TRAFFIC IMPACT REPORT

PROPOSED MOUNTAIN PEAK WINERY ALONG SODA CANYON ROAD IN NAPA VALLEY

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Prepared for: **Mountain Peak Winery**

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I. INTRODUCTION

This report has been prepared to determine if the proposed Mountain Peak Winery along Soda Canyon Road will result in any significant circulation system impacts at the project driveway connection to Soda Canyon Road or at the Silverado Trail/Soda Canyon Road intersection. Analysis has been provided for harvest Friday and Saturday PM peak hour conditions for existing, year 2019 (first year of full project production) and year 2030 (general plan buildout) horizons.

II. SUMMARY OF FINDINGS

A. "WITHOUT PROJECT" OPERATING CONDITIONS

1. Silverado Trail near the Soda Canyon Road intersection had higher two-way traffic volumes during the Friday PM peak hour than the Saturday afternoon peak traffic hour (1,545 two-way vehicles versus 1,245 two-way vehicles). Soda Canyon Road at the project driveway entrance also had higher two-way volumes during the Friday PM peak hour than during the Saturday PM peak traffic hour (62 two-way vehicles versus 46 two-way vehicles), while the project driveway had minimal traffic (1 vehicle) during each peak traffic hour.

2. The Silverado Trail intersection with Soda Canyon Road now has unacceptable operation on the stop sign controlled Soda Canyon Road approach during a harvest Friday PM peak traffic hour, but acceptable operation during the Saturday afternoon peak traffic hour. The intersection also has harvest Friday PM peak hour volumes exceeding peak hour signal warrant criteria levels.

3. The Silverado Trail intersection with Soda Canyon Road will be experiencing unacceptable levels of service on the stop sign controlled intersection approach during the Friday and Saturday PM peak traffic hours in both 2019 and 2030.

4. The Silverado Trail intersection with Soda Canyon Road will have PM Peak hour harvest volumes exceeding peak hour signal warrant criteria levels during the Friday PM peak traffic hour in 2019, and during both the Friday and Saturday PM peak traffic hours in 2030.

B. PROJECT IMPACTS

1. The project will result in either about 7 to 8 inbound or 7 to 8 outbound trips during the harvest Friday or Saturday PM peak traffic hours along Silverado Trail. The project trips during these hours will be associated with visitors conducting tours and tasting by appointment.

2. Project traffic during harvest will not produce any significant operational impacts at the Silverado Trail/Soda Canyon Road intersection during Friday or Saturday afternoon peak traffic conditions for the near term (year 2019) or long term (year 2030) analysis horizons.

3. Sight lines will be adequate at the project's proposed employee driveway connection to Soda Canyon Road. Elimination of the existing 3265 driveway connection to Soda Canyon Road and realigning the existing 3267 driveway connection from a 30- to a 90-degree approach will be a benefit. Sight lines at the new 3267 driveway connection to Soda Canyon Road will also be acceptable. Likewise, sight lines at the project's visitor driveway connection to the 3267 driveway will be acceptable, although the proposed 45-degree angle connection is less than ideal from a traffic safety standpoint.

C. CONCLUSIONS & RECOMMENDATIONS

The project would result in no significant off-site circulation system operational impacts nor any sight line impacts with Soda Canyon Road traffic at the project employee driveway connection to Soda Canyon Road. In addition, realigning the 3267 driveway connection to Soda Canyon Road to a 90-degree approach will be an improvement. However, to provide added safety at the project visitor driveway 45-degree connection to the 3267 driveway, at a minimum a stop sign should be provided on the project visitor driveway approach. Ideally, the visitor driveway should also be realigned to provide a 90-degree connection. In addition, vegetation should be cleared along the north side of Soda Canyon Road between the project employee driveway and the realigned 3267 driveway that could partially block sight lines for project employees exiting the site to see vehicles exiting the 3267 driveway.

III. PROJECT LOCATION & DESCRIPTION

The Mountain Peak Winery will be located on the east side of Soda Canyon Road about six miles northeast of the Silverado Trail/Soda Canyon Road intersection (see **Figure 1**). The current driveway connection serving a residential unit at 3265 Soda Canyon Road will be eliminated as part of the project and replaced by two new driveways. The first will connect to Soda Canyon Road about 100 feet west of the existing 3265 connection and will be used by winery employees and trucks. The second, to be used by visitors, will be located to the northeast along an existing driveway serving 3267 Soda Canyon Road. The 3267 driveway now intersects Soda Canyon Road at a 30-degree angle at the same location as the existing 3265 connection. However, the 3267 angled driveway connection to Soda Canyon Road will be reconfigured to provide a more standard 90-degree side road connection. **Figure 2** presents existing intersection geometrics and approach lanes, while **Figure 3** presents the revised driveway plan after project completion. The Mountain Peak Winery visitor driveway will connect to the existing 3267 driveway at a 45-degree angle about 400 feet north of Soda Canyon Road.

The proposed Mountain Peak Winery would have the following yearly production and employee, visitor and special event levels.

- 100,000 gallons per year production.
- Total 37 full- and part-time employees.[1]
- Bottling on-site.
- 50 percent of the grapes will be transported to site.
- Tours and tasting by appointment only – 7 days per week from 10:00 AM to 6:00 PM, 80 visitors/day maximum.
- Food and wine pairing events – 6 per month: 3 at 24 visitors per event and 3 at 12 visitors per event (between 10:00 AM & 10:00 PM).
- Marketing events – 4 per year, maximum 75 visitors per event. All events will be during off-peak traffic hours.
- Wine auction – 2 per year, maximum 125 visitors per event. Shuttle buses may be used for these two events.

In addition, the existing home on the project site will be removed.

IV. EXISTING CIRCULATION SYSTEM OPERATION

A. ANALYSIS LOCATIONS

The following two locations have been evaluated.

- Silverado Trail/Soda Canyon Road intersection
- Soda Canyon Road/Project Driveway intersections

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

B. VOLUMES

Friday 3:00 to 6:00 PM and Saturday 1:00 to 6:00 PM turn movement counts were conducted by Crane Transportation Group (CTG) in May 2013 at the Silverado Trail/Soda Canyon Road intersection, while Friday and Saturday counts during the same hours were conducted at the Soda Canyon Road/Project driveway intersection on July 26 and 27, 2013. The peak traffic hours at Silverado Trail/Soda Canyon Road were 4:30-5:30 PM on Friday and 4:00-5:00 PM on Saturday. Resultant peak hour counts are presented in **Figure 4**. Overall, two-way volumes along Silverado Trail at the Soda Canyon Road intersection were higher during the Friday peak hour (1,545 vehicles per hour [vph] versus 1,245 vph on Saturday), while two-way peak hour counts along Soda Canyon Road just west of the project access driveway intersection were also higher on Friday compared to Saturday (62 vph versus 46 vph).

[1] Employee and grape truck delivery details are presented in the **Appendix**.

May and July peak hour traffic counts were seasonally adjusted to reflect October harvest conditions based upon monthly adjustment factors utilized in nearby Napa Valley jurisdictions and SR 29 seasonal volume data from past studies. Overall, May and July counts would be expected to increase by about 3 percent to reflect fall harvest conditions. Resultant projected 2013 Friday and Saturday peak hour harvest volumes are presented in **Figure 5**.

C. ROADWAYS

Silverado Trail and Soda Canyon Road provide the only access to the project site. In the project vicinity, Silverado Trail has two well-paved 12-foot travel lanes and 8-foot paved shoulders that are signed and striped as Class II bicycle lanes. The posted speed limit is 55 miles per hour and the roadway is level. Soda Canyon Road has two travel lanes that gradually narrow as they extend uphill from Silverado Trail. There are minimal shoulder areas and frequent horizontal curves. Soda Canyon Road is stop sign controlled on its approach to Silverado Trail. A left turn lane is provided on the southbound Silverado Trail approach to Soda Canyon 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.

Signalized Intersections. For signalized intersections, the 2010 *Highway Capacity Manual* (Transportation Research Board, National Research Council) methodology was utilized. With this methodology, operations are defined by the level of service and average control delay per vehicle (measured in seconds) for the entire intersection. For a signalized intersection, control delay is the portion of the total delay attributed to traffic signal operation. This includes delay associated with deceleration, acceleration, stopping, and moving up in the queue. **Table 1** summarizes the relationship between delay and LOS for signalized intersections.

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. **Table 2** summarizes the relationship between delay and LOS for unsignalized intersections.

2. Minimum Acceptable Operation

Napa County has no published minimum level of service standards for unsignalized public road or private driveway intersections. The County General Plan (Policy CIR-16) states that the County shall seek to maintain an arterial Level of Service D or better on all County roadways except where maintaining this desired level of service would require installation of more travel lanes than shown on the Circulation Map. For this study, LOS D has been used for unsignalized intersections as the poorest acceptable operation for the entire intersection, with LOS E as the poorest acceptable operation for a side street stop sign controlled intersection approach. The reason for use of LOS E as the criteria for individual movements and LOS D as the criteria for the overall intersection is that the poorest operation at an unsignalized intersection is typically a specific stop sign controlled movement, unless side street volumes are high, in which case both the overall intersection and stop sign controlled movement are LOS F. Stop sign controlled intersections along Silverado Trail with low volumes of side street traffic tend to have poor stop sign controlled levels of service, but good to acceptable overall operation. As side street volumes increase, overall intersection operation also tends to degrade, but will usually remain one to two or more levels of service better than the stop sign controlled movement. When overall operation also degrades to LOS F operation, it is an indication of large volumes on the stop sign controlled approach, and the potential need for intersection signalization. The combined use of both criteria allows the County to identify those stop sign controlled intersections that have unacceptable delay for side street traffic as well as a sufficient amount of side street traffic that may meet signal warrant criteria levels.

3. Existing Intersection Operation During Harvest

Table 3 shows that during the 2013 harvest season, operation of the entire Silverado Trail/Soda Canyon Road intersection would be at acceptable levels of service (LOS B or A) during the Friday and Saturday peak traffic hours, respectively. Likewise, during the Saturday peak traffic hour the Soda Canyon Road stop sign controlled approach to Silverado Trail would be operating at an acceptable level of service (LOS E). However, during the Friday peak traffic hour, the stop sign controlled approach to Silverado Trail would be operating at an unacceptable level (LOS F).

E. INTERSECTION PEAK HOUR SIGNAL WARRANT EVALUATION

1. Analysis Methodology

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 *Manual on Uniform Traffic Control Devices* (MUTCD), Federal Highway Administration, 2010, California Supplement, which has been adopted by the State of California as a replacement for *Caltrans Traffic Manual*. 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 MUTCD, 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 the **Appendix** 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. It should also be noted that Warrant 3 has a second set of criteria based upon a combination of vehicle delay and volumes. This is typically referred to as the peak hour delay warrant.

In areas where there are less than 10,000 people in the immediate vicinity of an intersection or where the travel speeds on the uncontrolled intersection approaches are greater than 40 miles per hour, “rural” warrant criteria apply. They require only 70 percent of the volume levels of “urban” warrant criteria. These criteria are applicable to the Silverado Trail/Soda Canyon Road intersection.

2. Signalization Needs Based Upon Warrant Criteria

Table 4 shows that currently the Silverado Trail/Soda Canyon Road intersection has PM peak hour volumes exceeding warrant #3 criteria levels on Friday, but not on Saturday.

F. PLANNED IMPROVEMENTS

There are no planned and funded capacity improvements at the Silverado Trail/Soda Canyon Road intersection.[2]

[2] Mr. Paul Wilkinson, Napa County Public Works Department, May 2013.

V. FUTURE HORIZON CIRCULATION SYSTEM OPERATION WITHOUT THE PROJECT

Project traffic impacts have been determined for near and long term horizons. The near term horizon reflects the first year that the project will be at full production. Based upon input from the project applicant, the expected first year of full production will be 2019. The long term horizon reflects the County's general plan buildout year, which is 2030. Future horizon year volumes have been determined based upon traffic modeling projections for the year 2030 from the County's General Plan Circulation Element. This document showed an approximate 32 percent growth in weekday PM peak hour traffic along Silverado Trail between the years 2000 and 2030. Projecting straight-line traffic growth for analysis purposes, this translated into about a 7 percent growth in traffic from 2013 to the year 2019, and a 19 percent growth in traffic from 2013 to 2030.

Since traffic modeling projections were available for a weekday PM peak hour only and not a Saturday peak hour, north and southbound Saturday volumes on Silverado Trail were both uniformly increased by the percentages above. However, due to the greater detail available for weekday volumes which showed higher increases in southbound versus northbound traffic, Friday PM peak hour volumes were adjusted directionally, with the guidance that the two-way volume percent increases should be as listed above.

A. YEAR 2019 WITHOUT PROJECT EVALUATION

1. Volumes

Year 2019 "Without Project" Friday and Saturday PM peak hour harvest volumes are presented in **Figure 6**.

2. Intersection Level of Service

Table 3 shows that in 2019 during the harvest season, "Without Project" operation of the entire Silverado Trail/Soda Canyon Road intersection would be at acceptable levels of service during the Friday and Saturday PM peak traffic hours (LOS C on a Friday and LOS A on a Saturday). However, during both the Friday and Saturday PM peak hours, the stop sign controlled Soda Canyon Road approach to Silverado Trail would be operating at unacceptable levels (LOS F).

3. Intersection Signalization Needs

Table 4 shows that in 2019 during the harvest season, the Silverado Trail/Soda Canyon Road intersection would have PM peak hour "Without Project" volumes exceeding warrant #3 criteria levels on Friday, but not Saturday.

B. YEAR 2030 WITHOUT PROJECT EVALUATION

1. Volumes

Year 2030 "Without Project" Friday and Saturday PM peak hour harvest volumes are presented in **Figure 7**.

2. Intersection Level of Service

Table 3 shows that in 2030 during the harvest season, "Without Project" operation of the entire Silverado Trail intersection with Soda Canyon Road would be at acceptable levels of service during the Friday and Saturday PM peak traffic hours (LOS E on a Friday and LOS A on a Saturday). However, during both the Friday and Saturday PM peak hours, the stop sign controlled Soda Canyon Road approach to Silverado Trail would be operating at unacceptable levels (LOS F).

3. Intersection Signalization Needs

Table 4 shows that in 2030 during the harvest season, the Silverado Trail/Soda Canyon Road intersection would have both Friday and Saturday PM peak hour volumes exceeding peak hour signal warrant #3 criteria levels.

VI. PROJECT IMPACTS

A. SIGNIFICANCE CRITERIA

The following criteria were developed for recent traffic impact analyses in the County. These same criteria have been utilized in this study to determine the significance of impacts due to the project. An impact is considered to be significant if any of the following conditions are met.

- If an unsignalized intersection has "Without Project" overall LOS A, B, C or D operation and deteriorates to LOS E or F operation with the addition of project traffic – or – has a stop sign controlled movement operating at LOS A, B, C, D or E and deteriorates to LOS F with the additional project traffic, the impact is considered significant and would require mitigation.

- If an unsignalized intersection already has "Without Project" overall LOS E or F operation – or – if a stop sign controlled movement or approach is already operating at LOS F, an increase in traffic passing through the intersection of 1 percent or more due to the project is considered to be significant and would require mitigation.

- If the addition of project traffic to an unsignalized intersection increases "Without Project" volumes to meet peak hour signal warrant criteria levels, the impact is considered significant and would require mitigation.

- If "Without Project" volumes at an unsignalized intersection already meet peak hour signal warrant criteria levels and the level of service is already at an unacceptable level, an increase in traffic of 1 percent or more due to the project is considered significant and would require mitigation.

B. TRIP GENERATION

Friday and Saturday afternoon trip generation projections were developed with the assistance of the project applicant and their representative for all components of the employee, grape delivery and visitor activities at Mountain Peak Winery. Results are presented on an hourly basis in **Table 5** for Friday and Saturday afternoon conditions. As shown, no winery administrative or production employees would be expected on the local roadway network during harvest Friday or Saturday peak hour conditions, as all employees would be working until at least 6:00 PM during this time of year. Visitor-serving employees would also be working until at least 6:00 PM every day, as tours/tasting by appointment would close at this time. In addition, the one grape deliveries per day would typically be scheduled in the morning The only winery-related traffic expected on the local roadway network during the Friday or Saturday PM peak traffic hours along Silverado Trail would be associated with visitors. Assuming an average size group of ± 20 people entering the winery from 4:00 to 4:30 or leaving between 5:00 and 6:00 PM, this would result in about 8 vehicles accessing the winery during any given ambient peak traffic hour on a Friday, and about 7 vehicles accessing the winery during any given hour on a Saturday. Based upon research by Napa County, higher vehicle occupancies are typical on a weekend versus a weekday.

C. TRIP DISTRIBUTION

Project traffic was distributed to Silverado Trail in a pattern reflective of existing distribution patterns at the Soda Canyon Road intersection: ± 85 percent to/from the south and 15 percent to/from the north on a Friday afternoon, with ± 60 percent to/from the south and 40 percent to/from the north on a Saturday afternoon. The Friday and Saturday project traffic increments expected on Silverado Trail during the times of ambient PM peak hour traffic flow are presented in **Figure 8**, while Friday and Saturday "With Project" PM peak hour volumes for the years 2019 and 2030 are presented in **Figures 9** and **10,** respectively.

D. YEAR 2019 INTERSECTION IMPACTS (SODA CANYON ROAD)

1. Level of Service

Project traffic would not produce a significant level of service impact at the Silverado Trail/Soda Canyon Road intersection during the year 2019 Friday or Saturday PM peak traffic hours along Silverado Trail. Project traffic would not change any acceptable operation to unacceptable conditions, nor would it increase volumes by 1 percent or more at any location where "Without Project" operation would be unacceptable. Project volume increases would be 0.5 percent.

2. Signalization Needs

Project traffic would not produce a significant signalization needs impact at the Silverado Trail/Soda Canyon Road intersection during the year 2019 Friday or Saturday PM peak traffic hours along Silverado Trail. Project traffic would not increase volumes to meet signal warrant #3 criteria, nor would it increase volumes by 1 percent or more where "Without Project" volumes would already meet peak hour signal warrant criteria levels. Project volume increases would be 0.5 percent.

E. YEAR 2030 INTERSECTION IMPACTS (SODA CANYON ROAD)

1. Level of Service

Project traffic would not produce a significant level of service impact at the Silverado Trail/Soda Canyon Road intersection during the year 2030 Friday or Saturday PM peak traffic hours along Silverado Trail. Project traffic would not change any acceptable operation to unacceptable conditions, nor would it increase volumes by 1 percent or more where "Without Project" operation would be unacceptable. Project volume increases would be 0.5 percent or less.

2. Signalization Needs

Project traffic would not produce a significant signalization needs impact at the Silverado Trail/Soda Canyon Road intersection during the year 2030 Friday or Saturday PM peak traffic hours along Silverado Trail. Project traffic would not increase volumes to meet signal warrant #3 criteria, nor would it increase volumes by 1 percent where "Without Project" volumes would already meet peak hour signal warrant criteria levels. Project volume increases would be 0.5 percent or less.

F. SIGHT LINE ADEQUACY

Project Employee Driveway Connection to Soda Canyon Road
Sight lines would be acceptable for drivers turning from the project employee driveway to see Soda Canyon Road traffic. Sight lines to the east would be about 300 feet and to the west about 250 feet. Based upon a travel speed along Soda Canyon Road of 25 to 35 miles per hour, the required stopping sight distance would range from 155 to 250 feet.[3]

Sight lines would have been limited for drivers exiting from the project employee driveway to see vehicles exiting from the 3267 driveway, which now connects to Soda Canyon Road at a 30-degree angle. Vegetation along the north side of Soda Canyon Road between these two driveways severely limits sight lines and drivers exiting the 3267 driveway rarely stop as they enter Soda Canyon Road. However, as part of the project the 3267 driveway approach to Soda Canyon Road will be realigned to provide a 90-degree stop sign controlled connection. Therefore, westbound traffic turning from the 3267 driveway will be going at a very slow speed when they approach the project employee driveway. But, vegetation on the north side of Soda

[3] *A Policy on Geometric Design of Highways and Streets*, 2011, AASHTO.

Canyon Road between the new/realigned driveway connections may still present a sight line issue.

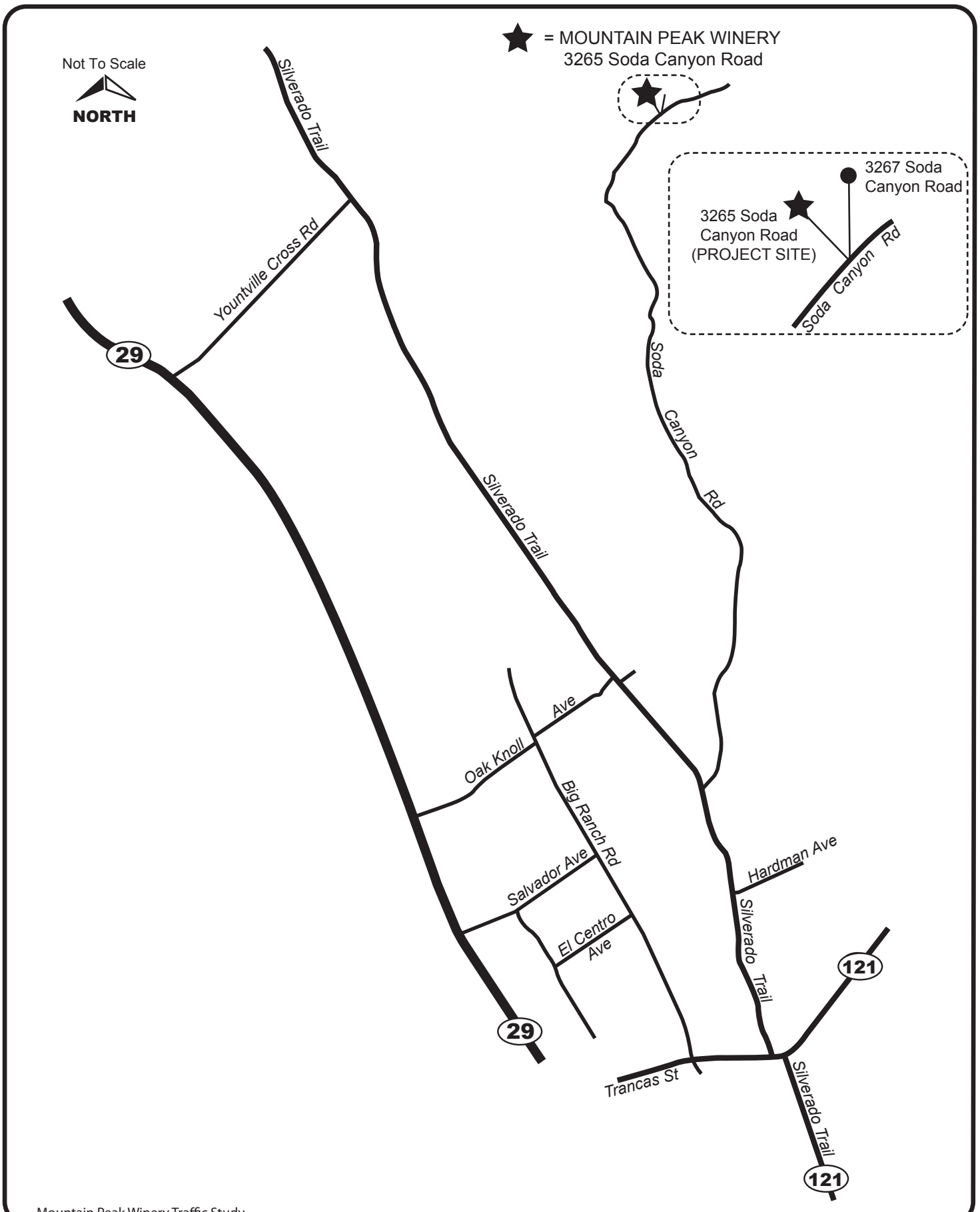
Realigned 3267 Driveway Connection to Soda Canyon Road
Sight lines would be acceptable for drivers turning from the realigned 3267 driveway approach to see Soda Canyon Road traffic. Sight lines to the east would be about 260 feet, and to the west about 270 feet. At most, 250 feet of stopping sight distance would be required based upon prevailing speeds along Soda Canyon Road.

Project Visitor Driveway Connection to 3267 Driveway
Sight lines will be acceptable for drivers turning from the project visitor driveway to the 3267 driveway. Sight lines to the north and south will be at least 300 feet, with 250 feet or less of stopping sight distance required. However, the proposed 45-degree connection is less than ideal for sight lines to the north. Since this visitor driveway will be used by different drivers every day, at a minimum stop sign control will be essential, with realignment to a 90-degree connection recommended.

VII. CONCLUSIONS & RECOMMENDATIONS

The project would result in no significant off-site circulation system operational impacts nor any sight line impacts with Soda Canyon Road traffic at the project employee driveway connection to Soda Canyon Road. In addition, realigning the 3267 driveway connection to Soda Canyon Road to a 90-degree approach will be an improvement. However, to provide added safety at the project visitor driveway 45-degree connection to the 3267 driveway, at a minimum a stop sign should be provided on the project visitor driveway approach. Ideally, the visitor driveway should also be realigned to provide a 90-degree connection. In addition, vegetation should be cleared along the north side of Soda Canyon Road between the project employee driveway and the realigned 3267 driveway that could partially block sight lines for project employees exiting the site to see vehicles exiting the 3267 driveway.

Figures



Mountain Peak Winery Traffic Study

Figure 1
Area Map

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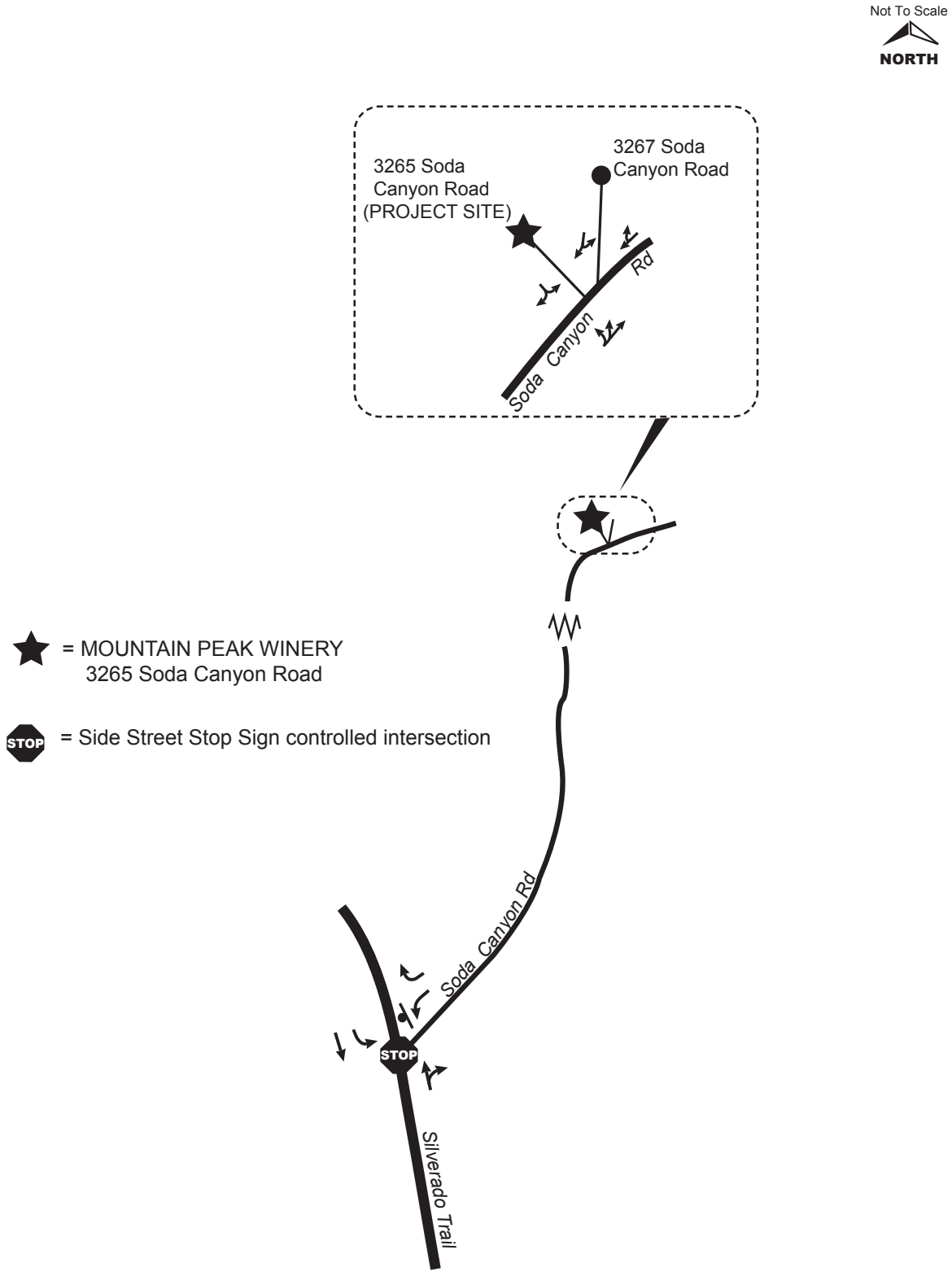

Mountain Peak Winery Traffic Study

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Figure 2

Existing Lane Geometrics and Intersection Control

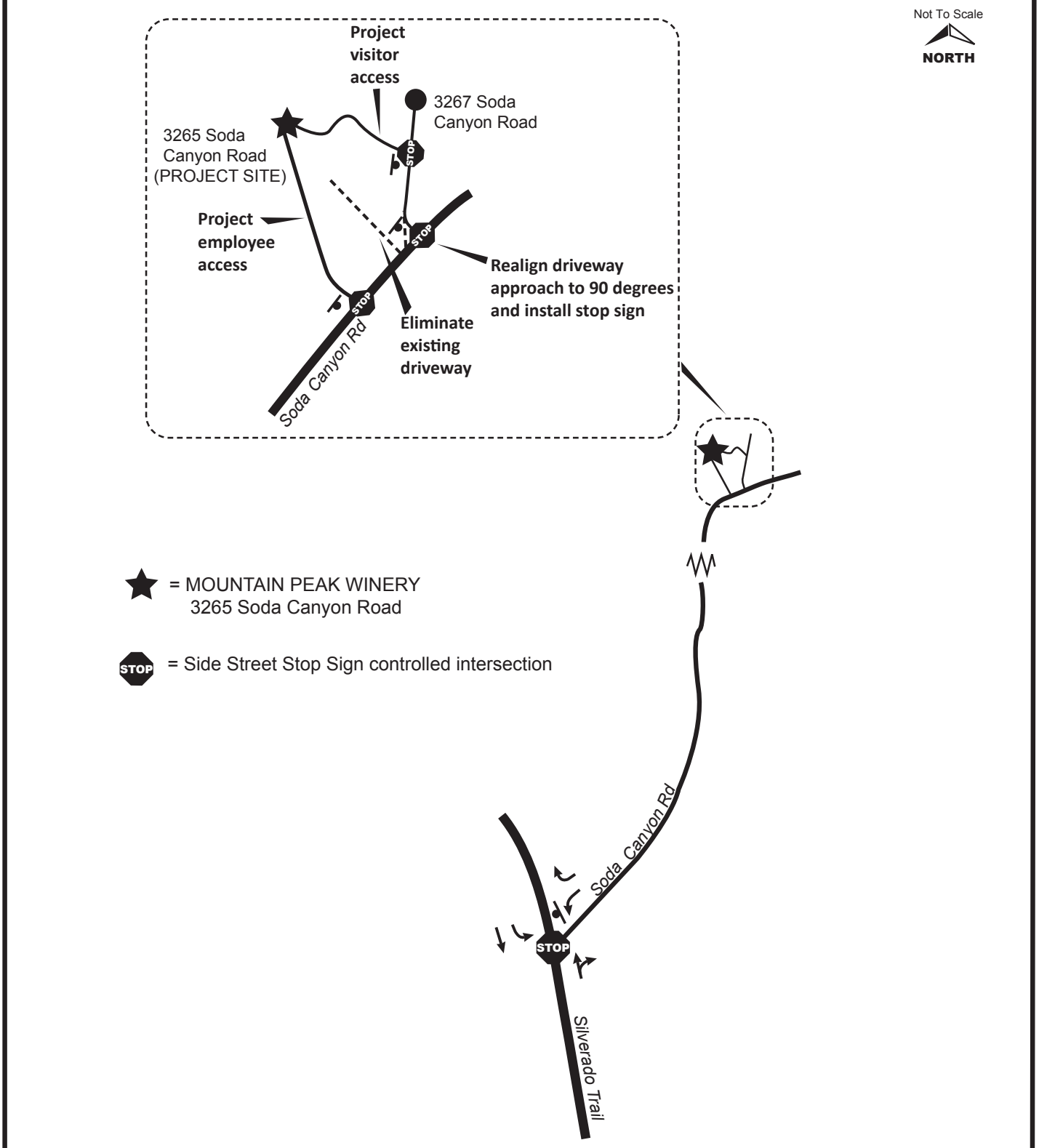

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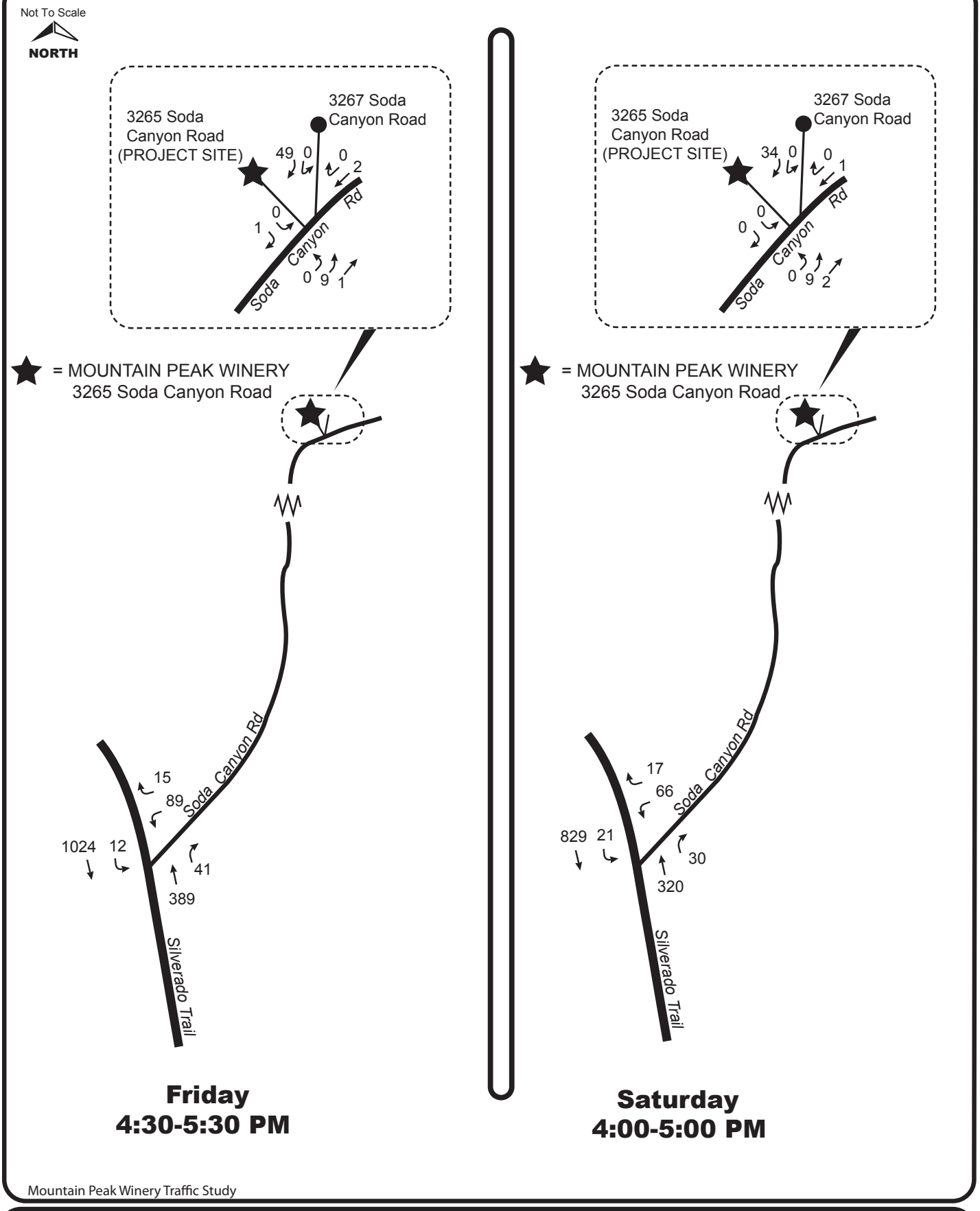
Figure 3
With Project Lane Geometrics and Intersection Control



Mountain Peak Winery Traffic Study

Figure 4

Existing (2013) May Friday and Saturday PM Peak Hour Volumes

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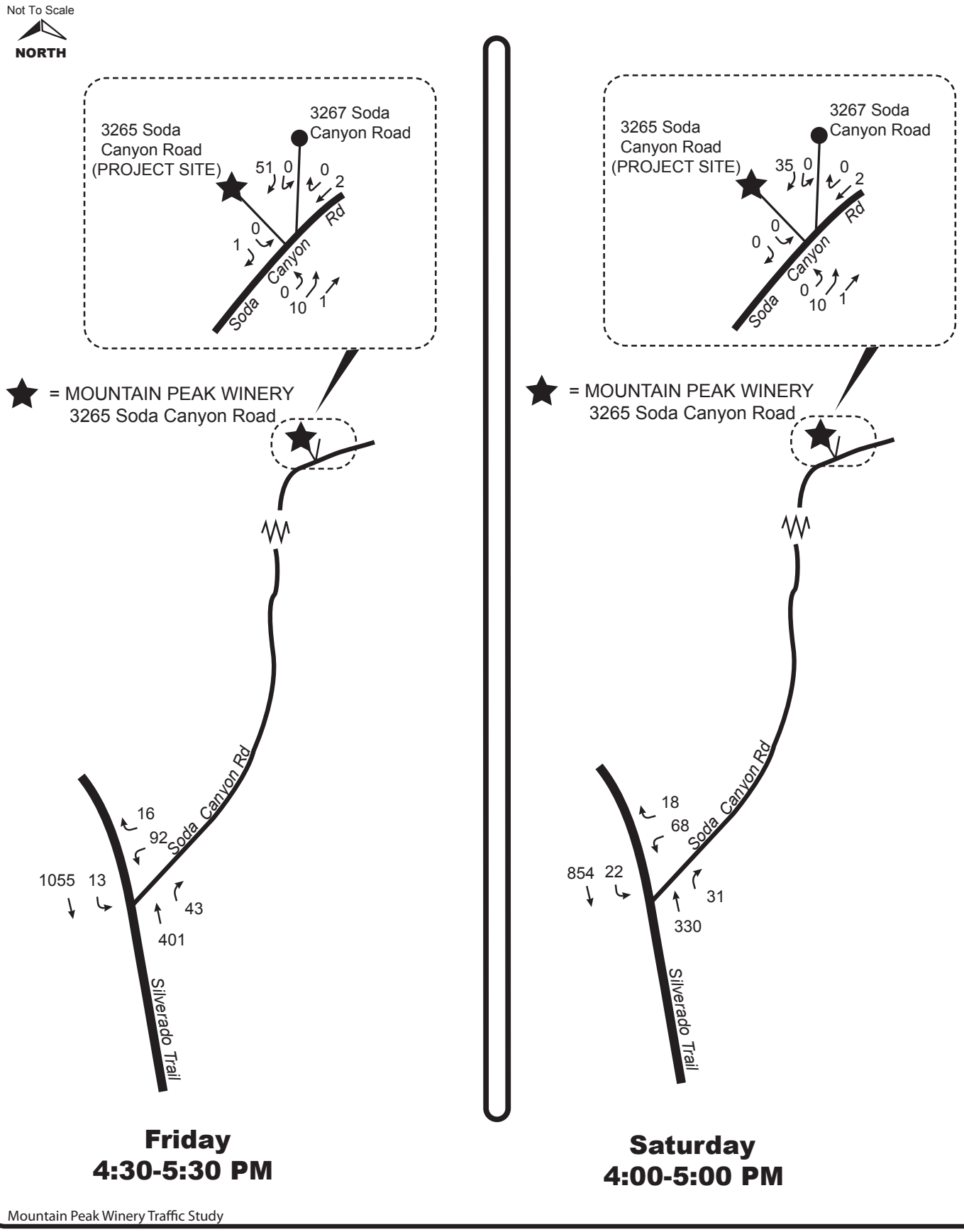

Mountain Peak Winery Traffic Study

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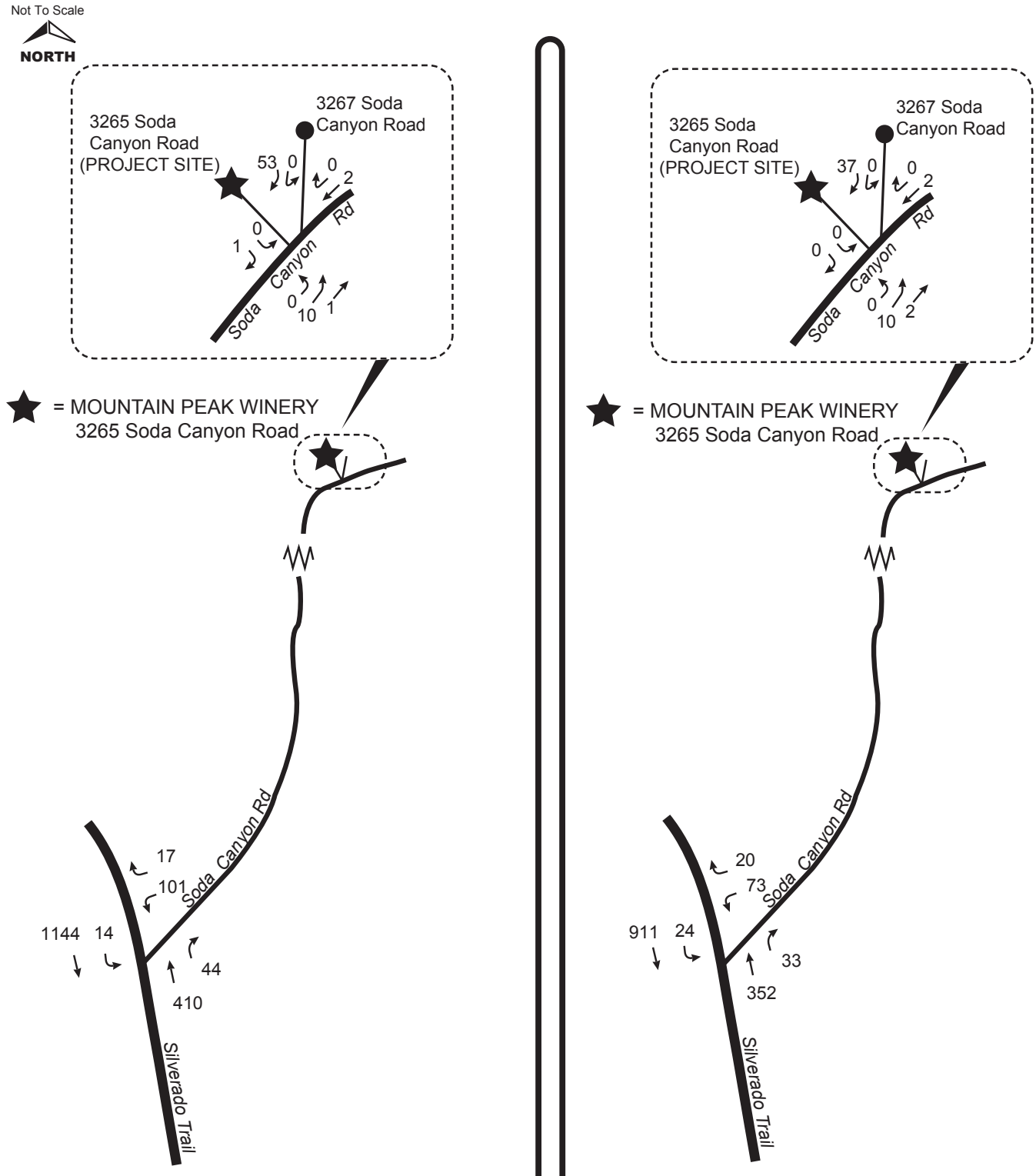
Figure 5
Existing (2013) Without Project
Harvest Friday and Saturday
PM Peak Hour Volumes



Mountain Peak Winery Traffic Study

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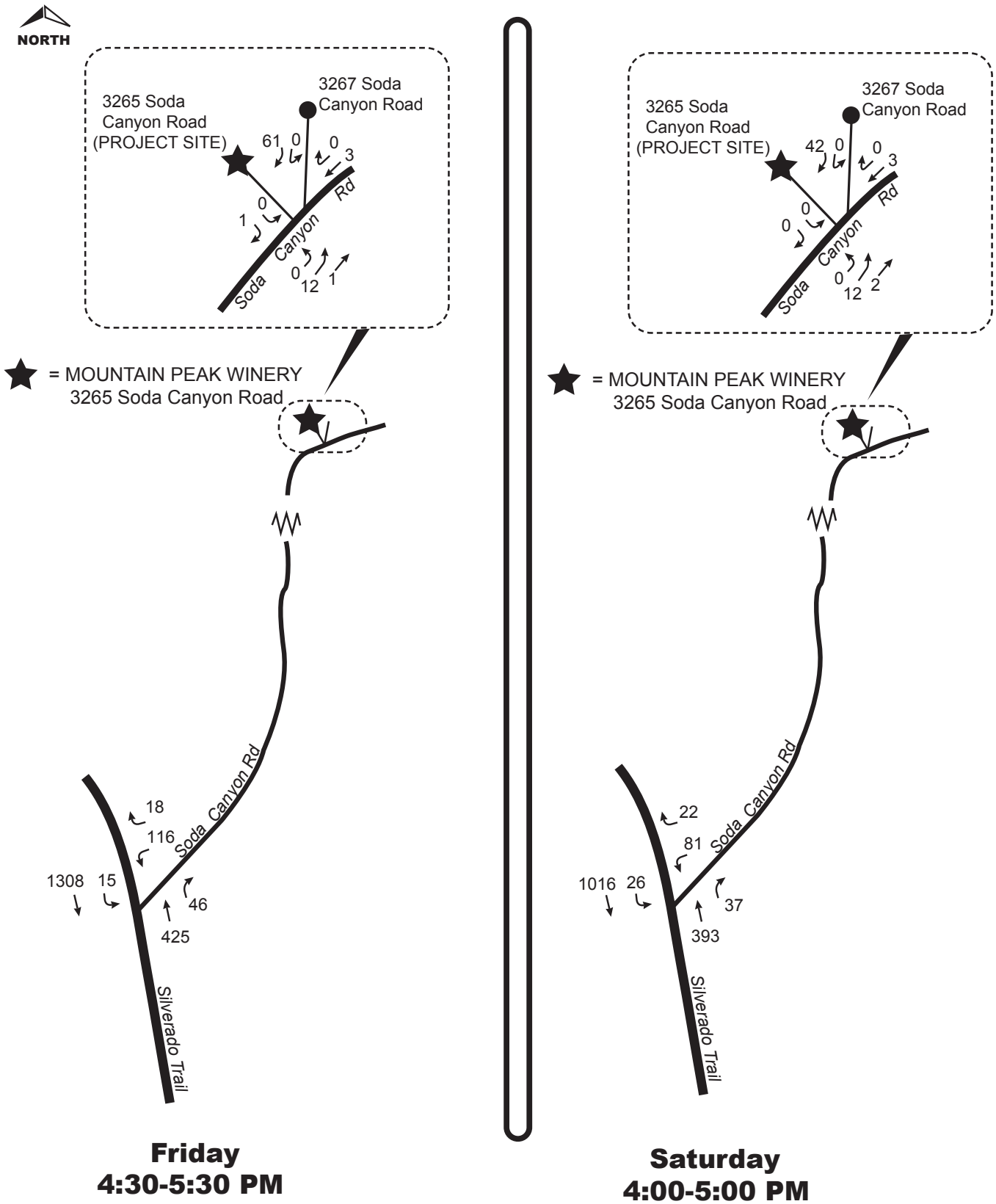
Figure 6
Year 2019 (Without Project)
Harvest Friday and Saturday
PM Peak Hour Volumes



Mountain Peak Winery Traffic Study

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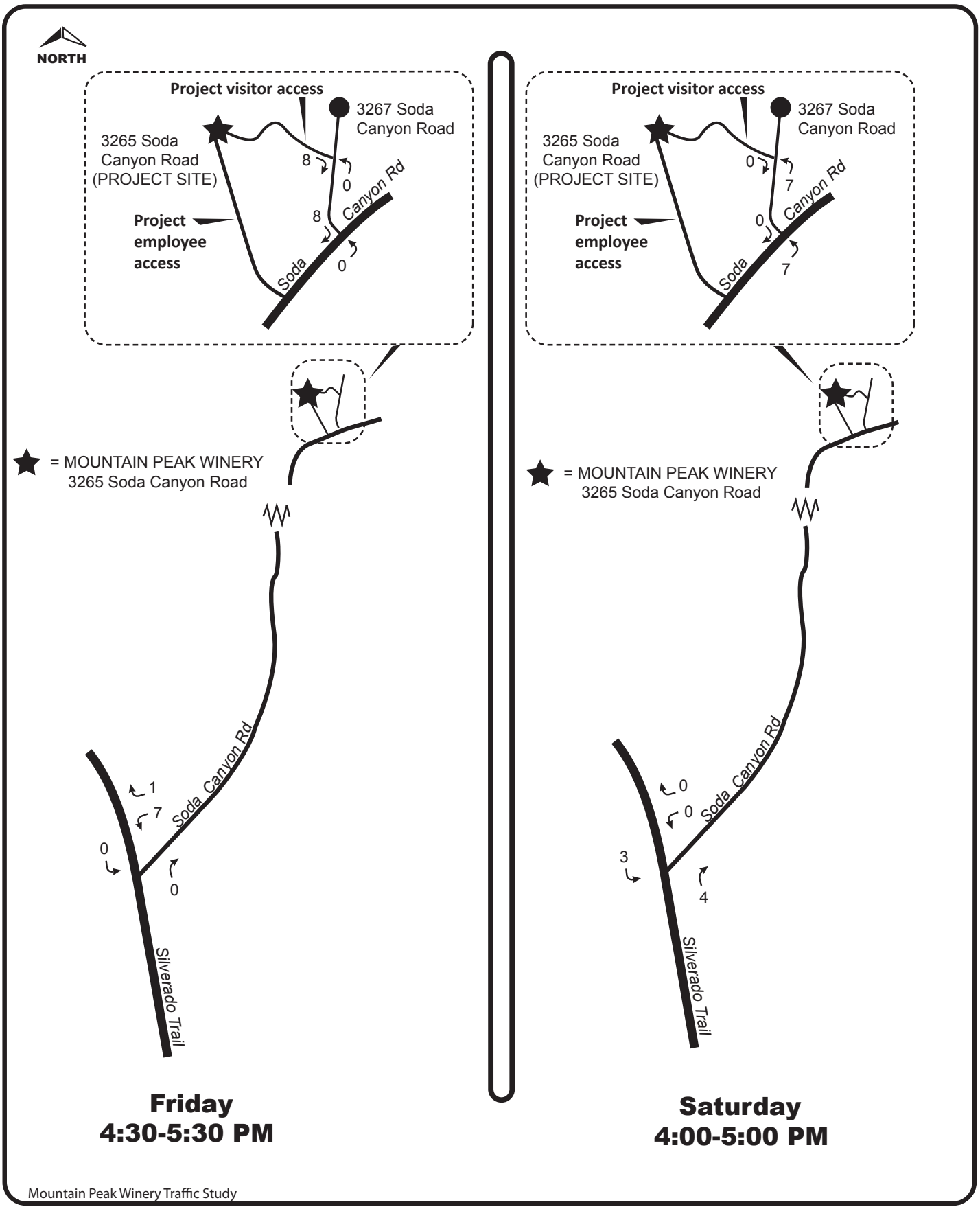
Figure 7
Year 2030 (Without Project)
Harvest Friday and Saturday
PM Peak Hour Volumes



Mountain Peak Winery Traffic Study

Figure 8
Project Traffic Increment

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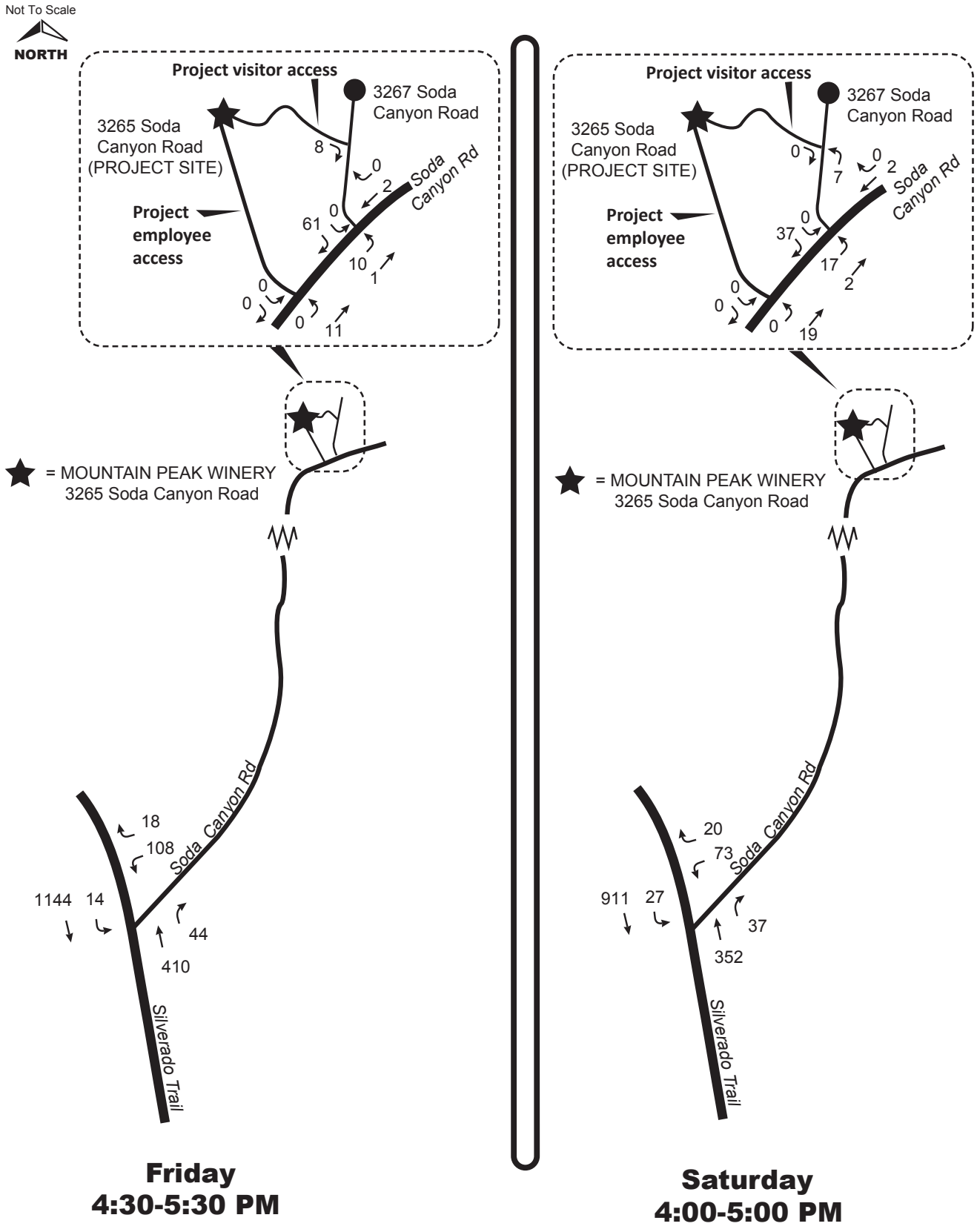

Mountain Peak Winery Traffic Study

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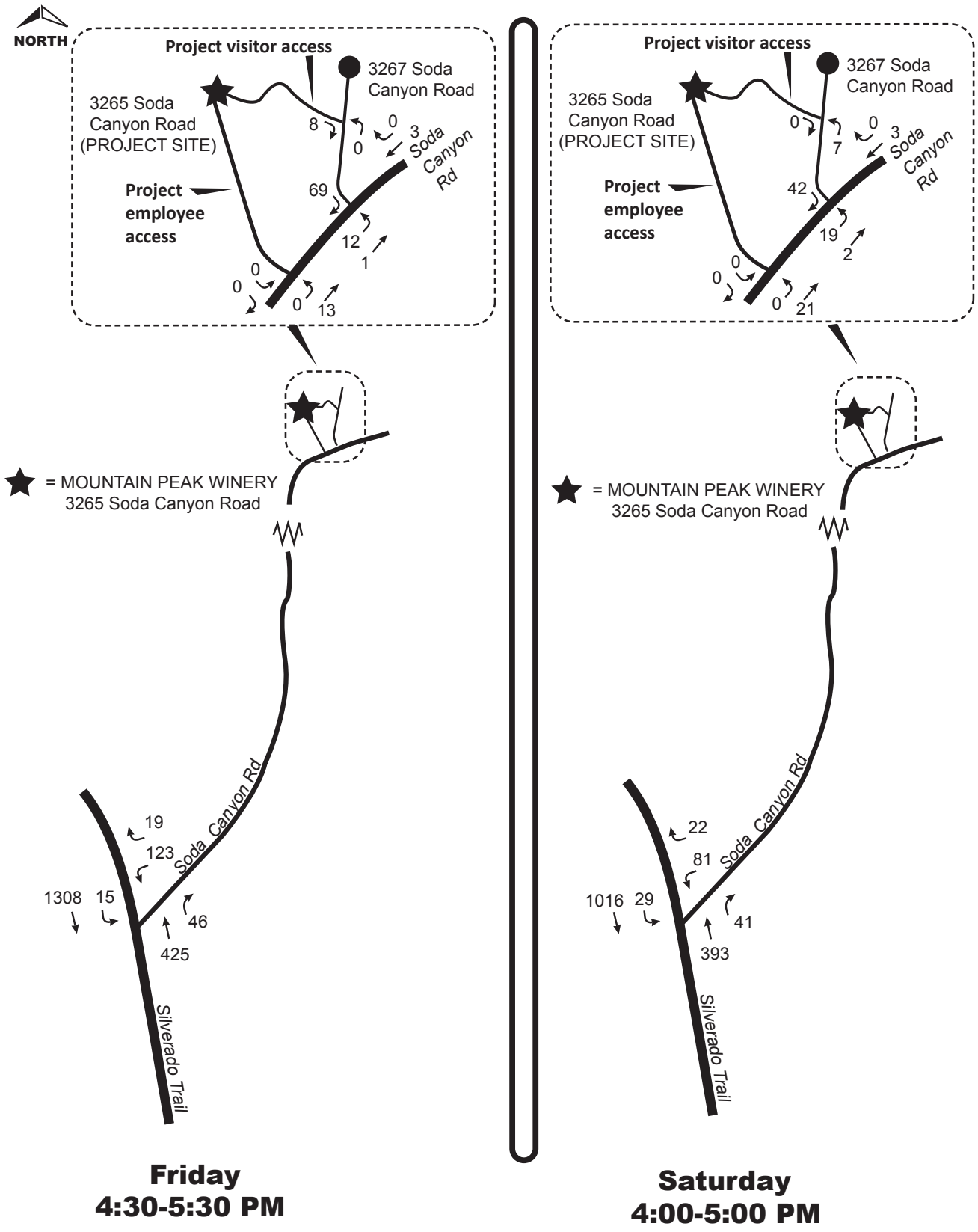
Figure 9
Year 2019 with Project
Harvest Friday and Saturday
PM Peak Hour Volumes



Mountain Peak Winery Traffic Study

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Figure 10
Year 2030 with Project
Harvest Friday and Saturday
PM Peak Hour Volumes

Tables

Table 1

SIGNALIZED INTERSECTION LOS CRITERIA

Level of Service	Description	Average Control Delay (Seconds Per Vehicle)
A	Operations with very low delay occurring with favorable progression and/or short cycle lengths.	≤ 10.0
B	Operations with low delay occurring with good progression and/or short cycle lengths.	10.1 to 20.0
C	Operations with average delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures begin to appear.	20.1 to 35.0
D	Operations with longer delays due to a combination of unfavorable progression, long cycle lengths, and/or high volume-to-capacity (V/C) ratios. Many vehicles stop and individual cycle failures are noticeable.	35.1 to 55.0
E	Operations with high delay values indicating poor progression, long cycle lengths, and high V/C ratios. Individual cycle failures are frequent occurrences. This is considered to be the limit of acceptable delay.	55.1 to 80.0
F	Operation with delays unacceptable to most drivers occurring due to oversaturation, poor progression, or very long cycle lengths.	> 80.0

Source: 2010 Highway Capacity Manual (Transportation Research Board).

Table 2

UNSIGNALIZED INTERSECTION LOS CRITERIA

Level of Service	Description	Average Control Delay (Seconds Per Vehicle)
A	Little or no delays	≤ 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: 2010 Highway Capacity Manual (Transportation Research Board).

Table 3

INTERSECTION LEVEL OF SERVICE

HARVEST FRIDAY PM PEAK HOUR

LOCATION	EXISTING	YEAR 2019		YEAR 2030	
		W/O PROJECT	WITH PROJECT	W/O PROJECT	WITH PROJECT
Silverado Trail/ Soda Canyon Rd.	F-152/A-8.4[1] **B-10.5**[2]	F-238/A-8.4 **C-18.0**	F-268/A-8.4 **C-21.4** (0.5%)*	F-486/A-8.5 **E-36.4** (0.4%)*	F-531/A-8.5 **E-41.7**

(1) Unsignalized level of service – control delay in seconds. Soda Canyon Road westbound stop sign controlled approach/Silverado Trail southbound left turn.

(2) **Unsignalized level of service – control delay in seconds (entire intersection).**

HARVEST SATURDAY PM PEAK HOUR

LOCATION	EXISTING	YEAR 2019		YEAR 2030	
		W/O PROJECT	WITH PROJECT	W/O PROJECT	WITH PROJECT
Silverado Trail/ Soda Canyon Rd.	E-41.2/A-8.2[1] **A-2.8**[2]	F-52.3/A-8.2 **A-3.7**	F-54.4/A-8.2 **A-3.8** (0.5%)*	F-88.9/A-8.4 **A-6.3**	F-92.5/A-8.4 **A-6.5** (0.5%)*

(1) Unsignalized level of service – control delay in seconds. Soda Canyon Road westbound stop sign controlled approach/Silverado Trail southbound left turn.

(2) **Unsignalized level of service – control delay in seconds (entire intersection).**

* (Percent project traffic.) Less than a 1% increase is not considered a significant impact.

Year 2010 Highway Capacity Manual (HCM) Analysis Methodology – individual approach or turn movement results Year 2000 HCM results for overall intersection operation. No overall intersection operation results obtainable from 2010 software.
Source: Crane Transportation Group

Table 4

INTERSECTION SIGNAL WARRANT EVALUATION

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

FRIDAY PM PEAK HOUR

LOCATION	EXISTING	YEAR 2019		YEAR 2030	
		W/O PROJECT	WITH PROJECT	W/O PROJECT	WITH PROJECT
Silverado Trail/ Soda Canyon Rd.	Yes	Yes	Yes (0.5%)*	Yes	Yes (0.4%)

SATURDAY PM PEAK HOUR

LOCATION	EXISTING	YEAR 2019		YEAR 2030	
		W/O PROJECT	WITH PROJECT	W/O PROJECT	WITH PROJECT
Silverado Trail/ Soda Canyon Rd.	No	No	No	Yes	Yes (0.5%)

* (Percent project traffic.) Less than a 1% increase is not considered a significant impact.

Source: Crane Transportation Group

Table 5

PROJECT TRIP GENERATION
MOUNTAIN PEAK WINERY

HARVEST FRIDAY

	TOTAL EMPL.	HOURS	TRIPS					
			3-4 PM		4-5 PM		5-6 PM	
			IN	OUT	IN	OUT	IN	OUT
Admin Employees	10	8AM-6PM	0	0	0	0	0	0
Production Employees – Full Time	9	6AM-6PM	0	0	0	0	0	0
Production Employees – Part Time	4	6AM-6PM	0	0	0	0	0	0
Tours/Tasting Employees	10	8AM-6PM	0	0	0	0	0	0
Grape Delivery Trucks	1/day	Between 6AM-6PM*	0	0	0	0	0	0
Visitors	80 total = 31 vehicles**	10AM-6PM	0	8	8	0	0	8

* Grapes typically delivered in the morning.
** 2.6 visitors/vehicle average on weekdays per County data.

HARVEST SATURDAY

	TOTAL EMPL.	HOURS	TRIPS							
			2-3 PM		3-4 PM		4-5 PM		5-6 PM	
			IN	OUT	IN	OUT	IN	OUT	IN	OUT
Admin Employees	10	8AM-6PM	0	0	0	0	0	0	0	0
Production Employees – Full Time	9	6AM-6PM	0	0	0	0	0	0	0	0
Production Employees – Part Time	4	6AM-6PM	0	0	0	0	0	0	0	0
Tours/Tasting Employees	10	8AM-6PM	0	0	0	0	0	0	0	0
Grape Delivery Trucks	1/day	Between 6AM-6PM*	0	0	0	0	0	0	0	0
Visitors	80 total = 29 vehicles**	10AM-6PM	7	0	0	7	7	0	0	7

* Grapes typically delivered in the morning.
** 2.8 visitors/vehicle average on Saturdays per County data.

Source: Crane Transportation Group

Appendix

Appendix
MOUNTAIN PEAK WINERY
EMPLOYEE, VISITOR & TRUCK INFORMATION

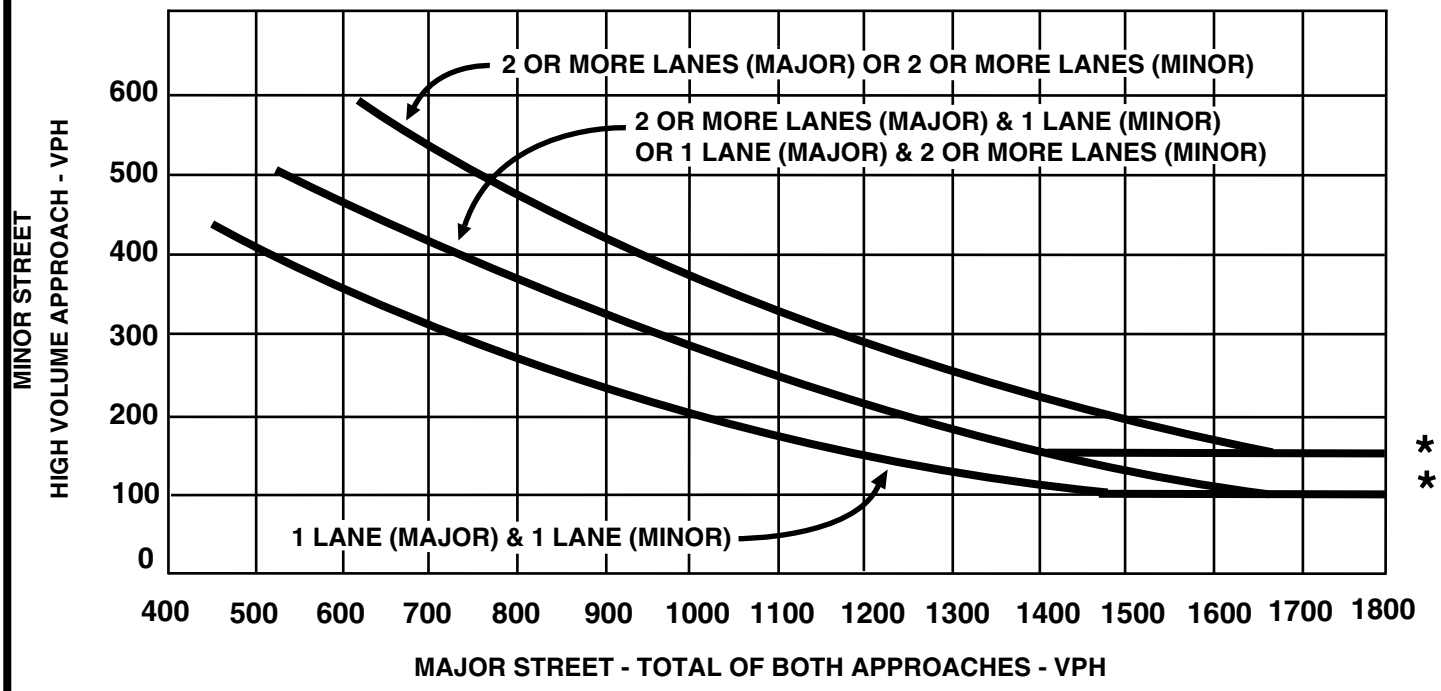
	HARVEST CONDITIONS	NON-HARVEST CONDITIONS
A.	**Full-time admin employees** # on Weekdays 10 # on Saturday 10 Work hours: Weekday 8AM to 6PM Saturday 8AM to 6PM	**Full-time admin employees** # on Weekdays 10 # on Saturday 10 Work hours: Weekday 8AM to 6PM Saturday 8AM to 6PM
B.	**Full-time production employees** # on Weekdays 9 # on Saturday 9 Work hours: Weekday 6AM to 6PM Saturday 6AM to 6PM	**Full-time production employees** # on Weekdays 6 # on Saturday 6 Work hours: Weekday 6AM to 6PM Saturday 6AM to 6PM
C.	**Part-time production employees** # on Weekdays 4 # on Saturday 4 Work hours: Weekday 6AM to 6PM Saturday 6AM to 6PM	**Part-time production employees** # on Weekdays 0 # on Saturday 0 Work hours: Weekday NA Saturday NA
D.	**Part-time administration employees** # on Weekdays 4 # on Saturday 0 Work hours: Weekday 9AM to 6PM Saturday NA	**Part-Time Administration Employees** # on Weekdays 4 # on Saturday 0 Work hours: Weekday 9AM to 6PM Saturday NA
E.	**Tours & tasting employees** # on Weekdays 10 # on Saturday or Sunday 10 Work hours: Weekday 8AM to 6PM Saturday 8AM to 6PM Sunday 8AM to 6PM	**Tours & tasting employees** # on Weekdays 10 # on Saturday or Sunday 10 Work hours: Weekday 8AM to 6PM Saturday 8AM to 6PM Sunday 8AM to 6PM

Appendix
MOUNTAIN PEAK WINERY
EMPLOYEE, VISITOR & TRUCK INFORMATION

	HARVEST CONDITIONS	NON-HARVEST CONDITIONS
F.	**Grape Delivery Trucks** # on Weekdays 1-2 # on Saturday 1-2 Delivery hours: Weekday 6AM to 6PM Saturday 6AM to 6PM # days of grape delivery: 7 days per week during harvest. Total of 32 trucks based on off-haul amount estimated.	No grape delivery
G.	**Maximum tours/tasting visitors (by appointment)** # on Weekdays 80 # on Saturday 80 Hours: Weekday 10:00 AM to 4:00 PM Saturday 10:00 AM to 4:00 PM Maximum 350 visitors/week	**Maximum tours/tasting visitors (by appointment)** # on Weekdays 80 # on Saturday 80 Hours: Weekday 10:00 AM to 4:00 PM Saturday 10:00 AM to 4:00 PM Maximum 350 visitors/week
H.	**Other employees?** # on Weekdays none # on Saturday none Work hours: Weekday _____ to _____ Saturday _____ to _____	**Other employees?** # on Weekdays none # on Saturday none Work hours: Weekday _____ to _____ Saturday _____ to _____
I.	**Other trucks?** # on Weekdays < 1/week # on Saturday _____ Work hours: Weekday 8:00 AM to 6:00 PM	**Other trucks?** # on Weekdays < 1/week # on Saturday _____ Work hours: Weekday 8:00 AM to 6:00 PM
J.	**Mobile bottling** No activity	**Mobile bottling** 10 days/year max 1 truck in by 8AM/out at 6PM

Percent grapes grown on site = 50%
Percent grapes imported to the site that will come from the north on Silverado Trail = 90%
Percent grapes imported to the site that will come from the south on Silverado Trail = 10%

PEAK HOUR VOLUME WARRANT #3
(Urban Area)



*** NOTE**

150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE

Source: California Manual on Uniform Traffic Control Devices, 2010

TECHNICAL APPENDIX

Capacity Worksheets

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

Intersection #1 Silverado Trail/Soda Canyon Rd

Average Delay (sec/veh): 10.5 Worst Case Level Of Service: F[156.2]

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Uncontrolled			Uncontrolled			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Lanes:	0 0 0 1 0			1 0 1 0 0			0 0 0 0 0			1 0 0 0 1		
Volume Module:												
Base Vol:	0	401	43	13	1055	0	0	0	0	92	0	16
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	0	401	43	13	1055	0	0	0	0	92	0	16
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
PHF Volume:	0	456	49	15	1199	0	0	0	0	105	0	18
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
FinalVolume:	0	456	49	15	1199	0	0	0	0	105	0	18
Critical Gap Module:												
Critical Gp:	xxxxx	xxxx	xxxxx	4.1	xxxx	xxxxx	xxxxx	xxxx	xxxxx	6.4	xxxx	6.2
FollowUpTim:	xxxxx	xxxx	xxxxx	2.2	xxxx	xxxxx	xxxxx	xxxx	xxxxx	3.5	xxxx	3.3
Capacity Module:												
Cnflict Vol:	xxxx	xxxx	xxxxx	505	xxxx	xxxxx	xxxx	xxxx	xxxxx	1709	xxxx	480
Potent Cap.:	xxxx	xxxx	xxxxx	1065	xxxx	xxxxx	xxxx	xxxx	xxxxx	101	xxxx	590
Move Cap.:	xxxx	xxxx	xxxxx	1065	xxxx	xxxxx	xxxx	xxxx	xxxxx	100	xxxx	590
Volume/Cap:	xxxx	xxxx	xxxx	0.01	xxxx	xxxx	xxxx	xxxx	xxxx	1.04	xxxx	0.03
Level Of Service Module:												
2Way95thQ:	xxxx	xxxx	xxxxx	0.0	xxxx	xxxxx	xxxx	xxxx	xxxxx	6.5	xxxx	0.1
Control Del:	xxxxx	xxxx	xxxxx	8.4	xxxx	xxxxx	xxxxx	xxxx	xxxxx	181.4	xxxx	11.3
LOS by Move:	*	*	*	A	*	*	*	*	*	F	*	B
Movement:	LT - LTR - RT			LT - LTR - RT			LT - LTR - RT			LT - LTR - RT		
Shared Cap.:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx
SharedQueue:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shrd ConDel:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shared LOS:	*	*	*	*	*	*	*	*	*	*	*	*
ApproachDel:	xxxxxx			xxxxxx			xxxxxx			156.2		
ApproachLOS:	*			*			*			F		

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

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: ExistingDRR
Agency/Co.: CTG
Date Performed: 5/23/2013
Analysis Time Period: Weekday PM Peak Hour
Intersection: Silverado/Soda Canyon
Jurisdiction: Napa Co
Units: U. S. Customary
Analysis Year:
Project ID:
East/West Street: Silverado Trail
North/South Street: Soda Canyon
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		401	43	13	1055	
Peak-Hour Factor, PHF		0.88	0.88	0.88	0.88	
Hourly Flow Rate, HFR		455	48	14	1198	
Percent Heavy Vehicles		--	--	0	--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes		1	0	1	1	
Configuration			TR	L	T	
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	92		16			
Peak Hour Factor, PHF	0.88		0.88			
Hourly Flow Rate, HFR	104		18			
Percent Heavy Vehicles	0		7			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			/			/
Lanes	1		1			
Configuration	L		R			

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		L	L		R			
v (vph)		14	104		18			
C(m) (vph)		1072	101		577			
v/c		0.01	1.03		0.03			
95% queue length		0.04	6.44		0.10			
Control Delay		8.4	176.0		11.4			
LOS		A	F		B			
Approach Delay				151.7				
Approach LOS				F				

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

Intersection #1 Silverado Trail/Soda Canyon Rd

Average Delay (sec/veh): 2.8 Worst Case Level Of Service: E[41.2]

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Uncontrolled			Uncontrolled			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Lanes:	0 0 0 1 0			1 0 1 0 0			0 0 0 0 0			1 0 0 0 1		
Volume Module:												
Base Vol:	0	330	31	22	854	0	0	0	0	68	0	18
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	0	330	31	22	854	0	0	0	0	68	0	18
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
PHF Volume:	0	371	35	25	960	0	0	0	0	76	0	20
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
FinalVolume:	0	371	35	25	960	0	0	0	0	76	0	20
Critical Gap Module:												
Critical Gp:	xxxxx	xxxx	xxxxx	4.1	xxxx	xxxxx	xxxxx	xxxx	xxxxx	6.4	xxxx	6.2
FollowUpTim:	xxxxx	xxxx	xxxxx	2.2	xxxx	xxxxx	xxxxx	xxxx	xxxxx	3.5	xxxx	3.3
Capacity Module:												
Cnflict Vol:	xxxx	xxxx	xxxxx	406	xxxx	xxxxx	xxxx	xxxx	xxxxx	1397	xxxx	388
Potent Cap.:	xxxx	xxxx	xxxxx	1159	xxxx	xxxxx	xxxx	xxxx	xxxxx	157	xxxx	664
Move Cap.:	xxxx	xxxx	xxxxx	1159	xxxx	xxxxx	xxxx	xxxx	xxxxx	154	xxxx	664
Volume/Cap:	xxxx	xxxx	xxxx	0.02	xxxx	xxxx	xxxx	xxxx	xxxx	0.50	xxxx	0.03
Level Of Service Module:												
2Way95thQ:	xxxx	xxxx	xxxxx	0.1	xxxx	xxxxx	xxxx	xxxx	xxxxx	2.4	xxxx	0.1
Control Del:	xxxxx	xxxx	xxxxx	8.2	xxxx	xxxxx	xxxxx	xxxx	xxxxx	49.3	xxxx	10.6
LOS by Move:	*	*	*	A	*	*	*	*	*	E	*	B
Movement:	LT - LTR - RT			LT - LTR - RT			LT - LTR - RT			LT - LTR - RT		
Shared Cap.:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx
SharedQueue:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shrd ConDel:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shared LOS:	*	*	*	*	*	*	*	*	*	*	*	*
ApproachDel:	xxxxxx			xxxxxx			xxxxxx			41.2		
ApproachLOS:	*			*			*			E		

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

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: DRR
Agency/Co.: CTG
Date Performed: 5/23/2013
Analysis Time Period: Saturday PM Peak Hour
Intersection: Silverado/Soda Canyon
Jurisdiction: Napa Co
Units: U. S. Customary
Analysis Year: Existing
Project ID:
East/West Street: Silverado Trail
North/South Street: Soda Canyon
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		330	31	22	854	
Peak-Hour Factor, PHF		0.89	0.89	0.89	0.89	
Hourly Flow Rate, HFR		370	34	24	959	
Percent Heavy Vehicles		--	--	0	--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes		1	0	1	1	
Configuration			TR	L	T	
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	68		18			
Peak Hour Factor, PHF	0.89		0.89			
Hourly Flow Rate, HFR	76		20			
Percent Heavy Vehicles	1		0			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			/			/
Lanes	1		1			
Configuration	L		R			

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		L	L		R			
v (vph)		24	76		20			
C(m) (vph)		1166	154		665			
v/c		0.02	0.49		0.03			
95% queue length		0.06	2.35		0.09			
Control Delay		8.2	49.2		10.6			
LOS		A	E		B			
Approach Delay				41.2				
Approach LOS				E				

HCS+: Unsignalized Intersections Release 5.6

Phone: Fax:
E-Mail:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: DRR
Agency/Co.: CTG
Date Performed: 5/23/2013
Analysis Time Period: Saturday PM Peak Hour
Intersection: Silverado/Soda Canyon
Jurisdiction: Napa Co
Units: U. S. Customary
Analysis Year: Existing
Project ID:
East/West Street: Silverado Trail
North/South Street: Soda Canyon
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1 L	2 T	3 R	4 L	5 T	6 R
Volume		330	31	22	854	
Peak-Hour Factor, PHF		0.89	0.89	0.89	0.89	
Peak-15 Minute Volume		93	9	6	240	
Hourly Flow Rate, HFR		370	34	24	959	
Percent Heavy Vehicles		--	--	0	--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes		1	0	1	1	
Configuration			TR	L	T	
Upstream Signal?		No			No	

Minor Street Movements	7 L	8 T	9 R	10 L	11 T	12 R
Volume	68		18			
Peak Hour Factor, PHF	0.89		0.89			
Peak-15 Minute Volume	19		5			
Hourly Flow Rate, HFR	76		20			
Percent Heavy Vehicles	1		0			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage				/		/
RT Channelized?			No			
Lanes	1		1			
Configuration	L		R			

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0

Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
Percent Blockage	0	0	0	0

Upstream Signal Data

	Prog. Flow vph	Sat Flow vph	Arrival Type	Green Time sec	Cycle Length sec	Prog. Speed mph	Distance to Signal feet
S2 Left-Turn							
Through							
S5 Left-Turn							
Through							

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

	Movement 2	Movement 5
Shared ln volume, major th vehicles:		
Shared ln volume, major rt vehicles:		
Sat flow rate, major th vehicles:		
Sat flow rate, major rt vehicles:		
Number of major street through lanes:		

Worksheet 4-Critical Gap and Follow-up Time Calculation

Critical Gap Calculation

Movement	1 L	4 L	7 L	8 T	9 R	10 L	11 T	12 R
t(c,base)		4.1	7.1		6.2			
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)		0	1		0			
t(c,g)			0.20	0.20	0.10	0.20	0.20	0.10
Percent Grade			0.00	0.00	0.00	0.00	0.00	0.00
t(3,lt)		0.00	0.70		0.00			
t(c,T): 1-stage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2-stage	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
t(c) 1-stage		4.1	6.4		6.2			
2-stage								

Follow-Up Time Calculations

Movement	1 L	4 L	7 L	8 T	9 R	10 L	11 T	12 R
t(f,base)		2.20	3.50		3.30			
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)		0	1		0			
t(f)		2.2	3.5		3.3			

Worksheet 5-Effect of Upstream Signals

Computation 1-Queue Clearance Time at Upstream Signal

	Movement 2		Movement 5	
	V(t)	V(l,prot)	V(t)	V(l,prot)
V prog				

Total Saturation Flow Rate, s (vph)								
Arrival Type								
Effective Green, g (sec)								
Cycle Length, C (sec)								
Rp (from Exhibit 16-11)								
Proportion vehicles arriving on green P								
g(q1)								
g(q2)								
g(q)								

Computation 2-Proportion of TWSC Intersection Time blocked	Movement 2		Movement 5	
	V(t)	V(l,prot)	V(t)	V(l,prot)
alpha				
beta				
Travel time, t(a) (sec)				
Smoothing Factor, F				
Proportion of conflicting flow, f				
Max platooned flow, V(c,max)				
Min platooned flow, V(c,min)				
Duration of blocked period, t(p)				
Proportion time blocked, p	0.000		0.000	

Computation 3-Platoon Event Periods	Result
p(2)	0.000
p(5)	0.000
p(dom)	
p(subo)	
Constrained or unconstrained?	

Proportion unblocked for minor movements, p(x)	(1) Single-stage Process	(2) Two-Stage Process Stage I	(3) Two-Stage Process Stage II
p(1)			
p(4)			
p(7)			
p(8)			
p(9)			
p(10)			
p(11)			
p(12)			

Computation 4 and 5 Single-Stage Process								
Movement	1 L	4 L	7 L	8 T	9 R	10 L	11 T	12 R
V c,x		404	1394		387			
s								
Px								
V c,u,x								
C r,x								
C plat,x								

Two-Stage Process				
	7	8	10	11

	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2
V(c,x)								
s		1500						
P(x)								
V(c,u,x)								
C(r,x)								
C(plat,x)								

Worksheet 6-Impedance and Capacity Equations

Step 1: RT from Minor St.	9	12
Conflicting Flows	387	
Potential Capacity	665	
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity	665	
Probability of Queue free St.	0.97	1.00
Step 2: LT from Major St.	4	1
Conflicting Flows	404	
Potential Capacity	1166	
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity	1166	
Probability of Queue free St.	0.98	1.00
Maj L-Shared Prob Q free St.		
Step 3: TH from Minor St.	8	11
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	0.98	0.98
Movement Capacity		
Probability of Queue free St.	1.00	1.00
Step 4: LT from Minor St.	7	10
Conflicting Flows	1394	
Potential Capacity	157	
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor		0.98
Maj. L, Min T Adj. Imp Factor.		0.98
Cap. Adj. factor due to Impeding mvmnt	0.98	0.95
Movement Capacity	154	

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

Step 3: TH from Minor St.	8	11
Part 1 - First Stage		
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor		
Cap. Adj. factor due to Impeding mvmnt		
Movement Capacity		
Probability of Queue free St.		

Part 2 - Second Stage			
Conflicting Flows			
Potential Capacity			
Pedestrian Impedance Factor			
Cap. Adj. factor due to Impeding mvmnt			
Movement Capacity			
Part 3 - Single Stage			
Conflicting Flows			
Potential Capacity			
Pedestrian Impedance Factor	1.00	1.00	
Cap. Adj. factor due to Impeding mvmnt	0.98	0.98	
Movement Capacity			
Result for 2 stage process:			
a			
y			
C t			
Probability of Queue free St.	1.00	1.00	
Step 4: LT from Minor St.	7	10	
Part 1 - First Stage			
Conflicting Flows			
Potential Capacity			
Pedestrian Impedance Factor			
Cap. Adj. factor due to Impeding mvmnt			
Movement Capacity			
Part 2 - Second Stage			
Conflicting Flows			
Potential Capacity			
Pedestrian Impedance Factor			
Cap. Adj. factor due to Impeding mvmnt			
Movement Capacity			
Part 3 - Single Stage			
Conflicting Flows	1394		
Potential Capacity	157		
Pedestrian Impedance Factor	1.00	1.00	
Maj. L, Min T Impedance factor		0.98	
Maj. L, Min T Adj. Imp Factor.		0.98	
Cap. Adj. factor due to Impeding mvmnt	0.98	0.95	
Movement Capacity	154		
Results for Two-stage process:			
a			
y			
C t	154		

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)	76		20			
Movement Capacity (vph)	154		665			
Shared Lane Capacity (vph)						

Worksheet 9-Computation of Effect of Flared Minor Street Approaches

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
C sep	154		665			
Volume	76		20			
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh						
SUM C sep						
n						
C act						

Worksheet 10-Delay, Queue Length, and Level of Service

Movement	1	4	7	8	9	10	11	12
Lane Config		L	L		R			
v (vph)		24	76		20			
C(m) (vph)		1166	154		665			
v/c		0.02	0.49		0.03			
95% queue length		0.06	2.35		0.09			
Control Delay		8.2	49.2		10.6			
LOS		A	E		B			
Approach Delay				41.2				
Approach LOS				E				

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	1.00	0.98
v(il), Volume for stream 2 or 5		
v(i2), Volume for stream 3 or 6		
s(il), Saturation flow rate for stream 2 or 5		
s(i2), Saturation flow rate for stream 3 or 6		
P*(oj)		
d(M,LT), Delay for stream 1 or 4		8.2
N, Number of major street through lanes		
d(rank,1) Delay for stream 2 or 5		

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

Intersection #1 Silverado Trail/Soda Canyon Rd

Average Delay (sec/veh): 18.0 Worst Case Level Of Service: F[262.7]

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Uncontrolled			Uncontrolled			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Lanes:	0 0 0 1 0			1 0 1 0 0			0 0 0 0 0			1 0 0 0 1		
Volume Module:												
Base Vol:	0	410	44	14	1144	0	0	0	0	101	0	17
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	0	410	44	14	1144	0	0	0	0	101	0	17
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
PHF Volume:	0	466	50	16	1300	0	0	0	0	115	0	19
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
FinalVolume:	0	466	50	16	1300	0	0	0	0	115	0	19
Critical Gap Module:												
Critical Gp:	xxxxx	xxxx	xxxxx	4.1	xxxx	xxxxx	xxxxx	xxxx	xxxxx	6.4	xxxx	6.2
FollowUpTim:	xxxxx	xxxx	xxxxx	2.2	xxxx	xxxxx	xxxxx	xxxx	xxxxx	3.5	xxxx	3.3
Capacity Module:												
Cnflict Vol:	xxxx	xxxx	xxxxx	516	xxxx	xxxxx	xxxx	xxxx	xxxxx	1823	xxxx	491
Potent Cap.:	xxxx	xxxx	xxxxx	1055	xxxx	xxxxx	xxxx	xxxx	xxxxx	86	xxxx	582
Move Cap.:	xxxx	xxxx	xxxxx	1055	xxxx	xxxxx	xxxx	xxxx	xxxxx	85	xxxx	582
Volume/Cap:	xxxx	xxxx	xxxx	0.02	xxxx	xxxx	xxxx	xxxx	xxxx	1.35	xxxx	0.03
Level Of Service Module:												
2Way95thQ:	xxxx	xxxx	xxxxx	0.0	xxxx	xxxxx	xxxx	xxxx	xxxxx	8.7	xxxx	0.1
Control Del:	xxxxx	xxxx	xxxxx	8.5	xxxx	xxxxx	xxxxx	xxxx	xxxxx	305.0	xxxx	11.4
LOS by Move:	*	*	*	A	*	*	*	*	*	F	*	B
Movement:	LT - LTR - RT			LT - LTR - RT			LT - LTR - RT			LT - LTR - RT		
Shared Cap.:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx
SharedQueue:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shrd ConDel:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shared LOS:	*	*	*	*	*	*	*	*	*	*	*	*
ApproachDel:	xxxxxx			xxxxxx			xxxxxx			262.7		
ApproachLOS:	*			*			*			F		

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

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: DRR
Agency/Co.: CTG
Date Performed: 5/23/2013
Analysis Time Period: Weekday PM Peak Hour
Intersection: Silverado/Soda Canyon
Jurisdiction: Napa Co
Units: U. S. Customary
Analysis Year: 2019 Harvest w/o Project
Project ID:
East/West Street: Silverado Trail
North/South Street: Soda Canyon
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		410	44	14	1144	
Peak-Hour Factor, PHF		0.89	0.89	0.89	0.89	
Hourly Flow Rate, HFR		460	49	15	1285	
Percent Heavy Vehicles		--	--	0	--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes		1	0	1	1	
Configuration			TR	L	T	
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	101		17			
Peak Hour Factor, PHF	0.89		0.89			
Hourly Flow Rate, HFR	113		19			
Percent Heavy Vehicles	0		7			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			/			/
Lanes	1		1			
Configuration	L		R			

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		L	L		R			
v (vph)		15	113		19			
C(m) (vph)		1066	88		573			
v/c		0.01	1.28		0.03			
95% queue length		0.04	8.26		0.10			
Control Delay		8.4	276.3		11.5			
LOS		A	F		B			
Approach Delay			238.2					
Approach LOS			F					

2019 with Project - Friday

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

Intersection #1 Silverado Trail/Soda Canyon Rd

Average Delay (sec/veh): 21.4 Worst Case Level Of Service: F[294.9]

Approach:	North Bound						South Bound						East Bound						West Bound					
Movement:	L	-	T	-	R		L	-	T	-	R		L	-	T	-	R		L	-	T	-	R	
Control:	Uncontrolled						Uncontrolled						Stop Sign						Stop Sign					
Rights:	Include						Include						Include						Include					
Lanes:	0	0	0	1	0		1	0	1	0	0		0	0	0	0	0		1	0	0	0	1	
Volume Module:																								
Base Vol:	0	411		44			14	1144		0			0		0		0		108		0		18	
Growth Adj:	1.00	1.00		1.00			1.00	1.00		1.00			1.00		1.00		1.00		1.00		1.00		1.00	
Initial Bse:	0	411		44			14	1144		0			0		0		0		108		0		18	
User Adj:	1.00	1.00		1.00			1.00	1.00		1.00			1.00		1.00		1.00		1.00		1.00		1.00	
PHF Adj:	0.88	0.88		0.88			0.88	0.88		0.88			0.88		0.88		0.88		0.88		0.88		0.88	
PHF Volume:	0	467		50			16	1300		0			0		0		0		123		0		20	
Reduct Vol:	0	0		0			0	0		0			0		0		0		0		0		0	
FinalVolume:	0	467		50			16	1300		0			0		0		0		123		0		20	
Critical Gap Module:																								
Critical Gp:	xxxxx	xxxx	xxxxx		4.1		xxxx	xxxxx	xxxxx	xxxx	xxxxx		6.4	xxxx		6.2								
FollowUpTim:	xxxxx	xxxx	xxxxx		2.2		xxxx	xxxxx	xxxxx	xxxx	xxxxx		3.5	xxxx		3.3								
Capacity Module:																								
Cnflict Vol:	xxxx	xxxx	xxxxx		517		xxxx	xxxxx		xxxx	xxxx	xxxxx		1824	xxxx		492							
Potent Cap.:	xxxx	xxxx	xxxxx		1054		xxxx	xxxxx		xxxx	xxxx	xxxxx		86	xxxx		581							
Move Cap.:	xxxx	xxxx	xxxxx		1054		xxxx	xxxxx		xxxx	xxxx	xxxxx		85	xxxx		581							
Volume/Cap:	xxxx	xxxx	xxxx		0.02		xxxx	xxxx		xxxx	xxxx	xxxx		1.45	xxxx		0.04							
Level Of Service Module:																								
2Way95thQ:	xxxx	xxxx	xxxxx		0.0		xxxx	xxxxx		xxxx	xxxx	xxxxx		9.6	xxxx		0.1							
Control Del:	xxxxx	xxxx	xxxxx		8.5		xxxx	xxxxx		xxxxx	xxxx	xxxxx		342.1	xxxx		11.4							
LOS by Move:	*	*	*		A		*	*		*	*	*		F	*		B							
Movement:	LT	-	LTR	-	RT		LT	-	LTR	-	RT		LT	-	LTR	-	RT		LT	-	LTR	-	RT	
Shared Cap.:	xxxx	xxxx	xxxxx				xxxx	xxxx	xxxxx				xxxx	xxxx	xxxxx				xxxx	xxxx	xxxxx			
SharedQueue:	xxxxx	xxxx	xxxxx				xxxxx	xxxx	xxxxx				xxxxx	xxxx	xxxxx				xxxxx	xxxx	xxxxx			
Shrd ConDel:	xxxxx	xxxx	xxxxx				xxxxx	xxxx	xxxxx				xxxxx	xxxx	xxxxx				xxxxx	xxxx	xxxxx			
Shared LOS:	*	*	*				*	*	*				*	*	*				*	*	*			
ApproachDel:	xxxxxx						xxxxxx						xxxxxx						294.9					
ApproachLOS:	*						*						*						F					

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

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

Intersection #1 Silverado Trail/Soda Canyon Rd

Average Delay (sec/veh): 3.7 Worst Case Level Of Service: F[54.3]

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Uncontrolled			Uncontrolled			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Lanes:	0 0 0 1 0			1 0 1 0 0			0 0 0 0 0			1 0 0 0 1		
Volume Module:												
Base Vol:	0	352	33	24	911	0	0	0	0	73	0	20
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	0	352	33	24	911	0	0	0	0	73	0	20
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
PHF Volume:	0	396	37	27	1024	0	0	0	0	82	0	22
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
FinalVolume:	0	396	37	27	1024	0	0	0	0	82	0	22
Critical Gap Module:												
Critical Gp:	xxxxx	xxxx	xxxxx	4.1	xxxx	xxxxx	xxxxx	xxxx	xxxxx	6.4	xxxx	6.2
FollowUpTim:	xxxxx	xxxx	xxxxx	2.2	xxxx	xxxxx	xxxxx	xxxx	xxxxx	3.5	xxxx	3.3
Capacity Module:												
Cnflict Vol:	xxxx	xxxx	xxxxx	433	xxxx	xxxxx	xxxx	xxxx	xxxxx	1492	xxxx	414
Potent Cap.:	xxxx	xxxx	xxxxx	1132	xxxx	xxxxx	xxxx	xxxx	xxxxx	137	xxxx	643
Move Cap.:	xxxx	xxxx	xxxxx	1132	xxxx	xxxxx	xxxx	xxxx	xxxxx	135	xxxx	643
Volume/Cap:	xxxx	xxxx	xxxx	0.02	xxxx	xxxx	xxxx	xxxx	xxxx	0.61	xxxx	0.03
Level Of Service Module:												
2Way95thQ:	xxxx	xxxx	xxxxx	0.1	xxxx	xxxxx	xxxx	xxxx	xxxxx	3.1	xxxx	0.1
Control Del:	xxxxx	xxxx	xxxxx	8.3	xxxx	xxxxx	xxxxx	xxxx	xxxxx	66.3	xxxx	10.8
LOS by Move:	*	*	*	A	*	*	*	*	*	F	*	B
Movement:	LT - LTR - RT			LT - LTR - RT			LT - LTR - RT			LT - LTR - RT		
Shared Cap.:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx
SharedQueue:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shrd ConDel:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shared LOS:	*	*	*	*	*	*	*	*	*	*	*	*
ApproachDel:	xxxxxx			xxxxxx			xxxxxx			54.3		
ApproachLOS:	*			*			*			F		

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

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: DRR
Agency/Co.: CTG
Date Performed: 5/23/2013
Analysis Time Period: Saturday PM Peak Hour
Intersection: Silverado/Soda Canyon
Jurisdiction: Napa Co
Units: U. S. Customary
Analysis Year: 2019 Harvest w/o Project
Project ID:
East/West Street: Silverado Trail
North/South Street: Soda Canyon
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		352	33	24	911	
Peak-Hour Factor, PHF		0.90	0.90	0.90	0.90	
Hourly Flow Rate, HFR		391	36	26	1012	
Percent Heavy Vehicles		--	--	0	--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes		1 0		1	1	
Configuration		TR		L	T	
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	73		20			
Peak Hour Factor, PHF	0.90		0.90			
Hourly Flow Rate, HFR	81		22			
Percent Heavy Vehicles	1		0			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			/			/
Lanes	1		1			
Configuration	L		R			

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		L	L		R			
v (vph)		26	81		22			
C(m) (vph)		1143	137		647			
v/c		0.02	0.59		0.03			
95% queue length		0.07	3.03		0.11			
Control Delay		8.2	63.6		10.8			
LOS		A	F		B			
Approach Delay			52.3					
Approach LOS			F					

2019 with project Saturday

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

Intersection #1 Silverado Trail/Soda Canyon Rd

Average Delay (sec/veh): 3.8 Worst Case Level Of Service: F[56.0]

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Uncontrolled			Uncontrolled			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Lanes:	0 0 0 1 0			1 0 1 0 0			0 0 0 0 0			1 0 0 0 1		
Volume Module:												
Base Vol:	0	352	37	27	912	0	0	0	0	73	0	20
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	0	352	37	27	912	0	0	0	0	73	0	20
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
PHF Volume:	0	396	42	30	1025	0	0	0	0	82	0	22
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
FinalVolume:	0	396	42	30	1025	0	0	0	0	82	0	22
Critical Gap Module:												
Critical Gp:	xxxxx	xxxx	xxxxx	4.1	xxxx	xxxxx	xxxxx	xxxx	xxxxx	6.4	xxxx	6.2
FollowUpTim:	xxxxx	xxxx	xxxxx	2.2	xxxx	xxxxx	xxxxx	xxxx	xxxxx	3.5	xxxx	3.3
Capacity Module:												
Cnflict Vol:	xxxx	xxxx	xxxxx	437	xxxx	xxxxx	xxxx	xxxx	xxxxx	1502	xxxx	416
Potent Cap.:	xxxx	xxxx	xxxxx	1128	xxxx	xxxxx	xxxx	xxxx	xxxxx	135	xxxx	641
Move Cap.:	xxxx	xxxx	xxxxx	1128	xxxx	xxxxx	xxxx	xxxx	xxxxx	133	xxxx	641
Volume/Cap:	xxxx	xxxx	xxxx	0.03	xxxx	xxxx	xxxx	xxxx	xxxx	0.62	xxxx	0.04
Level Of Service Module:												
2Way95thQ:	xxxx	xxxx	xxxxx	0.1	xxxx	xxxxx	xxxx	xxxx	xxxxx	3.2	xxxx	0.1
Control Del:	xxxxx	xxxx	xxxxx	8.3	xxxx	xxxxx	xxxxx	xxxx	xxxxx	68.4	xxxx	10.8
LOS by Move:	*	*	*	A	*	*	*	*	*	F	*	B
Movement:	LT -	LTR -	RT	LT -	LTR -	RT	LT -	LTR -	RT	LT -	LTR -	RT
Shared Cap.:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx
SharedQueue:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shrd ConDel:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shared LOS:	*	*	*	*	*	*	*	*	*	*	*	*
ApproachDel:	xxxxxx			xxxxxx			xxxxxx			56.0		
ApproachLOS:	*			*			*			F		

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

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

Intersection #1 Silverado Trail/Soda Canyon Rd

Average Delay (sec/veh): 36.4 Worst Case Level Of Service: F[522.1]

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Uncontrolled			Uncontrolled			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Lanes:	0 0 0 1 0			1 0 1 0 0			0 0 0 0 0			1 0 0 0 1		
Volume Module:												
Base Vol:	0	425	46	15	1308	0	0	0	0	116	0	18
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	0	425	46	15	1308	0	0	0	0	116	0	18
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
PHF Volume:	0	478	52	17	1470	0	0	0	0	130	0	20
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
FinalVolume:	0	478	52	17	1470	0	0	0	0	130	0	20
Critical Gap Module:												
Critical Gp:	xxxxx	xxxx	xxxxx	4.1	xxxx	xxxxx	xxxxx	xxxx	xxxxx	6.4	xxxx	6.2
FollowUpTim:	xxxxx	xxxx	xxxxx	2.2	xxxx	xxxxx	xxxxx	xxxx	xxxxx	3.5	xxxx	3.3
Capacity Module:												
Cnflict Vol:	xxxx	xxxx	xxxxx	529	xxxx	xxxxx	xxxx	xxxx	xxxxx	2007	xxxx	503
Potent Cap.:	xxxx	xxxx	xxxxx	1043	xxxx	xxxxx	xxxx	xxxx	xxxxx	66	xxxx	572
Move Cap.:	xxxx	xxxx	xxxxx	1043	xxxx	xxxxx	xxxx	xxxx	xxxxx	65	xxxx	572
Volume/Cap:	xxxx	xxxx	xxxx	0.02	xxxx	xxxx	xxxx	xxxx	xxxx	2.00	xxxx	0.04
Level Of Service Module:												
2Way95thQ:	xxxx	xxxx	xxxxx	0.0	xxxx	xxxxx	xxxx	xxxx	xxxxx	12.2	xxxx	0.1
Control Del:	xxxxx	xxxx	xxxxx	8.5	xxxx	xxxxx	xxxxx	xxxx	xxxxx	601.4	xxxx	11.5
LOS by Move:	*	*	*	A	*	*	*	*	*	F	*	B

Movement:	LT	LTR	RT	LT	LTR	RT	LT	LTR	RT	LT	LTR	RT
Shared Cap.:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx
SharedQueue:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shrd ConDel:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shared LOS:	*	*	*	*	*	*	*	*	*	*	*	*
ApproachDel:	xxxxxx			xxxxxx			xxxxxx			522.1		
ApproachLOS:	*			*			*			F		

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

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: DRR
Agency/Co.: CTG
Date Performed: 5/23/2013
Analysis Time Period: Weekday PM Peak Hour
Intersection: Silverado/Soda Canyon
Jurisdiction: Napa Co
Units: U. S. Customary
Analysis Year: 2030 Harvest w/o Project
Project ID:
East/West Street: Silverado Trail
North/South Street: Soda Canyon
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		425	46	15	1308	
Peak-Hour Factor, PHF		0.90	0.90	0.90	0.90	
Hourly Flow Rate, HFR		472	51	16	1453	
Percent Heavy Vehicles		--	--	0	--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes		1	0	1	1	
Configuration			TR	L	T	
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	116		18			
Peak Hour Factor, PHF	0.90		0.90			
Hourly Flow Rate, HFR	128		20			
Percent Heavy Vehicles	0		7			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			/			/
Lanes	1		1			
Configuration	L		R			

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		L	L		R			
v (vph)		16	128		20			
C(m) (vph)		1054	67		562			
v/c		0.02	1.91		0.04			
95% queue length		0.05	11.72		0.11			
Control Delay		8.5	560.5		11.6			
LOS		A	F		B			
Approach Delay				486.3				
Approach LOS				F				

HCS+: Unsignalized Intersections Release 5.6

Phone: Fax:
E-Mail:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: DRR
Agency/Co.: CTG
Date Performed: 5/23/2013
Analysis Time Period: Weekday PM Peak Hour
Intersection: Silverado/Soda Canyon
Jurisdiction: Napa Co
Units: U. S. Customary
Analysis Year: 2030 Harvest w/o Project
Project ID:
East/West Street: Silverado Trail
North/South Street: Soda Canyon
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		425	46	15	1308	
Peak-Hour Factor, PHF		0.90	0.90	0.90	0.90	
Peak-15 Minute Volume		118	13	4	363	
Hourly Flow Rate, HFR		472	51	16	1453	
Percent Heavy Vehicles		--	--	0	--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes		1	0	1	1	
Configuration			TR	L	T	
Upstream Signal?		No			No	

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	116		18			
Peak Hour Factor, PHF	0.90		0.90			
Peak-15 Minute Volume	32		5			
Hourly Flow Rate, HFR	128		20			
Percent Heavy Vehicles	0		7			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage				/		/
RT Channelized?			No			
Lanes	1		1			
Configuration	L		R			

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0

Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
Percent Blockage	0	0	0	0

Upstream Signal Data

	Prog. Flow vph	Sat Flow vph	Arrival Type	Green Time sec	Cycle Length sec	Prog. Speed mph	Distance to Signal feet
S2 Left-Turn							
Through							
S5 Left-Turn							
Through							

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

	Movement 2	Movement 5
Shared ln volume, major th vehicles:		
Shared ln volume, major rt vehicles:		
Sat flow rate, major th vehicles:		
Sat flow rate, major rt vehicles:		
Number of major street through lanes:		

Worksheet 4-Critical Gap and Follow-up Time Calculation

Critical Gap Calculation

Movement	1 L	4 L	7 L	8 T	9 R	10 L	11 T	12 R
t(c,base)		4.1	7.1		6.2			
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)		0	0		7			
t(c,g)			0.20	0.20	0.10	0.20	0.20	0.10
Percent Grade			0.00	0.00	0.00	0.00	0.00	0.00
t(3,lt)		0.00	0.70		0.00			
t(c,T): 1-stage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2-stage	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
t(c) 1-stage		4.1	6.4		6.3			
2-stage								

Follow-Up Time Calculations

Movement	1 L	4 L	7 L	8 T	9 R	10 L	11 T	12 R
t(f,base)		2.20	3.50		3.30			
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)		0	0		7			
t(f)		2.2	3.5		3.4			

Worksheet 5-Effect of Upstream Signals

Computation 1-Queue Clearance Time at Upstream Signal

	Movement 2		Movement 5	
	V(t)	V(l,prot)	V(t)	V(l,prot)
V prog				

Total Saturation Flow Rate, s (vph)	
Arrival Type	
Effective Green, g (sec)	
Cycle Length, C (sec)	
Rp (from Exhibit 16-11)	
Proportion vehicles arriving on green P	
g(q1)	
g(q2)	
g(q)	

Computation 2-Proportion of TWSC Intersection Time blocked	Movement 2		Movement 5	
	V(t)	V(l,prot)	V(t)	V(l,prot)
alpha				
beta				
Travel time, t(a) (sec)				
Smoothing Factor, F				
Proportion of conflicting flow, f				
Max platooned flow, V(c,max)				
Min platooned flow, V(c,min)				
Duration of blocked period, t(p)				
Proportion time blocked, p		0.000		0.000

Computation 3-Platoon Event Periods	Result
p(2)	0.000
p(5)	0.000
p(dom)	
p(subo)	
Constrained or unconstrained?	

Proportion unblocked for minor movements, p(x)	(1) Single-stage Process	(2) Two-Stage Process Stage I	(3) Two-Stage Process Stage II
p(1)			
p(4)			
p(7)			
p(8)			
p(9)			
p(10)			
p(11)			
p(12)			

Computation 4 and 5 Single-Stage Process								
Movement	1	4	7	8	9	10	11	12
	L	L	L	T	R	L	T	R
V c,x		523	1983		498			
s								
Px								
V c,u,x								
C r,x								
C plat,x								

Two-Stage Process				
	7	8	10	11

	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2
V(c,x)								
s		1500						
P(x)								
V(c,u,x)								
C(r,x)								
C(plat,x)								

Worksheet 6-Impedance and Capacity Equations

Step 1: RT from Minor St.	9	12
Conflicting Flows	498	
Potential Capacity	562	
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity	562	
Probability of Queue free St.	0.96	1.00
Step 2: LT from Major St.	4	1
Conflicting Flows	523	
Potential Capacity	1054	
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity	1054	
Probability of Queue free St.	0.98	1.00
Maj L-Shared Prob Q free St.		
Step 3: TH from Minor St.	8	11
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	0.98	0.98
Movement Capacity		
Probability of Queue free St.	1.00	1.00
Step 4: LT from Minor St.	7	10
Conflicting Flows	1983	
Potential Capacity	68	
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor		0.98
Maj. L, Min T Adj. Imp Factor.		0.99
Cap. Adj. factor due to Impeding mvmnt	0.98	0.95
Movement Capacity	67	

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

Step 3: TH from Minor St.	8	11
Part 1 - First Stage		
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor		
Cap. Adj. factor due to Impeding mvmnt		
Movement Capacity		
Probability of Queue free St.		

Part 2 - Second Stage			
Conflicting Flows			
Potential Capacity			
Pedestrian Impedance Factor			
Cap. Adj. factor due to Impeding mvmnt			
Movement Capacity			
Part 3 - Single Stage			
Conflicting Flows			
Potential Capacity			
Pedestrian Impedance Factor	1.00	1.00	
Cap. Adj. factor due to Impeding mvmnt	0.98	0.98	
Movement Capacity			
Result for 2 stage process:			
a			
y			
C t			
Probability of Queue free St.	1.00	1.00	
Step 4: LT from Minor St.	7	10	
Part 1 - First Stage			
Conflicting Flows			
Potential Capacity			
Pedestrian Impedance Factor			
Cap. Adj. factor due to Impeding mvmnt			
Movement Capacity			
Part 2 - Second Stage			
Conflicting Flows			
Potential Capacity			
Pedestrian Impedance Factor			
Cap. Adj. factor due to Impeding mvmnt			
Movement Capacity			
Part 3 - Single Stage			
Conflicting Flows	1983		
Potential Capacity	68		
Pedestrian Impedance Factor	1.00	1.00	
Maj. L, Min T Impedance factor		0.98	
Maj. L, Min T Adj. Imp Factor.		0.99	
Cap. Adj. factor due to Impeding mvmnt	0.98	0.95	
Movement Capacity	67		
Results for Two-stage process:			
a			
y			
C t	67		

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)	128		20			
Movement Capacity (vph)	67		562			
Shared Lane Capacity (vph)						

Worksheet 9-Computation of Effect of Flared Minor Street Approaches

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
C sep	67		562			
Volume	128		20			
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh						
SUM C sep						
n						
C act						

Worksheet 10-Delay, Queue Length, and Level of Service

Movement	1	4	7	8	9	10	11	12
Lane Config		L	L		R			
v (vph)		16	128		20			
C(m) (vph)		1054	67		562			
v/c		0.02	1.91		0.04			
95% queue length		0.05	11.72		0.11			
Control Delay		8.5	560.5		11.6			
LOS		A	F		B			
Approach Delay				486.3				
Approach LOS				F				

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	1.00	0.98
v(il), Volume for stream 2 or 5		
v(i2), Volume for stream 3 or 6		
s(il), Saturation flow rate for stream 2 or 5		
s(i2), Saturation flow rate for stream 3 or 6		
P*(oj)		
d(M,LT), Delay for stream 1 or 4		8.5
N, Number of major street through lanes		
d(rank,1) Delay for stream 2 or 5		

2030 with project Friday

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

Intersection #1 Silverado Trail/Soda Canyon Rd

Average Delay (sec/veh): 41.7 Worst Case Level Of Service: F[568.4]

Approach:	North Bound						South Bound						East Bound						West Bound					
Movement:	L	-	T	-	R		L	-	T	-	R		L	-	T	-	R		L	-	T	-	R	
Control:	Uncontrolled						Uncontrolled						Stop Sign						Stop Sign					
Rights:	Include						Include						Include						Include					
Lanes:	0	0	0	1	0		1	0	1	0	0		0	0	0	0	0		1	0	0	0	1	
Volume Module:																								
Base Vol:	0	426		46			15	1308		0			0		0		0		123		0		19	
Growth Adj:	1.00	1.00		1.00			1.00	1.00		1.00			1.00		1.00		1.00		1.00		1.00		1.00	
Initial Bse:	0	426		46			15	1308		0			0		0		0		123		0		19	
User Adj:	1.00	1.00		1.00			1.00	1.00		1.00			1.00		1.00		1.00		1.00		1.00		1.00	
PHF Adj:	0.89	0.89		0.89			0.89	0.89		0.89			0.89		0.89		0.89		0.89		0.89		0.89	
PHF Volume:	0	479		52			17	1470		0			0		0		0		138		0		21	
Reduct Vol:	0	0		0			0	0		0			0		0		0		0		0		0	
FinalVolume:	0	479		52			17	1470		0			0		0		0		138		0		21	
Critical Gap Module:																								
Critical Gp:	xxxxx	xxxx	xxxxx				4.1	xxxx	xxxxx	xxxxx	xxxx	xxxxx							6.4	xxxx			6.2	
FollowUpTim:	xxxxx	xxxx	xxxxx				2.2	xxxx	xxxxx	xxxxx	xxxx	xxxxx							3.5	xxxx			3.3	
Capacity Module:																								
Cnflict Vol:	xxxx	xxxx	xxxxx				530	xxxx	xxxxx		xxxx	xxxx	xxxxx						2008	xxxx			504	
Potent Cap.:	xxxx	xxxx	xxxxx				1042	xxxx	xxxxx		xxxx	xxxx	xxxxx						66	xxxx			571	
Move Cap.:	xxxx	xxxx	xxxxx				1042	xxxx	xxxxx		xxxx	xxxx	xxxxx						65	xxxx			571	
Volume/Cap:	xxxx	xxxx	xxxx				0.02	xxxx	xxxx		xxxx	xxxx	xxxx						2.12	xxxx			0.04	
Level Of Service Module:																								
2Way95thQ:	xxxx	xxxx	xxxxx				0.0	xxxx	xxxxx		xxxx	xxxx	xxxxx						13.1	xxxx			0.1	
Control Del:	xxxxx	xxxx	xxxxx				8.5	xxxx	xxxxx		xxxxx	xxxx	xxxxx						654.4	xxxx			11.5	
LOS by Move:	*	*	*				A	*	*		*	*	*						F	*			B	
Movement:	LT	-	LTR	-	RT		LT	-	LTR	-	RT		LT	-	LTR	-	RT		LT	-	LTR	-	RT	
Shared Cap.:	xxxx	xxxx	xxxxx				xxxx	xxxx	xxxxx				xxxx	xxxx	xxxxx				xxxx	xxxx	xxxxx			
SharedQueue:	xxxxx	xxxx	xxxxx				xxxxx	xxxx	xxxxx				xxxxx	xxxx	xxxxx				xxxxx	xxxx	xxxxx			
Shrd ConDel:	xxxxx	xxxx	xxxxx				xxxxx	xxxx	xxxxx				xxxxx	xxxx	xxxxx				xxxxx	xxxx	xxxxx			
Shared LOS:	*	*	*				*	*	*				*	*	*				*	*	*			
ApproachDel:	xxxxxx						xxxxxx						xxxxxx						568.4					
ApproachLOS:	*						*						*						F					

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

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

Intersection #1 Silverado Trail/Soda Canyon Rd

Average Delay (sec/veh): 6.3 Worst Case Level Of Service: F[94.6]

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Uncontrolled			Uncontrolled			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Lanes:	0 0 0 1 0			1 0 1 0 0			0 0 0 0 0			1 0 0 0 1		
Volume Module:												
Base Vol:	0	393	37	26	1016	0	0	0	0	81	0	22
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	0	393	37	26	1016	0	0	0	0	81	0	22
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
PHF Volume:	0	437	41	29	1129	0	0	0	0	90	0	24
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
FinalVolume:	0	437	41	29	1129	0	0	0	0	90	0	24
Critical Gap Module:												
Critical Gp:	xxxxx	xxxx	xxxxx	4.1	xxxx	xxxxx	xxxxx	xxxx	xxxxx	6.4	xxxx	6.2
FollowUpTim:	xxxxx	xxxx	xxxxx	2.2	xxxx	xxxxx	xxxxx	xxxx	xxxxx	3.5	xxxx	3.3
Capacity Module:												
Cnflict Vol:	xxxx	xxxx	xxxxx	478	xxxx	xxxxx	xxxx	xxxx	xxxxx	1644	xxxx	457
Potent Cap.:	xxxx	xxxx	xxxxx	1090	xxxx	xxxxx	xxxx	xxxx	xxxxx	111	xxxx	608
Move Cap.:	xxxx	xxxx	xxxxx	1090	xxxx	xxxxx	xxxx	xxxx	xxxxx	109	xxxx	608
Volume/Cap:	xxxx	xxxx	xxxx	0.03	xxxx	xxxx	xxxx	xxxx	xxxx	0.83	xxxx	0.04
Level Of Service Module:												
2Way95thQ:	xxxx	xxxx	xxxxx	0.1	xxxx	xxxxx	xxxx	xxxx	xxxxx	4.8	xxxx	0.1
Control Del:	xxxxx	xxxx	xxxxx	8.4	xxxx	xxxxx	xxxxx	xxxx	xxxxx	117.2	xxxx	11.2
LOS by Move:	*	*	*	A	*	*	*	*	*	F	*	B
Movement:	LT - LTR - RT			LT - LTR - RT			LT - LTR - RT			LT - LTR - RT		
Shared Cap.:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx
SharedQueue:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shrd ConDel:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shared LOS:	*	*	*	*	*	*	*	*	*	*	*	*
ApproachDel:	xxxxxx			xxxxxx			xxxxxx			94.6		
ApproachLOS:	*			*			*			F		

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

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: DRR
Agency/Co.: CTG
Date Performed: 5/23/2013
Analysis Time Period: Saturday PM Peak Hour
Intersection: Silverado/Soda Canyon
Jurisdiction: Napa Co
Units: U. S. Customary
Analysis Year: 2030 without Project
Project ID: Mountain Peak Winery
East/West Street: Silverado Trail
North/South Street: Soda Canyon
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		393	37	26	1016	
Peak-Hour Factor, PHF		0.91	0.91	0.91	0.91	
Hourly Flow Rate, HFR		431	40	28	1116	
Percent Heavy Vehicles		--	--	0	--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes		1	0	1	1	
Configuration			TR	L	T	
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	81		22			
Peak Hour Factor, PHF	0.91		0.91			
Hourly Flow Rate, HFR	89		24			
Percent Heavy Vehicles	1		0			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			/			/
Lanes	1		1			
Configuration	L		R			

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		L	L		R			
v (vph)		28	89		24			
C(m) (vph)		1101	111		613			
v/c		0.03	0.80		0.04			
95% queue length		0.08	4.56		0.12			
Control Delay		8.4	109.8		11.1			
LOS		A	F		B			
Approach Delay				88.9				
Approach LOS				F				

2030 with project - Saturday

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

Intersection #1 Silverado Trail/Soda Canyon Rd

Average Delay (sec/veh): 6.5 Worst Case Level Of Service: F[98.1]

Approach:	North Bound						South Bound						East Bound						West Bound					
Movement:	L	-	T	-	R		L	-	T	-	R		L	-	T	-	R		L	-	T	-	R	
Control:	Uncontrolled						Uncontrolled						Stop Sign						Stop Sign					
Rights:	Include						Include						Include						Include					
Lanes:	0	0	0	1	0		1	0	1	0	0		0	0	0	0	0		1	0	0	0	1	
Volume Module:																								
Base Vol:	0	393		41			29	1017		0			0		0		0		81		0		22	
Growth Adj:	1.00	1.00		1.00			1.00	1.00		1.00			1.00		1.00		1.00		1.00		1.00		1.00	
Initial Bse:	0	393		41			29	1017		0			0		0		0		81		0		22	
User Adj:	1.00	1.00		1.00			1.00	1.00		1.00			1.00		1.00		1.00		1.00		1.00		1.00	
PHF Adj:	0.90	0.90		0.90			0.90	0.90		0.90			0.90		0.90		0.90		0.90		0.90		0.90	
PHF Volume:	0	437		46			32	1130		0			0		0		0		90		0		24	
Reduct Vol:	0	0		0			0	0		0			0		0		0		0		0		0	
FinalVolume:	0	437		46			32	1130		0			0		0		0		90		0		24	
Critical Gap Module:																								
Critical Gp:	xxxxx	xxxx	xxxxx				4.1	xxxx	xxxxx	xxxxx	xxxx	xxxxx							6.4	xxxx			6.2	
FollowUpTim:	xxxxx	xxxx	xxxxx				2.2	xxxx	xxxxx	xxxxx	xxxx	xxxxx							3.5	xxxx			3.3	
Capacity Module:																								
Cnflict Vol:	xxxx	xxxx	xxxxx				482	xxxx	xxxxx	xxxx	xxxx	xxxxx							1654	xxxx			459	
Potent Cap.:	xxxx	xxxx	xxxxx				1086	xxxx	xxxxx	xxxx	xxxx	xxxxx							109	xxxx			606	
Move Cap.:	xxxx	xxxx	xxxxx				1086	xxxx	xxxxx	xxxx	xxxx	xxxxx							107	xxxx			606	
Volume/Cap:	xxxx	xxxx	xxxx				0.03	xxxx	xxxx	xxxx	xxxx	xxxx							0.84	xxxx			0.04	
Level Of Service Module:																								
2Way95thQ:	xxxx	xxxx	xxxxx				0.1	xxxx	xxxxx	xxxx	xxxx	xxxxx							4.9	xxxx			0.1	
Control Del:	xxxxx	xxxx	xxxxx				8.4	xxxx	xxxxx	xxxxx	xxxx	xxxxx							121.7	xxxx			11.2	
LOS by Move:	*	*	*				A	*	*	*	*	*							F	*			B	
Movement:	LT	-	LTR	-	RT		LT	-	LTR	-	RT		LT	-	LTR	-	RT		LT	-	LTR	-	RT	
Shared Cap.:	xxxx	xxxx	xxxxx				xxxx	xxxx	xxxxx				xxxx	xxxx	xxxxx				xxxx	xxxx	xxxxx			
SharedQueue:	xxxxx	xxxx	xxxxx				xxxxx	xxxx	xxxxx				xxxxx	xxxx	xxxxx				xxxxx	xxxx	xxxxx			
Shrd ConDel:	xxxxx	xxxx	xxxxx				xxxxx	xxxx	xxxxx				xxxxx	xxxx	xxxxx				xxxxx	xxxx	xxxxx			
Shared LOS:	*	*	*				*	*	*				*	*	*				*	*	*			
ApproachDel:	xxxxxx						xxxxxx						xxxxxx						98.1					
ApproachLOS:	*						*						*						F					

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

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: DRR
Agency/Co.: CTG
Date Performed: 7/29/2013
Analysis Time Period: Weekday PM Peak Hour
Intersection: Silverado/Soda Canyon
Jurisdiction: Napa Co
Units: U. S. Customary
Analysis Year: 2019 Harvest with Project
Project ID: Mountain Peak Winery
East/West Street: Silverado Trail
North/South Street: Soda Canyon
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		410	44	14	1144	
Peak-Hour Factor, PHF		0.89	0.89	0.89	0.89	
Hourly Flow Rate, HFR		460	49	15	1285	
Percent Heavy Vehicles		--	--	0	--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes		1	0	1	1	
Configuration			TR	L	T	
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	108		18			
Peak Hour Factor, PHF	0.89		0.89			
Hourly Flow Rate, HFR	121		20			
Percent Heavy Vehicles	0		7			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			/			/
Lanes	1		1			
Configuration	L		R			

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		L	L		R			
v (vph)		15	121		20			
C(m) (vph)		1066	88		573			
v/c		0.01	1.38		0.03			
95% queue length		0.04	9.11		0.11			
Control Delay		8.4	310.4		11.5			
LOS		A	F		B			
Approach Delay			268.0					
Approach LOS			F					

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: DRR
Agency/Co.: CTG
Date Performed: 7/27/2013
Analysis Time Period: Saturday PM Peak Hour
Intersection: Silverado/Soda Canyon
Jurisdiction: Napa Co
Units: U. S. Customary
Analysis Year: 2019 Harvest with Project
Project ID: Mountain Peak Winery
East/West Street: Silverado Trail
North/South Street: Soda Canyon
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		352	37	27	912	
Peak-Hour Factor, PHF		0.90	0.90	0.90	0.90	
Hourly Flow Rate, HFR		391	41	30	1013	
Percent Heavy Vehicles		--	--	0	--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes		1 0		1	1	
Configuration		TR		L	T	
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	73		20			
Peak Hour Factor, PHF	0.90		0.90			
Hourly Flow Rate, HFR	81		22			
Percent Heavy Vehicles	1		0			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			/			/
Lanes	1		1			
Configuration	L		R			

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		L	L		R			
v (vph)		30	81		22			
C(m) (vph)		1138	134		644			
v/c		0.03	0.60		0.03			
95% queue length		0.08	3.12		0.11			
Control Delay		8.2	66.3		10.8			
LOS		A	F		B			
Approach Delay			54.4					
Approach LOS			F					

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: DRR
Agency/Co.: CTG
Date Performed: 7/29/2013
Analysis Time Period: Weekday PM Peak Hour
Intersection: Silverado/Soda Canyon
Jurisdiction: Napa Co
Units: U. S. Customary
Analysis Year: 2030 Harvest with Project
Project ID: Mountain Peak Winery
East/West Street: Silverado Trail
North/South Street: Soda Canyon
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		426	46	15	1308	
Peak-Hour Factor, PHF		0.90	0.90	0.90	0.90	
Hourly Flow Rate, HFR		473	51	16	1453	
Percent Heavy Vehicles		--	--	0	--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes		1	0	1	1	
Configuration			TR	L	T	
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	123		19			
Peak Hour Factor, PHF	0.90		0.90			
Hourly Flow Rate, HFR	136		21			
Percent Heavy Vehicles	0		7			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			/			/
Lanes	1		1			
Configuration	L		R			

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		L	L		R			
v (vph)		16	136		21			
C(m) (vph)		1053	67		562			
v/c		0.02	2.03		0.04			
95% queue length		0.05	12.66		0.12			
Control Delay		8.5	611.0		11.7			
LOS		A	F		B			
Approach Delay				530.9				
Approach LOS				F				

HCS+: Unsignalized Intersections Release 5.6

Phone: Fax:
E-Mail:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: DRR
Agency/Co.: CTG
Date Performed: 7/29/2013
Analysis Time Period: Weekday PM Peak Hour
Intersection: Silverado/Soda Canyon
Jurisdiction: Napa Co
Units: U. S. Customary
Analysis Year: 2030 Harvest with Project
Project ID: Mountain Peak Winery
East/West Street: Silverado Trail
North/South Street: Soda Canyon
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1 L	2 T	3 R	4 L	5 T	6 R
Volume		426	46	15	1308	
Peak-Hour Factor, PHF		0.90	0.90	0.90	0.90	
Peak-15 Minute Volume		118	13	4	363	
Hourly Flow Rate, HFR		473	51	16	1453	
Percent Heavy Vehicles		--	--	0	--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes		1	0	1	1	
Configuration			TR	L	T	
Upstream Signal?		No			No	

Minor Street Movements	7 L	8 T	9 R	10 L	11 T	12 R
Volume	123		19			
Peak Hour Factor, PHF	0.90		0.90			
Peak-15 Minute Volume	34		5			
Hourly Flow Rate, HFR	136		21			
Percent Heavy Vehicles	0		7			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage				/		/
RT Channelized?			No			
Lanes	1		1			
Configuration	L		R			

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0

Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
Percent Blockage	0	0	0	0

Upstream Signal Data

	Prog. Flow vph	Sat Flow vph	Arrival Type	Green Time sec	Cycle Length sec	Prog. Speed mph	Distance to Signal feet
S2 Left-Turn							
Through							
S5 Left-Turn							
Through							

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

	Movement 2	Movement 5
Shared ln volume, major th vehicles:		
Shared ln volume, major rt vehicles:		
Sat flow rate, major th vehicles:		
Sat flow rate, major rt vehicles:		
Number of major street through lanes:		

Worksheet 4-Critical Gap and Follow-up Time Calculation

Critical Gap Calculation

Movement	1 L	4 L	7 L	8 T	9 R	10 L	11 T	12 R
t(c,base)		4.1	7.1		6.2			
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)		0	0		7			
t(c,g)			0.20	0.20	0.10	0.20	0.20	0.10
Percent Grade			0.00	0.00	0.00	0.00	0.00	0.00
t(3,lt)		0.00	0.70		0.00			
t(c,T): 1-stage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2-stage	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
t(c) 1-stage		4.1	6.4		6.3			
2-stage								

Follow-Up Time Calculations

Movement	1 L	4 L	7 L	8 T	9 R	10 L	11 T	12 R
t(f,base)		2.20	3.50		3.30			
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)		0	0		7			
t(f)		2.2	3.5		3.4			

Worksheet 5-Effect of Upstream Signals

Computation 1-Queue Clearance Time at Upstream Signal

	Movement 2		Movement 5	
	V(t)	V(l,prot)	V(t)	V(l,prot)
V prog				

Total Saturation Flow Rate, s (vph)	
Arrival Type	
Effective Green, g (sec)	
Cycle Length, C (sec)	
Rp (from Exhibit 16-11)	
Proportion vehicles arriving on green P	
g(q1)	
g(q2)	
g(q)	

Computation 2-Proportion of TWSC Intersection Time blocked	Movement 2		Movement 5	
	V(t)	V(l,prot)	V(t)	V(l,prot)
alpha				
beta				
Travel time, t(a) (sec)				
Smoothing Factor, F				
Proportion of conflicting flow, f				
Max platooned flow, V(c,max)				
Min platooned flow, V(c,min)				
Duration of blocked period, t(p)				
Proportion time blocked, p		0.000		0.000

Computation 3-Platoon Event Periods	Result
p(2)	0.000
p(5)	0.000
p(dom)	
p(subo)	
Constrained or unconstrained?	

Proportion unblocked for minor movements, p(x)	(1) Single-stage Process	(2) Two-Stage Process Stage I	(3) Two-Stage Process Stage II
p(1)			
p(4)			
p(7)			
p(8)			
p(9)			
p(10)			
p(11)			
p(12)			

Computation 4 and 5 Single-Stage Process								
Movement	1	4	7	8	9	10	11	12
	L	L	L	T	R	L	T	R
V c,x		524	1983		498			
s								
Px								
V c,u,x								
C r,x								
C plat,x								

Two-Stage Process				
	7	8	10	11

	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2
V(c,x)								
s		1500						
P(x)								
V(c,u,x)								
C(r,x)								
C(plat,x)								

Worksheet 6-Impedance and Capacity Equations

Step 1: RT from Minor St.	9	12
Conflicting Flows	498	
Potential Capacity	562	
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity	562	
Probability of Queue free St.	0.96	1.00
Step 2: LT from Major St.	4	1
Conflicting Flows	524	
Potential Capacity	1053	
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity	1053	
Probability of Queue free St.	0.98	1.00
Maj L-Shared Prob Q free St.		
Step 3: TH from Minor St.	8	11
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	0.98	0.98
Movement Capacity		
Probability of Queue free St.	1.00	1.00
Step 4: LT from Minor St.	7	10
Conflicting Flows	1983	
Potential Capacity	68	
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor		0.98
Maj. L, Min T Adj. Imp Factor.		0.99
Cap. Adj. factor due to Impeding mvmnt	0.98	0.95
Movement Capacity	67	

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

Step 3: TH from Minor St.	8	11
Part 1 - First Stage		
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor		
Cap. Adj. factor due to Impeding mvmnt		
Movement Capacity		
Probability of Queue free St.		

Part 2 - Second Stage			
Conflicting Flows			
Potential Capacity			
Pedestrian Impedance Factor			
Cap. Adj. factor due to Impeding mvmnt			
Movement Capacity			
Part 3 - Single Stage			
Conflicting Flows			
Potential Capacity			
Pedestrian Impedance Factor	1.00	1.00	
Cap. Adj. factor due to Impeding mvmnt	0.98	0.98	
Movement Capacity			
Result for 2 stage process:			
a			
y			
C t			
Probability of Queue free St.	1.00	1.00	
Step 4: LT from Minor St.	7	10	
Part 1 - First Stage			
Conflicting Flows			
Potential Capacity			
Pedestrian Impedance Factor			
Cap. Adj. factor due to Impeding mvmnt			
Movement Capacity			
Part 2 - Second Stage			
Conflicting Flows			
Potential Capacity			
Pedestrian Impedance Factor			
Cap. Adj. factor due to Impeding mvmnt			
Movement Capacity			
Part 3 - Single Stage			
Conflicting Flows	1983		
Potential Capacity	68		
Pedestrian Impedance Factor	1.00	1.00	
Maj. L, Min T Impedance factor		0.98	
Maj. L, Min T Adj. Imp Factor.		0.99	
Cap. Adj. factor due to Impeding mvmnt	0.98	0.95	
Movement Capacity	67		
Results for Two-stage process:			
a			
y			
C t	67		

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)	136		21			
Movement Capacity (vph)	67		562			
Shared Lane Capacity (vph)						

Worksheet 9-Computation of Effect of Flared Minor Street Approaches

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
C sep	67		562			
Volume	136		21			
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh						
SUM C sep						
n						
C act						

Worksheet 10-Delay, Queue Length, and Level of Service

Movement	1	4	7	8	9	10	11	12
Lane Config		L	L		R			
v (vph)		16	136		21			
C(m) (vph)		1053	67		562			
v/c		0.02	2.03		0.04			
95% queue length		0.05	12.66		0.12			
Control Delay		8.5	611.0		11.7			
LOS		A	F		B			
Approach Delay				530.9				
Approach LOS				F				

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	1.00	0.98
v(il), Volume for stream 2 or 5		
v(i2), Volume for stream 3 or 6		
s(il), Saturation flow rate for stream 2 or 5		
s(i2), Saturation flow rate for stream 3 or 6		
P*(oj)		
d(M,LT), Delay for stream 1 or 4		8.5
N, Number of major street through lanes		
d(rank,1) Delay for stream 2 or 5		

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: DRR
Agency/Co.: CTG
Date Performed: 7/29/2013
Analysis Time Period: Saturday PM Peak Hour
Intersection: Silverado/Soda Canyon
Jurisdiction: Napa Co
Units: U. S. Customary
Analysis Year: 2030 Harvest with Project
Project ID: Mountain Peak Winery
East/West Street: Silverado Trail
North/South Street: Soda Canyon
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		393	41	29	1017	
Peak-Hour Factor, PHF		0.91	0.91	0.91	0.91	
Hourly Flow Rate, HFR		431	45	31	1117	
Percent Heavy Vehicles		--	--	0	--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes		1	0	1	1	
Configuration			TR	L	T	
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	81		22			
Peak Hour Factor, PHF	0.91		0.91			
Hourly Flow Rate, HFR	89		24			
Percent Heavy Vehicles	1		0			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			/			/
Lanes	1		1			
Configuration	L		R			

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		L	L		R			
v (vph)		31	89		24			
C(m) (vph)		1097	109		610			
v/c		0.03	0.82		0.04			
95% queue length		0.09	4.66		0.12			
Control Delay		8.4	114.4		11.1			
LOS		A	F		B			
Approach Delay			92.5					
Approach LOS			F					

HCS+: Unsignalized Intersections Release 5.6

Phone: Fax:
E-Mail:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: DRR
Agency/Co.: CTG
Date Performed: 7/29/2013
Analysis Time Period: Saturday PM Peak Hour
Intersection: Silverado/Soda Canyon
Jurisdiction: Napa Co
Units: U. S. Customary
Analysis Year: 2030 Harvest with Project
Project ID: Mountain Peak Winery
East/West Street: Silverado Trail
North/South Street: Soda Canyon
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1 L	2 T	3 R	4 L	5 T	6 R
Volume		393	41	29	1017	
Peak-Hour Factor, PHF		0.91	0.91	0.91	0.91	
Peak-15 Minute Volume		108	11	8	279	
Hourly Flow Rate, HFR		431	45	31	1117	
Percent Heavy Vehicles		--	--	0	--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes		1	0	1	1	
Configuration			TR	L	T	
Upstream Signal?		No			No	

Minor Street Movements	7 L	8 T	9 R	10 L	11 T	12 R
Volume	81		22			
Peak Hour Factor, PHF	0.91		0.91			
Peak-15 Minute Volume	22		6			
Hourly Flow Rate, HFR	89		24			
Percent Heavy Vehicles	1		0			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage				/		/
RT Channelized?			No			
Lanes	1		1			
Configuration	L		R			

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0

Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
Percent Blockage	0	0	0	0

Upstream Signal Data

	Prog. Flow vph	Sat Flow vph	Arrival Type	Green Time sec	Cycle Length sec	Prog. Speed mph	Distance to Signal feet
S2 Left-Turn							
Through							
S5 Left-Turn							
Through							

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

	Movement 2	Movement 5
Shared ln volume, major th vehicles:		
Shared ln volume, major rt vehicles:		
Sat flow rate, major th vehicles:		
Sat flow rate, major rt vehicles:		
Number of major street through lanes:		

Worksheet 4-Critical Gap and Follow-up Time Calculation

Critical Gap Calculation

Movement	1 L	4 L	7 L	8 T	9 R	10 L	11 T	12 R
t(c,base)		4.1	7.1		6.2			
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)		0	1		0			
t(c,g)			0.20	0.20	0.10	0.20	0.20	0.10
Percent Grade			0.00	0.00	0.00	0.00	0.00	0.00
t(3,lt)		0.00	0.70		0.00			
t(c,T): 1-stage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2-stage	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
t(c) 1-stage		4.1	6.4		6.2			
2-stage								

Follow-Up Time Calculations

Movement	1 L	4 L	7 L	8 T	9 R	10 L	11 T	12 R
t(f,base)		2.20	3.50		3.30			
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)		0	1		0			
t(f)		2.2	3.5		3.3			

Worksheet 5-Effect of Upstream Signals

Computation 1-Queue Clearance Time at Upstream Signal

	Movement 2		Movement 5	
	V(t)	V(l,prot)	V(t)	V(l,prot)
V prog				

Total Saturation Flow Rate, s (vph)	
Arrival Type	
Effective Green, g (sec)	
Cycle Length, C (sec)	
Rp (from Exhibit 16-11)	
Proportion vehicles arriving on green P	
g(q1)	
g(q2)	
g(q)	

Computation 2-Proportion of TWSC Intersection Time blocked	Movement 2		Movement 5	
	V(t)	V(l,prot)	V(t)	V(l,prot)
alpha				
beta				
Travel time, t(a) (sec)				
Smoothing Factor, F				
Proportion of conflicting flow, f				
Max platooned flow, V(c,max)				
Min platooned flow, V(c,min)				
Duration of blocked period, t(p)				
Proportion time blocked, p	0.000		0.000	

Computation 3-Platoon Event Periods	Result
p(2)	0.000
p(5)	0.000
p(dom)	
p(subo)	
Constrained or unconstrained?	

Proportion unblocked for minor movements, p(x)	(1) Single-stage Process	(2) Two-Stage Process Stage I	(3) Two-Stage Process Stage II
p(1)			
p(4)			
p(7)			
p(8)			
p(9)			
p(10)			
p(11)			
p(12)			

Computation 4 and 5 Single-Stage Process								
Movement	1	4	7	8	9	10	11	12
	L	L	L	T	R	L	T	R
V c,x		476	1633		454			
s								
Px								
V c,u,x								
C r,x								
C plat,x								

Two-Stage Process				
	7	8	10	11

	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2
V(c,x)								
s		1500						
P(x)								
V(c,u,x)								
C(r,x)								
C(plat,x)								

Worksheet 6-Impedance and Capacity Equations

Step 1: RT from Minor St.	9	12
Conflicting Flows	454	
Potential Capacity	610	
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity	610	
Probability of Queue free St.	0.96	1.00
Step 2: LT from Major St.	4	1
Conflicting Flows	476	
Potential Capacity	1097	
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity	1097	
Probability of Queue free St.	0.97	1.00
Maj L-Shared Prob Q free St.		
Step 3: TH from Minor St.	8	11
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	0.97	0.97
Movement Capacity		
Probability of Queue free St.	1.00	1.00
Step 4: LT from Minor St.	7	10
Conflicting Flows	1633	
Potential Capacity	112	
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor		0.97
Maj. L, Min T Adj. Imp Factor.		0.98
Cap. Adj. factor due to Impeding mvmnt	0.97	0.94
Movement Capacity	109	

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

Step 3: TH from Minor St.	8	11
Part 1 - First Stage		
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor		
Cap. Adj. factor due to Impeding mvmnt		
Movement Capacity		
Probability of Queue free St.		

Part 2 - Second Stage			
Conflicting Flows			
Potential Capacity			
Pedestrian Impedance Factor			
Cap. Adj. factor due to Impeding mvmnt			
Movement Capacity			
Part 3 - Single Stage			
Conflicting Flows			
Potential Capacity			
Pedestrian Impedance Factor	1.00	1.00	
Cap. Adj. factor due to Impeding mvmnt	0.97	0.97	
Movement Capacity			
Result for 2 stage process:			
a			
y			
C t			
Probability of Queue free St.	1.00	1.00	
Step 4: LT from Minor St.	7	10	
Part 1 - First Stage			
Conflicting Flows			
Potential Capacity			
Pedestrian Impedance Factor			
Cap. Adj. factor due to Impeding mvmnt			
Movement Capacity			
Part 2 - Second Stage			
Conflicting Flows			
Potential Capacity			
Pedestrian Impedance Factor			
Cap. Adj. factor due to Impeding mvmnt			
Movement Capacity			
Part 3 - Single Stage			
Conflicting Flows	1633		
Potential Capacity	112		
Pedestrian Impedance Factor	1.00	1.00	
Maj. L, Min T Impedance factor		0.97	
Maj. L, Min T Adj. Imp Factor.		0.98	
Cap. Adj. factor due to Impeding mvmnt	0.97	0.94	
Movement Capacity	109		
Results for Two-stage process:			
a			
y			
C t	109		

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)	89		24			
Movement Capacity (vph)	109		610			
Shared Lane Capacity (vph)						

Worksheet 9-Computation of Effect of Flared Minor Street Approaches

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
C sep	109		610			
Volume	89		24			
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh						
SUM C sep						
n						
C act						

Worksheet 10-Delay, Queue Length, and Level of Service

Movement	1	4	7	8	9	10	11	12
Lane Config		L	L		R			
v (vph)		31	89		24			
C(m) (vph)		1097	109		610			
v/c		0.03	0.82		0.04			
95% queue length		0.09	4.66		0.12			
Control Delay		8.4	114.4		11.1			
LOS		A	F		B			
Approach Delay				92.5				
Approach LOS				F				

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	1.00	0.97
v(il), Volume for stream 2 or 5		
v(i2), Volume for stream 3 or 6		
s(il), Saturation flow rate for stream 2 or 5		
s(i2), Saturation flow rate for stream 3 or 6		
P*(oj)		
d(M,LT), Delay for stream 1 or 4		8.4
N, Number of major street through lanes		
d(rank,1) Delay for stream 2 or 5		