Attachment 5

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Updated Traffic Impact Study for the Highlands Christian Fellowship

in the

City of Calistoga

March 31, 2010

Table of Contents

Executive Summary

The proposed project is construction of a new 5,660 square foot building to house the Highlands Christian Fellowship church and associated functions on a currently vacant site located on the northerly side of Petrified Forest Road west of Highway 128. The church, day care center and pre-school are expected to generate an average of 398 vehicle trip ends on weekdays, including 46 during the p.m. peak hour, and 506 trip ends on Sundays, with 202 of these occurring during the midday peak hour.

The study intersection of Highway 128/Petrified Forest Road is currently operating at LOS D or better during both peak hours evaluated, and is expected to continue doing so with the addition of project-generated traffic. The calculated collision rate indicates that the intersection is experiencing crashes at a rate which is lower than the statewide average for similar four-way stop-controlled locations. As traffic levels increase in the future, operation is expected to deteriorate to LOS F without or with the project, though this has been deemed a significant and unavoidable impact in the EIR for the City's most recent General Plan update. The project applicant should pay the City's traffic impact fee to help fund future capacity improvements at this intersection.

The project site will have limited pedestrian access due to the lack of pedestrian facilities at the northwest corner of Highway 128/Petrified Forest Road. In anticipation of future development at this corner, a pedestrian path should be provided along the site's frontage from the driveway easterly to the property line to connect to such future facilities.

The proposed widening of Petrified Forest Road along the project's frontage will nominally improve bicycle access.

A left-turn lane and short acceleration lane are proposed to be installed on Petrified Forest as part of the project. The plans provided are inadequate to perform a complete review, so a more detailed striping plan should be provided for review to ensure that the turn lane has adequate transitions and appropriate markings. It is apparent, however, that the left-turn lane and right-turn taper will improve access to the project site and limit impacts to through traffic. It also appears that there will be no impact to the Gas-for-Less driveway, and access to the Lundy property will continue to be from the through lane, though drivers will now have to turn across two lanes instead of one.

Drivers exiting the project site are expected to encounter tolerable delays, with average delays of 15 seconds or less under short term volumes and about 31 seconds under projected future volumes. Sight distance to the west from the project driveway is adequate for approach speeds in excess of 45 mph.

Introduction and Study Parameters

Introduction

This report presents an analysis of the potential traffic impacts that would be associated with the proposed construction of new facilities to house the Highlands Christian Fellowship Church on Petrified Forest Road in the City of Calistoga. The traffic study was completed in accordance with the criteria established by the City of Calistoga, and is consistent with standard traffic engineering techniques.

Prelude

The purpose of a traffic impact study is to provide City staff and policy makers with data that they can use to make an informed decision regarding the potential traffic impacts of a proposed project, and any associated improvements that would be required in order to mitigate these impacts to a level of insignificance as defined by the City's General Plan or other policies. Traffic impacts are typically evaluated by determining the number of new trips that the proposed use would be expected to generate, distributing these trips to the surrounding street system based on existing travel patterns or anticipated travel patterns specific to the proposed project, then analyzing the impact the new traffic would be expected to have on critical intersections or roadway segments.

Project Profile

The project consists of a new 5,660 square foot building to house the church and associated facilities, including a pre-school for 24 children and a kindergarten for 24 children. The project site is located on the north side of Petrified Forest Road just west of Highway 128 in the City of Calistoga, as shown in Figure 1.

Study Area and Periods

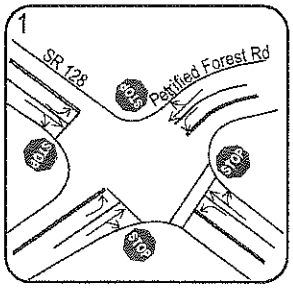
The study area consists of the intersection of Highway 128/Petrified Forest Road. Operating conditions during the weekday afternoon and Sunday morning peak periods were evaluated as these time periods reflect the highest traffic volumes areawide and for the proposed project. The afternoon peak hour studied was from 3:00 and 5:00 p.m.; the period from 4:00 to 6:00 p.m. typically reflects the highest level of congestion of the day during the homeward bound commute, while the Sunday peak occurs between 10:00 a.m.-12:15 p.m.

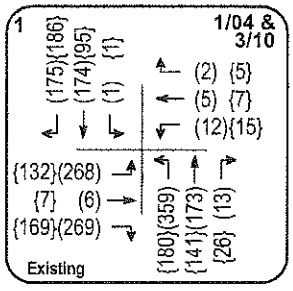
Intersection Level of Service Methodologies

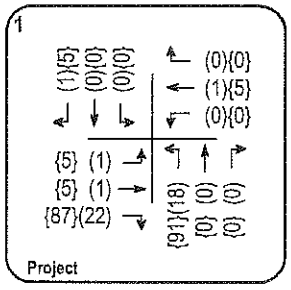
Level of Service (LOS) is used to rank traffic operation on various types of facilities based on traffic volumes and roadway capacity using a series of letter designations ranging from A to F. Generally, Level of Service A represents free flow conditions and Level of Service F represents forced flow or breakdown conditions. A unit of measure that indicates a level of delay generally accompanies the LOS designation.

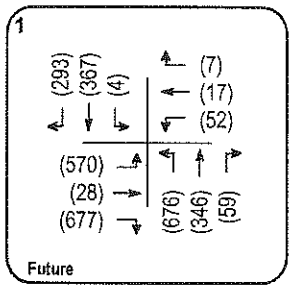
The study intersection was analyzed using methodologies published in the *Highway Capacity Manual* (HCM), Transportation Research Board, 2000. This source contains methodologies for various types of intersection control, all of which are related to a measurement of delay in average number of seconds per vehicle.

Under short-term conditions, the study intersection was analyzed using the "All-Way Stop-Controlled" Intersection" methodology from the HCM. This methodology evaluates delay for each approach based on turning movements, opposing and conflicting traffic volumes, and the number of lanes. Average









LEGEND
- Study Intersection
- (xx) P.M. Peak Hour Volume
- {xx} Sunday Peak Hour Volume

North

Not to Scale

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Updated Traffic Impact Study for the Highlands Christian Fellowship — Figure 1

City of Calistoga — Lane Configurations and Traffic Volumes

vehicle delay is computed for the intersection as a whole, and is then related to a Level of Service.

The ranges of delay associated with the various levels of service are indicated in Table 1.

Table 1
All-Way Stop-Controlled Intersection Level of Service Criteria

LOS A	Delay of 0 to 10 seconds. Upon stopping, drivers are immediately able to proceed.
LOS B	Delay of 10 to 15 seconds. Drivers may wait for one or two vehicles to clear the intersection before proceeding from a stop.
LOS C	Delay of 15 to 25 seconds. Drivers will enter a queue of one or two vehicles on the same approach, and wait for vehicle to clear from one or more approaches prior to entering the intersection.
LOS D	Delay of 25 to 35 seconds. Queues of more than two vehicles are encountered on one or more approaches.
LOS E	Delay of 35 to 50 seconds. Longer queues are encountered on more than one approach to the intersection.
LOS F	Delay of more than 50 seconds. Drivers enter long queues on all approaches.

Reference: *Highway Capacity Manual*, Transportation Research Board, 2000

Traffic Operation Standards

Following are excerpts from the City of Calistoga's General Plan that relate to the traffic analysis.

> *Level of Service – The City shall seek to maintain LOS D or better on all street segments and intersections outside of downtown.*
>
> *Pedestrian Facilities – The expansion of the sidewalk network shall be incorporated into the City's Capital Improvement planning, with priority given to Cedar Street and other collectors. The feasibility of amending street standards by reducing corner radii, narrowing streets or taking other measures that would slow local traffic and thus improve conditions for pedestrians shall be studied.*

In general, Calistoga has an overall lack of full sidewalk connectivity on the major collectors and arterials. Although some residents may like the rural characteristic of no sidewalks, collectors and arterials should be fully connected with sidewalks, and gaps should be closed through the Capital Improvement Program (CIP) or when fronting property redevelops at a minimum.

Standards of Significance

Based on guidelines provided in the General Plan, the impact of adding project-related traffic would be considered significant if it would:

- Result in the deterioration of levels of service on a roadway segment or at an intersection outside of the Downtown from LOS D or better to LOS E or worse.
- Fail to provide an American with Disability Act (ADA) accessible pedestrian circulation system.
- Include pedestrian design elements that are inconsistent with City or industry design standards.
- Include bicycle design elements that are inconsistent with City or industry design standards.
- Significantly interfere with the creation of an integrated bicycle transportation network.

The study intersection was exempted from the level of service standard by the City Council in its decision to adopt the draft 2003 General Plan Update, which will allow the potential occurrence of an unavoidable significant environmental effect caused by increased regional through traffic. This significant

environmental effect cannot reasonably be mitigated without adversely affecting the aesthetic, historic and economic well-being of the community.

It should be noted that although the study intersection is technically under the jurisdiction of Caltrans, based on information presented in their *Guide for the Preparation of Traffic Impact Studies*, the City's standards were applied.

Baseline Conditions

Description of Study Area

The proposed project is located on the north side of Petrified Forest Road just west of Highway 128 in the City of Calistoga. The study area for this analysis consisted of the intersection of Highway 128/ Petrified Forest Road, a four-way intersection with stop controls on all approaches and marked crosswalks on the northbound Highway 128 approach and the westbound Cedar Street approach. The location of the study intersection and the existing lane configurations and controls are shown in Figure 1.

Petrified Forest Road is a two-lane east-west arterial that intersects Highway 128 at the northern City Limit. It does not have curb, gutter, or sidewalk on either side of the street.

Highway 128 is a two-lane highway running north-south at the study intersection. It intersects Highway 29 near the center of the City. Highway 128 has discontinuous sidewalks, with major gaps in the pedestrian network. On the east side of the road sidewalk is provided to the north and south of Petrified Forest Road, while large gaps in the sidewalk system exist for the entire length on the west side.

Existing Conditions

The Existing Conditions scenario provides an evaluation of current operation based on existing traffic volumes during the p.m. and Sunday peak periods. This condition does not include project-generated traffic volumes. New peak hour turning movement counts were collected in March 2010 for the weekday afternoon peak; counts obtained in 2004 were used for the Sunday peak. Since the current and prior counts will be or were obtained during the winter, the counts were adjusted to reflect summertime conditions. Count adjustment factors published in the City of Napa's *Traffic Study Guidelines* were used to develop seasonal adjustments; factors of 1.133 for the month and 1.043 for the day of the week, or a total factor of 1.18, were applied weekday p.m. peak period and a multiplier of 1.179 was applied to the Sunday peak hour to adjust the volumes from January to summertime. The resulting factored counts were compared to data from September 2005 to estimate the effect of the current economic downturn on traffic. It was found that the factored volumes were relatively close to the 2005 volumes, with one direction being slightly higher and the other slightly lower. Based on this review it was determined that the factored volumes provide a reasonable estimate of current levels of traffic during the peak summertime months.

Intersection Levels of Service

Under existing conditions, the study intersection is operating acceptably. The existing traffic volumes are shown in Figure 1. A summary of the intersection level of service calculations is contained in Table 2, and copies of the Level of Service calculations are provided in Appendix A.

Table 2
Summary of Existing Peak Hour Intersection Level of Service Calculations

Study Intersection	Existing Conditions				Existing plus Project			
	PM Peak		Sunday Peak		PM Peak		Sunday Peak	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1. Hwy 128/Petrified Forest Rd	25.5	D	11.2	B	28.2	D	13.3	B

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service

Collision History

The collision history for the study area was reviewed to determine any trends or patterns that may indicate a safety issue. Collision rates were calculated based on the most recent available records from 2003 through 2008 obtained from the California Highway Patrol and published in their Statewide Integrated Traffic Records System (SWITRS) reports. Based on the volume entering during the weekday peak hour, the calculated collision rate for the study intersection is 0.29 collisions per million vehicles entering (c/mve), which is less than the Statewide average for similar facilities of 0.51 c/mve, as indicated in *2007 Accident Data on California State Highways*, California Department of Transportation. This analysis is indicated on a spreadsheet provided in Appendix B.

Future Conditions

Since the City does not have any approved projects in the vicinity of the proposed project, a Future analysis was performed in lieu of one for "plus Approved" conditions. Further, since there are no projections for Sunday morning, and the intersection operates better on Sundays than during the weekday p.m. peak, only the one peak was evaluated for this scenario. Future p.m. peak hour roadway segment traffic projections for year 2030 buildout conditions were obtained from the *Napa County General Plan Update EIR: Technical Memorandum for Traffic and Circulation Supporting the Findings and Recommendations*, Dowling Associates, 2007. The future segment volumes were converted to intersection turning movements by using a "Furness" procedure, through which the existing turning movements are factored until the total volumes in and out of each leg closely match the projected segment volumes.

Based on the General Plan projections, traffic volumes at the intersection are anticipated to nearly double over the next 23 years. Under these volumes, and without any improvements, the study intersection would be expected to operate at LOS F.

While LOS F operation is considered acceptable under the applied City policy, for informational purposes consideration was given to the improvements that would be needed to accommodate the anticipated level of development. It was determined that signalization alone would not result in operating conditions of LOS D or better. To achieve LOS D operation the Highway 128 approaches would all need to be widened to provide second through lanes and separate left-turn, through and right-turn lanes would be needed on the Petrified Forest Road approach. Though a detailed analysis was not performed, a cursory analysis indicates that a roundabout would also operate acceptably. Future volumes are shown in Figure 1 and Future operating conditions are summarized in Table 3.

Table 3
Summary of Future PM Peak Hour Level of Service Calculations

Study Intersection *Alternative Controls*	Future Conditions		Future plus Project	
	Delay	LOS	Delay	LOS
1. Hwy 128/Petrified Forest Rd	**	F	**	F
Signalized	*47.4*	*D*	*49.3*	*D*
Roundabout	*4.1*	*A*	*4.2*	*A*

Notes: Delay is measured in average seconds of delay per vehicle
LOS = Level of Service
** = Delay exceeds 120 seconds

Plus Project Conditions

Project Description

The proposed project is a 5,600 square foot building consisting of a church along with a preschool and kindergarten. The site is located on the north side of Petrified Forest Road west of Highway 128 in the northwest area of the City of Calistoga. Student enrollment for the 826 square foot preschool is expected to be 24 students and the kindergarten will have 24 students. Primary access to the project would be via a new driveway to be located on the north side of Petrified Forest Road 350 feet west of the intersection with Highway 128. The site will have 117 parking spaces as proposed.

The preschool will have two daily sessions during the week, with one in the morning from 8:30 a.m. to 12:00 p.m., and one in the afternoon from 12:30 p.m. to 4:00 p.m. The kindergarten has one daily session during the week from 8:30 a.m. to 2:30 p.m. School drop-off and pick-up times are 15 minutes before and after the beginning and ending of each session.

The proposed project site plan is shown in Figure 2.

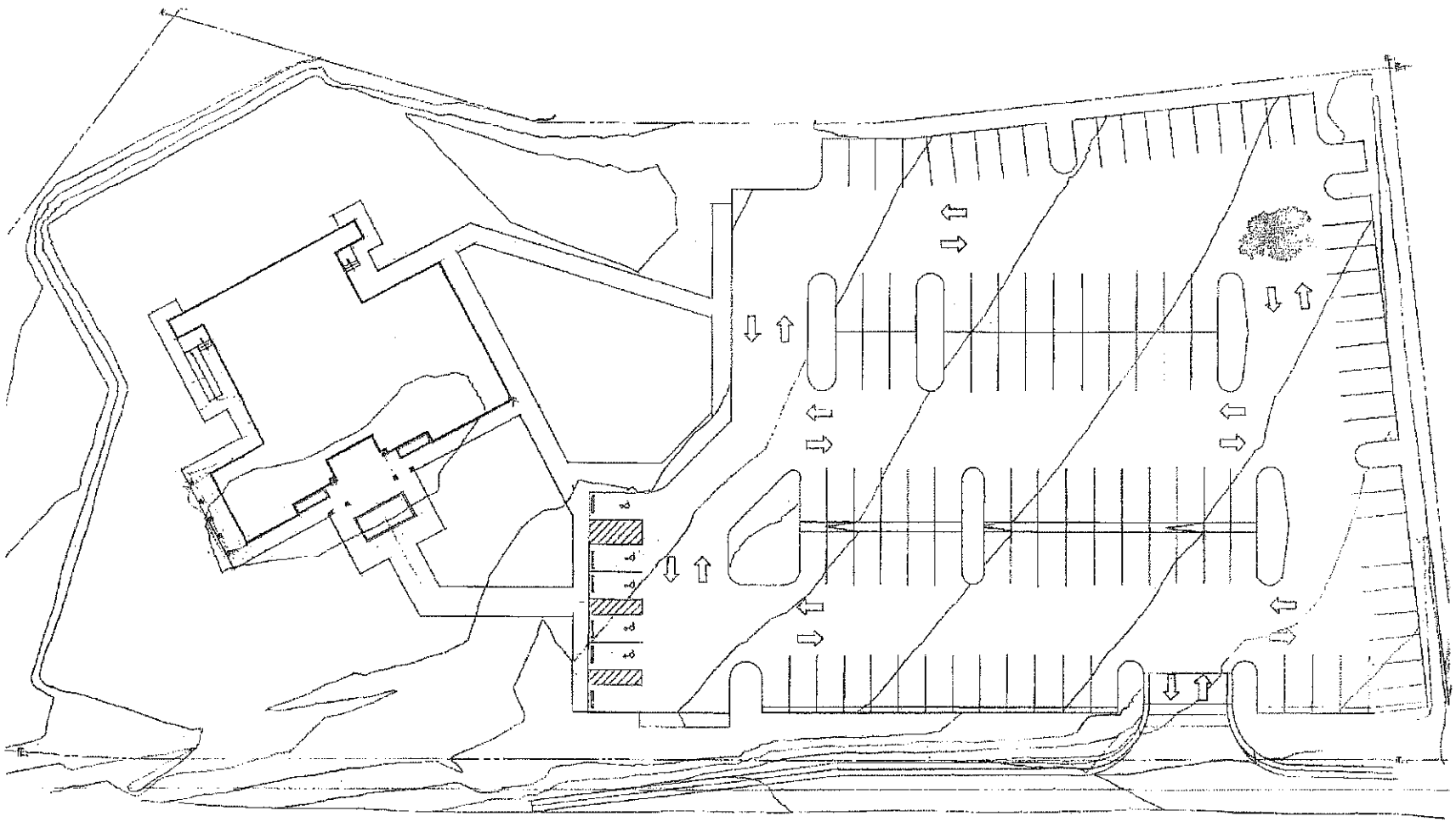
Trip Generation

The anticipated trip generation for the proposed project was estimated using standard rates published by the Institute of Transportation Engineers (ITE) in *Trip Generation*, 8th Edition, 2008. The trip generation potential of the project as planned was developed using the published standard rates for the "Day Care Center" (ITE LU 565) and the "Private K-8" land use (ITE LU 534) and the independent variable of number of students, the proposed preschool and kindergarten with a total population of 72 students would be expected to generate 398 vehicle trips per weekday, including 49 during the p.m. peak hour, as indicated in Table 4.

Table 4
Weekday Trip Generation Summary

Land Use	Units	Daily		PM Peak Hour			
		Rate	Trips	Rate	Trips	In	Out
Day Care Center	48 students	4.48	215	0.82	39	18	21
Private (K-8)	24 students	5.52	132	0.17	4	2	2
Church	5.60 ksf	9.11	51	0.55	3	1	2
Total			**398**		**46**	**21**	**25**

In the previous analysis of the project it was noted that use of the rates based on the size of the facility result in unrealistically low trip estimates. Since the number of seats associated with the current proposal was not indicated, the ratio of the currently proposed size to the previous size (6,975 square feet) was used along with the 412 seats previously indicated to develop a projected capacity for the building as proposed of 331 seats. Using rates for the "Church" (ITE LU 560) land use and the independent variable of seats, the proposed 331-seat church would be expected to generate 506 vehicle trips on Sunday, including 202 trips during the a.m. peak hour. Weekend trip estimates are indicated in Table 5.



North

Not to Scale

CAL010-1.ai 3/10

Updated Traffic Impact Study for the Highlands Christian Fellowship

City of Calistoga

Figure 2

Site Plan

Table 5
Sunday Trip Generation Summary

Land Use	Units	Daily		Morning Peak Hour			
		Rate	Trips	Rate	Trips	In	Out
Church	331 seats	1.53	506	0.61	202	103	99

Trip Distribution

The pattern used to allocate new project trips to the street network was based on the residency locations for existing members of the church. The applied distribution assumptions and resulting trips are shown in Table 6.

Table 6
Trip Distribution Assumptions

Route	Percent	Weekday Daily Trips	PM Trips	Sunday Trips
Highway 128 north of Petrified Forest Road	5%	20	2	10
Highway 128 south of Petrified Forest Road	88%	350	41	178
Petrified Forest Road west of Highway 128	2%	8	1	4
Cedar Street east of Highway 128	5%	20	2	10
TOTAL	**100%**	**398**	**46**	**202**

Intersection Operation

Existing plus Project Conditions

Upon the addition of project-related traffic to the Existing volumes, the study intersection is expected to continue operating acceptably. These results are summarized in Table 2. Project traffic volumes are shown in Figure 1.

Impact: The study intersection is expected to continue operating acceptably at the same levels of service upon the addition of project-generated traffic.

Recommendation: The project's impact is less-than-significant, so no improvements are needed.

Future plus Project Conditions

Upon the addition of project-generated traffic to the anticipated Future volumes the study intersection is expected to continue to operate acceptably under City policy. The Future plus Project operating conditions are summarized in Table 3.

Impact: The proposed project will contribute to the need for future improvements at the intersection of Highway 128/Petrified Forest Road, though it has a less-than-significant impact in and of itself.

Recommendation: The project should contribute to the City's traffic impact fee, which can be used to make planned improvements at Highway 128/Petrified Forest Road.

Alternative Modes

Pedestrian Access

As noted in the previous study for this project, the study area roadways and intersection offer minimal pedestrian facilities serving the project site, and this type of use is expected to generate limited pedestrian traffic. In keeping with the City's policy to expand pedestrian facilities where possible, it was previously recommended that a sidewalk or all-weather path be provided along the site's frontage from the driveway east to Highway 128. It was noted, however, that a new crosswalk on the north side of Highway 128/Petrified Forest Road would be needed to connect this new pathway to nearby facilities. It is understood that the crosswalk cannot be provided at this time, and that City staff has determined that the pedestrian path should not be installed without these connecting facilities. No off-site pedestrian facilities are therefore recommended, though an all-weather pedestrian pathway subject to the review and approval of the Public Works Department should be provided along the site's frontage east of the entrance driveway for future connectivity when the adjacent property to the east redevelops.

Bicycle Access

Rural routes such as Highway 128 and Petrified Forest Road are being used increasingly by cyclists despite their lack of any bicycle-friendly amenities, including paved shoulders. The frontage improvements that would be required as part of the proposed project will result in generally improved conditions for cyclists, though only for a short distance along Petrified Forest Road.

Site Access

The proposed access design for Petrified Forest Road includes a left-turn lane for movements into the site together with a storage area for left-turns onto Petrified Forest Road and another for right-turn deceleration. Though detailed plans were not made available, a review of the data provided indicates that the project would include widening toward the north only (into the project site), limiting the length of all of these added lanes.

Left-turns

The length of a left-turn lane is typically based on the need to provide sufficient transition in the through-traffic travel path together with adequate deceleration and storage space for the turning vehicles. Because all of the widening is occurring to one side, the transition length would be based on the 12-foot offset for westbound traffic. Using a 25-mph design speed due to the proximity to a stop-controlled intersection and assuming that drivers would decelerate to 15 mph before entering the turn pocket, and using Caltrans design criteria, the total length from conform point to conform point should be about 390 feet, including 125 feet for transitions on both ends of the striping pattern. A copy of the spreadsheet showing the turn pocket design elements is included in Appendix B. Further review of more detailed plans would be necessary to determine if the striping plan conforms to these requirements.

As shown on the plans provided, the left-turn lane extends beyond the driveway, providing a center turn lane where exiting drivers can wait for an opening in eastbound traffic after clearing the westbound lane. This kind of two-stage turn results in shorter delays, though the capacity of the storage is sufficient for only one vehicle. The center turn lane should be marked with a merge arrow easterly of the driveway to ensure that oncoming traffic understands the use of this lane and does not believe it is the start of the left-turn pocket at Highway 128.

Right-turns

Widening is proposed to the east of the project driveway to provide an area for right-turns into the site. While not proposed as a right-turn lane, this area can be used by drivers to decelerate prior to making their turn, allowing the turn to be made with minimal impedance to through traffic. The design as proposed appears to be consistent with that for a right-turn taper, and can be expected to operate acceptably.

Driveway Operation

While levels of service are not applicable to driveways, an operational analysis was prepared to determine if the delay for exiting drivers would be within a range considered tolerable. With project traffic added to existing volumes, delays for drivers turning out of the driveway are expected to average about 15 seconds or less for both the weekday and Sunday peak periods. With the higher volumes projected in the future, the average delay during the evening peak period is expected to increase to about 31 seconds. These levels of delay are consistent with what drivers experience entering major thoroughfares, such as Petrified Forest Road, so would be considered acceptable.

Consideration was also given to the potential for conflict with nearby driveways, including the most southwesterly driveway to the "More-for-Less" gas station and the Lundy property driveway. Though the plans provided have minimal detail, it appears that the turn lane will end and the existing centerlines resume about 45 feet easterly of the property line. Since the "More-for-Less" driveway is about 90 feet east of the property line, the change in striping is not expected to affect this driveway. The Lundy property driveway is located in the area that will be striped as an eastbound left-turn lane to serve the project site. Drivers turning left into the Lundy property driveway will continue to do so from the through lane, though they will not need to cross both the eastbound through lane and the left-turn lane. This situation is not uncommon, so should not present any operational problems.

Stopping Sight Distance

Consideration was given to the adequacy of stopping sight distance for vehicles approaching the site from the west to react to vehicles exiting the driveway. Based on photographs taken at the driveway site together with aerial photography it was determined that oncoming eastbound vehicles will be visible from a distance of about 425 feet westerly of the driveway. Application of Caltrans stopping sight distance standards indicates that this is adequate for approach speeds of nearly 45 mph. Since the speed survey obtained for the previous analysis indicated an 85th percentile speed of 36 mph for eastbound traffic, the available sight distance is adequate for prevailing speeds.

Conclusions and Recommendations

Conclusions

- The proposed project is expected to generate an average of 398 trips on a daily basis during the week and 506 on Sunday, including 46 trip ends during the weekday evening peak hour and 202 during the peak hour on Sunday.

- The study intersection of Highway 128/Petrified Forest Road is expected to operate acceptably at LOS D or better under existing volumes and with project-added trips, resulting in a less-than-significant impact on intersection operation.

- Under projected future volumes without and with the proposed project the study intersection is expected to operate at LOS F if left in its current configuration. Though this is considered acceptable under the applied standards, LOS D operation could be achieved with signalization or a modern roundabout together with additional lanes.

- The intersection of Highway 128/Petrified Forest Road has experienced a collision rate of 0.29 collisions per million vehicles entering (c/mve), which is considerably lower than the statewide average rate of 0.51 c/mve experienced at 4-way stop-controlled intersections on state highways.

- Pedestrian access to the site will remain difficult until such time as the parcel to the east redevelops.

- The wider shoulder area that will be provided on the project's frontage will nominally improve bicycle access.

- The proposed left-turn lane configuration on Petrified Forest Road appears to be generally acceptable, though the transitions on either end of the striping pattern may be inadequate to meet Caltrans design criteria.

- Drivers exiting the site are expected to encounter delays average 15 seconds or less under short term conditions and about 31 seconds under projected future conditions. This level of delay is consistent with driver expectation.

- Sight lines between drivers exiting the site and oncoming eastbound drivers are adequate for the prevailing speed.

Recommendations

- The project applicant should pay traffic impact fees as required by the City of Calistoga to fund future improvements at Highway 128/Petrified Forest Road.

- A pedestrian path or walkway should be provided along the project's frontage from the driveway to the easterly property line for future connection to areawide facilities at such time as the parcel to the east is redeveloped.

- A more detailed striping plan should be provided for review to ensure that the turn lane has adequate transitions and appropriate markings.

Study Participants and References

Study Participants

Principal in Charge/Traffic Engineer:	Dalene Whitlock, P.E., PTOE
Technician/Graphics:	Deborah J. Mizell
Editing/Formatting:	Angela McCoy

References

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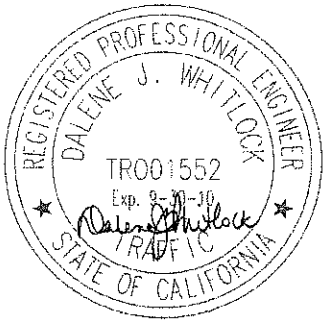

Appendix A

Intersection Level of Service Calculations

PM Peak Hour - Existing Conditions
Updated Traffic Impact Study for the Highlands Christian Fellowship
City of Calistoga

Level Of Service Computation Report
2000 HCM 4-Way Stop Method (Base Volume Alternative)

Intersection #1 Hwy 128/Petrified Forest Rd

Cycle (sec): 100 Critical Vol./Cap.(X): 0.838
Loss Time (sec): 0 (Y+R=4.0 sec) Average Delay (sec/veh): 25.5
Optimal Cycle: 0 Level Of Service: D

Street Name:	Hwy 128						Petrified Forest Rd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	1	0	0 1	0	1	0 0 1	0	1	0 0 1	0	1	0 0 1 0
Volume Module: >> Count Date: 1 Mar 2010 << 4:00 - 5:00 pm												
Base Vol:	359	173	13	1	174	175	268	6	269	12	5	2
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	359	173	13	1	174	175	268	6	269	12	5	2
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
PHF Volume:	399	192	14	1	193	194	298	7	299	13	6	2
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	399	192	14	1	193	194	298	7	299	13	6	2
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	399	192	14	1	193	194	298	7	299	13	6	2
Saturation Flow Module:												
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	0.93	0.07	1.00	0.50	0.50	1.00	0.02	0.98	1.00	0.71	0.29
Final Sat.:	476	473	36	442	253	254	458	12	527	370	285	114
Capacity Analysis Module:												
Vol/Sat:	0.84	0.41	0.41	0.00	0.76	0.76	0.65	0.57	0.57	0.04	0.02	0.02
Crit Moves:	****				****		****			****		
Delay/Veh:	37.6	14.2	14.2	10.6	28.2	28.2	23.2	17.1	17.1	12.0	11.1	11.1
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	37.6	14.2	14.2	10.6	28.2	28.2	23.2	17.1	17.1	12.0	11.1	11.1
LOS by Move:	E	B	B	B	D	D	C	C	C	B	B	B
ApproachDel:		29.6			28.1			20.1			11.7	
Delay Adj:		1.00			1.00			1.00			1.00	
ApprAdjDel:		29.6			28.1			20.1			11.7	
LOS by Appr:		D			D			C			B	
AllWayAvgQ:	3.6	0.6	0.6	0.0	2.6	2.6	1.6	1.2	1.2	0.0	0.0	0.0

Note: Queue reported is the number of cars per lane.

Sunday AM Peak Hour - Existing Conditions
Updated Traffic Impact Study for the Highlands Christian Fellowship
City of Calistoga

Level Of Service Computation Report
2000 HCM 4-Way Stop Method (Base Volume Alternative)

Intersection #1 Hwy 128/Petrified Forest Rd

Cycle (sec): 100 Critical Vol./Cap.(X): 0.437
Loss Time (sec): 0 (Y+R=4.0 sec) Average Delay (sec/veh): 11.2
Optimal Cycle: 0 Level Of Service: B

Street Name:	Hwy 128						Petrified Forest Rd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	1	0	0 1	0	1	0 0 1	0	1	0 0 1	0	1	0 0 1 0
Volume Module: >> Count Date: 11 Jan 2004 << 11:15-12:15												
Base Vol:	180	141	26	1	95	186	132	7	169	15	7	5
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	180	141	26	1	95	186	132	7	169	15	7	5
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	180	141	26	1	95	186	132	7	169	15	7	5
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	180	141	26	1	95	186	132	7	169	15	7	5
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	180	141	26	1	95	186	132	7	169	15	7	5
Saturation Flow Module:												
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	0.84	0.16	1.00	0.34	0.66	1.00	0.04	0.96	1.00	0.58	0.42
Final Sat.:	558	519	96	543	217	425	518	25	599	467	303	216
Capacity Analysis Module:												
Vol/Sat:	0.32	0.27	0.27	0.00	0.44	0.44	0.25	0.28	0.28	0.03	0.02	0.02
Crit Moves:	****					****			****	****		
Delay/Veh:	11.8	10.4	10.4	9.1	12.0	12.0	11.4	10.1	10.1	10.0	9.1	9.1
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	11.8	10.4	10.4	9.1	12.0	12.0	11.4	10.1	10.1	10.0	9.1	9.1
LOS by Move:	B	B	B	A	B	B	B	B	B	A	A	A
ApproachDel:		11.1			12.0			10.7			9.6	
Delay Adj:		1.00			1.00			1.00			1.00	
ApprAdjDel:		11.1			12.0			10.7			9.6	
LOS by Appr:		B			B			B			A	
AllWayAvgQ:	0.4	0.3	0.3	0.0	0.7	0.7	0.3	0.3	0.3	0.0	0.0	0.0

Note: Queue reported is the number of cars per lane.

PM Peak Hour - Existing plus Project
Updated Traffic Impact Study for the Highlands Christian Fellowship
City of Calistoga

Trip Generation Report

Forecast for PM

Zone #	Subzone	Amount	Units	Rate In	Rate Out	Trips In	Trips Out	Total Trips	% Of Total
1	Highlands Ch	1.00	Church	1.00	2.00	1	2	3	6.5
1	Highlands Ch	1.00	Private (K-8)	20.00	23.00	20	23	43	93.5
	Zone 1 Subtotal					21	25	46	100.0
TOTAL						21	25	46	100.0

Sunday AM Peak Hour - Existing plus Project Conditions
Updated Traffic Impact Study for the Highlands Christian Fellowship
City of Calistoga

Trip Generation Report

Forecast for Sunday

Zone #	Subzone	Amount	Units	Rate In	Rate Out	Trips In	Trips Out	Total Trips	% Of Total
1	Highlands Ch	1.00	Church	103.00	99.00	103	99	202	100.0
	Zone 1 Subtotal					103	99	202	100.0
TOTAL						103	99	202	100.0

PM Peak Hour - Existing plus Project
Updated Traffic Impact Study for the Highlands Christian Fellowship
City of Calistoga

Level Of Service Computation Report
2000 HCM 4-Way Stop Method (Future Volume Alternative)

Intersection #1 Hwy 128/Petrified Forest Rd

Cycle (sec):	100	Critical Vol./Cap.(X):	0.886
Loss Time (sec):	0 (Y+R=4.0 sec)	Average Delay (sec/veh):	28.2
Optimal Cycle:	0	Level Of Service:	D

Street Name:	Hwy 128						Petrified Forest Rd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	1	0	0 1	0	1	0 0 1	0	1	0 0 1	0	1	0 0 1 0
Volume Module: >> Count Date: 1 Mar 2010 << 4:00 - 5:00 pm												
Base Vol:	359	173	13	1	174	175	268	6	269	12	5	2
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	359	173	13	1	174	175	268	6	269	12	5	2
Added Vol:	18	0	0	0	0	1	1	1	22	0	1	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	377	173	13	1	174	176	269	7	291	12	6	2
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
PHF Volume:	419	192	14	1	193	196	299	8	323	13	7	2
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	419	192	14	1	193	196	299	8	323	13	7	2
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	419	192	14	1	193	196	299	8	323	13	7	2
Saturation Flow Module:												
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	0.93	0.07	1.00	0.50	0.50	1.00	0.02	0.98	1.00	0.75	0.25
Final Sat.:	473	469	35	436	249	252	455	13	522	369	297	99
Capacity Analysis Module:												
Vol/Sat:	0.89	0.41	0.41	0.00	0.78	0.78	0.66	0.62	0.62	0.04	0.02	0.02
Crit Moves:	****				****		****			****		
Delay/Veh:	44.9	14.4	14.4	10.7	29.7	29.7	23.7	19.1	19.1	12.1	11.3	11.3
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	44.9	14.4	14.4	10.7	29.7	29.7	23.7	19.1	19.1	12.1	11.3	11.3
LOS by Move:	E	B	B	B	D	D	C	C	C	B	B	B
ApproachDel:		34.8			29.7			21.3			11.8	
Delay Adj:		1.00			1.00			1.00			1.00	
ApprAdjDel:		34.8			29.7			21.3			11.8	
LOS by Appr:		D			D			C			B	
AllWayAvgQ:	4.5	0.7	0.7	0.0	2.8	2.8	1.7	1.4	1.4	0.0	0.0	0.0

Sunday AM Peak Hour - Existing plus Project Conditions
Updated Traffic Impact Study for the Highlands Christian Fellowship
City of Calistoga

Level Of Service Computation Report
2000 HCM 4-Way Stop Method (Future Volume Alternative)

Intersection #1 Hwy 128/Petrified Forest Rd

Cycle (sec):	100	Critical Vol./Cap.(X):	0.511
Loss Time (sec):	0 (Y+R=4.0 sec)	Average Delay (sec/veh):	13.3
Optimal Cycle:	0	Level Of Service:	B

Street Name:	Hwy 128						Petrified Forest Rd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	1	0	0 1	0	1	0 0 1	0	1	0 0 1	0	1	0 0 1 0
Volume Module: >> Count Date: 11 Jan 2004 << 11:15-12:15												
Base Vol:	180	141	26	1	95	186	132	7	169	15	7	5
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	180	141	26	1	95	186	132	7	169	15	7	5
Added Vol:	91	0	0	0	0	5	5	5	87	0	5	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	271	141	26	1	95	191	137	12	256	15	12	5
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	271	141	26	1	95	191	137	12	256	15	12	5
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	271	141	26	1	95	191	137	12	256	15	12	5
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	271	141	26	1	95	191	137	12	256	15	12	5
Saturation Flow Module:												
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	0.84	0.16	1.00	0.33	0.67	1.00	0.04	0.96	1.00	0.71	0.29
Final Sat.:	530	489	90	503	196	394	497	27	568	432	333	139
Capacity Analysis Module:												
Vol/Sat:	0.51	0.29	0.29	0.00	0.49	0.49	0.28	0.45	0.45	0.03	0.04	0.04
Crit Moves:	****					****			****		****	
Delay/Veh:	15.8	11.0	11.0	9.6	13.7	13.7	12.2	12.8	12.8	10.6	9.8	9.8
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	15.8	11.0	11.0	9.6	13.7	13.7	12.2	12.8	12.8	10.6	9.8	9.8
LOS by Move:	C	B	B	A	B	B	B	B	B	B	A	A
ApproachDel:		14.0			13.7			12.6			10.2	
Delay Adj:		1.00			1.00			1.00			1.00	
ApprAdjDel:		14.0			13.7			12.6			10.2	
LOS by Appr:		B			B			B			B	
AllWayAvgQ:	0.9	0.4	0.4	0.0	0.8	0.8	0.3	0.7	0.7	0.0	0.0	0.0

PM Peak Hour - Future Conditions
Updated Traffic Impact Study for the Highlands Christian Fellowship
City of Calistoga

Level Of Service Computation Report
2000 HCM 4-Way Stop Method (Base Volume Alternative)

Intersection #1 Hwy 128/Petrified Forest Rd

Cycle (sec): 100 Critical Vol./Cap.(X): 1.593
Loss Time (sec): 0 (Y+R=4.0 sec) Average Delay (sec/veh): 219.7
Optimal Cycle: 0 Level Of Service: F

Street Name:	Hwy 128						Petrified Forest Rd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	1	0	0 1	0	1	0 0 1	0	1	0 0 1	0	1	0 0 1 0
Volume Module:												
Base Vol:	676	346	59	4	367	293	570	28	677	52	17	7
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	676	346	59	4	367	293	570	28	677	52	17	7
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	676	346	59	4	367	293	570	28	677	52	17	7
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	676	346	59	4	367	293	570	28	677	52	17	7
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	676	346	59	4	367	293	570	28	677	52	17	7
Saturation Flow Module:												
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	0.85	0.15	1.00	0.56	0.44	1.00	0.04	0.96	1.00	0.71	0.29
Final Sat.:	424	391	67	378	234	187	425	20	474	357	272	112
Capacity Analysis Module:												
Vol/Sat:	1.59	0.89	0.89	0.01	1.57	1.57	1.34	1.43	1.43	0.15	0.06	0.06
Crit Moves:	****				****			****		****		
Delay/Veh:	298.5	46.5	46.5	12.2	290	289.9	191.9	224	223.8	14.4	12.7	12.7
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	298.5	46.5	46.5	12.2	290	289.9	191.9	224	223.8	14.4	12.7	12.7
LOS by Move:	F	E	E	B	F	F	F	F	F	B	B	B
ApproachDel:	204.1			288.3			209.5			13.9		
Delay Adj:	1.00			1.00			1.00			1.00		
ApprAdjDel:	204.1			288.3			209.5			13.9		
LOS by Appr:	F			F			F			B		
AllWayAvgQ:	33.9	4.6	4.6	0.0	32.5	32.5	21.3	29.3	29.3	0.2	0.1	0.1

Note: Queue reported is the number of cars per lane.

PM Peak Hour - Future plus Project Conditions
Updated Traffic Impact Study for the Highlands Christian Fellowship
City of Calistoga

Level Of Service Computation Report
2000 HCM 4-Way Stop Method (Future Volume Alternative)

Intersection #1 Hwy 128/Petrified Forest Rd

Cycle (sec): 100 Critical Vol./Cap.(X): 1.636
Loss Time (sec): 0 (Y+R=4.0 sec) Average Delay (sec/veh): 229.4
Optimal Cycle: 0 Level Of Service: F

Street Name:	Hwy 128						Petrified Forest Rd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	1	0	0 1	0	1	0 0 1	0	1	0 0 1	0	1	0 0 1 0
Volume Module:												
Base Vol:	676	346	59	4	367	293	570	28	677	52	17	7
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	676	346	59	4	367	293	570	28	677	52	17	7
Added Vol:	18	0	0	0	0	1	1	1	22	0	1	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	694	346	59	4	367	294	571	29	699	52	18	7
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	694	346	59	4	367	294	571	29	699	52	18	7
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	694	346	59	4	367	294	571	29	699	52	18	7
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	694	346	59	4	367	294	571	29	699	52	18	7
Saturation Flow Module:												
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	0.85	0.15	1.00	0.56	0.44	1.00	0.04	0.96	1.00	0.72	0.28
Final Sat.:	424	390	67	378	233	187	425	20	474	357	276	107
Capacity Analysis Module:												
Vol/Sat:	1.64	0.89	0.89	0.01	1.57	1.57	1.34	1.48	1.48	0.15	0.07	0.07
Crit Moves:	****				****			****		****		
Delay/Veh:	317.2	46.6	46.6	12.2	291	291.2	193.1	244	243.9	14.4	12.7	12.7
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	317.2	46.6	46.6	12.2	291	291.2	193.1	244	243.9	14.4	12.7	12.7
LOS by Move:	F	E	E	B	F	F	F	F	F	B	B	B
ApproachDel:	217.5			289.5			221.6			13.9		
Delay Adj:	1.00			1.00			1.00			1.00		
ApprAdjDel:	217.5			289.5			221.6			13.9		
LOS by Appr:	F			F			F			B		
AllWayAvgQ:	36.1	4.6	4.6	0.0	32.7	32.7	21.5	32.1	32.1	0.2	0.1	0.1

PM Peak Hour - Future Conditions (Mitigated)
Updated Traffic Impact Study for the Highlands Christian Fellowship
City of Calistoga

Level Of Service Computation Report
2000 HCM Operations Method (Base Volume Alternative)

Intersection #1 Hwy 128/Petrified Forest Rd

Cycle (sec):	100	Critical Vol./Cap.(X):	0.978
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	47.4
Optimal Cycle:	171	Level Of Service:	D

Street Name:	Hwy 128						Petrified Forest Rd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Ovl			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	1	0 1	1 0	1	0 1	1 0	1	0 1	0 1	1	0 0	1 0
Volume Module:												
Base Vol:	676	346	59	4	367	293	570	28	677	52	17	7
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	676	346	59	4	367	293	570	28	677	52	17	7
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	676	346	59	4	367	293	570	28	677	52	17	7
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	676	346	59	4	367	293	570	28	677	52	17	7
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	676	346	59	4	367	293	570	28	677	52	17	7
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.95	0.93	0.93	0.95	0.89	0.89	0.95	1.00	0.85	0.95	0.96	0.96
Lanes:	1.00	1.71	0.29	1.00	1.11	0.89	1.00	1.00	1.00	1.00	0.71	0.29
Final Sat.:	1805	3016	514	1805	1873	1495	1805	1900	1615	1805	1287	530
Capacity Analysis Module:												
Vol/Sat:	0.37	0.11	0.11	0.00	0.20	0.20	0.32	0.01	0.42	0.03	0.01	0.01
Crit Moves:	****				****		****				****	
Green/Cycle:	0.38	0.57	0.57	0.01	0.20	0.20	0.32	0.20	0.59	0.13	0.01	0.01
Volume/Cap:	0.98	0.20	0.20	0.20	0.98	0.98	0.98	0.07	0.71	0.22	0.98	0.98
Delay/Veh:	59.0	10.4	10.4	53.9	68.7	68.7	65.0	32.2	17.2	39.3	221	220.7
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	59.0	10.4	10.4	53.9	68.7	68.7	65.0	32.2	17.2	39.3	221	220.7
LOS by Move:	E	B	B	D	E	E	E	C	B	D	F	F
HCM2kAvgQ:	27	3	3	0	16	16	23	1	16	2	2	2

Note: Queue reported is the number of cars per lane.

PM Peak Hour - Future plus Project Conditions (Mitigated)
Updated Traffic Impact Study for the Highlands Christian Fellowship
City of Calistoga

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #1 Hwy 128/Petrified Forest Rd

Cycle (sec):	100	Critical Vol./Cap.(X):	0.990
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	49.3
Optimal Cycle:	180	Level Of Service:	D

Street Name:	Hwy 128						Petrified Forest Rd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Ovl			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	1	0 1	1 0	1	0 1	1 0	1	0 1	0 1	1	0 0	1 0
Volume Module:												
Base Vol:	676	346	59	4	367	293	570	28	677	52	17	7
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	676	346	59	4	367	293	570	28	677	52	17	7
Added Vol:	18	0	0	0	0	1	1	1	22	0	1	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	694	346	59	4	367	294	571	29	699	52	18	7
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	694	346	59	4	367	294	571	29	699	52	18	7
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	694	346	59	4	367	294	571	29	699	52	18	7
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	694	346	59	4	367	294	571	29	699	52	18	7
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.95	0.93	0.93	0.95	0.89	0.89	0.95	1.00	0.85	0.95	0.96	0.96
Lanes:	1.00	1.71	0.29	1.00	1.11	0.89	1.00	1.00	1.00	1.00	0.72	0.28
Final Sat.:	1805	3016	514	1805	1870	1498	1805	1900	1615	1805	1311	510
Capacity Analysis Module:												
Vol/Sat:	0.38	0.11	0.11	0.00	0.20	0.20	0.32	0.02	0.43	0.03	0.01	0.01
Crit Moves:	****				****		****				****	
Green/Cycle:	0.39	0.58	0.58	0.01	0.20	0.20	0.32	0.21	0.60	0.12	0.01	0.01
Volume/Cap:	0.99	0.20	0.20	0.20	0.99	0.99	0.99	0.07	0.72	0.23	0.99	0.99
Delay/Veh:	61.8	10.2	10.2	53.9	72.2	72.2	68.7	31.9	17.1	40.0	224	223.8
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	61.8	10.2	10.2	53.9	72.2	72.2	68.7	31.9	17.1	40.0	224	223.8
LOS by Move:	E	B	B	D	E	E	E	C	B	D	F	F
HCM2kAvgQ:	28	3	3	0	16	16	24	1	16	2	2	2

Note: Queue reported is the number of cars per lane.

PM Peak Hour - Future Conditions
Updated Traffic Impact Study for the Highlands Christian Fellowship
City of Calistoga

Level Of Service Computation Report
FHWA Roundabout Method (Base Volume Alternative)

Intersection #1 Hwy 128/Petrified Forest Rd

Average Delay (sec/veh): 4.1 Level Of Service: A

Street Name:	Hwy 128						Petrified Forest Rd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Yield Sign			Yield Sign			Yield Sign			Yield Sign		
Lanes:	2			2			2			1		
Volume Module:												
Base Vol:	676	346	59	4	367	293	570	28	677	52	17	7
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	676	346	59	4	367	293	570	28	677	52	17	7
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	676	346	59	4	367	293	570	28	677	52	17	7
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	676	346	59	4	367	293	570	28	677	52	17	7
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	676	346	59	4	367	293	570	28	677	52	17	7
PCE Module:												
AutoPCE:	676	346	59	4	367	293	570	28	677	52	17	7
TruckPCE:	0	0	0	0	0	0	0	0	0	0	0	0
ComboPCE:	0	0	0	0	0	0	0	0	0	0	0	0
BicyclePCE:	0	0	0	0	0	0	0	0	0	0	0	0
AdjVolume:	676	346	59	4	367	293	570	28	677	52	17	7
Delay Module: >> Time Period: 0.25 hours <<												
CircVolume:	602			745			423			1592		
MaxVolume:	1991			1888			2119			340		
PedVolume:	0			0			0			0		
AdjMaxVol:	1991			1888			2119			340		
ApproachVol:	1081			664			1275			76		
ApproachDel:	3.9			2.9			4.2			13.6		
Queue:	3.5			1.6			4.4			0.8		

PM Peak Hour - Future plus Project Conditions
Updated Traffic Impact Study for the Highlands Christian Fellowship
City of Calistoga

Level Of Service Computation Report
FHWA Roundabout Method (Future Volume Alternative)

Intersection #1 Hwy 128/Petrified Forest Rd

Average Delay (sec/veh): 4.2 Level Of Service: A

Street Name:	Hwy 128						Petrified Forest Rd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Yield Sign			Yield Sign			Yield Sign			Yield Sign		
Lanes:	2			2			2			1		
Volume Module:												
Base Vol:	676	346	59	4	367	293	570	28	677	52	17	7
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	676	346	59	4	367	293	570	28	677	52	17	7
Added Vol:	18	0	0	0	0	1	1	1	22	0	1	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	694	346	59	4	367	294	571	29	699	52	18	7
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	694	346	59	4	367	294	571	29	699	52	18	7
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	694	346	59	4	367	294	571	29	699	52	18	7
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	694	346	59	4	367	294	571	29	699	52	18	7
PCE Module:												
AutoPCE:	694	346	59	4	367	294	571	29	699	52	18	7
TruckPCE:	0	0	0	0	0	0	0	0	0	0	0	0
ComboPCE:	0	0	0	0	0	0	0	0	0	0	0	0
BicyclePCE:	0	0	0	0	0	0	0	0	0	0	0	0
AdjVolume:	694	346	59	4	367	294	571	29	699	52	18	7
Delay Module: >> Time Period: 0.25 hours <<												
CircVolume:	604			764			423			1611		
MaxVolume:	1989			1874			2119			330		
PedVolume:	0			0			0			0		
AdjMaxVol:	1989			1874			2119			330		
ApproachVol:	1099			665			1299			77		
ApproachDel:	4.0			3.0			4.3			14.2		
Queue:	3.6			1.6			4.5			0.9		

Appendix B

Collision Rate and Turn Pocket Dimension Spreadsheets

INTERSECTION COLLISION RATE CALCULATIONS

Highlands Christian Fellowship

Intersection # 1: Highway 128 & Petrified Forest Road
Date of Count: Monday, March 1, 2010

Number of Collisions: 10
Number of Injuries: 2
Number of Fatalities: 0
ADT: 15800
Start Date: January 1, 2003
End Date: December 31, 2008
Number of Years: 6

Intersection Type: FOUR-LEGGED
Control Type: 4 WAY STOP
Area: SUBURBAN

$$\text{collision rate} = \frac{\text{NUMBER OF COLLISIONS} \times 1\ \text{MILLION}}{\text{ADT} \times 365\ \text{DAYS PER YEAR} \times \text{NUMBER OF YEARS}}$$

$$\text{collision rate} = \frac{10 \times 1{,}000{,}000}{15{,}800 \times 365 \times 6}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.29 c/mve**	**0.0%**	**20.0%**
Statewide Average*	**0.51 c/mve**	**0.4%**	**36.4%**

ADT = average daily total vehicles entering intersection (adjusted for seasonal & weekday changes)
c/mve = collisions per million vehicles entering intersection
* *2007 Collision Data on California State Highways*, Caltrans

Left Turn Channelization Dimensions

3 Leg Intersection - Widening on One Side for Urban Areas with Constraints and Low/Moderate Traffic Speeds/Volumes

Project Name: **Highlands Christian Fellowship**

Location: **Petrified Forest Road**

Design Speed:	25 mph
Turn Pocket Width:	12.0 feet
Design Queue:	2 veh
Decelerate From:	15 mph
Intersection Width: *(Stopline to Stopline)*	30 feet
Bay Taper Length =	60 feet

Stacking Length =	50 feet
Deceleration =	115 feet
Transition =	125 feet
Total Length of Widening =	388.3 feet
Area Of Widening=	3123 sf