KETTLE CREEK RESIDENTIAL

PORT STANLEY, ON

TRAFFIC IMPACT STUDY

Prepared by:

RC SPENCER ASSOCIATES INC.
Consulting Engineers
Windsor: 800 University Avenue W. - Windsor ON N9A 5R9
Leamington: 18 Talbot Street W. - Leamington ON N8H 1M4
Chatham-Kent: 49 Raleigh Street - Chatham ON N7M 2M6

File No.: 24-1581 March 2024

KETTLE CREEK RESIDENTIAL, PORT STANLEY, ON

TRAFFIC IMPACT STUDY (MARCH 2024)

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INTRODUCTION AND BACKGROUND

G-Lover Holdings is proposing a redevelopment of a portion of the existing Kettle Creek Golf and Country Club in Port Stanley, ON, to accommodate a residential development. Port Stanley is a community in the Municipality of Central Elgin, in Elgin County; it is located on the north shore of Lake Erie. The area plan is illustrated on Figure 1.

Lake Line is an east / west rural arterial road to the west of Carlow Road / Union Road. Warren Street (County Road 21) is a 400m long east / west arterial link between Carlow Road / Union Road and Colborne Street. A midblock pedestrian crossover (PXO) is provided on Warren Street, where the sidewalk on the south side crosses to continue at the north side. Union Road, which is also known as County Road 20, is an arterial road that begins north of the Lake Line / Warren Street intersection and goes north and then west to Shedden, ON.

Carlow Road, which is also known as County Road 20, is a north / south arterial road that begins south of the Lake Line / Warren Street intersection and runs down to the beach and public boat launch areas to the south. It is noted there is an existing sidewalk on the east side of Carlow Road for approximately 100m south of Warren Street, which then switches to the west side at a pedestrian crossover. This sidewalk and crossover provide protection for pedestrians heading to and from the Kettle Creek Public School and the Port Stanley Arena and Community Centre. According to the "Traffic Study – Village of Port Stanley", a 40 km/h reduced speed zone and Community Safety Zone has recently been established along Carlow Road south of Warren Street. The sidewalk continues along the west side of Carlow Road to Bridge Street. Colborne Street, also known as County Road 4, proceeds from Bridge Street north to St. Thomas, where it becomes Highway 4 and continues to Highway 401 south of London.

All intersections within the study area are two-lane roadways. The intersections of Lake Line / Warren Street at Carlow Road / Union Road and Warren Street at Colborne Street are stop-controlled, as is the existing golf course access on Carlow Road. The posted speed limit is 50 km/h on all streets within the study area, except within the community safety zone (40 km/h) on Carlow Road (from Lake Line / Warren Street to north of the Kettle Creek Golf Course access). As defined on Figure 2, the study area includes the stop-controlled intersections of Lake Line / Warren Street at Carlow Road / Union Road and Warren Street at Colborne Street, as well as the stop-controlled intersection of the existing Kettle Creek Golf Club access at Carlow Road.

The draft plan (provided on Figure 3) consists of 222 residential units (142 single detached and 80 "vacant land" condos). To be conservative and to assess the "worst-case" scenario, it was assumed that the development will be built-out by the 2028 horizon year. To facilitate access to and from the development, the developer proposes use of the current Carlow Road site access.

The purpose of this study is to evaluate the potential impact of the proposed residential development on area traffic operations. However, seven other developments within the area are also anticipated to be constructed by the 2028 horizon year, so they were also reviewed within the context of this report. For consistency, the estimated trip generation for the area developments, as well as the trip distribution percentages, are based on the most recent study, completed by Strik, Baldinelli, Moniz Ltd. in October 2021 for the 37719 Lake Line Kettle Creek Subdivision, which is situated immediately north of the subject development.

TRAFFIC DATA COLLECTION

As provided in Appendix A, turning movement counts were obtained by Pyramid Traffic Inc. on 1 September 2022 for the intersections of:

- Site Access at Carlow Road (C.R. 20);
- Lake Line / Warren Street (C.R. 21) at Carlow Road / Union Road (C.R. 20); and
- Warren Street (C.R. 20) at Colborne Street (C.R. 4).

It should be noted that previous studies were based on traffic counts older than four years (due to the pandemic) and adjusted accordingly. This study, however, is based on recently collected traffic data; therefore, the results may somewhat differ from those of prior studies.

METHODOLOGY

The utilized software package (Synchro 11) analyzes various parameters of intersection performance, such as level of service (LOS), intersection capacity utilization (ICU), control delay, and queue lengths on individual approaches; the software relies on the Highway Capacity Manual (6th Edition), which focuses on quantifying and qualifying the traffic operations metrics.

Signalized level of service results are reported based on the following industry standard:

Level of Service	Average Control Delay (sec/veh)	General Description (Signalized Intersections)
A	≤10	Free Flow
B	>10 - 20	Stable Flow (slight delays)
C	>20 - 35	Stable flow (acceptable delays)
D	>35 - 55	Approaching unstable flow (tolerable delay, occasionally wait through more than one signal cycle before proceeding)
E	>55 - 80	Unstable flow (intolerable delay)
F	>80	Forced flow (jammed)

Unsignalized level of service results are reported based on the following industry standard:

Level of Service	Average Control Delay (sec/veh)
A	0 - 10
B	>10 - 15
C	>15 - 25
D	>25 - 35
E	>35 - 50
F	>50

TRIP GENERATION AND DISTRIBUTION

Trip generation for the proposed development was estimated from the Institute of Transportation Engineers Trip Generation Manual (11th Edition). The dataset's average rate was used instead of the fitted curve because the value of the independent variable is in the lower range of the dataset; the fitted curve equation does not pass through the origin.

ITE Land Use Code 210 (Single-Family Detached Housing) is the most appropriate (and conservative) code for the 222 proposed single-family dwellings. It provides generation rates of 0.70 trips per unit in the AM peak hour, with 26% entering and 74% exiting, and 0.94 trips per unit in the PM peak hour, with 63% entering and 37% exiting.

The details of the trip generation analysis are provided in Appendix B. The total trips generated by the proposed residential development are estimated to be 40 entering and 115 exiting during the AM peak hour, and 131 entering and 78 exiting during the PM peak hour.

To be consistent with previous reports, the site generated traffic was distributed to and from Carlow Road and at subsequent intersections considering the directional flow of existing traffic volumes on the surrounding network, as taken from the recent turning movement counts, as well as the anticipated origin / destinations assumed in the Strik, Baldinelli, Moniz Ltd. traffic study for the Lake Line Kettle Creek Subdivision. The trip distribution for the subject development is provided below, and the resulting site generated turning movements are illustrated on Figure 4.

Table 1: Trip Distribution

	AM Percentage	PM Percentage
Origin / Destination	**To / From**	**To / From**
North (Union)	5	5
North (Colborne)	45	35
South	50	60
Total	**100%**	**100%**

AREA DEVELOPMENT TRAFFIC

Various traffic impact studies and memos have been prepared for many of the potential area developments; the most recent study, as previously stated, was completed by Strik, Baldinelli, Moniz Ltd. in October 2021. This study, which addressed the impact of the proposed 37719 Lake Line Kettle Creek Subdivision (to the north of the subject development), considered five other proposed area developments. The Township of Southwold has also requested that a proposed subdivision at 4509 Union Road, north of the subject development, be considered in the current evaluation. To be consistent with the findings of the previous studies, RC Spencer Associates Inc. chose to evaluate the same horizon years as the previous studies; accordingly, the horizon years of 2028 and 2040 were examined, anticipating that all but Phase 2 of the Harbour Plan will be developed by horizon year 2028. The following table shows the anticipated area development trip generation results as presented in previous reports, with the addition of the 37719 Lake Line Road and 4509 Union Road developments:

Table 2: Area Development Traffic

Development	Units / GFA (sq.ft.)	AM Peak Hour Trips			PM Peak Hour Trips		
		In	Out	Total	In	Out	Total
Seaglass	510	53	205	258	210	113	323
Lakeview	60 / 1,800	14	33	47	45	34	81
Harbour Plan – Ph. 1 (2028)	178 / 20,274	65	120	185	202	164	366
Unnamed Residential	96	18	53	71	60	35	95
Little Creek West Lands	302	39	120	158	126	75	202
37719 Lake Line Road Sub.	97	17	53	70	59	35	94
4509 Union Road	182	23	67	90	72	44	116
2028 Total	**1425 / 22,074**	**229**	**651**	**879**	**774**	**500**	**1277**
Harbour Plan – Ph. 2 (2040)	795 / 29,276	173	380	553	504	362	886
2040 Total	**2220 / 51,350**	**402**	**1031**	**1433**	**1278**	**862**	**2163**

CAPACITY AND LEVEL OF SERVICE ANALYSIS

Detailed Synchro 11 analysis was carried out with respect to the following traffic scenarios:

- Existing Traffic;
- Background Traffic 2028 (Includes Area Development Traffic);
- Total Traffic 2028 (Background Traffic 2028 + Site Generated Traffic);
- Background Traffic 2040 (Includes Area Development Traffic); and
- Total Traffic 2040 (Background Traffic 2032 + Site Generated Traffic).

To be conservative, the analysis was carried out with the expectation that all but Phase 2 of the Harbour Plan will be developed by horizon year 2028. Background traffic was increased by 1.0% per year, compounded annually, for the horizon forecasts; this rate was confirmed with Elgin County representatives and is slightly higher than the background growth rate of 0.5% used in the previous area traffic studies.

Figure 5 illustrates the existing traffic volumes. Figures 6 to 11 illustrate the anticipated area development traffic for the 2028 and 2040 horizon years, the background 2028 and 2040 traffic, and summarize the total traffic estimates that result from the addition of site generated traffic to the 2028 and 2040 horizon year forecasts for background traffic in the study area. The resulting Synchro 11 simulation reports are provided in Appendix C.

To address the effect of traffic growth on individual intersections within the study area and to assess the need for potential geometric and / or traffic infrastructure improvements, the Synchro 11 results were summarized as follows:

Site Access at Carlow Road (County Road 20)

The existing tee intersection of the site access at Carlow Road is stop-controlled on the eastbound approach, but it will be reconstructed to accommodate two-way traffic to service the proposed subdivision. According to Table 3, even with the increases in background traffic growth and the addition of anticipated area development traffic and site generated traffic, it is anticipated that the intersection will perform satisfactorily in all horizon traffic scenarios. Carlow Road retains a LOS A in all future scenarios, while the site access is expected to operate at a LOS C (with a corresponding average control delay 22.3 seconds) and a queue length of up to 1.3 vehicles in the "worst-case" Total Traffic 2040 PM peak hour scenario.

Table 3: Level of Service by Approach – Site Access at Carlow Road

Scenario	Site Access at Carlow Road							
	AM Peak Hour				PM Peak Hour			
	E/B	W/B	N/B	S/B	E/B	W/B	N/B	S/B
Existing Traffic	A	-	A	A	B	-	A	A
Background Traffic 2028	A	-	A	A	B	-	A	A
Total Traffic 2028	B	-	A	A	C	-	A	A
Background Traffic 2040	B	-	A	A	C	-	A	A
Total Traffic 2040	B	-	A	A	C	-	A	A

Lake Line / Warren Street (County Road 21) at Carlow Road / Union Road (County Road 20)

All approaches to the all-way stop-controlled intersection of Lake Line / Warren Street at Carlow Road / Union Road are comprised of shared approach lanes, except for the northbound approach, which also accommodates a dedicated right turn lane. Based on the reported level of service results from Table 4, even with the increases in background traffic growth and the addition of anticipated area development traffic and site generated traffic, it is anticipated that the intersection will perform satisfactorily in all horizon traffic scenarios. The levels of service remain essentially the same between the background traffic and total traffic scenarios, which suggests that the subject development will not place additional stress on the existing intersection.

Table 4: Level of Service by Approach – Lake Line / Warren St. at Carlow Rd. / Union Rd.

Scenario	Lake Line / Warren St. at Carlow Rd. / Union Rd.							
	AM Peak Hour				PM Peak Hour			
	E/B	W/B	N/B	S/B	E/B	W/B	N/B	S/B
Existing Traffic	A	A	A	A	A	A	A	A
Background Traffic 2028	A	A	A	A	A	B	B	B
Total Traffic 2028	A	A	A	A	A	B	B	B
Background Traffic 2040	A	A	B	A	B	B	B	C
Total Traffic 2040	A	A	B	A	B	C	B	C

Warren Street (County Road 21) at Colborne Street (County Road 4)

The tee intersection of Warren Street at Colborne Street is stop-controlled on the eastbound approach. The eastbound and northbound approaches are comprised of shared lanes; the southbound approach is comprised of a right turn lane and a through lane. According to Table 5, even with the increases in background traffic growth and the addition of anticipated area development traffic and site generated traffic, it is anticipated that the intersection will perform satisfactorily during the studied AM peak hours; however, the levels of service and corresponding control delays deteriorate to the point of failure by the “Background Traffic 2040” scenario. It should be noted that this failure is largely the result of site generated traffic from other anticipated area developments; the subject development only generates approximately 27 of the projected 143 eastbound left turns in the critical PM peak hour, but the Colborne Street (CR4) traffic is expected to increase to the point where no gaps are available for eastbound trips to enter the northbound traffic stream. Since it is difficult to accurately project traffic operations and patterns 16 years into the future, this intersection should be monitored as area developments are built out.

Table 5: Level of Service by Approach – Warren Street at Colborne Street

Scenario	Warren Street at Colborne Street							
	AM Peak Hour				PM Peak Hour			
	E/B	W/B	N/B	S/B	E/B	W/B	N/B	S/B
Existing Traffic	B	-	A	A	B	-	A	A
Background Traffic 2028	B	-	A	A	C	-	A	A
Total Traffic 2028	B	-	A	A	D	-	A	A
Background Traffic 2040	B	-	A	A	F	-	A	A
Total Traffic 2040	C	-	A	A	F	-	A	A

GEOMETRIC AND TRAFFIC CONTROL IMPROVEMENTS

Site Access at Carlow Road (County Road 20)

Left turn lane warrants were examined for the intersection of the site access at Carlow Road; the provincial warrant references are provided in Appendix D. The speed limit on Carlow Road is 50 km/h; therefore, a 60 km/h design speed was selected as the basis for evaluating each scenario. Based on the estimated site generated turning movements (along with existing turning movements generated by the existing golf course), northbound left turns at the Carlow Road site access are expected to be less than 5% of the northbound approach volume (in the "background traffic" scenarios); therefore, the evaluation referenced the guidelines for unsignalized two-lane highways with 5% left turns and a design speed of 60 km/h. Based on the reference, and since the percentage of left turns does not meet the MTO's minimum 5% requirement, a northbound left turn lane on Carlow Road is not warranted for any of the background traffic scenarios.

Northbound left turns are expected to be approximately 12.7% and 22.7% of the approach volumes, respectively, in the Total Traffic 2028 AM and PM peak hour scenarios; therefore, the evaluation referenced the guidelines for unsignalized two-lane highways with 20% left turns and a design speed of 60 km/h. In the Total Traffic 2040 AM and PM Peak Hour scenarios, northbound left turns are expected to be approximately 9.0% and 27.6% of the approach volumes, respectively; therefore, the evaluation referenced the guidelines for unsignalized two-lane highways with 10% and 25% left turns. Based on the reference, a northbound left turn lane on Carlow Road is warranted for the Total Traffic 2040 PM Peak Hour; the lane's storage length should be at least 25m. Therefore, to accommodate the proposed development, the developer should be responsible for reconstructing the intersection of the site access at Carlow Road (to accommodate a dedicated northbound left turn lane with a minimum storage length of 25m); the taper length should be designed in accordance with the TAC Geometric Design Guide for Canadian Roads (2017), which suggests a minimum taper of 15:1.

Lake Line / Warren Street (County Road 21) at Carlow Road / Union Road (County Road 20)

Left turn lane warrants were considered for the intersection of Lake Line / Warren Street at Carlow Road / Union Road; however, the approaching and opposing volumes do not meet the minimum volume threshold for implementation of a dedicated left turn lane. Signal warrants were also examined for the intersection of Lake Line / Warren Street at Carlow Road / Union Road. As reported in Appendix E, this intersection does not meet the criteria for signalization in future scenarios. Based on the reported results, it is the engineers' opinion that this intersection will continue to function at a good level of service under the existing all-way stop control.

Warren Street (County Road 21) at Colborne Street (County Road 4)

Left turn lane warrants were examined for the intersection of Warren Street at Colborne Street; the provincial warrant references are provided in Appendix F. The speed limit on Colborne Street is 50 km/h; therefore, a 60 km/h design speed was selected as the basis for evaluating each scenario. Based on the estimated turning movements, in all traffic scenarios, northbound left turns are expected to be between 10% and 15% of the northbound approach volume; therefore, the evaluation referenced the guidelines for unsignalized two-lane highways with 15% left turns and a design speed of 60 km/h.

Based on the reference, a northbound left turn lane on Colborne Street is not warranted for the existing traffic scenarios; however, the evaluation indicates that a 15m northbound left turn lane on Colborne Street is warranted for the Background Traffic 2028 PM Peak Hour scenario. By the 2040 horizon year, for the background traffic scenario, the estimated traffic volumes require a dedicated northbound left turn lane with a storage length of at least 30m. Therefore, it is the engineers' opinion that the road authority (and other area developments) should be responsible for reconstructing the intersection of Warren Street at Colborne Street (to accommodate a dedicated northbound left turn lane with a minimum storage length of 30m); the taper length should be designed in accordance with the TAC Geometric Design Guide for Canadian Roads (2017), which suggests a minimum taper of 15:1.

Signal warrants were examined for the intersection of Warren Street at Colborne Street. As reported in Appendix F, this intersection does not meet the criteria for signalization in future scenarios. Accordingly, the intersection of Warren Street at Colborne Street was exclusively re-evaluated with respect to the recommended geometric improvements. For the Background and Total Traffic 2040 PM peak hour scenarios, a dedicated northbound left turn lane was incorporated into the existing eastbound stop-control condition.

The Synchro 11 report, as provided in Appendix F, indicates that, in the Background Traffic 2040 PM peak hour scenario, the eastbound LOS F is reduced from an average control delay of 74.2 seconds to 67.3 seconds, while the LOS F in the Total Traffic 2040 PM peak hour scenario is reduced from a delay of 118.5 seconds to a delay of 104.6 seconds.

Although intersection signalization is not warranted, an additional Synchro 11 analysis was undertaken to determine its potential impact on the intersection's traffic operations; the recommended northbound left turn lane was also considered in this additional evaluation, and the signal timings were optimized based on overall intersection control delay. The results indicate that, although the eastbound levels of service improve to LOS B with a control delay of 14.6 and 15.7 seconds, respectively, the corresponding 95th percentile eastbound queue length is 21m and 25.2m; this is likely the result of eastbound left-turning vehicles blocking the eastbound right-turning vehicles accepting southbound gaps in traffic. Furthermore, the northbound and southbound 95th percentile queue lengths increase to somewhere between 46.9m and 53.7m, as opposed to the free-flow condition realized under the existing eastbound stop-control condition.

Since signalization is not warranted and because the delay / queueing for northbound and southbound vehicles is increased due to signalization, it is the engineers' opinion that the intersection can remain stop-controlled on the eastbound approach. However, the road authority should continue to monitor the intersection as area developments become built out.

SIGHT LINE ANALYSIS

A sight line analysis was completed for the site access at Carlow Road; the intersection is stop-controlled on the eastbound approach. The analysis was completed per the TAC Geometric Design Guide for Canadian Roads (2017). The speed limit is 50 km/h on Carlow Road, so the analysis was completed for a 60 km/h design speed. As calculated in Appendix G, the intersection sight distance was determined to be 125m for the worst-case left turn egress maneuver. Intersection sight distance for a right turn egress maneuver was determined to be 108m.

Upon review of the sight triangles illustrated in Figure 12, it is the engineers' opinion that, although the road curves in both directions, there is sufficient sight distance in both directions for safe egress from the site. Furthermore, the calculations were completed for a 60 km/h design speed, but it is unlikely that motorists will exceed 50 km/h when navigating the bend. Therefore, the all-directional site access, as proposed, should be conducive to safe and efficient traffic operations.

SUMMARY AND CONCLUSIONS

G-Lover Holdings is proposing a redevelopment of a portion of the existing Kettle Creek Golf and Country Club in Port Stanley, ON, to accommodate a residential development. Port Stanley is a community in the Municipality of Central Elgin, in Elgin County; it is located on the north shore of Lake Erie. The draft plan consists of 222 single-family residential units. To be conservative and to assess the "worst-case" scenario, it was assumed that the development will be built-out within a four-year horizon. To facilitate access to and from the subject development, the developer proposes use of the current Carlow Road site access.

Using recently obtained turning movement counts, considering known area developments, and applying the best available trip generation and distribution methodologies, an analysis was completed to measure the potential operational impact of the proposed residential development on area traffic operations. Upon completion of the analysis, it was concluded that:

- The stop-controlled site access at Carlow Road is anticipated to operate favourably in the studied horizon years; a single egress lane should sufficiently accommodate the peak hour traffic demand;
- The stop-controlled intersection of Lake Line / Warren Street at Carlow Road / Union Road is operating at excellent levels of service under existing traffic conditions; within the studied horizon scenarios, post-development, this intersection is expected to operate satisfactorily without any geometric and / or traffic control improvements;
- The stop-controlled intersection of Warren Street at Colborne Street is operating at excellent levels of service under existing traffic conditions; however, within the studied horizon traffic scenarios, post-development (and due to other area developments), the eastbound approach deteriorates to the point of "failure" in the PM peak hours, so geometric and / or traffic control improvements are likely warranted;
- By Horizon Year 2040, a dedicated northbound left turn lane (with 25m storage length) is warranted at the intersection of the site access at Carlow Road; the developer should be responsible for its implementation;
- By Horizon Year 2040, a dedicated northbound left turn lane (with 30m storage length) is warranted at the intersection of Warren Street at Colborne Street; the road authority (and other area developments) should be responsible for its implementation;
- Traffic signals are not warranted at any of the studied intersections, but at its discretion, the road authority can implement signalization (even if the warrants are not met);

- The intersection of Warren Street at Colborne Street can remain eastbound stop-controlled; however, the road authority should continue to monitor the peak hour traffic operations as area developments become built out;
- Sufficient sight distance is provided for safe egress from the site.

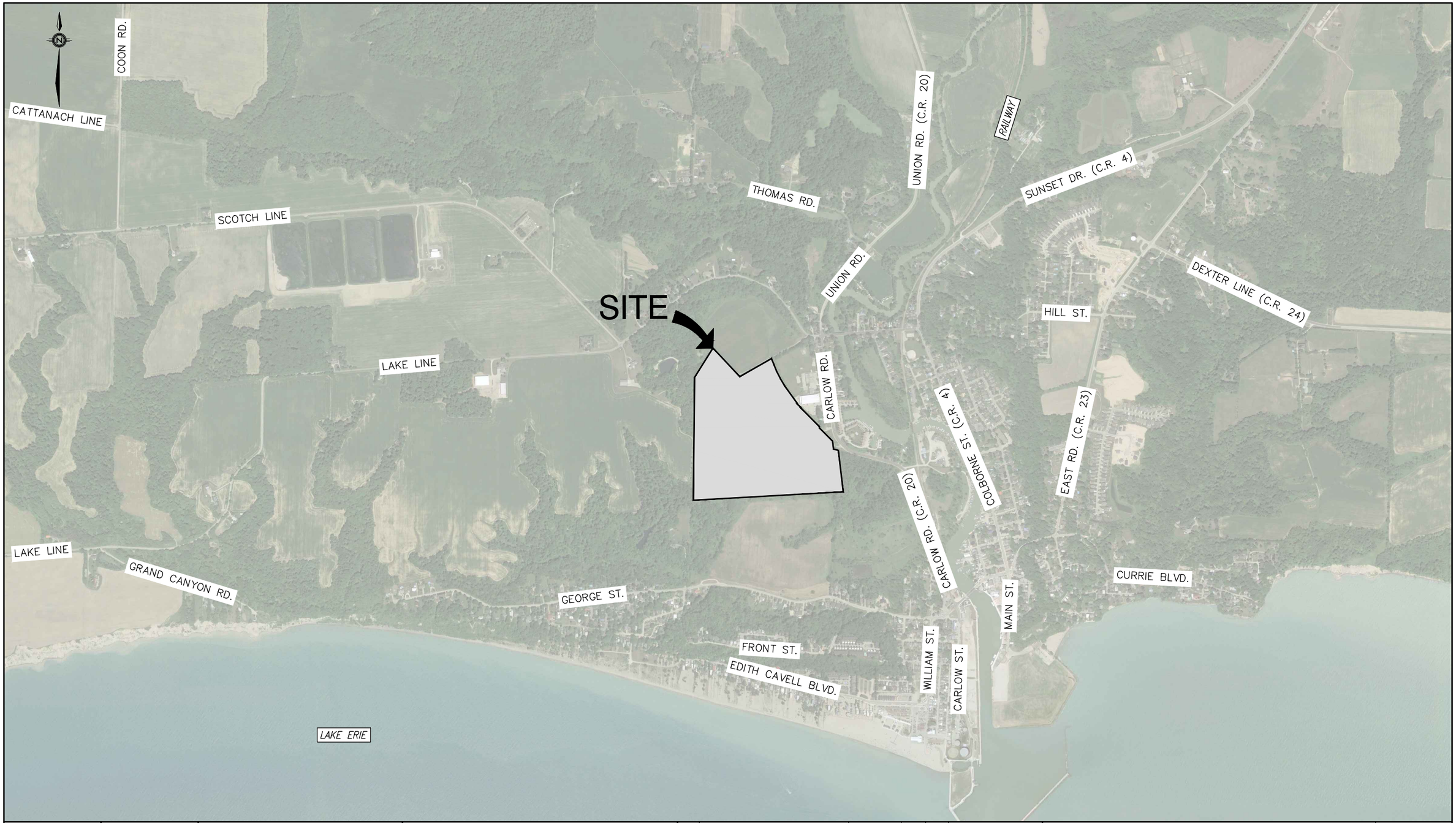
Therefore, based on the results of the technical work, it is the engineers' opinion that the proposed Kettle Creek Residential Development will not adversely impact area traffic operations; however, the recommended geometric and / or traffic control improvements should be implemented within a five-year horizon to ensure that the proposed area developments do not negatively impact the area's overall traffic operations and safety. Any geometric and / or traffic control improvements (like intersection reconstruction, widening, or signalization) should be prepared by a qualified Professional Traffic Operations Engineer (PTOE).

All of which is respectfully submitted,

RC Spencer Associates Inc.

Aaron D. Blata, M.Eng., P.Eng., PTOE, RSP1
Consulting Engineer, Road Safety Professional &
Professional Traffic Operations Engineer
Associate / Leamington Office Manager

Richard C. Spencer, M.A.Sc., P.Eng., PE
Consulting Engineer &
Fellow ITE Member
President / Windsor Office Manager



RC SPENCER ASSOCIATES INC.
Consulting Engineers
Windsor: 800 University Avenue W. – Windsor ON N9A 5R9
Leamington: 18 Talbot Street W. – Leamington ON N8H 1M4
Chatham-Kent: 49 Raleigh Street – Chatham ON N7M 2M6
Professional Engineers Ontario

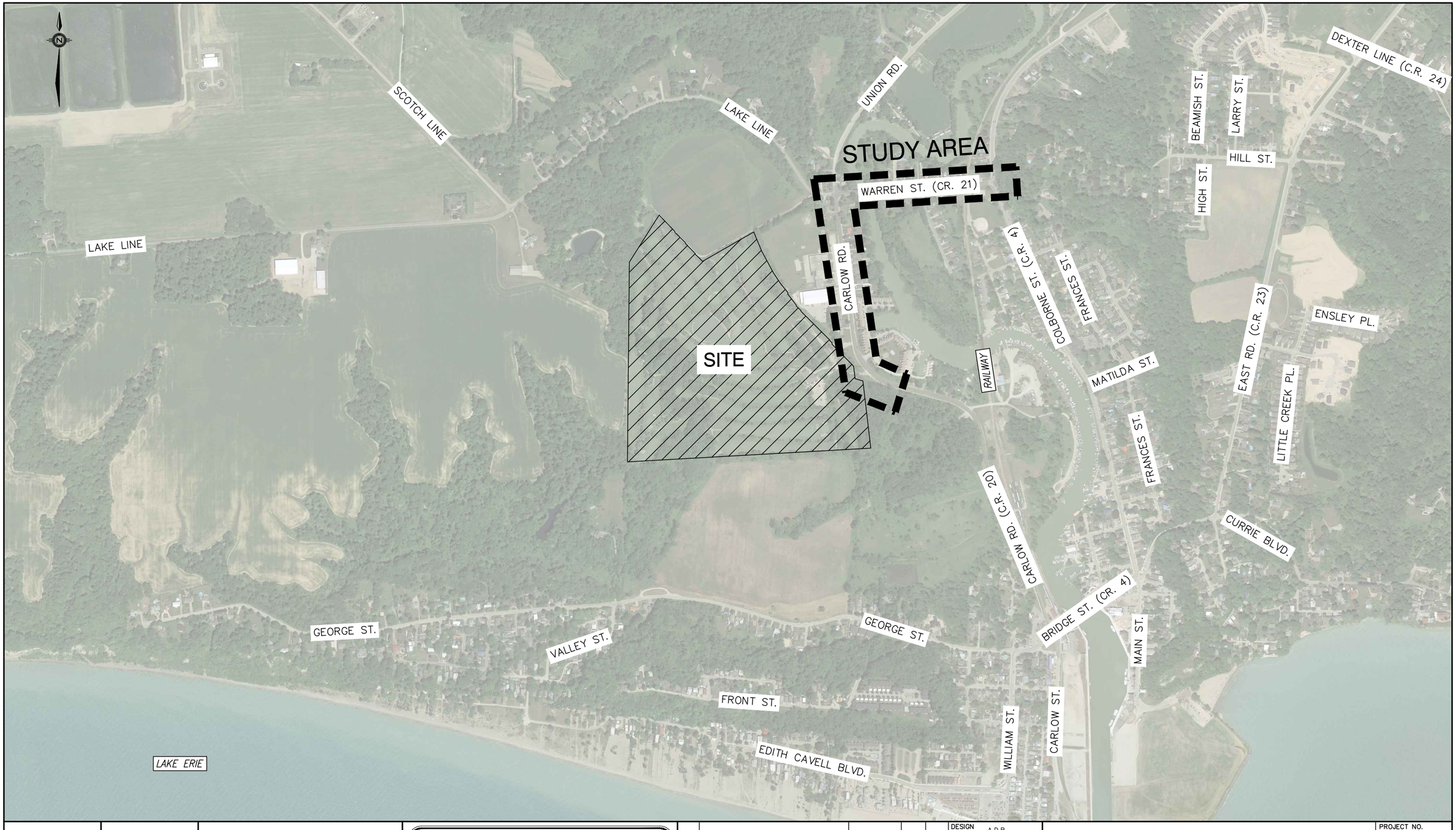
NO.	REVISION	DATE	BY	APP
2.	UPDATED REPORT FIGURES	19 MAR 2024	F.C.	A.D.B.
1.	CREATED REPORT FIGURES	04 MAR 2024	F.C.	A.D.B.

DESIGN A.D.B.
CHECKED A.D.B.
DRAWN F.C.
CHECKED A.D.B.
DATE MARCH 2024
SCALE N.T.S.

KETTLE CREEK DEVELOPMENT, PORT STANLEY – TIS

AREA PLAN

PROJECT NO. 24–1581
FIGURE NO. 1
OF 12



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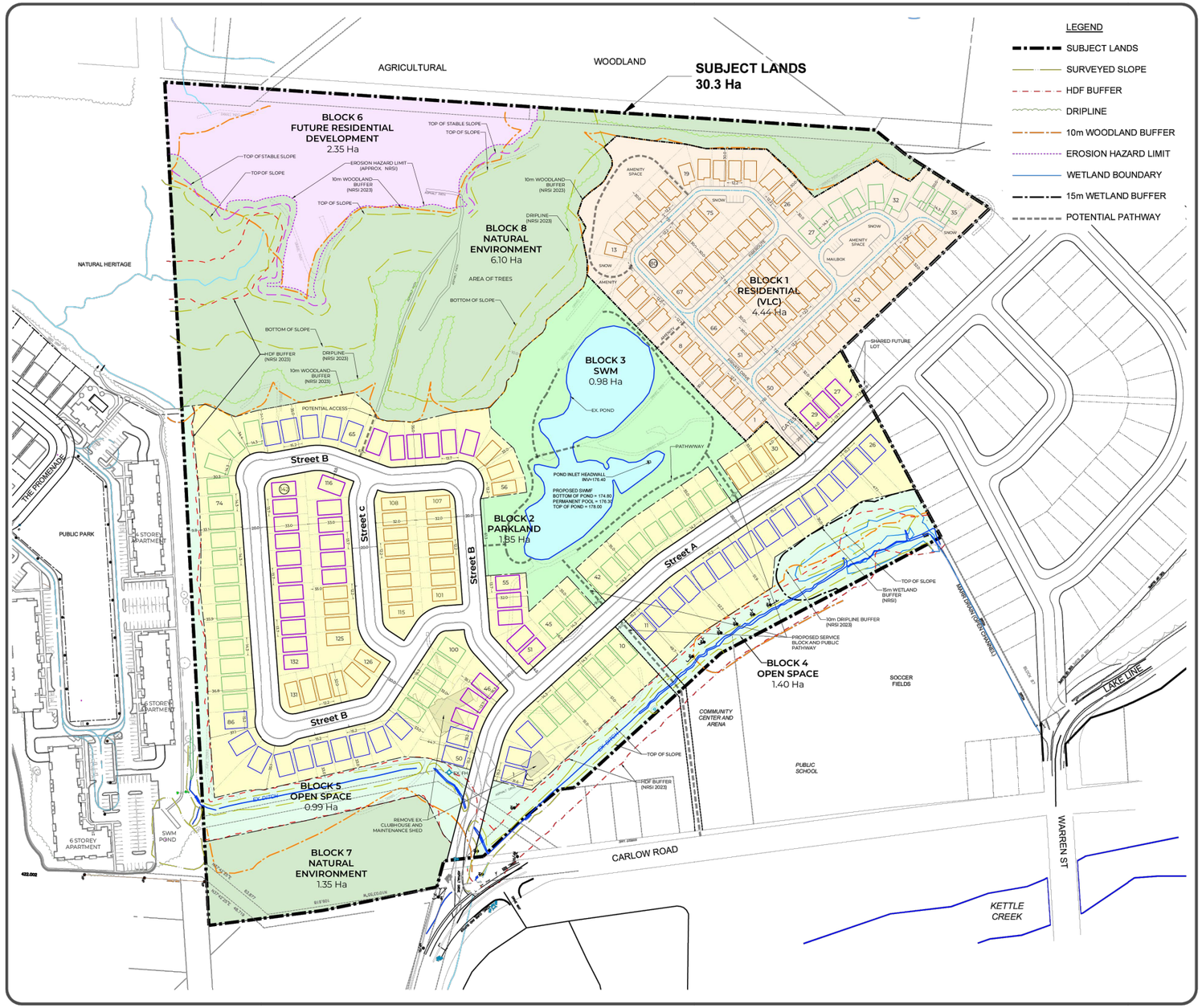
SCALE N.T.S.

KETTLE CREEK DEVELOPMENT, PORT STANLEY – TIS

STUDY AREA

PROJECT NO. 24–1581
FIGURE NO. 2
OF 12



Monteith•Brown
planning consultants
219 OXFORD STREET WEST, UNIT 302
LONDON, ONTARIO. N6H 1S5
519.686.1300 | WWW.MBPC.CA

LAND USE SCHEDULE

LAND USE	AREA (Ha)	%	UNITS
SINGLE DETACHED LOTS	8.01	39.1	142
RESIDENTIAL - VACANT LAND CONDO BLOCK 1	4.44	21.6	80
PARKLAND BLOCK 2	1.85	9.0	
SWM BLOCK 3	0.98	4.8	
OPEN SPACE BLOCKS 4-5	2.40	11.7	
PUBLIC STREETS A TO C	2.83	13.8	
DEVELOPABLE AREA	20.51	100.0	
FUTURE RESIDENTIAL DEVELOPMENT BLOCK 6	2.35		
NATURAL ENVIRONMENT BLOCKS 7-8	7.44		
TOTAL SITE AREA	30.30		222

POTENTIAL UNIT FRONTAGE BREAKDOWN

LOT WIDTH	SUBDIVISION	CONDO	%
12.2 (40')	32	71	46
13.7 (45')	34		15
14.3 (47')	40	9	22
15.2 (50')	36		16
TOTAL	142	80	100

PROPOSED DEVELOPMENT CONCEPT

KETTLECREEK GOLF COURSE
PORT STANLEY, ONTARIO
JAMES GLOVER

PRELIMINARY
FOR DISCUSSION PURPOSES ONLY

Feb 26, 2024
22-1800
SCALE 1: 3,000 (11x17)
0 30 60 90m

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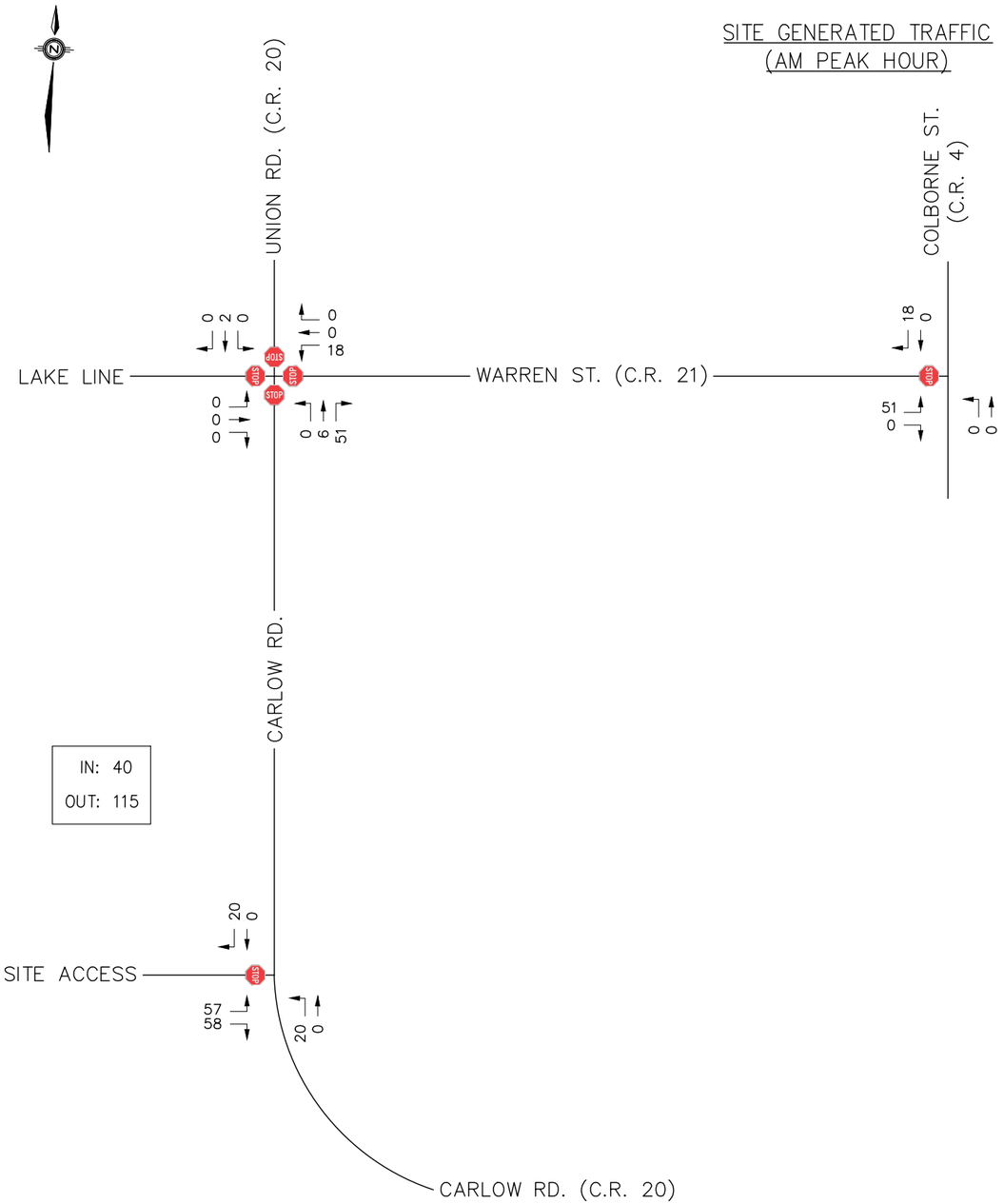
KETTLE CREEK DEVELOPMENT, PORT STANLEY – TIS

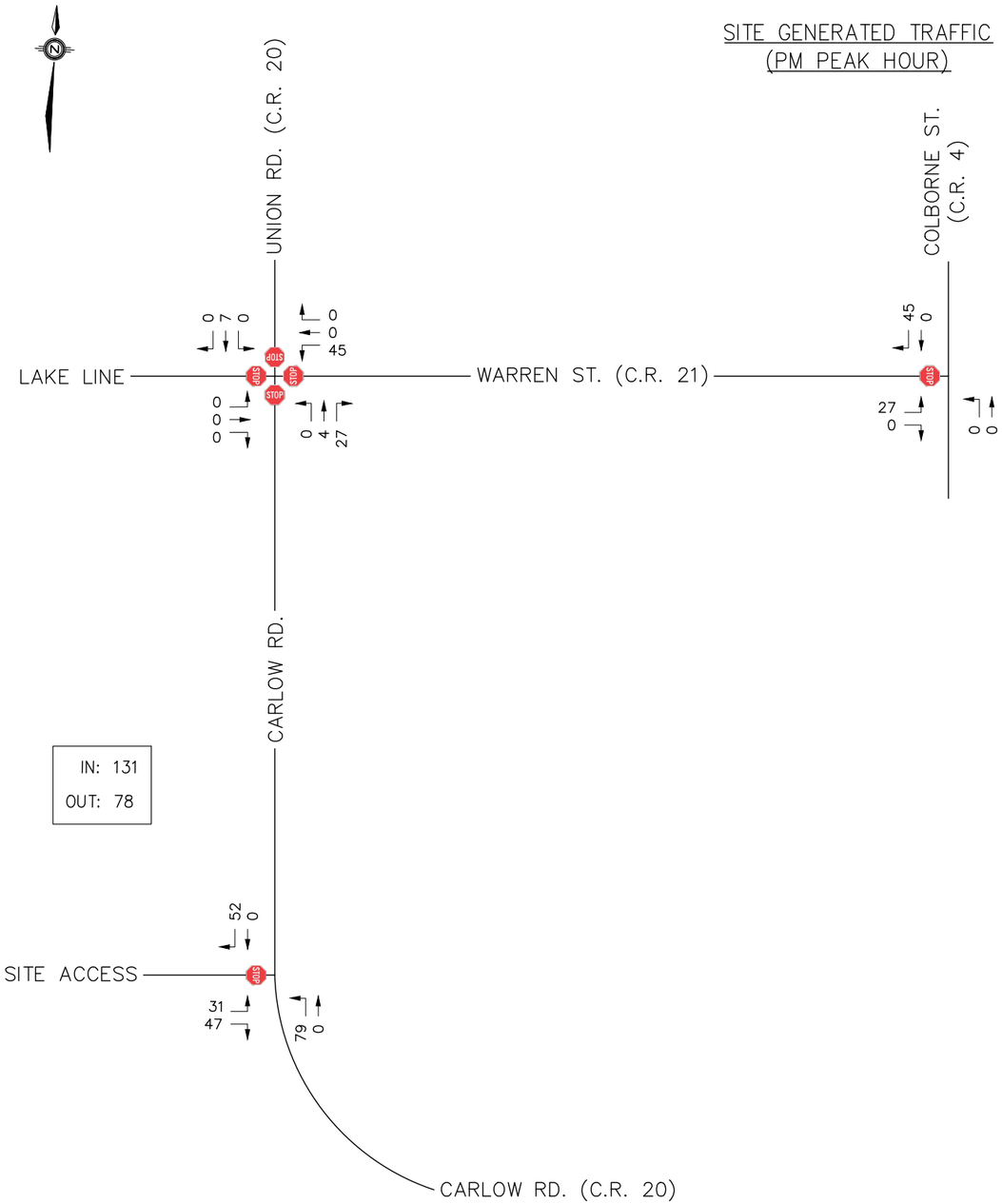
PRELIMINARY DRAFT PLAN

PROJECT NO. 24–1581
FIGURE NO. 3
OF 12

SITE GENERATED TRAFFIC (AM PEAK HOUR)



SITE GENERATED TRAFFIC (PM PEAK HOUR)



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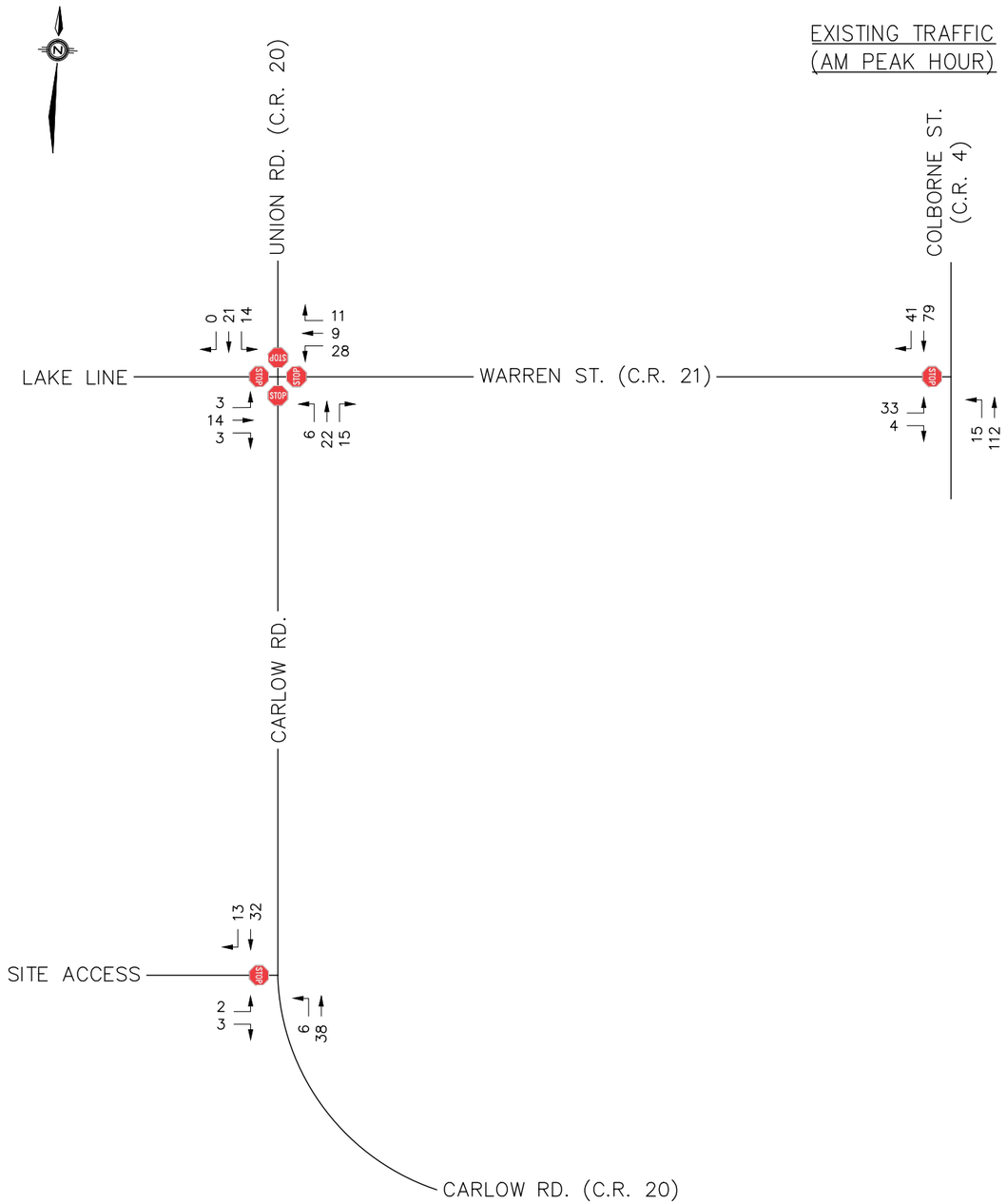
KETTLE CREEK DEVELOPMENT, PORT STANLEY – TIS

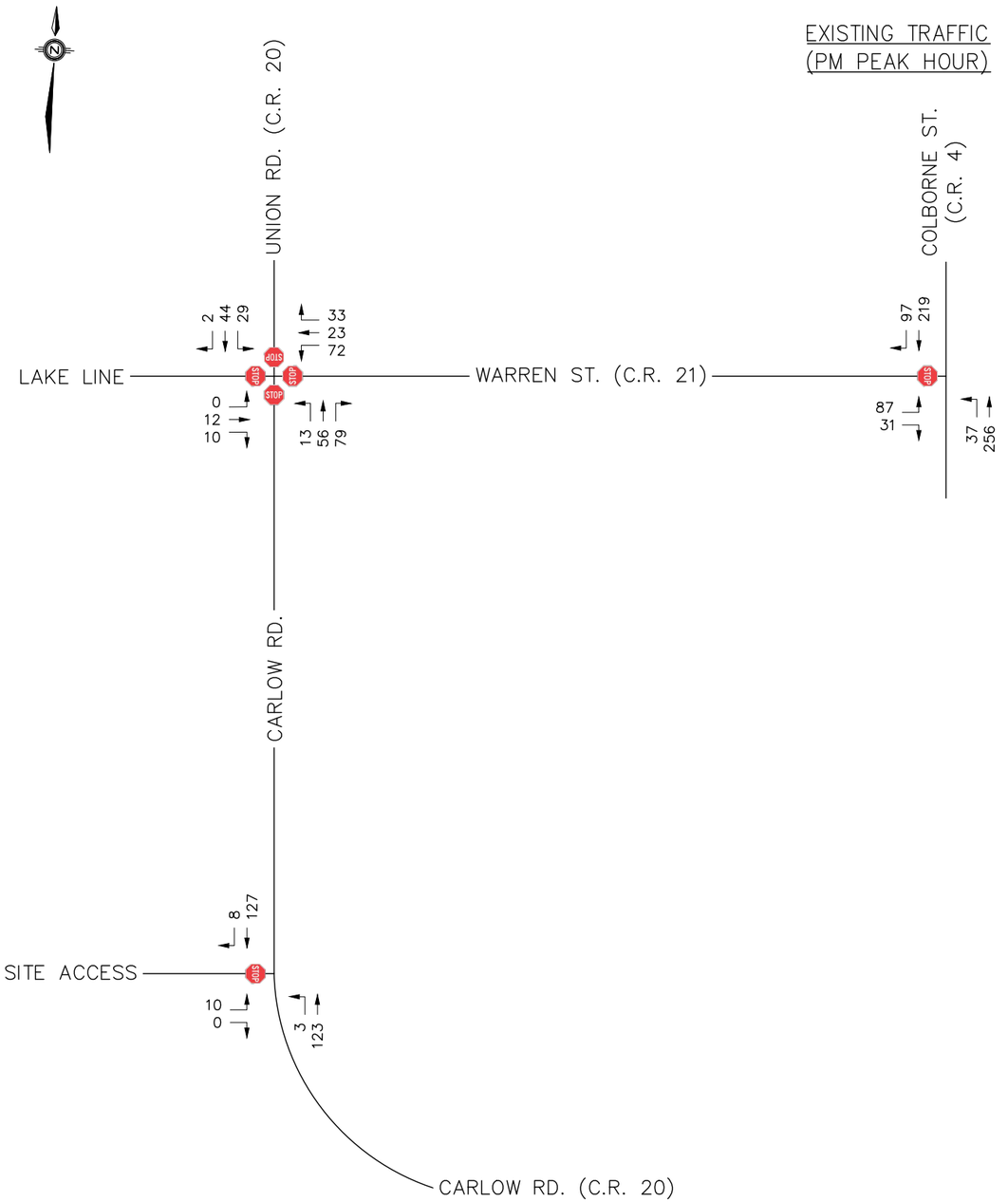
SITE GENERATED TRAFFIC (AM/PM PEAK HOUR)

PROJECT NO. 24–1581
FIGURE NO. 4
OF 12

EXISTING TRAFFIC
(AM PEAK HOUR)



EXISTING TRAFFIC
(PM PEAK HOUR)



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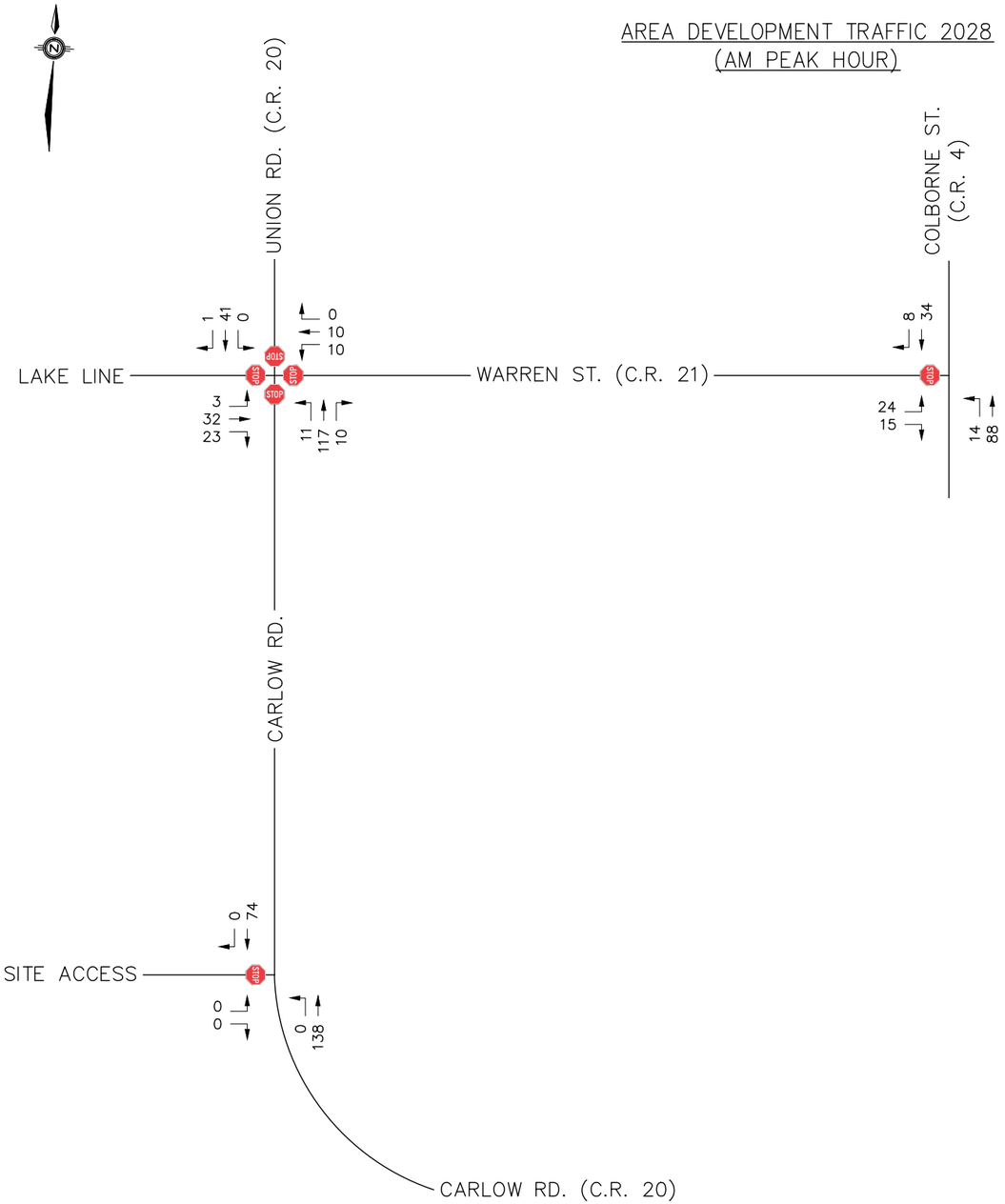
KETTLE CREEK DEVELOPMENT, PORT STANLEY – TIS

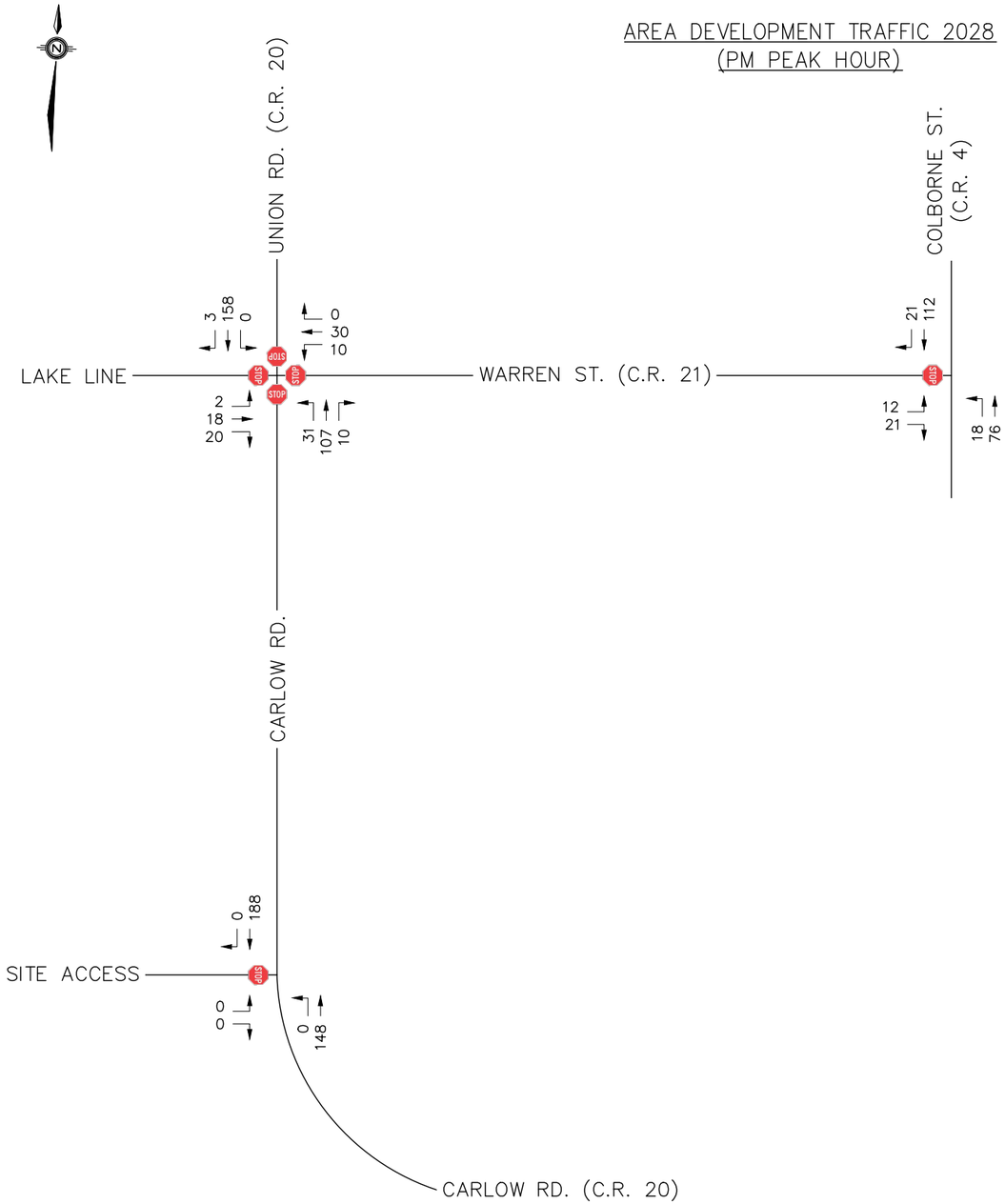
EXISTING TRAFFIC (AM/PM PEAK HOUR)

PROJECT NO. 24–1581
FIGURE NO. 5
OF 12

AREA DEVELOPMENT TRAFFIC 2028 (AM PEAK HOUR)



AREA DEVELOPMENT TRAFFIC 2028 (PM PEAK HOUR)



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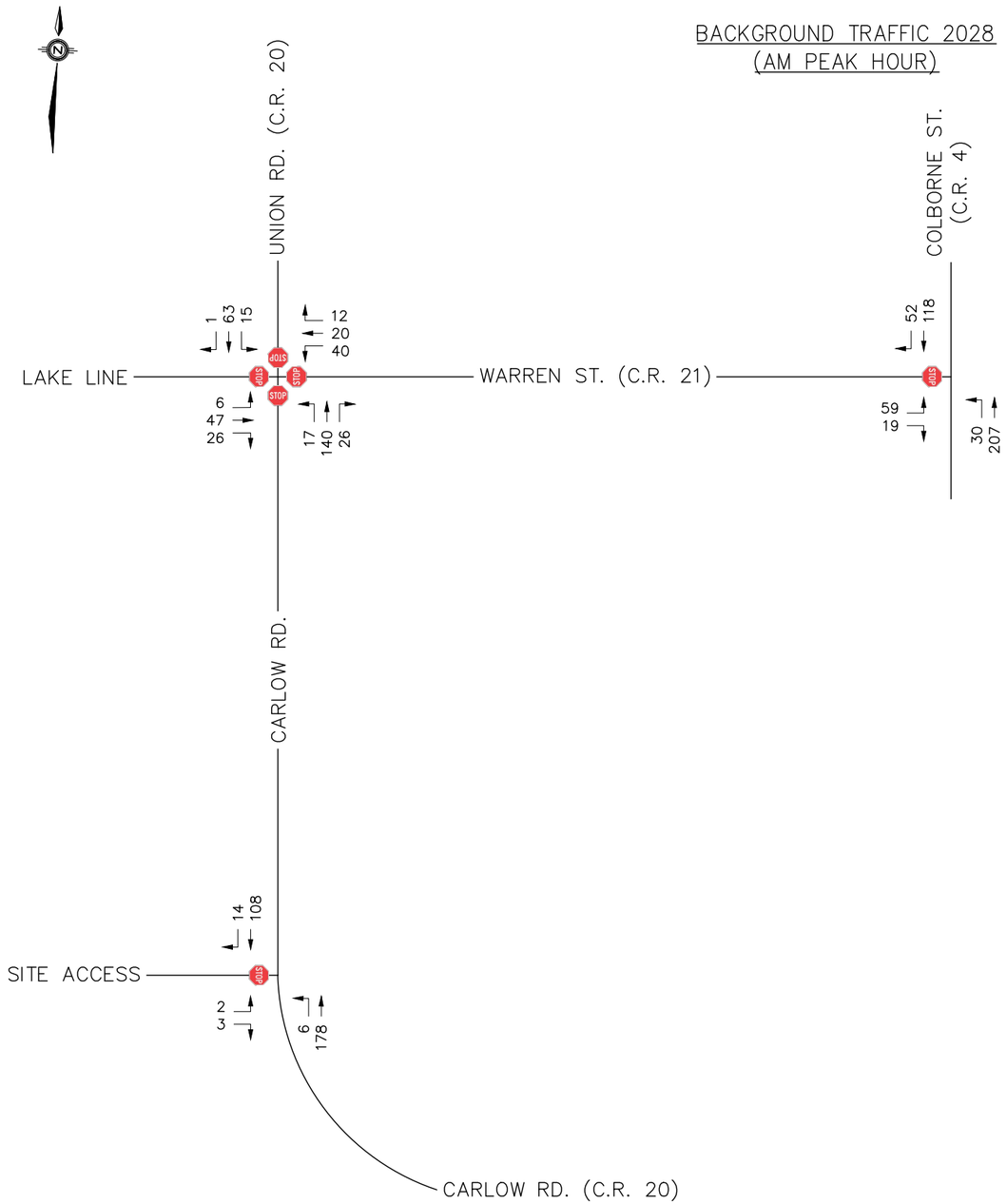
KETTLE CREEK DEVELOPMENT, PORT STANLEY – TIS

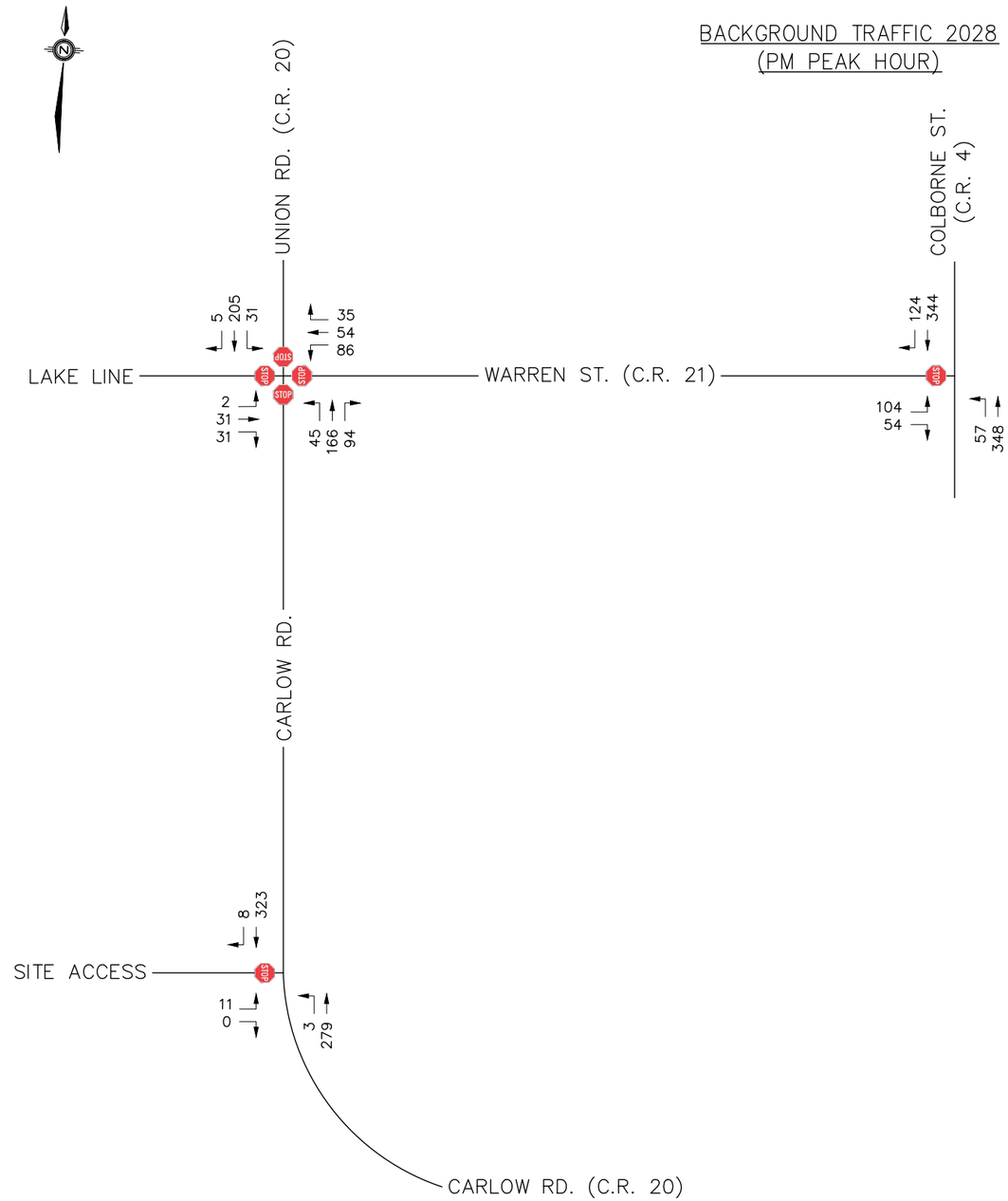
AREA DEVELOPMENT TRAFFIC 2028 (AM/PM PEAK HOUR)

PROJECT NO. 24–1581
FIGURE NO. 6
OF 12

BACKGROUND TRAFFIC 2028
(AM PEAK HOUR)



BACKGROUND TRAFFIC 2028
(PM PEAK HOUR)



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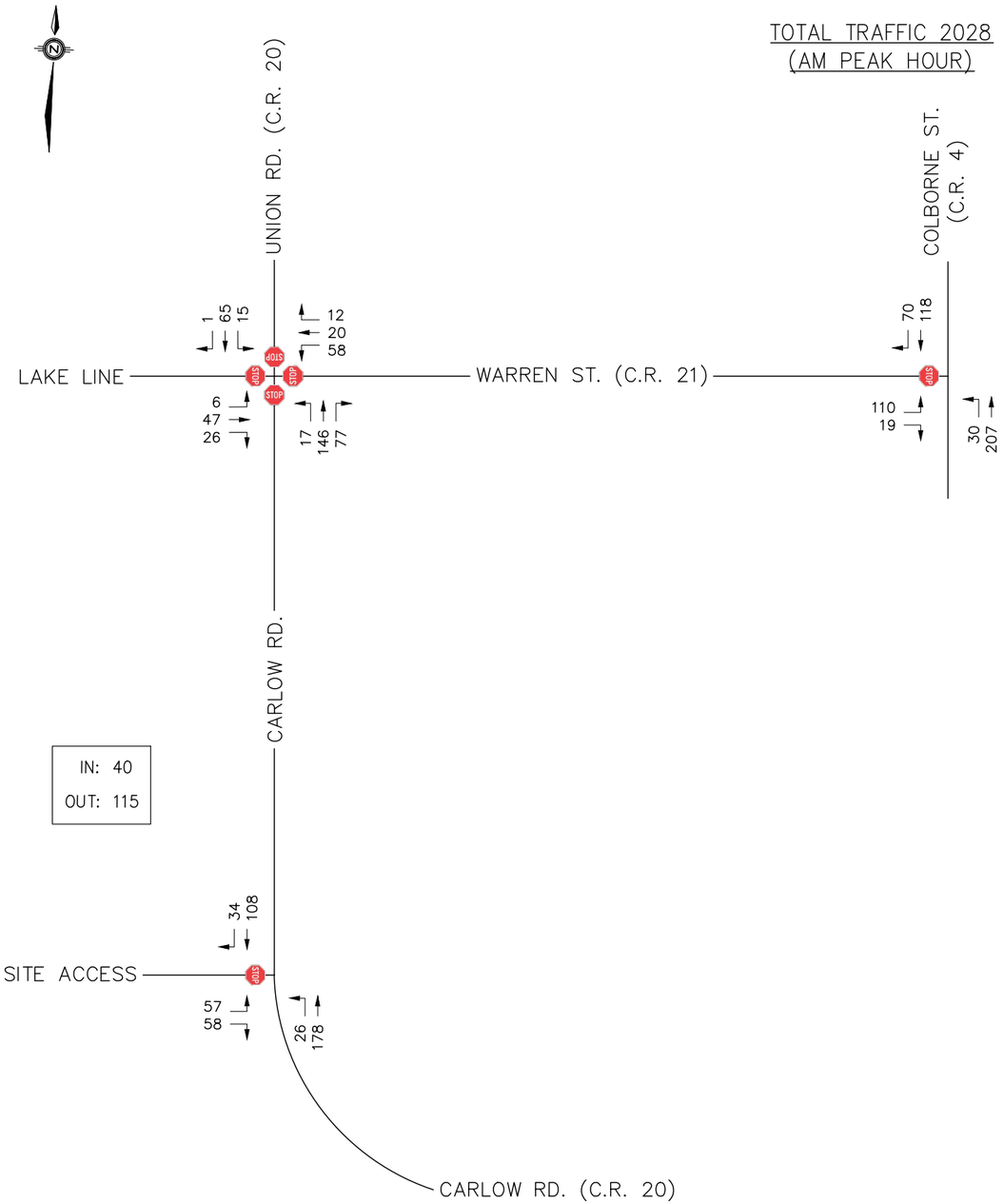
KETTLE CREEK DEVELOPMENT, PORT STANLEY – TIS

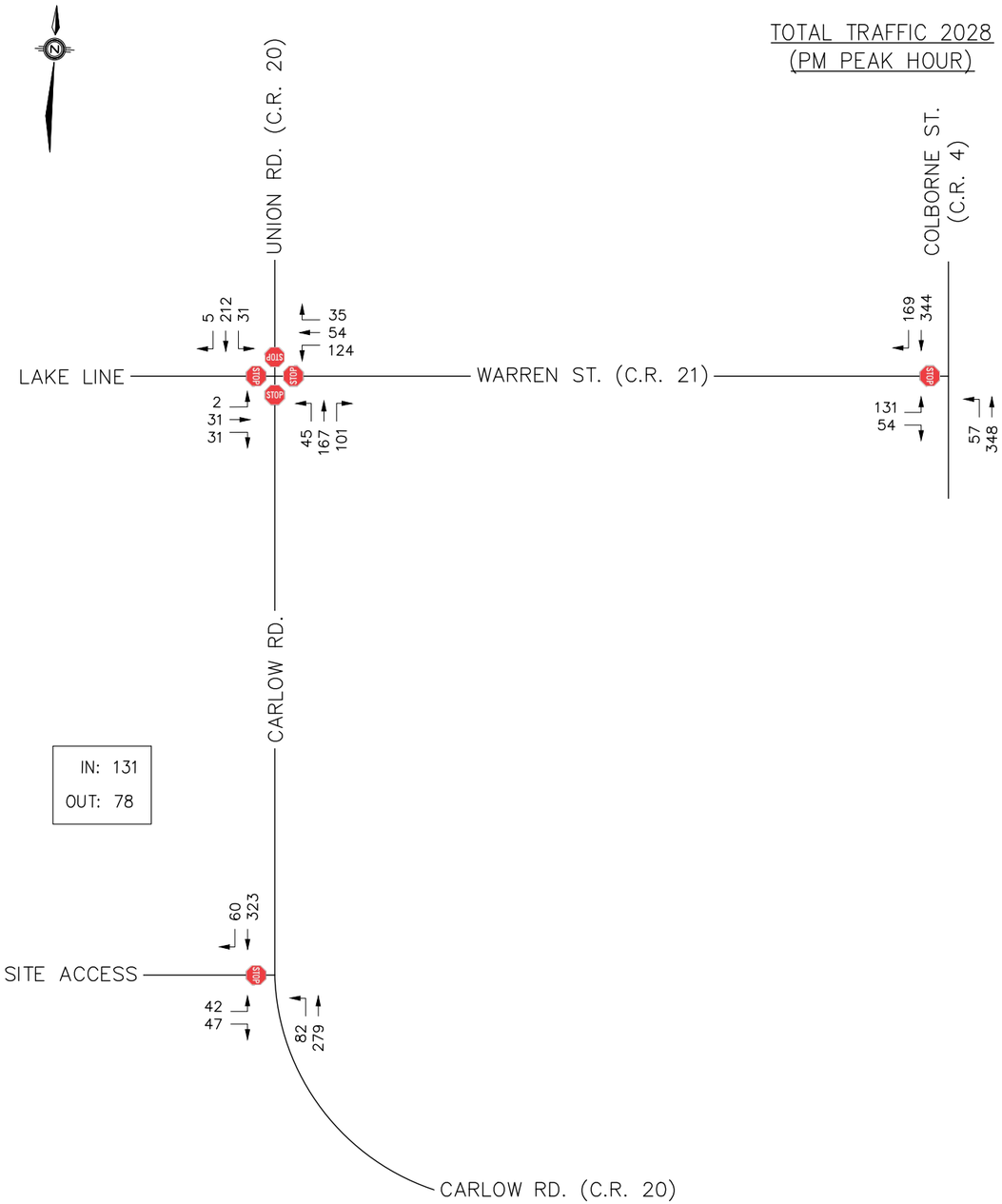
BACKGROUND TRAFFIC 2028 (AM/PM PEAK HOUR)

PROJECT NO. 24–1581
FIGURE NO. 7
OF 12

TOTAL TRAFFIC 2028 (AM PEAK HOUR)



TOTAL TRAFFIC 2028 (PM PEAK HOUR)



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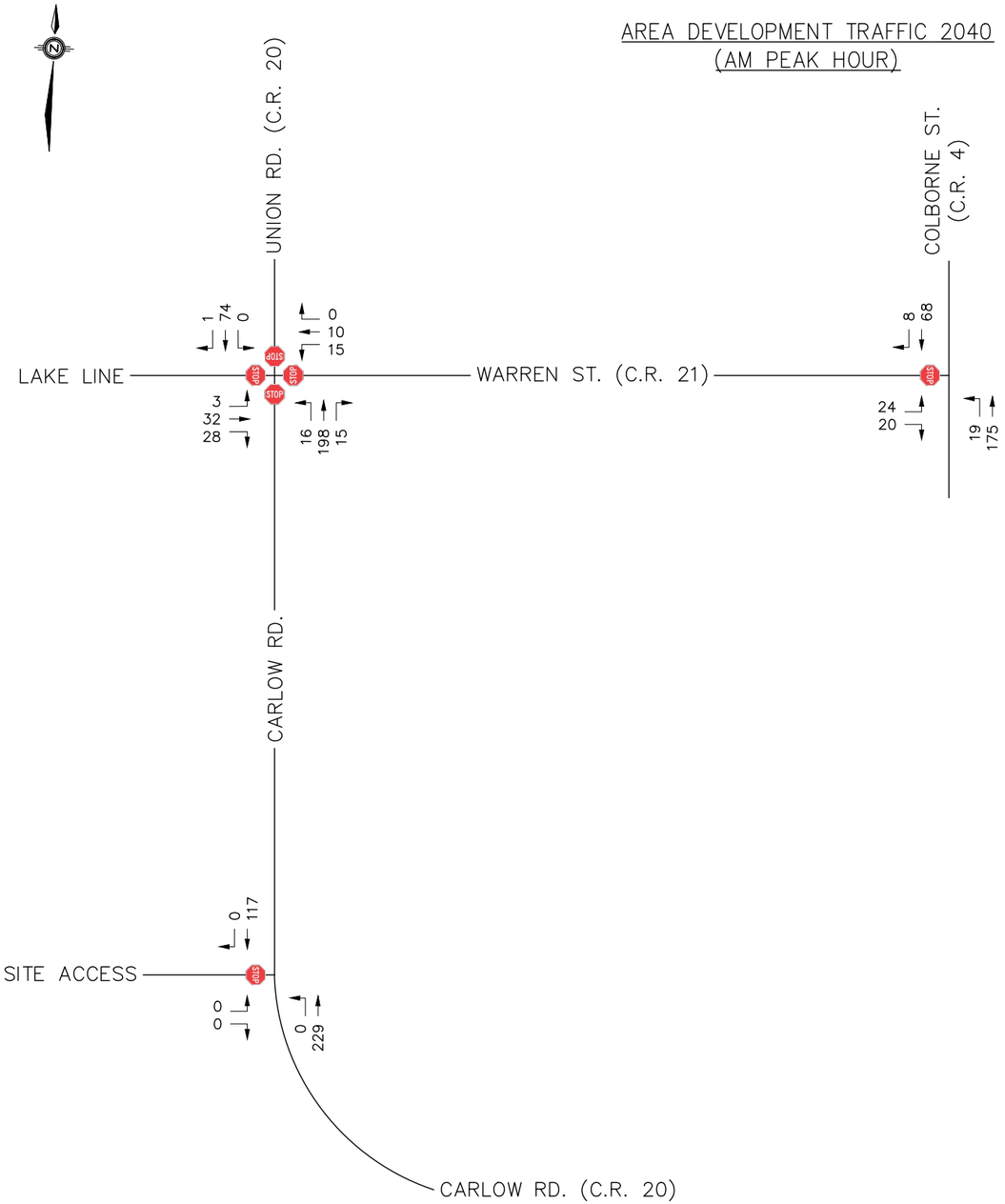
KETTLE CREEK DEVELOPMENT, PORT STANLEY – TIS

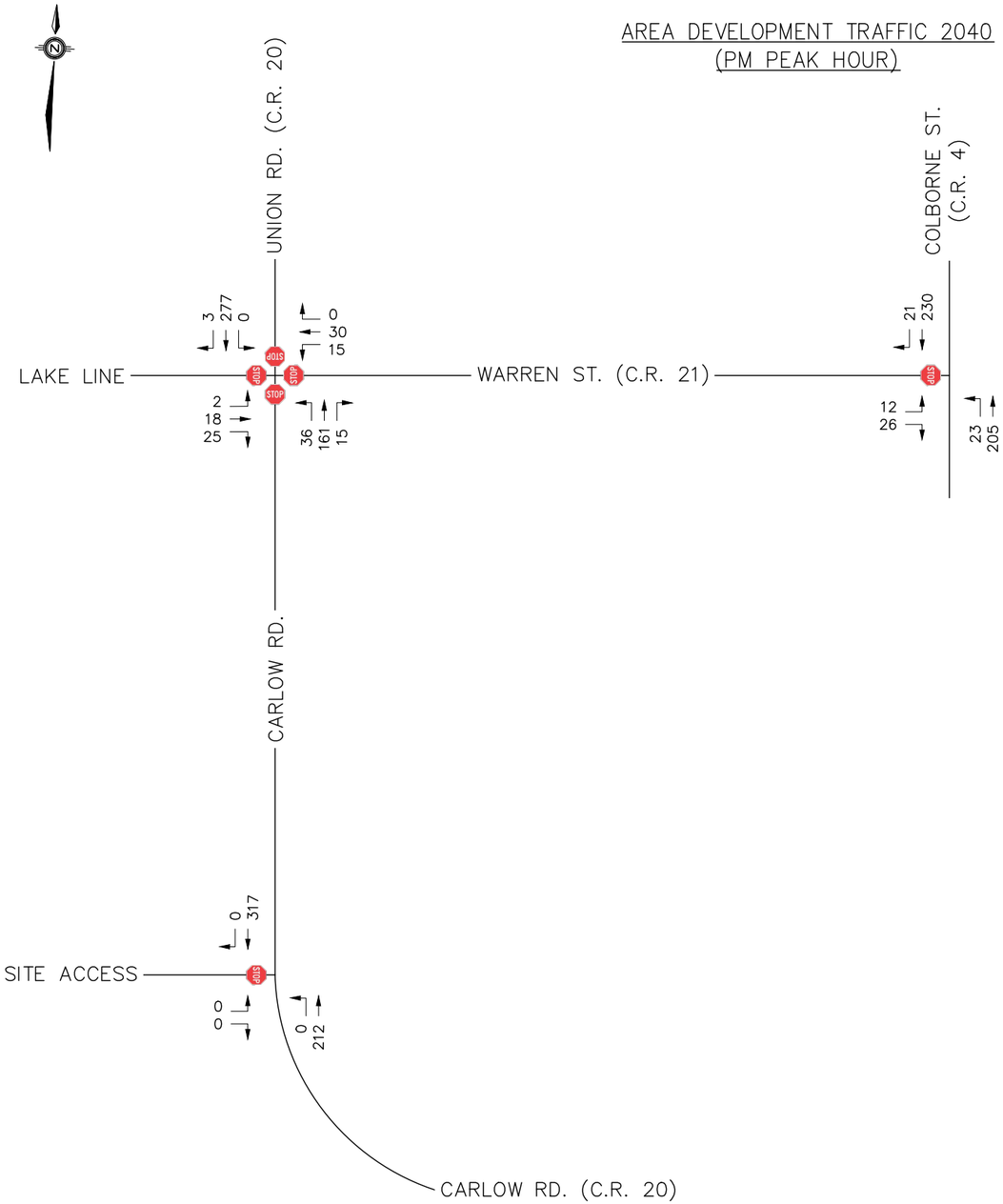
TOTAL TRAFFIC 2028 (AM/PM PEAK HOUR)

PROJECT NO. 24–1581
FIGURE NO. 8
OF 12

AREA DEVELOPMENT TRAFFIC 2040 (AM PEAK HOUR)



AREA DEVELOPMENT TRAFFIC 2040 (PM PEAK HOUR)



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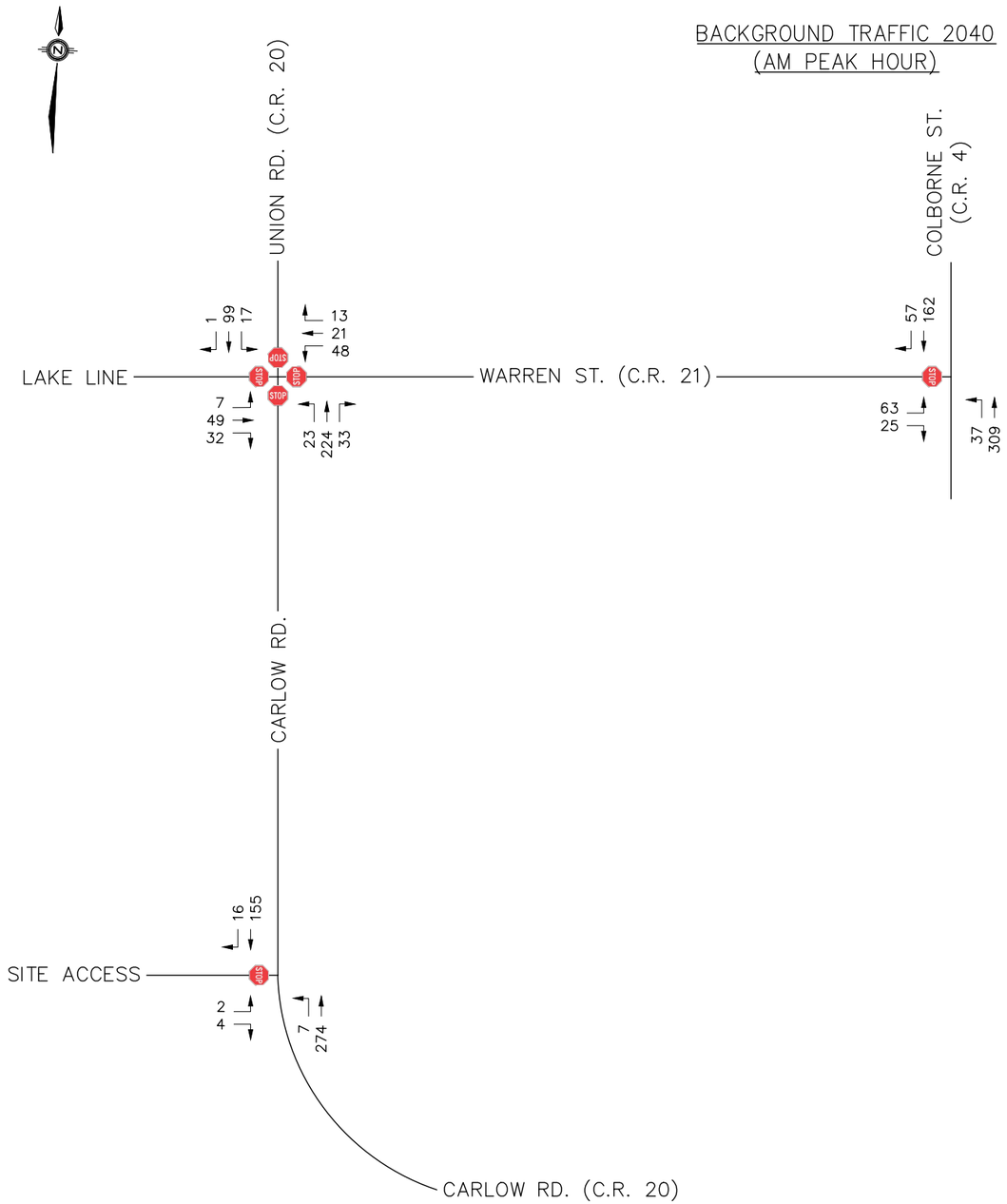
KETTLE CREEK DEVELOPMENT, PORT STANLEY – TIS

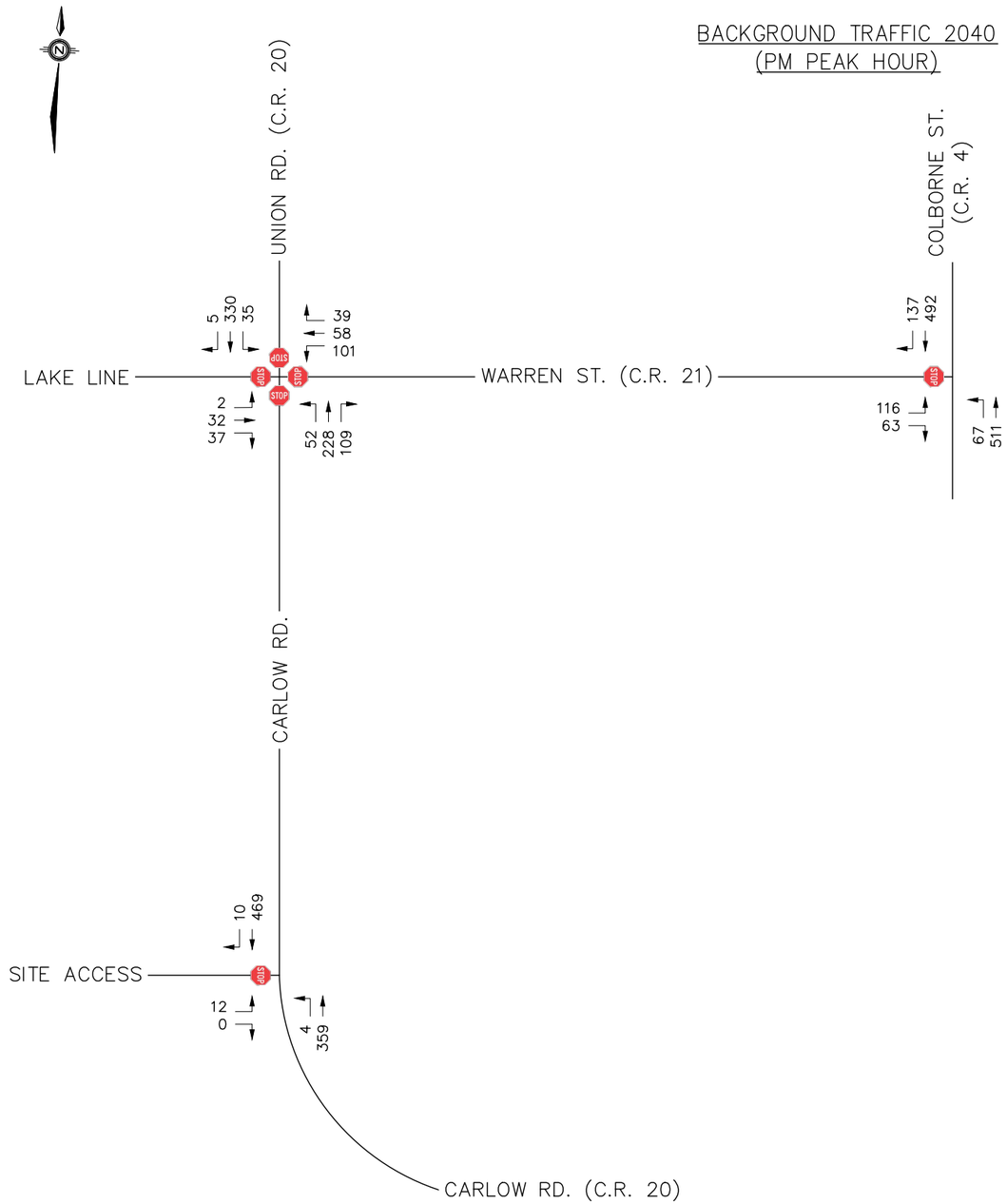
AREA DEVELOPMENT TRAFFIC 2040 (AM/PM PEAK HOUR)

PROJECT NO. 24–1581
FIGURE NO. 9
OF 12

BACKGROUND TRAFFIC 2040
(AM PEAK HOUR)



BACKGROUND TRAFFIC 2040
(PM PEAK HOUR)



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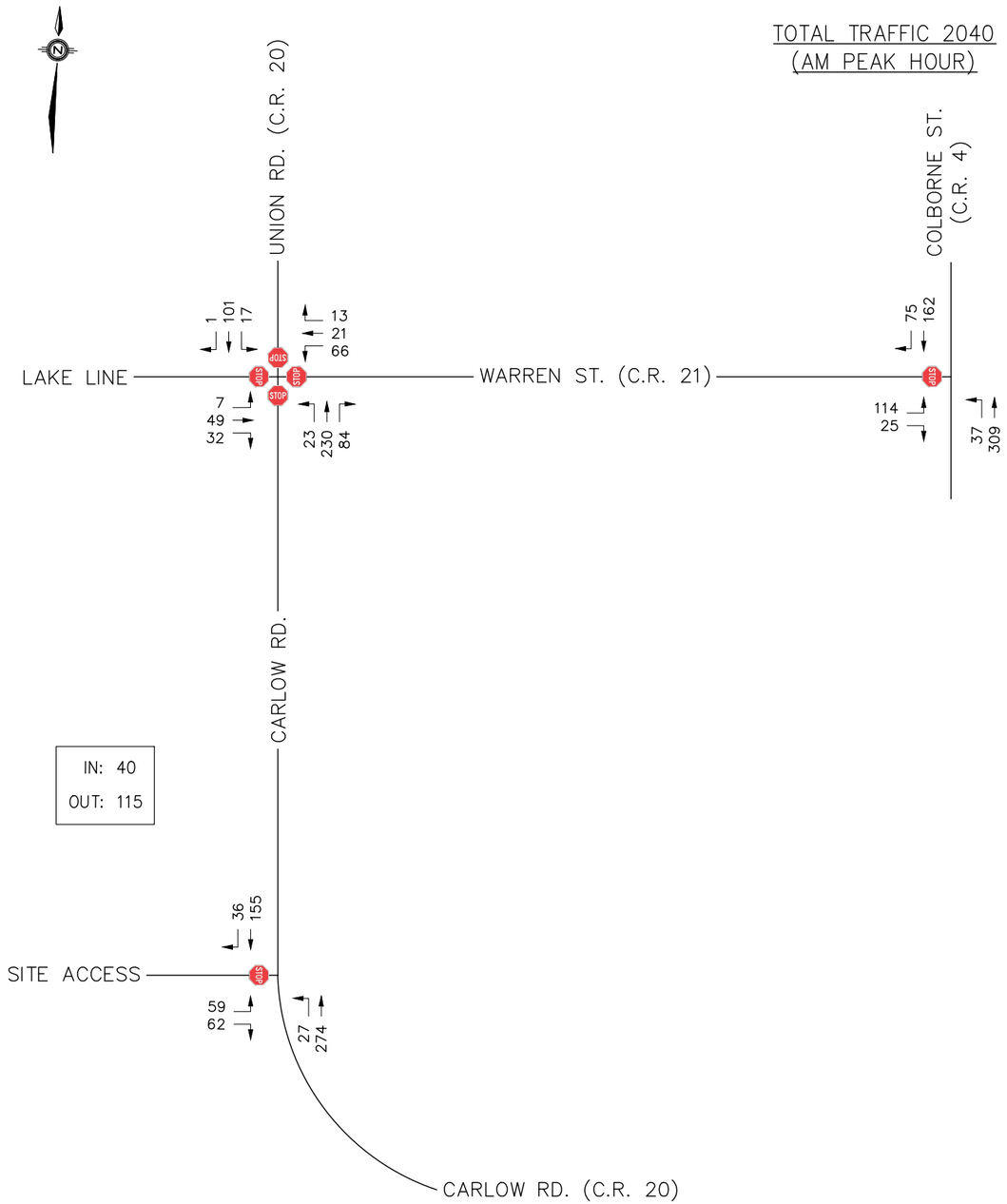
KETTLE CREEK DEVELOPMENT, PORT STANLEY – TIS

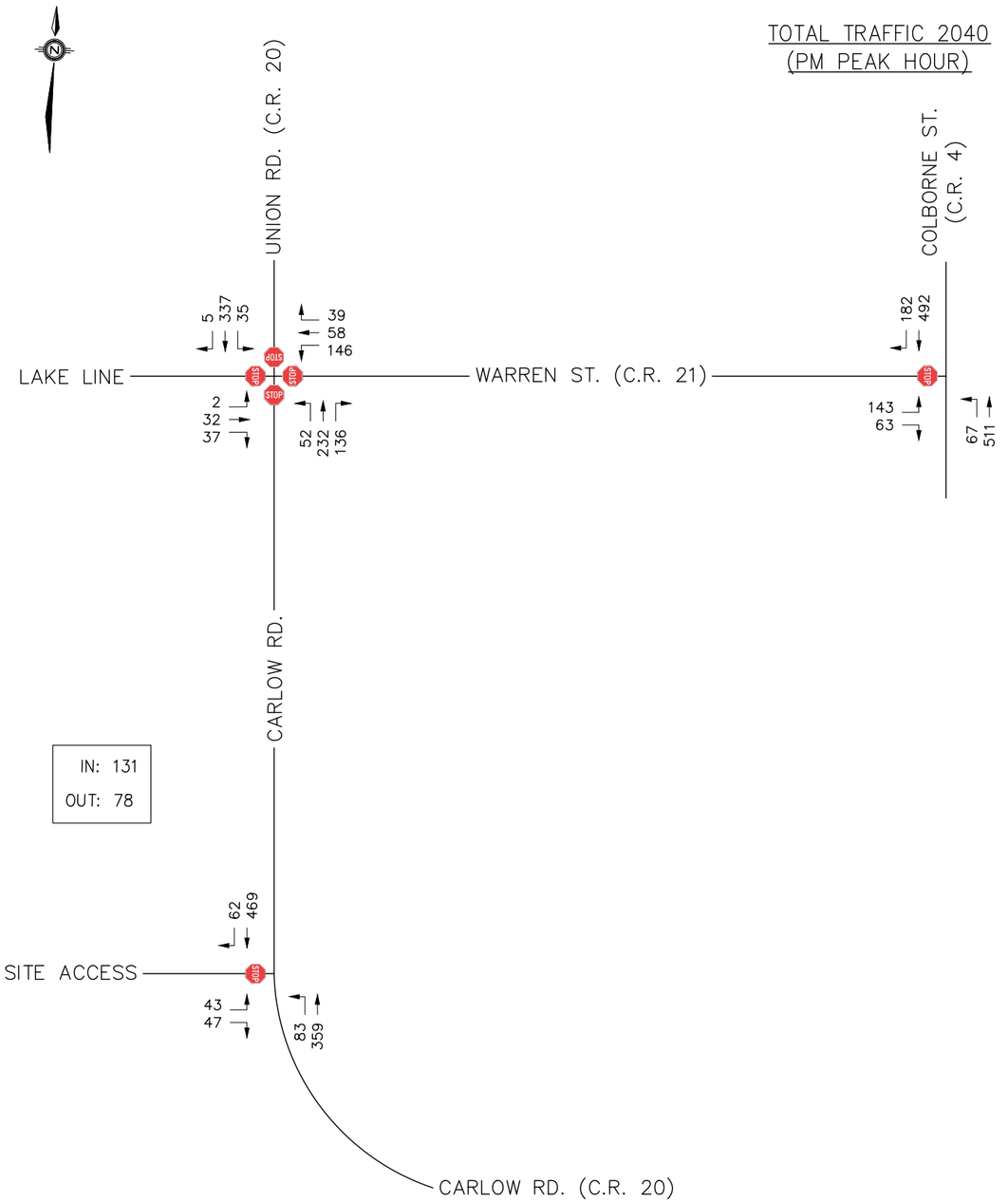
BACKGROUND TRAFFIC 2040 (AM/PM PEAK HOUR)

PROJECT NO. 24–1581
FIGURE NO. 10
OF 12

TOTAL TRAFFIC 2040 (AM PEAK HOUR)



TOTAL TRAFFIC 2040 (PM PEAK HOUR)



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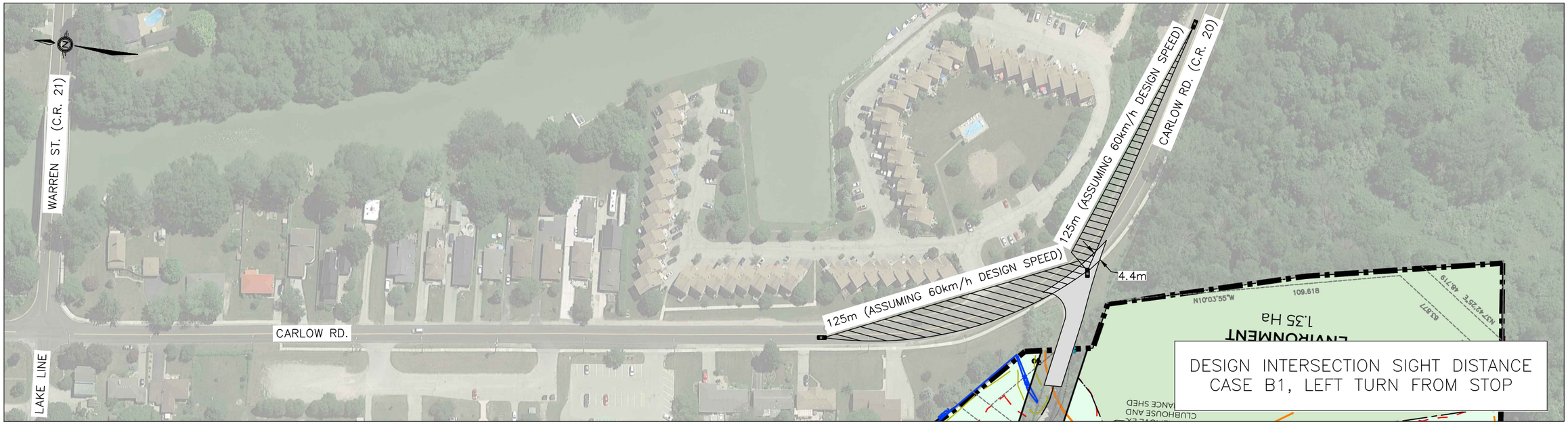
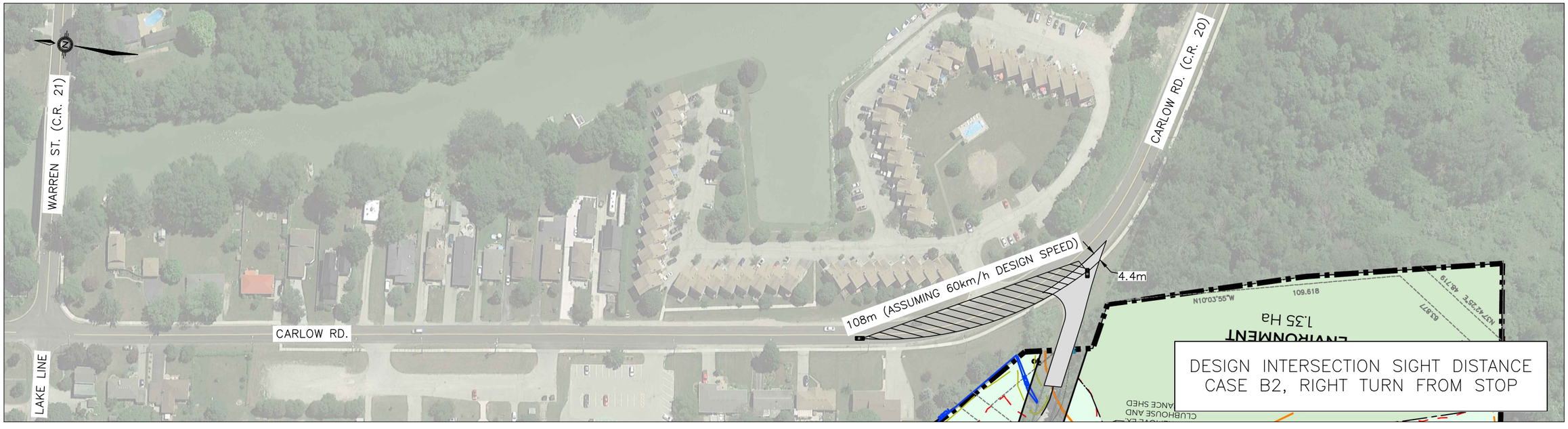
KETTLE CREEK DEVELOPMENT, PORT STANLEY – TIS

TOTAL TRAFFIC 2040 (AM/PM PEAK HOUR)

PROJECT NO. 24–1581
FIGURE NO. 11
OF 12





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KETTLE CREEK DEVELOPMENT, PORT STANLEY – TIS

SIGHT LINE ANALYSIS: SITE ACCESS AT CARLOW ROAD

PROJECT NO. 24–1581
FIGURE NO. 12
OF 12

Appendix A

TRAFFIC DATA COLLECTION

Site Access at Carlow Road (C.R. 20)
Lake Line / Warren Street (C.R. 21) at Carlow Road / Union Road (C.R. 20)
Warren Street (C.R. 21) at Colborne Street (C.R. 4)

Carlow Rd @ Golf Club Access

Morning Peak Diagram

Specified Period
From: 7:00:00
To: 9:00:00

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

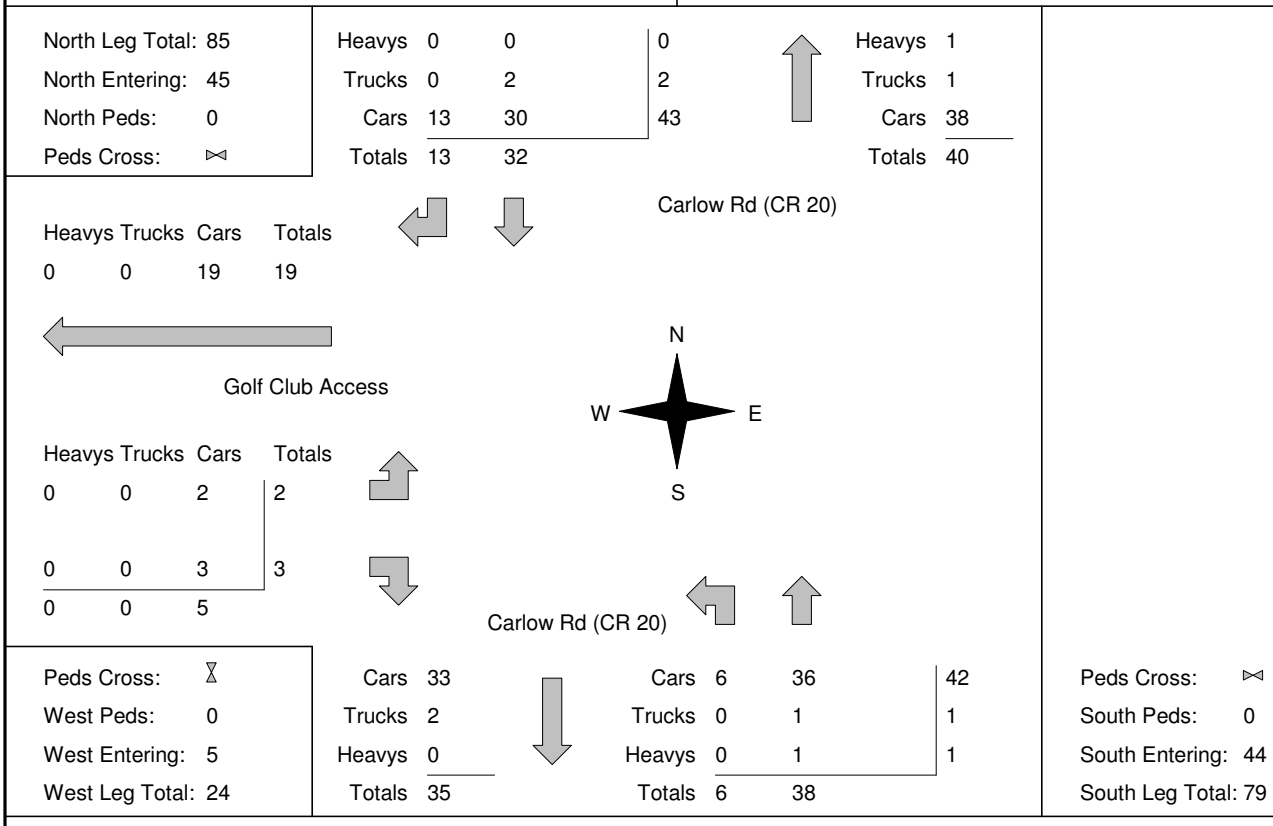
Municipality: Port Stanley
Site #: 0000000003
Intersection: Carlow Rd & Golf Club Access
TFR File #: 3
Count date: 1-Sep-2022

Weather conditions:
Clear/Dry

Person(s) who counted:
Cam

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

Major Road: Carlow Rd runs N/S



Comments

Carlow Rd @ Golf Club Access

Mid-day Peak Diagram

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

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

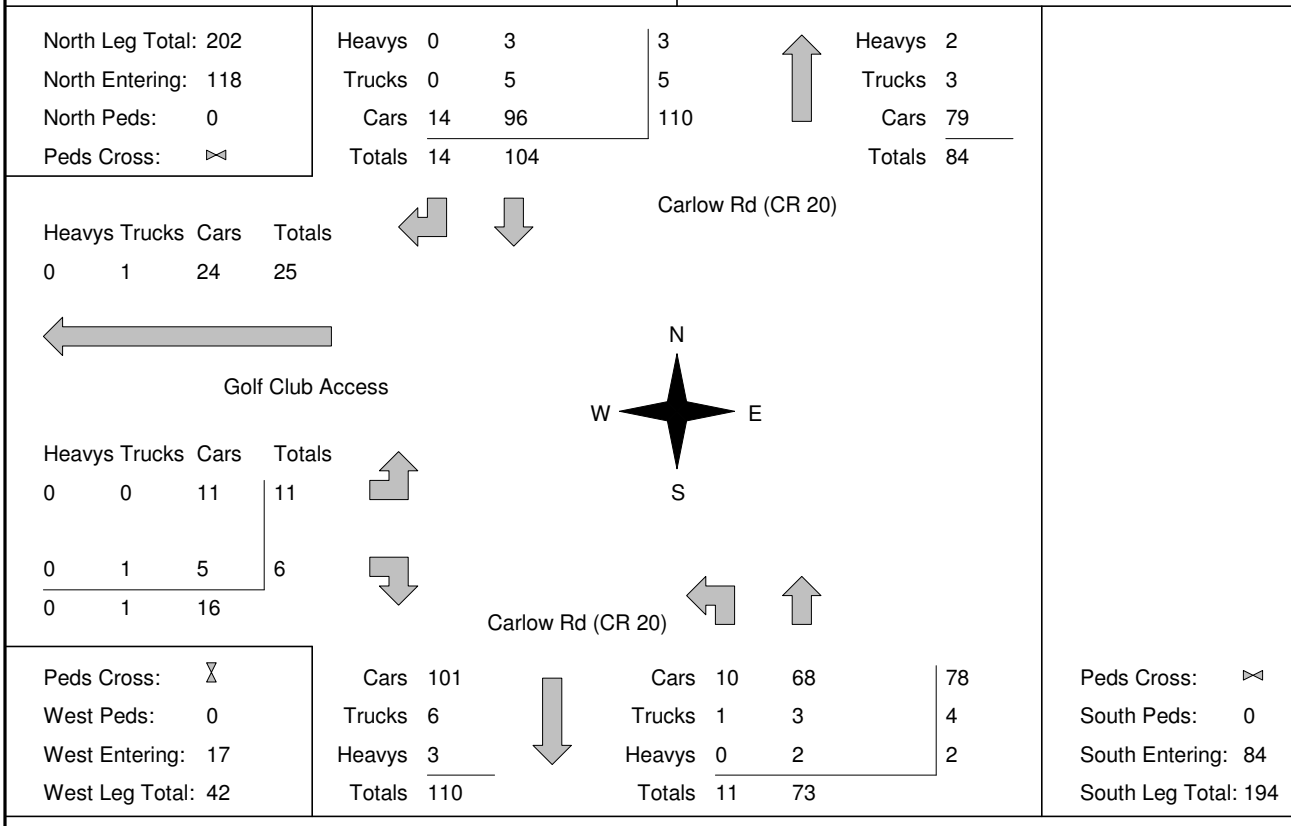
Municipality: Port Stanley
Site #: 0000000003
Intersection: Carlow Rd & Golf Club Access
TFR File #: 3
Count date: 1-Sep-2022

Weather conditions:
Clear/Dry

Person(s) who counted:
Cam

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

Major Road: Carlow Rd runs N/S



Comments

Carlow Rd @ Golf Club Access

Afternoon Peak Diagram

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

One Hour Peak
From: 15:45:00
To: 16:45:00

Municipality: Port Stanley
Site #: 0000000003
Intersection: Carlow Rd & Golf Club Access
TFR File #: 3
Count date: 1-Sep-2022

Weather conditions:
Clear/Dry

Person(s) who counted:
Cam

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

Major Road: Carlow Rd runs N/S

North Leg Total: 268
North Entering: 135
North Peds: 0
Peds Cross: ⋈

Heavys	0	1	1
Trucks	0	0	0
Cars	8	126	134
Totals	8	127	

Heavys	1
Trucks	3
Cars	129
Totals	133

Carlow Rd (CR 20)

Heavys	Trucks	Cars	Totals
0	0	11	11

Golf Club Access

N
W E
S

Heavys	Trucks	Cars	Totals
0	0	10	10
0	0	0	0
0	0	10	

Carlow Rd (CR 20)

Peds Cross: ⋈
West Peds: 0
West Entering: 10
West Leg Total: 21

Cars	126		
Trucks	0		
Heavys	1		
Totals	127		

Cars	3	119	122
Trucks	0	3	3
Heavys	0	1	1
Totals	3	123	

Peds Cross: ⋈
South Peds: 0
South Entering: 126
South Leg Total: 253

Comments

Carlow Rd @ Golf Club Access

Total Count Diagram

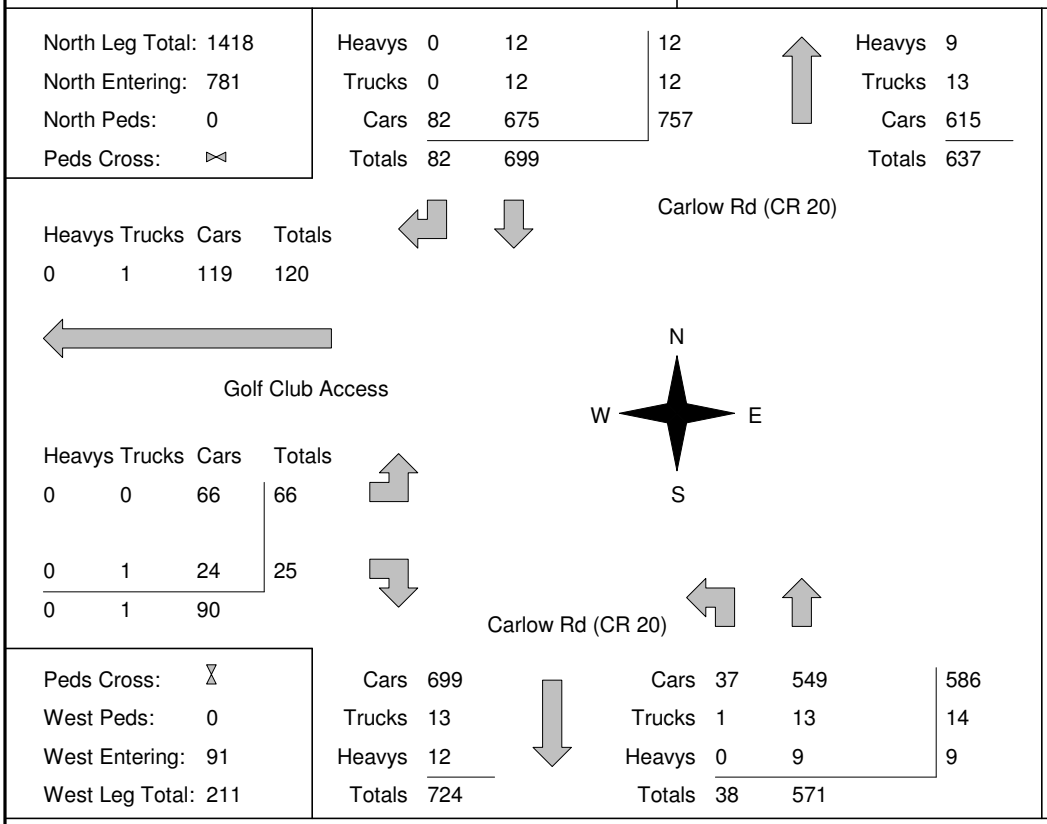
Municipality: Port Stanley
Site #: 0000000003
Intersection: Carlow Rd & Golf Club Access
TFR File #: 3
Count date: 1-Sep-2022

Weather conditions:
Clear/Dry

Person(s) who counted:
Cam

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

Major Road: Carlow Rd runs N/S



Comments

Union Rd/Carlow Rd @ Warren St/Lake Line

Morning Peak Diagram

Specified Period
From: 7:00:00
To: 9:00:00

One Hour Peak
From: 7:30:00
To: 8:30:00

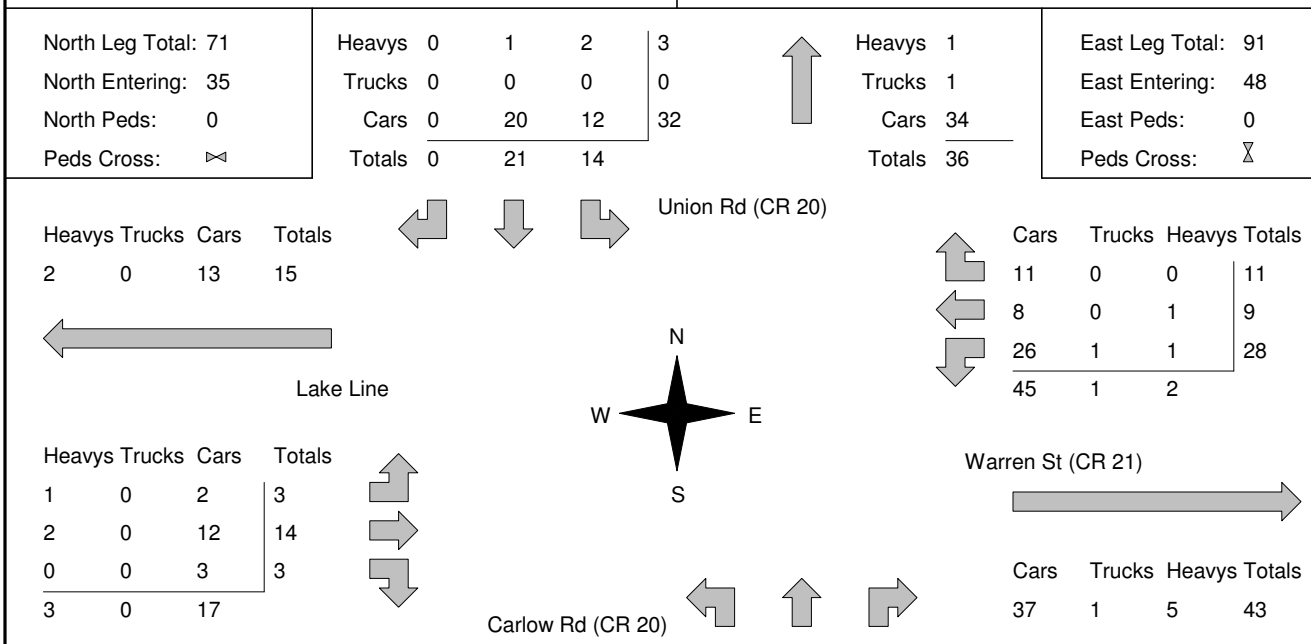
Municipality: Port Stanley
Site #: 0000000001
Intersection: Union Rd & Warren St
TFR File #: 1
Count date: 1-Sep-2022

Weather conditions:
Clear/Dry

Person(s) who counted:
Cam

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

Major Road: Union Rd runs N/S



Comments

Union Rd/Carlow Rd @ Warren St/Lake Line

Mid-day Peak Diagram

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

One Hour Peak
From: 12:15:00
To: 13:15:00

Municipality: Port Stanley
Site #: 0000000001
Intersection: Union Rd & Warren St
TFR File #: 1
Count date: 1-Sep-2022

Weather conditions:
Clear/Dry

Person(s) who counted:
Cam

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

Major Road: Union Rd runs N/S

North Leg Total: 134
North Entering: 71
North Peds: 0
Peds Cross: ⋈

Heavys	0	1	0	1
Trucks	0	0	0	0
Cars	2	47	21	70
Totals	2	48	21	

Heavys	1
Trucks	0
Cars	62
Totals	63

East Leg Total: 190
East Entering: 113
East Peds: 0
Peds Cross: ⧖

Union Rd (CR 20)

Heavys	Trucks	Cars	Totals
0	1	33	34

Cars	Trucks	Heavys	Totals
24	0	1	25
18	1	0	19
65	2	2	69
107	3	3	

Lake Line

N
W E
S

Heavys	Trucks	Cars	Totals
0	0	1	1
0	0	11	11
0	0	6	6
0	0	18	

Warren St (CR 21)

Cars	Trucks	Heavys	Totals
76	0	1	77

Carlow Rd (CR 20)

Peds Cross: ⧖
West Peds: 0
West Entering: 18
West Leg Total: 52

Cars	118
Trucks	2
Heavys	3
Totals	123

Cars	13	37	44	94
Trucks	0	0	0	0
Heavys	0	0	1	1
Totals	13	37	45	

Peds Cross: ⋈
South Peds: 0
South Entering: 95
South Leg Total: 218

Comments

Union Rd/Carlow Rd @ Warren St/Lake Line

Afternoon Peak Diagram

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

One Hour Peak
From: 15:30:00
To: 16:30:00

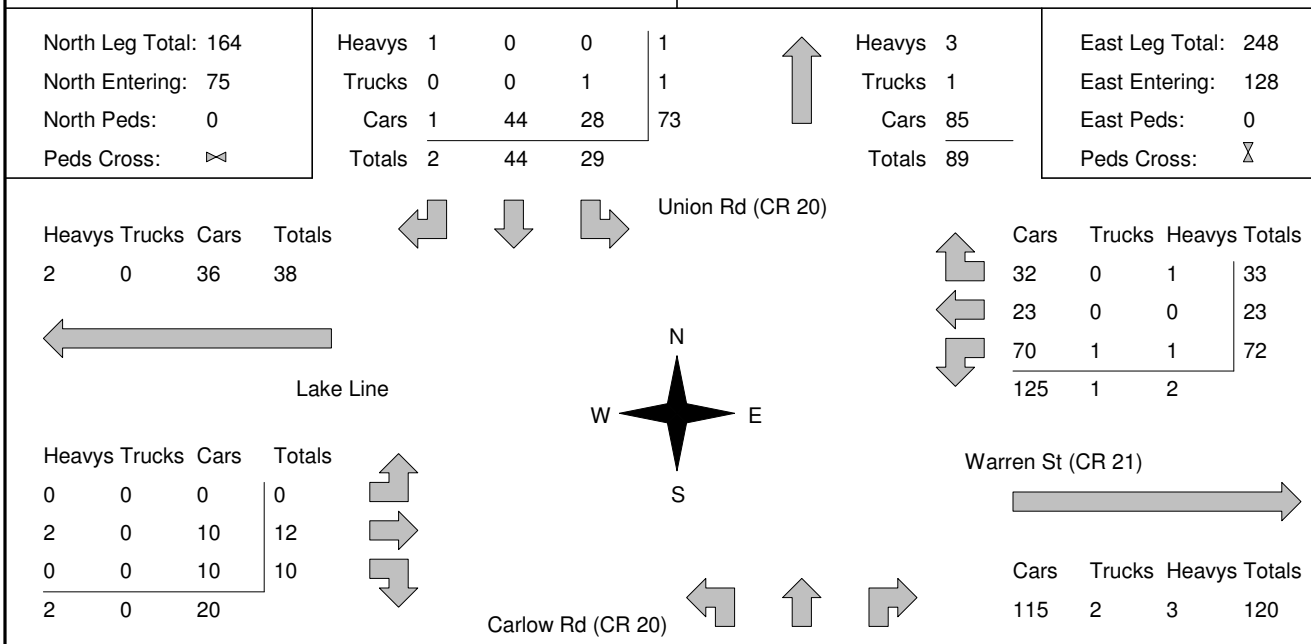
Municipality: Port Stanley
Site #: 0000000001
Intersection: Union Rd & Warren St
TFR File #: 1
Count date: 1-Sep-2022

Weather conditions:
Clear/Dry

Person(s) who counted:
Cam

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

Major Road: Union Rd runs N/S



Comments

Union Rd/Carlow Rd @ Warren St/Lake Line

Total Count Diagram

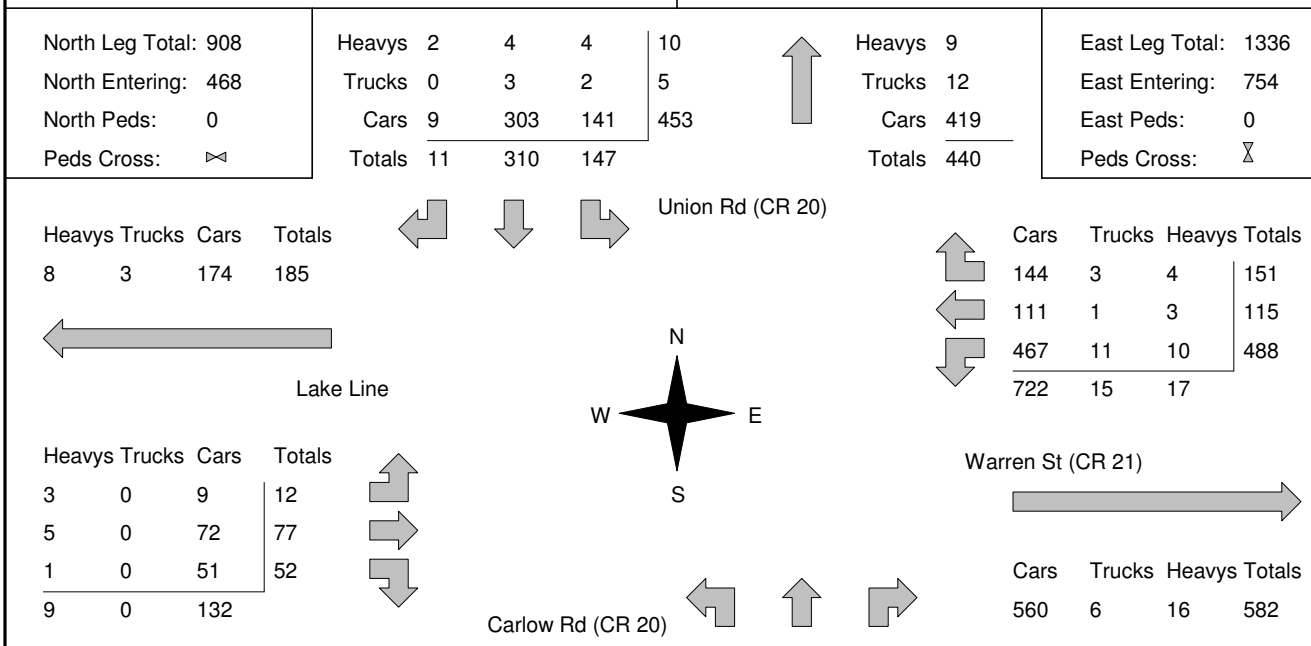
Municipality: Port Stanley
Site #: 0000000001
Intersection: Union Rd & Warren St
TFR File #: 1
Count date: 1-Sep-2022

Weather conditions:
Clear/Dry

Person(s) who counted:
Cam

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

Major Road: Union Rd runs N/S



Comments

Colborne St @ Warren St

Morning Peak Diagram

Specified Period
From: 7:00:00
To: 9:00:00

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

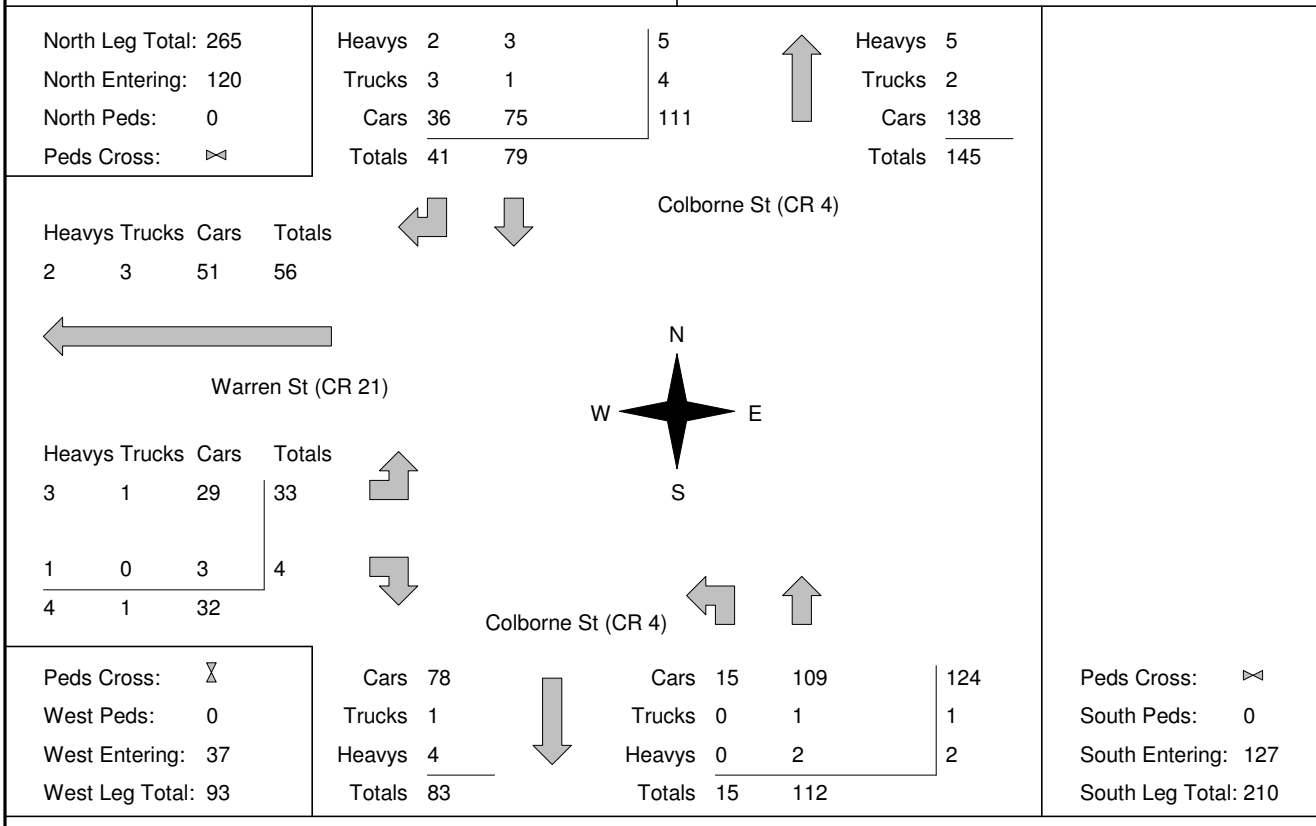
Municipality: Port Stanley
Site #: 0000000002
Intersection: Colborne St & Warren St
TFR File #: 2
Count date: 1-Sep-2022

Weather conditions:
Clear/Dry

Person(s) who counted:
Cam

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

Major Road: Colborne St runs N/S



Comments

Colborne St @ Warren St

Mid-day Peak Diagram

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

One Hour Peak
From: 12:45:00
To: 13:45:00

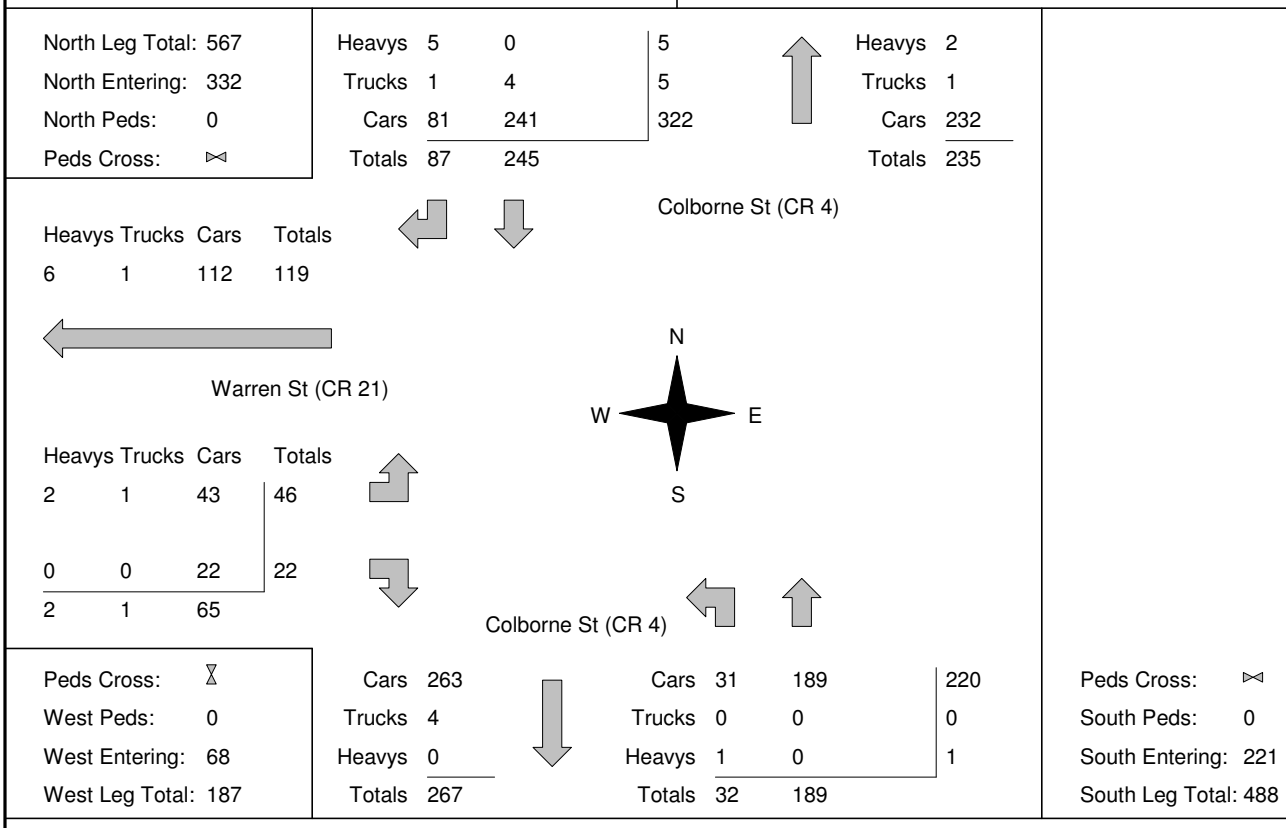
Municipality: Port Stanley
Site #: 0000000002
Intersection: Colborne St & Warren St
TFR File #: 2
Count date: 1-Sep-2022

Weather conditions:
Clear/Dry

Person(s) who counted:
Cam

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

Major Road: Colborne St runs N/S



Comments

Colborne St @ Warren St

Afternoon Peak Diagram

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

One Hour Peak
From: 15:45:00
To: 16:45:00

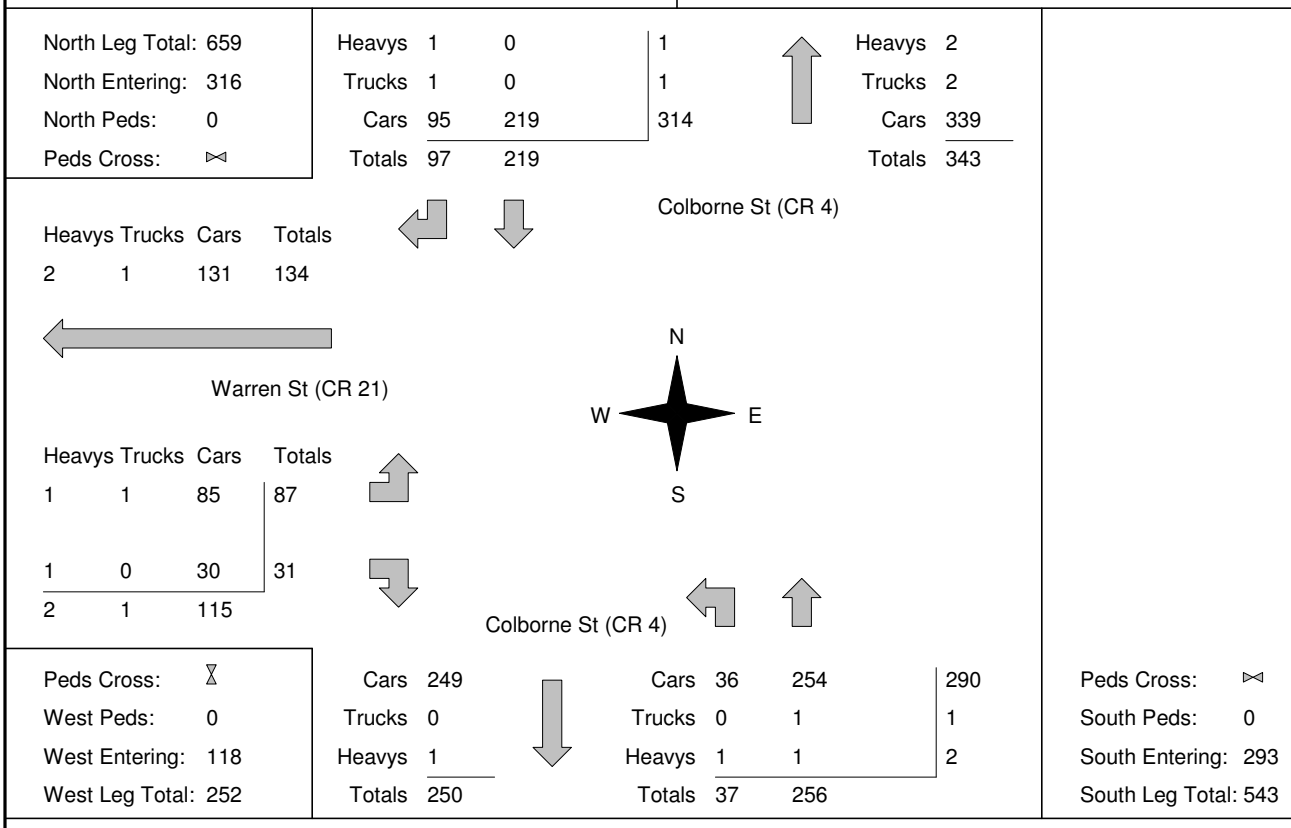
Municipality: Port Stanley
Site #: 0000000002
Intersection: Colborne St & Warren St
TFR File #: 2
Count date: 1-Sep-2022

Weather conditions:
Clear/Dry

Person(s) who counted:
Cam

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

Major Road: Colborne St runs N/S



Comments

Colborne St @ Warren St

Total Count Diagram

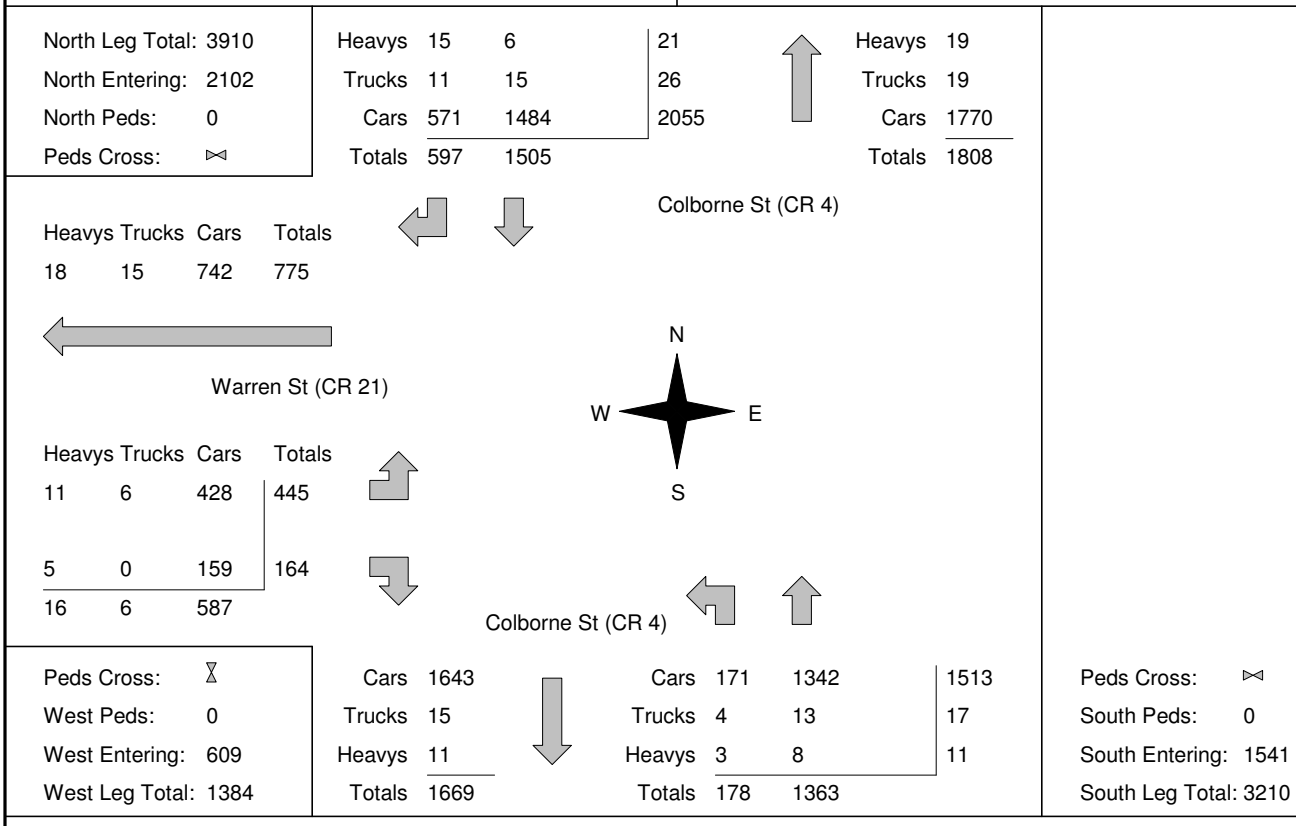
Municipality: Port Stanley
Site #: 0000000002
Intersection: Colborne St & Warren St
TFR File #: 2
Count date: 1-Sep-2022

Weather conditions:
Clear/Dry

Person(s) who counted:
Cam

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

Major Road: Colborne St runs N/S



Comments

Appendix B

ITE TRIP GENERATION MANUAL – 11TH EDITION REFERENCES

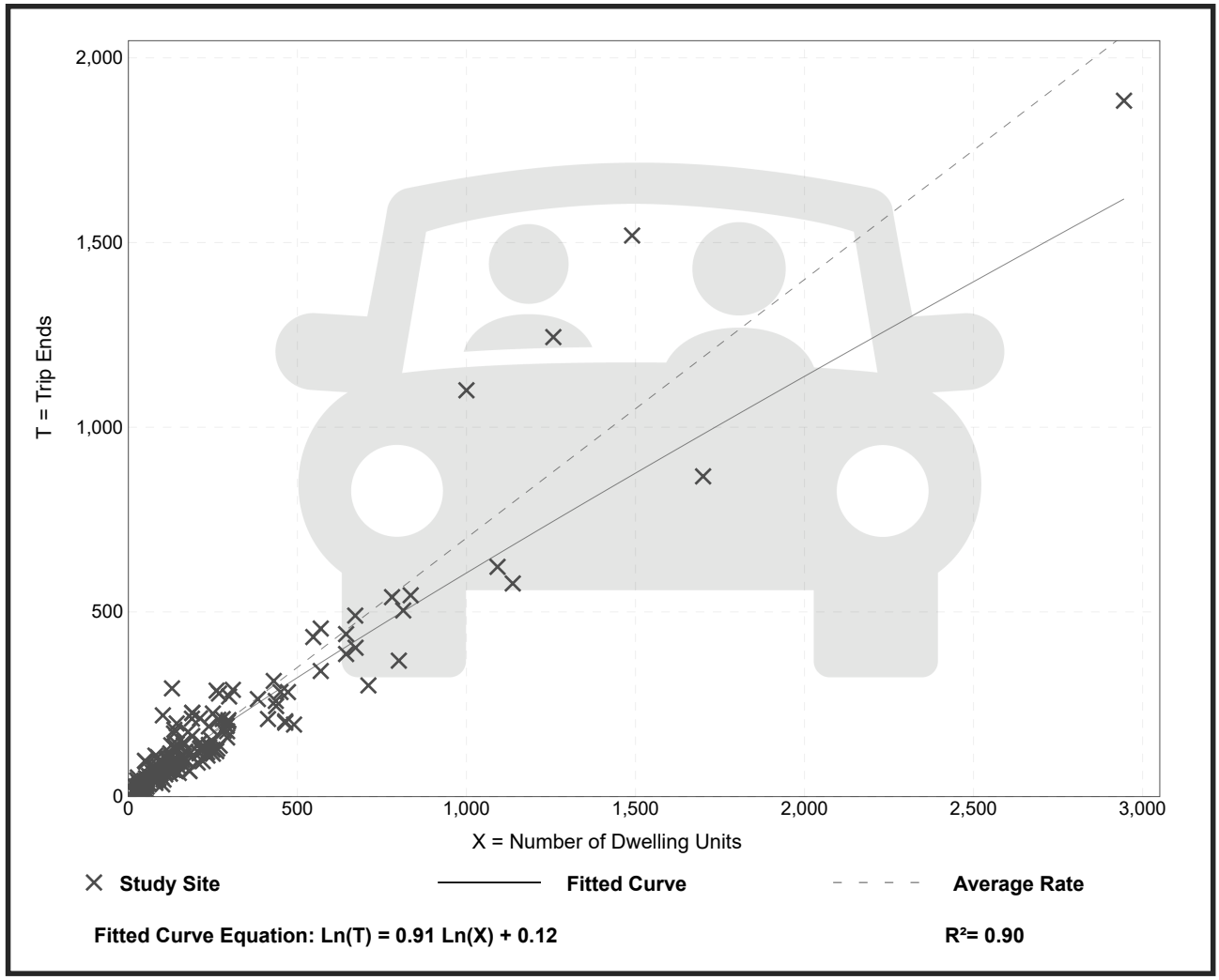
Single-Family Detached Housing
(210)

Vehicle Trip Ends vs:	**Dwelling Units**
On a:	**Weekday,**
	Peak Hour of Adjacent Street Traffic,
	One Hour Between 7 and 9 a.m.
Setting/Location:	**General Urban/Suburban**
Number of Studies:	192
Avg. Num. of Dwelling Units:	226
Directional Distribution:	26% entering, 74% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.70	0.27 - 2.27	0.24

Data Plot and Equation



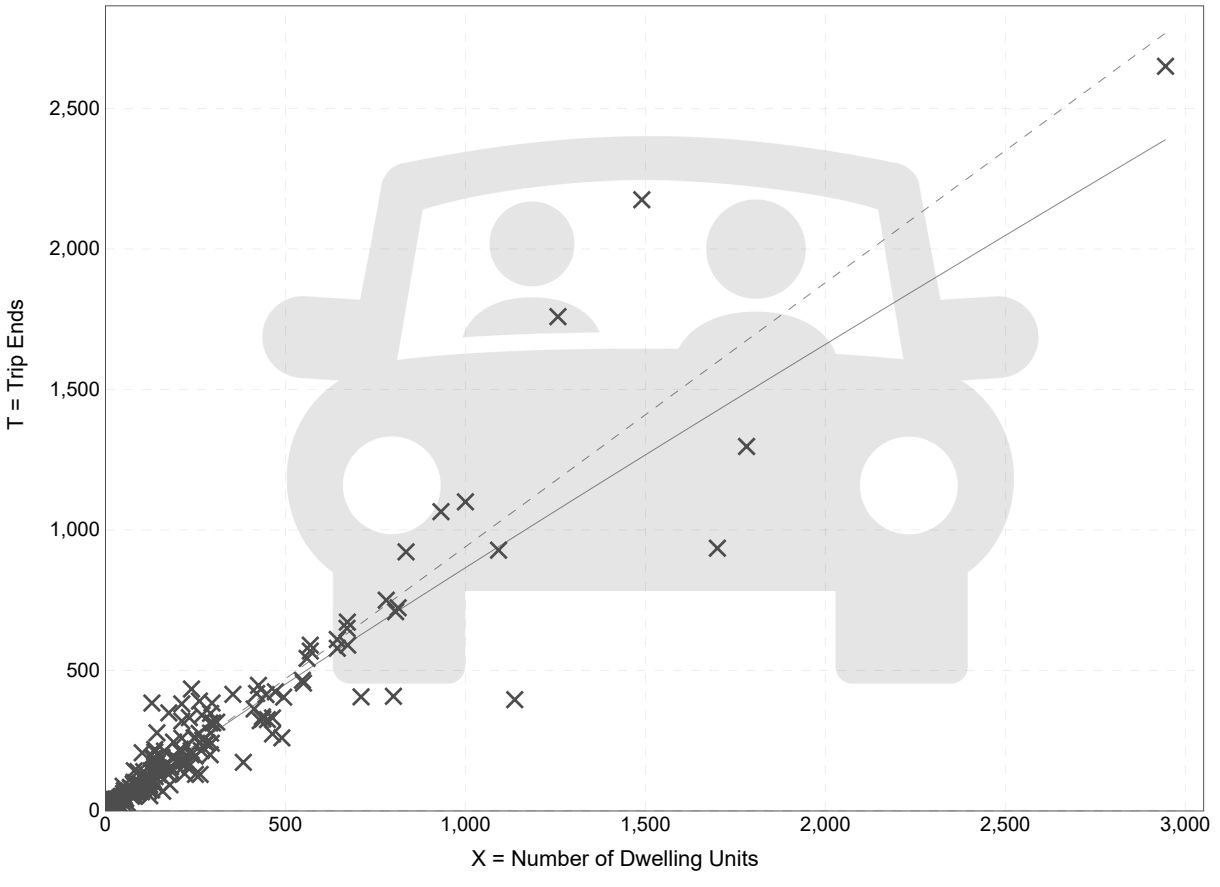
Single-Family Detached Housing
(210)

Vehicle Trip Ends vs: **Dwelling Units**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 208
Avg. Num. of Dwelling Units: 248
Directional Distribution: 63% entering, 37% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.94	0.35 - 2.98	0.31

Data Plot and Equation



Fitted Curve Equation: Ln(T) = 0.94 Ln(X) + 0.27

R^2= 0.92

Proposed Site Development Trip Generation and Distribution

Project: Kettle Creek Subdivision Traffic Impact Study

Site: Port Stanley, Ontario

Assumed Land Use (1): Single-Family Detached Housing - ITE No. 210

Average Vehicle Trip Ends vs.: Dwelling Units

ITE Trip Generation Data collected on a: Weekday

AM Peak Hour:	0.70	= Average Rate	26	% Entering
			74	% Exiting
PM Peak Hour:	0.94	= Average Rate	63	% Entering
			37	% Exiting

Assumed Land Use (1): Single-Family Detached Housing - ITE No. 210				
	Dwelling Units	**Trips Generated**	**Trips Entering**	**Trips Exiting**
AM Peak	222	155	40	115
PM Peak	222	209	131	78

Appendix C

DETAILED SYNCHRO RESULTS

Site Access at Carlow Road (C.R. 20)
Lake Line / Warren Street (C.R. 21) at Carlow Road / Union Road (C.R. 20)
Warren Street (C.R. 21) at Colborne Street (C.R. 4)

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	2	3	6	38	32	13
Future Vol, veh/h	2	3	6	38	32	13
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	3	6	0
Mvmt Flow	2	3	7	41	35	14

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	97	42	49	0	-	0
Stage 1	42	-	-	-	-	-
Stage 2	55	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	907	1034	1571	-	-	-
Stage 1	986	-	-	-	-	-
Stage 2	973	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	902	1034	1571	-	-	-
Mov Cap-2 Maneuver	902	-	-	-	-	-
Stage 1	981	-	-	-	-	-
Stage 2	973	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	8.7	1	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1571	-	977	-	-
HCM Lane V/C Ratio	0.004	-	0.006	-	-
HCM Control Delay (s)	7.3	0	8.7	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0	-	-

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	10	0	3	123	127	8
Future Vol, veh/h	10	0	3	123	127	8
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	3	1	0
Mvmt Flow	11	0	3	134	138	9

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	283	143	147	0	-	0
Stage 1	143	-	-	-	-	-
Stage 2	140	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	711	910	1447	-	-	-
Stage 1	889	-	-	-	-	-
Stage 2	892	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	710	910	1447	-	-	-
Mov Cap-2 Maneuver	710	-	-	-	-	-
Stage 1	887	-	-	-	-	-
Stage 2	892	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.1	0.2	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1447	-	710	-	-
HCM Lane V/C Ratio	0.002	-	0.015	-	-
HCM Control Delay (s)	7.5	0	10.1	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0	-	-

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	2	3	6	178	108	14
Future Vol, veh/h	2	3	6	178	108	14
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	3	6	0
Mvmt Flow	2	3	7	193	117	15

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	332	125	132	0	-	0
Stage 1	125	-	-	-	-	-
Stage 2	207	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	667	931	1466	-	-	-
Stage 1	906	-	-	-	-	-
Stage 2	832	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	664	931	1466	-	-	-
Mov Cap-2 Maneuver	664	-	-	-	-	-
Stage 1	901	-	-	-	-	-
Stage 2	832	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.5	0.2	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1466	-	802	-	-
HCM Lane V/C Ratio	0.004	-	0.007	-	-
HCM Control Delay (s)	7.5	0	9.5	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0	-	-

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	11	0	3	279	323	8
Future Vol, veh/h	11	0	3	279	323	8
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	3	1	0
Mvmt Flow	12	0	3	303	351	9

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	665	356	360	0	-	0
Stage 1	356	-	-	-	-	-
Stage 2	309	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	428	693	1210	-	-	-
Stage 1	713	-	-	-	-	-
Stage 2	749	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	427	693	1210	-	-	-
Mov Cap-2 Maneuver	427	-	-	-	-	-
Stage 1	711	-	-	-	-	-
Stage 2	749	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	13.7	0.1	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1210	-	427	-	-
HCM Lane V/C Ratio	0.003	-	0.028	-	-
HCM Control Delay (s)	8	0	13.7	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

Intersection	
Int Delay, s/veh	2.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	52	53	25	178	108	33
Future Vol, veh/h	52	53	25	178	108	33
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	3	6	0
Mvmt Flow	57	58	27	193	117	36

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	382	135	153	0	-	0
Stage 1	135	-	-	-	-	-
Stage 2	247	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	624	919	1440	-	-	-
Stage 1	896	-	-	-	-	-
Stage 2	799	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	611	919	1440	-	-	-
Mov Cap-2 Maneuver	611	-	-	-	-	-
Stage 1	877	-	-	-	-	-
Stage 2	799	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.8	0.9	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1440	-	735	-	-
HCM Lane V/C Ratio	0.019	-	0.155	-	-
HCM Control Delay (s)	7.5	0	10.8	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.5	-	-

Intersection	
Int Delay, s/veh	2.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	39	41	69	279	323	52
Future Vol, veh/h	39	41	69	279	323	52
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	3	1	0
Mvmt Flow	42	45	75	303	351	57

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	833	380	408	0	-	0
Stage 1	380	-	-	-	-	-
Stage 2	453	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	341	671	1162	-	-	-
Stage 1	696	-	-	-	-	-
Stage 2	645	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	314	671	1162	-	-	-
Mov Cap-2 Maneuver	314	-	-	-	-	-
Stage 1	642	-	-	-	-	-
Stage 2	645	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	15.4	1.6	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1162	-	432	-	-
HCM Lane V/C Ratio	0.065	-	0.201	-	-
HCM Control Delay (s)	8.3	0	15.4	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0.2	-	0.7	-	-

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	2	4	7	274	155	16
Future Vol, veh/h	2	4	7	274	155	16
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	3	6	0
Mvmt Flow	2	4	8	298	168	17

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	491	177	185	0	-	0
Stage 1	177	-	-	-	-	-
Stage 2	314	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	540	871	1402	-	-	-
Stage 1	859	-	-	-	-	-
Stage 2	745	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	536	871	1402	-	-	-
Mov Cap-2 Maneuver	536	-	-	-	-	-
Stage 1	853	-	-	-	-	-
Stage 2	745	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10	0.2	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1402	-	721	-	-
HCM Lane V/C Ratio	0.005	-	0.009	-	-
HCM Control Delay (s)	7.6	0	10	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0	-	-

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	12	0	4	359	469	10
Future Vol, veh/h	12	0	4	359	469	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	3	1	0
Mvmt Flow	13	0	4	390	510	11

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	914	516	521	0	-	0
Stage 1	516	-	-	-	-	-
Stage 2	398	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	306	563	1056	-	-	-
Stage 1	603	-	-	-	-	-
Stage 2	683	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	304	563	1056	-	-	-
Mov Cap-2 Maneuver	304	-	-	-	-	-
Stage 1	600	-	-	-	-	-
Stage 2	683	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	17.4	0.1	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1056	-	304	-	-
HCM Lane V/C Ratio	0.004	-	0.043	-	-
HCM Control Delay (s)	8.4	0	17.4	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

Intersection	
Int Delay, s/veh	2.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	52	54	26	274	155	35
Future Vol, veh/h	52	54	26	274	155	35
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	3	6	0
Mvmt Flow	57	59	28	298	168	38

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	541	187	206	0	-	0
Stage 1	187	-	-	-	-	-
Stage 2	354	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	506	860	1377	-	-	-
Stage 1	850	-	-	-	-	-
Stage 2	715	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	494	860	1377	-	-	-
Mov Cap-2 Maneuver	494	-	-	-	-	-
Stage 1	830	-	-	-	-	-
Stage 2	715	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12	0.7	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1377	-	631	-	-
HCM Lane V/C Ratio	0.021	-	0.183	-	-
HCM Control Delay (s)	7.7	0	12	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.7	-	-

Intersection	
Int Delay, s/veh	2.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	40	41	70	359	469	54
Future Vol, veh/h	40	41	70	359	469	54
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	3	1	0
Mvmt Flow	43	45	76	390	510	59

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1082	540	569	0	-	0
Stage 1	540	-	-	-	-	-
Stage 2	542	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	243	546	1013	-	-	-
Stage 1	588	-	-	-	-	-
Stage 2	587	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	220	546	1013	-	-	-
Mov Cap-2 Maneuver	220	-	-	-	-	-
Stage 1	532	-	-	-	-	-
Stage 2	587	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	20.8	1.4	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1013	-	315	-	-
HCM Lane V/C Ratio	0.075	-	0.28	-	-
HCM Control Delay (s)	8.8	0	20.8	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0.2	-	1.1	-	-

Intersection	
Intersection Delay, s/veh	7.6
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	3	14	3	28	9	11	6	22	15	14	21	0
Future Vol, veh/h	3	14	3	28	9	11	6	22	15	14	21	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	33	14	0	7	13	0	17	5	13	14	5	0
Mvmt Flow	3	15	3	30	10	12	7	24	16	15	23	0
Number of Lanes	0	1	0	0	1	0	0	1	1	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	2	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	1	1	1
HCM Control Delay	7.8	7.5	7.6	7.8
HCM LOS	A	A	A	A

Lane	NBLn1	NBLn2	EBLn1	WBLn1	SBLn1
Vol Left, %	21%	0%	15%	58%	40%
Vol Thru, %	79%	0%	70%	19%	60%
Vol Right, %	0%	100%	15%	23%	0%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	28	15	20	48	35
LT Vol	6	0	3	28	14
Through Vol	22	0	14	9	21
RT Vol	0	15	3	11	0
Lane Flow Rate	30	16	22	52	38
Geometry Grp	7	7	2	2	5
Degree of Util (X)	0.043	0.018	0.028	0.06	0.047
Departure Headway (Hd)	5.044	4.031	4.585	4.158	4.481
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	707	882	773	852	793
Service Time	2.797	1.784	2.661	2.229	2.543
HCM Lane V/C Ratio	0.042	0.018	0.028	0.061	0.048
HCM Control Delay	8	6.9	7.8	7.5	7.8
HCM Lane LOS	A	A	A	A	A
HCM 95th-tile Q	0.1	0.1	0.1	0.2	0.1

Intersection	
Intersection Delay, s/veh	8.2
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	12	10	72	23	33	13	56	79	29	44	2
Future Vol, veh/h	0	12	10	72	23	33	13	56	79	29	44	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	0	16	0	3	0	3	8	6	3	4	0	50
Mvmt Flow	0	13	11	78	25	36	14	61	86	32	48	2
Number of Lanes	0	1	0	0	1	0	0	1	1	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	2	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	1	1	1
HCM Control Delay	7.8	8.5	8	8.3
HCM LOS	A	A	A	A

Lane	NBLn1	NBLn2	EBLn1	WBLn1	SBLn1
Vol Left, %	19%	0%	0%	56%	39%
Vol Thru, %	81%	0%	55%	18%	59%
Vol Right, %	0%	100%	45%	26%	3%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	69	79	22	128	75
LT Vol	13	0	0	72	29
Through Vol	56	0	12	23	44
RT Vol	0	79	10	33	2
Lane Flow Rate	75	86	24	139	82
Geometry Grp	7	7	2	2	5
Degree of Util (X)	0.108	0.104	0.031	0.174	0.106
Departure Headway (Hd)	5.184	4.353	4.629	4.502	4.692
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	693	824	774	799	765
Service Time	2.905	2.073	2.652	2.52	2.715
HCM Lane V/C Ratio	0.108	0.104	0.031	0.174	0.107
HCM Control Delay	8.5	7.6	7.8	8.5	8.3
HCM Lane LOS	A	A	A	A	A
HCM 95th-tile Q	0.4	0.3	0.1	0.6	0.4

Intersection	
Intersection Delay, s/veh	9
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	6	47	26	40	20	12	17	140	26	15	63	1
Future Vol, veh/h	6	47	26	40	20	12	17	140	26	15	63	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	33	14	0	7	13	0	17	5	13	14	5	0
Mvmt Flow	7	51	28	43	22	13	18	152	28	16	68	1
Number of Lanes	0	1	0	0	1	0	0	1	1	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	2	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	1	1	1
HCM Control Delay	8.9	8.5	9.5	8.6
HCM LOS	A	A	A	A

Lane	NBLn1	NBLn2	EBLn1	WBLn1	SBLn1
Vol Left, %	11%	0%	8%	56%	19%
Vol Thru, %	89%	0%	59%	28%	80%
Vol Right, %	0%	100%	33%	17%	1%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	157	26	79	72	79
LT Vol	17	0	6	40	15
Through Vol	140	0	47	20	63
RT Vol	0	26	26	12	1
Lane Flow Rate	171	28	86	78	86
Geometry Grp	7	7	2	2	5
Degree of Util (X)	0.253	0.034	0.122	0.106	0.118
Departure Headway (Hd)	5.337	4.374	5.103	4.87	4.935
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	672	818	702	736	726
Service Time	3.069	2.106	3.138	2.904	2.972
HCM Lane V/C Ratio	0.254	0.034	0.123	0.106	0.118
HCM Control Delay	9.9	7.3	8.9	8.5	8.6
HCM Lane LOS	A	A	A	A	A
HCM 95th-tile Q	1	0.1	0.4	0.4	0.4

Intersection	
Intersection Delay, s/veh	11
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	2	31	31	86	54	35	45	166	94	31	205	5
Future Vol, veh/h	2	31	31	86	54	35	45	166	94	31	205	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	0	16	0	3	0	3	8	6	3	4	0	50
Mvmt Flow	2	34	34	93	59	38	49	180	102	34	223	5
Number of Lanes	0	1	0	0	1	0	0	1	1	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	2	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	1	1	1
HCM Control Delay	9.2	10.9	10.9	11.6
HCM LOS	A	B	B	B

Lane	NBLn1	NBLn2	EBLn1	WBLn1	SBLn1
Vol Left, %	21%	0%	3%	49%	13%
Vol Thru, %	79%	0%	48%	31%	85%
Vol Right, %	0%	100%	48%	20%	2%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	211	94	64	175	241
LT Vol	45	0	2	86	31
Through Vol	166	0	31	54	205
RT Vol	0	94	31	35	5
Lane Flow Rate	229	102	70	190	262
Geometry Grp	7	7	2	2	5
Degree of Util (X)	0.37	0.141	0.106	0.294	0.386
Departure Headway (Hd)	5.812	4.962	5.5	5.567	5.298
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	619	723	651	647	681
Service Time	3.536	2.686	3.539	3.597	3.324
HCM Lane V/C Ratio	0.37	0.141	0.108	0.294	0.385
HCM Control Delay	11.9	8.5	9.2	10.9	11.6
HCM Lane LOS	B	A	A	B	B
HCM 95th-tile Q	1.7	0.5	0.4	1.2	1.8

Intersection	
Intersection Delay, s/veh	9.1
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	6	47	26	57	20	12	17	145	71	15	65	1
Future Vol, veh/h	6	47	26	57	20	12	17	145	71	15	65	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	33	14	0	7	13	0	17	5	13	14	5	0
Mvmt Flow	7	51	28	62	22	13	18	158	77	16	71	1
Number of Lanes	0	1	0	0	1	0	0	1	1	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	2	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	1	1	1
HCM Control Delay	9	8.8	9.3	8.8
HCM LOS	A	A	A	A

Lane	NBLn1	NBLn2	EBLn1	WBLn1	SBLn1
Vol Left, %	10%	0%	8%	64%	19%
Vol Thru, %	90%	0%	59%	22%	80%
Vol Right, %	0%	100%	33%	13%	1%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	162	71	79	89	81
LT Vol	17	0	6	57	15
Through Vol	145	0	47	20	65
RT Vol	0	71	26	12	1
Lane Flow Rate	176	77	86	97	88
Geometry Grp	5	5	2	2	4a
Degree of Util (X)	0.264	0.095	0.125	0.135	0.123
Departure Headway (Hd)	5.396	4.434	5.243	5.019	5.044
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	666	806	683	713	709
Service Time	3.134	2.172	3.285	3.06	3.09
HCM Lane V/C Ratio	0.264	0.096	0.126	0.136	0.124
HCM Control Delay	10.1	7.6	9	8.8	8.8
HCM Lane LOS	B	A	A	A	A
HCM 95th-tile Q	1.1	0.3	0.4	0.5	0.4

Intersection	
Intersection Delay, s/veh	11.6
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	2	31	31	124	54	35	45	166	99	31	211	5
Future Vol, veh/h	2	31	31	124	54	35	45	166	99	31	211	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	0	16	0	3	0	3	8	6	3	4	0	50
Mvmt Flow	2	34	34	135	59	38	49	180	108	34	229	5
Number of Lanes	0	1	0	0	1	0	0	1	1	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	2	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	1	1	1
HCM Control Delay	9.4	12	11.3	12.2
HCM LOS	A	B	B	B

Lane	NBLn1	NBLn2	EBLn1	WBLn1	SBLn1
Vol Left, %	21%	0%	3%	58%	13%
Vol Thru, %	79%	0%	48%	25%	85%
Vol Right, %	0%	100%	48%	16%	2%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	211	99	64	213	247
LT Vol	45	0	2	124	31
Through Vol	166	0	31	54	211
RT Vol	0	99	31	35	5
Lane Flow Rate	229	108	70	232	268
Geometry Grp	5	5	2	2	4a
Degree of Util (X)	0.381	0.153	0.109	0.365	0.408
Departure Headway (Hd)	5.982	5.131	5.663	5.672	5.465
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	601	698	631	634	658
Service Time	3.717	2.866	3.713	3.71	3.501
HCM Lane V/C Ratio	0.381	0.155	0.111	0.366	0.407
HCM Control Delay	12.4	8.8	9.4	12	12.2
HCM Lane LOS	B	A	A	B	B
HCM 95th-tile Q	1.8	0.5	0.4	1.7	2

Intersection	
Intersection Delay, s/veh	10.4
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	7	49	32	48	21	13	23	224	33	17	99	1
Future Vol, veh/h	7	49	32	48	21	13	23	224	33	17	99	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	33	14	0	7	13	0	17	5	13	14	5	0
Mvmt Flow	8	53	35	52	23	14	25	243	36	18	108	1
Number of Lanes	0	1	0	0	1	0	0	1	1	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	2	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	1	1	1
HCM Control Delay	9.5	9.2	11.4	9.4
HCM LOS	A	A	B	A

Lane	NBLn1	NBLn2	EBLn1	WBLn1	SBLn1
Vol Left, %	9%	0%	8%	59%	15%
Vol Thru, %	91%	0%	56%	26%	85%
Vol Right, %	0%	100%	36%	16%	1%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	247	33	88	82	117
LT Vol	23	0	7	48	17
Through Vol	224	0	49	21	99
RT Vol	0	33	32	13	1
Lane Flow Rate	268	36	96	89	127
Geometry Grp	7	7	2	2	5
Degree of Util (X)	0.407	0.045	0.146	0.131	0.182
Departure Headway (Hd)	5.451	4.494	5.491	5.288	5.15
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	658	792	649	673	692
Service Time	3.206	2.249	3.559	3.357	3.216
HCM Lane V/C Ratio	0.407	0.045	0.148	0.132	0.184
HCM Control Delay	11.9	7.5	9.5	9.2	9.4
HCM Lane LOS	B	A	A	A	A
HCM 95th-tile Q	2	0.1	0.5	0.4	0.7

Intersection	
Intersection Delay, s/veh	15
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	2	32	37	101	58	39	52	228	109	35	330	5
Future Vol, veh/h	2	32	37	101	58	39	52	228	109	35	330	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	0	16	0	3	0	3	8	6	3	4	0	50
Mvmt Flow	2	35	40	110	63	42	57	248	118	38	359	5
Number of Lanes	0	1	0	0	1	0	0	1	1	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	2	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	1	1	1
HCM Control Delay	10.4	13.1	13.9	18
HCM LOS	B	B	B	C

Lane	NBLn1	NBLn2	EBLn1	WBLn1	SBLn1
Vol Left, %	19%	0%	3%	51%	9%
Vol Thru, %	81%	0%	45%	29%	89%
Vol Right, %	0%	100%	52%	20%	1%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	280	109	71	198	370
LT Vol	52	0	2	101	35
Through Vol	228	0	32	58	330
RT Vol	0	109	37	39	5
Lane Flow Rate	304	118	77	215	402
Geometry Grp	7	7	2	2	5
Degree of Util (X)	0.526	0.177	0.135	0.374	0.632
Departure Headway (Hd)	6.22	5.381	6.304	6.254	5.66
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	578	663	563	572	635
Service Time	3.983	3.143	4.399	4.328	3.72
HCM Lane V/C Ratio	0.526	0.178	0.137	0.376	0.633
HCM Control Delay	15.7	9.3	10.4	13.1	18
HCM Lane LOS	C	A	B	B	C
HCM 95th-tile Q	3.1	0.6	0.5	1.7	4.5

Intersection	
Intersection Delay, s/veh	10.5
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	7	49	32	65	21	13	23	229	78	17	101	1
Future Vol, veh/h	7	49	32	65	21	13	23	229	78	17	101	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	33	14	0	7	13	0	17	5	13	14	5	0
Mvmt Flow	8	53	35	71	23	14	25	249	85	18	110	1
Number of Lanes	0	1	0	0	1	0	0	1	1	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	2	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	1	1	1
HCM Control Delay	9.7	9.6	11.3	9.6
HCM LOS	A	A	B	A

Lane	NBLn1	NBLn2	EBLn1	WBLn1	SBLn1
Vol Left, %	9%	0%	8%	66%	14%
Vol Thru, %	91%	0%	56%	21%	85%
Vol Right, %	0%	100%	36%	13%	1%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	252	78	88	99	119
LT Vol	23	0	7	65	17
Through Vol	229	0	49	21	101
RT Vol	0	78	32	13	1
Lane Flow Rate	274	85	96	108	129
Geometry Grp	5	5	2	2	4a
Degree of Util (X)	0.42	0.107	0.149	0.162	0.189
Departure Headway (Hd)	5.517	4.561	5.623	5.42	5.26
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	649	780	633	656	676
Service Time	3.279	2.322	3.701	3.496	3.336
HCM Lane V/C Ratio	0.422	0.109	0.152	0.165	0.191
HCM Control Delay	12.3	7.9	9.7	9.6	9.6
HCM Lane LOS	B	A	A	A	A
HCM 95th-tile Q	2.1	0.4	0.5	0.6	0.7

Intersection	
Intersection Delay, s/veh	16.4
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	2	32	37	139	58	39	52	231	134	35	336	5
Future Vol, veh/h	2	32	37	139	58	39	52	231	134	35	336	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	0	16	0	3	0	3	8	6	3	4	0	50
Mvmt Flow	2	35	40	151	63	42	57	251	146	38	365	5
Number of Lanes	0	1	0	0	1	0	0	1	1	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	2	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	1	1	1
HCM Control Delay	10.8	14.9	14.8	20.2
HCM LOS	B	B	B	C

Lane	NBLn1	NBLn2	EBLn1	WBLn1	SBLn1
Vol Left, %	18%	0%	3%	59%	9%
Vol Thru, %	82%	0%	45%	25%	89%
Vol Right, %	0%	100%	52%	17%	1%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	283	134	71	236	376
LT Vol	52	0	2	139	35
Through Vol	231	0	32	58	336
RT Vol	0	134	37	39	5
Lane Flow Rate	308	146	77	257	409
Geometry Grp	5	5	2	2	4a
Degree of Util (X)	0.551	0.227	0.144	0.457	0.669
Departure Headway (Hd)	6.444	5.603	6.704	6.416	5.889
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	557	635	538	557	609
Service Time	4.235	3.394	4.704	4.514	3.976
HCM Lane V/C Ratio	0.553	0.23	0.143	0.461	0.672
HCM Control Delay	17	10.1	10.8	14.9	20.2
HCM Lane LOS	C	B	B	B	C
HCM 95th-tile Q	3.3	0.9	0.5	2.4	5

Intersection	
Int Delay, s/veh	1.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	33	4	15	112	79	41
Future Vol, veh/h	33	4	15	112	79	41
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	-	-	-	-	57
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	12	25	0	3	5	12
Mvmt Flow	36	4	16	122	86	45

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	240	86	131	0	-	0
Stage 1	86	-	-	-	-	-
Stage 2	154	-	-	-	-	-
Critical Hdwy	6.52	6.45	4.1	-	-	-
Critical Hdwy Stg 1	5.52	-	-	-	-	-
Critical Hdwy Stg 2	5.52	-	-	-	-	-
Follow-up Hdwy	3.608	3.525	2.2	-	-	-
Pot Cap-1 Maneuver	727	913	1467	-	-	-
Stage 1	913	-	-	-	-	-
Stage 2	850	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	718	913	1467	-	-	-
Mov Cap-2 Maneuver	718	-	-	-	-	-
Stage 1	902	-	-	-	-	-
Stage 2	850	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.2	0.9	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1467	-	735	-	-
HCM Lane V/C Ratio	0.011	-	0.055	-	-
HCM Control Delay (s)	7.5	0	10.2	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.2	-	-

Intersection	
Int Delay, s/veh	2.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	87	31	37	256	219	97
Future Vol, veh/h	87	31	37	256	219	97
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	57
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	3	3	1	0	2
Mvmt Flow	95	34	40	278	238	105

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	596	238	343	0	-	0
Stage 1	238	-	-	-	-	-
Stage 2	358	-	-	-	-	-
Critical Hdwy	6.42	6.23	4.13	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.327	2.227	-	-	-
Pot Cap-1 Maneuver	466	798	1210	-	-	-
Stage 1	802	-	-	-	-	-
Stage 2	707	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	448	798	1210	-	-	-
Mov Cap-2 Maneuver	448	-	-	-	-	-
Stage 1	771	-	-	-	-	-
Stage 2	707	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	14.5	1	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1210	-	506	-	-
HCM Lane V/C Ratio	0.033	-	0.253	-	-
HCM Control Delay (s)	8.1	0	14.5	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.1	-	1	-	-

Intersection	
Int Delay, s/veh	2.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	59	19	30	207	118	52
Future Vol, veh/h	59	19	30	207	118	52
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	-	-	-	-	57
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	12	25	0	3	5	12
Mvmt Flow	64	21	33	225	128	57

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	419	128	185	0	-	0
Stage 1	128	-	-	-	-	-
Stage 2	291	-	-	-	-	-
Critical Hdwy	6.52	6.45	4.1	-	-	-
Critical Hdwy Stg 1	5.52	-	-	-	-	-
Critical Hdwy Stg 2	5.52	-	-	-	-	-
Follow-up Hdwy	3.608	3.525	2.2	-	-	-
Pot Cap-1 Maneuver	572	864	1402	-	-	-
Stage 1	874	-	-	-	-	-
Stage 2	736	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	557	864	1402	-	-	-
Mov Cap-2 Maneuver	557	-	-	-	-	-
Stage 1	850	-	-	-	-	-
Stage 2	736	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.9	1	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1402	-	610	-	-
HCM Lane V/C Ratio	0.023	-	0.139	-	-
HCM Control Delay (s)	7.6	0	11.9	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.5	-	-

Intersection	
Int Delay, s/veh	4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	104	54	57	348	344	124
Future Vol, veh/h	104	54	57	348	344	124
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	-	-	-	-	57
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	3	3	1	0	2
Mvmt Flow	113	59	62	378	374	135

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	876	374	509	0	-	0
Stage 1	374	-	-	-	-	-
Stage 2	502	-	-	-	-	-
Critical Hdwy	6.42	6.23	4.13	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.327	2.227	-	-	-
Pot Cap-1 Maneuver	319	670	1051	-	-	-
Stage 1	696	-	-	-	-	-
Stage 2	608	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	295	670	1051	-	-	-
Mov Cap-2 Maneuver	295	-	-	-	-	-
Stage 1	644	-	-	-	-	-
Stage 2	608	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	23.3	1.2	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1051	-	365	-	-
HCM Lane V/C Ratio	0.059	-	0.471	-	-
HCM Control Delay (s)	8.6	0	23.3	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0.2	-	2.4	-	-

Intersection	
Int Delay, s/veh	3.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	104	19	30	207	118	69
Future Vol, veh/h	104	19	30	207	118	69
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	-	-	-	-	57
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	12	25	0	3	5	12
Mvmt Flow	113	21	33	225	128	75

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	419	128	203	0	-	0
Stage 1	128	-	-	-	-	-
Stage 2	291	-	-	-	-	-
Critical Hdwy	6.52	6.45	4.1	-	-	-
Critical Hdwy Stg 1	5.52	-	-	-	-	-
Critical Hdwy Stg 2	5.52	-	-	-	-	-
Follow-up Hdwy	3.608	3.525	2.2	-	-	-
Pot Cap-1 Maneuver	572	864	1381	-	-	-
Stage 1	874	-	-	-	-	-
Stage 2	736	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	557	864	1381	-	-	-
Mov Cap-2 Maneuver	557	-	-	-	-	-
Stage 1	850	-	-	-	-	-
Stage 2	736	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.9	1	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1381	-	589	-	-
HCM Lane V/C Ratio	0.024	-	0.227	-	-
HCM Control Delay (s)	7.7	0	12.9	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.9	-	-

Intersection	
Int Delay, s/veh	5.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	129	54	57	348	344	162
Future Vol, veh/h	129	54	57	348	344	162
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	-	-	-	-	57
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	3	3	1	0	2
Mvmt Flow	140	59	62	378	374	176

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	876	374	550	0	-	0
Stage 1	374	-	-	-	-	-
Stage 2	502	-	-	-	-	-
Critical Hdwy	6.42	6.23	4.13	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.327	2.227	-	-	-
Pot Cap-1 Maneuver	319	670	1015	-	-	-
Stage 1	696	-	-	-	-	-
Stage 2	608	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	294	670	1015	-	-	-
Mov Cap-2 Maneuver	294	-	-	-	-	-
Stage 1	642	-	-	-	-	-
Stage 2	608	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	27.7	1.2	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1015	-	352	-	-
HCM Lane V/C Ratio	0.061	-	0.565	-	-
HCM Control Delay (s)	8.8	0	27.7	-	-
HCM Lane LOS	A	A	D	-	-
HCM 95th %tile Q(veh)	0.2	-	3.3	-	-

Intersection	
Int Delay, s/veh	2.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	63	25	37	309	162	57
Future Vol, veh/h	63	25	37	309	162	57
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	-	-	-	-	57
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	12	25	0	3	5	12
Mvmt Flow	68	27	40	336	176	62

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	592	176	238	0	-	0
Stage 1	176	-	-	-	-	-
Stage 2	416	-	-	-	-	-
Critical Hdwy	6.52	6.45	4.1	-	-	-
Critical Hdwy Stg 1	5.52	-	-	-	-	-
Critical Hdwy Stg 2	5.52	-	-	-	-	-
Follow-up Hdwy	3.608	3.525	2.2	-	-	-
Pot Cap-1 Maneuver	453	811	1341	-	-	-
Stage 1	831	-	-	-	-	-
Stage 2	645	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	436	811	1341	-	-	-
Mov Cap-2 Maneuver	436	-	-	-	-	-
Stage 1	800	-	-	-	-	-
Stage 2	645	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	13.9	0.8	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1341	-	502	-	-
HCM Lane V/C Ratio	0.03	-	0.191	-	-
HCM Control Delay (s)	7.8	0	13.9	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.7	-	-

Intersection	
Int Delay, s/veh	10

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	116	63	67	511	492	137
Future Vol, veh/h	116	63	67	511	492	137
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	-	-	-	-	57
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	3	3	1	0	2
Mvmt Flow	126	68	73	555	535	149

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1236	535	684	0	-	0
Stage 1	535	-	-	-	-	-
Stage 2	701	-	-	-	-	-
Critical Hdwy	6.42	6.23	4.13	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.327	2.227	-	-	-
Pot Cap-1 Maneuver	195	543	905	-	-	-
Stage 1	587	-	-	-	-	-
Stage 2	492	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	172	543	905	-	-	-
Mov Cap-2 Maneuver	172	-	-	-	-	-
Stage 1	518	-	-	-	-	-
Stage 2	492	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	74.2	1.1	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	905	-	226	-	-
HCM Lane V/C Ratio	0.08	-	0.861	-	-
HCM Control Delay (s)	9.3	0	74.2	-	-
HCM Lane LOS	A	A	F	-	-
HCM 95th %tile Q(veh)	0.3	-	6.8	-	-

Intersection	
Int Delay, s/veh	3.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	108	25	37	309	162	74
Future Vol, veh/h	108	25	37	309	162	74
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	-	-	-	-	57
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	12	25	0	3	5	12
Mvmt Flow	117	27	40	336	176	80

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	592	176	256	0	-	0
Stage 1	176	-	-	-	-	-
Stage 2	416	-	-	-	-	-
Critical Hdwy	6.52	6.45	4.1	-	-	-
Critical Hdwy Stg 1	5.52	-	-	-	-	-
Critical Hdwy Stg 2	5.52	-	-	-	-	-
Follow-up Hdwy	3.608	3.525	2.2	-	-	-
Pot Cap-1 Maneuver	453	811	1321	-	-	-
Stage 1	831	-	-	-	-	-
Stage 2	645	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	436	811	1321	-	-	-
Mov Cap-2 Maneuver	436	-	-	-	-	-
Stage 1	800	-	-	-	-	-
Stage 2	645	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	15.8	0.8	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1321	-	478	-	-
HCM Lane V/C Ratio	0.03	-	0.302	-	-
HCM Control Delay (s)	7.8	0	15.8	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0.1	-	1.3	-	-

Intersection	
Int Delay, s/veh	16.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	141	63	67	511	492	175
Future Vol, veh/h	141	63	67	511	492	175
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	-	-	-	-	57
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	3	3	1	0	2
Mvmt Flow	153	68	73	555	535	190

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1236	535	725	0	-	0
Stage 1	535	-	-	-	-	-
Stage 2	701	-	-	-	-	-
Critical Hdwy	6.42	6.23	4.13	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.327	2.227	-	-	-
Pot Cap-1 Maneuver	195	543	873	-	-	-
Stage 1	587	-	-	-	-	-
Stage 2	492	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	171	543	873	-	-	-
Mov Cap-2 Maneuver	171	-	-	-	-	-
Stage 1	516	-	-	-	-	-
Stage 2	492	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	114	1.1	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	873	-	217	-	-
HCM Lane V/C Ratio	0.083	-	1.022	-	-
HCM Control Delay (s)	9.5	0	114	-	-
HCM Lane LOS	A	A	F	-	-
HCM 95th %tile Q(veh)	0.3	-	9.4	-	-

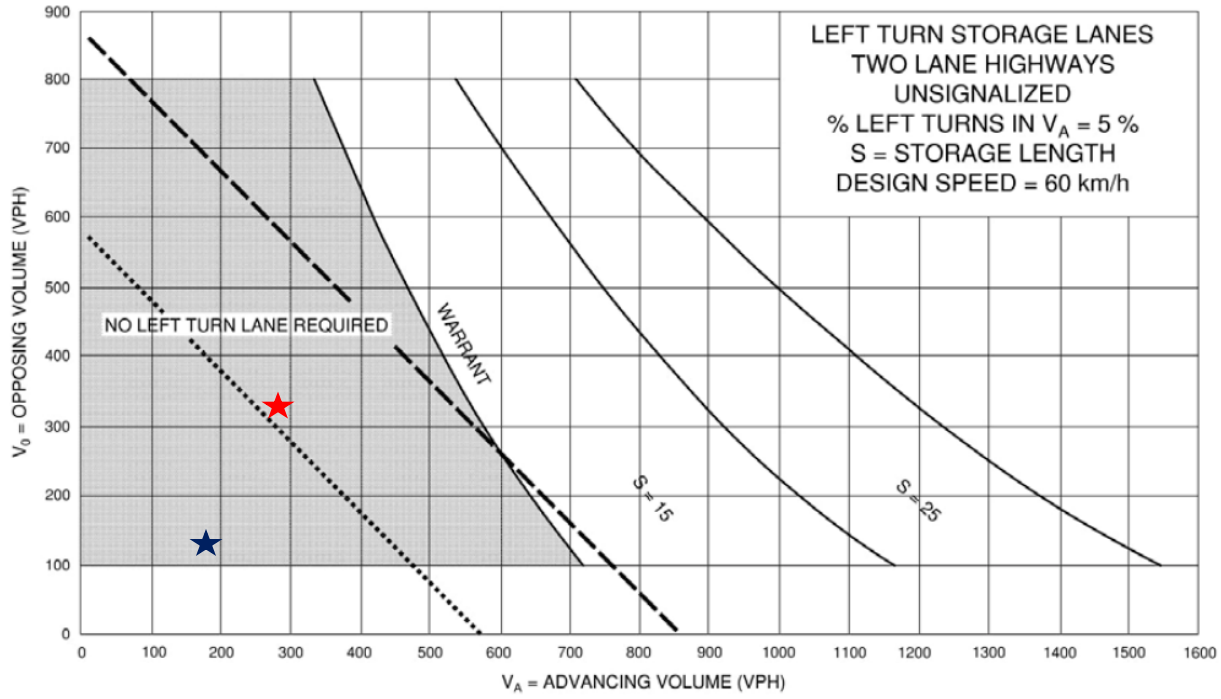
Appendix D

GEOMETRIC & TRAFFIC CONTROL IMPROVEMENTS

Site Access at Carlow Road (C.R. 20)

Site Access at Carlow Road – Northbound Left Turn Lane Warrants

Background Traffic 2028 – AM & PM Peak Hours



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

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

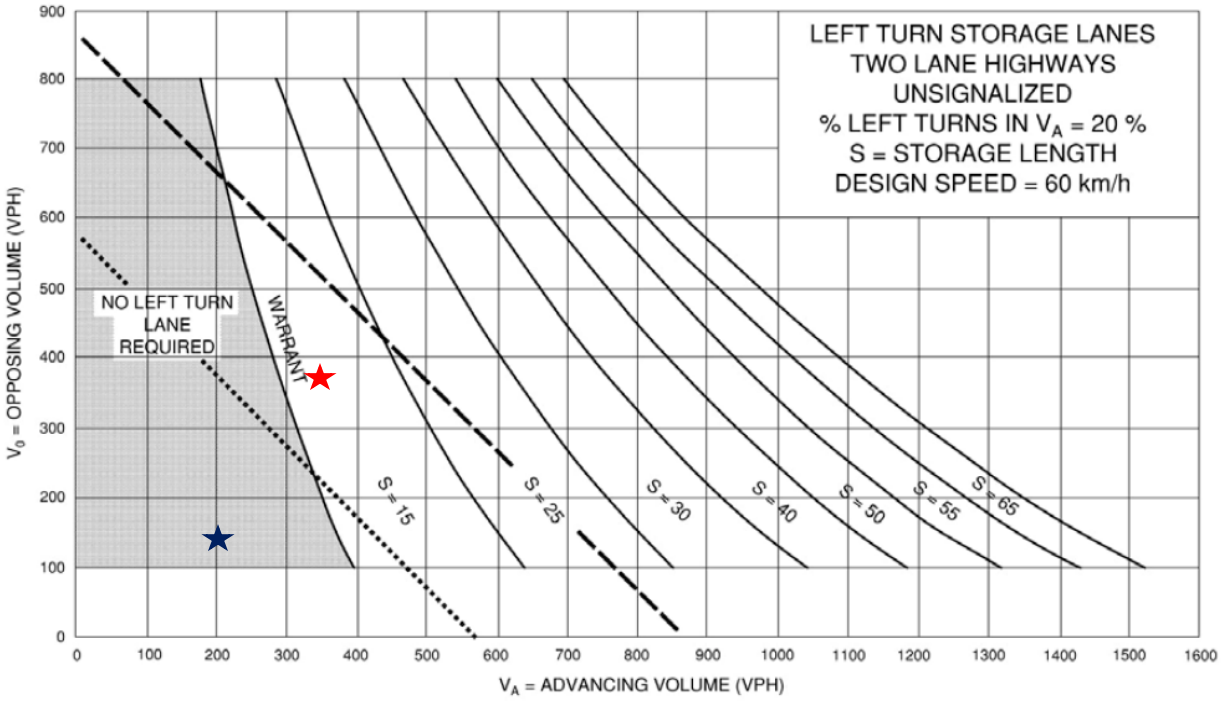
AM Peak Hour

PM Peak Hour

Peak Period	Approaching Volume	Opposing Volume	# Left Turns	% Left Turns	Storage Required (m)
AM	184	122	6	3.3	0
PM	282	331	3	1.1	0

Site Access at Carlow Road – Northbound Left Turn Lane Warrants

Total Traffic 2028 – AM & PM Peak Hours



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

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

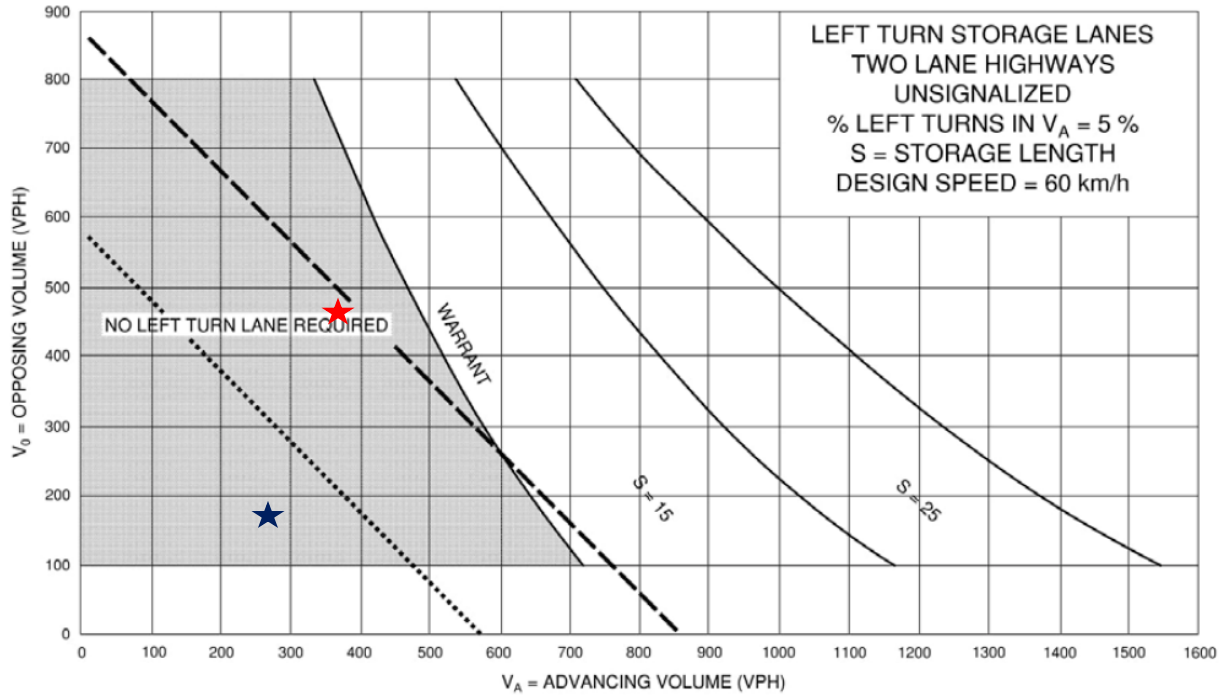
AM Peak Hour

PM Peak Hour

Peak Period	Approaching Volume	Opposing Volume	# Left Turns	% Left Turns	Storage Required (m)
AM	204	142	26	12.7	0
PM	361	383	82	22.7	15

Site Access at Carlow Road – Northbound Left Turn Lane Warrants

Background Traffic 2040 – AM & PM Peak Hours



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

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

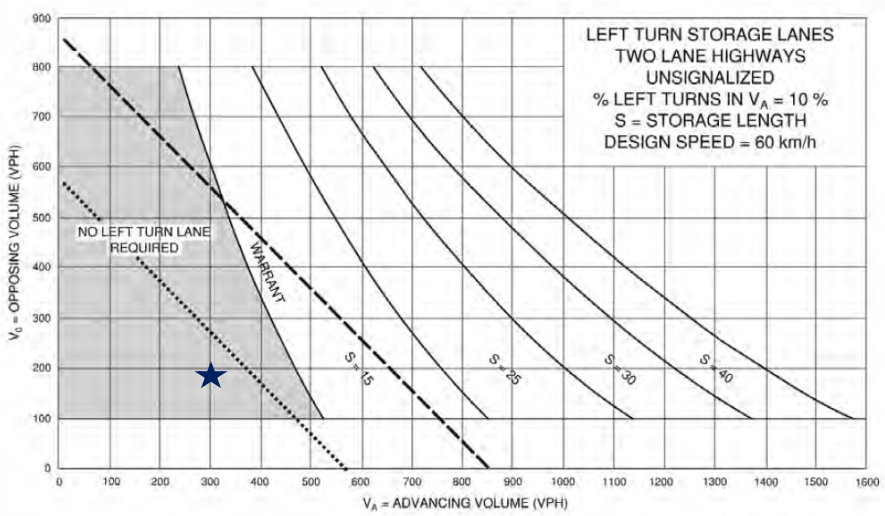
★ **AM Peak Hour**

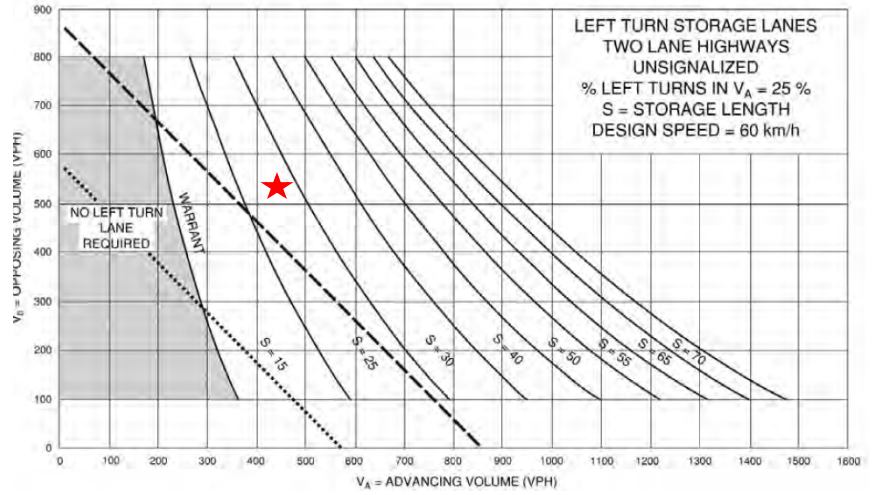
★ **PM Peak Hour**

Peak Period	Approaching Volume	Opposing Volume	# Left Turns	% Left Turns	Storage Required (m)
AM	281	171	7	2.5	0
PM	363	479	4	1.1	0

Site Access at Carlow Road – Northbound Left Turn Lane Warrants

Total Traffic 2040 – AM & PM Peak Hours





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

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

★ **AM Peak Hour**

★ **PM Peak Hour**

Peak Period	Approaching Volume	Opposing Volume	# Left Turns	% Left Turns	Storage Required (m)
AM	301	191	27	9.0	0
PM	442	531	83	27.6	25

Appendix E

GEOMETRIC & TRAFFIC CONTROL IMPROVEMENTS

Lake Line / Warren Street (C.R. 21) at Carlow Road / Union Road (C.R. 20)

Traffic Signal Warrants – Summary of Justifications (OTM Book 12)

Projected Background Traffic (Horizon Year 2028)

Lake Line / Warren Street (C.R. 21) at Carlow Road / Union Road

JUSTIFICATION	DESCRIPTION	MINIMUM REQUIREMENTS FOR TWO-LANE ROADWAYS		COMPLIANCE	
		FREE FLOW	RESTRICTED FLOW		
		OPERATING SPEED GREATER THAN OR EQUAL TO 70 km/h	OPERATING SPEED LESS THAN 70 km/h	SECTIONAL %	ENTIRE %**
1. MINIMUM VEHICULAR VOLUME	A*. Vehicle Volume, All Approaches for Each of the Heaviest 8 Hours of an Average Day, and	480	720	42 (1)	42
	B***. Vehicle Volume, Along Minor Streets for Each of the Same 8 Hours	120	170	57 (2)	
2. DELAY TO CROSS TRAFFIC	A*. Vehicle Volume, Major Street for Each of the Heaviest 8 Hours of an Average Day, and	480	720	28 (3)	28
	B*. Combined Vehicle and Pedestrian Volume Crossing the Major Street for Each of the Same 8 Hours.	50	75	78 (4)	
3. VOLUME/DELAY COMBINATIONS	The Above Justifications (1 and 2) Both Satisfied to the Extent of 80% or more	YES ☐	NO ☑		28
4. MIN. FOUR HOUR VEHICLE VOLUME	At Plotted Point Representing Hourly Volume for Minor Approach vs. Major Approach for Four Highest Hours of an Average Day Fall above the Applicable Curve	YES ☐	NO ☐		N/A
5. COLLISION EXPERIENCE	A. Total Reported Accidents of Types Susceptible to Correction by a Traffic Signal, per 12 Month Period Averaged over a 36 Month Period, and	5		N/A	N/A
	B. Adequate Trial of Less Restrictive Remedies. Where Satisfactory Observance and Enforcement Have Failed to Reduce the Number of Collisions	YES ☐	NO ☐		
6. PEDESTRIAN VOLUME AND DELAY	A. Plotted Point Representing 8 Hour Pedestrian Volume vs. 8 Hour Vehicular Volume Fall in Justified Zone, and	YES ☐	NO ☐		N/A
	B. Plotted Point Representing 8 Hour Volume of Pedestrian Experiencing Delays of 10 s or more vs. 8 Hour Pedestrian Volume Fall in Justified Zone	YES ☐	NO ☐		

Notes

* Vehicle Volume Warrants 1A and 2A for Roadways Having Two or More Moving Lanes in One Direction Should be 25% Higher than Values Given Above.

** The Lowest Sectional Percentage Governs the Entire Warrant.

*** For "T" Intersections, the Values for Warrant (1B) should be increased by 50%.

Justification 7 - Future Traffic Volumes

(1) = (413 + 785) / 4 / 720 = 42%

(2) = (151 + 239) / 4 / 170 = 57%

(3) = (262 + 546) / 4 / 720 = 28%

(4) = (93 + 142) / 4 / 75 = 78%

Traffic Signal Warrants – Summary of Justifications (OTM Book 12)

Projected Total Traffic (Horizon Year 2028)

Lake Line / Warren Street (C.R. 21) at Carlow Road / Union Road

JUSTIFICATION	DESCRIPTION	MINIMUM REQUIREMENTS FOR TWO-LANE ROADWAYS		COMPLIANCE	
		FREE FLOW	RESTRICTED FLOW		
		OPERATING SPEED GREATER THAN OR EQUAL TO 70 km/h	OPERATING SPEED LESS THAN 70 km/h	SECTIONAL %	ENTIRE %**
1. MINIMUM VEHICULAR VOLUME	A*. Vehicle Volume, All Approaches for Each of the Heaviest 8 Hours of an Average Day, and	480	720	45 (1)	45
	B***. Vehicle Volume, Along Minor Streets for Each of the Same 8 Hours	120	170	64 (2)	
2. DELAY TO CROSS TRAFFIC	A*. Vehicle Volume, Major Street for Each of the Heaviest 8 Hours of an Average Day, and	480	720	30 (3)	30
	B*. Combined Vehicle and Pedestrian Volume Crossing the Major Street for Each of the Same 8 Hours.	50	75	94 (4)	
3. VOLUME/DELAY COMBINATIONS	The Above Justifications (1 and 2) Both Satisfied to the Extent of 80% or more	YES ☐	NO ☑		30
4. MIN. FOUR HOUR VEHICLE VOLUME	At Plotted Point Representing Hourly Volume for Minor Approach vs. Major Approach for Four Highest Hours of an Average Day Fall above the Applicable Curve	YES ☐	NO ☐		N/A
5. COLLISION EXPERIENCE	A. Total Reported Accidents of Types Susceptible to Correction by a Traffic Signal, per 12 Month Period Averaged over a 36 Month Period, and	5		N/A	N/A
	B. Adequate Trial of Less Restrictive Remedies. Where Satisfactory Observance and Enforcement Have Failed to Reduce the Number of Collisions	YES ☐	NO ☐		
6. PEDESTRIAN VOLUME AND DELAY	A. Plotted Point Representing 8 Hour Pedestrian Volume vs. 8 Hour Vehicular Volume Fall in Justified Zone, and	YES ☐	NO ☐		N/A
	B. Plotted Point Representing 8 Hour Volume of Pedestrian Experiencing Delays of 10 s or more vs. 8 Hour Pedestrian Volume Fall in Justified Zone	YES ☐	NO ☐		

Notes

* Vehicle Volume Warrants 1A and 2A for Roadways Having Two or More Moving Lanes in One Direction Should be 25% Higher than Values Given Above.

** The Lowest Sectional Percentage Governs the Entire Warrant.

*** For "T" Intersections, the Values for Warrant (1B) should be increased by 50%.

Justification 7 - Future Traffic Volumes

(1) = (470 + 822) / 4 / 720 = 45%

(2) = (164 + 272) / 4 / 170 = 64%

(3) = (306 + 550) / 4 / 720 = 30%

(4) = (106 + 175) / 4 / 75 = 94%

Traffic Signal Warrants – Summary of Justifications (OTM Book 12)

Projected Background Traffic (Horizon Year 2040)

Lake Line / Warren Street (C.R. 21) at Carlow Road / Union Road

JUSTIFICATION	DESCRIPTION	MINIMUM REQUIREMENTS FOR TWO-LANE ROADWAYS		COMPLIANCE	
		FREE FLOW	RESTRICTED FLOW		
		OPERATING SPEED GREATER THAN OR EQUAL TO 70 km/h	OPERATING SPEED LESS THAN 70 km/h	SECTIONAL %	ENTIRE %**
1. MINIMUM VEHICULAR VOLUME	A*. Vehicle Volume, All Approaches for Each of the Heaviest 8 Hours of an Average Day, and	480	720	55 (1)	55
	B***. Vehicle Volume, Along Minor Streets for Each of the Same 8 Hours	120	170	65 (2)	
2. DELAY TO CROSS TRAFFIC	A*. Vehicle Volume, Major Street for Each of the Heaviest 8 Hours of an Average Day, and	480	720	40 (3)	40
	B*. Combined Vehicle and Pedestrian Volume Crossing the Major Street for Each of the Same 8 Hours.	50	75	88 (4)	
3. VOLUME/DELAY COMBINATIONS	The Above Justifications (1 and 2) Both Satisfied to the Extent of 80% or more	YES ☐	NO ☑		40
4. MIN. FOUR HOUR VEHICLE VOLUME	At Plotted Point Representing Hourly Volume for Minor Approach vs. Major Approach for Four Highest Hours of an Average Day Fall above the Applicable Curve	YES ☐	NO ☐		N/A
5. COLLISION EXPERIENCE	A. Total Reported Accidents of Types Susceptible to Correction by a Traffic Signal, per 12 Month Period Averaged over a 36 Month Period, and	5		N/A	N/A
	B. Adequate Trial of Less Restrictive Remedies. Where Satisfactory Observance and Enforcement Have Failed to Reduce the Number of Collisions	YES ☐	NO ☐		
6. PEDESTRIAN VOLUME AND DELAY	A. Plotted Point Representing 8 Hour Pedestrian Volume vs. 8 Hour Vehicular Volume Fall in Justified Zone, and	YES ☐	NO ☐		N/A
	B. Plotted Point Representing 8 Hour Volume of Pedestrian Experiencing Delays of 10 s or more vs. 8 Hour Pedestrian Volume Fall in Justified Zone	YES ☐	NO ☐		

Notes

* Vehicle Volume Warrants 1A and 2A for Roadways Having Two or More Moving Lanes in One Direction Should be 25% Higher than Values Given Above.

** The Lowest Sectional Percentage Governs the Entire Warrant.

*** For "T" Intersections, the Values for Warrant (1B) should be increased by 50%.

Justification 7 - Future Traffic Volumes

(1) = (567 + 1028) / 4 / 720 = 55%

(2) = (170 + 269) / 4 / 170 = 65%

(3) = (397 + 759) / 4 / 720 = 40%

(4) = (104 + 161) / 4 / 75 = 88%

Traffic Signal Warrants – Summary of Justifications (OTM Book 12)

Projected Total Traffic (Horizon Year 2040)

Lake Line / Warren Street (C.R. 21) at Carlow Road / Union Road

JUSTIFICATION	DESCRIPTION	MINIMUM REQUIREMENTS FOR TWO-LANE ROADWAYS		COMPLIANCE	
		FREE FLOW	RESTRICTED FLOW		
		OPERATING SPEED GREATER THAN OR EQUAL TO 70 km/h	OPERATING SPEED LESS THAN 70 km/h	SECTIONAL %	ENTIRE %**
1. MINIMUM VEHICULAR VOLUME	A*. Vehicle Volume, All Approaches for Each of the Heaviest 8 Hours of an Average Day, and	480	720	59 (1)	59
	B***. Vehicle Volume, Along Minor Streets for Each of the Same 8 Hours	120	170	71 (2)	
2. DELAY TO CROSS TRAFFIC	A*. Vehicle Volume, Major Street for Each of the Heaviest 8 Hours of an Average Day, and	480	720	43 (3)	43
	B*. Combined Vehicle and Pedestrian Volume Crossing the Major Street for Each of the Same 8 Hours.	50	75	104 (4)	
3. VOLUME/DELAY COMBINATIONS	The Above Justifications (1 and 2) Both Satisfied to the Extent of 80% or more	YES ☐	NO ☑		43
4. MIN. FOUR HOUR VEHICLE VOLUME	At Plotted Point Representing Hourly Volume for Minor Approach vs. Major Approach for Four Highest Hours of an Average Day Fall above the Applicable Curve	YES ☐	NO ☐		N/A
5. COLLISION EXPERIENCE	A. Total Reported Accidents of Types Susceptible to Correction by a Traffic Signal, per 12 Month Period Averaged over a 36 Month Period, and	5		N/A	N/A
	B. Adequate Trial of Less Restrictive Remedies. Where Satisfactory Observance and Enforcement Have Failed to Reduce the Number of Collisions	YES ☐	NO ☐		
6. PEDESTRIAN VOLUME AND DELAY	A. Plotted Point Representing 8 Hour Pedestrian Volume vs. 8 Hour Vehicular Volume Fall in Justified Zone, and	YES ☐	NO ☐		N/A
	B. Plotted Point Representing 8 Hour Volume of Pedestrian Experiencing Delays of 10 s or more vs. 8 Hour Pedestrian Volume Fall in Justified Zone	YES ☐	NO ☐		

Notes

* Vehicle Volume Warrants 1A and 2A for Roadways Having Two or More Moving Lanes in One Direction Should be 25% Higher than Values Given Above.

** The Lowest Sectional Percentage Governs the Entire Warrant.

*** For "T" Intersections, the Values for Warrant (1B) should be increased by 50%.

Justification 7 - Future Traffic Volumes

(1) = (624 + 1088) / 4 / 720 = 59%

(2) = (183 + 302) / 4 / 170 = 71%

(3) = (441 + 786) / 4 / 720 = 43%

(4) = (117 + 194) / 4 / 75 = 104%

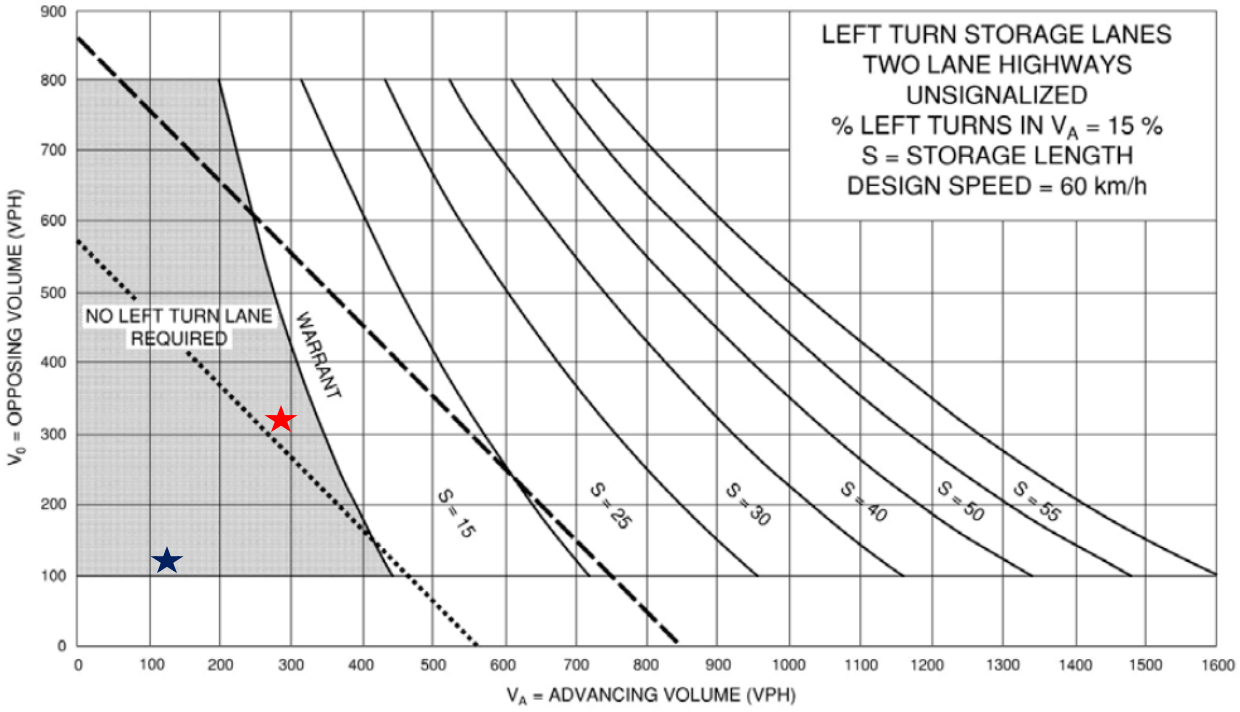
Appendix F

GEOMETRIC & TRAFFIC CONTROL IMPROVEMENTS

Warren Street (C.R. 21) at Colborne Street (C.R. 4)

Warren Street at Colborne Street – Northbound Left Turn Lane Warrants

Existing Traffic – AM & PM Peak Hours



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

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

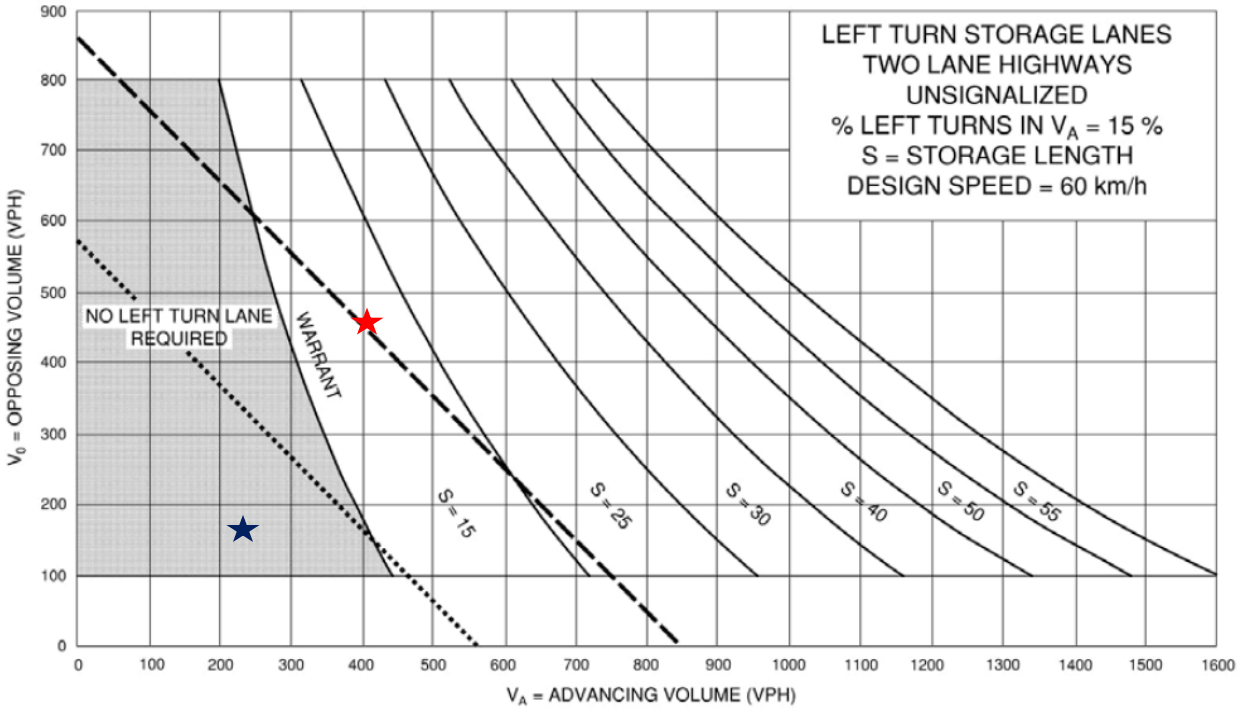
AM Peak Hour

PM Peak Hour

Peak Period	Approaching Volume	Opposing Volume	# Left Turns	% Left Turns	Storage Required (m)
AM	127	120	15	11.8	0
PM	293	316	37	12.6	0

Warren Street at Colborne Street – Northbound Left Turn Lane Warrants

Background Traffic 2028 – AM & PM Peak Hours



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

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

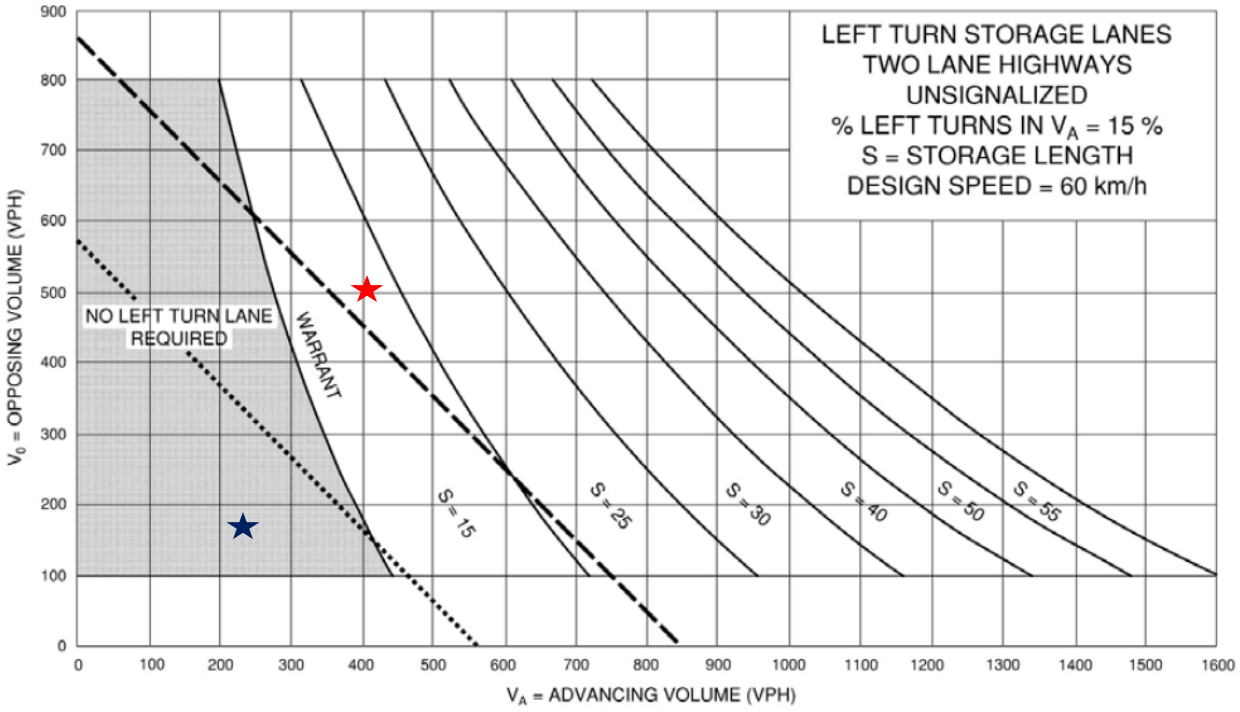
★ **AM Peak Hour**

★ **PM Peak Hour**

Peak Period	Approaching Volume	Opposing Volume	# Left Turns	% Left Turns	Storage Required (m)
AM	237	170	30	12.7	0
PM	405	468	57	14.1	15

Warren Street at Colborne Street – Northbound Left Turn Lane Warrants

Total Traffic 2028 – AM & PM Peak Hours



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

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

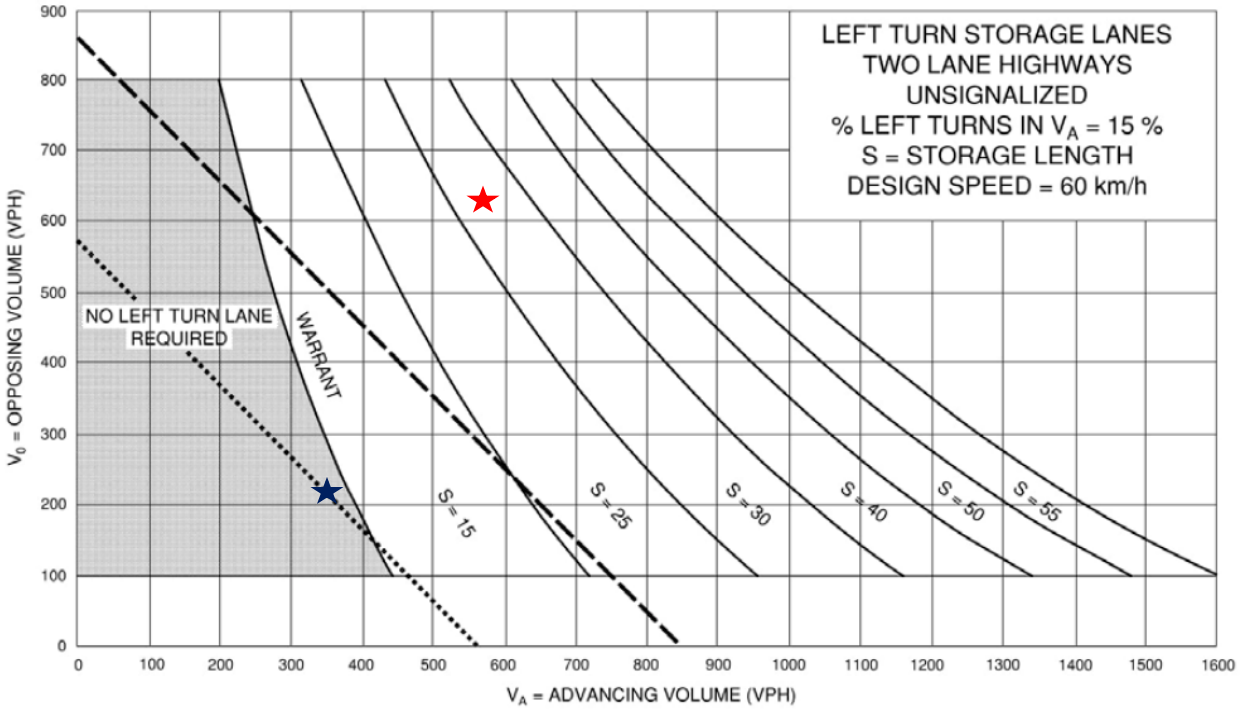
AM Peak Hour

PM Peak Hour

Peak Period	Approaching Volume	Opposing Volume	# Left Turns	% Left Turns	Storage Required (m)
AM	237	188	30	12.7	0
PM	405	513	57	14.1	15

Warren Street at Colborne Street – Northbound Left Turn Lane Warrants

Background Traffic 2040 – AM & PM Peak Hours



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

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

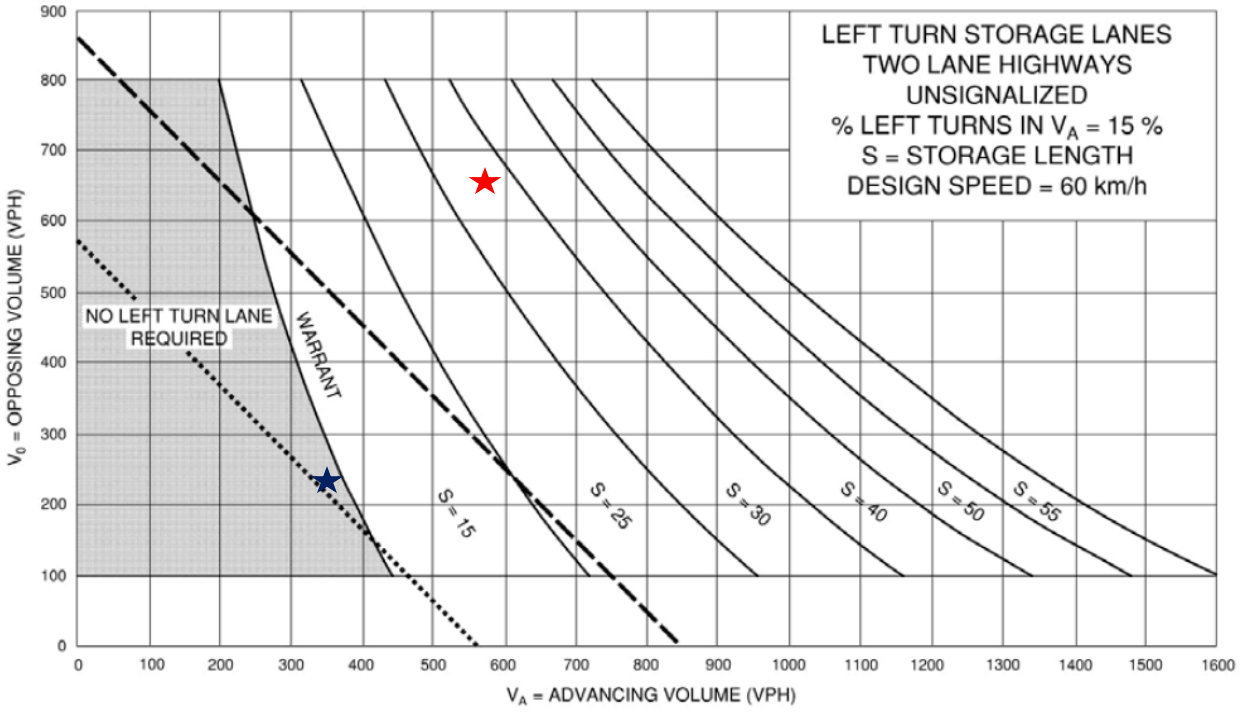
★ **AM Peak Hour**

★ **PM Peak Hour**

Peak Period	Approaching Volume	Opposing Volume	# Left Turns	% Left Turns	Storage Required (m)
AM	346	219	37	10.7	0
PM	578	629	67	11.6	30

Warren Street at Colborne Street – Northbound Left Turn Lane Warrants

Total Traffic 2040 – AM & PM Peak Hours



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

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

AM Peak Hour

PM Peak Hour

Peak Period	Approaching Volume	Opposing Volume	# Left Turns	% Left Turns	Storage Required (m)
AM	346	237	37	10.7	0
PM	578	674	67	11.6	30

Intersection	
Int Delay, s/veh	9.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	116	63	67	511	492	137
Future Vol, veh/h	116	63	67	511	492	137
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	-	30	-	-	57
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	3	3	1	0	2
Mvmt Flow	126	68	73	555	535	149

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1236	535	684	0	-	0
Stage 1	535	-	-	-	-	-
Stage 2	701	-	-	-	-	-
Critical Hdwy	6.42	6.23	4.13	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.327	2.227	-	-	-
Pot Cap-1 Maneuver	195	543	905	-	-	-
Stage 1	587	-	-	-	-	-
Stage 2	492	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	179	543	905	-	-	-
Mov Cap-2 Maneuver	179	-	-	-	-	-
Stage 1	539	-	-	-	-	-
Stage 2	492	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	67.3	1.1	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	905	-	234	-	-
HCM Lane V/C Ratio	0.08	-	0.831	-	-
HCM Control Delay (s)	9.3	-	67.3	-	-
HCM Lane LOS	A	-	F	-	-
HCM 95th %tile Q(veh)	0.3	-	6.4	-	-

Intersection	
Int Delay, s/veh	14.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	141	63	67	511	492	175
Future Vol, veh/h	141	63	67	511	492	175
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	-	30	-	-	57
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	3	3	1	0	2
Mvmt Flow	153	68	73	555	535	190

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1236	535	725	0	-	0
Stage 1	535	-	-	-	-	-
Stage 2	701	-	-	-	-	-
Critical Hdwy	6.42	6.23	4.13	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.327	2.227	-	-	-
Pot Cap-1 Maneuver	195	543	873	-	-	-
Stage 1	587	-	-	-	-	-
Stage 2	492	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	179	543	873	-	-	-
Mov Cap-2 Maneuver	179	-	-	-	-	-
Stage 1	538	-	-	-	-	-
Stage 2	492	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	100.7	1.1	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	873	-	226	-	-
HCM Lane V/C Ratio	0.083	-	0.981	-	-
HCM Control Delay (s)	9.5	-	100.7	-	-
HCM Lane LOS	A	-	F	-	-
HCM 95th %tile Q(veh)	0.3	-	8.9	-	-

Traffic Signal Warrants – Summary of Justifications (OTM Book 12)

Projected Background Traffic (Horizon Year 2028)

Colborne Street at Warren Street

JUSTIFICATION	DESCRIPTION	MINIMUM REQUIREMENTS FOR TWO-LANE ROADWAYS		COMPLIANCE	
		FREE FLOW	RESTRICTED FLOW		
		OPERATING SPEED GREATER THAN OR EQUAL TO 70 km/h	OPERATING SPEED LESS THAN 70 km/h	SECTIONAL %	ENTIRE %**
1. MINIMUM VEHICULAR VOLUME	A*. Vehicle Volume, All Approaches for Each of the Heaviest 8 Hours of an Average Day, and	480	720	53 (1)	23
	B***. Vehicle Volume, Along Minor Streets for Each of the Same 8 Hours	120	170	23 (2)	
2. DELAY TO CROSS TRAFFIC	A*. Vehicle Volume, Major Street for Each of the Heaviest 8 Hours of an Average Day, and	480	720	44 (3)	44
	B*. Combined Vehicle and Pedestrian Volume Crossing the Major Street for Each of the Same 8 Hours.	50	75	54 (4)	
3. VOLUME/DELAY COMBINATIONS	The Above Justifications (1 and 2) Both Satisfied to the Extent of 80% or more	YES ☐	NO ☑		23
4. MIN. FOUR HOUR VEHICLE VOLUME	At Plotted Point Representing Hourly Volume for Minor Approach vs. Major Approach for Four Highest Hours of an Average Day Fall above the Applicable Curve	YES ☐	NO ☐		N/A
5. COLLISION EXPERIENCE	A. Total Reported Accidents of Types Susceptible to Correction by a Traffic Signal, per 12 Month Period Averaged over a 36 Month Period, and	5		N/A	N/A
	B. Adequate Trial of Less Restrictive Remedies. Where Satisfactory Observance and Enforcement Have Failed to Reduce the Number of Collisions	YES ☐	NO ☐		
6. PEDESTRIAN VOLUME AND DELAY	A. Plotted Point Representing 8 Hour Pedestrian Volume vs. 8 Hour Vehicular Volume Fall in Justified Zone, and	YES ☐	NO ☐		N/A
	B. Plotted Point Representing 8 Hour Volume of Pedestrian Experiencing Delays of 10 s or more vs. 8 Hour Pedestrian Volume Fall in Justified Zone	YES ☐	NO ☐		

Notes

* Vehicle Volume Warrants 1A and 2A for Roadways Having Two or More Moving Lanes in One Direction Should be 25% Higher than Values Given Above.

** The Lowest Sectional Percentage Governs the Entire Warrant.

*** For "T" Intersections, the Values for Warrant (1B) should be increased by 50%.

Justification 7 - Future Traffic Volumes

(1) = (485 + 1031) / 4 / 720 = 53%

(2) = (78 + 158) / 4 / (170 x 1.5) = 23%

(3) = (407 + 873) / 4 / 720 = 44%

(4) = (59 + 104) / 4 / 75 = 54%

Traffic Signal Warrants – Summary of Justifications (OTM Book 12)

Projected Total Traffic (Horizon Year 2028)

Colborne Street at Warren Street

JUSTIFICATION	DESCRIPTION	MINIMUM REQUIREMENTS FOR TWO-LANE ROADWAYS		COMPLIANCE	
		FREE FLOW	RESTRICTED FLOW		
		OPERATING SPEED GREATER THAN OR EQUAL TO 70 km/h	OPERATING SPEED LESS THAN 70 km/h	SECTIONAL %	ENTIRE %**
1. MINIMUM VEHICULAR VOLUME	A*. Vehicle Volume, All Approaches for Each of the Heaviest 8 Hours of an Average Day, and	480	720	56 (1)	29
	B***. Vehicle Volume, Along Minor Streets for Each of the Same 8 Hours	120	170	29 (2)	
2. DELAY TO CROSS TRAFFIC	A*. Vehicle Volume, Major Street for Each of the Heaviest 8 Hours of an Average Day, and	480	720	46 (3)	46
	B*. Combined Vehicle and Pedestrian Volume Crossing the Major Street for Each of the Same 8 Hours.	50	75	73 (4)	
3. VOLUME/DELAY COMBINATIONS	The Above Justifications (1 and 2) Both Satisfied to the Extent of 80% or more	YES ☐	NO ☑		29
4. MIN. FOUR HOUR VEHICLE VOLUME	At Plotted Point Representing Hourly Volume for Minor Approach vs. Major Approach for Four Highest Hours of an Average Day Fall above the Applicable Curve	YES ☐	NO ☐		N/A
5. COLLISION EXPERIENCE	A. Total Reported Accidents of Types Susceptible to Correction by a Traffic Signal, per 12 Month Period Averaged over a 36 Month Period, and	5		N/A	N/A
	B. Adequate Trial of Less Restrictive Remedies. Where Satisfactory Observance and Enforcement Have Failed to Reduce the Number of Collisions	YES ☐	NO ☐		
6. PEDESTRIAN VOLUME AND DELAY	A. Plotted Point Representing 8 Hour Pedestrian Volume vs. 8 Hour Vehicular Volume Fall in Justified Zone, and	YES ☐	NO ☐		N/A
	B. Plotted Point Representing 8 Hour Volume of Pedestrian Experiencing Delays of 10 s or more vs. 8 Hour Pedestrian Volume Fall in Justified Zone	YES ☐	NO ☐		

Notes

* Vehicle Volume Warrants 1A and 2A for Roadways Having Two or More Moving Lanes in One Direction Should be 25% Higher than Values Given Above.

** The Lowest Sectional Percentage Governs the Entire Warrant.

*** For "T" Intersections, the Values for Warrant (1B) should be increased by 50%.

Justification 7 - Future Traffic Volumes

(1) = (535 + 1084) / 4 / 720 = 56%

(2) = (115 + 178) / 4 / (170 x 1.5) = 29%

(3) = (420 + 906) / 4 / 720 = 46%

(4) = (96 + 124) / 4 / 75 = 73%

Traffic Signal Warrants – Summary of Justifications (OTM Book 12)

Projected Background Traffic (Horizon Year 2040)

Colborne Street at Warren Street

JUSTIFICATION	DESCRIPTION	MINIMUM REQUIREMENTS FOR TWO-LANE ROADWAYS		COMPLIANCE	
		FREE FLOW	RESTRICTED FLOW		
		OPERATING SPEED GREATER THAN OR EQUAL TO 70 km/h	OPERATING SPEED LESS THAN 70 km/h	SECTIONAL %	ENTIRE %**
1. MINIMUM VEHICULAR VOLUME	A*. Vehicle Volume, All Approaches for Each of the Heaviest 8 Hours of an Average Day, and	480	720	71 (1)	26
	B***. Vehicle Volume, Along Minor Streets for Each of the Same 8 Hours	120	170	26 (2)	
2. DELAY TO CROSS TRAFFIC	A*. Vehicle Volume, Major Street for Each of the Heaviest 8 Hours of an Average Day, and	480	720	62 (3)	60
	B*. Combined Vehicle and Pedestrian Volume Crossing the Major Street for Each of the Same 8 Hours.	50	75	60 (4)	
3. VOLUME/DELAY COMBINATIONS	The Above Justifications (1 and 2) Both Satisfied to the Extent of 80% or more	YES ☐	NO ☑		26
4. MIN. FOUR HOUR VEHICLE VOLUME	At Plotted Point Representing Hourly Volume for Minor Approach vs. Major Approach for Four Highest Hours of an Average Day Fall above the Applicable Curve	YES ☐	NO ☐		N/A
5. COLLISION EXPERIENCE	A. Total Reported Accidents of Types Susceptible to Correction by a Traffic Signal, per 12 Month Period Averaged over a 36 Month Period, and	5		N/A	N/A
	B. Adequate Trial of Less Restrictive Remedies. Where Satisfactory Observance and Enforcement Have Failed to Reduce the Number of Collisions	YES ☐	NO ☐		
6. PEDESTRIAN VOLUME AND DELAY	A. Plotted Point Representing 8 Hour Pedestrian Volume vs. 8 Hour Vehicular Volume Fall in Justified Zone, and	YES ☐	NO ☐		N/A
	B. Plotted Point Representing 8 Hour Volume of Pedestrian Experiencing Delays of 10 s or more vs. 8 Hour Pedestrian Volume Fall in Justified Zone	YES ☐	NO ☐		

Notes

* Vehicle Volume Warrants 1A and 2A for Roadways Having Two or More Moving Lanes in One Direction Should be 25% Higher than Values Given Above.

** The Lowest Sectional Percentage Governs the Entire Warrant.

*** For "T" Intersections, the Values for Warrant (1B) should be increased by 50%.

Justification 7 - Future Traffic Volumes

(1) = (653 + 1386) / 4 / 720 = 71%

(2) = (88 + 179) / 4 / (170 x 1.5) = 26%

(3) = (565 + 1207) / 4 / 720 = 62%

(4) = (63 + 116) / 4 / 75 = 60%

Traffic Signal Warrants – Summary of Justifications (OTM Book 12)

Projected Total Traffic (Horizon Year 2040)

Colborne Street at Warren Street

JUSTIFICATION	DESCRIPTION	MINIMUM REQUIREMENTS FOR TWO-LANE ROADWAYS		COMPLIANCE	
		FREE FLOW	RESTRICTED FLOW		
		OPERATING SPEED GREATER THAN OR EQUAL TO 70 km/h	OPERATING SPEED LESS THAN 70 km/h	SECTIONAL %	ENTIRE %**
1. MINIMUM VEHICULAR VOLUME	A*. Vehicle Volume, All Approaches for Each of the Heaviest 8 Hours of an Average Day, and	480	720	71 (1)	32
	B***. Vehicle Volume, Along Minor Streets for Each of the Same 8 Hours	120	170	32 (2)	
2. DELAY TO CROSS TRAFFIC	A*. Vehicle Volume, Major Street for Each of the Heaviest 8 Hours of an Average Day, and	480	720	60 (3)	60
	B*. Combined Vehicle and Pedestrian Volume Crossing the Major Street for Each of the Same 8 Hours.	50	75	79 (4)	
3. VOLUME/DELAY COMBINATIONS	The Above Justifications (1 and 2) Both Satisfied to the Extent of 80% or more	YES ☐	NO ☑		32
4. MIN. FOUR HOUR VEHICLE VOLUME	At Plotted Point Representing Hourly Volume for Minor Approach vs. Major Approach for Four Highest Hours of an Average Day Fall above the Applicable Curve	YES ☐	NO ☐		N/A
5. COLLISION EXPERIENCE	A. Total Reported Accidents of Types Susceptible to Correction by a Traffic Signal, per 12 Month Period Averaged over a 36 Month Period, and	5		N/A	N/A
	B. Adequate Trial of Less Restrictive Remedies. Where Satisfactory Observance and Enforcement Have Failed to Reduce the Number of Collisions	YES ☐	NO ☐		
6. PEDESTRIAN VOLUME AND DELAY	A. Plotted Point Representing 8 Hour Pedestrian Volume vs. 8 Hour Vehicular Volume Fall in Justified Zone, and	YES ☐	NO ☐		N/A
	B. Plotted Point Representing 8 Hour Volume of Pedestrian Experiencing Delays of 10 s or more vs. 8 Hour Pedestrian Volume Fall in Justified Zone	YES ☐	NO ☐		

Notes

* Vehicle Volume Warrants 1A and 2A for Roadways Having Two or More Moving Lanes in One Direction Should be 25% Higher than Values Given Above.

** The Lowest Sectional Percentage Governs the Entire Warrant.

*** For "T" Intersections, the Values for Warrant (1B) should be increased by 50%.

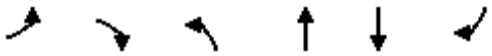
Justification 7 - Future Traffic Volumes

(1) = (603 + 1439) / 4 / 720 = 71%

(2) = (125 + 199) / 4 / (170 x 1.5) = 32%

(3) = (478 + 1240) / 4 / 720 = 60%

(4) = (100 + 136) / 4 / 75 = 79%

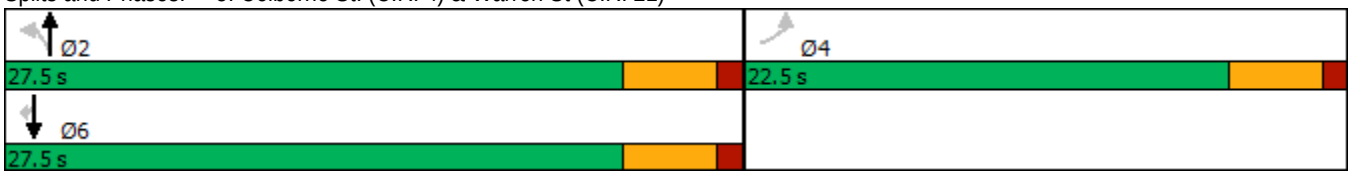


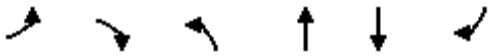
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	116	63	67	511	492	137
Future Volume (vph)	116	63	67	511	492	137
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0	30.0			57.0
Storage Lanes	1	0	1			1
Taper Length (m)	7.5		20.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.953					0.850
Flt Protected	0.969		0.950			
Satd. Flow (prot)	1714	0	1752	1881	1900	1583
Flt Permitted	0.969		0.422			
Satd. Flow (perm)	1714	0	778	1881	1900	1583
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	61					149
Link Speed (k/h)	50			50	50	
Link Distance (m)	423.2			109.1	115.7	
Travel Time (s)	30.5			7.9	8.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	3%	3%	1%	0%	2%
Adj. Flow (vph)	126	68	73	555	535	149
Shared Lane Traffic (%)						
Lane Group Flow (vph)	194	0	73	555	535	149
Turn Type	Perm		Perm	NA	NA	Perm
Protected Phases				2	6	
Permitted Phases	4		2			6
Detector Phase	4		2	2	6	6
Switch Phase						
Minimum Initial (s)	5.0		5.0	5.0	5.0	5.0
Minimum Split (s)	22.5		22.5	22.5	22.5	22.5
Total Split (s)	22.5		27.5	27.5	27.5	27.5
Total Split (%)	45.0%		55.0%	55.0%	55.0%	55.0%
Maximum Green (s)	18.0		23.0	23.0	23.0	23.0
Yellow Time (s)	3.5		3.5	3.5	3.5	3.5
All-Red Time (s)	1.0		1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5		4.5	4.5	4.5	4.5
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Recall Mode	None		Max	Max	Max	Max
Walk Time (s)	7.0		7.0	7.0	7.0	7.0
Flash Dont Walk (s)	11.0		11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0		0	0	0	0
Act Effct Green (s)	8.8		28.6	28.6	28.6	28.6
Actuated g/C Ratio	0.20		0.66	0.66	0.66	0.66
v/c Ratio	0.49		0.14	0.45	0.43	0.14
Control Delay	14.6		6.0	7.2	7.0	1.7
Queue Delay	0.0		0.0	0.0	0.0	0.0

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Total Delay	14.6		6.0	7.2	7.0	1.7
LOS	B		A	A	A	A
Approach Delay	14.6			7.1	5.8	
Approach LOS	B			A	A	
Queue Length 50th (m)	8.7		2.1	20.3	19.2	0.0
Queue Length 95th (m)	21.0		8.1	49.8	46.9	5.7
Internal Link Dist (m)	399.2			85.1	91.7	
Turn Bay Length (m)			30.0			57.0
Base Capacity (vph)	746		512	1238	1250	1092
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.26		0.14	0.45	0.43	0.14

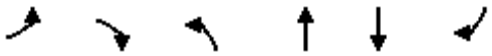
Intersection Summary			
Area Type:	Other		
Cycle Length: 50			
Actuated Cycle Length: 43.5			
Natural Cycle: 50			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.49			
Intersection Signal Delay: 7.5		Intersection LOS: A	
Intersection Capacity Utilization 51.6%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 5: Colborne St. (C.R. 4) & Warren St (C.R. 21)





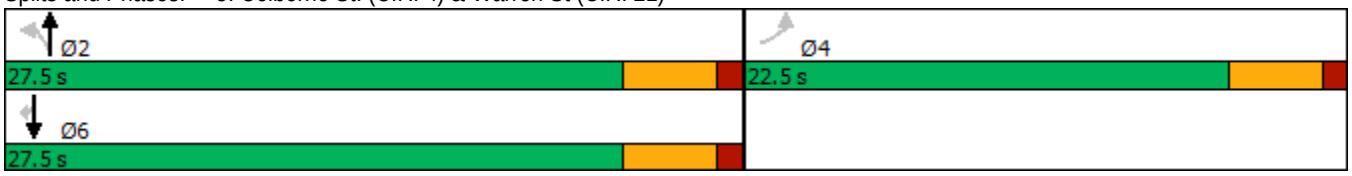
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	141	63	67	511	492	175
Future Volume (vph)	141	63	67	511	492	175
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0	30.0			57.0
Storage Lanes	1	0	1			1
Taper Length (m)	7.5		20.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.958					0.850
Flt Protected	0.967		0.950			
Satd. Flow (prot)	1720	0	1752	1881	1900	1583
Flt Permitted	0.967		0.415			
Satd. Flow (perm)	1720	0	766	1881	1900	1583
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	50					190
Link Speed (k/h)	50			50	50	
Link Distance (m)	423.2			109.1	115.7	
Travel Time (s)	30.5			7.9	8.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	3%	3%	1%	0%	2%
Adj. Flow (vph)	153	68	73	555	535	190
Shared Lane Traffic (%)						
Lane Group Flow (vph)	221	0	73	555	535	190
Turn Type	Perm		Perm	NA	NA	Perm
Protected Phases				2	6	
Permitted Phases	4		2			6
Detector Phase	4		2	2	6	6
Switch Phase						
Minimum Initial (s)	5.0		5.0	5.0	5.0	5.0
Minimum Split (s)	22.5		22.5	22.5	22.5	22.5
Total Split (s)	22.5		27.5	27.5	27.5	27.5
Total Split (%)	45.0%		55.0%	55.0%	55.0%	55.0%
Maximum Green (s)	18.0		23.0	23.0	23.0	23.0
Yellow Time (s)	3.5		3.5	3.5	3.5	3.5
All-Red Time (s)	1.0		1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5		4.5	4.5	4.5	4.5
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Recall Mode	None		Max	Max	Max	Max
Walk Time (s)	7.0		7.0	7.0	7.0	7.0
Flash Dont Walk (s)	11.0		11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0		0	0	0	0
Act Effct Green (s)	9.6		27.9	27.9	27.9	27.9
Actuated g/C Ratio	0.22		0.64	0.64	0.64	0.64
v/c Ratio	0.53		0.15	0.46	0.44	0.18
Control Delay	15.6		6.6	7.9	7.7	1.8
Queue Delay	0.0		0.0	0.0	0.0	0.0



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Total Delay	15.6		6.6	7.9	7.7	1.8
LOS	B		A	A	A	A
Approach Delay	15.6			7.8	6.1	
Approach LOS	B			A	A	
Queue Length 50th (m)	11.0		2.2	21.8	20.6	0.0
Queue Length 95th (m)	24.9		8.7	53.6	50.7	6.8
Internal Link Dist (m)	399.2			85.1	91.7	
Turn Bay Length (m)			30.0			57.0
Base Capacity (vph)	741		490	1205	1217	1082
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.30		0.15	0.46	0.44	0.18

Intersection Summary			
Area Type:	Other		
Cycle Length: 50			
Actuated Cycle Length: 43.5			
Natural Cycle: 50			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.53			
Intersection Signal Delay: 8.1		Intersection LOS: A	
Intersection Capacity Utilization 53.0%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 5: Colborne St. (C.R. 4) & Warren St (C.R. 21)



Appendix G

SIGHT LINE CALCULATIONS

Site Access at Carlow Road (C.R. 20)

24-1581: Kettle Creek Residential, Port Stanley, ON – Sight Line Analysis

Design Intersection Sight Distance (TAC Geometric Design Guide for Canadian Roads)

Design Speed: 60km/h (Posted Speed Limit = 50km/h)

Table 9.9.3: Time Gap for Case B1, Left Turn from Stop

Design Vehicle	Time Gap (t_g)(s) at Design Speed of Major Road
Passenger car	7.5
Single-unit truck	9.5
Combination truck (WB 19 and WB 20)	11.5
Longer truck	To be established by road authority

Intersection Stopping Distance **(ISD)** = 0.278 V_{major} t_g

Where:

ISD = intersection sight distance (m)
(length of the leg of sight triangle along the major road)
V_{major} = design speed of the major road (km/h)
t_g = time gap for minor road vehicle to enter the major road (s)

ISD $_{passenger\ car}$ (left turn from stop) = 0.278 x 60 x 7.5 = **125 m**

Table 9.9.5: Time Gap for Case B2—Right Turn from Stop and Case B3—Crossing Maneuver

Design Vehicle	Time Gap (t_g)(s) at Design Speed of Major Road
Passenger car	6.5
Single-unit truck	8.5
Combination truck (WB 19 and WB 20)	10.5

ISD $_{passenger\ car}$ (right turn from stop) = 0.278 x 60 x 6.5 = **108 m**