



Interoffice Memorandum

February 1, 2017

TO: Mayor Teresa Jacobs
and Board of County Commissioners

FROM: Mark V. Massaro, P. E., Director, Public Works Department

CONTACT PERSON: John Klimovitch, County Traffic Engineer
Traffic Engineering Division

PHONE NUMBER: (407) 836-7890

SUBJ: **Installation of a Traffic Signal at the Intersection of Winter Garden
Vineland Road (CR 535) and Bluebird Pond Road/Magnolia Park Court**

The Traffic Engineering staff has conducted a traffic signal warrant study at Winter Garden Vineland Road (CR 535) and Bluebird Pond Road/Magnolia Park Court.

The study consisted of an evaluation of existing field conditions, including delays, sight distance, 24-hour traffic volumes by time of day, traffic thresholds and crash history. For a traffic signal to become warranted, it must meet at least one of the eight (8) traffic signal warrants published in the Manual of Uniform Traffic Control Devices. The traffic signal warrant analysis shows that conditions were satisfied for Warrant 1 (Eight Hour Vehicular Volume), Warrant 2 (Four Hour Vehicular Volume) and Warrant 7 (Crash Experience) based on existing conditions.

Staff recommends that the Board approve the installation of a traffic signal at the intersection of Winter Garden Vineland Road (CR 535) and Bluebird Pond Road/Magnolia Park Court.

Action Requested: Approval of the installation of a traffic signal at the intersection of Winter Garden Vineland Road (CR 535) and Bluebird Pond Road/Magnolia Park Court. District 1.

MVM/JK/AHW/nad

Attachments



Winter Garden Vineland Road (CR 535) and Bluebird Pond Road/Magnolia Park Court Agenda Location Map



Proposed Signal
District 1: Commissioner Betsy VanderLey



Winter Garden Vineland Road (CR 535) and Bluebird Pond Road/Magnolia Park Court Consent Agenda District Map



District 1: Commissioner Betsy VanderLey

TRAFFIC SIGNAL WARRANT SUMMARY

City: ORLANDO
County: ORANGE

Engineer: Ching Yang
Date: January 12, 2017

Major Street: CR 535
Minor Street: Bluebird Pond Rd
(Existing Condition)

Lanes: 2 Critical Approach Speed: 45 mph
Lanes: 1

Volume Level Criteria

1. Is the critical speed of major street traffic > 70 km/h (40 mph)? ☒ Yes ☐ No
2. Is the intersection in a built-up area of isolated community of <10,000 population? Yes ☒ No

If Question 1 or 2 above is answered "Yes", then use "70%" volume level ☒ 70% ☐ 100%

WARRANT 1 - EIGHT-HOUR VEHICULAR VOLUME

Warrant 1 is satisfied if Condition A or Condition B is "100%" satisfied.

Warrant is also satisfied if both Condition A and Condition B are "80%" satisfied for major streets 40 mph or less, or "56%" satisfied for major streets greater than 40 mph.

Condition A - Minimum Vehicular Volume

Applicable: ☒ Yes ☐ No
Satisfied: ☒ Yes ☐ No
100% Satisfied: ☒ Yes ☐ No
56% or 80% Satisfied: ☒ Yes ☐ No

(volumes in veh/hr) Approach Lanes Volume Level	Minimum Requirements (80% Shown in Brackets)				Eight Highest Hours							
	1		2 or more		6-7 am	7-8 am	8-9 am	9-10 am	11-12 pm	2-3 pm	3-4 pm	4-5 pm
	100%	70%	100%	70%								
Both Approaches on Major Street	500 (400) [280]	350	600 (480) [336]	420	2,153	3,200	3,170	2,579	2,974	2,853	3,295	3,334
Highest Approach on Minor Street	150 (120) [84]	105	200 (160) [112]	140	156	203	242	150	145	140	139	144

Record 8 highest hours and the corresponding volumes in boxes provided. Condition is 100% satisfied if minimum volumes are met for eight hours. Condition is 80% satisfied if (parenthetical) volumes are met for eight hours. Condition is 56% satisfied if [bracketed] volumes are met for eight hours.

Condition B - Interruption of Continuous Traffic

Condition B is intended for application where the traffic volume is so heavy that traffic on the minor street suffers excessive delay.

Applicable: ☒ Yes ☐ No
Excessive Delay: ☐ Yes ☒ No
100% Satisfied: ☒ Yes ☐ No
56% or 80% Satisfied: ☒ Yes ☐ No

(volumes in veh/hr) Approach Lanes Volume Level	Minimum Requirements (80% Shown in Brackets)				Eight Highest Hours							
	1		2 or more		6-7 am	7-8 am	8-9 am	11-12 pm	2-3 pm	3-4 pm	4-5 pm	5-6 pm
	100%	70%	100%	70%								
Both Approaches on Major Street	750 (600) [420]	525	900 (720) [504]	630	2,153	3,200	3,170	2,579	2,974	2,853	3,295	3,334
Highest Approach on Minor Street	75 (60) [42]	53	100 (80) [56]	70	156	203	242	150	145	140	139	144

Record 8 highest hours and the corresponding volumes in boxes provided. Condition is 100% satisfied if the minimum volumes are met for eight hours. Condition is 80% satisfied if (parenthetical) volumes are met for eight hours. Condition is 56% satisfied if [bracketed] volumes are met for eight hours.

TRAFFIC SIGNAL WARRANT SUMMARY

City: Orlando Engineer: Ching Yang
County: Orange County Date: January 12, 2017
Major Street: CR535 Lanes: 2 Critical Approach Speed: 45 mph
Minor Street: Blubird Pond Rd Lanes: 1

Volume Level Criteria

1. Is the critical speed of major street traffic > 70 km/h (40 mph)? ☒ Yes ☐ No
2. Is the intersection in a built-up area of isolated community of <10,000 population? ☐ Yes ☒ No
If Question 1 or 2 above is answered "Yes", then use "70%" volume level ☒ 70% ☐ 100%

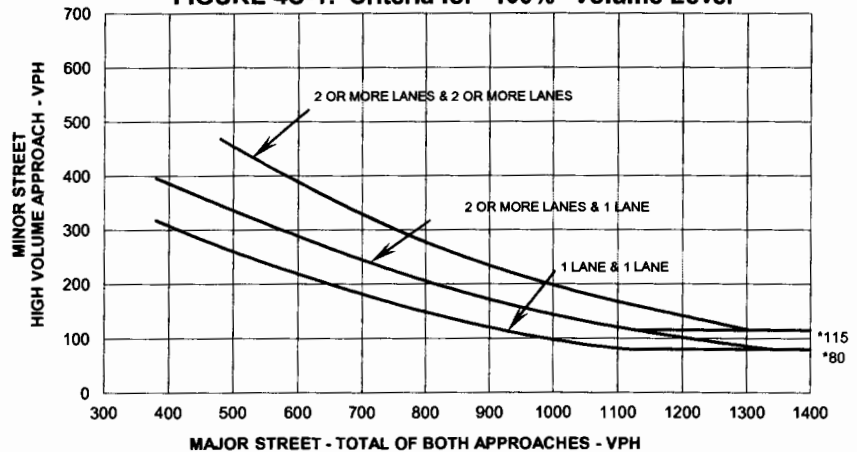
WARRANT 2 - FOUR-HOUR VEHICULAR VOLUME

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.

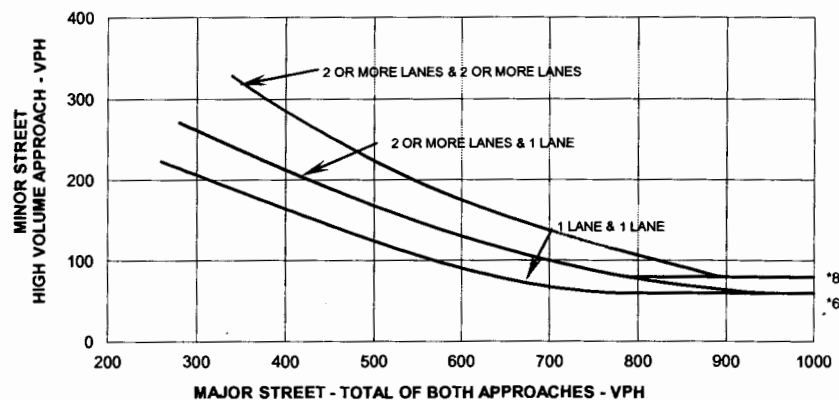
FIGURE 4C-1: Criteria for "100%" Volume Level



* 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.

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.

Four Highest Hours	Volumes	
	Major Street	Minor Street
6-7 am	2,153	156
7-8 am	3,200	203
8-9 am	3,170	242
9-10 am	2,579	150

TRAFFIC SIGNAL WARRANT SUMMARY

City: ORLANDO
County: ORANGE

Engineer: Ching Yang
Date: January 12, 2017

Major Street: CR 535
Minor Street: Bluebird Pond Rd

Lanes: 2 Critical Approach Speed: 45 mph
Lanes: 1

Volume Level Criteria

1. Is the critical speed of major street traffic > 70 km/h (40 mph)? ☒ Yes ☐ No
2. Is the intersection in a built-up area of isolated community of <10,000 population? ☐ Yes ☒ No
- If Question 1 or 2 above is answered "Yes", then use "70%" volume level ☒ 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		
8-9 am		

Criteria

1. Delay on Minor Approach *(vehicle-hours)

Approach Lanes	1	2
Delay Criteria*	4.0	5.0
Delay*		
Fulfilled?:	Yes	<input checked="" type="checkbox"/> No

2. Volume on Minor Approach *(vehicles per hour)

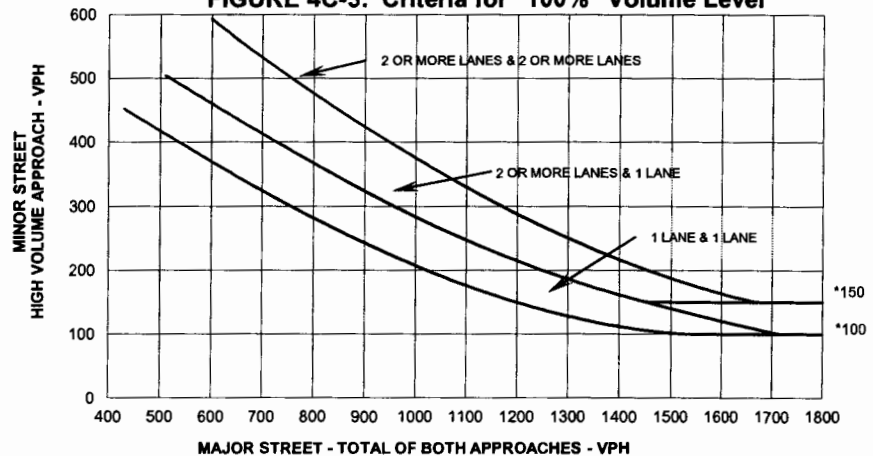
Approach Lanes	1	2
Volume Criteria*	100	150
Volume*	242	
Fulfilled?:	<input checked="" type="checkbox"/> Yes	No

3. Total Entering Volume *(vehicles per hour)

No. of Approaches	3	4
Volume Criteria*	650	800
Volume*		3,561
Fulfilled?:	<input checked="" type="checkbox"/> Yes	No

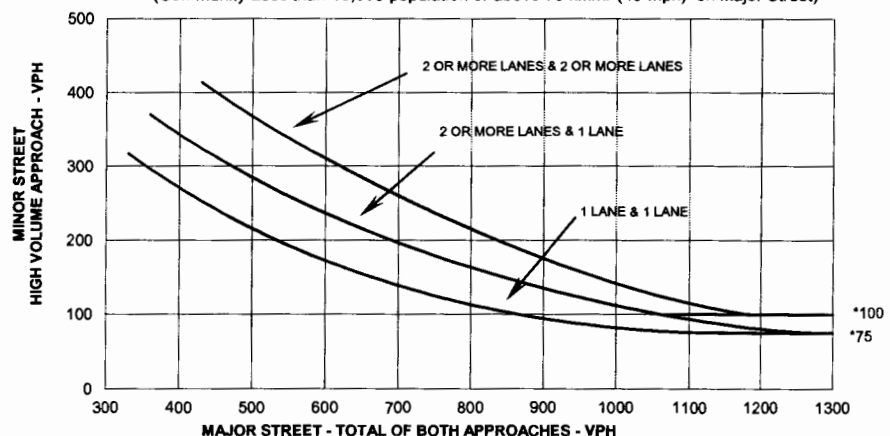
Plot volume combination on the applicable figure below.

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.

TRAFFIC SIGNAL WARRANT SUMMARY

City: ORLANDO
County: ORANGE

Engineer: Ching Yang
Date: January 12, 2017

Major Street: CR 535
Minor Street: Bluebird Pond Rd

Lanes: 2 Critical Approach Speed: 45 mph
Lanes: 1

WARRANT 4 - PEDESTRIAN VOLUME

Record hours where criteria are fulfilled and the corresponding volume or gap frequency in the boxes provided. The warrant is satisfied if condition 1 or 2 is fulfilled and condition 3 is fulfilled.

Applicable: Yes ☒ No
Satisfied: ☐ Yes ☐ No

Criteria	Hour	Pedestrian Volume	Pedestrian Gaps	Fulfilled?	
				Yes	No
1. Pedestrian volume crossing the major street is 100 ped/hr or more for each of any four hours <u>and</u> there are less than 60 gaps per hour in the major street traffic stream of adequate length.					
2. Pedestrian volume crossing the major street is 190 ped/hr or more for any one hour <u>and</u> there are less than 60 gaps per hour in the major street traffic stream of adequate length.					
3. The nearest traffic signal along the major street is located more than 90 m (300 ft) away, or the nearest signal is within 90 m (300 ft) but the proposed traffic signal will not restrict the progressive movement of traffic.					

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	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 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 90 m (300 ft) away, or the nearest signal is within 90 m (300 ft) but the proposed traffic signal will not restrict the progressive movement of traffic.		

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	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.		

24 HOUR VOLUME SUMMARY

NO	HOUR	CR 535		BLUEBIRD POND RD				1/11/2017	
		NB	SB	EB	WB	(NB+SB)	(EB+WB)	TOTAL	HOUR
1	0-1	171	160	8	0	331	8	339	0-1
2	1-2	76	109	2	0	185	2	187	1-2
3	2-3	39	61	3	3	100	6	106	2-3
4	3-4	42	115	7	0	157	7	164	3-4
5	4-5	63	284	14	1	347	15	362	4-5
6	5-6	194	603	38	3	797	41	838	5-6
7	6-7	794	1359	189	12	2153 ✓	201	2354	6-7
8	7-8	1233	1967	280	14	3200 ✓	294	3494	7-8
9	8-9	1348	1822	365	26	3170 ✓	391	3561	8-9
10	9-10	1015	1564	214	16	2579 ✓	230	2809	9-10
11	10-11	961	1413	193	10	2374	203	2577	10-11
12	11-12	975	1375	189	15	2350	204	2554	11-12
13	12-13	1010	1762	167	8	2772	175	2947	12-13
14	13-14	984	1990	203	8	2974 ✓	211	3185	13-14
15	14-15	1111	1742	189	9	2853 ✓	198	3051	14-15
16	15-16	1587	1708	192	13	3295 ✓	205	3500	15-16
17	16-17	1511	1823	212	8	3334 ✓	220	3554	16-17
18	17-18	1679	2006	178	11	3685	189	3874	17-18
19	18-19	1204	2163	173	9	3367	182	3549	18-19
20	19-20	775	1727	109	9	2502	118	2620	19-20
21	20-21	607	1321	49	1	1928	50	1978	20-21
22	21-22	409	917	48	4	1326	52	1378	21-22
23	22-23	324	547	22	1	871	23	894	22-23
24	23-24	288	265	14	0	553	14	567	23-24

TOTAL		18,400	28,803	3,058	181	47,203	3,239	50,442
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STREET	ADT
CR 535	47,203
BLUEBIRD POND RD	3,239

ALL TRAFFIC ALL LANES

	HOUR	VOLUME
AM PEAK	8-9	3,561
PM PEAK	17-18	3,874

24 HOUR VOLUME SUMMARY

NO	HOUR	CR 535		BLUEBIRD POND RD				1/11/2017	
		NB LEFT	SB LEFT	EB LEFT	WB	(NB+SB)	(EB+WB)	TOTAL	HOUR
1	0-1	5	7	6	0	12	6	18	0-1
2	1-2	2	8	2	0	10	2	12	1-2
3	2-3	2	5	2	0	7	2	9	2-3
4	3-4	1	7	5	0	8	5	13	3-4
5	4-5	1	12	11	0	13	11	24	4-5
6	5-6	1	41	29	0	42	29	71	5-6
7	6-7	1	113	156 ✓	0	114	156	270	6-7
8	7-8	8	121	203 ✓	0	129	203	332	7-8
9	8-9	21	104	242 ✓	0	125	242	367	8-9 ✓
10	9-10	14	66	150 ✓	0	80	150	230	9-10
11	10-11	15	32	130	0	47	130	177	10-11
12	11-12	11	16	122	0	27	122	149	11-12
13	12-13	25	35	114	0	60	114	174	12-13
14	13-14	27	112	145 ✓	0	139	145	284	13-14
15	14-15	14	90	140 ✓	0	104	140	244	14-15
16	15-16	31	57	139 ✓	0	88	139	227	15-16
17	16-17	42	62	144 ✓	0	104	144	248	16-17
18	17-18	51	54	131	0	105	131	236	17-18
19	18-19	39	72	128	0	111	128	239	18-19
20	19-20	28	48	80	0	76	80	156	19-20
21	20-21	20	64	30	0	84	30	114	20-21
22	21-22	20	59	36	0	79	36	115	21-22
23	22-23	19	35	15	0	54	15	69	22-23
24	23-24	10	13	6	0	23	6	29	23-24

TOTAL		408	1,233	2,166	0	1,641	2,166	3,807
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STREET	ADT
CR 535	1,641
BLUEBIRD POND RD	2,166

LEFT TURNS ONLY

	HOUR	VOLUME
AM PEAK	8-9	367
PM PEAK	13-14	284