“L”

Traffic Study

CRANE TRANSPORTATION GROUP

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MEMORANDUM

TO: Donna Oldford/Plans4Wine (dboldford@aol.com)

cc: Mike Muelrath (mike@appliedcivil.com)
Arvind Sodhani (asvineyards@gmail.com)

FROM: Mark D. Crane, P.E.

DATE: October 19, 2015

RE: **SIGHT LINE EVALUATION AT PROPOSED SODHANI WINERY DRIVEWAY LOCATION ALONG STATE ROUTE 29**

Donna:

At your request Crane Transportation Group has determined the sight lines that would be available for drivers at the proposed Sodhani Winery driveway along State Route 29/128 (SR 29). The proposed winery driveway would be about 100 feet south of the existing driveway now serving the Sodhani property, about 600 feet north of a curve in the state highway and on the outside and at the south end of a horizontal curve adjacent to the project site. This location would provide good sight lines to the north and south along the state highway (see **Figure 1**).

SIGHT LINES AT PROPOSED SODHANI WINERY PROJECT DRIVEWAY FOR EXITING DRIVER

TO THE NORTH ALONG SR 29	TO THE SOUTH ALONG SR 29
+ 1000 feet	600 feet

Source: Crane Transportation Group

Caltrans criteria for acceptable corner sight lines at a private driveway intersection is stopping sight distance. As detailed in the Caltrans Highway Design Manual, stopping sight distance for the posted 50 mile per hour speed is as follows.

SPEED	MINIMUM STOPPING SIGHT DISTANCE
50 mph	430 feet

Source: Caltrans Highway Design Manual, March 2014

Based upon these criteria, sight lines at the proposed project driveway connection to SR 29 would be acceptable.

Thank you,

Mark

Mark Crane, P.E.
Crane Transportation Group

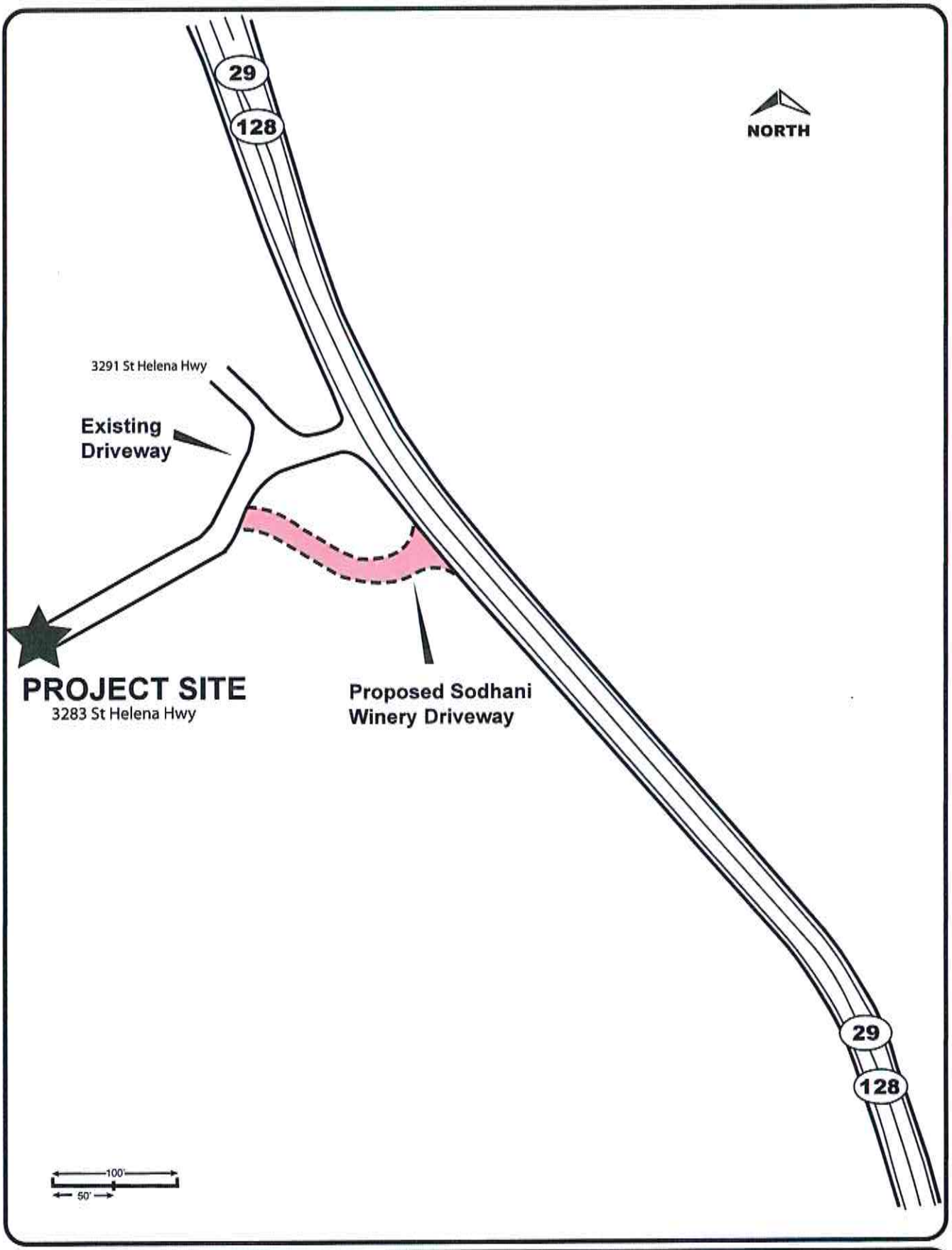

Figure 1
Proposed Sodhani Winery Driveway
Connection to SR29/128

CRANE TRANSPORTATION GROUP

TRAFFIC IMPACT REPORT

SR 29 INTERSECTION WITH THE DRIVEWAY SERVING THE PROPOSED SODHANI WINERY IN NAPA COUNTY

May 28, 2015

Prepared for: Caltrans

Prepared by: Mark D. Crane, P.E.
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I. INTRODUCTION

This report has been prepared at the request of Caltrans to detail existing and future (year 2030 General Plan Buildout) conditions at the SR 29 intersection with the driveway that will serve the proposed Sodhani Winery in Napa County. The driveway currently serves two properties, one with a residence and small winery (without visitation) and the other with a residence and vineyard.

II. PROJECT LOCATION

The analysis intersection is located at approximate PM 32.10 of SR 29 in Napa County between the cities of St. Helena and Calistoga (see **Figure 1**). It is the first driveway connection on the west side of the state highway about 460 feet south of the Grist Mill State Historical Park entrance. SR 29 in the project vicinity has single travel lanes in each direction, 2- to 3-foot-wide paved shoulders and a posted speed limit of 45 mph southbound and a 35 mph limit posted for northbound traffic at a curve about 3,000 feet south of the driveway. However, surveyed northbound speeds are closer to 45-50 mph by the time northbound vehicles reach the project driveway. The road is level and has a minor horizontal curve at the driveway connection. (The connection is on the outside of the curve.) A guardrail is in place along the east side of the road in the vicinity of the driveway. Tall trees line both sides of the highway and utility poles line the east side of the road behind the guardrail (see **Figure 2**).

The driveway connection to SR 29 provides shared access to two parcels. A residence and small winery are located on one property (3291), while vineyards and a house are located on the other property (3283). A small winery (without visitation) is proposed on the 3283 parcel, while the winery on the 3291 parcel has one employee, no visitation and no signage along the state highway. The 3291 driveway is gated immediately after separating from the shared use driveway connection to SR 29.

III. SUMMARY OF FINDINGS

- Sight lines at the project driveway connection to SR 29 are acceptable and exceed Caltrans criteria.

- Volumes during peak traffic hours on a Friday or Saturday would not warrant provision of a left turn lane either for Existing + Project or year 2030 Cumulative + Project traffic conditions. This includes traffic from development of a small winery without visitation on the 3283 parcel.

IV. EXISTING VOLUMES

Friday AM and PM peak period (7:00-9:00 AM & 3:00-6:00 PM) as well as Saturday afternoon peak period (noon-6:00 PM) turn movement traffic counts were conducted by All Traffic Data (under the supervision of Crane Transportation Group) at the analysis intersection on March 13 & 14, 2015. Count results are presented in **Figure 3**. The peak hours were 7:45-8:45 AM and 4:00-5:00 PM on Friday and 3:15-4:15 on Saturday afternoon. There were no left turns from northbound SR 29 into the driveway during any of the three peak traffic hours. During all 11 hours of counts over the two survey days, there were only three left turns from northbound SR 29 into the driveway.

Based upon seasonal traffic count information from the Caltrans PeMS system for SR 29 in the Napa Valley as well as from the City of Napa, it was determined that peak traffic volumes occur on SR 29 during the September grape harvest season. September weekday counts are about 9 percent higher than March weekday counts, while September weekend counts are about 12 percent higher than March weekend counts. Based upon these factors, the March peak hour turn movement counts were adjusted upwards to reflect peak September "Without Project" conditions, as shown in **Figure 4**.

V. YEAR 2030 CUMULATIVE GENERAL PLAN BUILDOUT VOLUMES

Traffic analysis has been conducted for both existing and year 2030 cumulative conditions. The 2030 horizon reflects the County General Plan Buildout year. Traffic modeling for the General Plan shows about a 19 percent growth in two-way weekday AM peak hour traffic and about a 27 percent growth in two-way weekday PM peak hour traffic along SR 29 in the project area between 2015 and 2030. Since traffic modeling projections were only available for weekday AM and PM peak hour conditions and not for the Saturday PM peak hour, Saturday two-way PM peak hour volumes on SR 29 were conservatively increased by the higher percentages found for the weekday PM peak hour.

Resultant year 2030 harvest "Without Project" Friday and Saturday peak hour volumes are presented in **Figure 5**.

VI. ADDITIONAL TRAFFIC DUE TO PROPOSED WINERY ON 3283 ST. HELENA HIGHWAY PARCEL

A small (12,000 gallon/year) winery is being proposed on the 3283 property served by the shared use driveway. It would employ one person who would commute to the site on weekdays and start work by 7:30 AM. This one added inbound trip would occur before the weekday AM peak hour of 7:45-8:45. There would be no visitation and no winery signage along the state highway. The proposed winery would produce no new inbound trips during either the weekday or Saturday peak traffic hours.

VII. LEFT TURN LANE WARRANT EVALUATION

A. EXISTING CONDITIONS

Caltrans left turn lane warrant criteria have been utilized to evaluate the need for a left turn lane on the northbound SR 29 approach to the analysis driveway (see **Table 1**). Since there were no left turns during any of the peak traffic hours and the future winery is scheduling its one employee to start work at a time before the weekday AM peak traffic hour, no peak hour left turns would indicate no need for a left turn lane. However, for analysis purposes, one left turn into the driveway has been utilized as traffic flow to/from the two residences being served by the shared use driveway can be random and on some days one left turn may occur during one of the peak hours.

Assuming one vehicle would be making a left turn, the percentage left turns of existing northbound traffic flow during each of the three peak traffic hours in September would be as follows.

EXISTING CONDITIONS

	% LEFT TURNS ON NB SR 29 WITH 1 VEHICLE MAKING A LEFT TURN INTO DRIVEWAY
Friday AM Peak Hour	.25%
Friday PM Peak Hour	.13%
Saturday PM Peak Hour	.14%

Overall advancing and opposing (northbound and southbound) volumes would be as follows.

EXISTING CONDITIONS

	SEPTEMBER 2015	
	ADVANCING VOLUME (NB VEHICLES)	OPPOSING VOLUME (SB VEHICLES)
Friday AM Peak Hour	396	690
Friday PM Peak Hour	753	546
Saturday PM Peak Hour	706	665

Caltrans left turn lane warrant criteria are based upon evaluation of peak hour volumes – see **Table 1**. For 50 mile per hour speeds, the combination of advancing and opposing (northbound and southbound) peak hour volumes on SR 29 at the project entrance is not found in the table. Likewise, the lowest percent left turns considered by Caltrans in the table is 5 percent, whereas at the project entrance the percent left turns for existing + project conditions would be 0.25 percent during the Friday AM peak hour, 0.13 percent during the Friday PM peak hour and 0.14 percent during the Saturday PM peak hour. Although no vehicles were surveyed making a left turn during these peak traffic hours, one vehicle has been projected to be making a left turn each of these hours for analysis purposes.

Table 2 presents an interpolation of the Caltrans left turn warrant table into the range of existing north and southbound volumes on SR 29 at the project entrance during the Friday and Saturday peak traffic hours in combination with the minimum percentage of northbound left turns that would require provision of a left turn lane serving the project site. As presented in **Table 3**, the actual percentage of northbound vehicles on SR 29 making a left turn into the shared use driveway during the Friday and Saturday peak traffic hours would be well under the minimum percent left turns which would warrant provision of a left turn lane.

For example, during the Friday PM peak traffic hour the percentage of northbound traffic turning left into the shared driveway requiring provision of a left turn lane would be 1.0 percent, while the actual percentage would be 0.13 percent. Likewise, during the Saturday PM peak traffic hour the percentage of northbound traffic turning left into the shared driveway requiring provision of a left turn lane would be 0.75 percent, while the actual percentage would be 0.14 percent. Therefore, no left turn lane would be warranted based upon analysis of the peak traffic hours of the week.

B. YEAR 2030 CUMULATIVE CONDITIONS

Analysis has also been conducted for year 2030 cumulative conditions in the same manner as for the existing evaluation. For cumulative analysis purposes, one left turn into the driveway during each peak traffic hour has been utilized to evaluate whether a left turn lane would be warranted on the northbound SR 29 approach to the shared use driveway.

Assuming one vehicle would be making a left turn, the percentage left turns of year 2030 northbound traffic flow during each of the three peak traffic hours would be as follows.

YEAR 2030

	% LEFT TURNS ON NB SR 29-128 WITH 1 VEHICLE MAKING A LEFT TURN INTO DRIVEWAY
Friday AM Peak Hour	.21%
Friday PM Peak Hour	.10%
Saturday PM Peak Hour	.11%

Overall advancing and opposing (northbound and southbound) volumes would be as follows.

YEAR 2030

	SEPTEMBER	
	ADVANCING VOLUME (NB VEHICLES)	OPPOSING VOLUME (SB VEHICLES)
Friday AM Peak Hour	472	824
Friday PM Peak Hour	958	696
Saturday PM Peak Hour	896	845

By 2030 assuming one left turn at the project entrance, the percent left turns for cumulative + project conditions would be 0.21 percent during the Friday AM peak hour, 0.10 percent during the Friday PM peak hour and 0.11 percent during the Saturday PM peak hour. Although no vehicles were surveyed during these peak traffic hours, one vehicle has been projected to be making a left turn each of these hours for analysis purposes.

Table 4 presents an interpolation of the Caltrans left turn warrant table into the range of 2030 north and southbound volumes on SR 29 at the project entrance during the Friday and Saturday peak traffic hours in combination with the minimum percentage of northbound left turns that would require provision of a left turn lane serving the project site. As presented in **Table 5**, the actual percentage of northbound vehicles on SR 29 making a left turn into the shared use driveway during the Friday and Saturday peak traffic hours would be under the minimum percent left turns which would warrant provision of a left turn lane.

For example, during the Friday PM peak traffic hour the percentage of northbound traffic turning left into the shared driveway requiring provision of a left turn lane would be 0.25 percent, while the actual percentage would be 0.10 percent. Likewise, during the Saturday PM peak traffic hour the percentage of northbound traffic turning left into the shared driveway requiring provision of a left turn lane would be 0.20 percent, while the actual percentage would be 0.11 percent. Therefore, no left turn lane would be warranted for cumulative conditions based upon analysis of the peak traffic hours of the week.

VIII. SIGHT LINES AT PROJECT DRIVEWAY CONNECTION TO SR 29

The project driveway connection to SR 29 is located on the outside of a minor horizontal curve which provides good sight lines to the north and south along the state highway. Adequacy into the future is, however, dependent upon brush along the west side of the highway near the driveway being maintained and not being allowed to block sight lines.

SIGHT LINES AT PROJECT DRIVEWAY FOR EXITING DRIVER

TO THE NORTH ALONG SR 29	TO THE SOUTH ALONG SR 29
+ 1000 feet	700 feet

Source: Crane Transportation Group

Caltrans criteria for acceptable sight lines at a private driveway intersection is stopping sight distance. As detailed in the Caltrans Highway Design Manual, stopping sight distances for 40 and 50 mile per hour speeds are as follows.

SPEED	MINIMUM STOPPING SIGHT DISTANCE
40 mph	300'
50 mph	430'

Source: Caltrans Highway Design Manual, March 2014

Based upon these criteria, sight lines at the project driveway connection to SR 29 are acceptable.

Tables

Table 1

CALTRANS HOURLY VOLUME WARRANTS FOR PROVISION OF LEFT TURN DECELERATION LANES ON TWO-LANE STATE HIGHWAYS

	Advancing Volumes, VPH*			
Opposing Volume, VPH*	**5% Left Turns**	**10% Left Turns**	**20% Left Turns**	**30% Left Turns**
		50 mph Operating Speed		
800	280	210	165	135
600	350	260	195	170
400	430	320	240	210
200	550	400	300	270
100	615	445	335	295

* VPH = vehicles per hour

Source: Caltrans Guidelines for Reconstruction of Intersections, 1985.

Table 2

CALTRANS LEFT TURN LANE WARRANT CHART – INTERPOLATION FOR PEAK HOUR VOLUMES ON SR 29 AT THE DRIVEWAY SERVING THE PROPOSED SODHANI WINERY*

EXISTING CONDITIONS WITH ONE LEFT TURN ASSUMED INTO SHARED USE DRIVEWAY DURING EACH PEAK TRAFFIC HOUR

50 MPH OPERATING SPEED

FRIDAY AM PEAK HOUR
(EXISTING SEPTEMBER 2015 VOLUMES)
(ADVANCING VOL = 396 VPH/OPPOSING VOL = 690 VPH)

	PERCENT LEFT TURNS REQUIRING PROVISION OF LEFT TURN LANE ASSUMING OPPOSING VOLUME IS MAINTAINED AT 690 VPH			
	5%	2.5%	1.25%	0.63%
Maximum Allowed Advancing Volume for Each Left Turn Percentage	315	420	N/A	N/A

FRIDAY PM PEAK HOUR
(EXISTING SEPTEMBER 2015 VOLUMES)
(ADVANCING VOL = 753 VPH/OPPOSING VOL = 546 VPH)

	PERCENT LEFT TURNS REQUIRING PROVISION OF LEFT TURN LANE ASSUMING OPPOSING VOLUME IS MAINTAINED AT 546 VPH			
	5%	2.5%	1.25%	0.63%
Maximum Allowed Advancing Volume for Each Left Turn Percentage	370	490	635	805

SATURDAY PM PEAK HOUR
(EXISTING SEPTEMBER 2015 VOLUMES)
(ADVANCING VOL = 706 VPH/OPPOSING VOL = 665 VPH)

	PERCENT LEFT TURNS REQUIRING PROVISION OF LEFT TURN LANE ASSUMING OPPOSING VOLUME IS MAINTAINED AT 665 VPH			
	5%	2.5%	1.25%	0.63%
Maximum Allowed Advancing Volume for Each Left Turn Percentage	325	435	570	730

*Interpolation of left turn lane warrant chart in *Guidelines for Reconstruction of Intersections*, 1985 reflecting advancing and opposing volumes found along SR 29 at the project driveway.

Source: Crane Transportation Group

Table 3

SUMMARY OF MINIMUM ALLOWABLE PEAK HOUR % LEFT TURNS FROM SR 29 INTO THE SHARED USE DRIVEWAY COMPARED TO ACTUAL EXPECTED % LEFT TURNS FOR EXISTING CONDITIONS

TIME PERIOD	PERCENT NORTHBOUND LEFT TURNS INTO SHARED USE DRIVEWAY: EXISTING CONDITIONS	MINIMUM % LEFT TURNS INTO SHARED USE DRIVEWAY WHEN LEFT TURN LANE WOULD BE WARRANTED	LEFT TURN LANE WARRANTED?
Friday AM Peak Hour	.25%*	2.4% left turns	No
Friday PM Peak Hour	.13%*	1.0% left turns	No
Saturday PM Peak Hour	.14%*	.75% left turns	No

*** No vehicles projected to be making left turn during these hours. However, one vehicle left turn assumed for analysis purposes.**

Source: Crane Transportation Group

Table 4

CALTRANS LEFT TURN LANE WARRANT CHART – INTERPOLATION FOR PEAK HOUR VOLUMES ON SR 29 AT THE DRIVEWAY SERVING THE PROPOSED SODHANI WINERY*

YEAR 2030 CUMULATIVE CONDITIONS WITH ONE LEFT TURN ASSUMED INTO THE SHARED USE DRIVEWAY DURING EACH PEAK TRAFFIC HOUR

50 MPH OPERATING SPEED

FRIDAY AM PEAK HOUR
(CUMULATIVE YEAR 2030 SEPTEMBER VOLUMES)
(ADVANCING VOL = 472 VPH/OPPOSING VOL = 824 VPH)

	PERCENT LEFT TURNS REQUIRING PROVISION OF LEFT TURN LANE ASSUMING OPPOSING VOLUME IS MAINTAINED AT 824 VPH			
	5%	2.5%	1.25%	0.63%
Maximum Allowed Advancing Volume for Each Left Turn Percentage	270	365	485	N/A

FRIDAY PM PEAK HOUR
(CUMULATIVE YEAR 2030 SEPTEMBER VOLUMES)
(ADVANCING VOL = 958 VPH/OPPOSING VOL = 696 VPH)

	PERCENT LEFT TURNS REQUIRING PROVISION OF LEFT TURN LANE ASSUMING OPPOSING VOLUME IS MAINTAINED AT 696 VPH					
	5%	2.5%	1.25%	.63%	.31%	.15%
Maximum Allowed Advancing Volume for Each Left Turn Percentage	315	420	550	705	885	1090

SATURDAY PM PEAK HOUR
(CUMULATIVE YEAR 2030 SEPTEMBER VOLUMES)
(ADVANCING VOL = 896 VPH/OPPOSING VOL = 845 VPH)

	PERCENT LEFT TURNS REQUIRING PROVISION OF LEFT TURN LANE ASSUMING OPPOSING VOLUME IS MAINTAINED AT 845 VPH					
	5%	2.5%	1.25%	.63%	.31%	.15%
Maximum Allowed Advancing Volume for Each Left Turn Percentage	260	350	465	605	770	960

*Interpolation of left turn lane warrant chart in *Guidelines for Reconstruction of Intersections*, 1985 reflecting advancing and opposing volumes found along SR 29 at the project driveway.

Source: Crane Transportation Group

Table 5

SUMMARY OF MINIMUM ALLOWABLE PEAK HOUR % LEFT TURNS FROM SR 29 INTO THE SHARED USE DRIVEWAY COMPARED TO ACTUAL EXPECTED % LEFT TURNS FOR YEAR 2030 CUMULATIVE CONDITIONS

TIME PERIOD	PERCENT NORTHBOUND LEFT TURNS INTO SHARED USE DRIVEWAY: CUMULATIVE CONDITIONS	MINIMUM % LEFT TURNS INTO SHARED USE DRIVEWAY WHEN LEFT TURN LANE WOULD BE WARRANTED	LEFT TURN LANE WARRANTED?
Friday AM Peak Hour	.21%*	1.25% left turns	No
Friday PM Peak Hour	.10%*	0.25% left turns	No
Saturday PM Peak Hour	.11%*	0.20% left turns	No

* No vehicles projected to be making left turn during these hours. One vehicle left turn assumed for analysis purposes.

Source: Crane Transportation Group

Figures

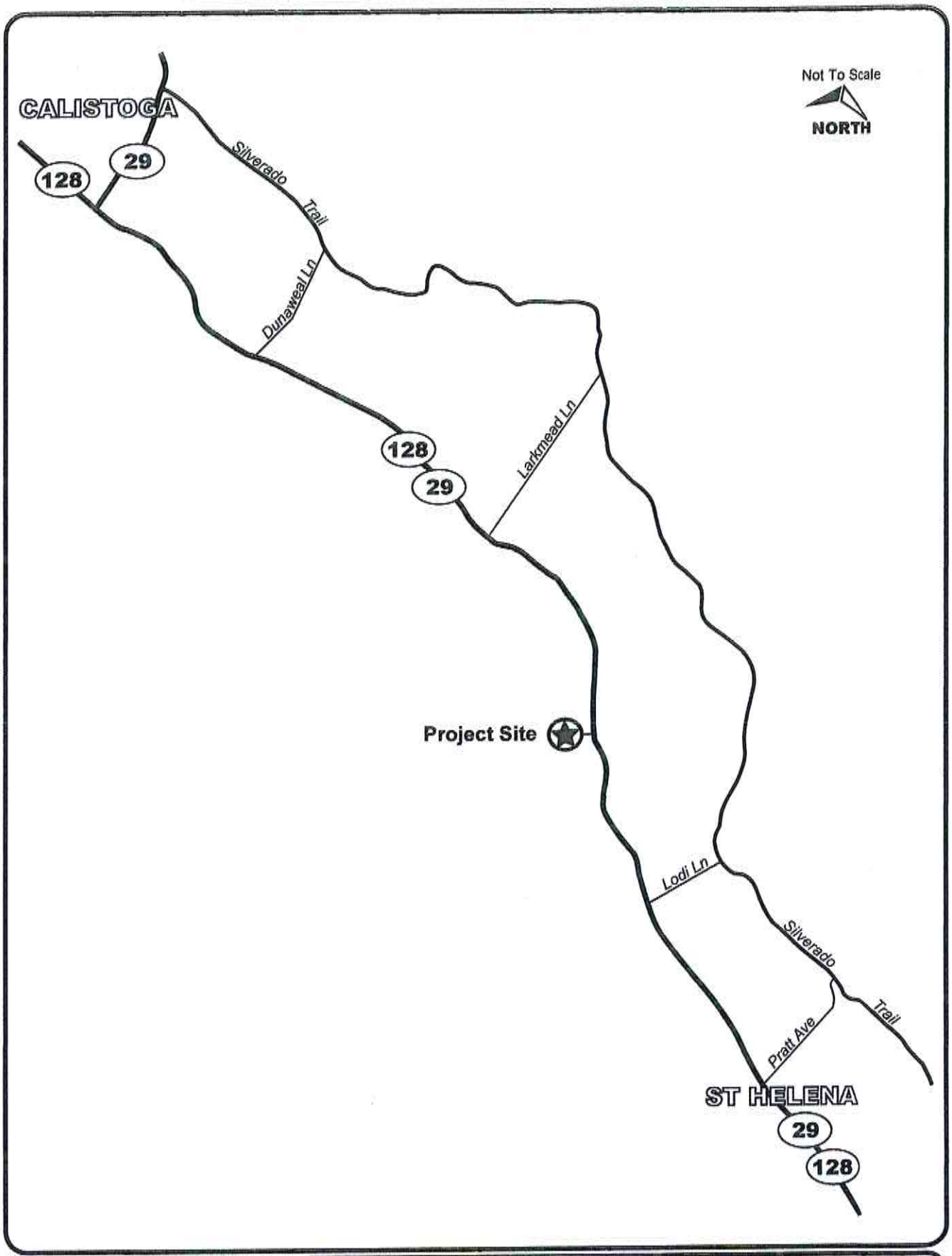

Figure 1
Area Map

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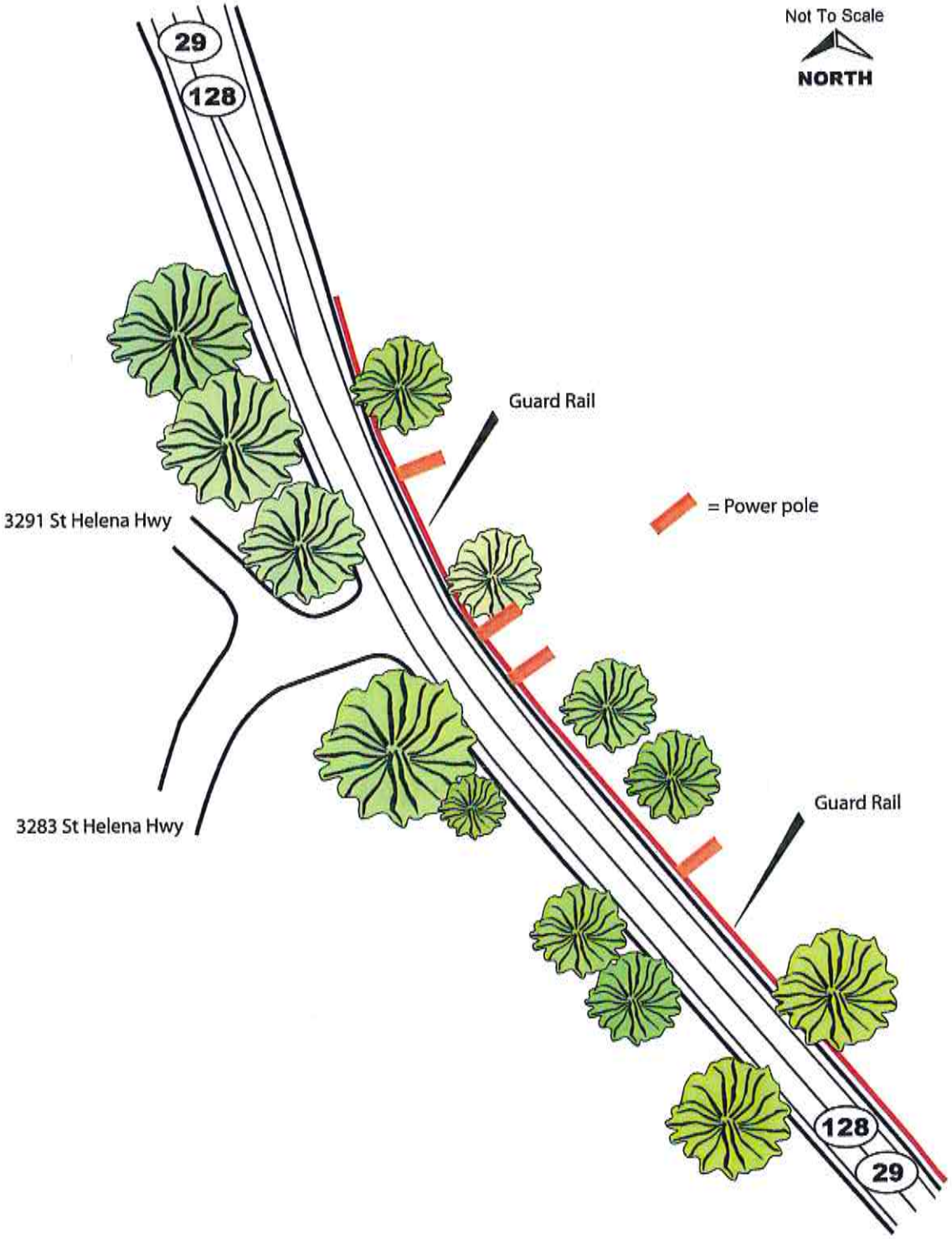

Figure 2

Conditions Along SR29-SR128 at the Project Site Access

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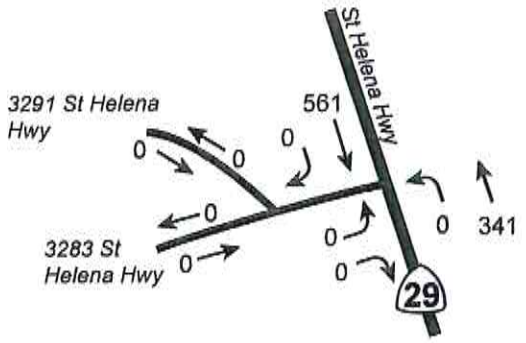
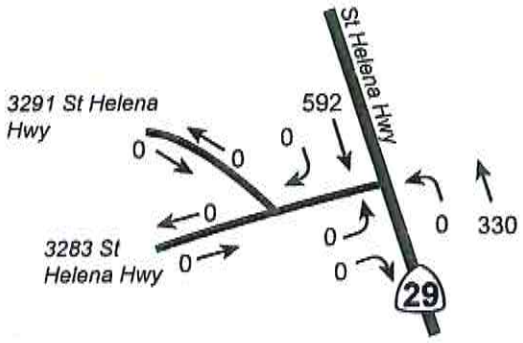
Not To Scale

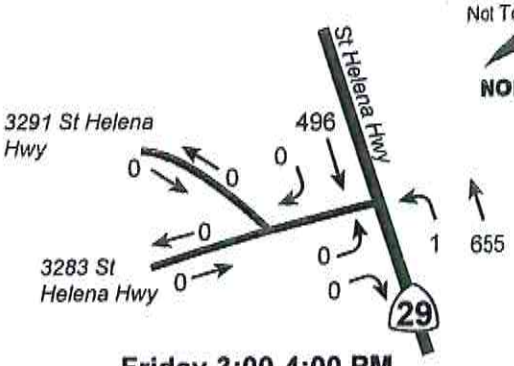
NORTH



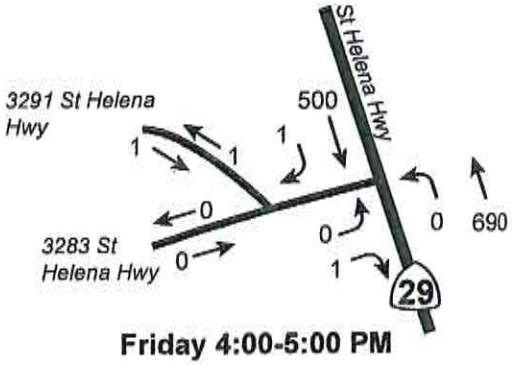
Friday 7:00-8:00 AM



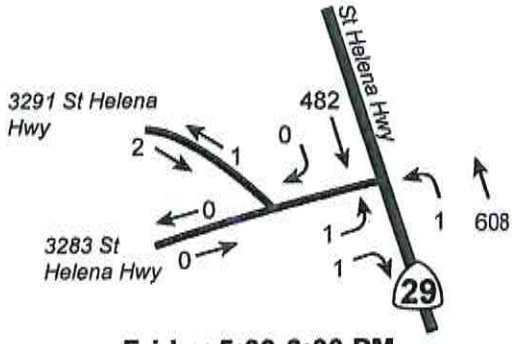
Friday 8:00-9:00 AM



Friday 3:00-4:00 PM

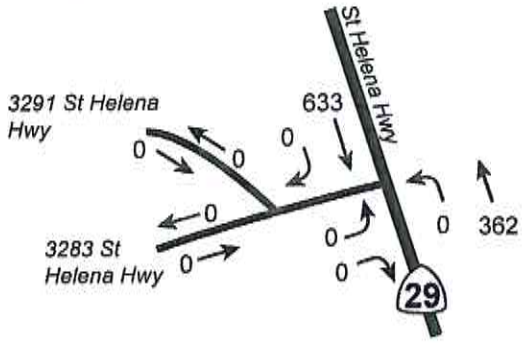


Friday 4:00-5:00 PM



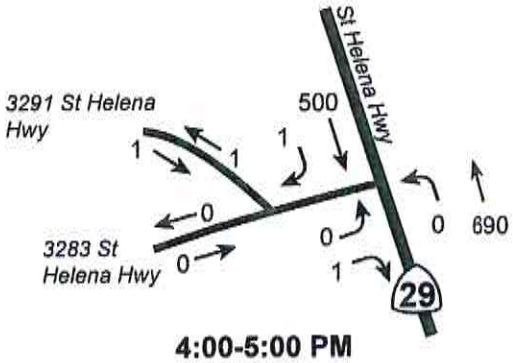
Friday 5:00-6:00 PM

FRIDAY AM PEAK HOUR



7:45-8:45 AM

FRIDAY PM PEAK HOUR



4:00-5:00 PM

Figure 3

Traffic Count Summaries
SR29/3283 & 3291 Driveway Connection
Friday AM & PM Mar 13, 2015

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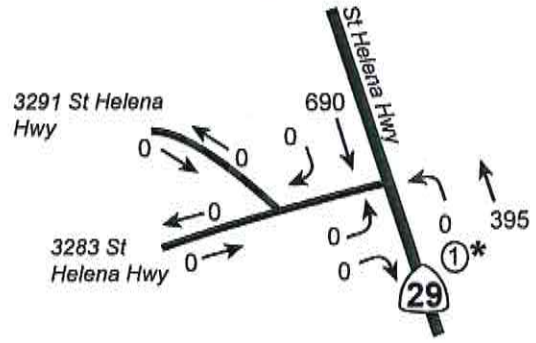
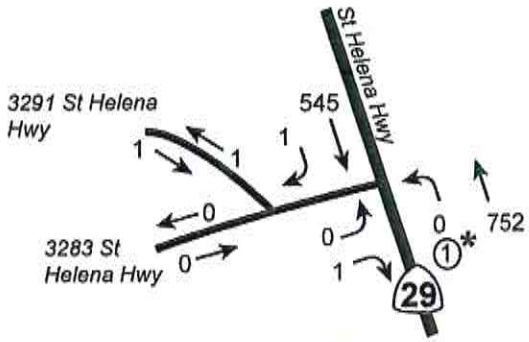
NORTH

FRIDAY AM PEAK HOUR



7:45-8:45 AM

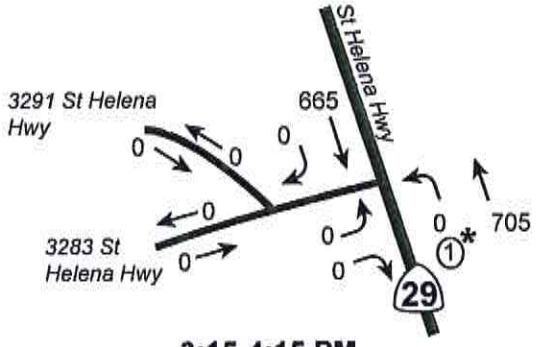
FRIDAY PM PEAK HOUR



4:00-5:00 PM

* No left turn movements were observed during traffic count and no left turn movements expected due to the proposed winery. One left turn is included for analysis purposes.

SATURDAY PM PEAK HOUR



3:15-4:15 PM

* No left turn movements were observed during traffic count and no left turn movements expected due to the proposed winery. One left turn is included for analysis purposes.

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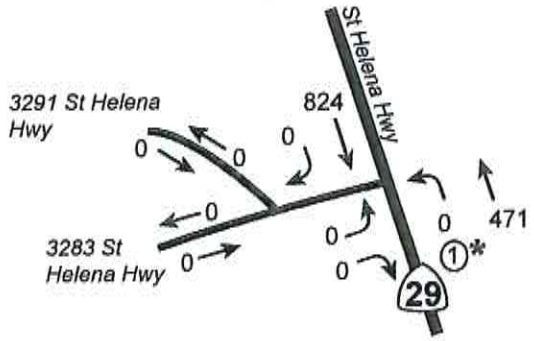
Figure 4

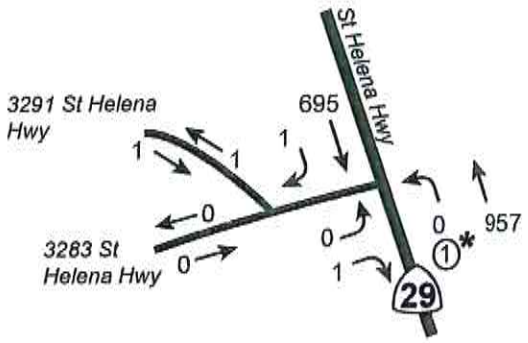
Existing Harvest Volumes
SR29/3283 & 3291 Driveway Connection
Friday AM & PM and Saturday PM Peak Hours

NORTH

FRIDAY AM PEAK HOUR

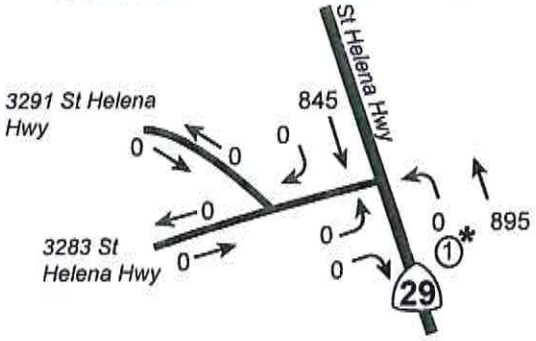


FRIDAY PM PEAK HOUR



* No left turn movements were observed during traffic count and no left turn movements expected due to the proposed winery. One left turn is included for analysis purposes.

SATURDAY PM PEAK HOUR



* No left turn movements were observed during traffic count and no left turn movements expected due to the proposed winery. One left turn is included for analysis purposes.

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Figure 5

Year 2030 Cumulative Harvest Volumes
SR29/3283 & 3291 Driveway Connection
Friday AM & PM and Saturday PM Peak Hours