.2		37.6	23.3	24.9	24.3		
Level of Service	A	B		A	B		D	C	C	C		
Approach Delay (s)		11.1			15.9		35.8			24.5		
Approach LOS		B			B		D			C		
Intersection Summary												
HCM 2000 Control Delay	17.4		HCM 2000 Level of Service				B					
HCM 2000 Volume to Capacity ratio	0.58											
Actuated Cycle Length (s)	77.7		Sum of lost time (s)				17.2					
Intersection Capacity Utilization	60.3%		ICU Level of Service				B					
Analysis Period (min)	15											
c Critical Lane Group												

MOVEMENT SUMMARY

Site: 101 [Ottawa/CR49 & Appleton/Ramsay FB2032 AM (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed	
		[Total HV]	%	[Total HV]	%				[Veh.]	Dist]					
		veh/h	%	veh/h	%	v/c	sec			m				km/h	
South: Appleton															
1	L2	All MCs	56	2.0	56	2.0	0.123	9.1	LOS A	0.5	3.4	0.45	0.60	0.45	45.2
2	T1	All MCs	8	2.0	8	2.0	0.123	3.6	LOS A	0.5	3.4	0.45	0.60	0.45	45.8
3	R2	All MCs	55	2.0	55	2.0	0.123	3.9	LOS A	0.5	3.4	0.45	0.60	0.45	45.6
Approach			119	2.0	119	2.0	0.123	6.3	LOS A	0.5	3.4	0.45	0.60	0.45	45.4
East: CR 49															
4	L2	All MCs	42	2.0	42	2.0	0.131	7.8	LOS A	0.7	5.2	0.22	0.35	0.22	46.4
5	T1	All MCs	348	2.0	348	2.0	0.131	2.3	LOS A	0.7	5.3	0.22	0.30	0.22	47.4
6	R2	All MCs	16	2.0	16	2.0	0.131	2.7	LOS A	0.7	5.3	0.21	0.27	0.21	47.4
Approach			407	2.0	407	2.0	0.131	2.9	LOS A	0.7	5.3	0.22	0.30	0.22	47.3
North: Ramsay															
7	L2	All MCs	29	2.0	29	2.0	0.060	8.9	LOS A	0.2	1.6	0.41	0.57	0.41	45.3
8	T1	All MCs	12	2.0	12	2.0	0.060	3.4	LOS A	0.2	1.6	0.41	0.57	0.41	45.8
9	R2	All MCs	19	2.0	19	2.0	0.060	3.7	LOS A	0.2	1.6	0.41	0.57	0.41	45.6
Approach			59	2.0	59	2.0	0.060	6.1	LOS A	0.2	1.6	0.41	0.57	0.41	45.5
West: Ottawa															
10	L2	All MCs	9	2.0	9	2.0	0.162	7.8	LOS A	0.9	6.2	0.23	0.29	0.23	46.9
11	T1	All MCs	446	2.0	446	2.0	0.162	2.3	LOS A	0.9	6.3	0.22	0.28	0.22	47.5
12	R2	All MCs	47	2.0	47	2.0	0.162	2.8	LOS A	0.9	6.3	0.22	0.28	0.22	47.4
Approach			502	2.0	502	2.0	0.162	2.5	LOS A	0.9	6.3	0.22	0.28	0.22	47.5
All Vehicles			1087	2.0	1087	2.0	0.162	3.2	LOS A	0.9	6.3	0.26	0.34	0.26	47.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akgelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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Project: C:\Users\MichelleChen\CGH TRANSPORTATION\CGH Working - Documents\Projects\2022-142 Houchaimi Mill Valley Estates\DATA\Sidra\2022-142 Sidra 2022-11-22.sip9

MOVEMENT SUMMARY

Site: 101 [Ottawa/CR49 & Appleton/Ramsay FB2032 PM (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed	
		[Total HV]	%	[Total HV]	%				[Veh.]	Dist]					
		veh/h	%	veh/h	%	v/c	sec			m				km/h	
South: Appleton															
1	L2	All MCs	80	2.0	80	2.0	0.140	9.0	LOS A	0.6	3.9	0.44	0.60	0.44	45.0
2	T1	All MCs	12	2.0	12	2.0	0.140	3.5	LOS A	0.6	3.9	0.44	0.60	0.44	45.5
3	R2	All MCs	44	2.0	44	2.0	0.140	3.8	LOS A	0.6	3.9	0.44	0.60	0.44	45.3
Approach			137	2.0	137	2.0	0.140	6.8	LOS A	0.6	3.9	0.44	0.60	0.44	45.1
East: CR 49															
4	L2	All MCs	70	2.0	70	2.0	0.259	8.0	LOS A	1.6	11.4	0.31	0.36	0.31	46.2
5	T1	All MCs	666	2.0	666	2.0	0.259	2.5	LOS A	1.7	11.8	0.30	0.32	0.30	47.1
6	R2	All MCs	47	2.0	47	2.0	0.259	2.9	LOS A	1.7	11.8	0.29	0.29	0.29	47.1
Approach			784	2.0	784	2.0	0.259	3.0	LOS A	1.7	11.8	0.30	0.32	0.30	47.0
North: Ramsay															
7	L2	All MCs	20	2.0	20	2.0	0.064	9.8	LOS A	0.2	1.7	0.53	0.64	0.53	45.1
8	T1	All MCs	15	2.0	15	2.0	0.064	4.3	LOS A	0.2	1.7	0.53	0.64	0.53	45.7
9	R2	All MCs	18	2.0	18	2.0	0.064	4.6	LOS A	0.2	1.7	0.53	0.64	0.53	45.5
Approach			53	2.0	53	2.0	0.064	6.4	LOS A	0.2	1.7	0.53	0.64	0.53	45.4
West: Ottawa															
10	L2	All MCs	18	2.0	18	2.0	0.162	7.9	LOS A	0.9	6.2	0.27	0.32	0.27	46.7
11	T1	All MCs	399	2.0	399	2.0	0.162	2.4	LOS A	0.9	6.3	0.26	0.31	0.26	47.4
12	R2	All MCs	74	2.0	74	2.0	0.162	2.8	LOS A	0.9	6.3	0.25	0.30	0.25	47.2
Approach			491	2.0	491	2.0	0.162	2.7	LOS A	0.9	6.3	0.26	0.31	0.26	47.3
All Vehicles			1464	2.0	1464	2.0	0.259	3.4	LOS A	1.7	11.8	0.31	0.35	0.31	46.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akgelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

SIDRA INTERSECTION 9.1 | Copyright © 2000-2023 Kcelik and Associates Pty Ltd | sidrasolutions.com
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Appendix H

2027 Future Total Synchro and Sidra Worksheets

HCM Signalized Intersection Capacity Analysis
 2: Paterson Street/Menzie Street & Ottawa Street

2027 Future Total
 AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔		↔	↔	↔		↔		↔		↔
Traffic Volume (vph)	1	564	88	54	444	3	137	9	83	2	14	6
Future Volume (vph)	1	564	88	54	444	3	137	9	83	2	14	6
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		6.3		6.3	6.3	6.3		6.0				6.0
Lane Util. Factor		1.00		1.00	1.00	1.00		1.00				1.00
Frbp, ped/bikes		1.00		1.00	1.00	0.97		0.99				0.99
Flpb, ped/bikes		1.00		1.00	1.00	1.00		0.99				1.00
Frt		0.98		1.00	1.00	0.85		0.95				0.96
Flt Protected		1.00		0.95	1.00	1.00		0.97				1.00
Satd. Flow (prot)		1650		1625	1664	1440		1524				1659
Flt Permitted		1.00		0.37	1.00	1.00		0.80				0.97
Satd. Flow (perm)		1650		640	1664	1440		1261				1620
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	1	606	95	58	477	3	147	10	89	2	15	6
RTOR Reduction (vph)	0	6	0	0	0	1	0	25	0	0	5	0
Lane Group Flow (vph)	0	696	0	58	477	2	0	221	0	0	18	0
Confl. Peds. (#/hr)	4		1	1		4	10		2	2		10
Confl. Bikes (#/hr)			2			2						2
Heavy Vehicles (%)	2%	5%	9%	4%	7%	2%	8%	2%	4%	2%	2%	2%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			8				4
Permitted Phases	2			6		6	8			4		
Actuated Green, G (s)		53.2		53.2	53.2	53.2		19.0				19.0
Effective Green, g (s)		53.2		53.2	53.2	53.2		19.0				19.0
Actuated g/C Ratio		0.63		0.63	0.63	0.63		0.22				0.22
Clearance Time (s)		6.3		6.3	6.3	6.3		6.0				6.0
Vehicle Extension (s)		3.0		3.0	3.0	3.0		3.0				3.0
Lane Grp Cap (vph)		1038		402	1047	906		283				364
v/s Ratio Prot					0.29							
v/s Ratio Perm		0.42		0.09		0.00		c0.18				0.01
v/c Ratio		0.67		0.14	0.46	0.00		0.78				0.05
Uniform Delay, d1		10.0		6.4	8.1	5.8		30.8				25.7
Progression Factor		1.00		1.00	1.00	1.00		1.00				1.00
Incremental Delay, d2		3.5		0.8	1.4	0.0		13.1				0.1
Delay (s)		13.5		7.1	9.6	5.8		43.9				25.7
Level of Service		B		A	A	A		D				C
Approach Delay (s)		13.5			9.3			43.9				25.7
Approach LOS		B			A			D				C

Intersection Summary			
HCM 2000 Control Delay	17.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	84.5	Sum of lost time (s)	12.3
Intersection Capacity Utilization	83.6%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM 2010 TWSC
 3: Appleton Side Road (Country Road 17) & Industrial Drive

2027 Future Total
 AM Peak Hour

Intersection						
Int Delay, s/veh	1.8					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔			↔	↔	
Traffic Vol, veh/h	16	21	26	147	92	17
Future Vol, veh/h	16	21	26	147	92	17
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	86	86	86	86	86	86
Heavy Vehicles, %	21	2	4	9	10	2
Mvmt Flow	19	24	30	171	107	20
Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	348	117	127	0	-	0
Stage 1	117	-	-	-	-	-
Stage 2	231	-	-	-	-	-
Critical Hdwy	6.61	6.22	4.14	-	-	-
Critical Hdwy Stg 1	5.61	-	-	-	-	-
Critical Hdwy Stg 2	5.61	-	-	-	-	-
Follow-up Hdwy	3.689	3.318	2.236	-	-	-
Pot Cap-1 Maneuver	612	935	1447	-	-	-
Stage 1	863	-	-	-	-	-
Stage 2	765	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	598	935	1447	-	-	-
Mov Cap-2 Maneuver	598	-	-	-	-	-
Stage 1	843	-	-	-	-	-
Stage 2	765	-	-	-	-	-
Approach	EB	NB	SB			
HCM Control Delay, s	10.1	1.1	0			
HCM LOS	B					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1447	-	752	-	-	
HCM Lane V/C Ratio	0.021	-	0.057	-	-	
HCM Control Delay (s)	7.5	0	10.1	-	-	
HCM Lane LOS	A	A	B	-	-	
HCM 95th %tile Q(veh)	0.1	-	0.2	-	-	

HCM 2010 TWSC
4: Paterson Street & Jack Dalgity Street/Access #1

2027 Future Total
AM Peak Hour

Intersection												
Int Delay, s/veh	5.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕		↕	↕			↕		↕	↕	
Traffic Vol, veh/h	37	0	11	11	0	54	10	20	4	18	25	17
Future Vol, veh/h	37	0	11	11	0	54	10	20	4	18	25	17
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	71	93	71	93	93	93	71	71	93	93	71	71
Heavy Vehicles, %	3	2	45	2	2	2	30	2	2	2	6	6
Mvmt Flow	52	0	15	12	0	58	14	28	4	19	35	24

Major/Minor	Minor2	Minor1	Major1	Major2										
Conflicting Flow All	172	145	47	151	155	30	59	0	0	32	0	0		
Stage 1	85	85	-	58	58	-	-	-	-	-	-	-		
Stage 2	87	60	-	93	97	-	-	-	-	-	-	-		
Critical Hdwy	7.13	6.52	6.65	7.12	6.52	6.22	4.4	-	-	4.12	-	-		
Critical Hdwy Stg 1	6.13	5.52	-	6.12	5.52	-	-	-	-	-	-	-		
Critical Hdwy Stg 2	6.13	5.52	-	6.12	5.52	-	-	-	-	-	-	-		
Follow-up Hdwy	3.527	4.018	3.705	3.518	4.018	3.318	2.47	-	-	2.218	-	-		
Pot Cap-1 Maneuver	789	746	913	816	737	1044	1384	-	-	1580	-	-		
Stage 1	920	824	-	954	847	-	-	-	-	-	-	-		
Stage 2	918	845	-	914	815	-	-	-	-	-	-	-		
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-		
Mov Cap-1 Maneuver	733	730	913	789	721	1044	1384	-	-	1580	-	-		
Mov Cap-2 Maneuver	733	730	-	789	721	-	-	-	-	-	-	-		
Stage 1	911	814	-	944	839	-	-	-	-	-	-	-		
Stage 2	858	837	-	888	805	-	-	-	-	-	-	-		

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.1	8.9	2.3	1.8
HCM LOS	B	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1384	-	-	768	990	1580	-	-
HCM Lane V/C Ratio	0.01	-	-	0.088	0.071	0.012	-	-
HCM Control Delay (s)	7.6	0	-	10.1	8.9	7.3	0	-
HCM Lane LOS	A	A	-	B	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.3	0.2	0	-	-

HCM 2010 TWSC
5: Appleton Side Road (Country Road 17) & Access #2

2027 Future Total
AM Peak Hour

Intersection						
Int Delay, s/veh	3.7					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↕			↕	↕	
Traffic Vol, veh/h	86	22	7	87	85	28
Future Vol, veh/h	86	22	7	87	85	28
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	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	92	24	8	94	91	30

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	216	106	121	0	-	0
Stage 1	106	-	-	-	-	-
Stage 2	110	-	-	-	-	-
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	772	948	1467	-	-	-
Stage 1	918	-	-	-	-	-
Stage 2	915	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	767	948	1467	-	-	-
Mov Cap-2 Maneuver	767	-	-	-	-	-
Stage 1	912	-	-	-	-	-
Stage 2	915	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.3	0.6	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1467	-	798	-	-
HCM Lane V/C Ratio	0.005	-	0.146	-	-
HCM Control Delay (s)	7.5	0	10.3	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.5	-	-

HCM Signalized Intersection Capacity Analysis
6: Industrial Drive/Sadler Drive & Ottawa Street

2027 Future Total
AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕	↔	↔	↕	↔	↔	↕	↔	↔	↕	↔
Traffic Volume (vph)	105	404	54	23	308	51	84	31	34	56	21	88
Future Volume (vph)	105	404	54	23	308	51	84	31	34	56	21	88
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.0	6.2		5.0	6.2		6.0	6.0	6.0	6.0		6.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00	1.00	1.00		1.00
Frnt	1.00	0.98		1.00	0.98		1.00	0.85	1.00	0.88		0.88
Flt Protected	0.95	1.00		0.95	1.00		0.96	1.00	0.95	1.00		1.00
Satd. Flow (prot)	1658	3257		1658	3246		1684	1483	1658	1534		1534
Flt Permitted	0.49	1.00		0.47	1.00		0.71	1.00	0.68	1.00		1.00
Satd. Flow (perm)	849	3257		819	3246		1239	1483	1181	1534		1534
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)	114	439	59	25	335	55	91	34	37	61	23	96
RTOR Reduction (vph)	0	8	0	0	11	0	0	0	32	0	83	0
Lane Group Flow (vph)	114	490	0	25	379	0	0	125	5	61	36	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8		8	4		
Actuated Green, G (s)	50.3	44.9		44.3	41.9		10.5	10.5	10.5	10.5		
Effective Green, g (s)	50.3	44.9		44.3	41.9		10.5	10.5	10.5	10.5		
Actuated g/C Ratio	0.67	0.60		0.59	0.56		0.14	0.14	0.14	0.14		
Clearance Time (s)	5.0	6.2		5.0	6.2		6.0	6.0	6.0	6.0		
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	627	1949		510	1813		173	207	165	214		
v/s Ratio Prot	c0.01	c0.15		0.00	0.12					0.02		
v/s Ratio Perm	0.11			0.03			c0.10	0.00	0.05			
v/c Ratio	0.18	0.25		0.05	0.21		0.72	0.03	0.37	0.17		
Uniform Delay, d1	4.4	7.1		6.4	8.3		30.9	27.8	29.2	28.4		
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00		
Incremental Delay, d2	0.1	0.3		0.0	0.3		13.9	0.0	1.4	0.4		
Delay (s)	4.6	7.4		6.4	8.5		44.7	27.9	30.6	28.8		
Level of Service	A	A		A	A		D	C	C	C		
Approach Delay (s)		6.9			8.4			40.9		29.4		
Approach LOS		A			A			D		C		
Intersection Summary												
HCM 2000 Control Delay		14.3					HCM 2000 Level of Service			B		
HCM 2000 Volume to Capacity ratio		0.34										
Actuated Cycle Length (s)		75.0					Sum of lost time (s)			17.2		
Intersection Capacity Utilization		45.4%					ICU Level of Service			A		
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
2: Paterson Street/Menzie Street & Ottawa Street

2027 Future Total
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕		↔	↕	↔		↕	↔	↔	↕	
Traffic Volume (vph)	4	601	111	65	829	11	128	8	69	7	3	5
Future Volume (vph)	4	601	111	65	829	11	128	8	69	7	3	5
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		6.3		6.3	6.3	6.3		6.0			6.0	
Lane Util. Factor		1.00		1.00	1.00	1.00		1.00			1.00	
Frnt		0.99		1.00	1.00	0.97		1.00			0.99	
Flt Protected		1.00		1.00	1.00	1.00		0.99			1.00	
Satd. Flow (prot)		1680		1658	1728	1438		1593			1608	
Flt Permitted		1.00		0.24	1.00	1.00		0.80			0.88	
Satd. Flow (perm)		1674		423	1728	1438		1316			1441	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	4	633	117	68	873	12	135	8	73	7	3	5
RTOR Reduction (vph)	0	7	0	0	0	5	0	20	0	0	4	0
Lane Group Flow (vph)	0	747	0	68	873	7	0	196	0	0	11	0
Confl. Peds. (#/hr)	4		14	14		4	8		1	1		8
Confl. Bikes (#/hr)			2			3			2			2
Heavy Vehicles (%)	2%	3%	2%	2%	3%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2		1	6			8			4	
Permitted Phases	2			6		6	8			4		
Actuated Green, G (s)		43.7		54.0	54.0	54.0		25.0			25.0	
Effective Green, g (s)		43.7		54.0	54.0	54.0		25.0			25.0	
Actuated g/C Ratio		0.48		0.59	0.59	0.59		0.27			0.27	
Clearance Time (s)		6.3		6.3	6.3	6.3		6.0			6.0	
Vehicle Extension (s)		3.0		3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)		801		304	1022	850		360			394	
v/s Ratio Prot				0.01	c0.51							
v/s Ratio Perm		c0.45		0.12		0.00		c0.15			0.01	
v/c Ratio		0.93		0.22	0.85	0.01		0.54			0.03	
Uniform Delay, d1		22.4		11.2	15.4	7.7		28.3			24.3	
Progression Factor		1.00		1.00	1.00	1.00		1.00			1.00	
Incremental Delay, d2		19.0		0.4	9.1	0.0		1.7			0.1	
Delay (s)		41.4		11.6	24.5	7.7		30.0			24.4	
Level of Service		D		B	C	A		C			C	
Approach Delay (s)		41.4			23.3			30.0			24.4	
Approach LOS		D			C			C			C	
Intersection Summary												
HCM 2000 Control Delay		31.1					HCM 2000 Level of Service			C		
HCM 2000 Volume to Capacity ratio		0.84										
Actuated Cycle Length (s)		91.3					Sum of lost time (s)			18.6		
Intersection Capacity Utilization		85.8%					ICU Level of Service			E		
Analysis Period (min)		15										
c Critical Lane Group												

HCM 2010 TWSC
3: Appleton Side Road (Country Road 17) & Industrial Drive

2027 Future Total
PM Peak Hour

Intersection						
Int Delay, s/veh	1.5					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔			↕	↕	
Traffic Vol, veh/h	16	22	36	136	212	30
Future Vol, veh/h	16	22	36	136	212	30
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	96	96	96	96	96	96
Heavy Vehicles, %	2	5	3	7	12	4
Mvmt Flow	17	23	38	142	221	31

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	455	237	252
Stage 1	237	-	-
Stage 2	218	-	-
Critical Hdwy	6.42	6.25	4.13
Critical Hdwy Stg 1	5.42	-	-
Critical Hdwy Stg 2	5.42	-	-
Follow-up Hdwy	3.518	3.345	2.227
Pot Cap-1 Maneuver	563	795	1307
Stage 1	802	-	-
Stage 2	818	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	545	795	1307
Mov Cap-2 Maneuver	545	-	-
Stage 1	776	-	-
Stage 2	818	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.7	1.6	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1307	-	666	-	-
HCM Lane V/C Ratio	0.029	-	0.059	-	-
HCM Control Delay (s)	7.8	0	10.7	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.2	-	-

HCM 2010 TWSC
4: Paterson Street & Jack Dalgity Street/Access #1

2027 Future Total
PM Peak Hour

Intersection												
Int Delay, s/veh	5.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	52	0	5	7	0	35	7	22	12	60	23	47
Future Vol, veh/h	52	0	5	7	0	35	7	22	12	60	23	47
Conflicting Peds, #/hr	0	0	0	0	0	0	1	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	93	94	93	93	93	94	94	93	93	94	94
Heavy Vehicles, %	10	2	2	2	2	2	2	2	2	2	7	4
Mvmt Flow	55	0	5	8	0	38	7	23	13	65	24	50

Major/Minor	Minor2	Minor1	Major1	Major2
Conflicting Flow All	243	230	50	226
Stage 1	180	180	-	44
Stage 2	63	50	-	182
Critical Hdwy	7.2	6.52	6.22	7.12
Critical Hdwy Stg 1	6.2	5.52	-	6.12
Critical Hdwy Stg 2	6.2	5.52	-	6.12
Follow-up Hdwy	3.59	4.018	3.318	3.518
Pot Cap-1 Maneuver	695	670	1018	729
Stage 1	803	750	-	970
Stage 2	928	853	-	820
Platoon blocked, %	-	-	-	-
Mov Cap-1 Maneuver	645	637	1017	698
Mov Cap-2 Maneuver	645	637	-	698
Stage 1	798	717	-	965
Stage 2	890	849	-	781

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.9	8.9	1.3	3.4
HCM LOS	B	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1523	-	-	666	964	1575	-	-
HCM Lane V/C Ratio	0.005	-	-	0.091	0.047	0.041	-	-
HCM Control Delay (s)	7.4	0	-	10.9	8.9	7.4	0	-
HCM Lane LOS	A	A	-	B	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.3	0.1	0.1	-	-

HCM 2010 TWSC
5: Appleton Side Road (Country Road 17) & Access #2

2027 Future Total
PM Peak Hour

Intersection						
Int Delay, s/veh	2.2					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔			↕	↕	
Traffic Vol, veh/h	56	14	24	116	138	96
Future Vol, veh/h	56	14	24	116	138	96
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	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	60	15	26	125	148	103
Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	377	200	251	0	-	0
Stage 1	200	-	-	-	-	-
Stage 2	177	-	-	-	-	-
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	625	841	1314	-	-	-
Stage 1	834	-	-	-	-	-
Stage 2	854	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	612	841	1314	-	-	-
Mov Cap-2 Maneuver	612	-	-	-	-	-
Stage 1	816	-	-	-	-	-
Stage 2	854	-	-	-	-	-
Approach	EB	NB	SB			
HCM Control Delay, s	11.3	1.3	0			
HCM LOS	B					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1314	-	647	-	-	
HCM Lane V/C Ratio	0.02	-	0.116	-	-	
HCM Control Delay (s)	7.8	0	11.3	-	-	
HCM Lane LOS	A	A	B	-	-	
HCM 95th %tile Q(veh)	0.1	-	0.4	-	-	

HCM Signalized Intersection Capacity Analysis
6: Industrial Drive/Sadler Drive & Ottawa Street

2027 Future Total
PM Peak Hour

	↔	↔	↔	↕	↕	↕	↕	↕	↕	↕	↕	↕
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕		↔	↕		↕	↕	↕	↕	↕	↕
Traffic Volume (vph)	84	430	133	43	689	61	160	50	35	46	34	85
Future Volume (vph)	84	430	133	43	689	61	160	50	35	46	34	85
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.0	6.2		5.0	6.2		6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00
Fr't	1.00	0.96		1.00	0.99		1.00	0.85	1.00	0.89		
Flt Protected	0.95	1.00		0.95	1.00		0.96	1.00	0.95	1.00		
Satd. Flow (prot)	1658	3198		1658	3275		1681	1483	1658	1558		
Flt Permitted	0.26	1.00		0.42	1.00		0.69	1.00	0.54	1.00		
Satd. Flow (perm)	451	3198		725	3275		1211	1483	936	1558		
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)	91	467	145	47	749	66	174	54	38	50	37	92
RTOR Reduction (vph)	0	27	0	0	6	0	0	0	29	0	69	0
Lane Group Flow (vph)	91	585	0	47	809	0	228	9	50	60	0	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	5	2		1	6		8		8		4	
Permitted Phases	2			6			8		8		4	
Actuated Green, G (s)	43.6	37.5		39.2	35.3		19.3	19.3	19.3	19.3		
Effective Green, g (s)	43.6	37.5		39.2	35.3		19.3	19.3	19.3	19.3		
Actuated g/C Ratio	0.56	0.48		0.50	0.45		0.25	0.25	0.25	0.25		
Clearance Time (s)	5.0	6.2		5.0	6.2		6.0	6.0	6.0	6.0		
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	346	1539		411	1484		300	367	231	386		
v/s Ratio Prot	c0.02	0.18		0.01	c0.25						0.04	
v/s Ratio Perm	0.13			0.05			c0.19	0.01	0.05			
v/c Ratio	0.26	0.38		0.11	0.55		0.76	0.03	0.22	0.15		
Uniform Delay, d1	8.6	12.8		9.9	15.5		27.2	22.2	23.3	22.9		
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00		
Incremental Delay, d2	0.4	0.7		0.1	1.4		10.8	0.0	0.5	0.2		
Delay (s)	9.1	13.5		10.0	16.9		37.9	22.2	23.8	23.1		
Level of Service	A	B		B	B		D	C	C	C		
Approach Delay (s)		13.0			16.5		35.7			23.3		
Approach LOS		B			B		D			C		
Intersection Summary												
HCM 2000 Control Delay	18.4		HCM 2000 Level of Service				B					
HCM 2000 Volume to Capacity ratio	0.58											
Actuated Cycle Length (s)	77.9				Sum of lost time (s)				17.2			
Intersection Capacity Utilization	60.2%		ICU Level of Service				B					
Analysis Period (min)	15											
c Critical Lane Group												

MOVEMENT SUMMARY

Site: 101 [Ottawa/CR49 & Appleton/Ramsay FT2027 AM (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed	
		[Total HV]	%	[Total HV]	%				[Veh.]	Dist]					
		veh/h	%	veh/h	%	v/c	sec			m				km/h	
South: Appleton															
1	L2	All MCs	64	2.0	64	2.0	0.210	9.2	LOS A	0.9	6.2	0.47	0.58	0.47	45.6
2	T1	All MCs	8	2.0	8	2.0	0.210	3.7	LOS A	0.9	6.2	0.47	0.58	0.47	46.1
3	R2	All MCs	133	2.0	133	2.0	0.210	4.0	LOS A	0.9	6.2	0.47	0.58	0.47	46.0
Approach			204	2.0	204	2.0	0.210	5.6	LOS A	0.9	6.2	0.47	0.58	0.47	45.8
East: CR 49															
4	L2	All MCs	66	2.0	66	2.0	0.133	7.8	LOS A	0.7	5.3	0.24	0.40	0.24	46.1
5	T1	All MCs	327	2.0	327	2.0	0.133	2.3	LOS A	0.8	5.4	0.23	0.32	0.23	47.2
6	R2	All MCs	16	2.0	16	2.0	0.133	2.7	LOS A	0.8	5.4	0.22	0.27	0.22	47.4
Approach			410	2.0	410	2.0	0.133	3.2	LOS A	0.8	5.4	0.23	0.33	0.23	47.0
North: Ramsay															
7	L2	All MCs	29	2.0	29	2.0	0.061	8.9	LOS A	0.2	1.6	0.42	0.58	0.42	45.3
8	T1	All MCs	12	2.0	12	2.0	0.061	3.5	LOS A	0.2	1.6	0.42	0.58	0.42	45.8
9	R2	All MCs	19	2.0	19	2.0	0.061	3.7	LOS A	0.2	1.6	0.42	0.58	0.42	45.6
Approach			59	2.0	59	2.0	0.061	6.2	LOS A	0.2	1.6	0.42	0.58	0.42	45.5
West: Ottawa															
10	L2	All MCs	9	2.0	9	2.0	0.159	7.9	LOS A	0.8	6.0	0.26	0.30	0.26	46.8
11	T1	All MCs	426	2.0	426	2.0	0.159	2.4	LOS A	0.9	6.1	0.25	0.30	0.25	47.4
12	R2	All MCs	48	2.0	48	2.0	0.159	2.8	LOS A	0.9	6.1	0.24	0.29	0.24	47.3
Approach			484	2.0	484	2.0	0.159	2.6	LOS A	0.9	6.1	0.25	0.29	0.25	47.4
All Vehicles			1157	2.0	1157	2.0	0.210	3.5	LOS A	0.9	6.2	0.29	0.37	0.29	46.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akgelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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MOVEMENT SUMMARY

Site: 101 [Ottawa/CR49 & Appleton/Ramsay FT2027 PM (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed	
		[Total HV]	%	[Total HV]	%				[Veh.]	Dist]					
		veh/h	%	veh/h	%	v/c	sec			m				km/h	
South: Appleton															
1	L2	All MCs	81	2.0	81	2.0	0.189	9.0	LOS A	0.8	5.7	0.46	0.58	0.46	45.3
2	T1	All MCs	12	2.0	12	2.0	0.189	3.5	LOS A	0.8	5.7	0.46	0.58	0.46	45.9
3	R2	All MCs	92	2.0	92	2.0	0.189	3.8	LOS A	0.8	5.7	0.46	0.58	0.46	45.7
Approach			186	2.0	186	2.0	0.189	6.1	LOS A	0.8	5.7	0.46	0.58	0.46	45.5
East: CR 49															
4	L2	All MCs	152	2.0	152	2.0	0.274	8.0	LOS A	1.7	12.4	0.32	0.43	0.32	45.7
5	T1	All MCs	631	2.0	631	2.0	0.274	2.5	LOS A	1.8	12.7	0.31	0.34	0.31	46.9
6	R2	All MCs	47	2.0	47	2.0	0.274	2.9	LOS A	1.8	12.7	0.30	0.29	0.30	47.1
Approach			830	2.0	830	2.0	0.274	3.5	LOS A	1.8	12.7	0.31	0.35	0.31	46.7
North: Ramsay															
7	L2	All MCs	20	2.0	20	2.0	0.065	9.9	LOS A	0.2	1.8	0.54	0.65	0.54	45.1
8	T1	All MCs	15	2.0	15	2.0	0.065	4.4	LOS A	0.2	1.8	0.54	0.65	0.54	45.6
9	R2	All MCs	18	2.0	18	2.0	0.065	4.7	LOS A	0.2	1.8	0.54	0.65	0.54	45.5
Approach			53	2.0	53	2.0	0.065	6.6	LOS A	0.2	1.8	0.54	0.65	0.54	45.4
West: Ottawa															
10	L2	All MCs	18	2.0	18	2.0	0.168	8.3	LOS A	0.9	6.6	0.37	0.36	0.37	46.3
11	T1	All MCs	378	2.0	378	2.0	0.168	2.8	LOS A	1.0	6.8	0.36	0.35	0.36	47.0
12	R2	All MCs	81	2.0	81	2.0	0.168	3.1	LOS A	1.0	6.8	0.34	0.33	0.34	46.9
Approach			477	2.0	477	2.0	0.168	3.0	LOS A	1.0	6.8	0.35	0.34	0.35	47.0
All Vehicles			1545	2.0	1545	2.0	0.274	3.8	LOS A	1.8	12.7	0.35	0.39	0.35	46.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akgelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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Appendix I

2032 Future Total Synchro and Sidra Worksheets

HCM Signalized Intersection Capacity Analysis
 2: Paterson Street/Menzie Street & Ottawa Street

2032 Future Total
 AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔		↔	↔	↔		↔		↔		↔
Traffic Volume (vph)	1	607	93	58	474	3	143	9	89	2	14	6
Future Volume (vph)	1	607	93	58	474	3	143	9	89	2	14	6
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		6.3		6.3	6.3	6.3		6.0				6.0
Lane Util. Factor		1.00		1.00	1.00	1.00		1.00				1.00
Frbp, ped/bikes		1.00		1.00	1.00	0.97		0.99				0.99
Flpb, ped/bikes		1.00		1.00	1.00	1.00		0.99				1.00
Frt		0.98		1.00	1.00	0.85		0.95				0.96
Flt Protected		1.00		0.95	1.00	1.00		0.97				1.00
Satd. Flow (prot)		1651		1625	1664	1440		1522				1659
Flt Permitted		1.00		0.35	1.00	1.00		0.80				0.97
Satd. Flow (perm)		1651		597	1664	1440		1262				1620
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	1	653	100	62	510	3	154	10	96	2	15	6
RTOR Reduction (vph)	0	5	0	0	0	1	0	25	0	0	5	0
Lane Group Flow (vph)	0	749	0	62	510	2	0	235	0	0	18	0
Confl. Peds. (#/hr)	4		1	1		4	10		2	2		10
Confl. Bikes (#/hr)			2			2						2
Heavy Vehicles (%)	2%	5%	9%	4%	7%	2%	8%	2%	4%	2%	2%	2%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			8				4
Permitted Phases	2			6		6	8			4		
Actuated Green, G (s)		52.9		52.9	52.9	52.9		19.8				19.8
Effective Green, g (s)		52.9		52.9	52.9	52.9		19.8				19.8
Actuated g/C Ratio		0.62		0.62	0.62	0.62		0.23				0.23
Clearance Time (s)		6.3		6.3	6.3	6.3		6.0				6.0
Vehicle Extension (s)		3.0		3.0	3.0	3.0		3.0				3.0
Lane Grp Cap (vph)		1027		371	1035	896		293				377
v/s Ratio Prot					0.31							
v/s Ratio Perm		0.45		0.10		0.00		c0.19				0.01
v/c Ratio		0.73		0.17	0.49	0.00		0.80				0.05
Uniform Delay, d1		11.1		6.8	8.7	6.1		30.7				25.3
Progression Factor		1.00		1.00	1.00	1.00		1.00				1.00
Incremental Delay, d2		4.5		1.0	1.7	0.0		14.5				0.1
Delay (s)		15.6		7.7	10.4	6.1		45.2				25.3
Level of Service		B		A	B	A		D				C
Approach Delay (s)		15.6			10.1			45.2				25.3
Approach LOS		B			B			D				C

Intersection Summary			
HCM 2000 Control Delay	18.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	12.3
Intersection Capacity Utilization	87.0%	ICU Level of Service	E
Analysis Period (min)	15		

HCM 2010 TWSC
 3: Appleton Side Road (Country Road 17) & Industrial Drive

2032 Future Total
 AM Peak Hour

Intersection						
Int Delay, s/veh	1.7					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔			↔	↔	
Traffic Vol, veh/h	16	21	26	155	98	17
Future Vol, veh/h	16	21	26	155	98	17
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	86	86	86	86	86	86
Heavy Vehicles, %	21	2	4	9	10	2
Mvmt Flow	19	24	30	180	114	20
Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	364	124	134	0	-	0
Stage 1	124	-	-	-	-	-
Stage 2	240	-	-	-	-	-
Critical Hdwy	6.61	6.22	4.14	-	-	-
Critical Hdwy Stg 1	5.61	-	-	-	-	-
Critical Hdwy Stg 2	5.61	-	-	-	-	-
Follow-up Hdwy	3.689	3.318	2.236	-	-	-
Pot Cap-1 Maneuver	599	927	1438	-	-	-
Stage 1	857	-	-	-	-	-
Stage 2	757	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	585	927	1438	-	-	-
Mov Cap-2 Maneuver	585	-	-	-	-	-
Stage 1	837	-	-	-	-	-
Stage 2	757	-	-	-	-	-
Approach	EB	NB	SB			
HCM Control Delay, s	10.2	1.1	0			
HCM LOS	B					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1438	-	740	-	-	
HCM Lane V/C Ratio	0.021	-	0.058	-	-	
HCM Control Delay (s)	7.6	0	10.2	-	-	
HCM Lane LOS	A	A	B	-	-	
HCM 95th %tile Q(veh)	0.1	-	0.2	-	-	

HCM 2010 TWSC
4: Paterson Street & Jack Dalgity Street/Access #1

2032 Future Total
AM Peak Hour

Intersection												
Int Delay, s/veh	5.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕		↕	↕			↕		↕	↕	
Traffic Vol, veh/h	37	0	11	11	0	54	10	32	4	18	34	17
Future Vol, veh/h	37	0	11	11	0	54	10	32	4	18	34	17
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	71	93	71	93	93	71	71	93	93	71	71	93
Heavy Vehicles, %	3	2	45	2	2	30	2	2	2	6	6	6
Mvmt Flow	52	0	15	12	0	58	14	45	4	19	48	24

Major/Minor	Minor2	Minor1	Major1	Major2
Conflicting Flow All	202	175	60	181
Stage 1	98	98	-	75
Stage 2	104	77	-	106
Critical Hdwy	7.13	6.52	6.65	7.12
Critical Hdwy Stg 1	6.13	5.52	-	6.12
Critical Hdwy Stg 2	6.13	5.52	-	6.12
Follow-up Hdwy	3.527	4.018	3.705	3.518
Pot Cap-1 Maneuver	754	718	897	781
Stage 1	906	814	-	934
Stage 2	899	831	-	900
Platoon blocked, %	-	-	-	-
Mov Cap-1 Maneuver	698	701	897	754
Mov Cap-2 Maneuver	698	701	-	754
Stage 1	896	803	-	924
Stage 2	839	822	-	873

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.4	9	1.7	1.6
HCM LOS	B	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1368	-	-	735	964	1558	-	-
HCM Lane V/C Ratio	0.01	-	-	0.092	0.073	0.012	-	-
HCM Control Delay (s)	7.7	0	-	10.4	9	7.3	0	-
HCM Lane LOS	A	A	-	B	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.3	0.2	0	-	-

HCM 2010 TWSC
5: Appleton Side Road (Country Road 17) & Access #2

2032 Future Total
AM Peak Hour

Intersection						
Int Delay, s/veh	3.5					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↕			↕	↕	
Traffic Vol, veh/h	86	21	7	95	91	28
Future Vol, veh/h	86	21	7	95	91	28
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	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	92	23	8	102	98	30

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	231	113	128
Stage 1	113	-	-
Stage 2	118	-	-
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	757	940	1458
Stage 1	912	-	-
Stage 2	907	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	752	940	1458
Mov Cap-2 Maneuver	752	-	-
Stage 1	907	-	-
Stage 2	907	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.4	0.5	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1458	-	783	-	-
HCM Lane V/C Ratio	0.005	-	0.147	-	-
HCM Control Delay (s)	7.5	0	10.4	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.5	-	-

HCM Signalized Intersection Capacity Analysis
6: Industrial Drive/Sadler Drive & Ottawa Street

2032 Future Total
AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕	↔	↔	↕	↔	↔	↕	↔	↔	↕	↔
Traffic Volume (vph)	105	435	54	23	331	51	84	31	34	56	21	88
Future Volume (vph)	105	435	54	23	331	51	84	31	34	56	21	88
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.0	6.2		5.0	6.2		6.0	6.0	6.0	6.0		6.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00	1.00	1.00		1.00
Fr	1.00	0.98		1.00	0.98		1.00	0.85	1.00	0.88		0.88
Flt Protected	0.95	1.00		0.95	1.00		0.96	1.00	0.95	1.00		1.00
Satd. Flow (prot)	1658	3261		1658	3250		1684	1483	1658	1534		1534
Flt Permitted	0.47	1.00		0.45	1.00		0.71	1.00	0.68	1.00		1.00
Satd. Flow (perm)	829	3261		793	3250		1239	1483	1181	1534		1534
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)	114	473	59	25	360	55	91	34	37	61	23	96
RTOR Reduction (vph)	0	7	0	0	10	0	0	0	32	0	83	0
Lane Group Flow (vph)	114	525	0	25	405	0	0	125	5	61	36	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	NA
Protected Phases	5	2		1	6		8	8	8	4		4
Permitted Phases	2			6			8		8	4		
Actuated Green, G (s)	50.2	44.8		44.2	41.8		10.0	10.0	10.0	10.0		10.0
Effective Green, g (s)	50.2	44.8		44.2	41.8		10.0	10.0	10.0	10.0		10.0
Actuated g/C Ratio	0.67	0.60		0.59	0.56		0.13	0.13	0.13	0.13		0.13
Clearance Time (s)	5.0	6.2		5.0	6.2		6.0	6.0	6.0	6.0		6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0		3.0
Lane Grp Cap (vph)	619	1963		499	1825		166	199	158	206		206
v/s Ratio Prot	c0.01	c0.16		0.00	0.12					0.02		
v/s Ratio Perm	0.11			0.03			c0.10	0.00	0.05			
v/c Ratio	0.18	0.27		0.05	0.22		0.75	0.02	0.39	0.17		
Uniform Delay, d1	4.3	7.0		6.2	8.2		31.0	28.0	29.4	28.5		
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00		
Incremental Delay, d2	0.1	0.3		0.0	0.3		17.4	0.1	1.6	0.4		
Delay (s)	4.4	7.4		6.3	8.4		48.4	28.0	31.0	28.9		
Level of Service	A	A		A	A		D	C	C	C		
Approach Delay (s)	6.8			8.3			43.8			29.6		
Approach LOS	A			A			D			C		

Intersection Summary			
HCM 2000 Control Delay	14.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	74.4	Sum of lost time (s)	17.2
Intersection Capacity Utilization	46.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
2: Paterson Street/Menzie Street & Ottawa Street

2032 Future Total
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕		↕	↕	↕		↕		↕	↕	↕
Traffic Volume (vph)	4	644	115	70	891	11	135	8	74	7	3	5
Future Volume (vph)	4	644	115	70	891	11	135	8	74	7	3	5
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		6.3		6.3	6.3	6.3		6.0				6.0
Lane Util. Factor		1.00		1.00	1.00	1.00		1.00				1.00
Frpb, ped/bikes		0.99		1.00	1.00	0.97		0.99				0.99
Flpb, ped/bikes		1.00		1.00	1.00	1.00		0.99				1.00
Fr		0.98		1.00	1.00	0.85		0.95				0.95
Flt Protected		1.00		0.95	1.00	1.00		0.97				0.98
Satd. Flow (prot)		1682		1658	1728	1438		1592				1608
Flt Permitted		1.00		0.23	1.00	1.00		0.80				0.87
Satd. Flow (perm)		1675		393	1728	1438		1316				1436
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	4	678	121	74	938	12	142	8	78	7	3	5
RTOR Reduction (vph)	0	7	0	0	0	5	0	21	0	0	4	0
Lane Group Flow (vph)	0	796	0	74	938	7	0	207	0	0	11	0
Confl. Peds. (#/hr)	4		14	14		4	8		1	1		8
Confl. Bikes (#/hr)			2			3			2			2
Heavy Vehicles (%)	2%	3%	2%	2%	3%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA	Perm	NA		NA
Protected Phases		2		1	6		8	8				4
Permitted Phases	2			6		6	8				4	
Actuated Green, G (s)		43.7		54.0	54.0	54.0		25.0				25.0
Effective Green, g (s)		43.7		54.0	54.0	54.0		25.0				25.0
Actuated g/C Ratio		0.48		0.59	0.59	0.59		0.27				0.27
Clearance Time (s)		6.3		6.3	6.3	6.3		6.0				6.0
Vehicle Extension (s)		3.0		3.0	3.0	3.0		3.0				3.0
Lane Grp Cap (vph)		801		287	1022	850		360				393
v/s Ratio Prot				0.01	c0.54							
v/s Ratio Perm		c0.48		0.14		0.00		c0.16				0.01
v/c Ratio		0.99		0.26	0.92	0.01		0.57				0.03
Uniform Delay, d1		23.7		11.6	16.7	7.7		28.6				24.3
Progression Factor		1.00		1.00	1.00	1.00		1.00				1.00
Incremental Delay, d2		30.4		0.5	14.2	0.0		2.2				0.1
Delay (s)		54.1		12.1	30.9	7.7		30.8				24.4
Level of Service		D		B	C	A		C				C
Approach Delay (s)		54.1		29.2				30.8				24.4
Approach LOS		D		C				C				C

Intersection Summary			
HCM 2000 Control Delay	39.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	91.3	Sum of lost time (s)	18.6
Intersection Capacity Utilization	89.2%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM 2010 TWSC
3: Appleton Side Road (Country Road 17) & Industrial Drive

2032 Future Total
PM Peak Hour

Intersection						
Int Delay, s/veh	1.5					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔			↕	↕	
Traffic Vol, veh/h	16	22	36	145	222	30
Future Vol, veh/h	16	22	36	145	222	30
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	96	96	96	96	96	96
Heavy Vehicles, %	2	5	3	7	12	4
Mvmt Flow	17	23	38	151	231	31

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	474	247	262
Stage 1	247	-	-
Stage 2	227	-	-
Critical Hdwy	6.42	6.25	4.13
Critical Hdwy Stg 1	5.42	-	-
Critical Hdwy Stg 2	5.42	-	-
Follow-up Hdwy	3.518	3.345	2.227
Pot Cap-1 Maneuver	549	784	1296
Stage 1	794	-	-
Stage 2	811	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	531	784	1296
Mov Cap-2 Maneuver	531	-	-
Stage 1	769	-	-
Stage 2	811	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.9	1.6	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1296	-	653	-	-
HCM Lane V/C Ratio	0.029	-	0.061	-	-
HCM Control Delay (s)	7.9	0	10.9	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.2	-	-

HCM 2010 TWSC
4: Paterson Street & Jack Dalgity Street/Access #1

2032 Future Total
PM Peak Hour

Intersection												
Int Delay, s/veh	5.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	52	0	5	7	0	35	7	34	12	60	32	47
Future Vol, veh/h	52	0	5	7	0	35	7	34	12	60	32	47
Conflicting Peds, #/hr	0	0	0	0	0	0	1	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	93	94	93	93	93	94	94	93	93	94	94
Heavy Vehicles, %	10	2	2	2	2	2	2	2	2	2	7	4
Mvmt Flow	55	0	5	8	0	38	7	36	13	65	34	50

Major/Minor	Minor2	Minor1	Major1	Major2
Conflicting Flow All	266	253	60	249
Stage 1	190	190	-	57
Stage 2	76	63	-	192
Critical Hdwy	7.2	6.52	6.22	7.12
Critical Hdwy Stg 1	6.2	5.52	-	6.12
Critical Hdwy Stg 2	6.2	5.52	-	6.12
Follow-up Hdwy	3.59	4.018	3.318	3.518
Pot Cap-1 Maneuver	671	650	1005	705
Stage 1	794	743	-	955
Stage 2	914	842	-	810
Platoon blocked, %	-	-	-	-
Mov Cap-1 Maneuver	622	618	1004	675
Mov Cap-2 Maneuver	622	618	-	675
Stage 1	789	710	-	950
Stage 2	876	838	-	770

Approach	EB	WB	NB	SB
HCM Control Delay, s	11.2	9	1	3.2
HCM LOS	B	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1511	-	-	643	945	1558	-	-
HCM Lane V/C Ratio	0.005	-	-	0.094	0.048	0.041	-	-
HCM Control Delay (s)	7.4	0	-	11.2	9	7.4	0	-
HCM Lane LOS	A	A	-	B	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.3	0.1	0.1	-	-

HCM 2010 TWSC
5: Appleton Side Road (Country Road 17) & Access #2

2032 Future Total
PM Peak Hour

Intersection						
Int Delay, s/veh	2.2					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔
Traffic Vol, veh/h	56	14	24	125	148	96
Future Vol, veh/h	56	14	24	125	148	96
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	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	60	15	26	134	159	103
Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	397	211	262	0	-	0
Stage 1	211	-	-	-	-	-
Stage 2	186	-	-	-	-	-
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	608	829	1302	-	-	-
Stage 1	824	-	-	-	-	-
Stage 2	846	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	595	829	1302	-	-	-
Mov Cap-2 Maneuver	595	-	-	-	-	-
Stage 1	806	-	-	-	-	-
Stage 2	846	-	-	-	-	-
Approach	EB	NB	SB			
HCM Control Delay, s	11.5	1.3	0			
HCM LOS	B					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1302	-	631	-	-	
HCM Lane V/C Ratio	0.02	-	0.119	-	-	
HCM Control Delay (s)	7.8	0	11.5	-	-	
HCM Lane LOS	A	A	B	-	-	
HCM 95th %tile Q(veh)	0.1	-	0.4	-	-	

HCM Signalized Intersection Capacity Analysis
6: Industrial Drive/Sadler Drive & Ottawa Street

2032 Future Total
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	84	462	133	43	742	61	160	50	35	46	34	85
Future Volume (vph)	84	462	133	43	742	61	160	50	35	46	34	85
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.0	6.2		5.0	6.2		6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00
Fr't	1.00	0.97		1.00	0.99		1.00	0.85	1.00	0.89		
Flt Protected	0.95	1.00		0.95	1.00		0.96	1.00	0.95	1.00		
Satd. Flow (prot)	1658	3204		1658	3278		1681	1483	1658	1558		
Flt Permitted	0.23	1.00		0.39	1.00		0.69	1.00	0.54	1.00		
Satd. Flow (perm)	407	3204		688	3278		1211	1483	936	1558		
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)	91	502	145	47	807	66	174	54	38	50	37	92
RTOR Reduction (vph)	0	24	0	0	6	0	0	0	29	0	69	0
Lane Group Flow (vph)	91	623	0	47	867	0	228	9	50	60	0	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	5	2		1	6		8		8		4	
Permitted Phases	2			6			8		8		4	
Actuated Green, G (s)	43.6	37.5		39.2	35.3		19.3	19.3	19.3	19.3		
Effective Green, g (s)	43.6	37.5		39.2	35.3		19.3	19.3	19.3	19.3		
Actuated g/C Ratio	0.56	0.48		0.50	0.45		0.25	0.25	0.25	0.25		
Clearance Time (s)	5.0	6.2		5.0	6.2		6.0	6.0	6.0	6.0		
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	325	1542		394	1485		300	367	231	386		
v/s Ratio Prot	c0.02	0.19		0.01	c0.26					0.04		
v/s Ratio Perm	0.13			0.05			c0.19	0.01	0.05			
v/c Ratio	0.28	0.40		0.12	0.58		0.76	0.03	0.22	0.15		
Uniform Delay, d1	8.8	13.0		9.9	15.8		27.2	22.2	23.3	22.9		
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00		
Incremental Delay, d2	0.5	0.8		0.1	1.7		10.8	0.0	0.5	0.2		
Delay (s)	9.3	13.8		10.0	17.5		37.9	22.2	23.8	23.1		
Level of Service	A	B		B	B		D	C	C	C		
Approach Delay (s)		13.2			17.1		35.7			23.3		
Approach LOS		B			B		D			C		
Intersection Summary												
HCM 2000 Control Delay	18.6			HCM 2000 Level of Service				B				
HCM 2000 Volume to Capacity ratio	0.61											
Actuated Cycle Length (s)	77.9				Sum of lost time (s)				17.2			
Intersection Capacity Utilization	61.7%			ICU Level of Service				B				
Analysis Period (min)	15											
c Critical Lane Group												

MOVEMENT SUMMARY

Site: 101 [Ottawa/CR49 & Appleton/Ramsay FT2032 AM (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed	
		[Total HV]	[Total HV]	[Total HV]	[Total HV]				[Veh.]	[Dist]					
		veh/h	%	veh/h	%	v/c	sec			veh	m			km/h	
South: Appleton															
1	L2	All MCs	68	2.0	68	2.0	0.223	9.3	LOS A	0.9	6.6	0.49	0.60	0.49	45.5
2	T1	All MCs	8	2.0	8	2.0	0.223	3.8	LOS A	0.9	6.6	0.49	0.60	0.49	46.1
3	R2	All MCs	137	2.0	137	2.0	0.223	4.1	LOS A	0.9	6.6	0.49	0.60	0.49	45.9
Approach			213	2.0	213	2.0	0.223	5.7	LOS A	0.9	6.6	0.49	0.60	0.49	45.8
East: CR 49															
4	L2	All MCs	69	2.0	69	2.0	0.142	7.8	LOS A	0.8	5.8	0.25	0.40	0.25	46.0
5	T1	All MCs	353	2.0	353	2.0	0.142	2.3	LOS A	0.8	5.9	0.24	0.32	0.24	47.2
6	R2	All MCs	16	2.0	16	2.0	0.142	2.8	LOS A	0.8	5.9	0.23	0.27	0.23	47.3
Approach			438	2.0	438	2.0	0.142	3.2	LOS A	0.8	5.9	0.24	0.33	0.24	47.0
North: Ramsay															
7	L2	All MCs	29	2.0	29	2.0	0.062	9.0	LOS A	0.2	1.6	0.43	0.58	0.43	45.2
8	T1	All MCs	12	2.0	12	2.0	0.062	3.5	LOS A	0.2	1.6	0.43	0.58	0.43	45.8
9	R2	All MCs	19	2.0	19	2.0	0.062	3.8	LOS A	0.2	1.6	0.43	0.58	0.43	45.6
Approach			59	2.0	59	2.0	0.062	6.2	LOS A	0.2	1.6	0.43	0.58	0.43	45.5
West: Ottawa															
10	L2	All MCs	9	2.0	9	2.0	0.171	7.9	LOS A	0.9	6.5	0.27	0.30	0.27	46.7
11	T1	All MCs	458	2.0	458	2.0	0.171	2.4	LOS A	0.9	6.7	0.26	0.30	0.26	47.4
12	R2	All MCs	52	2.0	52	2.0	0.171	2.9	LOS A	0.9	6.7	0.25	0.29	0.25	47.2
Approach			519	2.0	519	2.0	0.171	2.6	LOS A	0.9	6.7	0.26	0.30	0.26	47.4
All Vehicles			1230	2.0	1230	2.0	0.223	3.5	LOS A	0.9	6.7	0.30	0.37	0.30	46.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
 Roundabout LOS Method: SIDRA Roundabout LOS.
 Vehicle movement LOS values are based on average delay per movement.
 Intersection and Approach LOS values are based on average delay for all vehicle movements.
 Roundabout Capacity Model: SIDRA Standard.
 Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
 Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
 Gap-Acceptance Capacity Formula: SIDRA Standard (Akgelik M3D).
 HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
 Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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MOVEMENT SUMMARY

Site: 101 [Ottawa/CR49 & Appleton/Ramsay FT2032 PM (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed	
		[Total HV]	[Total HV]	[Total HV]	[Total HV]				[Veh.]	[Dist]					
		veh/h	%	veh/h	%	v/c	sec			veh	m			km/h	
South: Appleton															
1	L2	All MCs	88	2.0	88	2.0	0.202	9.1	LOS A	0.9	6.1	0.47	0.60	0.47	45.2
2	T1	All MCs	12	2.0	12	2.0	0.202	3.6	LOS A	0.9	6.1	0.47	0.60	0.47	45.8
3	R2	All MCs	95	2.0	95	2.0	0.202	3.9	LOS A	0.9	6.1	0.47	0.60	0.47	45.6
Approach			195	2.0	195	2.0	0.202	6.2	LOS A	0.9	6.1	0.47	0.60	0.47	45.4
East: CR 49															
4	L2	All MCs	157	2.0	157	2.0	0.294	8.1	LOS A	1.9	13.5	0.34	0.43	0.34	45.7
5	T1	All MCs	678	2.0	678	2.0	0.294	2.5	LOS A	2.0	13.9	0.32	0.34	0.32	46.9
6	R2	All MCs	47	2.0	47	2.0	0.294	2.9	LOS A	2.0	13.9	0.31	0.29	0.31	47.0
Approach			882	2.0	882	2.0	0.294	3.5	LOS A	2.0	13.9	0.32	0.35	0.32	46.7
North: Ramsay															
7	L2	All MCs	20	2.0	20	2.0	0.067	10.0	LOS B	0.3	1.8	0.56	0.66	0.56	45.0
8	T1	All MCs	15	2.0	15	2.0	0.067	4.6	LOS A	0.3	1.8	0.56	0.66	0.56	45.6
9	R2	All MCs	18	2.0	18	2.0	0.067	4.8	LOS A	0.3	1.8	0.56	0.66	0.56	45.4
Approach			53	2.0	53	2.0	0.067	6.7	LOS A	0.3	1.8	0.56	0.66	0.56	45.3
West: Ottawa															
10	L2	All MCs	18	2.0	18	2.0	0.181	8.3	LOS A	1.0	7.2	0.38	0.36	0.38	46.3
11	T1	All MCs	406	2.0	406	2.0	0.181	2.8	LOS A	1.0	7.4	0.37	0.35	0.37	47.0
12	R2	All MCs	87	2.0	87	2.0	0.181	3.1	LOS A	1.0	7.4	0.35	0.34	0.35	46.9
Approach			510	2.0	510	2.0	0.181	3.0	LOS A	1.0	7.4	0.36	0.35	0.36	46.9
All Vehicles			1640	2.0	1640	2.0	0.294	3.8	LOS A	2.0	13.9	0.36	0.39	0.36	46.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
 Roundabout LOS Method: SIDRA Roundabout LOS.
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 Roundabout Capacity Model: SIDRA Standard.
 Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
 Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
 Gap-Acceptance Capacity Formula: SIDRA Standard (Akgelik M3D).
 HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
 Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

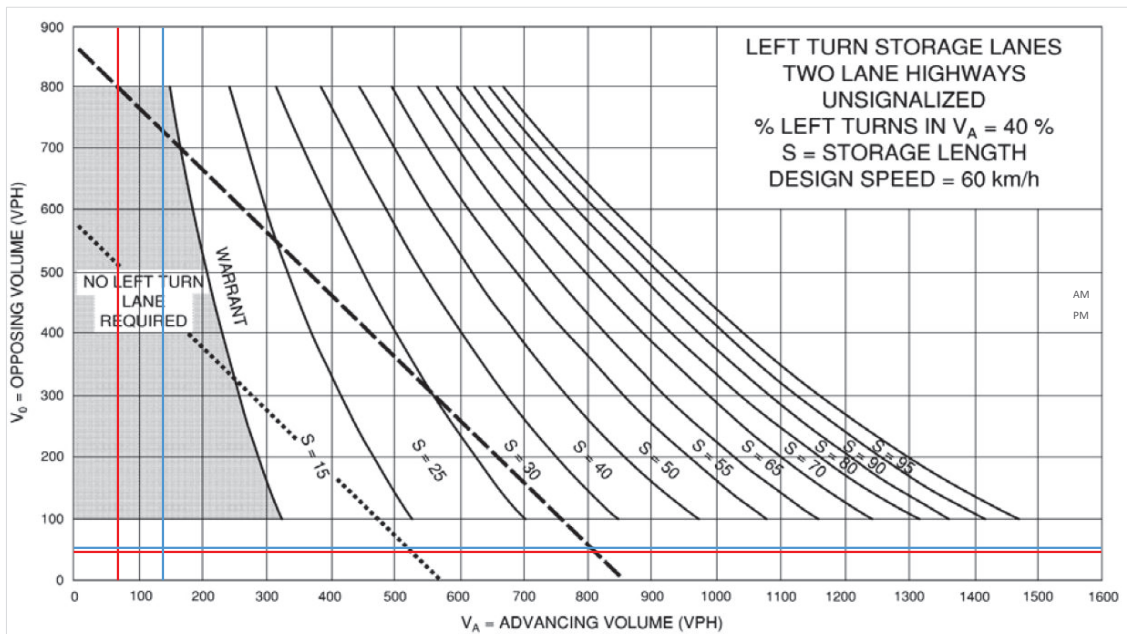
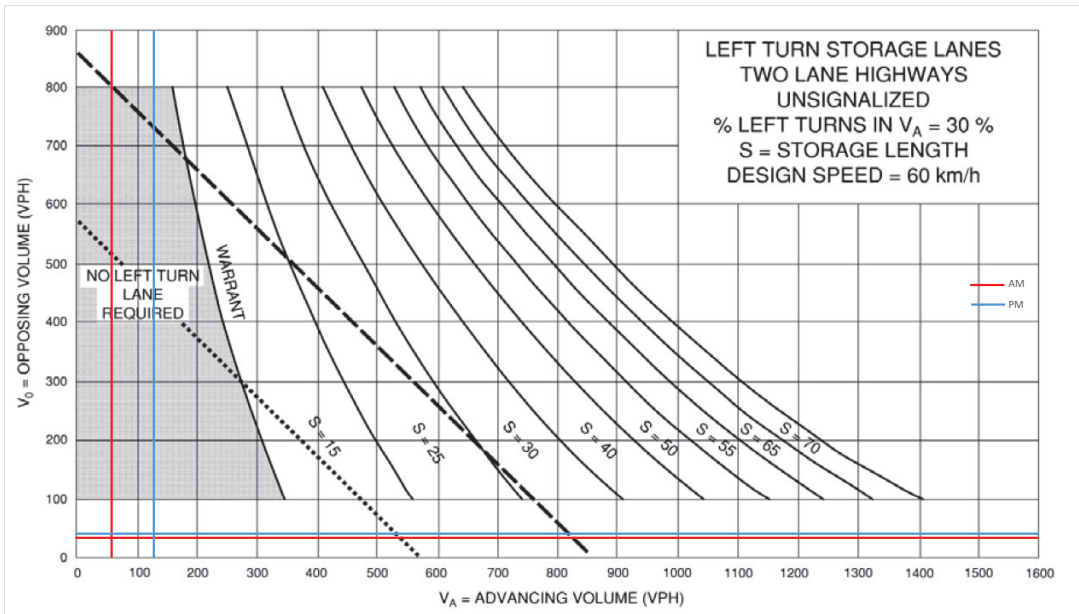
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Appendix J

Turn Lane Warrants

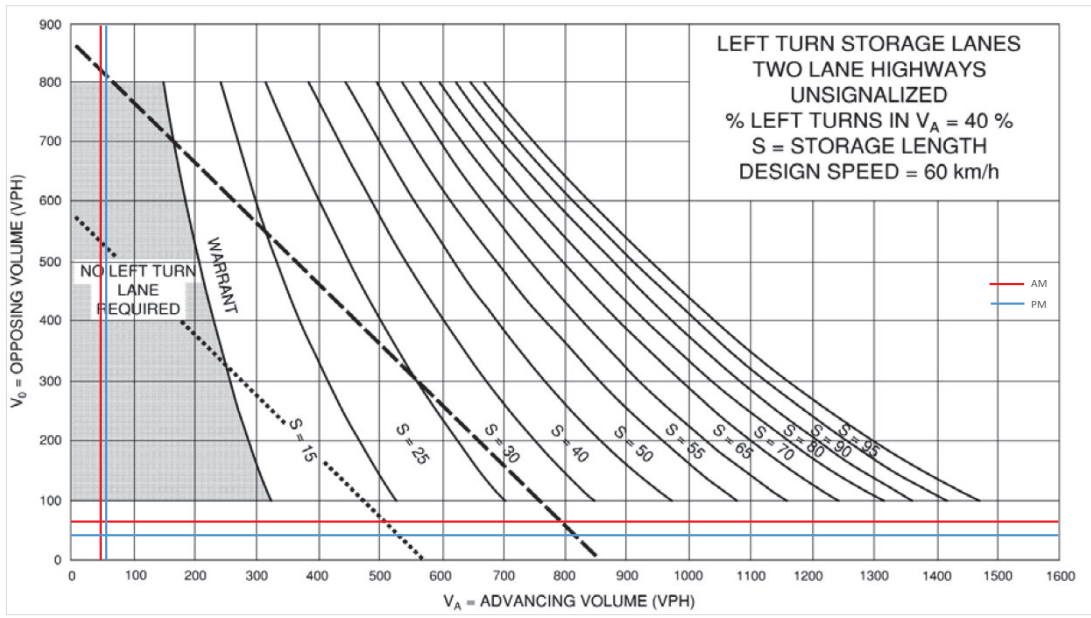
Jack Dalgity Stree/Access #1 @ Paterson Street

Existing																		
Design Speed																		
60 km/h	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	Yes SBL	SBT	SBR	%Left Turn	Volume Advancing	Volume Opposing			
AM	37	0	11	0	0	0	0	10	8	0	0	16	17	0.0%	33	18		
PM	52	0	5	0	0	0	0	7	10	0	0	14	47	0.0%	61	17		
Future Background 2027																		
Design Speed																		
60 km/h	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	Yes SBL	SBT	SBR	%Left Turn	Volume Advancing	Volume Opposing			
AM	37	0	11	0	0	0	0	10	20	0	0	25	17	0.0%	42	30		
PM	52	0	5	0	0	0	0	7	22	0	0	23	47	0.0%	70	29		
Future Background 2032																		
Design Speed																		
60 km/h	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	Yes SBL	SBT	SBR	%Left Turn	Volume Advancing	Volume Opposing			
AM	37	0	11	0	0	0	0	10	32	0	0	34	17	0.0%	51	42		
PM	52	0	5	0	0	0	0	7	34	0	0	32	47	0.0%	79	41		
Future Total 2027																		
Design Speed																		
60 km/h	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	Yes SBL	SBT	SBR	%Left Turn	Volume Advancing	Volume Opposing			
AM	37	0	11	11	0	54	10	20	4	18	25	17	30.0%	60	34			
PM	52	0	5	7	0	35	7	22	12	60	23	47	46.2%	130	41			
Future Total 2032																		
Design Speed																		
60 km/h	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	Yes SBL	SBT	SBR	%Left Turn	Volume Advancing	Volume Opposing			
AM	37	0	11	11	0	54	10	32	4	18	34	17	26.1%	69	46			
PM	52	0	5	7	0	35	7	34	12	60	32	47	43.2%	139	53			



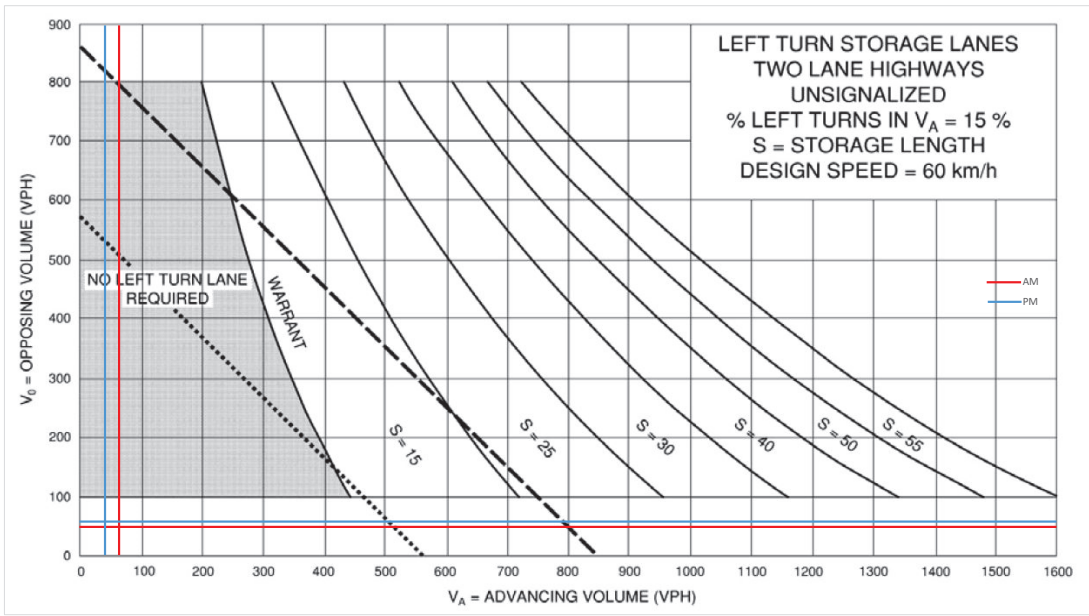
Jack Dalgity Stree/Access #1 @ Paterson Street

Existing																
Design Speed		Yes														
60 km/h		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	%Left Turn	Volume Advancing	Volume Opposing
AM	37	0	11	0	0	0	10	8	0	0	16	17	77.1%	48	0	
PM	52	0	5	0	0	0	7	10	0	0	14	47	91.2%	57	0	
Future Background 2027																
Design Speed		Yes														
60 km/h		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	%Left Turn	Volume Advancing	Volume Opposing
AM	37	0	11	0	0	0	10	20	0	0	25	17	77.1%	48	0	
PM	52	0	5	0	0	0	7	22	0	0	23	47	91.2%	57	0	
Future Background 2032																
Design Speed		Yes														
60 km/h		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	%Left Turn	Volume Advancing	Volume Opposing
AM	37	0	11	0	0	0	10	32	0	0	34	17	77.1%	48	0	
PM	52	0	5	0	0	0	7	34	0	0	32	47	91.2%	57	0	
Future Total 2027																
Design Speed		Yes														
60 km/h		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	%Left Turn	Volume Advancing	Volume Opposing
AM	37	0	11	11	0	54	10	20	4	18	25	17	77.1%	48	65	
PM	52	0	5	7	0	35	7	22	12	60	23	47	91.2%	57	42	
Future Total 2032																
Design Speed		Yes														
60 km/h		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	%Left Turn	Volume Advancing	Volume Opposing
AM	37	0	11	11	0	54	10	32	4	18	34	17	77.1%	48	65	
PM	52	0	5	7	0	35	7	34	12	60	32	47	91.2%	57	42	



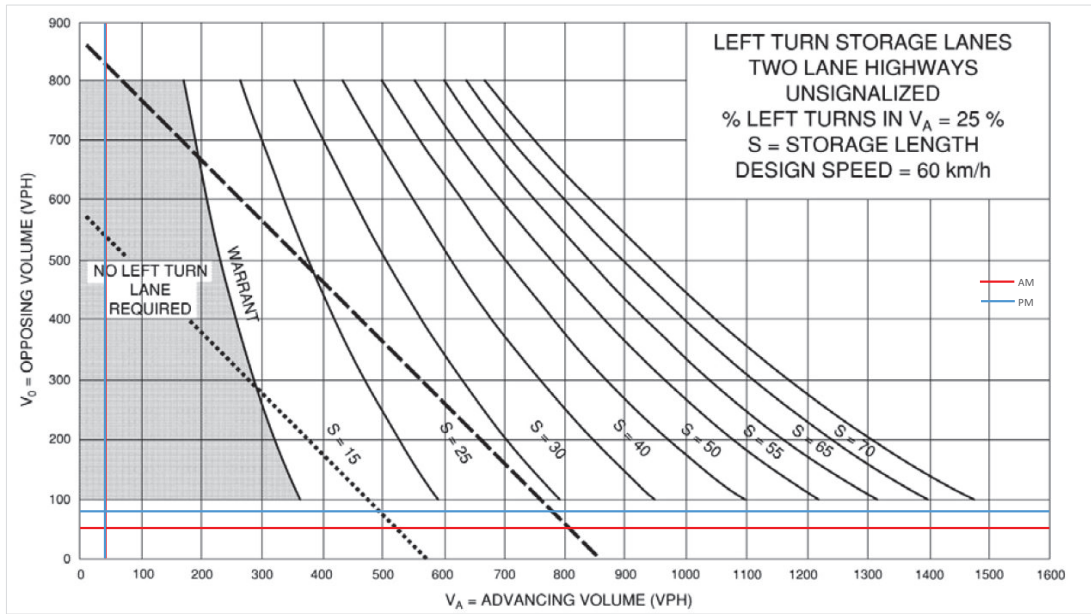
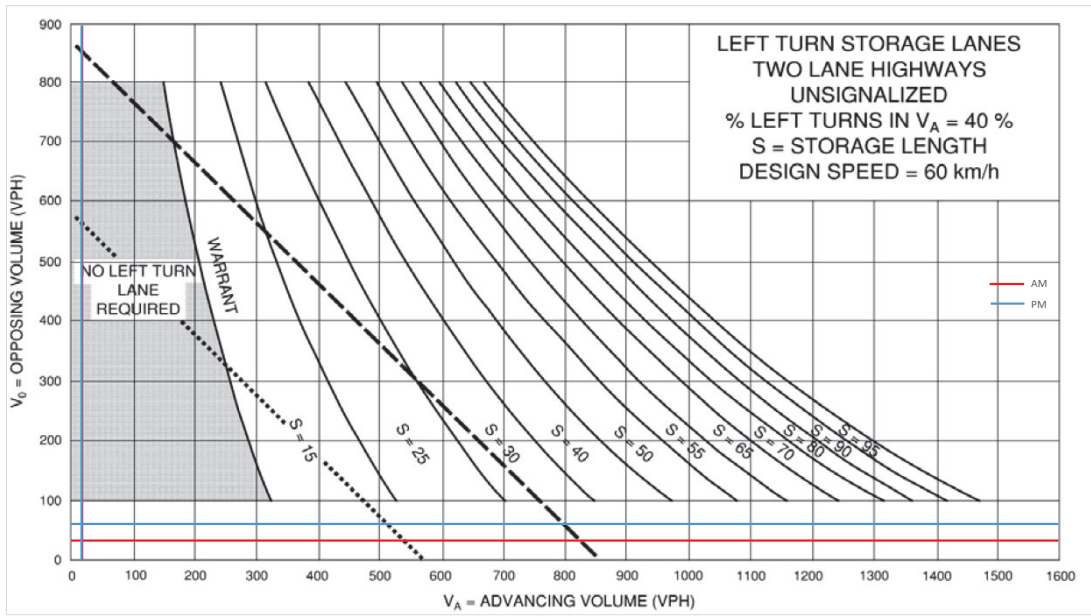
Jack Dalgity Stree/Access #1 @ Paterson Street

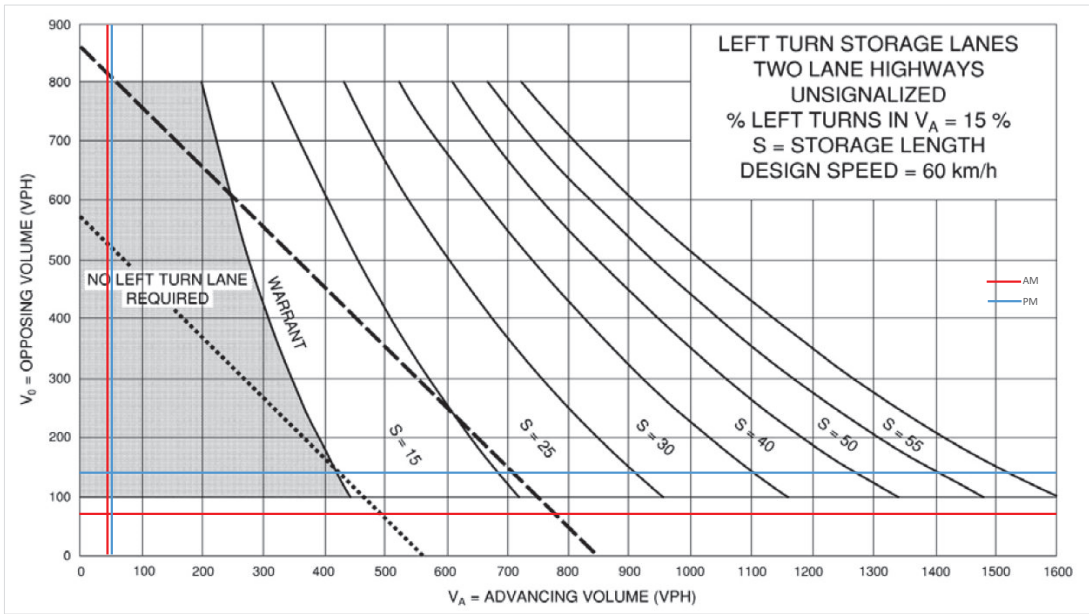
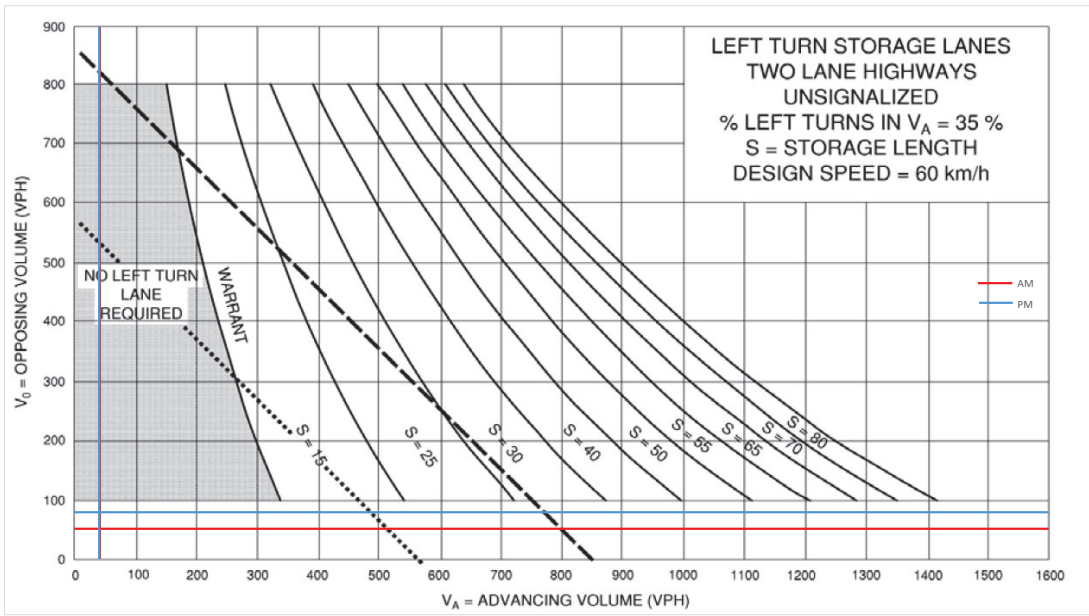
Existing																		
Design Speed		Yes													Volume Advancing		Volume Opposing	
60 km/h		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	%Left Turn				
AM		37	0	11	0	0	0	10	8	0	0	16	17	#DIV/0!	0	48		
PM		52	0	5	0	0	0	7	10	0	0	14	47	#DIV/0!	0	57		
Future Background 2027																		
Design Speed		Yes													Volume Advancing		Volume Opposing	
60 km/h		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	%Left Turn				
AM		37	0	11	0	0	0	10	20	0	0	25	17	#DIV/0!	0	48		
PM		52	0	5	0	0	0	7	22	0	0	23	47	#DIV/0!	0	57		
Future Background 2032																		
Design Speed		Yes													Volume Advancing		Volume Opposing	
60 km/h		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	%Left Turn				
AM		37	0	11	0	0	0	10	32	0	0	34	17	#DIV/0!	0	48		
PM		52	0	5	0	0	0	7	34	0	0	32	47	#DIV/0!	0	57		
Future Total 2027																		
Design Speed		Yes													Volume Advancing		Volume Opposing	
60 km/h		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	%Left Turn				
AM		37	0	11	11	0	54	10	20	4	18	25	17	16.9%	65	48		
PM		52	0	5	7	0	35	7	22	12	60	23	47	16.7%	42	57		
Future Total 2032																		
Design Speed		Yes													Volume Advancing		Volume Opposing	
60 km/h		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	%Left Turn				
AM		37	0	11	11	0	54	10	32	4	18	34	17	16.9%	65	48		
PM		52	0	5	7	0	35	7	34	12	60	32	47	16.7%	42	57		

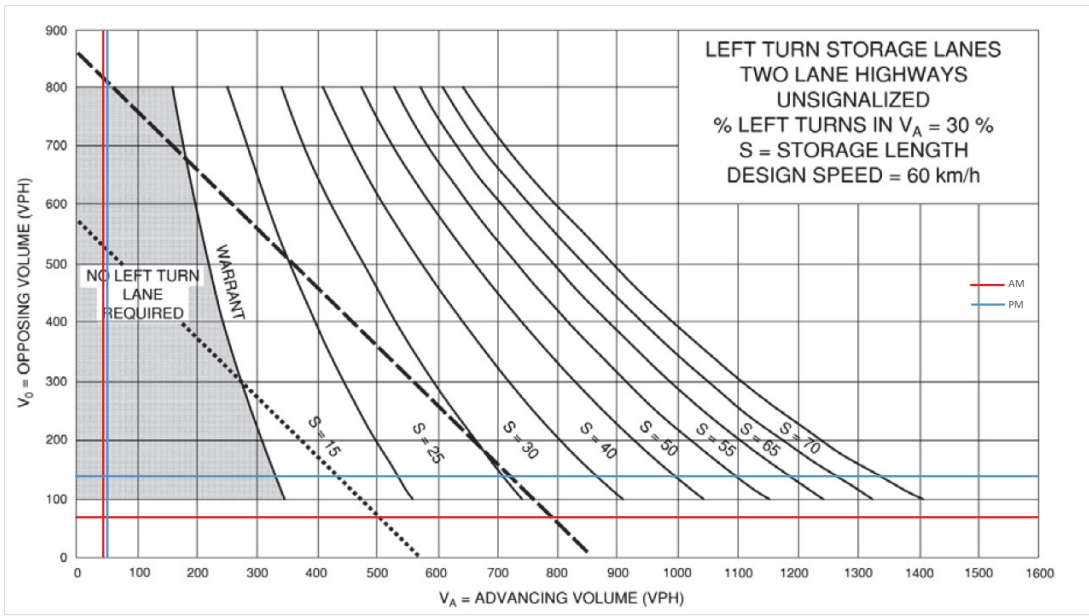


Jack Dalgity Stree/Access #1 @ Paterson Street

Existing																	
Design Speed		EBL	EBT	EBR	WBL	WBT	WBR	Yes NBL	NBT	NBR	SBL	SBT	SBR	%Left Turn	Volume Advancing	Volume Opposing	
60	km/h	AM	37	0	11	0	0	0	10	8	0	0	16	17	55.6%	18	33
		PM	52	0	5	0	0	0	7	10	0	0	14	47	41.2%	17	61
Future Background 2027																	
Design Speed		EBL	EBT	EBR	WBL	WBT	WBR	Yes NBL	NBT	NBR	SBL	SBT	SBR	%Left Turn	Volume Advancing	Volume Opposing	
60	km/h	AM	37	0	11	0	0	0	10	20	0	0	25	17	33.3%	30	42
		PM	52	0	5	0	0	0	7	22	0	0	23	47	24.1%	29	70
Future Background 2032																	
Design Speed		EBL	EBT	EBR	WBL	WBT	WBR	Yes NBL	NBT	NBR	SBL	SBT	SBR	%Left Turn	Volume Advancing	Volume Opposing	
60	km/h	AM	37	0	11	0	0	0	10	32	0	0	34	17	23.8%	42	51
		PM	52	0	5	0	0	0	7	34	0	0	32	47	17.1%	41	79
Future Total 2027																	
Design Speed		EBL	EBT	EBR	WBL	WBT	WBR	Yes NBL	NBT	NBR	SBL	SBT	SBR	%Left Turn	Volume Advancing	Volume Opposing	
60	km/h	AM	37	0	11	11	0	54	10	20	4	18	25	17	29.4%	34	60
		PM	52	0	5	7	0	35	7	22	12	60	23	47	17.1%	41	130
Future Total 2032																	
Design Speed		EBL	EBT	EBR	WBL	WBT	WBR	Yes NBL	NBT	NBR	SBL	SBT	SBR	%Left Turn	Volume Advancing	Volume Opposing	
60	km/h	AM	37	0	11	11	0	54	10	32	4	18	34	17	21.7%	46	69
		PM	52	0	5	7	0	35	7	34	12	60	32	47	13.2%	53	139



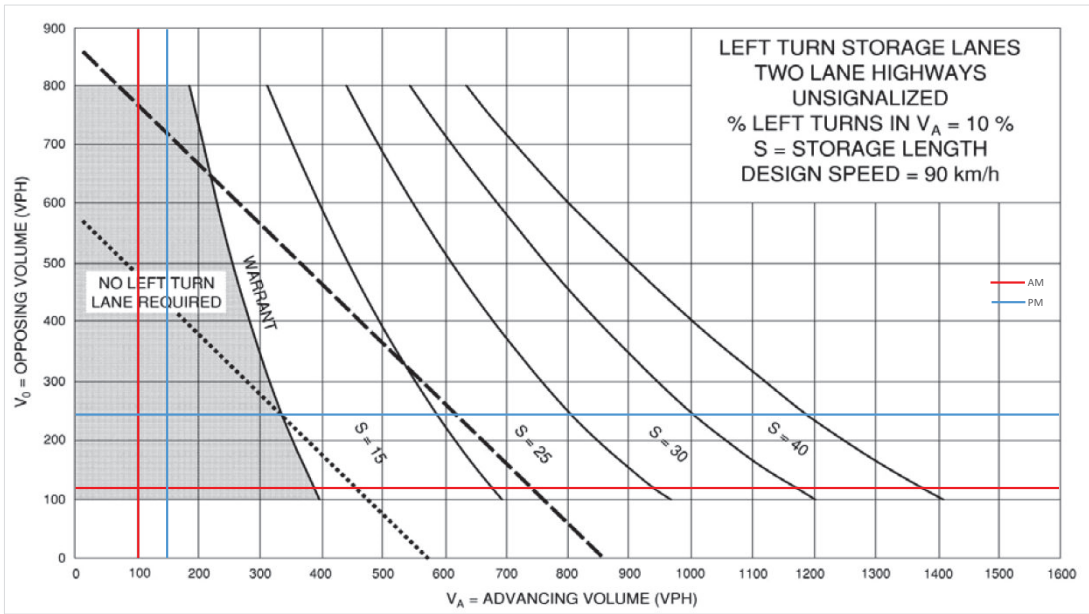
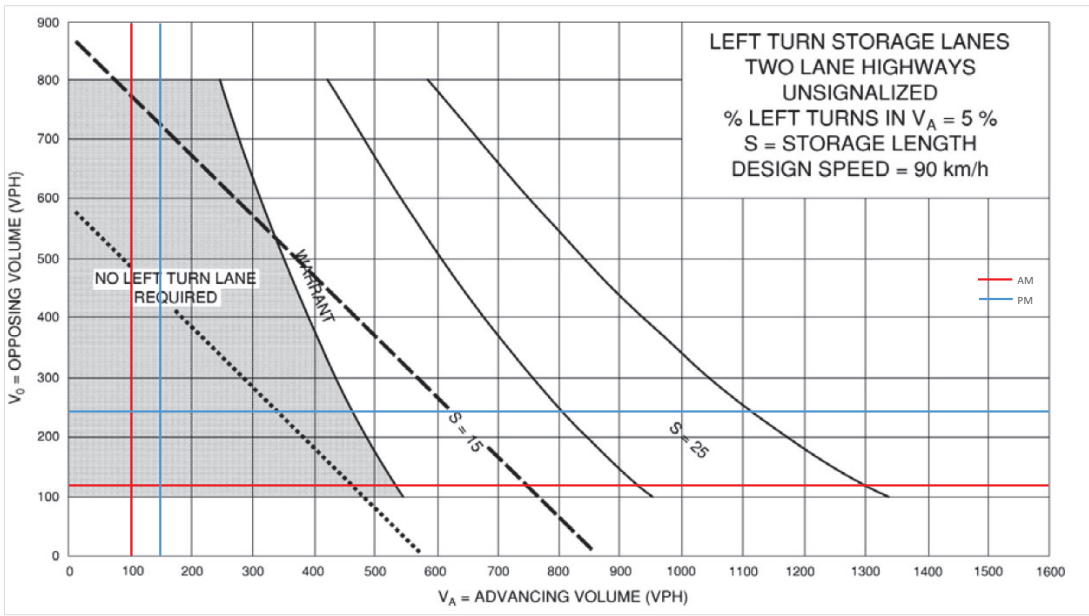


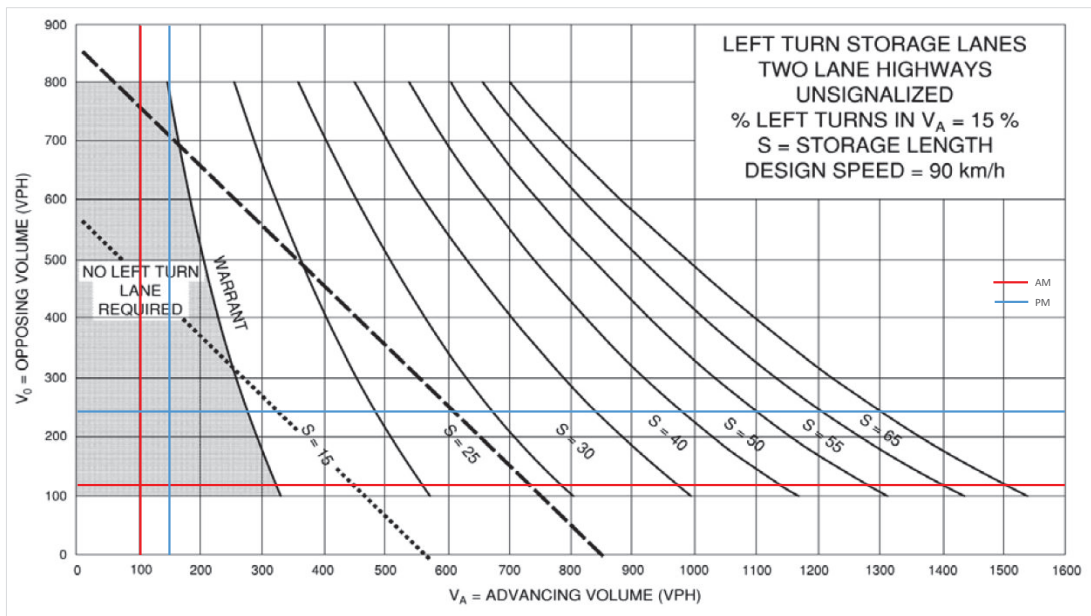


Access #2 @ Appleton Side Road

Future Total 2027																
Design Speed																
90 km/h																
	EBL	EBT	EBR	WBL	WBT	WBR	Yes NBL	NBT	NBR	SBL	SBT	SBR	%Left Turn	Volume Advancing	Volume Opposing	
AM	86	0	22	0	0	0	7	87	0	0	85	28	7.4%	94	113	
PM	56	0	14	0	0	0	24	116	0	0	138	96	17.1%	140	234	

Future Total 2032																
Design Speed																
90 km/h																
	EBL	EBT	EBR	WBL	WBT	WBR	Yes NBL	NBT	NBR	SBL	SBT	SBR	%Left Turn	Volume Advancing	Volume Opposing	
AM	86	0	22	0	0	0	7	95	0	0	91	28	6.9%	102	119	
PM	56	0	14	0	0	0	24	125	0	0	148	96	16.1%	149	244	





Access #2 @ Appleton Side Road

Future Total 2027															
Design Speed	Yes														
60 km/h	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	%Left Turn	Volume Advancing	Volume Opposing
AM	86	0	22	0	0	0	7	87	0	0	85	28	79.6%	108	0
PM	56	0	14	0	0	0	24	116	0	0	138	96	80.0%	70	0

Future Total 2032															
Design Speed	Yes														
60 km/h	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	%Left Turn	Volume Advancing	Volume Opposing
AM	86	0	22	0	0	0	7	95	0	0	91	28	79.6%	108	0
PM	56	0	14	0	0	0	24	125	0	0	148	96	80.0%	70	0

