

# Appendix D

**MOUNTAIN EAGLE SIGNAL WARRANT**  
**Pima County Department of Transportation**  
**Traffic Engineering Division**

**ANALYSIS OF THE WARRANTS FOR THE INSTALLATION OF A TRAFFIC SIGNAL**

Intersection: Valencia @ Mountain Eagle

Date: 4/5/2011

Date of Count: 2/2/2010

Calculations By: KS

**Definition:**

1. Leg: That portion of the roadway which extends outward in a given direction from the center of the intersection (1,2,3,4)
2. Approach: That portion of a leg which is used by traffic approaching the intersection (a,c,e,g)

**Conditions:**

**1. Major Street:**

- a. Number of approach lanes for moving traffic in each direction: 1
- b. Number of approach lanes used in this analysis:<sup>1</sup> 1
- c. Posted Speed Limit: 50 mph

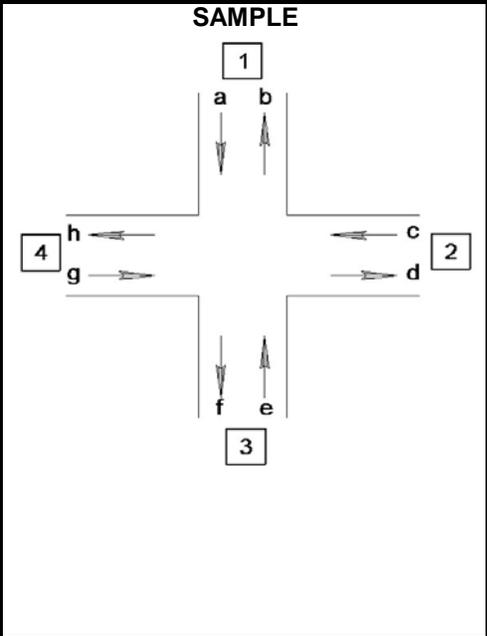
**2. Minor Street:**

- a. Number of approach lanes for moving traffic in each direction: 1
- b. Number of approach lanes used in this analysis:<sup>1</sup> 1
- c. Posted Speed Limit: 25 mph
- d. Total Delay on the highest vol. approach (special circumstances): NA

**3. 85th Percentile Speed on the Major Street:** >45 mph

- a. If this speed is less than or equal to 40 mph, use Group I requirements.
- b. If this speed is greater than 40 mph, use Group II requirements for Warrant 1, Part A.

**4. If the intersection lies within the built-up area of an isolated community having a population of less than 10,000, use Group II requirements.**



Time	A Req. Vol. <sup>5</sup>	B Req. Vol. <sup>6</sup>	6:00 ↓ 7:00	7:00 ↓ 8:00	8:00 ↓ 9:00	15:00 ↓ 16:00	16:00 ↓ 17:00	17:00 ↓ 18:00	18:00 ↓ 19:00	19:00 ↓ 20:00
(Use same hours for both streets) <sup>2</sup>										
<b>Major Street Volume</b> (Adjusted total of both approaches) <sup>4</sup>	420	900		386	297		299	456		
<b>Total Minor Street Approach Volume</b> (One direction of the higher volume minor street approach) <sup>3</sup>			56	60	48	36	66	46	36	30
<b>Adjusted Minor Street Approach Volume<sup>4</sup></b>	105	75								
<b>Pedestrian Volume</b> (Highest volume crosswalk crossing the major street)	-----MINIMAL-----									

<sup>1</sup> The number of approach lanes is generally defined as any lane that includes through traffic movements. An exclusive turn lane is not considered as an approach lane unless the turning traffic in the lane is greater than 30% of the total approach volume.

<sup>2</sup> Normally, the highest hourly volumes are chosen from the hours with the largest total number of vehicles approaching the intersection.

<sup>3</sup> The higher volume may be on one approach during some hours and the opposite approach during other hours.

<sup>4</sup> The adjusted volume may include the turning volumes from exclusive turn lanes that are not included as an approach lane<sup>1</sup>. One-half of the right turn volumes shall be excluded from shared right-through lanes and from exclusive right turn lanes that have greater than 30% of the approach volume.

<sup>5</sup> Minimum required volumes for Warrant 1, Condition A - Minimum Vehicular Volume.

<sup>6</sup> Minimum required volumes for Warrant 1, Condition B - Interruption of Continuous Traffic.

## MOUNTAIN EAGLE SIGNAL WARRANT (Cont.)

Intersection: Valencia @ Mountain Eagle

Warrant Description		# of 1 Hr Interval Volumes $\geq$ Criteria								Is Warrant Satisfied?		
		Major Street				Minor Street						
		# Hrs	Vol. Req. Met	# Hrs	Vol. Req. Met	# Hrs	Vol. Req. Met	# Hrs	Vol. Req. Met			
<b>1. Eight-Hour Vehicular Volumes</b>												
	Condition A - Minimum Vehicular Volume	1	NO	0	NO	0	NO	0	NO	NO		
	Condition B - Interruption of Continuous Traffic	0	NO	0	NO	0	NO	0	NO	NO		
	Condition C - Combination of Warrants	1	0	NO	NO	0	0	NO	NO	NO		
<b>2. Four-Hour Vehicular Volumes</b>										0	NO	NO
<b>3. Peak Hour</b>											NA	
	Total Delay $\geq$ Minimum Delay Criteria									--	NA	NA
	Minor Street Volume $\geq$ Minimum Criteria									--	NA	
	Total Entering Volume $\geq$ Minimum Criteria									--	NA	
<b>4. Pedestrian Volume</b>		--	--	--	--	--	--	--	--	NA	NA	
<b>5. School Crossing</b>											NA	NA
<b>6. Coordinated Signal System</b>												
	One-Way Street										NA	YES
	Two-Way Street										YES	
<b>7. Crash Experience</b>												
	Less Restrictive Remedies Fail										NO	NO
	Five or More Correctable Crashes										NO	
	80% of Warrant 1 or 4 are satisfied.										NO	
<b>8. Roadway Network</b>												
	Intersection of Major Routes										NA	NA
	Total Entering Volume $\geq$ Minimum Criteria										NA	

**VAHALLA SIGNAL WARRANT**  
**Pima County Department of Transportation**  
**Traffic Engineering Division**

**ANALYSIS OF THE WARRANTS FOR THE INSTALLATION OF A TRAFFIC SIGNAL**

**Intersection:** Valencia @ Vahalla

**Date:** 4/5/2011

**Date of Count:** 2/1/2011

**Calculations By:** KS

**Definition:**  
 1. Leg: That portion of the roadway which extends outward in a given direction from the center of the intersection (1,2,3,4)  
 2. Approach: That portion of a leg which is used by traffic approaching the intersection (a,c,e,g)

Conditions:	SAMPLE
<p><b>1. Major Street:</b></p> <p>a. Number of approach lanes for moving traffic in each direction: <u>1</u></p> <p>b. Number of approach lanes used in this analysis:<sup>1</sup> <u>1</u></p> <p>c. Posted Speed Limit: <u>50 mph</u></p> <p><b>2. Minor Street:</b></p> <p>a. Number of approach lanes for moving traffic in each direction: <u>1</u></p> <p>b. Number of approach lanes used in this analysis:<sup>1</sup> <u>1</u></p> <p>c. Posted Speed Limit: <u>25 mph</u></p> <p>d. Total Delay on the highest vol. approach (special circumstances): <u>NA</u></p> <p><b>3. 85th Percentile Speed on the Major Street:</b> <u>&gt;45 mph</u></p> <p>a. If this speed is less than or equal to 40 mph, use Group I requirements.</p> <p>b. If this speed is greater than 40 mph, use Group II requirements for Warrant 1, Part A.</p> <p><b>4. If the intersection lies within the built-up area of an isolated community having a population of less than 10,000, use Group II requirements.</b></p>	

Time	A Req. Vol. <sup>5</sup>	B Req. Vol. <sup>6</sup>	7:00 ↓ 8:00	8:00 ↓ 9:00	14:00 ↓ 15:00	15:00 ↓ 16:00	16:00 ↓ 17:00	17:00 ↓ 18:00	18:00 ↓ 19:00	19:00 ↓ 20:00
(Use same hours for both streets) <sup>2</sup>										
<b>Major Street Volume</b> (Adjusted total of both approaches) <sup>4</sup>	420	900	556	466	444	526	641	634	606	459
<b>Total Minor Street Approach Volume</b> (One direction of the higher volume minor street approach) <sup>3</sup>			35	21	14	28	27	21	20	18
<b>Adjusted Minor Street Approach Volume<sup>4</sup></b>	105	75								
<b>Pedestrian Volume</b> (Highest volume crosswalk crossing the major street)			-----MINIMAL-----							

\*Approach Volumes at Iberia

<sup>1</sup> The number of approach lanes is generally defined as any lane that includes through traffic movements. An exclusive turn lane is not considered as an approach lane unless the turning traffic in the lane is greater than 30% of the total approach volume.

<sup>2</sup> Normally, the highest hourly volumes are chosen from the hours with the largest total number of vehicles approaching the intersection.

<sup>3</sup> The higher volume may be on one approach during some hours and the opposite approach during other hours.

<sup>4</sup> The adjusted volume may include the turning volumes from exclusive turn lanes that are not included as an approach lane<sup>1</sup>. One-half of the right turn volumes shall be excluded from shared right-through lanes and from exclusive right turn lanes that have greater than 30% of the approach volume.

<sup>5</sup> Minimum required volumes for Warrant 1, Condition A - Minimum Vehicular Volume.

<sup>6</sup> Minimum required volumes for Warrant 1, Condition B - Interruption of Continuous Traffic.

## VAHALLA SIGNAL WARRANT (Cont.)

Intersection: Valencia @ Vahalla

Warrant Description		# of 1 Hr Interval Volumes $\geq$ Criteria								Is Warrant Satisfied?	
		Major Street				Minor Street					
		# Hrs	Vol. Req. Met	# Hrs	Vol. Req. Met	# Hrs	Vol. Req. Met	# Hrs	Vol. Req. Met		
<b>1. Eight-Hour Vehicular Volumes</b>											
	Condition A - Minimum Vehicular Volume	8	YES	0	NO	0	NO	0	NO	NO	
	Condition B - Interruption of Continuous Traffic	0	NO	0	NO	0	NO	0	NO	NO	
	Condition C - Combination of Warrants	8	0	YES	NO	0	0	NO	NO	NO	
<b>2. Four-Hour Vehicular Volumes</b>						0	NO			NO	
<b>3. Peak Hour</b>								NA			
	Total Delay $\geq$ Minimum Delay Criteria					--	NA			NA	
	Minor Street Volume $\geq$ Minimum Criteria					--	NA				
	Total Entering Volume $\geq$ Minimum Criteria					--	NA				
<b>4. Pedestrian Volume</b>		--	--	--	NA			NA	NA		
<b>5. School Crossing</b>								NA	NA		
<b>6. Coordinated Signal System</b>											
	One-Way Street							NA	YES		
	Two-Way Street							YES			
<b>7. Crash Experience</b>											
	Less Restrictive Remedies Fail							NO	NO		
	Five or More Correctable Crashes							NO			
	80% of Warrant 1 or 4 are satisfied.							NO			
<b>8. Roadway Network</b>											
	Intersection of Major Routes							NA	NA		
	Total Entering Volume $\geq$ Minimum Criteria							NA			

**IBERIA SIGNAL WARRANT**  
**Pima County Department of Transportation**  
**Traffic Engineering Division**

**ANALYSIS OF THE WARRANTS FOR THE INSTALLATION OF A TRAFFIC SIGNAL**

Intersection: Valencia @ Iberia

Date: 4/5/2011

Date of Count: 2/1/2011

Calculations By: KS

**Definition:**  
 1. Leg: That portion of the roadway which extends outward in a given direction from the center of the intersection (1,2,3,4)  
 2. Approach: That portion of a leg which is used by traffic approaching the intersection (a,c,e,g)

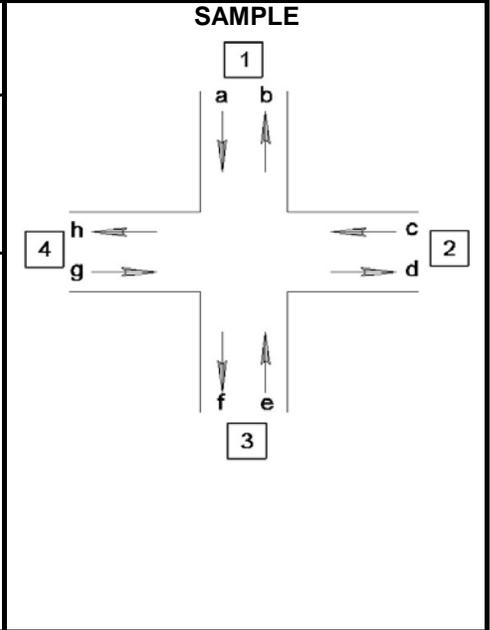
**Conditions:**

**1. Major Street:**  
 a. Number of approach lanes for moving traffic in each direction: 1  
 b. Number of approach lanes used in this analysis:<sup>1</sup> 1  
 c. Posted Speed Limit: 50 mph

**2. Minor Street:**  
 a. Number of approach lanes for moving traffic in each direction: 1  
 b. Number of approach lanes used in this analysis:<sup>1</sup> 1  
 c. Posted Speed Limit: 25 mph  
 d. Total Delay on the highest vol. approach (special circumstances): NA

**3. 85th Percentile Speed on the Major Street:** >45 mph  
 a. If this speed is less than or equal to 40 mph, use Group I requirements.  
 b. If this speed is greater than 40 mph, use Group II requirements for Warrant 1, Part A.

**4. If the intersection lies within the built-up area of an isolated community having a population of less than 10,000, use Group II requirements.**



Time (Use same hours for both streets) <sup>2</sup>	A Req. Vol. <sup>5</sup>	B Req. Vol. <sup>6</sup>	7:00	8:00	14:00	15:00	16:00	17:00	18:00	19:00
			8:00	9:00	15:00	16:00	17:00	18:00	19:00	20:00
<b>Major Street Volume</b> (Adjusted total of both approaches) <sup>4</sup>	420	900	556	466	444	526	641	634	606	459
<b>Total Minor Street Approach Volume</b> (One direction of the higher volume minor street approach) <sup>3</sup>			79	57	22	26	36	34	20	27
<b>Adjusted Minor Street Approach Volume<sup>4</sup></b>	105	75								
<b>Pedestrian Volume</b> (Highest volume crosswalk crossing the major street)	-----MINIMAL-----									

<sup>1</sup> The number of approach lanes is generally defined as any lane that includes through traffic movements. An exclusive turn lane is not considered as an approach lane unless the turning traffic in the lane is greater than 30% of the total approach volume.  
<sup>2</sup> Normally, the highest hourly volumes are chosen from the hours with the largest total number of vehicles approaching the intersection.  
<sup>3</sup> The higher volume may be on one approach during some hours and the opposite approach during other hours.  
<sup>4</sup> The adjusted volume may include the turning volumes from exclusive turn lanes that are not included as an approach lane<sup>1</sup>. One-half of the right turn volumes shall be excluded from shared right-through lanes and from exclusive right turn lanes that have greater than 30% of the approach volume.  
<sup>5</sup> Minimum required volumes for Warrant 1, Condition A - Minimum Vehicular Volume.  
<sup>6</sup> Minimum required volumes for Warrant 1, Condition B - Interruption of Continuous Traffic.

## IBERIA SIGNAL WARRANT (Cont.)

Intersection: Valencia @ Iberia

Warrant Description		# of 1 Hr Interval Volumes $\geq$ Criteria								Is Warrant Satisfied?		
		Major Street				Minor Street						
		# Hrs	Vol. Req. Met	# Hrs	Vol. Req. Met	# Hrs	Vol. Req. Met	# Hrs	Vol. Req. Met			
<b>1. Eight-Hour Vehicular Volumes</b>												
	Condition A - Minimum Vehicular Volume	8	YES	0	NO	0	NO	0	NO	NO		
	Condition B - Interruption of Continuous Traffic	0	NO	0	NO	0	NO	0	NO	NO		
	Condition C - Combination of Warrants	8	0	YES	NO	0	0	NO	NO	NO		
<b>2. Four-Hour Vehicular Volumes</b>										0	NO	NO
<b>3. Peak Hour</b>										NA		
	Total Delay $\geq$ Minimum Delay Criteria							--	NA	NA		
	Minor Street Volume $\geq$ Minimum Criteria							--	NA			
	Total Entering Volume $\geq$ Minimum Criteria							--	NA			
<b>4. Pedestrian Volume</b>		--	--	--	NA	NA	NA	NA	NA			
<b>5. School Crossing</b>										NA	NA	
<b>6. Coordinated Signal System</b>												
	One-Way Street							NA	YES			
	Two-Way Street							YES				
<b>7. Crash Experience</b>												
	Less Restrictive Remedies Fail							NO	NO			
	Five or More Correctable Crashes							NO				
	80% of Warrant 1 or 4 are satisfied.							NO				
<b>8. Roadway Network</b>												
	Intersection of Major Routes							NA	NA			
	Total Entering Volume $\geq$ Minimum Criteria							NA				

**WADE ROAD SIGNAL WARRANT**  
**Pima County Department of Transportation**  
**Traffic Engineering Division**

**ANALYSIS OF THE WARRANTS FOR THE INSTALLATION OF A TRAFFIC SIGNAL**

**Intersection:** Valencia @ Wade

**Date:** 4/1/2011

**Date of Count:** 11/22/2010

**Calculations By:** KS

<b>Definition:</b>	
1. Leg: That portion of the roadway which extends outward in a given direction from the center of the intersection (1,2,3,4)	
2. Approach: That portion of a leg which is used by traffic approaching the intersection (a,c,e,g)	
<b>Conditions:</b>	
<b>1. Major Street:</b> a. Number of approach lanes for moving traffic in each direction: <u>1</u> b. Number of approach lanes used in this analysis: <sup>1</sup> <u>1</u> c. Posted Speed Limit: <u>50 mph</u>	
<b>2. Minor Street:</b> a. Number of approach lanes for moving traffic in each direction: <u>1</u> b. Number of approach lanes used in this analysis: <sup>1</sup> <u>1</u> c. Posted Speed Limit: <u>45 mph</u> d. Total Delay on the highest vol. approach (special circumstances): <u>NA</u>	
<b>3. 85th Percentile Speed on the Major Street:</b> <u>&gt;45 mph</u> a. If this speed is less than or equal to 40 mph, use Group I requirements. b. If this speed is greater than 40 mph, use Group II requirements for Warrant 1, Part A.	
<b>4. If the intersection lies within the built-up area of an isolated community having a population of less than 10,000, use Group II requirements.</b>	

Time	A Req. Vol. <sup>5</sup>	B Req. Vol. <sup>6</sup>	7:00 ↓ 8:00	8:00 ↓ 9:00	9:00 ↓ 10:00	10:00 ↓ 11:00	11:00 ↓ 12:00	12:00 ↓ 13:00	16:00 ↓ 17:00	17:00 ↓ 18:00
(Use same hours for both streets) <sup>2</sup>										
<b>Major Street Volume</b> (Adjusted total of both approaches) <sup>4</sup>	420	900	596	755	750	468	892	980	1157	952
<b>Total Minor Street Approach Volume</b> (One direction of the higher volume minor street approach) <sup>3</sup>			343	378	293	137	143	134	150	149
<b>Adjusted Minor Street Approach Volume<sup>4</sup></b>	105	75	274	302	234	110	114	107	120	119
<b>Pedestrian Volume</b> (Highest volume crosswalk crossing the major street)			-----MINIMAL-----							

<sup>1</sup> The number of approach lanes is generally defined as any lane that includes through traffic movements. An exclusive turn lane is not considered as an approach lane unless the turning traffic in the lane is greater than 30% of the total approach volume.

<sup>2</sup> Normally, the highest hourly volumes are chosen from the hours with the largest total number of vehicles approaching the intersection.

<sup>3</sup> The higher volume may be on one approach during some hours and the opposite approach during other hours.

<sup>4</sup> The adjusted volume may include the turning volumes from exclusive turn lanes that are not included as an approach lane<sup>1</sup>. One-half of the right turn volumes shall be excluded from shared right-through lanes and from exclusive right turn lanes that have greater than 30% of the approach volume. For this analysis 80% of right turns was used as this is a T-intersection

<sup>5</sup> Minimum required volumes for Warrant 1, Condition A - Minimum Vehicular Volume.

<sup>6</sup> Minimum required volumes for Warrant 1, Condition B - Interruption of Continuous Traffic.

**WADE ROAD SIGNAL WARRANT (Cont.)**

Intersection: Valencia @ Wade

Warrant Description		# of 1 Hr Interval Volumes $\geq$ Criteria								Is Warrant Satisfied?
		Major Street				Minor Street				
		# Hrs	Vol. Req.	Met		# Hrs	Vol. Req.	Met		
<b>1. Eight-Hour Vehicular Volumes</b>										
	Condition A - Minimum Vehicular Volume	8		YES		8		YES		YES
	Condition B - Interruption of Continuous Traffic	4		NO		8		YES		NO
	Condition C - Combination of Warrants	8	4	YES	NO	8	8	YES	YES	NO
<b>2. Four-Hour Vehicular Volumes</b>										
						1	NO			NO
<b>3. Peak Hour</b>										
						NA				
	Total Delay $\geq$ Minimum Delay Criteria					--	NA		NA	
	Minor Street Volume $\geq$ Minimum Criteria					--	NA			
	Total Entering Volume $\geq$ Minimum Criteria					--	NA			
<b>4. Pedestrian Volume</b>		--		--		--	NA			NA
<b>5. School Crossing</b>										
						NA				NA
<b>6. Coordinated Signal System</b>										
	One-Way Street					NA				YES
	Two-Way Street					YES				
<b>7. Crash Experience</b>										
	Less Restrictive Remedies Fail					NO				NO
	Five or More Correctable Crashes					NO				
	80% of Warrant 1 or 4 are satisfied.					NO				
<b>8. Roadway Network</b>										
	Intersection of Major Routes					NA				NA
	Total Entering Volume $\geq$ Minimum Criteria					NA				