SIGNAL WARRANT ANALYSIS

E. LAKE MARY BOULEVARD AND SKYWAY DRIVE
SEMINOLE COUNTY, FLORIDA

Prepared for:

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January 2020

TPD No. 5236.1

PROFESSIONAL ENGINEERING CERTIFICATION

I hereby certify that I am a Professional Engineer properly registered in the State of Florida practicing with Traffic Planning & Design, Inc., a corporation authorized to operate as an engineering business, EB-3702, by the State of Florida Department of Professional Regulation, Board of Professional Engineers, and that I have prepared or approved the evaluations, findings, opinions, conclusions, or technical advice attached hereto for:

PROJECT: E. Lake Mary Boulevard and Skyway Drive

LOCATION: Seminole County, Florida

CLIENT: Corporate Properties of Florida, LLC.

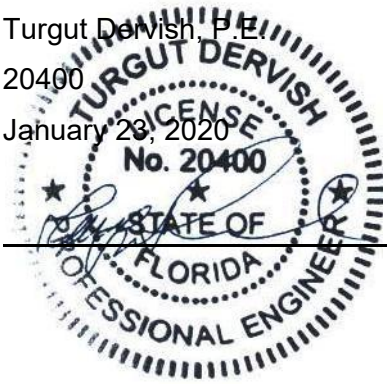
I hereby acknowledge that the procedures and references used to develop the results contained in these computations are standard to the professional practice of Transportation Engineering as applied through professional judgment and experience.

NAME: Turgut Dervish, P.E.

P.E. No.: 20400

DATE: January 23, 2020

SIGNATURE: _____



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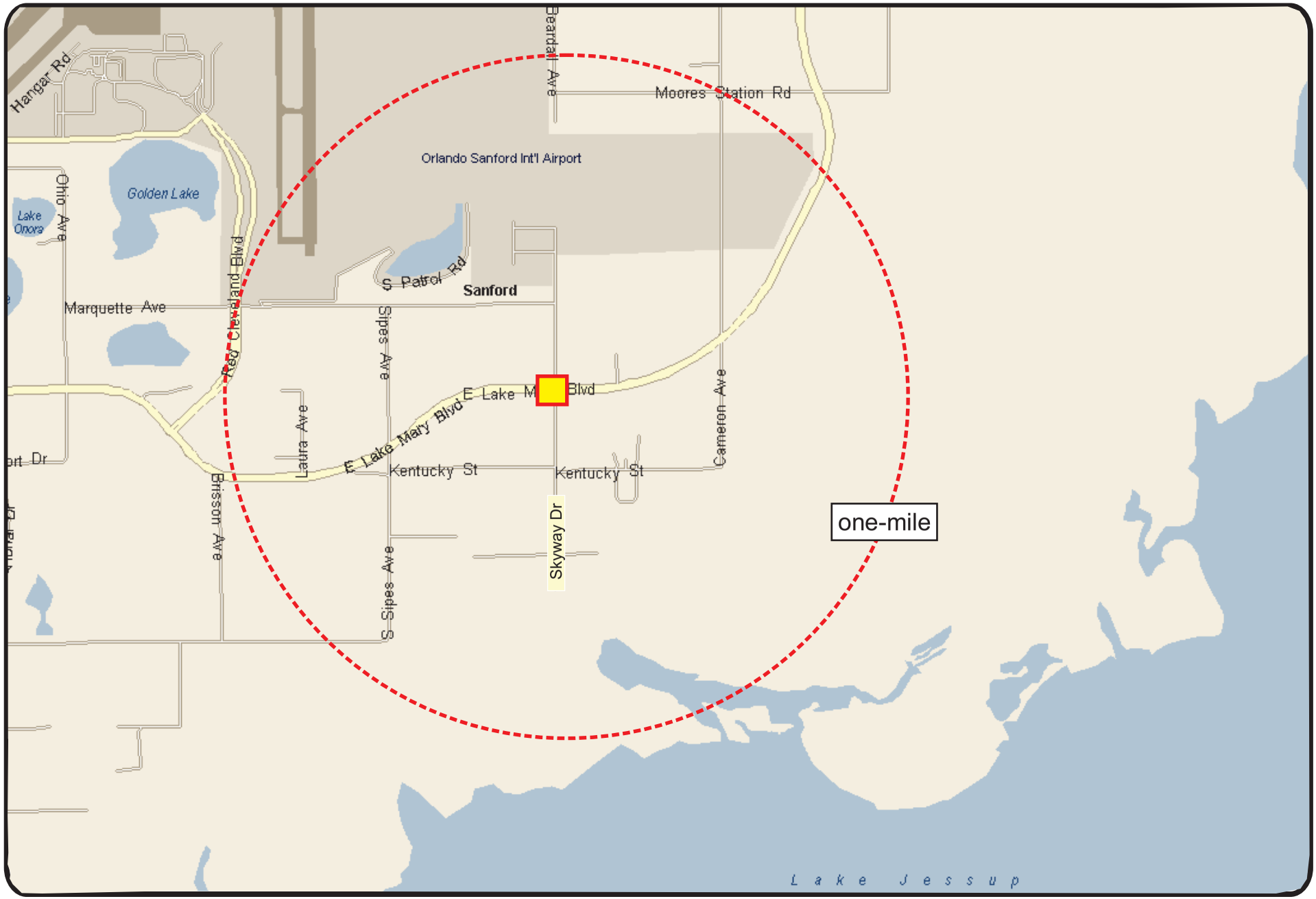
INTRODUCTION

This signal warrant analysis was conducted in order to determine the need of and justification for the installation of a traffic signal at the intersection of E. Lake Mary Boulevard and Skyway Drive in Seminole County, Florida. This location forms the intersection between E. Lake Mary Boulevard, a four-lane divided arterial roadway, with Skyway Drive, a two-lane roadway which serves existing and proposed new residential land uses in the area.

This intersection is in the Seminole County Dense Urban Land Use Area (DULA). Currently there are signalized intersections on E. Lake Mary Boulevard at Red Cleveland Boulevard, approximately 1.25 miles to the west and at SR 46, approximately 2.35 miles to the north-east. **Figure 1** depicts the intersection and the area roadway network.



E. Lake Mary Boulevard and Skyway Drive
Project № 5236.1

Figure 1

Site Location

EXISTING TRAFFIC CONDITIONS

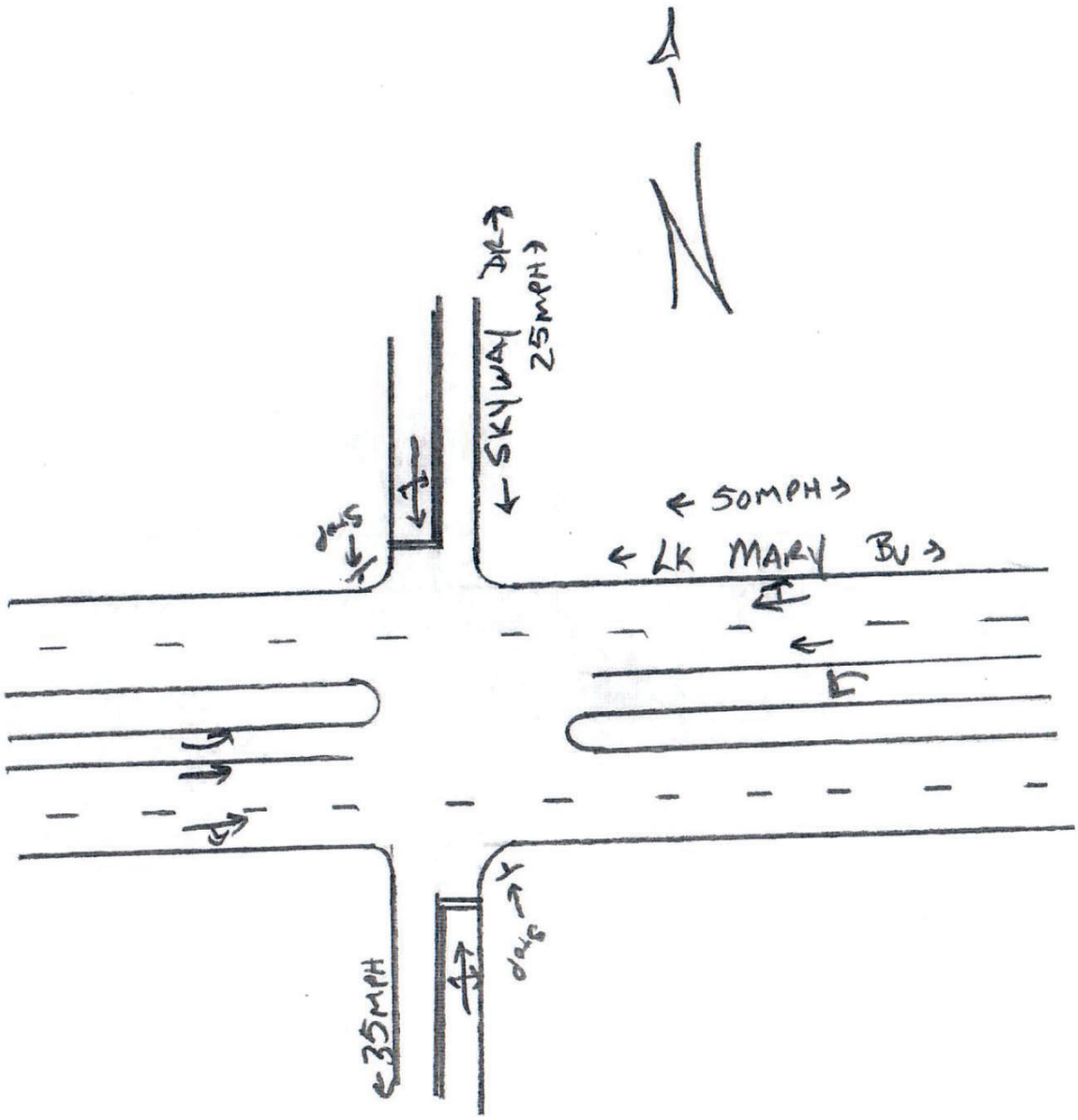
E. Lake Mary Boulevard is a four-lane divided roadway with a posted speed limit of 50 mph. Based on Seminole County counts made in 2019, it carries a daily traffic volume of 18,698 vehicles per day. Skyway intersects E. Lake Mary Boulevard from the north and south forming a four-way intersection.

Intersection Configuration

The existing lane configuration at the intersection of E. Lake Mary Boulevard and Skyway Drive is illustrated in **Figure 2.** In addition to the two through lanes in each direction, E. Lake Mary Boulevard has left-turn lanes in each direction. Skyway Drive is currently one lane on approach to the intersection.

Hourly Traffic Counts

Hourly traffic counts on E. Lake Mary Boulevard and Skyway Drive were obtained from 7:00 A.M. to 7:00 P.M. for use in the analysis. The counts made by 15-minute intervals in each travel direction are included in **Appendix A**. The counts were obtained on January 15, 2020. The FDOT seasonal factor is 1.04 and the existing counts were adjusted accordingly. These counts, as summarized by the hour, are shown in **Table 1**, will be used in the signal warrant analysis along with project trips from proposed developments within a one-mile radius of the intersection.



E. Lake Mary Boulevard and Skyway Drive
Project № 5236.1

Figure 2

Existing Lane Configuration

N
NTS

Table 1
Hourly Traffic Volumes
E. Lake Mary Boulevard and Skyway Drive Intersection

Hour	E. Lake Mary Boulevard			Skyway Drive			Grand Total
	EB	WB	Total	NB	SB	Total	
7-8 A.M.	450	1,296	1,746	10	8	18	1,764
8-9 A.M.	466	1,047	1,513	18	6	24	1,537
9-10 A.M.	300	534	834	14	9	25	857
10-11 A.M.	316	413	729	17	24	41	770
11-Noon	331	358	689	27	33	60	749
12-1 P.M.	389	433	822	11	24	35	857
1-2 P.M.	437	405	842	15	17	32	874
2-3 P.M.	646	433	1,079	19	36	55	1,134
3-4 P.M.	826	410	1,236	16	55	71	1,307
4-5 P.M.	1,070	419	1,489	19	54	63	1,562
5-6 P.M.	1,203	497	1,700	10	38	48	1,748
6-7 P.M.	769	373	1,142	2	15	17	1,159
Total	**7,203**	**6,618**	**13,821**	**178**	**319**	**497**	**14,318**

Note: Existing counts in Appendix have been seasonally adjusted using FDOT factor – 1.04

PROJECTED TRAFFIC CONDITIONS

To determine the traffic usage at the intersection of E. Lake Mary Boulevard and Skyway Drive, an analysis of the existing traffic volumes and proposed impacting developments and their trip generation characteristics was made. This included the estimation of the trips to be generated and the distribution/ assignment of these trips to the intersection. There are four development sites that will currently impact the intersection, which are Galileo School, consisting of 766 students and three are residential developments consisting of River Run with 94 dwelling units, Kentucky Square PD with 116 dwelling units and Skyway Development with 71 dwelling units.

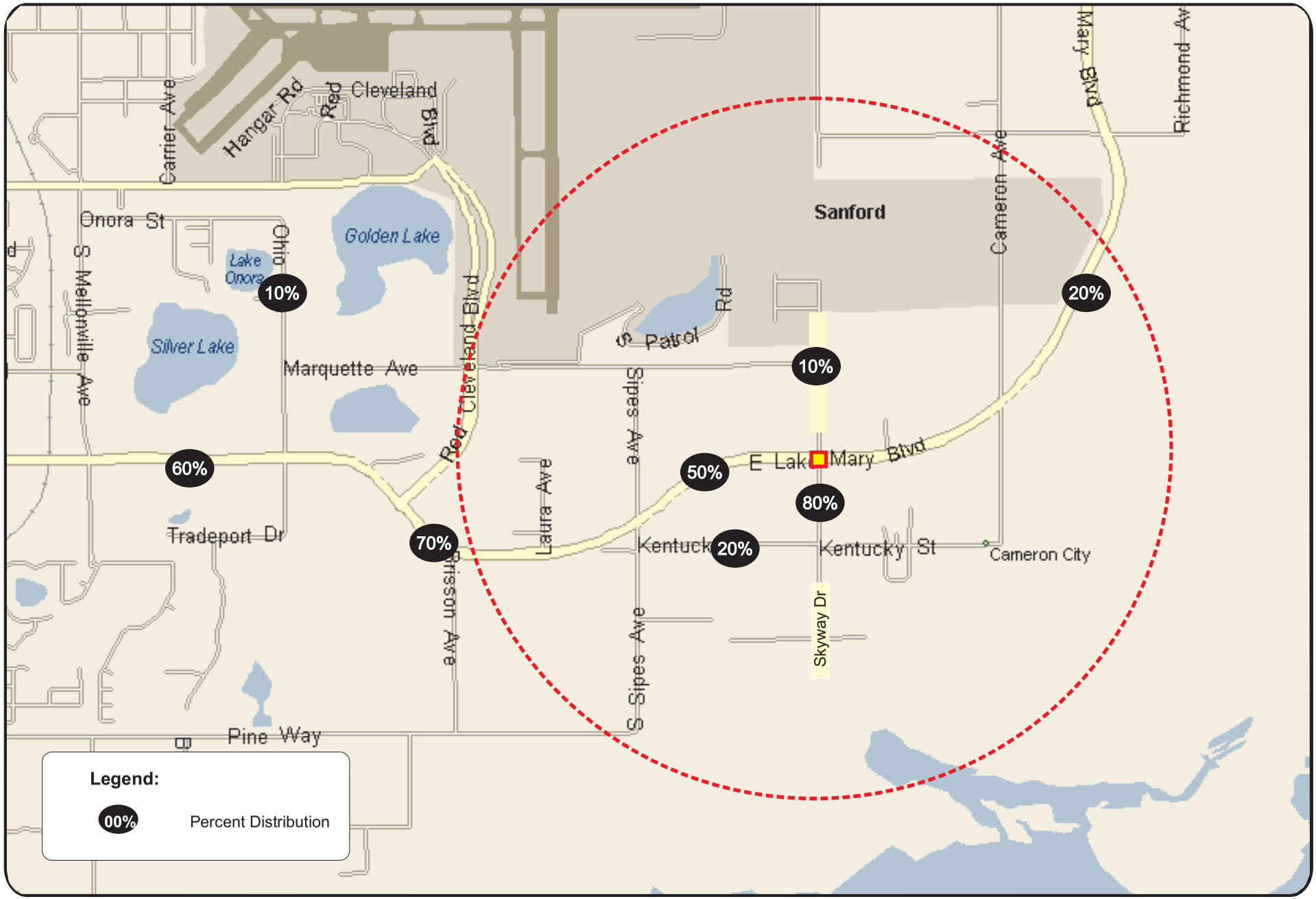
Trip Generation/Distribution

The trip generation of the proposed school and residential developments was calculated with the use of trip generation rates from the 10th Edition of the ITE Trip Generation Manual. The trip generation calculation is summarized in **Table 2**. As shown in the table, the proposed developments will generate a total additional 6,081 daily trips that may utilize the intersection of E. Lake Mary Boulevard and Skyway Drive. It should be noted that over 50% of the trips are being generated by the School. ITE Trip Generation worksheets are included in **Appendix B**.

Table 2
Trip Generation Summary

ITE Code	Land Use	Size	Daily Trips		A.M. Peak Hour Generation				P.M. Peak Hour Generation			
			Rate	Trips	Rate	Enter	Exit	Total	Rate	Enter	Exit	Total
210	Single Family	94 DU	10.45	982	0.77	18	54	72	0.99	59	34	93
210	Single Family	116 DU	10.28	1,192	0.75	22	65	87	1.01	74	43	117
210	Single Family	71 DU	10.69	759	0.77	14	41	55	1.03	46	27	73
534	Private K-8 Sch	766 Stu	4.11	3,148	0.88	370	303	673	0.26	92	107	199
Total Residential Trips				2,933	---	54	160	214	---	179	104	283
Total Trips				6,081	---	424	463	887	---	271	211	482

To determine a distribution of the generated trips in the area, the CFRPM v6.1 as utilized for the River Run Development was used for the residential developments. The distribution pattern developed for the Galileo Charter School was obtained from the traffic study for the school. Excerpts from the Galileo TIA along with the residential trip distribution plot are included in **Appendix C.** The residential trip distribution pattern is illustrated in **Figure 3**.



E. Lake Mary Boulevard and Skyway Drive
Project № 5236.1
Figure 3

Distribution Pattern

Projected New Development Impacting Intersection

In the signal warrant analysis, the projected hourly trips were developed utilizing daily volumes and applying the percent of daily traffic during the 60 minute period as established in Appendix A of the ITE Trip Generation Manual, 10th Edition, Volume 2 for residential (Land Use Codes 200-299) and Institutional (Land Use Codes 500-599). These trips, by type, are included in **Appendix D.**

A summary of the distribution of proposed trips to the intersection is shown in **Table 3**. Contained in **Table 3** are the existing counts on each intersection approach which are provided in **Appendix A**. The overall trips from the developments were distributed based upon the distribution shown in **Figure 3** for the residential trips. The Galileo School trips utilized the distribution pattern as provided in the excepts from the approved TIA, provided in **Appendix D**. Per discussion with Seminole County staff, a northbound right turn lane was included in the analysis. The approved volumes were then used in the analysis.

Table 3

East Lake Mary Boulevard (EB & WB) and Skyway Drive (NB & SB)
Intersection
Intersection Approach Summary with Future Trips Added

	East Lake Mary Boulevard									Skyway Drive												
	Lake Mary Boulevard (EB)				Lake Mary Boulevard (WB)						Skyway Drive (NB) - Left & Thru				Skyway Drive (NB) - Right					Skyway Drive (SB)			
Time Period	Existing Count	Plus SF Trips	Plus Galileo Trips	Total	Existing Count	Plus SF Trips	Plus Galileo Trips	Total	Grand Total	Time Period	Existing Count	Plus SF Trips	Plus Galileo Trips	Total	Existing Count	Plus SF Trips	Plus Galileo Trips	Total	Grand Total NB	Existing Count	Plus SF Trips	Plus Galileo Trips	Total
5-6		7	0	7		3	3	6		5-6		25	1	26		8	2	10			1	1	2
6-7		18	0	18		7	37	44		6-7		64	13	77		21	31	52			4	16	20
7-8	450	25	0	475	1296	10	114	1420	1895	7-8	7	89	41	137	3	30	93	126	263	8	5	50	63
8-9	466	20	0	486	1047	8	17	1072	1558	8-9	10	71	6	87	8	23	14	45	133	6	4	7	17
9-10	300	31	0	331	534	12	6	552	882	9-10	12	37	3	52	2	12	6	20	73	9	6	3	18
10-11	316	36	0	352	413	14	7	434	786	10-11	12	43	3	58	5	14	7	26	85	24	7	3	34
11-12	331	38	0	369	358	15	9	382	750	11-12	19	46	4	69	8	15	9	32	101	33	8	4	45
12-1	389	41	0	430	433	16	8	457	887	12-1	7	49	4	60	4	16	8	28	88	24	8	4	36
1-2	437	44	0	481	405	17	10	432	912	1-2	9	53	5	67	6	17	10	33	101	17	9	5	31
2-3	646	48	0	694	433	19	43	495	1188	2-3	11	58	22	91	8	19	51	78	170	36	10	19	65
3-4	826	72	0	898	410	29	43	482	1380	3-4	10	50	22	82	6	17	51	74	157	55	14	19	88
4-5	1070	80	0	1150	419	32	34	485	1635	4-5	14	56	17	87	5	19	38	62	149	54	16	15	85
5-6	1203	75	0	1278	497	30	26	553	1831	5-6	8	53	12	73	2	18	26	46	119	38	15	12	65
6-7	769	57	0	826	373	23	18	414	1240	6-7	2	40	8	50	0	13	18	31	81	15	11	8	34
7-8		44	0	44		18	13	31		7-8		31	6	37		10	13	23			9	6	15
8-9		31	0	31		12	6	18		8-9		37	2	39		12	6	18			6	2	8
9-10		19	0	19		7	2	9		9-10		23	1	24		8	2	10			4	1	5

Note: Existing Counts have been seasonally adjusted using FDOT factor = 1.04

SIGNAL WARRANT ANALYSIS

The signal warrant analysis was conducted in accordance with the procedures of the ***Manual on Uniform Control Devices*** (MUTCD) for streets and highways. According to the MUTCD, traffic signals should not be considered for installation unless one or more of the nine warrants specified therein are met and an engineering study justifies the need.

Applicable Warrants

The warrants applicable to this analysis are Warrant 1 – Eight Hour Vehicular Volume (Conditions A and B) and Warrant 2 – Four Hour Volume.

For Warrant 1, the Minimum Vehicular Volume (Condition A) is intended for application at locations where a large volume of intersecting traffic is the principal reason to consider installing a traffic control signal. The Interruption Continuous Traffic (Condition B) is intended for application at locations where Condition A is not satisfied and where the traffic volume on a major street is so heavy that traffic on a minor intersecting street suffers excessive delays or conflict in entering/crossing the major street. The MUTCD specifies that the minimum volume warrants are satisfied when for each of any eight hours of an average day the volumes are greater than the threshold values given in **Table 4.** Since the posted speed limit on E. Lake Mary Boulevard is greater than 40 mph, the 70% threshold values given in the table will be used in the analysis.

Warrant 2, the Four-Hour Vehicular volume signal warrant conditions are intended to be applied where the volume of intersecting traffic is the principal reason to consider installing a traffic control signal. This warrant is satisfied when for each of any four hours of an average day, the plotted points representing the vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour on the higher volume minor street approach (one direction only) all fall above the applicable curve in Figure 4C-1 or 4C-2 of the MUTCD for the existing combination of lanes.

The six warrants determined not to be applicable for the intersection under study are:

Warrant 3	-	Peak Hour (not applicable)
4	-	Pedestrian Volume (no pedestrian traffic)
5	-	School Crossing (there is no school crossing)
6	-	Coordinated Signal System (not an objective)
7	-	Crash Experience (data not available)
8	-	Roadway Network (not applicable)
9	-	Intersection Near a Grade Crossing (no grade crossing)

Table 4
Warrant 1 – Eight-Hour Vehicular Volume

Condition A-Minimum Vehicular Volume									
Number of Lanes for Moving Traffic on Each Approach		Vehicles Per Hour on Major Street (Total of both Approaches) *				Vehicles Per Hour on Higher Volume Minor Street (One Direction Only)			
Major Street	Minor Street	100%	80%	70%	56%	100%	80%	70%	56%
1 Lane	1 Lane	500	400	350	280	150	120	105	84
2 + Lanes	1 Lane	600	480	420	336	150	120	105	84
2 + Lanes	2 + Lanes	600	480	420	336	200	160	140	112
1 Lane	2 + Lanes	500	400	350	280	200	160	140	112
Condition B-Interruption of Continuous Traffic									
Number of Lanes for Moving Traffic on Each Approach		Vehicles Per Hour on Major Street (Total of both Approaches) *				Vehicles Per Hour on Higher Volume Minor Street (One Direction Only)			
Major Street	Minor Street	100%	80%	70%	56%	100%	80%	70%	56%
1 Lane	1 Lane	750	600	525	420	75	60	53	42
2 + Lanes	1 Lane	900	720	630	504	75	60	53	42
2 + Lanes	2 + Lanes	900	720	630	504	100	80	70	56
1 Lane	2 + Lanes	750	600	525	420	100	80	70	56

* When the 85-percentile speed of Major Street exceeds 40 mph, the 70% minimum volume thresholds values are used

Source: ***Manual on Uniform Traffic Control Devices***, 2009 Edition, U.S. Department of Transportation, Federal Highway Administration.

Warrant Analysis

Table 5 is a summary of hourly traffic volumes used in the signal warrant analysis along with an assessment of the applicable signal warrants. This table shows that the minimum volume requirements of Warrants 1B and 2 are fully satisfied. Therefore, a traffic signal should be considered for installation at the intersection of E. Lake Mary Boulevard and Skyway Drive. The completed Florida DOT Traffic Signal Warrant Summary forms are included in **Appendix E**.

Table 5
Signal Warrant Analysis

Hour	E. Lake Mary Boulevard	Skyway Drive	Warrant		
	Vehicles Per Hour (total both approaches)	Vehicles Per Hour (High Minor Street)	1A	1B	2
7 – 8 A.M.	1,895	137	X	X	X
8 – 9 A.M.	1,558	87		X	X
9 – 10 A.M.	882	52			
10 – 11 A.M.	786	58		X	X
11 – 12 Noon	750	69		X	X
12 – 1 P.M.	887	60		X	X
1 – 2 P.M.	912	67		X	X
2 – 3 P.M.	1,188	91		X	X
3 – 4 P.M.	1,380	82		X	X
4 – 5 P.M.	1,635	87		X	X
5 – 6 P.M.	1,831	73		X	X
6 – 7 P.M.	1,240	50		X	X
Hours Required			**8**	**8**	**4**
Hours Satisfied			**1**	**11**	**11**

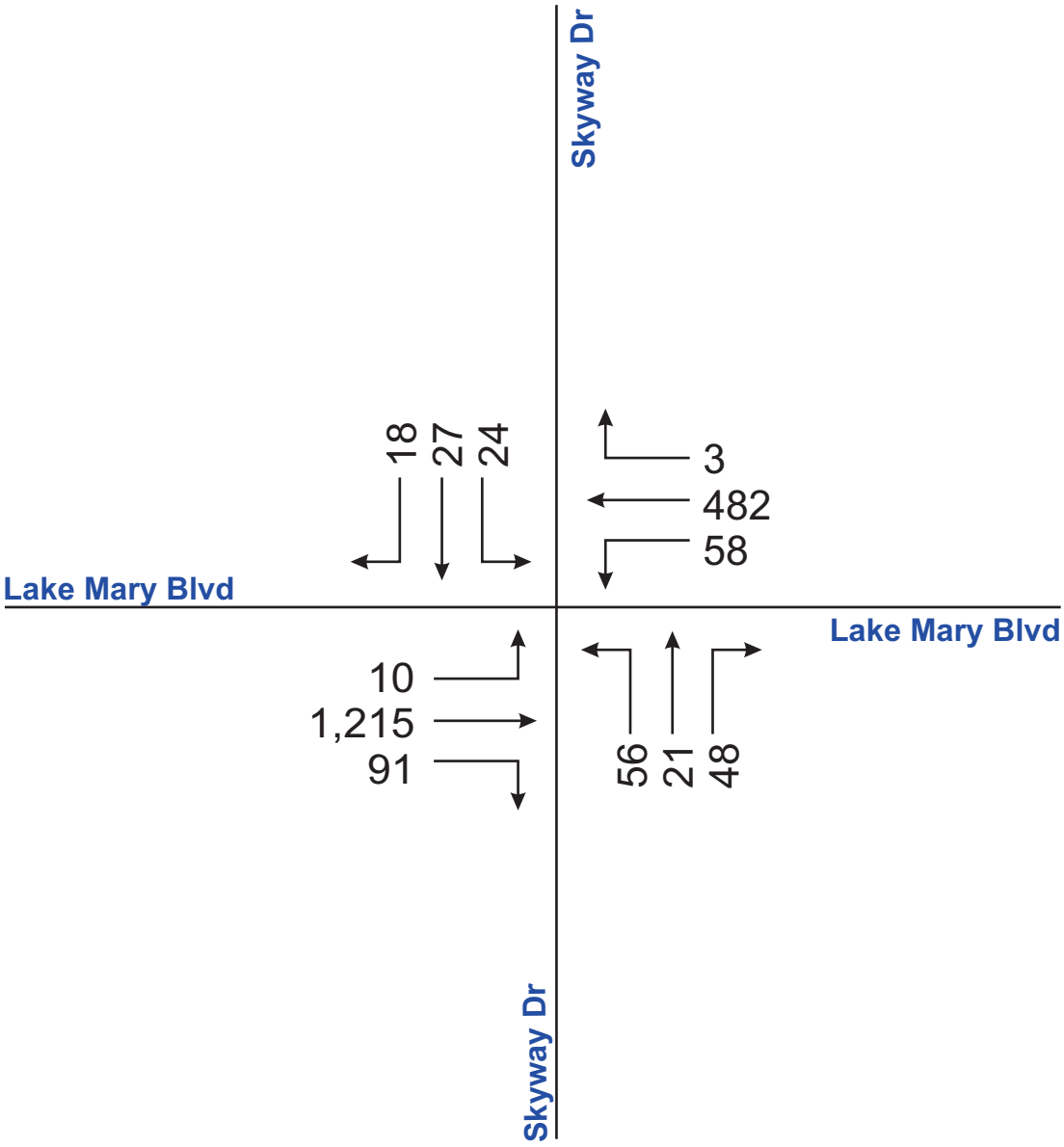
Intersection Traffic Volumes

The projected P.M. peak hour counts at the intersection of E. Lake Mary Boulevard and Skyway Drive are shown in **Figure 4.** The traffic volumes shown in this figure were obtained from existing counts obtained by TPD Inc., which are provided in Appendix A, and adding projected volumes as shown in **Table 3**. Using the projected traffic volumes and the existing intersection geometry, a capacity analysis was conducted at this intersection under STOP control and traffic signal control conditions. This was accomplished with the use of HCS7 software and the procedures of the Highway Capacity Manual. The results of this analysis are summarized below, and the worksheets are included in **Appendix F**.

Traffic Control	Eastbound		Westbound		Northbound		Southbound		Intersection	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
STOP	8.4	A	12.7	B	97.2	F	96.2	F	---	---
Signal	35.7	D	23.3	C	39.9	D	66.3	E	33.7	C

Delay in seconds/vehicle

The capacity analysis results reveal that the intersection will operate at a satisfactory LOS with the proposed signal. Under stop control, the northbound and southbound approaches of Skyway Drive will experience delays resulting in LOS F traffic conditions.



E. Lake Mary Boulevard and Skyway Drive
Project № 5236.1

Figure 4

P.M. Peak Hour Traffic Volumes With Future Developments

N
NTS

STUDY CONCLUSIONS

This signal warrant analysis was conducted to determine the need of and justification for the installation of a traffic signal at the intersection of E. Lake Mary Boulevard and Skyway Drive, in Seminole County, Florida. The warrant analysis was conducted utilizing existing hourly traffic on E. Lake Mary Boulevard and Skyway Drive and adding the developments of the Galileo School along with residential developments of River Run, Kentucky Square and Skyway that are within the one mile area that will impact the intersection. The study does not include vacant lands that can be developed in the future.

The results of the analysis as documented herein revealed that the minimum volumes of Warrant 1B (Eight-Hour Volume) and Warrant 2 (Four-Hour Vehicular Volume) are satisfied. Therefore, it is recommended that a traffic signal be considered for installation at this location.

The new signal will be designed as fully actuated and equipped with interconnect features. Additionally, pedestrian signals with crosswalks at the intersection should be provided. The estimated cost of a mast arm signal installation is $400,000, which should be allocated proportionately to the developments within the one-mile area.

APPENDICES

APPENDIX A

Intersection Counts

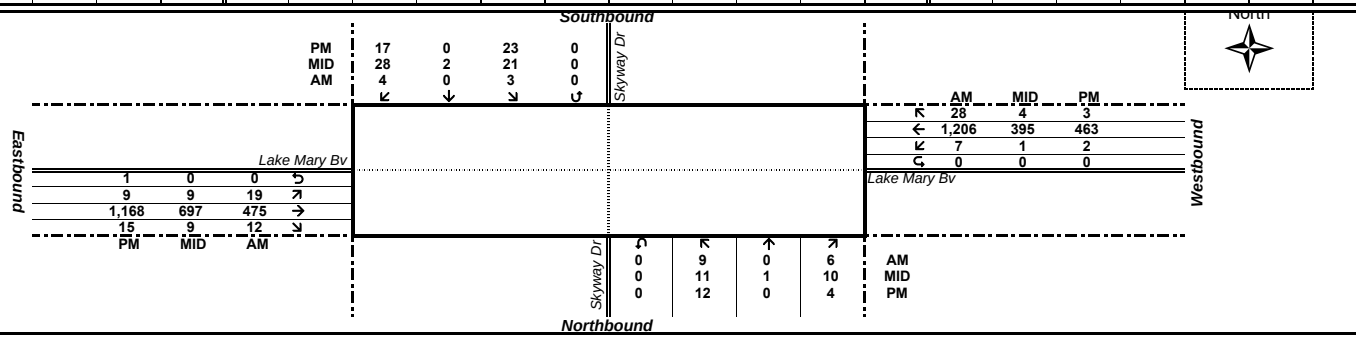
15 MINUTE TURNING MOVEMENT COUNTS

(Cars and Trucks)

DATE: January 15, 2020 (Wednesday) **CITY:** Sanford **LATITUDE:** 0

LOCATION: Skyway Dr & Lake Mary Bv **COUNTY:** Seminole County **LONGITUDE:** 0

	Skyway Dr					Skyway Dr						Lake Mary Bv					Lake Mary Bv						
TIME BEGIN	NORTHBOUND					SOUTHBOUND					N/S TOTAL	EASTBOUND					WESTBOUND					E/W TOTAL	GRAND TOTAL
	L	T	R	U-turn	TOTAL	L	T	R	U-turn	TOTAL		L	T	R	U-turn	TOTAL	L	T	R	U-turn	TOTAL		
07:00 AM	2	0	0	0	**2**	0	1	1	0	**2**	**4**	3	81	2	0	**86**	1	291	3	0	**295**	**381**	**385**
07:15 AM	2	0	0	0	**2**	1	0	3	0	**4**	**6**	5	90	3	0	**98**	2	312	3	0	**317**	**415**	**421**
07:30 AM	2	0	1	0	**3**	0	0	1	0	**1**	**4**	2	106	2	0	**110**	1	336	11	0	**348**	**458**	**462**
07:45 AM	1	0	2	0	**3**	1	0	0	0	**1**	**4**	7	128	4	0	**139**	3	276	7	0	**286**	**425**	**429**
TOTAL	7	0	3	0	**10**	2	1	5	0	**8**	**18**	17	405	11	0	**433**	7	1,215	24	0	**1,246**	**1,679**	**1,697**
08:00 AM	4	0	3	0	**7**	1	0	0	0	**1**	**8**	5	151	3	0	**159**	1	282	7	0	**290**	**449**	**457**
08:15 AM	0	0	3	0	**3**	1	1	0	0	**2**	**5**	4	103	3	0	**110**	1	288	5	0	**294**	**404**	**409**
08:30 AM	1	0	1	0	**2**	0	0	1	0	**1**	**3**	9	84	2	0	**95**	1	234	0	0	**235**	**330**	**333**
08:45 AM	5	0	1	0	**6**	1	0	1	0	**2**	**8**	4	78	2	0	**84**	0	181	7	0	**188**	**272**	**280**
TOTAL	10	0	8	0	**18**	3	1	2	0	**6**	**24**	22	416	10	0	**448**	3	985	19	0	**1,007**	**1,455**	**1,479**
09:00 AM	7	1	0	0	**8**	1	0	1	0	**2**	**10**	3	60	0	0	**63**	2	142	2	0	**146**	**209**	**219**
09:15 AM	2	0	1	0	**3**	2	0	1	0	**3**	**6**	4	65	3	0	**72**	0	134	1	0	**135**	**207**	**213**
09:30 AM	0	0	0	0	**0**	0	0	2	0	**2**	**2**	4	63	3	0	**70**	0	123	2	0	**125**	**195**	**197**
09:45 AM	2	0	1	0	**3**	1	0	1	0	**2**	**5**	5	75	3	0	**83**	0	103	4	0	**107**	**190**	**195**
TOTAL	11	1	2	0	**14**	4	0	5	0	**9**	**23**	16	263	9	0	**288**	2	502	9	0	**513**	**801**	**824**
10:00 AM	2	0	3	0	**5**	1	0	2	0	**3**	**8**	5	66	3	0	**74**	1	94	1	0	**96**	**170**	**178**
10:15 AM	5	0	2	0	**7**	2	0	8	0	**10**	**17**	2	68	3	0	**73**	0	91	0	0	**91**	**164**	**181**
10:30 AM	3	0	0	0	**3**	3	0	2	0	**5**	**8**	1	78	0	0	**79**	1	113	0	0	**114**	**193**	**201**
10:45 AM	1	1	0	0	**2**	1	0	4	0	**5**	**7**	3	70	5	0	**78**	4	91	1	0	**96**	**174**	**181**
TOTAL	11	1	5	0	**17**	7	0	16	0	**23**	**40**	11	282	11	0	**304**	6	389	2	0	**397**	**701**	**741**
11:00 AM	7	0	1	0	**8**	3	0	3	0	**6**	**14**	5	67	1	0	**73**	1	97	1	0	**99**	**172**	**186**
11:15 AM	2	0	2	0	**4**	2	1	1	0	**4**	**8**	3	68	4	0	**75**	1	80	0	0	**81**	**156**	**164**
11:30 AM	2	0	5	0	**7**	2	0	12	0	**14**	**21**	5	81	2	0	**88**	1	74	5	0	**80**	**168**	**189**
11:45 AM	7	0	0	0	**7**	1	0	7	0	**8**	**15**	7	72	3	0	**82**	1	81	2	0	**84**	**166**	**181**
TOTAL	18	0	8	0	**26**	8	1	23	0	**32**	**58**	20	288	10	0	**318**	4	332	8	0	**344**	**662**	**720**
12:00 PM	2	0	0	0	**2**	3	0	5	0	**8**	**10**	5	69	3	0	**77**	2	95	0	0	**97**	**174**	**184**
12:15 PM	1	0	1	0	**2**	3	0	3	0	**6**	**8**	6	87	4	0	**97**	1	111	4	0	**116**	**213**	**221**
12:30 PM	3	0	2	0	**5**	4	0	3	0	**7**	**12**	3	97	3	0	**103**	1	93	2	0	**96**	**199**	**211**
12:45 PM	1	0	1	0	**2**	0	0	2	0	**2**	**4**	4	89	4	0	**97**	1	105	1	0	**107**	**204**	**208**
TOTAL	7	0	4	0	**11**	10	0	13	0	**23**	**34**	18	342	14	0	**374**	5	404	7	0	**416**	**790**	**824**
01:00 PM	2	0	3	0	**5**	0	1	3	0	**4**	**9**	3	90	0	0	**93**	5	99	1	1	**106**	**199**	**208**
01:15 PM	0	0	0	0	**0**	0	1	4	0	**5**	**5**	5	77	6	0	**88**	0	94	3	0	**97**	**185**	**190**
01:30 PM	3	0	2	0	**5**	1	0	3	0	**4**	**9**	6	103	2	0	**111**	0	96	0	0	**96**	**207**	**216**
01:45 PM	4	0	1	0	**5**	1	0	2	0	**3**	**8**	4	122	2	0	**128**	0	88	2	0	**90**	**218**	**226**
TOTAL	9	0	6	0	**15**	2	2	12	0	**16**	**31**	18	392	10	0	**420**	5	377	6	1	**389**	**809**	**840**
02:00 PM	3	0	2	0	**5**	3	0	5	0	**8**	**13**	4	136	0	0	**140**	1	85	0	0	**86**	**226**	**239**
02:15 PM	2	0	1	0	**3**	4	0	3	0	**7**	**10**	4	165	2	0	**171**	0	91	2	0	**93**	**264**	**274**
02:30 PM	3	0	1	0	**4**	6	0	5	0	**11**	**15**	2	153	2	0	**157**	1	135	1	0	**137**	**294**	**309**
02:45 PM	3	0	4	0	**7**	2	0	7	0	**9**	**16**	1	150	2	0	**153**	0	100	0	0	**100**	**253**	**269**
TOTAL	11	0	8	0	**19**	15	0	20	0	**35**	**54**	11	604	6	0	**621**	2	411	3	0	**416**	**1,037**	**1,091**
03:00 PM	4	0	2	0	**6**	4	1	0	0	**5**	**11**	4	148	4	0	**156**	1	99	1	0	**101**	**257**	**268**
03:15 PM	3	0	1	0	**4**	5	0	5	0	**10**	**14**	2	178	1	0	**181**	0	96	1	0	**97**	**278**	**292**
03:30 PM	1	1	3	0	**5**	10	1	16	0	**27**	**32**	2	221	2	0	**225**	0	100	2	0	**102**	**327**	**359**
03:45 PM	1	0	0	0	**1**	3	0	8	0	**11**	**12**	2	227	3	0	**232**	1	91	2	0	**94**	**326**	**338**
TOTAL	9	1	6	0	**16**	22	2	29	0	**53**	**69**	10	774	10	0	**794**	2	386	6	0	**394**	**1,188**	**1,257**
04:00 PM	3	0	1	0	**4**	4	1	5	0	**10**	**14**	0	248	3	0	**251**	1	96	0	0	**97**	**348**	**362**
04:15 PM	1	0	2	0	**3**	5	1	10	0	**16**	**19**	3	238	4	1	**246**	0	95	3	0	**98**	**344**	**363**
04:30 PM	4	0	0	0	**4**	7	0	14	0	**21**	**25**	2	245	5	0	**252**	2	98	1	0	**101**	**353**	**378**
04:45 PM	5	0	2	0	**7**	4	0	1	0	**5**	**12**	6	272	2	0	**280**	0	106	1	0	**107**	**387**	**399**
TOTAL	13	0	5	0	**18**	20	2	30	0	**52**	**70**	11	1,003	14	1	**1,029**	3	395	5	0	**403**	**1,432**	**1,502**
05:00 PM	0	0	1	0	**1**	12	0	6	0	**18**	**19**	1	326	6	0	**333**	0	107	1	0	**108**	**441**	**460**
05:15 PM	2	0	0	0	**2**	5	0	8	0	**13**	**15**	2	302	4	1	**309**	1	114	1	0	**116**	**425**	**440**
05:30 PM	5	0	1	0	**6**	2	0	2	0	**4**	**10**	0	268	3	0	**271**	1	136	0	0	**137**	**408**	**418**
05:45 PM	1	0	0	0	**1**	1	0	1	0	**2**	**3**	2	242	0	0	**244**	1	116	0	0	**117**	**361**	**364**
TOTAL	8	0	2	0	**10**	20	0	17	0	**37**	**47**	5	1,138	13	1	**1,157**	3	473	2	0	**478**	**1,635**	**1,682**
06:00 PM	1	0	0	0	**1**	1	0	2	0	**3**	**4**	2	211	1	0	**214**	0	106	1	0	**107**	**321**	**325**
06:15 PM	0	0	0	0	**0**	2	1	0	0	**3**	**3**	0	216	0	0	**216**	1	103	0	0	**104**	**320**	**323**
06:30 PM	0	0	0	0	**0**	0	0	3	0	**3**	**3**	0	169	1	0	**170**	2	69	2	0	**73**	**243**	**246**
06:45 PM	1	0	0	0	**1**	4	0	1	0	**5**	**6**	0	137	2	0	**139**	4	68	3	0	**75**	**214**	**220**
TOTAL	2	0	0	0	**2**	7	1	6	0	**14**	**16**	2	733	4	0	**739**	7	346	6	0	**359**	**1,098**	**1,114**
AM Peak																					**Peak Hour Factor:**		**0.957**
07:15 AM to 08:15 AM	**9**	**0**	**6**	**0**	**15**	**3**	**0**	**4**	**0**	**7**	**22**	**19**	**475**	**12**	**0**	**506**	**7**	**1,206**	**28**	**0**	**1,241**	**1,747**	**1,769**
Midday Peak																					**Peak Hour Factor:**		**0.827**
02:45 PM to 03:45 PM	**11**	**1**	**10**	**0**	**22**	**21**	**2**	**28**	**0**	**51**	**73**	**9**	**697**	**9**	**0**	**715**	**1**	**395**	**4**	**0**	**400**	**1,115**	**1,188**
PM Peak																					**Peak Hour Factor:**		**0.933**
04:45 PM to 05:45 PM	**12**	**0**	**4**	**0**	**16**	**23**	**0**	**17**	**0**	**40**	**56**	**9**	**1,168**	**15**	**1**	**1,193**	**2**	**463**	**3**	**0**	**468**	**1,661**	**1,717**



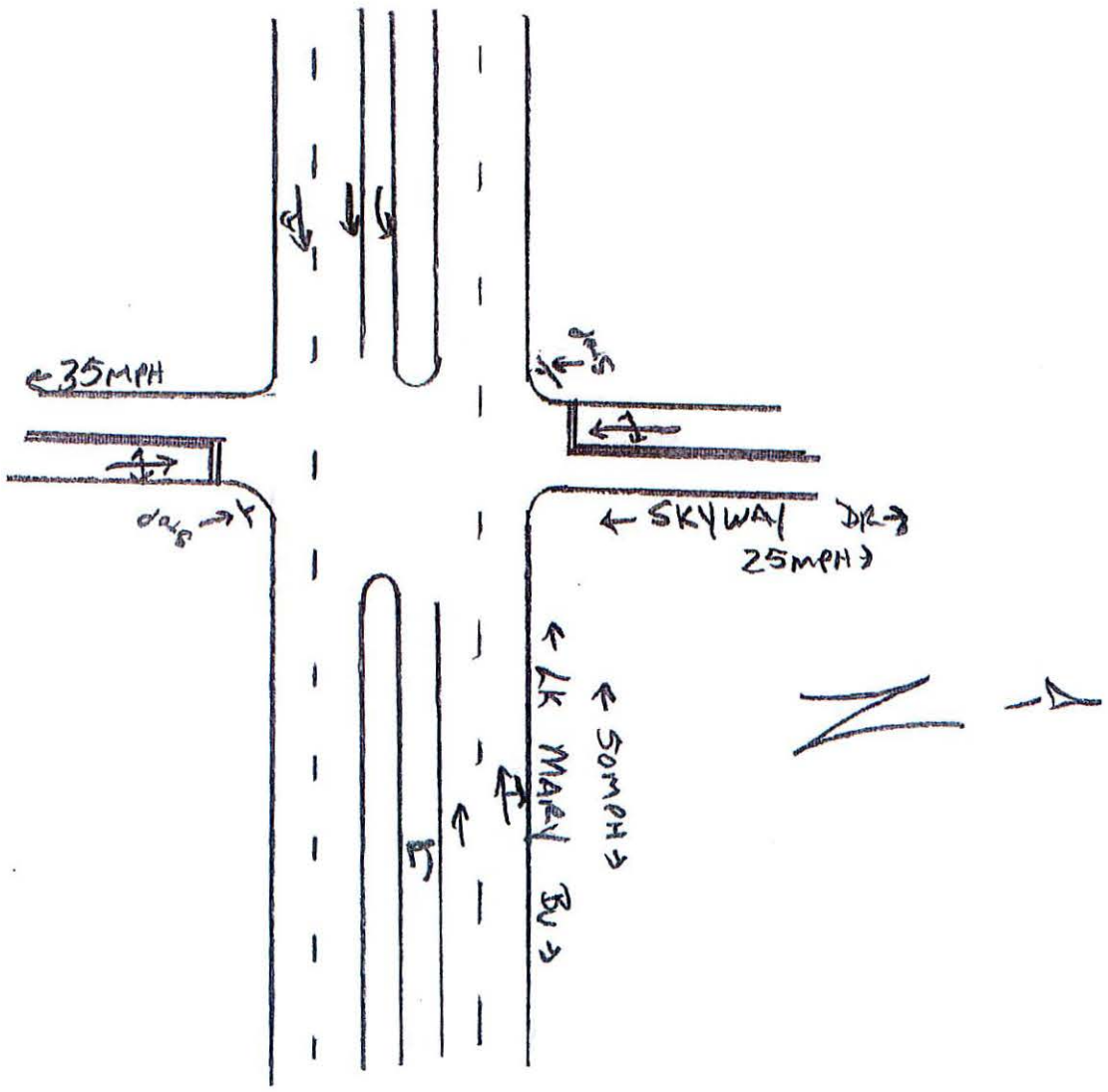
15 MINUTE TURNING MOVEMENT COUNTS

(Trucks Only)

DATE: January 15, 2020 (Wednesday) **CITY:** Sanford **LATITUDE:** 0

LOCATION: Skyway Dr & Lake Mary Bv **COUNTY:** Seminole County **LONGITUDE:** 0

	Skyway Dr					Skyway Dr						Lake Mary Bv						Lake Mary Bv						
TIME	**NORTHBOUND**					**SOUTHBOUND**					**N/S**	**EASTBOUND**					**WESTBOUND**					**E/W**	**GRAND**
BEGIN	**L**	**T**	**R**	***U-turn***	**TOTAL**	**L**	**T**	**R**	***U-turn***	**TOTAL**	**TOTAL**	**L**	**T**	**R**	***U-turn***	**TOTAL**	**L**	**T**	**R**	***U-turn***	**TOTAL**	**TOTAL**	**TOTAL**
07:00 AM	0	0	0	0	**0**	0	0	0	0	**0**	**0**	0	5	0	0	**5**	0	1	0	0	**1**	**6**	**6**
07:15 AM	0	0	0	0	**0**	0	0	0	0	**0**	**0**	0	2	0	0	**2**	2	4	0	0	**6**	**8**	**8**
07:30 AM	0	0	0	0	**0**	0	0	0	0	**0**	**0**	0	5	0	0	**5**	1	3	0	0	**4**	**9**	**9**
07:45 AM	0	0	2	0	**2**	0	0	0	0	**0**	**2**	0	5	1	0	**6**	2	3	0	0	**5**	**11**	**13**
TOTAL	0	0	2	0	**2**	0	0	0	0	**0**	**2**	0	17	1	0	**18**	5	11	0	0	**16**	**34**	**36**
08:00 AM	0	0	2	0	**2**	0	0	0	0	**0**	**2**	0	5	0	0	**5**	0	2	1	0	**3**	**8**	**10**
08:15 AM	0	0	1	0	**1**	0	0	0	0	**0**	**1**	0	1	0	0	**1**	1	2	0	0	**3**	**4**	**5**
08:30 AM	0	0	0	0	**0**	0	0	0	0	**0**	**0**	1	5	0	0	**6**	1	4	0	0	**5**	**11**	**11**
08:45 AM	0	0	1	0	**1**	0	0	0	0	**0**	**1**	0	6	0	0	**6**	0	3	2	0	**5**	**11**	**12**
TOTAL	0	0	4	0	**4**	0	0	0	0	**0**	**4**	1	17	0	0	**18**	2	11	3	0	**16**	**34**	**38**
09:00 AM	0	0	0	0	**0**	0	0	0	0	**0**	**0**	0	0	0	0	**0**	0	1	0	0	**1**	**1**	**1**
09:15 AM	0	0	0	0	**0**	0	0	0	0	**0**	**0**	0	0	0	0	**0**	0	2	0	0	**2**	**2**	**2**
09:30 AM	0	0	0	0	**0**	0	0	0	0	**0**	**0**	0	4	0	0	**4**	0	4	0	0	**4**	**8**	**8**
09:45 AM	0	0	0	0	**0**	0	0	0	0	**0**	**0**	0	4	0	0	**4**	0	4	0	0	**4**	**8**	**8**
TOTAL	0	0	0	0	**0**	0	0	0	0	**0**	**0**	0	8	0	0	**8**	0	11	0	0	**11**	**19**	**19**
10:00 AM	1	0	0	0	**1**	0	0	0	0	**0**	**1**	0	0	0	0	**0**	0	2	0	0	**2**	**2**	**3**
10:15 AM	0	0	1	0	**1**	0	0	1	0	**1**	**2**	0	1	0	0	**1**	0	1	0	0	**1**	**2**	**4**
10:30 AM	0	0	0	0	**0**	0	0	0	0	**0**	**0**	0	5	0	0	**5**	0	6	0	0	**6**	**11**	**11**
10:45 AM	0	0	0	0	**0**	0	0	0	0	**0**	**0**	0	4	0	0	**4**	1	2	0	0	**3**	**7**	**7**
TOTAL	1	0	1	0	**2**	0	0	1	0	**1**	**3**	0	10	0	0	**10**	1	11	0	0	**12**	**22**	**25**
11:00 AM	0	0	0	0	**0**	0	0	0	0	**0**	**0**	0	5	0	0	**5**	0	1	0	0	**1**	**6**	**6**
11:15 AM	0	0	0	0	**0**	0	0	0	0	**0**	**0**	0	3	0	0	**3**	0	4	0	0	**4**	**7**	**7**
11:30 AM	0	0	0	0	**0**	0	0	0	0	**0**	**0**	1	5	0	0	**6**	0	2	0	0	**2**	**8**	**8**
11:45 AM	0	0	0	0	**0**	0	0	0	0	**0**	**0**	1	4	0	0	**5**	0	1	0	0	**1**	**6**	**6**
TOTAL	0	0	0	0	**0**	0	0	0	0	**0**	**0**	2	17	0	0	**19**	0	8	0	0	**8**	**27**	**27**
12:00 PM	0	0	0	0	**0**	1	0	1	0	**2**	**2**	2	1	0	0	**3**	1	6	0	0	**7**	**10**	**12**
12:15 PM	0	0	0	0	**0**	0	0	0	0	**0**	**0**	0	6	0	0	**6**	0	5	0	0	**5**	**11**	**11**
12:30 PM	1	0	1	0	**2**	0	0	0	0	**0**	**2**	0	3	0	0	**3**	0	2	0	0	**2**	**5**	**7**
12:45 PM	0	0	0	0	**0**	0	0	0	0	**0**	**0**	0	3	0	0	**3**	0	9	0	0	**9**	**12**	**12**
TOTAL	1	0	1	0	**2**	1	0	1	0	**2**	**4**	2	13	0	0	**15**	1	22	0	0	**23**	**38**	**42**
01:00 PM	0	0	0	0	**0**	0	0	0	0	**0**	**0**	0	2	0	0	**2**	0	2	0	0	**2**	**4**	**4**
01:15 PM	0	0	0	0	**0**	0	0	0	0	**0**	**0**	2	1	0	0	**3**	0	3	0	0	**3**	**6**	**6**
01:30 PM	0	0	0	0	**0**	0	0	1	0	**1**	**1**	0	5	0	0	**5**	0	4	0	0	**4**	**9**	**10**
01:45 PM	0	0	1	0	**1**	0	0	1	0	**1**	**2**	0	4	0	0	**4**	0	5	1	0	**6**	**10**	**12**
TOTAL	0	0	1	0	**1**	0	0	2	0	**2**	**3**	2	12	0	0	**14**	0	14	1	0	**15**	**29**	**32**
02:00 PM	0	0	0	0	**0**	0	0	0	0	**0**	**0**	0	6	0	0	**6**	0	3	0	0	**3**	**9**	**9**
02:15 PM	0	0	0	0	**0**	0	0	1	0	**1**	**1**	0	5	0	0	**5**	0	4	0	0	**4**	**9**	**10**
02:30 PM	1	0	0	0	**1**	0	0	0	0	**0**	**1**	0	7	0	0	**7**	0	9	0	0	**9**	**16**	**17**
02:45 PM	0	0	1	0	**1**	0	0	0	0	**0**	**1**	0	4	0	0	**4**	0	1	0	0	**1**	**5**	**6**
TOTAL	1	0	1	0	**2**	0	0	1	0	**1**	**3**	0	22	0	0	**22**	0	17	0	0	**17**	**39**	**42**
03:00 PM	0	0	0	0	**0**	0	0	0	0	**0**	**0**	0	3	0	0	**3**	0	2	0	0	**2**	**5**	**5**
03:15 PM	0	0	0	0	**0**	0	0	1	0	**1**	**1**	0	3	0	0	**3**	0	3	0	0	**3**	**6**	**7**
03:30 PM	0	0	2	0	**2**	0	0	0	0	**0**	**2**	0	2	0	0	**2**	0	4	0	0	**4**	**6**	**8**
03:45 PM	0	0	0	0	**0**	0	0	0	0	**0**	**0**	0	5	0	0	**5**	0	4	0	0	**4**	**9**	**9**
TOTAL	0	0	2	0	**2**	0	0	1	0	**1**	**3**	0	13	0	0	**13**	0	13	0	0	**13**	**26**	**29**
04:00 PM	0	0	0	0	**0**	0	0	1	0	**1**	**1**	0	2	0	0	**2**	0	2	0	0	**2**	**4**	**5**
04:15 PM	0	0	0	0	**0**	0	0	0	0	**0**	**0**	0	5	1	0	**6**	0	3	0	0	**3**	**9**	**9**
04:30 PM	0	0	0	0	**0**	0	0	0	0	**0**	**0**	0	1	1	0	**2**	0	4	0	0	**4**	**6**	**6**
04:45 PM	0	0	2	0	**2**	0	0	0	0	**0**	**2**	0	2	0	0	**2**	0	6	0	0	**6**	**8**	**10**
TOTAL	0	0	2	0	**2**	0	0	1	0	**1**	**3**	0	10	2	0	**12**	0	15	0	0	**15**	**27**	**30**
05:00 PM	0	0	0	0	**0**	0	0	0	0	**0**	**0**	0	2	0	0	**2**	0	2	0	0	**2**	**4**	**4**
05:15 PM	1	0	0	0	**1**	0	0	2	0	**2**	**3**	0	2	0	0	**2**	0	2	0	0	**2**	**4**	**7**
05:30 PM	0	0	0	0	**0**	0	0	0	0	**0**	**0**	0	2	0	0	**2**	0	2	0	0	**2**	**4**	**4**
05:45 PM	0	0	0	0	**0**	0	0	0	0	**0**	**0**	0	2	0	0	**2**	0	3	0	0	**3**	**5**	**5**
TOTAL	1	0	0	0	**1**	0	0	2	0	**2**	**3**	0	8	0	0	**8**	0	9	0	0	**9**	**17**	**20**
06:00 PM	0	0	0	0	**0**	0	0	0	0	**0**	**0**	0	0	0	0	**0**	0	4	0	0	**4**	**4**	**4**
06:15 PM	0	0	0	0	**0**	0	0	0	0	**0**	**0**	0	1	0	0	**1**	0	5	0	0	**5**	**6**	**6**
06:30 PM	0	0	0	0	**0**	0	0	0	0	**0**	**0**	0	1	0	0	**1**	0	2	0	0	**2**	**3**	**3**
06:45 PM	0	0	0	0	**0**	0	0	0	0	**0**	**0**	0	0	0	0	**0**	0	0	0	0	**0**	**0**	**0**
TOTAL	0	0	0	0	**0**	0	0	0	0	**0**	**0**	0	2	0	0	**2**	0	11	0	0	**11**	**13**	**13**
AM Peak 07:15 AM to 08:15 AM	**0**	**0**	**4**	**0**	**4**	**0**	**0**	**0**	**0**	**0**	**4**	**0**	**17**	**1**	**0**	**18**	**5**	**12**	**1**	**0**	**18**	**36**	**40**
Midday Peak 02:45 PM to 03:45 PM	**0**	**0**	**3**	**0**	**3**	**0**	**0**	**1**	**0**	**1**	**4**	**0**	**12**	**0**	**0**	**12**	**0**	**10**	**0**	**0**	**10**	**22**	**26**
PM Peak 04:45 PM to 05:45 PM	**1**	**0**	**2**	**0**	**3**	**0**	**0**	**2**	**0**	**2**	**5**	**0**	**8**	**0**	**0**	**8**	**0**	**12**	**0**	**0**	**12**	**20**	**25**


35MPH
SKYWAY DR
25MPH
LK MARY BL
50MPH

2018 PEAK SEASON FACTOR CATEGORY REPORT - REPORT TYPE: ALL
CATEGORY: 7744 SEMINOLE I4 URBAN

WEEK	DATES	SF	MOCF: 0.97 PSCF
1	01/01/2018 - 01/06/2018	1.03	1.06
2	01/07/2018 - 01/13/2018	1.04	1.07
3	01/14/2018 - 01/20/2018	1.04	1.07
4	01/21/2018 - 01/27/2018	1.02	1.05
5	01/28/2018 - 02/03/2018	1.01	1.04
* 6	02/04/2018 - 02/10/2018	0.99	1.02
* 7	02/11/2018 - 02/17/2018	0.97	1.00
* 8	02/18/2018 - 02/24/2018	0.97	1.00
* 9	02/25/2018 - 03/03/2018	0.96	0.99
*10	03/04/2018 - 03/10/2018	0.95	0.98
*11	03/11/2018 - 03/17/2018	0.94	0.97
*12	03/18/2018 - 03/24/2018	0.95	0.98
*13	03/25/2018 - 03/31/2018	0.95	0.98
*14	04/01/2018 - 04/07/2018	0.96	0.99
*15	04/08/2018 - 04/14/2018	0.97	1.00
*16	04/15/2018 - 04/21/2018	0.97	1.00
*17	04/22/2018 - 04/28/2018	0.98	1.01
*18	04/29/2018 - 05/05/2018	0.99	1.02
19	05/06/2018 - 05/12/2018	1.00	1.03
20	05/13/2018 - 05/19/2018	1.01	1.04
21	05/20/2018 - 05/26/2018	1.01	1.04
22	05/27/2018 - 06/02/2018	1.01	1.04
23	06/03/2018 - 06/09/2018	1.00	1.03
24	06/10/2018 - 06/16/2018	1.00	1.03
25	06/17/2018 - 06/23/2018	1.00	1.03
26	06/24/2018 - 06/30/2018	1.00	1.03
27	07/01/2018 - 07/07/2018	1.00	1.03
28	07/08/2018 - 07/14/2018	1.01	1.04
29	07/15/2018 - 07/21/2018	1.01	1.04
30	07/22/2018 - 07/28/2018	1.01	1.04
31	07/29/2018 - 08/04/2018	1.00	1.03
32	08/05/2018 - 08/11/2018	1.00	1.03
33	08/12/2018 - 08/18/2018	1.00	1.03
34	08/19/2018 - 08/25/2018	1.01	1.04
35	08/26/2018 - 09/01/2018	1.02	1.05
36	09/02/2018 - 09/08/2018	1.02	1.05
37	09/09/2018 - 09/15/2018	1.03	1.06
38	09/16/2018 - 09/22/2018	1.03	1.06
39	09/23/2018 - 09/29/2018	1.02	1.05
40	09/30/2018 - 10/06/2018	1.02	1.05
41	10/07/2018 - 10/13/2018	1.01	1.04
42	10/14/2018 - 10/20/2018	1.01	1.04
43	10/21/2018 - 10/27/2018	1.01	1.04
44	10/28/2018 - 11/03/2018	1.02	1.05
45	11/04/2018 - 11/10/2018	1.02	1.05
46	11/11/2018 - 11/17/2018	1.02	1.05
47	11/18/2018 - 11/24/2018	1.03	1.06
48	11/25/2018 - 12/01/2018	1.03	1.06
49	12/02/2018 - 12/08/2018	1.03	1.06
50	12/09/2018 - 12/15/2018	1.03	1.06
51	12/16/2018 - 12/22/2018	1.03	1.06
52	12/23/2018 - 12/29/2018	1.04	1.07
53	12/30/2018 - 12/31/2018	1.04	1.07

* PEAK SEASON

COUNTY: 77
STATION: 8038
DESCRIPTION: E LAKE MARY BLVD, E OF RED CLEVELAND BLVD - OFF SY
START DATE: 02/06/2018
START TIME: 0000

TIME	DIRECTION: E 1ST	2ND	3RD	4TH	TOTAL	DIRECTION: W 1ST	2ND	3RD	4TH	TOTAL	COMBINED TOTAL
0000	11	9	4	5	29	4	3	4	5	16	45
0100	9	7	1	3	20	5	7	7	4	23	43
0200	1	2	7	7	17	2	5	4	9	20	37
0300	1	4	3	3	11	8	7	11	11	37	48
0400	2	4	11	11	28	14	31	40	58	143	171
0500	20	25	47	38	130	59	94	113	154	420	550
0600	50	62	62	74	248	153	240	311	303	1007	1255
0700	88	80	121	127	416	285	310	366	298	1259	1675
0800	143	124	87	81	435	273	281	236	194	984	1419
0900	84	85	88	60	317	166	161	122	131	580	897
1000	101	75	73	84	333	116	127	120	110	473	806
1100	86	87	87	91	351	100	101	114	111	426	777
1200	102	99	125	80	406	120	140	97	101	458	864
1300	104	127	131	121	483	71	89	76	79	315	798
1400	108	118	147	126	499	101	92	108	97	398	897
1500	173	191	229	225	818	83	102	123	139	447	1265
1600	240	230	301	305	1076	98	129	126	156	509	1585
1700	272	316	325	326	1239	160	159	158	139	616	1855
1800	262	233	203	202	900	146	123	165	91	525	1425
1900	165	104	111	108	488	164	142	91	86	483	971
2000	82	74	75	61	292	97	151	66	40	354	646
2100	47	49	46	49	191	59	24	43	40	166	357
2200	34	37	27	21	119	29	30	14	9	82	201
2300	25	14	18	22	79	18	5	8	1	32	111
24-HOUR TOTALS:					8925					9773	18698

PEAK VOLUME INFORMATION

	DIRECTION: E HOUR	VOLUME	DIRECTION: W HOUR	VOLUME	COMBINED DIRECTIONS HOUR	VOLUME
A.M.	730	515	645	1264	730	1733
P.M.	1700	1239	1645	633	1700	1855
DAILY	1700	1239	645	1264	1700	1855

GENERATED BY SPS 5.0.53P

APPENDIX B

Trip Generation Worksheets

Single-Family Detached Housing
(210)

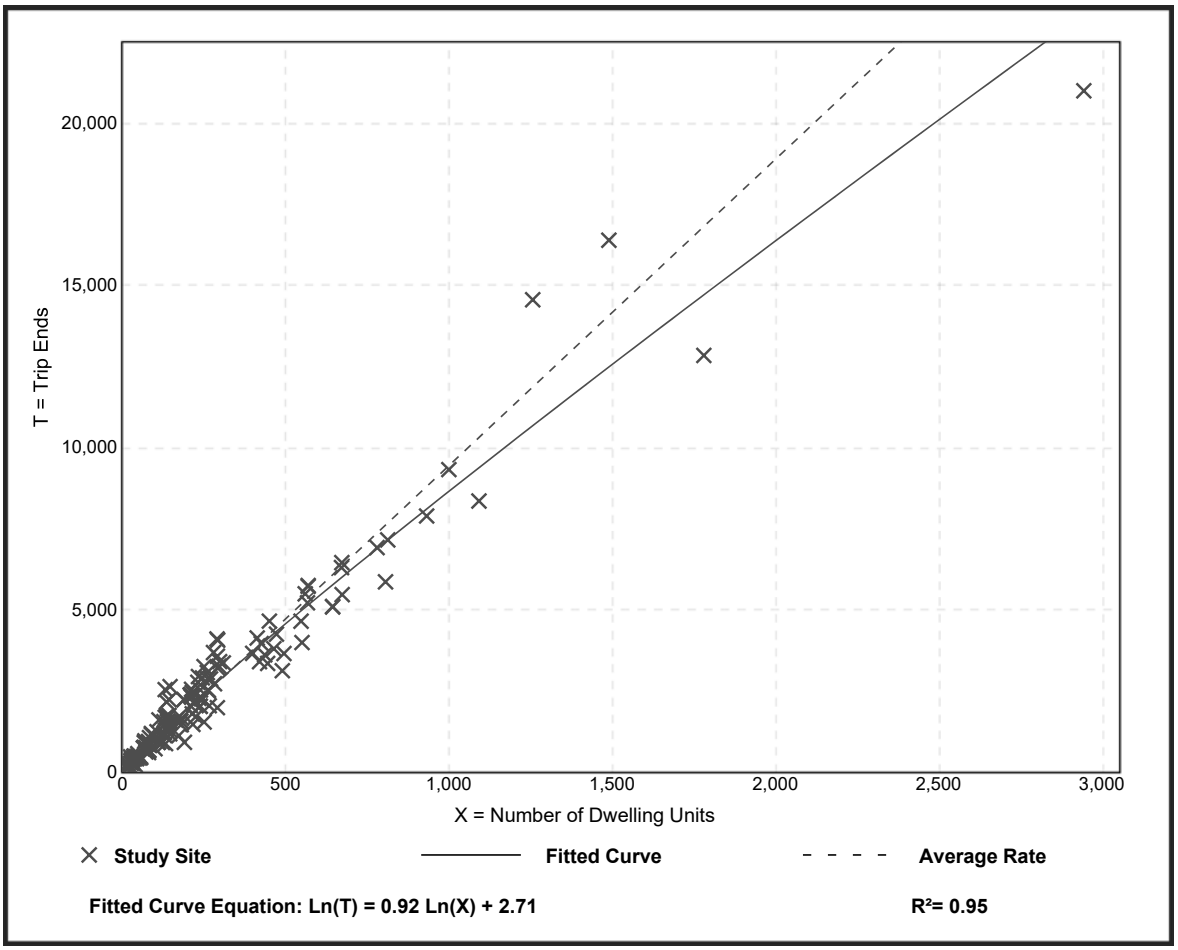
Vehicle Trip Ends vs: **Dwelling Units**
On a: **Weekday**

Setting/Location: **General Urban/Suburban**
Number of Studies: 159
Avg. Num. of Dwelling Units: 264
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
9.44	4.81 - 19.39	2.10

Data Plot and Equation



Fitted Curve Equation: Ln(T) = 0.92 Ln(X) + 2.71 **R^2= 0.95**

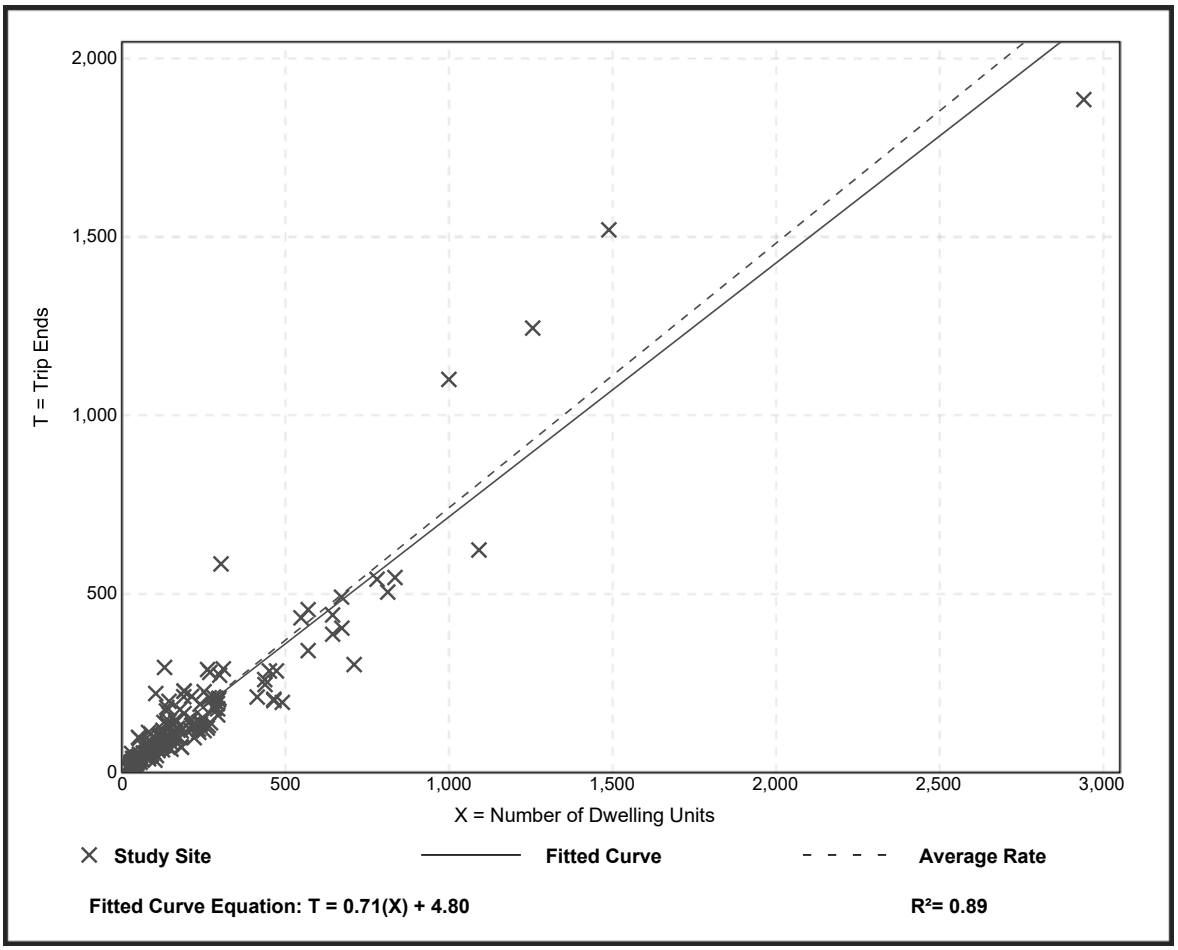
Single-Family Detached Housing
(210)

Vehicle Trip Ends vs: **Dwelling Units**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 173
Avg. Num. of Dwelling Units: 219
Directional Distribution: 25% entering, 75% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.74	0.33 - 2.27	0.27

Data Plot and Equation



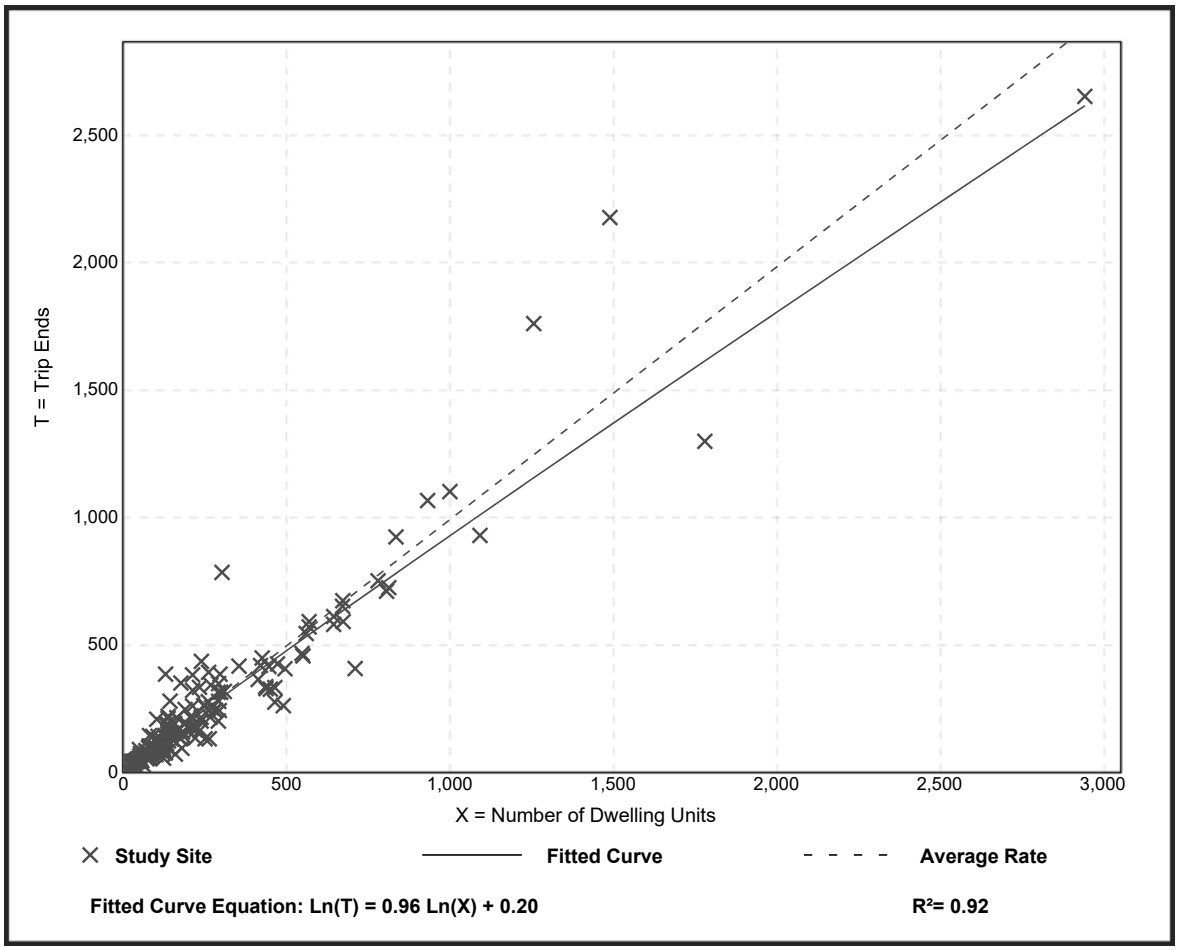
Single-Family Detached Housing
(210)

Vehicle Trip Ends vs: **Dwelling Units**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 190
Avg. Num. of Dwelling Units: 242
Directional Distribution: 63% entering, 37% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.99	0.44 - 2.98	0.31

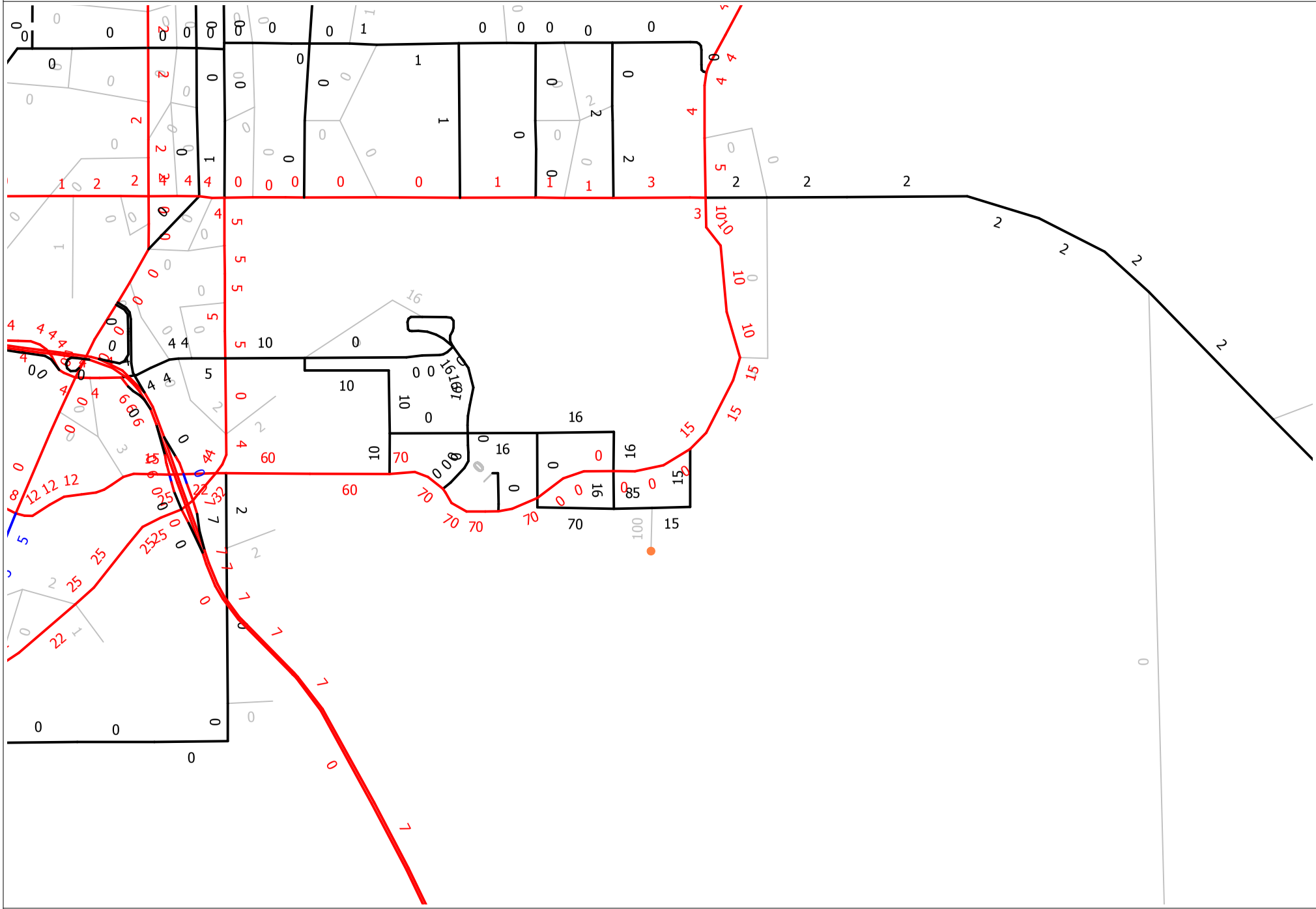
Data Plot and Equation



APPENDIX C

Model Distribution Plot

Trip Distribution



OUATS YEAR 2030 LRTP
C:\FSUTMS\D5\OUATS2040\Base\CF2025\P46752\Output\HRLDXY_C25.NET 4/23/2019

cube

TRAFFIC IMPACT ANALYSIS

SEMINOLE COUNTY, FLORIDA

Galileo Charter School

Skyway Drive

Prepared by:

Creative
Resources
Enhancing
Workable
Sustainability

606 Courtlea Cove Ave
Winter Garden, Florida 34787
407-758-0137

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June 2018

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p: 407.877.3524
m: 407.758.0137
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www.CREWSLLC.com

FIGURE 2
Project Trip Distribution

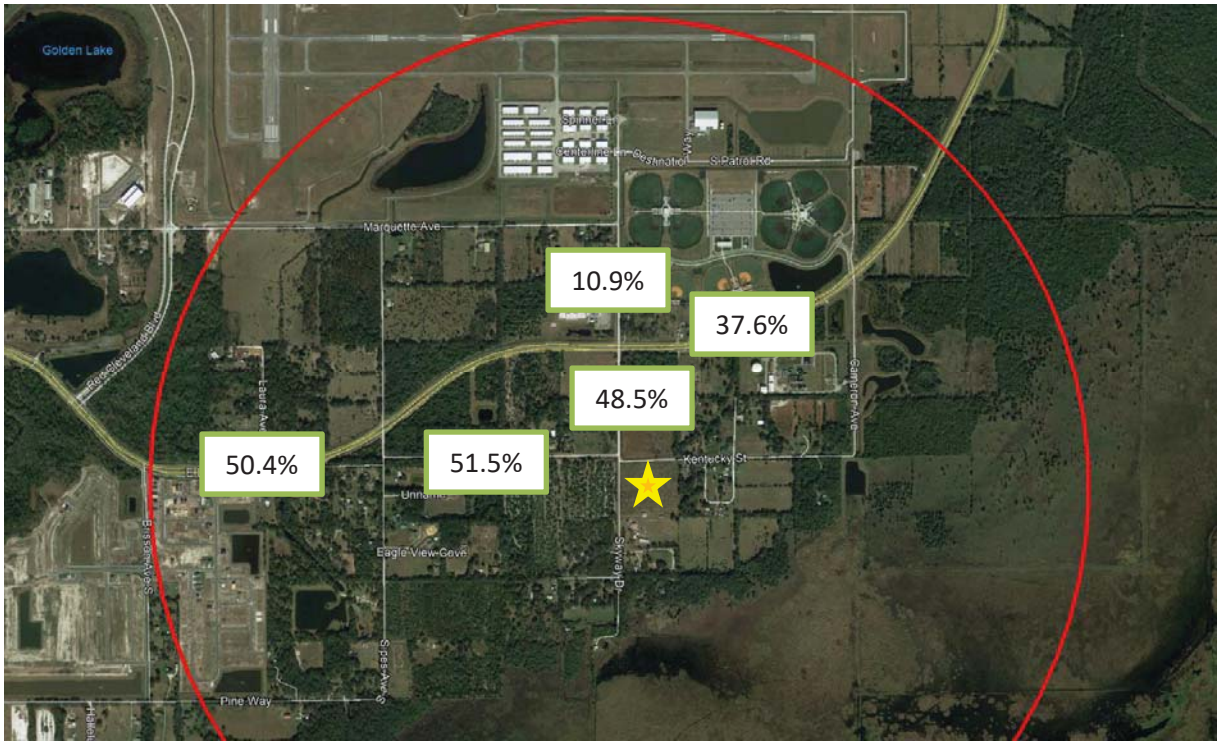


TABLE 2
Impacted Roadway Segments and Projected Conditions Analysis

Roadway Segment	Lns	Daily Capacity	Background Daily Traffic Existing	Comm.	Tot. BG	Project Distrib %	Volume	Total Projected	Available Capacity	Projected LOS	Adequate?
E. Lake Mary Blvd											
Red Cleveland Blvd to SR 46/41	4	42,560	8,998	-	8,998	50.4%	1587	10,585	31,975	B	Yes

Only two signalized intersections are located within the ¼ mile impact area:

Skyway Drive and Kentucky Road
Skyway Drive and Lake Mary Boulevard

Projected traffic at these intersections will be estimated by combining existing traffic volumes with an estimate of the committed traffic and the distributed AM and PM Peak hour project traffic. Both existing and projected intersection operations will be analyzed using existing timings and Synchro software using the procedures of the Highway Capacity Manual. Projected traffic volumes will be shown at the project's driveways.

FIGURE 4—Projected AM Peak Hour Traffic Volumes

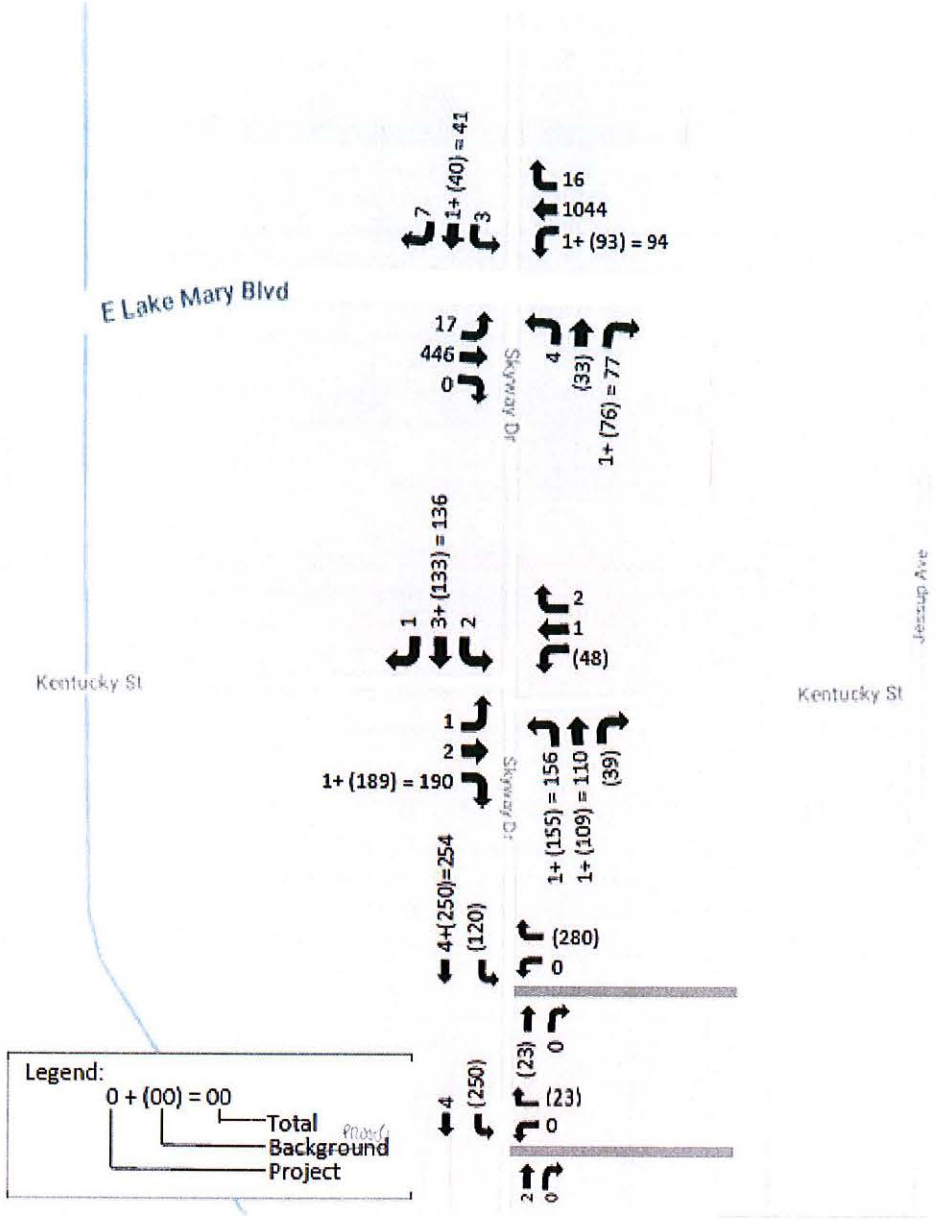
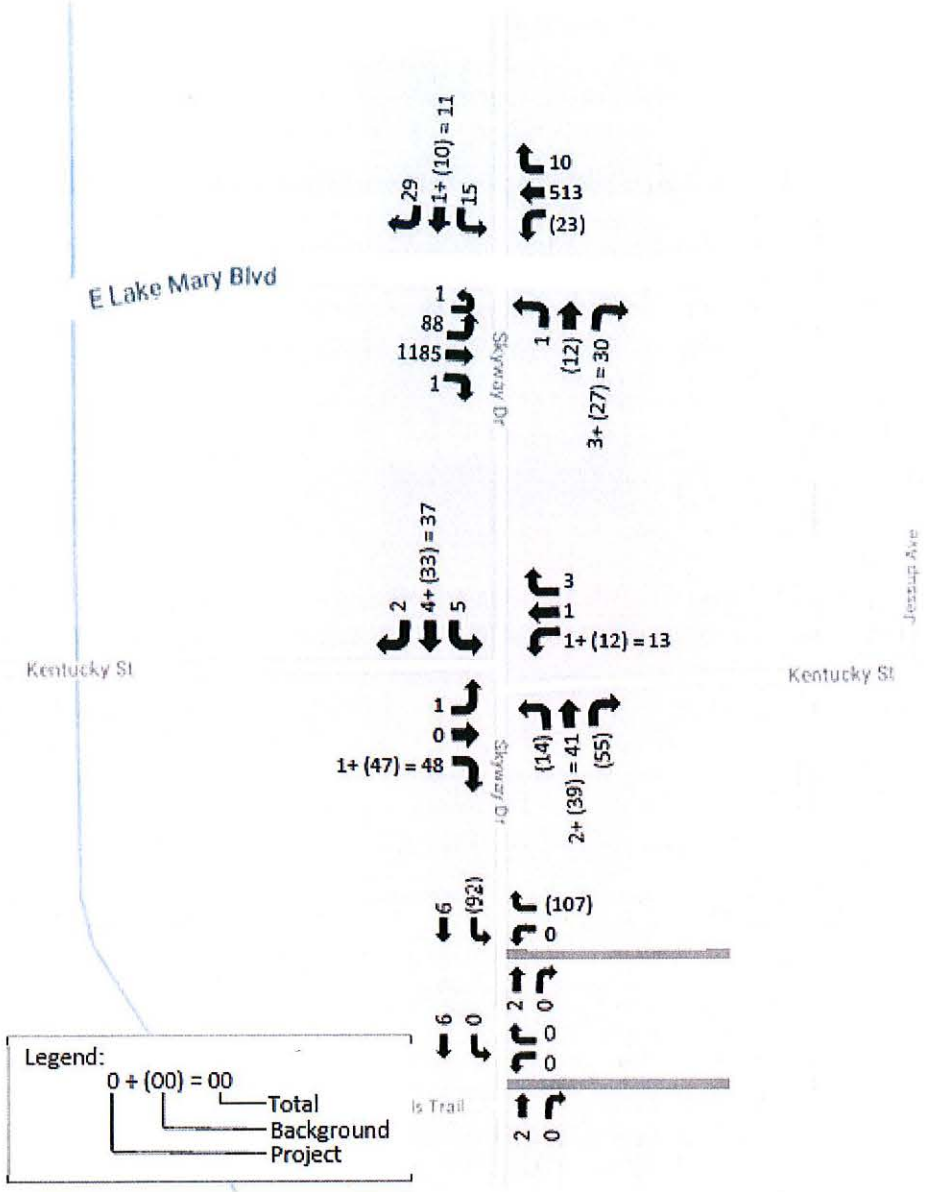


FIGURE 5—Projected PM Peak Hour Traffic Volumes



APPENDIX D

Hourly Projected Counts by Land Use

Single Family - ITE Code 210

5-6	1.2	
	1.6	
	2.0	
	2.9	1.93
6-7	3.8	
	4.5	
	5.4	
	6.2	4.98
7-8	6.7	
	7.3	
	7.1	
	6.6	6.93
8-9	6.2	
	5.7	
	5.1	
	4.9	5.48
9-10	4.3	
	4.1	
	4.4	
	4.4	4.30
10-11	4.8	
	5.0	
	5.0	
	5.2	5.00
11-12	5.2	
	5.3	
	5.4	
	5.4	5.33
12-1	5.5	
	5.6	
	5.8	
	6.1	5.75
1-2	6.0	
	6.1	
	6.2	
	6.2	6.13

2-3	6.6	
	6.8	
	6.7	
	7.1	6.80
3-4	7.2	
	7.7	
	8.5	
	8.9	8.08
4-5	9.0	
	8.9	
	8.9	
	8.9	8.93
5-6	8.8	
	8.6	
	8.3	
	7.9	8.40
6-7	7.2	
	6.7	
	6.0	
	5.6	6.38
7-8	5.2	
	5.0	
	4.8	
	4.7	4.93
8-9	4.7	
	4.5	
	4.3	
	3.7	4.30
9-10	3.4	
	2.8	
	2.3	
	2.0	2.63

Average of ITE Codes 522 & 537

5-6	0.3	
	0.5	
	0.7	
	1.1	0.64
6-7	2.8	
	6.0	
	10.5	
	15.3	8.63
7-8	26.8	
	29.9	
	26.3	
	22.0	26.24
8-9	8.9	
	3.0	
	2.2	
	1.7	3.93
9-10	1.7	
	1.6	
	1.5	
	1.5	1.56
10-11	1.6	
	1.6	
	1.6	
	1.9	1.66
11-12	2.1	
	2.2	
	2.4	
	2.3	2.24
12-1	2.3	
	2.4	
	2.1	
	1.8	2.11
1-2	1.6	
	1.9	
	3.2	
	3.9	2.63

2-3	6.8	
	11.7	
	14.5	
	14.9	11.95
3-4	14.1	
	11.6	
	10.6	
	11.6	11.95
4-5	11.2	
	10.3	
	8.5	
	7.2	9.29
5-6	7.3	
	6.9	
	6.6	
	6.2	6.71
6-7	5.5	
	4.6	
	4.3	
	4.2	4.63
7-8	3.6	
	3.7	
	3.5	
	2.7	3.36
8-9	2.4	
	1.5	
	1.0	
	0.8	1.40
9-10	0.7	
	0.6	
	0.5	
	0.4	0.55

Land Use	520 Elementary School		522 Middle School/Junior High School		537 Charter Elementary School	
Setting	General Urban/Suburban		General Urban/Suburban		General Urban/Suburban	
Time Period	Weekday		Weekday		Weekday	
Trip Type	Vehicle		Vehicle		Vehicle	
# Data Sites	11		2		1	
	AM	PM	AM	PM	AM	PM
12:00	0.0	2.4	0.1	1.5	0.0	3.0
12:15	0.0	2.8	0.1	1.7	0.0	3.1
12:30	0.0	2.9	0.1	1.6	0.0	2.5
12:45	0.0	2.8	0.0	1.5	0.0	2.0
1:00	0.0	4.1	0.0	1.9	0.0	1.3
1:15	0.0	5.3	0.0	2.6	0.0	1.1
1:30	0.0	9.5	0.0	5.0	0.0	1.3
1:45	0.0	13.0	0.0	6.3	0.0	2.5
2:00	0.0	14.8	0.0	8.0	0.0	5.6
2:15	0.0	14.9	0.0	9.9	0.0	13.5
2:30	0.0	12.4	0.0	10.2	0.0	18.7
2:45	0.0	11.1	0.0	10.5	0.1	19.2
3:00	0.0	11.0	0.0	10.6	0.1	17.5
3:15	0.0	10.8	0.0	10.3	0.1	12.9
3:30	0.0	10.4	0.0	9.3	0.1	11.8
3:45	0.0	10.1	0.1	9.7	0.1	13.5
4:00	0.0	8.9	0.2	9.3	0.0	13.1
4:15	0.0	9.2	0.3	9.4	0.0	11.2
4:30	0.0	9.1	0.5	10.3	0.0	6.7
4:45	0.0	7.6	0.5	10.7	0.0	3.6
5:00	0.0	5.9	0.6	11.7	0.0	2.8
5:15	0.0	3.8	0.8	11.4	0.1	2.4
5:30	0.4	2.2	1.0	10.6	0.4	2.5
5:45	1.2	1.3	1.5	10.0	0.7	2.3
6:00	2.5	0.7	2.9	9.2	2.7	1.8
6:15	5.3	0.4	7.3	8.3	4.6	0.9
6:30	10.3	0.2	15.0	7.8	6.0	0.7
6:45	18.8	0.1	17.0	8.0	13.5	0.3
7:00	30.0	0.1	18.2	6.9	35.4	0.3
7:15	34.5	0.0	17.4	7.3	42.4	0.1
7:30	32.0	0.0	11.0	6.8	41.6	0.1
7:45	24.6	0.0	9.0	5.2	34.9	0.2
8:00	13.3	0.0	6.6	4.5	11.2	0.2
8:15	6.6	0.0	3.4	2.7	2.5	0.2
8:30	4.2	0.0	2.4	1.8	1.9	0.2
8:45	2.8	0.0	2.3	1.5	1.1	0.1
9:00	2.0	0.0	2.1	1.4	1.3	0.0
9:15	1.7	0.0	1.8	1.2	1.3	0.0
9:30	1.5	0.0	1.5	1.0	1.5	0.0
9:45	1.5	0.0	1.6	0.8	1.4	0.0
10:00	1.7	0.0	1.6	0.5	1.5	0.0
10:15	2.2	0.0	1.7	0.3	1.5	0.0
10:30	2.5	0.0	1.9	0.2	1.3	0.0
10:45	2.7	0.0	2.0	0.1	1.8	0.0
11:00	2.7	0.0	2.1	0.1	2.1	0.0
11:15	2.4	0.0	2.1	0.1	2.3	0.0
11:30	2.4	0.0	1.9	0.1	2.9	0.0
11:45	2.4	0.0	1.6	0.1	2.9	0.0

Percent of Daily Traffic During the 60-Minute Period Beginning at Displayed Time

Land Use	210 Single-Family Detached Housing						220 Multifamily Housing (Low-Rise)							
Setting	General Urban/Suburban						General Urban/Suburban						Dense Multi-Use Urban	
Time Period	Weekday		Saturday		Sunday		Weekday		Saturday		Sunday		Weekday	
Trip Type	Vehicle		Vehicle		Vehicle		Vehicle		Vehicle		Vehicle		Vehicle	
# Data Sites	6		2		1		10		1		1		1	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
12:00	0.3	5.5	0.9	7.6	1.0	6.8	0.7	5.4	0.0	8.0	0.0	12.3	0.0	5.0
12:15	0.3	5.6	0.7	8.8	1.0	9.4	0.7	5.3	0.0	10.6	0.0	12.3	0.0	4.6
12:30	0.2	5.8	0.6	9.3	0.5	9.9	0.6	5.2	0.0	11.7	0.0	12.3	0.0	4.2
12:45	0.2	6.1	0.7	8.5	1.0	7.3	0.5	4.9	0.0	9.6	0.0	10.3	0.0	3.8
1:00	0.2	6.0	0.5	8.2	1.0	7.8	0.4	4.6	0.0	7.4	0.0	12.3	0.0	5.0
1:15	0.2	6.1	0.5	7.7	1.0	4.7	0.3	4.9	0.0	3.2	0.0	8.9	0.0	7.3
1:30	0.2	6.2	0.4	6.8	0.5	5.2	0.3	5.0	0.0	2.1	0.0	8.2	0.0	8.0
1:45	0.1	6.2	0.4	8.2	0.0	6.3	0.3	5.6	0.0	3.7	0.0	8.2	0.0	8.8
2:00	0.1	6.6	0.4	8.6	0.0	4.2	0.3	5.7	0.0	5.3	0.0	8.2	0.0	8.0
2:15	0.1	6.8	0.4	9.2	0.0	4.2	0.4	5.7	0.0	5.9	0.0	8.2	0.0	7.6
2:30	0.1	6.7	0.4	9.4	0.0	3.6	0.4	6.3	0.0	5.3	0.0	6.2	0.0	7.6
2:45	0.1	7.1	0.4	9.3	0.0	2.6	0.3	5.9	0.0	5.9	0.0	6.2	0.0	6.5
3:00	0.2	7.2	0.6	10.0	0.5	5.2	0.4	6.2	0.0	5.9	0.0	3.4	0.4	7.3
3:15	0.2	7.7	0.9	8.2	0.5	7.3	0.3	6.5	0.0	6.9	0.0	5.5	0.4	6.1
3:30	0.3	8.5	0.8	8.6	0.5	8.9	0.4	6.4	0.0	5.9	0.0	6.8	0.4	6.9
3:45	0.5	8.9	0.8	7.2	0.5	11.5	0.6	7.0	0.0	5.3	0.0	6.2	0.4	7.3
4:00	0.6	9.0	0.6	6.2	0.0	9.9	0.6	7.6	0.0	5.9	0.0	6.2	0.4	6.9
4:15	0.7	8.9	0.2	7.0	1.0	9.9	0.7	8.1	0.0	6.4	0.0	2.7	0.4	6.5
4:30	1.0	8.9	0.5	7.3	1.6	9.9	0.8	8.8	0.5	9.0	0.7	4.1	0.4	6.1
4:45	1.0	8.9	0.6	7.7	2.1	10.4	1.0	9.2	1.1	8.5	1.4	6.2	1.1	5.7
5:00	1.2	8.8	0.9	8.0	2.1	11.5	1.3	9.1	1.1	10.1	1.4	7.5	0.8	6.1
5:15	1.6	8.6	1.1	7.4	1.6	10.4	1.6	9.2	1.1	10.1	1.4	8.9	2.3	6.9
5:30	2.0	8.3	0.9	6.5	1.0	9.4	1.9	9.0	0.5	9.6	0.7	8.9	3.1	7.3
5:45	2.9	7.9	0.9	5.9	1.0	6.8	2.4	8.2	0.0	11.2	0.7	6.2	4.6	8.4
6:00	3.8	7.2	0.9	5.4	1.6	7.3	2.9	7.9	1.1	8.5	1.4	4.8	5.0	9.2
6:15	4.5	6.7	1.2	5.6	1.0	6.8	3.8	7.2	2.1	6.4	2.7	4.8	5.0	9.5
6:30	5.4	6.0	1.5	5.3	1.6	7.3	4.9	6.6	2.1	4.8	2.7	3.4	6.9	8.4
6:45	6.2	5.6	1.9	5.9	2.1	8.9	6.3	6.4	2.1	3.7	2.1	3.4	8.0	6.9
7:00	6.7	5.2	1.9	5.6	2.1	6.8	7.4	5.7	2.7	2.7	1.4	3.4	11.1	5.0
7:15	7.3	5.0	2.5	5.8	3.1	6.3	7.7	5.4	1.6	4.3	2.7	4.1	9.9	4.6
7:30	7.1	4.8	3.5	5.8	3.6	5.7	7.7	5.4	1.6	4.8	4.1	2.7	8.8	3.8
7:45	6.6	4.7	3.8	5.4	3.6	4.2	6.9	4.9	2.7	4.3	6.2	2.7	7.3	3.8
8:00	6.2	4.7	4.3	5.0	3.1	5.2	6.3	5.1	1.6	3.7	6.8	2.7	4.6	5.7
8:15	5.7	4.5	4.7	3.6	2.6	4.2	6.0	4.8	2.7	4.8	6.2	0.7	5.0	3.8
8:30	5.1	4.3	4.0	3.2	3.1	2.6	5.6	4.1	4.3	4.3	6.2	1.4	3.8	6.9
8:45	4.9	3.7	4.8	2.8	2.1	1.6	5.5	4.1	4.3	3.2	4.8	1.4	3.1	8.8
9:00	4.3	3.4	5.2	2.1	3.6	0.0	5.3	3.6	6.9	3.7	6.2	0.7	2.7	6.9
9:15	4.1	2.8	5.4	2.2	5.2	0.0	5.1	3.6	9.0	2.7	5.5	2.1	2.7	8.0
9:30	4.4	2.3	6.0	2.1	6.3	0.0	4.6	3.6	10.1	3.2	5.5	1.4	3.4	5.0
9:45	4.4	2.0	7.3	1.5	10.9	0.5	4.1	3.3	12.2	4.3	8.9	2.1	4.2	3.1
10:00	4.8	1.6	7.9	1.3	12.5	0.5	4.0	2.9	9.6	3.7	10.3	2.7	4.6	2.3
10:15	5.0	1.3	8.1	0.9	13.0	0.5	4.3	2.2	7.4	2.1	11.6	1.4	4.2	1.5
10:30	5.0	1.2	7.7	0.9	11.5	0.5	4.7	1.8	6.4	2.7	11.6	1.4	3.1	1.1
10:45	5.2	1.2	6.2	0.8	9.4	0.0	5.2	1.4	5.9	1.6	8.9	0.7	1.9	0.8
11:00	5.2	1.0	6.5	1.4	7.3	0.0	5.3	1.2	10.6	1.6	8.2	0.0	1.9	1.5
11:15	5.3	0.8	6.5	1.4	6.3	0.0	5.3	1.0	11.2	1.6	10.3	0.0	3.1	0.8
11:30	5.4	0.7	7.2	1.5	5.7	1.0	5.2	0.8	11.2	0.0	11.6	0.0	4.2	0.8
11:45	5.4	0.4	7.9	1.3	6.3	1.0	5.4	0.7	10.6	0.0	13.7	0.0	5.0	0.8

Percent of Daily Traffic During the 60-Minute Period Beginning at Displayed Time

Single Family Dwelling Units - ITE Code 210

				Hour Distributed Trips									
	Daily Total		2,838	Split		Entering Vehicles			Exiting Vehicles				
Time Period	% of Daily Traffic	D factor	Peak Hour Trips	Enter	Exit	EBRT 50%	SBT 10%	WBLT 20%	NBLT 50%	NBT 10%	NBLT + NBT Total	NBRT 20%	Total Approach
5-6	1.93	0.25	55	14	41	7	1	3	21	4	25	8	33
6-7	4.98	0.25	141	35	106	18	4	7	53	11	64	21	85
7-8	6.93	0.25	197	49	148	25	5	10	74	15	89	30	119
8-9	5.48	0.25	156	39	117	20	4	8	59	12	71	23	94
9-10	4.30	0.50	122	61	61	31	6	12	31	6	37	12	49
10-11	5.00	0.50	142	71	71	36	7	14	36	7	43	14	57
11-12	5.33	0.50	151	75	76	38	8	15	38	8	46	15	61
12-1	5.75	0.50	163	81	82	41	8	16	41	8	49	16	65
1-2	6.13	0.50	174	87	87	44	9	17	44	9	53	17	70
2-3	6.80	0.50	193	96	97	48	10	19	48	10	58	19	77
3-4	8.08	0.63	229	144	85	72	14	29	42	8	50	17	67
4-5	8.93	0.63	253	159	94	80	16	32	47	9	56	19	75
5-6	8.40	0.63	238	150	88	75	15	30	44	9	53	18	71
6-7	6.38	0.63	181	114.03	67	57	11	23	33	7	40	13	53
7-8	4.93	0.63	140	88	52	44	9	18	26	5	31	10	41
8-9	4.30	0.50	122	61	61	31	6	12	31	6	37	12	49
9-10	2.63	0.50	75	37	38	19	4	7	19	4	23	8	31

Middle School/ Junior High School - ITE Code 522

				Hour Distributed Trips									
	Daily Total		3,148	Split		Entering Vehicles			Exiting Vehicles				
Time Period	% of Daily Traffic	D factor	Peak Hour Trips	Enter	Exit	EBRT 00%	SBT 11%	WBLT 25%	NBLT 00%	NBT 11%	NBLT + NBT Total	NBRT 25%	Total Approach
5-6	0.64	0.55	20	11	9	0	1	3	0	1	1	2	3
6-7	8.63	0.55	272	150	122	0	16	37	0	13	13	31	44
7-8	26.24	0.55	826	454	372	0	50	114	0	41	41	93	134
8-9	3.93	0.55	124	68	56	0	7	17	0	6	6	14	20
9-10	1.56	0.50	49	25	25	0	3	6	0	3	3	6	9
10-11	1.66	0.50	52	26	26	0	3	7	0	3	3	7	10
11-12	2.24	0.50	71	35	36	0	4	9	0	4	4	9	13
12-1	2.11	0.50	66	33	33	0	4	8	0	4	4	8	12
1-2	2.63	0.50	83	41	42	0	5	10	0	5	5	10	15
2-3	11.95	0.46	376	172.96	203	0	19	43	0	22	22	51	73
3-4	11.95	0.46	376	173	203	0	19	43	0	22	22	51	73
4-5	9.29	0.46	292	134	158	0	15	34	0	17	17	39	56
5-6	6.71	0.50	211	105	106	0	12	26	0	12	12	26	38
6-7	4.63	0.50	146	73	73	0	8	18	0	8	8	18	26
7-8	3.36	0.50	106	53	53	0	6	13	0	6	6	13	19
8-9	1.40	0.50	44	22	22	0	2	6	0	2	2	6	8
9-10	0.55	0.50	17	8	9	0	1	2	0	1	1	2	3

APPENDIX E

FDOT Signal Warrant Summary Worksheets

State of Florida Department of Transportation

Form 750-020-01
TRAFFIC ENGINEERING
10/15

TRAFFIC SIGNAL WARRANT SUMMARY

City: Unincorporated
County: 77 – Seminole
District: Five

Engineer: TPD
Date: January 17, 2020

Major Street: E. Lake Mary blvd — Lanes: 2 — Major Approach Speed: 50
Minor Street: Skyway Drive — Lanes: 1 — Minor Approach Speed: 35

MUTCD Electronic Reference to Chapter 4: http://mutcd.fhwa.dot.gov/pdfs/2009r1r2/part4.pdf

Volume Level Criteria

1. Is the posted speed or 85th-percentile of major street > 40 mph (70 km/h)? ☑ Yes ☐ No
2. Is the intersection in a built-up area of an isolated community with a population < 10,000? ☐ Yes ☑ No

"70%" volume level **may** be used if Question 1 **or** 2 above is answered "Yes" ☑ 70% ☐ 100%

WARRANT 1 - EIGHT-HOUR VEHICULAR VOLUME

Warrant 1 is satisfied if Condition A or Condition B is "100%" satisfied for eight hours. ☑ Yes ☐ No

Warrant 1 is also satisfied if both Condition A and Condition B are "80%" satisfied (should only be applied after an adequate trial of other alternatives that could cause less delay and inconvenience to traffic has failed to solve the traffic problems). ☐ Yes ☑ No

Condition A - Minimum Vehicular Volume

Condition A is intended for application at locations where a large volume of intersecting traffic is the principal reason to consider installing a traffic control signal.

100% Satisfied: ☐ Yes ☑ No
80% Satisfied: ☐ Yes ☑ No
70% Satisfied: ☐ Yes ☑ No

Number of Lanes for moving traffic on each approach		Vehicles per hour on major-street (total of both approaches)			Vehicles per hour on minor-street (one direction only)		
Major	Minor	100%[a]	80%[b]	70%[c]	100%[a]	80%[b]	70%[c]
1	1	500	400	350	150	120	105
2 or more	1	600	480	420	150	120	105
2 or more	2 or more	600	480	420	200	160	140
1	2 or more	500	400	350	200	160	140

[a] Basic Minimum hourly volume
[b] Used for combination of Conditions A and B after adequate trial of other remedial measures
[c] May be used when the major-street speed exceeds 40 mph or in an isolated community with a population of less than 10,000

Record 8 highest hours and the corresponding major-street and minor-street volumes in the Instructions Sheet.

Street	Eight Highest Hours							
	7-8 AM	8-9 AM	11-12 AM	1-2 PM	2-3 PM	3-4 PM	4-5 PM	5-6 PM
Major	1,895	1,558	750	912	1,188	1,380	1,635	1,831
Minor	137	87	69	67	91	82	87	73

Existing Volumes

State of Florida Department of Transportation

TRAFFIC SIGNAL WARRANT SUMMARY

Condition B - Interruption of Continuous Traffic

Condition B is intended for application where Condition A is not satisfied and the traffic volume on a major street is so heavy that traffic on the minor intersecting street suffers excessive delay or conflict in entering or crossing the major street.

Applicable:	☑ Yes	☐ No
100% Satisfied:	☐ Yes	☑ No
80% Satisfied:	☑ Yes	☐ No
70% Satisfied:	☑ Yes	☐ No

Number of Lanes for moving traffic on each approach		Vehicles per hour on major-street (total of both approaches)			Vehicles per hour on minor-street (one direction only)		
Major	Minor	100%[a]	80%[b]	70%[c]	100%[a]	80%[b]	70%[c]
1	1	750	600	525	75	60	53
2 or more	1	900	720	630	75	60	53
2 or more	2 or more	900	720	630	100	80	70
1	2 or more	750	600	525	100	80	70

[a] Basic Minimum hourly volume

[b] Used for combination of Conditions A and B after adequate trial of other remedial measures

[c] May be used when the major-street speed exceeds 40 mph or in an isolated community with a population of less than 10,000

Record 8 highest hours and the corresponding major-street and minor-street volumes in the Instructions Sheet.

Eight Highest Hours								
Street	7-8 AM	8-9 AM	11-12 AM	1-2 PM	2-3 PM	3-4 PM	4-5 PM	5-6 PM
Major	1,895	1,558	750	912	1,188	1,380	1,635	1,831
Minor	137	87	69	67	91	82	87	73

Existing Volumes

Form 750-020-01
TRAFFIC ENGINEERING
10/15

State of Florida Department of Transportation

TRAFFIC SIGNAL WARRANT SUMMARY

City: Unincorporated
County: 77 – Seminole
District: Five

Engineer: TPD
Date: January 17, 2020

Major Street: E. Lake Mary blvd — Lanes: 2 — Major Approach Speed: 50
Minor Street: Skyway Drive — Lanes: 1 — Minor Approach Speed: 35

MUTCD Electronic Reference to Chapter 4: http://mutcd.fhwa.dot.gov/pdfs/2009r1r2/part4.pdf

Volume Level Criteria

1. Is the posted speed or 85th-percentile of major street > 40 mph (70 km/h)? ☑ Yes ☐ No
2. Is the intersection in a built-up area of an isolated community with a population < 10,000? ☐ Yes ☑ No

"70%" volume level **may** be used if Question 1 **or** 2 above is answered "Yes" ☑ Yes ☐ No

WARRANT 2 - FOUR-HOUR VEHICULAR VOLUME

If all four points lie above the appropriate line, then the warrant is satisfied.

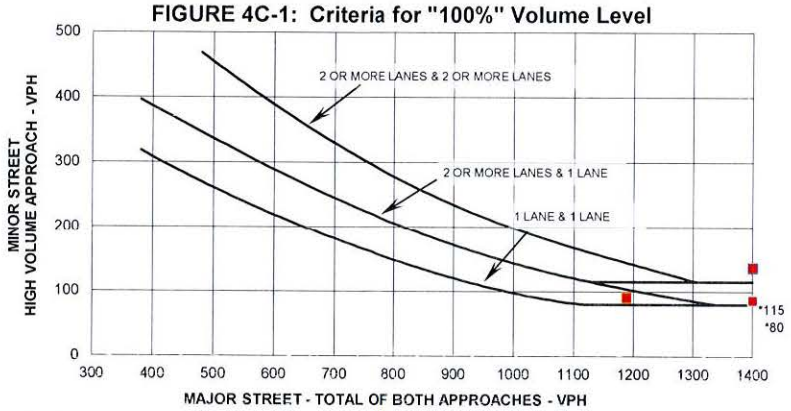
Applicable: ☑ Yes ☐ No
Satisfied: ☑ Yes ☐ No

Plot four volume combinations on the applicable figure below.

100% Volume Level

Four Highest Hours	Volumes	
	Major Street	Minor Street
7-8 AM	1895	137
8-9 AM	1558	87
2-3 PM	1188	91
4-5 PM	1635	87

FIGURE 4C-1: Criteria for "100%" Volume Level



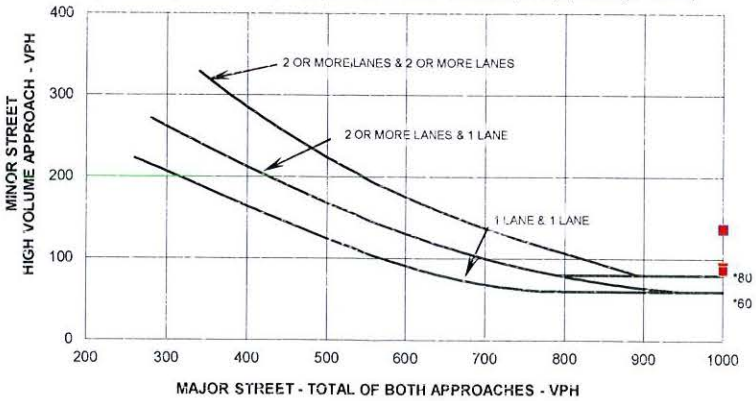
** Note: 115 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 80 vph applies as the lower threshold volume threshold for a minor street approach with one lane*

70% Volume Level

Four Highest Hours	Volumes	
	Major Street	Minor Street
7-8 AM	1895	137
8-9 AM	1558	87
2-3 PM	1188	91
4-5 PM	1635	87

FIGURE 4C-2: Criteria for "70%" Volume Level

(Community Less than 10,000 population or above 70 km/hr (40 mph) on Major Street)



** Note: 80 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 60 vph applies as the lower threshold volume threshold for a minor street approach with one lane.*

State of Florida Department of Transportation

Form 750-020-01
TRAFFIC ENGINEERING
10/15

TRAFFIC SIGNAL WARRANT SUMMARY

City:	Unincorporated	Engineer:	TPD
County:	77 – Seminole	Date:	January 17, 2020
District:	Five		

Major Street:	E. Lake Mary blvd	Lanes:	2	Major Approach Speed:	50
Minor Street:	Skyway Drive	Lanes:	1	Minor Approach Speed:	35

MUTCD Electronic Reference to Chapter 4: http://mutcd.fhwa.dot.gov/pdfs/2009r1r2/part4.pdf

Volume Level Criteria

1. Is the posted speed or 85th-percentile of major street > 40 mph (70 km/h)? ☑ Yes ☐ No
2. Is the intersection in a built-up area of an isolated community with a population < 10,000? ☐ Yes ☑ No

"70%" volume level **may** be used if Question 1 **or** 2 above is answered "Yes" ☑ 70% ☐ 100%

WARRANT 3 - PEAK HOUR

*If all three criteria are fulfilled **or** the plotted point lies above the appropriate line, then the warrant is satisfied.*

Applicable: ☐ Yes ☑ No
Satisfied: ☐ Yes ☐ No

Unusual condition justifying use of warrant:

Record hour when criteria are fulfilled and the corresponding delay or volume in boxes provided.

Peak Hour 100% Volume		
Time	Major Vol.	Minor Vol.

Peak Hour 70% Volume		
Time	Major Vol.	Minor Vol.
7-8 AM	1895	137

Criteria

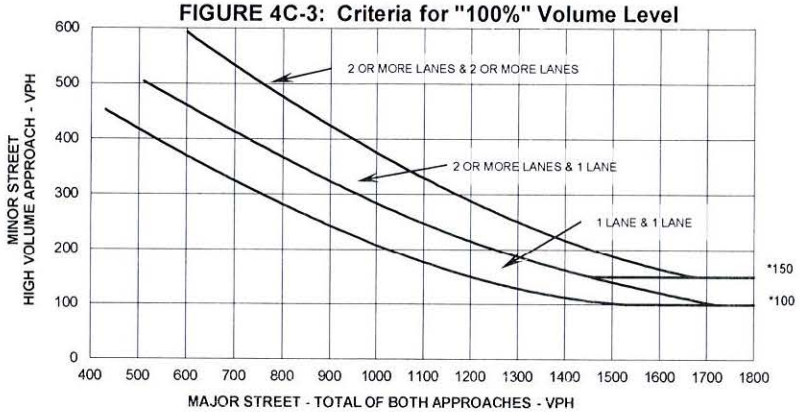
1. Delay on Minor Approach *(vehicle-hours)		
Approach Lanes	1	2
Delay Criteria*	4.0	5.0
Delay*		
Fulfilled?: ☐ Yes ☑ No		

2. Volume on Minor Approach One-Direction *(vehicles per hour)		
Approach Lanes	1	2
Volume Criteria*	100	150
Volume*		
Fulfilled?: ☐ Yes ☑ No		

3. Total Intersection Entering Volume *(vehicles per hour)		
No. of Approaches	3	4
Volume Criteria*	650	800
Volume*		
Fulfilled?: ☑ Yes ☐ No		

Plot volume combination on the applicable figure below.

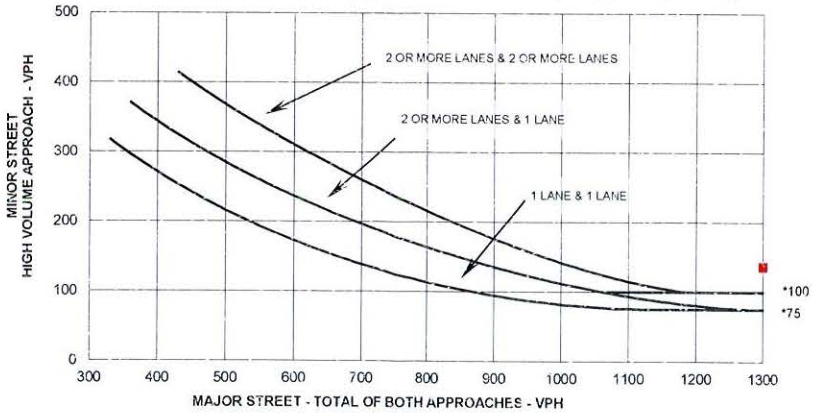
FIGURE 4C-3: Criteria for "100%" Volume Level



* Note: *150 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 100 vph applies as the lower threshold volume threshold for a minor street approach with one lane.*

FIGURE 4C-4: Criteria for "70%" Volume Level

(Community Less than 10,000 population or above 70 km/hr (40 mph) on Major Street)



* Note: *100 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 75 vph applies as the lower threshold volume threshold for a minor street approach with one lane.*

Form 750-020-01
TRAFFIC ENGINEERING
10/15

State of Florida Department of Transportation

TRAFFIC SIGNAL WARRANT SUMMARY

City:	Unincorporated	Engineer:	TPD
County:	77 – Seminole	Date:	January 17, 2020
District:	Five		

Major Street:	E. Lake Mary blvd	Lanes:	2	Major Approach Speed:	50
Minor Street:	Skyway Drive	Lanes:	1	Minor Approach Speed:	35

MUTCD Electronic Reference to Chapter 4: http://mutcd.fhwa.dot.gov/pdfs/2009r1r2/part4.pdf

Volume Level Criteria

1. Is the posted speed or 85th-percentile of major street > 40 mph (70 km/h)? ☑ Yes ☐ No
2. Is the intersection in a built-up area of an isolated community with a population < 10,000? ☐ Yes ☑ No

"70%" volume level **may** be used if Question 1 **or** 2 above is answered "Yes" ☑ 70% ☐ 100%

WARRANT 4 - PEDESTRIAN VOLUME

For each of any 4 hours of an average day, the plotted points lie above the appropriate line, then the warrant is satisfied.

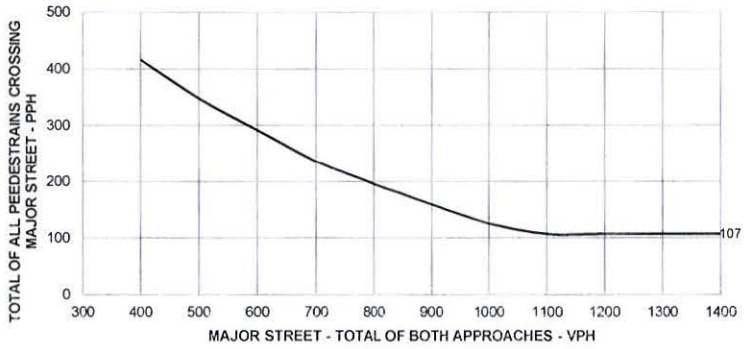
Applicable: ☐ Yes ☑ No
Satisfied: ☐ Yes ☐ No

Plot four volume combinations on the applicable figure below.

100% Volume Level

Four Highest Hours	Volumes	
	Major Street	Pedestrian Total

Figure 4C-5. Criteria for "100%" Volume Level



* Note: 107 pph applies as the lower threshold volume

70% Volume Level

Four Highest Hours	Volumes	
	Major Street	Pedestrian Total

Figure 4C-6 Criteria for "70%" Volume Level

* Note: 75 pph applies as the lower threshold volume

WARRANT 4 - PEDESTRIAN VOLUME

For 1 hour (any four consecutive 15-minute periods) of an average day, the plotted point falls above the appropriate line, then the warrant is satisfied.

Applicable: ☐ Yes ☐ No

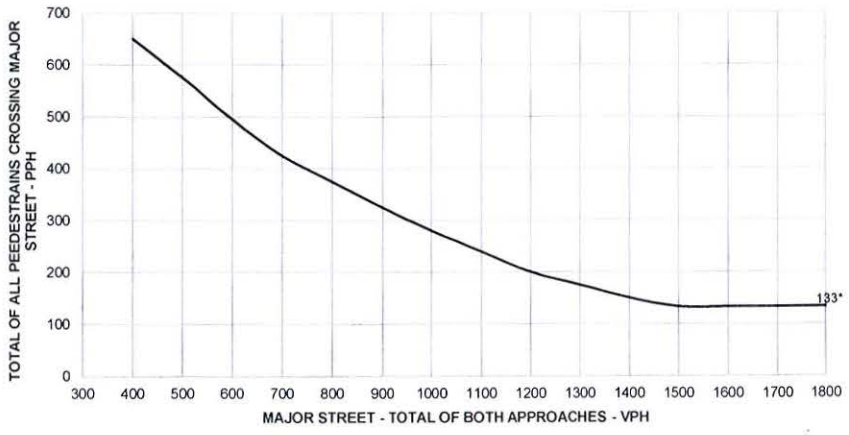
Satisfied: ☐ Yes ☐ No

Plot one volume combination on the applicable figure below.

100% Volume Level

Peak Hour	Volumes	
	Major Street	Pedestrian Total

Figure 4C-7. Criteria for "100%" Volume Level - Peak Hour

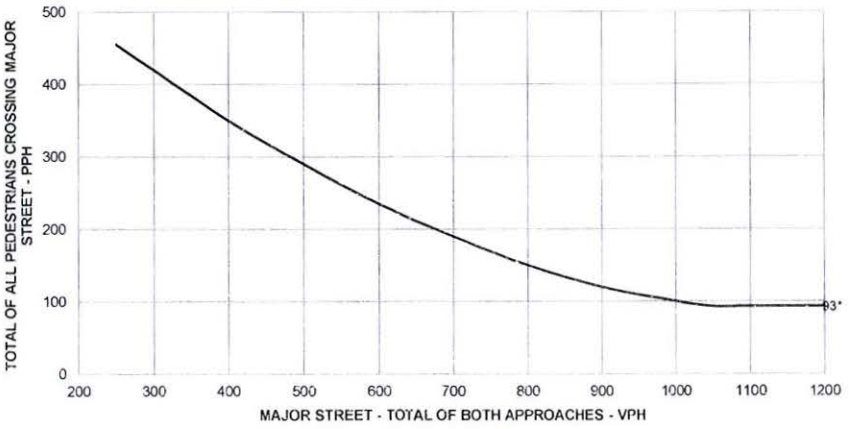


** Note: 133 pph applies as the lower threshold volume*

70% Volume Level

Peak Hour	Volumes	
	Major Street	Pedestrian Total

Figure 4C-8 Criteria for "70%" Volume Level - Peak Hour



** Note: 93 pph applies as the lower threshold volume*

State of Florida Department of Transportation

TRAFFIC SIGNAL WARRANT SUMMARY

City:	Unincorporated	Engineer:	TPD
County:	77 – Seminole	Date:	January 17, 2020
District:	Five		

Major Street:	E. Lake Mary blvd	Lanes:	2	Major Approach Speed:	50
Minor Street:	Skyway Drive	Lanes:	1	Minor Approach Speed:	35

MUTCD Electronic Reference to Chapter 4: http://mutcd.fhwa.dot.gov/pdfs/2009r1r2/part4.pdf

WARRANT 5 - SCHOOL CROSSING

Record hours where criteria are fulfilled and the corresponding volume or gap frequency in the boxes provided. The warrant is satisfied if all three of the criteria are fulfilled.

Applicable: ☐ Yes ☑ No

Satisfied: ☐ Yes ☐ No

Criteria				Fulfilled? Yes	Fulfilled? No
1. There are a minimum of 20 students crossing the major street during the highest crossing hour.	Students:	Hour:			
2. There are fewer adequate gaps in the major street traffic stream during the period when the children are using the established school crossing than the number of minutes in the same period.		Minutes:	Gaps:		
3. The nearest traffic signal along the major street is located more than 300 ft. (90 m) away, or the nearest signal is within 300 ft. (90 m) but the proposed traffic signal will not restrict the progressive movement of traffic.					

State of Florida Department of Transportation

TRAFFIC SIGNAL WARRANT SUMMARY

City:	Unincorporated	Engineer:	TPD
County:	77 – Seminole	Date:	January 17, 2020
District:	Five		

Major Street:	E. Lake Mary blvd	Lanes:	2	Major Approach Speed:	50
Minor Street:	Skyway Drive	Lanes:	1	Minor Approach Speed:	35

MUTCD Electronic Reference to Chapter 4: http://mutcd.fhwa.dot.gov/pdfs/2009r1r2/part4.pdf

WARRANT 6 - COORDINATED SIGNAL SYSTEM

Indicate if the criteria are fulfilled in the boxes provided. The warrant is satisfied if either criterion is fulfilled. This warrant should not be applied when the resulting signal spacing would be less than 300 m (1,000 ft.).

Applicable: ☐ Yes ☑ No

Satisfied: ☐ Yes ☑ No

Criteria	Fulfilled? Yes	Fulfilled? No
1. On a one-way street or a street that has traffic predominately in one direction, the adjacent signals are so far apart that they do not provide the necessary degree of vehicle platooning.		
2. On a two-way street, adjacent signals do not provide the necessary degree of platooning, and the proposed and adjacent signals will collectively provide a progressive operation.		

State of Florida Department of Transportation

TRAFFIC SIGNAL WARRANT SUMMARY

City: Unincorporated
County: 77 – Seminole
District: Five

Engineer: TPD
Date: January 17, 2020

Major Street: E. Lake Mary blvd — Lanes: 2 — Major Approach Speed: 50
Minor Street: Skyway Drive — Lanes: 1 — Minor Approach Speed: 35

MUTCD Electronic Reference to Chapter 4: http://mutcd.fhwa.dot.gov/pdfs/2009r1r2/part4.pdf

WARRANT 7 - CRASH EXPERIENCE

Record hours where criteria are fulfilled, the corresponding volume, and other information in the boxes provided. The warrant is satisfied if all three of the criteria are fulfilled.

Applicable: ☐ Yes ☑ No
Satisfied: ☐ Yes ☐ No

Criteria		Hour	Volume		Met?		Fulfilled?	
			Major	Minor	Yes	No	Yes	No
1. One of the warrants to the right is met.	Warrant 1, Condition A (80% satisfied)							
	Warrant 1, Condition B (80% satisfied)							
	Warrant 4, Pedestrian Volume at 80% of volume requirements: # ped/hr for four (4) hours or # ped/hr for one (1) hour.							
2. Adequate trial of other remedial measure has failed to reduce crash frequency.		Measure tried:						
3. Five or more reported crashes, of types susceptible to correction by signal, have occurred within a 12-month period.		Observed Crash Types:	Number of crashes per 12 months:					

State of Florida Department of Transportation

Form 750-020-01
TRAFFIC ENGINEERING
10/15

TRAFFIC SIGNAL WARRANT SUMMARY

City: Unincorporated
County: 77 – Seminole
District: Five

Engineer: TPD
Date: January 17, 2020

Major Street: E. Lake Mary blvd
Minor Street: Skyway Drive

Lanes: 2
Lanes: 1

Major Approach Speed: 50
Minor Approach Speed: 35

MUTCD Electronic Reference to Chapter 4: http://mutcd.fhwa.dot.gov/pdfs/2009r1r2/part4.pdf

WARRANT 8 - ROADWAY NETWORK

Record hours where criteria are fulfilled, and the corresponding volume or other information in the boxes provided. The warrant is satisfied if at least one of the criteria is fulfilled and if all intersecting routes have one or more of the Major Route characteristics listed.

Applicable: ☐ Yes ☑ No
Satisfied: ☐ Yes ☐ No

Criteria							Met?		Fulfilled?	
							Yes	No	Yes	No
1. Both of the criteria to the right are met.	a. Total entering volume of at least 1,000 veh/hr during a typical weekday peak hour.		Entering Volume:							
	b. Five-year projected volumes that satisfy one or more of Warrants 1, 2, or 3.	Warrant:	1	2	3					
		Satisfied?:								
2. Total entering volume at least 1,000 veh/hr for each of any 5 hrs of a non-normal business day (Sat. or Sun.)							← Hour			
							←Volume			

Characteristics of Major Routes		Met?		Fulfilled?	
		Yes	No	Yes	No
1. Part of the street or highway system that serves as the principal roadway network for through traffic flow.	Major Street:				
	Minor Street:				
2. Rural or suburban highway outside of, entering, or traversing a city.	Major Street:				
	Minor Street:				
3. Appears as a major route on an official plan.	Major Street:				
	Minor Street:				

State of Florida Department of Transportation

TRAFFIC SIGNAL WARRANT SUMMARY

City: Unincorporated
County: 77 – Seminole
District: Five

Engineer: TPD
Date: January 17, 2020

Major Street: E. Lake Mary blvd — Lanes: 2 — Major Approach Speed: 50
Minor Street: Skyway Drive — Lanes: 1 — Minor Approach Speed: 35

MUTCD Electronic Reference to Chapter 4: http://mutcd.fhwa.dot.gov/pdfs/2009r1r2/part4.pdf

Approach Lane Criteria

1. How many approach lanes are there at the track crossing? ☐ 1 ☐ 2 or

If there is 1 lane, use Figure 4C-9 and if there are 2 or more, use Figure 4C-10. ☐ Fig 4C-9 ☐ Fig 4C-10

WARRANT 9 - INTERSECTION NEAR A GRADE CROSSING

This signal warrant should be applied only after adequate consideration has been given to other alternatives or after a trial of an alternative has failed to alleviate the safety concerns associated with the grade crossing.

Indicate if both criteria are fulfilled in the boxes provided. The warrant is satisfied if both criteria are met.

Applicable: ☐ Yes ☐ No
Satisfied: ☐ Yes ☐ No

Criteria	Fulfilled? Yes	Fulfilled? No
1. A grade crossing exists on an approach controlled by a STOP or YIELD sign and the center of the track nearest to the intersection is within 140 feet of the stop line or yield line on the approach; and	☐	☐
2. During the highest traffic volume hour during which the rail uses the crossing, the plotted point falls above the applicable curve for the existing combination of approach lanes over the track and the distance D (clear storage distance).	☐	☐

Use the following tables (4C-2, 4C-3, and 4C-4 to appropriately adjust the minor-street approach volume).

Inputs		Adjustment Factors from Tables
Occurrences of Rail traffic per day		
% of High Occupancy Buses on Minor-Street Approach		1.00
Enter D (feet)		
% of Tractor-Trailer Trucks on Minor-Street Approach		0.50

Table 4C-2. Adjustment Factor for Daily Frequency of Rail Traffic

Rail Traffic per Day	Adjustment Factor
1	0.67
2	0.91
3 to 5	1.00
6 to 8	1.18
9 to 11	1.25
12 or more	1.33

Table 4C-3. Adjustment Factor for Percentage of High-Occupancy Buses

% of High-Occupancy Buses* on Minor Street Approach	Adjustment Factor
0%	1.00
2%	1.09
4%	1.19
6% or more	1.32

* A high-occupancy bus is defined as a bus occupied by at least 20 people

Table 4C-4. Adjustment Factor for Percentage of Tractor-Trailer Trucks

% of Tractor-Trailer Trucks on Minor-Street Approach	Adjustment Factor	
	D less than 70 feet	D of 70 feet or more
0% to 2.5%	0.50	0.50
2.6% to 7.5%	0.75	0.75
7.6% to 12.5%	1.00	1.00
12.6% to 17.5%	2.30	1.15
17.6% to 22.5%	2.70	1.35
22.6% to 27.5%	3.28	1.64
More than 27.5%	4.18	2.09

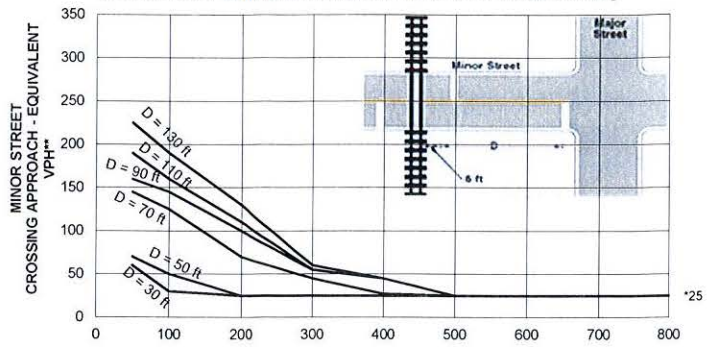
Input the major and minor street volumes before adjustment factors are applied

1 Approach Lane		
D (ft)	Major Vol.	Minor Vol.

After adjustment factors are applied

1 Approach Lane w/Factors		
D (ft)	Major Vol.	Minor Vol.

FIGURE 4C-9: Criteria for 1 Approach Lane at the Track Crossing



* *Note: 25 vph applies as the lower threshold volume*

* **Note: VPH after applying the adjustment factors in Tables 4C-2, 4C, and or 4C-4, if appropriate*

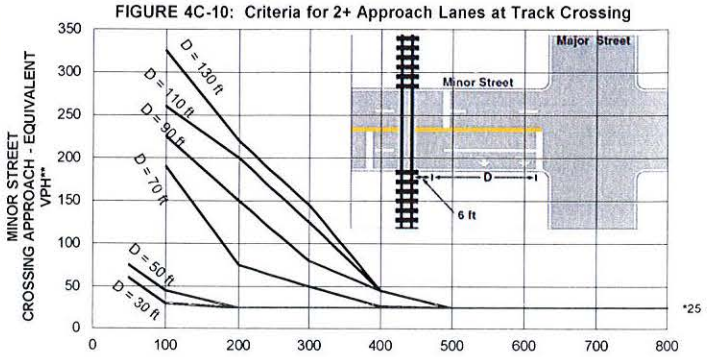
Input D and the major and minor street volumes before adjustment factors are applied

2 or more Approach Lanes		
D (ft)	Major Vol.	Minor Vol.

After adjustment factors are applied

2+ Approach Lane w/Factors		
D (ft)	Major Vol.	Minor Vol

FIGURE 4C-10: Criteria for 2+ Approach Lanes at Track Crossing



* *Note: 25 vph applies as the lower threshold volume*

* **Note: VPH after applying the adjustment factors in Tables 4C-2, 4C, and or 4C-4, if appropriate*

Form 750-020-01
TRAFFIC ENGINEERING
10/15

State of Florida Department of Transportation

TRAFFIC SIGNAL WARRANT SUMMARY

City:	Unincorporated	Engineer:	TPD
County:	77 – Seminole	Date:	January 17, 2020
District:	Five		

Major Street:	E. Lake Mary blvd	Lanes:	2	Major Approach Speed:	50
Minor Street:	Skyway Drive	Lanes:	1	Minor Approach Speed:	35

MUTCD Electronic Reference to Chapter 4: http://mutcd.fhwa.dot.gov/pdfs/2009r1r2/part4.pdf

CONCLUSIONS

Remarks: **Warrant 1(Eight Hour Volume) and Warrant 2 (Four-Hour Vehicular Volume) are satisfied. Therefore it** is recommended that a traffic signal be considered for installation at this location.

WARRANTS SATISFIED:

☑	Warrant 1	☐	Not Applicable
☑	Warrant 2	☐	Not Applicable
☐	Warrant 3	☑	Not Applicable
☐	Warrant 4	☑	Not Applicable
☐	Warrant 5	☑	Not Applicable
☐	Warrant 6	☑	Not Applicable
☐	Warrant 7	☑	Not Applicable
☐	Warrant 8	☑	Not Applicable
☐	Warrant 9	☑	Not Applicable

APPENDIX F

Projected HCS Capacity Worksheets

HCS7 Two-Way Stop-Control Report

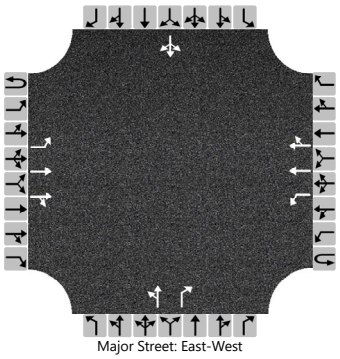
General Information

Analyst	TPD/jd
Agency/Co.	Seminole County
Date Performed	1/20/2020
Analysis Year	2020
Time Analyzed	P.M. Peak Hour
Intersection Orientation	East-West
Project Description	Lake Mary Blvd and Skyway Drive

Site Information

Intersection	Lake Mary Blvd and Skyway
Jurisdiction	Seminole County
East/West Street	Lake Mary Blvd
North/South Street	Skyway Drive
Peak Hour Factor	0.98
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	2	0	0	1	2	0		0	1	1		0	1	0
Configuration		L	T	TR		L	T	TR		LT		R			LTR	
Volume (veh/h)	0	10	1215	91	0	58	482	3		56	21	48		24	27	18
Percent Heavy Vehicles (%)	0	0			0	0				0	0	0		0	0	0
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized										No						
Median Type | Storage			Left Only							1						

Critical and Follow-up Headways

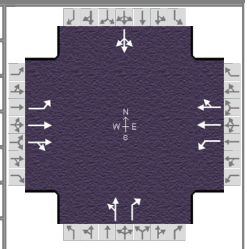
Base Critical Headway (sec)		4.1				4.1				7.5	6.5	6.9		7.5	6.5	6.9
Critical Headway (sec)		4.10				4.10				7.50	6.50	6.90		7.50	6.50	6.90
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.20				2.20				3.50	4.00	3.30		3.50	4.00	3.30

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		10				59				79		49			70	
Capacity, c (veh/h)		1079				524				89		406			102	
v/c Ratio		0.01				0.11				0.88		0.12			0.69	
95% Queue Length, Q_{95} (veh)		0.0				0.4				4.8		0.4			3.5	
Control Delay (s/veh)		8.4				12.7				148.4		15.1			96.2	
Level of Service (LOS)		A				B				F		C			F	
Approach Delay (s/veh)		0.1				1.4				97.2				96.2		
Approach LOS										F				F		

HCS7 Signalized Intersection Results Summary

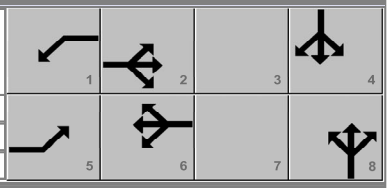
General Information				Intersection Information	
Agency	Seminole County			Duration, h	0.25
Analyst	TPD/jd	Analysis Date	Jan 20, 2020	Area Type	Other
Jurisdiction	Seminole County	Time Period	P.M. Peak Hour	PHF	0.98
Urban Street	Lake Mary Blvd	Analysis Year	2020	Analysis Period	1> 7:00
Intersection	Lake Mary Blvd & Skyw…	File Name	LMB and Skyway PM Peak Hour signal Streets1….		
Project Description	P.M. Peak Hour with Development				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	10	1215	91	58	482	3	56	21	48	24	27	18

Signal Information			
Cycle, s	130.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	1.8	50.3	5.3	6.6	31.0	0.0
Yellow	5.0	5.0	5.0	5.0	5.0	0.0
Red	2.0	2.0	2.0	2.0	2.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6		8		4
Case Number	1.2	4.0	1.3	4.0		11.0		12.0
Phase Duration, s	8.8	66.1	12.3	69.6		38.0		13.6
Change Period, (*Y+R c*), s	7.0	7.0	7.0	7.0		7.0		7.0
Max Allow Headway (*MAH*), s	3.0	0.0	3.0	0.0		3.1		3.0
Queue Clearance Time (*g s*), s	2.4		2.0			32.1		7.1
Green Extension Time (*g e*), s	0.0	0.0	0.8	0.0		0.1		0.1
Phase Call Probability	0.31		0.88			0.99		0.92
Max Out Probability	0.00		0.01			0.09		0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	10	674	659	59	248	247		79	49		70	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1810	1900	1853	1810	1900	1896		1833	1610		1785	
Queue Service Time (*g s*), s	0.4	38.4	38.7	0.0	10.0	10.0		4.5	3.1		5.1	
Cycle Queue Clearance Time (*g c*), s	0.4	38.4	38.7	0.0	10.0	10.0		4.5	3.1		5.1	
Green Ratio (*g/C*)	0.42	0.45	0.45	0.42	0.48	0.48		0.24	0.24		0.05	
Capacity (*c*), veh/h	379	877	855	197	927	925		425	373		90	
Volume-to-Capacity Ratio (*X*)	0.027	0.768	0.771	0.300	0.267	0.267		0.185	0.131		0.779	
Back of Queue (*Q*), ft/ln (95 th percentile)	7.9	621.9	612.5	78.2	195	194.8		88.9	54.7		106.7	
Back of Queue (*Q*), veh/ln (95 th percentile)	0.3	24.9	24.5	3.1	7.8	7.8		3.6	2.2		4.3	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		0.00	
Uniform Delay (*d 1*), s/veh	22.2	29.2	29.3	48.0	19.6	19.6		40.1	39.6		61.0	
Incremental Delay (*d 2*), s/veh	0.0	6.4	6.7	0.3	0.7	0.7		0.1	0.1		5.3	
Initial Queue Delay (*d 3*), s/veh	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	
Control Delay (*d*), s/veh	22.2	35.6	35.9	48.3	20.3	20.3		40.2	39.6		66.3	
Level of Service (LOS)	C	D	D	D	C	C		D	D		E	
Approach Delay, s/veh / LOS	35.7	D		23.3	C		39.9	D		66.3	E	
Intersection Delay, s/veh / LOS	33.7						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.96	B	1.69	B	2.33	B	2.30	B
Bicycle LOS Score / LOS	1.60	B	0.94	A	0.70	A	0.60	A