TRANSPORTATION STUDY

April 2024

Proposed Residential Sub-Division Development
Port Colborne, Ontario

Prepared For

Mapleview (Port Colborne) Homes
1 Valleybrook Drive, Suite 303
Toronto, ON M3B 2S7

c/o Max Fedchyshak
NPG Planning Solutions

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April 3, 2024

Mapleview (Port Colborne) Homes
1 Valleybrook Drive, Suite 303
Toronto, ON M3B 2S7

c/o Max Fedchyshak
NPG Planning Solutions

Re: Rosemount Gardens, Proposed Residential Sub-Division Development, Port Colborne, ON, Transportation Study

Dear Mr. Fedchyshak,

TRANS-PLAN is pleased to submit this Transportation Study, in support of the proposed residential sub-division development, located at Pt Lt 31 & 32, Con 1, Humberstone, Killaly Street West, east of Quarry Ponds, in the City of Port Colborne, Niagara Region. The proposed development consists of mid-rise residential and mixed-use buildings, single-family units, and townhouse units.

Our traffic impact study includes traffic counts in the study area, trip generation estimates for the site and an intersection capacity analysis for existing and future traffic conditions. Our findings indicate that, the southbound left movement at the intersection of Killaly Street West at West Side Road are expected to operate with high delays and a LOS of F under future horizon years. A signal warrant analysis and left turn analysis were conducted at critical intersections to determine potential intersection improvements that could help alleviate traffic on the minor roadways.

Our parking review includes the review of the City of Port Colborne Zoning Bylaw in comparison to the proposed parking supply. Our site plan review includes a review of the circulation of loading delivery/waste collection vehicles and emergency vehicles to demonstrate that the vehicles are able to circulate the site to their respective designated areas in a safe and efficient manner.

Sincerely,

Anil Seegobin, P.Eng.
Partner, Engineer
Trans-Plan Transportation Inc.
Transportation Consultants

Vivian Leung
Traffic Analyst

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1. INTRODUCTION

Trans-Plan has been retained by Mapleview (Port Colborne) Homes to complete a Transportation Study in support of a proposed residential sub-division development, located at Pt Lt 31 & 32, Con 1, Humberstone, Killaly Street West, east of Quarry Ponds, in the City of Port Colborne, Niagara Region. This study includes the following studies and tasks:

Traffic Impact Study

- Review and assessment of the existing road network
- Assessment of boundary roadway operations under future background conditions, including a review of traffic growth, area developments and proposed transportation improvements in the study area
- Assessment of the impact of site-generated traffic on the study area intersections under future background and total traffic conditions
- Discussion of roadway and intersection improvements, as required, to accommodate the proposed development
- A review of the traffic signal warrant analysis at the intersection of Killaly Street West at West Side Road and Steele Street at Elgin Street West, as per Ontario Traffic Manual (OTM) guidelines, Book 12, Traffic Signals
- A review of left turn lane warrants at the intersection of Killaly Street West at West Side Road and Killaly Street West at Third Avenue, as per MTO turn lane warrant analysis

Site Plan Review

- Vehicle turning template review for the circulation of loading/ waste collection and emergency vehicles so that vehicles can access/egress the designated loading area and circulate the site

2. CORRESPONDENCE

Prior to commencing this study, Transportation and Planning staff at the City of Port Colborne, Niagara Region and Ministry of Transportation Ontario (MTO) Staff were contacted and provided with our study terms of reference for their approval and / or comments. Comments were received from City of Port Colborne Engineering Division and Niagara Region and was incorporated in the study (see Appendix A). MTO did not provide comments at the time of the completion of this report.

3. SITE LOCATION

The site location is shown in Figure 1 is located at Pt Lt 31 & 32, Con 1, Humberstone, Killaly Street West, east of Quarry Ponds, in the City of Port Colborne, Niagara Region. The subject site is currently occupied by some vegetation and trees. Directly north and south of the site are mainly residential uses consisting of single-family dwelling units. Directly west of the site is the Quarry Ponds. Directly east of the site are commercial uses that consist of an automotive service shop, Domino's Pizza, a medical pharmacy and townhouse dwellings.

4. PROPOSED DEVELOPMENT

The proposed site plan, provided by ICON Architects., is shown in Figure 2. The proposed development consists of mid-rise residential and mixed-use buildings, single-family units, and townhouse units. The four

8-storey mid-rise residential buildings and four 8-storey mixed-use, mid-rise residential buildings consist of a total of 1,231 units and a total commercial GFA of 3,196.8 sq.m. A total of 96 single family houses and 783 townhouses (stacked, regular, back to back, rear lane) are also proposed. Vehicle access is proposed via two full movement accesses from Killaly Street West and one access which connects to Elgin Street West.

5. EXISTING CONDITIONS

5.1 Road Network

The roadways located in the study area are described as follows:

Killaly Street West is a regional road that runs an east-west direction under the jurisdiction of the Region of Niagara. Killaly Street West consists of two travel lanes; one in each direction. The posted speed limit on Killaly Street West is 60km/h west of West Side Road and 50km/h east of West Side Road, within the vicinity of the site.

Main Street West is a regional road that runs in an east-west direction under the jurisdiction of the Region of Niagara. Main Street West consists of two travel lanes; one in each direction. The posted speed limit on Main Street West is 60km/h with the vicinity of the site.

Third Avenue is a local road under the jurisdiction of the City of Port Colborne that runs in a north-south direction. Third Avenue consists of two travel lanes; one in each direction. The speed limit is assumed at 50 km/h, within the vicinity of the site.

West Side Road is an arterial road under the jurisdiction of the City of Port Colborne that runs in a north-south direction. West Side Road consists of two travel lanes; one in each direction. The speed limit is assumed at 50 km/h, within the vicinity of the site.

Elgin Street West is a local road that runs in an east-west direction under the jurisdiction of the City of Port Colborne. Elgin Street West consists of two travel lanes; one in each direction. The speed limit is assumed at 50 km/h, within the vicinity of the site.

Steele Street is an arterial road that runs in a north-south direction under the jurisdiction of the City of Port Colborne. Steele Street consists of two travel lanes; one in each direction. The posted speed limit on Steele Street is 50km/h with the vicinity of the site.

Main Street West, Third Avenue, West Side Road at Killaly Street West and Elgin Street West at Steele Street is controlled by a stop sign at its intersection. The intersection of Killaly Street West at Steele Street is controlled by a traffic signal at its intersection. The existing study area roadway characteristics is shown in Figure 3.

5.2 Traffic Counts

Since existing traffic volumes for the study area intersections are not available, Trans-Plan conducted counts at the study area roadways to determine the existing conditions. The TMCs were conducted on Wednesday December 14, 2022 and Tuesday January 10, 2023. The count hours and peak hours obtained for each intersection is summarized in Table 1. The existing traffic volumes for the weekday AM and PM peak hours is shown in Figure 4. Detailed TMC data are provided in Appendix B.

Table 1 – Intersection Turning Movement Count Details

Intersection	Count Date	Count Hours	Peak Hours
Killaly Street West & Steele Street	Tuesday January 10, 2023	7:00am - 9:30am 4:00pm - 6:30pm	8:00am – 9:00am 4:00pm - 5:00pm
Killaly Street West & West Side Road	Wednesday December 14, 2022	7:00am - 9:30am 4:00pm - 6:30pm	7:45am - 8:45am 4:00pm - 5:00pm
Killaly Street West & Third Avenue	Wednesday December 14, 2022	7:00am - 9:30am 4:00pm - 6:30pm	8:30am – 9:30am 4:30pm - 5:30pm
Killaly Street West & Main Street West	Wednesday December 14, 2022	7:00am - 9:30am 4:00pm - 6:30pm	8:30am – 9:30am 4:00pm - 5:00pm
Steele Street & Elgin Street West	Wednesday December 14, 2022	7:00am - 9:30am 4:00pm - 6:30pm	8:30am – 9:30am 4:00pm - 5:00pm

5.3 Transit Service

The site is served by Niagara Region Transit, which connects transit riders to between the Welland Bus Terminal and Port Colborne City Hall.

25 line is a Port Link to Port Colborne bus route. It operates between the Welland Bus Terminal to Port Colborne City Hall, with flag to stop areas within Port Colborne south of Barrick Road, during Mondays to Saturdays from 6:30 AM to 10 PM with frequencies of 60 minutes.

A study area route map is provided in Figure 5.

6. FUTURE BACKGROUND CONDITIONS

Future background traffic volumes were determined based on a review of planned developments, road improvements and future traffic volume growth in the study area. Planned roadway and transit improvements are also reviewed in this section.

6.1 Horizon Years

For our traffic study, the following horizon years were analyzed:

- Existing conditions
- 2-year buildout + 5-year horizon period after full build-out of development, year 2031;
- 10-year horizon period, year 2036

6.2 Background Traffic Growth

Typically, traffic growth in the study area is analyzed through a linear regression analysis of aggregate Annual Average Daily Traffic (AADT) mid-block volumes. However, there was no available AADT data. As a result, based on our correspondence with the City of Port Colborne staff, a conservative 2 percent per annum growth rate for the planning horizon year was applied to the study area roadways.

6.3 Planned Background Developments

Based on our review of the City of Port Colborne Development Website, there are no notable background developments within the vicinity of the subject site.

6.4 Planned Roadway and Transit Improvements

Based on our correspondence with the City of Port Colborne staff and review of the Niagara Region Construction Projects and Studies website, there are no roadway or transit improvements within the vicinity of the subject site.

The future background traffic volumes for the 2031 and 2036 horizon years for the weekday AM and PM peak hours are shown in Figure 6 and Figure 7, respectively.

7. SITE TRAFFIC

7.1 Trip Generation

Site trips for the proposed townhouse units were generated using the Institute of Transportation Engineers (ITE) Trip Generation manuals, 11th Edition. The following ITE Land Use Code (LUC) was utilized to determine suitable trip rates: LUC 221 for Multifamily Housing (Mid-Rise), LUC 210 for Single-Family Detached Housing, LUC 220 for Multifamily Housing (Low-Rise) and LUC 822 for Strip Retail Plaza. The site trip generation for the subject site is shown in Table 2**.**

Table 2 – Site Trip Generation

Land Use	Size		AM Peak Hour			PM Peak Hour		
			In	Out	Total	In	Out	Total
Multifamily Housing (Mid-Rise) ITE Code 221	1231 units	Dist.	23%	77%	100%	61%	39%	100%
		Equation	T = 0.44(X) - 11.61			T = 0.39(X) + 0.34		
		Rate	0.1	0.33	0.43	0.24	0.15	0.39
		Trips	**122**	**408**	**530**	**293**	**187**	**480**
Single- Family Detached Housing ITE Code 210	96 units	Dist.	25%	75%	100%	63%	37%	100%
		Equation	Ln(T)= 0.91Ln(X) + 0.12			Ln(T)= 0.94Ln(X) + 0.27		
		Rate	0.19	0.56	0.75	0.63	0.37	1
		Trips	**18**	**54**	**72**	**60**	**36**	**96**
Multifamily Housing (Low-Rise) ITE Code 220	783 units	Dist.	24%	76%	100%	63%	37%	100%
		Equation	T = 0.31(X) + 22.85			T = 0.43(X) + 20.55		
		Rate	0.08	0.26	0.34	0.29	0.17	0.46
		Trips	**64**	**202**	**266**	**225**	**132**	**357**
Strip Retail Plaza ITE Code 822	34.41 per 1000 Sq.ft.	Dist.	60%	40%	100%	50%	50%	100%
		Equation	Ln(T)= 0.66Ln(X) + 1.84			Ln(T)= 0.71Ln(X) + 2.72		
		Rate	1.13	0.75	1.88	2.69	2.69	5.38
		Trips	**39**	**26**	**65**	**93**	**94**	**187**
Total Trips			**243**	**690**	**933**	**671**	**449**	**1120**

The subject site is expected to generate approximately 933 and 1120 two-way trips in the weekday AM and PM peak hours, respectively.

7.2 Trip Distribution and Assignment

Site trips for the proposed development were distributed to / from the site and the boundary roadways using the existing traffic patterns of the study area obtained from traffic counts. The site traffic assignment for the weekday AM and PM peak hours are shown in Figure 8.

8. FUTURE TOTAL TRAFFIC CONDITIONS

Site traffic volumes were added to the future background traffic volumes to obtain future total traffic volumes for the peak hours. The future total traffic volumes for horizon years 2031 and 2036 for the weekday AM and PM peak hours, are shown in Figure 9 and Figure 10, respectively.

9. CAPACITY ANALYSIS

9.1 Traffic Analysis Assumptions

For the intersection of Killaly Street West at Main Street, due to the irregular design of the intersection, the Synchro was modelled with Main Street as a road that runs in an east-west direction with Killaly Street West modelled as a road that runs in the north direction. Main Street is modelled with a westbound through/right movement and with a eastbound through/left movement. Killaly Street West is modelled with a northbound left and a northbound right movement.

9.2 Auto Trip Capacity

A capacity analysis was performed for the study area intersections using Synchro analysis software. The capacity analysis results for existing conditions and for the horizon year 2031 and 2036 is shown in Table 3 and Table 4, respectively.

Capacity analysis sheets, and Level of Service (LOS) definitions are provided in Appendix C and Appendix D, respectively.

Capacity Analysis Thresholds:

No capacity thresholds were identified for the City of Port Colborne. According to the Niagara Region Guidelines for Transportation Impact Studies, volume-to-capacity (v/c) ratio of 0.85 or less is acceptable for through-right or right-turn movements at signalized intersections. Dedicated left-turn movements with a v/c of 0.90 are considered to be acceptable. At unsignalized intersections, a LOS of C or better is considered to be acceptable.

The results of the capacity analysis are discussed in this section for each intersection.

<u>Existing Traffic Operations</u>

- Under existing conditions, the signalized intersection at Killaly Street West and Steele Street operates at a good LOS of B with minimal delays. All unsignalized intersections within the study area operates at an acceptable LOS of C or better with minimal delays.

<u>Horizon Year 2031 Traffic Operations</u>

- The intersection of Killaly Street West and Steele Street is expected to operate similarly to existing conditions with a good LOS of B and minimal delays.

- The eastbound left and westbound left movement at the intersection of Steele Street & Elgin Street in the weekday PM peak hour, are expected to operate at a LOS of E with delays up to 1 minute.
- The northbound through/ left/ right movement at the intersection of Killaly Steet West & West Side Road are expected to operate at an LOS of D in the weekday AM peak hour and at a LOS of F in the weekday PM peak hour with delays of up to approximately 1 minute. The southbound through/ left/ right is expected to operate at an LOS of F with critical delays.
- The northbound left movement at the intersection of Killaly Street West & Main Street is expected to operate at a LOS of D in the weekday PM peak hour.
- All remaining intersections and accesses are expected operate at an acceptable level of service or better with minor delays.

Horizon Year 2036 Traffic Operations

- Similar to the horizon year 2031, the overall intersection of Killaly Street West and Steele Street is expected to operate similarly with an overall LOS of B and minimal delays.
- The eastbound left and westbound left movement at the intersection of Steele Street & Elgin Street in the weekday PM peak hour, are expected to operate at a LOS of F with delays up to 65 seconds.
- The northbound through/ left/ right movement and southbound through/ left/ right movement at the intersection of Killaly Steet West & West Side Road are expected to operate similar to the 2031 horizon year conditions with critical delays.
- The northbound left movement at the intersection of Killaly Street West & Main Street is expected to operate similar to the 2031 horizon year conditions.
- All remaining intersections and movements are expected operate at an acceptable level of service or better with minor delays.

Summary

There are potential areas of improvement for the study area roadways that could help improve the operability of the intersections. The intersection of Killaly Street West at West Side Road and Steele Street at Elgin Street West are the intersections that experience some delays in the future horizon years. Therefore, additional signal warrant and left turn warrant analysis were conducted to determine the improvements that could help alleviate the traffic. Further detailed discussion is provided below. The remaining minor roadway connections are experience delays when turning onto major roadways.

Table 3 - 2031 Capacity Analysis Results, Weekday AM and PM Peak Hours

Intersection	Existing Traffic Conditions						2031 Background Traffic Conditions						2031 Total Traffic Conditions					
Movement	AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS
Steele Street & Elgin Street West																		
Eastbound Left		15	B		21	C		16	C		26	D		20	C		46	E
Eastbound Right		10	B		11	B		11	B		12	B		12	B		13	B
Westbound Left		14	B		20	C		16	C		24	C		23	C		42	E
Westbound Through / Right		10	A		12	B		10	B		12	B		11	B		13	B
Northbound Through / Left		1	A		1	A		1	A		1	A		2	A		3	A
Southbound Through / Right		0	A		0	A		0	A		0	A		0	A		0	A
Steele Street & Killaly Street West	**0.29**	**13**	**B**	**0.37**	**15**	**B**	**0.34**	**13**	**B**	**0.43**	**15**	**B**	**0.50**	**17**	**B**	**0.59**	**18**	**B**
Eastbound Left	0.02	18	B	0.04	18	B	0.02	18	B	0.04	18	B	0.01	16	B	0.05	16	B
Eastbound Through	0.45	21	C	0.45	20	C	0.50	21	C	0.50	21	C	0.75	26	C	0.61	21	C
Eastbound Right	0.12	19	B	0.17	19	B	0.14	18	B	0.19	19	B	0.15	16	B	0.19	16	B
Westbound Left	0.15	19	B	0.15	19	B	0.17	19	B	0.17	19	B	0.19	17	B	0.15	16	B
Westbound Through / Right	0.22	19	B	0.49	21	C	0.25	19	B	0.55	21	C	0.32	17	B	0.77	27	C
Northbound Left	0.24	8	A	0.32	9	A	0.28	8	A	0.38	10	A	0.33	13	B	0.47	15	B
Northbound Through / Right	0.20	7	A	0.13	7	A	0.23	7	A	0.15	7	A	0.31	12	B	0.20	11	B
Southbound Left	0.06	6	A	0.03	6	A	0.08	7	A	0.03	6	A	0.09	10	A	0.04	10	A
Southbound Through / Right	0.12	6	A	0.10	7	A	0.14	7	A	0.12	7	A	0.19	11	B	0.23	11	B
Killaly Street West & West Side Road/ Proposed Site Access																		
Eastbound Through / Left		0	A		0	A												
Eastbound Through / Left / Right								0	A		1	A		0	A		0	A
Westbound Through / Left / Right								0	A		0	A		1	A		2	A
Westbound Through / Right		0	A		0	A												
Northbound Through / Left / Right								0	A		0	A		34	D		89	F
Southbound Left / Right		12	B		16	C												
Southbound Through / Left / Right								15	B		27	D		5 mins	F		>14mins	F
Killaly Street West & 3rd Avenue/ Proposed Site Access																		
Eastbound Through / Left		0	A		0	A												
Eastbound Through / Left / Right								0	A		0	A		0	A		0	A
Westbound Through / Right		0	A		0	A												
Westbound Through / Left / Right								0	A		0	A		2	A		4	A
Northbound Through / Left / Right								0	A		0	A		15	B		19	C
Southbound Left / Right		10	A		10	A												
Southbound Through / Left / Right								10	A		10	A		14	B		18	C
Killaly Street West & Main Street																		
Eastbound Through / Right		0	A		0	A		0	A		0	A		0	A		0	A
Westbound Through / Left		0	A		0	A		0	A		0	A		1	A		1	A
Northbound Left		12	B		15	B		13	B		17	C		20	C		31	D
Northbound Right		10	A		10	A		10	B		10	B		11	B		11	B
Elgin Street West & Proposed Site Access																		
Eastbound Through / Left														8	A		7	A
Westbound Through / Right														7	A		8	A
Southbound Left / Right														8	A		8	A

Table 4 - 2036 Capacity Analysis Results, Weekday AM and PM Peak Hours

Intersection	2036 Background Traffic Conditions						2036 Total Traffic Conditions					
Movement	AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS
Steele Street & Elgin Street West												
Eastbound Left		18	C		32	D		23	C		65	F
Eastbound Right		11	B		12	B		12	B		14	B
Westbound Left		17	C		28	D		26	D		53	F
Westbound Through / Right		11	B		13	B		11	B		14	B
Northbound Through / Left		2	A		1	A		2	A		3	A
Southbound Through / Right		0	A		0	A		0	A		0	A
Steele Street & Killaly Street West	**0.38**	**13**	**B**	**0.47**	**15**	**B**	**0.53**	**17**	**B**	**0.63**	**19**	**B**
Eastbound Left	0.02	18	B	0.05	18	B	0.01	15	B	0.06	15	B
Eastbound Through	0.53	21	C	0.53	21	C	0.76	26	C	0.62	21	C
Eastbound Right	0.15	18	B	0.21	18	B	0.18	16	B	0.21	16	B
Westbound Left	0.19	19	B	0.19	18	B	0.22	17	B	0.17	16	B
Westbound Through / Right	0.26	19	B	0.58	22	C	0.33	17	B	0.78	27	C
Northbound Left	0.32	9	A	0.43	11	B	0.38	14	B	0.53	17	B
Northbound Through / Right	0.26	8	A	0.17	8	A	0.34	13	B	0.23	12	B
Southbound Left	0.08	7	A	0.04	7	A	0.10	11	B	0.04	10	B
Southbound Through / Right	0.15	7	A	0.13	7	A	0.21	11	B	0.24	12	B
Killaly Street West & West Side Road/ Proposed Site Access												
Eastbound Through / Left / Right		0	A		0	A		0	A		0	A
Westbound Through / Left / Right		0	A		0	A		1	A		2	A
Northbound Through / Left / Right		0	A		0	A		39	E		120	F
Southbound Through / Left / Right		16	C		41	E		7 mins	F		>14mins	F
Killaly Street West & 3rd Avenue/ Proposed Site Access												
Eastbound Through / Left / Right		0	A		0	A		0	A		0	A
Westbound Through / Left / Right		0	A		0	A		2	A		3	A
Northbound Through / Left / Right		0	A		0	A		15	B		20	C
Southbound Through / Left / Right		10	B		10	B		15	B		19	C
Killaly Street West & Main Street												
Eastbound Through / Right		0	A		0	A		0	A		0	A
Westbound Through / Left		0	A		0	A		1	A		1	A
Northbound Left		14	B		19	C		23	C		41	E
Northbound Right		10	B		11	B		11	B		11	B
Elgin Street West & Proposed Site Access												
Eastbound Through / Left								8	A		7	A
Westbound Through / Right								7	A		8	A
Southbound Left / Right								8	A		8	A

10. SIGNAL WARRANT ANALYSIS

A signal warrant analysis, based on OTM Guidelines, Book 12, Traffic Signals, was completed for the intersection of Killaly Street West and West Side Road and at Steele Street at Elgin Street West, due to the expected increase in delays observed in Section 9.2.

As eight-hour volume projection is not available, the Average Hourly Volumes (AHV) method was utilized for this warrant. The AHV equals the AM and PM peak hour volume divided by four, and the future 2031 and 2036 total volumes were utilized. Killaly Street West operates at a 60km/h and Steele Street operates at a 50km/h and the minimum requirement of restricted flow. The combined weekday AM and PM peak hour were utilized for the traffic signal warrant shown in Table 5 for Killaly Street West & West Side Road. The combined weekday AM and PM peak hour were utilized for the traffic signal warrant shown in Table 6 for Steele Street & Elgin Street West.

Table 5 – Signal Warrant Justification, Killaly Street West & West Side Road

Justification	Description	Minimum Requirement (1 Lane)	Average Hourly Volume		Compliance (120% required)	
			Weekday 2031 Total	Weekday 2036 Total	Weekday 2031 Total	Weekday 2036 Total
1. Minimum vehicular volume	A. Vehicle volume, all approaches	720	682	722	95%	100%
	B. Vehicle volume, minor streets	170	321	336	189%	198%
2. Delay to Cross Traffic	A. Vehicle volume, major street	720	362	386	50%	54%
	B. Vehicle volume, crossing artery from minor street	75	175	190	230%	253%

Based on the OTM signal warrant guidelines, traffic signal control is warranted at the intersection of Killaly Street West and West Side Road under future 2031 and 2036 traffic conditions. Therefore, it is recommended a signal be implemented at the intersection of Killaly Street West and West Side Road to help alleviate the delays at the intersection.

Table 6 – Signal Warrant Justification, Steele Street & Elgin Street West

Justification	Description	Minimum Requirement (1 Lane)	Average Hourly Volume		Compliance (120% required)	
			Weekday 2031 Total	Weekday 2036 Total	Weekday 2031 Total	Weekday 2036 Total
1. Minimum vehicular volume	A. Vehicle volume, all approaches	720	515	558	72%	78%
	B. Vehicle volume, minor streets	170	119	125	70%	74%
2. Delay to Cross Traffic	A. Vehicle volume, major street	720	397	433	55%	60%
	B. Vehicle volume, crossing artery from minor street	75	39	41	52%	55%

Under future 2031 and 2036 traffic conditions, a traffic signal control is not warranted at the intersection of Steele Street and Elgin Street West. Therefore, it is recommended the intersection remain unsignalized within the study horizon year, but the Town should consider monitoring the intersection for potential increased delays.

11. LEFT TURN WARRANTS

A left turn warrant was completed for the future 2031 and 2036 horizon year and was reviewed for the intersections of Killaly Street West and West Side Road and at Killaly Street West and Third Avenue. These intersections are new access connections to Killaly Street West proposed for the subject site. The MTO Geometric Design Standard warrants were analyzed based on the design speed according to the posted speed limits for study area roadways. The posted speed limit on Killaly Street West is 60km/h within the vicinity of the site.

The traffic volumes used for the analysis were the weekday AM and weekday PM peak hours under future 2031 and 2036 total traffic conditions. The analysis for the 2031 and 2036 horizon year period of the intersection of Killaly Street West and West Side Road is provided in Appendix E and shown below in Table 7 to Table 10. The analysis for the 2031 and 2036 horizon year period of the intersection of Killaly Street West and Third Avenue is provided in Appendix E and shown below in Table 10 to Table 14.

Table 7 – Year 2031, Left Turn Warrant Justification, Killaly Street West and West Side Road, East Leg

Criteria	AM Peak Hour Traffic Volumes	PM Peak Hour Traffic Volumes
Westbound Left Turn (WBLT) Traffic Volumes	37	100
Advancing Traffic Volumes (Westbound)	330	611
% Left Turns in Advancing Traffic Volumes (WB)	11%	16%
Opposing Traffic Volumes (Eastbound)	247	258
Warrant at 70km/h design speed justified?	No	Yes

Source: MTO Geometric Design Appendix E, Figure EA-10

Table 8 – Year 2031, Left Turn Warrant Justification, Killaly Street West and West Side Road, West Leg

Criteria	AM Peak Hour Traffic Volumes	PM Peak Hour Traffic Volumes
Eastbound Left Turn (EBLT) Traffic Volumes	1	6
Advancing Traffic Volumes (Eastbound)	247	258
% Left Turns in Advancing Traffic Volumes (EB)	0.4%	2%
Opposing Traffic Volumes (Westbound)	330	611
Warrant at 70km/h design speed justified?	No	No

Source: MTO Geometric Design Appendix E, Figure EA-10

Table 9 – Year 2036, Left Turn Warrant Justification, Killaly Street West and West Side Road, East Leg

Criteria	AM Peak Hour Traffic Volumes	PM Peak Hour Traffic Volumes
Westbound Left Turn (WBLT) Traffic Volumes	37	100
Advancing Traffic Volumes (Westbound)	358	654
% Left Turns in Advancing Traffic Volumes (WB)	10%	15%
Opposing Traffic Volumes (Eastbound)	260	271
Warrant at 70km/h design speed justified?	No	Yes

Source: MTO Geometric Design Appendix E, Figure EA-10

Table 10 – Year 2036, Left Turn Warrant Justification, Killaly Street West and West Side Road, West Leg

Criteria	AM Peak Hour Traffic Volumes	PM Peak Hour Traffic Volumes
Eastbound Left Turn (EBLT) Traffic Volumes	1	6
Advancing Traffic Volumes (Eastbound)	260	271
% Left Turns in Advancing Traffic Volumes (EB)	0.4%	2%
Opposing Traffic Volumes (Westbound)	358	654
Warrant at 70km/h design speed justified?	No	No

Source: MTO Geometric Design Appendix E, Figure EA-10

Table 11 – Year 2031, Left Turn Warrant Justification, Killaly Street West and Third Avenue, East Leg

Criteria	AM Peak Hour Traffic Volumes	PM Peak Hour Traffic Volumes
Westbound Left Turn (WBLT) Traffic Volumes	36	100
Advancing Traffic Volumes (Westbound)	188	268
% Left Turns in Advancing Traffic Volumes (WB)	19%	37%
Opposing Traffic Volumes (Eastbound)	175	281
Warrant at 70km/h design speed justified?	No	No

Source: MTO Geometric Design Appendix E, Figure EA-10

Table 12 – Year 2031, Left Turn Warrant Justification, Killaly Street West and Third Avenue, West Leg

Criteria	AM Peak Hour Traffic Volumes	PM Peak Hour Traffic Volumes
Eastbound Left Turn (EBLT) Traffic Volumes	1	2
Advancing Traffic Volumes (Eastbound)	175	281
% Left Turns in Advancing Traffic Volumes (EB)	0.4%	3%
Opposing Traffic Volumes (Westbound)	188	268
Warrant at 70km/h design speed justified?	No	No

Source: MTO Geometric Design Appendix E, Figure EA-10

Table 13 – Year 2036, Left Turn Warrant Justification, Killaly Street West and Third Avenue, East Leg

Criteria	AM Peak Hour Traffic Volumes	PM Peak Hour Traffic Volumes
Westbound Left Turn (WBLT) Traffic Volumes	36	100
Advancing Traffic Volumes (Westbound)	197	281
% Left Turns in Advancing Traffic Volumes (WB)	18%	36%
Opposing Traffic Volumes (Eastbound)	186	294
Warrant at 70km/h design speed justified?	No	No

Source: MTO Geometric Design Appendix E, Figure EA-10

Table 14 – Year 2036, Left Turn Warrant Justification, Killaly Street West and Third Avenue, West Leg

Criteria	AM Peak Hour Traffic Volumes	PM Peak Hour Traffic Volumes
Eastbound Left Turn (EBLT) Traffic Volumes	1	3
Advancing Traffic Volumes (Eastbound)	186	294
% Left Turns in Advancing Traffic Volumes (EB)	0.5%	1%
Opposing Traffic Volumes (Westbound)	197	281
Warrant at 70km/h design speed justified?	No	No

Source: MTO Geometric Design Appendix E, Figure EA-10

The overall results indicate that a westbound left turn lane at the intersection of Killaly Street West at West Side Road is warranted for the horizon year 2031 and 2036. Although an eastbound left turn lane is not warranted, it is recommended to match the westbound left turn lane roadway geometry. Left turn lanes are not warranted for the intersection of Killaly Street West at Third Avenue.

12. PARKING REVIEW

The City of Port Colborne Zoning By-law was reviewed to determine parking needs for the site. Source information is provided in Appendix F.

12.1 Parking Requirements

A summary of the parking requirements and proposed parking supply for the proposed land uses is provided in Table 15, based on the City of Port Colborne Zoning By-law.

Table 15 – Parking Requirements Review

Land Use	Size	Minimum Parking Requirement		Parking Supply (spaces)
		Rate	Required Spaces	
Apartment Building	1231 units	1.25 spaces per unit 1.32	1539	1547
Retail	3,196.8	1 space per 20 sq.m. GFA	160	
Dwelling, Detached	96 units	1 space per unit	96	96
Dwelling, Townhouse	783 units	1 space per unit	783	783
		Total Spaces	2578	2426

Based on the City of Port Colborne Zoning By-law, the parking requirement for the subject site is 2578 spaces. The proposed parking supply is 2426 spaces, which is deficient of the City's requirements by a minimal 6 percent. Generally, a 10 percent deficiency of the parking supply requirements is acceptable. It is in Trans-Plan's opinion that the proposed parking supply can accommodate the proposed development.

12.2 Shared Parking Analysis Review

To gain a further understanding of the shared parking between the uses, a review of the Institute of Transportation Engineers (ITE) Parking Generation manuals was conducted. Shared parking was applied to the apartment building and retail use as they are expected to peak at different times throughout the day. The time-of-day (hourly) distributions of parking demands were obtained from the ITE Parking Generation manuals, 5th Edition, using ITE Land Use Code (LUC) 221 for Multifamily Housing (Mid-Rise) and LUC 820 for Shopping Centre. Detailed information (for each hour interval) is provided in Appendix F.

Table 16 shows the future peak demands during the critical peak hourly periods, based on the required parking requirements.

Table 16 – Shared Parking Analysis, Residential and Retail Use

Time	Multifamily Housing (Mid-Rise) (LUC 221)		Shopping Centre (LUC 820)		Parking Demands (spaces)
	Pct.	Spaces	Pct.	Spaces	
12:00	50%	770	77%	123	893
13:00	49%	754	100%	160	914
14:00	49%	754	98%	157	911
15:00	50%	770	90%	144	914
16:00	58%	893	76%	122	1014
17:00	64%	985	82%	131	1116
18:00	67%	1031	89%	142	1174
19:00	70%	1077	90%	144	1221
20:00	**76%**	**1170**	**84%**	**134**	**1304**

Based on the shared parking adjusted rates, the peak peaking demand at the site for both the residential and retail uses would be 1304 spaces. Therefore, based on the site context and shared parking analysis, the parking supply between the residential and retail uses is expected to be acceptable.

13. SITE PLAN REVIEW

13.1 Site Circulation Review

A site circulation review was completed using AutoTurn vehicle turning template software to confirm that circulation of loading/waste collection vehicles and emergency vehicles can access/egress the designated areas and circulate the site.

- Figure 11 shows an emergency vehicle (Fire Truck) entering and circulating the site.
- Figure 12 shows a waste collection vehicle entering and circulating the site.
- Figure 13 shows a loading/ delivery vehicle entering and circulating the site.

14. SUMMARY AND RECOMMENDATIONS

14.1 Summary

Our Transportation Study summary and recommendations, for proposed residential sub-division development, located at Pt Lt 31 & 32, Con 1, Humberstone, Killaly Street West, east of Quarry Ponds, in the City of Port Colborne, Niagara Region, are provided as follows:

<u>Traffic Impact Study</u>

- The proposed development consists mid-rise residential and mixed-use buildings, single-family units, and townhouse units. The four 8-storey mid-rise residential buildings and four 8-storey mixed-use

mid-rise residential buildings consists of a total of 1231 units and a total commercial GFA of 3,196.8 sq.m.. A total of 96 single family houses and 783 townhouses are also proposed. Vehicle access is proposed via two full movement accesses from Killaly Street West and one access which connects to Elgin Street West. A total proposed parking supply of 1547 spaces is provided for the mid-rise residential and mixed-used buildings. The single family units and townhouse units will have a minimum of one space per unit.

- Site trips for the development was based on rates provided in the ITE Trip Generation manual. The subject site is expected to generate 933 and 1120 trips in the weekday AM and PM peak hours, respectively.
- Based on the capacity analysis, the southbound left movement at the intersection of Killaly Street West at West Side Road are expected to operate with high delays and a LOS of F under future horizon years.
- Signal warrant analysis and left turn lane warrants were conducted to determine potential roadway improvements that would help alleviate traffic at intersections expected to experience increased delays. It is determined that a signal is warranted for the intersection of Killaly Street West & West Side Road.
- A westbound left turn lane at the intersection of Killaly Street West at West Side Road is warranted in the future. Although an eastbound left turn lane is not warranted, it is also recommended to match the westbound left turn lane roadway geometry.

Parking Review

- Based on the City of Port Colborne Zoning By-law, the parking requirement for the subject site is 2578 spaces. The proposed parking supply is 2426 spaces, which is deficient of the City's requirements by a minimal 6%.
- Generally, a 10 percent deficiency of the parking supply requirements is acceptable. It is in Trans-Plan's opinion that the proposed parking supply can accommodate the proposed development.

Site Plan Review

- A site circulation review confirms that the circulation loading/ delivery vehicles, waste collection vehicles and emergency vehicles can access/egress the designated parking areas and circulate the site with minimal issues.

14.2 Recommendations

The intersection of Killaly Street West at West Side Road is expected to experience delays for movements from the minor road connections. Based on traffic signal warrants and left turn warrants, the intersection of Killaly Street West at West Side Road warrants a signal and requires a westbound left turn lane to help alleviate future delays. Although an eastbound left turn lane is not warranted, it is also recommended to match the westbound left turn lane roadway geometry. The intersection of Steele Street at Elgin Street West does not warrant a signal and should be maintained as an unsignalized intersection, however, the intersection should be monitored in the future to determine when a traffic signal could be implemented.

Respectfully submitted,

Anil Seegobin, P.Eng.
Partner, Engineer

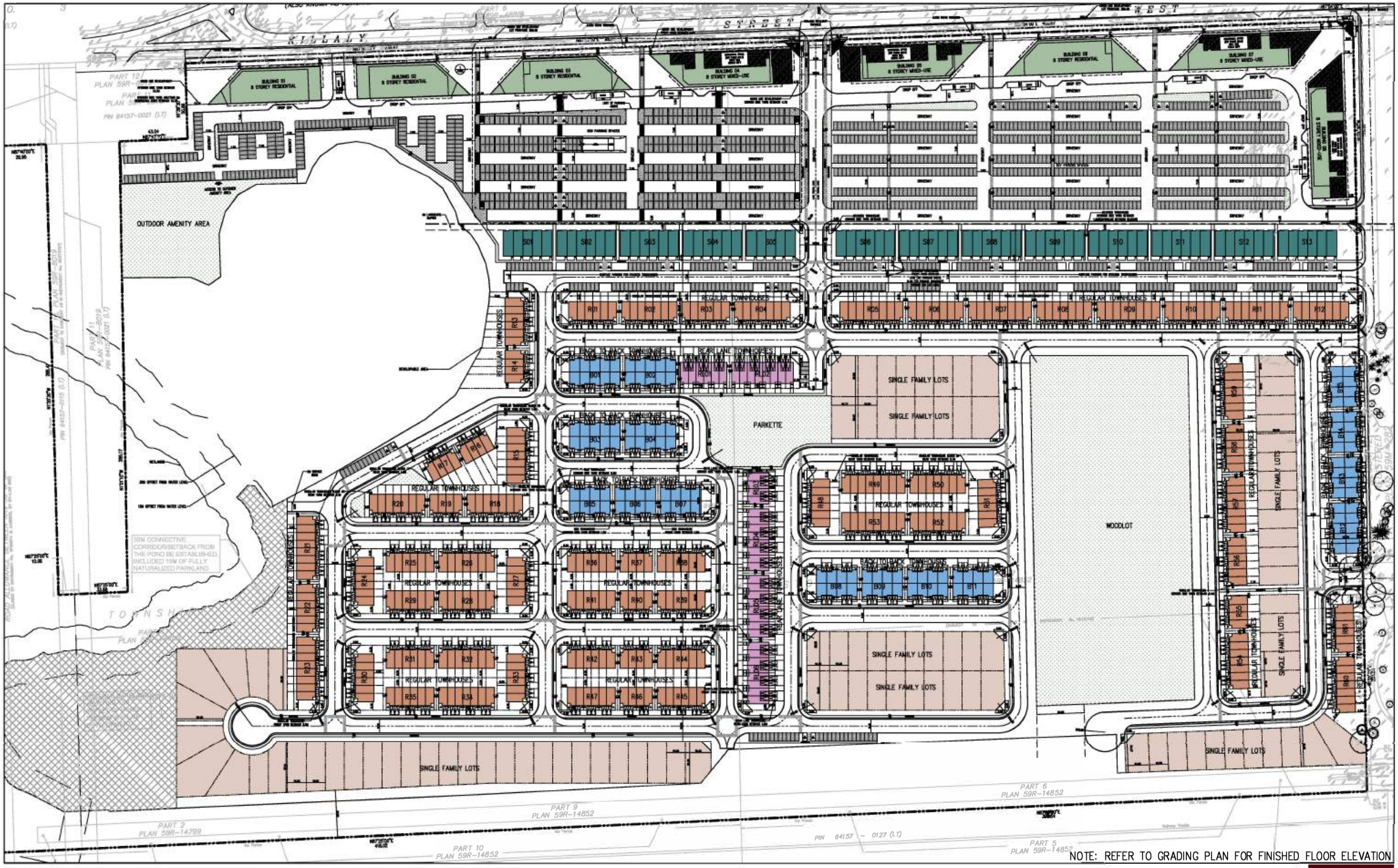
Vivian Leung
Traffic Analyst

Trans-Plan Transportation Inc.
Transportation Consultants

Figure 1 – Site Location

Source: Google Earth

Figure 2 - Proposed Site Plan



NOTE: REFER TO GRADING PLAN FOR FINISHED FLOOR ELEVATION

LEGEND
- MIXED USE RESIDENTIAL BUILDING
- COMMERCIAL SPACE
- STACKED TOWNHOUSES
- BACK TO BACK TOWNHOUSES
- REGULAR TOWNHOUSES
- SINGLE FAMILY HOUSES
- REAR LANE TOWNHOUSES

KILLALY STREET
PORT COLBORNE, ON

DRAWING TITLE
SITE PLAN

Scale: 1:1000
Date: MAR. 28, 2024
Project No. 22129
Drawn by: YA
Checked by: RE
Drawing No. A101

ICON ARCHITECTS

Figure 3: Existing Roadway Characteristics

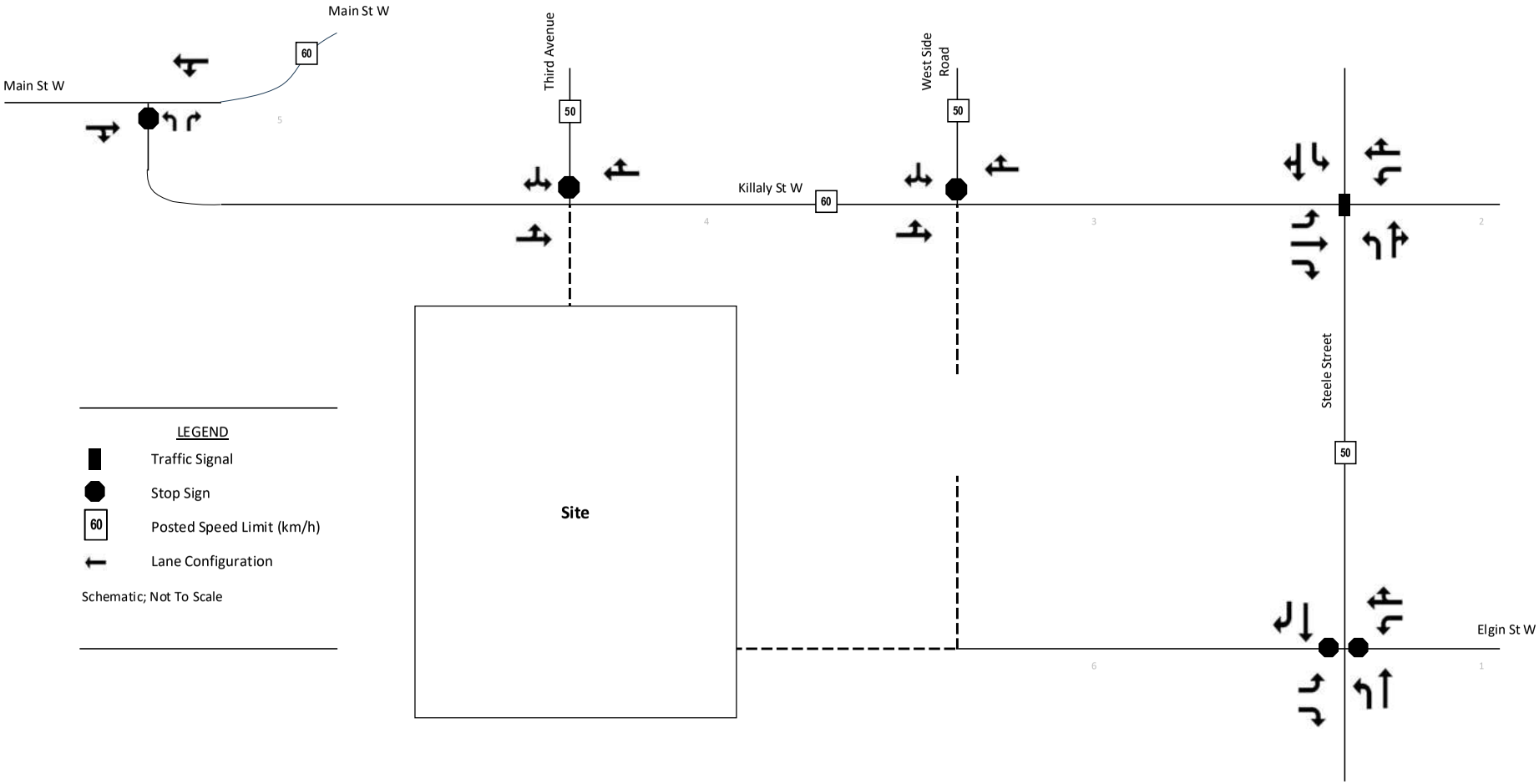


Figure 4: Existing Traffic Volumes, Weekday AM & PM Peak Hours

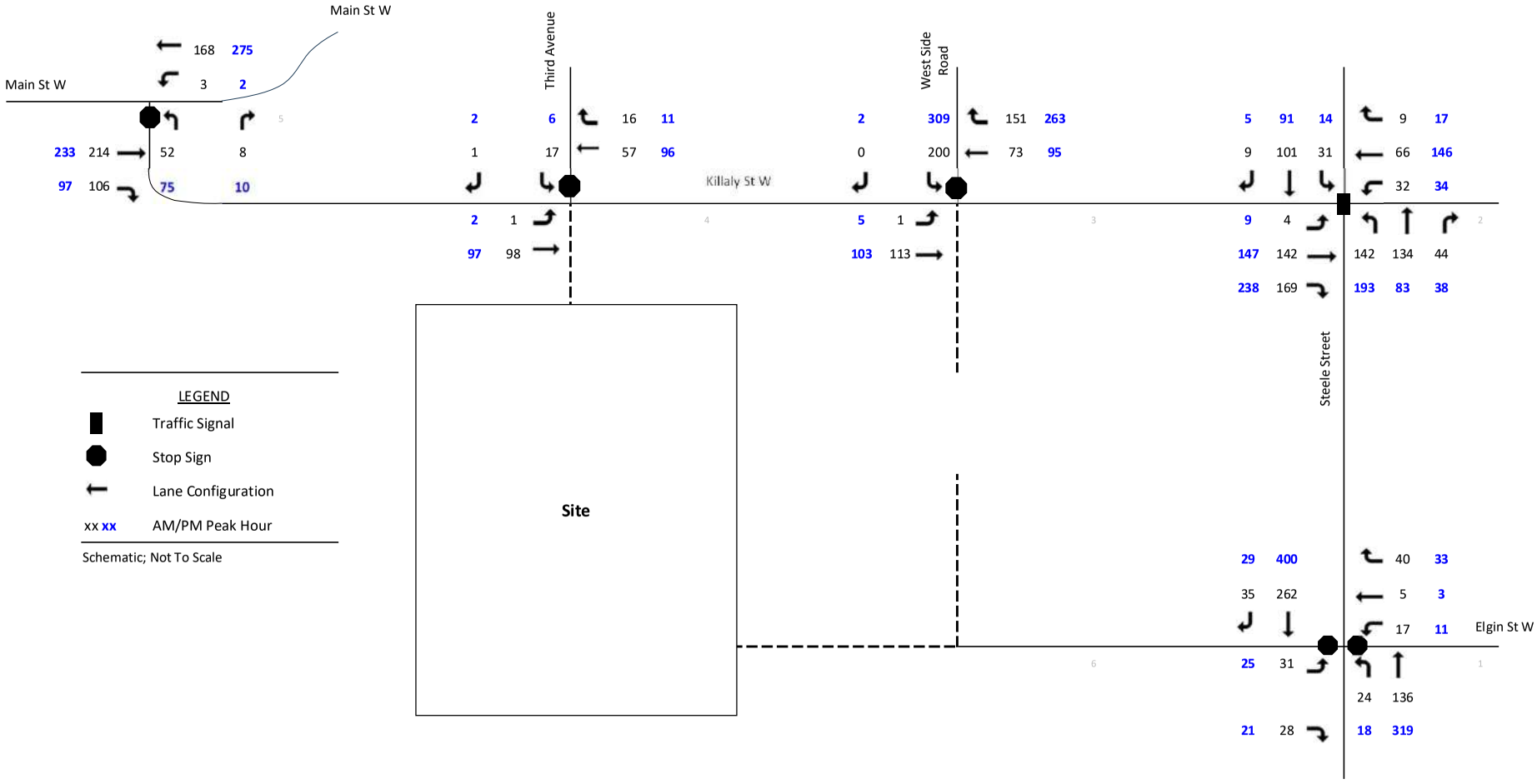


Figure 5- Transit Map

Figure 6: 2031 Background Traffic Volumes, Weekday AM & PM Peak Hours

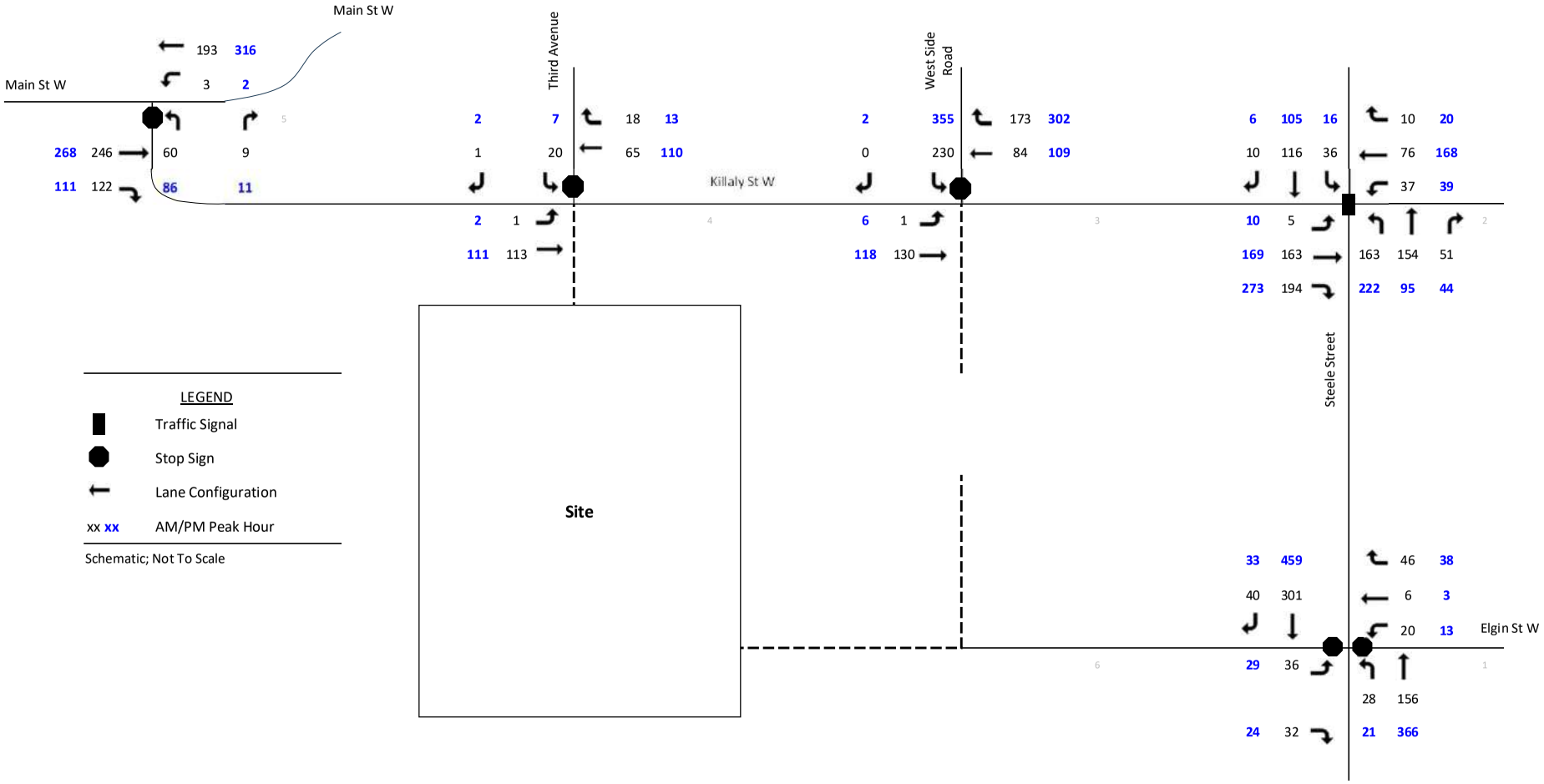


Figure 7: 2036 Background Traffic Volumes, Weekday AM & PM Peak Hours

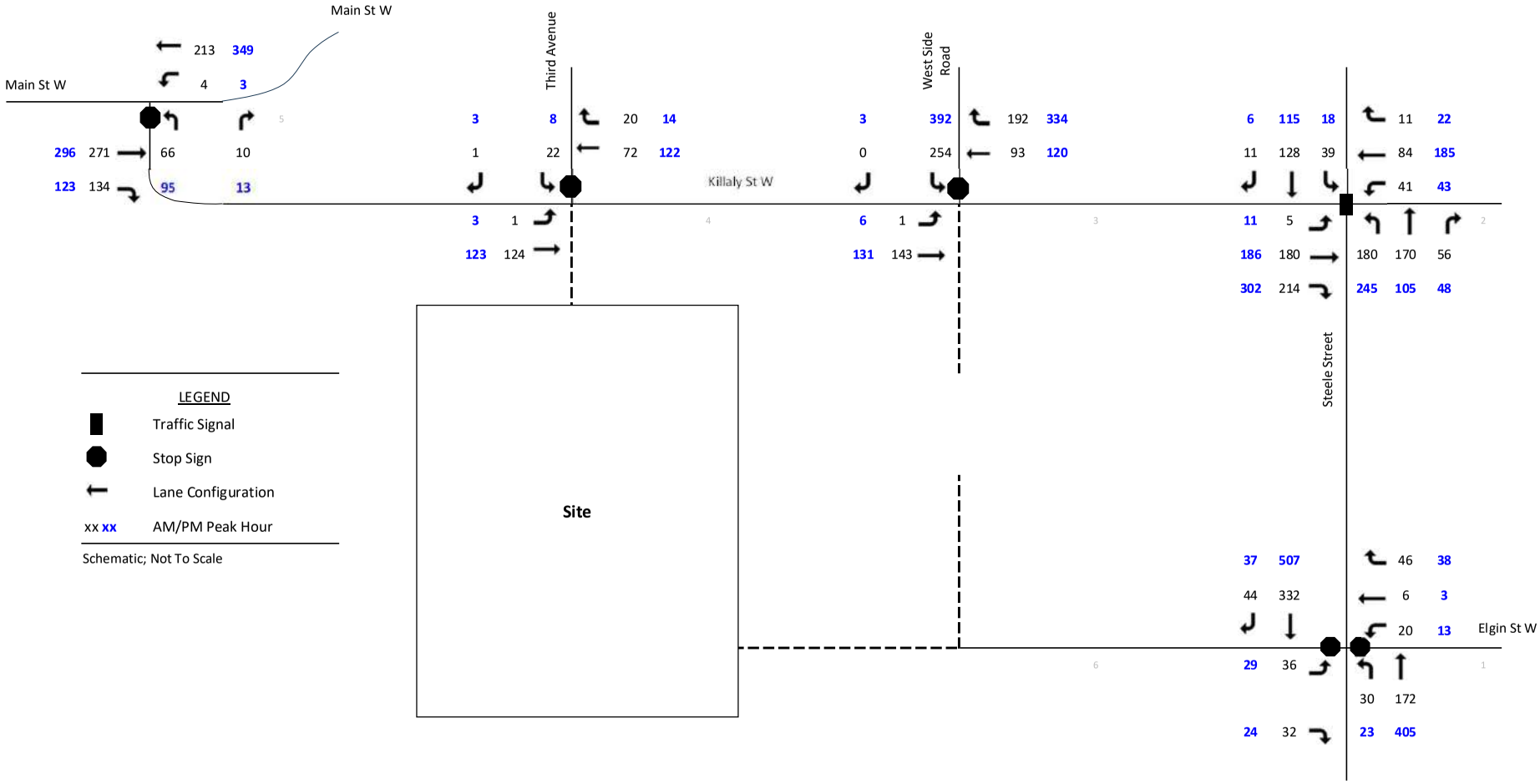


Figure 8: Site Traffic Volumes, Weekday AM & PM Peak Hours

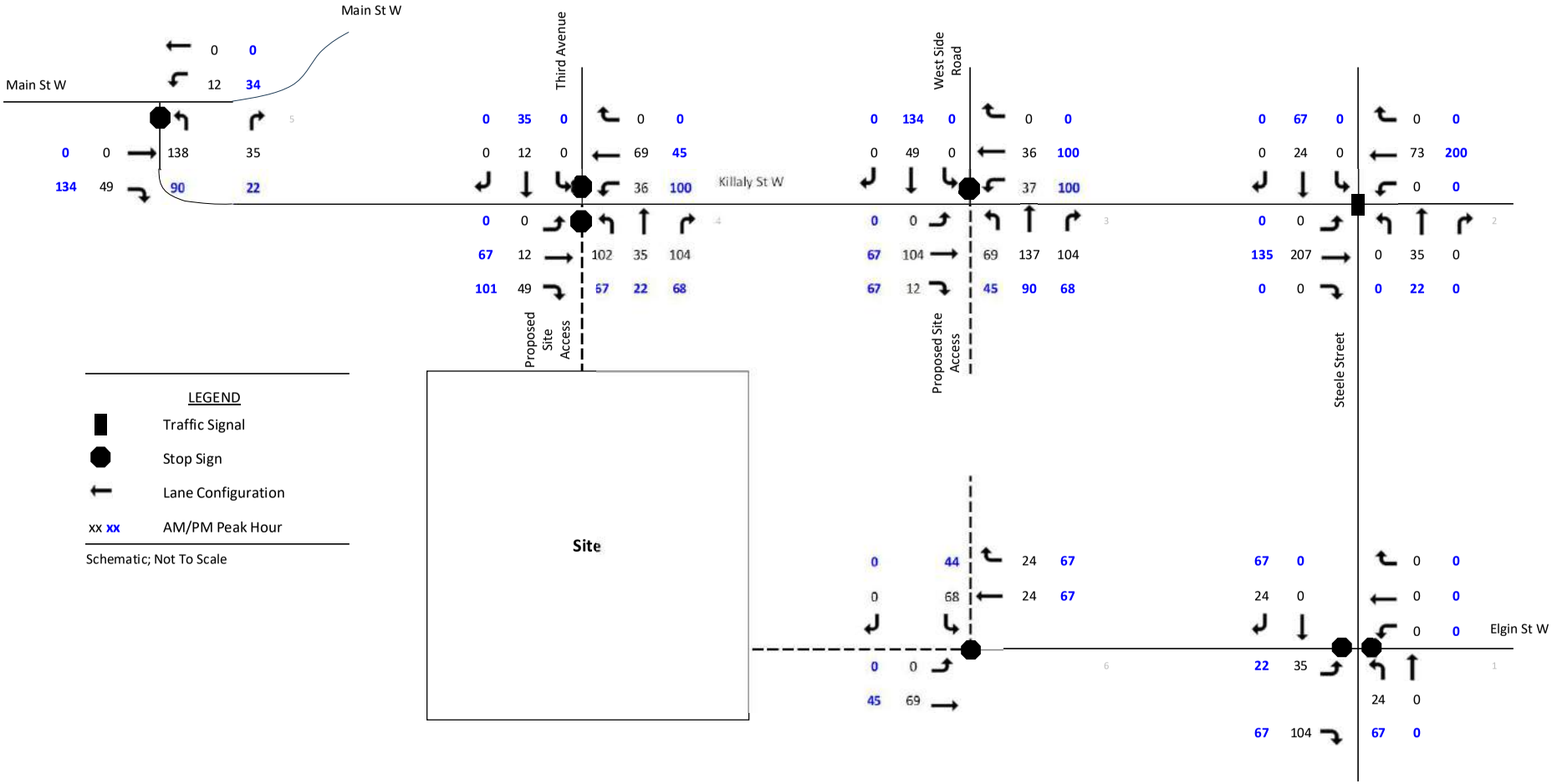


Figure 9: 2031 Total Traffic Volumes, Weekday AM & PM Peak Hours

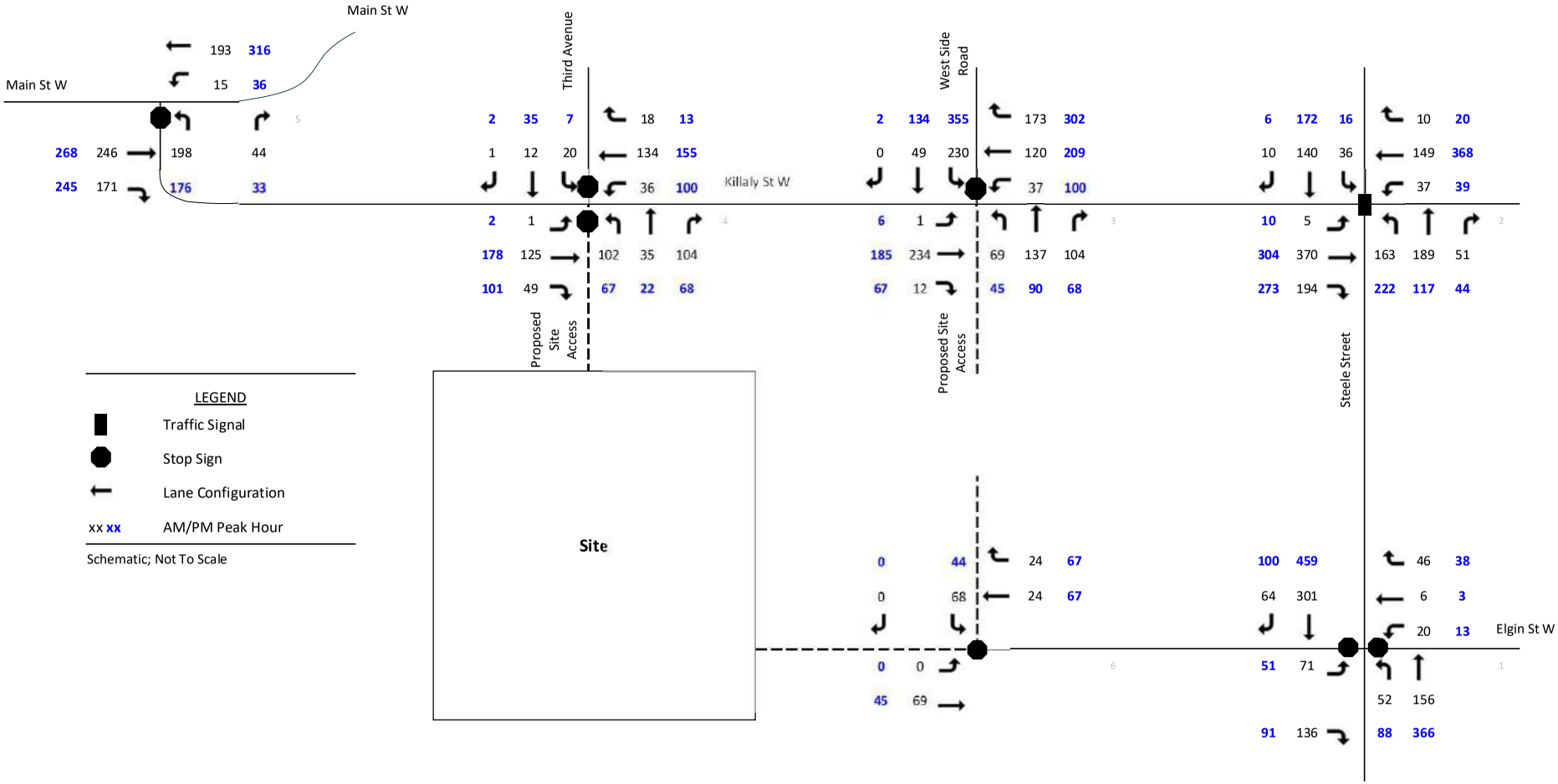
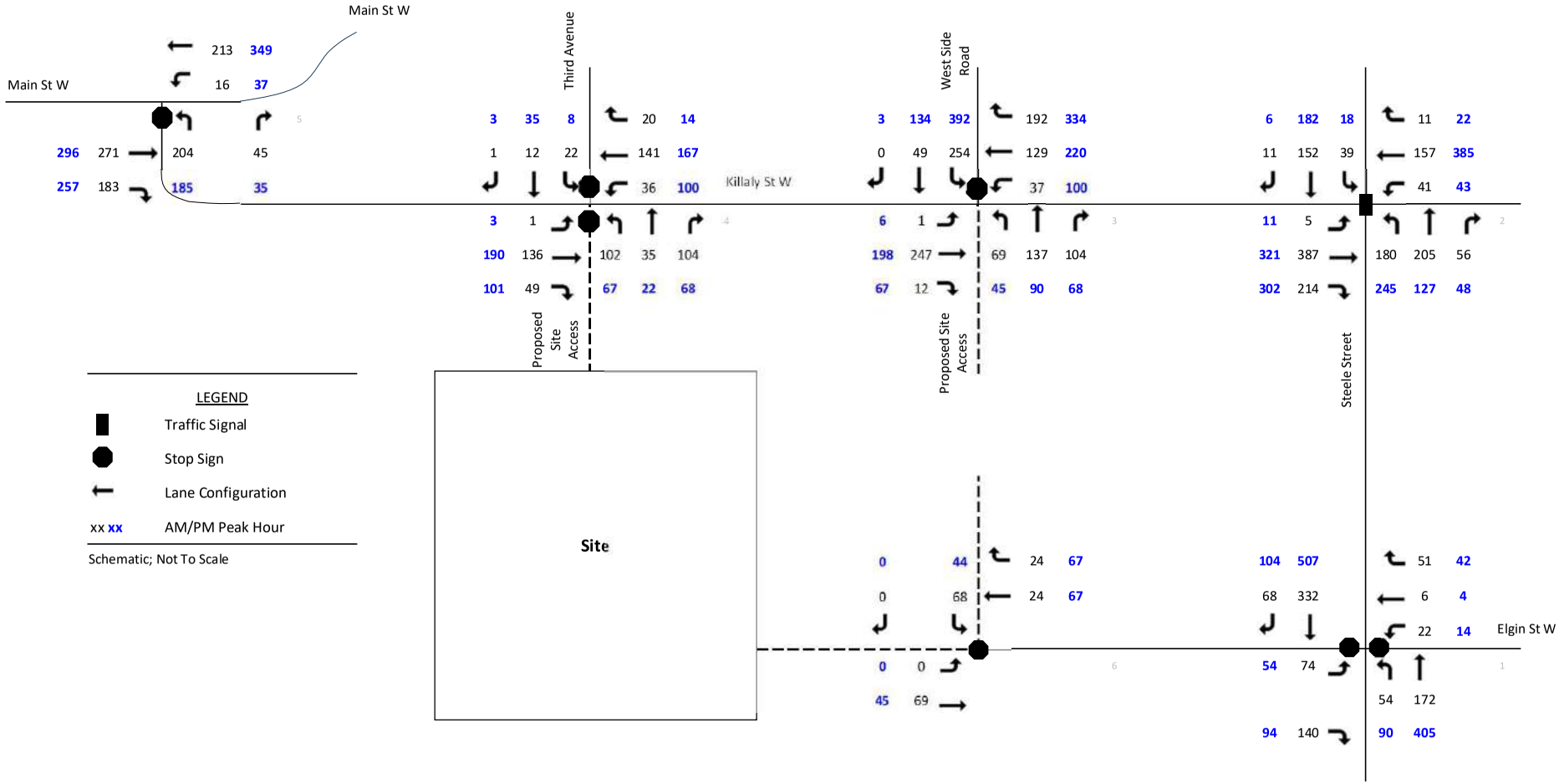


Figure 10: 2036 Total Traffic Volumes, Weekday AM & PM Peak Hours



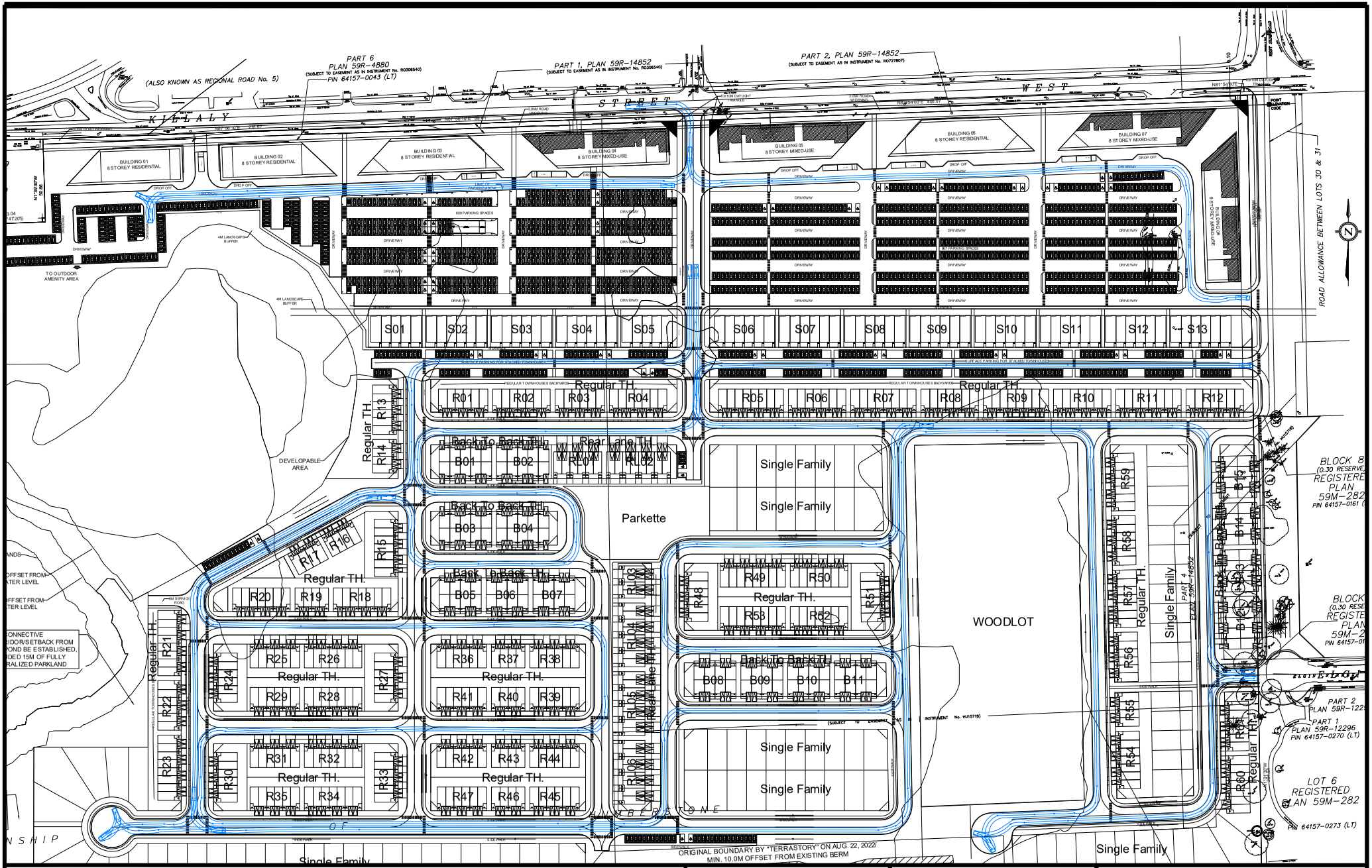
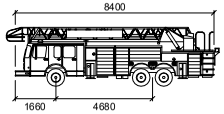


Figure 11 - Fire Emergency Vehicle, Entering and Circulating Site

PROPOSED RESIDENTIAL SUBDIVISION DEVELOPMENT
PORT COLBORNE, ON



Fire Truck

	mm
Width	: 2540
Track	: 2540
Lock to Lock Time	: 6.0
Steering Angle	: 22.5

CONSTRUCTION NORTH
TRUE NORTH

Source: ICON Architects Inc. dated September 2023

SCALE: 1:500 UNITS: mm

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67 Mowat Avenue, Suite 331
Toronto, Ontario, M6K 3E3
tel: (647) 931-7383
website: www.trans-plan.com

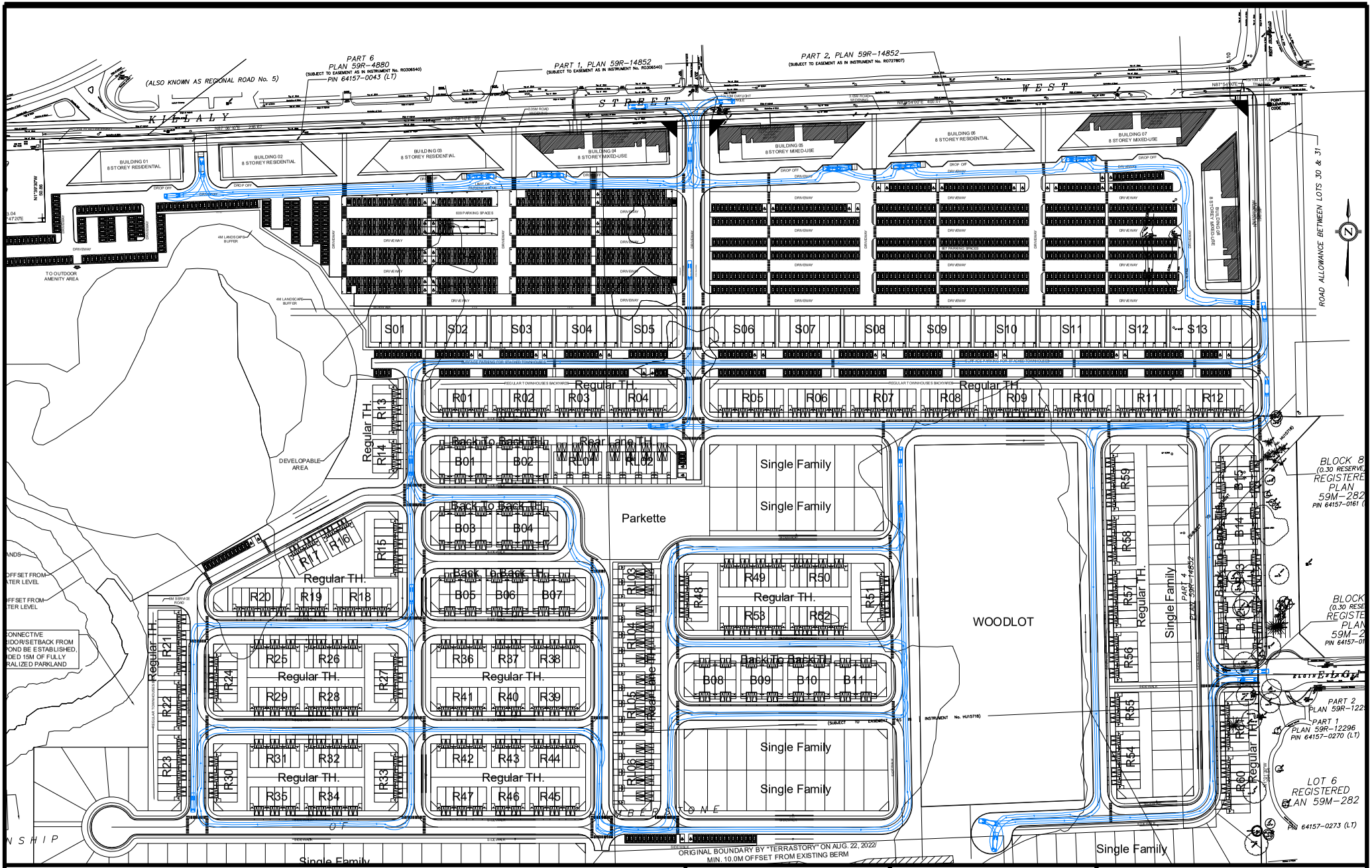
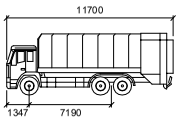


Figure 12 - Waste Collection Vehicle, Entering and Circulating Site

PROPOSED RESIDENTIAL SUBDIVISION DEVELOPMENT
PORT COLBORNE, ON



Waste Collection

	mm
Width	: 2470
Track	: 2470
Lock to Lock Time	: 6.0
Steering Angle	: 53.0

CONSTRUCTION NORTH
TRUE NORTH

Source: ICON Architects Inc. dated September 2023

SCALE: 1:500 UNITS: mm

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website: www.trans-plan.com

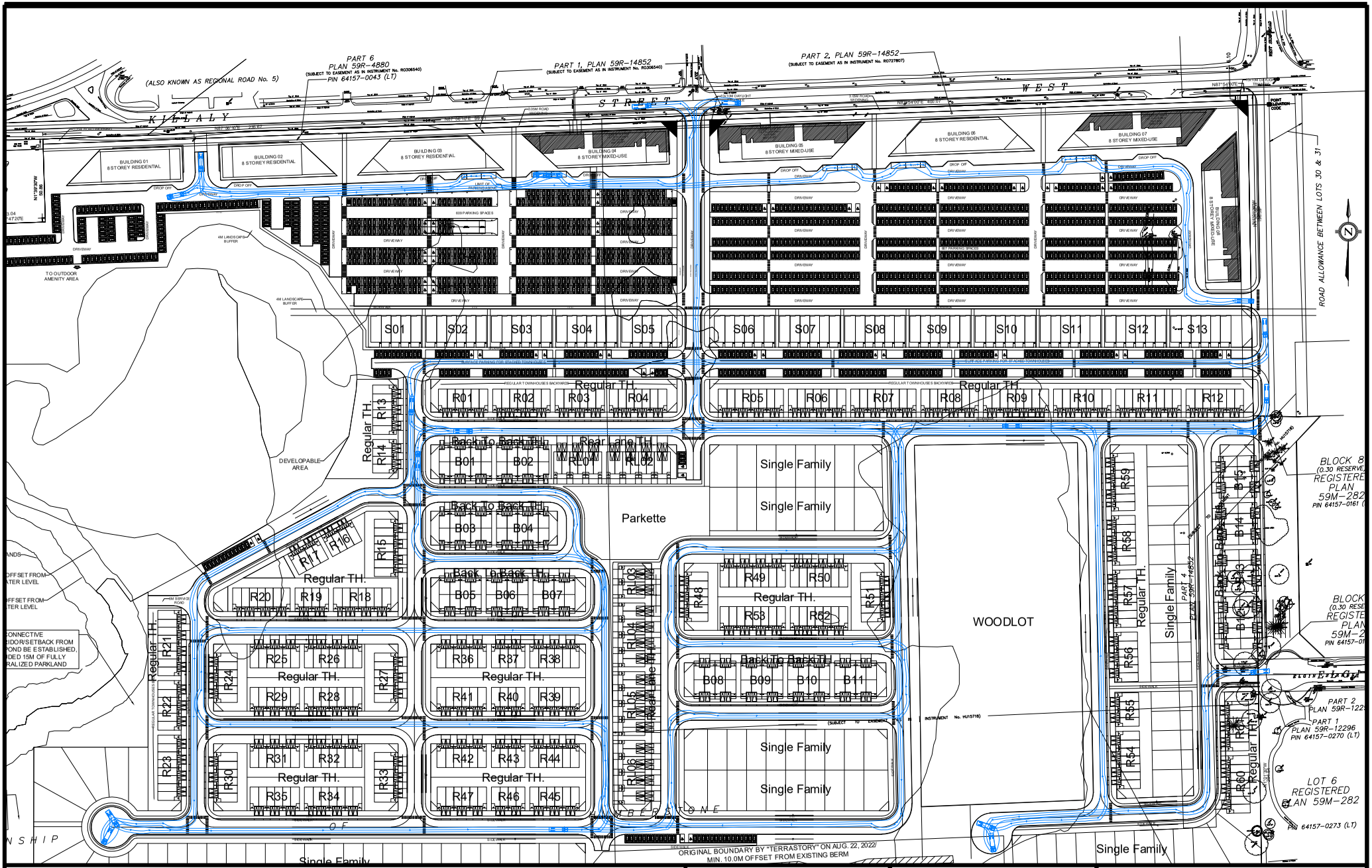
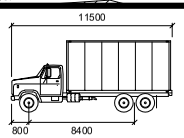


Figure 13 - Loading/ Delivery Vehicle, Entering and Circulating Site

PROPOSED RESIDENTIAL SUBDIVISION DEVELOPMENT
PORT COLBORNE, ON



HSU

	mm
Width	: 2600
Track	: 2600
Lock to Lock Time	: 6.0
Steering Angle	: 40.0

CONSTRUCTION NORTH
TRUE NORTH

Source: ICON Architects Inc. dated September 2023

SCALE: 1:500 UNITS: mm

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APPENDICES

Appendix A – Correspondence with City of Port Colborne

Appendix B – Turning Movement Counts and Signal Timing Plans

Appendix C – Capacity Analysis Sheets

Appendix D – Level of Service Definitions

Appendix E – Left Turn Lane Warrants

Appendix F – City of Port Colborne Zoning By-law, Excerpts

APPENDIX A

Correspondence with City of Port Colborne

RE: Terms of Reference - Residential Sub-Division

Mathew Pilon <Mathew.Pilon@portcolborne.ca>

Fri 2022-12-09 2:12 PM

To:Vivian Leung <vivian.leung@trans-plan.com>

Cc:Eliza Durant <Eliza.Durant@portcolborne.ca>;Joe Colasurdo <Joe.Colasurdo@portcolborne.ca>;Denise Landry <Denise.Landry@portcolborne.ca>;Nicholas Olschansky <Nicholas.Olschansky@portcolborne.ca>

Hi Vivian,

Thanks for the phone call today. As discussed, I can provide the following information on your data requests.

1. No roadway improvements for the intersections are currently planned within the study area.
2. No current active transportation improvements planned within the Study Area. It should be noted that Kilally Street West is a Regional Road. You may wish to reach out to them to confirm, but we have not heard anything from them regarding active transportation in this area.
3. 2% growth rate is suitable for the traffic data.

Engineering has no issues with the Terms of Reference, but I would ask that you also get confirmation from those in planning, (Denise and Nick) to make sure there isn't anything they think should be added.

Hope this information helps!

Regards,
Mat

-----Original Message-----
From: Joe Colasurdo <Joe.Colasurdo@portcolborne.ca>
Sent: December 8, 2022 11:25 AM
To: Denise Landry <Denise.Landry@portcolborne.ca>; Nicholas Olschansky <Nicholas.Olschansky@portcolborne.ca>
Cc: Janice Peyton <Janice.Peyton@portcolborne.ca>; vivian.leung@trans-plan.com; Mathew Pilon <Mathew.Pilon@portcolborne.ca>; Eliza Durant <Eliza.Durant@portcolborne.ca>
Subject: FW: Terms of Reference - Residential Sub-Division

All, please see request below from Vivian Leung who has been retained to complete a traffic study for future sub-division.

Mat/Eliza, if you can review the attached and provide any background info to Vivian that may assist, that would be great.

Thanks,

Joe

APPENDIX B

Turning Movement Counts and Signal Timing Plan

Turning Movement Count Diagram

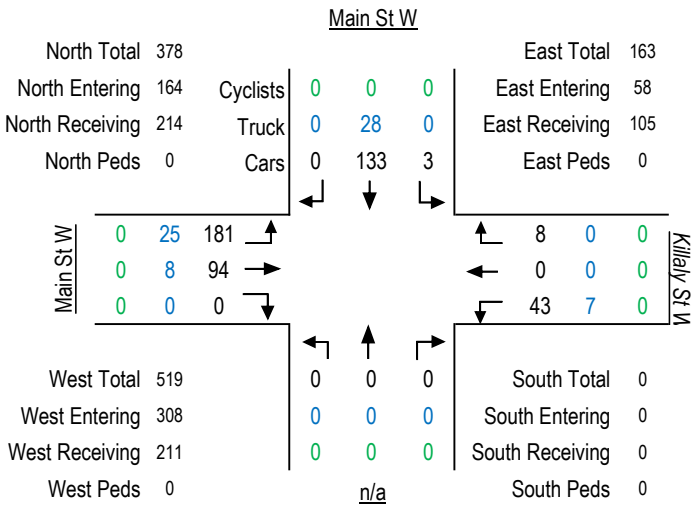
Intersection: Killaly Street West and Main Street West

Intersection ID:

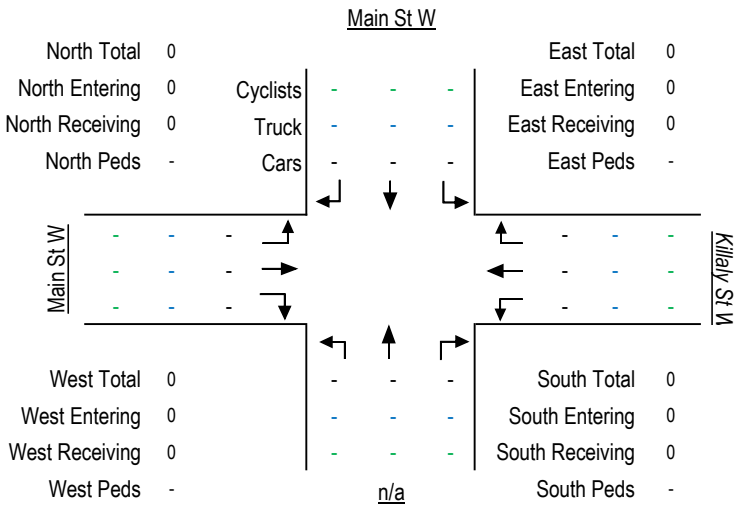
Municipality: Port Colborne, Ontario

Date: Wednesday, December 14, 2022

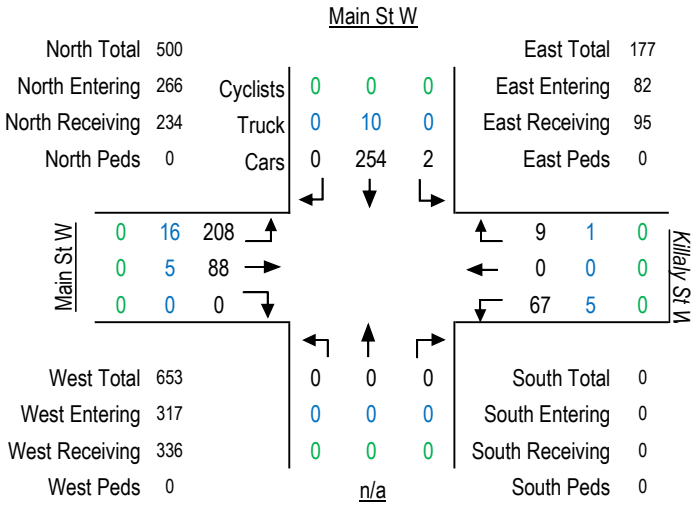
AM Peak Hour: 7:45 to 8:45



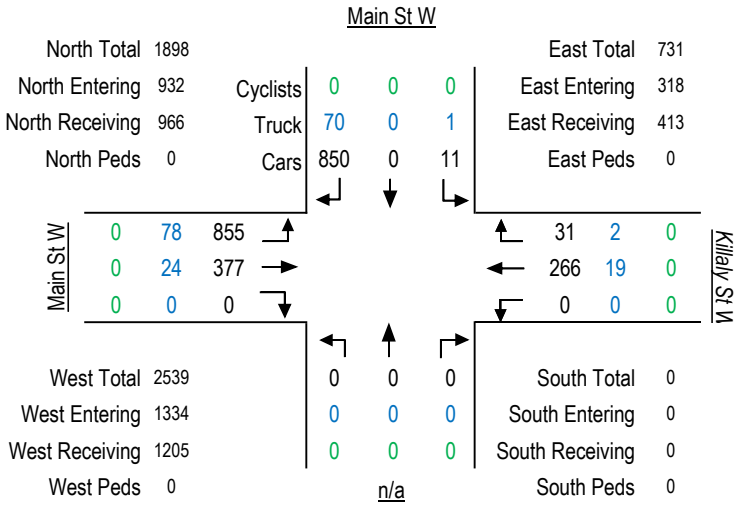
MD Peak Hour: - to -



PM Peak Hour: 16:00 to 17:00



Total 8-Hour Count



Turning Movement Count Diagram

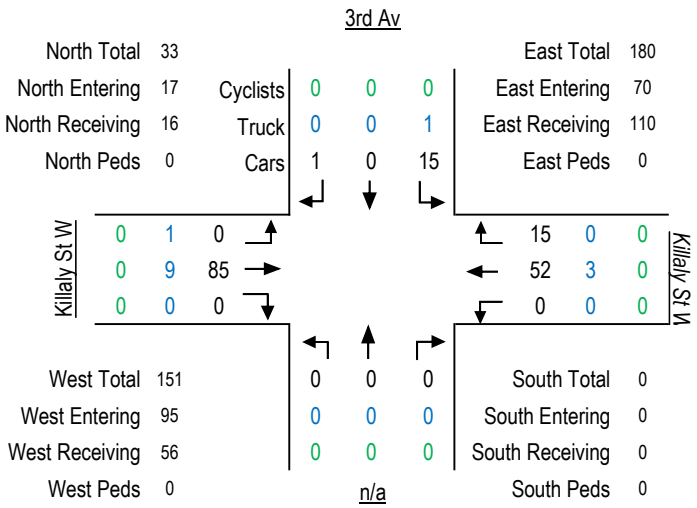
Intersection: Killaly Street West and 3rd Avenue

Intersection ID:

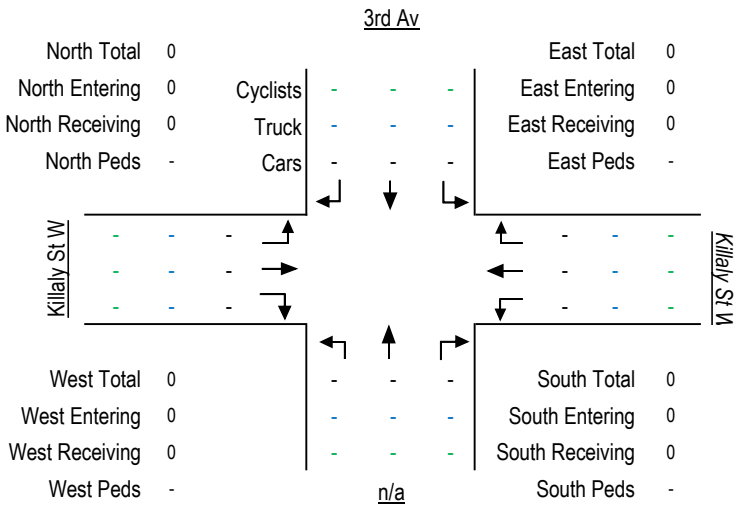
Municipality: Port Colborne, Ontario

Date: Wednesday, December 14, 2022

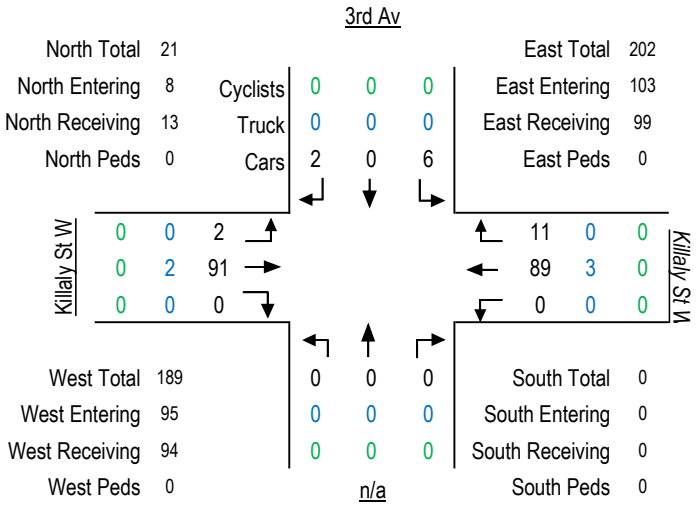
AM Peak Hour: 8:30 to 9:30



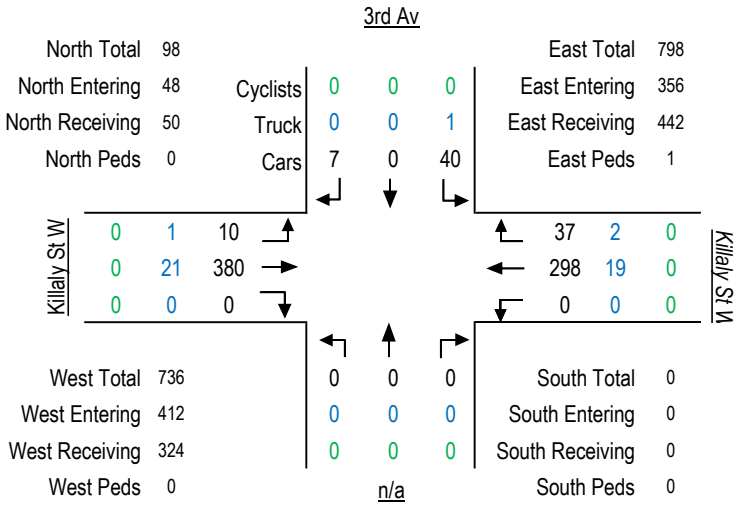
MD Peak Hour: - to -



PM Peak Hour: 16:30 to 17:30



Total 8-Hour Count



Turning Movement Count Diagram

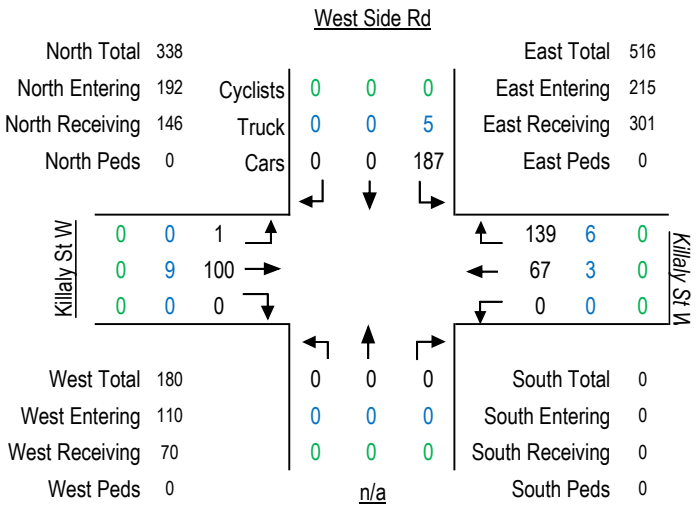
Intersection: Killaly Street West and West Side Road

Intersection ID:

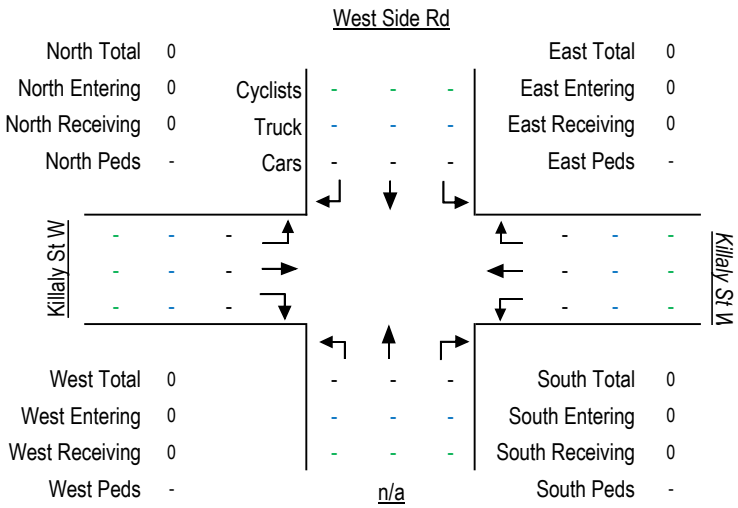
Municipality: Port Colborne, Ontario

Date: Wednesday, December 14, 2022

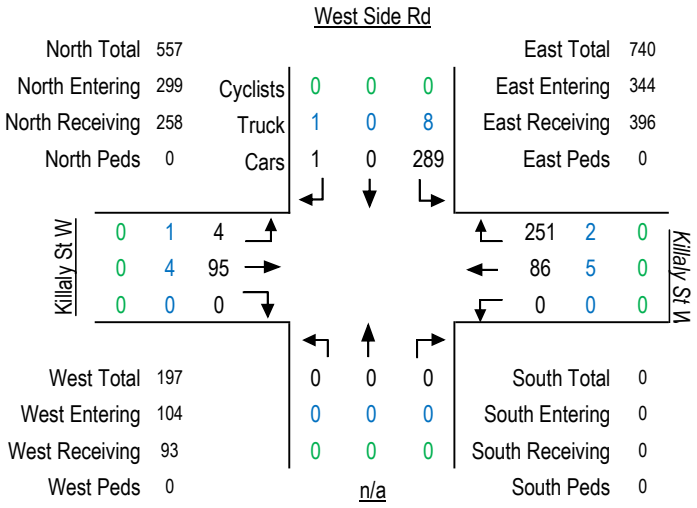
AM Peak Hour: 8:30 to 9:30



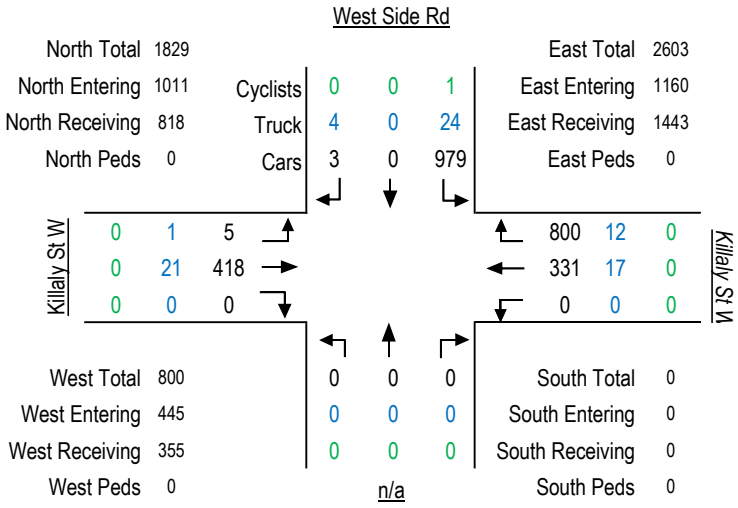
MD Peak Hour: - to -



PM Peak Hour: 16:00 to 17:00



Total 8-Hour Count



Turning Movement Count Diagram

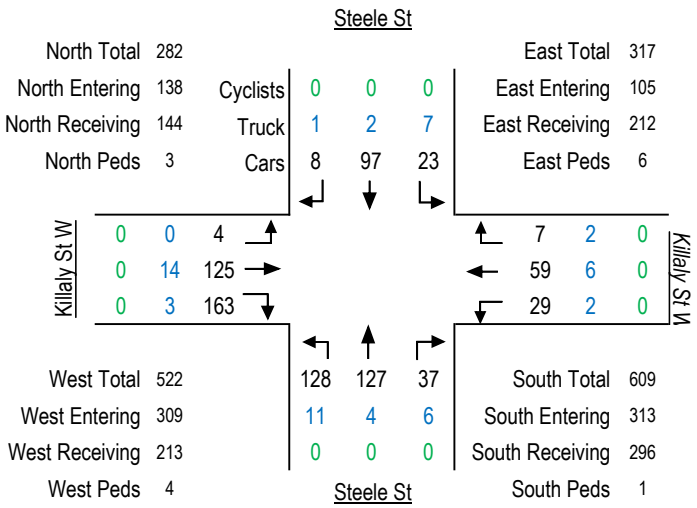
Intersection: Killaly Street West and Steele Street

Intersection ID:

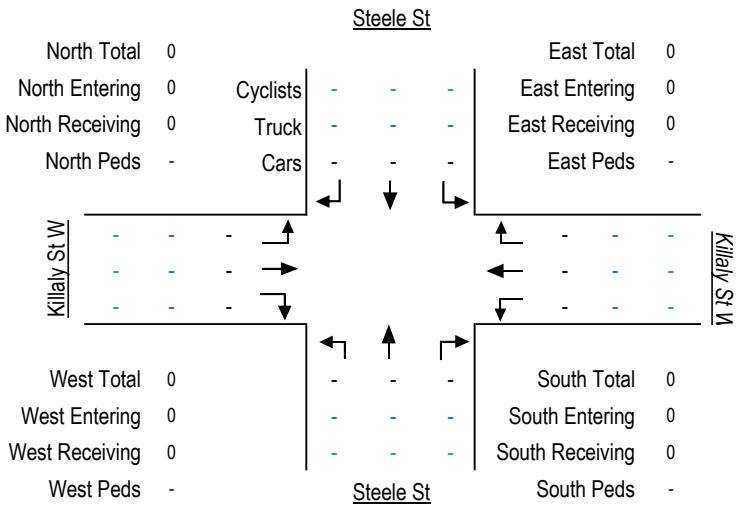
Municipality: Port Colborne, Ontario

Date: Tuesday, January 10, 2023

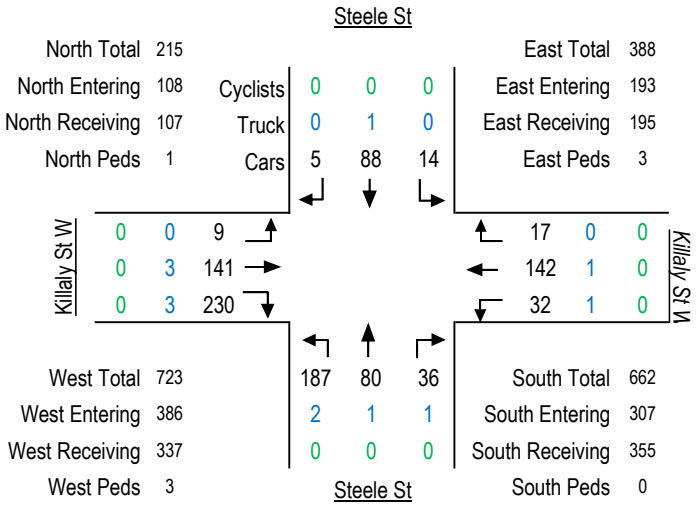
AM Peak Hour: 8:00 to 9:00



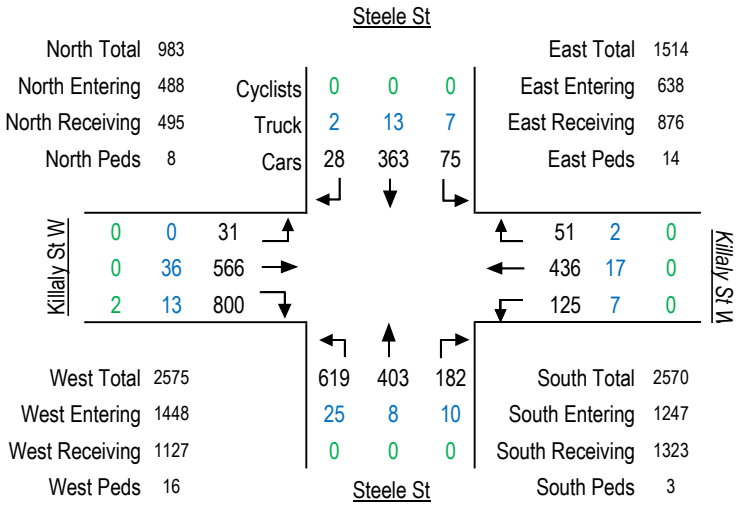
MD Peak Hour: - to -



PM Peak Hour: 16:00 to 17:00



Total 8-Hour Count



Turning Movement Count Diagram

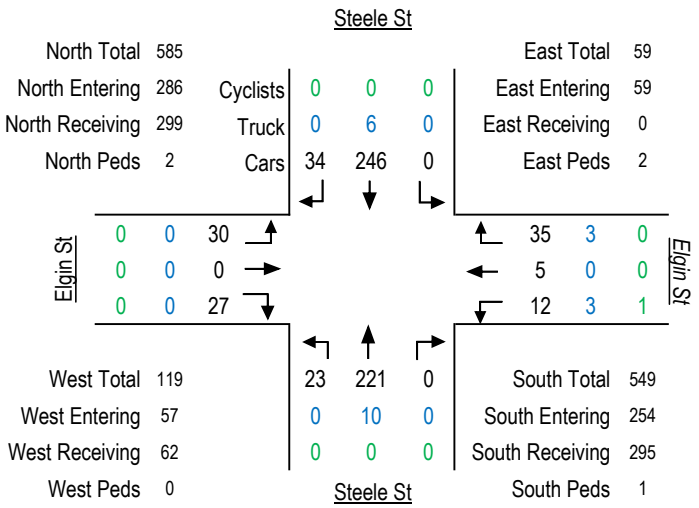
Intersection: Elgin Street and Steele Street

Intersection ID:

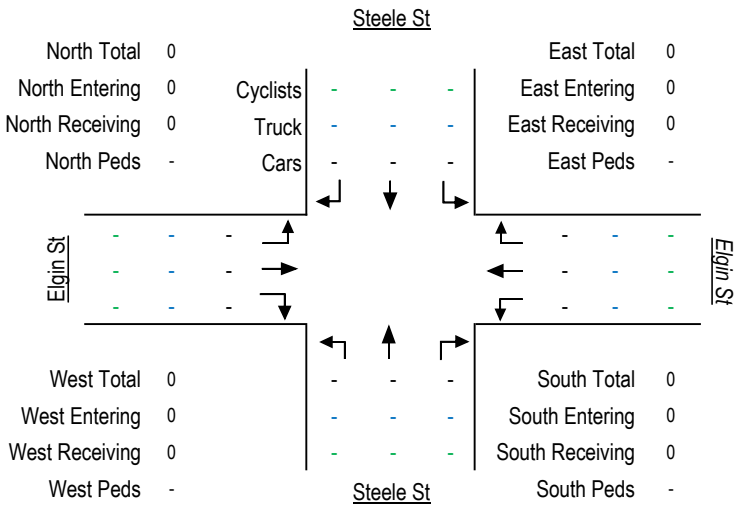
Municipality: Port Colborne, Ontario

Date: Wednesday, December 14, 2022

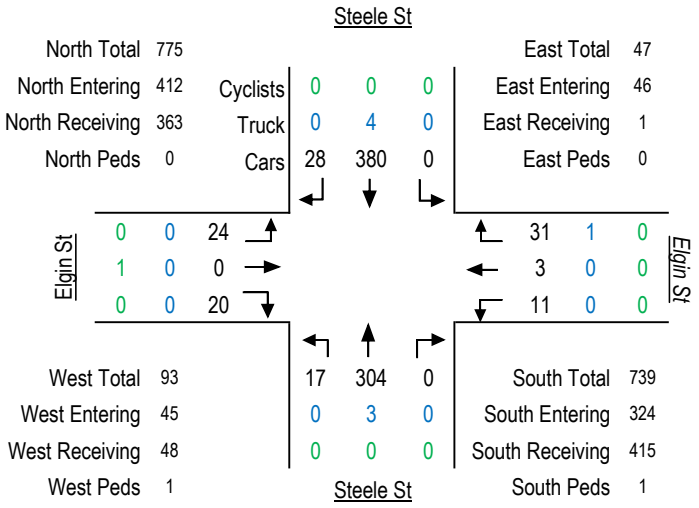
AM Peak Hour: 8:30 to 9:30



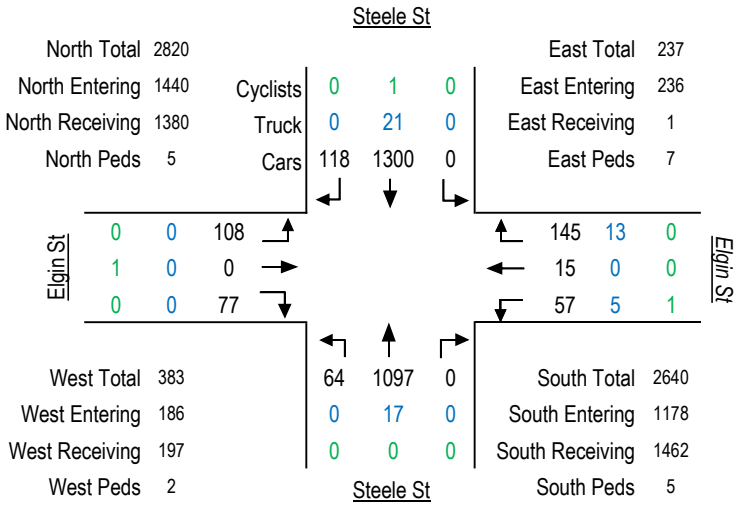
MD Peak Hour: - to -



PM Peak Hour: 16:00 to 17:00



Total 8-Hour Count



Signal Code: 005STL

Intersection: RR5 (KILLALY ST.) & STEELE ST.

Municipality: ptcolborne

Owner: region

Last Modified: 2014-12-08 9:45:09 AM

Timing Parameters	EBD & WBD THRU KILLALY ST.	NBD & SBD THRU STEELE ST.	n/a	n/a	n/a	n/a
Min Green	10	8	0	0	0	0
Walk	11	10	0	0	0	0
Ped Clearance	20	17	0	0	0	0
Vehicle Ext.	2.8	2.8	0	0	0	0
Max Green	35	30	0	0	0	0
Yellow	4.1	4.1	0	0	0	0
All Red	3.3	2.9	0	0	0	0

		Offset
Minimum Cycle	32.4	0
Pedestrian Cycle	72.4	
Maximum Cycle	79.4	0
Operation	FA	

Installed On:	2010-11-29
Count Date:	2012-08-01

FA = Fully Actuated SA = Semi Actuated FT = Fixed Time

APPENDIX C

Capacity Analysis Sheets

Existing Conditions

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	31	0	28	17	5	40	24	136	0	0	262	35
Future Volume (Veh/h)	31	0	28	17	5	40	24	136	0	0	262	35
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	34	0	30	18	5	43	26	148	0	0	285	38
Pedestrians		2						2			2	
Lane Width (m)		3.6						3.6			3.6	
Walking Speed (m/s)		1.2						1.2			1.2	
Percent Blockage		0						0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)											370	
pX, platoon unblocked												
vC, conflicting volume	554	506	308	536	525	150	325			148		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	554	506	308	536	525	150	325			148		
tC, single (s)	7.1	6.5	6.2	7.2	6.5	6.4	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.6	4.0	3.5	2.2			2.2		
p0 queue free %	92	100	96	96	99	95	98			100		
cM capacity (veh/h)	412	461	734	420	450	850	1244			1446		

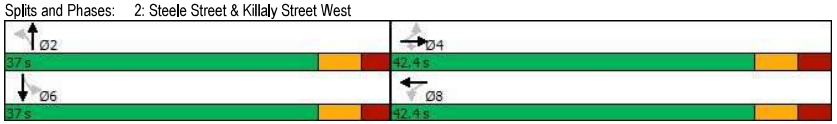
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	34	30	18	48	174	323
Volume Left	34	0	18	0	26	0
Volume Right	0	30	0	43	0	38
cSH	412	734	420	778	1244	1700
Volume to Capacity	0.08	0.04	0.04	0.06	0.02	0.19
Queue Length 95th (m)	2.1	1.0	1.1	1.6	0.5	0.0
Control Delay (s)	14.5	10.1	14.0	9.9	1.3	0.0
Lane LOS	B	B	B	A	A	
Approach Delay (s)	12.5		11.0		1.3	0.0
Approach LOS	B		B			

Intersection Summary					
Average Delay	2.8				
Intersection Capacity Utilization	42.9%	ICU Level of Service	A		
Analysis Period (min)	15				

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	4	142	169	32	66	142	134	31	101
Future Volume (vph)	4	142	169	32	66	142	134	31	101
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4			8		2		6
Permitted Phases	4		4	8		2		6	
Detector Phase	4	4	4	8	8	2	2	6	6
Switch Phase									
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	8.0	8.0	8.0	8.0
Minimum Split (s)	38.4	38.4	38.4	38.4	38.4	34.0	34.0	34.0	34.0
Total Split (s)	42.4	42.4	42.4	42.4	42.4	37.0	37.0	37.0	37.0
Total Split (%)	53.4%	53.4%	53.4%	53.4%	53.4%	46.6%	46.6%	46.6%	46.6%
Yellow Time (s)	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
All-Red Time (s)	3.3	3.3	3.3	3.3	3.3	2.9	2.9	2.9	2.9
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.4	7.4	7.4	7.4	7.4	7.0	7.0	7.0	7.0
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	None	None	None	None	None	Max	Max	Max	Max
Act Effct Green (s)	11.0	11.0	11.0	11.0	11.0	30.6	30.6	30.6	30.6
Actuated g/C Ratio	0.20	0.20	0.20	0.20	0.20	0.55	0.55	0.55	0.55
v/c Ratio	0.02	0.46	0.41	0.15	0.24	0.24	0.20	0.06	0.12
Control Delay	17.8	24.4	6.7	19.9	18.7	8.2	6.6	6.9	6.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.8	24.4	6.7	19.9	18.7	8.2	6.6	6.9	6.6
LOS	B	C	A	B	B	A	A	A	A
Approach Delay		14.8			19.1		7.3		6.7
Approach LOS		B			B		A		A

Intersection Summary			
Cycle Length: 79.4			
Actuated Cycle Length: 56			
Natural Cycle: 75			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.46			
Intersection Signal Delay: 11.3		Intersection LOS: B	
Intersection Capacity Utilization 62.3%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 2: Steele Street & Killaly Street West



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	4	142	169	32	66	9	142	134	44	31	101	9
Future Volume (vph)	4	142	169	32	66	9	142	134	44	31	101	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.4	7.4	7.4	7.4	7.4		7.0	7.0		7.0	7.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		0.99	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	0.96		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1801	1727	1550	1702	1682		1662	1720		1463	1822	
Flt Permitted	0.70	1.00	1.00	0.66	1.00		0.68	1.00		0.64	1.00	
Satd. Flow (perm)	1334	1727	1550	1181	1682		1190	1720		979	1822	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	4	154	184	35	72	10	154	146	48	34	110	10
RTOR Reduction (vph)	0	0	148	0	8	0	0	11	0	0	3	0
Lane Group Flow (vph)	4	154	36	35	74	0	154	183	0	34	117	0
Confl. Peds. (#/hr)	3		1	1		3	6		4	4		6
Heavy Vehicles (%)	0%	10%	2%	6%	9%	22%	8%	3%	14%	23%	2%	11%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	11.0	11.0	11.0	11.0	11.0		30.6	30.6		30.6	30.6	
Effective Green, g (s)	11.0	11.0	11.0	11.0	11.0		30.6	30.6		30.6	30.6	
Actuated g/C Ratio	0.20	0.20	0.20	0.20	0.20		0.55	0.55		0.55	0.55	
Clearance Time (s)	7.4	7.4	7.4	7.4	7.4		7.0	7.0		7.0	7.0	
Vehicle Extension (s)	2.8	2.8	2.8	2.8	2.8		2.8	2.8		2.8	2.8	
Lane Grp Cap (vph)	262	339	304	231	330		650	939		534	995	
v/s Ratio Prot		c0.09			0.04			0.11			0.06	
v/s Ratio Perm	0.00		0.02	0.03			c0.13			0.03		
v/c Ratio	0.02	0.45	0.12	0.15	0.22		0.24	0.20		0.06	0.12	
Uniform Delay, d1	18.1	19.9	18.5	18.6	18.9		6.6	6.4		6.0	6.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	0.9	0.2	0.3	0.3		0.9	0.5		0.2	0.2	
Delay (s)	18.2	20.7	18.7	18.9	19.2		7.5	6.9		6.2	6.4	
Level of Service	B	C	B	B	B		A	A		A	A	
Approach Delay (s)		19.6			19.1			7.2			6.4	
Approach LOS		B			B			A			A	

Intersection Summary				
HCM 2000 Control Delay	12.9	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.29			
Actuated Cycle Length (s)	56.0	Sum of lost time (s)	14.4	
Intersection Capacity Utilization	62.3%	ICU Level of Service	B	
Analysis Period (min)	15			

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	1	113	73	151	200	0
Future Volume (Veh/h)	1	113	73	151	200	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	123	79	164	217	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	243				286	161
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	243				286	161
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				69	100
cM capacity (veh/h)	1335				702	889

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	124	243	217
Volume Left	1	0	217
Volume Right	0	164	0
cSH	1335	1700	702
Volume to Capacity	0.00	0.14	0.31
Queue Length 95th (m)	0.0	0.0	10.5
Control Delay (s)	0.1	0.0	12.4
Lane LOS	A		B
Approach Delay (s)	0.1	0.0	12.4
Approach LOS			B

Intersection Summary			
Average Delay	4.6		
Intersection Capacity Utilization	30.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	1	98	57	16	17	1
Future Volume (Veh/h)	1	98	57	16	17	1
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	107	62	17	18	1
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	79				180	70
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	79				180	70
tC, single (s)	5.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	3.1				3.5	3.3
p0 queue free %	100				98	100
cM capacity (veh/h)	1074				814	998

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	108	79	19
Volume Left	1	0	18
Volume Right	0	17	1
cSH	1074	1700	822
Volume to Capacity	0.00	0.05	0.02
Queue Length 95th (m)	0.0	0.0	0.6
Control Delay (s)	0.1	0.0	9.5
Lane LOS	A		A
Approach Delay (s)	0.1	0.0	9.5
Approach LOS			A

Intersection Summary				
Average Delay			0.9	
Intersection Capacity Utilization			16.0%	ICU Level of Service A
Analysis Period (min)			15	

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	214	106	3	168	52	8
Future Volume (Veh/h)	214	106	3	168	52	8
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	233	115	3	183	57	9
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			233		480	290
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			233		480	290
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		90	99
cM capacity (veh/h)			1335		544	749

Direction, Lane #	EB 1	WB 1	NB 1	NB 2
Volume Total	348	186	57	9
Volume Left	0	3	57	0
Volume Right	115	0	0	9
cSH	1700	1335	544	749
Volume to Capacity	0.20	0.00	0.10	0.01
Queue Length 95th (m)	0.0	0.1	2.8	0.3
Control Delay (s)	0.0	0.1	12.4	9.9
Lane LOS		A	B	A
Approach Delay (s)	0.0	0.1	12.0	
Approach LOS			B	

Intersection Summary				
Average Delay			1.4	
Intersection Capacity Utilization			27.7%	ICU Level of Service A
Analysis Period (min)			15	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	25	0	21	11	3	33	18	319	0	0	400	29
Future Volume (Veh/h)	25	0	21	11	3	33	18	319	0	0	400	29
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	27	0	23	12	3	36	20	347	0	0	435	32
Pedestrians		2						2			2	
Lane Width (m)		3.6						3.6			3.6	
Walking Speed (m/s)		1.2						1.2			1.2	
Percent Blockage		0						0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)											370	
pX, platoon unblocked												
vC, conflicting volume	880	840	455	863	856	349	469			347		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	880	840	455	863	856	349	469			347		
tC, single (s)	7.1	6.5	6.2	7.2	6.5	6.4	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.6	4.0	3.5	2.2			2.2		
p0 queue free %	89	100	96	95	99	94	98			100		
cM capacity (veh/h)	249	298	607	254	291	654	1101			1223		

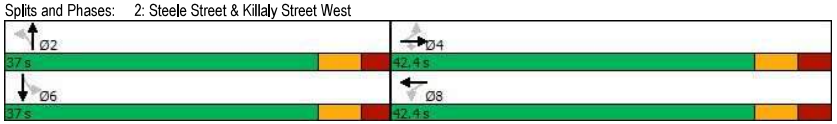
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	27	23	12	39	367	467
Volume Left	27	0	12	0	20	0
Volume Right	0	23	0	36	0	32
cSH	249	607	254	597	1101	1700
Volume to Capacity	0.11	0.04	0.05	0.07	0.02	0.27
Queue Length 95th (m)	2.9	0.9	1.2	1.7	0.4	0.0
Control Delay (s)	21.2	11.2	19.9	11.5	0.6	0.0
Lane LOS	C	B	C	B	A	
Approach Delay (s)	16.6		13.4		0.6	0.0
Approach LOS	C		B			

Intersection Summary					
Average Delay	1.9				
Intersection Capacity Utilization	46.6%	ICU Level of Service	A		
Analysis Period (min)	15				

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	9	147	238	34	146	193	83	14	91
Future Volume (vph)	9	147	238	34	146	193	83	14	91
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4			8		2		6
Permitted Phases	4		4	8		2		6	
Detector Phase	4	4	4	8	8	2	2	6	6
Switch Phase									
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	8.0	8.0	8.0	8.0
Minimum Split (s)	38.4	38.4	38.4	38.4	38.4	34.0	34.0	34.0	34.0
Total Split (s)	42.4	42.4	42.4	42.4	42.4	37.0	37.0	37.0	37.0
Total Split (%)	53.4%	53.4%	53.4%	53.4%	53.4%	46.6%	46.6%	46.6%	46.6%
Yellow Time (s)	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
All-Red Time (s)	3.3	3.3	3.3	3.3	3.3	2.9	2.9	2.9	2.9
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.4	7.4	7.4	7.4	7.4	7.0	7.0	7.0	7.0
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	None	None	None	None	None	Max	Max	Max	Max
Act Effct Green (s)	11.4	11.4	11.4	11.4	11.4	30.1	30.1	30.1	30.1
Actuated g/C Ratio	0.20	0.20	0.20	0.20	0.20	0.54	0.54	0.54	0.54
v/c Ratio	0.04	0.45	0.50	0.15	0.50	0.32	0.14	0.03	0.11
Control Delay	17.8	23.9	6.7	19.7	24.0	9.4	5.9	7.0	7.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.8	23.9	6.7	19.7	24.0	9.4	5.9	7.0	7.0
LOS	B	C	A	B	C	A	A	A	A
Approach Delay		13.4			23.3		8.1		7.0
Approach LOS		B			C		A		A

Intersection Summary			
Cycle Length: 79.4			
Actuated Cycle Length: 55.9			
Natural Cycle: 75			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.50			
Intersection Signal Delay: 13.0		Intersection LOS: B	
Intersection Capacity Utilization 64.2%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 2: Steele Street & Killaly Street West



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	147	238	34	146	17	193	83	38	14	91	5
Future Volume (vph)	9	147	238	34	146	17	193	83	38	14	91	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.4	7.4	7.4	7.4	7.4		7.0	7.0		7.0	7.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		0.99	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	0.95		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1801	1727	1550	1702	1692		1662	1688		1462	1839	
Flt Permitted	0.65	1.00	1.00	0.66	1.00		0.69	1.00		0.67	1.00	
Satd. Flow (perm)	1224	1727	1550	1174	1692		1207	1688		1036	1839	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	10	160	259	37	159	18	210	90	41	15	99	5
RTOR Reduction (vph)	0	0	206	0	7	0	0	15	0	0	2	0
Lane Group Flow (vph)	10	160	53	37	170	0	210	116	0	15	102	0
Confl. Peds. (#/hr)	3		1	1		3	6		4	4		6
Heavy Vehicles (%)	0%	10%	2%	6%	9%	22%	8%	3%	14%	23%	2%	11%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	11.4	11.4	11.4	11.4	11.4		30.0	30.0		30.0	30.0	
Effective Green, g (s)	11.4	11.4	11.4	11.4	11.4		30.0	30.0		30.0	30.0	
Actuated g/C Ratio	0.20	0.20	0.20	0.20	0.20		0.54	0.54		0.54	0.54	
Clearance Time (s)	7.4	7.4	7.4	7.4	7.4		7.0	7.0		7.0	7.0	
Vehicle Extension (s)	2.8	2.8	2.8	2.8	2.8		2.8	2.8		2.8	2.8	
Lane Grp Cap (vph)	250	352	316	239	345		648	907		556	988	
v/s Ratio Prot		0.09			c0.10			0.07			0.06	
v/s Ratio Perm	0.01		0.03	0.03			c0.17			0.01		
v/c Ratio	0.04	0.45	0.17	0.15	0.49		0.32	0.13		0.03	0.10	
Uniform Delay, d1	17.8	19.5	18.3	18.2	19.6		7.2	6.4		6.1	6.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.8	0.2	0.3	1.0		1.3	0.3		0.1	0.2	
Delay (s)	17.9	20.3	18.5	18.5	20.6		8.5	6.7		6.1	6.5	
Level of Service	B	C	B	B	C		A	A		A	A	
Approach Delay (s)		19.2			20.3			7.8			6.5	
Approach LOS		B			C			A			A	

Intersection Summary				
HCM 2000 Control Delay	14.5	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.37			
Actuated Cycle Length (s)	55.8	Sum of lost time (s)	14.4	
Intersection Capacity Utilization	64.2%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	103	95	263	309	2
Future Volume (Veh/h)	5	103	95	263	309	2
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	112	103	286	336	2
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	389				368	246
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	389				368	246
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				46	100
cM capacity (veh/h)	1181				627	798

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	117	389	338
Volume Left	5	0	336
Volume Right	0	286	2
cSH	1181	1700	628
Volume to Capacity	0.00	0.23	0.54
Queue Length 95th (m)	0.1	0.0	25.7
Control Delay (s)	0.4	0.0	17.2
Lane LOS	A		C
Approach Delay (s)	0.4	0.0	17.2
Approach LOS			C

Intersection Summary			
Average Delay	6.9		
Intersection Capacity Utilization	45.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	2	97	96	11	6	2
Future Volume (Veh/h)	2	97	96	11	6	2
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	105	104	12	7	2
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	116				219	110
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	116				219	110
tC, single (s)	5.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	3.1				3.5	3.3
p0 queue free %	100				99	100
cM capacity (veh/h)	1035				772	949

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	107	116	9
Volume Left	2	0	7
Volume Right	0	12	2
cSH	1035	1700	806
Volume to Capacity	0.00	0.07	0.01
Queue Length 95th (m)	0.0	0.0	0.3
Control Delay (s)	0.2	0.0	9.5
Lane LOS	A		A
Approach Delay (s)	0.2	0.0	9.5
Approach LOS			A

Intersection Summary				
Average Delay		0.5		
Intersection Capacity Utilization		16.7%	ICU Level of Service	A
Analysis Period (min)		15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	233	97	2	275	75	10
Future Volume (Veh/h)	233	97	2	275	75	10
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	253	105	2	299	82	11
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			253		608	306
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			253		608	306
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		82	99
cM capacity (veh/h)			1312		458	734

Direction, Lane #	EB 1	WB 1	NB 1	NB 2
Volume Total	358	301	82	11
Volume Left	0	2	82	0
Volume Right	105	0	0	11
cSH	1700	1312	458	734
Volume to Capacity	0.21	0.00	0.18	0.01
Queue Length 95th (m)	0.0	0.0	5.2	0.4
Control Delay (s)	0.0	0.1	14.6	10.0
Lane LOS		A	B	A
Approach Delay (s)	0.0	0.1	14.0	
Approach LOS			B	

Intersection Summary				
Average Delay		1.8		
Intersection Capacity Utilization		29.0%	ICU Level of Service	A
Analysis Period (min)		15		

Future 2031 Conditions

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	36	0	32	20	6	46	28	156	0	0	301	40
Future Volume (Veh/h)	36	0	32	20	6	46	28	156	0	0	301	40
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	39	0	35	22	7	50	30	170	0	0	327	43
Pedestrians		2						2			2	
Lane Width (m)		3.6						3.6			3.6	
Walking Speed (m/s)		1.2						1.2			1.2	
Percent Blockage		0						0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)											370	
pX, platoon unblocked												
vC, conflicting volume	636	580	352	616	602	172	372			170		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	636	580	352	616	602	172	372			170		
tC, single (s)	7.1	6.5	6.2	7.2	6.5	6.4	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.6	4.0	3.5	2.2			2.2		
p0 queue free %	89	100	95	94	98	94	97			100		
cM capacity (veh/h)	356	417	693	366	405	826	1196			1420		

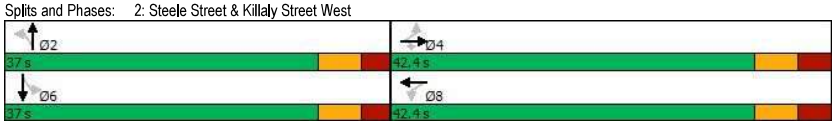
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	39	35	22	57	200	370
Volume Left	39	0	22	0	30	0
Volume Right	0	35	0	50	0	43
cSH	356	693	366	732	1196	1700
Volume to Capacity	0.11	0.05	0.06	0.08	0.03	0.22
Queue Length 95th (m)	2.9	1.3	1.5	2.0	0.6	0.0
Control Delay (s)	16.3	10.5	15.5	10.3	1.4	0.0
Lane LOS	C	B	C	B	A	
Approach Delay (s)	13.6		11.8		1.4	0.0
Approach LOS	B		B			

Intersection Summary					
Average Delay	3.1				
Intersection Capacity Utilization	47.0%	ICU Level of Service	A		
Analysis Period (min)	15				

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	5	163	194	37	76	163	154	36	116
Future Volume (vph)	5	163	194	37	76	163	154	36	116
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4			8		2		6
Permitted Phases	4		4	8		2		6	
Detector Phase	4	4	4	8	8	2	2	6	6
Switch Phase									
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	8.0	8.0	8.0	8.0
Minimum Split (s)	38.4	38.4	38.4	38.4	38.4	34.0	34.0	34.0	34.0
Total Split (s)	42.4	42.4	42.4	42.4	42.4	37.0	37.0	37.0	37.0
Total Split (%)	53.4%	53.4%	53.4%	53.4%	53.4%	46.6%	46.6%	46.6%	46.6%
Yellow Time (s)	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
All-Red Time (s)	3.3	3.3	3.3	3.3	3.3	2.9	2.9	2.9	2.9
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.4	7.4	7.4	7.4	7.4	7.0	7.0	7.0	7.0
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	None	None	None	None	None	Max	Max	Max	Max
Act Effct Green (s)	11.5	11.5	11.5	11.5	11.5	30.0	30.0	30.0	30.0
Actuated g/C Ratio	0.21	0.21	0.21	0.21	0.21	0.54	0.54	0.54	0.54
v/c Ratio	0.02	0.50	0.44	0.17	0.27	0.28	0.24	0.08	0.14
Control Delay	17.4	25.0	6.5	19.9	18.8	9.1	7.3	7.4	7.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.4	25.0	6.5	19.9	18.8	9.1	7.3	7.4	7.1
LOS	B	C	A	B	B	A	A	A	A
Approach Delay		14.9			19.1		8.1		7.2
Approach LOS		B			B		A		A

Intersection Summary			
Cycle Length: 79.4			
Actuated Cycle Length: 55.9			
Natural Cycle: 75			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.50			
Intersection Signal Delay: 11.7		Intersection LOS: B	
Intersection Capacity Utilization 73.9%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 2: Steele Street & Killaly Street West



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	163	194	37	76	10	163	154	51	36	116	10
Future Volume (vph)	5	163	194	37	76	10	163	154	51	36	116	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.4	7.4	7.4	7.4	7.4		7.0	7.0		7.0	7.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		0.99	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	0.96		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1801	1727	1550	1702	1684		1663	1720		1463	1824	
Flt Permitted	0.70	1.00	1.00	0.65	1.00		0.67	1.00		0.62	1.00	
Satd. Flow (perm)	1319	1727	1550	1156	1684		1172	1720		954	1824	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	177	211	40	83	11	177	167	55	39	126	11
RTOR Reduction (vph)	0	0	168	0	9	0	0	11	0	0	3	0
Lane Group Flow (vph)	5	177	43	40	85	0	177	211	0	39	134	0
Confl. Peds. (#/hr)	3		1	1		3	6		4	4		6
Heavy Vehicles (%)	0%	10%	2%	6%	9%	22%	8%	3%	14%	23%	2%	11%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	11.5	11.5	11.5	11.5	11.5		30.0	30.0		30.0	30.0	
Effective Green, g (s)	11.5	11.5	11.5	11.5	11.5		30.0	30.0		30.0	30.0	
Actuated g/C Ratio	0.21	0.21	0.21	0.21	0.21		0.54	0.54		0.54	0.54	
Clearance Time (s)	7.4	7.4	7.4	7.4	7.4		7.0	7.0		7.0	7.0	
Vehicle Extension (s)	2.8	2.8	2.8	2.8	2.8		2.8	2.8		2.8	2.8	
Lane Grp Cap (vph)	271	355	318	237	346		628	923		511	978	
v/s Ratio Prot		c0.10			0.05			0.12			0.07	
v/s Ratio Perm	0.00		0.03	0.03			c0.15			0.04		
v/c Ratio	0.02	0.50	0.14	0.17	0.25		0.28	0.23		0.08	0.14	
Uniform Delay, d1	17.7	19.6	18.1	18.3	18.6		7.1	6.8		6.3	6.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	1.0	0.2	0.3	0.3		1.1	0.6		0.3	0.3	
Delay (s)	17.7	20.6	18.3	18.6	18.9		8.2	7.4		6.5	6.8	
Level of Service	B	C	B	B	B		A	A		A	A	
Approach Delay (s)		19.4			18.8			7.8			6.7	
Approach LOS		B			B			A			A	

Intersection Summary				
HCM 2000 Control Delay	13.1	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.34			
Actuated Cycle Length (s)	55.9	Sum of lost time (s)	14.4	
Intersection Capacity Utilization	73.9%	ICU Level of Service	D	
Analysis Period (min)	15			

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	130	0	0	84	173	0	0	0	230	0	0
Future Volume (Veh/h)	1	130	0	0	84	173	0	0	0	230	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	141	0	0	91	188	0	0	0	250	0	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	279			141			328	422	141	328	328	185
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	279			141			328	422	141	328	328	185
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	60	100	100
cM capacity (veh/h)	1295			1442			625	523	907	623	590	862

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	142	279	0	250
Volume Left	1	0	0	250
Volume Right	0	188	0	0
cSH	1295	1442	1700	623
Volume to Capacity	0.00	0.00	0.00	0.40
Queue Length 95th (m)	0.0	0.0	0.0	15.4
Control Delay (s)	0.1	0.0	0.0	14.6
Lane LOS	A		A	B
Approach Delay (s)	0.1	0.0	0.0	14.6
Approach LOS			A	B

Intersection Summary				
Average Delay	5.5			
Intersection Capacity Utilization	34.5%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	113	0	0	65	18	0	0	0	20	0	1
Future Volume (Veh/h)	1	113	0	0	65	18	0	0	0	20	0	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	123	0	0	71	20	0	0	0	22	0	1
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	91			123			207	216	123	206	206	81
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	91			123			207	216	123	206	206	81
tC, single (s)	5.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	3.1			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	97	100	100
cM capacity (veh/h)	1061			1464			749	681	928	756	690	985

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	124	91	0	23
Volume Left	1	0	0	22
Volume Right	0	20	0	1
cSH	1061	1464	1700	763
Volume to Capacity	0.00	0.00	0.00	0.03
Queue Length 95th (m)	0.0	0.0	0.0	0.7
Control Delay (s)	0.1	0.0	0.0	9.9
Lane LOS	A		A	A
Approach Delay (s)	0.1	0.0	0.0	9.9
Approach LOS			A	A

Intersection Summary					
Average Delay	1.0				
Intersection Capacity Utilization	16.7%	ICU Level of Service		A	
Analysis Period (min)	15				

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	246	122	3	193	60	9
Future Volume (Veh/h)	246	122	3	193	60	9
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	267	133	3	210	65	10
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			267		550	334
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			267		550	334
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		87	99
cM capacity (veh/h)			1297		495	708

Direction, Lane #	EB 1	WB 1	NB 1	NB 2
Volume Total	400	213	65	10
Volume Left	0	3	65	0
Volume Right	133	0	0	10
cSH	1700	1297	495	708
Volume to Capacity	0.24	0.00	0.13	0.01
Queue Length 95th (m)	0.0	0.1	3.6	0.3
Control Delay (s)	0.0	0.1	13.4	10.2
Lane LOS		A	B	B
Approach Delay (s)	0.0	0.1	12.9	
Approach LOS			B	

Intersection Summary				
Average Delay	1.5			
Intersection Capacity Utilization	30.4%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	29	0	24	13	3	38	21	366	0	0	459	33
Future Volume (Veh/h)	29	0	24	13	3	38	21	366	0	0	459	33
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	32	0	26	14	3	41	23	398	0	0	499	36
Pedestrians		2						2			2	
Lane Width (m)		3.6						3.6			3.6	
Walking Speed (m/s)		1.2						1.2			1.2	
Percent Blockage		0						0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)											370	
pX, platoon unblocked												
vC, conflicting volume	1008	963	521	989	981	400	537			398		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1008	963	521	989	981	400	537			398		
tC, single (s)	7.1	6.5	6.2	7.2	6.5	6.4	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.6	4.0	3.5	2.2			2.2		
p0 queue free %	84	100	95	93	99	93	98			100		
cM capacity (veh/h)	200	251	557	206	245	612	1040			1172		

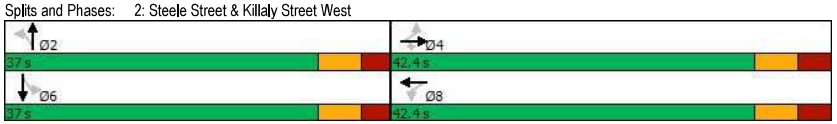
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	32	26	14	44	421	535
Volume Left	32	0	14	0	23	0
Volume Right	0	26	0	41	0	36
cSH	200	557	206	555	1040	1700
Volume to Capacity	0.16	0.05	0.07	0.08	0.02	0.31
Queue Length 95th (m)	4.5	1.2	1.7	2.1	0.5	0.0
Control Delay (s)	26.4	11.8	23.8	12.0	0.7	0.0
Lane LOS	D	B	C	B	A	
Approach Delay (s)	19.8		14.9		0.7	0.0
Approach LOS	C		B			

Intersection Summary					
Average Delay	2.2				
Intersection Capacity Utilization	51.7%	ICU Level of Service	A		
Analysis Period (min)	15				

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	10	169	273	39	168	222	95	16	105
Future Volume (vph)	10	169	273	39	168	222	95	16	105
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4			8		2		6
Permitted Phases	4		4	8		2		6	
Detector Phase	4	4	4	8	8	2	2	6	6
Switch Phase									
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	8.0	8.0	8.0	8.0
Minimum Split (s)	38.4	38.4	38.4	38.4	38.4	34.0	34.0	34.0	34.0
Total Split (s)	42.4	42.4	42.4	42.4	42.4	37.0	37.0	37.0	37.0
Total Split (%)	53.4%	53.4%	53.4%	53.4%	53.4%	46.6%	46.6%	46.6%	46.6%
Yellow Time (s)	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
All-Red Time (s)	3.3	3.3	3.3	3.3	3.3	2.9	2.9	2.9	2.9
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.4	7.4	7.4	7.4	7.4	7.0	7.0	7.0	7.0
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	None	None	None	None	None	Max	Max	Max	Max
Act Effct Green (s)	12.1	12.1	12.1	12.1	12.1	30.1	30.1	30.1	30.1
Actuated g/C Ratio	0.21	0.21	0.21	0.21	0.21	0.53	0.53	0.53	0.53
v/c Ratio	0.04	0.50	0.53	0.17	0.56	0.38	0.17	0.03	0.12
Control Delay	17.5	24.5	6.5	19.6	24.9	10.7	6.4	7.6	7.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.5	24.5	6.5	19.6	24.9	10.7	6.4	7.6	7.5
LOS	B	C	A	B	C	B	A	A	A
Approach Delay		13.5			24.0		9.1		7.5
Approach LOS		B			C		A		A

Intersection Summary			
Cycle Length: 79.4			
Actuated Cycle Length: 56.6			
Natural Cycle: 75			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.56			
Intersection Signal Delay: 13.5		Intersection LOS: B	
Intersection Capacity Utilization 66.3%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 2: Steele Street & Killaly Street West



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	169	273	39	168	20	222	95	44	16	105	6
Future Volume (vph)	10	169	273	39	168	20	222	95	44	16	105	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.4	7.4	7.4	7.4	7.4		7.0	7.0		7.0	7.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		0.99	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	0.95		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1801	1727	1550	1702	1689		1662	1686		1462	1834	
Flt Permitted	0.63	1.00	1.00	0.64	1.00		0.68	1.00		0.66	1.00	
Satd. Flow (perm)	1193	1727	1550	1149	1689		1189	1686		1018	1834	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	11	184	297	42	183	22	241	103	48	17	114	7
RTOR Reduction (vph)	0	0	234	0	8	0	0	16	0	0	2	0
Lane Group Flow (vph)	11	184	63	42	197	0	241	135	0	17	119	0
Confl. Peds. (#/hr)	3		1	1		3	6		4	4		6
Heavy Vehicles (%)	0%	10%	2%	6%	9%	22%	8%	3%	14%	23%	2%	11%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	12.1	12.1	12.1	12.1	12.1		30.1	30.1		30.1	30.1	
Effective Green, g (s)	12.1	12.1	12.1	12.1	12.1		30.1	30.1		30.1	30.1	
Actuated g/C Ratio	0.21	0.21	0.21	0.21	0.21		0.53	0.53		0.53	0.53	
Clearance Time (s)	7.4	7.4	7.4	7.4	7.4		7.0	7.0		7.0	7.0	
Vehicle Extension (s)	2.8	2.8	2.8	2.8	2.8		2.8	2.8		2.8	2.8	
Lane Grp Cap (vph)	255	369	331	245	361		632	896		541	975	
v/s Ratio Prot		0.11			c0.12			0.08			0.06	
v/s Ratio Perm	0.01		0.04	0.04			c0.20			0.02		
v/c Ratio	0.04	0.50	0.19	0.17	0.55		0.38	0.15		0.03	0.12	
Uniform Delay, d1	17.7	19.6	18.2	18.2	19.8		7.8	6.7		6.3	6.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.9	0.3	0.3	1.5		1.7	0.4		0.1	0.3	
Delay (s)	17.7	20.5	18.5	18.5	21.4		9.5	7.1		6.4	6.9	
Level of Service	B	C	B	B	C		A	A		A	A	
Approach Delay (s)		19.2			20.9			8.6			6.8	
Approach LOS		B			C			A			A	

Intersection Summary				
HCM 2000 Control Delay	14.9	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.43			
Actuated Cycle Length (s)	56.6	Sum of lost time (s)	14.4	
Intersection Capacity Utilization	66.3%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	6	118	0	0	109	302	0	0	0	355	0	2
Future Volume (Veh/h)	6	118	0	0	109	302	0	0	0	355	0	2
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	128	0	0	118	328	0	0	0	386	0	2
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	446			128			426	588	128	424	424	282
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	446			128			426	588	128	424	424	282
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	100	100	28	100	100
cM capacity (veh/h)	1125			1458			535	419	922	536	519	762

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	135	446	0	388
Volume Left	7	0	0	386
Volume Right	0	328	0	2
cSH	1125	1458	1700	537
Volume to Capacity	0.01	0.00	0.00	0.72
Queue Length 95th (m)	0.2	0.0	0.0	47.4
Control Delay (s)	0.5	0.0	0.0	27.2
Lane LOS	A		A	D
Approach Delay (s)	0.5	0.0	0.0	27.2
Approach LOS			A	D

Intersection Summary				
Average Delay	11.0			
Intersection Capacity Utilization	50.8%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	111	0	0	110	13	0	0	0	7	0	2
Future Volume (Veh/h)	2	111	0	0	110	13	0	0	0	7	0	2
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	121	0	0	120	14	0	0	0	8	0	2
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	134			121			254	259	121	252	252	127
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	134			121			254	259	121	252	252	127
tC, single (s)	5.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	3.1			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	99	100	100
cM capacity (veh/h)	1017			1467			697	644	930	704	650	929

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	123	134	0	10
Volume Left	2	0	0	8
Volume Right	0	14	0	2
cSH	1017	1467	1700	740
Volume to Capacity	0.00	0.00	0.00	0.01
Queue Length 95th (m)	0.0	0.0	0.0	0.3
Control Delay (s)	0.2	0.0	0.0	9.9
Lane LOS	A		A	A
Approach Delay (s)	0.2	0.0	0.0	9.9
Approach LOS			A	A

Intersection Summary					
Average Delay			0.4		
Intersection Capacity Utilization			17.4%	ICU Level of Service	A
Analysis Period (min)			15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	268	111	2	316	86	11
Future Volume (Veh/h)	268	111	2	316	86	11
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	291	121	2	343	93	12
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			291		698	352
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			291		698	352
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		77	98
cM capacity (veh/h)			1271		406	692

Direction, Lane #	EB 1	WB 1	NB 1	NB 2
Volume Total	412	345	93	12
Volume Left	0	2	93	0
Volume Right	121	0	0	12
cSH	1700	1271	406	692
Volume to Capacity	0.24	0.00	0.23	0.02
Queue Length 95th (m)	0.0	0.0	7.0	0.4
Control Delay (s)	0.0	0.1	16.5	10.3
Lane LOS		A	C	B
Approach Delay (s)	0.0	0.1	15.8	
Approach LOS			C	

Intersection Summary					
Average Delay			1.9		
Intersection Capacity Utilization			32.3%	ICU Level of Service	A
Analysis Period (min)			15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	71	0	136	20	6	46	52	156	0	0	301	64
Future Volume (Veh/h)	71	0	136	20	6	46	52	156	0	0	301	64
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	77	0	148	22	7	50	57	170	0	0	327	70
Pedestrians		2						2			2	
Lane Width (m)		3.6						3.6			3.6	
Walking Speed (m/s)		1.2						1.2			1.2	
Percent Blockage		0						0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)											370	
pX, platoon unblocked												
vC, conflicting volume	704	648	366	796	683	172	399			170		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	704	648	366	796	683	172	399			170		
tC, single (s)	7.1	6.5	6.2	7.2	6.5	6.4	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.6	4.0	3.5	2.2			2.2		
p0 queue free %	76	100	78	90	98	94	95			100		
cM capacity (veh/h)	314	372	681	224	355	826	1169			1420		

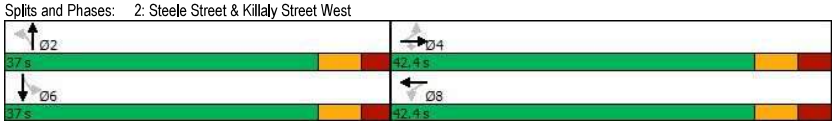
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	77	148	22	57	227	397
Volume Left	77	0	22	0	57	0
Volume Right	0	148	0	50	0	70
cSH	314	681	224	710	1169	1700
Volume to Capacity	0.24	0.22	0.10	0.08	0.05	0.23
Queue Length 95th (m)	7.5	6.6	2.6	2.1	1.2	0.0
Control Delay (s)	20.1	11.7	22.8	10.5	2.4	0.0
Lane LOS	C	B	C	B	A	
Approach Delay (s)	14.6		13.9		2.4	0.0
Approach LOS	B		B			

Intersection Summary					
Average Delay	5.3				
Intersection Capacity Utilization	51.6%	ICU Level of Service	A		
Analysis Period (min)	15				

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	5	370	194	37	149	163	189	36	140
Future Volume (vph)	5	370	194	37	149	163	189	36	140
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4			8		2		6
Permitted Phases	4		4	8		2		6	
Detector Phase	4	4	4	8	8	2	2	6	6
Switch Phase									
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	8.0	8.0	8.0	8.0
Minimum Split (s)	38.4	38.4	38.4	38.4	38.4	34.0	34.0	34.0	34.0
Total Split (s)	42.4	42.4	42.4	42.4	42.4	37.0	37.0	37.0	37.0
Total Split (%)	53.4%	53.4%	53.4%	53.4%	53.4%	46.6%	46.6%	46.6%	46.6%
Yellow Time (s)	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
All-Red Time (s)	3.3	3.3	3.3	3.3	3.3	2.9	2.9	2.9	2.9
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.4	7.4	7.4	7.4	7.4	7.0	7.0	7.0	7.0
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	None	None	None	None	None	Max	Max	Max	Max
Act Effct Green (s)	20.0	20.0	20.0	20.0	20.0	30.3	30.3	30.3	30.3
Actuated g/C Ratio	0.31	0.31	0.31	0.31	0.31	0.47	0.47	0.47	0.47
v/c Ratio	0.01	0.75	0.34	0.19	0.33	0.33	0.32	0.09	0.19
Control Delay	14.2	29.5	4.8	17.8	17.6	15.0	12.7	12.7	12.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.2	29.5	4.8	17.8	17.6	15.0	12.7	12.7	12.2
LOS	B	C	A	B	B	B	B	B	B
Approach Delay		20.9			17.7		13.6		12.3
Approach LOS		C			B		B		B

Intersection Summary			
Cycle Length: 79.4			
Actuated Cycle Length: 64.8			
Natural Cycle: 75			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.75			
Intersection Signal Delay: 17.1		Intersection LOS: B	
Intersection Capacity Utilization 80.1%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 2: Steele Street & Killaly Street West



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	370	194	37	149	10	163	189	51	36	140	10
Future Volume (vph)	5	370	194	37	149	10	163	189	51	36	140	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.4	7.4	7.4	7.4	7.4		7.0	7.0		7.0	7.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		0.99	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.97		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1801	1727	1550	1702	1711		1662	1738		1463	1830	
Flt Permitted	0.65	1.00	1.00	0.38	1.00		0.65	1.00		0.60	1.00	
Satd. Flow (perm)	1228	1727	1550	685	1711		1144	1738		921	1830	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	402	211	40	162	11	177	205	55	39	152	11
RTOR Reduction (vph)	0	0	137	0	4	0	0	11	0	0	3	0
Lane Group Flow (vph)	5	402	74	40	169	0	177	249	0	39	160	0
Confl. Peds. (#/hr)	3		1	1		3	6		4	4		6
Heavy Vehicles (%)	0%	10%	2%	6%	9%	22%	8%	3%	14%	23%	2%	11%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	20.0	20.0	20.0	20.0	20.0		30.3	30.3		30.3	30.3	
Effective Green, g (s)	20.0	20.0	20.0	20.0	20.0		30.3	30.3		30.3	30.3	
Actuated g/C Ratio	0.31	0.31	0.31	0.31	0.31		0.47	0.47		0.47	0.47	
Clearance Time (s)	7.4	7.4	7.4	7.4	7.4		7.0	7.0		7.0	7.0	
Vehicle Extension (s)	2.8	2.8	2.8	2.8	2.8		2.8	2.8		2.8	2.8	
Lane Grp Cap (vph)	379	533	479	211	528		535	813		431	857	
v/s Ratio Prot		c0.23			0.10			0.14			0.09	
v/s Ratio Perm	0.00		0.05	0.06			c0.15			0.04		
v/c Ratio	0.01	0.75	0.15	0.19	0.32		0.33	0.31		0.09	0.19	
Uniform Delay, d1	15.5	20.1	16.2	16.4	17.1		10.8	10.7		9.5	10.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	5.9	0.1	0.4	0.3		1.7	1.0		0.4	0.5	
Delay (s)	15.5	26.0	16.4	16.8	17.4		12.5	11.7		10.0	10.5	
Level of Service	B	C	B	B	B		B	B		A	B	
Approach Delay (s)		22.6			17.3			12.0			10.4	
Approach LOS		C			B			B			B	

Intersection Summary				
HCM 2000 Control Delay	17.0	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.50			
Actuated Cycle Length (s)	64.7	Sum of lost time (s)	14.4	
Intersection Capacity Utilization	80.1%	ICU Level of Service	D	
Analysis Period (min)	15			

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	234	12	37	120	173	69	137	104	230	49	0
Future Volume (Veh/h)	1	234	12	37	120	173	69	137	104	230	49	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	254	13	40	130	188	75	149	113	250	53	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	318			267			593	660	260	754	573	224
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	318			267			593	660	260	754	573	224
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			97			80	60	85	0	87	100
cM capacity (veh/h)	1253			1297			368	371	778	186	416	820

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	268	358	337	303
Volume Left	1	40	75	250
Volume Right	13	188	113	0
cSH	1253	1297	449	206
Volume to Capacity	0.00	0.03	0.75	1.47
Queue Length 95th (m)	0.0	0.8	50.0	146.6
Control Delay (s)	0.0	1.1	33.5	279.4
Lane LOS	A	A	D	F
Approach Delay (s)	0.0	1.1	33.5	279.4
Approach LOS			D	F

Intersection Summary			
Average Delay	76.1		
Intersection Capacity Utilization	78.1%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	125	49	36	134	18	102	35	104	20	12	1
Future Volume (Veh/h)	1	125	49	36	134	18	102	35	104	20	12	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	136	53	39	146	20	111	38	113	22	13	1
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	166			189			406	408	162	530	425	156
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	166			189			406	408	162	530	425	156
tC, single (s)	5.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	3.1			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			97			79	93	87	94	97	100
cM capacity (veh/h)	985			1385			532	517	882	372	506	895

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	190	205	262	36
Volume Left	1	39	111	22
Volume Right	53	20	113	1
cSH	985	1385	639	419
Volume to Capacity	0.00	0.03	0.41	0.09
Queue Length 95th (m)	0.0	0.7	16.0	2.2
Control Delay (s)	0.1	1.7	14.5	14.4
Lane LOS	A	A	B	B
Approach Delay (s)	0.1	1.7	14.5	14.4
Approach LOS			B	B

Intersection Summary					
Average Delay			6.7		
Intersection Capacity Utilization			44.8%	ICU Level of Service	A
Analysis Period (min)			15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	246	171	15	193	198	44
Future Volume (Veh/h)	246	171	15	193	198	44
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	267	186	16	210	215	48
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			267		602	360
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			267		602	360
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		53	93
cM capacity (veh/h)			1297		457	684

Direction, Lane #	EB 1	WB 1	NB 1	NB 2
Volume Total	453	226	215	48
Volume Left	0	16	215	0
Volume Right	186	0	0	48
cSH	1700	1297	457	684
Volume to Capacity	0.27	0.01	0.47	0.07
Queue Length 95th (m)	0.0	0.3	19.7	1.8
Control Delay (s)	0.0	0.7	19.7	10.7
Lane LOS		A	C	B
Approach Delay (s)	0.0	0.7	18.0	
Approach LOS			C	

Intersection Summary					
Average Delay			5.2		
Intersection Capacity Utilization			41.0%	ICU Level of Service	A
Analysis Period (min)			15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Stop	Stop		Stop	
Traffic Volume (vph)	0	69	24	24	68	0
Future Volume (vph)	0	69	24	24	68	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	75	26	26	74	0

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total (vph)	75	52	74
Volume Left (vph)	0	0	74
Volume Right (vph)	0	26	0
Hadj (s)	0.03	-0.27	0.23
Departure Headway (s)	4.2	3.9	4.4
Degree Utilization, x	0.09	0.06	0.09
Capacity (veh/h)	844	902	788
Control Delay (s)	7.6	7.1	7.8
Approach Delay (s)	7.6	7.1	7.8
Approach LOS	A	A	A

Intersection Summary				
Delay		7.5		
Level of Service		A		
Intersection Capacity Utilization	14.1%	ICU Level of Service		A
Analysis Period (min)		15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	51	0	91	13	3	38	88	366	0	0	459	100
Future Volume (Veh/h)	51	0	91	13	3	38	88	366	0	0	459	100
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	55	0	99	14	3	41	96	398	0	0	499	109
Pedestrians		2						2			2	
Lane Width (m)		3.6						3.6			3.6	
Walking Speed (m/s)		1.2						1.2			1.2	
Percent Blockage		0						0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)											370	
pX, platoon unblocked												
vC, conflicting volume	1190	1146	558	1244	1200	400	610			398		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1190	1146	558	1244	1200	400	610			398		
tC, single (s)	7.1	6.5	6.2	7.2	6.5	6.4	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.6	4.0	3.5	2.2			2.2		
p0 queue free %	61	100	81	87	98	93	90			100		
cM capacity (veh/h)	141	181	532	110	168	612	977			1172		

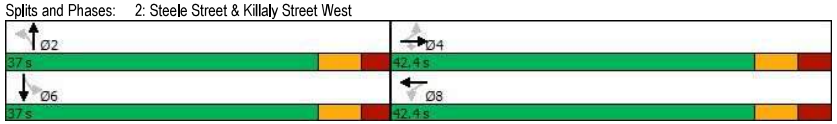
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	55	99	14	44	494	608
Volume Left	55	0	14	0	96	0
Volume Right	0	99	0	41	0	109
cSH	141	532	110	518	977	1700
Volume to Capacity	0.39	0.19	0.13	0.08	0.10	0.36
Queue Length 95th (m)	13.3	5.4	3.4	2.2	2.6	0.0
Control Delay (s)	46.1	13.3	42.4	12.6	2.7	0.0
Lane LOS	E	B	E	B	A	
Approach Delay (s)	25.0		19.8		2.7	0.0
Approach LOS	D		C			

Intersection Summary				
Average Delay		4.8		
Intersection Capacity Utilization	74.1%	ICU Level of Service		D
Analysis Period (min)		15		

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	10	304	273	39	368	222	117	16	172
Future Volume (vph)	10	304	273	39	368	222	117	16	172
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4			8		2		6
Permitted Phases	4		4	8		2		6	
Detector Phase	4	4	4	8	8	2	2	6	6
Switch Phase									
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	8.0	8.0	8.0	8.0
Minimum Split (s)	38.4	38.4	38.4	38.4	38.4	34.0	34.0	34.0	34.0
Total Split (s)	42.4	42.4	42.4	42.4	42.4	37.0	37.0	37.0	37.0
Total Split (%)	53.4%	53.4%	53.4%	53.4%	53.4%	46.6%	46.6%	46.6%	46.6%
Yellow Time (s)	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
All-Red Time (s)	3.3	3.3	3.3	3.3	3.3	2.9	2.9	2.9	2.9
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.4	7.4	7.4	7.4	7.4	7.0	7.0	7.0	7.0
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	None	None	None	None	None	Max	Max	Max	Max
Act Effct Green (s)	20.6	20.6	20.6	20.6	20.6	30.2	30.2	30.2	30.2
Actuated g/C Ratio	0.32	0.32	0.32	0.32	0.32	0.46	0.46	0.46	0.46
v/c Ratio	0.05	0.61	0.43	0.15	0.78	0.47	0.22	0.04	0.23
Control Delay	15.0	23.6	4.2	16.6	30.4	17.7	11.1	12.6	12.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.0	23.6	4.2	16.6	30.4	17.7	11.1	12.6	12.8
LOS	B	C	A	B	C	B	B	B	B
Approach Delay		14.4			29.2		14.9		12.8
Approach LOS		B			C		B		B

Intersection Summary			
Cycle Length: 79.4			
Actuated Cycle Length: 65.3			
Natural Cycle: 75			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.78			
Intersection Signal Delay: 18.3		Intersection LOS: B	
Intersection Capacity Utilization 85.0%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 2: Steele Street & Killaly Street West



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	304	273	39	368	20	222	117	44	16	172	6
Future Volume (vph)	10	304	273	39	368	20	222	117	44	16	172	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.4	7.4	7.4	7.4	7.4		7.0	7.0		7.0	7.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		0.99	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.96		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1802	1727	1550	1702	1717		1662	1707		1462	1845	
Flt Permitted	0.36	1.00	1.00	0.49	1.00		0.64	1.00		0.65	1.00	
Satd. Flow (perm)	681	1727	1550	878	1717		1112	1707		995	1845	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	11	330	297	42	400	22	241	127	48	17	187	7
RTOR Reduction (vph)	0	0	203	0	3	0	0	15	0	0	2	0
Lane Group Flow (vph)	11	330	94	42	419	0	241	160	0	17	192	0
Confl. Peds. (#/hr)	3		1	1		3	6		4	4		6
Heavy Vehicles (%)	0%	10%	2%	6%	9%	22%	8%	3%	14%	23%	2%	11%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	20.6	20.6	20.6	20.6	20.6		30.2	30.2		30.2	30.2	
Effective Green, g (s)	20.6	20.6	20.6	20.6	20.6		30.2	30.2		30.2	30.2	
Actuated g/C Ratio	0.32	0.32	0.32	0.32	0.32		0.46	0.46		0.46	0.46	
Clearance Time (s)	7.4	7.4	7.4	7.4	7.4		7.0	7.0		7.0	7.0	
Vehicle Extension (s)	2.8	2.8	2.8	2.8	2.8		2.8	2.8		2.8	2.8	
Lane Grp Cap (vph)	215	545	489	277	542		515	790		460	854	
v/s Ratio Prot		0.19			c0.24			0.09			0.10	
v/s Ratio Perm	0.02		0.06	0.05			c0.22			0.02		
v/c Ratio	0.05	0.61	0.19	0.15	0.77		0.47	0.20		0.04	0.23	
Uniform Delay, d1	15.5	18.9	16.2	16.0	20.2		12.0	10.4		9.6	10.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	1.8	0.2	0.2	6.7		3.0	0.6		0.2	0.6	
Delay (s)	15.6	20.6	16.4	16.2	26.9		15.0	10.9		9.7	11.1	
Level of Service	B	C	B	B	C		B	B		A	B	
Approach Delay (s)		18.6			25.9			13.3			11.0	
Approach LOS		B			C			B			B	

Intersection Summary					
HCM 2000 Control Delay	18.4	HCM 2000 Level of Service	B		
HCM 2000 Volume to Capacity ratio	0.59				
Actuated Cycle Length (s)	65.2	Sum of lost time (s)	14.4		
Intersection Capacity Utilization	85.0%	ICU Level of Service	E		
Analysis Period (min)	15				

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	6	185	67	100	209	302	45	90	68	355	134	2
Future Volume (Veh/h)	6	185	67	100	209	302	45	90	68	355	134	2
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	201	73	109	227	328	49	98	74	386	146	2
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	555			274			936	1024	238	984	897	391
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	555			274			936	1024	238	984	897	391
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			92			61	54	91	0	43	100
cM capacity (veh/h)	1026			1289			125	214	801	124	254	662

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	281	664	221	534
Volume Left	7	109	49	386
Volume Right	73	328	74	2
cSH	1026	1289	234	144
Volume to Capacity	0.01	0.08	0.94	3.70
Queue Length 95th (m)	0.2	2.2	66.5	Err
Control Delay (s)	0.3	2.2	89.3	Err
Lane LOS	A	A	F	F
Approach Delay (s)	0.3	2.2	89.3	Err
Approach LOS			F	F

Intersection Summary					
Average Delay	3153.4				
Intersection Capacity Utilization	100.7%	ICU Level of Service		G	
Analysis Period (min)	15				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	178	101	100	155	13	67	22	68	7	35	2
Future Volume (Veh/h)	2	178	101	100	155	13	67	22	68	7	35	2
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	193	110	109	168	14	73	24	74	8	38	2
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	182			303			666	652	248	731	700	175
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	182			303			666	652	248	731	700	175
tC, single (s)	5.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	3.1			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			91			77	93	91	97	89	100
cM capacity (veh/h)	970			1258			317	353	791	272	331	874

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	305	291	171	48
Volume Left	2	109	73	8
Volume Right	110	14	74	2
cSH	970	1258	436	328
Volume to Capacity	0.00	0.09	0.39	0.15
Queue Length 95th (m)	0.0	2.3	14.7	4.1
Control Delay (s)	0.1	3.5	18.5	17.9
Lane LOS	A	A	C	C
Approach Delay (s)	0.1	3.5	18.5	17.9
Approach LOS			C	C

Intersection Summary					
Average Delay	6.2				
Intersection Capacity Utilization	55.8%	ICU Level of Service		B	
Analysis Period (min)	15				

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	268	245	36	316	176	33
Future Volume (Veh/h)	268	245	36	316	176	33
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	291	266	39	343	191	36
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			291		845	424
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			291		845	424
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		41	94
cM capacity (veh/h)			1271		323	630

Direction, Lane #	EB 1	WB 1	NB 1	NB 2
Volume Total	557	382	191	36
Volume Left	0	39	191	0
Volume Right	266	0	0	36
cSH	1700	1271	323	630
Volume to Capacity	0.33	0.03	0.59	0.06
Queue Length 95th (m)	0.0	0.8	28.6	1.5
Control Delay (s)	0.0	1.1	31.1	11.1
Lane LOS		A	D	B
Approach Delay (s)	0.0	1.1	27.9	
Approach LOS			D	

Intersection Summary				
Average Delay	5.8			
Intersection Capacity Utilization	63.1%	ICU Level of Service	B	
Analysis Period (min)	15			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Stop	Stop		Stop	
Traffic Volume (vph)	0	45	67	67	44	0
Future Volume (vph)	0	45	67	67	44	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	49	73	73	48	0

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total (vph)	49	146	48
Volume Left (vph)	0	0	48
Volume Right (vph)	0	73	0
Hadj (s)	0.03	-0.27	0.23
Departure Headway (s)	4.2	3.8	4.5
Degree Utilization, x	0.06	0.15	0.06
Capacity (veh/h)	840	931	755
Control Delay (s)	7.4	7.5	7.8
Approach Delay (s)	7.4	7.5	7.8
Approach LOS	A	A	A

Intersection Summary				
Delay		7.5		
Level of Service		A		
Intersection Capacity Utilization		17.6%	ICU Level of Service	A
Analysis Period (min)		15		

Future 2036 Conditions

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	39	0	36	22	6	51	30	172	0	0	332	44
Future Volume (Veh/h)	39	0	36	22	6	51	30	172	0	0	332	44
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	42	0	39	24	7	55	33	187	0	0	361	48
Pedestrians		2						2			2	
Lane Width (m)		3.6						3.6			3.6	
Walking Speed (m/s)		1.2						1.2			1.2	
Percent Blockage		0						0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)											370	
pX, platoon unblocked												
vC, conflicting volume	700	640	389	679	664	189	411			187		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	700	640	389	679	664	189	411			187		
tC, single (s)	7.1	6.5	6.2	7.2	6.5	6.4	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.6	4.0	3.5	2.2			2.2		
p0 queue free %	87	100	94	93	98	93	97			100		
cM capacity (veh/h)	319	384	661	328	372	808	1157			1399		

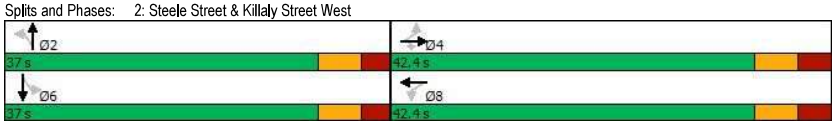
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	42	39	24	62	220	409
Volume Left	42	0	24	0	33	0
Volume Right	0	39	0	55	0	48
cSH	319	661	328	713	1157	1700
Volume to Capacity	0.13	0.06	0.07	0.09	0.03	0.24
Queue Length 95th (m)	3.6	1.5	1.9	2.3	0.7	0.0
Control Delay (s)	18.0	10.8	16.8	10.5	1.5	0.0
Lane LOS	C	B	C	B	A	
Approach Delay (s)	14.5		12.3		1.5	0.0
Approach LOS	B		B			

Intersection Summary					
Average Delay	3.2				
Intersection Capacity Utilization	50.0%	ICU Level of Service	A		
Analysis Period (min)	15				

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	5	180	214	41	84	180	170	39	128
Future Volume (vph)	5	180	214	41	84	180	170	39	128
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4			8		2		6
Permitted Phases	4		4	8		2		6	
Detector Phase	4	4	4	8	8	2	2	6	6
Switch Phase									
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	8.0	8.0	8.0	8.0
Minimum Split (s)	38.4	38.4	38.4	38.4	38.4	34.0	34.0	34.0	34.0
Total Split (s)	42.4	42.4	42.4	42.4	42.4	37.0	37.0	37.0	37.0
Total Split (%)	53.4%	53.4%	53.4%	53.4%	53.4%	46.6%	46.6%	46.6%	46.6%
Yellow Time (s)	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
All-Red Time (s)	3.3	3.3	3.3	3.3	3.3	2.9	2.9	2.9	2.9
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.4	7.4	7.4	7.4	7.4	7.0	7.0	7.0	7.0
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	None	None	None	None	None	Max	Max	Max	Max
Act Effct Green (s)	12.0	12.0	12.0	12.0	12.0	30.0	30.0	30.0	30.0
Actuated g/C Ratio	0.21	0.21	0.21	0.21	0.21	0.53	0.53	0.53	0.53
v/c Ratio	0.02	0.54	0.46	0.19	0.28	0.32	0.27	0.08	0.16
Control Delay	17.2	25.5	6.3	20.0	18.9	9.8	7.8	7.8	7.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.2	25.5	6.3	20.0	18.9	9.8	7.8	7.8	7.5
LOS	B	C	A	B	B	A	A	A	A
Approach Delay		15.1			19.2		8.7		7.6
Approach LOS		B			B		A		A

Intersection Summary			
Cycle Length: 79.4			
Actuated Cycle Length: 56.4			
Natural Cycle: 75			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.54			
Intersection Signal Delay: 12.1		Intersection LOS: B	
Intersection Capacity Utilization 74.8%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 2: Steele Street & Killaly Street West



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	180	214	41	84	11	180	170	56	39	128	11
Future Volume (vph)	5	180	214	41	84	11	180	170	56	39	128	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.4	7.4	7.4	7.4	7.4		7.0	7.0		7.0	7.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		0.99	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	0.96		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1801	1727	1550	1702	1685		1663	1720		1463	1824	
Flt Permitted	0.69	1.00	1.00	0.63	1.00		0.66	1.00		0.61	1.00	
Satd. Flow (perm)	1309	1727	1550	1137	1685		1157	1720		934	1824	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	196	233	45	91	12	196	185	61	42	139	12
RTOR Reduction (vph)	0	0	183	0	9	0	0	11	0	0	3	0
Lane Group Flow (vph)	5	196	50	45	94	0	196	235	0	42	148	0
Confl. Peds. (#/hr)	3		1	1		3	6		4	4		6
Heavy Vehicles (%)	0%	10%	2%	6%	9%	22%	8%	3%	14%	23%	2%	11%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	12.0	12.0	12.0	12.0	12.0		30.0	30.0		30.0	30.0	
Effective Green, g (s)	12.0	12.0	12.0	12.0	12.0		30.0	30.0		30.0	30.0	
Actuated g/C Ratio	0.21	0.21	0.21	0.21	0.21		0.53	0.53		0.53	0.53	
Clearance Time (s)	7.4	7.4	7.4	7.4	7.4		7.0	7.0		7.0	7.0	
Vehicle Extension (s)	2.8	2.8	2.8	2.8	2.8		2.8	2.8		2.8	2.8	
Lane Grp Cap (vph)	278	367	329	241	358		615	914		496	970	
v/s Ratio Prot		c0.11			0.06			0.14			0.08	
v/s Ratio Perm	0.00		0.03	0.04			c0.17			0.04		
v/c Ratio	0.02	0.53	0.15	0.19	0.26		0.32	0.26		0.08	0.15	
Uniform Delay, d1	17.5	19.7	18.1	18.2	18.5		7.4	7.2		6.5	6.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	1.4	0.2	0.3	0.4		1.4	0.7		0.3	0.3	
Delay (s)	17.6	21.1	18.2	18.5	18.9		8.8	7.8		6.8	7.1	
Level of Service	B	C	B	B	B		A	A		A	A	
Approach Delay (s)		19.5			18.8			8.3			7.0	
Approach LOS		B			B			A			A	

Intersection Summary				
HCM 2000 Control Delay	13.4	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.38			
Actuated Cycle Length (s)	56.4	Sum of lost time (s)	14.4	
Intersection Capacity Utilization	74.8%	ICU Level of Service	D	
Analysis Period (min)	15			

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	143	0	0	93	192	0	0	0	254	0	0
Future Volume (Veh/h)	1	143	0	0	93	192	0	0	0	254	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	155	0	0	101	209	0	0	0	276	0	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	310			155			362	467	155	362	362	206
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	310			155			362	467	155	362	362	206
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	53	100	100
cM capacity (veh/h)	1262			1425			593	493	891	591	565	840

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	156	310	0	276
Volume Left	1	0	0	276
Volume Right	0	209	0	0
cSH	1262	1425	1700	591
Volume to Capacity	0.00	0.00	0.00	0.47
Queue Length 95th (m)	0.0	0.0	0.0	19.8
Control Delay (s)	0.1	0.0	0.0	16.3
Lane LOS	A		A	C
Approach Delay (s)	0.1	0.0	0.0	16.3
Approach LOS			A	C

Intersection Summary				
Average Delay	6.1			
Intersection Capacity Utilization	37.4%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	124	0	0	72	20	0	0	0	22	0	1
Future Volume (Veh/h)	1	124	0	0	72	20	0	0	0	22	0	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	135	0	0	78	22	0	0	0	24	0	1
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	100			135			227	237	135	226	226	89
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	100			135			227	237	135	226	226	89
tC, single (s)	5.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	3.1			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	97	100	100
cM capacity (veh/h)	1052			1449			727	663	914	733	673	975

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	136	100	0	25
Volume Left	1	0	0	24
Volume Right	0	22	0	1
cSH	1052	1449	1700	740
Volume to Capacity	0.00	0.00	0.00	0.03
Queue Length 95th (m)	0.0	0.0	0.0	0.8
Control Delay (s)	0.1	0.0	0.0	10.0
Lane LOS	A		A	B
Approach Delay (s)	0.1	0.0	0.0	10.0
Approach LOS			A	B

Intersection Summary					
Average Delay	1.0				
Intersection Capacity Utilization	17.3%	ICU Level of Service		A	
Analysis Period (min)	15				

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	271	134	4	213	66	10
Future Volume (Veh/h)	271	134	4	213	66	10
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	295	146	4	232	72	11
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			295		608	368
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			295		608	368
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		84	98
cM capacity (veh/h)			1266		457	677

Direction, Lane #	EB 1	WB 1	NB 1	NB 2
Volume Total	441	236	72	11
Volume Left	0	4	72	0
Volume Right	146	0	0	11
cSH	1700	1266	457	677
Volume to Capacity	0.26	0.00	0.16	0.02
Queue Length 95th (m)	0.0	0.1	4.4	0.4
Control Delay (s)	0.0	0.2	14.3	10.4
Lane LOS		A	B	B
Approach Delay (s)	0.0	0.2	13.8	
Approach LOS			B	

Intersection Summary				
Average Delay	1.6			
Intersection Capacity Utilization	32.8%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	32	0	27	14	4	42	23	405	0	0	507	37
Future Volume (Veh/h)	32	0	27	14	4	42	23	405	0	0	507	37
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	35	0	29	15	4	46	25	440	0	0	551	40
Pedestrians		2						2			2	
Lane Width (m)		3.6						3.6			3.6	
Walking Speed (m/s)		1.2						1.2			1.2	
Percent Blockage		0						0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)											370	
pX, platoon unblocked												
vC, conflicting volume	1113	1063	575	1092	1083	442	593			440		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1113	1063	575	1092	1083	442	593			440		
tC, single (s)	7.1	6.5	6.2	7.2	6.5	6.4	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.6	4.0	3.5	2.2			2.2		
p0 queue free %	79	100	94	91	98	92	97			100		
cM capacity (veh/h)	166	219	520	173	213	578	991			1131		

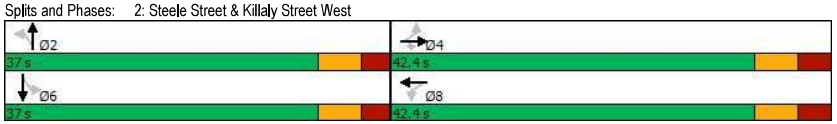
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	35	29	15	50	465	591
Volume Left	35	0	15	0	25	0
Volume Right	0	29	0	46	0	40
cSH	166	520	173	509	991	1700
Volume to Capacity	0.21	0.06	0.09	0.10	0.03	0.35
Queue Length 95th (m)	6.1	1.4	2.3	2.6	0.6	0.0
Control Delay (s)	32.4	12.3	27.8	12.8	0.8	0.0
Lane LOS	D	B	D	B	A	
Approach Delay (s)	23.3		16.3		0.8	0.0
Approach LOS	C		C			

Intersection Summary					
Average Delay	2.4				
Intersection Capacity Utilization	55.5%	ICU Level of Service	B		
Analysis Period (min)	15				

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	11	186	302	43	185	245	105	18	115
Future Volume (vph)	11	186	302	43	185	245	105	18	115
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4			8		2		6
Permitted Phases	4		4	8		2		6	
Detector Phase	4	4	4	8	8	2	2	6	6
Switch Phase									
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	8.0	8.0	8.0	8.0
Minimum Split (s)	38.4	38.4	38.4	38.4	38.4	34.0	34.0	34.0	34.0
Total Split (s)	42.4	42.4	42.4	42.4	42.4	37.0	37.0	37.0	37.0
Total Split (%)	53.4%	53.4%	53.4%	53.4%	53.4%	46.6%	46.6%	46.6%	46.6%
Yellow Time (s)	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
All-Red Time (s)	3.3	3.3	3.3	3.3	3.3	2.9	2.9	2.9	2.9
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.4	7.4	7.4	7.4	7.4	7.0	7.0	7.0	7.0
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	None	None	None	None	None	Max	Max	Max	Max
Act Effct Green (s)	12.7	12.7	12.7	12.7	12.7	30.1	30.1	30.1	30.1
Actuated g/C Ratio	0.22	0.22	0.22	0.22	0.22	0.53	0.53	0.53	0.53
v/c Ratio	0.05	0.53	0.55	0.19	0.59	0.43	0.18	0.04	0.14
Control Delay	17.3	24.9	6.4	19.6	25.7	11.8	6.9	8.0	7.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.3	24.9	6.4	19.6	25.7	11.8	6.9	8.0	7.9
LOS	B	C	A	B	C	B	A	A	A
Approach Delay		13.5			24.6		9.9		7.9
Approach LOS		B			C		A		A

Intersection Summary			
Cycle Length: 79.4			
Actuated Cycle Length: 57.2			
Natural Cycle: 75			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.59			
Intersection Signal Delay: 14.0		Intersection LOS: B	
Intersection Capacity Utilization 80.9%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 2: Steele Street & Killaly Street West



HCM Signalized Intersection Capacity Analysis <2036 Background> PM Peak Hour
2: Steele Street & Killaly Street West 03-27-2024

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	186	302	43	185	22	245	105	48	18	115	6
Future Volume (vph)	11	186	302	43	185	22	245	105	48	18	115	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.4	7.4	7.4	7.4	7.4		7.0	7.0		7.0	7.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		0.99	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	0.95		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1801	1727	1550	1702	1690		1662	1688		1463	1837	
Flt Permitted	0.62	1.00	1.00	0.63	1.00		0.67	1.00		0.65	1.00	
Satd. Flow (perm)	1172	1727	1550	1130	1690		1177	1688		1004	1837	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	12	202	328	47	201	24	266	114	52	20	125	7
RTOR Reduction (vph)	0	0	255	0	8	0	0	16	0	0	2	0
Lane Group Flow (vph)	12	202	73	47	217	0	266	150	0	20	130	0
Confl. Peds. (#/hr)	3		1	1		3	6		4	4		6
Heavy Vehicles (%)	0%	10%	2%	6%	9%	22%	8%	3%	14%	23%	2%	11%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	12.7	12.7	12.7	12.7	12.7		30.1	30.1		30.1	30.1	
Effective Green, g (s)	12.7	12.7	12.7	12.7	12.7		30.1	30.1		30.1	30.1	
Actuated g/C Ratio	0.22	0.22	0.22	0.22	0.22		0.53	0.53		0.53	0.53	
Clearance Time (s)	7.4	7.4	7.4	7.4	7.4		7.0	7.0		7.0	7.0	
Vehicle Extension (s)	2.8	2.8	2.8	2.8	2.8		2.8	2.8		2.8	2.8	
Lane Grp Cap (vph)	260	383	344	250	375		619	888		528	966	
v/s Ratio Prot		0.12			c0.13			0.09			0.07	
v/s Ratio Perm	0.01		0.05	0.04			c0.23			0.02		
v/c Ratio	0.05	0.53	0.21	0.19	0.58		0.43	0.17		0.04	0.13	
Uniform Delay, d1	17.5	19.6	18.2	18.1	19.9		8.3	7.0		6.6	6.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	1.2	0.3	0.3	2.0		2.2	0.4		0.1	0.3	
Delay (s)	17.6	20.8	18.4	18.4	21.9		10.5	7.5		6.7	7.2	
Level of Service	B	C	B	B	C		B	A		A	A	
Approach Delay (s)		19.3			21.3			9.3			7.1	
Approach LOS		B			C			A			A	

Intersection Summary				
HCM 2000 Control Delay	15.3	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.47			
Actuated Cycle Length (s)	57.2	Sum of lost time (s)	14.4	
Intersection Capacity Utilization	80.9%	ICU Level of Service	D	
Analysis Period (min)	15			

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis <2036 Background> PM Peak Hour
3: Killaly Street West & West Side Road 03-27-2024

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	6	131	0	0	120	334	0	0	0	392	0	3
Future Volume (Veh/h)	6	131	0	0	120	334	0	0	0	392	0	3
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	142	0	0	130	363	0	0	0	426	0	3
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	493			142			470	649	142	468	468	312
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	493			142			470	649	142	468	468	312
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	100	100	15	100	100
cM capacity (veh/h)	1081			1441			499	386	906	502	490	733

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	149	493	0	429
Volume Left	7	0	0	426
Volume Right	0	363	0	3
cSH	1081	1441	1700	503
Volume to Capacity	0.01	0.00	0.00	0.85
Queue Length 95th (m)	0.2	0.0	0.0	71.1
Control Delay (s)	0.4	0.0	0.0	41.1
Lane LOS	A		A	E
Approach Delay (s)	0.4	0.0	0.0	41.1
Approach LOS			A	E

Intersection Summary				
Average Delay	16.5			
Intersection Capacity Utilization	55.4%	ICU Level of Service	B	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	3	123	0	0	122	14	0	0	0	8	0	3
Future Volume (Veh/h)	3	123	0	0	122	14	0	0	0	8	0	3
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	134	0	0	133	15	0	0	0	9	0	3
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	148			134			284	288	134	280	280	140
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	148			134			284	288	134	280	280	140
tC, single (s)	5.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	3.1			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	99	100	100
cM capacity (veh/h)	1003			1451			665	620	915	674	626	913

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	137	148	0	12
Volume Left	3	0	0	9
Volume Right	0	15	0	3
cSH	1003	1451	1700	721
Volume to Capacity	0.00	0.00	0.00	0.02
Queue Length 95th (m)	0.1	0.0	0.0	0.4
Control Delay (s)	0.2	0.0	0.0	10.1
Lane LOS	A		A	B
Approach Delay (s)	0.2	0.0	0.0	10.1
Approach LOS			A	B

Intersection Summary					
Average Delay	0.5				
Intersection Capacity Utilization	18.9%	ICU Level of Service		A	
Analysis Period (min)	15				

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	296	123	3	349	95	13
Future Volume (Veh/h)	296	123	3	349	95	13
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	322	134	3	379	103	14
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			322		774	389
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			322		774	389
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		72	98
cM capacity (veh/h)			1238		366	659

Direction, Lane #	EB 1	WB 1	NB 1	NB 2
Volume Total	456	382	103	14
Volume Left	0	3	103	0
Volume Right	134	0	0	14
cSH	1700	1238	366	659
Volume to Capacity	0.27	0.00	0.28	0.02
Queue Length 95th (m)	0.0	0.1	9.1	0.5
Control Delay (s)	0.0	0.1	18.6	10.6
Lane LOS		A	C	B
Approach Delay (s)	0.0	0.1	17.7	
Approach LOS			C	

Intersection Summary				
Average Delay	2.2			
Intersection Capacity Utilization	35.0%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	74	0	140	22	6	51	54	172	0	0	332	68
Future Volume (Veh/h)	74	0	140	22	6	51	54	172	0	0	332	68
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	80	0	152	24	7	55	59	187	0	0	361	74
Pedestrians		2						2			2	
Lane Width (m)		3.6						3.6			3.6	
Walking Speed (m/s)		1.2						1.2			1.2	
Percent Blockage		0						0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)											370	
pX, platoon unblocked												
vC, conflicting volume	766	705	402	857	742	189	437			187		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	766	705	402	857	742	189	437			187		
tC, single (s)	7.1	6.5	6.2	7.2	6.5	6.4	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.6	4.0	3.5	2.2			2.2		
p0 queue free %	72	100	77	88	98	93	95			100		
cM capacity (veh/h)	282	344	650	199	328	808	1132			1399		

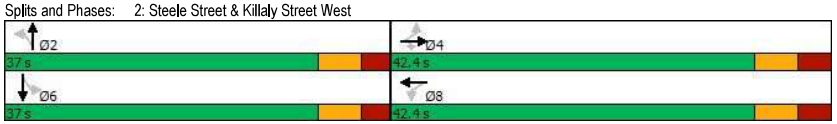
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	80	152	24	62	246	435
Volume Left	80	0	24	0	59	0
Volume Right	0	152	0	55	0	74
cSH	282	650	199	693	1132	1700
Volume to Capacity	0.28	0.23	0.12	0.09	0.05	0.26
Queue Length 95th (m)	9.1	7.2	3.2	2.3	1.3	0.0
Control Delay (s)	22.7	12.2	25.6	10.7	2.4	0.0
Lane LOS	C	B	D	B	A	
Approach Delay (s)	15.8		14.9		2.4	0.0
Approach LOS	C		B			

Intersection Summary					
Average Delay	5.5				
Intersection Capacity Utilization	54.6%	ICU Level of Service	A		
Analysis Period (min)	15				

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	5	387	214	41	157	180	205	39	152
Future Volume (vph)	5	387	214	41	157	180	205	39	152
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4			8		2		6
Permitted Phases	4		4	8		2		6	
Detector Phase	4	4	4	8	8	2	2	6	6
Switch Phase									
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	8.0	8.0	8.0	8.0
Minimum Split (s)	38.4	38.4	38.4	38.4	38.4	34.0	34.0	34.0	34.0
Total Split (s)	42.4	42.4	42.4	42.4	42.4	37.0	37.0	37.0	37.0
Total Split (%)	53.4%	53.4%	53.4%	53.4%	53.4%	46.6%	46.6%	46.6%	46.6%
Yellow Time (s)	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
All-Red Time (s)	3.3	3.3	3.3	3.3	3.3	2.9	2.9	2.9	2.9
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.4	7.4	7.4	7.4	7.4	7.0	7.0	7.0	7.0
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	None	None	None	None	None	Max	Max	Max	Max
Act Effct Green (s)	21.1	21.1	21.1	21.1	21.1	30.3	30.3	30.3	30.3
Actuated g/C Ratio	0.32	0.32	0.32	0.32	0.32	0.46	0.46	0.46	0.46
v/c Ratio	0.01	0.76	0.37	0.22	0.33	0.38	0.35	0.10	0.21
Control Delay	13.8	29.5	5.1	18.1	17.5	16.4	13.8	13.5	13.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.8	29.5	5.1	18.1	17.5	16.4	13.8	13.5	13.0
LOS	B	C	A	B	B	B	B	B	B
Approach Delay		20.7			17.6		14.9		13.1
Approach LOS		C			B		B		B

Intersection Summary			
Cycle Length: 79.4			
Actuated Cycle Length: 65.9			
Natural Cycle: 75			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.76			
Intersection Signal Delay: 17.4		Intersection LOS: B	
Intersection Capacity Utilization 84.4%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 2: Steele Street & Killaly Street West



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	387	214	41	157	11	180	205	56	39	152	11
Future Volume (vph)	5	387	214	41	157	11	180	205	56	39	152	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.4	7.4	7.4	7.4	7.4		7.0	7.0		7.0	7.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		0.99	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.97		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1801	1727	1550	1702	1710		1662	1736		1463	1829	
Flt Permitted	0.64	1.00	1.00	0.36	1.00		0.65	1.00		0.59	1.00	
Satd. Flow (perm)	1217	1727	1550	651	1710		1129	1736		902	1829	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	421	233	45	171	12	196	223	61	42	165	12
RTOR Reduction (vph)	0	0	142	0	4	0	0	11	0	0	3	0
Lane Group Flow (vph)	5	421	91	45	179	0	196	273	0	42	174	0
Confl. Peds. (#/hr)	3		1	1		3	6		4	4		6
Heavy Vehicles (%)	0%	10%	2%	6%	9%	22%	8%	3%	14%	23%	2%	11%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	21.1	21.1	21.1	21.1	21.1		30.3	30.3		30.3	30.3	
Effective Green, g (s)	21.1	21.1	21.1	21.1	21.1		30.3	30.3		30.3	30.3	
Actuated g/C Ratio	0.32	0.32	0.32	0.32	0.32		0.46	0.46		0.46	0.46	
Clearance Time (s)	7.4	7.4	7.4	7.4	7.4		7.0	7.0		7.0	7.0	
Vehicle Extension (s)	2.8	2.8	2.8	2.8	2.8		2.8	2.8		2.8	2.8	
Lane Grp Cap (vph)	390	553	497	208	548		519	799		415	842	
v/s Ratio Prot		c0.24			0.10			0.16			0.10	
v/s Ratio Perm	0.00		0.06	0.07			c0.17			0.05		
v/c Ratio	0.01	0.76	0.18	0.22	0.33		0.38	0.34		0.10	0.21	
Uniform Delay, d1	15.2	20.1	16.1	16.3	17.0		11.6	11.4		10.0	10.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	6.0	0.2	0.5	0.3		2.1	1.2		0.5	0.6	
Delay (s)	15.3	26.1	16.3	16.8	17.3		13.7	12.5		10.5	11.1	
Level of Service	B	C	B	B	B		B	B		B	B	
Approach Delay (s)		22.6			17.2			13.0			11.0	
Approach LOS		C			B			B			B	

Intersection Summary				
HCM 2000 Control Delay	17.3	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.53			
Actuated Cycle Length (s)	65.8	Sum of lost time (s)	14.4	
Intersection Capacity Utilization	84.4%	ICU Level of Service	E	
Analysis Period (min)	15			

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	247	12	37	129	192	69	137	104	254	49	0
Future Volume (Veh/h)	1	247	12	37	129	192	69	137	104	254	49	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	268	13	40	140	209	75	149	113	276	53	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	349			281			628	706	274	788	608	244
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	349			281			628	706	274	788	608	244
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			97			78	57	85	0	87	100
cM capacity (veh/h)	1221			1282			347	349	764	171	397	799

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	282	389	337	329
Volume Left	1	40	75	276
Volume Right	13	209	113	0
cSH	1221	1282	426	188
Volume to Capacity	0.00	0.03	0.79	1.75
Queue Length 95th (m)	0.0	0.8	55.8	184.0
Control Delay (s)	0.0	1.1	38.6	401.8
Lane LOS	A	A	E	F
Approach Delay (s)	0.0	1.1	38.6	401.8
Approach LOS			E	F

Intersection Summary			
Average Delay	108.9		
Intersection Capacity Utilization	81.7%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	136	49	36	141	20	102	35	104	22	12	1
Future Volume (Veh/h)	1	136	49	36	141	20	102	35	104	22	12	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	148	53	39	153	22	111	38	113	24	13	1
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	175			201			426	430	174	550	445	164
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	175			201			426	430	174	550	445	164
tC, single (s)	5.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	3.1			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			97			78	92	87	93	97	100
cM capacity (veh/h)	976			1371			515	503	869	359	493	886

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	202	214	262	38
Volume Left	1	39	111	24
Volume Right	53	22	113	1
cSH	976	1371	622	403
Volume to Capacity	0.00	0.03	0.42	0.09
Queue Length 95th (m)	0.0	0.7	16.7	2.5
Control Delay (s)	0.1	1.6	14.9	14.9
Lane LOS	A	A	B	B
Approach Delay (s)	0.1	1.6	14.9	14.9
Approach LOS			B	B

Intersection Summary				
Average Delay	6.7			
Intersection Capacity Utilization	45.6%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	271	183	16	213	204	45
Future Volume (Veh/h)	271	183	16	213	204	45
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	295	199	17	232	222	49
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			295		660	394
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			295		660	394
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		47	93
cM capacity (veh/h)			1266		422	655

Direction, Lane #	EB 1	WB 1	NB 1	NB 2
Volume Total	494	249	222	49
Volume Left	0	17	222	0
Volume Right	199	0	0	49
cSH	1700	1266	422	655
Volume to Capacity	0.29	0.01	0.53	0.07
Queue Length 95th (m)	0.0	0.3	23.8	1.9
Control Delay (s)	0.0	0.7	22.6	10.9
Lane LOS		A	C	B
Approach Delay (s)	0.0	0.7	20.5	
Approach LOS			C	

Intersection Summary				
Average Delay	5.6			
Intersection Capacity Utilization	43.4%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Stop	Stop		Stop	
Traffic Volume (vph)	0	69	24	24	68	0
Future Volume (vph)	0	69	24	24	68	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	75	26	26	74	0

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total (vph)	75	52	74
Volume Left (vph)	0	0	74
Volume Right (vph)	0	26	0
Hadj (s)	0.03	-0.27	0.23
Departure Headway (s)	4.2	3.9	4.4
Degree Utilization, x	0.09	0.06	0.09
Capacity (veh/h)	844	902	788
Control Delay (s)	7.6	7.1	7.8
Approach Delay (s)	7.6	7.1	7.8
Approach LOS	A	A	A

Intersection Summary				
Delay		7.5		
Level of Service		A		
Intersection Capacity Utilization	14.1%	ICU Level of Service		A
Analysis Period (min)		15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	54	0	94	14	4	42	90	405	0	0	507	104
Future Volume (Veh/h)	54	0	94	14	4	42	90	405	0	0	507	104
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	59	0	102	15	4	46	98	440	0	0	551	113
Pedestrians		2						2			2	
Lane Width (m)		3.6						3.6			3.6	
Walking Speed (m/s)		1.2						1.2			1.2	
Percent Blockage		0						0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)											370	
pX, platoon unblocked												
vC, conflicting volume	1296	1246	612	1348	1302	442	666			440		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1296	1246	612	1348	1302	442	666			440		
tC, single (s)	7.1	6.5	6.2	7.2	6.5	6.4	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.6	4.0	3.5	2.2			2.2		
p0 queue free %	49	100	79	83	97	92	89			100		
cM capacity (veh/h)	116	157	495	91	145	578	931			1131		

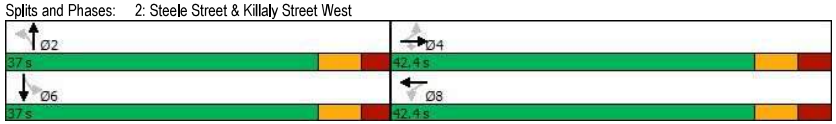
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	59	102	15	50	538	664
Volume Left	59	0	15	0	98	0
Volume Right	0	102	0	46	0	113
cSH	116	495	91	467	931	1700
Volume to Capacity	0.51	0.21	0.17	0.11	0.11	0.39
Queue Length 95th (m)	18.7	6.1	4.5	2.9	2.8	0.0
Control Delay (s)	64.6	14.1	52.5	13.6	2.8	0.0
Lane LOS	F	B	F	B	A	
Approach Delay (s)	32.6		22.6		2.8	0.0
Approach LOS	D		C			

Intersection Summary				
Average Delay		5.8		
Intersection Capacity Utilization	79.2%	ICU Level of Service		D
Analysis Period (min)		15		

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	11	321	302	43	385	245	127	18	182
Future Volume (vph)	11	321	302	43	385	245	127	18	182
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4			8		2		6
Permitted Phases	4		4	8		2		6	
Detector Phase	4	4	4	8	8	2	2	6	6
Switch Phase									
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	8.0	8.0	8.0	8.0
Minimum Split (s)	38.4	38.4	38.4	38.4	38.4	34.0	34.0	34.0	34.0
Total Split (s)	42.4	42.4	42.4	42.4	42.4	37.0	37.0	37.0	37.0
Total Split (%)	53.4%	53.4%	53.4%	53.4%	53.4%	46.6%	46.6%	46.6%	46.6%
Yellow Time (s)	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
All-Red Time (s)	3.3	3.3	3.3	3.3	3.3	2.9	2.9	2.9	2.9
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.4	7.4	7.4	7.4	7.4	7.0	7.0	7.0	7.0
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	None	None	None	None	None	Max	Max	Max	Max
Act Effct Green (s)	21.7	21.7	21.7	21.7	21.7	30.3	30.3	30.3	30.3
Actuated g/C Ratio	0.33	0.33	0.33	0.33	0.33	0.46	0.46	0.46	0.46
v/c Ratio	0.06	0.62	0.45	0.17	0.79	0.53	0.24	0.04	0.24
Control Delay	14.7	23.6	4.1	16.6	30.4	20.0	12.1	13.3	13.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.7	23.6	4.1	16.6	30.4	20.0	12.1	13.3	13.6
LOS	B	C	A	B	C	C	B	B	B
Approach Delay		14.2			29.1		16.7		13.6
Approach LOS		B			C		B		B

Intersection Summary			
Cycle Length: 79.4			
Actuated Cycle Length: 66.5			
Natural Cycle: 75			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.79			
Intersection Signal Delay: 18.6		Intersection LOS: B	
Intersection Capacity Utilization 89.6%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 2: Steele Street & Killaly Street West



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	321	302	43	385	22	245	127	48	18	182	6
Future Volume (vph)	11	321	302	43	385	22	245	127	48	18	182	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.4	7.4	7.4	7.4	7.4		7.0	7.0		7.0	7.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		0.99	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.96		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1802	1727	1550	1702	1716		1662	1707		1462	1846	
Flt Permitted	0.34	1.00	1.00	0.47	1.00		0.63	1.00		0.64	1.00	
Satd. Flow (perm)	644	1727	1550	836	1716		1101	1707		982	1846	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	12	349	328	47	418	24	266	138	52	20	198	7
RTOR Reduction (vph)	0	0	221	0	3	0	0	15	0	0	2	0
Lane Group Flow (vph)	12	349	107	47	439	0	266	175	0	20	203	0
Confl. Peds. (#/hr)	3		1	1		3	6		4	4		6
Heavy Vehicles (%)	0%	10%	2%	6%	9%	22%	8%	3%	14%	23%	2%	11%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	21.7	21.7	21.7	21.7	21.7		30.3	30.3		30.3	30.3	
Effective Green, g (s)	21.7	21.7	21.7	21.7	21.7		30.3	30.3		30.3	30.3	
Actuated g/C Ratio	0.33	0.33	0.33	0.33	0.33		0.46	0.46		0.46	0.46	
Clearance Time (s)	7.4	7.4	7.4	7.4	7.4		7.0	7.0		7.0	7.0	
Vehicle Extension (s)	2.8	2.8	2.8	2.8	2.8		2.8	2.8		2.8	2.8	
Lane Grp Cap (vph)	210	564	506	273	560		502	778		448	842	
v/s Ratio Prot		0.20			c0.26			0.10			0.11	
v/s Ratio Perm	0.02		0.07	0.06			c0.24			0.02		
v/c Ratio	0.06	0.62	0.21	0.17	0.78		0.53	0.23		0.04	0.24	
Uniform Delay, d1	15.3	18.9	16.2	15.9	20.2		12.9	10.9		10.0	11.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	1.9	0.2	0.3	7.0		4.0	0.7		0.2	0.7	
Delay (s)	15.4	20.8	16.4	16.2	27.2		16.9	11.6		10.2	11.7	
Level of Service	B	C	B	B	C		B	B		B	B	
Approach Delay (s)		18.6			26.1			14.7			11.6	
Approach LOS		B			C			B			B	

Intersection Summary					
HCM 2000 Control Delay	18.8	HCM 2000 Level of Service		B	
HCM 2000 Volume to Capacity ratio	0.63				
Actuated Cycle Length (s)	66.4	Sum of lost time (s)		14.4	
Intersection Capacity Utilization	89.6%	ICU Level of Service		E	
Analysis Period (min)	15				

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	6	198	67	100	220	334	45	90	68	392	134	3
Future Volume (Veh/h)	6	198	67	100	220	334	45	90	68	392	134	3
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	215	73	109	239	363	49	98	74	426	146	3
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	602			288			980	1086	252	1027	940	420
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	602			288			980	1086	252	1027	940	420
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			91			55	50	91	0	39	100
cM capacity (veh/h)	985			1274			110	197	787	109	239	637

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	295	711	221	575
Volume Left	7	109	49	426
Volume Right	73	363	74	3
cSH	985	1274	213	127
Volume to Capacity	0.01	0.09	1.04	4.52
Queue Length 95th (m)	0.2	2.2	77.1	Err
Control Delay (s)	0.3	2.1	120.2	Err
Lane LOS	A	A	F	F
Approach Delay (s)	0.3	2.1	120.2	Err
Approach LOS			F	F

Intersection Summary					
Average Delay	3206.2				
Intersection Capacity Utilization	106.0%	ICU Level of Service	G		
Analysis Period (min)	15				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	3	190	101	100	167	14	67	22	68	8	35	3
Future Volume (Veh/h)	3	190	101	100	167	14	67	22	68	8	35	3
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	207	110	109	182	15	73	24	74	9	38	3
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	197			317			698	683	262	762	730	190
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	197			317			698	683	262	762	730	190
tC, single (s)	5.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	3.1			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			91			76	93	90	97	88	100
cM capacity (veh/h)	955			1243			300	338	777	258	317	857

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	320	306	171	50
Volume Left	3	109	73	9
Volume Right	110	15	74	3
cSH	955	1243	417	316
Volume to Capacity	0.00	0.09	0.41	0.16
Queue Length 95th (m)	0.1	2.3	15.7	4.4
Control Delay (s)	0.1	3.4	19.5	18.5
Lane LOS	A	A	C	C
Approach Delay (s)	0.1	3.4	19.5	18.5
Approach LOS			C	C

Intersection Summary					
Average Delay	6.3				
Intersection Capacity Utilization	57.2%	ICU Level of Service	B		
Analysis Period (min)	15				

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	296	257	37	349	185	35
Future Volume (Veh/h)	296	257	37	349	185	35
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	322	279	40	379	201	38
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			322		920	462
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			322		920	462
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		31	94
cM capacity (veh/h)			1238		291	600

Direction, Lane #	EB 1	WB 1	NB 1	NB 2
Volume Total	601	419	201	38
Volume Left	0	40	201	0
Volume Right	279	0	0	38
cSH	1700	1238	291	600
Volume to Capacity	0.35	0.03	0.69	0.06
Queue Length 95th (m)	0.0	0.8	37.8	1.6
Control Delay (s)	0.0	1.1	41.1	11.4
Lane LOS		A	E	B
Approach Delay (s)	0.0	1.1	36.3	
Approach LOS			E	

Intersection Summary				
Average Delay	7.3			
Intersection Capacity Utilization	66.1%	ICU Level of Service	C	
Analysis Period (min)	15			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Stop	Stop		Stop	
Traffic Volume (vph)	0	45	67	67	44	0
Future Volume (vph)	0	45	67	67	44	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	49	73	73	48	0

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total (vph)	49	146	48
Volume Left (vph)	0	0	48
Volume Right (vph)	0	73	0
Hadj (s)	0.03	-0.27	0.23
Departure Headway (s)	4.2	3.8	4.5
Degree Utilization, x	0.06	0.15	0.06
Capacity (veh/h)	840	931	755
Control Delay (s)	7.4	7.5	7.8
Approach Delay (s)	7.4	7.5	7.8
Approach LOS	A	A	A

Intersection Summary				
Delay	7.5			
Level of Service	A			
Intersection Capacity Utilization	17.6%	ICU Level of Service	A	
Analysis Period (min)	15			

APPENDIX D

Level of Service Definitions

LEVEL OF SERVICE ANALYSIS AT SIGNALIZED INTERSECTIONS

To assist in clarifying the arithmetic analysis associated with traffic engineering, it is often useful to refer to "Level of Service". The term Level of Service implies a qualitative measure of traffic flow at an intersection. It is dependent upon vehicle delay and vehicle queue lengths at the approaches. Specifically, Level of Service criteria are stated in terms of the average stopped delay per vehicle for a 15-minute analysis period. The following table describes the characteristics of each level:

Level of Service	Features	Stopped Delay per Vehicle (sec)
A	At this level of service, almost no signal phase is fully utilized by traffic. Very seldom does a vehicle wait longer than one red indication. The approach appears open, turning movements are easily made and drivers have freedom of operation.	≤ 5.0
B	At this level, an occasional signal phase is fully utilized and many phases approach full use. Many drivers begin to feel somewhat restricted within platoons of vehicles approaching the intersection.	> 5.0 and ≤ 15.0
C	At this level, the operation is stable though with more frequent fully utilized signal phases. Drivers feel more restricted and occasionally may have to wait more than one red signal indication, and queues may develop behind turning vehicles. This level is normally employed in urban intersection design.	> 15.0 and ≤ 25.0
D	At this level, the motorist experiences increasing restriction and instability of flow. There are substantial delays to approaching vehicles during short peaks within the peak period, but there are enough cycles with lower demand to permit occasional clearance of developing queues and prevent excessive backups.	> 25.0 and ≤ 40.0
E	At this level, capacity is reached. There are long queues of vehicles waiting upstream of the intersection and delays to vehicles may extend to several signal cycles.	> 40.0 and ≤ 60.0
F	At this level, saturation occurs, with vehicle demand exceeding the available capacity.	> 60.0

LEVEL OF SERVICE ANALYSIS AT UNSIGNALIZED INTERSECTIONS[1]

The term "level of service" implies a qualitative measure of traffic flow at an intersection. It is dependent upon the vehicle delay and vehicle queue lengths at approaches. The level of service at unsignalized intersections is often related to the delay accumulated by flows on the minor streets, caused by all other conflicting movements. The following table describes the characteristics of each level.

Level of Service	Features
A	Little or no traffic delay occurs. Approaches appear open, turning movements are easily made, and drivers have freedom of operation.
B	Short traffic delays occur. Many drivers begin to feel somewhat restricted in terms of freedom of operation.
C	Average traffic delays occur. Operations are generally stable, but drivers emerging from the minor street may experience difficulty in completing their movement. This may occasionally impact on the stability of flow on the major street.
D	Long traffic delays occur. Motorists emerging from the minor street experience significant restriction and frustration. Drivers on the major street will experience congestion and delay as drivers emerging from the minor street interfere with the major through movements.
E	Very long traffic delays occur. Operations approach the capacity of the intersection.
F	Saturation occurs, with vehicle demand exceeding the available capacity. Very long traffic delays occur.

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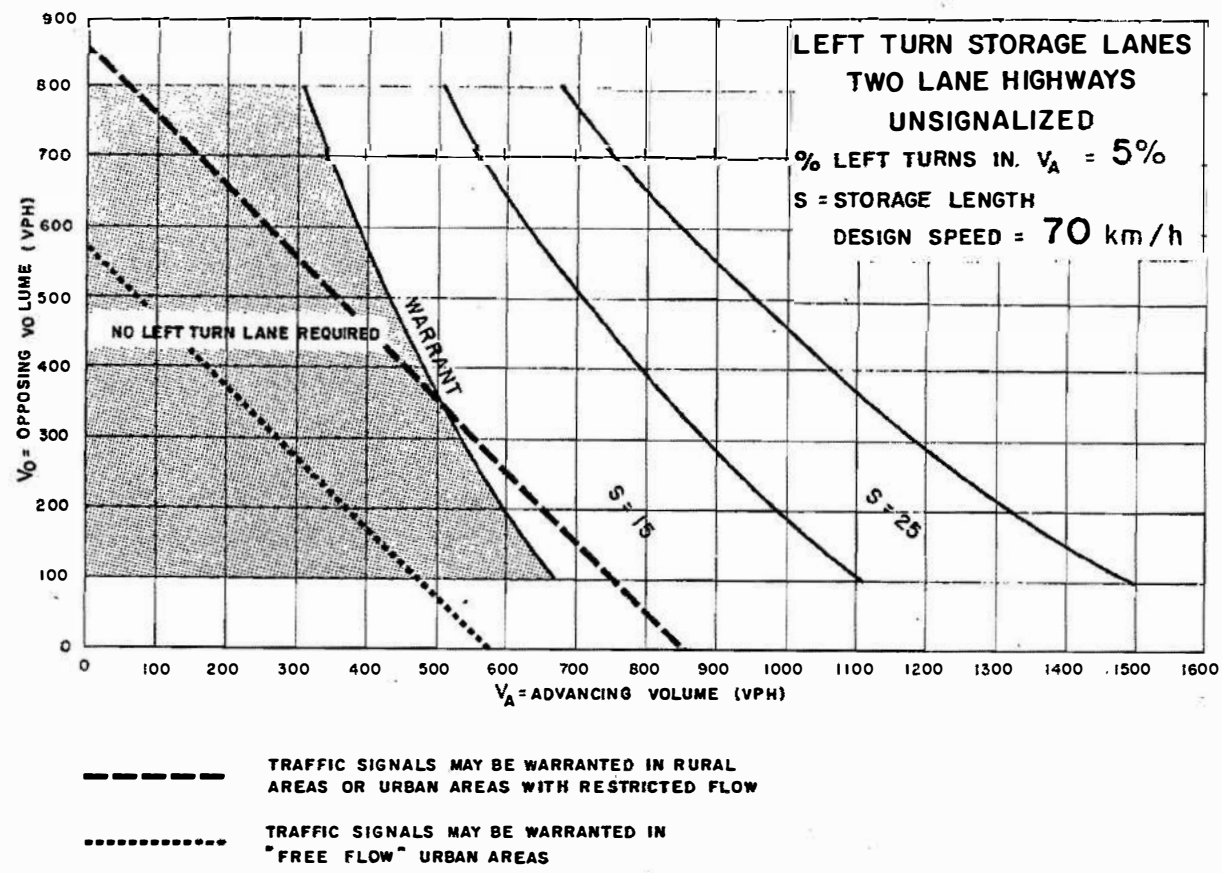
(1) Highway Capacity Manual - Special Report No. 209, Transportation Research Board, 1985.

APPENDIX E

Left Turn Lane Warrants



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

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

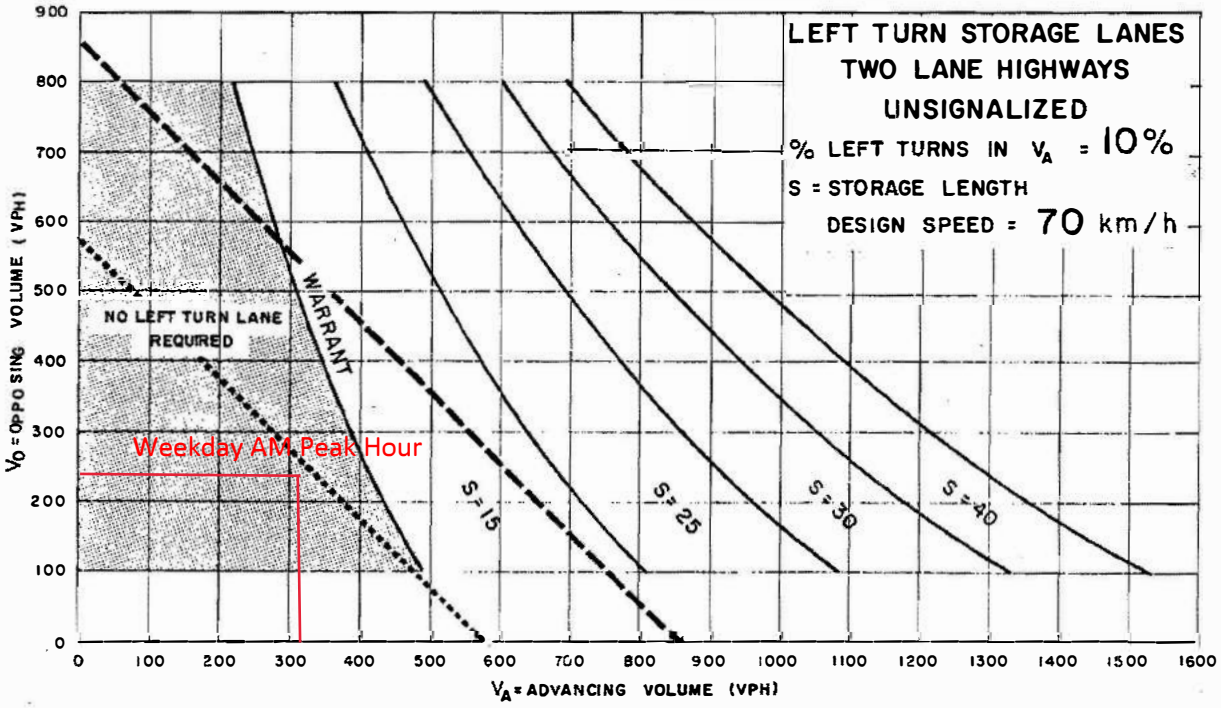
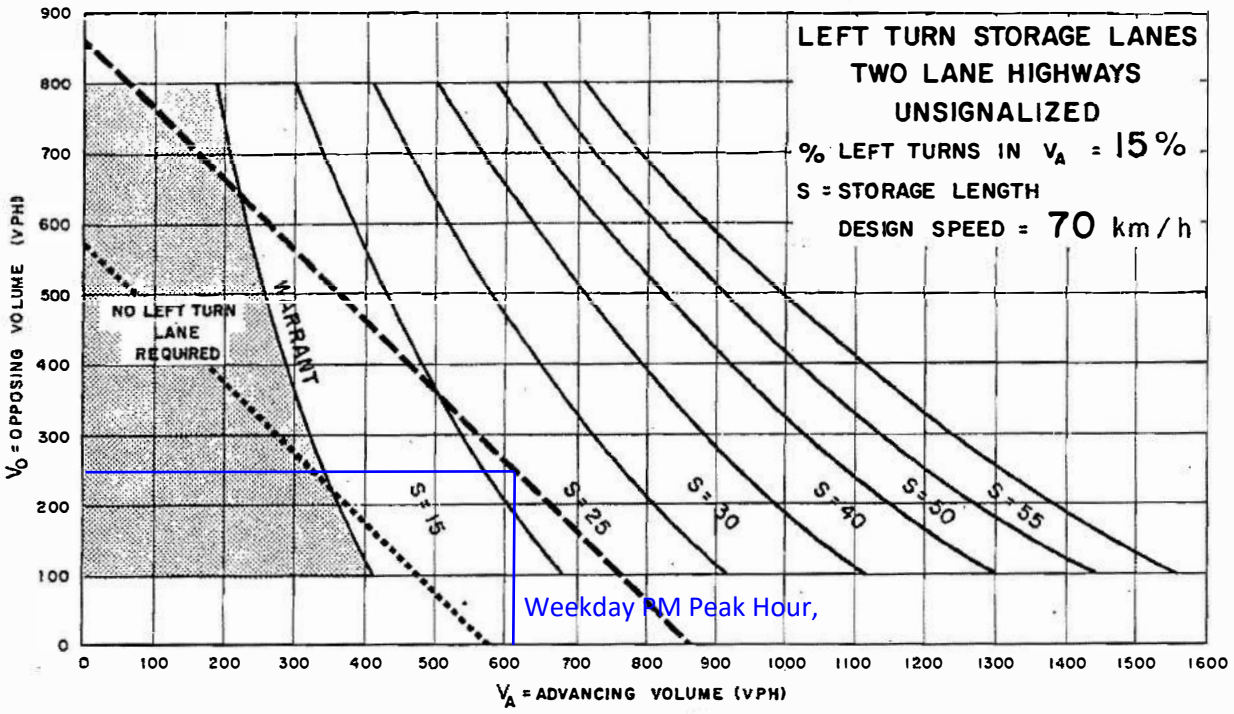


Figure EA-10



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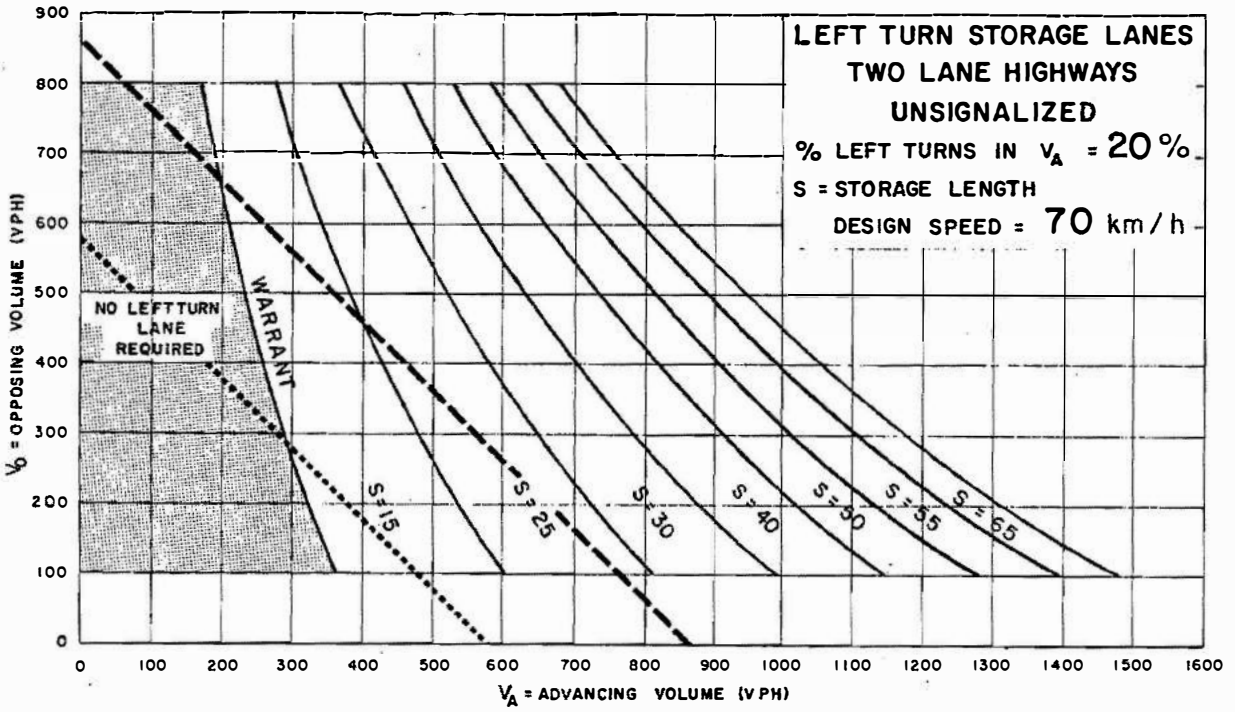
TRAFFIC SIGNALS MAY BE WARRANTED IN "FREE FLOW" URBAN AREAS



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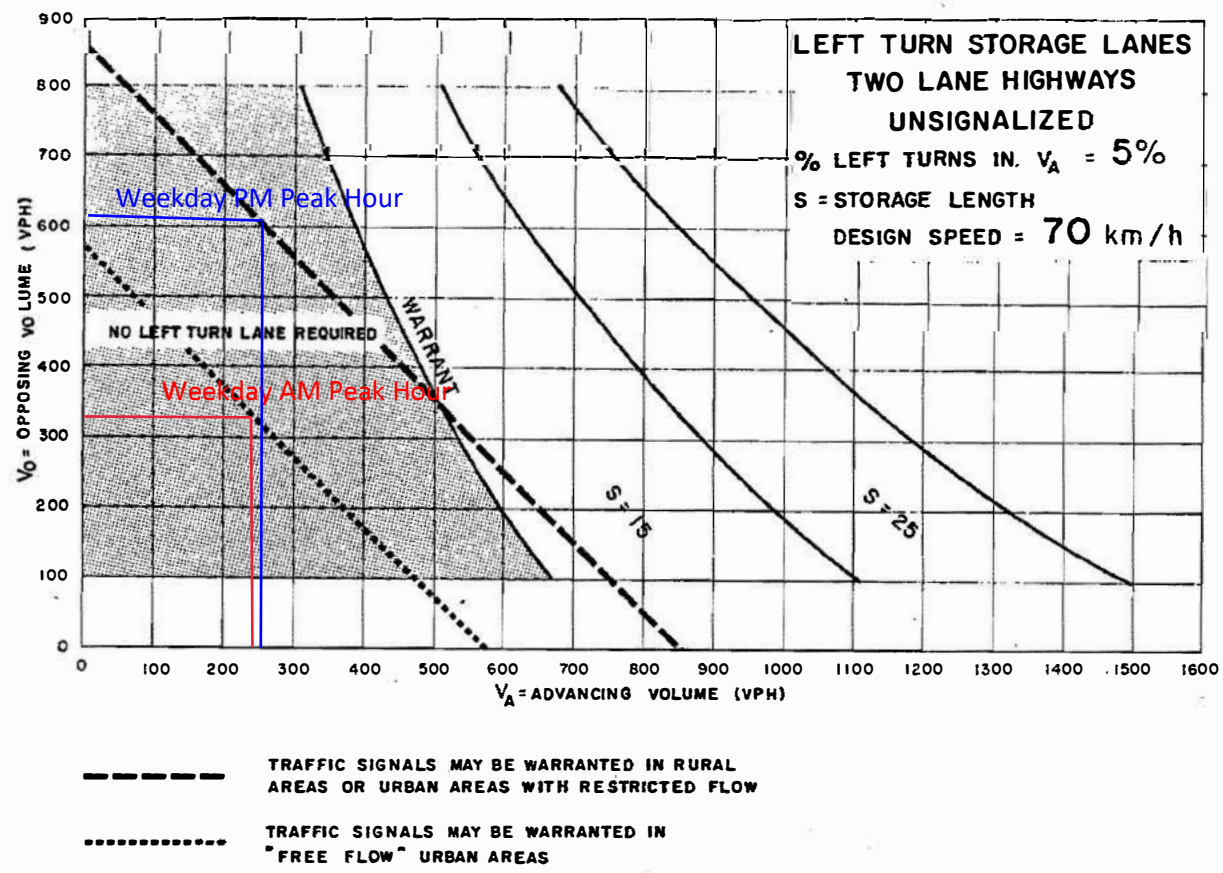


TRAFFIC SIGNALS MAY BE WARRANTED IN RURAL AREAS OR URBAN AREAS WITH RESTRICTED FLOW

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

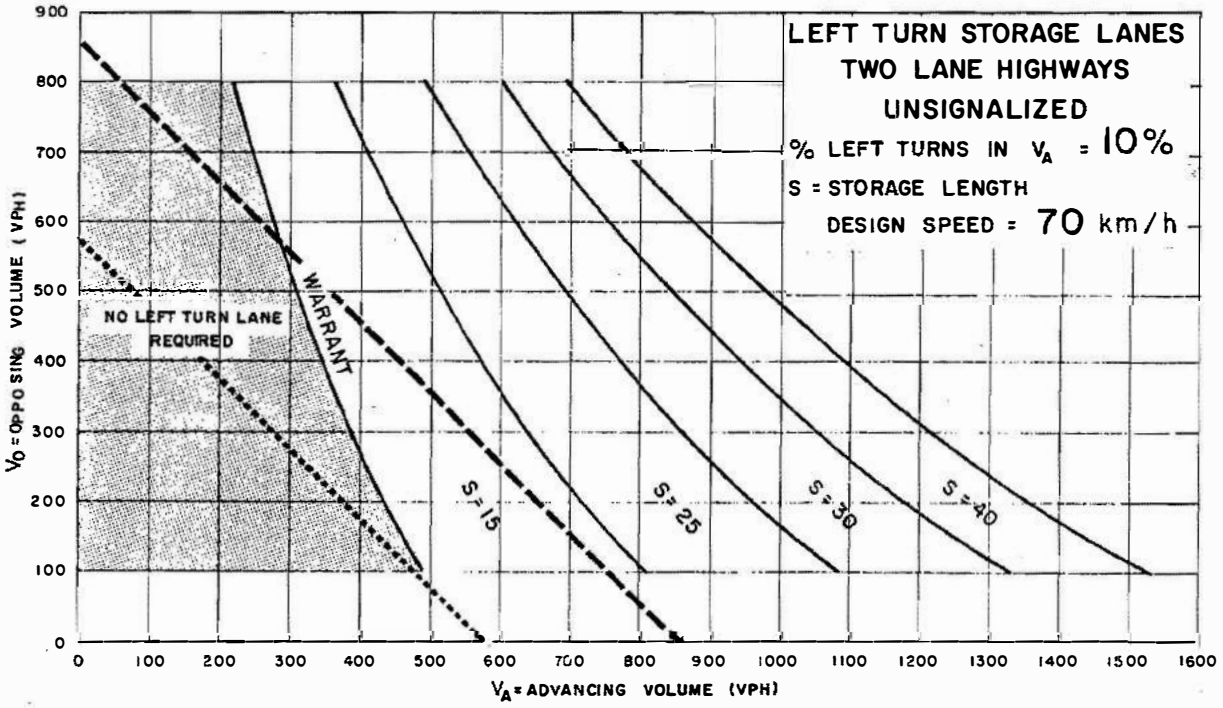
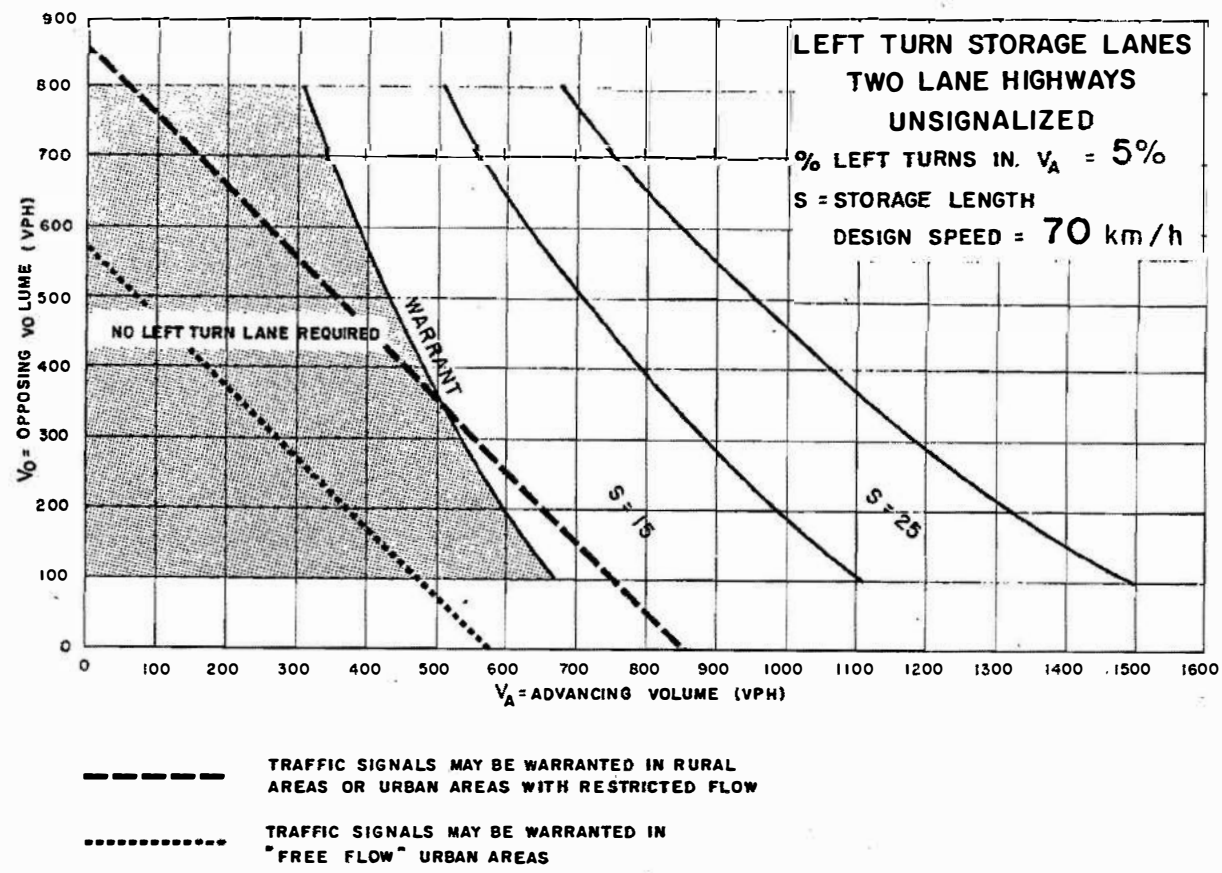


Figure EA-10


LEFT TURN STORAGE LANES
TWO LANE HIGHWAYS
UNSIGNALIZED
% LEFT TURNS IN V_A = 5%
S = STORAGE LENGTH
DESIGN SPEED = 70 km/h
NO LEFT TURN LANE REQUIRED
WARRANT
S=15
S=25
V_O = OPPOSING VOLUME (VPH)
V_A = ADVANCING VOLUME (VPH)
0 100 200 300 400 500 600 700 800 900 1000 1100 1200 1300 1400 1500 1600
0 100 200 300 400 500 600 700 800 900
TRAFFIC SIGNALS MAY BE WARRANTED IN RURAL AREAS OR URBAN AREAS WITH RESTRICTED FLOW
TRAFFIC SIGNALS MAY BE WARRANTED IN "FREE FLOW" URBAN AREAS

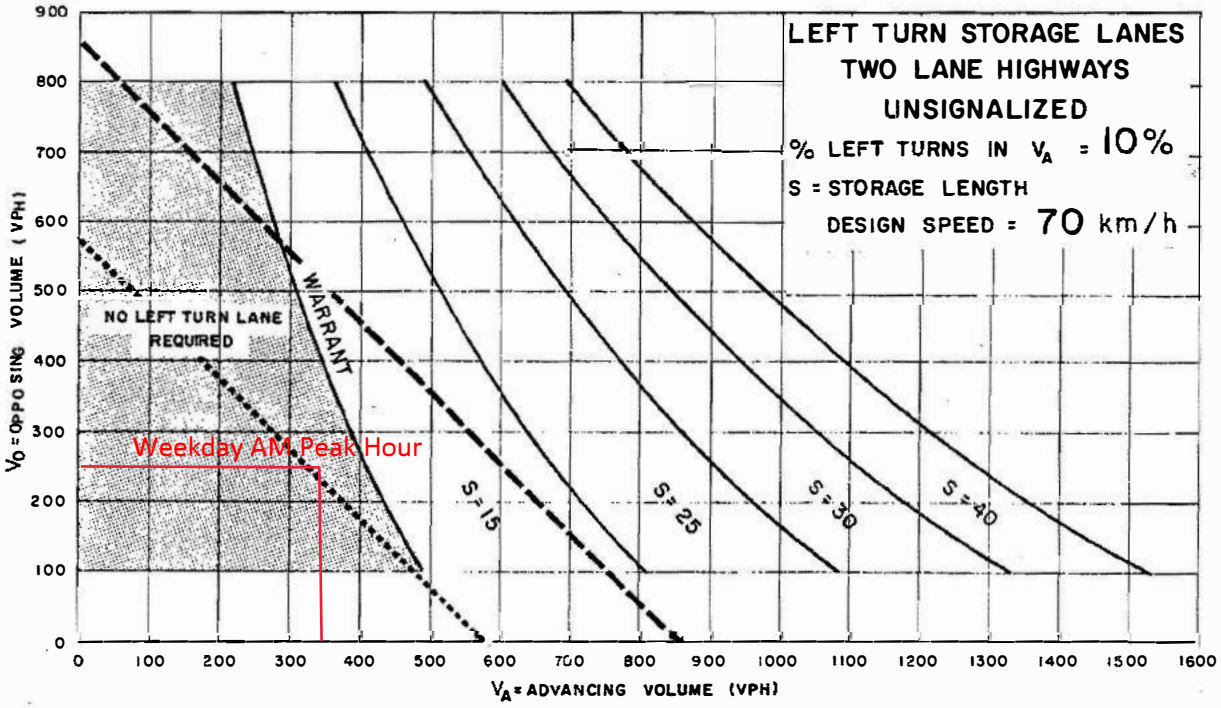
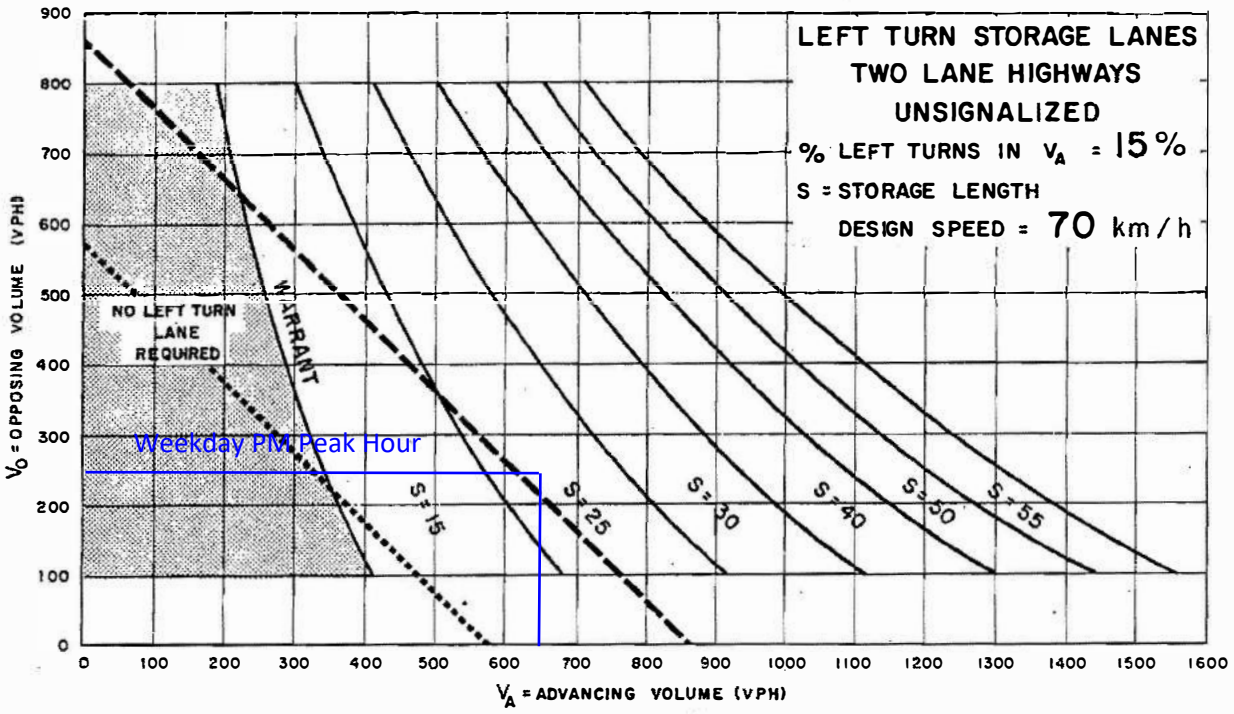

LEFT TURN STORAGE LANES
TWO LANE HIGHWAYS
UNSIGNALIZED
% LEFT TURNS IN V_A = 10%
S = STORAGE LENGTH
DESIGN SPEED = 70 km/h
NO LEFT TURN LANE REQUIRED
WARRANT
Weekday AM Peak Hour
S=15
S=25
S=30
S=40
V_O = OPPOSING VOLUME (VPH)
V_A = ADVANCING VOLUME (VPH)
0 100 200 300 400 500 600 700 800 900 1000 1100 1200 1300 1400 1500 1600

Figure EA-10



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

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

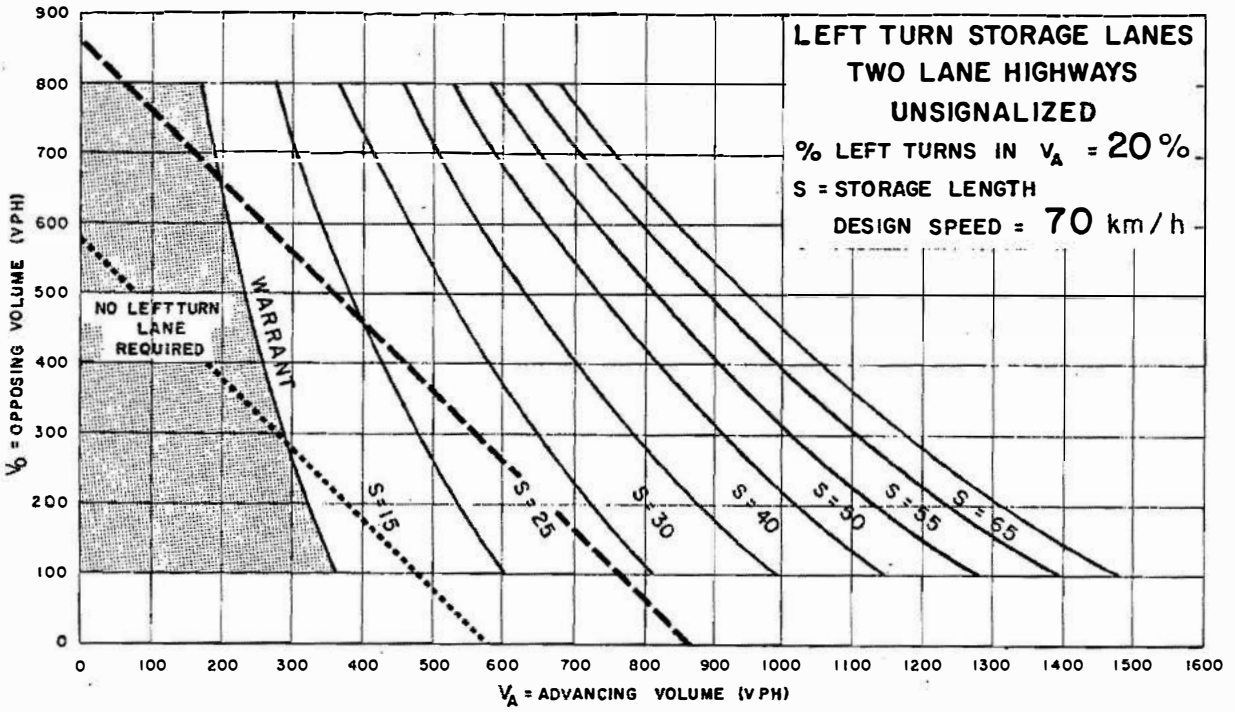
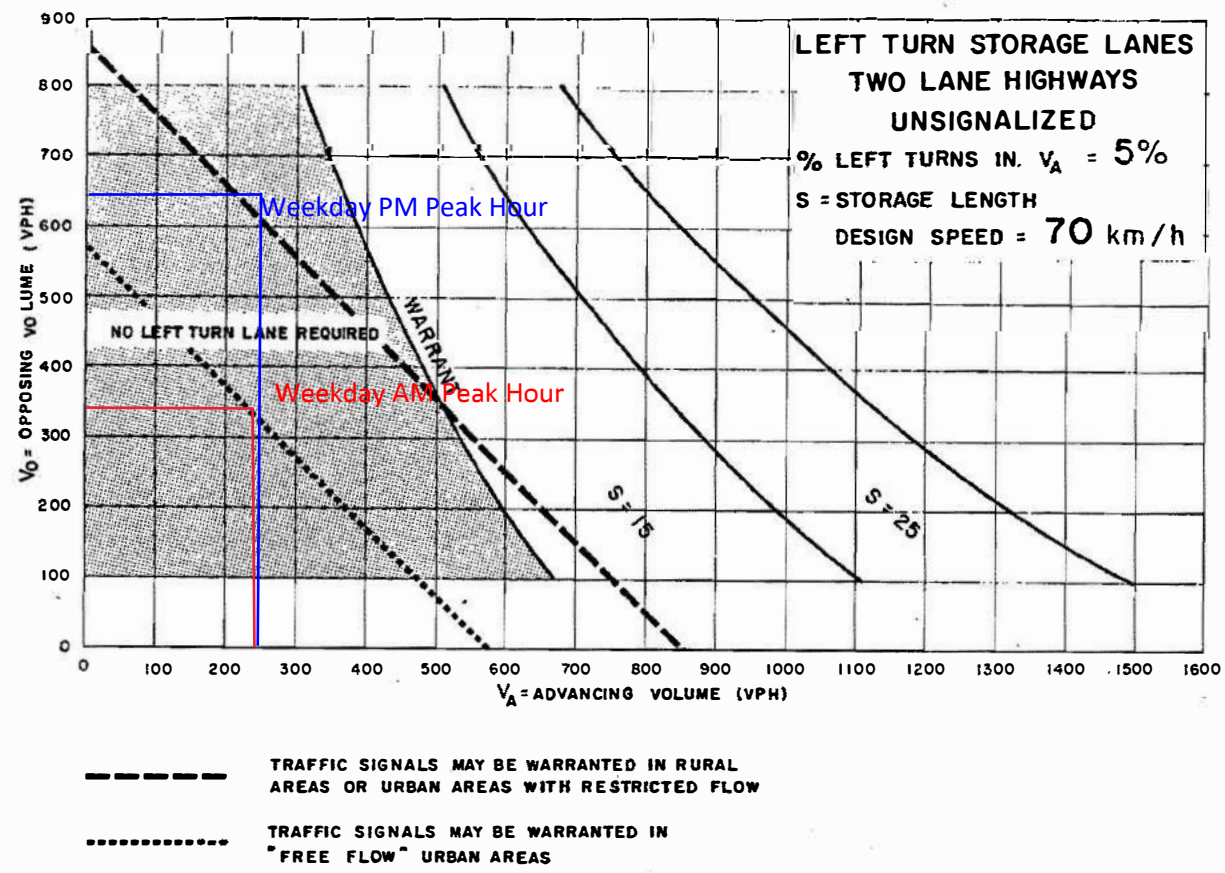


Figure EA-11



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

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

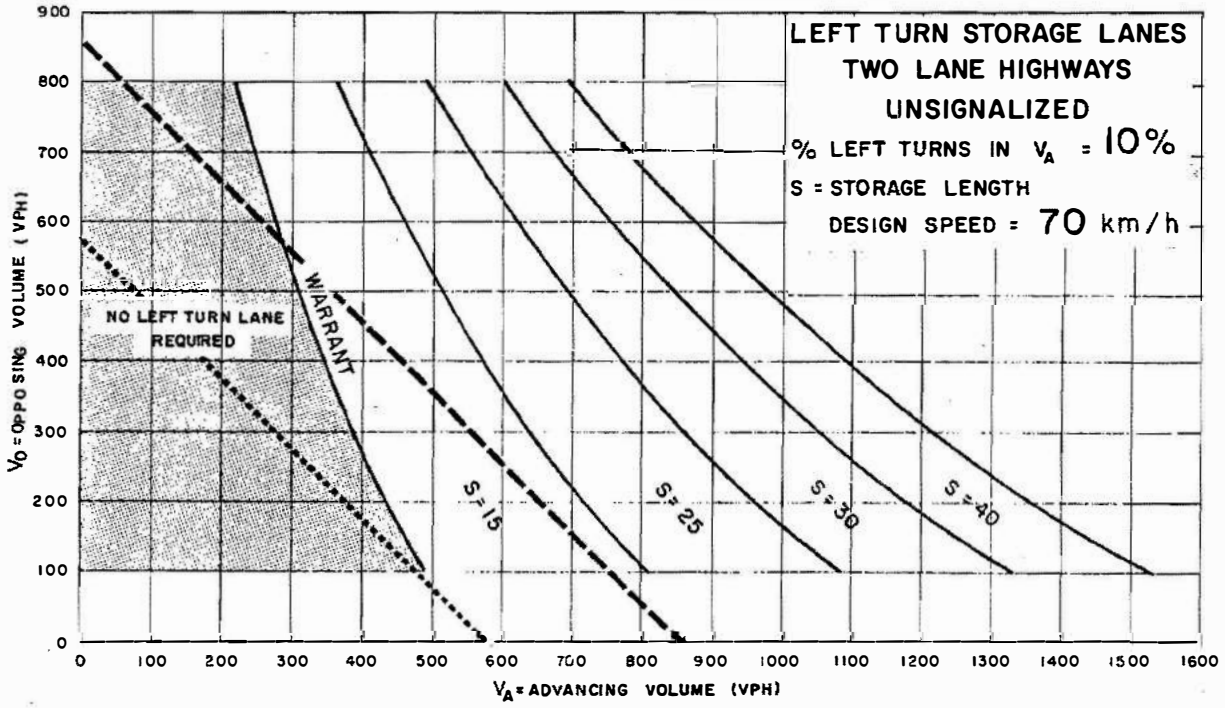
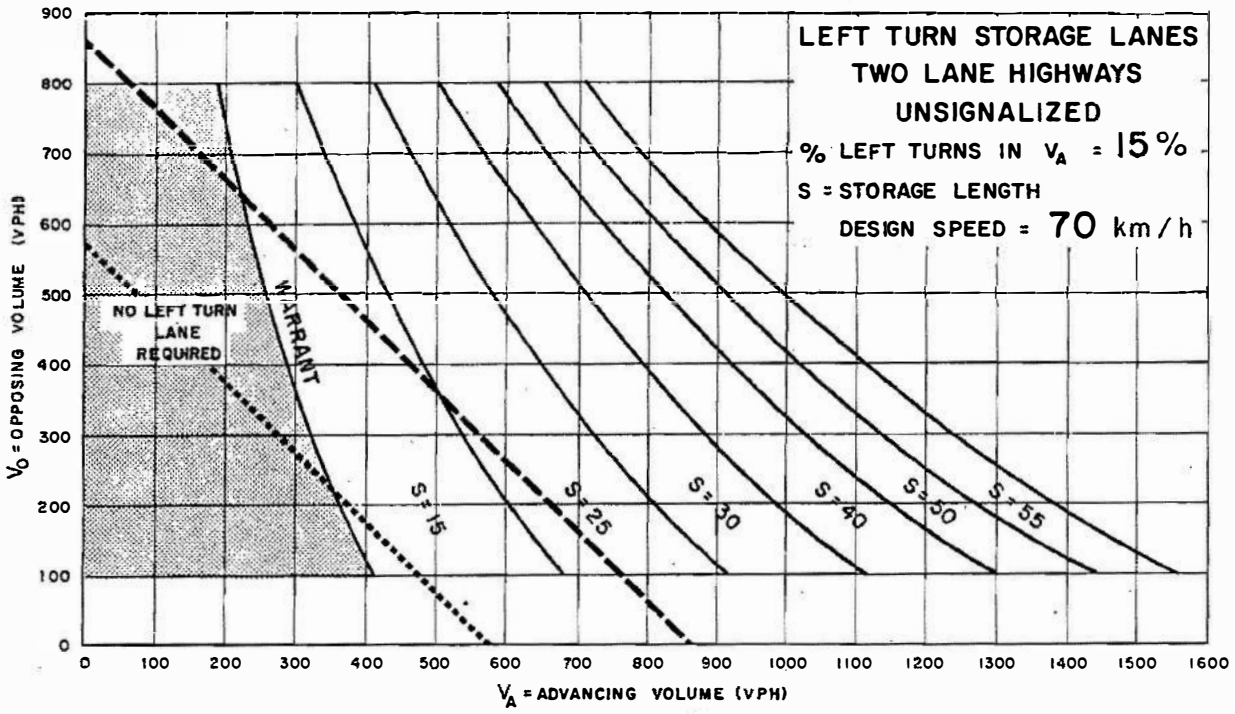
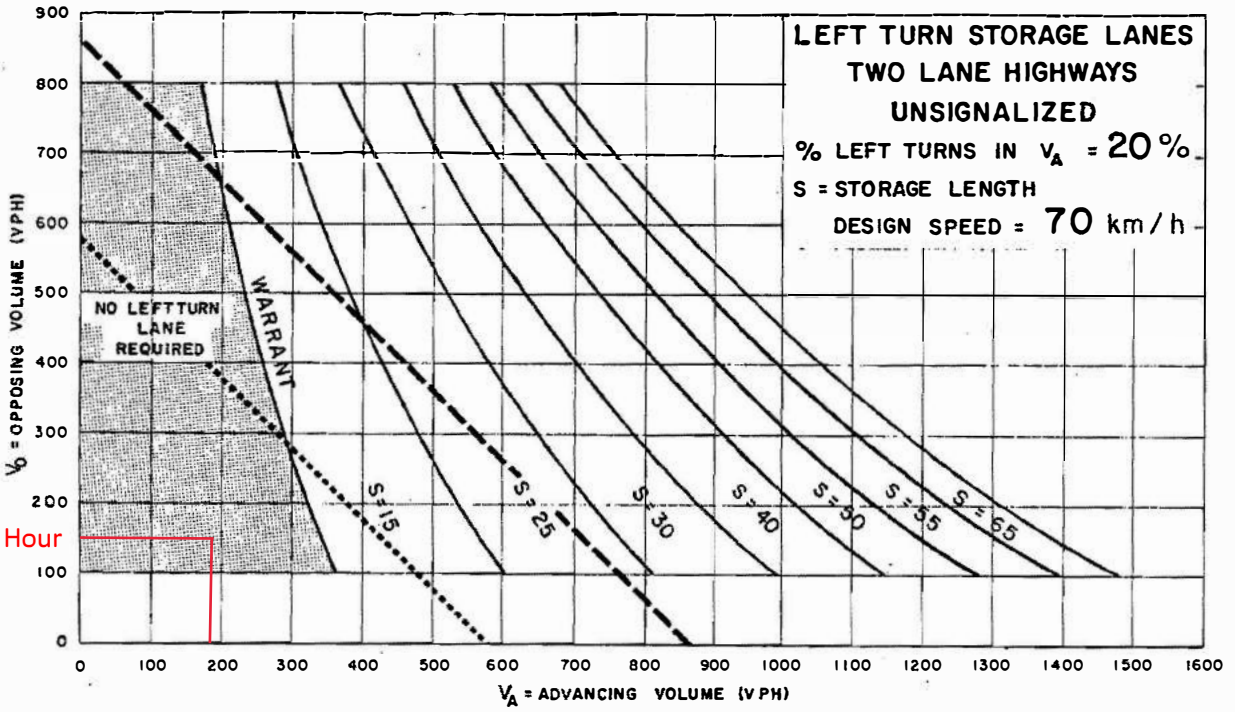


Figure EA-10



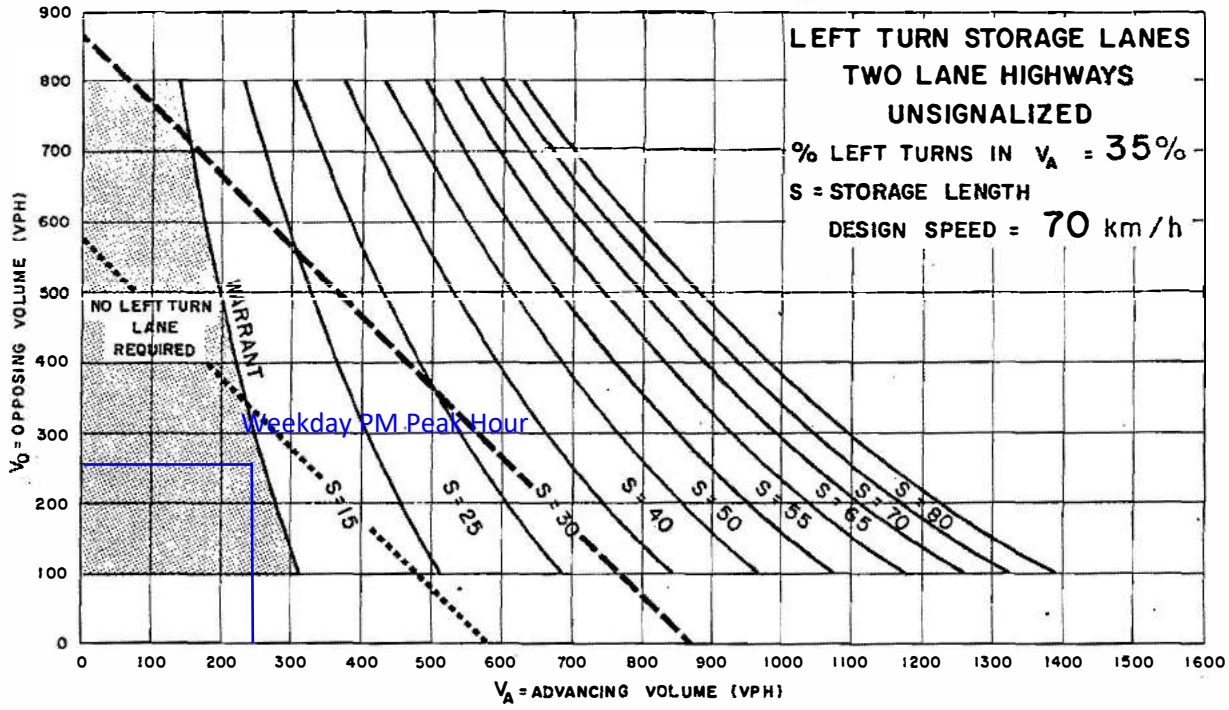
TRAFFIC SIGNALS MAY BE WARRANTED IN RURAL AREAS OR URBAN AREAS WITH RESTRICTED FLOW

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



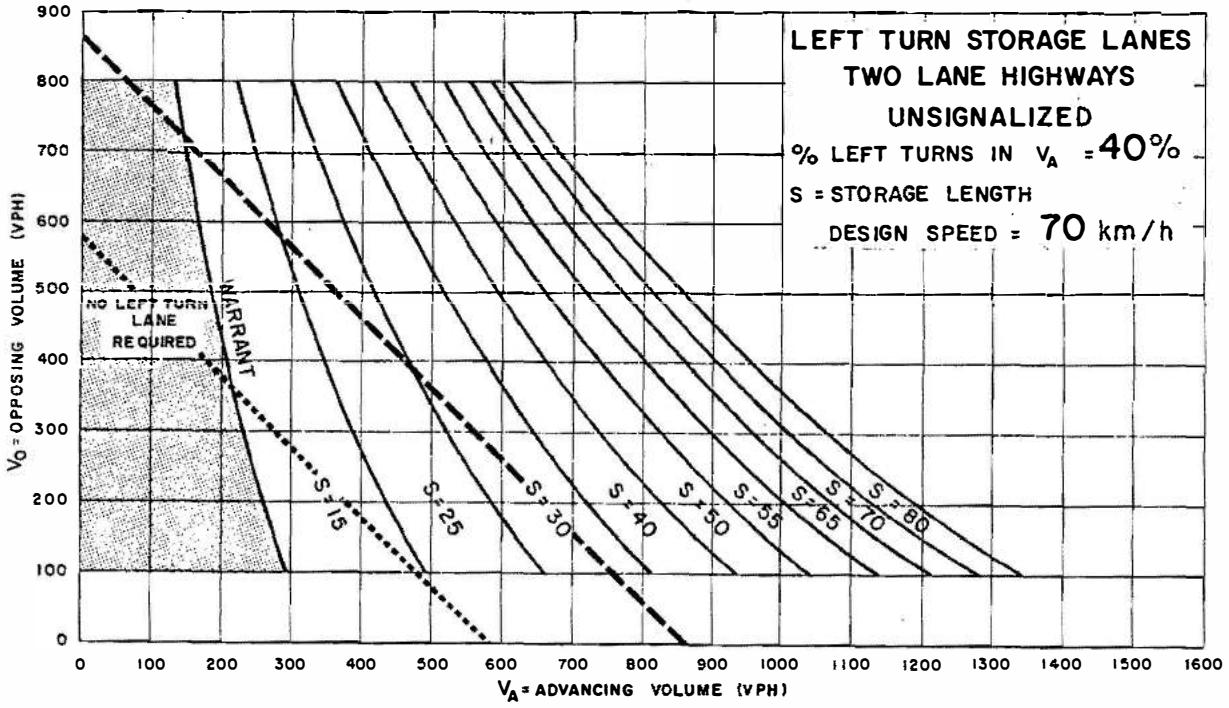
Weekday AM Peak Hour

Figure EA-11



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

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



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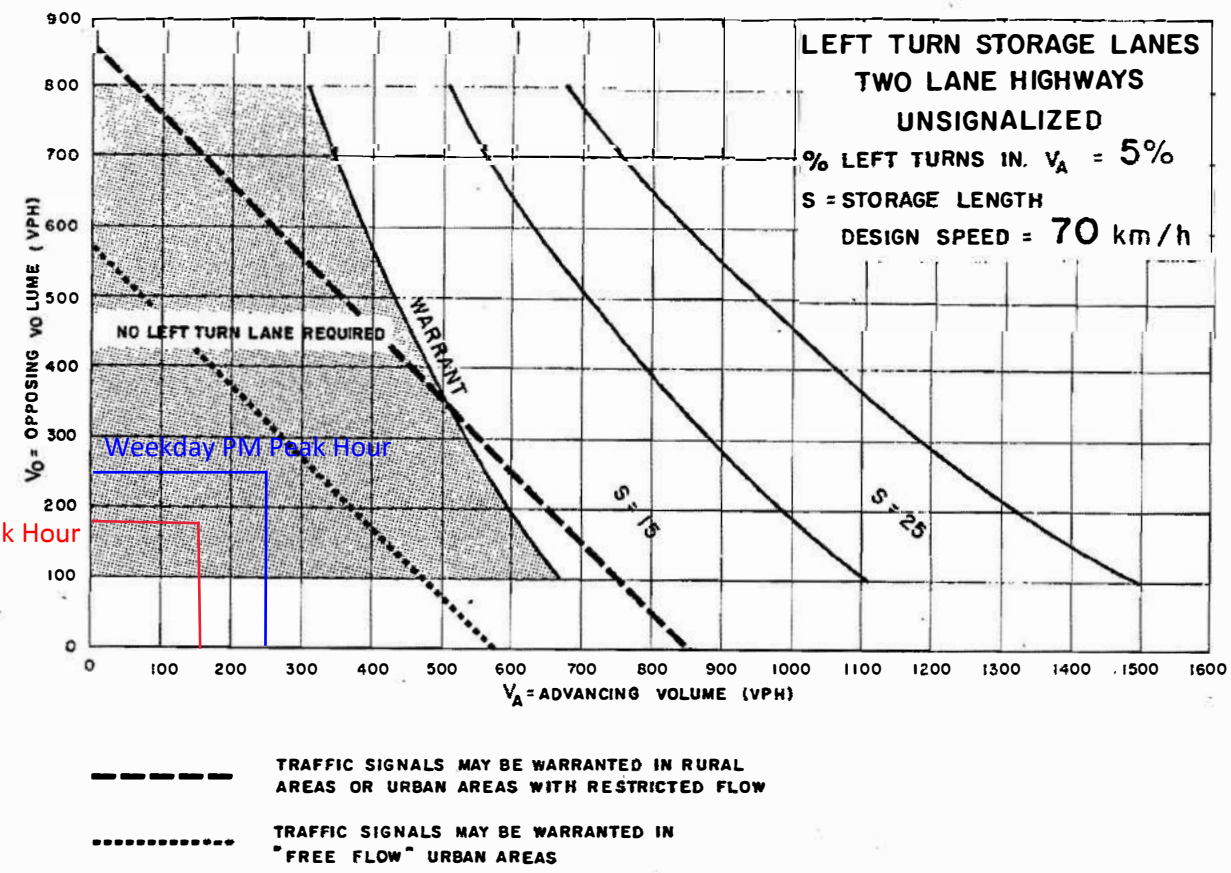


TRAFFIC SIGNALS MAY BE WARRANTED IN RURAL AREAS OR URBAN AREAS WITH RESTRICTED FLOW

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

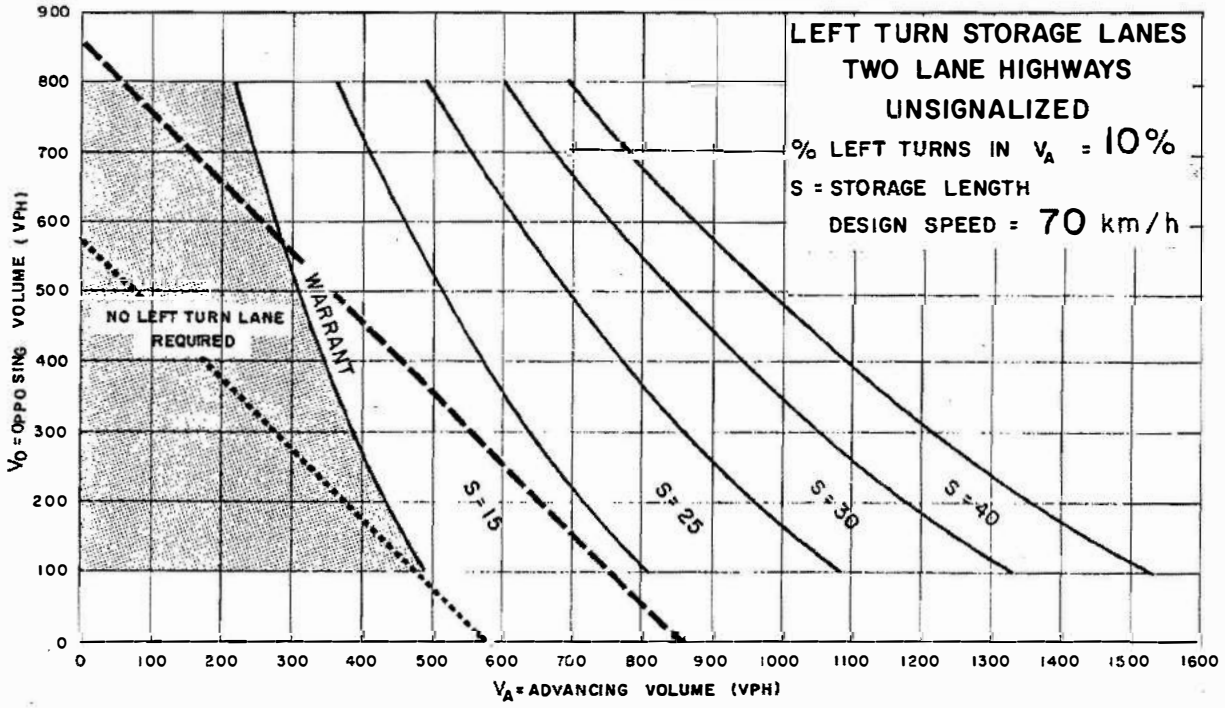
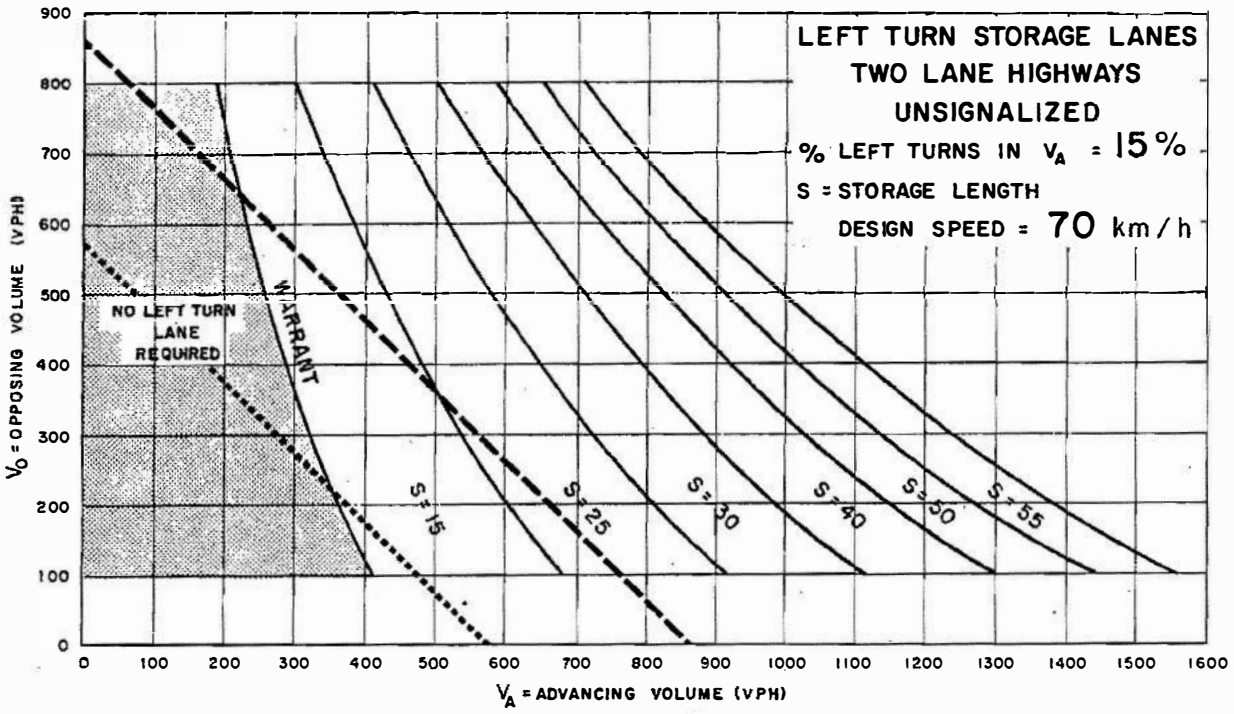
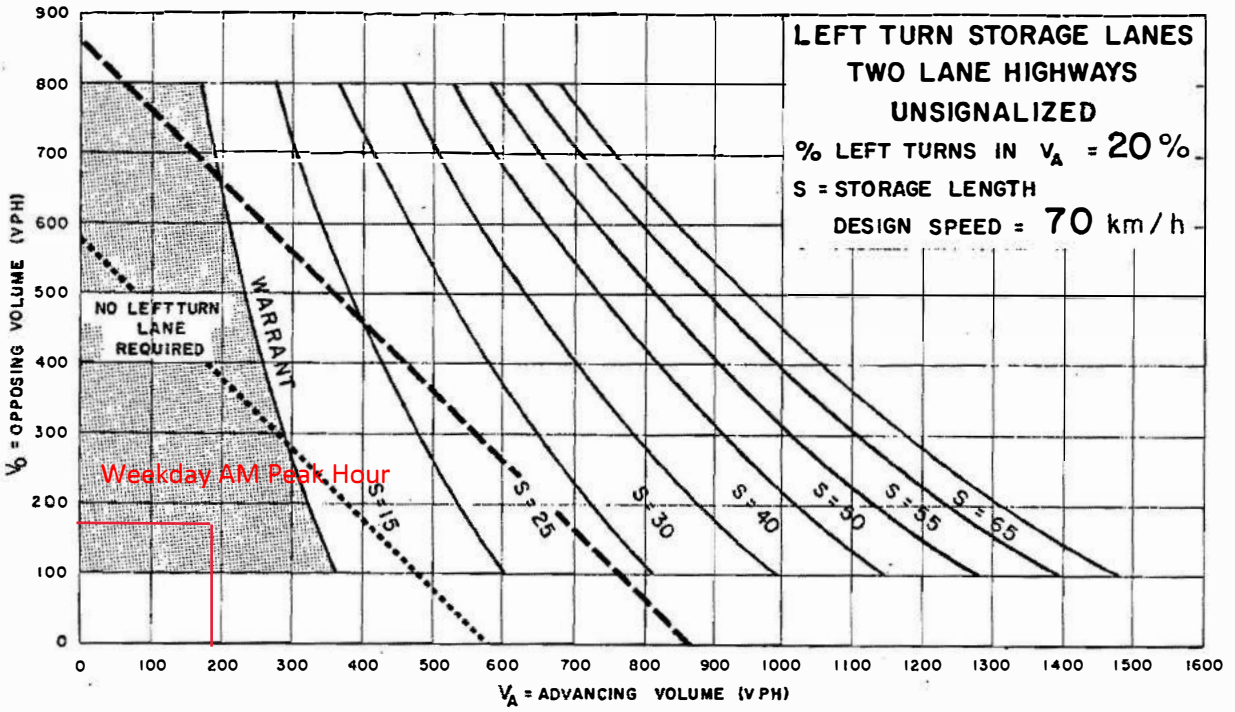


Figure EA-10



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

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



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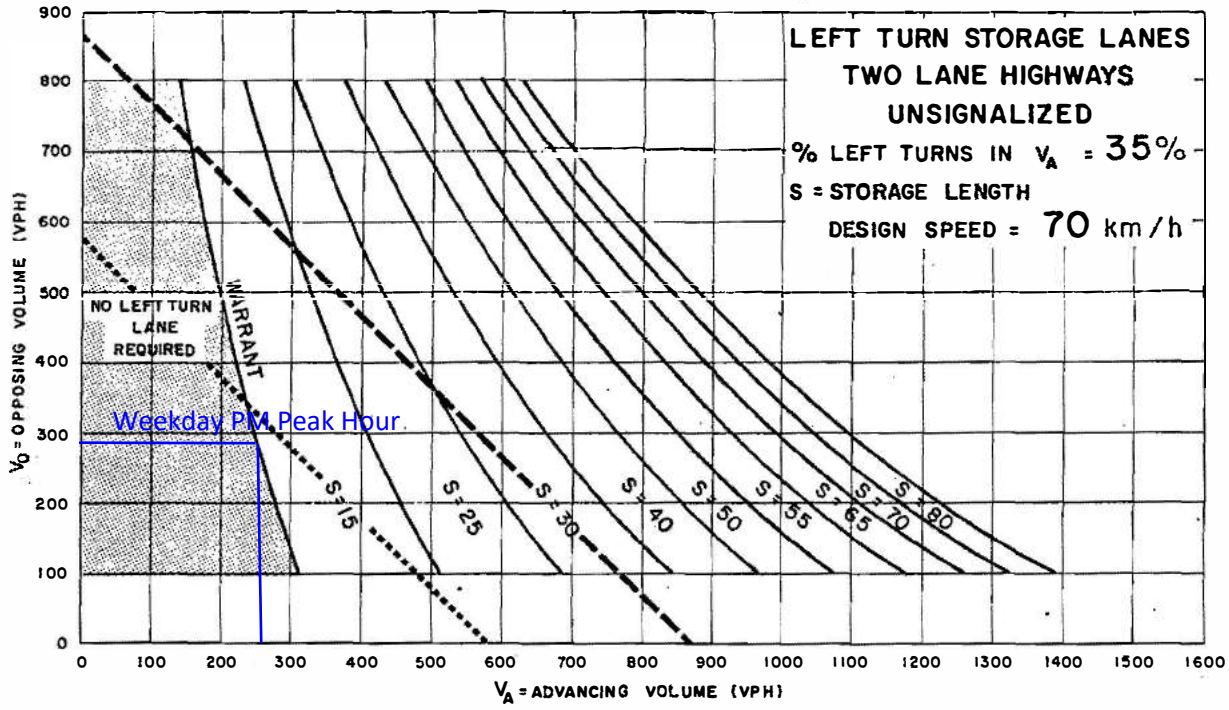


TRAFFIC SIGNALS MAY BE WARRANTED IN RURAL AREAS OR URBAN AREAS WITH RESTRICTED FLOW

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

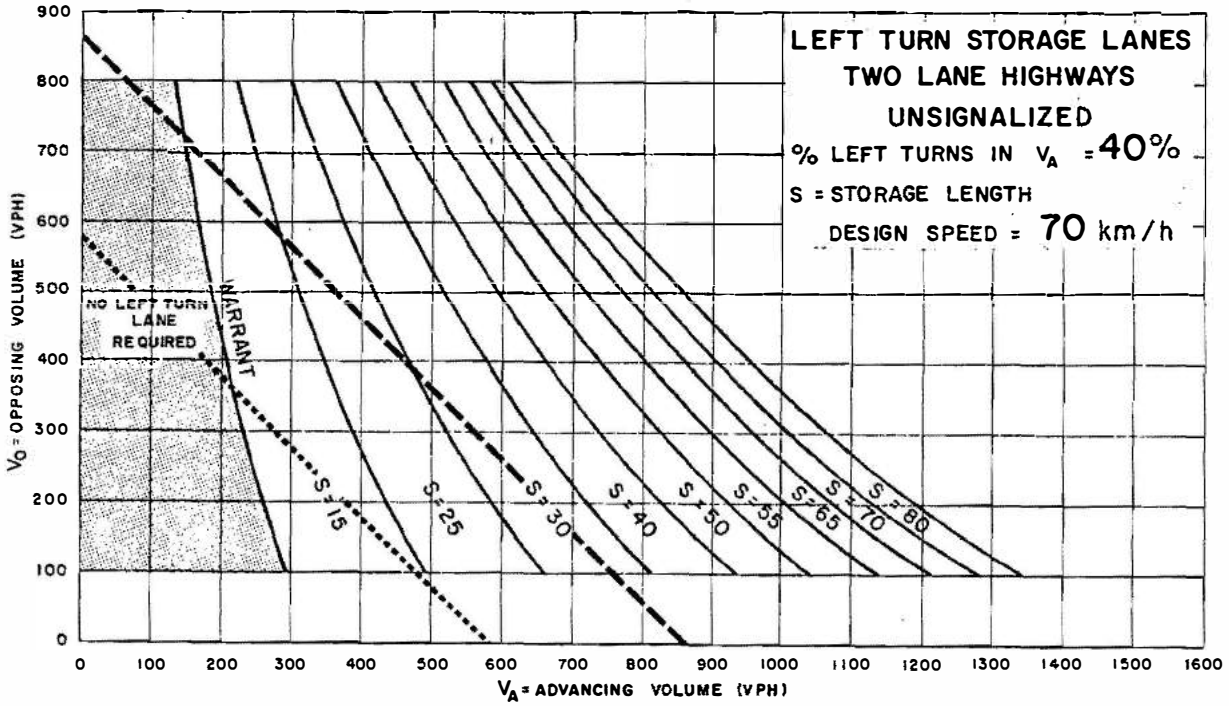
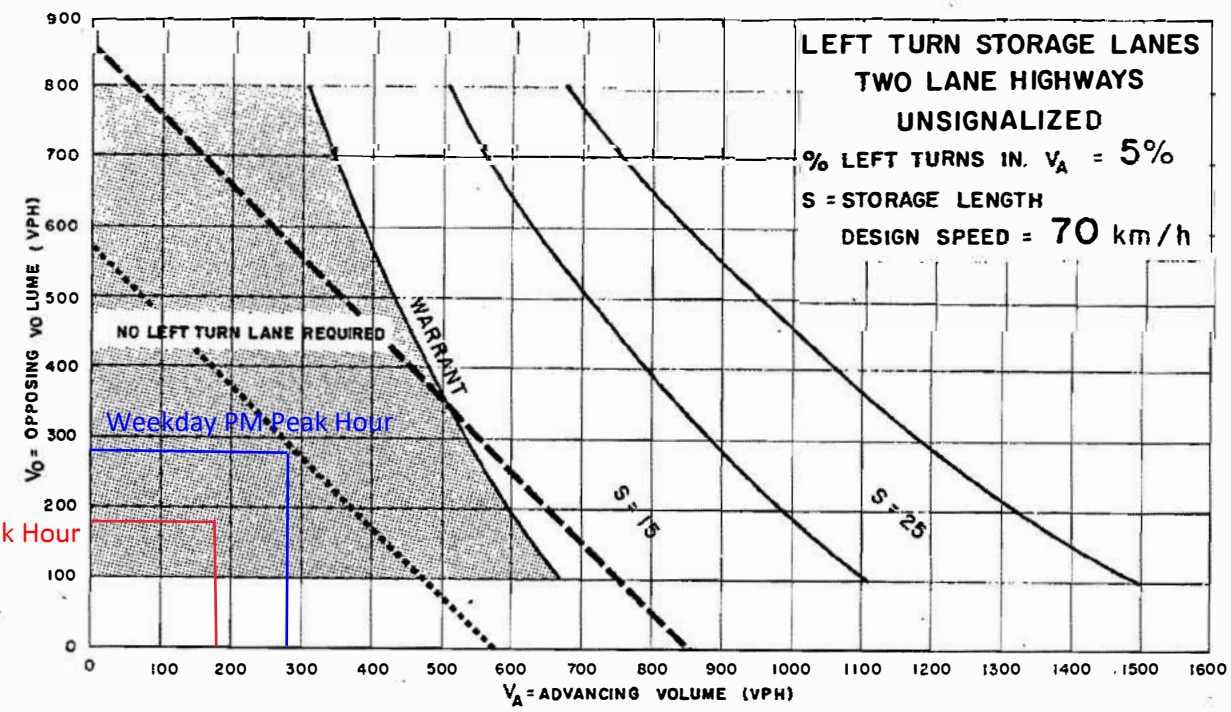


Figure EA-13



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

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

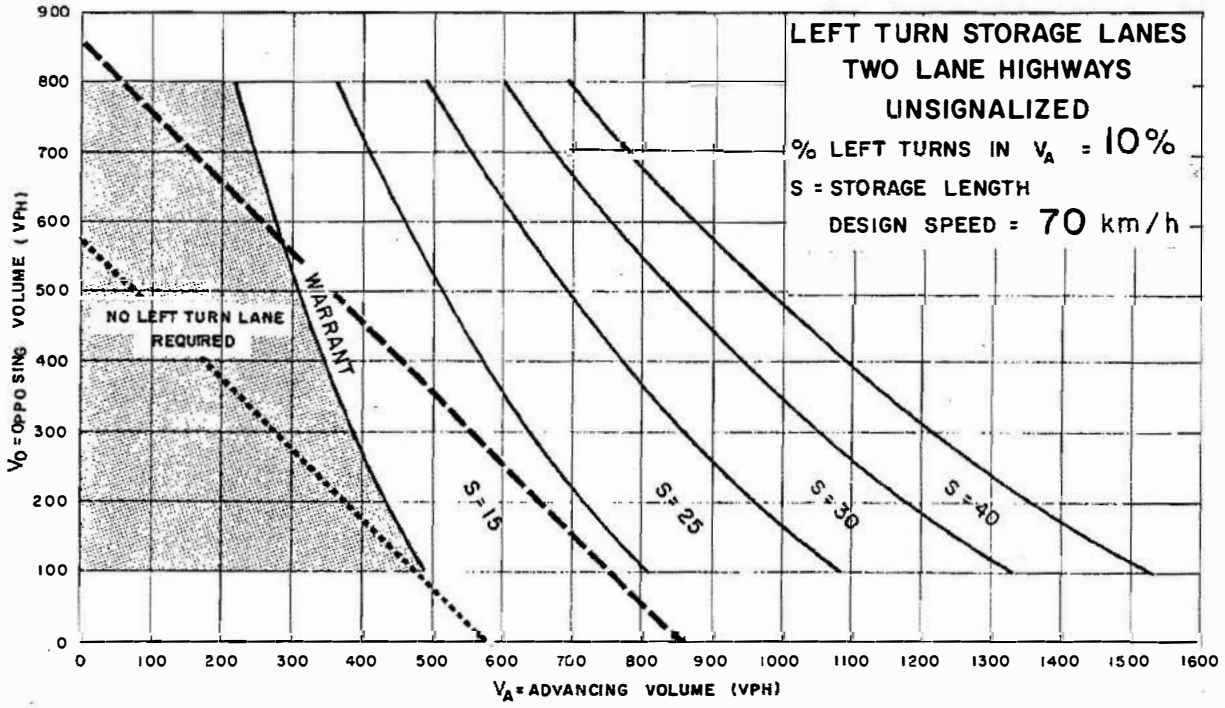


Figure EA-10

APPENDIX F

City of Port Colborne Zoning By-law, Excerpts

Section 3: Parking Provisions

3.1 Parking Space Requirements

a) Except as otherwise provided in Section 3, the owner or occupant of any lot, building or structure used or erected for any of the purposes set forth in this By-law, shall provide and maintain for the sole use of the owner, occupant or other persons entering upon or making use of the said lot, building or structure from time to time, one or more parking spaces in accordance with the requirements of Section 3.1.1 and 3.1.2.

3.1.1 Parking Space Requirements for Residential Uses

Permitted Use	**No. of Spaces Required per Unit**
Apartment Building	1.25
Apartment Building, Public	1 space per 3 units
Bed and Breakfast	1 space per guest room
Dwelling, Accessory	1
Dwelling, Detached	1
Dwelling, Duplex	1
Dwelling, Fourplex	1
Dwelling, Semi-Detached	1
Dwelling, Townhouse Block	1
Dwelling, Townhouse Street	1
Dwelling, Triplex	1
Dwelling Unit, Accessory	1 (can be tandem)
Long Term Care Facility	0.4 per dwelling unit and per care bed
Supportive Living Facility	0.5

3.1.2 Parking Space Requirements for Non-Residential Uses

Permitted Use	
Adult Oriented Entertainment Establishment	Min 1 space per 20 square metres gfa
Animal Care Establishment	Min 1 space per 20 square metres gfa
Brew Pub	Min 1 space per 20 square metres gfa
Cannabis Production Facility	1 space for every employee on the largest shift
Cultural Facility	Min 1 space per 65 square metres gfa
Contractor's Yard	Min 1 space per 100 square metres gfa
Day Care	Min 1 space per 25 square metres gfa
Golf Course and Driving Range	18 per 9 holes of golf plus 1 per 27 square metres of club house
Heavy Equipment Sales and Service	Min 1 space per 35 square metres gfa

Hospital	Min 1 space per 50 square metres gfa
Hotel	1 per guest room
Industry, Heavy	Min 1 space per 100 square metres gfa
Commercial Plaza	Min 1 space per 25 square metres gfa
Elementary School	Min 1.25 spaces per classroom
Secondary School	Min 2 spaces per classroom
Public Use	Min 1 space per 30 square metres gfa
Industry, Light	Min 1 space per 100 square metres gfa
Marina	0.6 per boat slip
Medical Clinic	Min 1 space per 28 square metres gfa
Motor Vehicle Gas Station	Min 1 space per 20 square metres gfa
Motor Vehicle Repair Garage	Min 1 space per 20 square metres gfa
Motor Vehicle Sales/Rental and Service	Min 1 space per 30 square metres gfa
Office	Min 1 space per 28 square metres gfa
Place of Assembly/Banquet Hall *	Min 1 space per 20 square metres gfa
Place of Worship *	Min 1 space per 20 square metres gfa
Recreation Facility *	Min 1 space per 20 square metres gfa
Restaurant, Fast Food	Min 1 space per 20 square metres gfa
Restaurant, Full-Service*	Min 1 space per 20 square metres gfa
Restaurant, Take-Out	Min 1 space per 20 square metres gfa
Retail Store	Min 1 space per 20 square metres gfa
Service Commercial	Min 1 space per 20 square metres gfa
Transportation Depot	Min 1 space per 100 square metres gfa
All other non-residential uses listed in the	Min 1 space per 20 square metres gfa

* Applies only to portion of building dedicated to the assembly of persons

3.1.3 Calculation of Parking Requirement

a) The calculation of the minimum number of required parking spaces shall be rounded up to the nearest whole number.

3.2 Parking Space Dimensions

	Min. Width (m)	**Min. Depth (m)**	**Conditions**
Standard Parking Space	2.6	5.2	-
Standard Parking Space Obstructed on Two Sides	3.5	5.2	Abutting any wall, column or structure on both sides

Land Use: 221 Multifamily Housing (Mid-Rise)

Description

Mid-rise multifamily housing includes apartments, townhouses, and condominiums located within the same building with at least three other dwelling units and with between three and 10 levels (floors) of residence. Multifamily housing (low-rise) (Land Use 220), multifamily housing (high-rise) (Land Use 222), and affordable housing (Land Use 223) are related land uses.

Time of Day Distribution for Parking Demand

The following table presents a time-of-day distribution of parking demand on a weekday (one general urban/suburban study site), a Saturday (two general urban/suburban study sites), and a Sunday (one dense multi-use urban study site).

	Percent of Peak Parking Demand		
Hour Beginning	Weekday	Saturday	Sunday
12:00–4:00 a.m.	100	100	100
5:00 a.m.	94	99	–
6:00 a.m.	83	97	–
7:00 a.m.	71	95	–
8:00 a.m.	61	88	–
9:00 a.m.	55	83	–
10:00 a.m.	54	75	–
11:00 a.m.	53	71	–
12:00 p.m.	50	68	–
1:00 p.m.	49	66	33
2:00 p.m.	49	70	40
3:00 p.m.	50	69	27
4:00 p.m.	58	72	13
5:00 p.m.	64	74	33
6:00 p.m.	67	74	60
7:00 p.m.	70	73	67
8:00 p.m.	76	75	47
9:00 p.m.	83	78	53
10:00 p.m.	90	82	73
11:00 p.m.	93	88	93

Land Use: 820 Shopping Center

Description

A shopping center is an integrated group of commercial establishments that is planned, developed, owned, and managed as a unit. A shopping center's composition is related to its market area in terms of size, location, and type of store. A shopping center also provides on-site parking facilities sufficient to serve its own parking demands.

Time of Day Distribution for Parking Demand

The following table presents a time-of-day distribution of parking demand **during the month of December** on a weekday (seven study sites), a Friday (eight study sites), and a Saturday (19 study sites).

	Percent of Peak Parking Demand during December		
Hour Beginning	Weekday	Friday	Saturday
12:00–4:00 a.m.	–	–	–
5:00 a.m.	–	–	–
6:00 a.m.	–	–	–
7:00 a.m.	–	–	–
8:00 a.m.	–	–	–
9:00 a.m.	–	–	–
10:00 a.m.	–	74	–
11:00 a.m.	–	87	85
12:00 p.m.	77	97	97
1:00 p.m.	100	100	98
2:00 p.m.	98	92	100
3:00 p.m.	90	85	97
4:00 p.m.	76	84	88
5:00 p.m.	82	78	77
6:00 p.m.	89	75	64
7:00 p.m.	90	63	–
8:00 p.m.	84	–	–
9:00 p.m.	–	–	–
10:00 p.m.	–	–	–
11:00 p.m.	–	–	–