Project No: 584-02

TRAFFIC STUDY

PROPOSED COMMERCIAL GPA-ZC
NORTHWEST CORNER OF
COTTONWOOD ROAD AND PLANZ ROAD

Prepared for:

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INTRODUCTION

The purpose of this study is to evaluate the potential traffic impact of a proposed GPA-ZC for a convenience store with gasoline pumps located at the northwest corner of Cottonwood Road and East Planz Road in the City of Bakersfield, California.

A. Land Use, Site and Study Area Boundaries

The proposed project consists of a gas station with 8 fueling positions and a 3,100 square foot convenience store (See Figure 3: Site Plan). The current land use designation for the project site is R-2 (Medium-density Residential). A general plan amendment is being proposed for a change from LMR (Light-medium Residential) to GC (General Commercial) and a zone change is being proposed from R-2 to C-2 (General Commercial).

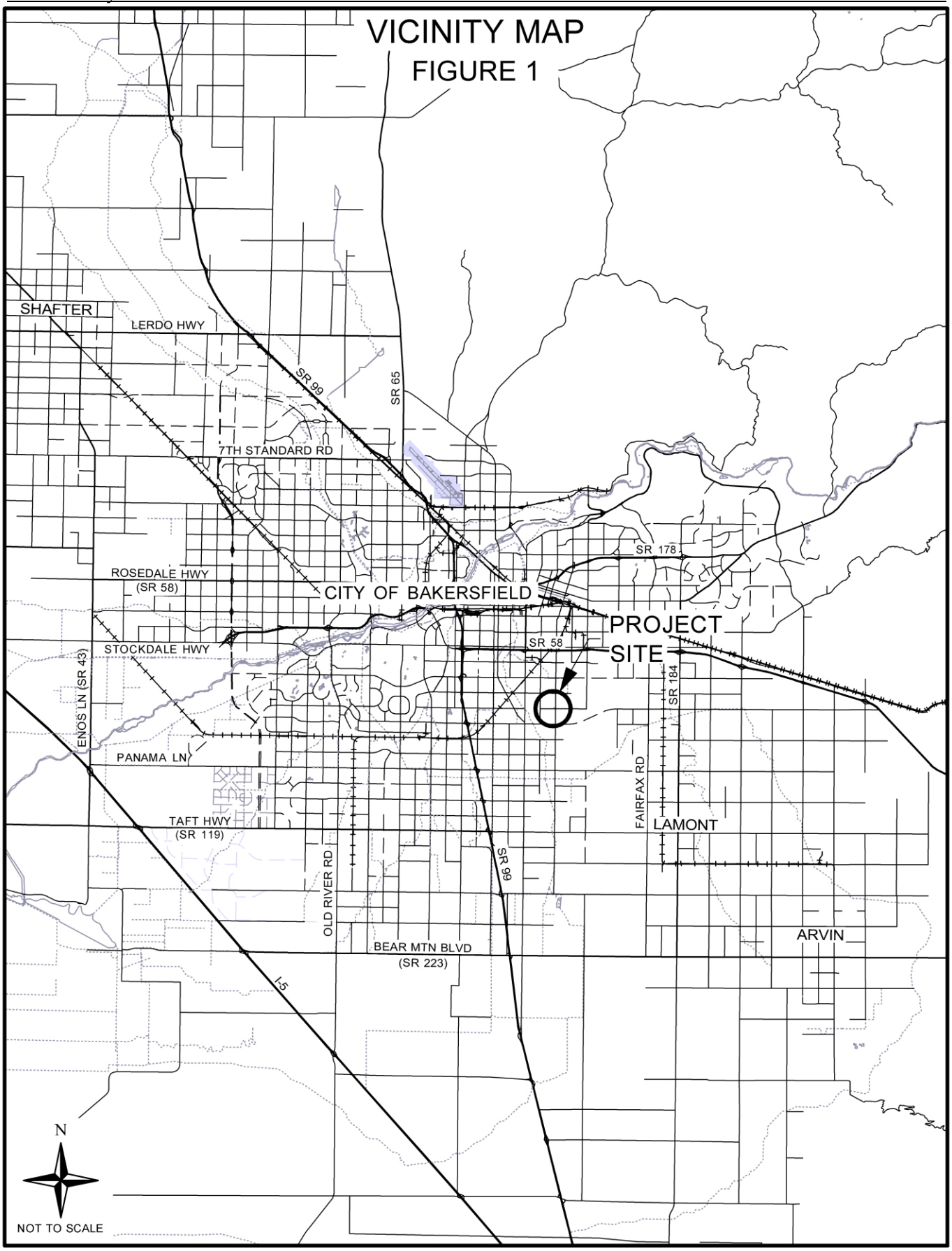
Three unsignalized intersections are included in this study. The scope of the study was developed in association with The City of Bakersfield Public Works Traffic Division. A vicinity map is presented in Figure 1 and a location map is presented in Figure 2.

B. Existing Site Uses and Site Access

The project site currently consists of vacant land, with no building or other structures. Access to the site is proposed along both E. Planz Road and Oliver Street.

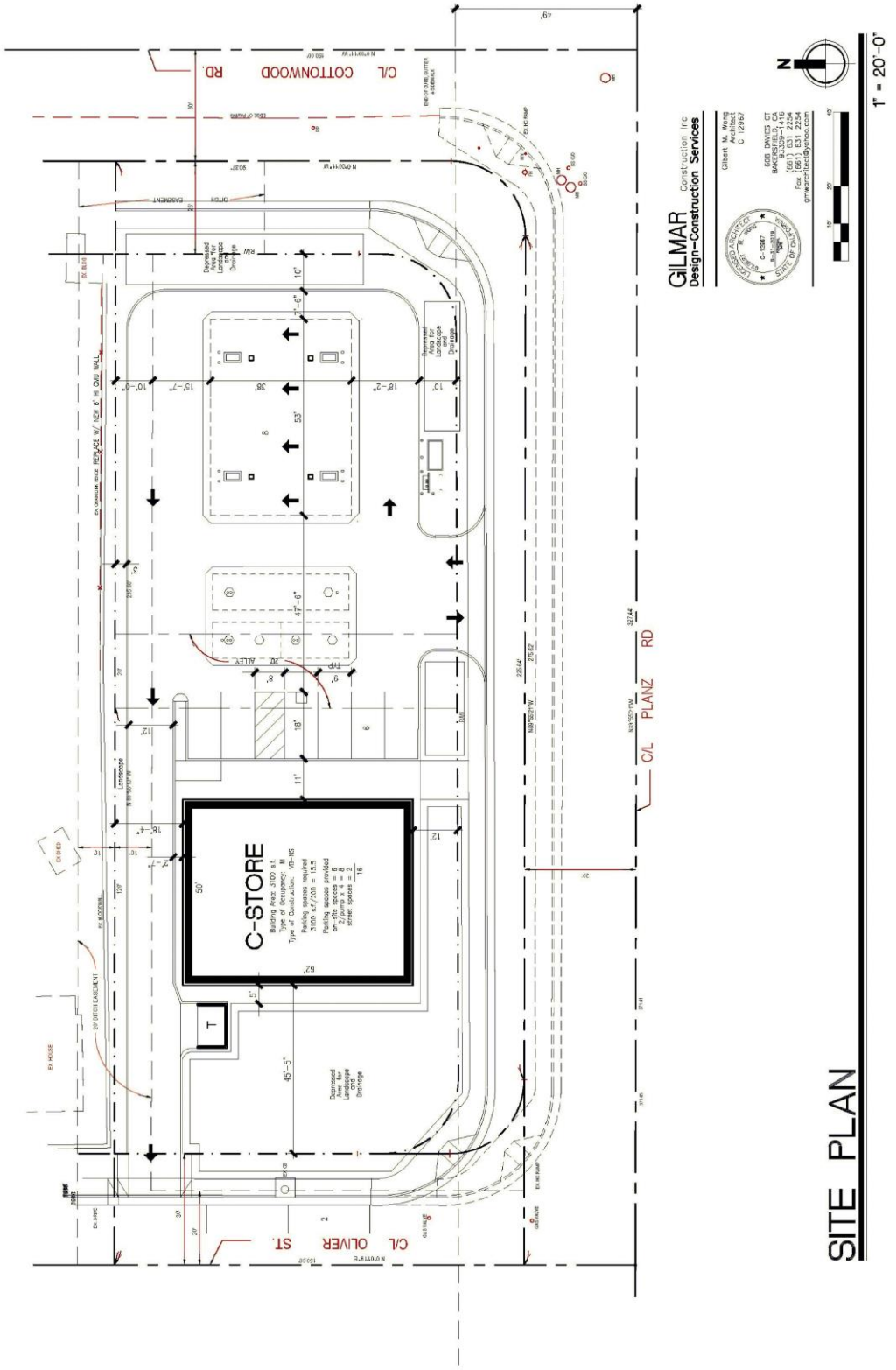
C. Existing Uses in Vicinity of the Site

Existing land uses in the vicinity of the project site include single-family residential land uses to the west, north and south, vacant land to the immediate east, and the Bakersfield Wastewater Treatment Plant further east. To the east and south, the project site is bounded by Cottonwood Road and E. Planz Road, respectively.


VICINITY MAP
FIGURE 1
SHAFTER
LERDO HWY
SR 99
SR 65
7TH STANDARD RD
SR 178
ROSEDALE HWY
(SR 58)
CITY OF BAKERSFIELD
PROJECT
SITE
SR 58
STOCKDALE HWY
ENOS LN (SR 43)
SR 184
PANAMA LN
FAIRFAX RD
LAMONT
TAFT HWY
(SR 119)
OLD RIVER RD
SR 99
ARVIN
BEAR MTN BLVD
(SR 223)
I-5
N
NOT TO SCALE


LOCATION MAP
FIGURE 2
Watts Dr
Madison Ave
Cottonwood Rd
Project Site
Planz Rd
Oliver St
White Ln
N
NOT TO SCALE
LEGEND
EXISTING ROAD
FUTURE ROAD

SITE PLAN
FIGURE 3



D. Roadway Descriptions

Cottonwood Road is a north-south arterial that extends south from Brundage Lane. In the vicinity of the project it exists as an undivided two-lane roadway with improvements adjacent to development. It provides access to residential and commercial land uses.

Planz Road is an east-west collector. It extends east from Wilson Road in Southwest Bakersfield to the Bakersfield Municipal Airport just east of Union Avenue. It continues east from Madison Avenue as a collector. It provides access from residential and commercial areas to north-south arterials.

Watts Drive is an east-west collector that extends west from Cottonwood Road as a two-lane roadway with curb and gutter that becomes Wilson Road as it crosses S. Union Avenue. East of Cottonwood Road, Watts Drive is a local roadway with no curb or gutter. Watts Drive provides access to residential, commercial, and industrial land uses.

White Lane is an arterial which extends west from Cottonwood Road approximately one mile south of E. Casa Loma Drive. It currently operates as a two-lane roadway with no curb and gutter in the vicinity of the project site. White Lane provides access to residential and commercial land uses within the study area.

PROJECT TRIP GENERATION AND DESIGN HOUR VOLUMES

The trip generation and design hour volumes shown in Table 1 were calculated using the Institute of Transportation Engineers (ITE) Trip Generation, 10th Edition. The ADT, AM and PM peak hour rates, and peak hour directional splits for ITE Land Use Code 853 (Convenience Market with Gasoline Pumps) were used to estimate the project traffic.

Table 1
Project Trip Generation

General Information			Daily Trips		AM Peak Hour Trips			PM Peak Hour Trips		
ITE Code	Development Type	Variable	ADT RATE	ADT	Rate	In % Split/ Trips	Out % Split/ Trips	Rate	In % Split/ Trips	Out % Split/ Trips
853	Convenience Market with Gasoline Pumps	8 Vehicle Fueling Positions	322.5	2580	20.55	50% 82	50% 82	24.25	50% 97	50% 97
sub-total				2,580		82	82		97	97
Pass-by		40%		1,032		33	33		39	39
Total				1,548		49	49		58	58

TRIP DISTRIBUTION AND ASSIGNMENT

The project trip distribution in Table 2 represents the most logically traveled routes for traffic accessing the project. Project traffic distribution was estimated based on a review of the potential draw from population centers within the region and the type of land use involved. These assumptions were used to distribute project traffic as shown in Figure 5.

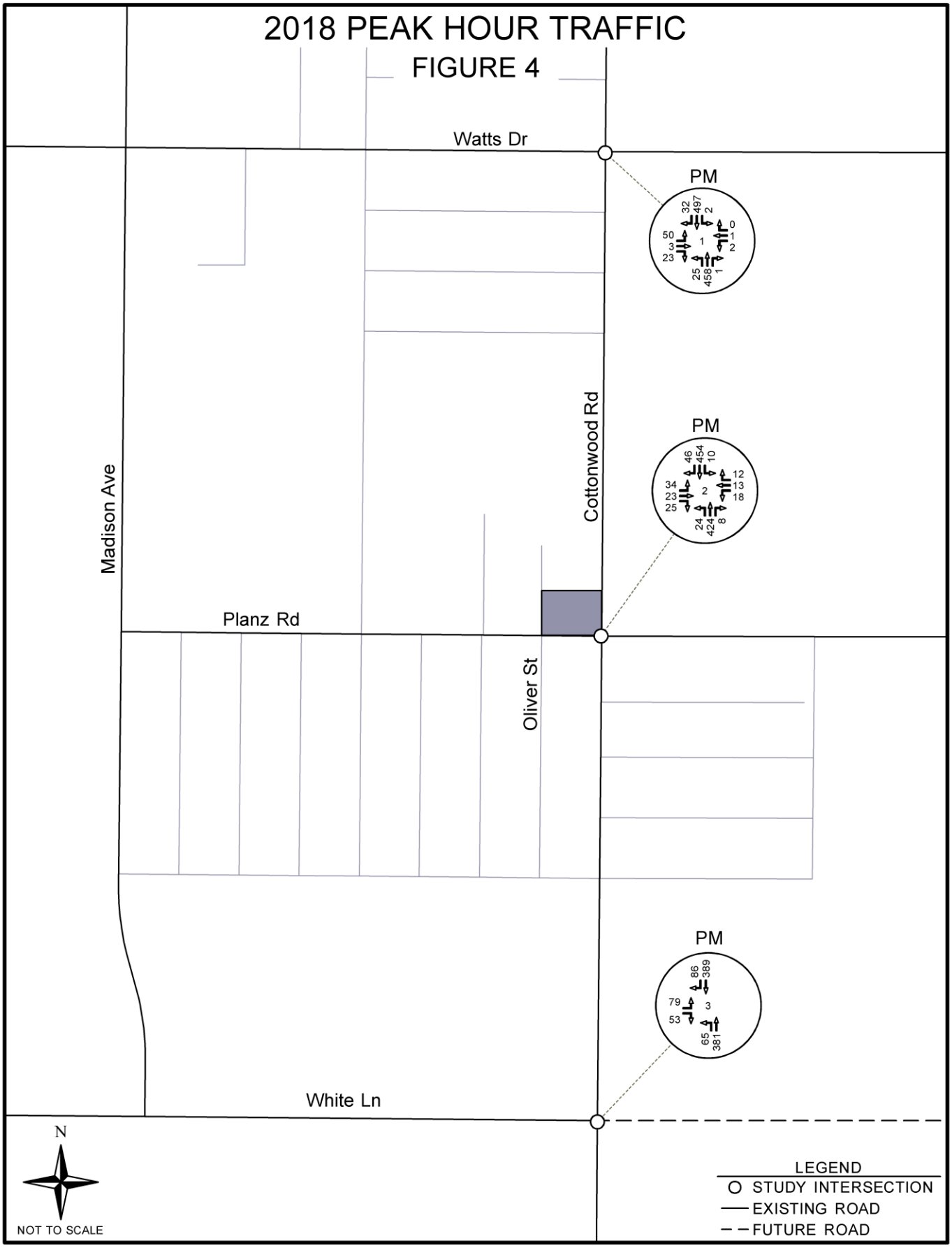
Table 2
Project Trip Distribution

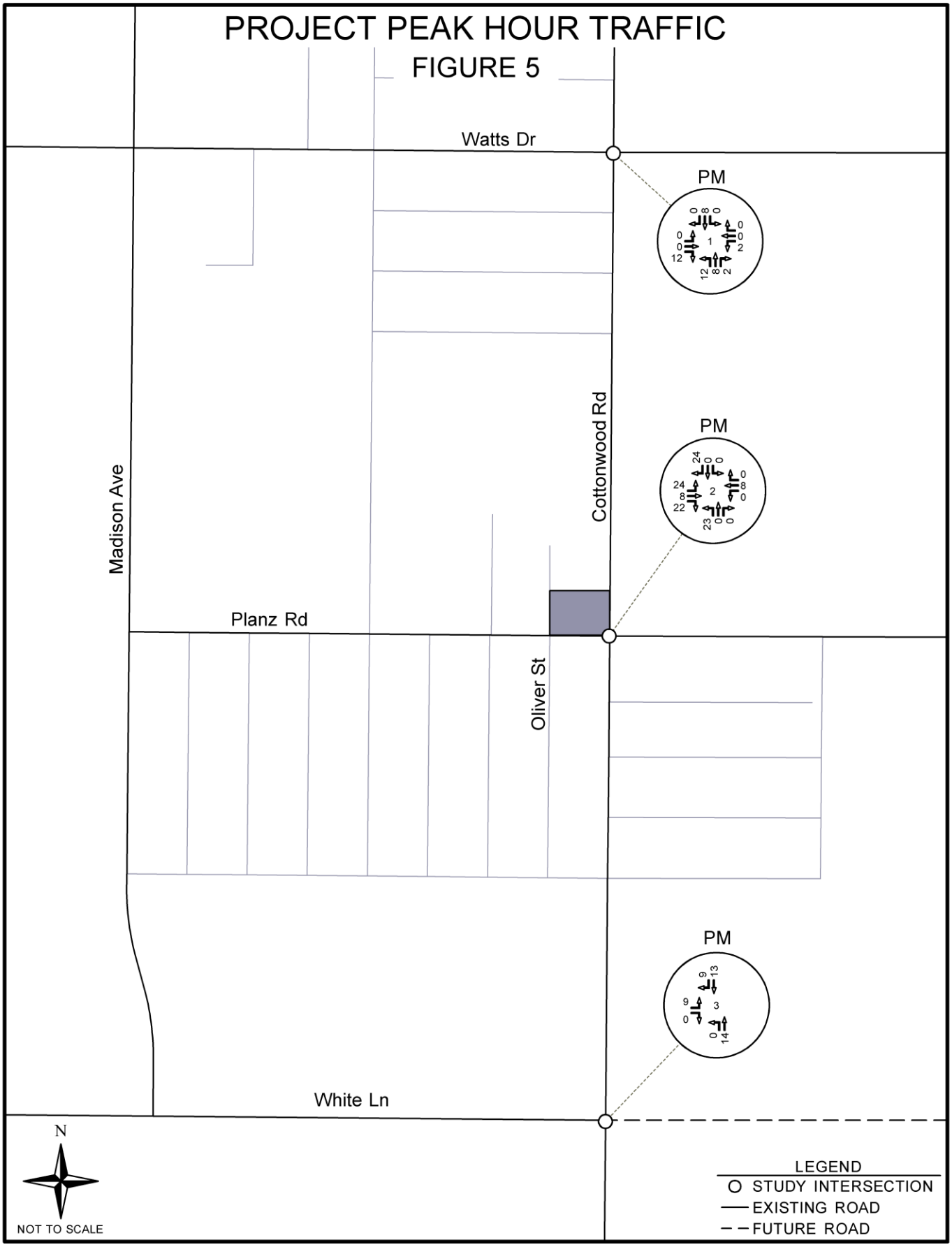
Direction	Percent	Primary Roadways
North	25	Cottonwood Road
East	10	Watts Drive, E. Planz Road
South	25	Cottonwood Road
West	40	E. White Lane

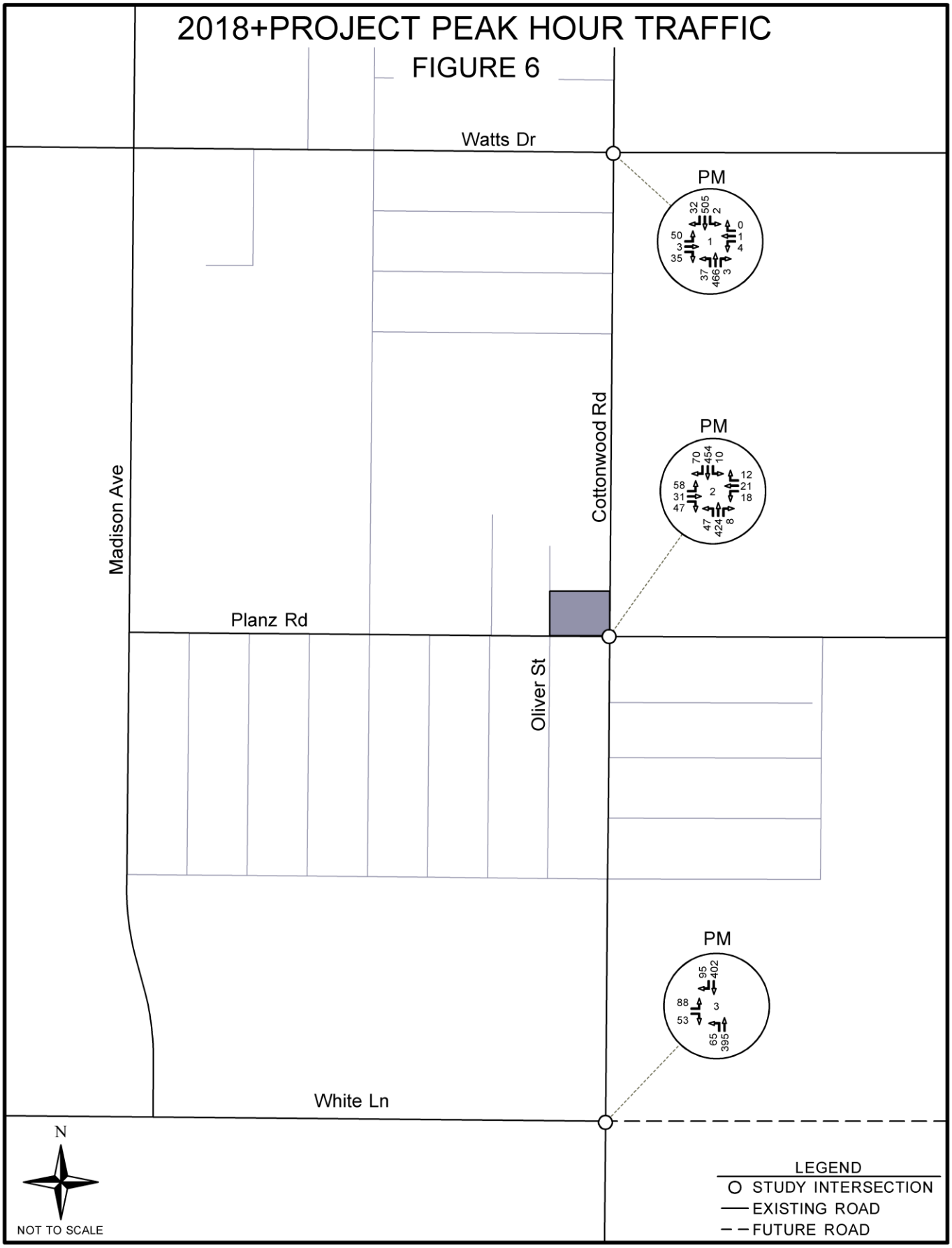
EXISTING AND FUTURE TRAFFIC

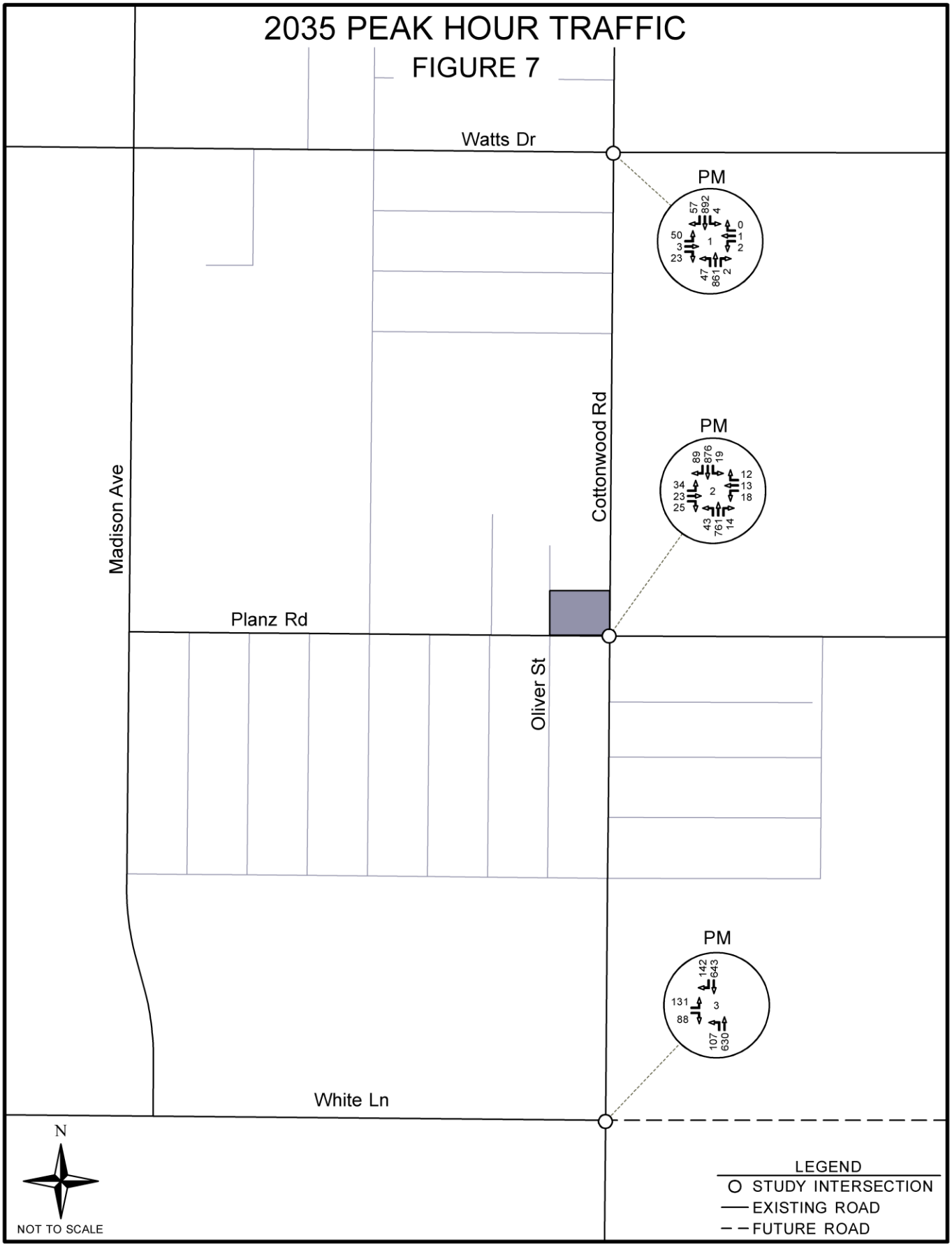
Existing peak hour turn movement volumes were field measured on December 5, 2018 at the study intersections and are shown in Figure 4. Existing+Project peak hour volumes are shown in Figure 6.

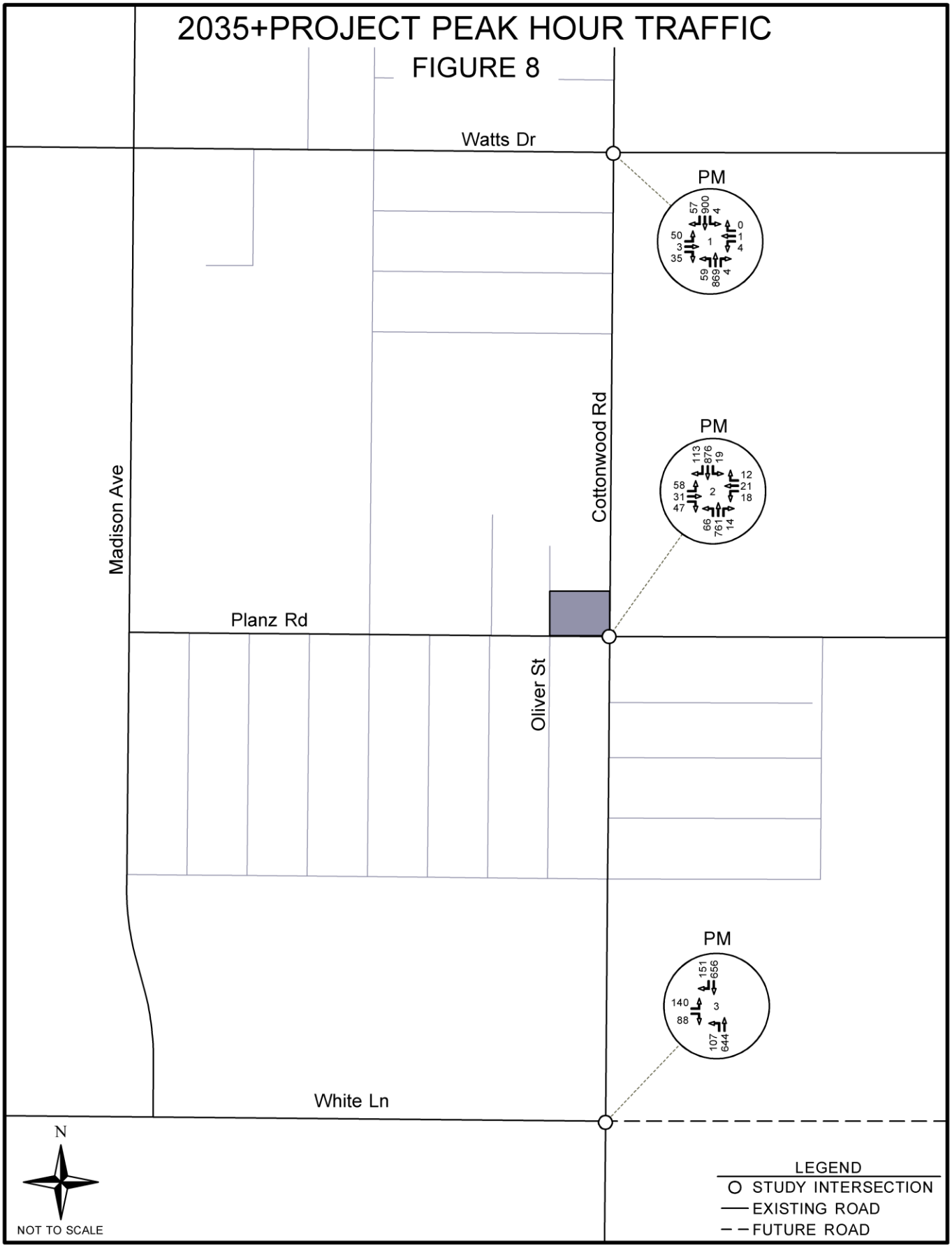
Annual growth rates from approximately 0.05% to 3.78% were applied to existing traffic volumes to estimate future traffic volumes for the year 2035. These growth rates were estimated based on a review of existing developments and KernCOG traffic model data. Future peak hour volumes are shown in Figures 7 and 8.


2018 PEAK HOUR TRAFFIC
FIGURE 4
Watts Dr
Madison Ave
Cottonwood Rd
Planz Rd
Oliver St
White Ln
PM
32 497 2
50 3 23
1
0 1 2
25 458 1
PM
46 454 10
34 23 25
2
12 13 18
24 424 8
PM
86 389
79 53
3
65 381
N
NOT TO SCALE
LEGEND
STUDY INTERSECTION
EXISTING ROAD
FUTURE ROAD


PROJECT PEAK HOUR TRAFFIC
FIGURE 5
Watts Dr
PM
0 8 0
0 0 2
0 0 1
12 8 2
12
Cottonwood Rd
PM
24 0 0
24 8 2
22 0 8
23 0 0
Madison Ave
Planz Rd
Oliver St
PM
9 13
9 3
0 14
White Ln
N
NOT TO SCALE
LEGEND
STUDY INTERSECTION
EXISTING ROAD
FUTURE ROAD


2018+PROJECT PEAK HOUR TRAFFIC
FIGURE 6
Watts Dr
Madison Ave
Cottonwood Rd
Planz Rd
Oliver St
White Ln
PM
32 505 2
50 3 35
1
0 1 4
37 466 3
PM
70 454 10
58 31 47
2
12 21 18
47 424 8
PM
95 402
88 53
3
65 395
N
NOT TO SCALE
LEGEND
STUDY INTERSECTION
EXISTING ROAD
FUTURE ROAD


2035 PEAK HOUR TRAFFIC
FIGURE 7
Watts Dr
Madison Ave
Cottonwood Rd
Planz Rd
Oliver St
White Ln
PM
57 892 4
50 3 23
1
0 1 2
47 861 2
PM
89 876 19
34 23 25
2
12 13 18
43 761 14
PM
142 643
131 88
3
107 630
N
NOT TO SCALE
LEGEND
STUDY INTERSECTION
EXISTING ROAD
FUTURE ROAD


2035+PROJECT PEAK HOUR TRAFFIC
FIGURE 8
Watts Dr
Madison Ave
Cottonwood Rd
Planz Rd
Oliver St
White Ln
PM
57 900 4
50 3 35
1
0 1 4
59 869 4
PM
113 876 19
58 31 47
2
12 21 18
66 761 14
PM
151 656
140 88
3
107 644
N
NOT TO SCALE
LEGEND
STUDY INTERSECTION
EXISTING ROAD
FUTURE ROAD

INTERSECTION ANALYSIS

A capacity analysis of the study intersections was conducted using Synchro 9 software from Trafficware. This software utilizes the 2010 capacity analysis methodology in the Transportation Research Board's Highway Capacity Manual. The analysis was performed for the following traffic scenarios:

- Existing (2018)
- Existing+Project (2018)
- Future (2035)
- Future+Project (2035)

Level of service (LOS) criteria for unsignalized and signalized intersections, as described in HCM 2010, are presented in the tables below. Level of service analysis results for the study intersections are presented in Table 3. The intersection peak hour level of service goal for the City of Bakersfield is LOS C or better.

LEVEL OF SERVICE CRITERIA
UNSIGNALIZED INTERSECTION

Average Control Delay (sec/veh)	Level of Service	Expected Delay to Minor Street Traffic
≤ 10	A	Little or no delay
> 10 and ≤ 15	B	Short traffic delays
> 15 and ≤ 25	C	Average traffic delays
> 25 and ≤ 35	D	Long traffic delays
> 35 and ≤ 50	E	Very long traffic delays
> 50	F	Extreme delays

LEVEL OF SERVICE CRITERIA
SIGNALIZED INTERSECTIONS

Volume/Capacity	Control Delay (sec/veh)	Level of Service
< 0.60	≤ 10	A
0.61 - 0.70	> 10 and ≤ 20	B
0.71 - 0.80	> 20 and ≤ 35	C
0.81 - 0.90	> 35 and ≤ 55	D
0.91 - 1.00	> 55 and ≤ 80	E
> 1.0	> 80	F

Table 3
PM Unsignalized Intersection Level of Service

#	Intersection	Movement	2018	2018+ Project	2035	2035+ Project	2035+ Project w/Mitigation[1]
1	Cottonwood Rd & Watts Dr	EB WB	D (31.1) D (26.6)	D (33.2) D (30.3)	F (>300) F (121.8)	F (>300) F (176.9)	B
2	Cottonwood Rd & E. Planz Rd	Overall Intersection	C	D (27.1)	F (54.4)	F (54.9)	C
3	Cottonwood Rd & E. White Ln	EB	D (26.0)	D (30.2)	F (>300)	F (>300)	C

[1] See Table 6 for mitigation measures.

TRAFFIC SIGNAL WARRANT ANALYSIS

Peak hour signal warrants were evaluated for each of the unsignalized intersections within the study based on the California Manual on Uniform Traffic Control Devices (MUTCD). Peak hour signal warrants assess delay to traffic on the minor street approaches when entering or crossing a major street. Signal warrant analysis results for the PM peak hour are shown in Table 4.

It is important to note that a signal warrant defines the minimum condition under which signalization of an intersection might be warranted. Meeting this threshold does not suggest traffic signals are required, but rather, that other traffic factors and conditions be considered in order to determine whether signals are truly justified.

It is also noted that signal warrants do not necessarily correlate with level of service. An intersection may satisfy a signal warrant condition and operate at or above an acceptable level of service, or operate below an acceptable level of service and not meet signal warrant criteria.

Table 4
PM Traffic Signal Warrants

		2018			2018+Project			2035			2035+Project		
#	Intersection	Major Street Total Approach Vol	Minor Street High Approach Vol	Warrant Met	Major Street Total Approach Vol	Minor Street High Approach Vol	Warrant Met	Major Street Total Approach Vol	Minor Street High Approach Vol	Warrant Met	Major Street Total Approach Vol	Minor Street High Approach Vol	Warrant Met
1	Cottonwood Rd at Watts Rd	1015	76	NO	1045	88	YES	1863	76	YES	1893	88	YES
2	Cottonwood Rd at E Planz Rd	966	82	NO	1013	136	YES	1802	82	YES	1849	136	YES
3	Cottonwood Rd at White Ln	921	132	YES	957	141	YES	1522	219	YES	1558	228	YES

ROADWAY ANALYSIS

The volume-to-capacity ratios shown in Table 5 were calculated for roadways with published ADT information and future projected traffic.

A volume-to-capacity ratio (v/c) of greater than 0.80 corresponds to a LOS of less than C, as defined in the Highway Capacity Manual. Mitigation is required where project traffic reduces the LOS to below an acceptable level, or where the pre-existing condition of the roadway is below an acceptable level of service and degrades below the pre-existing LOS with the addition of the project.

Table 5
Roadway Capacity

Street	2018[1] ADT	2035+ Project	v/c(Ex) 2018	v/c(Ex) 2018+Proj	v/c(Ex) 2035	v/c(Ex) 2035+Proj	v/c(Mit) 2035+Proj[2]
Cottonwood Rd: Watts Dr - E Planz Rd	10457	19654	20015	0.70	0.72	**1.31**	**1.33**	0.67
Cottonwood Rd: E White Ln - E Planz Rd	10429	18727	19329	0.70	0.74	**1.25**	**1.29**	0.64

[1]2018 data not available; data grown out from most recent year available.

[2]See Table 7 for mitigation measures.

MITIGATION

Intersection and roadway improvements needed by the year 2035 to maintain or improve the operational level of service of the street system in the vicinity of the project are shown in Tables 6 and 7. The Regional Transportation Impact Fee (RTIF) Program is a fee imposed on new development and contains a Regional Transportation Facilities List and a Transportation Impact Fee Schedule. The Facilities List includes many of the facilities needed to maintain a Level of Service (LOS) C or better for new growth or to prevent the degradation of facilities which are currently operating below LOS C. The Fee Schedule sets forth the fees to be collected from new development to mitigate the need for the facilities.

Table 6
Future Intersection Improvements and Local Mitigation

#	Intersection	Total Improvements Required by 2035	Local Mitigation (Improvements not covered by RTIF or adjacent development)	Project Share for Local Mitigation
1	Cottonwood Rd & Watts Dr.	Signal; NBL,NBR; SBL, SBR	Signal	4.93%
2	Cottonwood Rd & E. Planz Rd	Signal; NBL,NBR; SBL, SBR	-	-
3	Cottonwood Rd & E. White Ln	Signal; NBL,NBR; SBL, SBR; WBL, WBR	-	-

Notes: NB = Northbound, SB = Southbound, L = Left-Turn Lane, WB = Westbound, T = Through Lane, EB = Eastbound, R = Right-Turn Lane

Table 7
Future Roadway Improvements and Local Mitigation

Roadway Segment	Total Improvements Required by 2035	Local Mitigation (Improvements not covered by RTIF or adjacent development)
Cottonwood Rd: Watts Dr - E Planz Rd	Add two lanes	-
Cottonwood Rd: E White Ln - E Planz Rd	Add two lanes	-

SUMMARY AND CONCLUSIONS

This study evaluated the potential traffic impact of a proposed general plan amendment and zone change for a convenience store with gasoline pumps located at the northwest corner of Cottonwood Road and E. Planz Road.

Level of Service Analysis

The intersections at Cottonwood Road & Watts Drive and Cottonwood Road & E. Planz Road operate below an acceptable level of service prior to the addition of project traffic in existing and future year scenarios. The intersection of Cottonwood Road and White Lane operates at an acceptable level of service during peak hours in the existing year, but is anticipated to operate below an acceptable level of service with the addition of project traffic; both in existing and future year scenarios.

Roadway Capacity

The roadway segments of Cottonwood Road from Watts Drive to E. White Lane are anticipated to operate below an acceptable level of service in the future year (2035) prior to the addition of project traffic.

Conclusion

Three study intersections and two roadway segments were identified to need improvements in order to maintain acceptable levels of service as shown in Tables 6 and 7. These improvements, with the exception of the addition of a signal at the intersection of Cottonwood Road and Watts Drive, are included in the RTIF facilities list. Provided that the improvements listed in Tables 6 and 7 are constructed, it is anticipated that the proposed commercial General Plan Amendment (GPA) and Zone Change will have a less-than-significant impact on traffic operations in the vicinity of the project.

REFERENCES

1. Annual Traffic Census, Kern COG
2. City of Bakersfield General Plan, approved 2010
3. Highway Capacity Manual, Special Report 209, Transportation Research Board
4. California Manual on Uniform Traffic Control Devices for Streets and Highways, 2012 Edition, Federal Highway Administration (FHA)
5. Trip Generation, 10th Edition, Institute of Transportation Engineers (ITE)

APPENDIX

Intersection 1
Cottonwood Rd & Watts Rd

Intersection	
Int Delay, s/veh	2.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	50	3	23	2	1	0	25	458	1	2	497	32
Future Vol, veh/h	50	3	23	2	1	0	25	458	1	2	497	32
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	54	3	25	2	1	0	27	498	1	2	540	35

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1125	1125	568	1139	1142	508	580	0	0	504	0	0
Stage 1	567	567	-	558	558	-	-	-	-	-	-	-
Stage 2	558	558	-	581	584	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	182	205	522	178	200	565	994	-	-	1061	-	-
Stage 1	508	507	-	514	512	-	-	-	-	-	-	-
Stage 2	514	512	-	499	498	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	174	195	518	161	190	560	990	-	-	1057	-	-
Mov Cap-2 Maneuver	174	195	-	161	190	-	-	-	-	-	-	-
Stage 1	487	503	-	492	490	-	-	-	-	-	-	-
Stage 2	491	490	-	468	494	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	31.1	26.6	0.5	0
HCM LOS	D	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	990	-	-	219	170	1057	-	-
HCM Lane V/C Ratio	0.027	-	-	0.377	0.019	0.002	-	-
HCM Control Delay (s)	8.7	0	-	31.1	26.6	8.4	0	-
HCM Lane LOS	A	A	-	D	D	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	1.7	0.1	0	-	-

Intersection	
Int Delay, s/veh	3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	50	3	35	4	1	0	37	466	3	2	505	32
Future Vol, veh/h	50	3	35	4	1	0	37	466	3	2	505	32
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	54	3	38	4	1	0	40	507	3	2	549	35

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1170	1171	576	1190	1187	518	589	0	0	515	0	0
Stage 1	576	576	-	594	594	-	-	-	-	-	-	-
Stage 2	594	595	-	596	593	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	170	193	517	165	188	558	986	-	-	1051	-	-
Stage 1	503	502	-	491	493	-	-	-	-	-	-	-
Stage 2	491	492	-	490	493	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	160	180	513	143	175	553	982	-	-	1047	-	-
Mov Cap-2 Maneuver	160	180	-	143	175	-	-	-	-	-	-	-
Stage 1	472	498	-	461	463	-	-	-	-	-	-	-
Stage 2	460	462	-	447	489	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	33.2	30.3	0.6	0
HCM LOS	D	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	982	-	-	221	148	1047	-	-
HCM Lane V/C Ratio	0.041	-	-	0.433	0.037	0.002	-	-
HCM Control Delay (s)	8.8	0	-	33.2	30.3	8.4	0	-
HCM Lane LOS	A	A	-	D	D	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	2	0.1	0	-	-

Intersection	
Int Delay, s/veh	22.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	50	3	23	2	1	0	47	861	2	4	892	57
Future Vol, veh/h	50	3	23	2	1	0	47	861	2	4	892	57
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	54	3	25	2	1	0	51	936	2	4	970	62

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	2059	2059	1011	2072	2089	947	1037	0	0	943	0	0
Stage 1	1014	1014	-	1044	1044	-	-	-	-	-	-	-
Stage 2	1045	1045	-	1028	1045	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	~ 40	55	291	40	53	317	670	-	-	727	-	-
Stage 1	288	316	-	277	306	-	-	-	-	-	-	-
Stage 2	276	306	-	283	306	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	~ 34	45	289	30	44	314	667	-	-	724	-	-
Mov Cap-2 Maneuver	~ 34	45	-	30	44	-	-	-	-	-	-	-
Stage 1	241	311	-	232	256	-	-	-	-	-	-	-
Stage 2	230	256	-	251	301	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	$ 551.5	121.8	0.6	0
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	667	-	-	47	34	724	-	-
HCM Lane V/C Ratio	0.077	-	-	1.758	0.096	0.006	-	-
HCM Control Delay (s)	10.8	0	-	$ 551.5	121.8	10	0	-
HCM Lane LOS	B	A	-	F	F	B	A	-
HCM 95th %tile Q(veh)	0.2	-	-	8.2	0.3	0	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	28.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	50	3	35	4	1	0	59	869	4	4	900	57
Future Vol, veh/h	50	3	35	4	1	0	59	869	4	4	900	57
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	54	3	38	4	1	0	64	945	4	4	978	62

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	2104	2105	1019	2124	2134	957	1045	0	0	954	0	0
Stage 1	1023	1023	-	1080	1080	-	-	-	-	-	-	-
Stage 2	1081	1082	-	1044	1054	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	~ 38	51	288	36	49	313	666	-	-	720	-	-
Stage 1	284	313	-	264	294	-	-	-	-	-	-	-
Stage 2	264	294	-	277	303	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	~ 31	40	286	24	38	310	663	-	-	717	-	-
Mov Cap-2 Maneuver	~ 31	40	-	24	38	-	-	-	-	-	-	-
Stage 1	225	308	-	209	233	-	-	-	-	-	-	-
Stage 2	208	233	-	234	298	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	$ 625	176.9	0.7	0
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	663	-	-	49	26	717	-	-
HCM Lane V/C Ratio	0.097	-	-	1.952	0.209	0.006	-	-
HCM Control Delay (s)	11	0	-	$ 625	176.9	10.1	0	-
HCM Lane LOS	B	A	-	F	F	B	A	-
HCM 95th %tile Q(veh)	0.3	-	-	9.6	0.6	0	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

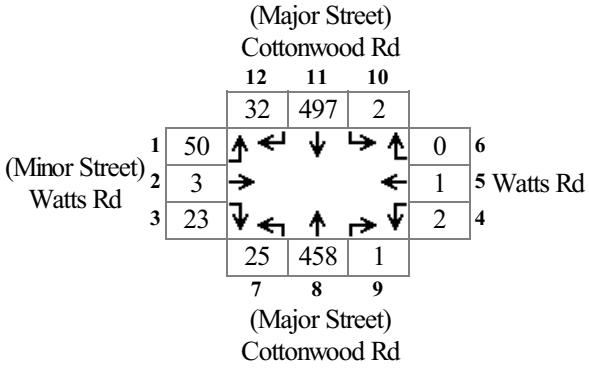
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	50	3	35	4	1	0	59	869	4	4	900	57
Future Volume (veh/h)	50	3	35	4	1	0	59	869	4	4	900	57
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1750	1863	1750	1750	1863	1750	1716	1863	1716	1716	1863	1716
Adj Flow Rate, veh/h	54	3	38	4	1	0	64	945	4	4	978	62
Adj No. of Lanes	0	1	0	0	1	0	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	172	5	48	217	41	0	76	1239	970	7	1160	908
Arrive On Green	0.08	0.08	0.08	0.08	0.08	0.00	0.09	1.00	1.00	0.00	0.62	0.62
Sat Flow, veh/h	840	57	598	1209	510	0	1634	1863	1458	1634	1863	1458
Grp Volume(v), veh/h	95	0	0	5	0	0	64	945	4	4	978	62
Grp Sat Flow(s),veh/h/ln	1496	0	0	1719	0	0	1634	1863	1458	1634	1863	1458
Q Serve(g_s), s	3.2	0.0	0.0	0.0	0.0	0.0	2.1	0.0	0.0	0.1	22.5	0.9
Cycle Q Clear(g_c), s	3.4	0.0	0.0	0.1	0.0	0.0	2.1	0.0	0.0	0.1	22.5	0.9
Prop In Lane	0.57		0.40	0.80		0.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	225	0	0	258	0	0	76	1239	970	7	1160	908
V/C Ratio(X)	0.42	0.00	0.00	0.02	0.00	0.00	0.84	0.76	0.00	0.57	0.84	0.07
Avail Cap(c_a), veh/h	601	0	0	622	0	0	121	1239	970	121	1160	908
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	0.69	0.69	0.69	1.00	1.00	1.00
Uniform Delay (d), s/veh	24.4	0.0	0.0	22.9	0.0	0.0	24.3	0.0	0.0	26.8	8.1	4.0
Incr Delay (d2), s/veh	1.3	0.0	0.0	0.0	0.0	0.0	18.0	3.1	0.0	56.2	7.5	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.5	0.0	0.0	0.1	0.0	0.0	1.3	1.1	0.0	0.2	13.6	0.4
LnGrp Delay(d),s/veh	25.6	0.0	0.0	22.9	0.0	0.0	42.3	3.1	0.0	83.0	15.6	4.2
LnGrp LOS	C			C			D	A	A	F	B	A
Approach Vol, veh/h		95			5			1013			1044	
Approach Delay, s/veh		25.6			22.9			5.6			15.2	
Approach LOS		C			C			A			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	4.7	40.4		8.8	7.0	38.1		8.8
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	4.0	18.0		18.0	4.0	18.0		18.0
Max Q Clear Time (g_c+I1), s	2.1	2.0		5.4	4.1	24.5		2.1
Green Ext Time (p_c), s	0.0	9.2		0.2	0.0	0.0		0.3

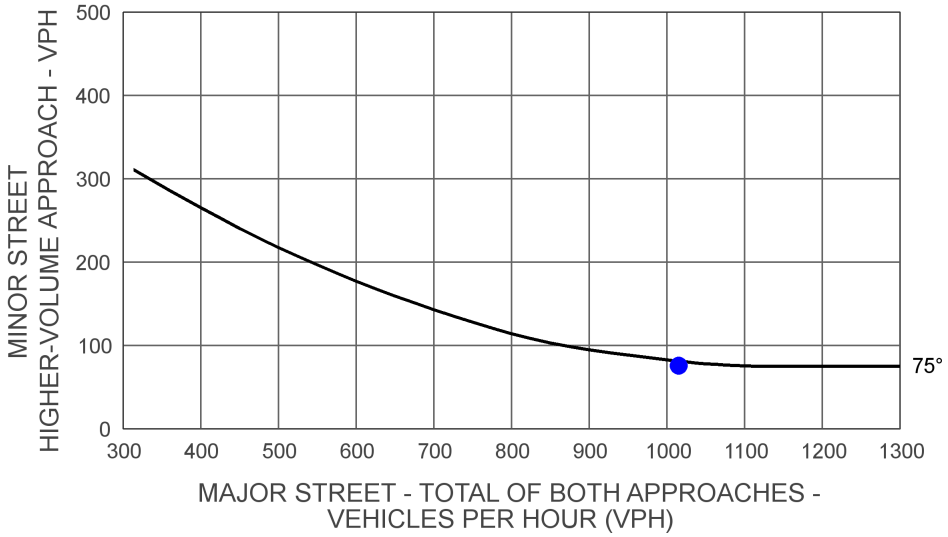
Intersection Summary	
HCM 2010 Ctrl Delay	11.2
HCM 2010 LOS	B

Rural Peak Hour Signal Warrant
Intersection Does Not Meet Signal Warrant

Scenario: PM Existing
Intersection #: 1

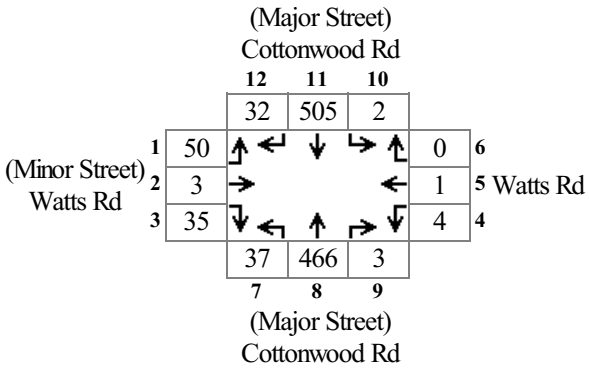


Major Total: 1015
Minor High Volume: 76

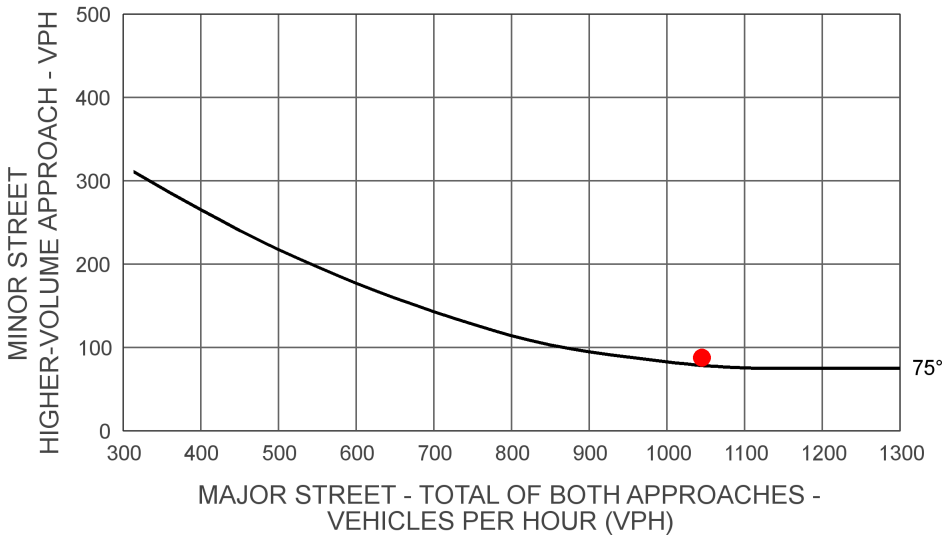


Rural Peak Hour Signal Warrant
Intersection Meets Signal Warrant

Scenario: PM Existing+Project
Intersection #: 1

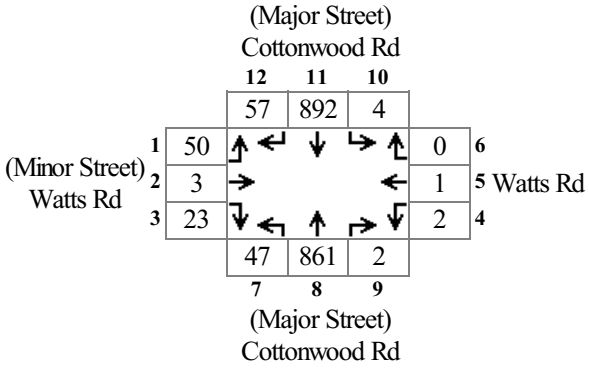


Major Total: 1045
Minor High Volume: 88

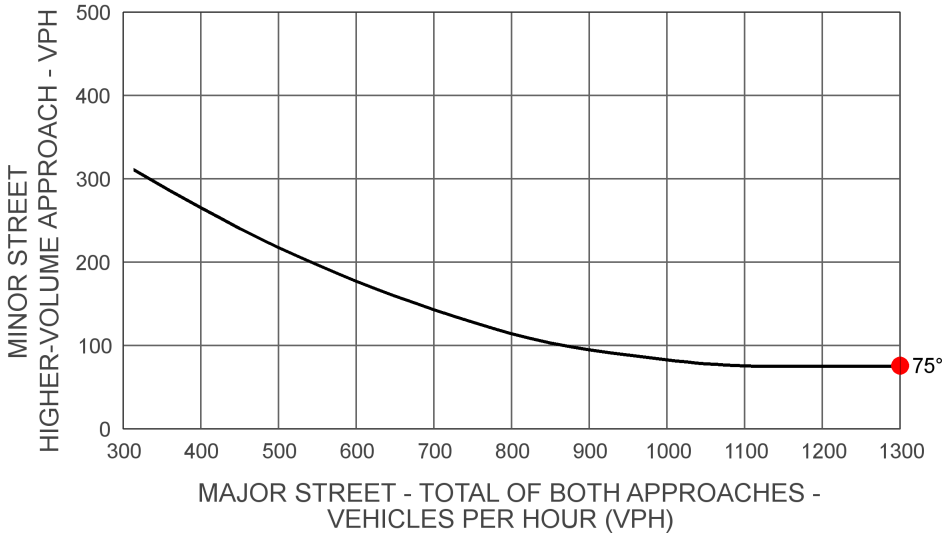


Rural Peak Hour Signal Warrant
Intersection Meets Signal Warrant

Scenario: PM Future
Intersection #: 1

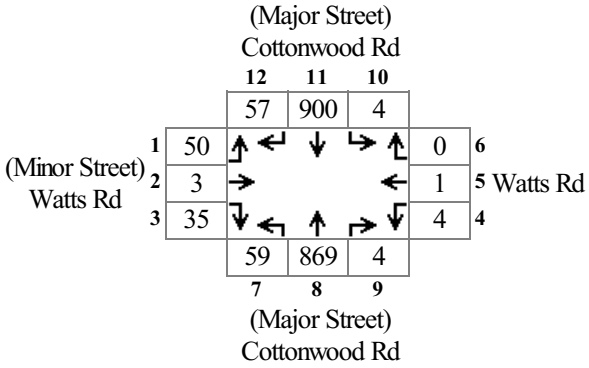


Major Total: 1863
Minor High Volume: 76

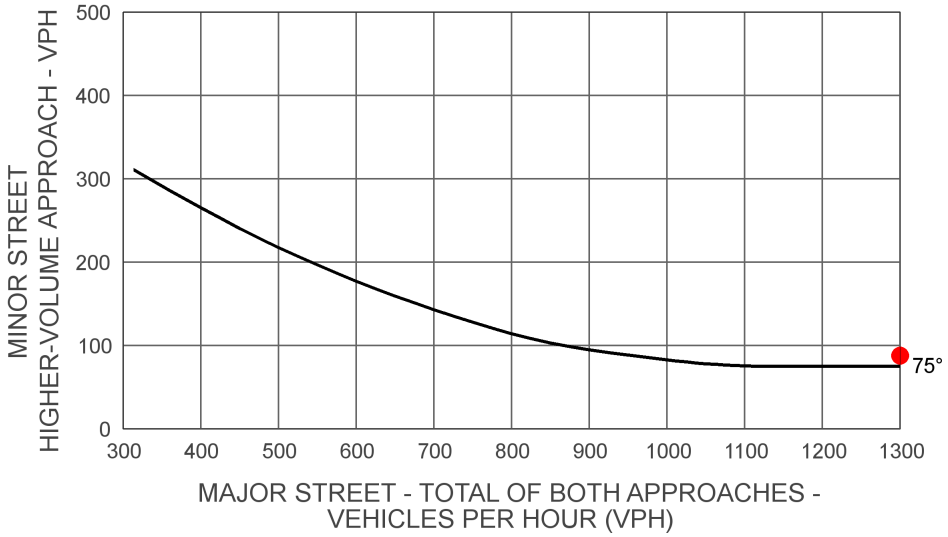


Rural Peak Hour Signal Warrant
Intersection Meets Signal Warrant

Scenario: PM Future+Project
Intersection #: 1

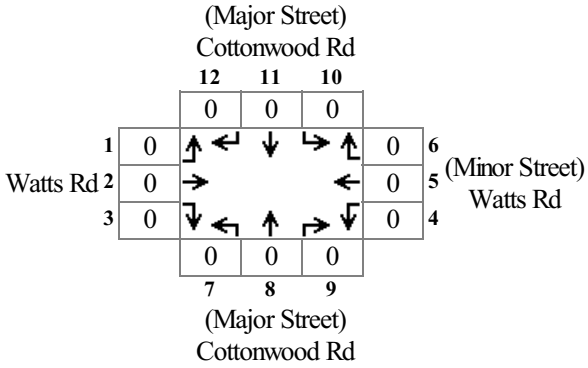


Major Total: 1893
Minor High Volume: 88

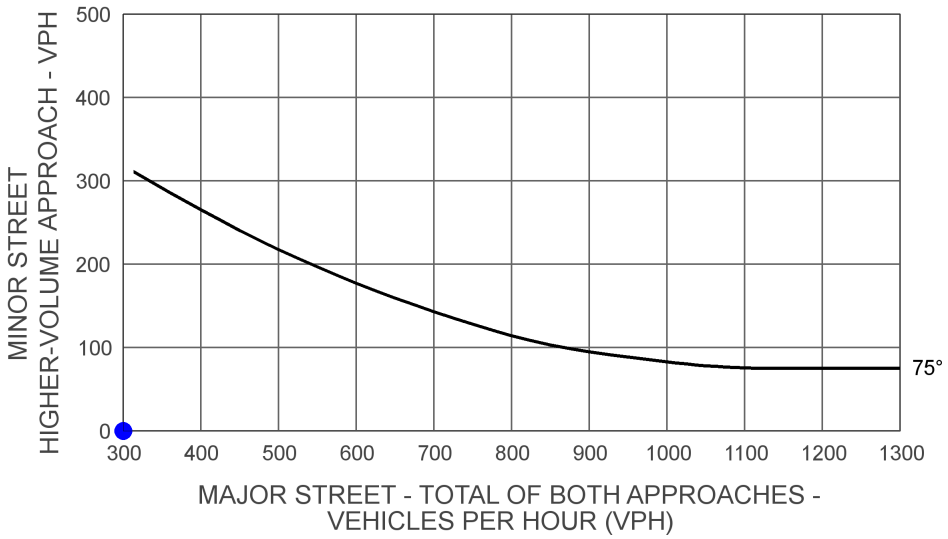


Rural Peak Hour Signal Warrant
Intersection Does Not Meet Signal Warrant

Scenario: AM Existing
Intersection #: 1

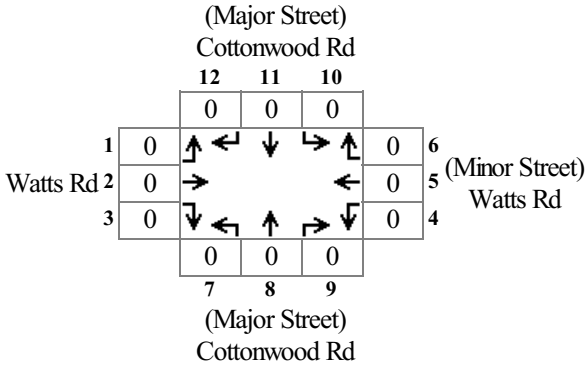


Major Total: 0
Minor High Volume: 0

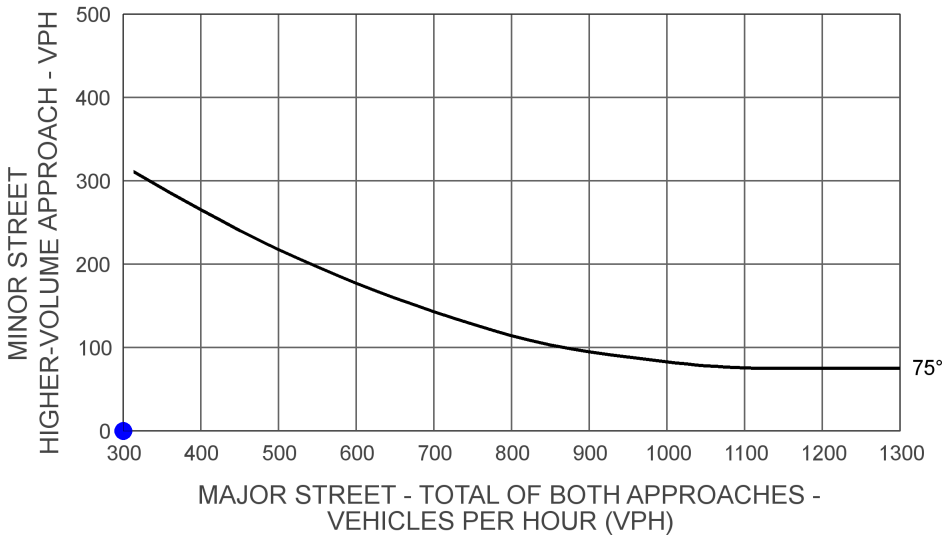


Rural Peak Hour Signal Warrant
Intersection Does Not Meet Signal Warrant

Scenario: AM Existing+Project
Intersection #: 1

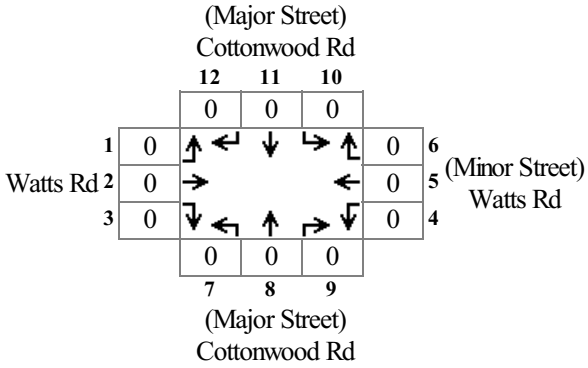


Major Total: 0
Minor High Volume: 0

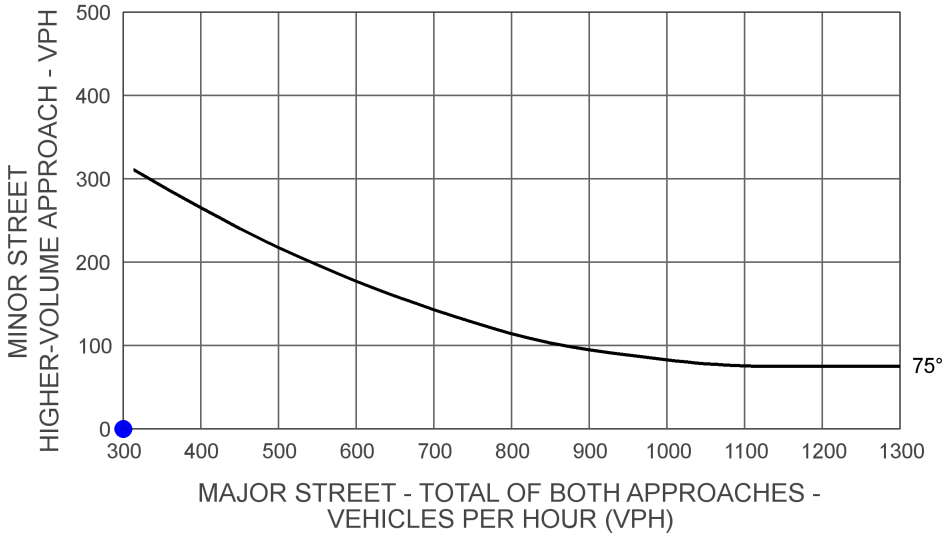


Rural Peak Hour Signal Warrant
Intersection Does Not Meet Signal Warrant

Scenario: AM Future
Intersection #: 1

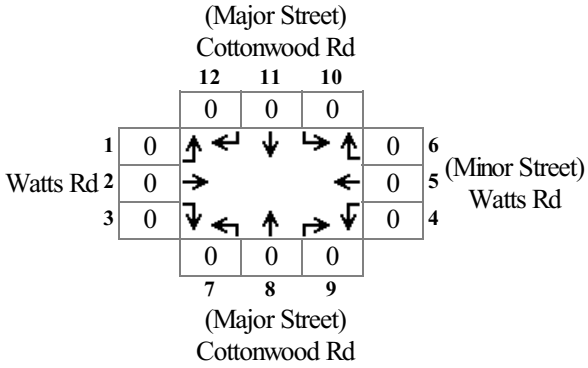


Major Total: 0
Minor High Volume: 0

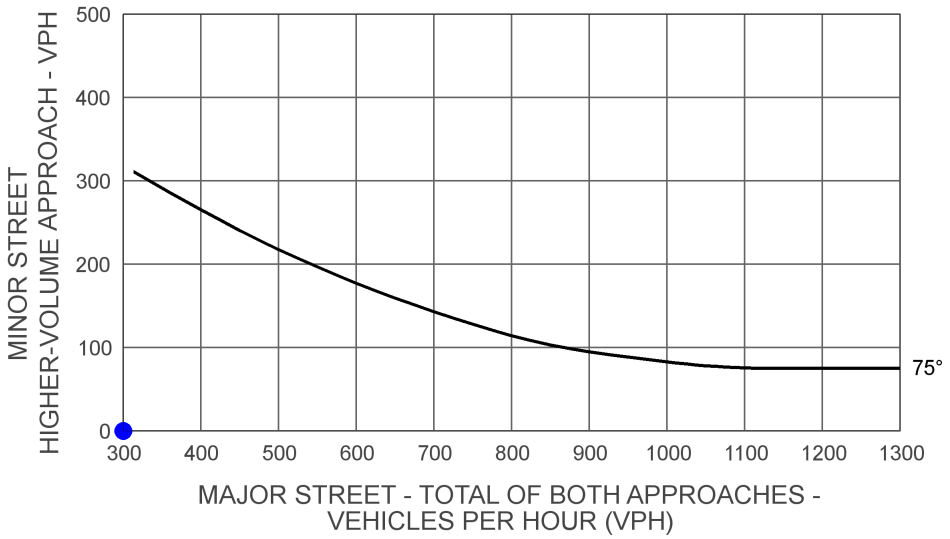


Rural Peak Hour Signal Warrant
Intersection Does Not Meet Signal Warrant

Scenario: AM Future+Project
Intersection #: 1



Major Total: 0
Minor High Volume: 0



Intersection 2
Cottonwood Rd & E Planz Rd

Intersection	
Intersection Delay, s/veh	19.9
Intersection LOS	C

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	34	23	25	0	18	13	12	0	24	424	8	0	10	454	46
Future Vol, veh/h	0	34	23	25	0	18	13	12	0	24	424	8	0	10	454	46
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	37	25	27	0	20	14	13	0	26	461	9	0	11	493	50
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	10.8	10.3	19.4	22.7
HCM LOS	B	B	C	C

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	5%	41%	42%	2%
Vol Thru, %	93%	28%	30%	89%
Vol Right, %	2%	30%	28%	9%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	456	82	43	510
LT Vol	24	34	18	10
Through Vol	424	23	13	454
RT Vol	8	25	12	46
Lane Flow Rate	496	89	47	554
Geometry Grp	1	1	1	1
Degree of Util (X)	0.703	0.16	0.086	0.769
Departure Headway (Hd)	5.105	6.459	6.616	4.993
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	709	554	540	726
Service Time	3.14	4.516	4.68	3.026
HCM Lane V/C Ratio	0.7	0.161	0.087	0.763
HCM Control Delay	19.4	10.8	10.3	22.7
HCM Lane LOS	C	B	B	C
HCM 95th-tile Q	5.8	0.6	0.3	7.4

Intersection	
Intersection Delay, s/veh	27.1
Intersection LOS	D

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	58	31	47	0	18	21	12	0	47	424	8	0	10	454	70
Future Vol, veh/h	0	58	31	47	0	18	21	12	0	47	424	8	0	10	454	70
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	63	34	51	0	20	23	13	0	51	461	9	0	11	493	76
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	12.5	11.2	26.7	32.8
HCM LOS	B	B	D	D

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	10%	43%	35%	2%
Vol Thru, %	89%	23%	41%	85%
Vol Right, %	2%	35%	24%	13%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	479	136	51	534
LT Vol	47	58	18	10
Through Vol	424	31	21	454
RT Vol	8	47	12	70
Lane Flow Rate	521	148	55	580
Geometry Grp	1	1	1	1
Degree of Util (X)	0.795	0.28	0.112	0.862
Departure Headway (Hd)	5.496	6.828	7.247	5.344
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	651	529	497	673
Service Time	3.582	4.832	5.256	3.427
HCM Lane V/C Ratio	0.8	0.28	0.111	0.862
HCM Control Delay	26.7	12.5	11.2	32.8
HCM Lane LOS	D	B	B	D
HCM 95th-tile Q	7.9	1.1	0.4	10

Intersection	
Intersection Delay, s/veh	54.4
Intersection LOS	F

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	34	23	25	0	18	13	12	0	43	761	14	0	19	876	89
Future Vol, veh/h	0	34	23	25	0	18	13	12	0	43	761	14	0	19	876	89
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	37	25	27	0	20	14	13	0	47	827	15	0	21	952	97
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	11.7	11.2	57.5	57.2
HCM LOS	B	B	F	F

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	5%	41%	42%	2%
Vol Thru, %	93%	28%	30%	89%
Vol Right, %	2%	30%	28%	9%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	818	82	43	984
LT Vol	43	34	18	19
Through Vol	761	23	13	876
RT Vol	14	25	12	89
Lane Flow Rate	889	89	47	1070
Geometry Grp	1	1	1	1
Degree of Util (X)	1	0.177	0.096	1
Departure Headway (Hd)	5.331	7.165	7.387	5.281
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	685	503	487	695
Service Time	3.364	5.181	5.408	3.314
HCM Lane V/C Ratio	1.298	0.177	0.097	1.54
HCM Control Delay	57.5	11.7	11.2	57.2
HCM Lane LOS	F	B	B	F
HCM 95th-tile Q	15.9	0.6	0.3	15.9

Intersection	
Intersection Delay, s/veh	54.9
Intersection LOS	F

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	58	31	47	0	18	21	12	0	66	761	14	0	19	876	113
Future Vol, veh/h	0	58	31	47	0	18	21	12	0	66	761	14	0	19	876	113
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	63	34	51	0	20	23	13	0	72	827	15	0	21	952	123
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	13.2	11.8	59.4	59
HCM LOS	B	B	F	F

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	8%	43%	35%	2%
Vol Thru, %	90%	23%	41%	87%
Vol Right, %	2%	35%	24%	11%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	841	136	51	1008
LT Vol	66	58	18	19
Through Vol	761	31	21	876
RT Vol	14	47	12	113
Lane Flow Rate	914	148	55	1096
Geometry Grp	1	1	1	1
Degree of Util (X)	1	0.295	0.119	1
Departure Headway (Hd)	5.652	7.195	7.697	5.583
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	649	501	467	657
Service Time	3.702	5.219	5.728	3.632
HCM Lane V/C Ratio	1.408	0.295	0.118	1.668
HCM Control Delay	59.4	13.2	11.8	59
HCM Lane LOS	F	B	B	F
HCM 95th-tile Q	15.4	1.2	0.4	15.5

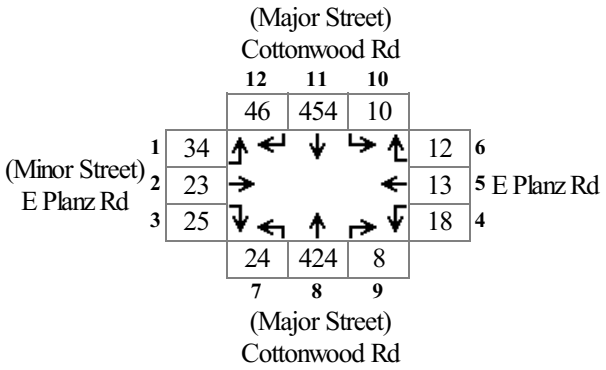
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	58	31	47	18	21	12	66	761	14	19	876	113
Future Volume (veh/h)	58	31	47	18	21	12	66	761	14	19	876	113
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		0.97	0.99		0.97	1.00		0.97	1.00		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1750	1863	1750	1750	1863	1750	1716	1863	1716	1716	1863	1716
Adj Flow Rate, veh/h	63	34	51	20	23	13	72	827	15	21	952	123
Adj No. of Lanes	0	1	0	0	1	0	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	171	70	77	143	135	57	87	1093	834	33	1031	786
Arrive On Green	0.14	0.14	0.14	0.14	0.14	0.14	0.02	0.19	0.19	0.01	0.37	0.37
Sat Flow, veh/h	532	489	537	365	941	395	1634	1863	1421	1634	1863	1421
Grp Volume(v), veh/h	148	0	0	56	0	0	72	827	15	21	952	123
Grp Sat Flow(s),veh/h/ln	1558	0	0	1701	0	0	1634	1863	1421	1634	1863	1421
Q Serve(g_s), s	3.3	0.0	0.0	0.0	0.0	0.0	2.4	22.6	0.5	0.7	26.4	3.1
Cycle Q Clear(g_c), s	4.8	0.0	0.0	1.5	0.0	0.0	2.4	22.6	0.5	0.7	26.4	3.1
Prop In Lane	0.43		0.34	0.36		0.23	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	318	0	0	334	0	0	87	1093	834	33	1031	786
V/C Ratio(X)	0.47	0.00	0.00	0.17	0.00	0.00	0.82	0.76	0.02	0.64	0.92	0.16
Avail Cap(c_a), veh/h	606	0	0	628	0	0	121	1093	834	121	1031	786
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33	0.67	0.67	0.67
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	0.75	0.75	0.75	0.33	0.33	0.33
Uniform Delay (d), s/veh	21.8	0.0	0.0	20.5	0.0	0.0	26.3	18.1	9.2	26.4	15.9	8.6
Incr Delay (d2), s/veh	1.1	0.0	0.0	0.2	0.0	0.0	20.9	3.7	0.0	6.7	5.9	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.1	0.0	0.0	0.8	0.0	0.0	1.6	12.8	0.2	0.4	15.3	1.3
LnGrp Delay(d),s/veh	22.9	0.0	0.0	20.7	0.0	0.0	47.2	21.8	9.2	33.2	21.8	8.7
LnGrp LOS	C			C			D	C	A	C	C	A
Approach Vol, veh/h		148			56			914			1096	
Approach Delay, s/veh		22.9			20.7			23.6			20.5	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	5.6	36.2		12.2	7.4	34.4		12.2
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	4.0	18.0		18.0	4.0	18.0		18.0
Max Q Clear Time (g_c+I1), s	2.7	24.6		6.8	4.4	28.4		3.5
Green Ext Time (p_c), s	0.0	0.0		0.5	0.0	0.0		0.6

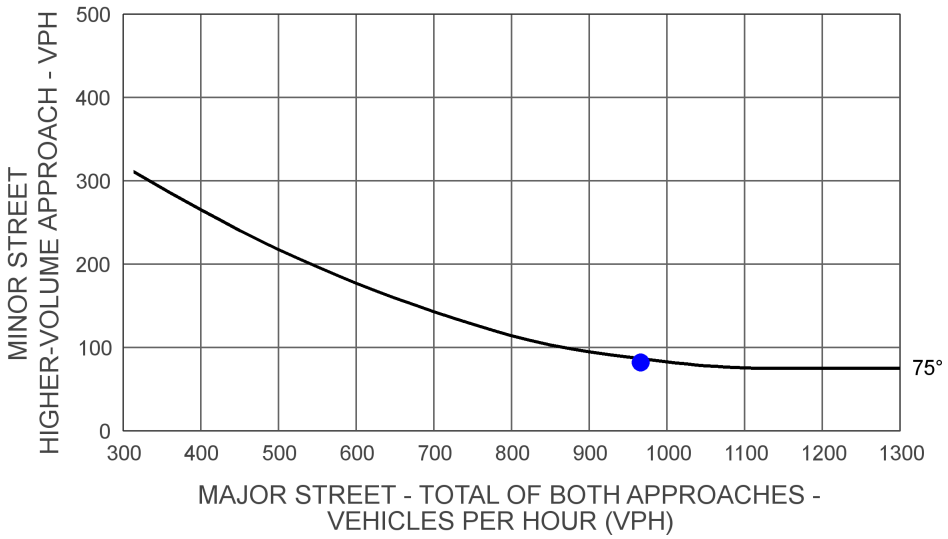
Intersection Summary		
HCM 2010 Ctrl Delay		22.0
HCM 2010 LOS		C

Rural Peak Hour Signal Warrant
Intersection Does Not Meet Signal Warrant

Scenario: PM Existing
Intersection #: 2

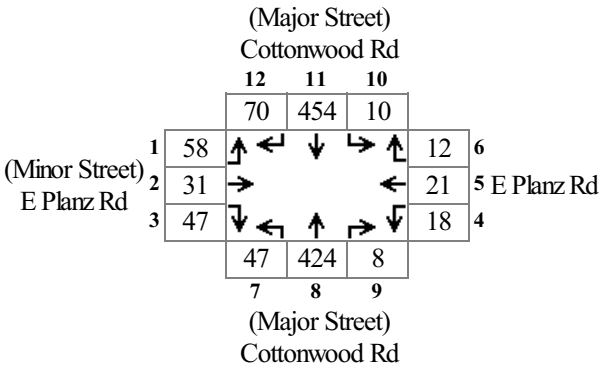


Major Total: 966
Minor High Volume: 82

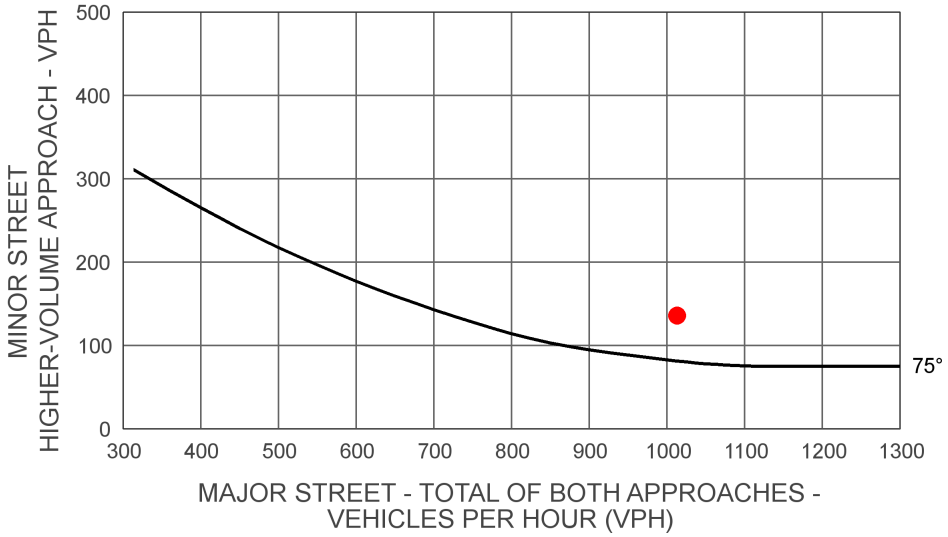


Rural Peak Hour Signal Warrant
Intersection Meets Signal Warrant

Scenario: PM Existing+Project
Intersection #: 2

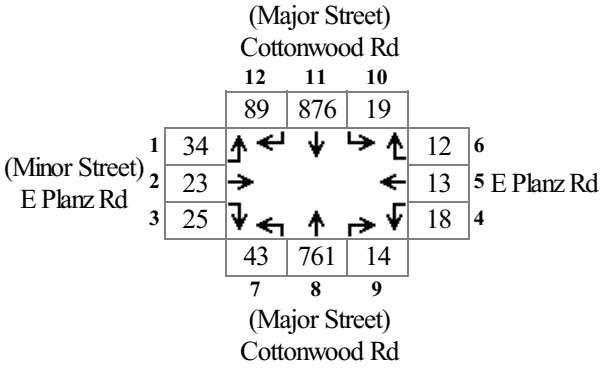


Major Total: 1013
Minor High Volume: 136

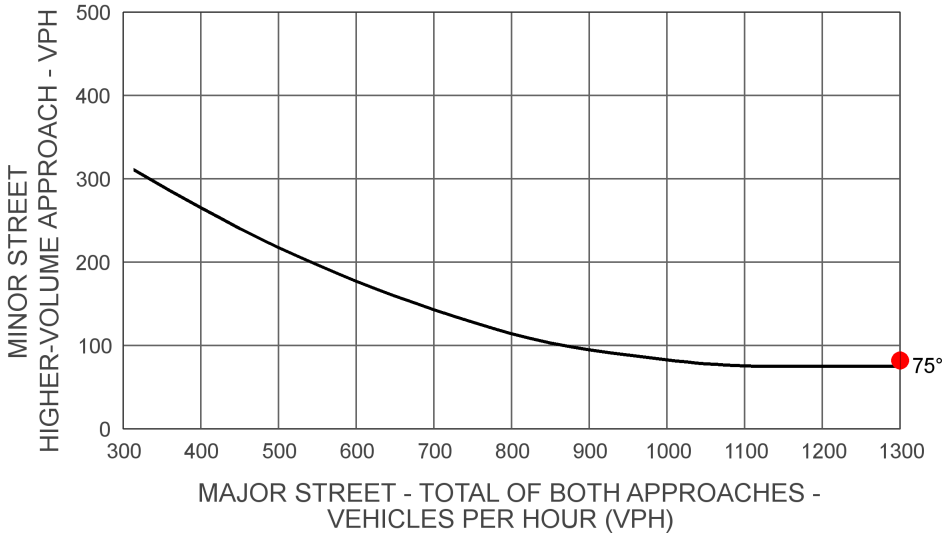


Rural Peak Hour Signal Warrant
Intersection Meets Signal Warrant

Scenario: PM Future
Intersection #: 2

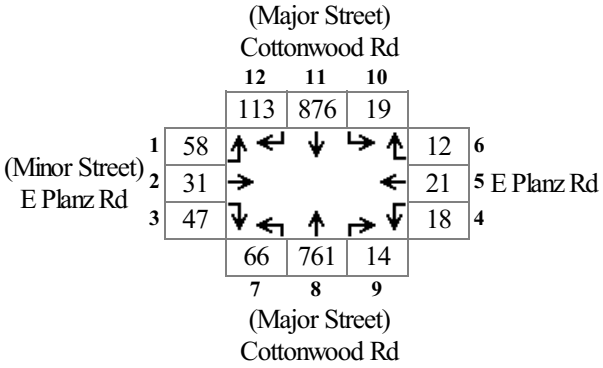


Major Total: 1802
Minor High Volume: 82

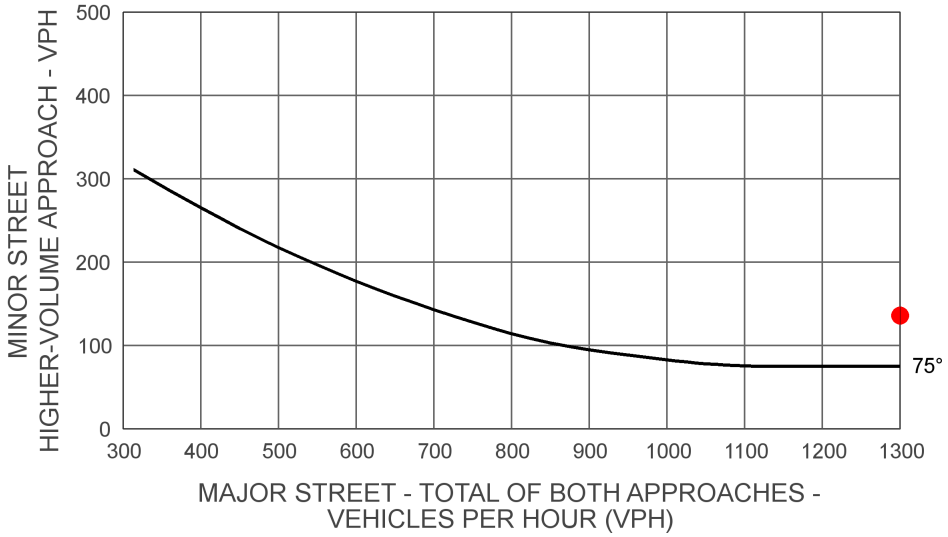


Rural Peak Hour Signal Warrant
Intersection Meets Signal Warrant

Scenario: PM Future+Project
Intersection #: 2

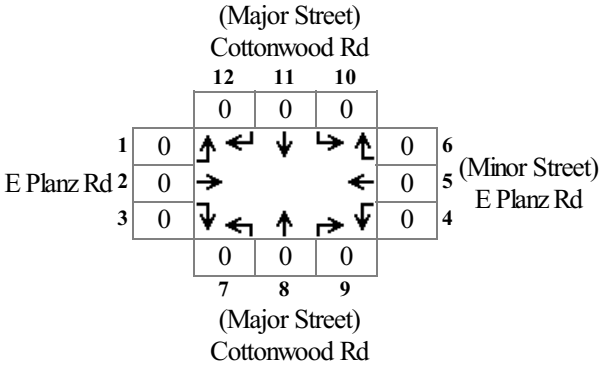


Major Total: 1849
Minor High Volume: 136

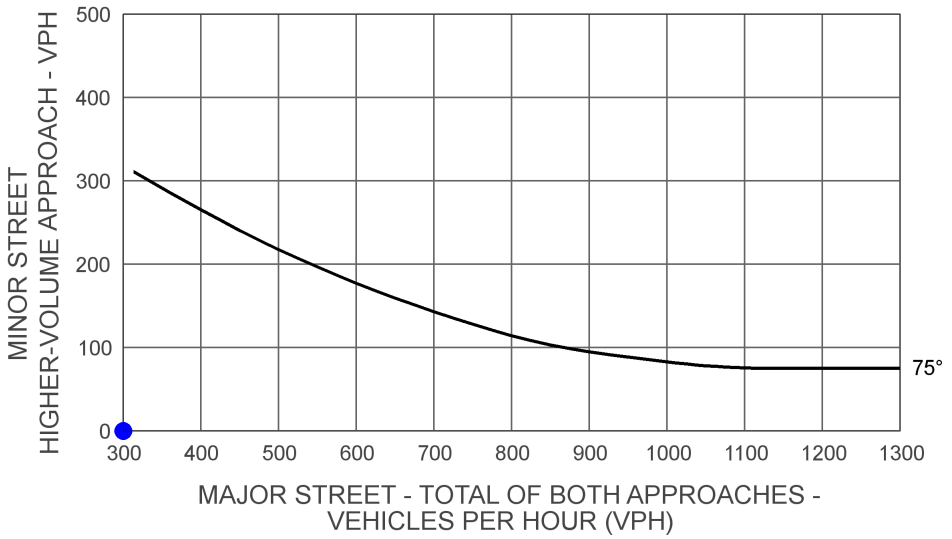


Rural Peak Hour Signal Warrant
Intersection Does Not Meet Signal Warrant

Scenario: AM Existing
Intersection #: 2

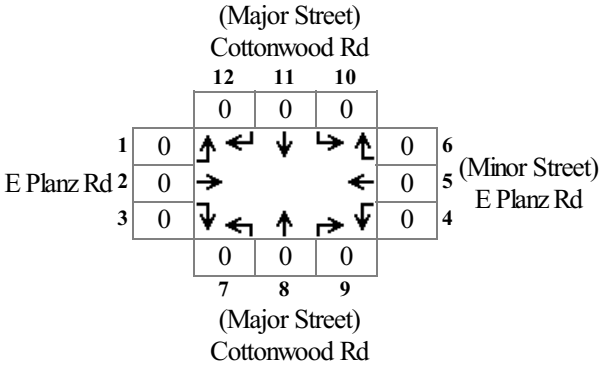


Major Total: 0
Minor High Volume: 0

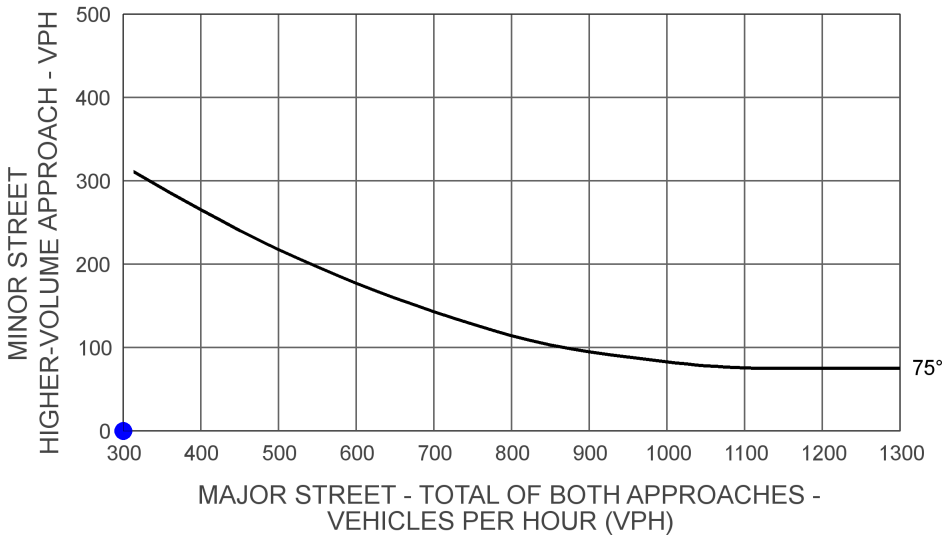


Rural Peak Hour Signal Warrant
Intersection Does Not Meet Signal Warrant

Scenario: AM Existing+Project
Intersection #: 2

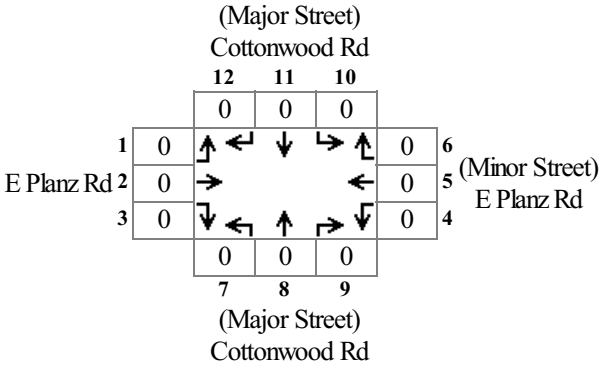


Major Total: 0
Minor High Volume: 0

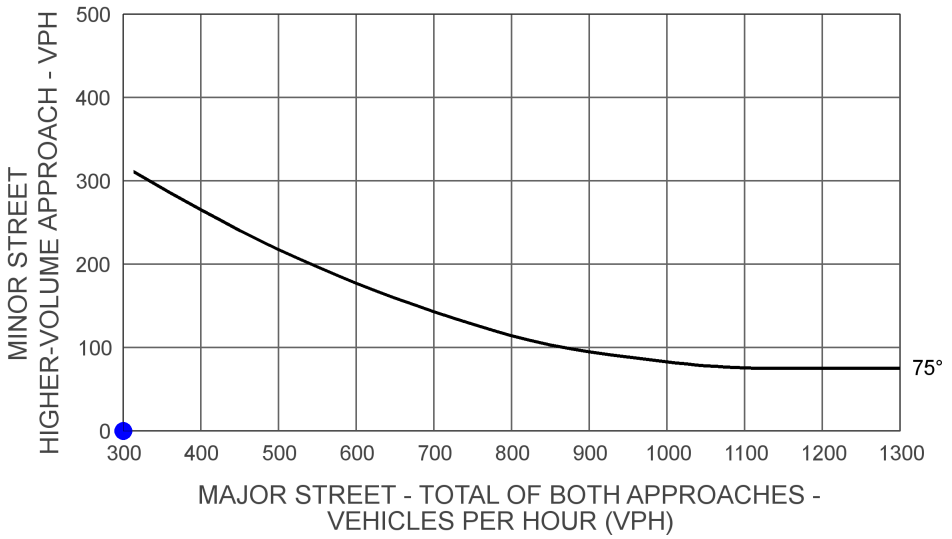


Rural Peak Hour Signal Warrant
Intersection Does Not Meet Signal Warrant

Scenario: AM Future
Intersection #: 2

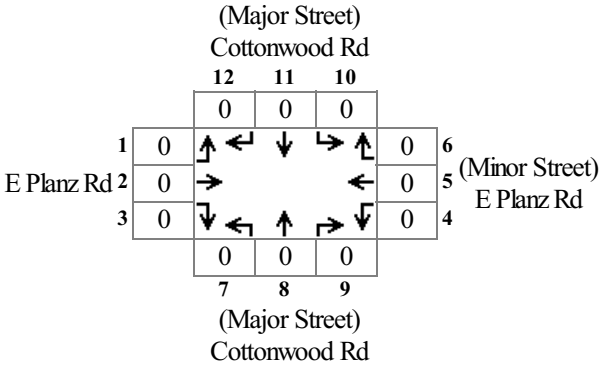


Major Total: 0
Minor High Volume: 0

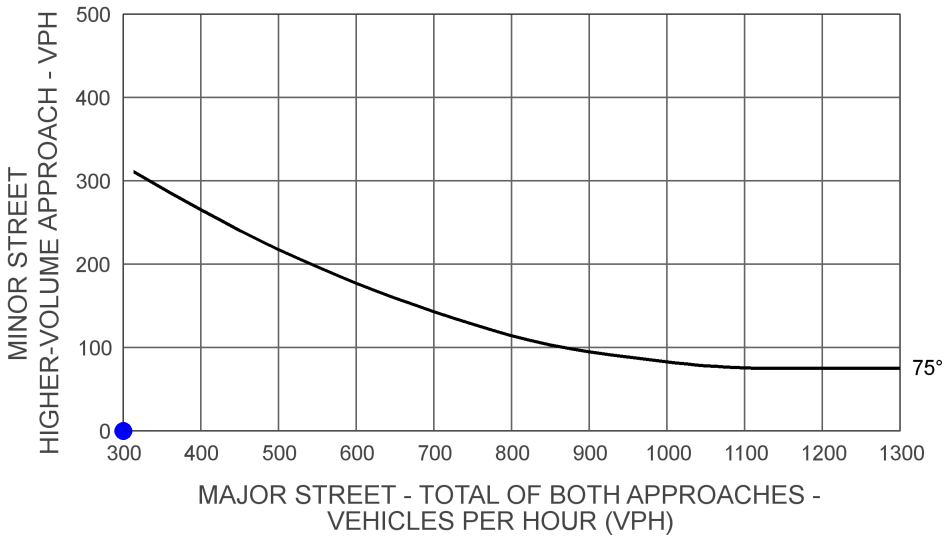


Rural Peak Hour Signal Warrant
Intersection Does Not Meet Signal Warrant

Scenario: AM Future+Project
Intersection #: 2



Major Total: 0
Minor High Volume: 0



Intersection 3
Cottonwood Rd & White Ln

Intersection	
Int Delay, s/veh	3.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Traffic Vol, veh/h	79	53	65	381	389	86
Future Vol, veh/h	79	53	65	381	389	86
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	86	58	71	414	423	93

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1025	475	516	0	-	0
Stage 1	470	-	-	-	-	-
Stage 2	555	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	260	590	1050	-	-	-
Stage 1	629	-	-	-	-	-
Stage 2	575	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	237	588	1046	-	-	-
Mov Cap-2 Maneuver	237	-	-	-	-	-
Stage 1	629	-	-	-	-	-
Stage 2	524	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	26	1.3	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1046	-	312	-	-
HCM Lane V/C Ratio	0.068	-	0.46	-	-
HCM Control Delay (s)	8.7	0	26	-	-
HCM Lane LOS	A	A	D	-	-
HCM 95th %tile Q(veh)	0.2	-	2.3	-	-

Intersection	
Int Delay, s/veh	4.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Traffic Vol, veh/h	88	53	65	395	402	95
Future Vol, veh/h	88	53	65	395	402	95
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	96	58	71	429	437	103

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1060	494	540	0	-	0
Stage 1	489	-	-	-	-	-
Stage 2	571	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	248	575	1028	-	-	-
Stage 1	616	-	-	-	-	-
Stage 2	565	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	225	573	1024	-	-	-
Mov Cap-2 Maneuver	225	-	-	-	-	-
Stage 1	616	-	-	-	-	-
Stage 2	514	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	30.2	1.2	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1024	-	292	-	-
HCM Lane V/C Ratio	0.069	-	0.525	-	-
HCM Control Delay (s)	8.8	0	30.2	-	-
HCM Lane LOS	A	A	D	-	-
HCM 95th %tile Q(veh)	0.2	-	2.8	-	-

Intersection	
Int Delay, s/veh	72.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Traffic Vol, veh/h	131	88	107	630	643	142
Future Vol, veh/h	131	88	107	630	643	142
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	142	96	116	685	699	154

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1693	781	853	0	-	0
Stage 1	776	-	-	-	-	-
Stage 2	917	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	~ 102	395	786	-	-	-
Stage 1	454	-	-	-	-	-
Stage 2	390	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 78	393	783	-	-	-
Mov Cap-2 Maneuver	~ 78	-	-	-	-	-
Stage 1	454	-	-	-	-	-
Stage 2	297	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	$ 572.2	1.5	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	783	-	115	-	-
HCM Lane V/C Ratio	0.149	-	2.07	-	-
HCM Control Delay (s)	10.4	0	$ 572.2	-	-
HCM Lane LOS	B	A	F	-	-
HCM 95th %tile Q(veh)	0.5	-	19.9	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	89.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Traffic Vol, veh/h	140	88	107	644	656	151
Future Vol, veh/h	140	88	107	644	656	151
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	152	96	116	700	713	164

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1728	800	877	0	-	0
Stage 1	795	-	-	-	-	-
Stage 2	933	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	~ 97	385	770	-	-	-
Stage 1	445	-	-	-	-	-
Stage 2	383	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 73	383	767	-	-	-
Mov Cap-2 Maneuver	~ 73	-	-	-	-	-
Stage 1	445	-	-	-	-	-
Stage 2	288	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	$ 695.5	1.5	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	767	-	106	-	-
HCM Lane V/C Ratio	0.152	-	2.338	-	-
HCM Control Delay (s)	10.5	0	$ 695.5	-	-
HCM Lane LOS	B	A	F	-	-
HCM 95th %tile Q(veh)	0.5	-	22	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	140	88	107	644	656	151
Future Volume (veh/h)	140	88	107	644	656	151
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1716	1750	1716	1863	1863	1716
Adj Flow Rate, veh/h	152	96	116	700	713	164
Adj No. of Lanes	0	0	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	0	2	2	2	2
Cap, veh/h	186	117	121	1189	896	701
Arrive On Green	0.20	0.20	0.07	0.64	0.16	0.16
Sat Flow, veh/h	953	602	1634	1863	1863	1458
Grp Volume(v), veh/h	249	0	116	700	713	164
Grp Sat Flow(s),veh/h/ln	1562	0	1634	1863	1863	1458
Q Serve(g_s), s	8.2	0.0	3.8	11.8	19.9	5.3
Cycle Q Clear(g_c), s	8.2	0.0	3.8	11.8	19.9	5.3
Prop In Lane	0.61	0.39	1.00			1.00
Lane Grp Cap(c), veh/h	305	0	121	1189	896	701
V/C Ratio(X)	0.82	0.00	0.96	0.59	0.80	0.23
Avail Cap(c_a), veh/h	521	0	121	1189	896	701
HCM Platoon Ratio	1.00	1.00	1.00	1.00	0.33	0.33
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.32	0.32
Uniform Delay (d), s/veh	20.8	0.0	24.9	5.7	20.2	14.0
Incr Delay (d2), s/veh	5.4	0.0	68.6	2.1	2.4	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.0	0.0	4.0	6.5	10.9	2.2
LnGrp Delay(d),s/veh	26.2	0.0	93.5	7.8	22.6	14.3
LnGrp LOS	C		F	A	C	B
Approach Vol, veh/h	249			816	877	
Approach Delay, s/veh	26.2			20.0	21.1	
Approach LOS	C			B	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		39.0		15.0	8.5	30.5		
Change Period (Y+Rc), s		4.5		4.5	4.5	4.5		
Max Green Setting (Gmax), s		18.0		18.0	4.0	18.0		
Max Q Clear Time (g_c+I1), s		13.8		10.2	5.8	21.9		
Green Ext Time (p_c), s		2.7		0.5	0.0	0.0		

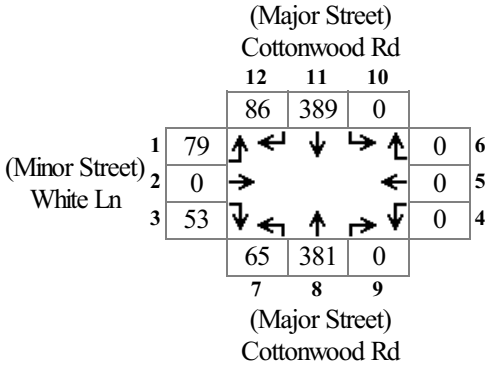
Intersection Summary	
HCM 2010 Ctrl Delay	21.3
HCM 2010 LOS	C

Notes

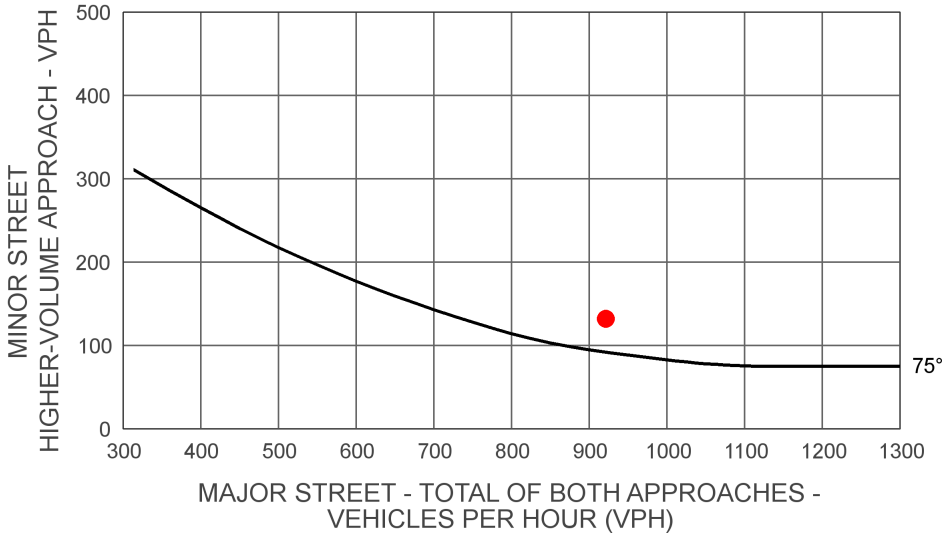
User approved volume balancing among the lanes for turning movement.

Rural Peak Hour Signal Warrant
Intersection Meets Signal Warrant

Scenario: PM Existing
Intersection #: 3

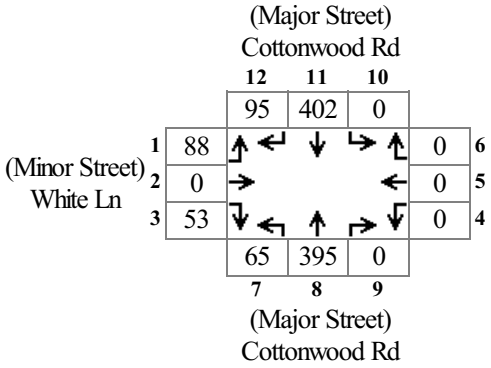


Major Total: 921
Minor High Volume: 132

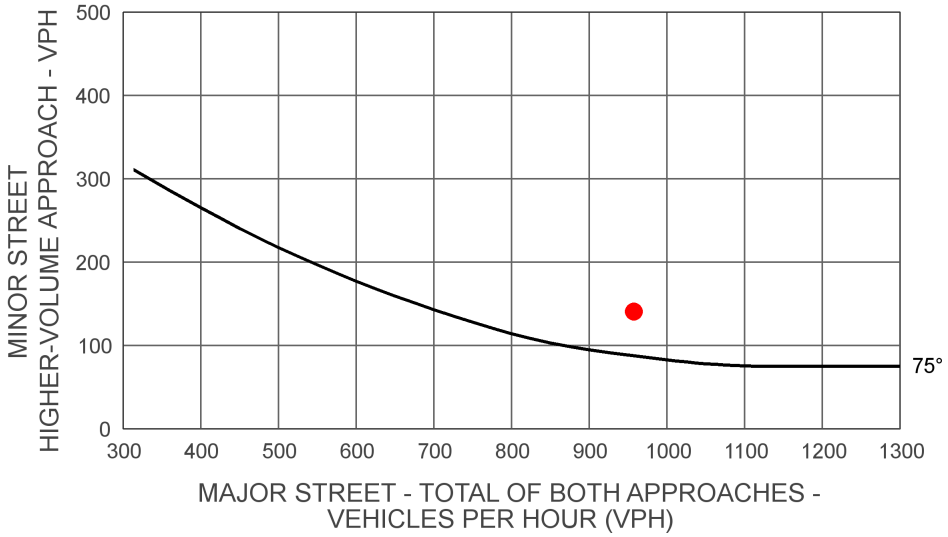


Rural Peak Hour Signal Warrant
Intersection Meets Signal Warrant

Scenario: PM Existing+Project
Intersection #: 3

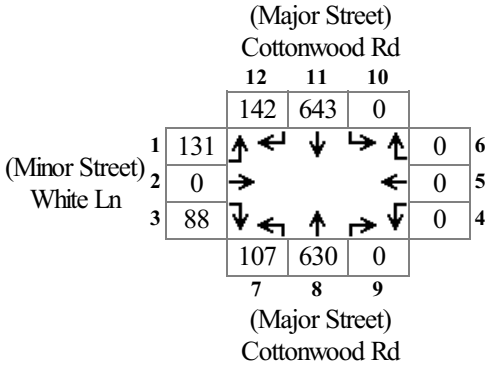


Major Total: 957
Minor High Volume: 141

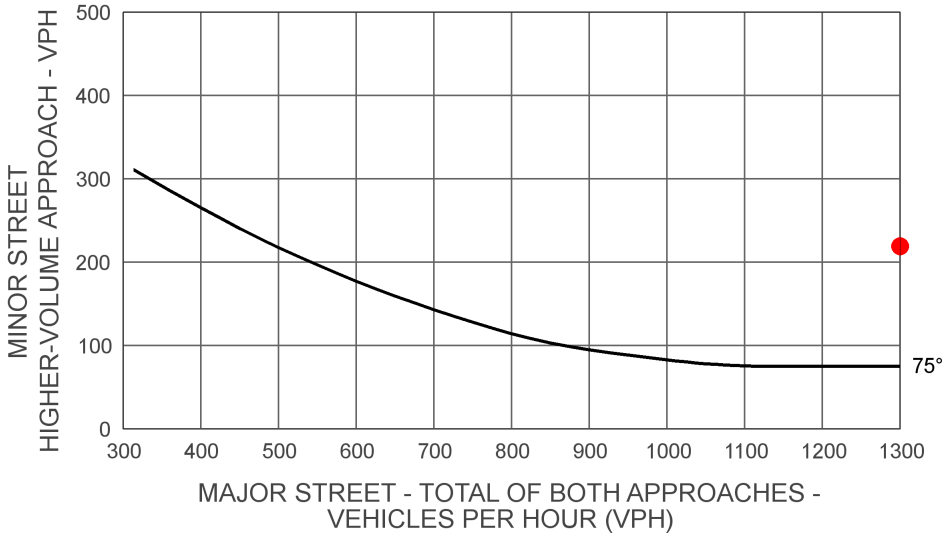


Rural Peak Hour Signal Warrant
Intersection Meets Signal Warrant

Scenario: PM Future
Intersection #: 3

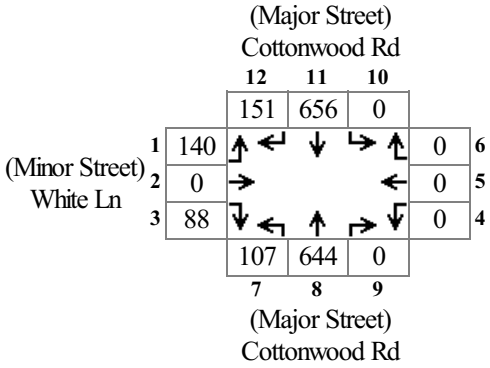


Major Total: 1522
Minor High Volume: 219

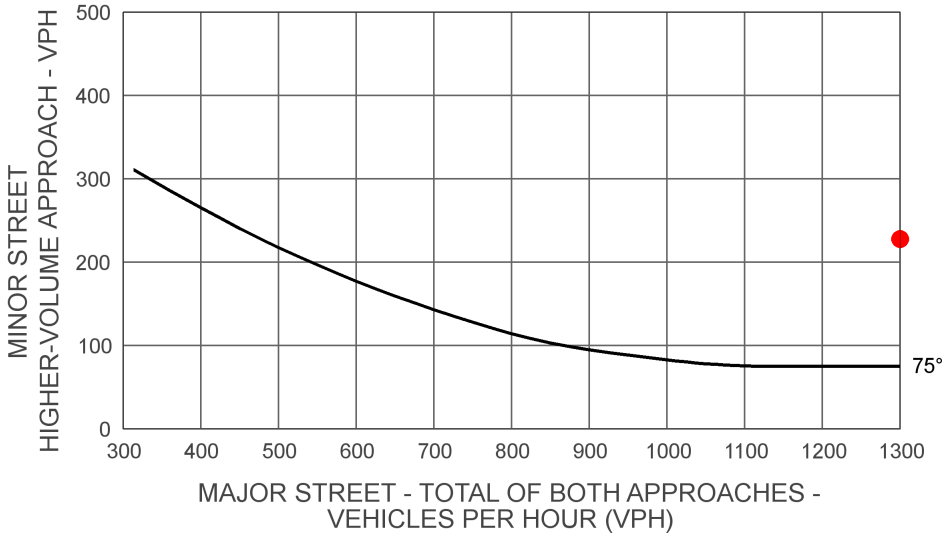


Rural Peak Hour Signal Warrant
Intersection Meets Signal Warrant

Scenario: PM Future+Project
Intersection #: 3

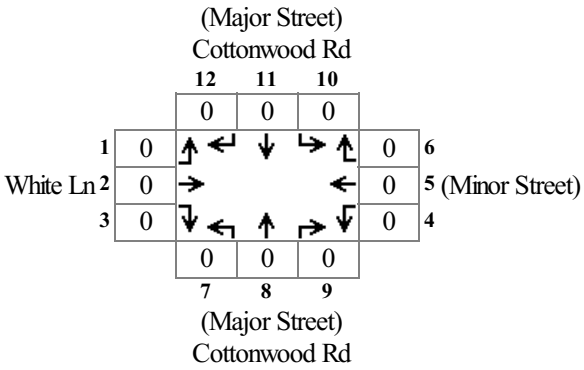


Major Total: 1558
Minor High Volume: 228

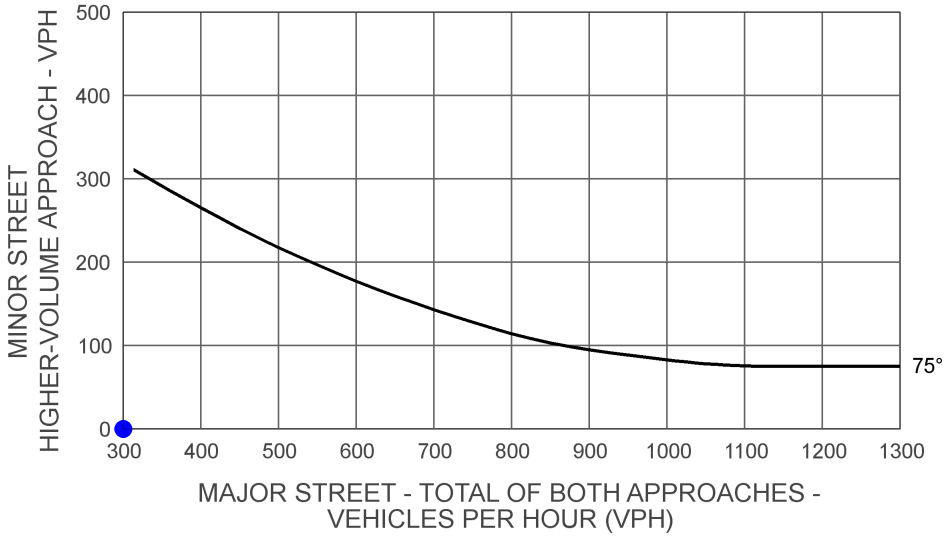


Rural Peak Hour Signal Warrant
Intersection Does Not Meet Signal Warrant

Scenario: AM Existing
Intersection #: 3

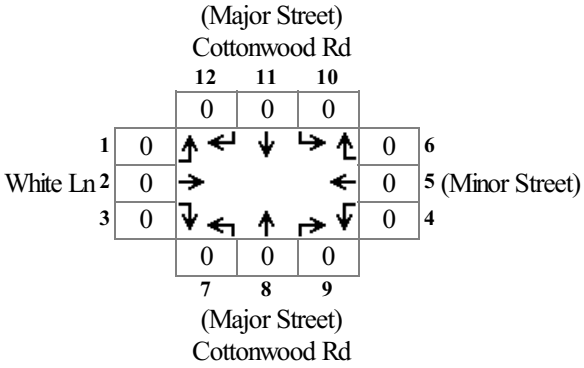


Major Total: 0
Minor High Volume: 0

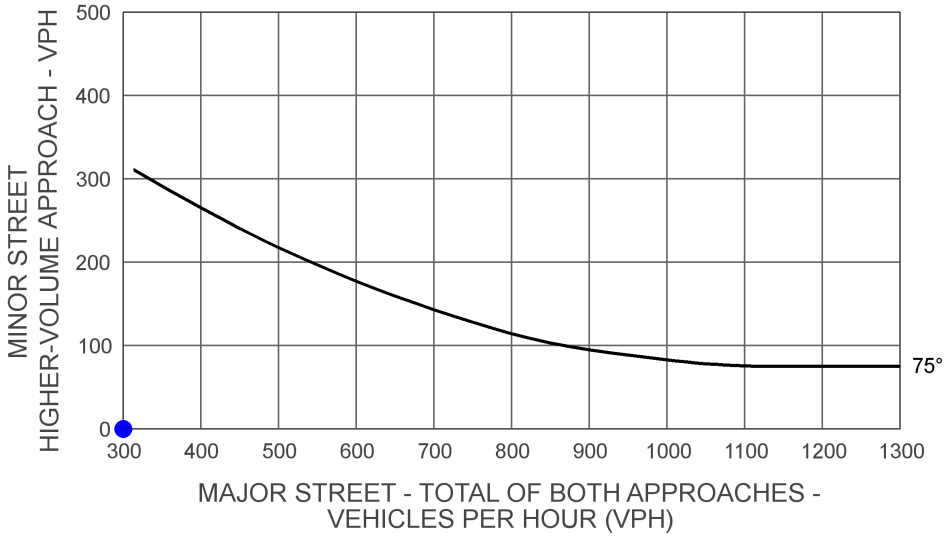


Rural Peak Hour Signal Warrant
Intersection Does Not Meet Signal Warrant

Scenario: AM Existing+Project
Intersection #: 3

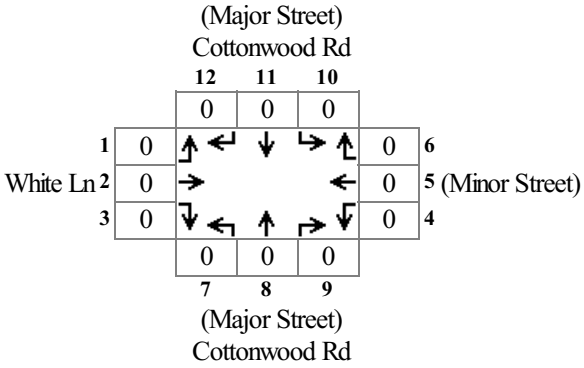


Major Total: 0
Minor High Volume: 0

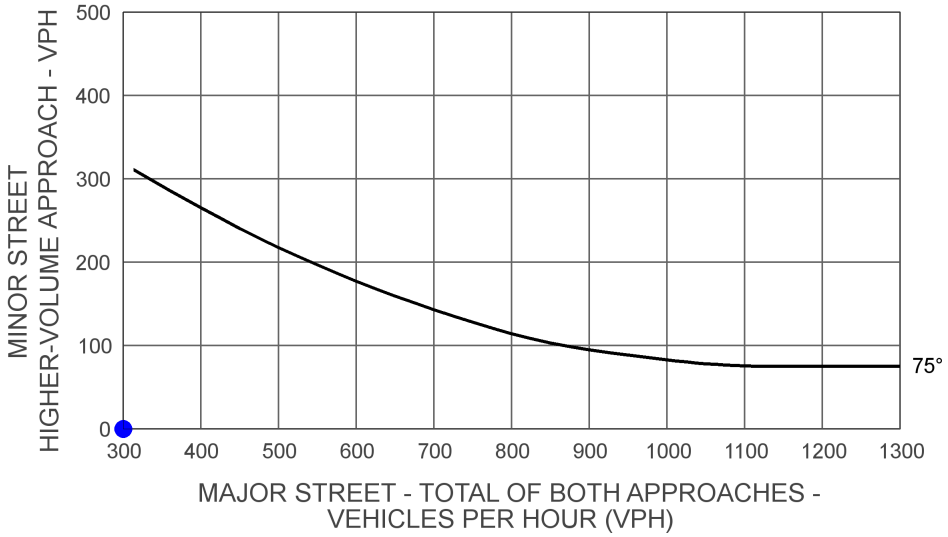


Rural Peak Hour Signal Warrant
Intersection Does Not Meet Signal Warrant

Scenario: AM Future
Intersection #: 3

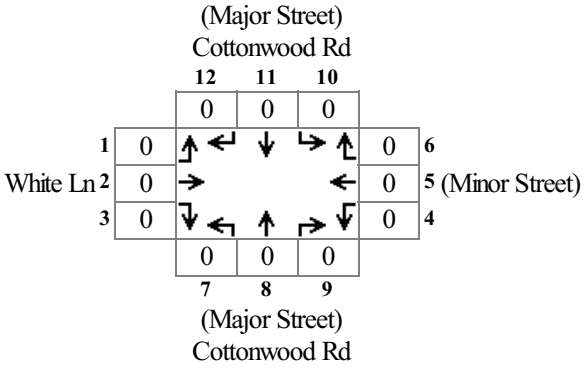


Major Total: 0
Minor High Volume: 0

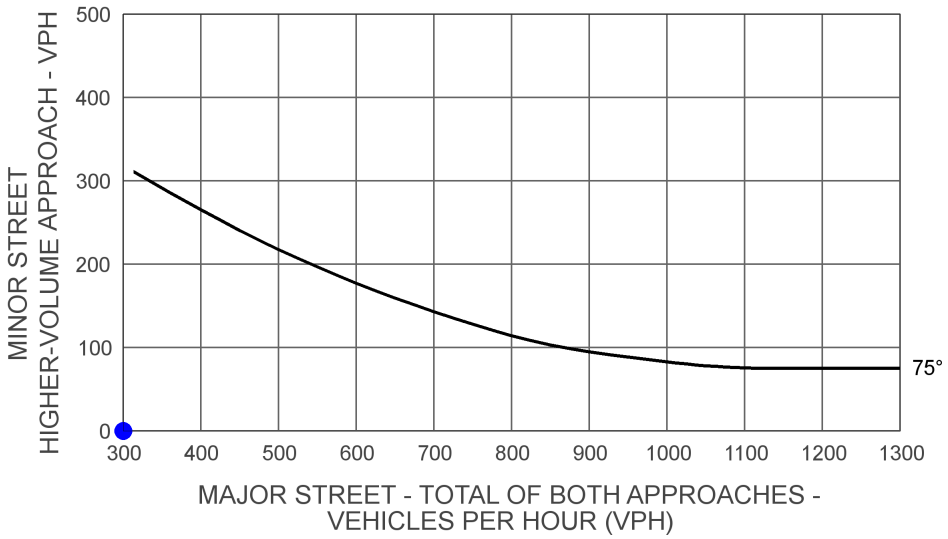


Rural Peak Hour Signal Warrant
Intersection Does Not Meet Signal Warrant

Scenario: AM Future+Project
Intersection #: 3



Major Total: 0
Minor High Volume: 0



Vehicle Turn Movement Data

VEHICLE TURNING MOVEMENT COUNT

#1 Cottonwood Rd & Watts Rd - PM PEAK HOUR

LOCATION #:	1	PEAK HOUR	4:30 AM to 5:30 AM
NORTH / SOUTH:	Cottonwood Rd	DATE:	12/06/2018
EAST / WEST:	Watts Rd	VICINITY:	Bakersfield, CA

DIRECTION:	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTALS:
4:30 AM	5	137	0	0	118	7	12	2	6	1	0	0	288
4:45 AM	8	121	1	1	128	6	16	1	4	1	0	0	287
5:00 AM	8	106	0	1	131	8	7	0	7	0	0	0	268
5:15 AM	4	94	0	0	120	11	15	0	6	0	1	0	251
VOLUME STATS:	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	
TOTAL:	25	458	1	2	497	32	50	3	23	2	1	0	1094
[1]PHF:		0.852			0.948			0.905			0.750		0.950

[1]Peak Hour Factor (directional aggregate)

VEHICLE TURNING MOVEMENT COUNT

#2 Cottonwood Rd & E Planz Rd - PM PEAK HOUR

LOCATION #:	2	PEAK HOUR	4:30 AM to 5:30 AM
NORTH / SOUTH:	Cottonwood Rd	DATE:	12/06/2018
EAST / WEST:	E Planz Rd	VICINITY:	Bakersfield, CA

DIRECTION:	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTALS:
4:30 AM	4	128	1	4	110	9	7	2	12	8	7	3	295
4:45 AM	10	103	2	1	106	11	11	12	3	4	1	2	266
5:00 AM	6	98	2	4	130	10	8	5	5	4	4	5	281
5:15 AM	4	95	3	1	108	16	8	4	5	2	1	2	249
VOLUME STATS:	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	
TOTAL:	24	424	8	10	454	46	34	23	25	18	13	12	1091
[1]PHF:		0.857			0.885			0.788			0.597		0.925

[1]Peak Hour Factor (directional aggregate)

VEHICLE TURNING MOVEMENT COUNT

#3 Cottonwood Rd & White Ln - PM PEAK HOUR

LOCATION #:	3	PEAK HOUR	4:30 AM to 5:30 AM
NORTH / SOUTH:	Cottonwood Rd	DATE:	12/06/2018
EAST / WEST:	White Ln	VICINITY:	Bakersfield, CA

DIRECTION:	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTALS:
4:30 AM	15	116	0	0	89	25	18	0	7	0	0	0	270
4:45 AM	20	104	0	0	97	16	17	0	19	0	0	0	273
5:00 AM	18	82	0	0	103	24	25	0	18	0	0	0	270
5:15 AM	12	79	0	0	100	21	19	0	9	0	0	0	240
VOLUME STATS:	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	
TOTAL:	65	381	0	0	389	86	79	0	53	0	0	0	1053
[1]PHF:		0.851			0.935			0.767			0.000		0.964

[1]Peak Hour Factor (directional aggregate)