



INNOVATIVE IDEAS
EXCEPTIONAL DESIGN
UNMATCHED CLIENT SERVICE

Clark County Signals Study
Final Tech Memo

Appendix E: PC Warrants Signal Warrant and Multi-Way Stop Application Analysis Results

Signal Warrants - Summary

Major Street Approaches

Northbound: BIRD RD

Number of Lanes: **1**
 85% Speed > 40 MPH.
 Total Approach Volume: **1,347**

Southbound: BUCK CREEK

Number of Lanes: **1**
 85% Speed > 40 MPH.
 Total Approach Volume: **998**

Minor Street Approaches

Eastbound: OLD COLUMBUS RD

Number of Lanes: **1**

 Total Approach Volume: **656**

Westbound: OLD COLUMBUS RD

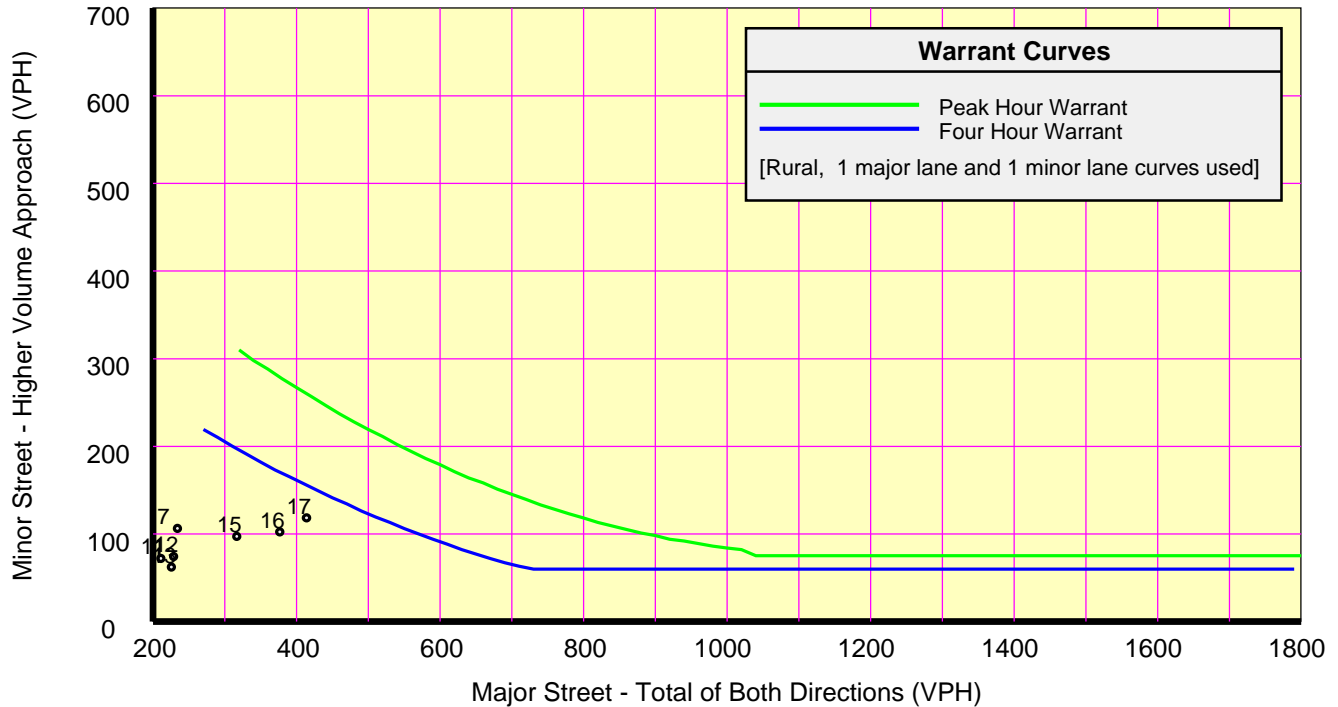
Number of Lanes: **1**

 Total Approach Volume: **771**

Warrant Summary (Rural values apply.)

Warrant 1 - Eight Hour Vehicular Volumes	Not Satisfied
Warrant 1A - Minimum Vehicular Volume Not Satisfied Required volumes reached for 1 hours, 8 are needed	
Warrant 1B - Interruption of Continuous Traffic Not Satisfied Required volumes reached for 0 hours, 8 are needed	
Warrant 1 A&B - Combination of Warrants Not Satisfied Required volumes reached for 0 hours, 8 are needed	
Warrant 2 - Four Hour Volumes	Not Satisfied
Number of hours (0) volumes exceed minimum < minimum required (4).	
Warrant 3 - Peak Hour	Not Satisfied
Warrant 3A - Peak Hour Delay Not Satisfied Approach volumes on minor street don't exceed minimums for any hour. Delay data not evaluated.	
Warrant 3B - Peak Hour Volumes Not Satisfied Volumes do not exceed minimums for any hour.	
Warrant 4 - Pedestrian Volumes	Not Evaluated
Warrant 5 - School Crossing	Not Evaluated
Warrant 6 - Coordinated Signal System	Not Evaluated
Warrant 7 - Crash Experience	Not Satisfied
Number of accidents (2) is less than minimum (5). Volume minimums are not met.	
Warrant 8 - Roadway Network	Not Evaluated
Warrant 9 - Intersection Near a Grade Crossing	Not Evaluated

Signal Warrants - Summary



Analysis of 8-Hour Volume Warrants:

War 1A-Minimum Volume

War 1B-Interruption of Traffic

War 1C-Combination of Warrants

Hour Begin	Major Total	Minor Vol	Dir	Maj 350	Min 105	Hour Begin	Major Total	Minor Vol	Dir	Maj 525	Min 53	Hour Begin	Major Total	Minor Vol	Dir	Maj 420	Min 84
16:15	371	113	W	Yes	Yes	17:00	414	118	W	No	Yes	17:00	414	118	W	No	Yes
16:00	377	102	W	Yes	No	16:45	407	117	W	No	Yes	16:45	407	117	W	No	Yes
15:45	371	96	W	Yes	No	16:30	378	115	W	No	Yes	16:30	378	115	W	No	Yes
15:30	365	96	W	Yes	No	16:00	377	102	W	No	Yes	16:00	377	102	W	No	Yes
15:15	351	104	W	Yes	No	16:15	371	113	W	No	Yes	16:15	371	113	W	No	Yes
15:00	317	97	W	No	No	15:45	371	96	W	No	Yes	15:45	371	96	W	No	Yes
17:15	309	86	EB	No	No	15:30	365	96	W	No	Yes	15:30	365	96	W	No	Yes
07:15	256	107	W	No	Yes	15:15	351	104	W	No	Yes	15:15	351	104	W	No	Yes
14:45	236	75	W	No	No	15:00	317	97	W	No	Yes	15:00	317	97	W	No	Yes
07:30	235	119	W	No	Yes	17:15	309	86	EB	No	Yes	17:15	309	86	EB	No	Yes
07:00	234	106	W	No	Yes	07:15	256	107	W	No	Yes	07:15	256	107	W	No	Yes
12:45	230	62	EB	No	No	14:45	236	75	W	No	Yes	14:45	236	75	W	No	No
12:00	229	74	EB	No	No	07:30	235	119	W	No	Yes	07:30	235	119	W	No	Yes
12:30	227	65	EB	No	No	07:00	234	106	W	No	Yes	07:00	234	106	W	No	Yes
13:00	226	62	EB	No	No	12:45	230	62	EB	No	Yes	12:45	230	62	EB	No	No
12:15	226	70	EB	No	No	12:00	229	74	EB	No	Yes	12:00	229	74	EB	No	No
11:45	217	72	W	No	No	12:30	227	65	EB	No	Yes	12:30	227	65	EB	No	No
11:30	213	74	W	No	No	13:00	226	62	EB	No	Yes	13:00	226	62	EB	No	No
11:00	211	72	W	No	No	12:15	226	70	EB	No	Yes	12:15	226	70	EB	No	No
11:15	210	76	W	No	No	11:45	217	72	W	No	Yes	11:45	217	72	W	No	No
07:45	207	113	W	No	Yes	11:30	213	74	W	No	Yes	11:30	213	74	W	No	No
17:30	206	56	W	No	No	11:00	211	72	W	No	Yes	11:00	211	72	W	No	No
08:00	179	94	W	No	No	11:15	210	76	W	No	Yes	11:15	210	76	W	No	No
13:15	178	47	EB	No	No	07:45	207	113	W	No	Yes	07:45	207	113	W	No	Yes

Signal Warrants - Summary

Major Street Approaches

Northbound: Springfield-Xenia

Number of Lanes: **1**
 85% Speed > 40 MPH.
 Total Approach Volume: **1,887**

Southbound: Springfield-Xenia

Number of Lanes: **1**
 85% Speed > 40 MPH.
 Total Approach Volume: **1,857**

Minor Street Approaches

Eastbound: Possum

Number of Lanes: **1**

 Total Approach Volume: **382**

Westbound: Possum

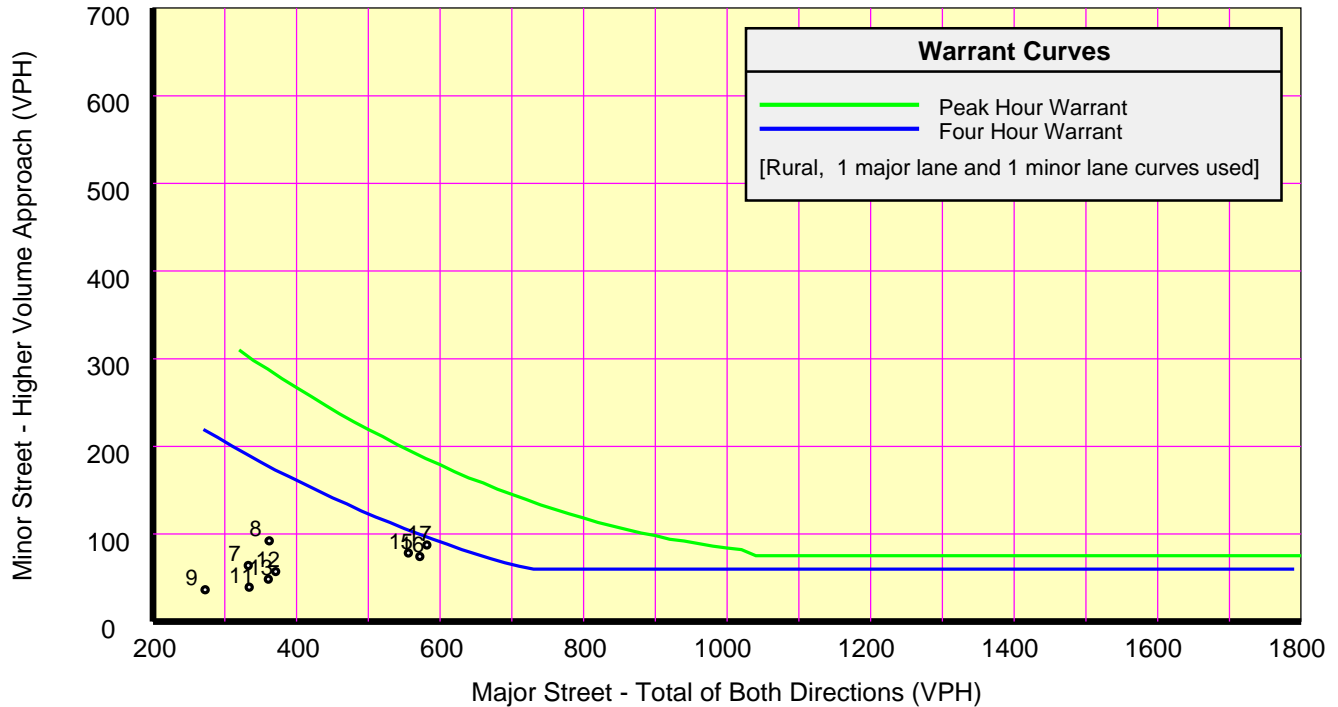
Number of Lanes: **1**

 Total Approach Volume: **575**

Warrant Summary (Rural values apply.)

Warrant 1 - Eight Hour Vehicular Volumes	Not Satisfied
Warrant 1A - Minimum Vehicular Volume Not Satisfied	
Required volumes reached for 0 hours, 8 are needed	
Warrant 1B - Interruption of Continuous Traffic Not Satisfied	
Required volumes reached for 3 hours, 8 are needed	
Warrant 1 A&B - Combination of Warrants Not Satisfied	
Required volumes reached for 1 hours, 8 are needed	
Warrant 2 - Four Hour Volumes	Not Satisfied
Number of hours (0) volumes exceed minimum < minimum required (4).	
Warrant 3 - Peak Hour	Not Satisfied
Warrant 3A - Peak Hour Delay Not Satisfied	
Approach volumes on minor street don't exceed minimums for any hour. Delay data not evaluated.	
Warrant 3B - Peak Hour Volumes Not Satisfied	
Volumes do not exceed minimums for any hour.	
Warrant 4 - Pedestrian Volumes	Not Evaluated
Warrant 5 - School Crossing	Not Evaluated
Warrant 6 - Coordinated Signal System	Not Evaluated
Warrant 7 - Crash Experience	Not Satisfied
Number of accidents (2) is less than minimum (5). Volume minimums are not met.	
Warrant 8 - Roadway Network	Not Evaluated
Warrant 9 - Intersection Near a Grade Crossing	Not Evaluated

Signal Warrants - Summary



Analysis of 8-Hour Volume Warrants:

War 1A-Minimum Volume

War 1B-Interruption of Traffic

War 1C-Combination of Warrants

Hour Begin	Major Total	Minor Vol	Dir	Maj 350	Min 105	Hour Begin	Major Total	Minor Vol	Dir	Maj 525	Min 53	Hour Begin	Major Total	Minor Vol	Dir	Maj 420	Min 84
15:45	593	74	W	Yes	No	17:00	582	87	W	Yes	Yes	16:15	586	85	W	Yes	Yes
16:30	591	79	W	Yes	No	16:00	572	74	W	Yes	Yes	15:45	593	74	W	Yes	No
16:15	586	85	W	Yes	No	15:00	556	78	W	Yes	Yes	15:30	573	76	W	Yes	No
17:00	582	87	W	Yes	No	14:45	408	55	W	No	Yes	16:00	572	74	W	Yes	No
16:45	574	84	W	Yes	No	07:30	385	77	W	No	Yes	15:15	557	71	W	Yes	No
15:30	573	76	W	Yes	No	07:45	373	86	W	No	Yes	15:00	556	78	W	Yes	No
16:00	572	74	W	Yes	No	11:45	372	55	W	No	Yes	17:15	431	65	W	Yes	No
15:15	557	71	W	Yes	No	12:00	371	57	W	No	Yes	14:45	408	55	W	No	No
15:00	556	78	W	Yes	No	12:45	367	52	EB	No	No	07:30	385	77	W	No	No
17:15	431	65	W	Yes	No	11:30	367	51	W	No	No	07:45	373	86	W	No	Yes
14:45	408	55	W	Yes	No	07:15	367	77	W	No	Yes	11:45	372	55	W	No	No
07:30	385	77	W	Yes	No	08:00	362	92	W	No	Yes	12:00	371	57	W	No	No
07:45	373	86	W	Yes	No	13:00	361	48	W	No	No	12:45	367	52	EB	No	No
11:45	372	55	W	Yes	No	12:15	361	64	W	No	Yes	11:30	367	51	W	No	No
12:00	371	57	W	Yes	No	11:15	354	44	W	No	No	07:15	367	77	W	No	No
12:45	367	52	EB	Yes	No	12:30	347	56	W	No	Yes	08:00	362	92	W	No	Yes
11:30	367	51	W	Yes	No	08:15	342	77	W	No	Yes	13:00	361	48	W	No	No
07:15	367	77	W	Yes	No	11:00	334	39	W	No	No	12:15	361	64	W	No	No
08:00	362	92	W	Yes	No	07:00	333	64	W	No	Yes	11:15	354	44	W	No	No
13:00	361	48	W	Yes	No	08:30	326	69	W	No	Yes	12:30	347	56	W	No	No
12:15	361	64	W	Yes	No	08:45	319	58	W	No	Yes	08:15	342	77	W	No	No
11:15	354	44	W	Yes	No	09:00	273	36	W	No	No	11:00	334	39	W	No	No
12:30	347	56	W	No	No	13:15	268	29	W	No	No	07:00	333	64	W	No	No
08:15	342	77	W	No	No	14:30	264	39	W	No	No	08:30	326	69	W	No	No

Signal Warrants - Summary

Major Street Approaches

Eastbound: LEFFEL

Number of Lanes: **1**
 85% Speed > 40 MPH.
 Total Approach Volume: **2,586**

Westbound: LEFFEL

Number of Lanes: **1**
 85% Speed > 40 MPH.
 Total Approach Volume: **1,960**

Minor Street Approaches

Northbound: SELMA

Number of Lanes: **1**

 Total Approach Volume: **1,127**

Southbound: SELMA

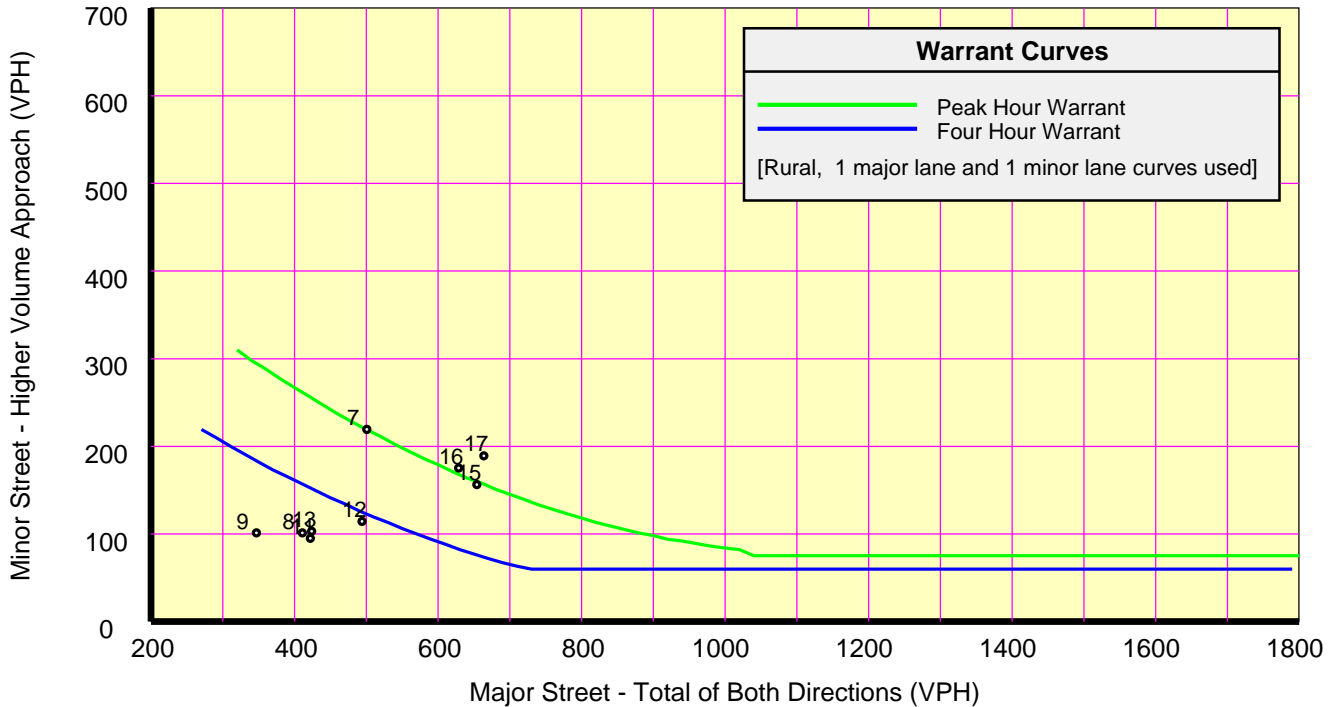
Number of Lanes: **1**

 Total Approach Volume: **1,131**

Warrant Summary (Rural values apply.)

Warrant 1 - Eight Hour Vehicular Volumes	Satisfied
Warrant 1A - Minimum Vehicular Volume Not Satisfied Required volumes reached for 7 hours, 8 are needed	
Warrant 1B - Interruption of Continuous Traffic Not Satisfied Required volumes reached for 3 hours, 8 are needed	
Warrant 1 A&B - Combination of Warrants Satisfied Required volumes reached for 8 hours, 8 are needed	
Warrant 2 - Four Hour Volumes	Satisfied
Number of hours (4) volumes exceed minimum < minimum required (4).	
Warrant 3 - Peak Hour	Satisfied
Warrant 3A - Peak Hour Delay Satisfied Number of hours (11) volumes exceed minimum >= required (1). Delay data not evaluated.	
Warrant 3B - Peak Hour Volumes Satisfied Volumes exceed minimums for at least one hour.	
Warrant 4 - Pedestrian Volumes	Not Evaluated
Warrant 5 - School Crossing	Not Evaluated
Warrant 6 - Coordinated Signal System	Not Evaluated
Warrant 7 - Crash Experience	Not Evaluated
Warrant 8 - Roadway Network	Not Evaluated
Warrant 9 - Intersection Near a Grade Crossing	Not Evaluated

Signal Warrants - Summary



Analysis of 8-Hour Volume Warrants:

War 1A-Minimum Volume

War 1B-Interruption of Traffic

War 1C-Combination of Warrants

Hour Begin	Major Total	Minor Vol	Dir	Maj 350	Min 105	Hour Begin	Major Total	Minor Vol	Dir	Maj 525	Min 53	Hour Begin	Major Total	Minor Vol	Dir	Maj 420	Min 84
16:45	708	202	SB	Yes	Yes	17:00	664	189	SB	Yes	Yes	16:45	708	202	SB	Yes	Yes
15:45	630	168	SB	Yes	Yes	15:00	654	156	SB	Yes	Yes	15:45	630	168	SB	Yes	Yes
14:45	488	115	SB	Yes	Yes	16:00	629	175	SB	Yes	Yes	07:00	501	219	NB	Yes	Yes
07:45	466	128	NB	Yes	Yes	07:30	516	149	NB	No	Yes	12:00	494	114	SB	Yes	Yes
11:15	456	111	SB	Yes	Yes	07:15	516	201	NB	No	Yes	14:45	488	115	SB	Yes	Yes
12:15	455	115	NB	Yes	Yes	07:00	501	219	NB	No	Yes	13:00	424	103	NB	Yes	Yes
06:45	355	169	NB	Yes	Yes	12:00	494	114	SB	No	Yes	11:00	422	95	NB	Yes	Yes
11:00	422	95	NB	Yes	No	11:30	493	117	SB	No	Yes	08:15	421	97	NB	Yes	Yes
08:45	357	100	NB	Yes	No	14:45	488	115	SB	No	Yes	08:00	411	101	NB	No	Yes
09:00	347	101	NB	No	No	11:45	488	110	NB	No	Yes	06:45	355	169	NB	No	Yes
13:15	326	78	NB	No	No	07:45	466	128	NB	No	Yes	10:45	305	74	NB	No	No
10:45	305	74	NB	No	No	11:15	456	111	SB	No	Yes	14:30	289	71	SB	No	No
14:30	289	71	SB	No	No	12:15	455	115	NB	No	Yes	09:15	238	73	NB	No	No
09:15	238	73	NB	No	No	12:45	434	103	SB	No	Yes	06:30	205	121	NB	No	Yes
13:30	227	49	SB	No	No	12:30	431	116	NB	No	Yes	10:30	189	47	NB	No	No
06:30	205	121	NB	No	Yes	13:00	424	103	NB	No	Yes	09:30	152	45	NB	No	No
10:30	189	47	NB	No	No	11:00	422	95	NB	No	Yes	14:15	137	33	SB	No	No
09:30	152	45	NB	No	No	08:15	421	97	NB	No	Yes	17:45	121	35	SB	No	No
14:15	137	33	SB	No	No	08:00	411	101	NB	No	Yes	10:15	103	27	NB	No	No
17:45	121	35	SB	No	No	08:30	386	106	NB	No	Yes	06:15	84	50	NB	No	No
13:45	113	25	SB	No	No	08:45	357	100	NB	No	Yes	09:45	81	31	SB	No	No
10:15	103	27	NB	No	No	06:45	355	169	NB	No	Yes	22:45	0	0	SB	No	No
06:15	84	50	NB	No	No	09:00	347	101	NB	No	Yes	22:30	0	0	SB	No	No
09:45	81	31	SB	No	No	13:15	326	78	NB	No	Yes	22:15	0	0	SB	No	No

Multi-Way Stop Warrant Report

Major Street Approaches

Northbound: BIRD RD

Total Approach Volume: **1,569**
 85% Speed > 40 MPH.

Southbound: BUCK CREEK

Total Approach Volume: **1,143**
 85% Speed > 40 MPH.

Minor Street Approaches

Eastbound: OLD COLUMBUS RD

Total Approach Volume: **889**

Westbound: OLD COLUMBUS RD

Total Approach Volume: **995**

Warrant Summary

Criteria A - Interim Measure **Not Evaluated**

If traffic signals are justified, stop signs can be installed as an interim measure.

Criteria B - Crash Experience **Not Satisfied**

Number of crashes (2) is less than the minimum required (5).

Criteria C - Minimum Volumes and Delays **Satisfied**

Average Delay Per Vehicle (42) is more than minimum required (30).
 Average of 8 highest hours exceeds volume criteria.

Criteria D - 80% of Volumes, Delays, and Crashes **Not Satisfied**

Average Delay Per Vehicle (42) is more than minimum required (30).
 Number of crashes (2) is less than the minimum required (4).
 Average of 8 highest hours exceeds volume criteria.

Analysis of 8-Hour Volume Warrants:

Time	Major Total	Major Avg	Minor Total	Minor Avg	Crit C			Crit D		
					Major	Minor	Meets?	Major	Minor	Meets?
17:00 - 18:00	479	316.8	307	218.1	210-Yes	140-Yes	Both	240-Yes	160-Yes	Both
16:00 - 17:00	436		247							
15:00 - 16:00	366		244							
07:00 - 08:00	272		249							
12:00 - 13:00	266		188							
13:00 - 14:00	261		161							
11:00 - 12:00	245		160							
08:00 - 09:00	209		189							
09:00 - 10:00	178		139							
23:00 - 00:00	0		0							
22:00 - 23:00	0		0							
21:00 - 22:00	0		0							
20:00 - 21:00	0		0							
19:00 - 20:00	0		0							
18:00 - 19:00	0		0							
14:00 - 15:00	0		0							
10:00 - 11:00	0		0							
06:00 - 07:00	0		0							
05:00 - 06:00	0		0							
04:00 - 05:00	0		0							
03:00 - 04:00	0		0							
02:00 - 03:00	0		0							
01:00 - 02:00	0		0							
00:00 - 01:00	0		0							

DLZ OHIO, INC.
 6121 Huntley Rd.
 Columbus, OH 43229
 (614) 888-0040

Study Name : **Springfield-Xenia_Possum**

Multi-Way Stop Warrant Report

Major Street Approaches

Northbound: SPRING XENIA
 Total Approach Volume: **1,930**
 85% Speed > 40 MPH.

Southbound: SPRING XENIA
 Total Approach Volume: **1,905**
 85% Speed > 40 MPH.

Minor Street Approaches

Eastbound: POSSUM
 Total Approach Volume: **412**

Westbound: POSSUM
 Total Approach Volume: **679**

Warrant Summary

- Criteria A - Interim Measure** **Not Evaluated**
 If traffic signals are justified, stop signs can be installed as an interim measure.
- Criteria B - Crash Experience** **Not Satisfied**
 Number of crashes (2) is less than the minimum required (5).
- Criteria C - Minimum Volumes and Delays** **Not Satisfied**
 Average Delay Per Vehicle (21) is less than minimum required (30).
 Average of 8 highest hours does not meet volume criteria.
- Criteria D - 80% of Volumes, Delays, and Crashes** **Not Satisfied**
 Average Delay Per Vehicle (21) is less than minimum required (30).
 Number of crashes (2) is less than the minimum required (4).
 Average of 8 highest hours does not meet volume criteria.

Analysis of 8-Hour Volume Warrants:

Time	Major Total	Major Avg	Minor Total	Minor Avg	Crit C			Crit D		
					Major	Minor	Meets?	Major	Minor	Meets?
17:00 - 18:00	596	444.3	153	128.5	210-Yes	140-No	Major	240-Yes	160-No	Major
16:00 - 17:00	587		152							
15:00 - 16:00	570		154							
12:00 - 13:00	379		112							
08:00 - 09:00	370		175							
13:00 - 14:00	369		96							
11:00 - 12:00	342		72							
07:00 - 08:00	341		114							
09:00 - 10:00	281		63							
23:00 - 00:00	0		0							
22:00 - 23:00	0		0							
21:00 - 22:00	0		0							
20:00 - 21:00	0		0							
19:00 - 20:00	0		0							
18:00 - 19:00	0		0							
14:00 - 15:00	0		0							
10:00 - 11:00	0		0							
06:00 - 07:00	0		0							
05:00 - 06:00	0		0							
04:00 - 05:00	0		0							
03:00 - 04:00	0		0							
02:00 - 03:00	0		0							
01:00 - 02:00	0		0							
00:00 - 01:00	0		0							