“J”

Traffic Impact Study

Hard Six Cellars Winery P16-00333 & Use Permit Exception to
Conservation Regulations P19-00315
Planning Commission Hearing October 16, 2019

TRAFFIC IMPACT REPORT

PROPOSED HARD SIX CELLARS WINERY ALONG THE SOUTH FORK OF DIAMOND MOUNTAIN ROAD IN THE NAPA VALLEY

January 24, 2017

Prepared for: **HARD SIX CELLARS WINERY**

Prepared by: **Mark D. Crane, P.E.**
California Registered Traffic Engineer (#1381)
CRANE TRANSPORTATION GROUP
2621 E. Windrim Court
Elk Grove, CA 95758
(916) 647-3406
cranetransgroup@gmail.com

I. INTRODUCTION

This traffic report has been prepared at the request of the Napa County Public Works Department as authorized by the Hard Six Cellars Winery applicant. It has determined if traffic from the proposed Hard Six Cellars Winery will result in any significant impacts to the local circulation system and the need for any mitigation measures. The proposed project winery location is shown in **Figure 1**.

II. SCOPE OF SERVICES

The scope of service for this traffic study was approved by the Napa County Public Works Department. Evaluation was conducted for harvest Friday PM commute and Saturday afternoon peak traffic conditions. Existing, year 2020 and year 2030 (Cumulative – General Plan Buildout) horizons were evaluated both with and without project traffic. Operating conditions along State Route 29-128 (SR 29) and the South Fork of Diamond Mountain Road as well as at the SR 29/Diamond Mountain Road intersection were evaluated for all analysis scenarios based upon significance criteria recently approved for County traffic studies. In addition, sight line adequacy was evaluated at the project driveway intersection with the South Fork of Diamond Mountain Road. Significant impacts, if any, were identified and measures listed, if needed, to mitigate all impacts to a less than significant level.

III. SUMMARY OF FINDINGS

A. "WITHOUT PROJECT" OPERATING CONDITIONS

1. Existing Volumes – Harvest 2016

SR 29 at the South Fork of Diamond Mountain Road now has higher projected 2016 September harvest two-way traffic volumes during the Friday PM peak traffic hour compared to the Saturday PM peak traffic hour (about 1,250 two-way peak hour vehicles from 3:45 to 4:45 PM on Friday versus 1,070 two-way peak hour vehicles from 5:00 to 6:00 PM on Saturday). The South Fork of Diamond Mountain Road at the project entrance would be expected to have 5 two-way vehicles during the Friday PM peak hour and 5 vehicles during the Saturday afternoon peak hour. The driveway serving the project site would have a total of 2 vehicles during the Friday PM peak hour and 0 vehicles during the Saturday PM peak hour.

2. Year 2016 Harvest – Circulation System Operation

- **SR 29/Diamond Mountain Road** intersection – acceptable level of service during all time periods.
- **SR 29** roadway segments – acceptable level of service during all time periods.

3. Year 2020 Harvest – Circulation System Operation

- **SR 29/Diamond Mountain Road** intersection – acceptable level of service during all time periods.
- **SR 29** roadway segments – acceptable level of service during all time periods.

4. Year 2030 Harvest – Circulation System Operation

- **SR 29/Diamond Mountain Road** intersection – acceptable level of service during all time periods.
- **SR 29** roadway segments – acceptable level of service during all time periods except Friday PM peak hour – northbound (north and south of Diamond Mountain Road).

B. PROJECT IMPACTS

1. Project Trip Generation

The proposed project will result in the following trip generation during the Friday and Saturday peak traffic hours.

PROJECT TRIP GENERATION

HARVEST

FRIDAY PM PEAK HOUR* (3:45-4:45)		SATURDAY PM PEAK HOUR* (5:00-6:00)	
INBOUND TRIPS	OUTBOUND TRIPS	INBOUND TRIPS	OUTBOUND TRIPS
1	1	0	1

* Peak hour at the SR 29/Diamond Mountain Road intersection.
Source: Hard Six Cellars Winery; compiled by Crane Transportation Group

Trips during both the Friday and Saturday PM peak hours will be visitors by appointment.

2. Project Site Access to the South Fork of Diamond Mountain Road

The project will access the South Fork of Diamond Mountain Road at an existing driveway connection about 1,000 feet south of the Diamond Mountain Road intersection.

3. Year 2016 Existing + Project Off-Cite Circulation Impacts – Harvest

The proposed project would not result in any significant off-site circulation impacts to SR 29 or to the SR 29/Diamond Mountain Road intersection. The project would not degrade operation from acceptable to unacceptable at any analyzed location. ***Less than significant impact.***

4. **Year 2020 Existing + Project Off-Site Circulation Impacts – Harvest**
The proposed project would not result in any significant off-site circulation impacts to SR 29 or to the SR 29/Diamond Mountain Road intersection. The project would not degrade operation from acceptable to unacceptable at any analyzed location. ***Less than significant impact.***

5. **Year 2030 Existing + Project Off-Site Circulation Impacts – Harvest**
The proposed project would not result in any significant off-site circulation impacts to SR 29 or to the SR 29/Diamond Mountain Road intersection. The project would not degrade operation from acceptable to unacceptable at any analyzed location and/or increase peak hour volumes by 1 percent or greater on any segment of SR 29 already experiencing unacceptable "Without Project" operation. ***Less than significant impact.***

6. **Sight Lines at Project Driveway**
Sight lines at the existing driveway connection to the South Fork of Diamond Mountain Road that will serve the Hard Six Winery are now limited due to topography as well as trees and brush on the east side of the road to the north and south of the driveway connection. However, sight lines will be significantly improved (to County Public Works approval) with the removal of trees and brush both north and south of the driveway. This removal is part of the project description. ***Less than significant impact.***

7. **Marketing Events**
The four marketing events per year will not be held at times of peak weekday or weekend traffic activity along SR 29. ***Less than significant impact.***

8. **Mitigations**
No measures required.

C. CONCLUSIONS & RECOMMENDATIONS

The project would result in no significant off-site circulation system operational impacts to SR 29 or to the SR 29/Diamond Mountain Road intersection. Also, marketing events will be scheduled to eliminate any guest and staff traffic from the local circulation system between 3:00 and 5:30 PM during any day of the week. Finally, sight lines at the project entrance along the South Fork of Diamond Mountain Road will be significantly improved by the removal of trees and brush on the east side of the road to the north and south of the driveway. This removal is being proposed as part of the project.

IV. PROJECT LOCATION & DESCRIPTION

The Hard Six Cellars Winery will be located on the east side of the South Fork of Diamond Mountain Road with the entrance about 1,000 feet south of the South Fork of Diamond Mountain Road/Diamond Mountain Road intersection and almost three miles from SR 29 (see **Figure 1**). There is currently a driveway along the South Fork of Diamond Mountain Road serving an existing residence and vineyards that will be used by winery traffic. Trucks outhauling grapes from the on-site vineyards to the South Fork of Diamond Mountain Road, Diamond Mountain Road, and SR 29 now use this driveway.

The proposed Hard Six Cellars Winery will have the following yearly production, employees, visitors and marketing events as well as providing the following sight line improvements at the project entrance.

- 20,000 gallons per year production.
- Bottling on-site.
- 2 full-time and 2 part-time administrative employees during harvest. Also, 1 full-time and 2 part-time production employees.
- 87.6 percent of the grapes will be transported to site (with about half being transported to the winery from the north and half from the south on SR 29). This will result in about 16 grape haul trucks per year. However, processing of grapes at the winery now being grown on the property will eliminate about 3-4 existing grape haul trucks per year now leaving the site.
- Tours and tasting will be by appointment only – 7 days per week from 10:00 AM to 6:00 PM, maximum 16 visitors per day (resulting in about 6-7 vehicles).
- Marketing events – 4 per year: maximum 75 visitors each (27-29 vehicles) between 10:00 AM and 2:30 PM or after 6:00 PM.
- Sight lines at the project entrance along the South Fork of Diamond Mountain Road will be significantly improved by the removal of trees and brush on the east (project) side of the road to the north and south of the driveway.

V. EXISTING CIRCULATION SYSTEM EVALUATION PROCEDURES

A. ANALYSIS LOCATIONS

At County direction, the following locations have been evaluated.

1. **SR 29/Diamond Mountain Road intersection (The Diamond Mountain Road approach is stop sign controlled).**

2. **South Fork of Diamond Mountain Road/Project Driveway intersection.**

3. **The SR 29 two-lane highway segments just north and south of Diamond Mountain Road.**

Figure 2 presents a schematic of approach geometrics and control at each analysis intersection.

B. VOLUMES

1. ANALYSIS SEASONS AND DAYS OF THE WEEK

At County request project traffic impacts have been evaluated during harvest conditions. Based upon more than four years of historical information from Caltrans PeMS (Performance Measurement System) count surveys along SR 29 in the Napa Valley, September has the highest daily volumes of the year (during harvest), with August having the highest summer non-harvest daily volumes of the year. While some sources showed August volumes at a few locations in the Napa Valley being the same or a little higher than those in September, overall it was determined that September volumes at the vast majority of locations were slightly higher than August volumes by the following factors.

	September Compared to August Peak Hour Volumes
Weekday	+ 1%
Saturday	+ 2%

Therefore, only harvest conditions were selected for evaluation.

In regards to the peak traffic days of the week, the recently released Napa County Travel Behavioral Study[1] shows that the highest weekday volumes in Napa Valley occur on a Friday, with the highest weekend volumes occurring on a Saturday. In addition, historical count data from the City of Napa show that Friday has the highest volumes of any weekday, while Caltrans

[1] Fehr & Peers, December 8, 2014.

historical counts for SR 29 between St. Helena and Napa also show that weekday AM and PM peak hour volumes are higher on a Friday than on either a Wednesday or Thursday. Therefore, Friday and Saturday peak traffic conditions were evaluated in this study.

2. COUNT RESULTS

Friday 3:00 to 6:00 PM as well as Saturday 1:00 to 6:00 PM turn movement counts were conducted by Crane Transportation Group (CTG) in April 2016 at the SR 29/Diamond Mountain Road and South Fork of Diamond Mountain Road/project access driveway intersections. The peak traffic hours were determined to be 3:45-4:45 PM on Friday and 5:00-6:00 PM on Saturday, although many hours on Friday and Saturday afternoons had similar volumes. Resultant April 2016 peak hour counts are presented in **Appendix Figure 1**. Overall, two-way volumes along SR 29 at the project entrance were highest during the April Friday PM peak traffic hour (about 1,170 vehicles on Friday versus 1,000 vehicles during the Saturday PM peak hour).

3. SEASONAL ADJUSTMENTS

April 2016 peak hour traffic counts were seasonally adjusted to reflect September 2015 harvest conditions based upon the Caltrans PeMS historical counts for SR 29 as well as monthly and day of week adjustment factors utilized in other Napa Valley jurisdictions. Overall, April weekday counts would be expected to increase by about 6 percent to reflect fall harvest conditions, while April Saturday counts would be expected to increase by about 7 percent.

Resultant 2016 Friday and Saturday PM peak hour harvest volumes are presented in **Figure 3**.

C. ROADWAYS

Roadway descriptions are based upon the designation that SR 29 runs in a general north-south direction through the project area, Diamond Mountain Road runs in an east-west direction, and the South Fork of Diamond Mountain Road runs in a north-south direction.

State Route 29-128 (SR 29) provides the only subregional access to Diamond Mountain Road. It has two well-paved 12-foot travel lanes and eight-foot-wide paved shoulders. The posted speed limit is 55 miles per hour and the roadway is level. The highway traverses a horizontal curve through the Diamond Mountain Road intersection. SR 29 is not controlled on its approaches to the Diamond Mountain Road tee intersection, but a left turn lane has been provided on the northbound intersection approach.

Diamond Mountain Road is a narrow two-lane rural County collector road extending westerly from its tee intersection with SR 29. It is stop sign controlled on its approach to the state highway. It has numerous horizontal curves, no centerline stripe and a gradual uphill grade east to west. The posted speed limit is 15 miles per hour along the majority of the road. There are intermittent dirt shoulders and numerous trees close to the edge of the road.

The South Fork of Diamond Mountain Road is a very narrow two-lane road with numerous horizontal curves, intermittent dirt shoulders, no centerline striping and a gradual uphill north-to-south grade. In the vicinity of the project driveway it is 14 to 15 feet wide. There are numerous tree trunks located in close proximity to the edge of the road and there is no posted speed limit. The South Fork of Diamond Mountain Road is posted "Not a Through Road" at its intersection with Diamond Mountain Road. It is yield controlled on its southbound (downhill) approach to Diamond Mountain Road.

D. INTERSECTION LEVEL OF SERVICE

1. ANALYSIS METHODOLOGY

Transportation engineers and planners commonly use a grading system called level of service (LOS) to measure and describe the operational status of the local roadway network. LOS is a description of the quality of a roadway facility's operation, ranging from LOS A (indicating free-flow traffic conditions with little or no delay) to LOS F (representing oversaturated conditions where traffic flows exceed design capacity, resulting in long queues and delays). Intersections, rather than roadway segments between intersections, are almost always the capacity controlling locations for any circulation system.

Unsignalized Intersections. For unsignalized (all-way stop-controlled and side-street stop-controlled) intersections, the 2010 *Highway Capacity Manual* (Transportation Research Board, National Research Council) methodology for unsignalized intersections was utilized. For side-street stop-controlled intersections, operations are defined by the level of service and average control delay per vehicle (measured in seconds), with delay reported for the stop sign controlled approaches or turn movements, although overall delay is also typically reported for intersections along state highways. For all-way stop-controlled intersections, operations are defined by the average control delay for the entire intersection (measured in seconds per vehicle). The delay at an unsignalized intersection incorporates delay associated with deceleration, acceleration, stopping, and moving up in the queue. It should be noted that the 2010 analysis software for unsignalized intersections does not report overall intersection delay. However, the year 2000 software does report overall delay and was utilized to report overall intersection operation. **Table 1** summarizes the relationship between delay and LOS for unsignalized intersections.

2. MINIMUM ACCEPTABLE OPERATION

Napa County is currently adopting new minimum acceptable operating condition standards for unsignalized intersections. Based upon the new standards, Level of Service D (LOS D) is the poorest acceptable operation for side street stop sign controlled approaches at two-way stop intersections and for all-way-stop intersections.

E. INTERSECTION SIGNAL WARRANTS

Traffic signals are used to provide an orderly flow of traffic through an intersection. Many times they are needed to offer side street traffic an opportunity to access a major road where high volumes and/or high vehicle speeds block crossing or turn movements. They do not, however, increase the capacity of an intersection (i.e., increase the overall intersection's ability to accommodate additional vehicles) and, in fact, often slightly reduce the number of total vehicles that can pass through an intersection in a given period of time. Signals can also cause an increase in traffic accidents if installed at inappropriate locations.

There are 9 possible tests for determining whether a traffic signal should be considered for installation. These tests, called "warrants", consider criteria such as actual traffic volume, pedestrian volume, presence of school children, and accident history. The intersection volume data together with the available collision histories were compared to warrants contained in the *California Manual on Uniform Traffic Control Devices* (CMUTCD) 2014. Section 4C of the MUTCD provides guidelines, or warrants, which may indicate need for a traffic signal at an unsignalized intersection. As indicated in the CMUTCD, satisfaction of one or more warrants does not necessarily require immediate installation of a traffic signal. It is merely an indication that the local jurisdiction should begin monitoring conditions at that location and that a signal may ultimately be required.

Warrant 3, the peak hour volume warrant, is often used as an initial check of signalization needs since peak hour volume data is typically available and this warrant is usually the first one to be met. Warrant 3 is based on a curve and takes only the hour with the highest volume of the day into account. Please see **Appendix Table A-1** for the warrant chart. To meet this warrant, a minimum of 100 vehicles per hour must approach the intersection on one of the side streets with a single lane approach or 150 vehicles with a two-lane approach.

It should be noted that a “rural” warrant chart is utilized when the uncontrolled intersection approaches have vehicle speeds greater than 40 miles per hour or when the intersection is in a community with less than 10,000 population. The rural chart has been utilized for evaluation of the SR 29/Diamond Mountain Road intersection since the speeds on SR 29 are greater than 40 miles per hour and the intersection is in a rural setting.

F. ROADWAY SEGMENT LEVEL OF SERVICE

1. ANALYSIS METHODOLOGY

Roadway segment operation for SR 29 has been evaluated based upon criteria developed for Napa County roadways as part of the County General Plan Update in 2007: Napa County General Plan Update EIR – Technical Memorandum for Traffic and Circulation Supporting the Findings and Recommendations by Dowling Associates, February 2007. Table 5 in this report, “Peak Hour Roadway Capacities,” shows the following directional capacity limit-level of service relationships for a two-lane rural highway, such as SR 29.

		LOS A	LOS B	LOS C	LOS D	LOS E
2-Lane Rural Highway (SR 29)	Maximum Peak Direction Volumes	100	330	620	870	1200
	Volume/Capacity Ratio	(.08)	(.28)	(.52)	(.73)	(1.00)

2. MINIMUM ACCEPTABLE OPERATION

Level of service D (LOS D) is the poorest acceptable roadway segment operation in Napa County.

F. PLANNED IMPROVEMENTS

There are no planned and funded improvements at any location evaluated in this study.[2]

VI. FUTURE HORIZON TRAFFIC VOLUME PROJECTIONS

Traffic analysis has been conducted for existing (2016), year 2020 and cumulative (year 2030) horizons at County request. The 2030 horizon reflects the County General Plan Buildout year. Traffic modeling for the General Plan shows about a 26 to 27 percent growth in two-way weekday PM peak hour traffic along SR 29 in the project area between 2015 and 2030. Projecting straight line traffic growth for analysis purposes, this translates into about a 7.7 percent growth in two-way PM peak hour traffic from 2016 to the year 2020. Since traffic modeling projections were only available for weekday PM peak hour conditions and not for the Saturday PM peak hour, Saturday two-way PM peak hour volumes on SR 29 were also increased by the percentages found for the weekday PM peak hour.

There are no County traffic model projections for Diamond Mountain Road or the South Fork of Diamond Mountain Road. For analysis purposes the percent growth along both roads was projected to be one third that of SR 29.

Resultant year 2020 harvest “Without Project” Friday and Saturday peak hour volumes are presented in **Figure 4**, while year 2030 harvest “Without Project” Friday and Saturday peak hour volumes are presented in **Figure 5**.

[2] Mr. Rick Marshall, Napa County Public Works Department, March 2016.

VII. OFF-SITE CIRCULATION SYSTEM OPERATION – WITHOUT PROJECT

1. EXISTING (2016) OPERATING CONDITIONS (WITHOUT PROJECT)

A. HARVEST

1. INTERSECTION LEVEL OF SERVICE (SR 29/Diamond Mountain Road) – Table 2

a) Friday PM Peak Hour

Acceptable Diamond Mountain Road stop sign controlled operation: LOS C

b) Saturday PM Peak Hour

Acceptable Diamond Mountain Road stop sign controlled operation: LOS C

2. INTERSECTION SIGNALIZATION NEEDS (SR 29/DIAMOND MOUNTAIN ROAD) – Table 3

a) Friday PM Peak Hour

Volumes would not meet Caltrans rural signal warrant #3 volume criteria.

b) Saturday PM Peak Hour

Volumes would not meet Caltrans rural signal warrant #3 volume criteria.

3. ROADWAY SEGMENT LEVEL OF SERVICE (SR 29) – Table 4

a) Friday PM Peak Hour

SR 29: Acceptable operation both north and south of Diamond Mountain Road: LOS D northbound and LOS C southbound.

b) Saturday PM Peak Hour

SR 29: Acceptable operation both north and south of Diamond Mountain Road: LOS C northbound and LOS C southbound.

2. YEAR 2020 OPERATING CONDITIONS (WITHOUT PROJECT)

A. HARVEST

1. INTERSECTION LEVEL OF SERVICE (SR 29/Diamond Mountain Road) – Table 2

a) Friday PM Peak Hour

Acceptable Diamond Mountain Road stop sign controlled operation: LOS D

b) Saturday PM Peak Hour

Acceptable Diamond Mountain Road stop sign controlled operation: LOS C

2. INTERSECTION SIGNALIZATION NEEDS (SR 29/DIAMOND MOUNTAIN ROAD) – Table 3

a) Friday PM Peak Hour

Volumes would not meet Caltrans rural signal warrant #3 volume criteria.

b) Saturday PM Peak Hour

Volumes would not meet Caltrans rural signal warrant #3 volume criteria.

3. ROADWAY SEGMENT LEVEL OF SERVICE (SR 29) – Table 5

a) Friday PM Peak Hour

SR 29 Acceptable operation both north and south of Diamond Mountain Road: LOS D northbound and LOS C southbound.

b) Saturday PM Peak Hour

SR 29: Acceptable operation both north and south of Diamond Mountain Road: LOS D northbound and LOS C southbound.

3. CUMULATIVE (YEAR 2030) OPERATING CONDITIONS (WITHOUT PROJECT)

A. HARVEST

1. INTERSECTION LEVEL OF SERVICE (SR 29/Diamond Mountain Road) – Table 2

a) Friday PM Peak Hour

Acceptable Diamond Mountain Road stop sign controlled operation: LOS D

b) Saturday PM Peak Hour

Acceptable Diamond Mountain Road stop sign controlled operation: LOS C

2. INTERSECTION SIGNALIZATION NEEDS (SR 29/DIAMOND MOUNTAIN ROAD) – Table 3

a) Friday PM Peak Hour

Volumes would not meet Caltrans rural signal warrant #3 volume criteria.

b) Saturday PM Peak Hour

Volumes would not meet Caltrans rural signal warrant #3 volume criteria.

3. ROADWAY SEGMENT LEVEL OF SERVICE (SR 29) – Table 6

a) Friday PM Peak Hour

SR 29: Acceptable LOS C or D operation southbound, but **unacceptable LOS E operation northbound both north and south of Diamond Mountain Road.**

b) Saturday PM Peak Hour

SR 29: Acceptable operation both north and south of Diamond Mountain Road: LOS D northbound and southbound, except LOS C southbound to the north of Diamond Mountain Road.

VIII. PROJECT IMPACT EVALUATION SIGNIFICANCE CRITERIA

A. SIGNIFICANCE CRITERIA

1. COUNTY OF NAPA

The following criteria have recently been developed for traffic impact analyses in Napa County.

EXISTING + PROJECT CONDITIONS

A. ARTERIAL SEGMENTS

A project would cause a significant impact requiring mitigation if:

1. An arterial segment operates at LOS A, B, C or D during the selected peak hours without project trips, and deteriorates to LOS E or F with the addition of project trips, or
2. An arterial segment operates at LOS E or F during the selected peak hours without project trips, and the addition of project trips increases the total segment volume by one percent or more.

For the second criteria, the following equation should be used if the arterial operates at LOS E or F without the project:

Project Contribution % = Project Trips ÷ Existing Volumes

B. SIGNALIZED INTERSECTIONS

A project would cause a significant impact requiring mitigation if:

1. A signalized intersection operates at LOS A, B, C or D during the selected peak hours without project trips, and deteriorates to LOS E or F with the addition of project trips, or
2. A signalized intersection operates at LOS E or F during the selected peak hours without project trips, and the addition of project trips increases the total entering volume by one percent or more.

For the second criteria, the following equation should be used if the signalized intersection operates at LOS E or F without the project:

Project Contribution % = Project Trips ÷ Existing Volumes

Maintaining LOS D or better at all signalized intersections would sometimes require expanding the physical footprint of an intersection. In some locations around the County, expanding physical transportation infrastructure could be in direct conflict with the County's goals of preserving the area's rural character, improving safety, and sustaining the agricultural industry, making these potential improvements infeasible. The County's Circulation Element lists intersections that are slated for improvement or expansion in unincorporated Napa County.[3]

Transportation studies should individually consider the feasibility of potential mitigation measures with respect to right-of-way acquisition, regardless of the intersection's place in the Circulation Element's identified improvement lists, and present potential alternative mitigation measures that do not require right-of-way acquisition. County staff would then review that information and make the decision about the feasibility of the identified potential mitigations.

For intersections that cannot be improved without substantial additional right-of-way according to both the Circulation Element and the individual transportation impact study, and where other mitigations such as updating signal timing, signal phasing and operations, and/or signing and striping improvements do not improve the LOS, LOS E or F will be considered acceptable and the one percent threshold would not apply. Analysis of signalized intersection LOS should still be presented for informational purposes, and

[3] According to the Circulation Element dated June 8, 2008, the following intersections can be altered or expanded as a mitigation measure: SR-12/Airport Boulevard/SR-29, SR-221/SR-12/Highway 29, and several intersections along SR-29 and SR-128 north of Napa. The significance criteria shown above should apply to facilities where appropriate based upon the most recent Circulation Element chapter of the General Plan.

there should still be an evaluation of effects on safety and local access, per Policy CIR-18.

C. UNSIGNALIZED INTERSECTIONS (ALL WAY STOP AND SIDE STREET STOP SIGN CONTROLLED)

LOS for all way stop controlled intersections is defined as an average of the delay at all approaches. LOS for side street stop controlled intersections is defined by the delay and LOS for the worst case approach. The recommended interpretation of Policy CIR-16 regarding unsignalized intersection significance criteria is as follows:

1. An unsignalized intersection operates at LOS A, B, C or D during the selected peak hours without project trips, the LOS deteriorates to LOS E or F with the addition of project traffic, and the peak hour traffic signal warrant criteria should also be evaluated and presented for information purposes, or
2. An unsignalized intersection operates at LOS E or F during the selected peak hours without project trips and the project contributes one percent or more of the total entering traffic for all way stop controlled intersections, or 10 percent or more of the traffic on a side street approach for side street stop controlled intersections; the peak hour traffic signal warrant criteria should also be evaluated and presented for informational purposes.

All Way Stop Controlled Intersections

For the second criteria at an all way stop controlled intersection, the following equation should be used if the all way stop controlled intersection operates at LOS E or F without the project.

Project Contribution % = Project Trips ÷ Existing Volumes

Side Street Stop Controlled Intersections

For the second criteria at a side street stop controlled intersection, the following equation should be used if the side street stop controlled intersection operates at LOS E or F without the project.

Project Contribution % = Project Trips ÷ Existing Volumes

Both of those volumes are for the stop controlled approaches only. Each stop controlled approach that operates at LOS E or F should be analyzed individually.

CUMULATIVE+ PROJECT CONDITIONS

A. ARTERIAL SEGMENTS, SIGNALIZED INTERSECTIONS AND UNSIGNALIZED INTERSECTIONS

A project would cause a significant cumulative impact requiring mitigation if:

1. The overall amount of expected traffic growth causes conditions to deteriorate such that any of the significance criteria described above for existing conditions are met, and
2. The project's contribution to a significant cumulative impact would be equal to or greater than five percent of the growth in traffic from existing conditions.

A project's contribution to a cumulative condition would be calculated as the project's percentage contribution to the total growth in traffic from existing conditions.

Project Contribution % = Project Trips ÷ (Cumulative Volumes - Existing Volumes)

IX. PROJECT TRIP GENERATION & DISTRIBUTION

A. TRIP GENERATION

Friday and Saturday PM peak hour trip generation projections were developed with the assistance of the project applicant and their representative for all components of employee, grape delivery and visitor activities at the proposed Hard Six Cellars Winery (see worksheets in the **Appendix**). Results are presented on an hourly basis in **Tables 7** and **8** for harvest Friday and Saturday PM Peak hour conditions. A summary of peak hour trips is presented in **Table 9**. During the harvest Friday PM peak traffic hour there would be a projected 1 inbound and 1 outbound vehicle, while during the harvest Saturday PM peak traffic hour there would be a projected 0 inbound and 1 outbound vehicle. As shown, no winery employees would be expected on the local roadway network during the harvest Friday or Saturday PM peak traffic hours; the minimal project traffic during these peak hours would be visitor related.

B. TRIP DISTRIBUTION

Project traffic was distributed to SR 29 in a pattern reflective of existing distribution patterns at the SR 29/Diamond Mountain Road intersection. Most visitor traffic would be expected to travel to/from the south on SR 29.

The harvest Friday and Saturday project traffic increments expected on Diamond Mountain Road and SR 29 during the times of ambient peak traffic flows are presented in **Figure 6**. Friday and Saturday Existing "With Project" peak hour volumes are presented in **Figure 7**, "With Project" peak hour volumes for year 2020 conditions are presented in **Figure 8**, and "With Project" peak hour volumes for cumulative (year 2030) conditions are presented in **Figure 9**.

C. PLANNED ROADWAY IMPROVEMENTS

There are no capacity increasing roadway improvements planned by Caltrans or the County on the local roadway network serving the project site.[4]

X. PROJECT OFF-SITE IMPACTS

A. EXISTING WITH PROJECT CONDITIONS

1. HARVEST

a) Summary

Project traffic would not result in any significant level of service or signal warrant impacts at the SR 29/Diamond Mountain Road intersection, or any level of service impacts along any analyzed SR 29 roadway segments during the Friday and Saturday PM peak traffic hours. ***Less than significant***.

b) Intersection Level of Service (SR 29/Diamond Mountain Road) – Table 2

The SR 29/Diamond Mountain Road intersection would maintain acceptable operation with the addition of project traffic during the Friday and Saturday PM peak traffic hours. ***Less than significant.***

c) Intersection Signalization Needs (SR 29/Diamond Mountain Road) – Table 3

The SR 29/Diamond Mountain Road intersection would <u>not</u> have volumes increased to meet peak hour signal warrant #3 volume criteria levels with the addition of project traffic during the Friday and Saturday PM peak traffic hours. ***Less than significant.***

d) Roadway Segments (SR 29) – Table 4

All analyzed roadway segments would maintain acceptable operation with the addition of project traffic during the Friday and Saturday PM peak traffic hours. ***Less than significant.***

B. YEAR 2020 WITH PROJECT CONDITIONS

1. HARVEST

a) Summary

Project traffic would not result in any significant level of service or signal warrant impacts at the SR 29/Diamond Mountain Road intersection, or any level of service impacts along any analyzed SR 29 roadway segments during the Friday and Saturday PM peak traffic hours. ***Less than significant***.

---

[4] Mr. Rick Marshall, Napa County Public Works Department, March 2016.

b) Intersection Level of Service (SR 29/Diamond Mountain Road) – Table 2

The SR 29/Diamond Mountain Road intersection would maintain acceptable operation with the addition of project traffic during the Friday and Saturday PM peak traffic hours. ***Less than significant.***

c) Intersection Signalization Needs (SR 29/Diamond Mountain Road) – Table 3

The SR 29/Diamond Mountain Road intersection would not have volumes increased to meet peak hour signal warrant #3 volume criteria levels with the addition of project traffic during the Friday and Saturday PM peak traffic hours. ***Less than significant.***

d) Roadway Segments (SR 29) – Table 5

All analyzed roadway segments would maintain acceptable operation with the addition of project traffic during the Friday and Saturday PM peak traffic hours. ***Less than significant.***

C. CUMULATIVE (YEAR 2030) WITH PROJECT CONDITIONS

1. HARVEST

a) Summary

Project traffic would not result in any significant level of service or signal warrant impacts at the SR 29/Diamond Mountain Road intersection, or any level of service impacts along any analyzed SR 29 roadway segments during the Friday and Saturday PM peak traffic hours. ***Less than significant***.

b) Intersection Level of Service (SR 29/Diamond Mountain Road) – Table 2

The SR 29/Diamond Mountain Road intersection would maintain acceptable operation with the addition of project traffic during the Friday and Saturday PM peak traffic hours. ***Less than significant.***

c) Intersection Signalization Needs (SR 29/Diamond Mountain Road) – Table 3

The SR 29/Diamond Mountain Road intersection would not have volumes increased to meet peak hour signal warrant #3 volume criteria levels with the addition of project traffic during the Friday and Saturday PM peak traffic hours. ***Less than significant.***

d) Roadway Segments (SR 29) – Table 6

All analyzed roadway segments, with one exception, would maintain acceptable operation with the addition of project traffic during the Friday and Saturday PM peak traffic hours. During the Friday PM peak traffic hour when "Without Project" northbound operation would be an unacceptable LOS E, the project would increase two-way segment volumes by only 0.1 percent, which would be less than the County significance criteria limit of 1.0 percent traffic added. ***Less than significant.***

XI. PROJECT ACCESS IMPACTS

A. SIGHT LINE ADEQUACY AT PROJECT DRIVEWAY

There is no posted speed limit on the South Fork of Diamond Mountain Road at the project entrance and vehicles were observed traveling 15 to 25 miles per hour. The roadway width just north of the project driveway connection is about 14 to 15 feet wide. Sight lines for drivers exiting the project driveway to the South Fork of Diamond Mountain Road are about 130 feet to the south (to see downhill traffic) and about 65 feet to the north (to see uphill traffic). Sight line to the north is restricted by trees and brush along the east side of the road as well as the significant change in grade between the South Fork of Diamond Mountain Road (uphill north to south) and the project driveway (downhill approach) acute angle connection, which requires about a 150-degree right turn for exiting vehicles (see **Figure 10**). Sight line to the south is restricted by trees and brush along the east side of the road, road curvature and a hillside.

As shown in **Figures 11** and **12** and detailed in the project description, the project is proposing to remove trees and brush on the east side of the South Fork of Diamond Mountain Road to the north and south of the project driveway connection. This measure has been approved by County Public Works as providing acceptable sight lines.

Less than significant.

XII. MARKETING EVENTS

Table 10 presents details of the number of guests, employees and hired event staffing that would likely be present for the 4 proposed marketing events during the year. Each event would be held with up to 75 guests (resulting in about 27-29 visitor vehicles). Total hired staffing for these 4 events would result in an additional 4 vehicles accessing the winery. Events would last about three to four hours and would occur from 10:00 AM to 2:30 PM or start at 6:00 PM on both weekdays and weekend days.

There will be no regular visitation allowed during any marketing events.

Less than significant.

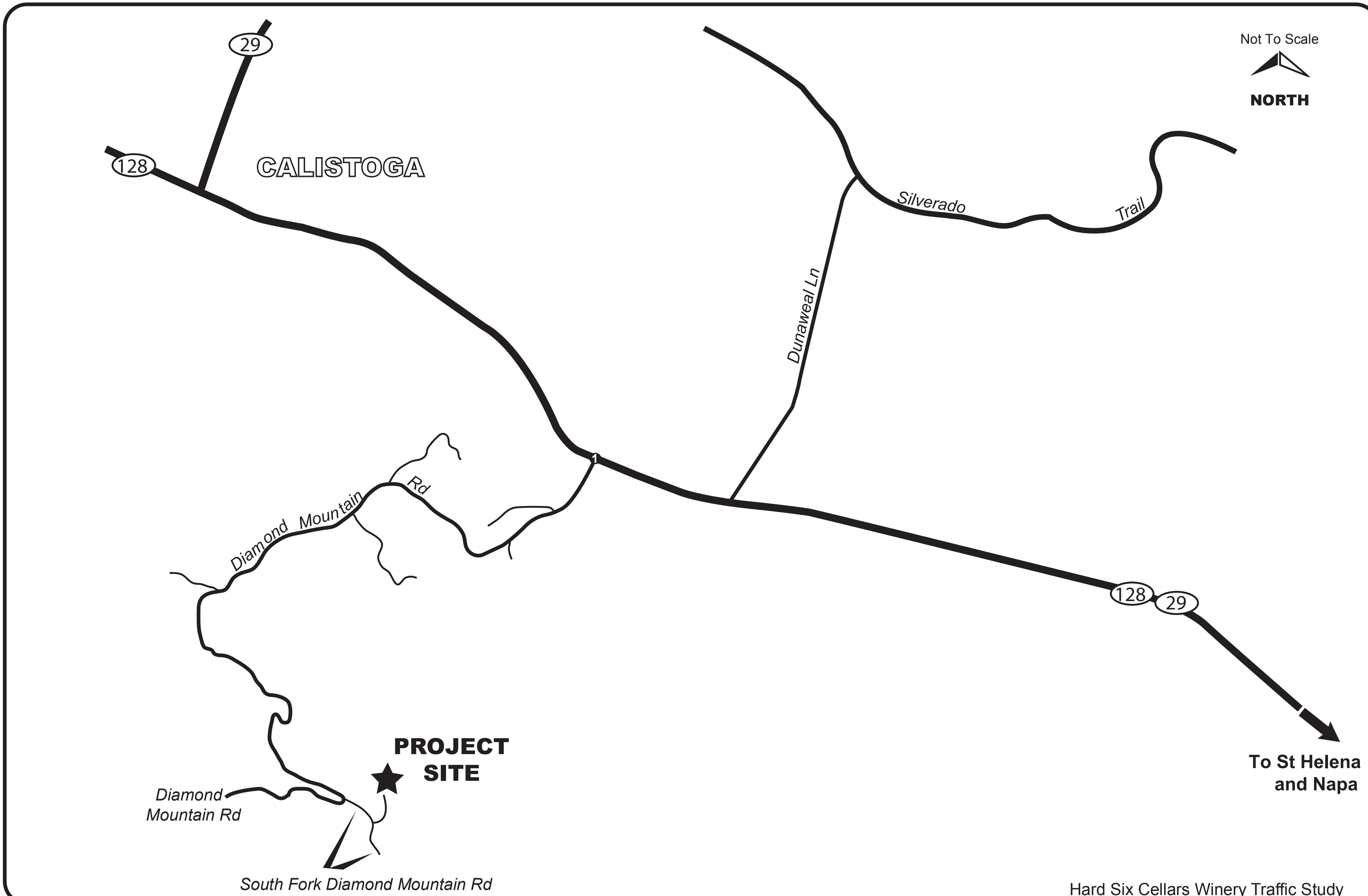
XIII. MITIGATION MEASURES

No measures required.

XIV. CONCLUSIONS & RECOMMENDATIONS

The project would result in no significant off-site circulation system operational impacts to SR 29 or to the SR 29/Diamond Mountain Road intersection. Also, marketing events will be scheduled to eliminate any guest and staff traffic from the local circulation system between 3:00 and 5:30 PM during any day of the week. Finally, sight lines at the project entrance along the South Fork of Diamond Mountain Road will be significantly improved by the removal of trees and brush on the east side of the road to the north and south of the driveway. This removal is being proposed as part of the project.

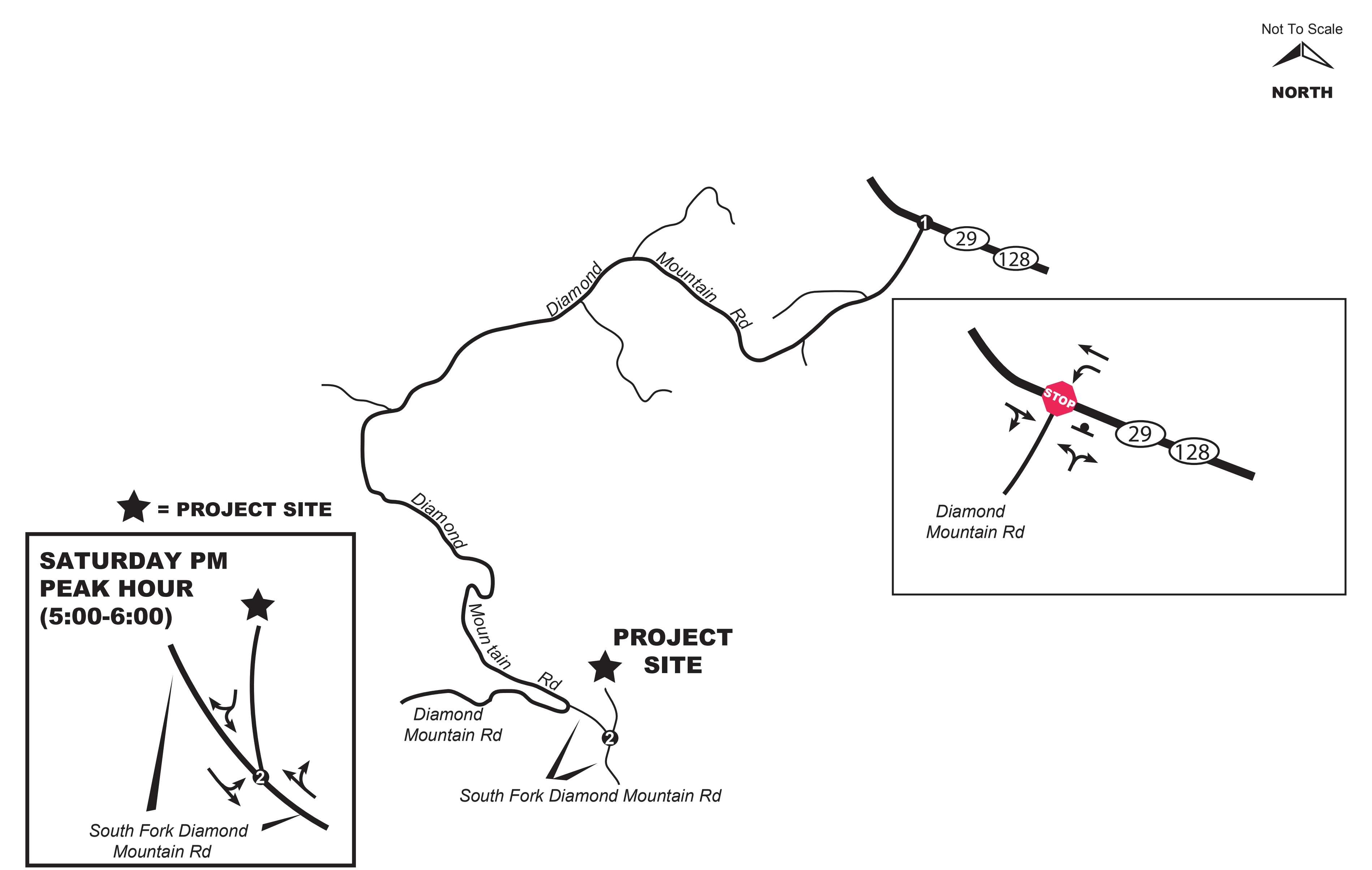
Figures



CRANE TRANSPORTATION GROUP

Figure 1

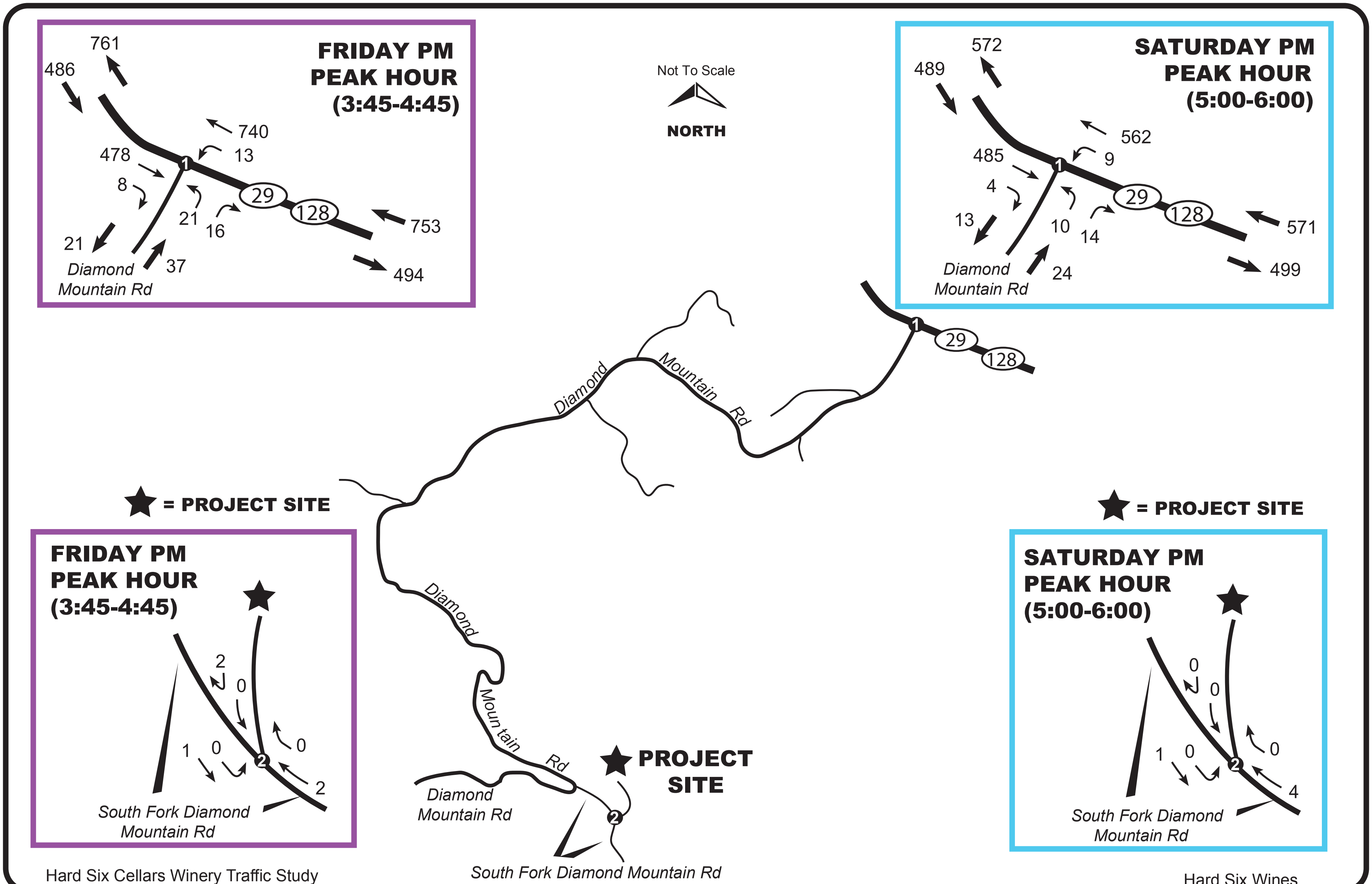
Area Map



Hard Six Cellars Winery Traffic Study

CRANE TRANSPORTATION GROUP

Figure 2
Intersection Lane Geometrics and Control

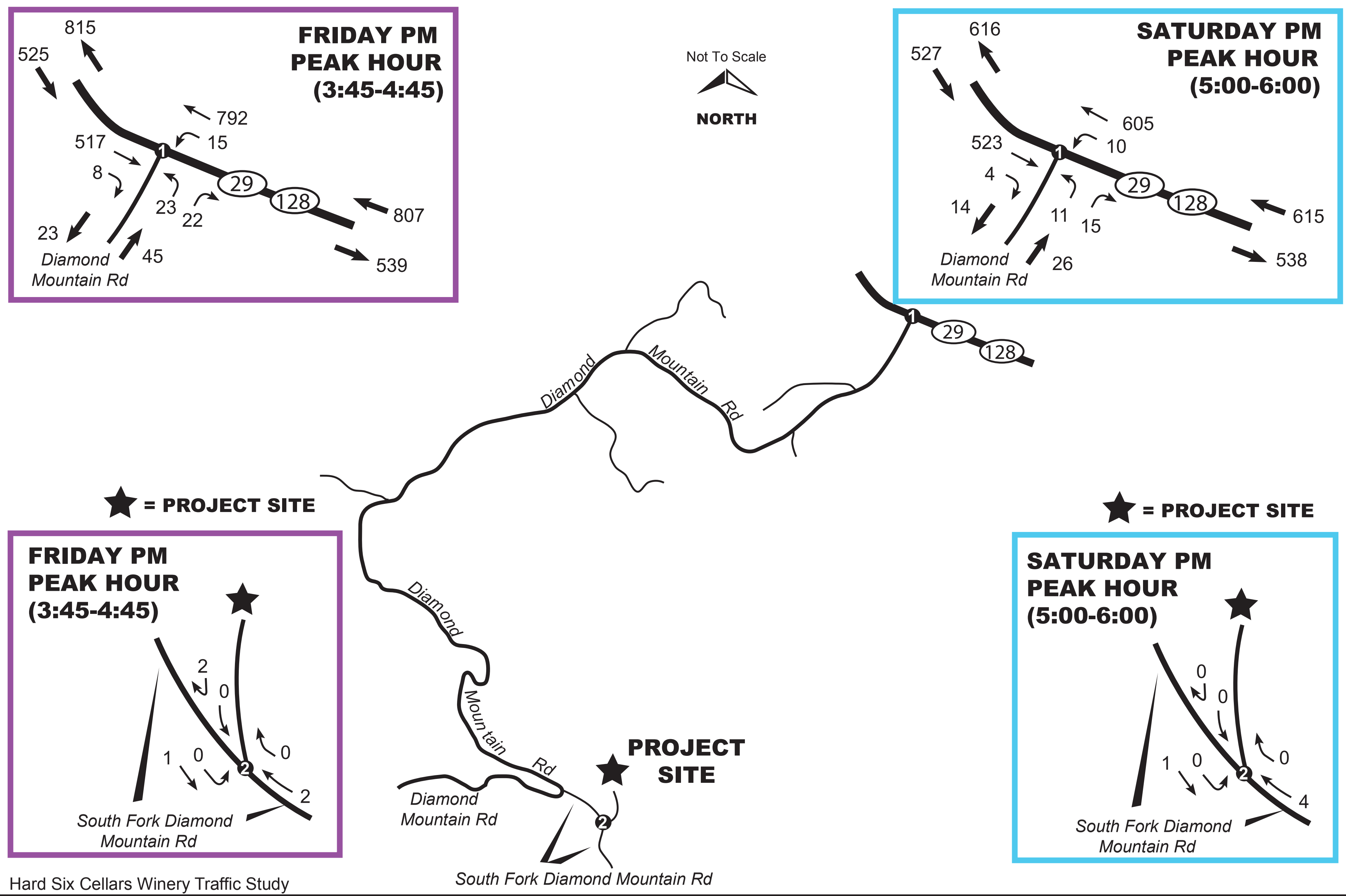


Hard Six Cellars Winery Traffic Study

Hard Six Wines

CRANE TRANSPORTATION GROUP

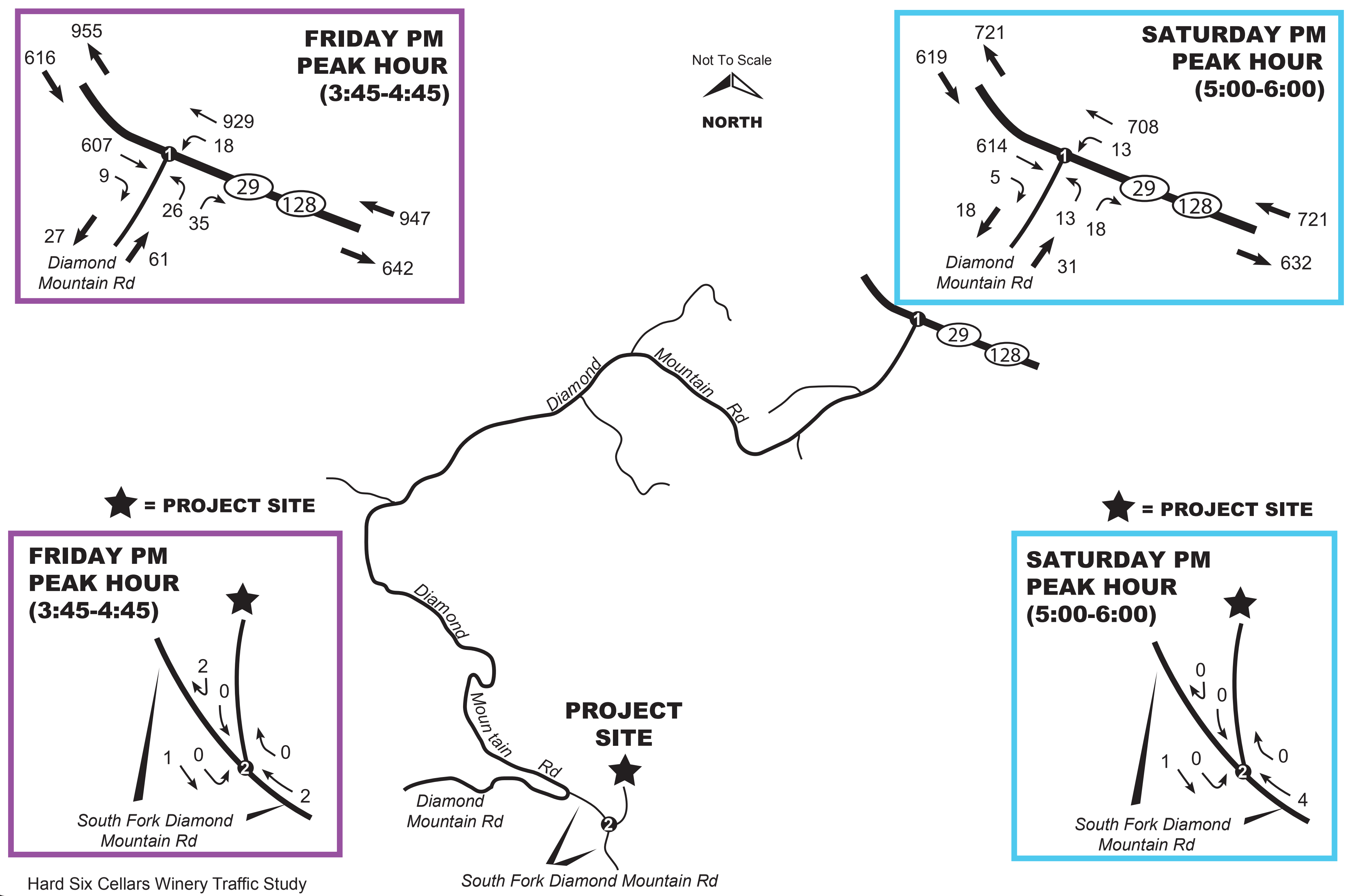
Figure 3
2016 Harvest Friday and Saturday (without Project)
PM Peak Hour Volumes



Hard Six Cellars Winery Traffic Study

CRANE TRANSPORTATION GROUP

Figure 4
2020 Harvest Friday and Saturday (without Project)
PM Peak Hour Volumes

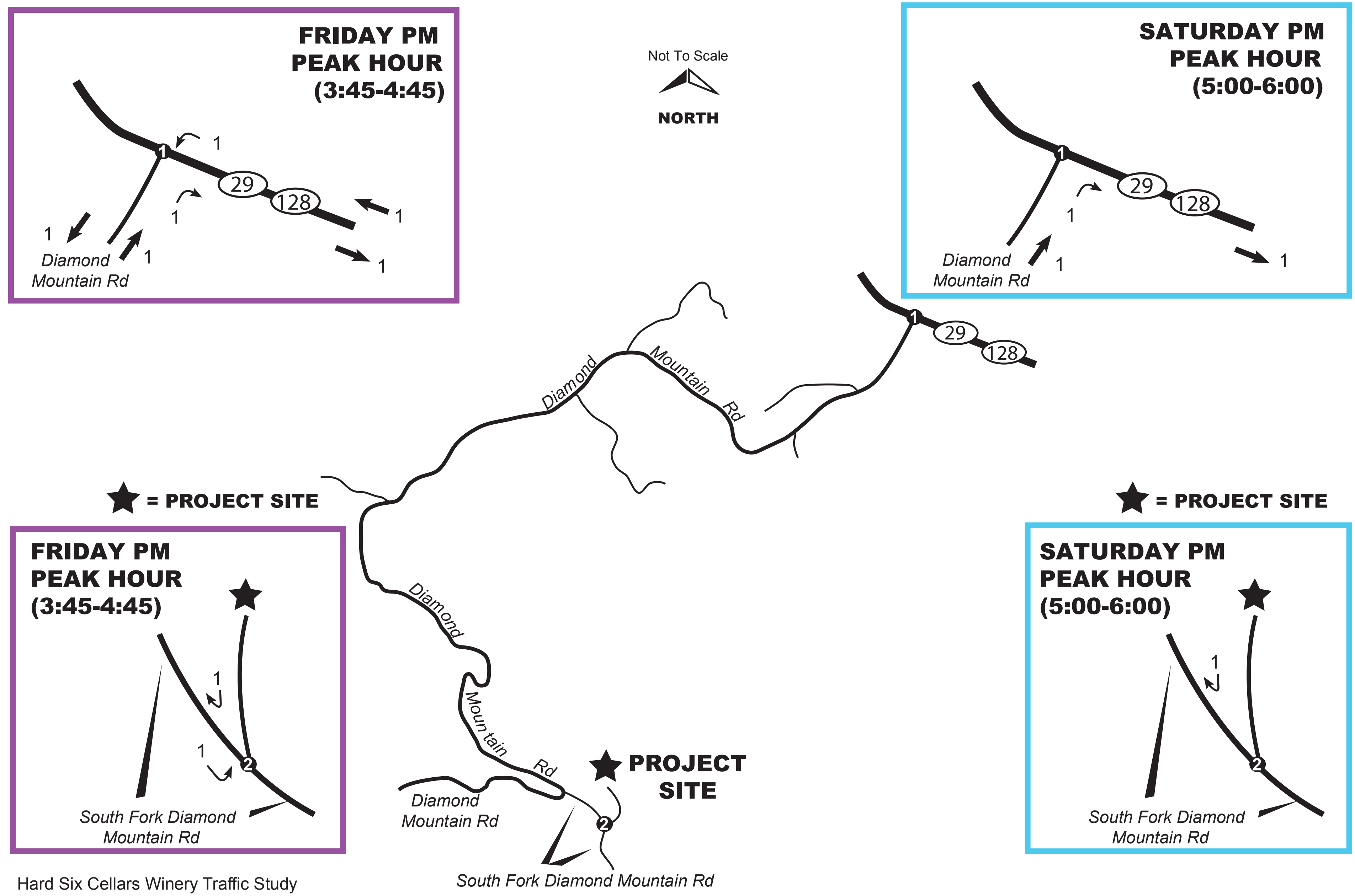


Hard Six Cellars Winery Traffic Study

CRANE TRANSPORTATION GROUP

Figure 5

2030 Harvest Friday and Saturday (without Project)
PM Peak Hour Volumes

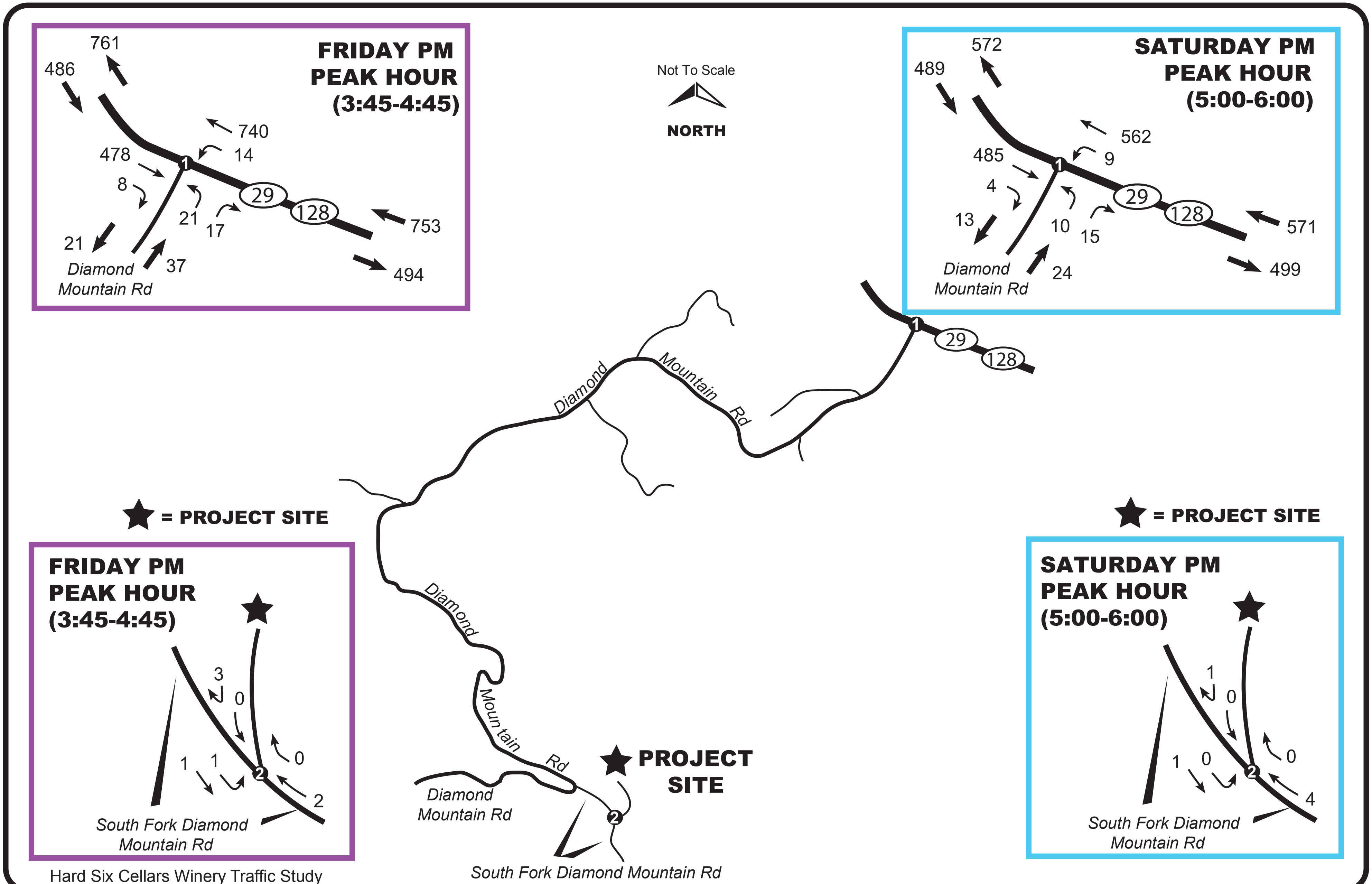


Hard Six Cellars Winery Traffic Study

CRANE TRANSPORTATION GROUP

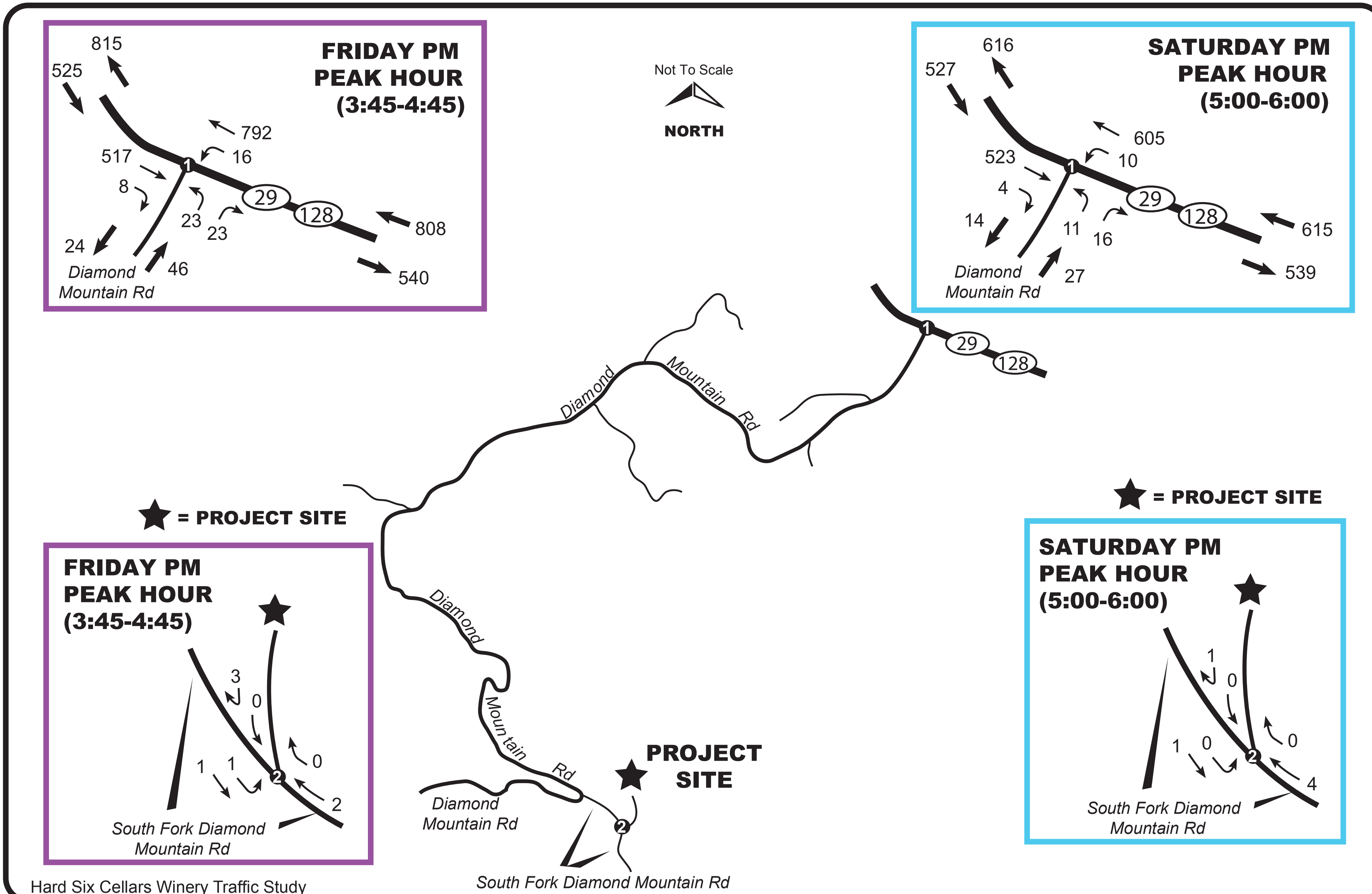
Figure 6

Harvest Friday and Saturday PM Peak Hour Project Traffic Increment



CRANE TRANSPORTATION GROUP

Figure 7
2016 Harvest Friday and Saturday (with Project)
PM Peak Hour Volumes

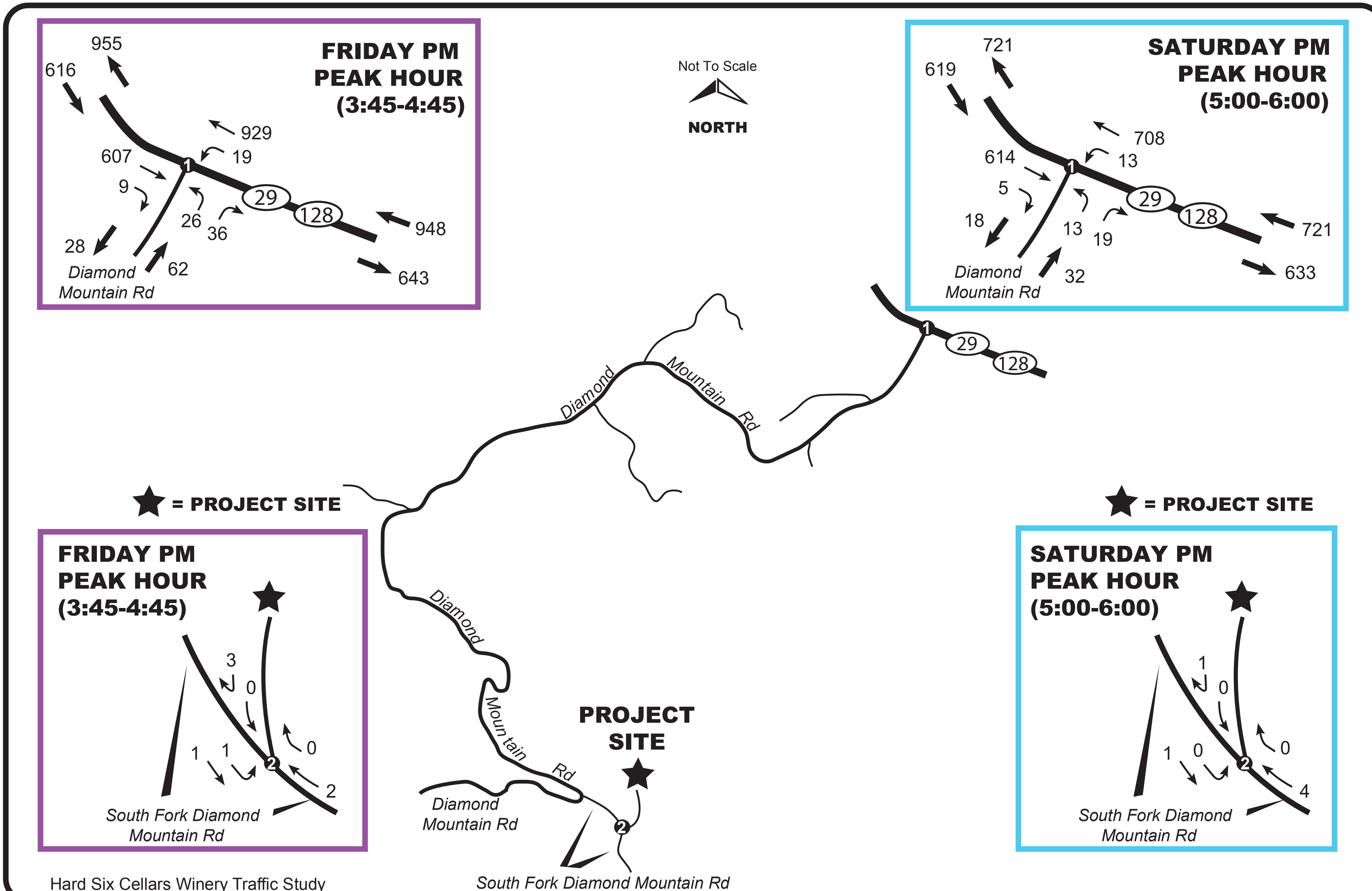


Hard Six Cellars Winery Traffic Study

CRANE TRANSPORTATION GROUP

Figure 8

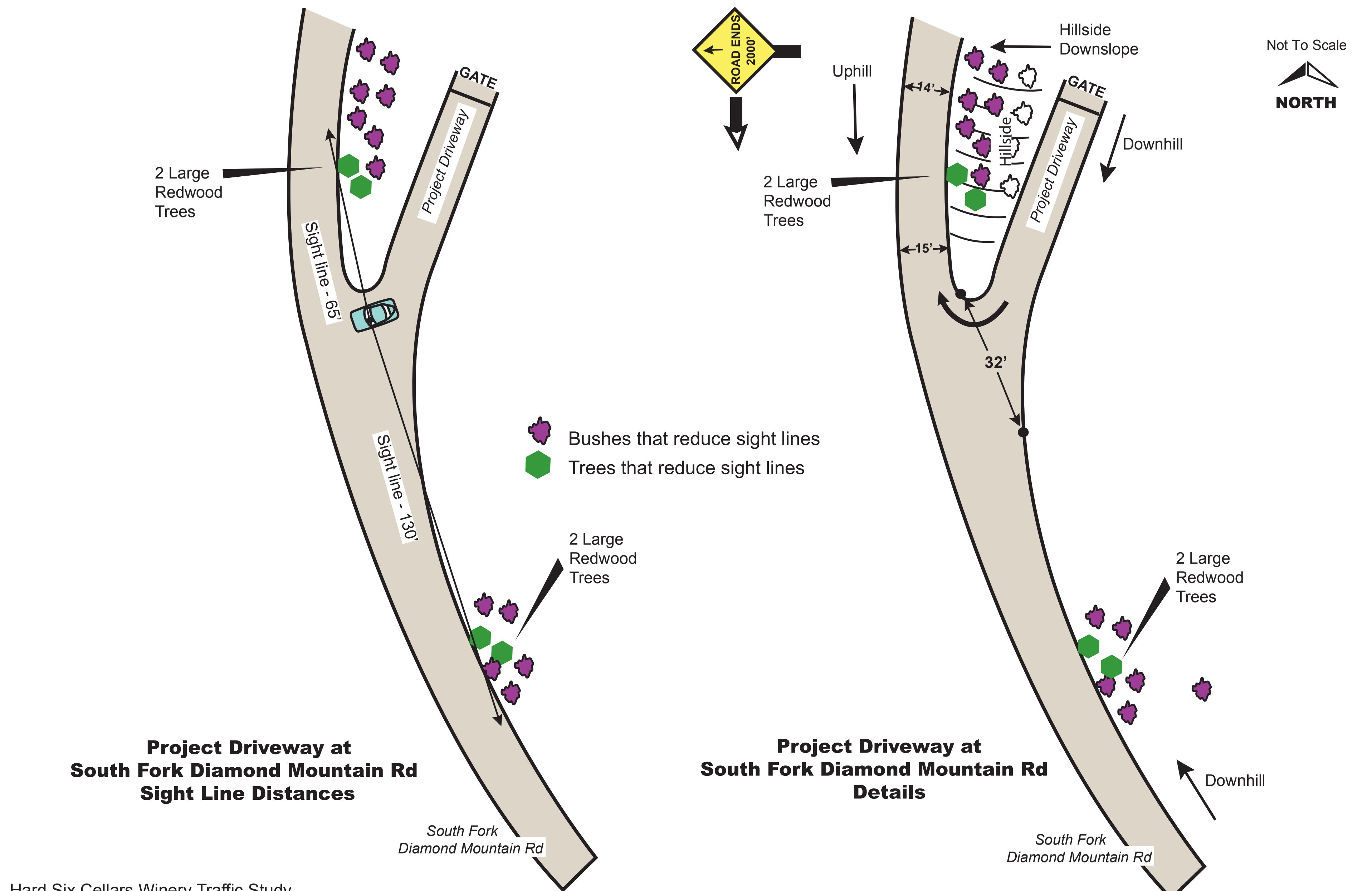
2020 Harvest Friday and Saturday (with Project)
PM Peak Hour Volumes



Hard Six Cellars Winery Traffic Study

CRANE TRANSPORTATION GROUP

Figure 9
2030 Harvest Friday and Saturday (with Project)
PM Peak Hour Volumes



Hard Six Cellars Winery Traffic Study

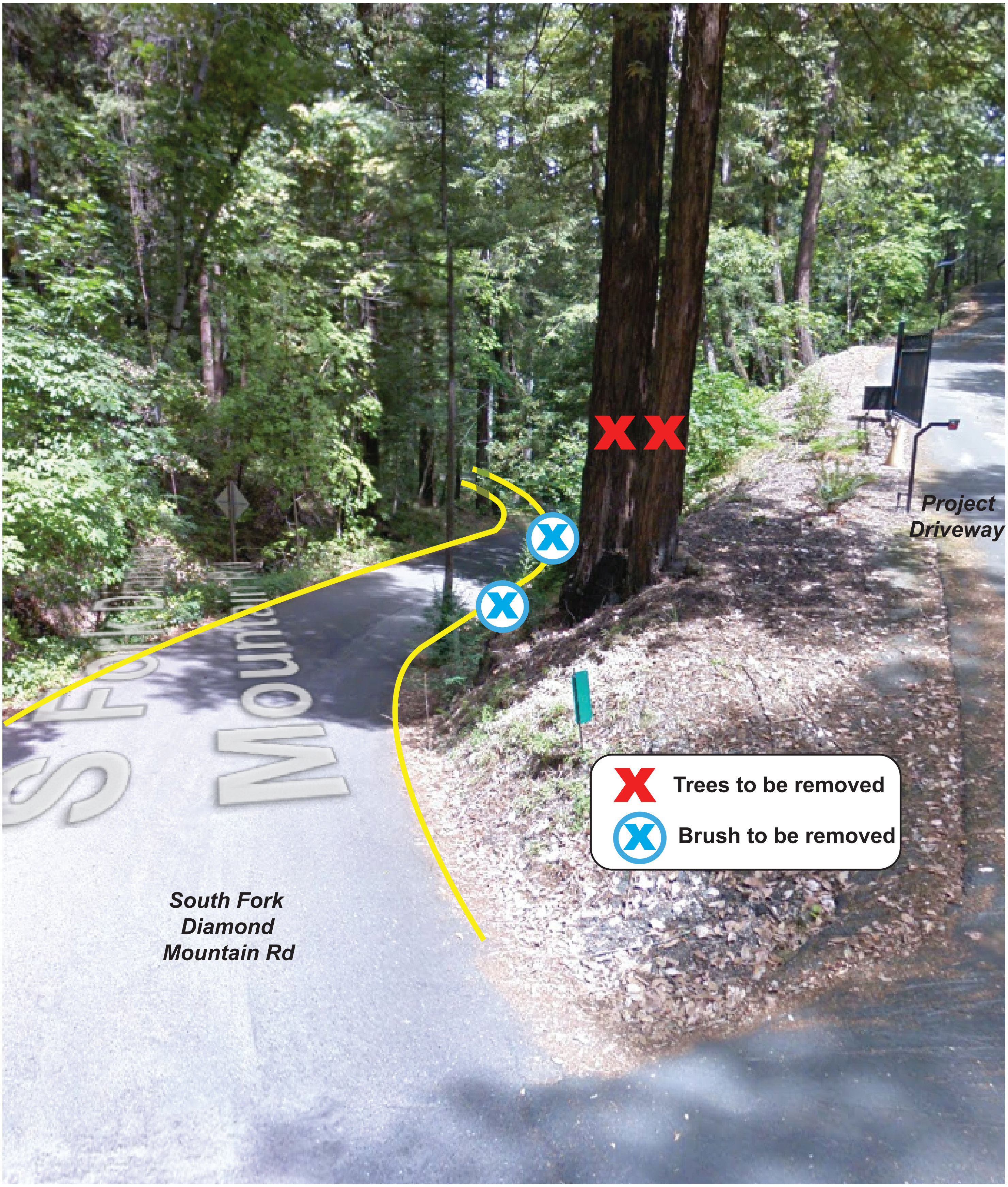
CRANE TRANSPORTATION GROUP

Figure 10

Project Driveway/South Fork Diamond Mountain Rd Details & Sight Lines Distances

CRANE TRANSPORTATION GROUP

Figure 11
Trees and Brush to be Removed from South Fork Diamond Mountain Rd to the east of the Project Driveway



CRANE TRANSPORTATION GROUP

Figure 12
Trees and Brush to be Removed from South Fork Diamond Mountain Rd to the west of the Project Driveway

Tables

Table 1

UNSIGNALIZED INTERSECTION LOS CRITERIA

Level of Service	Description	Average Control Delay (Seconds Per Vehicle)
A	Little or no delays	$\leq$ 10.0
B	Short traffic delays	10.1 to 15.0
C	Average traffic delays	15.1 to 25.0
D	Long traffic delays	25.1 to 35.0
E	Very long traffic delays	35.1 to 50.0
F	Extreme traffic delays with intersection capacity exceeded (for an all-way stop), or with approach/turn movement capacity exceeded (for a side street stop controlled intersection)	> 50.0

Source: 2000 Highway Capacity Manual (Transportation Research Board).

Table 2

INTERSECTION LEVEL OF SERVICE

SR 29-128/DIAMOND MOUNTAIN ROAD

HARVEST

EXISTING (2016)

LOCATION	FRIDAY PM PEAK HOUR W/O PROJECT	FRIDAY PM PEAK HOUR WITH PROJECT	SATURDAY PM PEAK HOUR W/O PROJECT	SATURDAY PM PEAK HOUR WITH PROJECT
SR 29/Diamond Mountain Road	C-23.4 /A-8.5[(1)]	C-23.4 A-8.5	C-15.9/ A-8.4	C-15.9/ A-8.4

YEAR 2020

LOCATION	FRIDAY PM PEAK HOUR W/O PROJECT	FRIDAY PM PEAK HOUR WITH PROJECT	SATURDAY PM PEAK HOUR W/O PROJECT	SATURDAY PM PEAK HOUR WITH PROJECT
SR 29/Diamond Mountain Road	D-25.3/A-8.6[(1)]	D-25.3/A-.86	C-17.3/A-8.5	C-17.3/A-8.5

CUMULATIVE (YEAR 2030)

LOCATION	FRIDAY PM PEAK HOUR W/O PROJECT	FRIDAY PM PEAK HOUR WITH PROJECT	SATURDAY PM PEAK HOUR W/O PROJECT	SATURDAY PM PEAK HOUR WITH PROJECT
SR 29/Diamond Mountain Road	D-33.9/A-8.9[(1)]	D-33.9/A-8.9	C-21.0/A-8.8	C-21.0/A-8.8

(1) Unsignalized level of service – control delay in seconds. Diamond Mountain Road eastbound stop sign controlled approach/SR 29-128 northbound left turn.

Year 2010 Highway Capacity Manual (HCM) Analysis Methodology
Source: Crane Transportation Group

Table 3

INTERSECTION SIGNAL WARRANT EVALUATION

SR 29-128/DIAMOND MOUNTAIN ROAD

Do volumes meet peak hour signal Warrant #3 rural condition criteria?

HARVEST

EXISTING (2016)

FRIDAY PM PEAK HOUR		SATURDAY PM PEAK HOUR	
W/O PROJECT	WITH PROJECT	W/O PROJECT	WITH PROJECT
NO	NO	NO	NO

YEAR 2020

FRIDAY PM PEAK HOUR		SATURDAY PM PEAK HOUR	
W/O PROJECT	WITH PROJECT	W/O PROJECT	WITH PROJECT
NO	NO	NO	NO

CUMULATIVE (YEAR 2030)

FRIDAY PM PEAK HOUR		SATURDAY PM PEAK HOUR	
W/O PROJECT	WITH PROJECT	W/O PROJECT	WITH PROJECT
NO	NO	NO	NO

Source: Crane Transportation Group

Table 4

ROADWAY SEGMENT LEVEL OF SERVICE

SR 29 JUST NORTH & SOUTH OF DIAMOND MOUNTAIN ROAD

EXISTING – 2016

HARVEST

LOCATION	DIRECTION	DIRECTIONAL CAPACITY (VEH/HR)	FRIDAY PM PEAK HOUR				SATURDAY PM PEAK HOUR			
			W/O PROJECT		WITH PROJECT		W/O PROJECT		WITH PROJECT	
			VOL[1]	LOS[2]	VOL	LOS	VOL	LOS	VOL	LOS
SR 29 North of Diamond Mountain Road	NB	1200	761	D	761	D	572	C	572	C
	SB	1200	486	C	486	C	489	C	489	C
SR 29 South of Diamond Mountain Road	NB	1200	753	D	754	D	571	C	571	C
	SB	1200	494	C	495	C	499	C	500	C

(1) VOL = volume
(2) LOS = level of service

Analysis Methodology Source: Napa County General Plan Update EIR Technical Memorandum for Traffic and Circulation Supporting the Findings and recommendations, Dowling Associates, February 9, 2007.

Compiled by: Crane Transportation Group

Table 5

ROADWAY SEGMENT LEVEL OF SERVICE

SR 29 JUST NORTH & SOUTH OF DIAMOND MOUNTAIN ROAD

YEAR 2020

HARVEST

LOCATION	DIRECTION	DIRECTIONAL CAPACITY (VEH/HR)	FRIDAY PM PEAK HOUR W/O PROJECT VOL[1]	FRIDAY PM PEAK HOUR W/O PROJECT LOS[2]	FRIDAY PM PEAK HOUR WITH PROJECT VOL	FRIDAY PM PEAK HOUR WITH PROJECT LOS	SATURDAY PM PEAK HOUR W/O PROJECT VOL	SATURDAY PM PEAK HOUR W/O PROJECT LOS	SATURDAY PM PEAK HOUR WITH PROJECT VOL	SATURDAY PM PEAK HOUR WITH PROJECT LOS
SR 29 North of Diamond Mountain Road	NB	1200	815	D	815	D	616	C	616	C
	SB	1200	525	C	525	C	527	C	527	C
SR 29 South of Diamond Mountain Road	NB	1200	807	D	808	D	615	C	615	C
	SB	1200	539	C	540	C	538	C	539	C

(1) VOL = volume
(2) LOS = level of service

Analysis Methodology Source: Napa County General Plan Update EIR Technical Memorandum for Traffic and Circulation Supporting the Findings and recommendations, Dowling Associates, February 9, 2007.

Compiled by: Crane Transportation Group

Table 6

ROADWAY SEGMENT LEVEL OF SERVICE

SR 29 JUST NORTH & SOUTH OF DIAMOND MOUNTAIN ROAD

CUMULATIVE (YEAR 2030)

HARVEST

LOCATION	DIRECTION	DIRECTIONAL CAPACITY (VEH/HR)	FRIDAY PM PEAK HOUR				SATURDAY PM PEAK HOUR			
			W/O PROJECT		WITH PROJECT		W/O PROJECT		WITH PROJECT	
			VOL[1]	LOS[2]	VOL	LOS	VOL	LOS	VOL	LOS
SR 29 North of Diamond Mountain Road	NB	1200	955	E	955	E	721	D	721	D
	SB	1200	616	C	616	C	619	C	619	C
SR 29 South of Diamond Mountain Road	NB	1200	947	E	948	E	721	D	722	D
	SB	1200	642	D	642	D	632	D	632	D

(1) VOL = volume
(2) LOS = level of service

Analysis Methodology Source: Napa County General Plan Update EIR Technical Memorandum for Traffic and Circulation Supporting the Findings and recommendations, Dowling Associates, February 9, 2007.

Compiled by: Crane Transportation Group

Table 7

PROJECT TRIP GENERATION
HARD SIX CELLARS WINERY

HARVEST

FRIDAY

			PM TRIPS							
			3:00-4:00		4:00-5:00		5:00-6:00		3:45-4:45*	
	TOTAL	HOURS	IN	OUT	IN	OUT	IN	OUT	IN	OUT
Admin Employees-Full Time	2	9:00AM-6:00PM	0	0	0	0	0	0	0	0
Admin Employees – Part Time	2	9:00 AM-6:00 PM	0	0	0	0	0	0	0	0
Production Employees-Full Time	1	7:00AM-5:30PM	0	0	0	0	0	1	0	0
Production Employees-Part Time	2	7:00AM-5:30PM	0	0	0	0	0	2	0	0
Tours/Tasting Employees	2	9:00AM-6:00PM	0	0	0	0	0	0	0	0
Grape Delivery Trucks (12.4% grown on site) 12-15 Days	1/day	6:00AM-[1] 2:00PM	0	0	0	0	0	0	0	0
Reduction in Grape Outhaul Trucks	2/week	6:00AM-2:00PM	0	0	0	0	0	0	0	0
Other Trucks (Bottle Supply/Case Pickup)	1-2/week	7:00AM-3:30PM	0	0	0	0	0	0	0	0
Visitors	16 (7 veh)[2]	10:00AM-6:00PM	1	1	1	1	0	1	1	1
TOTAL			1	1	1	1	0	4	1	1

(1) Grapes typically delivered in the morning.
(2) 2.6 visitors/vehicle average on weekdays per County data.
* Peak traffic hour along SR 29.
Source: Hard Six Cellars Winery project applicant; Compiled by: Crane Transportation Group

Table 8

PROJECT TRIP GENERATION
HARD SIX CELLARS WINERY

HARVEST

SATURDAY

	TOTAL	HOURS	PM TRIPS							
			2-3 PM		3-4 PM		4-5 PM		5-6 PM*	
			IN	OUT	IN	OUT	IN	OUT	IN	OUT
Admin Employees – Full or Part Time	0	–	0	0	0	0	0	0	0	0
Production Employees – Full or Part Time	0	–	0	0	0	0	0	0	0	0
Tours/Tasting Employees	2	9:00 AM-6:00 PM	0	0	0	0	0	0	0	0
Visitors	16 (6 veh) (2)	10:00 AM-6:00 PM	1	1	1	1	1	1	0	1
TOTAL			1	1	1	1	1	1	0	1

(1) Grapes typically delivered in the morning.
(2) 2.8 visitors/vehicle average on Saturdays per County data.
* Peak traffic hour along SR 29.

Source: Hard Six Cellars Winery project applicant; Compiled by: Crane Transportation Group

Table 9

PROJECT TRIP GENERATION

HARVEST

FRIDAY PM PEAK HOUR* (3:45-4:45)		SATURDAY PM PEAK HOUR* (5:00-6:00)	
INBOUND TRIPS	OUTBOUND TRIPS	INBOUND TRIPS	OUTBOUND TRIPS
1	1	0	1

* Peak hour at the SR 29/Diamond Mountain Road intersection.
Source: Hard Six Cellars Winery; compiled by Crane Transportation Group

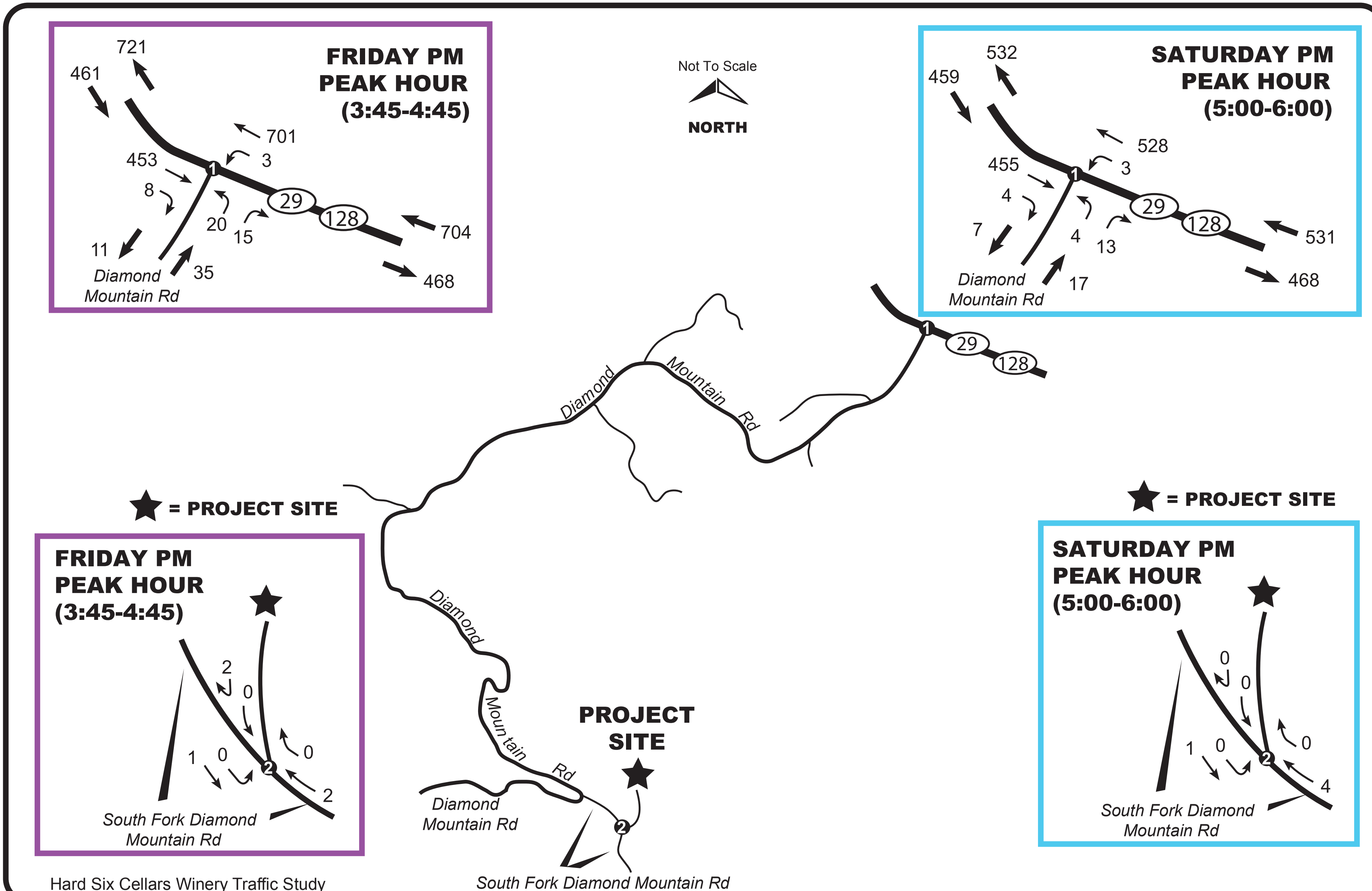
Table 10

HARD SIX CELLARS WINERY
MARKETING EVENT TRAFFIC DETAILS

MARKETING EVENTS	STAFF/GUEST CATEGORY	# OF PEOPLE	# OF VEHICLES	TIMES	REGULAR VISITATION ELIMINATED DURING MARKETING EVENT?
4 per year	Guests	75	27-29	11:00 AM-2:30 PM or starting at 6:30 PM	Yes, but not for entire day if an event starting at 6:30 PM
	Extra Winery Staff	0	0		
	Caterers	4	2		
	Entertainers	1 or less	1 or less		
	Delivery vehicles	1	1		
	Other?				

Source: Hard Six Cellars Winery applicant

Appendix



Hard Six Cellars Winery Traffic Study

CRANE TRANSPORTATION GROUP

Appendix Figure A-1

Existing April 2016 Friday and Saturday PM Peak Hour Volumes

Appendix

HARD SIX CELLARS WINERY
EXPECTED PROJECT TRAFFIC ACTIVITY DETAILS

HARVEST CONDITIONS	
A. **Full-time admin employees** # on Weekdays __2__ # on Saturday __0__ # on Sunday __0__ Work hours: Weekday: 9:00 AM to 6:00 PM Saturday: NA Sunday: NA	E. **Tours & tasting employees** # on Weekdays __2__ # on Saturday __2__ # on Sunday __2__ Work hours: Weekday: 9:00 AM to 6:00 PM Saturday: 9:00 AM to 6:00 PM Sunday: 9:00 AM to 6:00 PM
B. **Part-time admin employees** # on Weekdays __2__ # on Saturday __0__ # on Sunday __0__ Work hours: Weekday: 9:00 AM to 6:00 PM Saturday: NA Sunday: NA	F. **Grape delivery trucks** # on Weekdays __1/day__ # on Saturday __0__ # on Sunday __0__ Delivery hours: Weekday: 6:00 AM to 2:00 PM Saturday: NA Sunday: NA # days of grape delivery: __16__
C. **Full-time production employees** # on Weekdays __1__ # on Saturday __0__ # on Sunday __0__ Work hours: Weekday: 7:00 AM to 5:30 PM Saturday: NA Sunday: NA	G. **Maximum tours/tasting visitors** # on Weekdays __16__ # on Saturday __16__ # on Sunday __16__ Tasting hours: Weekday: 10:00 AM to 6:00 PM Saturday: 10:00 AM to 6:00 PM Sunday: 10:00 AM to 6:00 PM
D. **Part-time production employees** # on Weekdays __2__ # on Saturday __0__ # on Sunday __0__ Work hours: Weekday: 7:00 AM to 5:30 PM Saturday: NA Sunday: NA	H. **Other Trucks on regular basis** # on Weekdays __2__ # on Saturday __0__ # on Sunday __0__ Delivery hours: Weekday: 8:00 AM to 6:00 PM Saturday: NA Sunday: NA

Appendix

HARD SIX CELLARS WINERY
EXPECTED PROJECT TRAFFIC ACTIVITY DETAILS

I. **Grape source**

Percent grapes that will be grown on site: 12.4%
Percent grapes transported to the site from the north on SR 29: 50%
Percent grapes transported to the site from the south on SR 29: 50%

J. **Marketing Events**

events/year: 4
people/event: 75
typical days: weekdays or weekend days
typical hours: 10:00 AM to 2:30 PM or starting at 6:30 PM

TECHNICAL APPENDIX

Capacity Worksheets

Intersection	
Int Delay, s/veh	0.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	478	8	13	740	21	16
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	125	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	0	0	3	0	0
Mvmt Flow	520	9	14	804	23	17

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	528	0	1357	524
Stage 1	-	-	-	-	524	-
Stage 2	-	-	-	-	833	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1049	-	166	557
Stage 1	-	-	-	-	598	-
Stage 2	-	-	-	-	430	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1049	-	164	557
Mov Cap-2 Maneuver	-	-	-	-	164	-
Stage 1	-	-	-	-	598	-
Stage 2	-	-	-	-	424	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	23.4
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	236	-	-	1049	-
HCM Lane V/C Ratio	0.17	-	-	0.013	-
HCM Control Delay (s)	23.4	-	-	8.5	-
HCM Lane LOS	C	-	-	A	-
HCM 95th %tile Q(veh)	0.6	-	-	0	-

Intersection	
Int Delay, s/veh	0.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	485	4	9	562	10	14
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	125	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	505	4	9	585	10	15

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	509	0	1111	507
Stage 1	-	-	-	-	507	-
Stage 2	-	-	-	-	604	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1066	-	233	570
Stage 1	-	-	-	-	609	-
Stage 2	-	-	-	-	550	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1066	-	231	570
Mov Cap-2 Maneuver	-	-	-	-	231	-
Stage 1	-	-	-	-	609	-
Stage 2	-	-	-	-	545	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	15.9
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	354	-	-	1066	-
HCM Lane V/C Ratio	0.071	-	-	0.009	-
HCM Control Delay (s)	15.9	-	-	8.4	-
HCM Lane LOS	C	-	-	A	-
HCM 95th %tile Q(veh)	0.2	-	-	0	-

Intersection	
Int Delay, s/veh	0.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	517	8	15	792	23	22
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	125	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	2	0	0	3	0	0
Mvmt Flow	556	9	16	852	25	24

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	565	0	1444	560
Stage 1	-	-	-	-	560	-
Stage 2	-	-	-	-	884	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1017	-	147	532
Stage 1	-	-	-	-	576	-
Stage 2	-	-	-	-	407	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1017	-	145	532
Mov Cap-2 Maneuver	-	-	-	-	145	-
Stage 1	-	-	-	-	576	-
Stage 2	-	-	-	-	401	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	25.3
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	225	-	-	1017	-
HCM Lane V/C Ratio	0.215	-	-	0.016	-
HCM Control Delay (s)	25.3	-	-	8.6	-
HCM Lane LOS	D	-	-	A	-
HCM 95th %tile Q(veh)	0.8	-	-	0	-

Intersection	
Int Delay, s/veh	0.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	523	4	10	605	11	15
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	125	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	545	4	10	630	11	16

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	549	0	1198	547
Stage 1	-	-	-	-	547	-
Stage 2	-	-	-	-	651	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1031	-	207	541
Stage 1	-	-	-	-	584	-
Stage 2	-	-	-	-	523	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1031	-	205	541
Mov Cap-2 Maneuver	-	-	-	-	205	-
Stage 1	-	-	-	-	584	-
Stage 2	-	-	-	-	518	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	17.3
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	319	-	-	1031	-
HCM Lane V/C Ratio	0.085	-	-	0.01	-
HCM Control Delay (s)	17.3	-	-	8.5	-
HCM Lane LOS	C	-	-	A	-
HCM 95th %tile Q(veh)	0.3	-	-	0	-

Intersection	
Int Delay, s/veh	1.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	607	9	18	929	26	35
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	125	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	2	0	0	3	0	0
Mvmt Flow	646	10	19	988	28	37

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	655	0	1678	651
Stage 1	-	-	-	-	651	-
Stage 2	-	-	-	-	1027	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	942	-	106	472
Stage 1	-	-	-	-	523	-
Stage 2	-	-	-	-	348	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	942	-	104	472
Mov Cap-2 Maneuver	-	-	-	-	104	-
Stage 1	-	-	-	-	523	-
Stage 2	-	-	-	-	341	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	33.9
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	188	-	-	942	-
HCM Lane V/C Ratio	0.345	-	-	0.02	-
HCM Control Delay (s)	33.9	-	-	8.9	-
HCM Lane LOS	D	-	-	A	-
HCM 95th %tile Q(veh)	1.4	-	-	0.1	-

Intersection	
Int Delay, s/veh	0.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	614	5	13	708	13	18
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	125	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	97	97	97	97	97	97
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	633	5	13	730	13	19

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	638	0	1393	636
Stage 1	-	-	-	-	636	-
Stage 2	-	-	-	-	757	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	956	-	158	481
Stage 1	-	-	-	-	531	-
Stage 2	-	-	-	-	467	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	956	-	156	481
Mov Cap-2 Maneuver	-	-	-	-	156	-
Stage 1	-	-	-	-	531	-
Stage 2	-	-	-	-	461	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	21
HCM LOS			C

Minor Lane/Major Mvm	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	257	-	-	956	-
HCM Lane V/C Ratio	0.124	-	-	0.014	-
HCM Control Delay (s)	21	-	-	8.8	-
HCM Lane LOS	C	-	-	A	-
HCM 95th %tile Q(veh)	0.4	-	-	0	-

Intersection	
Int Delay, s/veh	0.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	478	8	14	740	21	17
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	125	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	0	0	3	0	0
Mvmt Flow	520	9	15	804	23	18

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	528	0	1359	524
Stage 1	-	-	-	-	524	-
Stage 2	-	-	-	-	835	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1049	-	165	557
Stage 1	-	-	-	-	598	-
Stage 2	-	-	-	-	429	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1049	-	163	557
Mov Cap-2 Maneuver	-	-	-	-	163	-
Stage 1	-	-	-	-	598	-
Stage 2	-	-	-	-	423	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	23.3
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	238	-	-	1049	-
HCM Lane V/C Ratio	0.174	-	-	0.015	-
HCM Control Delay (s)	23.3	-	-	8.5	-
HCM Lane LOS	C	-	-	A	-
HCM 95th %tile Q(veh)	0.6	-	-	0	-

Intersection	
Int Delay, s/veh	0.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	485	4	9	562	10	15
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	125	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	505	4	9	585	10	16

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	509	0	1111	507
Stage 1	-	-	-	-	507	-
Stage 2	-	-	-	-	604	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1066	-	233	570
Stage 1	-	-	-	-	609	-
Stage 2	-	-	-	-	550	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1066	-	231	570
Mov Cap-2 Maneuver	-	-	-	-	231	-
Stage 1	-	-	-	-	609	-
Stage 2	-	-	-	-	545	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	15.8
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	359	-	-	1066	-
HCM Lane V/C Ratio	0.073	-	-	0.009	-
HCM Control Delay (s)	15.8	-	-	8.4	-
HCM Lane LOS	C	-	-	A	-
HCM 95th %tile Q(veh)	0.2	-	-	0	-

Intersection	
Int Delay, s/veh	1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	517	8	16	792	23	23
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	125	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	2	0	0	3	0	0
Mvmt Flow	556	9	17	852	25	25

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	565	0	1446	560
Stage 1	-	-	-	-	560	-
Stage 2	-	-	-	-	886	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1017	-	147	532
Stage 1	-	-	-	-	576	-
Stage 2	-	-	-	-	406	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1017	-	145	532
Mov Cap-2 Maneuver	-	-	-	-	145	-
Stage 1	-	-	-	-	576	-
Stage 2	-	-	-	-	399	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	25.1
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	228	-	-	1017	-
HCM Lane V/C Ratio	0.217	-	-	0.017	-
HCM Control Delay (s)	25.1	-	-	8.6	-
HCM Lane LOS	D	-	-	A	-
HCM 95th %tile Q(veh)	0.8	-	-	0.1	-

Intersection	
Int Delay, s/veh	0.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	523	4	10	605	11	16
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	125	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	545	4	10	630	11	17

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	549	0	1198	547
Stage 1	-	-	-	-	547	-
Stage 2	-	-	-	-	651	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1031	-	207	541
Stage 1	-	-	-	-	584	-
Stage 2	-	-	-	-	523	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1031	-	205	541
Mov Cap-2 Maneuver	-	-	-	-	205	-
Stage 1	-	-	-	-	584	-
Stage 2	-	-	-	-	518	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	17.2
HCM LOS			C

Minor Lane/Major Mvm	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	324	-	-	1031	-
HCM Lane V/C Ratio	0.087	-	-	0.01	-
HCM Control Delay (s)	17.2	-	-	8.5	-
HCM Lane LOS	C	-	-	A	-
HCM 95th %tile Q(veh)	0.3	-	-	0	-

Intersection	
Int Delay, s/veh	1.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	607	9	19	929	26	36
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	125	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	2	0	0	3	0	0
Mvmt Flow	646	10	20	988	28	38

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	655	0	1680	651
Stage 1	-	-	-	-	651	-
Stage 2	-	-	-	-	1029	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	942	-	105	472
Stage 1	-	-	-	-	523	-
Stage 2	-	-	-	-	348	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	942	-	103	472
Mov Cap-2 Maneuver	-	-	-	-	103	-
Stage 1	-	-	-	-	523	-
Stage 2	-	-	-	-	341	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	33.9
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	189	-	-	942	-
HCM Lane V/C Ratio	0.349	-	-	0.021	-
HCM Control Delay (s)	33.9	-	-	8.9	-
HCM Lane LOS	D	-	-	A	-
HCM 95th %tile Q(veh)	1.5	-	-	0.1	-

Intersection	
Int Delay, s/veh	0.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	614	5	13	708	13	19
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	125	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	97	97	97	97	97	97
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	633	5	13	730	13	20

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	638	0	1393	636
Stage 1	-	-	-	-	636	-
Stage 2	-	-	-	-	757	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	956	-	158	481
Stage 1	-	-	-	-	531	-
Stage 2	-	-	-	-	467	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	956	-	156	481
Mov Cap-2 Maneuver	-	-	-	-	156	-
Stage 1	-	-	-	-	531	-
Stage 2	-	-	-	-	461	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	20.8
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	261	-	-	956	-
HCM Lane V/C Ratio	0.126	-	-	0.014	-
HCM Control Delay (s)	20.8	-	-	8.8	-
HCM Lane LOS	C	-	-	A	-
HCM 95th %tile Q(veh)	0.4	-	-	0	-

CRANE TRANSPORTATION GROUP

Central Valley Office:
2621 E. Windrim Court
Elk Grove, CA 95758
(916) 647-3406 *phone*
(916) 647-3408 *fax*

San Francisco Bay Area Office:
6220 Bay View Avenue
San Pablo, CA 94806
(510) 236-9375 *phone*
(510) 236-1091 *fax*

MEMORANDUM

TO: Michael Hawkins (michael.hawkins@countyofnapa.org)

cc: Donna Oldford/Plans4Wine (dboldford@aol.com)
Andrew Simpson (asimpson@deltacivil.com)

FROM: Mark D. Crane, P.E.

DATE: March 12, 2018

RE: **PROPOSED HARD SIX WINERY – SIGHT LINES AT DRIVEWAY CONNECTION TO SOUTH FORK DIAMOND MOUNTAIN ROAD**

Mike:

At your request Crane Transportation Group (CTG) and Delta Consulting & Engineering of St. Helena have conducted a study evaluating the adequacy of sight lines at the South Fork Diamond Mountain Road (DMR) intersection with the existing driveway that will serve traffic from the proposed Hard Six Winery. Topics covered were those discussed between us by phone and then outlined in your March 7, 2018 email.

A. REQUESTED ANALYSIS

In brief, items requested and provided in this memo report are:

- Grades on the DMR uphill (southbound) driveway approach and on the downhill (northbound) driveway approach.
- Typical hourly volumes on each approach.
- 85th percentile speeds on each approach based upon radar surveys by CTG.
- Required AASHTO stopping sight distances based upon DMR approach grades and 85th percentile vehicle speeds.
- Existing sight lines to the north and south along DMR for a driver turning from the driveway.

- Sight lines to be provided after applicant proposed tree and brush removal, regarding and driveway recontouring.

- Sight lines after additional regrading that would occur on a neighbor's property and adjacent to a creek. These additional measures are not being proposed by the applicant.

B. ATTACHMENTS

Attached information used in the evaluation is as follows:

- **Figure 1.** Eight hours of Friday and Saturday traffic counts at the DMR/Driveway intersection in April 2016.

- **Figure 2.** A diagram of DMR with distances and elevations.

- **Figure 3.** A photo of DMR south of the project driveway (downhill northbound approach) to see possible tree and brush removal plans discussed with County Public Works in 2016.

- **Figure 4.** A photo of DMR north of the project driveway (uphill southbound approach) to see possible tree and brush removal plans discussed with County Public Works in 2016.

- Page 1 of 2 from Delta Consulting & Engineering showing 4 photographs of sight lines along DMR south of the project driveway with and without proposed improvements. Improvements shown are both applicant proposed as well as additional measures that could further increase sight lines, but are not being proposed by the applicant.

- Page 2 of 2 from Delta Consulting & Engineering showing 3 photographs of sight lines along DMR north of the project driveway after applicant proposed tree and brush removal as well as regarding.

C. SUMMARY OF FINDINGS

Table 1 presents a summary of the sight line evaluation along DMR north and south of the proposed Hard Six Winery driveway. As shown:

- Volumes along DMR are very light at the driveway from 0 to 4 vehicles per hour on either approach.

- The grade on downhill (northbound) approach is about half of the grade on the uphill (southbound) approach: about 7.5 percent versus about 15 percent.

- 85th percentile speeds are similar: 22.5 mph on the downhill (northbound) approach and 21.5 mph on the uphill (southbound) approach.

- AASHTO stopping sight distance requirements for a driver turning from the driveway are about 150 feet to the south to see a downhill vehicle and about 110 feet to the north to see an uphill vehicle.

- Existing sight lines for a driver turning from the driveway are now less than acceptable both to the south and north (only 120 feet to the south with 150 feet required and only 65 feet to the north with 110 feet required).

- The applicant's proposed tree and brush removal as well as regrading would provide acceptable sight lines from the driveway to the north (135 feet provided and 110 feet required).

- The applicant's proposed brush removal would not provide sight lines from the driveway to the south (130 feet provided and 150 feet required).

- Additional measures to the south would be able to provide an acceptable 165-foot sight line (with 150 feet being required). However, those additional measures would require cutting slope on private property and grading immediately adjacent to a creek.

Thank you.

Mark Crane, P.E.

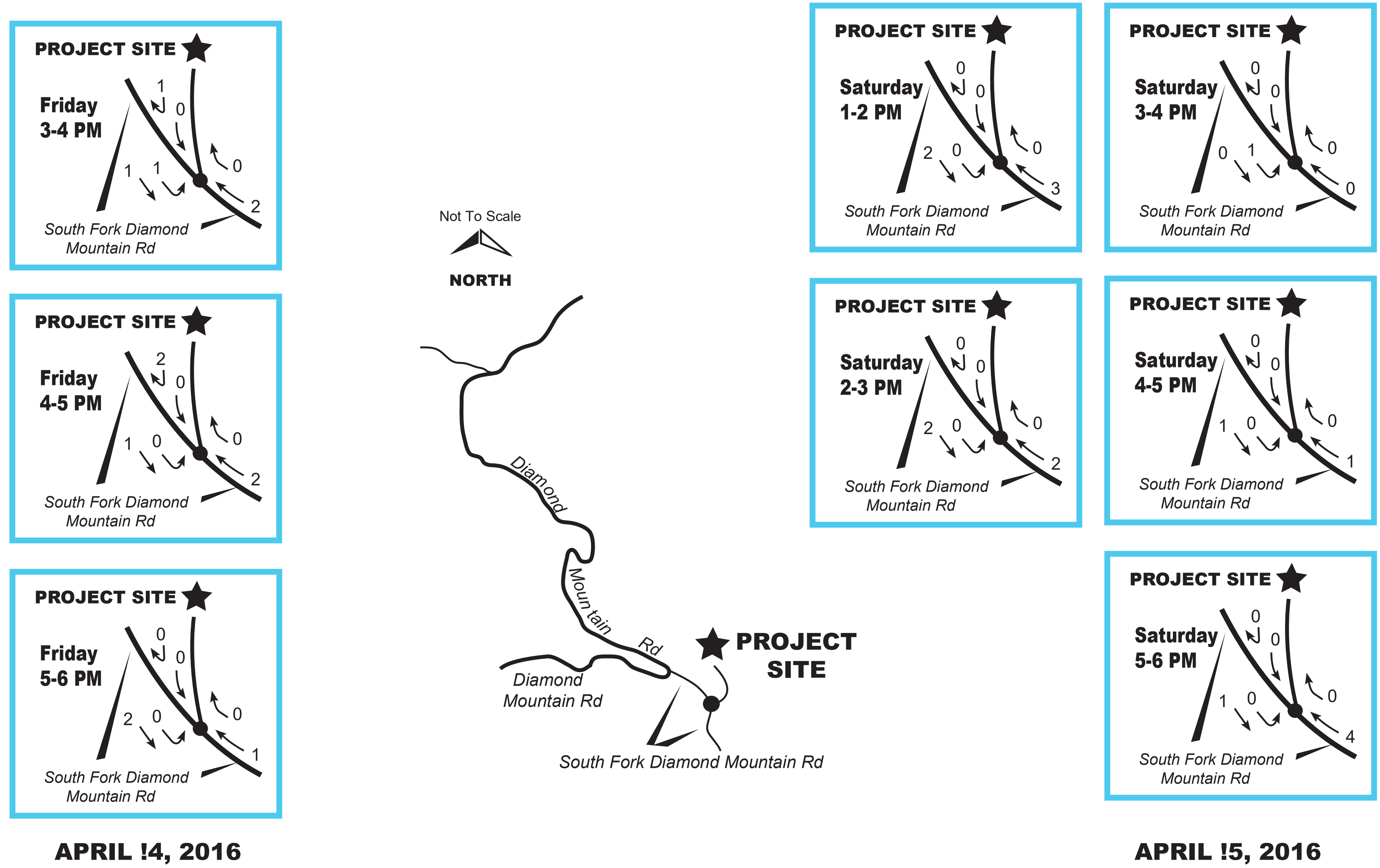
Table 1

EVALUATION OF REQUIRED SIGHT LINES ON SOUTH FORK DIAMOND MOUNTAIN ROAD AT THE EXISTING DRIVEWAY THAT WILL BE SERVING HARD SIX WINERY TRAFFIC

EVALUATION INPUTS	SOUTH OF DRIVEWAY (DOWNHILL GRADE APPROACH)	NORTH OF DRIVEWAY (UPHILL GRADE APPROACH)
1. Grade of South Fork Diamond Mountain Road	**7.5%**	**15%**
2. Hourly Volumes	**2-3 vehicles**	**2-3 vehicles**
3. 85th Percentile Vehicle Speeds	**22.5 mph**	**21.5 mph**
4. AASHTO Stopping Sight Distance Requirements	**147 feet (downhill grade)**	**109 feet (uphill grade)**
5. Existing Sight Line Available Today	**120 feet**	**65 feet**
6. Sight Lines After Proposed Improvements by Applicant	**130 feet**	**135 feet**
7. Sight Lines After Maximum Potential Improvements*	**165 feet**	N/A

* Includes cutting slope on private property and grading immediately adjacent to a creek.

Sources: Volumes, speeds, stopping sight distance requirements & existing sight lines – Crane Transportation Group
Sight lines after proposed & maximum potential improvements – Delta Consulting & Engineering of St. Helena

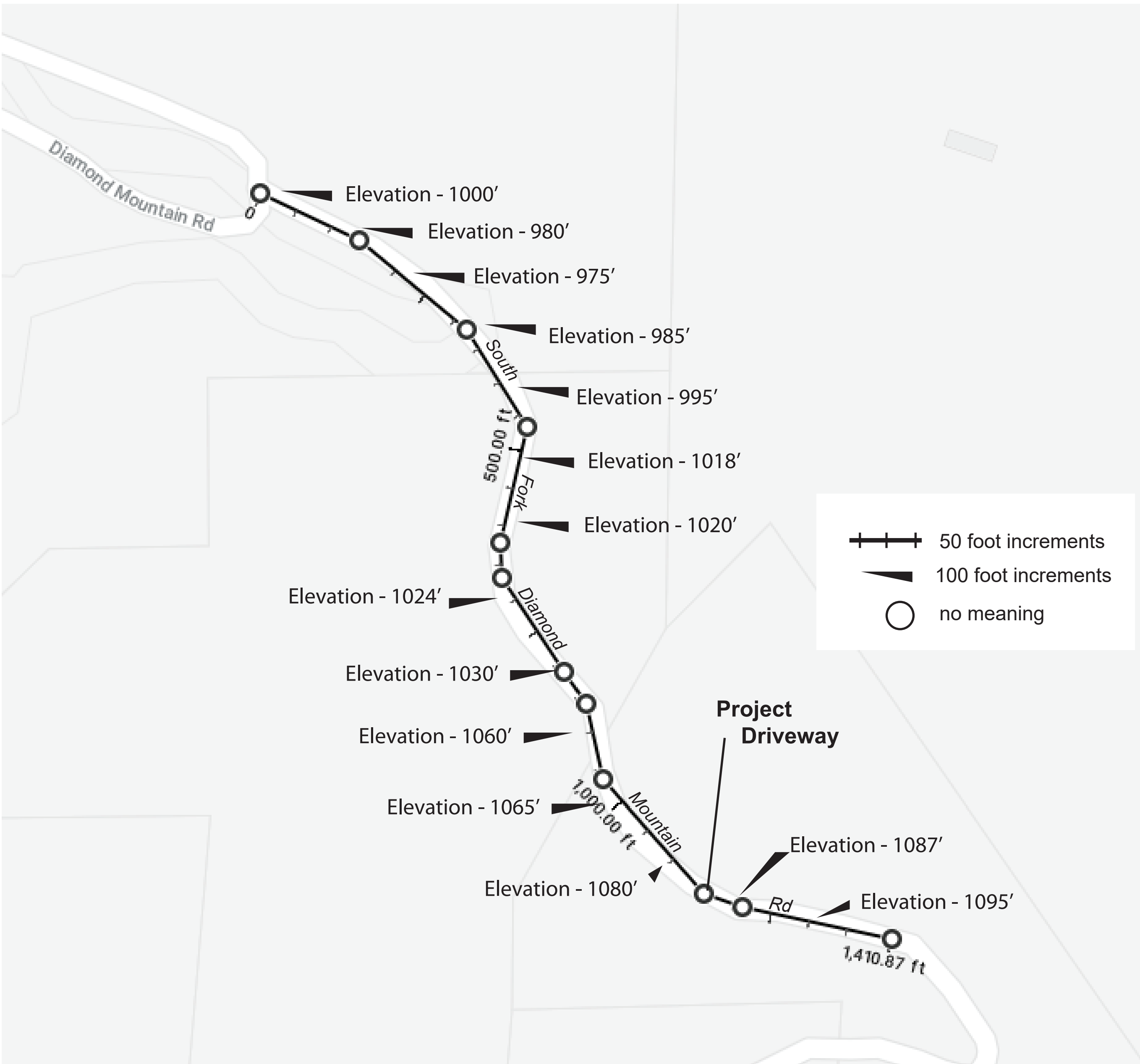


Hard Six Cellars Winery Traffic Study

CRANE TRANSPORTATION GROUP

Figure 1

April 2016 Friday and Saturday Hourly Volumes at the Hard 6 Winery Access Intersection with South Fork Diamond Mountain Road



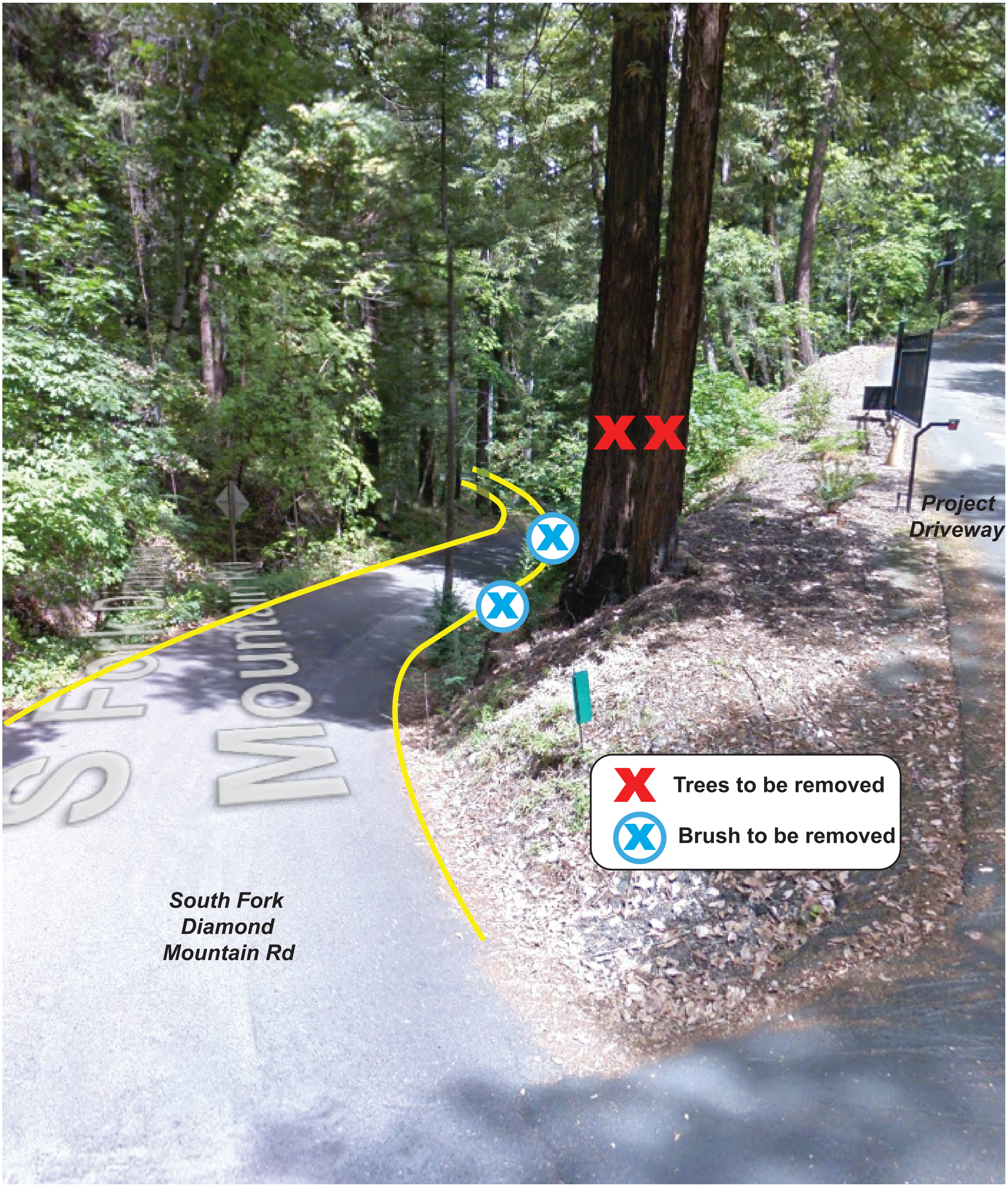
South Fork Diamond Mountain Rd Elevations in 100' increments

Source Google Earth Pro 2018

CRANE TRANSPORTATION GROUP

Figure 2

South Fork Diamond Mountain Rd Elevations



CRANE TRANSPORTATION GROUP

Figure 3

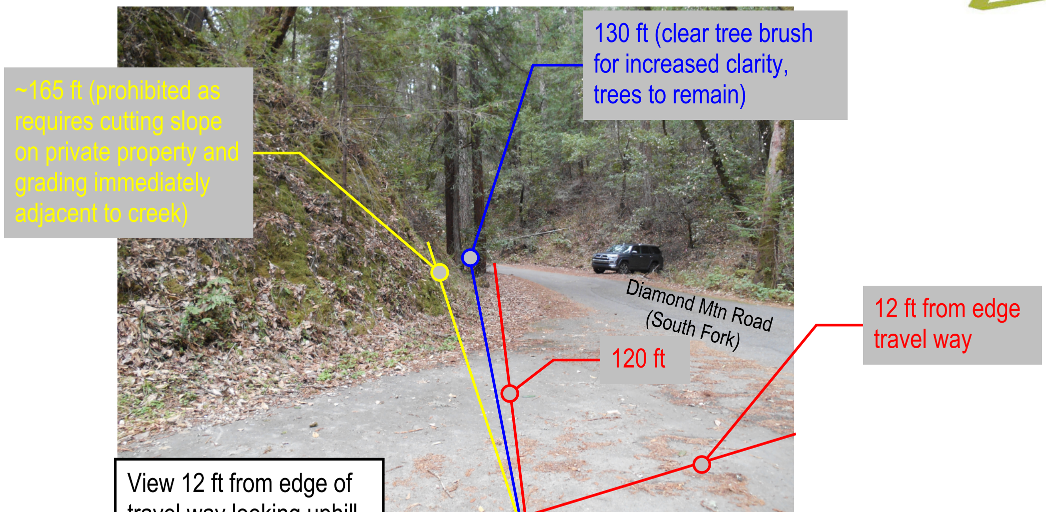
Year 2016 Recommended Tree and Brush Removal on the East side of the South Fork Diamond Mountain Rd to the South of the Project Driveway - Uphill Approach

Figure 4

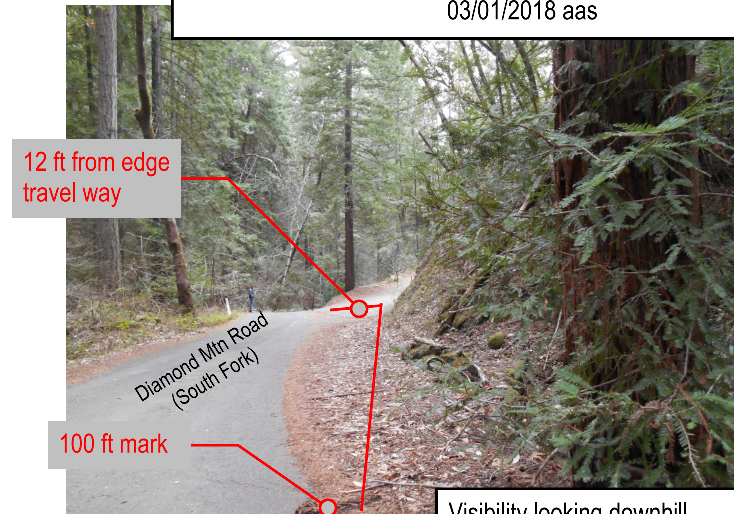
Year 2016 Recommended Tree and Brush Removal on the East side of the South Fork Diamond Mountain Rd to the North of the Project Driveway - Downhill Approach

CRANE TRANSPORTATION GROUP

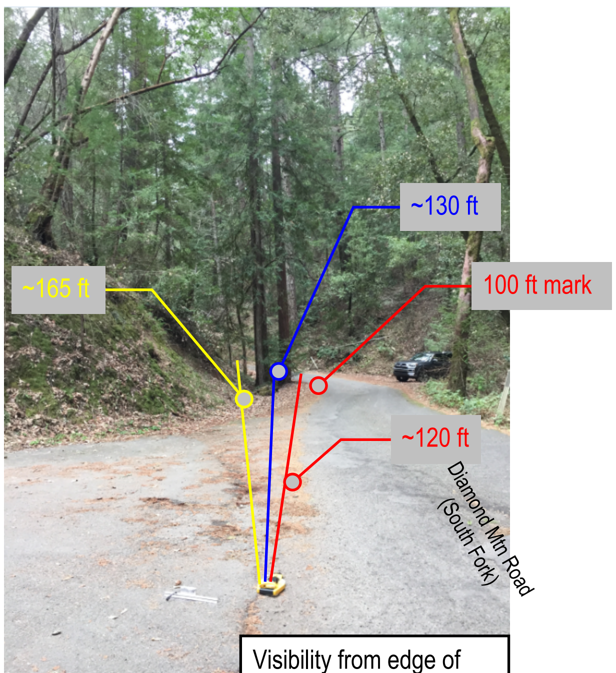
HARD SIX CELLARS
Driveway Intersection with Diamond Mountain Road, South Fork
Site Distance Exhibit
03/01/2018 aas



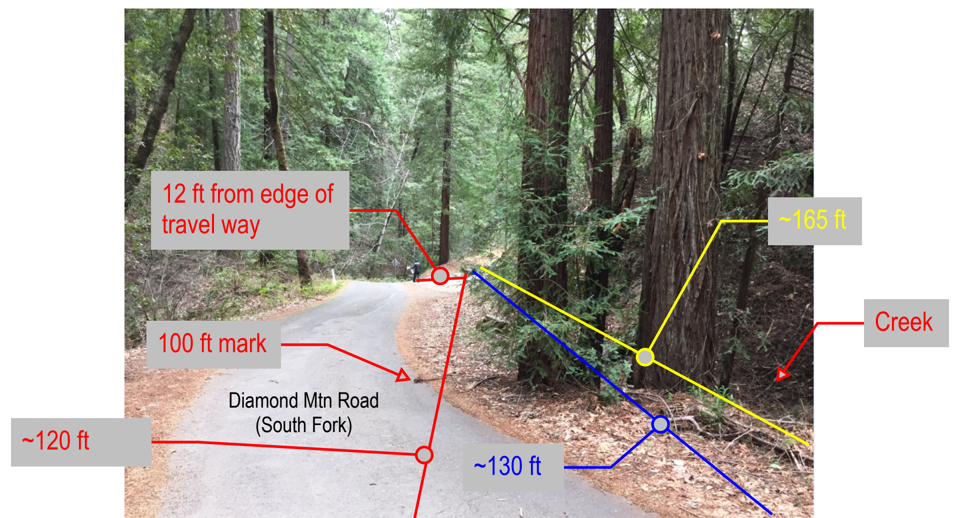
View 12 ft from edge of travel way looking uphill



Visibility looking downhill toward driveway intersection at 100 ft mark



Visibility from edge of travel way looking uphill



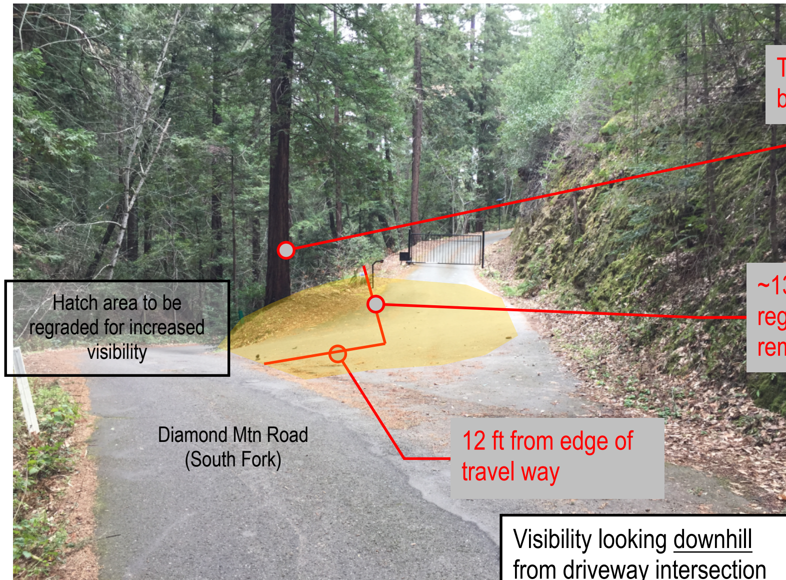
Visibility looking downhill toward driveway intersection

DELTA CONSULTING & ENGINEERING
OF ST. HELENA

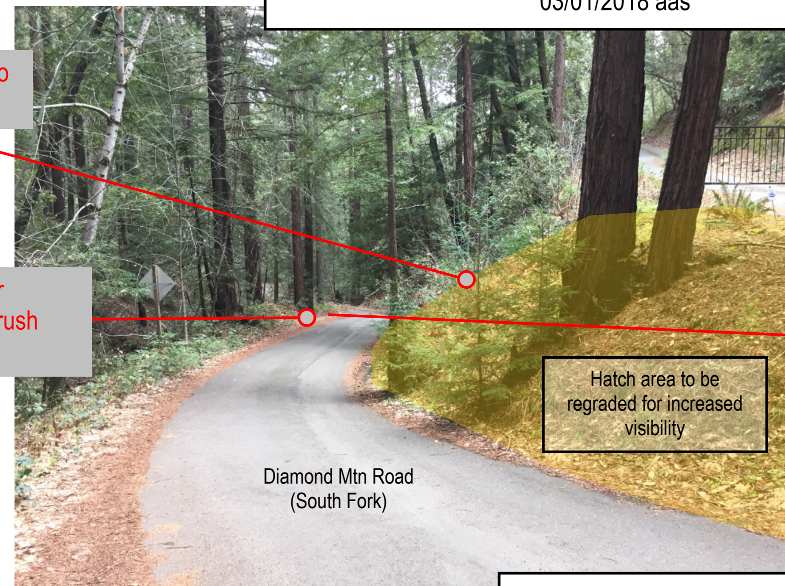
HARD SIX CELLARS
Driveway Intersection with Diamond Mountain Road, South Fork
Site Distance Exhibit
03/01/2018 aas

Trees and brush to be removed

~135 ft site line after regrading and tee/brush removal



Visibility looking downhill from driveway intersection



Visibility looking downhill from driveway intersection

Area to be regraded at driveway intersection

1104 ADAMS STREET, SUITE 203 - ST. HELENA, CALIFORNIA 94574
707-963-8456 TELE + WWW.DELTACIVIL.COM