

Traffic Impact Study

Proposed Research & Technology Park Expansion

South of Nees Avenue and East of Temperance Avenue

Clovis, California

Prepared For:

City of Clovis
1033 Fifth Street
Clovis, California 93612

Date:

July 30, 2008

Job No.:

07-066.01



PETERS ENGINEERING GROUP

A CALIFORNIA CORPORATION

952 POLLASKY AVENUE
CLOVIS, CALIFORNIA 93612

PHONE (559) 299-1544
FAX (559) 299-1722



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A CALIFORNIA CORPORATION

952 POLLASKY AVENUE
CLOVIS, CALIFORNIA 93612

PHONE (559) 299-1544
FAX (559) 299-1722

Mr. Ryan Burnett
City of Clovis
1033 Fifth Street
Clovis, California 93612

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INTRODUCTION

This report presents the results of a traffic impact study for a proposed single family residence in Clovis, California. This analysis focuses on the anticipated effect of vehicle traffic resulting from the project.

PROJECT DESCRIPTION

The proposed Research and Technology Park Expansion (Project) includes an amendment to the City of Clovis General Plan and the Herndon-Shepherd Specific Plan to add approximately 153 acres to the existing Clovis Research and Technology Park. The project totals approximately 139 net acres excluding street right of way. Approximately nine acres will be used for ponding basins, leaving approximately 130 acres for development. The proposed land use designation is Mixed Use Area 40, which allows a mixture of research and technology uses. The site is generally located south of Nees Avenue, east of the Enterprise Canal, north of State Route (SR) 168, and west of the DeWolf Avenue alignment. A Site Vicinity Map is presented in Figure 1. A Site Map is presented in Figure 2.

The proposed Project is a modification of the planned land use; no specific development projects are currently proposed within the Project site. Therefore, for purposes of modeling trip generation the ultimate development of the Project site must be assumed. City of Clovis staff provided an estimate that approximately 70 percent of the site (91 acres) will be developed with office buildings and 30 percent (39 acres) of the site will be developed with light industrial uses.

The Project also includes modification of the Clovis General Plan Circulation Element and the Herndon-Shepherd Specific Plan Circulation Element to allow the extension of Alluvial Avenue as an arterial street from its current intersection with Temperance Avenue northeastward across the Enterprise Canal, through the Project site, to connect with DeWolf Avenue and the ultimate interchange near the southwestern portion of Harlan Ranch.

The Project also proposes to change the classification of Nees Avenue east of Temperance Avenue from an arterial street to a collector street. Locan Avenue south of Nees Avenue would be changed from a local road to an industrial/commercial local road.

The project is more fully described in the Notice of Preparation for the project dated December 2007.

STUDY AREA AND TIME PERIOD

The study intersections were determined in discussions with City of Clovis staff based on the anticipated distribution of project traffic, the proximity of the intersections to the development, and the potential need for future improvements. This report includes analysis of the following intersections:

- Temperance Avenue / Shepherd Avenue
- Temperance Avenue / Nees Avenue
- Temperance Avenue / Alluvial Avenue
- Temperance Avenue / SR 168 Westbound ramps
- Temperance Avenue / SR 168 Eastbound ramps
- Temperance Avenue / Herndon Avenue
- Locan Avenue / Shepherd Avenue
- Locan Avenue / Nees Avenue
- Locan Avenue / Alluvial Avenue
- DeWolf Avenue / Shepherd Avenue
- DeWolf Avenue / Alluvial Avenue
- Alluvial Avenue / Nees Avenue
- SR 168 / Shepherd Avenue
- Nees Avenue / SR 168 interchange (including estimate of year interchange is warranted).

The study time periods include the weekday a.m. and p.m. peak hours determined between 7:00 and 9:00 a.m. and between 4:00 and 6:00 p.m. The peak hours were analyzed for the following conditions:

- Existing Conditions;
- Existing Plus Project Conditions;
- Cumulative No Project Conditions (Year 2030); and
- Cumulative With Project Conditions (Year 2030).

It should be noted that the existing-plus-project conditions analyses are included to satisfy the requirements of the California Environmental Quality Act (CEQA); however, the actual development of the proposed land uses would actually occur over many years. Therefore, the existing-plus-project conditions analyses do not represent conditions that are expected to actually occur. The cumulative year 2030 analyses are the primary scenarios that are likely to occur and are most relevant to this study.

LANE CONFIGURATIONS AND INTERSECTION CONTROL

The existing lane configurations and intersection control (i.e., traffic signals, stop signs) at the study intersections are presented in Figure 3. The existing-plus-project lane configurations are presented in Figure 4. The existing lane configurations are the basis for the cumulative no-Project analyses. The existing-plus-project lane configurations are the basis for the cumulative with-Project analyses.

PROJECT TRIP GENERATION

Data provided in the Institute of Transportation Engineers (ITE) *Trip Generation, 7th Edition*, were used to estimate the number of trips anticipated to be generated by the project.

Assuming 40 percent floor area ratio (FAR) for the light industrial uses on 91 acres, up to 679,539 square feet of light industrial building area would be constructed. Assuming 25 percent FAR for office uses on 39 acres, up to 990,994 square feet of office building area would be constructed. It is noted that parking and landscaping requirements typically result in a FAR of approximately 25 percent; a FAR of 30 to 40 percent is unlikely based on parking and landscaping requirements. Table 1 presents the trip generation information for the Project.

Table 1
Project Trip Generation

Land Use	ITE Code	Units	A.M. Peak Hour Traffic Volumes			P.M. Peak Hour Traffic Volumes			Weekday Traffic Volumes	
			Rate Split	Enter	Exit	Rate Split	Enter	Exit	Rate	Total
Office Park	750	990,994 sq. ft.	1.74 89/11	1,535	190	1.5 14/86	208	1,279	11.42	11,318
Light Industrial	110	679,539 sq. ft.	0.92 88/12	551	75	0.98 12/88	80	586	6.97	4,737
TOTALS	-	-	-	2,086	265	-	288	1,865	-	16,055

Reference: *Trip Generation, 7th Edition*, Institute of Transportation Engineers 2003

Rates are reported in trips per 1,000 square feet

Splits are reported as Entering/Exiting as a percentage of the total

Pass-by and captured trip reductions are not typically significant for office and industrial land uses and were not applied to the Project traffic volumes. The Project description and other relevant Project data were provided to the Council of Fresno County Governments (COG) to perform a Project-specific select zone analysis based on the 2030 COG travel demand model. It should be noted that the COG travel model provides a basis for the regional distribution of Project traffic; however, the Project traffic volumes are adjusted manually using engineering judgment to reflect expected driver behavior not accommodated by the travel model. Trip distribution within the Project and at the Project access points was generally performed manually using engineering judgment considering the locations of the various land uses. The anticipated Project traffic volumes at the study intersections are presented in Figure 5.

NO-PROJECT SITE TRIP GENERATION

For comparison purposes, the amount of traffic that potentially could have been generated by a project constructed based on the current very-low density land use designation is presented in Table 2. The calculation of the planned land use traffic volumes is based on 113 acres of Very Low Density Residential (at 2.0 dwelling units per acre yields 226 single-family residential units), 19.9 acres of Commercial land uses (at 25 percent typical FAR yields 216,712 square feet of building area), and 20.1 acres of High Density Residential (at 25.0 dwelling units per acre yields 502 apartment units).

Table 2
No-Project Site Trip Generation

Land Use	ITE Code	Units	A.M. Peak Hour Traffic Volumes			P.M. Peak Hour Traffic Volumes			Weekday Traffic Volumes	
			Rate Split	Enter	Exit	Rate Split	Enter	Exit	Rate	Total
Single-Family Residential	210	226	0.75 25/75	43	127	1.01 63/37	144	85	9.57	2,163
Shopping Center	820	216,712 sq. ft.	1.03 61/39	137	87	3.75 48/52	390	423	42.94	9,306
Apartment	220	502	0.51 20/80	51	205	0.62 65/35	203	109	6.72	3,374
TOTALS	-	-	-	231	419	-	737	617	-	14,843

Reference: *Trip Generation, 7th Edition*, Institute of Transportation Engineers 2003
 Rates are reported in trips per dwelling unit or per 1,000 square feet as applicable
 Splits are reported as Entering/Exiting as a percentage of the total

A comparison of the data presented in Tables 1 and 2 indicates that the proposed Project increases the traffic volumes expected to be generated at the site above that which would have been expected under the current land use designations. The actual increase in traffic volumes resulting from the proposed Project is presented in Table 3.

Table 3
Trip Generation Difference Resulting From Proposed Project

A.M. Peak Hour Traffic Volumes			P.M. Peak Hour Traffic Volumes			Weekday Traffic Volumes
Enter	Exit	Total	Enter	Exit	Total	Total
1,855	-154	1,701	-449	1,248	799	1,212

EXISTING AND EXISTING-PLUS-PROJECT TRAFFIC VOLUMES

Existing peak-hour traffic volumes were determined by performing manual turning-movement counts at the study intersections between 7:00 and 9:00 a.m. and between 4:00 and 6:00 p.m. The data sheets are attached and include the date the counts were performed. The existing peak-hour turning movement volumes are presented in Figure 6. Construction of the streets and intersections proposed by the Project will result in a partial redistribution of the existing traffic volumes. The estimated redistributed existing traffic volumes are presented in Figure 7. Existing-Plus-Project traffic volumes are presented in Figure 8.

CUMULATIVE YEAR 2030 TRAFFIC VOLUMES

Cumulative no-Project traffic volumes are evaluated to determine the year 2030 traffic volumes that are expected to exist if the site is developed in accordance with the currently-planned land use.

Cumulative year 2030 traffic volumes were projected using the *Increment Method* developed by the Council of Fresno County Governments (COG). The 2030 traffic volumes were projected by extrapolating the results of the 2025 model data. Future turning movements were projected based on the methods presented in Chapter 8 of the Transportation Research Board National Cooperative Highway Research Program Report 255 entitled "Highway Traffic Data for Urbanized Area Project Planning and Design." Cumulative No-Project

traffic volumes are presented in Figure 9. Cumulative-with-project traffic volumes are presented in Figure 10.

SIGNIFICANCE CRITERIA

The Transportation Research Board *Highway Capacity Manual*, 2000, (HCM) defines level of service (LOS) as a qualitative measure describing operational characteristics within a traffic stream, based on service measures such as speed and travel time, freedom to maneuver, traffic interruptions, comfort, and convenience. LOS characteristics for both unsignalized and signalized intersections are presented in Tables 4 and 5.

Table 4
Level of Service Characteristics for Unsignalized Intersections

Level of Service	Description	Average Vehicle Delay (seconds)
A	Little or no delay.	0-10
B	Short delays.	>10-15
C	Average delays.	>15-25
D	Long delays.	>25-35
E	Very long delays.	>35-50
F	Extremely long delays.	>50

Reference: *Highway Capacity Manual*, Transportation Research Board

Table 5
Level of Service Characteristics for Signalized Intersections

Level of Service	Description	Average Vehicle Delay (seconds)
A	Extremely favorable progression. Most vehicles arrive during green phase. Many vehicles do not stop.	≤10
B	Good progression.	>10-20
C	Fair progression. Significant number of vehicles stopped. Some queues do not clear.	>20-35
D	Noticeable congestion. Many vehicles stop. Individual cycle failures are noticeable. Queues often do not clear.	>35-55
E	Poor progression. Individual cycle failures are frequent. Queues frequently do not clear.	>55-80
F	Poor progression. Oversaturation. Many individual cycle failures and queues not cleared.	>80

Reference: *Highway Capacity Manual*, Transportation Research Board

The City of Clovis requires that a LOS D or better be maintained at major intersections. A traffic impact is recognized if a proposed project will decrease the LOS below D or if a proposed project will exacerbate an existing intersection operating at LOS E or F by increasing the average delay at the intersection.

At unsignalized intersections, a traffic impact would be considered “adverse but not significant” if the LOS standard is exceeded but the projected traffic volume does not satisfy traffic signal warrants. Under these conditions, the only means to completely alleviate delays to stop-controlled vehicles may be to install a traffic signal. However, the unsatisfied signal warrants imply that the reduction in delay for the stop-controlled vehicles may not justify the new delays that would be incurred by the major street traffic (which at two-way stop-controlled intersections is not currently required to stop). Under these circumstances,

installation of traffic signals would not be recommended and the substandard LOS for stop-controlled vehicles would be considered an “adverse but not significant” impact.

A queuing impact is recognized if the calculated 95th-percentile queue length exceeds the available storage capacity in a left-turn lane. Queuing impacts are also recognized if queues in a through lane or right-turn lane are expected to extend to adjacent intersections. For purposes of these analyses, a calculated 95th-percentile queue exceeding 1,000 feet in a through lane is considered excessive and is identified as an impact.

INTERSECTION ANALYSES

The levels of service at the study intersections were determined using the computer program Synchro 6 (Build 614), which is based on the HCM procedures for calculating levels of service. The intersection analysis sheets are attached.

The State of California Department of Transportation *California Manual on Uniform Traffic Control Devices for Streets and Highways* dated September 26, 2006 (CMUTCD) presents various warrant analyses to assist in evaluating the need for traffic signals at an intersection. Figure 4C-4, Warrant 3, Peak Hour (70% Factor) as presented in the CMUTCD was utilized to evaluate the possibility that traffic signals may be warranted at impacted unsignalized study intersections. Peak-hour traffic signal warrant studies are performed only for cases in which the unsignalized intersection operates at LOS D or worse. The warrant analysis sheets are attached.

The results of the intersection operational analyses and peak-hour warrant studies are presented in Tables 6 through 9. Substandard levels of service are highlighted in bold type. A key to descriptors in the tables is presented below.

Key to Tables 6 through 9

AWS:	All-way stop control
TWS:	Two-way stop control
OWS:	One-way stop control
DNE:	Intersection does not exist
n/r:	Analysis not required
2/1:	Peak-hour traffic signal warrants met for condition in which the major street has two lanes and the minor street has one lane.
2/2:	Peak-hour traffic signal warrants met for condition in which the major street and the minor street each have two lanes.

Table 6
Intersection Analysis Summary - Existing Conditions

Intersection	Control Type	A.M. Peak Hour			P.M. Peak Hour		
		Delay (sec)	LOS	Peak Hour Warrant	Delay (sec)	LOS	Peak Hour Warrant
Temperance / Shepherd	TWS	17.9	C	n/r	13.8	B	n/r
Locan / Shepherd	OWS	13.6	B	n/r	11.8	B	n/r
DeWolf / Shepherd	Signal	8.4	A	n/r	8.2	A	n/r
SR 168 / Shepherd	Signal	13.3	B	n/r	11.6	B	n/r
Temperance / Nees	AWS	13.0	B	n/r	10.7	B	n/r
Locan / Nees	AWS	7.3	A	n/r	7.6	A	n/r
Temperance / Alluvial	Signal	15.8	B	n/r	11.7	B	n/r
Locan / Alluvial	DNE	-	-	-	-	-	-
Alluvial / Nees	DNE	-	-	-	-	-	-
DeWolf / Nees	DNE	-	-	-	-	-	-
Nees / SR 168	Signal	12.2	B	n/r	7.1	A	n/r
Temperance / SR 168 WB	Signal	2.9	A	n/r	2.7	A	n/r
Temperance / SR 168 EB	Signal	10.3	B	n/r	9.5	A	n/r
Temperance / Herndon	Signal	23.4	C	n/r	25.0	C	n/r

Table 7
Intersection Analysis Summary – Existing-Plus-Project Conditions

Intersection	Control Type	A.M. Peak Hour			P.M. Peak Hour		
		Delay (sec)	LOS	Peak Hour Warrant	Delay (sec)	LOS	Peak Hour Warrant
Temperance / Shepherd	TWS	22.4	C	Not met	41.4	E	2/1
Locan / Shepherd	OWS	14.8	B	n/r	14.6	B	n/r
DeWolf / Shepherd	Signal	9.5	A	n/r	8.6	A	n/r
SR 168 / Shepherd	Signal	15.2	B	n/r	10.6	B	n/r
Temperance / Nees	AWS	52.5	F	2/2	18.9	C	2/2
Locan / Nees	AWS	9.6	A	n/r	9.7	A	n/r
Temperance / Alluvial	Signal	50.6	D	n/r	27.2	C	n/r
Locan / Alluvial	OWS	406.7	F	2/2	231.1	F	2/2
Alluvial / Nees	OWS	15.1	C	n/r	13.4	B	n/r
DeWolf / Alluvial	OWS	16.5	C	n/r	14.5	B	n/r
Nees / SR 168	Signal	23.2	C	n/r	13.8	B	n/r
Temperance / SR 168 WB	Signal	4.1	A	n/r	2.8	A	n/r
Temperance / SR 168 EB	Signal	24.0	C	n/r	15.5	B	n/r
Temperance / Herndon	Signal	28.2	C	n/r	25.0	C	n/r

Table 8
Intersection Analysis Summary – Cumulative No-Project Conditions

Intersection	Control Type	A.M. Peak Hour			P.M. Peak Hour		
		Delay (sec)	LOS	Peak Hour Warrant	Delay (sec)	LOS	Peak Hour Warrant
Temperance / Shepherd	TWS	*	F	2/2	*	F	2/2
Locan / Shepherd	OWS	61.3	F	2/1	81.5	F	2/1
DeWolf / Shepherd	Signal	13.5	B	n/r	15.3	B	n/r
SR 168 / Shepherd	Signal	49.9	D	n/r	29.7	C	n/r
Temperance / Nees	AWS	276.6	F	2/2	191.9	F	2/2
Locan / Nees	AWS	15.6	C	Not met	40.4	E	Not met
Temperance / Alluvial	Signal	30.4	C	n/r	23.6	C	n/r
Locan / Alluvial	DNE	-	-	-	-	-	-
Alluvial / Nees	DNE	-	-	-	-	-	-
DeWolf / Nees	OWS	178.0	F	2/2	*	F	2/2
Nees / SR 168	Signal	48.1	D	n/r	29.6	C	n/r
Temperance / SR 168 WB	Signal	5.0	A	n/r	5.8	A	n/r
Temperance / SR 168 EB	Signal	19.8	B	n/r	82.1	F	n/r
Temperance / Herndon	Signal	42.4	D	n/r	90.4	F	n/r

Table 9
Intersection Analysis Summary – Cumulative With-Project Conditions

Intersection	Control Type	A.M. Peak Hour			P.M. Peak Hour		
		Delay (sec)	LOS	Peak Hour Warrant	Delay (sec)	LOS	Peak Hour Warrant
Temperance / Shepherd	TWS	*	F	2/2	*	F	2/2
Locan / Shepherd	OWS	102.1	F	2/2	538.7	F	2/2
DeWolf / Shepherd	Signal	13.3	B	n/r	15.9	B	n/r
SR 168 / Shepherd	Signal	43.0	D	n/r	31.2	C	n/r
Temperance / Nees	AWS	155.1	F	2/2	165.4	F	2/2
Locan / Nees	AWS	14.7	B	n/r	16.5	C	n/r
Temperance / Alluvial	Signal	52.2	D	n/r	59.0	E	n/r
Locan / Alluvial	OWS	429.4	F	2/2	543.8	F	2/2
Alluvial / Nees	OWS	25.6	D	Not met	42.9	E	Not met
DeWolf / Alluvial	OWS	448.2	F	2/2	*	F	2/2
Nees / SR 168	Signal	57.2	E	n/r	36.2	D	n/r
Temperance / SR 168 WB	Signal	5.3	A	n/r	4.9	A	n/r
Temperance / SR 168 EB	Signal	49.2	D	n/r	80.6	F	n/r
Temperance / Herndon	Signal	44.2	D	n/r	103.0	F	n/r

* Excessive delays not reported.

The results of the intersection operational analyses also include an estimate of the 95th-percentile queue lengths at signalized intersections. The existing storage capacity and the calculated 95th-percentile queue lengths are presented in Table 10. Queue lengths that are considered to be a significant impact are highlighted in bold type. A key to descriptors in the tables is presented below.

Key to Table 10

L: Left-turn lane
 R: Right-turn lane
 T: Through lane
 DNE: Does not exist
 All lengths are reported in feet.

Table 10
95th-Percentile Queue Length Summary

Intersection	Existing Storage Capacity	95 th -Percentile Queue Length							
		Existing		Existing-Plus-Project		Cumulative No Project		Cumulative With Project	
		A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
DeWolf/Shepherd									
Eastbound L	250	0	0	0	0	6	5	6	5
Eastbound T	-	21	29	22	32	132	233	132	236
Eastbound R	115	14	22	16	17	28	32	31	33
Westbound L	260	12	21	57	45	64	91	68	92
Westbound T	-	61	46	64	47	572	392	583	397
Northbound L	250	44	31	32	41	83	128	86	149
Northbound R	250	7	10	14	24	31	22	31	23
SR 168/Shepherd									
Eastbound L	615	20	30	13	19	117	160	137	160
Eastbound T	-	39	33	40	34	176	343	199	343
Eastbound R	685	32	25	26	10	90	38	174	37
Westbound L	150	52	26	105	38	99	70	225	69
Westbound T	-	58	36	57	36	382	303	452	303
Westbound R	-								
Northbound L	935	40	48	22	74	81	114	90	121
Northbound T	-	55	149	65	183	158	476	159	527
Northbound R	465	8	18	13	31	18	37	16	45
Southbound L	450	6	8	5	8	26	54	28	54
Southbound T	-	174	58	220	66	586	210	616	211
Southbound R	560	15	13	13	10	38	37	41	37
Temperance/Alluvial									
Eastbound L	250	35	34	42	44	61	66	71	84
Eastbound T	-	14	13	295	54	43	78	199	126
Eastbound R	240	26	30	33	40	38	75		
Westbound L	n/a	89	47	372	833	361	180	541	1,036
Westbound T	-	18	9	43	179	75	61	58	126
Westbound R	-	15	14	27	38	29	41		
Northbound L	230	73	72	86	102	297	232	288	312
Northbound T	430	99	148	141	195	189	295	242	371
Northbound R	125	34	21	644	65	38	56	637	94
Southbound L	270	56	35	350	89	85	213	412	251
Southbound T	-	185	99	173	166	400	228	332	423
Southbound R	270	15	13	15	18	27	19	31	25

Table 10 (Continued)
95th-Percentile Queue Length Summary

Intersection Approach	Existing Storage Capacity	95 th -Percentile Queue Length							
		Existing		Existing- Plus-Project		Cumulative No Project		Cumulative With Project	
		A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
Nees/SR#168									
Eastbound L	150	0	0	46	178	177	242	210	414
Eastbound T	150	0	0	14	37	217	208	203	241
Eastbound R	150	0	0	17	31	155	40	52	110
Westbound L	325	149	51	204	55	514	270	563	238
Westbound T	325	0	0	22	10	85	112	116	105
Westbound R	325	0	0	12	8	27	25	30	26
Northbound L	800	2	9	207	61	319	314	485	315
Northbound T	-	87	167	82	178	190	401	194	458
Northbound R	520	21	33	19	36	29	49	29	52
Southbound L	550	13	13	13	14	61	54	64	54
Southbound T	-	228	81	241	88	762	231	880	231
Southbound R	410	0	0	39	22	59	41	146	45
Temperance/SR 168 WB									
Westbound L	400	25	21	25	20	63	47	59	38
Westbound R	400	14	11	24	12	22	29	69	15
Northbound T	535	68	98	235	115	157	281	332	257
Northbound R	-	0	0	0	0	0	0	0	0
Southbound T	425	60	52	67	104	160	178	157	248
Southbound R	425	36	25	37	44	49	40	39	53
Temperance/SR 168 EB									
Eastbound L	415	58	158	480	186	209	391	809	341
Eastbound R	415	37	97	42	354	187	1,350	228	1,225
Northbound T	-	371	140	542	153	560	1,044	912	831
Northbound R	-								
Southbound L	275	15	27	22	44	83	121	91	171
Southbound T	520	66	53	76	122	161	410	232	555
Temperance/Herndon									
Eastbound L	275	47	53	90	61	64	191	142	122
Eastbound T	-	145	363	145	363	236	1,333	272	1,149
Eastbound R	300	25	41	25	41	38	205	43	163
Westbound L	150	21	28	21	28	35	91	39	75
Westbound T	-	131	105	131	105	221	294	255	237
Westbound R	400	138	47	231	48	267	82	360	72
Northbound L	240	77	45	77	45	205	156	171	142
Northbound T	-	181	98	235	108	412	574	531	437
Northbound R	105	15	21	15	21	21	64	23	42
Southbound L	170	234	348	242	408	409	1,032	381	974
Southbound T	-	87	156	93	201	304	610	233	626
Southbound R	150	25	33	27	43	40	86	40	87

The results of the intersection operational analyses indicate that certain intersections are expected to operate at substandard levels of service. Additional intersection analyses were performed to determine the intersection configuration required to achieve acceptable levels of

service and queue length conditions. The results of the additional level-of-service analyses are presented in Tables 11 through 14. The mitigated intersection analyses are attached.

Table 11
Mitigated Intersection Analysis Summary – Existing Conditions

Intersection	Control Type	A.M. Peak Hour		P.M. Peak Hour	
		Delay (sec)	LOS	Delay (sec)	LOS
Temperance / Herndon	Signal	20.2	C	18.7	B

Table 12
Mitigated Intersection Analysis Summary – Existing-Plus-Project Conditions

Intersection	Control Type	A.M. Peak Hour		P.M. Peak Hour	
		Delay (sec)	LOS	Delay (sec)	LOS
Temperance / Shepherd	Signal	14.8	B	20.6	C
Temperance / Nees	Signal	19.8	B	21.2	C
Temperance / Alluvial	Signal	25.4	C	23.8	C
Locan / Alluvial	Signal	12.6	B	10.4	B
Temperance / SR 168 WB*	Signal	2.5	A	2.1	A
Temperance / SR 168 EB	Signal	16.9	B	24.5	C
Temperance / Herndon	Signal	24.8	C	19.9	B

* Mitigations not required at this intersection. However, adjacent intersections require mitigations and interact with this intersection.

Table 13
Mitigated Intersection Analysis Summary – Cumulative No-Project Conditions

Intersection	Control Type	A.M. Peak Hour		P.M. Peak Hour	
		Delay (sec)	LOS	Delay (sec)	LOS
Temperance / Shepherd	Signal	21.2	C	22.2	C
Locan / Shepherd	Signal	12.1	B	10.2	B
SR 168 / Shepherd	Signal	34.0	C	27.3	C
Temperance / Nees	Signal	22.5	C	24.3	C
Locan / Nees	AWS	15.2	C	16.2	C
DeWolf / Nees	Signal	13.6	B	18.1	B
Nees / SR 168	Interchange	-	-	-	-
Temperance / SR 168 EB	Signal	16.6	B	28.1	C
Temperance / Herndon	Signal	33.0	C	52.4	D

Table 14
Mitigated Intersection Analysis Summary – Cumulative With-Project Conditions

Intersection	Control Type	A.M. Peak Hour		P.M. Peak Hour	
		Delay (sec)	LOS	Delay (sec)	LOS
Temperance / Shepherd	Signal	18.3	B	21.6	C
Locan / Shepherd	Signal	12.7	B	13.6	B
SR 168 / Shepherd	Signal	32.4	C	28.4	C
Temperance / Nees	Signal	23.2	C	24.6	C
Temperance / Alluvial	Signal	31.6	C	30.9	C
Locan / Alluvial	Signal	13.1	B	12.4	B
DeWolf / Alluvial	Signal	16.5	B	17.3	B
Nees / SR 168	Interchange	-	-	-	-
Temperance / SR 168 WB*	Signal	3.7	A	2.4	A
Temperance / SR 168 EB	Signal	21.6	C	28.2	C
Temperance / Herndon	Signal	39.8	D	36.6	D

* Mitigations not required at this intersection. However, adjacent intersections require mitigations and interact with this intersection.

The calculated 95th-percentile queue lengths for the mitigated conditions at signalized intersections are presented in Table 15. A key to descriptors in the tables is presented below.

Key to Table 15

- | | | | |
|----|-----------------|------|----------------|
| L: | Left-turn lane | Int: | Interchange |
| T: | Through lane | DNE: | Does not exist |
| R: | Right-turn lane | n/s: | Not signalized |

All lengths are reported in feet.

Table 15
95th-Percentile Queue Length Summary – Mitigated Conditions

Intersection	Existing Storage Capacity	95 th -Percentile Queue Length							
		Existing		Existing-Plus-Project		Cumulative No Project		Cumulative With Project	
		A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
Temperance/Shepherd									
Eastbound L	250	n/s	n/s	10	8	21	18	20	18
Eastbound T	-	n/s	n/s	87	57	221	431	265	432
Eastbound R	545	n/s	n/s	59	34	53	50	64	50
Westbound L	250	n/s	n/s	54	35	146	82	150	85
Westbound T	-	n/s	n/s	153	172	289	299	284	371
Westbound R	-								
Northbound L	250	n/s	n/s	149	379	303	284	126	196
Northbound T	-	n/s	n/s	18	23	28	37	29	38
Northbound R	-								
Southbound L	-	n/s	n/s	15	6	17	6	17	5
Southbound T	-	n/s	n/s	25	19	26	19	26	19
Southbound R	-								
Locan/Shepherd									
Eastbound L	250	n/s	n/s	n/s	n/s	0	0	0	0
Eastbound T	-	n/s	n/s	n/s	n/s	166	278	199	285
Eastbound R	-								
Westbound L	250	n/s	n/s	n/s	n/s	40	31	50	36
Westbound T	-	n/s	n/s	n/s	n/s	469	429	459	465
Westbound R	-								
Northbound L	-	n/s	n/s	n/s	n/s	44	46	54	106
Northbound R	-	n/s	n/s	n/s	n/s	16	18	18	21
DeWolf/Shepherd									
Eastbound L	250	0	0	0	0	6	5	6	5
Eastbound T	-	21	29	22	32	132	233	132	236
Eastbound R	115	14	22	16	17	28	32	31	33
Westbound L	260	12	21	57	45	64	91	68	92
Westbound T	-	61	46	64	47	572	392	583	397
Northbound L	250	44	31	32	41	83	128	86	149
Northbound R	250	7	10	14	24	31	22	31	23

Table 15 (Continued)
95th-Percentile Queue Length Summary – Mitigated Conditions

Intersection Approach	Existing Storage Capacity	95 th -Percentile Queue Length							
		Existing		Existing- Plus-Project		Cumulative No Project		Cumulative With Project	
		A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
SR 168/Shepherd									
Eastbound L	615	20	30	13	19	117	160	137	160
Eastbound T	-	39	33	40	34	176	343	199	343
Eastbound R	685	32	25	26	10	90	38	174	37
Westbound L	150	52	26	105	38	99	70	225	69
Westbound T	-	58	36	57	36	148	132	171	132
Westbound R	-								
Northbound L	935	40	48	22	74	81	114	90	121
Northbound T	-	55	149	65	183	158	476	159	527
Northbound R	465	8	18	13	31	18	37	16	45
Southbound L	450	6	8	5	8	26	54	28	54
Southbound T	-	174	58	220	66	586	210	616	211
Southbound R	560	15	13	13	10	38	37	41	37
Temperance/Nees		n/s	n/s						
Eastbound L	240	n/s	n/s	75	51	152	233	152	244
Eastbound T	-	n/s	n/s	86	50	80	130	66	63
Eastbound R	-					36	50	43	53
Westbound L	-	n/s	n/s	97	143	227	60	278	231
Westbound T	-	n/s	n/s	54	70	126	136	84	111
Westbound R	-								
Northbound L	150	n/s	n/s	118	180	100	173	106	205
Northbound T	-	n/s	n/s	134	337	107	271	117	227
Northbound R	190	n/s	n/s	33	26				
Southbound L	260	n/s	n/s	122	39	39	87	150	56
Southbound T	-	n/s	n/s	365	160	191	111	237	119
Southbound R	-	n/s	n/s	38	17	52	34	52	34
Temperance/Alluvial									
Eastbound L	250	35	34	39	39	61	66	67	79
Eastbound T	-	14	13	152	40	43	78	187	98
Eastbound R	240	26	30			38	75		
Westbound L	n/a	89	47	122	368	361	180	186	399
Westbound T	-	18	9	22	119	75	61	52	108
Westbound R	-	15	14	27	56	29	41	38	49
Northbound L	230	73	72	68	62	297	232	266	253
Northbound T	-	99	148	100	54	189	295	180	290
Northbound R	125	34	21	65	0	38	56	31	51
Southbound L	270	56	35	285	79	85	213	309	201
Southbound T	-	185	99	157	121	400	228	296	366
Southbound R	270	15	13	14	14	27	19	28	23
Locan/Alluvial	DNE	DNE	DNE			DNE	DNE		
Eastbound L	DNE	DNE	DNE	159	84	DNE	DNE	152	124
Eastbound T	DNE	DNE	DNE	34	40	DNE	DNE	23	50
Westbound T	DNE	DNE	DNE	91	54	DNE	DNE	103	66
Westbound R	DNE	DNE	DNE			DNE	DNE		
Southbound L	DNE	DNE	DNE	92	149	DNE	DNE	84	187
Southbound R	DNE	DNE	DNE	49	55	DNE	DNE	61	67

Table 15 (Continued)
95th-Percentile Queue Length Summary – Mitigated Conditions

Intersection Approach	Existing Storage Capacity	95 th -Percentile Queue Length							
		Existing		Existing- Plus-Project		Cumulative No Project		Cumulative With Project	
		A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
DeWolf/Alluvial (Nees)	DNE	DNE	DNE	n/s	n/s				
Eastbound L	DNE	DNE	DNE	n/s	n/s	87	253	91	258
Eastbound T	DNE	DNE	DNE	n/s	n/s	37	55	42	141
Westbound T	DNE	DNE	DNE	n/s	n/s	55	96	147	94
Westbound R	DNE	DNE	DNE	n/s	n/s	56	64	56	70
Southbound L	DNE	DNE	DNE	n/s	n/s	369	293	375	356
Southbound R	DNE	DNE	DNE	n/s	n/s	33	30	37	29
Nees/SR 168						Int	Int	Int	Int
Eastbound L	150	0	0	46	178	-	-	-	-
Eastbound T	150	0	0	14	37	-	-	-	-
Eastbound R	150	0	0	17	31	-	-	-	-
Westbound L	325	149	51	204	55	-	-	-	-
Westbound T	325	0	0	22	10	-	-	-	-
Westbound R	325	0	0	12	8	-	-	-	-
Northbound L	800	2	9	207	61	-	-	-	-
Northbound T	-	87	167	82	178	-	-	-	-
Northbound R	520	21	33	19	36	-	-	-	-
Southbound L	550	13	13	13	14	-	-	-	-
Southbound T	-	228	81	241	88	-	-	-	-
Southbound R	410	0	0	39	22	-	-	-	-
Temperance/SR 168 WB									
Westbound L	400	25	21	44	29	63	47	81	78
Westbound R	400	14	11	29	16	22	29	90	26
Northbound T	535	68	98	127	36	157	281	298	130
Northbound R	-	0	0	0	0	0	0	0	0
Southbound T	425	60	52	22	50	160	178	43	63
Southbound R	425	36	25	19	305	49	40	0	8
Temperance/SR-168 EB									
Eastbound L	415	58	158	204	80	209	378	297	157
Eastbound R	415	37	97	47	387	51	368	40	453
Northbound T	-	371	140	458	243	558	568	650	545
Northbound R	-								
Southbound L	275	15	27	20	61	83	70	80	136
Southbound T	520	66	53	32	85	160	178	45	63

Table 15 (Continued)
95th-Percentile Queue Length Summary – Mitigated Conditions

Intersection Approach	Existing Storage Capacity	95 th -Percentile Queue Length							
		Existing		Existing- Plus-Project		Cumulative No Project		Cumulative With Project	
		A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
Temperance/Herndon									
Eastbound L	275	46	47	90	57	64	162	142	123
Eastbound T	-	67	130	67	136	107	315	119	397
Eastbound R	300	25	37	24	37	38	94	41	136
Westbound L	150	21	25	21	26	35	58	39	63
Westbound T	-	127	92	127	95	221	183	245	211
Westbound R	400	133	42	224	43	322	177	439	92
Northbound L	240	75	41	77	43	205	90	201	109
Northbound T	-	175	86	229	97	387	278	487	318
Northbound R	105	15	19	15	19	20	34	21	36
Southbound L	170	87	151	94	190	171	354	175	324
Southbound T	-	87	159	96	215	304	462	228	501
Southbound R	150	25	35	28	46	40	44	39	59

DISCUSSION

Existing Conditions

The results of the existing conditions analyses indicate that the study intersections are currently operating at acceptable levels of service.

Excessive queues occur in the southbound left-turn lane at the intersection of Temperance and Herndon Avenues during the a.m. and p.m. peak hours. The deficient storage capacity could be corrected by extending the existing left-turn lane to a length of approximately 350 feet or by striping a second southbound left-turn lane. Construction of the second left-turn lane would require that a second eastbound through lane be constructed on Herndon Avenue east of Temperance Avenue, which would allow for a second eastbound lane through the intersection.

The proposed Project is not responsible for mitigating existing deficiencies.

Existing-Plus-Project Conditions

The existing-plus-Project conditions represent the anticipated conditions assuming immediate build-out of the proposed Project. Although it is unlikely that these conditions will actually occur since build-out of the Project is expected to occur over several years, the analyses are presented herein to satisfy the requirements of CEQA. The results of the existing-plus-Project-conditions analyses indicate that the study intersections are expected to operate at acceptable levels of service with the following exceptions:

- Temperance Avenue / Shepherd Avenue;
- Temperance Avenue / Nees Avenue; and
- Locan Avenue / Alluvial Avenue.

Queuing impacts are expected to occur at the following locations:

- Temperance Avenue / Alluvial Avenue;
- Temperance Avenue / SR 168 Eastbound Ramps; and
- Temperance Avenue / Herndon Avenue.

Temperance Avenue / Shepherd Avenue

Peak-hour traffic signal warrants are expected to be satisfied at the intersection of Temperance and Shepherd Avenues only for the condition in which the minor street has one lane. Since traffic signal warrants are very nearly satisfied, traffic signal warrants should be analyzed during the school year as new development occurs in the region and at the Project site. This is a significant impact. The Project will be required to mitigate its fair share of the impact by payment of City of Clovis development fees. The City of Clovis shall monitor the intersection and implement construction of traffic signals when the signals are warranted.

Temperance Avenue / Nees Avenue

Peak-hour traffic signals warrants are expected to be satisfied at the intersection of Temperance and Nees Avenues. This result suggests that the intersection should be signalized in the near future as development in the region progresses. Traffic signal warrants should be analyzed during the school year as new development occurs in the region and at the Project site. This is a significant impact. The Project will be required to mitigate its fair share of the impact by payment of City of Clovis development fees. The City of Clovis shall monitor the intersection and implement construction of traffic signals when the signals are warranted.

Locan Avenue / Alluvial Avenue

Peak-hour traffic signal warrants are expected to be satisfied at the intersection of Locan and Alluvial Avenues. Traffic signal warrants should be analyzed as new development occurs in the region and at the Project site. This is a significant impact. The Project will be required to mitigate its fair share of the impact by payment of City of Clovis development fees. The City of Clovis shall monitor the intersection and implement construction of traffic signals when the signals are warranted.

As an alternative, a roundabout may be considered. A roundabout can function as an efficient intersection control feature while also acting as a traffic calming device.

Temperance Avenue / SR 168 Eastbound Ramps

The intersection of Temperance Avenue and the SR 168 eastbound ramps is expected to require a second eastbound left-turn lane to accommodate the Project traffic. This is a significant impact. The Project will be required to mitigate its fair share of the impact by payment of City of Clovis development fees. The City of Clovis and Caltrans shall monitor the ramp intersection and the City shall implement ramp widening once it is warranted based on operational analyses.

Temperance Avenue / Alluvial Avenue

The intersection of Temperance and Alluvial Avenues will require the following lane configurations to operate at acceptable levels of service with acceptable 95th-percentile queues:

- Eastbound: one left-turn lane and two through lanes with a shared right turn;
- Westbound: two left-turn lanes, two through lanes, and one right-turn lane;
- Northbound: one left-turn lane, two through lanes, and two right-turn lanes; and
- Southbound: one left-turn lane, two through lanes, and one right-turn lane.

The lengths of the turn lanes and the number of lanes constructed during early phases development of the Project site should consider the results of the cumulative-with-Project conditions analyses discussed later in this report. It is recommended that the intersection of Temperance and Alluvial Avenues be interconnected and coordinated with the existing traffic signals at the SR 168 / Temperance Avenue interchange. This is a significant impact that the Project will be required to mitigate.

Temperance Avenue / Herndon Avenue

Excessive queues occur in the southbound left-turn lane at the intersection of Temperance and Herndon Avenues during the a.m. and p.m. peak hours. This is an existing deficiency that will not be significantly exacerbated by the Project. The proposed Project is not responsible for mitigating existing deficiencies.

Cumulative No-Project Conditions

The cumulative no-project conditions analyses represent the conditions that are expected to occur in the year 2030 if the Project site is built out in accordance with the current General Plan land uses. The results indicate that the following intersections are expected to require improvements to operate at acceptable levels of service:

- Temperance Avenue / Shepherd Avenue;
- Locan Avenue / Shepherd Avenue;
- SR 168 / Shepherd Avenue;
- Temperance Avenue / Nees Avenue;
- Locan Avenue / Nees Avenue;
- DeWolf Avenue / Nees Avenue;
- Nees Avenue / SR 168;
- Temperance Avenue / SR 168 Eastbound ramps; and
- Temperance Avenue / Herndon Avenue.

Queuing impacts are expected to occur at the following locations:

- Temperance Avenue / Alluvial Avenue;
- Nees Avenue / SR 168
- Temperance Avenue / SR 168 Eastbound Ramps; and
- Temperance Avenue / Herndon Avenue.

The recommended improvements for each of the impacted locations to operate at acceptable levels of service in the year 2030 without the proposed Project are presented below. Where

turn lanes are recommended, the length of the storage lane plus suitable portions of the bay taper should be long enough to accommodate the queues listed in Table 15.

Temperance Avenue / Shepherd Avenue

The intersection of Temperance and Shepherd Avenues is expected to require signalization with protected left-turn phasing and the following minimum lane configurations:

- Eastbound: one left-turn lane, two through lanes, and one right-turn lane;
- Westbound: one left-turn lane and two through lanes with a shared right turn;
- Northbound: one left-turn lane and one through lane with a shared right turn; and
- Southbound: one left-turn lane and one through lane with a shared right turn.

The required length of the northbound left-turn lane is approximately 300 feet. As an alternative, a second northbound left-turn lane may be constructed. A second northbound left-turn lane would be expected to improve the efficiency of the intersection.

Locan Avenue / Shepherd Avenue

The intersection of Locan and Shepherd Avenues is expected to require signalization with protected left-turn phasing and the following minimum lane configurations:

- Eastbound: one left-turn lane and two through lanes with a shared right-turn;
- Westbound: one left-turn lane and one through lane with a shared right turn; and
- Southbound: one left-turn lane and one right-turn lane.

SR 168 / Shepherd Avenue

The intersection of SR 168 and Shepherd Avenue is expected to require a second westbound through lane on Shepherd Avenue to operate at acceptable levels of service.

Temperance Avenue / Nees Avenue

The intersection of Temperance and Nees Avenues is expected to require signalization with protected left-turn phasing and the following minimum lane configurations:

- Eastbound: one left-turn lane, one through lane, and one right-turn lane;
- Westbound: two left-turn lanes and one through lane with a shared right turn;
- Northbound: two left-turn lanes and two through lane with a shared right turn; and
- Southbound: one left-turn lane, two through lanes, and one right-turn lane.

Locan Avenue / Nees Avenue

The intersection of Locan and Nees Avenues is expected to require the construction of an eastbound left-turn lane while maintaining the existing all-way stop control.

DeWolf Avenue / Nees Avenue

The intersection of DeWolf and Nees Avenues is expected to require signalization with protected left-turn phasing and the following minimum lane configurations:

- Eastbound: one left-turn lane and two through lanes;
- Westbound: two through lanes and one right-turn lane; and
- Southbound: one left-turn lane and one right-turn lane.

Nees Avenue / SR 168

The analyses indicate that the intersection of Nees Avenue and SR 168 should be converted to a freeway interchange prior to the year 2030. Previous studies have concluded that the interchange will be warranted in approximately the year 2023 (*Final Report – Amendment to the Transportation Element of the Harlan Ranch Development EIR* dated December 28, 2007 by TJKM Transportation Consultants).

Temperance Avenue / SR 168 Eastbound Ramps

The intersection of Temperance Avenue and the SR 168 eastbound ramps is expected to require a second eastbound right-turn lane on the existing off ramp.

Temperance Avenue / Herndon Avenue

The intersection of Temperance and Herndon Avenues is currently signalized, but will require the following minimum lane configurations to operate at acceptable levels of service based on the cumulative conditions without the Project:

- Eastbound: two left-turn lanes, two through lanes, and one right-turn lane;
- Westbound: two left-turn lanes, two through lanes, and one right-turn lane;
- Northbound: two left-turn lanes, two through lanes, and one right-turn lane; and
- Southbound: two left-turn lanes, two through lanes, and one right-turn lane.

Temperance Avenue / Alluvial Avenue

The intersection of Temperance and Alluvial Avenues is currently signalized, but is expected to require lengthening of the northbound left-turn lane to accommodate a storage length of 300 feet. The westbound left-turn lane is expected to require a length of approximately 350 feet to accommodate the required storage. As an alternative, two left-turn lanes may be considered.

Cumulative With-Project Conditions

The cumulative-with-Project conditions analyses indicate that the following intersections are expected to operate at substandard levels of service:

- Temperance Avenue / Shepherd Avenue;
- Locan Avenue / Shepherd Avenue;
- SR 168 / Shepherd Avenue;
- Temperance Avenue / Nees Avenue;
- Temperance Avenue / Alluvial Avenue;
- Locan Avenue / Alluvial Avenue;
- Alluvial Avenue / Nees Avenue;
- DeWolf Avenue / Alluvial Avenue;
- Nees Avenue / SR 168;
- Temperance Avenue / SR 168 Eastbound ramps; and
- Temperance Avenue / Herndon Avenue.

Queuing impacts are expected to occur at the following locations:

- Temperance Avenue / Alluvial Avenue;
- Nees Avenue / SR 168;
- Temperance Avenue / SR 168 Eastbound Ramps; and
- Temperance Avenue / Herndon Avenue.

The recommended improvements for each of the impacted locations to operate at acceptable levels of service in the year 2030 with the proposed Project are presented below. Where turn lanes are recommended, the length of the storage lane plus suitable portions of the bay taper should be long enough to accommodate the queues listed in Table 15.

Temperance Avenue / Shepherd Avenue

The intersection of Temperance and Shepherd Avenues is expected to require signalization with protected left-turn phasing and the following minimum lane configurations:

- Eastbound: one left-turn lane, two through lanes, and one right-turn lane;
- Westbound: one left-turn lane and two through lanes with a shared right turn;
- Northbound: two left-turn lanes and one through lane with a shared right turn; and
- Southbound: one left-turn lane and through lane with a shared right turn.

The intersection of Temperance and Shepherd Avenues was identified as being deficient in the cumulative no-project analyses and the proposed Project is expected to exacerbate the deficiency. This is a significant impact. The Project will be required to mitigate its fair share of the impact by payment of City of Clovis development fees. The City of Clovis shall monitor the intersection and implement construction of traffic signals when the signals are warranted.

Locan Avenue / Shepherd Avenue

The intersection of Locan and Shepherd Avenues is expected to require signalization with protected left-turn phasing and the following minimum lane configurations:

- Eastbound: one left-turn lane and two through lanes with a shared right-turn;
- Westbound: one left-turn lane and one through lane with a shared right turn; and
- Northbound: one left-turn lane and one right-turn lane.

The intersection of Locan and Shepherd Avenues was identified as being deficient in the cumulative no-project analyses and the proposed Project is expected to exacerbate the deficiency. This is a significant impact. The Project will be required to mitigate its fair share of the impact by payment of City of Clovis development fees. The City of Clovis shall monitor the intersection and implement construction of traffic signals when the signals are warranted.

SR 168 / Shepherd Avenue

The intersection of SR 168 and Shepherd Avenue is expected to require a second westbound through lane on Shepherd Avenue to operate at acceptable levels of service. This improvement was identified as being required based on the cumulative no-project analyses and the proposed Project is not expected to exacerbate this condition. The existing intersection is constructed to accommodate an additional through lane. Therefore, no significant impact is identified and no Project mitigations are required.

Temperance Avenue / Nees Avenue

The intersection of Temperance and Nees Avenues is expected to require signalization with protected left-turn phasing and the following minimum lane configurations:

- Eastbound: one left-turn lane, one through lane, and one right-turn lane;
- Westbound: one left-turn lane and one through lane with a shared right turn;
- Northbound: two left-turn lanes and two through lane with a shared right turn; and
- Southbound: one left-turn lane, two through lanes, and one right-turn lane.

The intersection of Temperance and Nees Avenues was identified as being deficient in the cumulative no-project analyses and the proposed Project is expected to contribute to the deficiency. This is a significant impact. The Project will be required to mitigate its fair share of the impact by payment of City of Clovis development fees. The City of Clovis shall monitor the intersection and implement construction of traffic signals when the signals are warranted. It should be noted that the extension of Alluvial Avenue provides an alternate route that eliminates the need for two westbound left-turn lanes on Nees Avenue at Temperance Avenue with the proposed Project.

Locan Avenue / Nees Avenue

The extension of Alluvial Avenue is expected to reduce the number of eastbound left turns at the intersection of Locan and Nees Avenues. Therefore, the intersection is not expected to be deficient with the Project and no impacts requiring mitigation are identified.

DeWolf Avenue / Alluvial Avenue

The intersection of DeWolf and Alluvial Avenues is expected to require signalization with protected left-turn phasing and the following minimum lane configurations:

- Eastbound: one left-turn lane and two through lanes;
- Westbound: two through lanes and one right-turn lane; and
- Southbound: one left-turn lane and one right-turn lane.

This is a significant impact. The Project will be required to mitigate its fair share of the impact by payment of City of Clovis development fees. The City of Clovis shall monitor the intersection and implement construction of traffic signals when the signals are warranted.

Nees Avenue / SR 168

The analyses indicate that the intersection of Nees Avenue and SR 168 should be converted to a freeway interchange prior to the year 2030. Previous studies have concluded that the interchange will be warranted in approximately the year 2023 (*Final Report – Amendment to the Transportation Element of the Harlan Ranch Development EIR* dated December 28, 2007 by TJKM Transportation Consultants). However, the proposed Project is expected to generate more traffic than the previous planned land use at the Project site. Therefore, additional intersection analyses have been performed to revise the estimated year that the interchange is expected to be warranted. The traffic volumes were interpolated between the existing-plus-project and the cumulative-with-project traffic volumes. The results of the additional intersection analyses for the years 2020 through 2022 are attached. The analyses suggest that the intersection will begin to operate at a level of service D in approximately the year 2021. At this point an interchange will begin to be warranted. It should be noted that the actual year during which the interchange will be warranted may deviate significantly from

the year 2021 depending on many unknown factors, primarily the rate of development in the region.

The intersection of Nees Avenue and SR 168 was identified as being deficient in the cumulative no-project analyses and the proposed Project is expected to contribute to the deficiency. Therefore, the impact is significant and the Project will be required to mitigate its fair share of the impact by payment of City of Clovis development fees. The City of Clovis should ensure that the required improvements are covered in development fees to be collected by the City.

Temperance Avenue / Alluvial Avenue

The intersection of Temperance and Alluvial Avenues is currently signalized but will require the following minimum lane configurations to operate at acceptable levels of service based on the cumulative conditions without the Project:

- Eastbound: one left-turn lane and two through lanes with a shared right turn;
- Westbound: two left-turn lanes (400 feet long), two through lanes, and one right-turn lane;
- Northbound: one left-turn lane (280 feet long), two through lanes, and two right-turn lanes (see discussion below); and
- Southbound: one left-turn lane (300 feet long), two through lanes, and one right-turn lane.

It is recommended that two northbound left-turn lanes be constructed to provide efficient access to the Project site and to minimize northbound queues. The analyses suggest that the 95th-percentile queue for the northbound right-turn will be on the order of two to three vehicles (requiring up to approximately 75 feet of storage). However, the 95th-percentile queue for the northbound through movement is expected to be on the order of 305 feet. Therefore, it is recommended that the westernmost of the two northbound right-turn lanes be constructed with a length of at least 300 feet to allow access to the right-turn lane despite the northbound through queues. The eastern right-turn lane should be constructed with a length of at least 75 feet. The construction of the second northbound right-turn lane may be deferred. The City and Caltrans shall monitor the northbound queues at the intersection in the future and a second 75-foot-long northbound right-turn lane shall be constructed east of the 300-foot-long right-turn lane if the northbound right-turn queues regularly exceed 300 feet.

It is recommended that the existing crosswalk on the south side of the intersection, crossing Temperance Avenue, be eliminated to minimize conflicts with the northbound right turns and the westbound left turns.

It is recommended that the intersection of Temperance and Alluvial Avenues be interconnected and coordinated with the existing traffic signals at the SR 168 / Temperance Avenue interchange.

The impacts at the intersection of Temperance and Alluvial Avenues are significant and the Project will be required to construct the mitigations.

Locan Avenue / Alluvial Avenue

Peak-hour traffic signal warrants are expected to be satisfied at the intersection of Locan and Alluvial Avenues. Traffic signal warrants should be analyzed as new development occurs in the region and at the Project site. This is a significant impact. The Project will be required to

mitigate its fair share of the impact by payment of City of Clovis development fees. The City of Clovis shall monitor the intersection and implement construction of traffic signals when the signals are warranted.

As an alternative, a roundabout may be considered. A roundabout can function as an efficient intersection control feature while also acting as a traffic calming device.

Temperance Avenue / SR 168 Eastbound Ramps

The intersection of Temperance Avenue and the SR 168 eastbound ramps is expected to require a second eastbound left-turn lane and a second eastbound right-turn lane on the existing off ramp. In addition, the intersection should be interconnected with the intersection of Temperance Avenue / SR 168 westbound ramps and the intersection of Temperance and Alluvial Avenues. This is a significant impact. The Project will be required to mitigate its fair share of the impact by payment of City of Clovis development fees. The City of Clovis and Caltrans shall monitor the ramp intersection and the City shall implement ramp widening once it is warranted based on operational analyses.

Temperance Avenue / Herndon Avenue

The intersection of Temperance and Herndon Avenues is currently signalized, but will require the following minimum lane configurations to operate at acceptable levels of service based on the cumulative conditions without the Project:

- Eastbound: two left-turn lanes, two through lanes, and one right-turn lane;
- Westbound: two left-turn lanes, two through lanes, and one right-turn lane;
- Northbound: two left-turn lanes, two through lanes, and one right-turn lane; and
- Southbound: two left-turn lanes, two through lanes, and one right-turn lane.

These improvements were identified as being required based on the cumulative no-project analyses and the proposed Project is not expected to significantly exacerbate this condition. Therefore, no significant impact is identified and no Project mitigations are required.

Nees Avenue Classification

The intersection analyses at Temperance and Nees Avenues and at Locan and Ness Avenues indicate that only one lane will be required on Nees Avenue. It is noted that the number of lanes required on a road segment is typically governed by the number of lanes required at intersections for adequate storage and levels of service. Therefore, Nees Avenue east of Temperance Avenue may be classified as a "Collector" with one through travel lane in each direction. A two-way left-turn lane may be constructed to allow access to driveways along Nees Avenue without interfering with travel in the through lanes.

CONCLUSIONS AND RECOMMENDATIONS

Generally-accepted traffic engineering principles and methods were employed to estimate the amount of traffic expected to be generated by the Project and to analyze the traffic conditions expected to exist in the future. The Project is expected to generate more traffic than the currently-planned land use at the Project site. The conclusion of this traffic impact study is that the road network at the study intersections is either adequate or can be mitigated to accommodate the proposed Project and regional growth through the year 2030. Conclusions and recommendations resulting from each study scenario are summarized below, followed by a summary of the Project mitigation requirements.

Existing Conditions

The study intersections are currently operating at acceptable levels of service.

Storage capacity is currently deficient in the southbound left-turn lane at the intersection of Temperance and Herndon Avenues. The deficient storage capacity could be corrected by extending the existing left-turn lane to a length of approximately 350 feet or by striping a second southbound left-turn lane. Construction of the second left-turn lane would require that a second eastbound through lane be constructed on Herndon Avenue east of Temperance Avenue, which would allow for a second eastbound lane through the intersection.

The proposed Project is not responsible for mitigating existing deficiencies.

Existing-Plus-Project Conditions

The existing-plus-Project conditions represent the anticipated conditions assuming immediate build-out of the proposed Project. Although it is unlikely that these conditions will actually occur since build-out of the Project is expected to occur over several years, the analyses are presented herein to satisfy the requirements of CEQA.

Traffic signals should be installed at the intersection of Temperance and Shepherd Avenues once traffic signal warrants are satisfied. This is a significant impact. The Project will be required to mitigate its fair share of the impact by payment of City of Clovis development fees. The City of Clovis shall monitor the intersection and implement construction of traffic signals when the signals are warranted.

Traffic signals should be installed at the intersection of Temperance and Nees Avenues once traffic signal warrants are satisfied. This is a significant impact. The Project will be required to mitigate its fair share of the impact by payment of City of Clovis development fees. The City of Clovis shall monitor the intersection and implement construction of traffic signals when the signals are warranted.

Traffic signals should be installed at the intersection of Locan and Alluvial Avenues once traffic signal warrants are satisfied. This is a significant impact. The Project will be required to mitigate its fair share of the impact by payment of City of Clovis development fees. The City of Clovis shall monitor the intersection and implement construction of traffic signals when the signals are warranted. As an alternative, a roundabout may be considered.

The intersection of Temperance Avenue and the SR 168 eastbound ramps is expected to require a second eastbound left-turn lane to accommodate the Project traffic. This is a significant impact. The Project will be required to mitigate its fair share of the impact by payment of City of Clovis development fees. The City of Clovis and Caltrans shall monitor the ramp intersection and the City shall implement ramp widening once it is warranted based on operational analyses.

The intersection of Temperance and Alluvial Avenues will require at least the following lane configurations:

- Eastbound: one left-turn lane and two through lanes with a shared right turn;
- Westbound: two left-turn lanes, two through lanes, and one right-turn lane;
- Northbound: one left-turn lane, two through lanes, and two right-turn lanes; and
- Southbound: one left-turn lane, two through lanes, and one right-turn lane.

The lengths and number of lanes at the intersection of Temperance and Alluvial Avenues should consider the cumulative-with-Project conditions. It is recommended that the intersection be interconnected and coordinated with the existing traffic signals at the SR 168 / Temperance Avenue interchange. This is a significant impact that the Project will be required to mitigate.

Excessive queues occur in the southbound left-turn lane at the intersection of Temperance and Herndon Avenues. This is an existing deficiency that will not be significantly exacerbated by the Project. The proposed Project is not responsible for mitigating existing deficiencies.

Cumulative No-Project Conditions

The cumulative no-project conditions analyses represent the conditions that are expected to occur in the year 2030 if the Project site is built out in accordance with the current General Plan land uses.

The intersection of Temperance and Shepherd Avenues is expected to require signalization with protected left-turn phasing and the following minimum lane configurations:

- Eastbound: one left-turn lane, two through lanes, and one right-turn lane;
- Westbound: one left-turn lane and two through lanes with a shared right turn;
- Northbound: one left-turn lane and one through lane with a shared right turn; and
- Southbound: one left-turn lane and one through lane with a shared right turn.

The required length of the northbound left-turn lane at the intersection of Temperance and Shepherd Avenues is approximately 300 feet. As an alternative, a second northbound left-turn lane may be constructed.

The intersection of Locan and Shepherd Avenues is expected to require signalization with protected left-turn phasing and the following minimum lane configurations:

- Eastbound: one left-turn lane and two through lanes with a shared right-turn;
- Westbound: one left-turn lane and one through lane with a shared right turn; and
- Southbound: one left-turn lane and one right-turn lane.

The intersection of SR 168 and Shepherd Avenue is expected to require a second westbound through lane on Shepherd Avenue to operate at acceptable levels of service.

The intersection of Temperance and Nees Avenues is expected to require signalization with protected left-turn phasing and the following minimum lane configurations:

- Eastbound: one left-turn lane, one through lane, and one right-turn lane;
- Westbound: two left-turn lanes and one through lane with a shared right turn;
- Northbound: two left-turn lanes and two through lane with a shared right turn; and
- Southbound: one left-turn lane, two through lanes, and one right-turn lane.

The intersection of Locan and Nees Avenues is expected to require the construction of an eastbound left-turn lane while maintaining the existing all-way stop control.

The intersection of DeWolf and Nees Avenues is expected to require signalization with protected left-turn phasing and the following minimum lane configurations:

- Eastbound: one left-turn lane and two through lanes;
- Westbound: two through lanes and one right-turn lane; and
- Southbound: one left-turn lane and one right-turn lane.

The analyses indicate that the intersection of Nees Avenue and SR 168 should be converted to a freeway interchange prior to the year 2030.

The intersection of Temperance Avenue and the SR 168 eastbound ramps is expected to require a second eastbound right-turn lane on the existing off ramp.

The intersection of Temperance and Herndon Avenues will require the following minimum lane configurations:

- Eastbound: two left-turn lanes, two through lanes, and one right-turn lane;
- Westbound: two left-turn lanes, two through lanes, and one right-turn lane;
- Northbound: two left-turn lanes, two through lanes, and one right-turn lane; and
- Southbound: two left-turn lanes, two through lanes, and one right-turn lane.

The intersection of Temperance and Alluvial Avenues is expected to require lengthening of the northbound left-turn lane to accommodate a storage length of 300 feet. The westbound left-turn lane is expected to require a length of approximately 350 feet to accommodate the required storage. As an alternative, two left-turn lanes may be considered.

Cumulative With-Project Conditions

The intersection of Temperance and Shepherd Avenues is expected to require signalization with protected left-turn phasing and the following minimum lane configurations:

- Eastbound: one left-turn lane, two through lanes, and one right-turn lane;
- Westbound: one left-turn lane and two through lanes with a shared right turn;
- Northbound: two left-turn lanes and one through lane with a shared right turn; and
- Southbound: one left-turn lane and through lane with a shared right turn.

The intersection of Temperance and Shepherd Avenues was identified as being deficient in the cumulative no-project analyses and the proposed Project is expected to exacerbate the deficiency. This is a significant impact. The Project will be required to mitigate its fair share of the impact by payment of City of Clovis development fees. The City of Clovis shall monitor the intersection and implement construction of traffic signals when the signals are warranted.

The intersection of Locan and Shepherd Avenues is expected to require signalization with protected left-turn phasing and the following minimum lane configurations:

- Eastbound: one left-turn lane and two through lanes with a shared right-turn;
- Westbound: one left-turn lane and one through lane with a shared right turn; and
- Northbound: one left-turn lane and one right-turn lane.

The intersection of Locan and Shepherd Avenues was identified as being deficient in the cumulative no-project analyses and the proposed Project is expected to exacerbate the deficiency. This is a significant impact. The Project will be required to mitigate its fair share of the impact by payment of City of Clovis development fees. The City of Clovis shall

monitor the intersection and implement construction of traffic signals when the signals are warranted.

The intersection of SR 168 and Shepherd Avenue is expected to require a second westbound through lane on Shepherd Avenue to operate at acceptable levels of service. This improvement was identified as being required based on the cumulative no-project analyses and the proposed Project is not expected to exacerbate this condition. The existing intersection is constructed to accommodate an additional through lane. Therefore, no significant impact is identified and no Project mitigations are required.

The intersection of Temperance and Nees Avenues is expected to require signalization with protected left-turn phasing and the following minimum lane configurations:

- Eastbound: one left-turn lane, one through lane, and one right-turn lane;
- Westbound: one left-turn lane and one through lane with a shared right turn;
- Northbound: two left-turn lanes and two through lane with a shared right turn; and
- Southbound: one left-turn lane, two through lanes, and one right-turn lane.

The intersection of Temperance and Nees Avenues was identified as being deficient in the cumulative no-project analyses and the proposed Project is expected to contribute to the deficiency. This is a significant impact. The Project will be required to mitigate its fair share of the impact by payment of City of Clovis development fees. The City of Clovis shall monitor the intersection and implement construction of traffic signals when the signals are warranted.

The extension of Alluvial Avenue is expected to reduce the number of eastbound left turns at the intersection of Locan and Nees Avenues. Therefore, the intersection is not expected to be deficient with the Project and no impacts requiring mitigation are identified.

The intersection of DeWolf and Alluvial Avenues is expected to require signalization with protected left-turn phasing and the following minimum lane configurations:

- Eastbound: one left-turn lane and two through lanes;
- Westbound: two through lanes and one right-turn lane; and
- Southbound: one left-turn lane and one right-turn lane.

This is a significant impact to the intersection of DeWolf and Alluvial Avenues. The Project will be required to mitigate its fair share of the impact by payment of City of Clovis development fees. The City of Clovis shall monitor the intersection and implement construction of traffic signals when the signals are warranted.

Traffic signals should be installed at the intersection of Locan and Alluvial Avenues once traffic signal warrants are satisfied. This is a significant impact. The Project will be required to mitigate its fair share of the impact by payment of City of Clovis development fees. The City of Clovis shall monitor the intersection and implement construction of traffic signals when the signals are warranted. As an alternative, a roundabout may be considered.

The intersection of Nees Avenue and SR 168 should be converted to a freeway interchange as early as approximately the year 2021. The intersection of Nees Avenue and SR 168 was identified as being deficient in the cumulative no-project analyses and the proposed Project is expected to contribute to the deficiency. Therefore, the impact is significant and the Project will be required to mitigate its fair share of the impact by payment of City of Clovis

development fees. The City of Clovis should ensure that the required improvements are covered in development fees to be collected by the City.

The intersection of Temperance and Alluvial Avenues will require the following minimum lane configurations to operate at acceptable levels of service based on the cumulative conditions without the Project:

- Eastbound: one left-turn lane and two through lanes with a shared right turn;
- Westbound: two left-turn lanes (400 feet long), two through lanes, and one right-turn lane;
- Northbound: one left-turn lane (280 feet long), two through lanes, and two right-turn lanes (see discussion below); and
- Southbound: one left-turn lane (300 feet long), two through lanes, and one right-turn lane.

It is recommended that two northbound left-turn lanes be constructed at the intersection of Temperance and Alluvial Avenues to provide efficient access to the Project site and to minimize northbound queues. The westernmost of the two northbound right-turn lanes should be constructed with a length of at least 300 feet and the eastern right-turn lane should be constructed with a length of at least 75 feet. The construction of the second northbound right-turn lane may be deferred. The City and Caltrans shall monitor the northbound queues at the intersection in the future and a second 75-foot-long northbound right-turn lane shall be constructed east of the 300-foot-long right-turn lane if the northbound right-turn queues regularly exceed 300 feet.

It is recommended that the existing crosswalk on the south side Alluvial Avenue, crossing Temperance Avenue, be eliminated.

It is recommended that the intersection of Temperance and Alluvial Avenues be interconnected and coordinated with the existing traffic signals at the SR 168 / Temperance Avenue interchange.

The impacts at the intersection of Temperance and Alluvial Avenues are significant and the Project will be required to construct the mitigations.

The intersection of Temperance Avenue and the SR 168 eastbound ramps is expected to require a second eastbound left-turn lane and a second eastbound right-turn lane on the existing off ramp. In addition, the intersection should be interconnected with the intersection of Temperance Avenue / SR 168 westbound ramps and the intersection of Temperance and Alluvial Avenues. This is a significant impact. The Project will be required to mitigate its fair share of the impact by payment of City of Clovis development fees. The City of Clovis and Caltrans shall monitor the ramp intersection and the City shall implement ramp widening once it is warranted based on operational analyses.

The intersection of Temperance and Herndon Avenues will require the following minimum lane configurations to operate at acceptable levels of service based on the cumulative conditions without the Project:

- Eastbound: two left-turn lanes, two through lanes, and one right-turn lane;
- Westbound: two left-turn lanes, two through lanes, and one right-turn lane;
- Northbound: two left-turn lanes, two through lanes, and one right-turn lane; and
- Southbound: two left-turn lanes, two through lanes, and one right-turn lane.

These improvements were identified as being required based on the cumulative no-project analyses and the proposed Project is not expected to significantly exacerbate this condition. Therefore, no significant impact is identified and no Project mitigations are required.

Nees Avenue east of Temperance Avenue may be classified as a “Collector” with one through travel lane in each direction. A two-way left-turn lane may be constructed to allow access to driveways along Nees Avenue without interfering with travel in the through lanes.

SUMMARY OF PROJECT MITIGATIONS

The Project shall construct improvements at the intersection of Temperance and Alluvial Avenues as described below:

- Eastbound: one left-turn lane and two through lanes with a shared right turn;
- Westbound: two left-turn lanes (400 feet long), one through lane, and one right-turn lane;
- Northbound: one left-turn lane (280 feet long), two through lanes, and two right-turn lanes (one lane 300 feet long and one lane at least 75 feet long, see clarification below); and
- Southbound: one left-turn lane (300 feet long), two through lanes, and one right-turn lane.

The intersection of Temperance and Alluvial Avenues should be provided with a northbound right-turn lane with a length of at least 300 feet. The construction of a second northbound right-turn lane may be deferred. The City and Caltrans shall monitor the northbound queues at the intersection in the future and a second 75-foot-long northbound right-turn lane shall be constructed east of the 300-foot-long right-turn lane if the northbound right-turn queues regularly exceed 300 feet.

The existing crosswalk on the south side Alluvial Avenue, crossing Temperance Avenue, shall be eliminated.

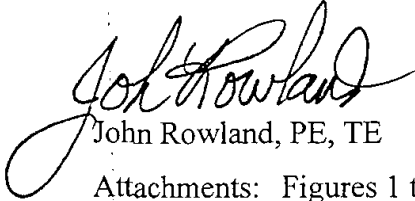
The Project shall pay City of Clovis development fees to mitigate its fair share of significant impacts at the following locations, with the physical mitigation listed in parentheses:

- Intersection of Temperance and Shepherd Avenues (traffic signals);
- Intersection of Temperance and Nees Avenues (traffic signals);
- Intersection of Locan and Alluvial Avenues (traffic signals or roundabout);
- Intersection of Temperance Avenue and the SR 168 eastbound ramps (second eastbound left-turn lane and interconnect with intersections at westbound ramps and Alluvial Avenue);
- Intersection of DeWolf and Alluvial Avenues (traffic signals);
- Intersection of Locan and Shepherd Avenues (traffic signals); and
- Intersection of Nees Avenue and SR 168 (interchange).

Focused traffic analyses may be performed at the discretion of the City of Clovis as development progresses to determine when and if traffic signals are warranted based on criteria presented in the most recent version of the California Manual on Uniform traffic control devices. The City may require individual developments within the Project site to construct the improvements listed above if warranted.

Thank you for the opportunity to perform this traffic impact study. Please feel free to contact our office if you have any questions.

PETERS ENGINEERING GROUP


John Rowland, PE, TE



8-29-08

- Attachments: Figures 1 through 10
Traffic Count Data Sheets
Intersection Analyses
Peak Hour Traffic Signal Warrants
Mitigated Intersection Analyses
Years 2020 through 2022 Intersection Analyses – Nees Avenue / SR 168

Attachments can be viewed at the City of Clovis Planning and Development Services, 1033 Fifth Street, Clovis, CA 93612 or call Ryan Burnett, AICP, Project Coordinator at 559-324-2336.