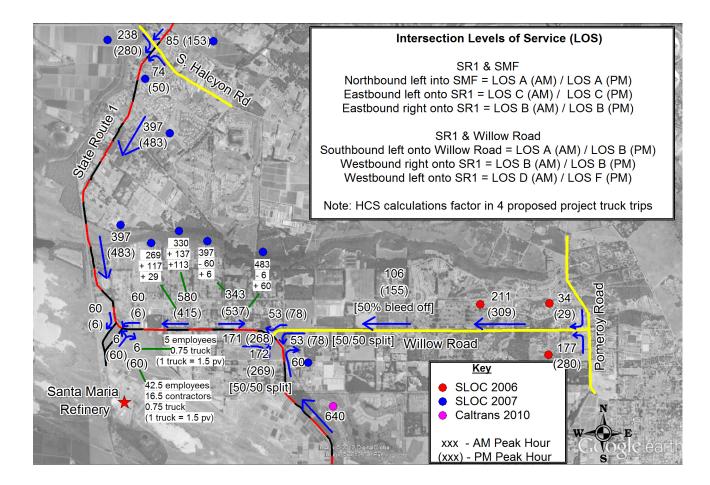
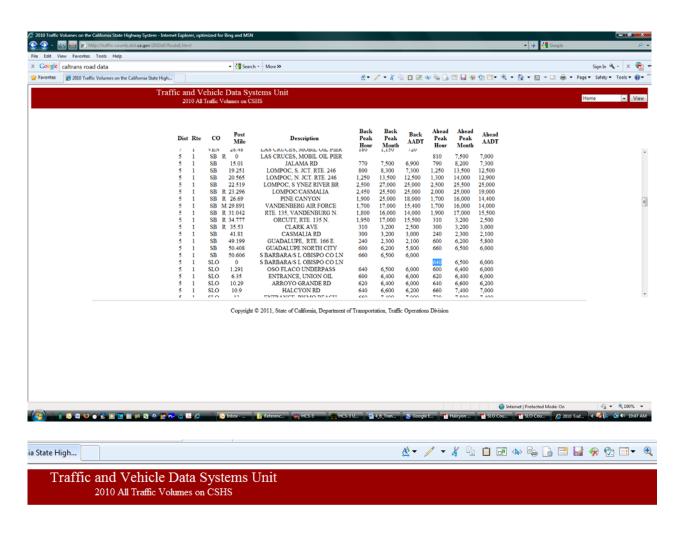
Appendix F - Intersection Traffic Data

Intersection Level of Service Map	F-1
Caltrans 2010	F-2
SMC 2010b	F-3
SMC 2007a	F-7
SMC 2007b	F-8
SLOC 2007	F-9
SLOC 2006	F-12
HCS 1998 – SR1 & SMF Drive AM	F-14
HCS 1998 – SR1 & SMF Drive PM	F-22
HCS 1998 – SR1 & Willow Road AM	F-30
HCS 1998 – SR1 & Willow Road PM	F-38
P&S 2004	F-46

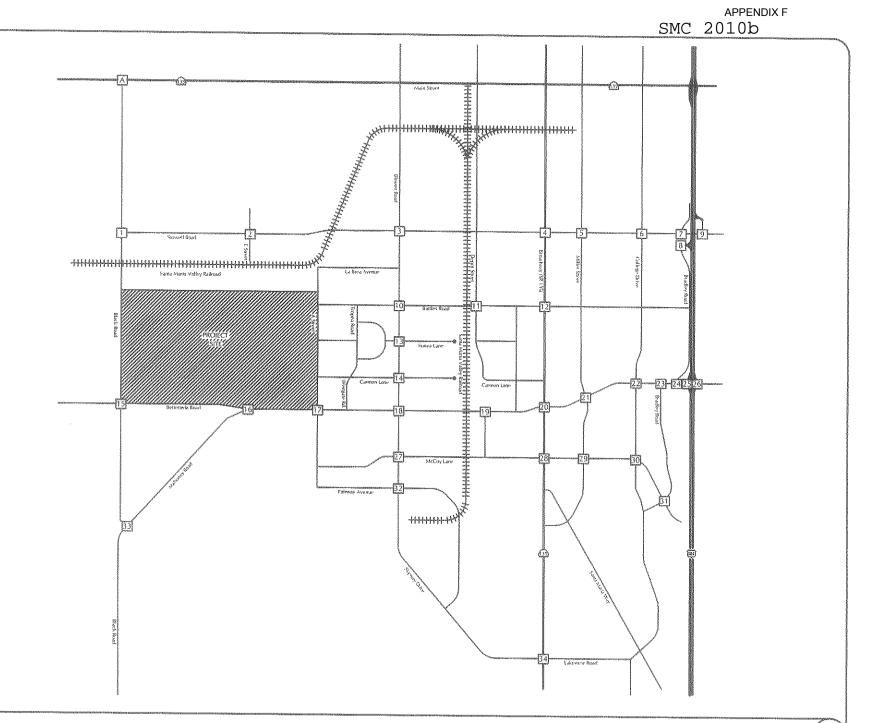
Intersection Level of Service Map





Dist		со	Post Mile	Description	Back Peak Hour	Back Peak Month	Back AADT	Ahead Peak Hour	Ahead Peak Month	Ahead AADT
5	1	VEIN SB I	28.48 R 0	LAS CRUCES, MOBIL OIL PIER LAS CRUCES, MOBIL OIL PIER	180	1,150	/20	810	7,500	7,000
5	1	SB	15.01	JALAMA RD	770	7.500	6.900	790	8,200	7,000
5	-	SB				-				•
_	1		19.251	LOMPOC, S. JCT. RTE. 246	800	8,300	7,300	1,250	13,500	12,500
5	1	SB	20.565	LOMPOC, N. JCT. RTE. 246	1,250	13,500	12,500	1,300	14,000	12,900
5	1	SB	22.519	LOMPOC, S YNEZ RIVER BR	2,500	27,000	25,000	2,500	25,500	25,000
5	1	SB I	R 23.296	LOMPOC/CASMALIA	2,450	25,500	25,000	2,000	25,000	19,000
5	1	SB I	R 26.69	PINE CANYON	1,900	25,000	18,000	1,700	16,000	14,400
5	1	SB N	√I 29.891	VANDENBERG AIR FORCE	1,700	17,000	15,400	1,700	16,000	14,000
5	1	SB I	R 31.042	RTE. 135, VANDENBURG N.	1,800	16,000	14,000	1,900	17,000	15,500
5	1	SB I	R 34.777	ORCUTT, RTE. 135 N.	1,950	17,000	15,500	310	3,200	2,500
5	1	SB I	R 35.53	CLARK AVE	310	3,200	2,500	300	3,200	3,000
5	1	SB	41.81	CASMALIA RD	300	3,200	3,000	240	2,300	2,100
5	1	SB	49.199	GUADALUPE, RTE. 166 E.	240	2,300	2,100	600	6,200	5,800
5	1	SB	50.408	GUADALUPE NORTH CITY	600	6,200	5,800	660	6,500	6,000
5	1	SB	50.606	S BARBARA/S L OBISPO CO LN	660	6,500	6,000			
5	1	SLO	0	S BARBARA/S L OBISPO CO LN				640	6,500	6,000
5	1	SLO	1.291	OSO FLACO UNDERPASS	640	6,500	6,000	600	6,400	6,000
5	1	SLO	6.35	ENTRANCE, UNION OIL	600	6,400	6,000	620	6,400	6,000
5	1	SLO	10.29	ARROYO GRANDE RD	620	6,400	6,000	640	6,600	6,200
5	1	SLO	10.9	HALCYON RD	640	6,600	6,200	660	7,400	7,000
•	1	CT O	12	ENTERANCE DICMO DEACH	660	7 400	7 000	720	7 000	7 400

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Associated Transportation Engineers September 8, 2010 NOT TO SCALE

STUDY-AREA INTERSECTIONS

FIGURE (

MMF - #09077

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FIGURE

MMF - #09077

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28 3 62 62 257 757 112 7 7 7 7 196 7 194 4	29 775 82 215 35 157 403 128 24 215 35	30 524 -120 -15 175 204 120 53 65	31	32 73 10 16 181 16 95 39 39 50 50	33 21 4 71 71 71	34



Table 1 Existing (Scenario 1) Intersection Operations

		A.M. Pe	ak	P.M. Pe	ak
Intersection	Control	ICU	LOS	ICU	LOS
Main Street/Black Road(a)	Stop Sign	11.4 Sec.	В	15.5 Sec.	С
Stowell Road/Black Road(a)	Stop Sign	8.7 Sec.	Α	9.2 Sec.	Α
Stowell Road/"E" Street(a)	Stop Sign	7.8 Sec.	Α	8.8 Sec.	Α
Stowell Road/Blosser Road	Signal	0.39	Α	0.64	В
Stowell Road/Broadway (SR 135)	Signal	0.52	Α	0.76	С
Stowell Road/Miller Street	Signal	0.52	Α	0.70	В
Stowell Road/College Drive	Signal	0.45	Α	0.52	А
Stowell Road/Bradley Road	Signal	0.46	Α	0.65	В
Stowell Road/U.S. 101 NB Ramps(a)	Stop Sign	8.7 Sec.	Α	31.4 Sec.	D
Bradley Road/U.S. 101 SB Ramps	Signal	0.39	Α	0.59	А
Battles Road/Blosser Road	Signal	0.44	Α	0.51	Α
Battles Road/Depot Street	Signal	0.39	Α	0.53	Α
Battles Road/Broadway (SR 135)	Signal	0.45	Α	0.64	В
Sonya Lane/Blosser Road(a)	Stop Sign	32.3 Sec.	D	30.6 Sec.	D
Carmen Lane/Blosser Road	Signal	0.54	Α	0.60	Α
Betteravia Road/Black Road(a)	Stop Sign	8.6 Sec.	Α	9.4 Sec.	Α
Betteravia Road/Mahoney Road(a)	Stop Sign	12.5 Sec.	В	18.2 Sec.	С
Betteravia Road/"A" Street	Signal	0.49	Α	0.47	Α
Betteravia Road/Blosser Road	Signal	0.49	А	0.66	В
Betteravia Road/Depot Street(a)	Stop Sign	9.4 Sec.	A	10.8 Sec.	В
Betteravia Road/Broadway (SR 135)	Signal	0.53	A	0.67	В
Betteravia Road/Miller Street	Signal	0.40	À	0.63	В
Betteravia Road/College Drive	Signal	0.44	А	0.60	Α
Betteravia Road/Bradley Road	Signal	0.31	А	0.63	В
Betteravia Road/U.S. 101 SB Ramps	Signal	0.47	А	0.55	Α
Betteravia Road/U.S. 101 NB Ramps	Signal	0.33	Α	0.54	Α
McCoy Lane/Skyway Drive	Signal	0.47	А	0.50	Α
McCoy Lane/Broadway (SR 135)	Signal	0.53	Α	0.90	D
McCoy Lane/Miller Street	Signal	0.33	Α	0.53	Α
McCoy Lane/College Drive(b)	Roundabout	1.9 Sec.	Α	2.2 Sec.	Α
McCoy Lane/Bradley Road(b)	Roundabout	1.5 Sec.	А	1.6 Sec.	Α
Fairway Avenue/Blosser Road	Signal	0.39	Α	0.45	Α
Black Road/Mahoney Road(a)	Stop Sign	8.7 Sec.	Α	8.9 Sec.	А
Skyway Drive/Broadway (SR 135)	Signal	0.63	В	0.79	С

⁽a) Stop-Sign intersection. LOS based on average control delay per vehicle in seconds.

⁽b) Roundabout intersection. LOS based on average control delay per vehicle in seconds.

Table 4.10-2	Level of	Service	Definitions

LOS	Control	Delay ¹	Definition					
LUS	Unsignalized	Signalized	- Definition					
Α	< 10.0	< 10.0	Conditions of free unobstructed flow, no delays and all signal phases sufficient in duration to clear all approaching vehicles.					
В	10.1-15.0	10.1-20.0	Conditions of stable flow, very little delay, a few phases are unable to handle all approaching vehicles.					
С	15.1-25.0	20.1-35.0	Conditions of stable flow, delays are low to moderate, full use of peak direction signal phases is experienced.					
D	25.1-35.0	35.1-55.0	Conditions approaching unstable flow, delays are moderate to heavy, significant signal time deficiencies are experienced for short durations during the peak traffic period.					
E	35.1-50.0	55.1-80.0	Conditions of unstable flow, delays are significant, signal phase timing is generally insufficient, congestion exists for extended duration throughout the peak period.					
F	> 50.0	> 80.0	Conditions of forced flow, travel speeds are low and volumes are well above capacity. This condition is often caused when vehicles released by an upstream signal are unable to proceed because of back-ups from a downstream signal.					

¹ Average control delay per vehicle in seconds. Source: 2000 Highway Capacity Manual.

The City typically uses the "Intersection Capacity utilization" (ICU) methodology for assessing traffic operations at intersections. This is the methodology required under the Congestion Management Plan administered by the Santa Barbara County Association of Government (SBCAG). The Highway Capacity Manual Operations Method¹ is the preferred method of Caltrans (Broadway and Main Street are state routes). The Highway Capacity Manual Operations Method was selected for this study because it provides a detailed analyses of intersection operations using factors to account for lane widths, traffic mix (standard vehicles, trucks, buses, etc,), pedestrian and bicycle activity, parking maneuvers, and other such traffic characteristics that would be affected by the proposed Specific Plan.

Existing P.M. peak hour traffic volumes for the key intersections in the study area are listed in Table 4.10-3. All of the key intersections currently operate at LOS C or better during the P.M. peak hour period, which meets the City's LOS D standard.

Table 4.10-3 Existing PM Peak Hour LOS

Intersection	Control	Delay / LOS
Broadway/Fesler Street	Signalized	18.5 Sec/LOS B
Broadway/Main Street	Signalized	21.3 Sec/LOS C
Broadway/Cook Street	Signalized	26.9 Sec/LOS C
Main Street/Pine Street	Signalized	17.0 Sec/LOS B
Main Street/Lincoln Street	Unsignalized	10.4 Sec/LOS B
Main Street/Town Center Drive	Signalized	18.7 Sec/LOS B
Main Street/Miller Street	Signalized	38.6 Sec/LOS B

Source: Downtown Specific Plan, City of Santa Maria, California, Supplemental Traffic Analysis (ATE; April 2006).

Note: LOS based on average delay per vehicle in seconds pursuant to HCM.

¹<u>Highway Capacity Manual</u>, Highway Research Board Special Report 209, Transportation Research Board, National Research Council, 2000.

Table 4.2-2
Existing PM Peak-Hour Levels of Service

Intersection	Control	ICU/LOS
College Drive/Main Street	Signalized	0.69/LOS B
U.S. 101 SB Off-Ramp-Bradley Road/Main Street	Signalized	0.61/LOS B
U.S. 101 NB On-Ramp-Nicholson Avenue/Main Street	Signalized	0.68/LOS B
Palisade Drive/Main Street	Signalized	0.44/LOS A
Suey Road/Main Street	Signalized	0.43/LOS A

Source: Associated Transportation Engineers. CMP Traffic Analysis for the Marian Hospital Expansion Project. May 2006.

The closest bus stop is located in front of the project site along Church Street. Due to its current location directly in front of the new park and monument, the bus stop will be moved to the west following the buildout of the new facility.

Regional access via public transportation is also available in the City. The Breeze bus service provides service to Vandenburg Air Force Base and Lompoc, the San Luis Obispo Regional Transit Authority provides service to San Luis Obispo County and the Guadalupe Flyer provides regular weekday service between Guadalupe and Santa Maria.

Bicycle Facilities

The use of bicycles instead of automobiles as a means of transportation improves health and fitness, provides enjoyment, and reduces air pollution, traffic congestion, energy consumption, and transportation costs. These benefits justify local and regional government recognition of bicycles as a viable transportation mode for local trips as well as the development and improvement of facilities to accommodate safe and efficient bicycle use. Bikeways are defined into four categories: Multi-Purpose Trail II, Class II (Bike Lane), and Class III (Bike Route). Each category is discussed below.

Multi-Purpose Trail I bikeways are completely separated joint use facilities designed for shared pedestrian and bicycle use. These faculties may be located along rivers, abandoned and existing railroad, utility rights-of-ways and between parks.

Multi-Purpose Trail II are separated joint use facilities (pedestrian and bicycle) which are used in conjunction with a Class II bike lane. This type of facility gives the bike rider the option of using the bike lane or the separated multi-purpose trail. This facility typically replaces the traditional sidewalk, as it can serve as both the sidewalk and recreational trail.

According to the South County (Nipomo) Traffic Model Update report, (March 2006), SR-1 (Cienaga Street) currently carries approximately 11,540 ADT west of Halcyon Road (and Arroyo Grande Creek) and 5,190 ADT east of Halcyon Road (and Arroyo Grande Creek). SR-1 carries approximately 4,190 ADT north of and 10,150 ADT south of Halcyon Road/SR-1 (Mesa View Drive) intersection. According to 2004 Annual Average Daily Truck Traffic on the California State Highway System (published on Caltrans website), trucks comprise approximately 11% of the average daily traffic through the SR-1 study segment.

Halcyon Road carries an Annual Average Daily Traffic (AADT) of approximately 8,580 vehicles north of and 10,080 vehicles south of SR-1 (Cienaga Street). Halcyon Road carries an AADT of approximately 3,850 vehicles east/south of the SR-1 (Mesa View Drive) intersection. Halcyon Road currently carries approximately two percent truck traffic on a daily basis. Figure TR-1 provides Existing (2004-05) Traffic Volumes and Figure TR-2 provides existing study intersection lane geometrics and control, as used for traffic analysis purposes.

d. Intersection Operations

Traffic flow on rural arterial <u>roadways</u> is most constrained at intersections. analysis of traffic flow must examine the operating conditions at critical intersections during peak travel periods. LOS A through F are used to rate roadway and intersection operations. Table TR-2 presents existing intersection traffic operations under existing (2005) traffic volumes shown in Figure TR-1 and existing intersection lane geometrics and control shown in Figure TR-2.

TABLE TR-2 Existing Conditions (2005): Intersection Level of Service

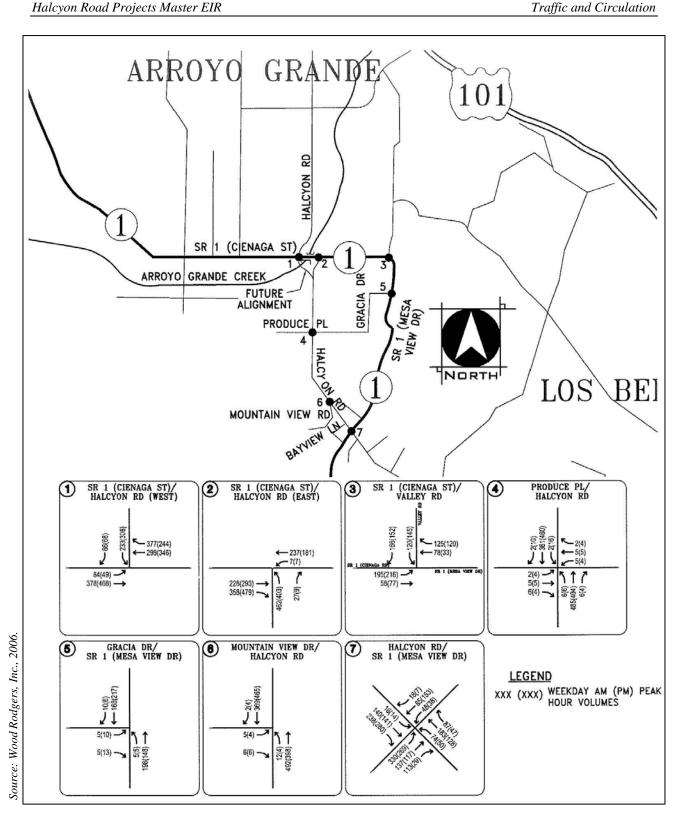
	Intersection:	Control	AM F	Peak Ho	our	PM Peak Hour		
#		Control Type	Delay (Sec/Veh)	LOS	Warrant Met?	Delay (Sec/Veh)	LOS	Warrant Met?
1	SR-1 (Cienaga Street)/Halcyon Road (west)	AWSC	39.5	E	Yes	104.9	F	Yes
2	SR-1 (Cienaga Street)/Halcyon Road (east)	AWSC	90.4	F	Yes	256.3	F	Yes
3	SR-1 (Cienaga Street/Mesa View Drive)/ Valley Road	TWSC	10.0	Α	Yes	23.3	С	Yes
4	Produce Place/Halcyon Road	TWSC	19.4	С	No	19.1	С	No
5	Gracia Drive/SR-1 (Mesa View Drive)	TWSC	10.3	В	No	10.4	В	No
6	Mountain View Road/Halcyon Road	TWSC	14.4	В	No	10.3	В	No
7	SR-1 (Mesa View Drive)/Halcyon Road	Signal	31.1	С	-	25.1	С	-

Final MEIR TR-5

^{1. &}quot;#" denotes intersection numbers as shown on Figures TR-1 and TR-2.

^{2.} For TWSC intersections, "Worse-Case" movement delay (in seconds/vehicle" are indicated. "Average" control delays (in seconds/vehicle) are indicated for signal-controlled and AWSC intersections.

^{3.} Warrant = MUTCD 2003 based Peak-hour-Volume Warrant #3 (Rural Areas).



Traffic and Circulation

As shown in Table TR-2, the two "offset" SR-1 (Cienaga Street) intersections with Halcyon Road are currently operating at AM and PM peak hour LOS E or worse conditions under existing intersection lane geometrics and unsignalized control conditions. The remaining study intersections are currently operating at LOS C or better conditions during typical weekday AM and PM peak hour periods. The two "offset" SR-1 (Cienaga Street) intersections with Halcyon Road, and the SR-1/Valley Road intersection currently meet MUTCD 2003 based peak hour signal warrant #3 (rural areas).

Roadway Operations e.

Existing roadway operations under existing roadway capacity configurations were quantified utilizing the roadway ADT based LOS thresholds. The results are summarized in Table TR-3.

TABLE TR-3 Existing (2005) Conditions: Roadway Level of Service

Roadway Segment	Existing Functional Capacity Configuration*	ADT	LOS
Halcyon Road Segments			
North of SR-1 (Cienaga Street)	Two-Lane Collector	8,576	С
Between SR-1 (Cienaga Street) and SR-1 (Mesa View Drive)	Two-Lane Collector	10,074	D
East/South of SR-1 (Mesa View Drive)	Two-Lane Collector	3,854	С
SR-1 Segments			
West of Halcyon Road-West (Cienaga Street)	Two-Lane Arterial	11,544	С
Between Halcyon Road and Valley Road	Two-Lane Arterial	5,186	Α
Between Valley Road and Halcyon Road-South	Two-Lane Arterial	4,190	А
South of Halcyon Road-South	Two-Lane Arterial	10,151	В
Note: ADT = Average Daily Traffic * The indicated Functional Capacity Classifications are obtained from the	South County Traffic Model Update Study	(March 2006)	•

As shown in Table TR-3, all study roadway segments except Halcyon Road are currently operating at LOS C or better on a daily basis with the existing roadway capacity configurations. The Halcyon Road segment between SR-1 (Cienaga Street) and SR-1 (Mesa View Drive) is currently operating at LOS D on a daily basis, mainly due to the 15% grade approaching SR-1 (Mesa View Drive).

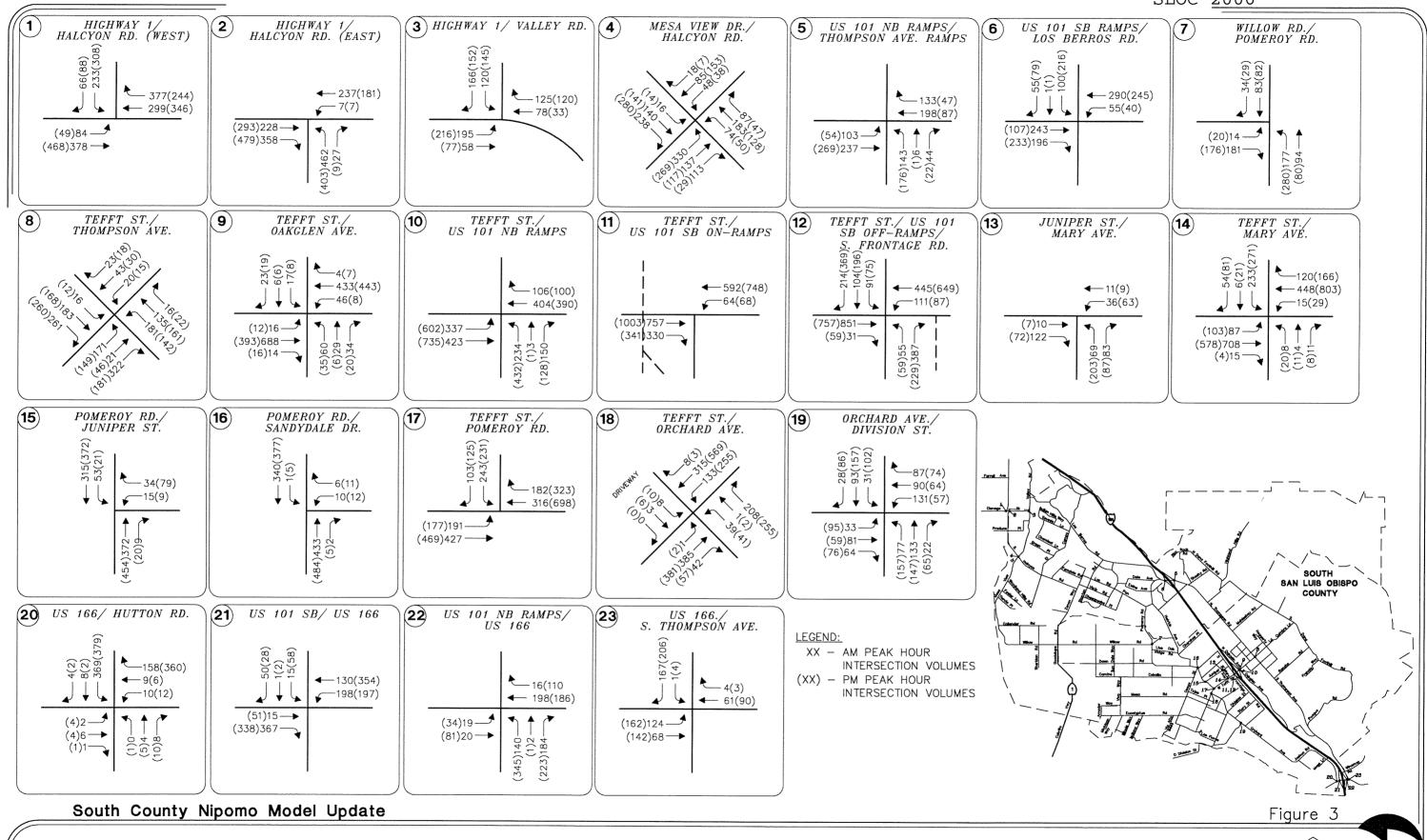
f. Roadway Area-Wide Improvements

The South County Circulation Study (last update: 2005), as reported in the South County Traffic *Model Update*, projects improvements to be in-place by the year 2025 as follows:

1. Willow Road extension to Thompson Avenue – The Supplemental Environmental Impact Report (SEIR) will be complete by June 2006. The design of the project will

Final MEIR TR-8

SLOC 2006



Intersections

Existing peak hour intersection traffic operations were quantified by applying existing traffic volumes (shown on Figure 3) and existing intersection lane geometrics and control (shown on Figure 4). Table 4 presents the existing peak hour intersection levels of service.

TABLE 4
EXISTING CONDITIONS: INTERSECTION LEVELS-OF-SERVICE

			A	M Peak Ho	ur PM Peak Hour			
		Control			Warrant			Warrant
#	Intersection	Type	Delay	LOS	Met?	Delay	LOS	Met?
1	Highway 1/Halcyon Road (west)	AWSC	25.9	D	Yes	41.9	E	Yes
2	Highway 1/Halcyon Road (east)	AWSC	63.0	F	Yes	107.1	F	Yes
3	Highway 1/Valley Road	TWSC	13.4	В	No	22.3	C	No
4	Mesa View Drive/Halcyon Road	Signal	22.7	C	-	22.5	C	-
5	US 101 NB Ramps/Thompson Avenue	TWSC	25.8	D	No	18.7	C	No
6	US 101 SB Ramps/Los Berros Road	TWSC	20.2	C	No	24.6	C	No
7	Willow Road/Pomeroy Road	TWSC	10.5	В	No	11.0	В	No
8	Tefft Street/Thompson Avenue	Signal	28.6	С	-	26.1	C	-
9	Tefft Street/Oakglen Avenue	Signal	14.4	В	-	8.9	A	-
10	US 101 NB Ramps/Tefft Street	Signal	27.2	\mathbf{C}^2	-	31.2	\mathbf{C}^2	-
12	US 101 SB Ramps/South Frontage Road/Tefft Street ¹	Signal	49.0	\mathbf{D}^1	-	60.5	\mathbf{E}^1	-
13	Juniper Street/Mary Avenue	TWSC	11.2	В	No	12.1	В	No
14	Tefft Street/Mary Avenue	Signal	23.1	C	-	24.5	C	-
15	Pomeroy Road/Juniper Street	TWSC	13.5	В	No	13.7	В	No
16	Pomeroy Road/Sandydale Drive	TWSC	14.6	В	No	15.6	С	No
17	Tefft Street/Pomeroy Road	Signal	24.4	С	-	23.7	C	-
18	Tefft Street/Orchard Avenue	Signal	18.8	В	-	17.5	В	-
19	Orchard Avenue/Division Street	Signal	22.3	C	-	27.3	C	-
20	US 166/Hutton Road	TWSC	11.4	В	No	13.8	В	No
21	US 101 SB Ramps/US 166	TWSC	11.9	В	No	27.3	D	No
22	US 101 NB Ramps/US 166	TWSC	10.3	В	No	18.2	С	Yes
23	US 166/South Thompson Avenue	TWSC	17.3	C	No	9.9	A	No

 $Legend: TWSC = Two-Way-Stop\ Control.$

 $AWSC = All-Way-Stop\ Control.$,

OVR – *Over Capacity*

Warrant = Caltrans Peak hour-Volume based Signal Warrant-11 (Urban Areas) - for freeway ramp intersections

Warrant = MUTCD Peak hour-Volume based Signal Warrant-11 (Urban Areas) - for all other intersections

Bolded Intersection, Delays, and LOS indicate intersections operating at deficient LOS "D" or worse for intersections within County right-of way, and LOS "E" and "F" for intersections within Caltrans right of way.

- 1. Intersection 11 (US 101 SB on-ramp/Tefft Street) forms the fifth leg of Intersection 12.
- Due to closely spaced intersections, queue back-up on Tefft Street in the vicinity of the US 101 SB ramp/Tefft Street intersection may affect
 the actual travel demand through the US 101 northbound ramp/Tefft Street intersection, thereby resulting in a lower calculated delay and
 corresponding LOS.

As shown in Table 4, the SR 1 intersections at Halcyon Road (east and west) are currently operating at deficient LOS "E" or worse during at least one peak hour period. The SR 1/Halcyon Road (east and west) intersections and the US 101 northbound ramp/US 166 intersection meet peak-hour-volume based signal warrants, indicating that the peak-hour-volume of minor-street vehicles experience unacceptable delays and are significantly large to warrant installation of a traffic signal at this location.

The US 101 southbound off-ramp intersection at Tefft Street and South Frontage Road (Intersection 12) operates at unacceptable LOS "D" and "E" during the AM and PM peak hours, respectively. This intersection is closely spaced with the Tefft Street/US 101 SB on-ramp intersection (Intersection 11), such that the US 101 southbound on-ramp is essentially the fifth leg of the US 101 southbound off-ramp/Tefft Street intersection, and the Tefft Street/US 101 NB ramp intersection (Intersection 10). The staggered alignment and close

HCS: Unsignalized Intersections Release 3.2

TWO-WAY STOP CONTROL SUMMARY

Intersection: Refinery and HWY 1

Analyst: MRS Project No.: 102

Date: 5/7/2012

East/West Street: Refinery Drive North/South Street: HWY 1

Intersection Orientation: NS Study period (hrs): 1.00

_	Vehic oproach ovement	le V 1 L		nes and hbound 2 T	Adjust	mer 	nts 4 L	Sout	hbou 5 T	ınd	6 R
Volume Hourly Flow Rate Percent Heavy Ve Median Type RT Channelized?		60 60 10 ideo		580 580 					397 397 		60 60
Lanes Configuration Upstream Signal?			1 L	1 T No					1 T No	1 R	
-	oproach ovement	7 L	West	bound 8 T	9 R		10 L	East	bour 11 T	nd	12 R
Volume Hourly Flow Rate Percent Heavy Ve Percent Grade (% Median Storage Flared Approach:	hicles) 1			0			6 6 10		0		6 6 10
RT Channelized? Lanes Configuration	Scorage							1 L		1 R	No

	Delay,	Oueue	Ler	nath	, and Le	vel of	Ser	vice		
Approach	NB ,	SB			, Westboun				stbound	
Movement	1	4		7	8	9		10	11	12
Lane Config	L		ĺ				ĺ	L		R
v (vph)	60							6		6
C(m) (vph)	1063							218		635
v/c	0.06							0.03		0.01
95% queue length	0.04							0.00		0.00
Control Delay	8.6							22.0		10.7
LOS	A							С		В
Approach Delay									16.4	
Approach LOS									С	

HCS: Unsignalized Intersections Release 3.2

MRS

3140 Telegraph Road Ventura, CA

Phone: 805-289-3929

E-Mail:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Vehicle Volumes and Adjustments

Fax:

Intersection: Refinery and HWY 1

City/State:

Configuration

Analyst: MRS Project No.: 102

Time period Analyzed:

Date: 5/7/2012

East/West Street: Refinery Drive

North/South Street: HWY 1

Intersection Orientation: NS Study period (hrs): 1.00

Major Street Movements		2	3	4	5	6	
	L	Т	R	L	Т	R	
Volume	60	580			397	60	
Peak-Hour Factor, PHF	1.00	1.00			1.00	1.00	
Peak-15 Minute Volume	15	145			99	15	
Hourly Flow Rate, HFR	60	580			397	60	
Percent Heavy Vehicles							
_	Undivided						
RT Channelized?						No	
Lanes	1	1			1	1	
Configuration	L	Т			ТR		
Upstream Signal?		No			No		
Minor Street Movements	7	8	9	10	11	12	
	L	Т	R	L	Т	R	
Volume				6		6	
Peak Hour Factor, PHF				1.00		1.00	
Peak-15 Minute Volume				2		2	
Hourly Flow Rate, HFR				6		6	
Percent Heavy Vehicles				10		10	
Percent Grade (%)		0			0		
Median Storage 1							
Flared Approach: Exis	ts?						
Stor							
RT Channelized?	J .					No	
Lanes				1		1	

Pedestrian Volumes and Adjustments

L

R

F-15 13 14 15 16 Movements

Flow (ped/hr)	0	0	0	0	APPENDIX F
Lane Width (ft)	12.0	12.0	12.0	12.0	
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0	
Percent Blockage	0	0	0	0	

	Up	stream Si	gnal Dat	a	
Prog. Flow vph	Sat Flow vph	Arrival Type		<u> </u>	 Distance to Signal feet

S2 Left-Turn Through S5 Left-Turn Through

Worksheet 3-Data for Computing Effect of Delay to Major Street Vehicles

Movement 2 Movement 5

Shared ln volume, major th vehicles:
Shared ln volume, major rt vehicles:
Sat flow rate, major th vehicles:
Sat flow rate, major rt vehicles:
Number of major street through lanes:

Critical Gap Calculation

Worksheet 4-Critical Gap and Follow-up Time Calculation

N/	-	1	1	-	0	0	1.0		10
Movement	•	1 L	4 L	7 L	8 T	9 R	10 L	11 T	12 R
+ / 1	. \	4 1					- 1		6 0
t(c,base	2)	4.1					7.1		6.2
t(c,hv)		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)		10					10		10
t(c,g)				0.20	0.20	0.10	0.20	0.20	0.10
Grade/10	0			0.00	0.00	0.00	0.00	0.00	0.00
t(3,1t)	-	0.00					0.70		0.00
t(c,T):	1-stage		0.00	0.00	0.00	0.00	0.00	0.00	0.00
C (C, 1).	2-stage		0.00	1.00	1.00	0.00	1.00	1.00	0.00
+ / ~ \			0.00	1.00	1.00	0.00		1.00	
t(c)	1-stage						6.5		6.3
	2-stage	4.2					5.5		6.3
Follow-U	Jp Time Ca	alculat	ions						
Movement	_	1	4	7	8	9	10	11	12
110 1 01110110		L	L	Ĺ	T	R	L	T	R
		ш	ш	ш	T	10	ш	1	IC
t(f,base	<u>)</u>	2.20					3.50		3.30
t(f,HV)	•	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)		10	0.50	0.50	0.50	0.50	10	0.50	10
t(f)		2.3					3.6		3.4
C(I)		∠.3					3.0		J.4

Worksheet 5-Effect of Upstream Signals

```
V(t)
                                                  V(1,prot) V(t)
                                                                      V(1,prot)
V prog
Total Saturation Flow Rate, s (vph)
Arrival Type
Effective Green, g (sec)
Cycle Length, C (sec)
Rp (from table 9-2)
Proportion vehicles arriving on green P
g (q1)
g (q2)
g(q)
Computation 2-Proportion of TWSC Intersection Time blocked
                                               Movement 2
                                                                  Movement 5
                                                  V(l,prot) V(t)
                                            V(t)
                                                                      V(1,prot)
alpha
beta
Travel time, t(a) (sec)
Smoothing Factor, F
Proportion of conflicting flow, f
Max platooned flow, V(c,max)
Min platooned flow, V(c,min)
Duration of blocked period, t(p)
                                                 0.000
                                                                     0.000
Proportion time blocked, p
Computation 3-Platoon Event Periods
                                           Result
p(2)
                                           0.000
                                           0.000
p(5)
p(dom)
p(subo)
Constrained or unconstrained?
Proportion
                             (1)
                                              (2)
unblocked
                                                                (3)
for minor
                        Single-stage
                                               Two-Stage Process
                          Process
movements, p(x)
                                           Stage I
                                                            Stage II
p(1)
p(4)
p(7)
p(8)
p(9)
p(10)
p(11)
p(12)
Computation 4 and 5
Single-Stage Process
Movement
                         1
                                        7
                                                        9
                                                              10
                                                                      11
                                                                             12
                                                Т
                         L
                                 L
                                        L
                                                        R
                                                               L
                                                                       Т
                                                                              R
V c,x
                        457
                                                              1097
                                                                             397
                                                                     F-17
Рx
```

Movement 2

APMENNEMENT 5

C r,x C plat,x

Two-Stage	Process
-----------	---------

Two-Stage Process 7 8	1	0	1 .	1
7 8 Stage1 Stage2 Stage1 Stag			11 Stage1	
V(c,x) s	397	700 1700		
P(x) V(c,u,x)		1700		
C(r,x) C(plat,x)				
Worksheet 6-Impedance and Capacity Equatio	ons			
Step 1: RT from Minor St.	9		12	
Conflicting Flows Potential Capacity Pedestrian Impedance Factor	1.00		397 635 1.00	
Movement Capacity Probability of Queue free St.	1.00		635 0.99	
Step 2: LT from Major St.	4		1	
Conflicting Flows Potential Capacity Pedestrian Impedance Factor Movement Capacity Probability of Queue free St. Maj L-Shared Prob Q free St.	1.00		457 1063 1.00 1063 0.94	
Step 3: TH from Minor St.	8		11	
Conflicting Flows Potential Capacity Pedestrian Impedance Factor Cap. Adj. factor due to Impeding mvmnt Movement Capacity Probability of Queue free St.	1.00 0.94 1.00		1.00 0.94 1.00	
Step 4: LT from Minor St.	7		10	
Conflicting Flows Potential Capacity Pedestrian Impedance Factor Maj. L, Min T Impedance factor Maj. L, Min T Adj. Imp Factor. Cap. Adj. factor due to Impeding mvmnt Movement Capacity	1.00 0.94 0.96 0.95		1097 228 1.00 0.94 0.96 0.96 218	
	_	_	F-18	

Worksheet 7-Computation of the Effect of Two-stage Gap Acceptance

		APPENDIX F
Step 3: TH from Minor St.	8	11
Part 1 - First Stage Conflicting Flows Potential Capacity Pedestrian Impedance Factor Cap. Adj. factor due to Impeding mvmnt Movement Capacity Probability of Queue free St.	444 1.00 0.94 419 1.00	607 1.00 1.00 607 1.00
Part 2 - Second Stage Conflicting Flows Potential Capacity Pedestrian Impedance Factor Cap. Adj. factor due to Impeding mvmnt Movement Capacity	571 1.00 1.00 571	444 1.00 0.94 419
Part 3 - Single Stage Conflicting Flows Potential Capacity Pedestrian Impedance Factor Cap. Adj. factor due to Impeding mvmnt Movement Capacity	1.00 0.94	1.00 0.94
Result for 2 stage process: a Y C t	0.00	0.00
Probability of Queue free St.	1.00	1.00
Step 4: LT from Minor St.	7	10
Part 1 - First Stage Conflicting Flows Potential Capacity Pedestrian Impedance Factor Cap. Adj. factor due to Impeding mvmnt Movement Capacity	496 1.00 0.94 468	397 662 1.00 1.00 662
Part 2 - Second Stage Conflicting Flows Potential Capacity Pedestrian Impedance Factor Cap. Adj. factor due to Impeding mvmnt Movement Capacity	660 1.00 0.99 654	700 478 1.00 0.94 451
Part 3 - Single Stage Conflicting Flows Potential Capacity Pedestrian Impedance Factor Maj. L, Min T Impedance factor Maj. L, Min T Adj. Imp Factor. Cap. Adj. factor due to Impeding mvmnt Movement Capacity	1.00 0.94 0.96 0.95	1097 228 1.00 0.94 0.96 0.96 218
Results for Two-stage process: a	0.00	F-19 0.00

Y C t						0.00	А	PPENDIQ _F 00 218)
Worksheet 8-Shared	Lane Ca	lculati	ons						
Movement			7 L		8 T	9 R	10 L	11 T	12 R
Volume (vph) Movement Capacity (Shared Lane Capacit							6 218		6 635
Worksheet 9-Computa	tion of	Effect	of Fl	ared	Minc	or Street	t Appro	paches	
Movement			7 L		8 T	9 R	10 L	11 T	12 R
C sep Volume Delay Q sep Q sep +1 round (Qsep +1)							218 6		635 6
n max C sh SUM C sep n C act									
Worksheet 10-Delay,	Queue :	Length,	and L	evel	of S	Service			
Movement Lane Config	1 L	4	7	8		9	10 L	11	12 R
95% queue length Control Delay LOS	0.06 0.04						6 218 0.03 0.00 22.0 C		6 635 0.01 0.00 10.7 B
Approach Delay Approach LOS								16.4 C	
Worksheet 11-Shared	Major 1	LT Impe	dance	and I	Delay				
						Movemen			nent 5
<pre>p(oj) v(il), Volume for s v(i2), Volume for s s(il), Saturation f s(i2), Saturation f</pre>	tream 3 low rate	or 6 e for s				0.94	4	1. F-20	00

d(M,LT), Delay for stream 1 or 4 N, Number of major street through lanes d(rank,1) Delay for stream 2 or 5 8.6 APPENDIX F

HCS: Unsignalized Intersections Release 3.2

TWO-WAY STOP CONTROL SUMMARY

Intersection: Refinery and HWY 1

Analyst: MRS Project No.: 102

Date: 5/7/2012

East/West Street: Refinery Drive North/South Street: HWY 1

Intersection Orientation: NS Study period (hrs): 1.00

_	Vehicl proach ovement	e V 1 L		nes and hbound 2 T	Adjust 3 R	mer 	nts 4 L	Sout	hbou 5 T	ınd	6 R
Volume Hourly Flow Rate, Percent Heavy Vel Median Type RT Channelized?		6 6 10 dec		415 415 					483 483 		6 6
Lanes Configuration Upstream Signal?			1 L	1 T No					1 T No	1 R	NO
	proach ovement	7 L	West	bound 8 T	9 R		10 L	East	bour 11 T	nd	12 R
Volume Hourly Flow Rate, Percent Heavy Veh Percent Grade (%) Median Storage Flared Approach:	nicles 1			0			60 60 10		0		60 60 10
RT Channelized? Lanes Configuration	beerage							1 L		1 R	No

	Delay,	Queue	Le	ngth	ı, and Le	vel of	Service)	
Approach	NB	SB			Westboun	ıd		Eastboun	d
Movement	1	4		7	8	9	10	11	12
Lane Config	L		İ				ļ L		R
v (vph)	6						60		60
C(m) (vph)	1034						294	:	568
v/c	0.01						0.2	0	0.11
95% queue length	0.00						0.8	35	0.33
Control Delay	8.5						20.	4	12.1
LOS	A						С		В
Approach Delay								16.2	
Approach LOS								С	

HCS: Unsignalized Intersections Release 3.2

MRS

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TWO-WAY STOP CONTROL (TWSC) ANALYSIS

Vehicle Volumes and Adjustments

Intersection: Refinery and HWY 1

City/State:

Configuration

Analyst: MRS Project No.: 102

Time period Analyzed:

Date: 5/7/2012

East/West Street: Refinery Drive

North/South Street: HWY 1

Intersection Orientation: NS Study period (hrs): 1.00

	٧С١	11010	OTAMOD	ana ma	J ab emerre	- 0		
Major Street Moveme	ents	1	2	3	4	5	6	
		L	Т	R	L	T	R	
Volume		6	415			483	6	
Peak-Hour Factor, 1	PHF	1.00	1.00			1.00	1.00	
Peak-15 Minute Volu	ume	2	104			121	2	
Hourly Flow Rate, I	HFR	6	415			483	6	
Percent Heavy Vehic	cles	10						
Median Type	Undi	<i>r</i> ided						
RT Channelized?							No	
Lanes		1	1			1 1	<u>.</u>	
Configuration		${f L}$	T			T R		
Upstream Signal?			No			No		
Minor Street Moveme	ents	7	8	9	10	11	12	
		L	T	R	L	T	R	
Volume					60		60	
Peak Hour Factor, 1	PHF				1.00		1.00	
Peak-15 Minute Volu	ume				15		15	
Hourly Flow Rate, I	HFR				60		60	
Percent Heavy Vehic	cles				10		10	
Percent Grade (%)			0			0		
Median Storage	1							
Flared Approach: 1	Exists?							
	Storage							
RT Channelized?	_						No	
Lanes					1	1		

Pedestrian Volumes and Adjustments 16

L

R

F-23

13 14 15 Movements

Flow (ped/hr)	0	0	0	0	APPENDIX F
Lane Width (ft)	12.0	12.0	12.0	12.0	
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0	
Percent Blockage	0	0	0	0	

	Upstream Signal Data											
Prog.				4	_	Distance						
Flow vph	Flow vph	Type	sec	sec	mph	to Signal feet						
<u>-</u>	-				-							

S2 Left-Turn Through S5 Left-Turn Through

Worksheet 3-Data for Computing Effect of Delay to Major Street Vehicles

Movement 2 Movement 5

Shared ln volume, major th vehicles:
Shared ln volume, major rt vehicles:
Sat flow rate, major th vehicles:
Sat flow rate, major rt vehicles:
Number of major street through lanes:

Critical Gap Calculation

Worksheet 4-Critical Gap and Follow-up Time Calculation

Movement		1 L	4 L	7 L	8 T	9 R	10 L	11 T	12 R
t(c,base	·)	4.1					7.1		6.2
t(c,hv) P(hv)		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00 10
t(c,g) Grade/10	0			0.20	0.20	0.10 0.00	0.20	0.20	0.10
t(3,1t) t(c,T):	1-stage		0.00	0.00	0.00	0.00	0.70 0.00 1.00	0.00	0.00 0.00 0.00
t(c)	2-stage 1-stage 2-stage	4.2	0.00	1.00	1.00	0.00	6.5 5.5	1.00	6.3 6.3
Follow-U	p Time Ca	alculati	ions						
Movement	_	1 L	4 L	7 L	8 T	9 R	10 L	11 T	12 R
t(f,base t(f,HV) P(HV) t(f)	2)	2.20 0.90 10 2.3	0.90	0.90	0.90	0.90	3.50 0.90 10 3.6	0.90	3.30 0.90 10 3.4

Worksheet 5-Effect of Upstream Signals

```
V(t)
                                                  V(1,prot) V(t)
                                                                      V(1,prot)
V prog
Total Saturation Flow Rate, s (vph)
Arrival Type
Effective Green, g (sec)
Cycle Length, C (sec)
Rp (from table 9-2)
Proportion vehicles arriving on green P
g (q1)
g (q2)
g(q)
Computation 2-Proportion of TWSC Intersection Time blocked
                                               Movement 2
                                                                  Movement 5
                                                  V(l,prot) V(t)
                                            V(t)
                                                                      V(1,prot)
alpha
beta
Travel time, t(a) (sec)
Smoothing Factor, F
Proportion of conflicting flow, f
Max platooned flow, V(c,max)
Min platooned flow, V(c,min)
Duration of blocked period, t(p)
                                                 0.000
                                                                     0.000
Proportion time blocked, p
Computation 3-Platoon Event Periods
                                           Result
p(2)
                                           0.000
                                           0.000
p(5)
p(dom)
p(subo)
Constrained or unconstrained?
Proportion
                             (1)
                                              (2)
unblocked
                                                                (3)
for minor
                        Single-stage
                                               Two-Stage Process
                          Process
movements, p(x)
                                           Stage I
                                                            Stage II
p(1)
p(4)
p(7)
p(8)
p(9)
p(10)
p(11)
p(12)
Computation 4 and 5
Single-Stage Process
                                                                             12
Movement
                         1
                                        7
                                                        9
                                                              10
                                                                      11
                                                Т
                         L
                                 L
                                        L
                                                        R
                                                                       Т
                                                               L
                                                                              R
V c,x
                                                              910
                        489
                                                                             483
                                                                     F-25
Рx
```

Movement 2

APMENNEMENT 5

C r,x C plat,x

	Two-Stage	Process
--	-----------	---------

Two-Stage Proc	ess	7		0	1	.0	1	1
	Stage1	•	Stage1	8 Stage2				1 Stage2
V(c,x) s					483	427 1700		
P(x) V(c,u,x)						1700		
C(r,x) C(plat,x)								
Worksheet 6-Im	pedance	and Cap	acity Eq	quations				
Step 1: RT fro	m Minor	St.			9		12	
Conflicting Fl Potential Capa	city						483 568	
Pedestrian Imp Movement Capac	ity				1.00		1.00 568	
Probability of					1.00		0.89	
Step 2: LT fro	m Major	St.			4		1	
Conflicting Fl Potential Capa Pedestrian Imp Movement Capac Probability of Maj L-Shared P	city edance ity Queue	free St.			1.00		489 1034 1.00 1034 0.99	
Step 3: TH fro					8		11	
Conflicting Fl Potential Capa								
Pedestrian Imp Cap. Adj. fact Movement Capac	edance or due		ing mvmr	nt	1.00 0.99		1.00 0.99	
Probability of		free St.			1.00		1.00	
Step 4: LT fro	m Minor	St.			7		10	
Conflicting Fl Potential Capa Pedestrian Imp Maj. L, Min T Maj. L, Min T Cap. Adj. fact Movement Capac	city edance Impedan Adj. Im or due	ce facto p Factor	•	nt	1.00 0.99 1.00 0.89		910 295 1.00 0.99 1.00 294	
							F-26	
1 1		C . 1		c —				

Worksheet 7-Computation of the Effect of Two-stage Gap Acceptance

Cton 2. TH from Minor Ct	C	APPENDIX F
Step 3: TH from Minor St.	8	11
Part 1 - First Stage Conflicting Flows Potential Capacity Pedestrian Impedance Factor Cap. Adj. factor due to Impeding mvmnt Movement Capacity Probability of Queue free St.	589 1.00 0.99 586 1.00	556 1.00 1.00 556 1.00
Part 2 - Second Stage Conflicting Flows Potential Capacity Pedestrian Impedance Factor Cap. Adj. factor due to Impeding mvmnt Movement Capacity	553 1.00 1.00 553	589 1.00 0.99 586
Part 3 - Single Stage Conflicting Flows Potential Capacity Pedestrian Impedance Factor Cap. Adj. factor due to Impeding mvmnt Movement Capacity	1.00 0.99	1.00 0.99
Result for 2 stage process: a Y C t	0.00	0.00
Probability of Queue free St.	1.00	1.00
Step 4: LT from Minor St.	7	10
Part 1 - First Stage Conflicting Flows Potential Capacity Pedestrian Impedance Factor Cap. Adj. factor due to Impeding mvmnt Movement Capacity	662 1.00 0.99 658	483 604 1.00 1.00 604
Part 2 - Second Stage Conflicting Flows Potential Capacity Pedestrian Impedance Factor Cap. Adj. factor due to Impeding mvmnt Movement Capacity	603 1.00 0.89 539	427 641 1.00 0.99 637
Part 3 - Single Stage Conflicting Flows Potential Capacity Pedestrian Impedance Factor Maj. L, Min T Impedance factor Maj. L, Min T Adj. Imp Factor. Cap. Adj. factor due to Impeding mvmnt Movement Capacity	1.00 0.99 1.00 0.89	910 295 1.00 0.99 1.00 1.00
Results for Two-stage process: a	0.00	F-27 0.00

Y C t						0.00	А	PPENDIQF 00 294	
Worksheet 8-Shared	Lane Ca	lculati	ons						
Movement				7 L	8 T	9 R	10 L	11 T	12 R
Volume (vph) Movement Capacity (Shared Lane Capacit							60 294		60 568
Worksheet 9-Computa	ation of	Effect	of F	lared	Minc	or Street	Appro	aches	
Movement				7 L	8 T	9 R	10 L	11 T	12 R
C sep Volume Delay Q sep Q sep +1 round (Qsep +1)							294 60		568 60
n max C sh SUM C sep n C act									
Worksheet 10-Delay,	Queue	Length,	and :	Level	of S	Service			
Movement Lane Config	1 L	4	7	8		9	10 L	11	12 R
v (vph) C(m) (vph) v/c 95% queue length Control Delay LOS Approach Delay Approach LOS							60 294 0.20 0.85 20.4		60 568 0.11 0.33 12.1 B
Worksheet 11-Shared	d Major	LT Impe	dance	and l	Delay	7			
						Movemer	nt 2	Movem	ent 5
<pre>p(oj) v(il), Volume for s v(i2), Volume for s s(il), Saturation f s(i2), Saturation f P*(oj)</pre>	stream 3 low rat	or 6 e for s				0.99	9	1. F-28	00

d(M,LT), Delay for stream 1 or 4 N, Number of major street through lanes d(rank,1) Delay for stream 2 or 5 8.5 APPENDIX F

HCS: Unsignalized Intersections Release 3.2

TWO-WAY STOP CONTROL SUMMARY

Intersection: HWY 1 and Willow

Analyst: MRS Project No.: 102

Date: 5/7/2012 East/West Street: Willow North/South Street: HWY 1

Intersection Orientation: NS Study period (hrs): 1.00

Vehicle	Volumes	and	Adjustments
a h	Monthb	5 arra	

	V C11.	TCTC VC	Tanco an	.a. <u>21</u> a. ja		.1100			
Major Street:	Approach	No	orthboun	.d		Southbound			
_	Movement	1	2	3		4	5	6	
		L	Т	R	İ	L	Т	R	
Volume			640			171	172		
Hourly Flow Ra	ate, HFR		640			171	172		
Percent Heavy	Vehicles					10			
Median Type RT Channelized		ivided							
Lanes			1			1	1		
Configuration			T			${ m L}$	${f T}$		
Upstream Signal?			No				No		
Minor Street:	Approach	W	estbound	[Ea	stbound		

TITILOT DOTOGO.	11pp10a011	, , ,			-	Lab cb carr	<i>_</i>
	Movement	7	8	9	10	11	12
		L	Т	R	L	Т	R
Volume		53		53			
Hourly Flow Ra	ite, HFR	53		53			
Percent Heavy	Vehicles	10		10			
Percent Grade	(%)		0			0	
Median Storage	· 1						
Flared Approac	h: Exists? Storage						

L

Configuration

Approach LOS

RT Channelized? No Lanes 1

	Delay,	Queue Le	ength, a	and Le	vel of Se	ervice		
Approach	NB	SB	Wes	stboun	.d	Εä	astbound	
Movement	1	4	7	8	9	10	11	12
Lane Config		L	L		R			
v (vph)		171	53		53			
C(m) (vph)		907	180		461			
v/c		0.19	0.29		0.11			
95% queue length		0.79	1.35		0.38			
Control Delay		9.9	33.3		13.8			
LOS		A	D		В			
Approach Delay				23.6				

R

C

F-30

F-31

HCS: Unsignalized Intersections Release 3.2

MRS

3140 Telegraph Road Ventura, CA

Phone: 805-289-3929 Fax:

E-Mail:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Vehicle Volumes and Adjustments

HWY 1 and Willow Intersection:

City/State:

Configuration

Analyst: MRS Project No.: 102

Time period Analyzed:

5/7/2012 Date: East/West Street: Willow North/South Street: HWY 1

Intersection Orientation: NS Study period (hrs): 1.00

Major Street Move	ments	1 L	2 T	3 R	4 L	5 T	6 R
Volume Peak-Hour Factor, Peak-15 Minute Vo Hourly Flow Rate, Percent Heavy Veh Median Type	lume HFR icles	ivided	640 1.00 160 640		171 1.00 43 171 10	172 1.00 43 172	
RT Channelized? Lanes Configuration Upstream Signal?			1 T No		1 L	1 T No	
Minor Street Move	ments	7 L	8 T	9 R	10 L	11 T	12 R
Volume Peak Hour Factor, Peak-15 Minute Vo Hourly Flow Rate, Percent Heavy Veh Percent Grade (%) Median Storage Flared Approach:	lume HFR icles 1	13 53 10	0	53 1.00 13 53 10		0	
RT Channelized? Lanes	Secretary	1		No 1			

Pedestrian Volumes and Adjustments

R

L

Flow (ped/hr)	0	0	0	0	APPENDIX F
Lane Width (ft)	12.0	12.0	12.0	12.0	
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0	
Percent Blockage	0	0	0	0	

	Up	stream Sig	gnal Dat	a		
Prog. Flow vph	-	Arrival Type	Green	Cycle	_	Distance to Signal feet
٧٢	, DII		500	500	D11	1000

S2 Left-Turn Through S5 Left-Turn Through

Worksheet 3-Data for Computing Effect of Delay to Major Street Vehicles

Movement 2 Movement 5
Shared In volume, major th vehicles:

Shared ln volume, major rt vehicles: Sat flow rate, major th vehicles: Sat flow rate, major rt vehicles: Number of major street through lanes:

Worksheet 4-Critical Gap and Follow-up Time Calculation

Critical	Gap Cal	culatio	n						
Movement		1	4	7	8	9	10	11	12
		L	L	L	Т	R	L	T	R
t(c,base)		4.1	7.1		6.2			
t(c,hv) P(hv)		1.00	1.00 10	1.00 10	1.00	1.00 10	1.00	1.00	1.00
t(c,g)				0.20	0.20	0.10	0.20	0.20	0.10
Grade/10	0			0.00	0.00	0.00	0.00	0.00	0.00
t(3,1t)			0.00	0.70		0.00			
t(c,T):	1-stage		0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2-stage		0.00	1.00	1.00	0.00	1.00	1.00	0.00
t(c)	1-stage		4.2	6.5		6.3			
	2-stage		4.2	5.5		6.3			
Follow-U	p Time C	alculat	ions						
Movement		1	4	7	8	9	10	11	12
		L	L	L	Т	R	L	T	R
t(f,base)		2.20	3.50		3.30			
t(f,HV)		0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)			10	10		10			
t(f)			2.3	3.6		3.4			

Worksheet 5-Effect of Upstream Signals

```
APMANNEMENT 5
                                            V(t)
                                                    V(1,prot) V(t)
                                                                       V(1,prot)
V prog
Total Saturation Flow Rate, s (vph)
Arrival Type
Effective Green, g (sec)
Cycle Length, C (sec)
Rp (from table 9-2)
Proportion vehicles arriving on green P
g (q1)
g (q2)
g(q)
Computation 2-Proportion of TWSC Intersection Time blocked
                                                Movement 2
                                                                   Movement 5
                                                   V(1,prot) V(t)
                                            V(t)
                                                                       V(1,prot)
alpha
beta
Travel time, t(a) (sec)
Smoothing Factor, F
Proportion of conflicting flow, f
Max platooned flow, V(c,max)
Min platooned flow, V(c,min)
Duration of blocked period, t(p)
                                                  0.000
                                                                      0.000
Proportion time blocked, p
Computation 3-Platoon Event Periods
                                           Result
p(2)
                                           0.000
                                           0.000
p(5)
p(dom)
p(subo)
Constrained or unconstrained?
Proportion
                             (1)
                                               (2)
unblocked
                                                                 (3)
for minor
                         Single-stage
                                                Two-Stage Process
                           Process
movements, p(x)
                                           Stage I
                                                             Stage II
p(1)
p(4)
p(7)
p(8)
p(9)
p(10)
p(11)
p(12)
Computation 4 and 5
Single-Stage Process
                                                                               12
Movement
                          1
                                         7
                                                         9
                                                               10
                                                                       11
                          \mathbf{L}
                                 L
                                                 Τ
                                                                L
                                                                        Т
                                         L
                                                        R
                                                                                R
V c,x
                                640
                                        1154
                                                       640
                                                                      F-33
Рx
```

Movement 2

Cr,x C plat,x

Two-Stage Process

		7		8	1	_0	1	1
	Stage1	Stage2	Stage1	Stage2				
V(c,x) s	640	514 1700						
P(x) V(c,u,x)		1700						
C(r,x) C(plat,x)								
Worksheet 6-1	Impedance	and Cap	acity Eq	quations				
Step 1: RT fr	com Minor	St.			9		12	
Conflicting F					640			
Potential Cap Pedestrian Im		Factor			461 1.00		1.00	
Movement Capa		ractor			461		1.00	
Probability c	-	free St.			0.89		1.00	
Step 2: LT fr	com Major	St.			4		1	
Conflicting F	lows				640			
Potential Cap					907			
Pedestrian Im		Factor			1.00		1.00	
Movement Capa Probability o		free St			907 0.81		1.00	
Maj L-Shared					0.01		1.00	
Step 3: TH fr	com Minor	St.			8		11	
Conflicting F								
Potential Cap		Factor			1.00		1.00	
Pedestrian Im Cap. Adj. fac	-		ina mvmr	nt.	0.81		0.81	
Movement Capa					0.01		0.01	
Probability c	of Queue	free St.			1.00		1.00	
Step 4: LT fr	com Minor	St.			7		10	
Conflicting F	lows				1154			
Potential Cap	-				210			
Pedestrian In	-		70		1.00		1.00	
Maj. L, Min T Maj. L, Min T	ı ımpedan Dadi Tm	ice lacto in Factor	T		0.81 0.86		0.81 0.86	
Cap. Adj. fac				nt	0.86		0.76	
Movement Capa			د		180			
							F-34	

Step 3: TH from Minor St.	8	APPENDIX F
Part 1 - First Stage Conflicting Flows Potential Capacity Pedestrian Impedance Factor Cap. Adj. factor due to Impeding mvmnt Movement Capacity Probability of Queue free St.	473 1.00 1.00 473 1.00	539 1.00 0.81 437 1.00
Part 2 - Second Stage Conflicting Flows Potential Capacity Pedestrian Impedance Factor Cap. Adj. factor due to Impeding mvmnt Movement Capacity	539 1.00 0.81 437	473 1.00 1.00 473
Part 3 - Single Stage Conflicting Flows Potential Capacity Pedestrian Impedance Factor Cap. Adj. factor due to Impeding mvmnt Movement Capacity	1.00 0.81	1.00 0.81
Result for 2 stage process: a Y C t	0.00	0.00
Probability of Queue free St. Step 4: LT from Minor St.	1.00	1.00
Part 1 - First Stage Conflicting Flows Potential Capacity Pedestrian Impedance Factor Cap. Adj. factor due to Impeding mvmnt Movement Capacity	640 510 1.00 1.00 510	584 1.00 0.81 474
Part 2 - Second Stage Conflicting Flows Potential Capacity Pedestrian Impedance Factor Cap. Adj. factor due to Impeding mvmnt Movement Capacity	514 584 1.00 0.81 474	496 1.00 0.89 439
Part 3 - Single Stage Conflicting Flows Potential Capacity Pedestrian Impedance Factor Maj. L, Min T Impedance factor Maj. L, Min T Adj. Imp Factor. Cap. Adj. factor due to Impeding mvmnt Movement Capacity	1154 210 1.00 0.81 0.86 0.86 180	1.00 0.81 0.86 0.76
Results for Two-stage process: a	0.00	F-35 0.00

ations					
7 L	8 T	9 R	10 L	11 T	12 R
53 180		53 461			
ect of Flared	Minc	or Stree	t Appro	oaches	
7 L	8 T	9 R	10 L	11 T	12 R
180 53		461 53			
th, and Level	of S	Service			
7 8 L		9 R	10	11	12
53 180 9 0.29 9 1.35 33.3 D	. 6	53 461 0.11 0.38 13.8 B			
mpedance and 1	Delay	7			
		Moveme	nt 2	Mover	ment 5
5 6		1.0	0	0	.81
r stream 2 or r stream 3 or				F-36	
	7 L 53 180 ect of Flared 7 L 180 53 180 9 0.29 9 1.35 33.3 D 23 C mpedance and I	7 8 L T 53 180 ect of Flared Mino 7 8 L T 180 53 180 9 0.29 9 1.35 33.3 D 23.6 C mpedance and Delay 5 6 r stream 2 or 5	7 8 9 1 T R 53 53 180 461 ect of Flared Minor Stree 7 8 9 L T R 180 461 53 53 180 461 9 0.29 0.11 9 1.35 0.38 33.3 13.8 D B 23.6 C mpedance and Delay Moveme 1.0 5 6 r stream 2 or 5	7 8 9 10 L T R L 53 53 180 461 ect of Flared Minor Street Appro 7 8 9 10 L T R L 180 461 53 53 th, and Level of Service 7 8 9 10 L R 53 53 180 461 9 0.29 0.11 9 1.35 0.38 33.3 13.8 D B 23.6 C mpedance and Delay Movement 2 1.00 5 6 r stream 2 or 5	The stream 2 or 5 The stream 2 or 5 The stream 2 or 5 The stream 2 or 5 The stream 2 or 5 The stream 2 or 5 The stream 2 or 5 The stream 2 or 5 The stream 2 or 5 The stream 2 or 5 The stream 2 or 5 The stream 2 or 5 The stream 2 or 5 The stream 2 or 5 The stream 2 or 5 The stream 2 or 5

0.00

180

APPENDIQ F 00

HCS: Unsignalized Intersections Release 3.2

TWO-WAY STOP CONTROL SUMMARY

Intersection: HWY 1 and Willow

Analyst: MRS Project No.: 102

Date: 5/7/2012 East/West Street: Willow North/South Street: HWY 1

Intersection Orientation: NS Study period (hrs): 1.00

Vehic]	le Vo	lumes	and	Adj	ustments

Major Street:	Approach	N	orthbour	nd		Southbound			
	Movement	1	2	3		4	5	6	
		L	Т	R	ĺ	L	Т	R	
Volume			640			268	269		
Hourly Flow Ra	ate, HFR		640			268	269		
Percent Heavy	Vehicles					10			
Median Type RT Channelized		ivided							
Lanes			1			1	1		
Configuration			T			L	${f T}$		
Upstream Signal?			No				No		
Minor Street:	Approach	W	estbound	i		Ea	stbound		

1111101 001000.	1100104011	***			_	Jab cz carr	~
	Movement	7	8	9	10	11	12
		L	Т	R	L	Т	R
Volume		78		78			
Hourly Flow Ra	ite, HFR	78		78			
Percent Heavy	Vehicles	10		10			
Percent Grade	(왕)		0			0	
Median Storage	e 1						
Flared Approac	ch: Exists? Storage						

RT Channelized? No 1

Lanes Configuration \mathbf{L} R

		Queue Le	_				. 1	
Approach	NB	SB	Wes	tbound		Ľа	astbound	
Movement	1	4	7	8	9	10	11	12
Lane Config		L	L		R			
v (vph)		268	78		78			
C(m) (vph)		907	107		461			
v/c		0.30	0.73		0.17			
95% queue length		1.44	5.43		0.67			
Control Delay		10.6	116.7		14.4			
LOS		В	F		В			
Approach Delay				65.5				
_								

Approach LOS F

F-39

HCS: Unsignalized Intersections Release 3.2

MRS

3140 Telegraph Road Ventura, CA

Phone: 805-289-3929 Fax:

E-Mail:

Lanes

Configuration

TWO-WAY STOP CONTROL (TWSC) ANALYSIS

Vehicle Volumes and Adjustments

Intersection: HWY 1 and Willow

City/State:

Analyst: MRS Project No.: 102

Time period Analyzed:

5/7/2012 Date: East/West Street: Willow North/South Street: HWY 1

Intersection Orientation: NS Study period (hrs): 1.00

Major Street Movemen	ts	1 L	2 T	3 R	4 L	5 T	6 R
Volume Peak-Hour Factor, PH Peak-15 Minute Volum Hourly Flow Rate, HF: Percent Heavy Vehicl Median Type RT Channelized?	e R	ided	640 1.00 160 640		268 1.00 67 268 10	269 1.00 67 269	
Lanes Configuration Upstream Signal?			1 T No		1 L	1 T No	
Minor Street Movemen	ts	7 L	8 T	9 R	10 L	11 T	12 R
Volume Peak Hour Factor, PH Peak-15 Minute Volum Hourly Flow Rate, HF Percent Heavy Vehicl Percent Grade (%) Median Storage 1 Flared Approach: Ex	F e R es	78 1.00 20 78 10	0	78 1.00 20 78 10		0	
RT Channelized?	•			No			

Pedestrian Volumes and Adjustments

1

R

1

L

Flow (ped/hr)	0	0	0	0	APPENDIX F
Lane Width (ft)	12.0	12.0	12.0	12.0	
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0	
Percent Blockage	0	0	0	0	

	Up	stream Si	gnal Dat	a	
Prog. Flow vph	Sat Flow vph	Arrival Type		Cycle Length sec	 Distance to Signal feet

S2 Left-Turn Through S5 Left-Turn Through

Worksheet 3-Data for Computing Effect of Delay to Major Street Vehicles

Movement 2 Movement 5
Shared In volume, major th vehicles:

Shared ln volume, major th vehicles:
Shared ln volume, major rt vehicles:
Sat flow rate, major th vehicles:
Sat flow rate, major rt vehicles:
Number of major street through lanes:

Worksheet 4-Critical Gap and Follow-up Time Calculation

Critical	Gap Cal	culatio	on						
Movement		1	4	7	8	9	10	11	12
		L	L	L	T	R	L	T	R
t(c,base)		4.1	7.1		6.2			
t(c,hv) P(hv)		1.00	1.00 10	1.00 10	1.00	1.00 10	1.00	1.00	1.00
t(c,g)				0.20	0.20	0.10	0.20	0.20	0.10
Grade/10	0		0 00	0.00	0.00	0.00	0.00	0.00	0.00
t(3,1t) t(c,T):	1-stage	. 0 00	0.00	0.70 0.00	0.00	0.00	0.00	0.00	0.00
C (C, I).	2-stage		0.00	1.00	1.00	0.00	1.00	1.00	0.00
t(c)	1-stage		4.2	6.5	_,,,	6.3			
	2-stage	:	4.2	5.5		6.3			
Follow-U	p Time C	alculat	ions						
Movement	_	1	4	7	8	9	10	11	12
		L	L	L	T	R	L	T	R
t(f,base)		2.20	3.50		3.30			
t(f,HV)		0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV) t(f)			10 2.3	10 3.6		10 3.4			
C (L)			4.3	3.0		J.4			

Worksheet 5-Effect of Upstream Signals

```
APMENNEMENT 5
                                            V(t)
                                                   V(1,prot) V(t)
                                                                       V(1,prot)
V prog
Total Saturation Flow Rate, s (vph)
Arrival Type
Effective Green, g (sec)
Cycle Length, C (sec)
Rp (from table 9-2)
Proportion vehicles arriving on green P
g (q1)
g (q2)
g(q)
Computation 2-Proportion of TWSC Intersection Time blocked
                                                Movement 2
                                                                   Movement 5
                                                   V(l,prot) V(t)
                                            V(t)
                                                                       V(1,prot)
alpha
beta
Travel time, t(a) (sec)
Smoothing Factor, F
Proportion of conflicting flow, f
Max platooned flow, V(c,max)
Min platooned flow, V(c,min)
Duration of blocked period, t(p)
                                                  0.000
                                                                      0.000
Proportion time blocked, p
Computation 3-Platoon Event Periods
                                           Result
p(2)
                                           0.000
                                           0.000
p(5)
p(dom)
p(subo)
Constrained or unconstrained?
Proportion
                             (1)
                                               (2)
unblocked
                                                                 (3)
for minor
                         Single-stage
                                                Two-Stage Process
                           Process
movements, p(x)
                                           Stage I
                                                             Stage II
p(1)
p(4)
p(7)
p(8)
p(9)
p(10)
p(11)
p(12)
Computation 4 and 5
Single-Stage Process
                                                                              12
Movement
                          1
                                         7
                                                         9
                                                               10
                                                                       11
                          \mathbf{L}
                                 L
                                                 Τ
                                                                L
                                                                        Т
                                         L
                                                        R
                                                                               R
V c,x
                                640
                                        1445
                                                       640
                                                                      F-41
Рx
```

Movement 2

C r,x C plat,x

Two-Stage	Process
-----------	---------

Iwo-beage FI	00000	7		8	1	10	1	.1
	Stage1		Stage1	Stage2				
V(c,x) s P(x) V(c,u,x)	640	805 1700						
C(r,x) C(plat,x)								
Worksheet 6-	Impedance	and Cap	acity E	quations				
Step 1: RT f	rom Minor	St.			9		12	2
Conflicting Potential Ca	pacity	En at a s			640 461		1 00	
Pedestrian I Movement Cap Probability	acity				1.00 461 0.83		1.00	
Step 2: LT f					4		1.00	
Conflicting Potential Ca					640 907			
Pedestrian I Movement Cap	mpedance acity				1.00		1.00	
Probability Maj L-Shared					0.70		1.00)
Step 3: TH f	rom Minor	St.			8		11	-
Conflicting Potential Ca								
Pedestrian I Cap. Adj. fa	ctor due		ing mvm	nt	1.00 0.70		1.00 0.70	
Movement Cap Probability		free St.			1.00		1.00)
Step 4: LT f	rom Minor	St.			7		10)
Conflicting Potential Ca	pacity				1445 139			
Pedestrian I Maj. L, Min	T Impedan	ce facto			1.00		1.00)
Maj. L, Min Cap. Adj. fa Movement Cap	ctor due			nt	0.77 0.77 107		0.77 0.64	
							F-42	

Step 3: TH from Minor St.	8	APPENDIX F 11
Part 1 - First Stage Conflicting Flows Potential Capacity Pedestrian Impedance Factor Cap. Adj. factor due to Impeding mvmnt Movement Capacity	473	398 1.00 0.70 280
Probability of Queue free St. Part 2 - Second Stage	1.00	1.00
Conflicting Flows Potential Capacity Pedestrian Impedance Factor Cap. Adj. factor due to Impeding mvmnt Movement Capacity	398 1.00 0.70 280	473 1.00 1.00 473
Part 3 - Single Stage Conflicting Flows Potential Capacity		
Pedestrian Impedance Factor Cap. Adj. factor due to Impeding mvmnt Movement Capacity	1.00	1.00 0.70
Result for 2 stage process: a	0.00	0.00
Y C t	0.00	0.00
Probability of Queue free St.	1.00	1.00
Step 4: LT from Minor St.	7	10
Part 1 - First Stage Conflicting Flows Potential Capacity Pedestrian Impedance Factor Cap. Adj. factor due to Impeding mvmnt Movement Capacity	640 510 1.00 1.00 510	426 1.00 0.70 300
Part 2 - Second Stage Conflicting Flows Potential Capacity Pedestrian Impedance Factor Cap. Adj. factor due to Impeding mvmnt Movement Capacity	805 426 1.00 0.70 300	489 1.00 0.83 406
Part 3 - Single Stage Conflicting Flows Potential Capacity Pedestrian Impedance Factor Maj. L, Min T Impedance factor Maj. L, Min T Adj. Imp Factor. Cap. Adj. factor due to Impeding mvmnt Movement Capacity	1445 139 1.00 0.70 0.77 0.77	1.00 0.70 0.77 0.64
Results for Two-stage process: a	0.00	F-43 0.00
	0.00	3.00

				_			
Worksheet 8-Shared Lane C	Calculat	ions					
Movement		7 L	8 T	9 R		11 T	12 R
Volume (vph) Movement Capacity (vph) Shared Lane Capacity (vph	1)	78 107		78 461			
Worksheet 9-Computation c	of Effect	t of Flar	ed Mir	nor Stree	et Appro	oaches	
Movement		7 L	8 T	9 R	10 L	11 T	12 R
C sep Volume Delay Q sep Q sep +1 round (Qsep +1)		107 78		461 78			
n max C sh SUM C sep n C act							
Worksheet 10-Delay, Queue	e Length	, and Lev	el of	Service			
Movement 1 Lane Config	4 L	7 L	8	9 R	10	11	12
v (vph) C(m) (vph) v/c 95% queue length Control Delay LOS Approach Delay Approach LOS		0.73 5.43 116.7 F	65.5 F	78 461 0.17 0.67 14.4 B			
Worksheet 11-Shared Major	LT Impe	edance an	d Dela	ay			
				Moveme	ent 2	Move	ment 5
p(oj) v(il), Volume for stream v(i2), Volume for stream				1.0	00	0	.70
s(il), Saturation flow ra							

0.00

107

APPENDIQ F 00

REVISED- DJ Farms Traffic Impact Study

Bakersfield. The road is the main route to commercial and employment opportunities in Santa Maria. Caltrans is proposing to widen SR 166 from Guadalupe to the Santa Maria City limits. Two alternatives are proposed, including maintaining the roadway with two lanes and constructing a continuous two-way left turn lane or adding an additional lane in each direction and providing a continuous two-way left turn lane. The purpose of the widening project is to improve the operational efficiency and safety on SR 166 by reducing conflicts between commuter, tourist, agricultural and truck traffic. However, the current status of the project shows no funding available for the SR 166 Widening project beyond Project Approval & Environmental Document (PA&ED) phase. Currently work on this project is stalled. The City of Guadalupe circulation plan is to maintain the road as a two-lane arterial.

Obispo Street is a north-south two-lane roadway that connects SR 166 with the east side of Guadalupe. The road serves a mixture of residential, commercial and industrial land uses. The Civic Center (which houses City Hall, the police department and one of the City's fire stations) is located on Obispo Street, approximately one mile from SR 166.

Flower Avenue is a two-lane roadway that provides access to residential and other land uses north of State Route 166. The road dead-ends north of 4th St. Flower Avenue establishes the eastern boundary of the City of Guadalupe.

Existing Intersection Operations

Penfield & Smith conducted traffic counts at the study intersections on September 9 and 10, 2003 from 7 to 9 AM and from 4 to 6 PM. The existing peak hour volumes are illustrated in Exhibit 3. As shown in Table 2 below, all three study intersections currently operate within the City's acceptable level of service range during both peak hours.

Table 2
Existing Peak Hour Levels of Service

Intersection	Traffic Control	AM Peak LOS (sec/veh.)	PM Peak LOS (sec./veh.)	
SR 166/SR 1	All-way STOP	13.2/LOS B	12.9/LOS B	
SR 166/Obispo St.	One-way STOP	13.7/LOS B	12.4/LOS B	
SR 166/Flower Ave.	One-way STOP	14.9/LOS B	13.0/LOS B	

Future Conditions

The base future traffic volumes were determined based on the volumes provided in the Project Study Report on State Route 166 prepared by Caltrans in June 2001. The twenty year traffic growth rate was determined to be approximately one percent per year. The future traffic volumes are illustrated in Exhibit 4.