65

07-2047

SOUTHWEST TRAFFIC ENGINEERING, LLC

TECHNICAL MEMORANDUM #1

CANYON TRAILS TOWNE CENTER

COTTON LANE/YUMA ROAD

27 JULY 2007

PREPARED FOR

VESTAR DEVELOPMENT COMPANY
2425 EAST CAMELBACK ROAD, SUITE 750
PHOENIX, ARIZONA 85016

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CANYONS TRAIL TOWNE CENTER
COTTON LANE AND YUMA ROAD
TRAFFIC SIGNAL WARRANT ANALYSIS

Project Description

Vestar Development Company is currently in the process of completing on site and off site civil engineering plans for the Canyon Trails Towne Center project located on the northeast corner of the intersection of Cotton Lane/Yuma Road in Goodyear, Arizona. The project boundaries extend to the north to the intersection of Cotton Lane/Canyon Trails Boulevard. A vicinity map of the project is shown in **Figure 1**.

The project has been under development for several years, with construction expected to begin in August 2007.

A Traffic Impact Analysis (TIA) was completed for the project, as required per Goodyear guidelines, which addressed the impact of the project on the adjacent street system. The original TIA was completed in October 2004, with a revised version was completed in July 2006. This Technical Memorandum will update the traffic signal warrant analysis completed at the intersection of Cotton Lane/Canyon Trails Boulevard.

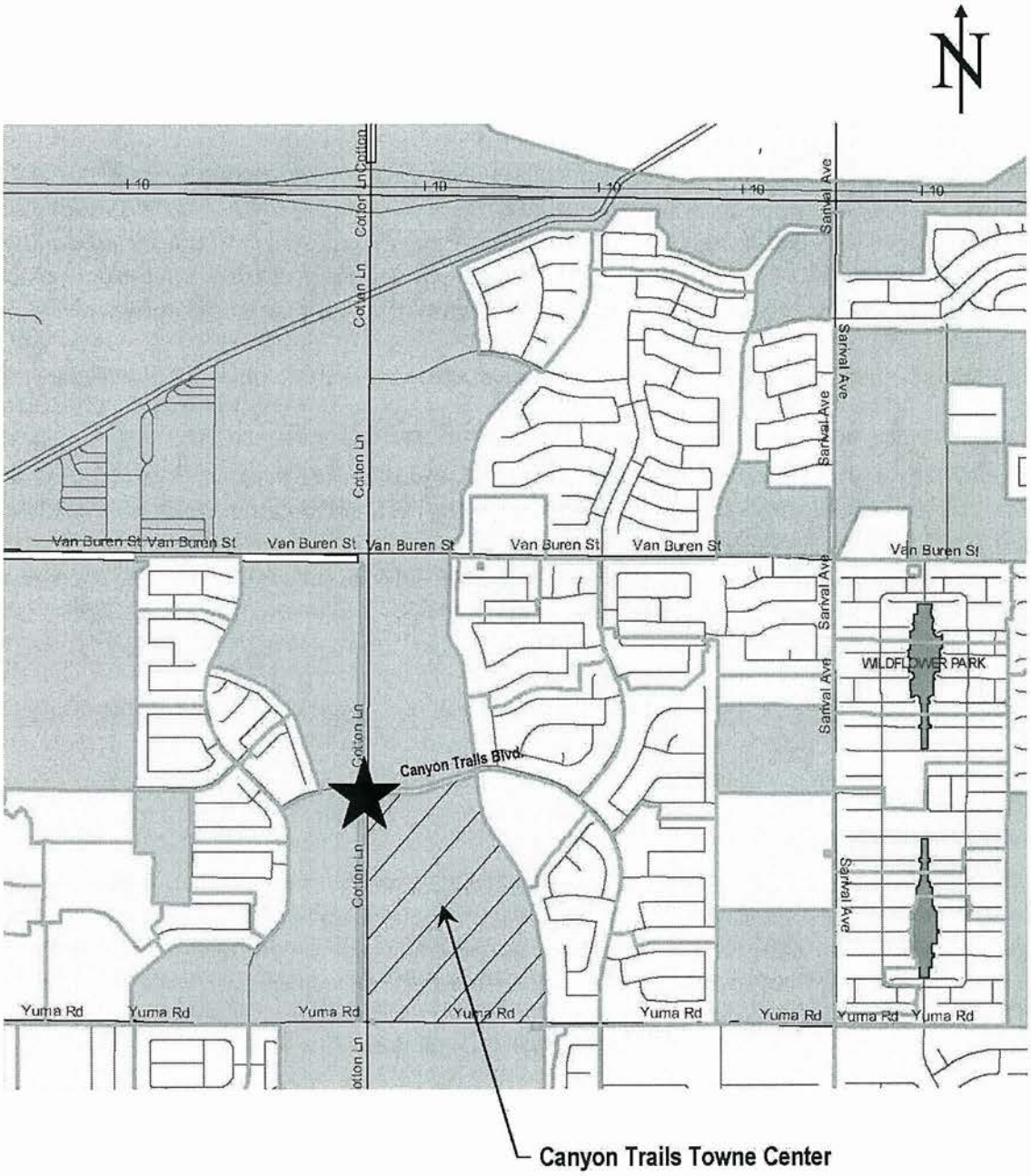
Existing and Future Conditions

The study location includes the existing un-signalized intersection of Cotton Lane/Canyon Trails Boulevard.

Cotton Lane is a four-lane roadway section with a flush dirt median posted at 50 miles per hour (mph) with dirt shoulders. Median breaks with paved left turn lanes are located at key minor street intersections. No curb, gutter, or sidewalk facilities are located along this section of Cotton Lane. Cotton Lane serves as a major north/south arterial within Goodyear and has been identified as the future alignment of the State Route 303 Loop Highway (Loop 303).

Canyon Trails Boulevard is a half-mile collector street located between Van Buren Street and Yuma Road which currently serves two large residential subdivisions located east and west of Cotton Lane. East of Cotton Lane, Canyon Trails Boulevard is a two-lane roadway with no curb, gutter, or sidewalk facilities posted at 25 mph. Approximately ¼ mile east of Cotton Lane, Canyon Trails Boulevard widens to a three-lane roadway with a two-way middle left turn lane, curb, gutter, offset sidewalk, and bike lane facilities. West of Cotton Lane, Canyon Trails Boulevard is a three-lane roadway striped down to a two-lane roadway adjacent ot Cotton Lane. This western extension of Canyon Trails Boulevard is posted at 25 mph and has curb and gutter facilities. As the street approaches Lilac Street, the pavement marking shifts the roadway into a three-lane section with a two-way middle left turn lane and bike lanes.

Figure 1 – Vicinity Map



The un-signalized intersection of Cotton Lane/Canyon Trails Boulevard is controlled by STOP signs on the eastbound and westbound approaches. Traffic on Cotton Lane is free flow. The northbound and southbound approaches provide for an exclusive left turn lane, two through lanes, and an exclusive right turn lane. The eastbound and westbound approaches offer a shared left turn/through/right turn lane. No curb, gutter, or sidewalk facilities are located at the intersection.

As part of the construction of the Canyon Trails Towne Center project, the east leg of the intersection of Cotton Lane/Canyon Trails Boulevard will be widened to match both the three lane section of roadway to the east, but also the west leg of the intersection. The eastbound and westbound approaches would then provide for an exclusive left turn lane and shared through/right turn lane. The pavement marking on the west leg of Canyon Trails Boulevard will have to be re-striped to match the new east leg.

Existing and Future Traffic Data

In order to form a basis for traffic signal warrant analysis, a weekday 24-hour approach traffic count was taken at intersection of Cotton Lane/Canyon Trails Boulevard. The traffic counts were conducted in mid July 2007.

Using Figures 7 (2008 Site Traffic Volumes) and 9 (Pass-By Traffic Volumes) from the *Canyon Trails Towne Center Traffic Impact Analysis* dated July 2006, pass-by trips were removed from the expected trip generation of the project, to determine the amount of site generated traffic that would approach the intersection of Cotton Lane/Canyon Trails Boulevard.

With the 2008 Site Traffic Volumes expressed in terms of peak hours, several assumptions were made regarding the distribution of traffic throughout the day. A K factor of 9% was used as the total proportion of daily traffic occurring during the PM peak hour. It was also assumed that all of the daily project traffic was spread throughout the fourteen hours of the day from 6:00 AM to 8:00 PM.

These factors, along with the updated traffic counts in 2007, were used to determine the approach volumes for each leg of the study intersection. The following formula was used in determining these average daily traffic values:

$$\text{Average Daily Traffic} = \text{Peak Hour Traffic Volume}/K$$

Due to the lack of historic traffic count data in the area, a five percent growth rate was used to estimate traffic growth in the project area to the year 2008. Using the compounded yearly traffic growth rate, 2008 weekday traffic volumes without the project were estimated.

The calculations and traffic volumes are shown at the end of this technical memorandum.

Traffic Signal Warrant Analysis

The *Manual on Uniform Traffic Control Devices (MUTCD),* Federal Highway Administration, 2003, lists 8 warrants that are used to determine if a traffic signal should be considered for installation at an intersection. A traffic signal is warranted if one or more of the warrants are satisfied. Warrants #1 (Eight Hour Volume), #2 (Four Hour Vehicular Volume), and #3 (Peak Hour) were used to evaluate the need to signalize the intersection. Based on existing conditions, availability of information, and applicability, the remaining warrants (#4, #5, #6, #7, and #8) do not apply to the given conditions.

Warrant #1 (Eight Hour Volume) is satisfied when for at least eight (8) hours of an average day, specific traffic volume levels are met for both the major and minor streets (Condition A – Minimum Vehicular Volume). The MUTCD states these volumes depending on the vehicles per hour (vph) combined for both approaches of the major street, and for the highest volume approach on the minor street. The values vary depending on the number of approach lanes.

Warrant #1 also applies to operating conditions where the major street traffic levels are sufficiently high that traffic entering or crossing from a minor street suffers excessive delay (Condition B – Interruption of Continuous Traffic). Once again, the warrant is satisfied when for each of any of the same eight (8) hours of an average day, specific traffic volume levels are met for both the major and minor streets.

Warrant #2 (Four Hour Volume) is met when, for any four hours of the average day on both the major and minor streets, the hourly approach volumes are above the plotted curve contained in the MUTCD (see Appendix).

Warrant #3 (Peak Hour Volume) is met when, for any hour of the day, approach volumes on both the major and minor streets are above the plotted curve contained in the MUTCD (see Appendix).

Warrant #7, Crash Experience, was not calculated since this warrant must meet three specific criteria. These include meeting 80% of Warrants #1 Conditions A and B and Warrant #4; completing adequate trials of alternatives with satisfactory observance and enforcement; and five or more reported crashes, of types susceptible to correction by a traffic signal, have occurred within a 12-month period, with each crash involving personal injury or property damage. The author of this report was not aware of any trials of alternatives that were completed at the study intersections in order to improve specific accident patterns.

Traffic signal warrant analyses were performed for the intersection of Cotton Lane/Canyon Trails Boulevard for the existing conditions (2007 without) with the project, future conditions without the project (2008 without), and future consitions with the project (2008 with).

The results of each analysis are summarized in **Table 1**. Complete traffic signal warrant calculations for each scenario can be found at the end of this technical memorandum.

Table 1 – Traffic Signal Warrant Analysis (Cotton Ln/Canyon Trails Blvd)

Year	Warrant Number								
	1		2	3	4	5	6	7	8
	Condition A	Condition B							
2007 without project	No	No	No	No	*	*	*	*	*
Hours Met	0	0	0	0	*	*	*	*	*
2008 without project	No	No	No	No	*	*	*	*	*
Hours Met	0	0	0	0	*	*	*	*	*
2008 with project	Yes	Yes	Yes	Yes	*	*	*	*	*
Hours Met	14	14	14	4	*	*	*	*	*

* Warrant Not Evaluated

As shown in **Table 1**, the Cotton Lane/Canyon Trails Boulevard intersection satisfies traffic signal warrants 1, 2 and 3 with traffic from the project in 2008. As an intersection located on the half-mile, a new traffic signal at the intersection of Cotton Lane/Canyon Trails Boulevard will have limited impact on the progression along Cotton Lane. However, once the Loop 303 is constructed, this traffic signal will most likely be removed.

Volumes for: Thursday, July 12, 2007 City: Goodyear Project #: 07-5235-001

Location: Cotton Ln. & Canyon Trails Blvd.

AM Period	NB		SB		EB		WB			PM Period	NB		SB		EB		WB		
00:00	0		19		1		2			12:00	44		43		6		11		
00:15	4		13		0		1			12:15	37		65		5		5		
00:30	5		8		0		1			12:30	41		53		5		6		
00:45	8	17	2	42	0	1	2	6	66	12:45	48	170	59	220	7	23	4	26	439
01:00	2		9		0		1			13:00	55		63		8		6		
01:15	3		5		0		1			13:15	56		66		4		5		
01:30	2		7		0		1			13:30	63		60		5		4		
01:45	2	9	7	28	0	0	0	3	40	13:45	39	213	54	243	6	23	7	22	501
02:00	9		2		0		0			14:00	54		58		3		5		
02:15	6		3		0		1			14:15	44		57		5		8		
02:30	8		7		0		0			14:30	40		65		8		5		
02:45	6	29	5	17	0	0	0	1	47	14:45	45	183	42	222	5	21	6	24	450
03:00	7		5		0		0			15:00	50		69		7		3		
03:15	6		3		1		3			15:15	52		55		4		6		
03:30	5		6		0		2			15:30	58		50		5		8		
03:45	14	32	1	15	0	1	2	7	55	15:45	56	216	49	223	3	19	5	22	480
04:00	13		15		0		0			16:00	60		63		2		8		
04:15	9		18		2		7			16:15	43		58		3		7		
04:30	30		30		2		5			16:30	39		57		2		4		
04:45	40	92	29	92	0	4	11	23	211	16:45	51	193	72	250	5	12	7	26	481
05:00	35		41		1		5			17:00	47		78		5		6		
05:15	53		30		3		8			17:15	36		56		3		6		
05:30	60		29		1		6			17:30	44		58		4		5		
05:45	53	201	34	134	1	6	11	30	371	17:45	47	174	81	273	2	14	9	26	487
06:00	48		47		1		11			18:00	38		83		7		8		
06:15	78		37		1		16			18:15	41		69		2		5		
06:30	65		37		5		11			18:30	25		66		2		9		
06:45	55	246	51	172	1	8	15	53	479	18:45	38	142	60	278	1	12	6	28	460
07:00	58		40		10		11			19:00	27		56		2		8		
07:15	72		52		2		14			19:15	33		67		1		2		
07:30	63		47		5		9			19:30	20		62		3		9		
07:45	80	273	59	198	4	21	8	42	534	19:45	28	108	47	232	0	6	4	23	369
08:00	62		36		6		7			20:00	24		50		1		7		
08:15	44		34		3		13			20:15	32		52		3		3		
08:30	64		38		7		7			20:30	32		45		1		6		
08:45	61	231	46	154	6	22	8	35	442	20:45	18	106	55	202	2	7	10	26	341
09:00	69		24		3		12			21:00	21		42		1		5		
09:15	47		36		6		6			21:15	15		42		1		4		
09:30	50		52		7		9			21:30	13		55		2		4		
09:45	50	216	47	159	4	20	8	35	430	21:45	10	59	28	167	1	5	5	18	249
10:00	40		42		5		11			22:00	9		38		0		2		
10:15	53		38		8		6			22:15	21		33		1		3		
10:30	50		43		7		10			22:30	10		28		0		2		
10:45	37	180	36	159	12	32	4	31	402	22:45	13	53	23	122	0	1	2	9	185
11:00	52		50		2		12			23:00	11		27		0		4		
11:15	45		32		6		3			23:15	14		25		1		2		
11:30	45		44		7		8			23:30	0		19		1		3		
11:45	36	178	50	176	4	19	4	27	400	23:45	2	27	18	89	0	2	2	11	129
Total Vol.		1704		1346		134		293	**3477**			1644		2521		145		261	**4571**

Daily Totals

NB	SB	EB	WB	Combined
3348	3867	279	554	**8048**

	AM					PM				
Split %	49.0%	38.7%	3.9%	8.4%	**43.2%**	36.0%	55.2%	3.2%	5.7%	**56.8%**
Peak Hour	07:15	11:45	10:00	06:00	**07:00**	15:15	17:45	12:15	17:45	**12:45**
Volume	277	211	32	53	**534**	226	299	25	31	**513**
P.H.F.	0.87	0.81	0.67	0.83	**0.88**	0.96	0.90	0.78	0.86	**0.97**

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Calculations

Project Name:	Canyon Trails Towne Center	Project No.	Sw07001	Sheet Name:	Cotton Lane/Canyon Trails Boulevard	Sheet:	1	of	1
Designed By:	Bgood	Date:	16 July 2007	Checked By:		Date:			

See attached scans from the Canyon Trails Towne Center TIA dated July 2006, showing trip distribution and pass-by distribution for 2008.

1. Figure 7 shows Trip Distribution:
   a. 117 westbound pm peak hour trips
   b. 340 northbound pm peak hour trips
   c. 452 (359+93) southbound pm peak hour trips

2. Figure 9 shows Pass-By Trips:
   a. 14 westbound pass-by trips
   b. 32 northbound pass-by trips
   c. 80 southbound pass-by trips

3. Reducing the Trip Distribution by the Pass-By Trips results in:
   a. 103 = (117-14) westbound pm peak hour trips
   b. 308 = (340-32) northbound pm peak hour trips
   c. 372 = (452-80) southbound pm peak hour trips

4. Using the standard conversion factor of 9% to convert from Daily to PM Peak hour, the values in (3) above are converted backwards from PM Peak hour to Daily.
   a. 103/0.09 = 1,144 daily trips westbound
   b. 308/0.09 = 3,422 daily trips northbound
   c. 372/0.09 = 4,133 daily trips southbound

5. Assuming that trips will be evenly distributed throughout 14 business hours of the day from 6am to 8pm, the values in (4) are converted into new hourly volumes for use in the warrant spreadsheet.
   a. 1,144/14 = 82 trips per hour westbound
   b. 3,422/14 = 245 trips per hour northbound
   c. 4,133/14 = 296 trips per hour southbound

6. These values are then added to the projected background volumes and placed in the traffic signal warrant spreadsheet.

July 2007 Traffic Volume Approach Counts without Project

	EB	WB	NB	SB
12 - 1 AM	1	6	17	42
1 - 2 AM	0	3	9	28
2 - 3 AM	0	1	29	17
3 - 4 AM	1	7	32	15
4 - 5 AM	4	23	92	92
5 - 6 AM	6	30	201	134
6 - 7 AM	8	53	246	172
7 - 8 AM	21	42	273	198
8 - 9 AM	22	35	231	154
9 - 10 AM	20	35	216	159
10 - 11 AM	32	31	180	159
11 AM - 12 PM	19	27	178	176
12 - 1 PM	23	26	170	220
1 - 2 PM	23	22	213	243
2 - 3 PM	21	24	183	222
3 - 4 PM	19	22	216	223
4 - 5 PM	12	26	193	250
5 - 6 PM	14	26	174	273
6 - 7 PM	12	28	142	278
7 - 8 PM	6	23	108	232
8 - 9 PM	7	26	106	202
9 - 10 PM	5	18	59	167
10 - 11 PM	1	9	53	122
11 - 12 PM	2	11	27	89
total	279	554	3348	3867

Cotton Lane/Canyon Trails Boulevard

2008 Traffic Volume Approach Counts without Project and 5% Growth Rate

	EB	WB	NB	SB
12 - 1 AM	1	6	18	44
1 - 2 AM	0	3	9	29
2 - 3 AM	0	1	30	18
3 - 4 AM	1	7	34	16
4 - 5 AM	4	24	97	97
5 - 6 AM	6	32	211	141
6 - 7 AM	8	56	258	181
7 - 8 AM	22	44	287	208
8 - 9 AM	23	37	243	162
9 - 10 AM	21	37	227	167
10 - 11 AM	34	33	189	167
11 AM - 12 PM	20	28	187	185
12 - 1 PM	24	27	179	231
1 - 2 PM	24	23	224	255
2 - 3 PM	22	25	192	233
3 - 4 PM	20	23	227	234
4 - 5 PM	13	27	203	263
5 - 6 PM	15	27	183	287
6 - 7 PM	13	29	149	292
7 - 8 PM	6	24	113	244
8 - 9 PM	7	27	111	212
9 - 10 PM	5	19	62	175
10 - 11 PM	1	9	56	128
11 - 12 PM	2	12	28	93
total	293	582	3515	4060

Cotton Lane/Canyon Trails Boulevard

2008 Traffic Volume Approach Counts with Project

	EB	WB	NB	SB
12 - 1 AM	1	6	18	44
1 - 2 AM	0	3	9	29
2 - 3 AM	0	1	30	18
3 - 4 AM	1	7	34	16
4 - 5 AM	4	24	97	97
5 - 6 AM	6	32	211	141
6 - 7 AM	8	138	503	477
7 - 8 AM	22	126	532	504
8 - 9 AM	23	119	488	458
9 - 10 AM	21	119	472	463
10 - 11 AM	34	115	434	463
11 AM - 12 PM	20	110	432	481
12 - 1 PM	24	109	424	527
1 - 2 PM	24	105	469	551
2 - 3 PM	22	107	437	529
3 - 4 PM	20	105	472	530
4 - 5 PM	13	109	448	559
5 - 6 PM	15	109	428	583
6 - 7 PM	13	111	394	588
7 - 8 PM	6	106	358	540
8 - 9 PM	7	27	111	212
9 - 10 PM	5	19	62	175
10 - 11 PM	1	9	56	128
11 - 12 PM	2	12	28	93
total	293	1730	6945	8204

Cotton Lane/Canyon Trails Boulevard

Canyon Trails Blvd - WB, NB, and SB site traffic

	EB	WB	NB	SB
12 - 1 AM	0	0	0	0
1 - 2 AM	0	0	0	0
2 - 3 AM	0	0	0	0
3 - 4 AM	0	0	0	0
4 - 5 AM	0	0	0	0
5 - 6 AM	0	0	0	0
6 - 7 AM	0	82	245	296
7 - 8 AM	0	82	245	296
8 - 9 AM	0	82	245	296
9 - 10 AM	0	82	245	296
10 - 11 AM	0	82	245	296
11 AM - 12 PM	0	82	245	296
12 - 1 PM	0	82	245	296
1 - 2 PM	0	82	245	296
2 - 3 PM	0	82	245	296
3 - 4 PM	0	82	245	296
4 - 5 PM	0	82	245	296
5 - 6 PM	0	82	245	296
6 - 7 PM	0	82	245	296
7 - 8 PM	0	82	245	296
8 - 9 PM	0	0	0	0
9 - 10 PM	0	0	0	0
10 - 11 PM	0	0	0	0
11 - 12 PM	0	0	0	0
	0	1148	3430	4144

General Description of Intersection

Project Number: sw07001

Name of Major Roadway: Cotton Lane
- *Direction:* N/S
- *# of NB Lanes:* 2
- *# of SB Lanes:* 2
- *85th percentile speed:* 45 *mph*
- *Control #:*
- *Section #:*
- *Route #:*

Name of Minor Roadway: Canyon Trails Boulevard
- *Direction:* E/W
- *# of EB Lanes:* 1
- *# of WB Lanes:* 1
- *85th percentile speed:* 25 *mph*
- *Control #:*
- *Section #:*
- *Route #:*

City: Goodyear
Population: 10,000

County: Maricopa
District:

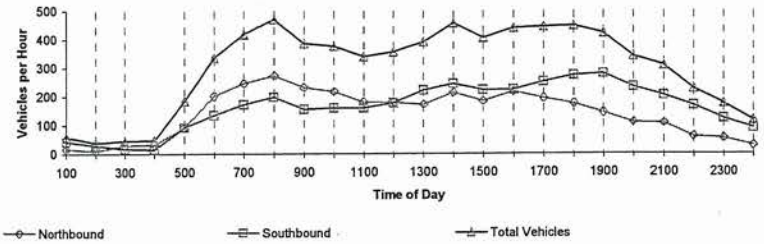
Data Source: 24 Hour Counts
Date of Survey: 07/12/07 *(press Ctrl + ;)*
Day of Week: Thursday
Weather: Sunny
Surface Conditions: Dry, Smooth

Enter Traffic Volumes:

Automated Traffic Counts

Street: **Cotton Lane**
Location: **Canyon Trails Boulevard**

City/State: **Goodyear, AZ**
Project #: **sw07001**
Date: **07/12/07**
Day of Week: **Thursday**
Data Source: **24 Hour Counts**



24-Hour Volume: **7,215**

Time	Northbound		Southbound	
	Vehicles	Peds	Vehicles	Peds
12:00 AM				
12:15 AM				
12:30 AM				
12:45 AM				
1:00 AM	17		42	
1:15 AM				
1:30 AM				
1:45 AM				
2:00 AM	9		28	
2:15 AM				
2:30 AM				
2:45 AM				
3:00 AM	29		17	
3:15 AM				
3:30 AM				
3:45 AM				
4:00 AM	32		15	
4:15 AM				
4:30 AM				
4:45 AM				
5:00 AM	92		92	
5:15 AM				
5:30 AM				
5:45 AM				
6:00 AM	201		134	
6:15 AM				
6:30 AM				
6:45 AM				
7:00 AM	246		172	
7:15 AM				
7:30 AM				
7:45 AM				
8:00 AM	273		198	
8:15 AM				
8:30 AM				
8:45 AM				
9:00 AM	231		154	
9:15 AM				
9:30 AM				
9:45 AM				
10:00 AM	216		159	
10:15 AM				
10:30 AM				
10:45 AM				
11:00 AM	180		159	
11:15 AM				
11:30 AM				
11:45 AM				
12:00 PM	178		176	

Time	Northbound		Southbound	
	Vehicles	Peds	Vehicles	Peds
12:00 PM				
12:15 PM				
12:30 PM				
12:45 PM				
1:00 PM	170		220	
1:15 PM				
1:30 PM				
1:45 PM				
2:00 PM	213		243	
2:15 PM				
2:30 PM				
2:45 PM				
3:00 PM	183		222	
3:15 PM				
3:30 PM				
3:45 PM				
4:00 PM	216		223	
4:15 PM				
4:30 PM				
4:45 PM				
5:00 PM	193		250	
5:15 PM				
5:30 PM				
5:45 PM				
6:00 PM	174		273	
6:15 PM				
6:30 PM				
6:45 PM				
7:00 PM	142		278	
7:15 PM				
7:30 PM				
7:45 PM				
8:00 PM	108		232	
8:15 PM				
8:30 PM				
8:45 PM				
9:00 PM	106		202	
9:15 PM				
9:30 PM				
9:45 PM				
10:00 PM	59		167	
10:15 PM				
10:30 PM				
10:45 PM				
11:00 PM	53		122	
11:15 PM				
11:30 PM				
11:45 PM				
12:00 AM	27		89	
	3,348		3,867	
			24-Hour Volume	7,215

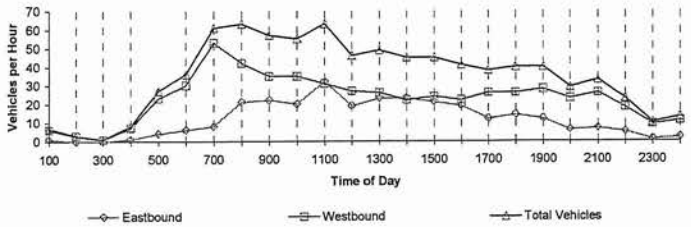
Equipment ID#:

Automated Traffic Counts

Street: **Canyon Trails Boulevard**
Location: **Cotton Lane**

City/State: **Goodyear, AZ**
Project #:
Date: **07/12/07**
Day of Week: **Thursday**
Data Source: **24 Hour Counts**

24-Hour Volume: **833**



Time	Eastbound		Westbound	
	Vehicles	Peds	Vehicles	Peds
12:00 AM				
12:15 AM				
12:30 AM				
12:45 AM				
1:00 AM	1		6	
1:15 AM				
1:30 AM				
1:45 AM				
2:00 AM	0		3	
2:15 AM				
2:30 AM				
2:45 AM				
3:00 AM	0		1	
3:15 AM				
3:30 AM				
3:45 AM				
4:00 AM	1		7	
4:15 AM				
4:30 AM				
4:45 AM				
5:00 AM	4		23	
5:15 AM				
5:30 AM				
5:45 AM				
6:00 AM	6		30	
6:15 AM				
6:30 AM				
6:45 AM				
7:00 AM	8		53	
7:15 AM				
7:30 AM				
7:45 AM				
8:00 AM	21		42	
8:15 AM				
8:30 AM				
8:45 AM				
9:00 AM	22		35	
9:15 AM				
9:30 AM				
9:45 AM				
10:00 AM	20		35	
10:15 AM				
10:30 AM				
10:45 AM				
11:00 AM	32		31	
11:15 AM				
11:30 AM				
11:45 AM				
12:00 PM	19		27	

Time	Eastbound		Westbound	
	Vehicles	Peds	Vehicles	Peds
12:00 PM				
12:15 PM				
12:30 PM				
12:45 PM				
1:00 PM	23		26	
1:15 PM				
1:30 PM				
1:45 PM				
2:00 PM	23		22	
2:15 PM				
2:30 PM				
2:45 PM				
3:00 PM	21		24	
3:15 PM				
3:30 PM				
3:45 PM				
4:00 PM	19		22	
4:15 PM				
4:30 PM				
12:00 AM				
5:00 PM	12		26	
5:15 PM				
5:30 PM				
5:45 PM				
6:00 PM	14		26	
6:15 PM				
6:30 PM				
6:45 PM				
7:00 PM	12		28	
7:15 PM				
7:30 PM				
7:45 PM				
8:00 PM	6		23	
8:15 PM				
8:30 PM				
8:45 PM				
9:00 PM	7		26	
9:15 PM				
9:30 PM				
9:45 PM				
10:00 PM	5		18	
10:15 PM				
10:30 PM				
10:45 PM				
11:00 PM	1		9	
11:15 PM				
11:30 PM				
11:45 PM				
12:00 AM	2		11	
	279		554	
	24-Hour Volume		833	

Equipment ID#:

City: _____ _____ 07/12/07

Control Section

_____ _____ _____ - _____

_____ _____ _____ - _____

Condition A

	Urban	Urban	Rural*
1	500	150	105
1	600	150	**105**
2 or more	600	200	140
2 or more	500	200	140

*Criteria when the 85th percentile speed is greater than 40 mph or when the population is less than 10,000

Warrant 1

Begin		Major	Minor	Major	Minor	Both Meet
12:00 AM	1:00 AM	59	6		N	N
1:00 AM	2:00 AM	37	3		N	N
2:00 AM	3:00 AM	46	1		N	N
3:00 AM	4:00 AM	47	7		N	N
4:00 AM	5:00 AM	184	23		N	N
5:00 AM	6:00 AM	335	30		N	N
6:00 AM	7:00 AM	418	53		N	N
7:00 AM	8:00 AM	471	42		N	N
8:00 AM	9:00 AM	385	35		N	N
9:00 AM	10:00 AM	375	35		N	N
10:00 AM	11:00 AM	339	32		N	N
11:00 AM	12:00 PM	354	27		N	N
12:00 PM	1:00 PM	390	26		N	N
1:00 PM	2:00 PM	456	23		N	N
2:00 PM	3:00 PM	405	24		N	N
3:00 PM	4:00 PM	439	22		N	N
4:00 PM	5:00 PM	443	26		N	N
5:00 PM	6:00 PM	447	26		N	N
6:00 PM	7:00 PM	420	28		N	N
7:00 PM	8:00 PM	340	23		N	N
8:00 PM	9:00 PM	308	26		N	N
9:00 PM	10:00 PM	226	18		N	N
10:00 PM	11:00 PM	175	9		N	N
11:00 PM	12:00 AM	116	11		N	N

Total number of hours, both the major(both approaches) and minor(high volume approach) met: 0

Hours Required: 8

Condition A is not satisfied

Warrant 1: Eight- Hour Volumes
Condition B

Number of Lanes			Major Street Both Approaches Required		Minor Street High Volume Approach Required	
Major	Street	Minor Street	Urban	Rural*	Urban	Rural*
1		1	750	525	75	53
2 or more		1	900	**630**	75	**53**
2 or more		2 or more	900	630	100	70
1		2 or more	750	525	100	70

*Criteria when the 85th percentile speed is greater than 40 mph or when the population is less than 10,000

Warrant 2

Time		Volume		Criteria		
				Major	Minor	
Begin	End	Major	Minor	>= 630	> = 53	Both Meet
12:00 AM	1:00 AM	59	6	N	N	N
1:00 AM	2:00 AM	37	3	N	N	N
2:00 AM	3:00 AM	46	1	N	N	N
3:00 AM	4:00 AM	47	7	N	N	N
4:00 AM	5:00 AM	184	23	N	N	N
5:00 AM	6:00 AM	335	30	N	N	N
6:00 AM	7:00 AM	418	53	N	Y	N
7:00 AM	8:00 AM	471	42	N	N	N
8:00 AM	9:00 AM	385	35	N	N	N
9:00 AM	10:00 AM	375	35	N	N	N
10:00 AM	11:00 AM	339	32	N	N	N
11:00 AM	12:00 PM	354	27	N	N	N
12:00 PM	1:00 PM	390	26	N	N	N
1:00 PM	2:00 PM	456	23	N	N	N
2:00 PM	3:00 PM	405	24	N	N	N
3:00 PM	4:00 PM	439	22	N	N	N
4:00 PM	5:00 PM	443	26	N	N	N
5:00 PM	6:00 PM	447	26	N	N	N
6:00 PM	7:00 PM	420	28	N	N	N
7:00 PM	8:00 PM	340	23	N	N	N
8:00 PM	9:00 PM	308	26	N	N	N
9:00 PM	10:00 PM	226	18	N	N	N
10:00 PM	11:00 PM	175	9	N	N	N
11:00 PM	12:00 AM	116	11	N	N	N

Total number of hours, both the major(both approaches) and minor(high volume approach) met: 0

Hours Required: 8

Condition B is not satisfied
Warrant 1 not satisfied.

Warrant 2: Four Hour Vehicular Volumes

This warrant is similar to Warrant 1A, except that the required traffic volumes must be present for at least four hours of an average day. The traffic volumes required are based on curves (Figure 4C-1) shown in the MUTCD.

*** These traffic volumes are not known.**

Warrant 2 is not satisfied

Warrant 3, Condition A- Peak Hour Delay

This warrant is intended for application where traffic conditions will cause undue delay to traffic entering or crossing the major street. The peak hour delay warrant is satisfied when the following conditions exist for one hour (any four consecutive 15-minute periods) of an average weekday:

(1) The total delay by the traffic on a side street controlled by a stop sign equals or exceeds four vehicle-hours for a one-lane approach and five vehicle-hours for a two-lane approach, **and**

(2) the volume on the side street (one direction) equals or exceeds 100 vph for one moving lane of traffic and 150 vph for two moving lanes, **and**

(3) the total traffic volume serviced during 1 hour equals or exceeds 800 vph for an intersection with four (or more) approaches or 650 vph for three approaches.

***Part 1 - N/A**
***Part 2 - N/A**
***Part 3 - N/A**

Warrant 3, Condition B - Peak Hour Volume
This warrant applies to traffic entering from the minor street which encounters undue delay crossing the main street. This is satisfied when the main street and side street traffic volumes satisfy the curves shown in Figure 4C-4 of the TMUTCD.

Warrant 3 Condition B is not satisfied.

Warrant 4: Pedestrian Volume

Required*	Existing
100 or more for each of any four hours	**0%**
OR	
190 or more during any one hour	**0%**

* For predominant pedestrian crossing speeds less than 3.5 ft/sec, the pedestrian volume may be reduced as much as 50 percent.

Gap Requirements

YES	NO	Is the nearest signal located more than 300 feet away?
YES	NO	For traffic flow which is not platooned, are there less than 60 gaps per hour of adequate length for the pedestrians to cross the street?

Warrant 4 is N/A.

Warrant 5: School Crossing

YES NO Is the number of adequate gaps in traffic stream during the period when the children are using the crossing less than the number of minutes in the same period?

Warrant 5 is N/A.

Warrant 6: Coordinate Systems

YES NO Are the adjacent signals in a signal system?
YES NO Would the resultant spacing be 1000 feet or more?

Warrant 6 is N/A.

Warrant 7: Crash Experience

YES NO Is 80% or more of one of Warrants #1, #2, or #3 met?
YES NO Have there been more than five accidents susceptible to correction by a traffic signal in 12 months?

Warrant 7 is N/A.

Warrant 8: Roadway Network

YES NO Does the major street having an existing or immediately projected entering volume of > 1000 vehicles per hour of a typical weekday?

YES NO Do 5-year projected traffic volumes meet Warrants 1, 2, or 3?

YES NO Is there an entering traffic volume of at least 1000 vehicles per hour for each of any 5 hours on a Saturday or Sunday?

Warrant 8 is N/A.

Summary:

Warrants satisfied: none

Warrants not satisfied: 1, 2, 3

Warrants not applicable: 4, 5, 6, 7, 8

Warrants not included in study: none

Warrant 2 - Four Hour Vehicular Volumes

85th % speed: > 40 mph
Population: >= 10,000

Major Street Lanes: 2
Minor Street Lanes: 1

Use Figure: 4C-2 2&1

Rank	Major Street Volume	Minor Street Volume	Figure 4C-1			Figure 4C-2		
			1&1	2&1	2&2	1&1	2&1	2&2
1	116	11	-	-	-	-	N	-
2	59	6	-	-	-	-	N	-
3	37	3	-	-	-	-	N	-
4	46	1	-	-	-	-	N	-
5	47	7	-	-	-	-	N	-
6	184	23	-	-	-	-	N	-
7	335	30	-	-	-	-	N	-
8	418	53	-	-	-	-	N	-
9	471	42	-	-	-	-	N	-
10	385	35	-	-	-	-	N	-
11	375	35	-	-	-	-	N	-
12	339	32	-	-	-	-	N	-
13	354	27	-	-	-	-	N	-
14	390	26	-	-	-	-	N	-
15	456	23	-	-	-	-	N	-
16	405	24	-	-	-	-	N	-
17	439	22	-	-	-	-	N	-
18	443	26	-	-	-	-	N	-
19	447	26	-	-	-	-	N	-
20	420	28	-	-	-	-	N	-
21	340	23	-	-	-	-	N	-
22	308	26	-	-	-	-	N	-
23	226	18	-	-	-	-	N	-
24	175	9	-	-	-	-	N	-
			0	0	0	0	0	0
Warrant 2 is not satisfied.			N	N	N	N	N	N

Warrant 3 - Peak Hour
Condition B

85th % speed: > 40 mph
Population: >= 10,000

Major Street Lanes: 2
Minor Street Lanes: 1

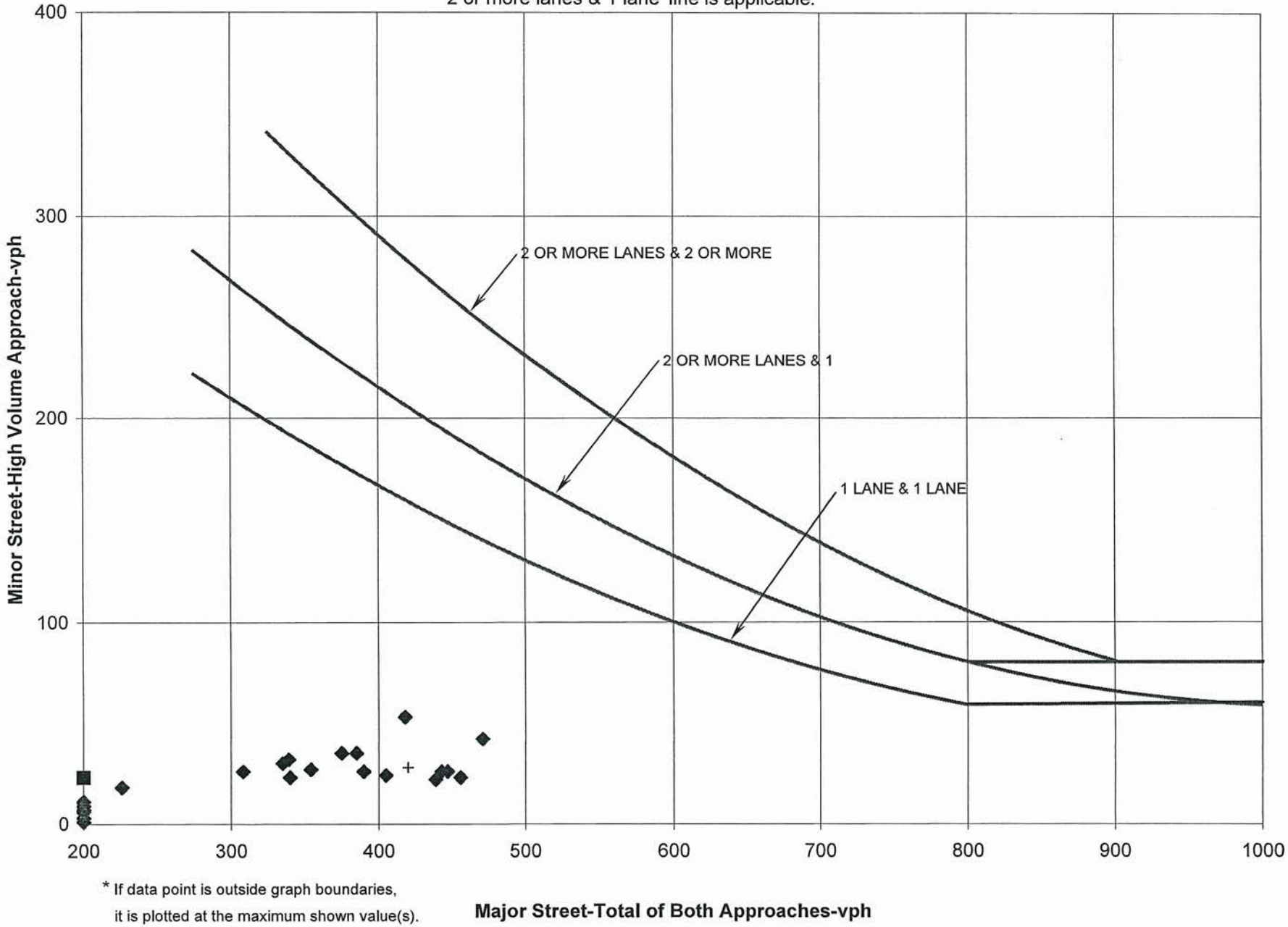
Use Figure: 4C-4 2&1

Peak Hour		Major Street	Minor Street	Figure 4C-3			Figure 4C-4		
Start Time	End Time	Volume	Volume	1&1	2&1	2&2	1&1	2&1	2&2
11:00 PM	12:00 AM	116	11	-	-	-	-	N	-
12:00 AM	1:00 AM	59	6	-	-	-	-	N	-
1:00 AM	2:00 AM	37	3	-	-	-	-	N	-
2:00 AM	3:00 AM	46	1	-	-	-	-	N	-
3:00 AM	4:00 AM	47	7	-	-	-	-	N	-
4:00 AM	5:00 AM	184	23	-	-	-	-	N	-
5:00 AM	6:00 AM	335	30	-	-	-	-	N	-
6:00 AM	7:00 AM	418	53	-	-	-	-	N	-
7:00 AM	8:00 AM	471	42	-	-	-	-	N	-
8:00 AM	9:00 AM	385	35	-	-	-	-	N	-
9:00 AM	10:00 AM	375	35	-	-	-	-	N	-
10:00 AM	11:00 AM	339	32	-	-	-	-	N	-
11:00 AM	12:00 PM	354	27	-	-	-	-	N	-
12:00 PM	1:00 PM	390	26	-	-	-	-	N	-
1:00 PM	2:00 PM	456	23	-	-	-	-	N	-
2:00 PM	3:00 PM	405	24	-	-	-	-	N	-
3:00 PM	4:00 PM	439	22	-	-	-	-	N	-
4:00 PM	5:00 PM	443	26	-	-	-	-	N	-
5:00 PM	6:00 PM	447	26	-	-	-	-	N	-
6:00 PM	7:00 PM	420	28	-	-	-	-	N	-
7:00 PM	8:00 PM	340	23	-	-	-	-	N	-
8:00 PM	9:00 PM	308	26	-	-	-	-	N	-
9:00 PM	10:00 PM	226	18	-	-	-	-	N	-
10:00 PM	11:00 PM	175	9	-	-	-	-	N	-
				0	0	0	0	0	0
Warrant 3 Condition B is not satisfied.				N	N	N	N	N	N

Warrant 2

Figure 4C-2 Four Hour Volume Warrant (population<10,000 or >40 mph on major street)

'2 or more lanes & 1 lane' line is applicable.

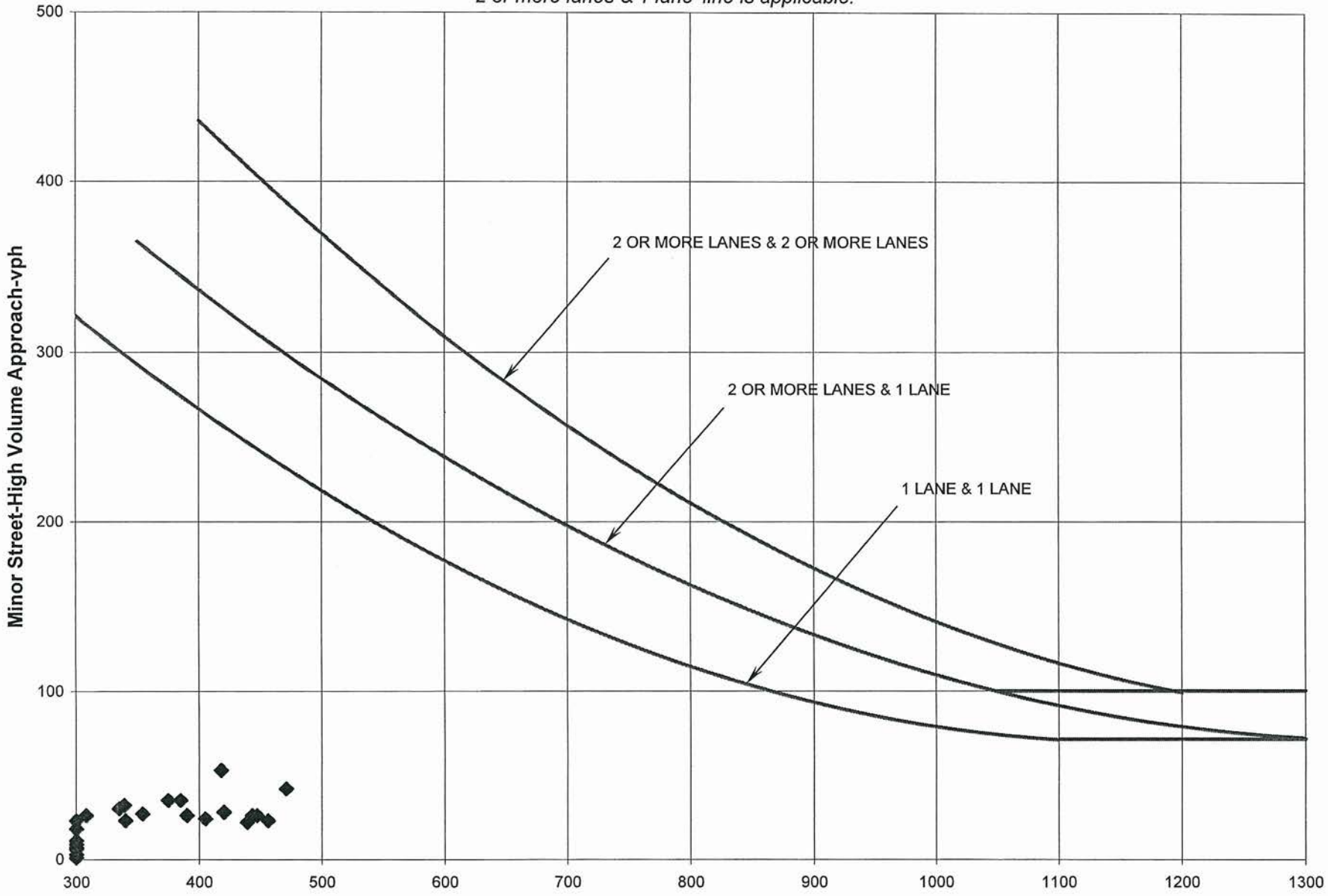


* If data point is outside graph boundaries, it is plotted at the maximum shown value(s).

Warrant 3

Figure 4C-4 Peak Hour Warrant (population<10,000 or >40 mph on major street)

'2 or more lanes & 1 lane' line is applicable.



* If data point is outside graph boundaries, it is plotted at the maximum shown value(s).

General Description of Intersection

Project Number: sw07001

Name of Major Roadway: Cotton Lane

Direction: N/S

# of NB Lanes: 2

# of SB Lanes: 2

85th percentile speed: 45 *mph*

Control #:

Section #:

Route #:

Name of Minor Roadway: Canyon Trails Boulevard

Direction: E/W

# of EB Lanes: 1

# of WB Lanes: 1

85th percentile speed: 25 *mph*

Control #:

Section #:

Route #:

City: Goodyear

Population: 10,000

County: Maricopa

District:

Data Source: 24 Hour Counts

Date of Survey: 07/12/07 *(press Ctrl + ;)*

Day of Week: Thursday

Weather: Sunny

Surface Conditions: Dry

Smooth

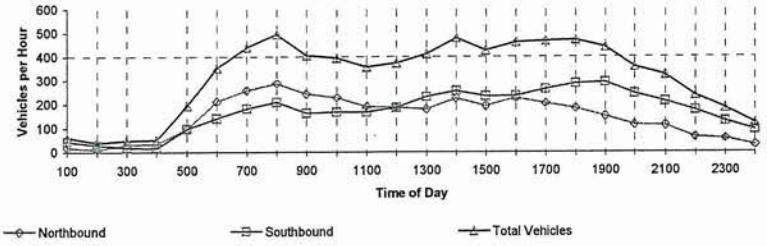
Enter Traffic Volumes:

Automated Traffic Counts

Street: **Cotton Lane**
Location: **Canyon Trails Boulevard**

City/State: **Goodyear, AZ**
Project #: **sw07001**
Date: **07/12/07**
Day of Week: **Thursday**
Data Source: **24 Hour Counts**

24-Hour Volume: **7,579**



Time	Northbound		Southbound	
	Vehicles	Peds	Vehicles	Peds
12:00 AM				
12:15 AM				
12:30 AM				
12:45 AM				
1:00 AM	18		44	
1:15 AM				
1:30 AM				
1:45 AM				
2:00 AM	9		29	
2:15 AM				
2:30 AM				
2:45 AM				
3:00 AM	30		18	
3:15 AM				
3:30 AM				
3:45 AM				
4:00 AM	34		16	
4:15 AM				
4:30 AM				
4:45 AM				
5:00 AM	97		97	
5:15 AM				
5:30 AM				
5:45 AM				
6:00 AM	211		141	
6:15 AM				
6:30 AM				
6:45 AM				
7:00 AM	258		181	
7:15 AM				
7:30 AM				
7:45 AM				
8:00 AM	287		208	
8:15 AM				
8:30 AM				
8:45 AM				
9:00 AM	243		162	
9:15 AM				
9:30 AM				
9:45 AM				
10:00 AM	227		167	
10:15 AM				
10:30 AM				
10:45 AM				
11:00 AM	189		167	
11:15 AM				
11:30 AM				
11:45 AM				
12:00 PM	187		185	

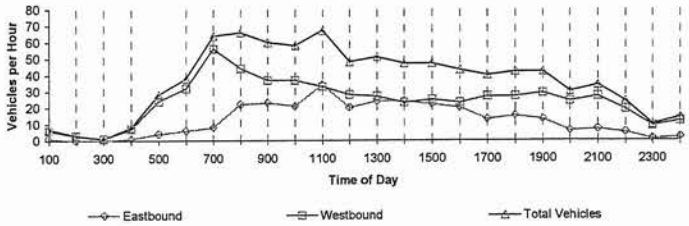
Time	Northbound		Southbound	
	Vehicles	Peds	Vehicles	Peds
12:00 PM				
12:15 PM				
12:30 PM				
12:45 PM				
1:00 PM	179		231	
1:15 PM				
1:30 PM				
1:45 PM				
2:00 PM	224		255	
2:15 PM				
2:30 PM				
2:45 PM				
3:00 PM	192		233	
3:15 PM				
3:30 PM				
3:45 PM				
4:00 PM	227		234	
4:15 PM				
4:30 PM				
4:45 PM				
5:00 PM	203		263	
5:15 PM				
5:30 PM				
5:45 PM				
6:00 PM	183		287	
6:15 PM				
6:30 PM				
6:45 PM				
7:00 PM	149		292	
7:15 PM				
7:30 PM				
7:45 PM				
8:00 PM	113		244	
8:15 PM				
8:30 PM				
8:45 PM				
9:00 PM	111		212	
9:15 PM				
9:30 PM				
9:45 PM				
10:00 PM	62		175	
10:15 PM				
10:30 PM				
10:45 PM				
11:00 PM	56		128	
11:15 PM				
11:30 PM				
11:45 PM				
12:00 AM	28		93	
	3,517		4,062	
			24-Hour Volume	7,579

Equipment ID#:

Automated Traffic Counts

Street: **Canyon Trails Boulevard**
Location: **Cotton Lane**

City/State: **Goodyear, AZ**
Project #:
Date: **07/12/07**
Day of Week: **Thursday**
Data Source: **24 Hour Counts**



24-Hour Volume: **872**

Time	Eastbound		Westbound	
	Vehicles	Peds	Vehicles	Peds
12:00 AM				
12:15 AM				
12:30 AM				
12:45 AM				
1:00 AM	1		6	
1:15 AM				
1:30 AM				
1:45 AM				
2:00 AM	0		3	
2:15 AM				
2:30 AM				
2:45 AM				
3:00 AM	0		1	
3:15 AM				
3:30 AM				
3:45 AM				
4:00 AM	1		7	
4:15 AM				
4:30 AM				
4:45 AM				
5:00 AM	4		24	
5:15 AM				
5:30 AM				
5:45 AM				
6:00 AM	6		32	
6:15 AM				
6:30 AM				
6:45 AM				
7:00 AM	8		56	
7:15 AM				
7:30 AM				
7:45 AM				
8:00 AM	22		44	
8:15 AM				
8:30 AM				
8:45 AM				
9:00 AM	23		37	
9:15 AM				
9:30 AM				
9:45 AM				
10:00 AM	21		37	
10:15 AM				
10:30 AM				
10:45 AM				
11:00 AM	34		33	
11:15 AM				
11:30 AM				
11:45 AM				
12:00 PM	20		28	

Time	Eastbound		Westbound	
	Vehicles	Peds	Vehicles	Peds
12:00 PM				
12:15 PM				
12:30 PM				
12:45 PM				
1:00 PM	24		27	
1:15 PM				
1:30 PM				
1:45 PM				
2:00 PM	24		23	
2:15 PM				
2:30 PM				
2:45 PM				
3:00 PM	22		25	
3:15 PM				
3:30 PM				
3:45 PM				
4:00 PM	20		23	
4:15 PM				
4:30 PM				
12:00 AM				
5:00 PM	13		27	
5:15 PM				
5:30 PM				
5:45 PM				
6:00 PM	15		27	
6:15 PM				
6:30 PM				
6:45 PM				
7:00 PM	13		29	
7:15 PM				
7:30 PM				
7:45 PM				
8:00 PM	6		24	
8:15 PM				
8:30 PM				
8:45 PM				
9:00 PM	7		27	
9:15 PM				
9:30 PM				
9:45 PM				
10:00 PM	5		19	
10:15 PM				
10:30 PM				
10:45 PM				
11:00 PM	1		9	
11:15 PM				
11:30 PM				
11:45 PM				
12:00 AM	2		12	
	292		580	
	24-Hour Volume		872	

Equipment ID#:

TRAFFIC SURVEY - COUNT ANALYSIS
2003 MUTCD WARRANTS

County: Maricopa | District No.:
City: Goodyear | Population: 10,000 | Survey Date: 07/12/07

	Route #	Name	Control	Section	85% Spee
Major		Cotton Lane		-	45
Minor		Canyon Trails Boulevard		-	25

Warrant 1: Eight- Hour Volumes
Condition A

Number of Lanes			Major Street Both Approaches Required		Minor Street High Volume Approach Required	
Major	Street	Minor Street	Urban	Rural*	Urban	Rural*
1		1	500	350	150	105
2 or more		1	600	**420**	150	**105**
2 or more		2 or more	600	420	200	140
1		2 or more	500	350	200	140

*Criteria when the 85th percentile speed is greater than 40 mph or when the population is less than 10,000

Warrant 1

Time		Volume		Criteria		
				Major	Minor	
Begin	End	Major	Minor	>= 420	>= 105	Both Meet
12:00 AM	1:00 AM	62	6	N	N	N
1:00 AM	2:00 AM	38	3	N	N	N
2:00 AM	3:00 AM	48	1	N	N	N
3:00 AM	4:00 AM	50	7	N	N	N
4:00 AM	5:00 AM	194	24	N	N	N
5:00 AM	6:00 AM	352	32	N	N	N
6:00 AM	7:00 AM	439	56	Y	N	N
7:00 AM	8:00 AM	495	44	Y	N	N
8:00 AM	9:00 AM	405	37	N	N	N
9:00 AM	10:00 AM	394	37	N	N	N
10:00 AM	11:00 AM	356	34	N	N	N
11:00 AM	12:00 PM	372	28	N	N	N
12:00 PM	1:00 PM	410	27	N	N	N
1:00 PM	2:00 PM	479	24	Y	N	N
2:00 PM	3:00 PM	425	25	Y	N	N
3:00 PM	4:00 PM	461	23	Y	N	N
4:00 PM	5:00 PM	466	27	Y	N	N
5:00 PM	6:00 PM	470	27	Y	N	N
6:00 PM	7:00 PM	441	29	Y	N	N
7:00 PM	8:00 PM	357	24	N	N	N
8:00 PM	9:00 PM	323	27	N	N	N
9:00 PM	10:00 PM	237	19	N	N	N
10:00 PM	11:00 PM	184	9	N	N	N
11:00 PM	12:00 AM	121	12	N	N	N

Total number of hours, both the major(both approaches) and minor(high volume approach) met: 0
Hours Required: 8

Condition A is not satisfied
Warrant 1 not satisfied.

Warrant 1: Eight- Hour Volumes
Condition B

Number of Lanes			Major Street Both Approaches Required		Minor Street High Volume Approach Required	
Major	Street	Minor Street	Urban	Rural*	Urban	Rural*
1		1	750	525	75	53
2 or more		1	900	**630**	75	**53**
2 or more		2 or more	900	630	100	70
1		2 or more	750	525	100	70

*Criteria when the 85th percentile speed is greater than 40 mph or when the population is less than 10,000

Warrant 2

Time		Volume		Criteria		
Begin	End	Major	Minor	Major >= 630	Minor > = 53	Both Meet
12:00 AM	1:00 AM	62	6	N	N	N
1:00 AM	2:00 AM	38	3	N	N	N
2:00 AM	3:00 AM	48	1	N	N	N
3:00 AM	4:00 AM	50	7	N	N	N
4:00 AM	5:00 AM	194	24	N	N	N
5:00 AM	6:00 AM	352	32	N	N	N
6:00 AM	7:00 AM	439	56	N	Y	N
7:00 AM	8:00 AM	495	44	N	N	N
8:00 AM	9:00 AM	405	37	N	N	N
9:00 AM	10:00 AM	394	37	N	N	N
10:00 AM	11:00 AM	356	34	N	N	N
11:00 AM	12:00 PM	372	28	N	N	N
12:00 PM	1:00 PM	410	27	N	N	N
1:00 PM	2:00 PM	479	24	N	N	N
2:00 PM	3:00 PM	425	25	N	N	N
3:00 PM	4:00 PM	461	23	N	N	N
4:00 PM	5:00 PM	466	27	N	N	N
5:00 PM	6:00 PM	470	27	N	N	N
6:00 PM	7:00 PM	441	29	N	N	N
7:00 PM	8:00 PM	357	24	N	N	N
8:00 PM	9:00 PM	323	27	N	N	N
9:00 PM	10:00 PM	237	19	N	N	N
10:00 PM	11:00 PM	184	9	N	N	N
11:00 PM	12:00 AM	121	12	N	N	N

Total number of hours, both the major(both approaches) and minor(high volume approach) met: 0

Hours Required: 8

Condition B is not satisfied
Warrant 1 not satisfied.

Warrant 2: Four Hour Vehicular Volumes

This warrant is similar to Warrant 1A, except that the required traffic volumes must be present for at least four hours of an average day. The traffic volumes required are based on curves (Figure 4C-1) shown in the MUTCD.

*** These traffic volumes are not known.**

Warrant 2 is not satisfied

Warrant 3, Condition A- Peak Hour Delay

This warrant is intended for application where traffic conditions will cause undue delay to traffic entering or crossing the major street. The peak hour delay warrant is satisfied when the following conditions exist for one hour (any four consecutive 15-minute periods) of an average weekday:

(1) The total delay by the traffic on a side street controlled by a stop sign equals or exceeds four vehicle-hours for a one-lane approach and five vehicle-hours for a two-lane approach, **and**

(2) the volume on the side street (one direction) equals or exceeds 100 vph for one moving lane of traffic and 150 vph for two moving lanes, **and**

(3) the total traffic volume serviced during 1 hour equals or exceeds 800 vph for an intersection with four (or more) approaches or 650 vph for three approaches.

***Part 1 - N/A**
***Part 2 - N/A**
***Part 3 - N/A**

Warrant 3, Condition B - Peak Hour Volume
This warrant applies to traffic entering from the minor street which encounters undue delay crossing the main street. This is satisfied when the main street and side street traffic volumes satisfy the curves shown in Figure 4C-4 of the TMUTCD.

Warrant 3 Condition B is not satisfied.

Warrant 4: Pedestrian Volume

Required*	Existing
100 or more for each of any four hours	**0%**
OR	
190 or more during any one hour	**0%**

* For predominant pedestrian crossing speeds less than 3.5 ft/sec, the pedestrian volume may be reduced as much as 50 percent.

Gap Requirements

YES	NO	Is the nearest signal located more than 300 feet away?
YES	NO	For traffic flow which is not platooned, are there less than 60 gaps per hour of adequate length for the pedestrians to cross the street?

Warrant 4 is N/A.

Warrant 5: School Crossing

YES NO Is the number of adequate gaps in traffic stream during the period when the children are using the crossing less than the number of minutes in the same period?

Warrant 5 is N/A.

Warrant 6: Coordinate Systems

YES NO Are the adjacent signals in a signal system?
YES NO Would the resultant spacing be 1000 feet or more?

Warrant 6 is N/A.

Warrant 7: Crash Experience

YES NO Is 80% or more of one of Warrants #1, #2, or #3 met?
YES NO Have there been more than five accidents susceptible to correction by a traffic signal in 12 months?

Warrant 7 is N/A.

Warrant 8: Roadway Network

YES NO Does the major street having an existing or immediately projected entering volume of > 1000 vehicles per hour of a typical weekday?

YES NO Do 5-year projected traffic volumes meet Warrants 1, 2, or 3?

YES NO Is there an entering traffic volume of at least 1000 vehicles per hour for each of any 5 hours on a Saturday or Sunday?

Warrant 8 is N/A.

Summary:

Warrants satisfied: none

Warrants not satisfied: 1, 2, 3

Warrants not applicable: 4, 5, 6, 7, 8

Warrants not included in study: none

Warrant 2 - Four Hour Vehicular Volumes

85th % speed: > 40 mph
Population: >= 10,000

Major Street Lanes: 2
Minor Street Lanes: 1

Use Figure: 4C-2 2&1

Rank	Major Street Volume	Minor Street Volume	Figure 4C-1			Figure 4C-2		
			1&1	2&1	2&2	1&1	2&1	2&2
1	121	12	-	-	-	-	N	-
2	62	6	-	-	-	-	N	-
3	38	3	-	-	-	-	N	-
4	48	1	-	-	-	-	N	-
5	50	7	-	-	-	-	N	-
6	194	24	-	-	-	-	N	-
7	352	32	-	-	-	-	N	-
8	439	56	-	-	-	-	N	-
9	495	44	-	-	-	-	N	-
10	405	37	-	-	-	-	N	-
11	394	37	-	-	-	-	N	-
12	356	34	-	-	-	-	N	-
13	372	28	-	-	-	-	N	-
14	410	27	-	-	-	-	N	-
15	479	24	-	-	-	-	N	-
16	425	25	-	-	-	-	N	-
17	461	23	-	-	-	-	N	-
18	466	27	-	-	-	-	N	-
19	470	27	-	-	-	-	N	-
20	441	29	-	-	-	-	N	-
21	357	24	-	-	-	-	N	-
22	323	27	-	-	-	-	N	-
23	237	19	-	-	-	-	N	-
24	184	9	-	-	-	-	N	-
			0	0	0	0	0	0
Warrant 2 is not satisfied.			N	N	N	N	N	N

Warrant 3 - Peak Hour
Condition B

85th % speed: > 40 mph
Population: >= 10,000

Major Street Lanes: 2
Minor Street Lanes: 1

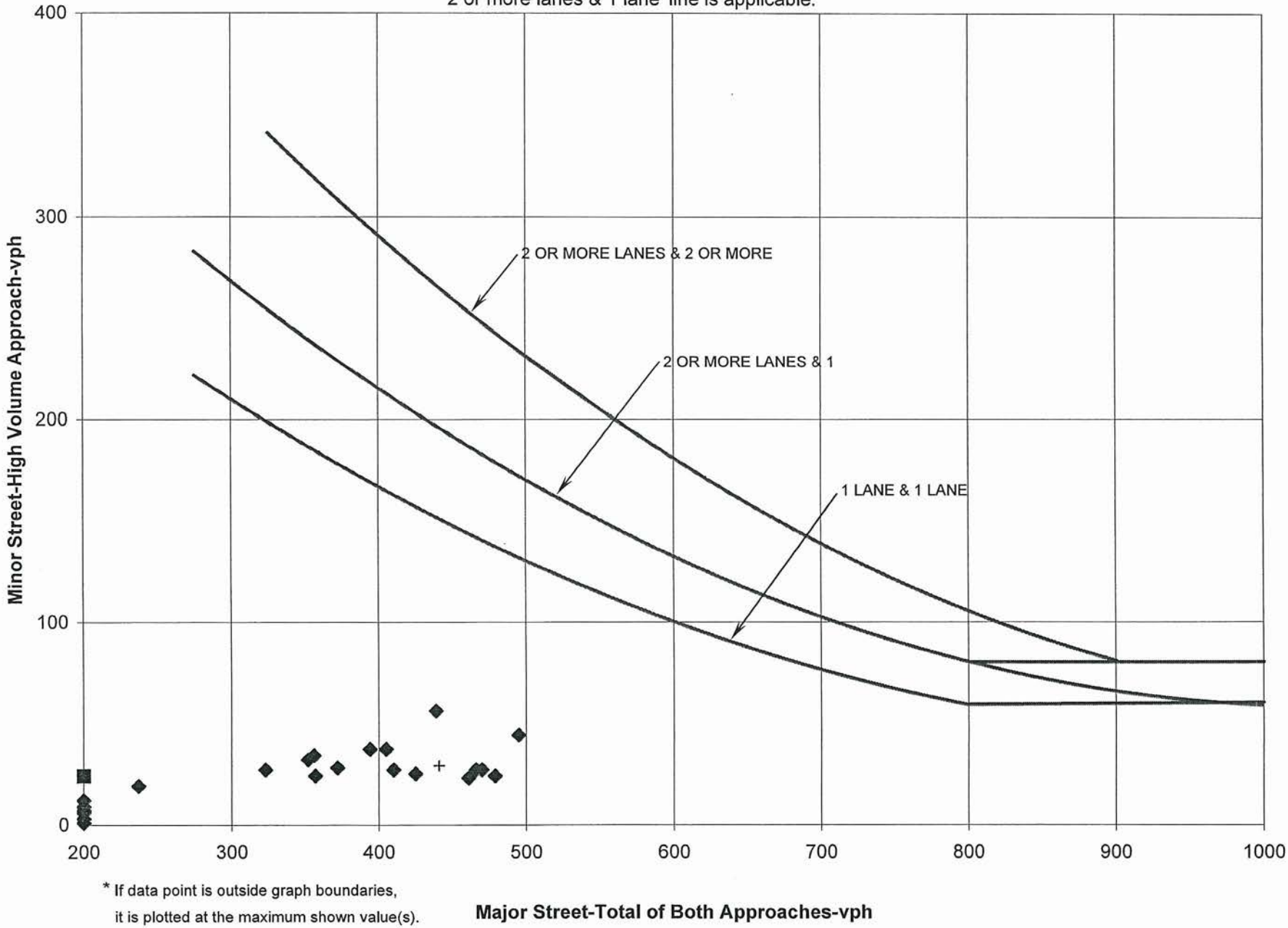
Use Figure: 4C-4 2&1

Peak Hour		Major Street	Minor Street	Figure 4C-3			Figure 4C-4		
Start Time	End Time	Volume	Volume	1&1	2&1	2&2	1&1	2&1	2&2
11:00 PM	12:00 AM	121	12	-	-	-	-	N	-
12:00 AM	1:00 AM	62	6	-	-	-	-	N	-
1:00 AM	2:00 AM	38	3	-	-	-	-	N	-
2:00 AM	3:00 AM	48	1	-	-	-	-	N	-
3:00 AM	4:00 AM	50	7	-	-	-	-	N	-
4:00 AM	5:00 AM	194	24	-	-	-	-	N	-
5:00 AM	6:00 AM	352	32	-	-	-	-	N	-
6:00 AM	7:00 AM	439	56	-	-	-	-	N	-
7:00 AM	8:00 AM	495	44	-	-	-	-	N	-
8:00 AM	9:00 AM	405	37	-	-	-	-	N	-
9:00 AM	10:00 AM	394	37	-	-	-	-	N	-
10:00 AM	11:00 AM	356	34	-	-	-	-	N	-
11:00 AM	12:00 PM	372	28	-	-	-	-	N	-
12:00 PM	1:00 PM	410	27	-	-	-	-	N	-
1:00 PM	2:00 PM	479	24	-	-	-	-	N	-
2:00 PM	3:00 PM	425	25	-	-	-	-	N	-
3:00 PM	4:00 PM	461	23	-	-	-	-	N	-
4:00 PM	5:00 PM	466	27	-	-	-	-	N	-
5:00 PM	6:00 PM	470	27	-	-	-	-	N	-
6:00 PM	7:00 PM	441	29	-	-	-	-	N	-
7:00 PM	8:00 PM	357	24	-	-	-	-	N	-
8:00 PM	9:00 PM	323	27	-	-	-	-	N	-
9:00 PM	10:00 PM	237	19	-	-	-	-	N	-
10:00 PM	11:00 PM	184	9	-	-	-	-	N	-
				0	0	0	0	0	0
Warrant 3 Condition B is not satisfied.				N	N	N	N	N	N

Warrant 2

Figure 4C-2 Four Hour Volume Warrant (population<10,000 or >40 mph on major street)

'2 or more lanes & 1 lane' line is applicable.

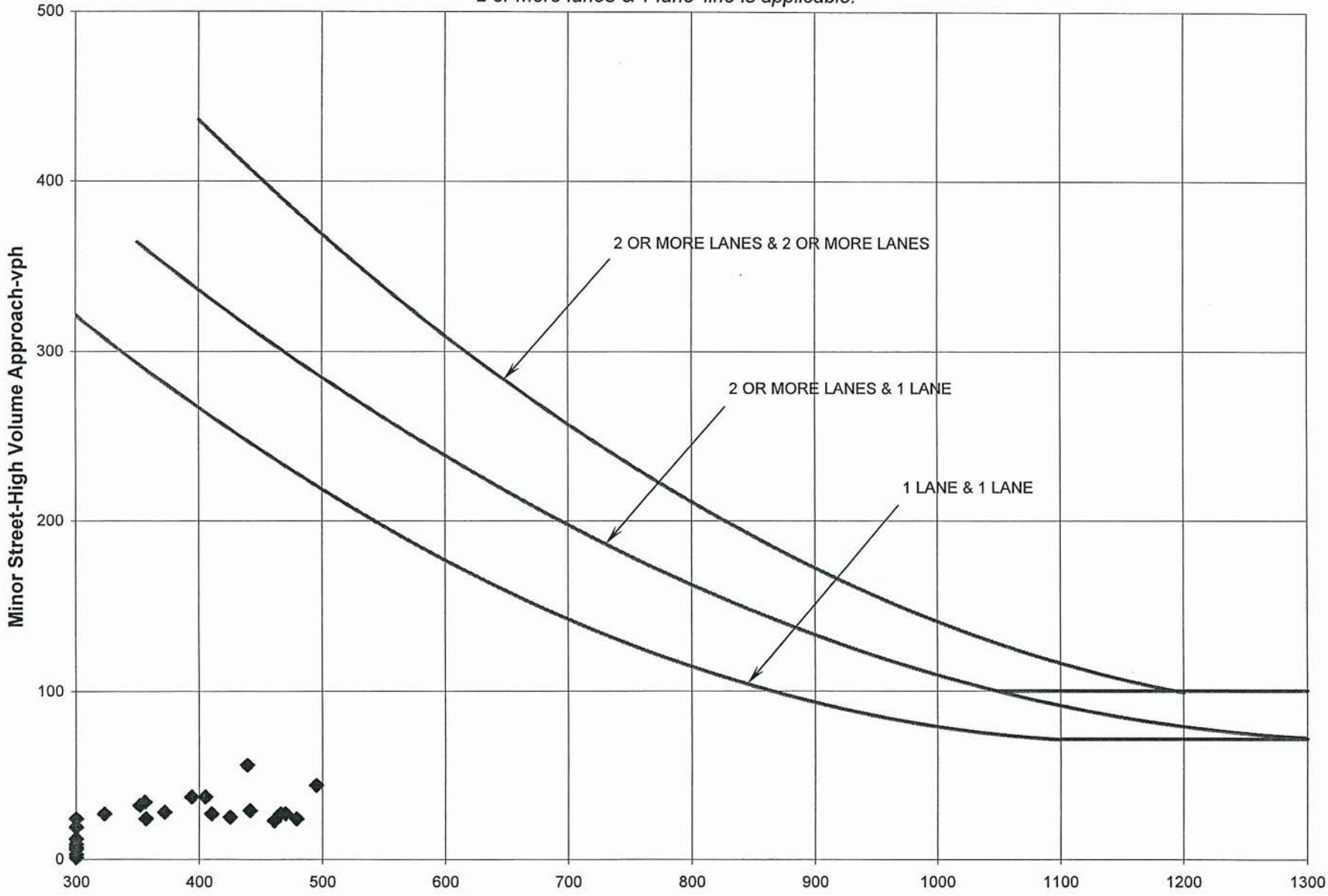


* If data point is outside graph boundaries, it is plotted at the maximum shown value(s).

Warrant 3

Figure 4C-4 Peak Hour Warrant (population<10,000 or >40 mph on major street)

'2 or more lanes & 1 lane' line is applicable.



* If data point is outside graph boundaries, it is plotted at the maximum shown value(s).

Cotton Lane/Canyon Trails Boulevard 2008 With Project

General Description of Intersection

Project Number:	sw07001	
Name of Major Roadway:	Cotton Lane	
Direction:	N/S	
# of NB Lanes:	2	
# of SB Lanes:	2	
85th percentile speed:	45	*mph*
Control #:		
Section #:		
Route #:		
Name of Minor Roadway:	Canyon Trails Boulevard	
Direction:	E/W	
# of EB Lanes:	1	
# of WB Lanes:	1	
85th percentile speed:	25	*mph*
Control #:		
Section #:		
Route #:		
City:	Goodyear	
Population:	10,000	
County:	Maricopa	
District:		
Data Source:	24 Hour Counts	
Date of Survey:	07/12/07	*(press Ctrl + ;)*
Day of Week:	Thursday	
Weather:	Sunny	
Surface Conditions:	Dry	
	Smooth	

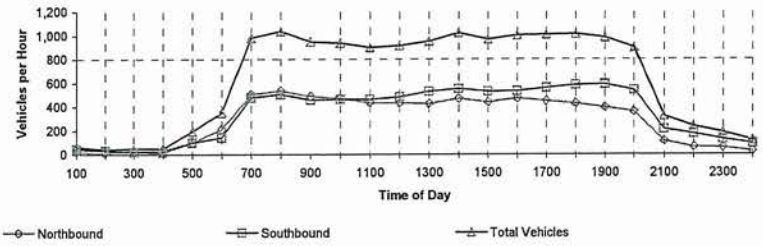
Enter Traffic Volumes:

Automated Traffic Counts

Street: **Cotton Lane**
Location: **Canyon Trails Boulevard**

City/State: **Goodyear, AZ**
Project #: **sw07001**
Date: **07/12/07**
Day of Week: **Thursday**
Data Source: **24 Hour Counts**

24-Hour Volume: **15,153**



Time	Northbound		Southbound	
	Vehicles	Peds	Vehicles	Peds
12:00 AM				
12:15 AM				
12:30 AM				
12:45 AM				
1:00 AM	18		44	
1:15 AM				
1:30 AM				
1:45 AM				
2:00 AM	9		29	
2:15 AM				
2:30 AM				
2:45 AM				
3:00 AM	30		18	
3:15 AM				
3:30 AM				
3:45 AM				
4:00 AM	34		16	
4:15 AM				
4:30 AM				
4:45 AM				
5:00 AM	97		97	
5:15 AM				
5:30 AM				
5:45 AM				
6:00 AM	211		141	
6:15 AM				
6:30 AM				
6:45 AM				
7:00 AM	503		477	
7:15 AM				
7:30 AM				
7:45 AM				
8:00 AM	532		504	
8:15 AM				
8:30 AM				
8:45 AM				
9:00 AM	488		458	
9:15 AM				
9:30 AM				
9:45 AM				
10:00 AM	472		463	
10:15 AM				
10:30 AM				
10:45 AM				
11:00 AM	434		463	
11:15 AM				
11:30 AM				
11:45 AM				
12:00 PM	432		481	

Time	Northbound		Southbound	
	Vehicles	Peds	Vehicles	Peds
12:00 PM				
12:15 PM				
12:30 PM				
12:45 PM				
1:00 PM	424		527	
1:15 PM				
1:30 PM				
1:45 PM				
2:00 PM	469		551	
2:15 PM				
2:30 PM				
2:45 PM				
3:00 PM	437		529	
3:15 PM				
3:30 PM				
3:45 PM				
4:00 PM	472		530	
4:15 PM				
4:30 PM				
4:45 PM				
5:00 PM	448		559	
5:15 PM				
5:30 PM				
5:45 PM				
6:00 PM	428		583	
6:15 PM				
6:30 PM				
6:45 PM				
7:00 PM	394		588	
7:15 PM				
7:30 PM				
7:45 PM				
8:00 PM	358		540	
8:15 PM				
8:30 PM				
8:45 PM				
9:00 PM	111		212	
9:15 PM				
9:30 PM				
9:45 PM				
10:00 PM	62		175	
10:15 PM				
10:30 PM				
10:45 PM				
11:00 PM	56		128	
11:15 PM				
11:30 PM				
11:45 PM				
12:00 AM	28		93	
	6,947		8,206	
	24-Hour Volume		15,153	

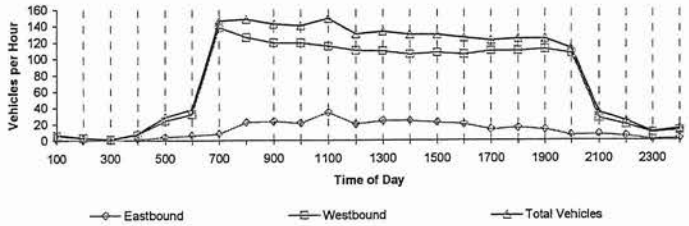
Equipment ID#:

Automated Traffic Counts

Street: **Canyon Trails Boulevard**
Location: **Cotton Lane**

City/State: **Goodyear, AZ**
Project #:
Date: **07/12/07**
Day of Week: **Thursday**
Data Source: **24 Hour Counts**

24-Hour Volume: **2,020**



Time	Eastbound		Westbound	
	Vehicles	Peds	Vehicles	Peds
12:00 AM				
12:15 AM				
12:30 AM				
12:45 AM				
1:00 AM	1		6	
1:15 AM				
1:30 AM				
1:45 AM				
2:00 AM	0		3	
2:15 AM				
2:30 AM				
2:45 AM				
3:00 AM	0		1	
3:15 AM				
3:30 AM				
3:45 AM				
4:00 AM	1		7	
4:15 AM				
4:30 AM				
4:45 AM				
5:00 AM	4		24	
5:15 AM				
5:30 AM				
5:45 AM				
6:00 AM	6		32	
6:15 AM				
6:30 AM				
6:45 AM				
7:00 AM	8		138	
7:15 AM				
7:30 AM				
7:45 AM				
8:00 AM	22		126	
8:15 AM				
8:30 AM				
8:45 AM				
9:00 AM	23		119	
9:15 AM				
9:30 AM				
9:45 AM				
10:00 AM	21		119	
10:15 AM				
10:30 AM				
10:45 AM				
11:00 AM	34		115	
11:15 AM				
11:30 AM				
11:45 AM				
12:00 PM	20		110	

Time	Eastbound		Westbound	
	Vehicles	Peds	Vehicles	Peds
12:00 PM				
12:15 PM				
12:30 PM				
12:45 PM				
1:00 PM	24		109	
1:15 PM				
1:30 PM				
1:45 PM				
2:00 PM	24		105	
2:15 PM				
2:30 PM				
2:45 PM				
3:00 PM	22		107	
3:15 PM				
3:30 PM				
3:45 PM				
4:00 PM	20		105	
4:15 PM				
4:30 PM				
12:00 AM				
5:00 PM	13		109	
5:15 PM				
5:30 PM				
5:45 PM				
6:00 PM	15		109	
6:15 PM				
6:30 PM				
6:45 PM				
7:00 PM	13		111	
7:15 PM				
7:30 PM				
7:45 PM				
8:00 PM	6		106	
8:15 PM				
8:30 PM				
8:45 PM				
9:00 PM	7		27	
9:15 PM				
9:30 PM				
9:45 PM				
10:00 PM	5		19	
10:15 PM				
10:30 PM				
10:45 PM				
11:00 PM	1		9	
11:15 PM				
11:30 PM				
11:45 PM				
12:00 AM	2		12	
	292		1,728	
	24-Hour Volume		2,020	

Equipment ID#:

TRAFFIC SURVEY - COUNT ANALYSIS
2003 MUTCD WARRANTS

County: Maricopa | District No.:
City: Goodyear | Population: 10,000 | Survey Date: 07/12/07

	Route #	Name	Control	Section	85% Spee
Major		Cotton Lane		-	45
Minor		Canyon Trails Boulevard		-	25

Warrant 1: Eight- Hour Volumes
Condition A

Number of Lanes			Major Street Both Approaches Required		Minor Street High Volume Approach Required	
Major	Street	Minor Street	Urban	Rural*	Urban	Rural*
1		1	500	350	150	105
2 or more		1	600	**420**	150	**105**
2 or more		2 or more	600	420	200	140
1		2 or more	500	350	200	140

*Criteria when the 85th percentile speed is greater than 40 mph or when the population is less than 10,000

Warrant 1

Time		Volume		Criteria Major	Minor	
Begin	End	Major	Minor	>= 420	>= 105	Both Meet
12:00 AM	1:00 AM	62	6	N	N	N
1:00 AM	2:00 AM	38	3	N	N	N
2:00 AM	3:00 AM	48	1	N	N	N
3:00 AM	4:00 AM	50	7	N	N	N
4:00 AM	5:00 AM	194	24	N	N	N
5:00 AM	6:00 AM	352	32	N	N	N
6:00 AM	7:00 AM	980	138	Y	Y	Y
7:00 AM	8:00 AM	1036	126	Y	Y	Y
8:00 AM	9:00 AM	946	119	Y	Y	Y
9:00 AM	10:00 AM	935	119	Y	Y	Y
10:00 AM	11:00 AM	897	115	Y	Y	Y
11:00 AM	12:00 PM	913	110	Y	Y	Y
12:00 PM	1:00 PM	951	109	Y	Y	Y
1:00 PM	2:00 PM	1020	105	Y	Y	Y
2:00 PM	3:00 PM	966	107	Y	Y	Y
3:00 PM	4:00 PM	1002	105	Y	Y	Y
4:00 PM	5:00 PM	1007	109	Y	Y	Y
5:00 PM	6:00 PM	1011	109	Y	Y	Y
6:00 PM	7:00 PM	982	111	Y	Y	Y
7:00 PM	8:00 PM	898	106	Y	Y	Y
8:00 PM	9:00 PM	323	27	N	N	N
9:00 PM	10:00 PM	237	19	N	N	N
10:00 PM	11:00 PM	184	9	N	N	N
11:00 PM	12:00 AM	121	12	N	N	N

Total number of hours, both the major(both approaches) and minor(high volume approach) met: 14
Hours Required: 8

Condition A is satisfied
Warrant 1 satisfied.

Warrant 1: Eight- Hour Volumes
Condition B

Number of Lanes			Major Street Both Approaches Required		Minor Street High Volume Approach Required	
Major	Street	Minor Street	Urban	Rural*	Urban	Rural*
1		1	750	525	75	53
2 or more		1	900	**630**	75	**53**
2 or more		2 or more	900	630	100	70
1		2 or more	750	525	100	70

*Criteria when the 85th percentile speed is greater than 40 mph or when the population is less than 10,000

Warrant 2

Time		Volume		Criteria		
				Major	Minor	
Begin	End	Major	Minor	>= 630	> = 53	Both Meet
12:00 AM	1:00 AM	62	6	N	N	N
1:00 AM	2:00 AM	38	3	N	N	N
2:00 AM	3:00 AM	48	1	N	N	N
3:00 AM	4:00 AM	50	7	N	N	N
4:00 AM	5:00 AM	194	24	N	N	N
5:00 AM	6:00 AM	352	32	N	N	N
6:00 AM	7:00 AM	980	138	Y	Y	Y
7:00 AM	8:00 AM	1036	126	Y	Y	Y
8:00 AM	9:00 AM	946	119	Y	Y	Y
9:00 AM	10:00 AM	935	119	Y	Y	Y
10:00 AM	11:00 AM	897	115	Y	Y	Y
11:00 AM	12:00 PM	913	110	Y	Y	Y
12:00 PM	1:00 PM	951	109	Y	Y	Y
1:00 PM	2:00 PM	1020	105	Y	Y	Y
2:00 PM	3:00 PM	966	107	Y	Y	Y
3:00 PM	4:00 PM	1002	105	Y	Y	Y
4:00 PM	5:00 PM	1007	109	Y	Y	Y
5:00 PM	6:00 PM	1011	109	Y	Y	Y
6:00 PM	7:00 PM	982	111	Y	Y	Y
7:00 PM	8:00 PM	898	106	Y	Y	Y
8:00 PM	9:00 PM	323	27	N	N	N
9:00 PM	10:00 PM	237	19	N	N	N
10:00 PM	11:00 PM	184	9	N	N	N
11:00 PM	12:00 AM	121	12	N	N	N

Total number of hours, both the major(both approaches) and minor(high volume approach) met: 14

Hours Required: 8

Condition B is satisfied
Warrant 1 satisfied.

Warrant 2: Four Hour Vehicular Volumes

This warrant is similar to Warrant 1A, except that the required traffic volumes must be present for at least four hours of an average day. The traffic volumes required are based on curves (Figure 4C-1) shown in the MUTCD.

*** The required traffic is present for at least four hours.**

Warrant 2 is satisfied

Warrant 3, Condition A- Peak Hour Delay

This warrant is intended for application where traffic conditions will cause undue delay to traffic entering or crossing the major street. The peak hour delay warrant is satisfied when the following conditions exist for one hour (any four consecutive 15-minute periods) of an average weekday:

(1) The total delay by the traffic on a side street controlled by a stop sign equals or exceeds four vehicle-hours for a one-lane approach and five vehicle-hours for a two-lane approach, **and**

(2) the volume on the side street (one direction) equals or exceeds 100 vph for one moving lane of traffic and 150 vph for two moving lanes, **and**

(3) the total traffic volume serviced during 1 hour equals or exceeds 800 vph for an intersection with four (or more) approaches or 650 vph for three approaches.

***Part 1 - N/A**
***Part 2 - N/A**
***Part 3 - N/A**

Warrant 3, Condition B - Peak Hour Volume
This warrant applies to traffic entering from the minor street which encounters undue delay crossing the main street. This is satisfied when the main street and side street traffic volumes satisfy the curves shown in Figure 4C-4 of the TMUTCD.

Warrant 3 Condition B is satisfied.

Warrant 4: Pedestrian Volume

Required*	Existing
100 or more for each of any four hours	**0%**
OR	
190 or more during any one hour	**0%**

* For predominant pedestrian crossing speeds less than 3.5 ft/sec, the pedestrian volume may be reduced as much as 50 percent.

Gap Requirements

YES	NO	Is the nearest signal located more than 300 feet away?
YES	NO	For traffic flow which is not platooned, are there less than 60 gaps per hour of adequate length for the pedestrians to cross the street?

Warrant 4 is N/A.

Warrant 5: School Crossing

YES NO Is the number of adequate gaps in traffic stream during the period when the children are using the crossing less than the number of minutes in the same period?

Warrant 5 is N/A.

Warrant 6: Coordinate Systems

YES NO Are the adjacent signals in a signal system?
YES NO Would the resultant spacing be 1000 feet or more?

Warrant 6 is N/A.

Warrant 7: Crash Experience

YES NO Is 80% or more of one of Warrants #1, #2, or #3 met?
YES NO Have there been more than five accidents susceptible to correction by a traffic signal in 12 months?

Warrant 7 is N/A.

Warrant 8: Roadway Network

YES NO Does the major street having an existing or immediately projected entering volume of > 1000 vehicles per hour of a typical weekday?

YES NO Do 5-year projected traffic volumes meet Warrants 1, 2, or 3?

YES NO Is there an entering traffic volume of at least 1000 vehicles per hour for each of any 5 hours on a Saturday or Sunday?

Warrant 8 is N/A.

Summary:

Warrants satisfied: 1, 2, 3

Warrants not satisfied: none

Warrants not applicable: 4, 5, 6, 7, 8

Warrants not included in study: none

Warrant 2 - Four Hour Vehicular Volumes

85th % speed: > 40 mph
Population: >= 10,000

Major Street Lanes: 2
Minor Street Lanes: 1

Use Figure: 4C-2 2&1

Rank	Major Street Volume	Minor Street Volume	Figure 4C-1			Figure 4C-2		
			1&1	2&1	2&2	1&1	2&1	2&2
1	121	12	-	-	-	-	N	-
2	62	6	-	-	-	-	N	-
3	38	3	-	-	-	-	N	-
4	48	1	-	-	-	-	N	-
5	50	7	-	-	-	-	N	-
6	194	24	-	-	-	-	N	-
7	352	32	-	-	-	-	N	-
8	980	138	-	-	-	-	Y	-
9	1036	126	-	-	-	-	Y	-
10	946	119	-	-	-	-	Y	-
11	935	119	-	-	-	-	Y	-
12	897	115	-	-	-	-	Y	-
13	913	110	-	-	-	-	Y	-
14	951	109	-	-	-	-	Y	-
15	1020	105	-	-	-	-	Y	-
16	966	107	-	-	-	-	Y	-
17	1002	105	-	-	-	-	Y	-
18	1007	109	-	-	-	-	Y	-
19	1011	109	-	-	-	-	Y	-
20	982	111	-	-	-	-	Y	-
21	898	106	-	-	-	-	Y	-
22	323	27	-	-	-	-	N	-
23	237	19	-	-	-	-	N	-
24	184	9	-	-	-	-	N	-
			0	0	0	0	14	0
Warrant 2 is satisfied.			N	N	N	N	Y	N

Warrant 3 - Peak Hour
Condition B

85th % speed: > 40 mph
Population: >= 10,000

Major Street Lanes: 2
Minor Street Lanes: 1

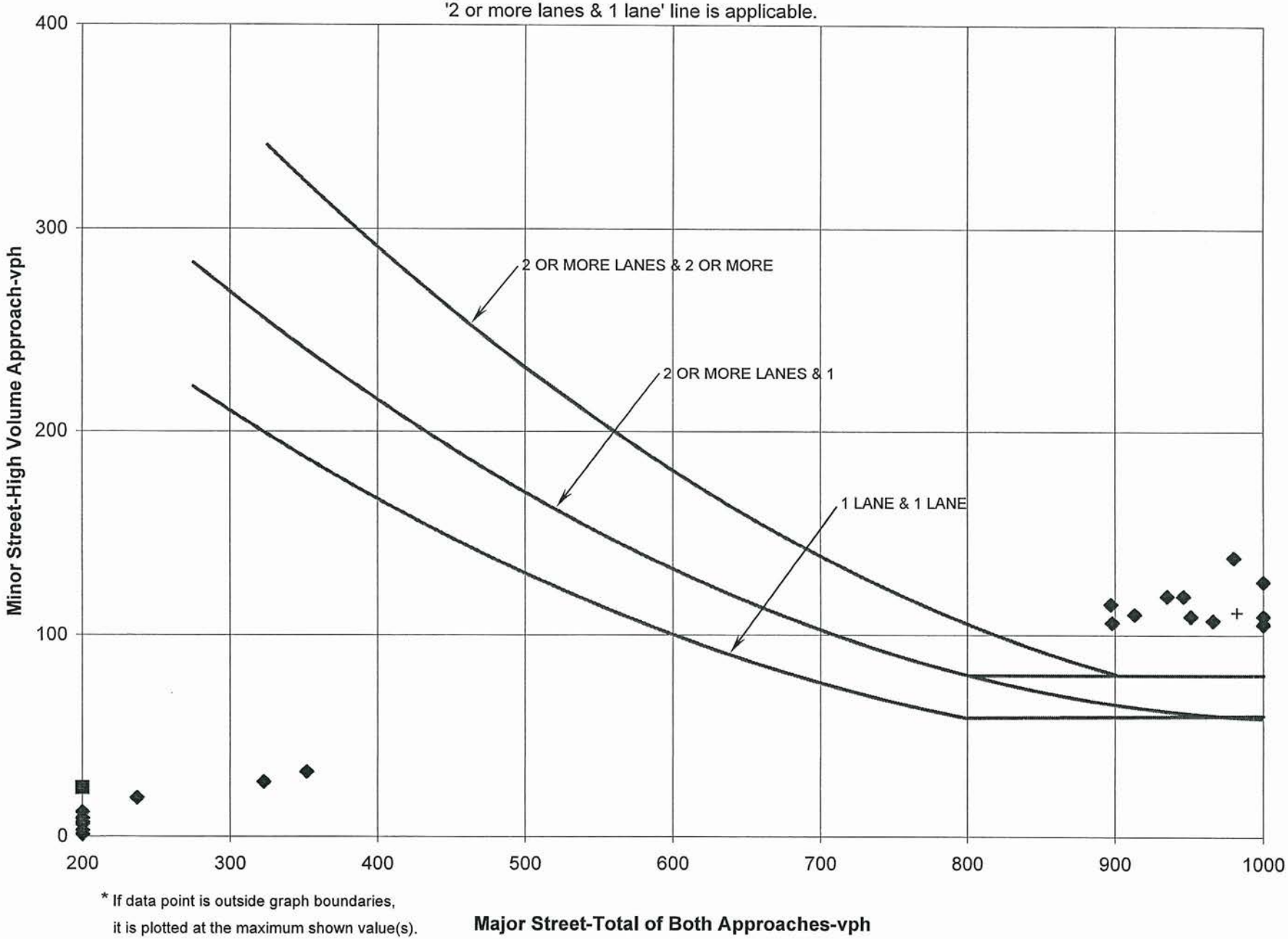
Use Figure: 4C-4 2&1

Peak Hour		Major Street	Minor Street	Figure 4C-3			Figure 4C-4		
Start Time	End Time	Volume	Volume	1&1	2&1	2&2	1&1	2&1	2&2
11:00 PM	12:00 AM	121	12	-	-	-	-	N	-
12:00 AM	1:00 AM	62	6	-	-	-	-	N	-
1:00 AM	2:00 AM	38	3	-	-	-	-	N	-
2:00 AM	3:00 AM	48	1	-	-	-	-	N	-
3:00 AM	4:00 AM	50	7	-	-	-	-	N	-
4:00 AM	5:00 AM	194	24	-	-	-	-	N	-
5:00 AM	6:00 AM	352	32	-	-	-	-	N	-
6:00 AM	7:00 AM	980	138	-	-	-	-	Y	-
7:00 AM	8:00 AM	1036	126	-	-	-	-	Y	-
8:00 AM	9:00 AM	946	119	-	-	-	-	N	-
9:00 AM	10:00 AM	935	119	-	-	-	-	N	-
10:00 AM	11:00 AM	897	115	-	-	-	-	N	-
11:00 AM	12:00 PM	913	110	-	-	-	-	N	-
12:00 PM	1:00 PM	951	109	-	-	-	-	N	-
1:00 PM	2:00 PM	1020	105	-	-	-	-	N	-
2:00 PM	3:00 PM	966	107	-	-	-	-	N	-
3:00 PM	4:00 PM	1002	105	-	-	-	-	N	-
4:00 PM	5:00 PM	1007	109	-	-	-	-	Y	-
5:00 PM	6:00 PM	1011	109	-	-	-	-	Y	-
6:00 PM	7:00 PM	982	111	-	-	-	-	N	-
7:00 PM	8:00 PM	898	106	-	-	-	-	N	-
8:00 PM	9:00 PM	323	27	-	-	-	-	N	-
9:00 PM	10:00 PM	237	19	-	-	-	-	N	-
10:00 PM	11:00 PM	184	9	-	-	-	-	N	-
				0	0	0	0	4	0
Warrant 3 Condition B is satisfied.				N	N	N	N	Y	N

Warrant 2

Figure 4C-2 Four Hour Volume Warrant (population<10,000 or >40 mph on major street)

'2 or more lanes & 1 lane' line is applicable.

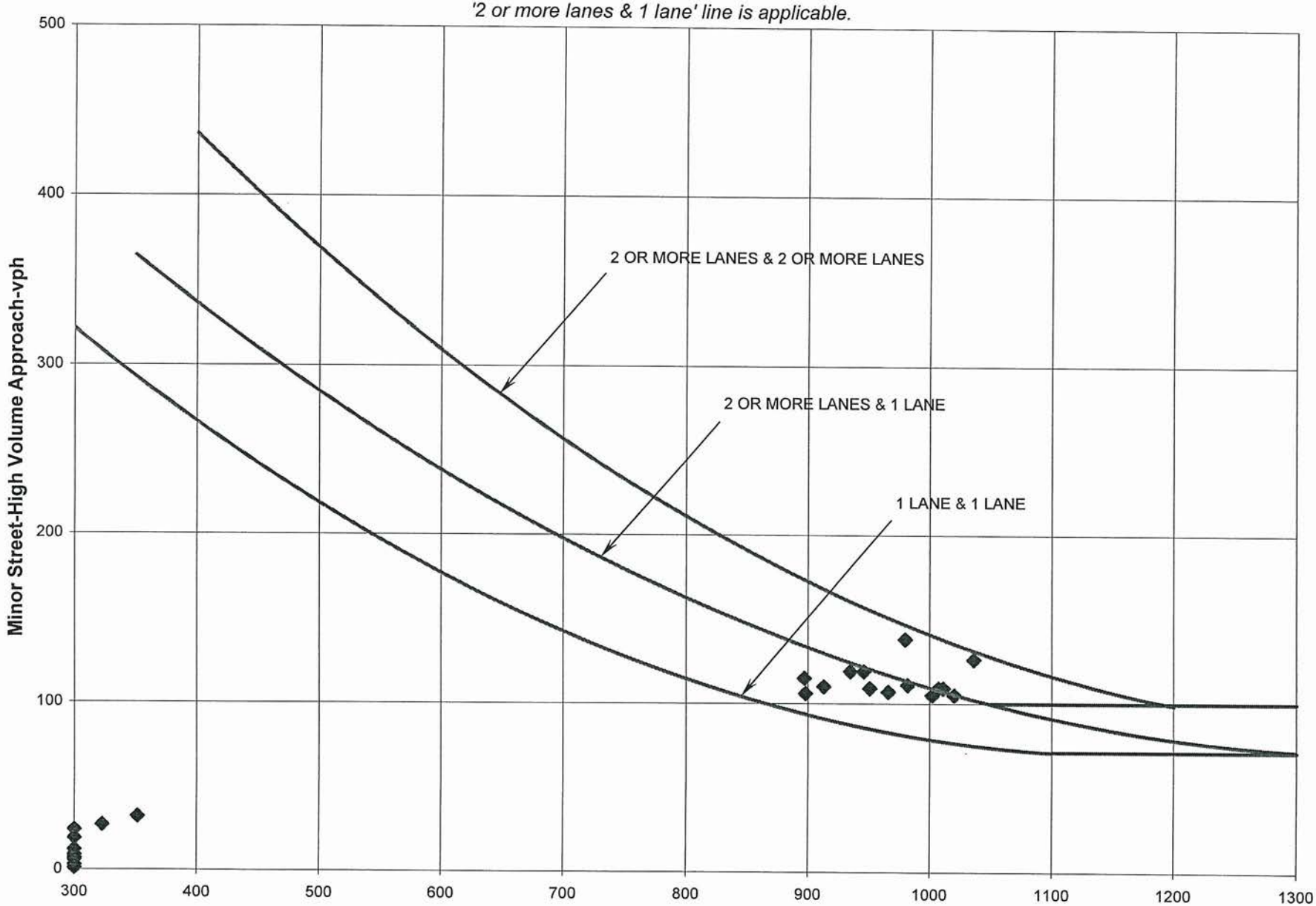


* If data point is outside graph boundaries, it is plotted at the maximum shown value(s).

Warrant 3

Figure 4C-4 Peak Hour Warrant (population<10,000 or >40 mph on major street)

'2 or more lanes & 1 lane' line is applicable.



* If data point is outside graph boundaries, it is plotted at the maximum shown value(s).