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Traffic Impact Study

Howell Mountain Cemetery P20-00030
Planning Commission Hearing Date (June 17, 2026)



Final Traffic Impact Study for the Howell Mountain Cemetery Project



Prepared for the County of Napa

File Number: P20-0030

Submitted by

W-Trans

December 13, 2023



**TRAFFIC ENGINEERING
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Executive Summary

The proposed project is the development of a green burial cemetery on a 110-acre site in the County of Napa; the site would be managed as a conservation property. Approximately 21.8 acres of the 110-acre site would be designated for interment areas and would accommodate plots and gravesites. The remaining portion of the site would be retained as open space. The administrative and sales functions of the cemetery would be located off-site in a separate office.

Based on standard rates published by the Institute of Transportation Engineers (ITE) and data from a peak hour survey at North Sonoma Mountain Regional Park and Open Space Preserve in Sonoma County, the project’s proposed cemetery and open space uses are expected to generate an average of 108 trips per day, including 8 p.m. peak hour trips on Friday and 34 trips during the Saturday p.m. peak hour.

The study area consists of the section of Howell Mountain Road fronting the project site and the intersection of Silverado Trail/Deer Park Road. The study intersection is currently operating at LOS D during the Friday p.m. peak hour and LOS C during the Saturday p.m. peak hour. With project traffic added these service levels would be the same.

Under the anticipated Future volumes, operation of the study intersection is expected to deteriorate to LOS F during the Friday p.m. peak hour and to LOS E during the Saturday p.m. peak hour under the existing all-way stop control. Acceptable LOS D or C operation could be achieved by energizing the traffic signal that currently operates in red flash and modifying the lane assignments to include exclusive left-turn lanes and shared through/right-turn lanes on all four approaches. Upon the addition of project-generated traffic to the anticipated Future volumes and with the existing all-way stop controls, the study intersection would continue operating at LOS F during the Friday p.m. peak hour and would deteriorate to LOS F during the Saturday p.m. peak hour. Use of the traffic signal with the modified lane configuration would result in acceptable LOS D or C operation during both peaks. Alternatively, should the County determine that the signal should not be energized, modification of the lane configuration to convert the southbound approach from a shared left-turn/through lane and a dedicated right-turn lane to a shared through/right-turn lane and a dedicated left-turn lane would result in improved operation and offset the project’s adverse impact.

Bicycle facilities serving the project site are adequate and will improve upon the completion of the proposed facilities. The existing pedestrian facilities serving the project site on Howell Mountain Road are consistent with the surrounding area and adequate for the type of land use. Existing transit facilities serving the project site are adequate given the lack of demand.

While sight lines to the west from the driveway location are adequate, the trees blocking sight lines to the east of the driveway should be trimmed or removed and the low-lying vegetation should be maintained at a height of less than three feet to achieve adequate sight lines.

A left-turn lane is warranted on Howell Mountain Road at the existing project driveway based on the County of Napa’s current policy. To install a left-turn lane it would be necessary to remove a substantial number of heritage redwood and other trees as well as grade into a hillside or fill a downward slope. Both of these activities would negatively impact these natural resources, thereby providing evidence for the County to make a finding to allow an exception to this standard. As there are no other left-turn lanes on Howell Mountain Road in the study area, the lack of a left-turn lane would therefore be consistent with the character of the roadway and would not violate driver expectation, resulting in operational conditions that would be effectively the same without a turn lane as with one.

Introduction

This report presents an analysis of the potential effects on traffic operation associated with development of a proposed green burial cemetery to be located on a 110-acre site in the County of Napa. The traffic study was completed in accordance with the criteria established by the County of Napa, reflects a scope of work reviewed and approved by County staff, and is consistent with standard traffic engineering techniques.

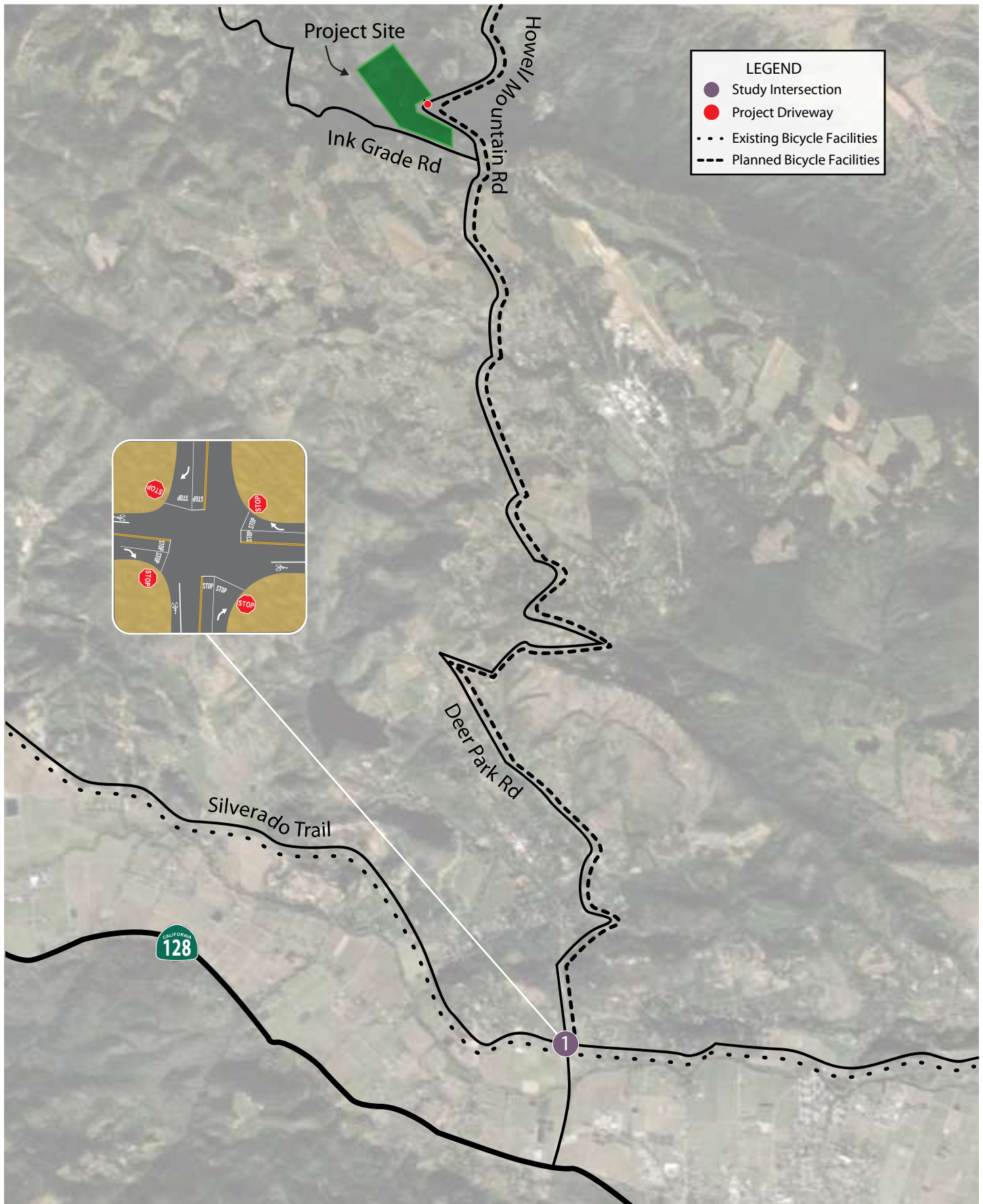
Prelude

The purpose of a traffic impact study is to provide County staff and policy makers with data they can use to make an informed decision regarding the potential traffic impacts and adverse effects of a proposed project, and any associated improvements that would be required to mitigate these impacts to a level of insignificance as defined by the County's General Plan or other policies and address adverse effects. Vehicular traffic is typically evaluated by determining the number of new trips that the proposed use would be expected to generate, distributing these trips to the surrounding street system based on existing travel patterns or anticipated travel patterns specific to the proposed project, then analyzing if the new traffic would be expected to have an adverse effect on operation of critical intersections or roadway segments. Impacts relative to access for pedestrians, bicyclists, and to transit are also addressed.

Project Profile

The proposed project would be developed as a green burial cemetery on a 110-acre site in the County of Napa and managed as a conservation property. Approximately 21.8 acres of the 110-acre site would be designated for interment areas and would accommodate plots and gravesites. The remaining portion of the site would be retained as open space. Existing and planned trails would be open to the public. Trails would provide access for pedestrians and all-terrain vehicles associated with the cemetery function to gain access to plots within interment areas. A 20-foot-wide driveway would extend from Howell Mountain Road into the site and terminate at a turnaround area north of the welcome center. A 400 square foot welcome center would be built at the end of the driveway. The cemetery's administrative and sales functions would be housed in an existing, previously approved office building located in a nearby community.

The County of Napa file number is P20-0030. The project site is located at 1225 Howell Mountain Road, as shown in Figure 1.



Traffic Impact Study for the Howell Mountain Cemetery Project
Figure 1 – Study Area and Existing Lane Configurations

Transportation Setting

Operational Analysis

Study Area and Periods

The study area consists of the section of Howell Mountain Road fronting the project site and the intersection of Silverado Trail/Deer Park Road.

Operating conditions during the Friday and Saturday p.m. peak periods were evaluated as these time periods reflect the highest traffic volumes areawide and for the proposed project. The Friday evening peak hour occurs between 4:00 and 5:00 p.m. and typically reflects the highest level of congestion of the day during the homeward bound commute, while the weekend midday peak occurs between 1:45 and 2:45 p.m. when visitation to area wineries is at its peak.

Study Intersections

Silverado Trail/Deer Park Road is an all-way stop-controlled intersection with stop signs on all four approaches. It is noted that a full traffic signal has been installed at this location, though it is not operational as a signal; rather, it currently operates with only the red indications flashing. The location of the study intersection and the existing lane configurations and controls are shown in Figure 1.

Study Roadway

Howell Mountain Road is a rural two-lane roadway that winds its way north-south from Deer Park Road on the south to Chiles Pope Valley Road on the north. The roadway is approximately 28 feet wide adjacent to the site and includes two 11-foot travel lanes and three-foot shoulders. Howell Mountain Road has a posted speed limit of 35 miles per hour (mph), though it is noted that the roadway has a posted advisory speed of 15 mph at the horizontal curve approximately 275 feet northwest of the existing driveway.

This study was initiated in 2020 when shelter-in-place orders were in effect due to the COVID-19 pandemic, so traffic volumes at that time were considered atypical. As a result, traffic counts were collected on Chiles Pope Valley Road at a location where counts had previously been collected in October 2017 for the *Maxville Lake Winery Traffic Impact Study*. Chiles Pope Valley Road was selected because it has a similar character and use and is in the same geographic area. These new count volumes were used as the “control” for purposes of establishing factors to be applied to current volumes on Howell Mountain Road to achieve “adjusted existing” volumes. New counts on both Howell Mountain Road and Chiles Pope Valley Road were collected for two Fridays and Saturdays each. The growth factor was applied to Howell Mountain Road to estimate conditions in 2020 without the COVID-19 pandemic. The growth factor calculations are provided in Appendix A. Based on these traffic counts collected in October 2017 and June and July of 2020, the ADT adjacent to the site is approximately 1,700 on weekdays and 1,600 on weekend days.

Collision History

The collision history for the study area was reviewed to determine any trends or patterns that may indicate a safety issue. Collision rates were calculated based on records available from the California

Highway Patrol as published in their Statewide Integrated Traffic Records System (SWITRS) reports. The most current five-year period available is June 1, 2017, through May 31, 2022. For purposes of determining the collision rate, the 2020 counts were used rather than estimating volumes in 2022 as use of this smaller number in the denominator provides a more conservative result.

As presented in Table 1, the calculated collision rate for the study intersection was compared to average collision rate for similar facilities statewide, as indicated in *2019 Collision Data on California State Highways*, California Department of Transportation (Caltrans). The intersection of Silverado Trail/Deer Park Road had a calculated collision rate equal to the statewide average for four-legged all-way stop-controlled intersections, indicating that it is operating within what would typically be considered acceptable safety parameters.

Table 1 – Collision Rates at the Study Intersections

Study Intersection	Number of Collisions (2017-2022)	Calculated Collision Rate (c/mve)	Statewide Average Collision Rate (c/mve)
1. Silverado Trail/Deer Park Rd	7	0.27	0.27

Note: c/mve = collisions per million vehicles entering

The collision rate for the study roadway segment was also compared to the statewide average for similar facilities. Three of the four reported collisions on the study segment of Howell Mountain Road involved a fixed object and one was a sideswipe. While the study segment had an above-average collision rate compared to the statewide average, the number of collisions is low and the injury rate is below the statewide average; therefore, no remedial action is suggested. In addition, the collision rate is somewhat conservative as it was calculated using the estimated 2020 traffic volumes. The study segment collision history is summarized in Table 2 and the collision rate calculations are provided in Appendix B.

Table 2 – Collision Rates at the Study Roadways

Study Roadway	Number of Collisions (2017-2022)	Calculated Collision Rate (c/mve)	Statewide Average Collision Rate (c/mve)
1. Howell Mountain Rd	4	1.29	0.87

Note: c/mve = collisions per million vehicles entering

Alternative Modes

Pedestrian Facilities

Pedestrian facilities include sidewalks, crosswalks, pedestrian signal phases, curb ramps, curb extensions, and various streetscape amenities such as lighting, benches, etc. As might be expected given the rural location of the project site, a connected pedestrian network is lacking, though such facilities would not be appropriate in this setting.

Bicycle Facilities

The *Highway Design Manual*, Caltrans, 2020, classifies bikeways into the following categories:

- **Class I Multi-Use Path** – a completely separated right-of-way for the exclusive use of bicycles and pedestrians with cross flows of motorized traffic minimized.
- **Class II Bike Lane** – a striped and signed lane for one-way bike travel on a street or highway.
- **Class III Bike Route** – signing only for shared use with motor vehicles within the same travel lane on a street or highway.
- **Class IV Bikeway** – also known as a separated bikeway, a Class IV Bikeway is for the exclusive use of bicycles and includes a separation between the bikeway and the motor vehicle traffic lane. The separation may include, but is not limited to, grade separation, flexible posts, inflexible physical barriers, or on-street parking.

In the project area, there are bike lanes on Silverado Trail. According to the 2019 *Napa Countywide Bicycle Plan*, bicycle facilities are proposed for Deer Park Road and Howell Mountain Road, as summarized in Table 3.

Table 3 – Bicycle Facility Summary				
Status Facility	Class	Length (miles)	Begin Point	End Point
Existing				
Silverado Trail	II	26.9	SR 121 (Napa)	SR 29 (Calistoga)
Planned				
Deer Park Rd	III	4.05	Silverado Trail	White Cottage Rd
Howell Mountain Rd	III	3.54	Deer Park Rd	Ink Grade Rd
Howell Mountain Rd	III	2.48	Ink Grade Rd	Pope Valley Rd
Howell Mountain Rd	III	4.36	Silverado Trail	Deer Park Rd

Source: *Napa County Bicycle Plan*, Napa Valley Transportation Authority, 2019

Transit Facilities

Transit Services throughout Napa County are provided by Napa Valley Transit (VINE). There are no VINE stops within one-quarter of a mile of the project site.

Capacity Analysis

Intersection Level of Service Methodologies

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

The study intersection has stop signs on all approaches so was analyzed using the “All-Way Stop-Controlled” Intersection methodology from the HCM. This methodology evaluates delay for each approach based on turning movements, opposing and conflicting traffic volumes, and the number of lanes. Average vehicle delay is computed for the intersection as a whole and is then related to a Level of Service.

The ranges of delay associated with the various levels of service are indicated in Table 4.

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

Reference: *Highway Capacity Manual*, Transportation Research Board, 2010

Traffic Operation Standards

Napa County

In the Circulation Element of the *Napa County General Plan*, the following policies have been adopted:

- **Policy CIR-31** – The County seeks to provide a roadway system that maintains current roadway capacities in most locations and is efficient in providing local access.
- **Policy CIR-38** – The County seeks to maintain operations of roads and intersections in the unincorporated County area that minimize travel delays and promote safe access for all users. Operational analysis shall be conducted according to the latest version of the Highway Capacity Manual and as described in the current version of the County’s Transportation Impact Study Guidelines. In general, the County seeks to maintain Level of Service (LOS) D on arterial roadways and at signalized intersections, as the service level that best aligns with the County’s desire to balance its rural character with the needs of supporting economic vitality and growth.



In situations where the County determines that achieving LOS D would cause an unacceptable conflict with other goals and objectives, minimizing collisions and the adequacy of local access will be the County's priorities. Mitigating operational impacts should first focus on reducing the project's vehicular trips through modifying the project definition, applying TDM strategies, and/or applying new technologies that could reduce vehicular travel and associated delays; then secondarily should consider physical infrastructure changes. Proposed mitigations will be evaluated for their effect on collisions and local access, and for their effectiveness in achieving the maximum potential reduction in the project's operational impacts (see the County's Transportation Impact Study Guidelines for a list of potential mitigation measures).

The following roadway segments are exceptions to the LOS D standard described above:

- *State Route 29 in the unincorporated areas between Yountville and Calistoga: LOS F is acceptable.*
- *Silverado Trail between State Route 128 and Yountville Cross Road: LOS E is acceptable.*
- *State Route 12/121 between the Napa/Sonoma county line and Carneros Junction: LOS F is acceptable.*
- *American Canyon Road from I-80 to American Canyon City Limit: LOS E is acceptable.*

To provide a more quantitative method of adhering to the above standards, the County refers to *Guidelines for Interpretation of General Plan Circulation Policies on Significance Criteria* (Fehr & Peers, 2015). The document establishes thresholds of significance for road segments and different intersection control types. The memorandum states a project would cause a significant impact requiring mitigation if, for existing conditions:

- A signalized intersection operates at LOS A, B, C, or D during the selected peak hours without Project trips, and the LOS deteriorates to LOS E or F with the addition of Project trips; or
- A signalized intersection operates at LOS E or F during the selected peak hours without Project trips, and the addition of Project trips increases the total entering volume by one percent or more.
 - $\text{Project Contribution \%} = \text{Project Trips} \div \text{Existing Volumes}$
- An unsignalized intersection operates at LOS A, B, C, or D during the selected peak hours without Project trips, and the LOS deteriorates to LOS E or F with the addition of Project traffic; the peak hour traffic signal warrant criteria should also be evaluated and presented for informational purposes; or
- An unsignalized intersection operates at LOS E or F during the selected peak hours without Project trips, and the project contributes one percent or more of the total entering traffic for all-way stop-controlled intersections, or ten percent or more of the traffic on a side-street approach for side-street stop-controlled intersections; the peak hour traffic signal criteria should also be evaluated and presented for informational purposes. Both of those volumes are for the stop-controlled approaches only. Each stop-controlled approach that operates at LOS E or F should be analyzed individually;
 - All-Way Stop-Controlled Intersections – The following equation should be used if the all-way stop-controlled intersection operates at LOS E or F without the Project:
 - $\text{Project Contribution \%} = \text{Project Trips} \div \text{Existing Volumes}$
 - Side-Street Stop-Controlled Intersections – The following equation should be used if the side-street stop-controlled intersection operates at LOS E or F without the Project:
 - $\text{Project Contribution \%} = \text{Project Trips} \div \text{Existing Volumes}$
- An arterial segment operates at LOS A, B, C or D during the selected peak hours without Project trips, and deteriorates to LOS E or F with the addition of Project trips; or
- An arterial segment operates at LOS E or F during the selected peak hours without Project trips, and the addition of Project trips increases the total segment volume by one percent or more. The following equation should be used if the arterial segment operates at LOS E or F without the Project:

- Project Contribution % = Project Trips ÷ Existing Volumes

Further, a project would cause a significant impact requiring mitigation if, for cumulative (future) conditions, the Project’s volume is equal to, or greater than five percent of the difference between cumulative (future) and existing volumes.

- **Cumulative Conditions** – A Project’s contribution to a cumulative condition would be calculated as the Project’s percentage contribution to the total growth in traffic. This calculation applies to arterials, signalized intersections, and unsignalized intersections.
 - Project Contribution % = Project Trips ÷ (Cumulative Volumes – Existing Volumes)

It is noted that under current California Environmental Quality Act (CEQA) law the metric of LOS is no longer a valid indication of a significant traffic impact, so for purposes of this analysis operation was evaluated for consistency with General Plan policies, and where these policies are not met, the results are identified as having an adverse effect under such policies.

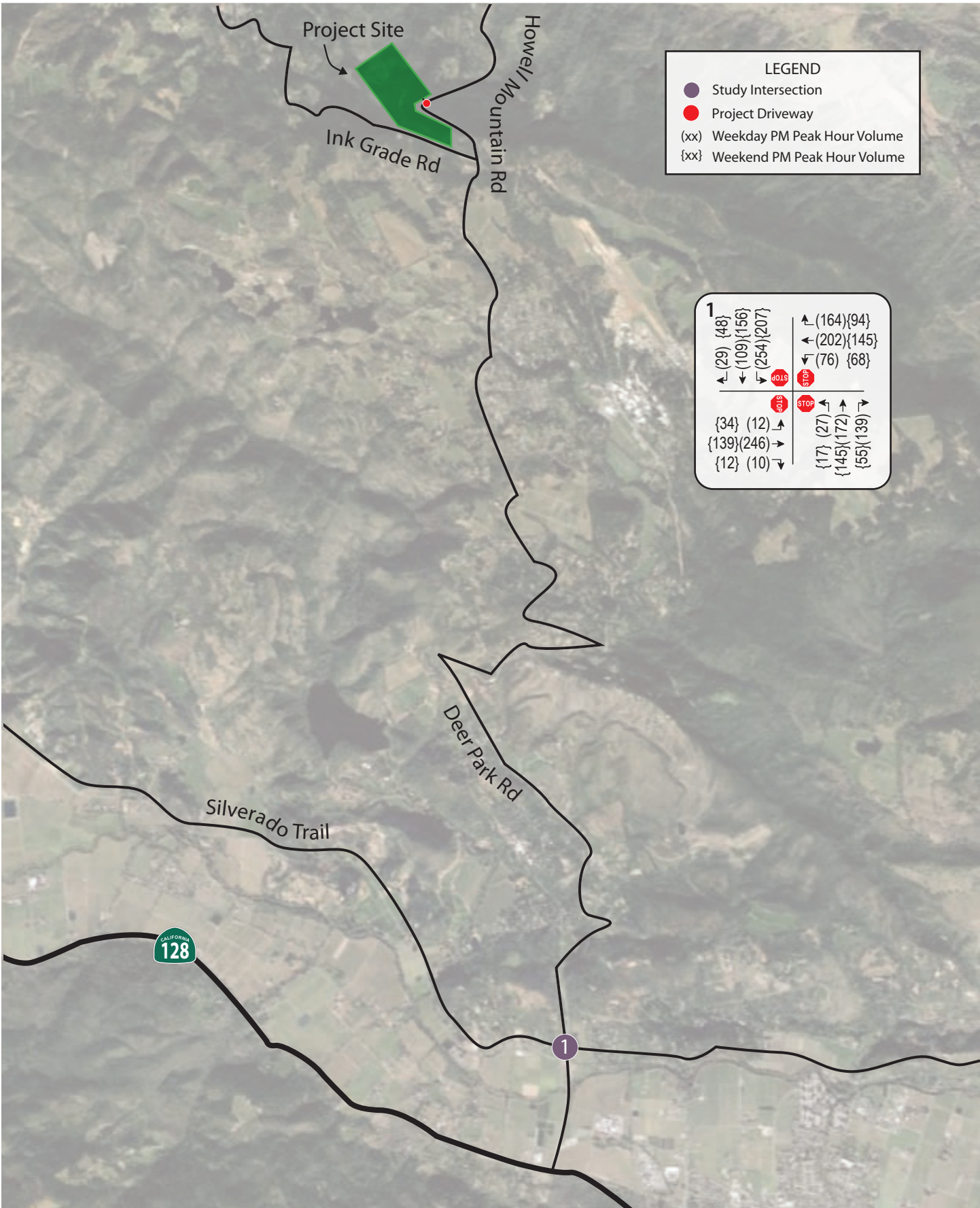
Existing Conditions

The Existing Conditions scenario provides an evaluation of current operation based on existing traffic volumes during the Friday and Saturday p.m. peak periods. This condition does not include project-generated traffic volumes. Peak hour factors (PHF’s) were calculated based on the counts obtained and used in the levels of service calculations, unless the calculated PHF was less than 0.90 in which case 0.90 was used as a “floor.” The growth factors projected by the *Napa Solano Travel Demand Model* were adjusted to estimate the three years of growth that has occurred from 2017 to 2020. The existing counts for the Silverado Trail/Deer Park Road intersection were multiplied by the growth factor to project 2020 weekday p.m. turning movement volumes. The same growth factors used for the weekday p.m. peak hour were used for the weekend midday peak hour as the model does not contain information for weekend days.

Under existing conditions, the study intersection is operating acceptably. A summary of the intersection level of service calculations is contained in Table 5, and copies of the Level of Service calculations are provided in Appendix C. The existing traffic volumes are shown in Figure 2.

Table 5 – Existing PM Peak Hour Intersection Levels of Service				
Study Intersection	Friday Peak		Saturday Peak	
	Delay	LOS	Delay	LOS
1. Silverado Trail/Deer Park Rd	25.0	D	16.7	C

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



Traffic Impact Study for the Howell Mountain Cemetery Project
Figure 2 – Existing Traffic Volumes



Future Conditions

Future volumes for the horizon year 2040 were calculated based on output from the *Napa Solano Travel Demand Model*, maintained by the Solano Transportation Authority (STA). Base year (2015) and future (2040) segment volumes for the weekday p.m. peak period were used to calculate a growth factor for the study intersection. It is noted that the model is projecting substantial increases in traffic volumes in the area resulting in a growth factor of 1.47 for Silverado Trail/Deer Park Road.

Under the anticipated Future volumes and assuming continued use of the existing all-way stop control, the study intersection is expected to deteriorate to LOS F operation during the Friday p.m. peak hour and to LOS E during the Saturday p.m. peak hour. Operating conditions are summarized in Table 6 and future volumes are shown in Figure 3.

Table 6 – Future PM Peak Hour Intersection Levels of Service

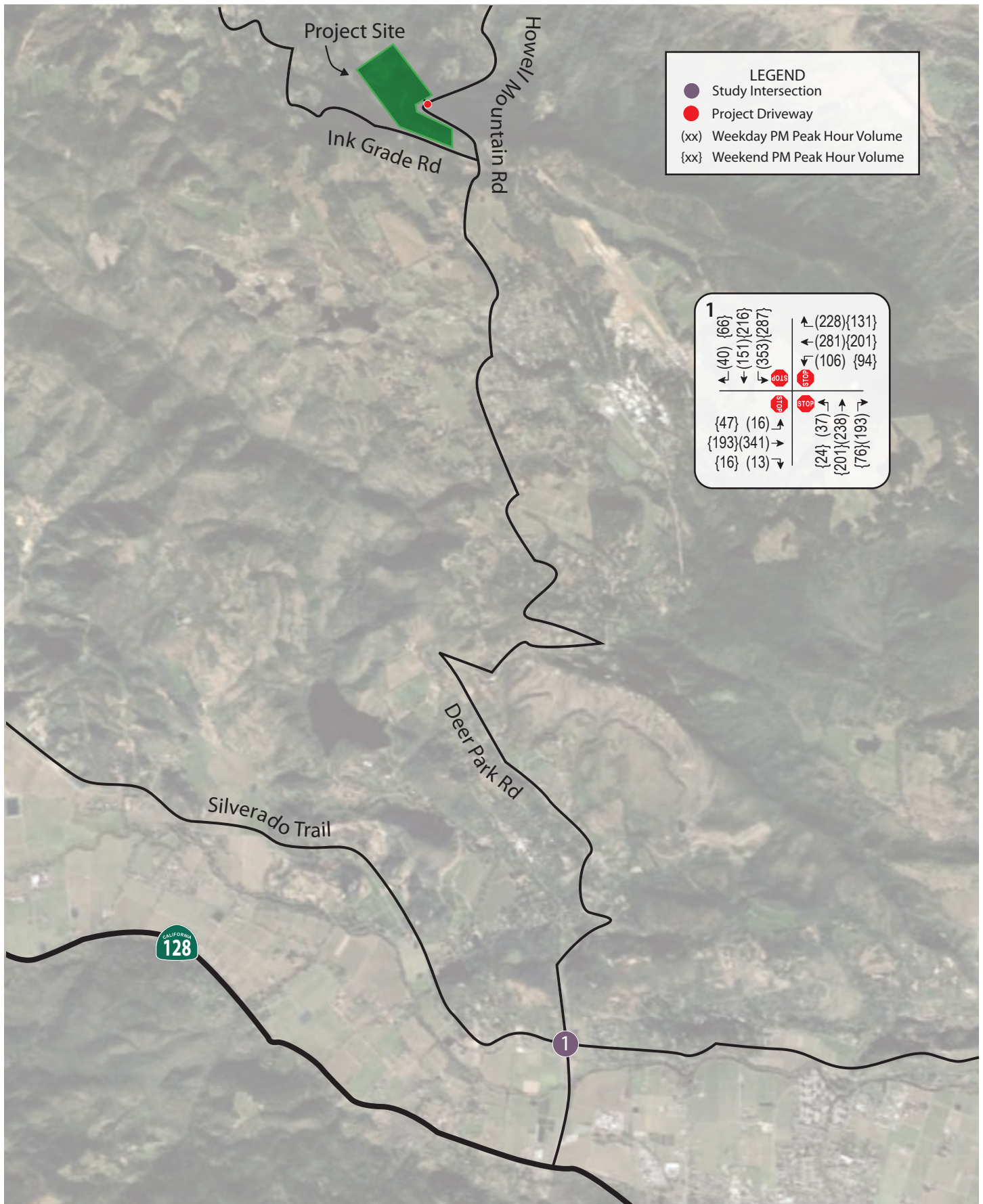
Study Intersection	Friday Peak		Saturday Peak	
	Delay	LOS	Delay	LOS
1. Silverado Trail/Deer Park Rd	83.1	F	45.3	E
Signalized	43.3	D	24.9	C

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service; **Bold** text = deficient operation; Shaded = with improvements

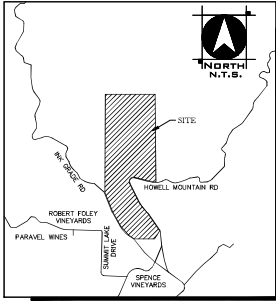
Conversion of the existing traffic signal at the intersection from flashing red operation to normal signal operation and modification of the lane configurations to include separate left-turn and shared through/right-turn lanes on all four approaches would result in acceptable LOS D or C operation during the Friday and Saturday peak hours respectively.

Project Description

The proposed project would be developed as a green burial cemetery on a 110-acre site in the County of Napa and managed as a conservation property. Approximately 21.8 acres of the 110-acre site would be designated for interment areas and would accommodate plots and gravesites. The remaining portion of the site would be retained as open space. Existing and planned trails would be open to the public. Trails would provide access for pedestrians and all-terrain vehicles associated with the cemetery function to gain access to plots within interment areas. A 20-foot-wide driveway would extend from Howell Mountain Road into the site and terminate at a turnaround area north of the office. The administrative and sales functions of the cemetery would be housed at an off-site location in an existing, previously approved office building in a nearby community. The specific site has not yet been identified, however, the use of an existing building would take advantage of the environmental clearance process for that building and no further analysis would be needed. A 400 square foot welcome center would be built at the end of the driveway. The proposed project site plan is shown in Figure 4.



Traffic Impact Study for the Howell Mountain Cemetery Project
Figure 3 – Future Traffic Volumes



VICINITY MAP
NOT TO SCALE

PROJECT SUMMARY

OWNER/DEVELOPER/APPLICANT
ETERNAL PRESERVE HOLDINGS, LLC
380 INDUSTRIAL AVE
ROCKLIN, CA
95765

ENGINEER
TSD ENGINEERING, INC
785 ORCHARD DRIVE
FOLSOM, CA 95630
ATTN: CASEY FEICKERT
cfeickert@tsdeng.com

PROPOSED USE
GREEN BURIAL CEMETERY

ZONING

AW (AGRICULTURAL WATERSHED)

SCALE

1"=150'

CONTOUR INTERVAL

2' CONTOUR INTERVAL

TOPOGRAPHY

AERIAL TOPOGRAPHIC SURVEY

CONDUCTED JULY, 2017

ASSESSORS PARCEL NO

018-120-016, 018-120-027

AREA

PARCEL A - 69.55 AC

PARCEL B - 39.73 AC

TOTAL - 109.300 AC

NUMBER OF PARCELS

(2) TWO

WATER SUPPLY

PRIVATE WELL

SEWAGE DISPOSAL

PRIVATE SEPTIC SYSTEM

FIREF PROTECTION

NAPA COUNTY FIRE DEPARTMENT

PARK DISTRICT

NAPA COUNTY

SCHOOL DISTRICT

HOWELL MOUNTAIN

ELEMENTARY SCHOOL

DISTRICT

GAS & ELECTRIC

PG&E

TELEPHONE

AT&T

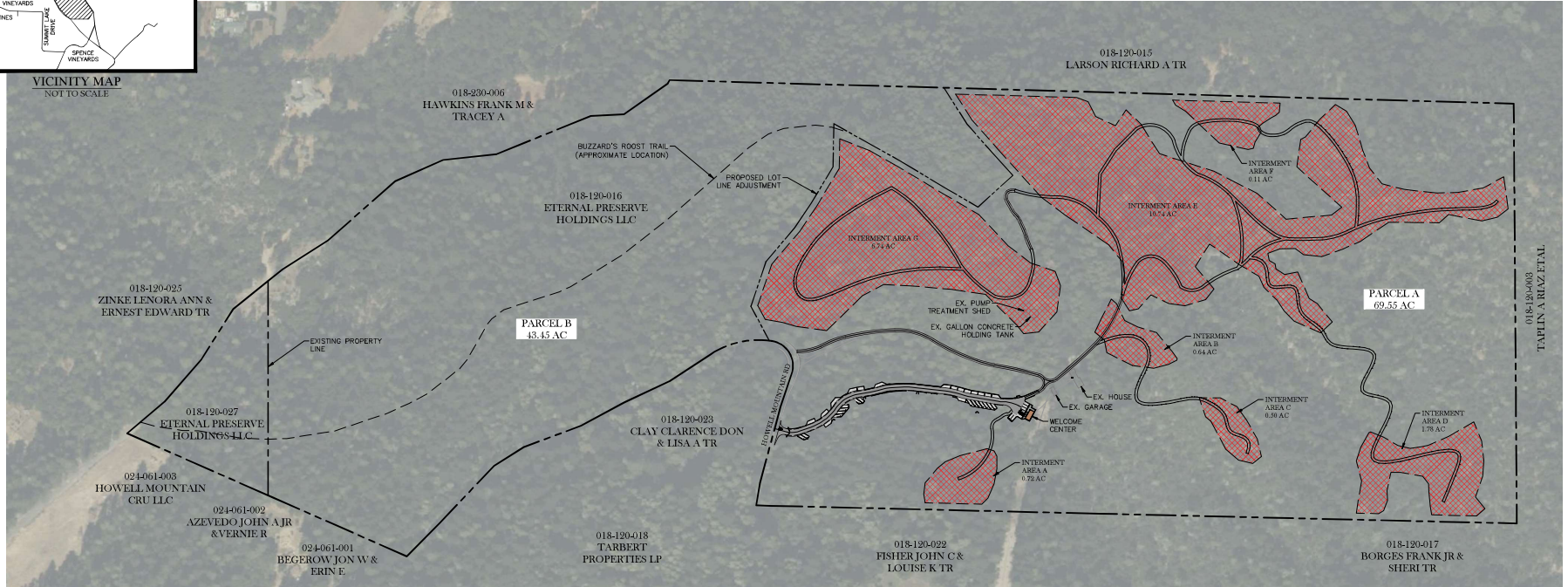
PARKING SUMMARY

STANDARD PARKING STALL (9'x20') 37

ACCESSIBLE PARKING (9'x20') 1

TOTAL STALLS 38

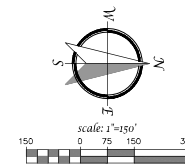
PRELIMINARY OVERALL SITE PLAN
HOWELL MOUNTAIN
CEMETERY
1225 HOWELL MOUNTAIN ROAD
NAPA COUNTY, CA



PRELIMINARY OVERALL SITE PLAN
DECEMBER 9, 2022



785 Orchard Drive, Suite 110
Folsom, CA 95630
Phone: (916) 608-0707
Fax: (916) 608-0701



SHEET
1/7



Trip Generation

The anticipated trip generation for the proposed project was estimated using standard rates published by the Institute of Transportation Engineers (ITE) in *Trip Generation Manual*, 11th Edition, 2021 for a Cemetery (Land Use #566). Standard rates account for all trips associated with the cemetery use; however, since the administrative and sales functions of the cemetery would be housed off-site, the trip generation estimate is considered conservative. Based on the applicant’s knowledge of similar facilities, it was estimated that approximately 28 percent of cemetery-related trips would be to the off-site office, which is not included as part of the proposed project.

Consideration was given to use of the rates for Public Parks (Land Use #411) for the open space; however, the public parks land use represents facilities with activities such as sports, developed picnic facilities, boating, multi-use trails, etc. and this is not representative of the proposed open space. Due to limitations of this data, the trip generation for the 88.2 acres of open space was estimated using data from a peak hour survey for North Sonoma Mountain Regional Park and Open Space Preserve in Sonoma County, where the primary usage is by trail users and which is at a similarly remote location as the project site. Given the rural location of the site and the numerous other parks in the area with hiking trails, including the considerably larger Bothe-Napa Valley State Park (1,900 acres) and Las Posadas State Forest (800 acres), it appears likely that trail users at the project site would consist primarily of cemetery visitors and that few project trips would be for the sole purpose of using the proposed trails. Therefore, the trip generation estimate for the proposed open space is considered conservative.

Based on application of the ITE and use-specific trip generation rates, the proposed project is expected to generate an average of 108 trips per day, including 8 p.m. peak hour trips on Friday and 34 trips during the Saturday p.m. peak hour. These results are summarized in Table 7.

Table 7 – Trip Generation Summary

Land Use	Units	Daily		Weekday PM Peak Hour				Weekend PM Peak Hour			
		Rate	Trips	Rate	Trips	In	Out	Rate	Trips	In	Out
Cemetery	21.8 ac	6.02	131	0.46	10	3	7	2.00	44	23	21
Off-Site Office Trips	-28%		-37		-3	-1	-2		-12	-6	-6
Public Parks	88.2 ac	0.16	14	0.017	1	1	0	0.025	2	1	1
Total			108		8	3	5		34	18	16

Note: ac = acres

Trip Distribution

The pattern used to allocate new project trips to the street network was determined based on familiarity with the area and surrounding region as well as likely origins and destinations for patrons of the project. Because the cemetery is located on the east side of the Napa Valley, it is likely that nearly all the project-related trips would occur via Silverado Trail. A distribution of 70 percent to the south and 30 percent to the north via Silverado Trail was applied.

Intersection Operation

It is noted that the intersection operations analysis described below was conducted based on an earlier version of the project description. Based on the previous description it was estimated that the project would generate 170 daily trips, or 62 more than are now estimated, with 14 trips during the weekday p.m. peak hour and 46 during the weekend p.m. peak hour, or six more p.m. peak hour trips and 12 more weekend peak hour trips. As the analysis includes more project-added trips, the estimated impact of the project on intersection operations is conservative.

Existing plus Project Conditions

Upon the addition of project-related traffic to Existing volumes, the study intersection of Silverado Trail/Deer Park Road would be expected to continue operating acceptably. Project traffic results are summarized in Table 8 and project traffic volumes are shown in Figure 5.

Study Intersection	Existing Conditions				Existing plus Project			
	Friday Peak		Saturday Peak		Friday Peak		Saturday Peak	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1. Silverado Trail/Deer Park Rd	25.0	D	16.7	C	25.9	D	17.9	C

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

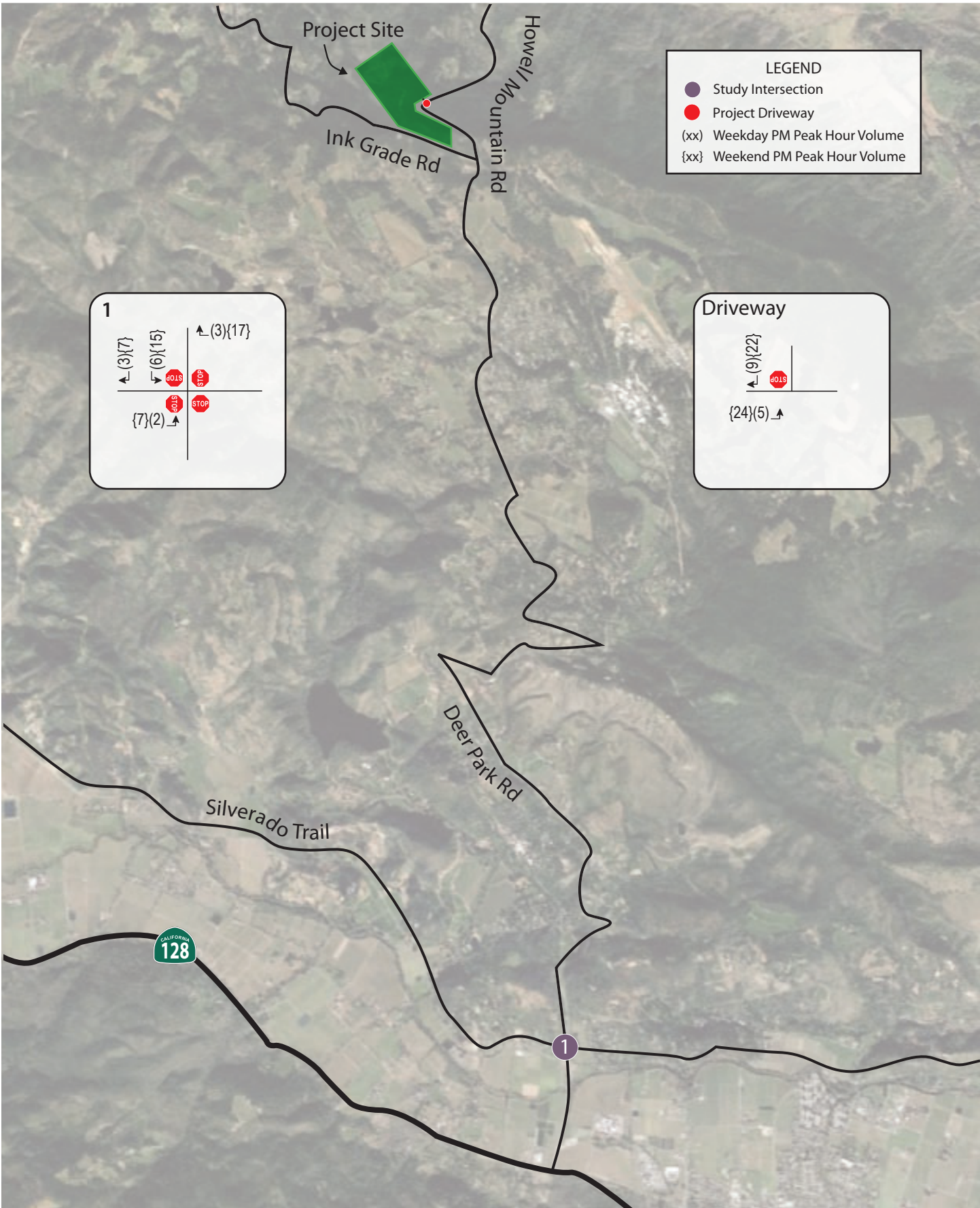
Finding – The study intersection is expected to continue operating acceptably at the same service levels upon the addition of project-generated traffic.

Future plus Project Conditions

Upon the addition of project-generated traffic to the anticipated Future volumes and under the current geometrics and controls, the study intersection would continue operating at LOS F during the Friday p.m. peak hour and would deteriorate to LOS F operation during the Saturday p.m. peak hour. As noted above, the analysis used a higher trip generation estimate based on a previous version of the project description; however, based on the County’s evaluation criteria, the project would still result in an adverse impact at this intersection and the finding would not change even if the lower trip generation associated with the project as currently proposed were applied. The Future plus Project operating conditions are summarized in Table 9.

Study Intersection <i>Approach</i>	Future Conditions				Future plus Project			
	Friday Peak		Saturday Peak		Friday Peak		Saturday Peak	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1. Silverado Trail/Deer Park Rd	83.1	F	45.3	E	85.6	F	50.5	F
Signalized	43.3	D	24.9	C	44.8	D	25.9	C
Modify SB Lane Assignments					49.2	E	21.1	C

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service; **Bold** text = deficient operation; **Shaded** cells = conditions with recommended improvements; In = lane



Traffic Impact Study for the Howell Mountain Cemetery Project
Figure 5 – Project Traffic Volumes



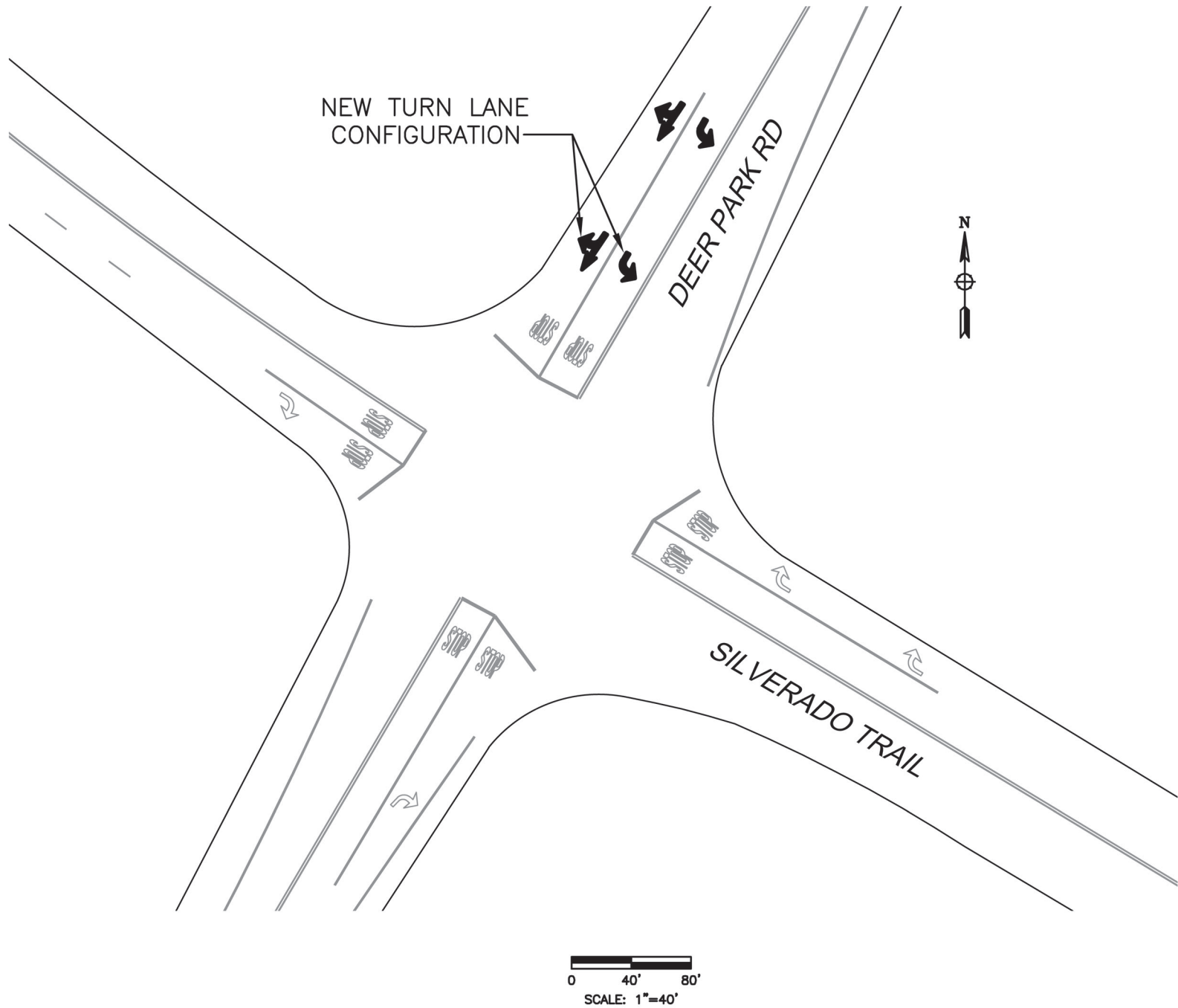
Finding – With the addition of project-generated traffic to the intersection as currently configured and controlled, continued LOS operation would be expected during the Friday p.m. peak hour and operation would deteriorate to LOS F during the Saturday p.m. peak hour. With signalization and modifications to the lane assignments, which are needed to achieve acceptable operation without the project, acceptable operation would be maintained upon the addition of project-generated traffic.

Recommendation – If the County determines that the signal at Silverado Trail/Deer Park Road is not to be energized to accommodate the projected increases in areawide traffic, it is recommended that the markings on the southbound approach be modified to change the through/left-turn lane to a dedicated left-turn lane and change the right-turn lane to a through/right-turn lane as part of the proposed project. While the through lane would be offset from the centerline on the southerly leg with this change, the receiving lane is of sufficient width that the edgeline would direct through traffic to the appropriate location and no further modifications would be needed. With this change in the lane assignments acceptable operation would be achieved during the weekend peak hour and an improvement from LOS F to LOS E would be expected during the weekday p.m. peak hour. The proposed change is indicated in Figure 6.

Travel Demand Analysis

Senate Bill (SB) 743 established a change in the metric to be applied for determining traffic impacts associated with development projects. Rather than the delay-based criteria associated with a Level of Service analysis, the increase in Vehicle Miles Traveled (VMT) as a result of a project will be the basis for determining impacts once this new metric is fully vetted and adopted. The *Napa County Traffic Impact Study (TIS) Guidelines, 2022*, established thresholds of significance related to VMT. The County guidelines state that projects estimated to generate more than 110 net new passenger trips per day must conduct a VMT analysis and identify feasible strategies to reduce the project’s vehicular travel. If these strategies would not reduce the project’s VMT by at least 15 percent, the project would be considered to have a significant VMT impact. Total VMT has been identified by the County as the metric to be used to assess a project’s VMT.

The project is estimated to generate an average of 108 trips per day. Since the estimated trip generation is less than the County’s threshold of 110 trips per day, the project is presumed to have a less-than-significant impact for VMT and no mitigation measures are required. However, Transportation Demand Management (TDM) measures are recommended to ensure that the proposed on-site parking supply can meet the anticipated demand on days where visitation is expected to be high; these strategies are described in the parking discussion below. While project-related VMT would be less than significant, and trip reduction measures are not needed as a mitigation, the implementation of TDM measures would reduce VMT further below estimated levels and would support the County’s efforts to reduce vehicle trips.



Traffic Impact Study for the Howell Mountain Cemetery Project
Figure 6 – Recommended Improvement Sketch

Alternative Modes

Pedestrian Facilities

Given its rural location, lack of existing facilities, and the nature of the project, project patrons and employees are not expected to walk to the site.

Finding – The lack of pedestrian facilities serving the project site on Howell Mountain Road is consistent with the surrounding area and adequate for the type of land use.

Bicycle Facilities

Silverado Trail has Class II bike lanes and is a major regional route that may be used to access the project site from the south. The planned Class III bicycle facilities on Howell Mountain Road would further enhance access to the site.

Finding – Bicycle facilities serving the project site are adequate and will improve upon the completion of the proposed facilities. The project would not affect the County’s ability to establish the Class III route on Howell Mountain Road, so is consistent with these plans.

Transit

The proposed project would not be expected to generate new transit demand due to the lack of transit facilities in the area.

Finding – The lack of transit facilities serving the project site is adequate for the demand.

Access and Circulation

Site Access

As proposed, a 20-foot-wide driveway would extend from Howell Mountain Road into the site and terminate at a turnaround area north of the welcome center. This would be the only access point to the site for the cemetery and open space uses, and there would be no additional pedestrian entrances or trailheads to provide access to the trails.

Finding – On-site circulation is expected to continue operating acceptably.

Sight Distance

Sight distances along Howell Mountain Road at the project driveway were evaluated based on sight distance criteria contained in the *Highway Design Manual* published by Caltrans. The recommended sight distances for minor street approaches that are driveways are based on stopping sight distance, with approach travel speeds used as the basis for determining the recommended sight distance. For an approach speed of 35 mph the recommended stopping sight distance is 250 feet. This is applicable to the east of the project driveway based on the posted speed limit. To the west, an advisory speed limit of 15 mph is posted around the curve west of the driveway. Applying a conservative design speed of 25 mph for vehicles approaching from this direction, the recommended stopping sight distance is 150 feet.

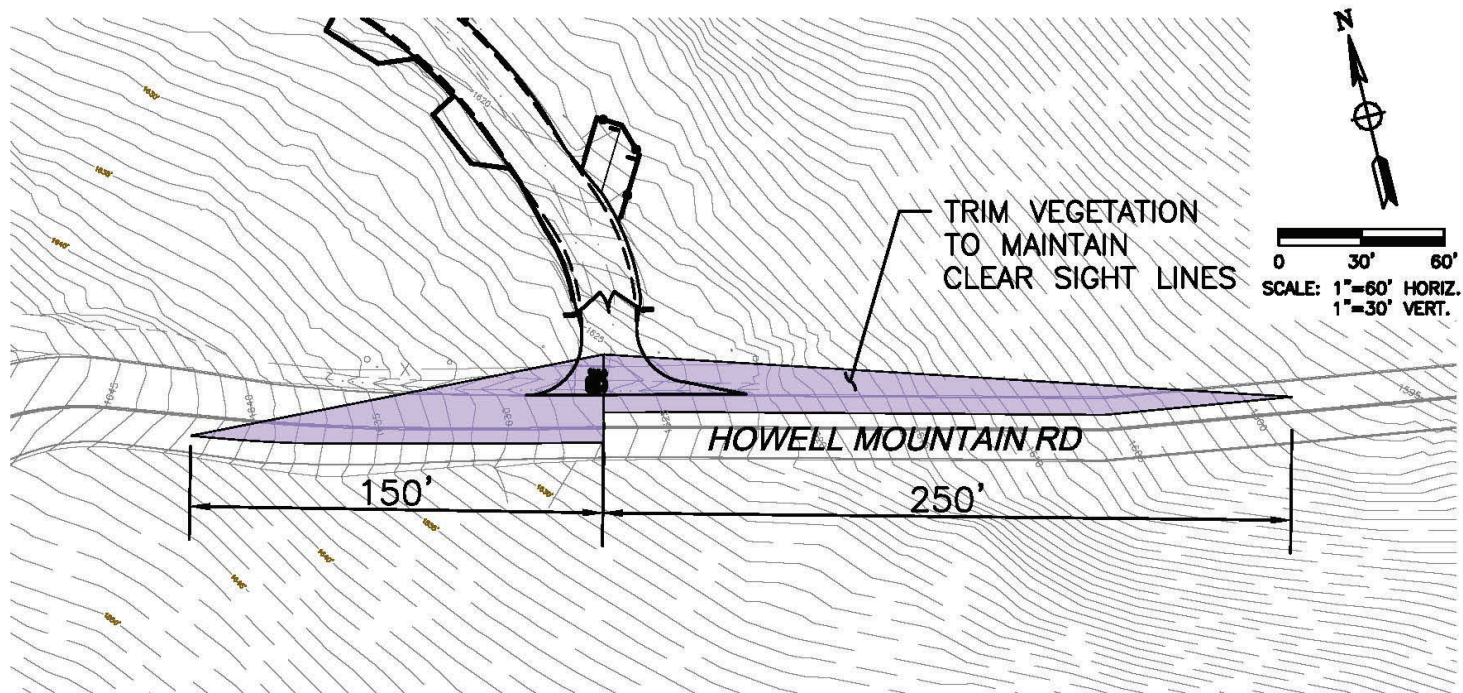
Based on a review of field conditions, sight distance at the driveway extends approximately 180 feet to the west and 260 feet to the east. However, vegetation on the north side of Howell Mountain Road east of the project driveway can hinder sight lines, restricting the available sight distance to below recommended minimums. Therefore, to ensure adequate sight lines are maintained, vegetation east of the driveway should be trimmed per guidance provided by the Federal Highway Administration in its guide on *Vegetation Control for Safety, 2007*, which recommends that bushes and shrubs be kept under three feet in height, and that trees and hanging branches be trimmed to a minimum height of seven feet. Sight distance diagrams for the minimum recommended distance of 150 feet to the west and 250 feet to the east are provided in Figure 7.

Finding – Adequate sight distance is available at the project driveway looking to the west and could be achieved to the east by trimming vegetation.

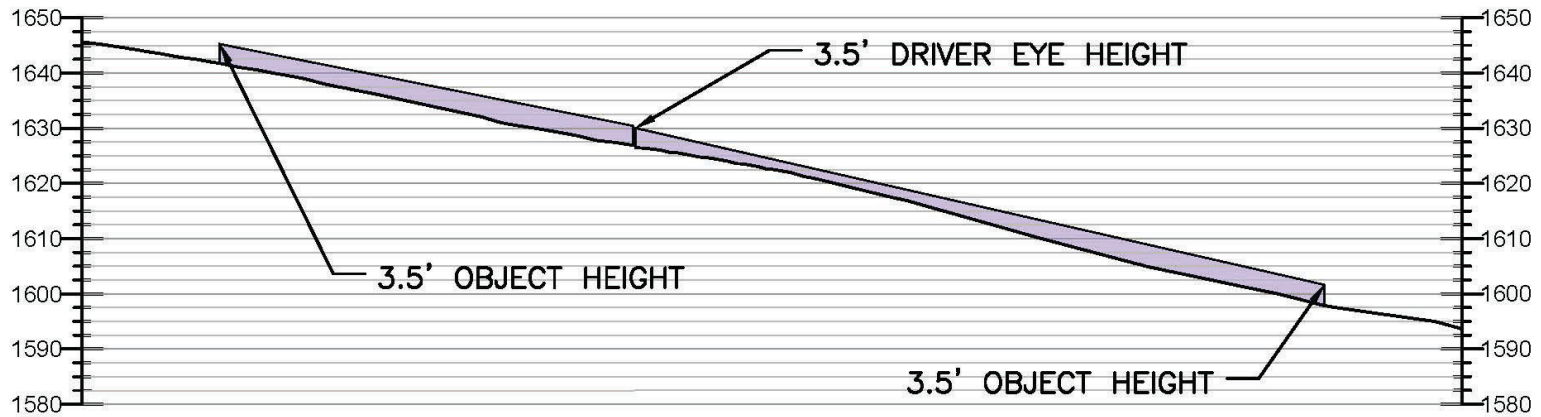
Recommendation – To achieve adequate sight lines to the east vegetation should be trimmed such that bushes and shrubs are kept under three feet in height, and that trees and hanging branches are trimmed to a minimum height of seven feet. Additionally, sight distance should be reevaluated after the vegetation is trimmed.

Emergency Access

The AutoTURN application of AutoCAD was used to simulate the travel path of a typical Napa County fire truck in order to evaluate the adequacy of emergency vehicle access for the project driveway. As designed, a typical fire truck with a length of 29.5 feet would be able to enter, circulate through and exit the site. Access for emergency response vehicles is therefore expected to function acceptably. Two access exhibits, one simulating inbound access to the project site and the other simulating outbound access, are provided in Appendix D.



PLAN



PROFILE

Access Analysis

Left-Turn Lane Warrants

The County of Napa has a published policy that provides guidance on when a turn lane is needed based on the daily traffic volume projected to use the driveway as a function of roadway ADT (Average Daily Traffic). A left-turn lane meets warrants when the corresponding value plots above the curve indicated on the Left Turn Lane Warrant Graph from the *Napa County Road and Street Standards* and is unwarranted if the value plots below the curve.

Based on the Napa County left turn lane warrant graph, a left-turn lane would be warranted on Howell Mountain Road at the project driveway using Existing plus Project volumes.

According to the *Napa County Road and Street Standards, 2023*, exceptions to Napa County Standards may be allowed if:

The exception will preserve unique features of the natural environment which includes, but is not limited to, natural water courses, steep slopes, geological features, heritage oak trees, or other trees of at least six inches in diameter at breast height and found by the decision-maker to be of significant importance, but does not include human altered environmental features such as vineyards and ornamental or decorative landscaping, or artificial features such as, rock walls, fences, or the like; and

The Zoning Administrator, Planning Commission, or other approving body shall not grant an exception unless it finds that grant of the exception, as conditioned by the Zoning Administrator, the Planning Commission, or other approving body provides the same overall practical effect as these Standards towards providing defensible space, and consideration towards life, safety, and public welfare.

As is evident through a review of the area using Google Earth, there are numerous large redwood and other trees on both sides of Howell Mountain Road on either side of the project driveway and close enough to the roadway that they would need to be removed to widen the road to accommodate a left-turn lane. Further, the roadway runs along the side of a mountain, as indicated by the topographic lines on the grading plan, resulting in grades on both sides of the road that would require retaining walls to accommodate any widening. To install a left-turn lane would require removal of heritage trees as well as grading into a hill or fill on a downward slope. As this activity would not preserve the unique features of the natural environment, an exception appears to be warranted.

Because an exception is required to preserve this natural resource, consideration was given to the ability to achieve the same overall effect as providing a left-turn lane. There are currently no left-turn lanes on Howell Mountain Road in the vicinity of the project site, including at nearby intersections and other driveways, so drivers would routinely encounter vehicles stopped or slowing to turn left into cross streets and intersections along this roadway segment. The lack of a left-turn lane would therefore not violate driver expectation and this would, in fact, be consistent with the character and operation of the roadway. As these is not a negative safety impact that would need to be mitigated through installation of a left-turn lane, given the low volume of traffic both on Howell Mountain Road and accessing the site, the overall effect in terms of traffic operation is essentially the same without a turn lane as it would be with one.

A copy of the traffic counts that were collected for the warrant analysis and the left-turn-lane warrant graphs are included in Appendix E.

Finding – A left-turn lane is warranted on Howell Mountain Road at the existing project driveway based on the County of Napa’s policy. However, as installation of a left-turn pocket would require removal of numerous large trees and therefore have a negative impact on this natural resource, it appears that an exception to the policy would be reasonable.

Recommendation – An exception to the County’s standards to not put in a left-turn pocket should be pursued to avoid removal of a substantial number of heritage trees.

Parking

The project as proposed includes the construction of 38 parking spaces, one of which would be a regular accessible space. Since the cemetery office functions would be located off-site, typically there would be only two employees on site at the cemetery during the week and one on weekends. The largest number of visitors to the cemetery is anticipated on weekends, and assuming that two spaces would be available for employees, the remaining 36 spaces would be available for guests. Since Napa County does not have a specific parking minimum for cemeteries or similar land uses, the planning commission or zoning administrator has the authority to determine the number of parking spaces that are required, in accordance with Napa County Code 18.110.030.

The anticipated demand for on-site parking was estimated based on information provided by the applicant based on their experience with similar facilities. The applicant has estimated that 15 to 25 vehicles are typically used to transport guests to graveside interment services; with an estimated 30 to 40 vehicles at larger services, which occur less frequently. In addition to interment services, consideration was given to cemetery visitation; peak visiting times are holidays including Mother’s Day, Father’s Day, and Christmas, when it is estimated that there would be 150 to 200 vehicles per day. Visitors are estimated to spend one hour or less at the site. Therefore, with 36 visitor spaces available on weekends, 18 percent of the peak holiday visitors could be accommodated at one time.

To accommodate larger interment services, project staff would need to coordinate with funeral homes and places of worship that host funeral services, providing them with information about the site’s maximum capacity, and indicating that they will be turned away from the cemetery if no on-site parking spaces are available. Attendees at services should be encouraged to carpool regardless of the anticipated size of the event to minimize the number of vehicles at the project site, and multiple interment services should not be scheduled simultaneously. For larger gatherings, customers should be encouraged to provide a shuttle to transport groups of guests to and from the site. To minimize the potential for exceeding the available parking supply on high visitation days, interment services should be prohibited on those days to allow the parking spaces to be used by other visitors. Ridesharing should be encouraged for all visitors on such days.

According to Chapter 5 of the Guide to ADA Accessibility Standards and *Napa County Road and Street Standards*, 2021 for a parking lot with between 26 and 50 spaces the parking lot must have a minimum of two accessible spaces, one of which must be a van accessible space. One parking space near the welcome center will need to be designated as an accessible space and resized for an accessible van space.

Napa County Code Section 18.110.040 specifies that all projects requiring more than 10 automobile spaces shall provide 10 bicycle parking spaces. In addition, for projects requiring 20 or more vehicle spaces, one-half of the bicycle parking spaces shall be covered. As proposed, the project would provide 10 spaces at the welcome center, five of which would be covered.

Finding – The project would have adequate parking for day-to-day requirements, but the demand could potentially exceed the supply for parking on high visitation days if one or more interment services are also scheduled. The proposed bicycle parking would meet County requirements.

Recommendations – One space near the welcome center should be designed as a van accessible space. Cemetery staff should coordinate with funeral service operators to encourage carpooling to the site for all interment services, to use a shuttle for larger events, and to indicate that visitors will be turned away

from the cemetery if on-site parking is not available. Only one interment service should be scheduled at a time, and on holidays when higher levels of visitation are expected, no interment services should be scheduled. Ridesharing should be encouraged for all visitors on holidays, and informational materials for the cemetery should indicate that visitors will be turned away if on-site parking spaces are not available. To prevent visitors to the site from interfering with through traffic along Howell Mountain Road, “No Parking on Pavement” signs should be installed along both sides of the roadway for the areas within 500 feet of the driveway.

Conclusions and Recommendations

Conclusions

- The study intersection is currently operating acceptably.
- Under the projected future volumes operation would be expected to deteriorate to LOS E or F during the Saturday and Friday peak periods respectively. Acceptable LOS D operation could be achieved by converting control to the existing traffic signal that currently operates in red flash only. Additionally, the lane assignments would need to be changed to provide a separate left-turn lane and shared through/right-turn lane on each approach.
- The proposed project is expected to generate an average of 108 trips per day, including eight p.m. peak hour trips on Friday and 34 trips during the Saturday p.m. peak hour. This estimate is conservative, as the administrative and sales functions of the cemetery will be located off-site.
- The intersection of Silverado Trail/Deer Park Road would be expected to continue operating acceptably with project traffic added to existing volumes. With signalization, as is needed to achieve acceptable operation under future volumes, acceptable operation would continue upon adding project-generated trips.
- Should the County elect not to convert to full signalized operation at Silverado Trail/Deer Park Road, acceptable operation could be achieved during the weekend peak hour (LOS F to LOS C) and operated improved from LOS F to LOS E during the weekday p.m. peak hour by modifying the striping on the southbound approach to include a left-turn lane and a through/right-turn lane.
- Since the project would generate fewer than 110 trips per day, the project's VMT impact is presumed to be less than significant. The location of the project's administrative and sales functions in an off-site office would result in fewer trips to the site than would otherwise be expected. While the open space portion of the site would be open to the general public, it is anticipated that trail users would be primarily cemetery visitors. The use of carpooling and shuttle services would reduce project-related VMT below levels that would otherwise be expected, though TDM measures are recommended to address parking supply adequacy and would further reduce VMT.
- Under the anticipated Future volumes, operation of the study intersection is expected to deteriorate to LOS F during the Friday p.m. peak hour and to LOS E during the Saturday p.m. peak hour. Upon the addition of project-generated traffic to the anticipated Future volumes, the study intersection would continue operating at LOS F during the Friday p.m. peak hour and would deteriorate to LOS F during the Saturday p.m. peak hour.
- While there are no pedestrian, bicycle or transit facilities in the project vicinity, the project would not conflict with any policies relevant to these modes, so would have a less-than-significant impact as regards these modes.
- On-site circulation is expected to operate acceptably.
- Adequate sight distance is available at the project driveway in both directions.

- A left-turn lane would be warranted on Howell Mountain Road at the existing project driveway based on the County's criteria. Since installation of a turn lane would require the removal of a substantial number of heritage redwood and other trees, an exception to this policy appears to be warranted. As there are no other left turn lanes on Howell Mountain Road in the vicinity of the project site, the lack of a left-turn lane at the project driveway would be consistent with driver expectation and the character of the roadway.
- The proposed parking supply is expected to be adequate for typical use levels, although there would be potential capacity concerns during large interment services and during interment services held on days when visitation is high.

Recommendations

- If the County determines that the existing signal equipment at Silverado Trail/Deer Park Road is not going to be used to control the intersection in the future to achieve acceptable operation, it is recommended that the lane assignment on the southbound approach be modified to convert the left-turn/through lane to a left-turn lane and the right-turn lane to a through/right-turn lane by replacing the existing pavement arrows.
- To achieve adequate sight lines to the east from the project driveway, vegetation on the north side of Howell Mountain Road should be trimmed such that bushes and shrubs be kept under three feet in height, and that trees and hanging branches be trimmed to a minimum height of seven feet. Sight distance should be reevaluated after the vegetation is trimmed.
- A van accessible space should be provided near the welcome center.
- Cemetery staff should coordinate with providers of funeral services to inform cemetery visitors about the limited parking supply, to encourage carpooling to the site, and to recommend the provision of a shuttle to the cemetery for large interment services. Visitors that arrive at the site when no parking spaces are available would be prohibited from entering. "No Parking on Pavement" signs should be installed along both sides of Howell Mountain Road to control parking within 500 feet of the project driveway.

Study Participants and References

Study Participants

Principal in Charge	Dalene J. Whitlock, PE (Civil, Traffic), PTOE,
Senior Planner	Barry Bergman, AICP
Associate Engineer	Cameron Nye, EIT
Graphics	Cameron Wong, Jessica Bender
Editing/Formatting	Jessica Bender
Quality Control	Dalene J. Whitlock, PE (Civil, Traffic), PTOE

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NAX163



Appendix A

Traffic Counts and Growth Rate Calculations





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VOLUME

Chiles Pope Valley Rd near Maxville Lake Winery

Day: Friday
Date: 6/26/2020

City: St Helena
Project #: CA20_8104_001

DAILY TOTALS					NB	SB	EB	WB	Total		
					577	525	0	0	1,102		
AM Period	NB	SB	EB	WB	TOTAL	PM Period	NB	SB	EB	WB	TOTAL
00:00	0	0			0	12:00	10	14			24
00:15	0	1			1	12:15	6	18			24
00:30	1	1			2	12:30	5	18			23
00:45	1	2	0	2	1	12:45	17	38	9	59	26
01:00	1	0			1	13:00	4	9			13
01:15	0	0			0	13:15	12	9			21
01:30	0	0			0	13:30	9	13			22
01:45	0	1	0		0	13:45	14	39	12	43	26
02:00	0	0			0	14:00	18	11			29
02:15	0	1			1	14:15	9	14			23
02:30	1	0			1	14:30	8	16			24
02:45	0	1	1	2	1	14:45	10	45	14	55	24
03:00	2	1			3	15:00	13	14			27
03:15	5	1			6	15:15	6	19			25
03:30	2	1			3	15:30	11	15			26
03:45	1	10	1	4	2	15:45	10	40	10	58	20
04:00	1	3			4	16:00	7	14			21
04:15	3	0			3	16:15	5	4			9
04:30	8	2			10	16:30	11	11			22
04:45	10	22	0	5	10	16:45	12	35	8	37	20
05:00	9	7			16	17:00	9	8			17
05:15	14	2			16	17:15	6	3			9
05:30	16	4			20	17:30	6	1			7
05:45	22	61	7	20	29	17:45	14	35	6	18	20
06:00	4	5			9	18:00	7	4			11
06:15	5	3			8	18:15	7	2			9
06:30	11	4			15	18:30	2	4			6
06:45	11	31	5	17	16	18:45	11	27	1	11	12
07:00	3	5			8	19:00	10	5			15
07:15	3	4			7	19:15	8	5			13
07:30	2	6			8	19:30	5	2			7
07:45	5	13	8	23	13	19:45	3	26	2	14	5
08:00	8	5			13	20:00	0	1			1
08:15	9	10			19	20:15	5	2			7
08:30	7	5			12	20:30	3	3			6
08:45	7	31	9	29	16	20:45	4	12	4	10	8
09:00	4	5			9	21:00	4	5			9
09:15	6	7			13	21:15	0	1			1
09:30	7	3			10	21:30	3	0			3
09:45	9	26	12	27	21	21:45	5	12	3	9	8
10:00	4	13			17	22:00	0	0			0
10:15	9	5			14	22:15	2	0			2
10:30	5	12			17	22:30	1	1			2
10:45	9	27	7	37	16	22:45	3	6	0	1	3
11:00	9	9			18	23:00	3	2			5
11:15	7	11			18	23:15	1	0			1
11:30	5	13			18	23:30	3	0			3
11:45	7	28	8	41	15	23:45	2	9	1	3	3
TOTALS	253	207			460	TOTALS	324	318			642
SPLIT %	55.0%	45.0%			41.7%	SPLIT %	50.5%	49.5%			58.3%

DAILY TOTALS					NB	SB	EB	WB	Total		
					577	525	0	0	1,102		
AM Peak Hour	05:00	11:45			11:45	PM Peak Hour	13:15	14:30		13:45	
AM Pk Volume	61	58			86	PM Pk Volume	53	63		102	
Pk Hr Factor	0.693	0.806			0.896	Pk Hr Factor	0.736	0.829		0.879	
7 - 9 Volume	44	52	0	0	96	4 - 6 Volume	70	55	0	0	125
7 - 9 Peak Hour	08:00	07:30			08:00	4 - 6 Peak Hour	16:30	16:00			16:00
7 - 9 Pk Volume	31	29	0	0	60	4 - 6 Pk Volume	38	37	0	0	72
Pk Hr Factor	0.861	0.725	0.000	0.000	0.789	Pk Hr Factor	0.792	0.661	0.000	0.000	0.818

VOLUME

Chiles Pope Valley Rd near Maxville Lake Winery

Day: Saturday
Date: 6/27/2020

City: St Helena
Project #: CA20_8104_001

DAILY TOTALS					NB	SB	EB	WB	Total		
					425	450	0	0	875		
AM Period	NB	SB	EB	WB	TOTAL	PM Period	NB	SB	EB	WB	TOTAL
00:00	1	0			1	12:00	11	6			17
00:15	0	0			0	12:15	14	6			20
00:30	0	0			0	12:30	5	8			13
00:45	2	3	1	1	3	12:45	8	38	3	23	11
01:00	0	0			0	13:00	5	9			14
01:15	0	0			0	13:15	14	10			24
01:30	1	0			1	13:30	15	13			28
01:45	1	2	0		1	13:45	7	41	11	43	18
02:00	0	0			0	14:00	10	12			22
02:15	0	0			0	14:15	5	5			10
02:30	1	4			5	14:30	6	10			16
02:45	0	1	2	6	2	14:45	5	26	8	35	13
03:00	1	1			2	15:00	5	5			10
03:15	1	0			1	15:15	10	7			17
03:30	0	2			2	15:30	9	8			17
03:45	1	3	0	3	1	15:45	6	30	13	33	19
04:00	0	0			0	16:00	6	10			16
04:15	2	0			2	16:15	8	7			15
04:30	5	0			5	16:30	0	7			7
04:45	5	12	0		5	16:45	7	21	5	29	12
05:00	10	2			12	17:00	5	6			11
05:15	10	2			12	17:15	9	12			21
05:30	12	0			12	17:30	6	3			9
05:45	11	43	6	10	17	17:45	6	26	6	27	12
06:00	3	2			5	18:00	2	6			8
06:15	5	2			7	18:15	6	5			11
06:30	10	2			12	18:30	3	13			16
06:45	3	21	1	7	4	18:45	5	16	8	32	13
07:00	7	5			12	19:00	2	0			2
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07:30	3	2			5	19:30	4	4			8
07:45	4	18	9	21	13	19:45	2	12	5	14	7
08:00	2	4			6	20:00	1	2			3
08:15	4	9			13	20:15	2	3			5
08:30	7	6			13	20:30	1	2			3
08:45	6	19	10	29	16	20:45	1	5	4	11	5
09:00	4	5			9	21:00	4	5			9
09:15	8	5			13	21:15	1	2			3
09:30	1	4			5	21:30	0	2			2
09:45	13	26	7	21	20	21:45	2	7	5	14	7
10:00	2	9			11	22:00	3	1			4
10:15	5	4			9	22:15	0	0			0
10:30	8	13			21	22:30	1	1			2
10:45	4	19	12	38	16	22:45	1	5	0	2	1
11:00	4	10			14	23:00	0	1			1
11:15	11	22			33	23:15	0	0			0
11:30	5	10			15	23:30	1	1			2
11:45	9	29	7	49	16	23:45	1	2	0	2	1
TOTALS	196	185			381	TOTALS	229	265			494
SPLIT %	51.4%	48.6%			43.5%	SPLIT %	46.4%	53.6%			56.5%

DAILY TOTALS					NB	SB	EB	WB	Total
					425	450	0	0	875
AM Peak Hour	05:00	10:30			10:30	PM Peak Hour	13:15	13:15	13:15
AM Pk Volume	43	57			84	PM Pk Volume	46	46	92
Pk Hr Factor	0.896	0.648			0.636	Pk Hr Factor	0.767	0.885	0.821
7 - 9 Volume	37	50	0	0	87	4 - 6 Volume	47	56	103
7 - 9 Peak Hour	08:00	08:00			08:00	4 - 6 Peak Hour	16:45	16:30	16:45
7 - 9 Pk Volume	19	29	0	0	48	4 - 6 Pk Volume	27	30	53
Pk Hr Factor	0.679	0.725	0.000	0.000	0.750	Pk Hr Factor	0.750	0.625	0.631

VOLUME

Howell Mountain Rd near project site access

Day: Friday
Date: 6/26/2020

City: Angwin
Project #: CA20_8104_002

DAILY TOTALS					NB	SB	EB	WB	Total		
					0	0	874	822	1,696		
AM Period	NB	SB	EB	WB	TOTAL	PM Period	NB	SB	EB	WB	TOTAL
00:00			4	0	4	12:00			16	10	26
00:15			0	2	2	12:15			14	11	25
00:30			1	3	4	12:30			8	12	20
00:45			1	6	5	12:45			18	56	45
01:00			1	2	3	13:00			13	18	31
01:15			1	0	1	13:15			16	13	29
01:30			2	0	2	13:30			24	6	30
01:45			1	5	2	13:45			17	70	48
02:00			0	1	1	14:00			22	15	37
02:15			0	0	0	14:15			19	15	34
02:30			0	1	1	14:30			21	12	33
02:45			2	2	1	14:45			11	73	56
03:00			0	0	0	15:00			23	17	40
03:15			0	1	1	15:15			18	14	32
03:30			0	0	0	15:30			27	20	47
03:45			0	1	2	15:45			24	92	64
04:00			1	0	1	16:00			17	9	26
04:15			2	1	3	16:15			24	12	36
04:30			3	3	6	16:30			21	8	29
04:45			3	9	5	16:45			30	92	38
05:00			11	7	18	17:00			23	12	35
05:15			4	10	14	17:15			28	4	32
05:30			4	12	16	17:30			12	8	20
05:45			10	29	11	17:45			17	80	29
06:00			3	14	17	18:00			15	15	30
06:15			5	19	24	18:15			15	5	20
06:30			6	12	18	18:30			10	7	17
06:45			5	19	8	18:45			9	49	4
07:00			11	23	34	19:00			7	2	9
07:15			13	20	33	19:15			11	9	20
07:30			6	21	27	19:30			11	12	23
07:45			8	38	23	19:45			8	37	2
08:00			2	15	17	20:00			6	7	13
08:15			7	18	25	20:15			4	6	10
08:30			12	16	28	20:30			5	7	12
08:45			13	34	9	20:45			9	24	7
09:00			6	12	18	21:00			2	3	5
09:15			11	15	26	21:15			3	3	6
09:30			11	15	26	21:30			6	1	7
09:45			7	35	18	21:45			6	17	3
10:00			10	15	25	22:00			3	3	6
10:15			12	16	28	22:15			4	6	10
10:30			5	13	18	22:30			5	3	8
10:45			10	37	12	22:45			3	15	2
11:00			6	14	20	23:00			3	4	7
11:15			17	12	29	23:15			6	2	8
11:30			7	15	22	23:30			0	2	2
11:45			15	45	8	23:45			1	10	1
TOTALS			259	426	685	TOTALS			615	396	1011
SPLIT %			37.8%	62.2%	40.4%	SPLIT %			60.8%	39.2%	59.6%

DAILY TOTALS					NB	SB	EB	WB	Total		
					0	0	874	822	1,696		
AM Peak Hour			11:15	07:00	07:00	PM Peak Hour			16:30	14:45	15:00
AM Pk Volume			55	87	125	PM Pk Volume			102	65	156
Pk Hr Factor			0.809	0.946	0.919	Pk Hr Factor			0.850	0.813	0.830
7 - 9 Volume	0	0	72	145	217	4 - 6 Volume	0	0	172	67	239
7 - 9 Peak Hour			07:00	07:00	07:00	4 - 6 Peak Hour			16:30	16:15	16:15
7 - 9 Pk Volume	0	0	38	87	125	4 - 6 Pk Volume	0	0	102	41	139
Pk Hr Factor	0.000	0.000	0.731	0.946	0.919	Pk Hr Factor	0.000	0.000	0.850	0.854	0.891

VOLUME

Howell Mountain Rd near project site access

Day: Saturday
Date: 6/27/2020

City: Angwin
Project #: CA20_8104_002

DAILY TOTALS					NB	SB	EB	WB	Total					
					0	0	660	588	1,248					
AM Period	NB	SB	EB	WB	TOTAL	PM Period	NB	SB	EB	WB	TOTAL			
00:00			1	0	1	12:00			5	9	14			
00:15			0	2	2	12:15			8	10	18			
00:30			0	0	0	12:30			11	17	28			
00:45			2	3	2	4	12:45		20	44	4	40	24	84
01:00			0	0	0	13:00			18	5	23			
01:15			1	1	2	13:15			9	12	21			
01:30			0	0	0	13:30			14	12	26			
01:45			1	2	0	1	13:45		11	52	7	36	18	88
02:00			1	0	1	14:00			16	5	21			
02:15			0	1	1	14:15			10	9	19			
02:30			0	1	1	14:30			10	8	18			
02:45			0	1	0	2	14:45		16	52	14	36	30	88
03:00			0	0	0	15:00			9	8	17			
03:15			0	1	1	15:15			5	12	17			
03:30			0	0	0	15:30			15	8	23			
03:45			0	0	1	0	15:45		17	46	12	40	29	86
04:00			0	1	1	16:00			9	17	26			
04:15			0	3	3	16:15			15	11	26			
04:30			2	0	2	16:30			11	11	22			
04:45			2	4	3	7	16:45		12	47	10	49	22	96
05:00			11	5	16	17:00			11	5	16			
05:15			2	8	10	17:15			10	11	21			
05:30			10	4	14	17:30			5	13	18			
05:45			1	24	5	22	17:45		12	38	9	38	21	76
06:00			1	4	5	18:00			7	12	19			
06:15			1	2	3	18:15			5	4	9			
06:30			5	4	9	18:30			11	3	14			
06:45			5	12	8	18	18:45		10	33	12	31	22	64
07:00			2	2	4	19:00			7	12	19			
07:15			4	5	9	19:15			15	7	22			
07:30			7	10	17	19:30			15	7	22			
07:45			10	23	6	23	19:45		11	48	6	32	17	80
08:00			7	5	12	20:00			5	8	13			
08:15			6	6	12	20:15			7	3	10			
08:30			2	5	7	20:30			13	14	27			
08:45			5	20	7	23	20:45		12	37	5	30	17	67
09:00			7	12	19	21:00			7	6	13			
09:15			9	13	22	21:15			4	3	7			
09:30			8	5	13	21:30			1	2	3			
09:45			9	33	4	34	21:45		1	13	3	14	4	27
10:00			10	14	24	22:00			3	2	5			
10:15			9	4	13	22:15			3	2	5			
10:30			16	6	22	22:30			3	3	6			
10:45			13	48	13	37	22:45		2	11	4	11	6	22
11:00			15	9	24	23:00			4	0	4			
11:15			16	14	30	23:15			3	4	7			
11:30			13	18	31	23:30			4	2	6			
11:45			14	58	11	52	23:45		0	11	1	7	1	18
TOTALS			228	224	452	TOTALS			432	364	796			
SPLIT %			50.4%	49.6%	36.2%	SPLIT %			54.3%	45.7%	63.8%			

DAILY TOTALS					NB	SB	EB	WB	Total		
					0	0	660	588	1,248		
AM Peak Hour			10:30	10:45	10:45	PM Peak Hour			12:45	15:45	15:30
AM Pk Volume			60	54	111	PM Pk Volume			61	51	104
Pk Hr Factor			0.938	0.750	0.895	Pk Hr Factor			0.763	0.750	0.897
7 - 9 Volume	0	0	43	46	89	4 - 6 Volume	0	0	85	87	172
7 - 9 Peak Hour			07:30	07:30	07:30	4 - 6 Peak Hour			16:15	16:00	16:00
7 - 9 Pk Volume	0	0	30	27	57	4 - 6 Pk Volume	0	0	49	49	96
Pk Hr Factor	0.000	0.000	0.750	0.675	0.838	Pk Hr Factor	0.000	0.000	0.817	0.721	0.923

VOLUME

Chiles Pope Valley Rd Near Maxville Lake Winery

Day: Friday
Date: 7/10/2020

City: St. Helena
Project #: CA20_8105_001

DAILY TOTALS					NB	SB	EB	WB	Total		
					621	511	0	0	1,132		
AM Period	NB	SB	EB	WB	TOTAL	PM Period	NB	SB	EB	WB	TOTAL
00:00	3	3			6	12:00	10	6			16
00:15	2	0			2	12:15	7	9			16
00:30	2	0			2	12:30	10	9			19
00:45	0	7	0	3	10	12:45	10	37	15	39	76
01:00	0	0			0	13:00	11	13			24
01:15	0	0			0	13:15	12	14			26
01:30	1	0			1	13:30	5	14			19
01:45	1	2	0		3	13:45	14	42	3	44	86
02:00	0	1			1	14:00	12	5			17
02:15	0	0			0	14:15	10	17			27
02:30	0	0			0	14:30	12	23			35
02:45	0	0	1		1	14:45	12	46	20	65	111
03:00	0	0			0	15:00	7	19			26
03:15	0	1			1	15:15	15	13			28
03:30	1	0			1	15:30	18	25			43
03:45	0	1	1	2	4	15:45	14	54	8	65	119
04:00	2	3			5	16:00	13	12			25
04:15	1	2			3	16:15	8	9			17
04:30	1	0			1	16:30	3	9			12
04:45	5	9	0	5	14	16:45	18	42	5	35	77
05:00	8	10			18	17:00	9	8			17
05:15	15	2			17	17:15	11	5			16
05:30	26	7			33	17:30	8	7			15
05:45	27	76	12	31	107	17:45	8	36	3	23	59
06:00	3	5			8	18:00	7	4			11
06:15	4	6			10	18:15	6	3			9
06:30	5	9			14	18:30	4	2			6
06:45	10	22	3	23	45	18:45	7	24	4	13	37
07:00	8	3			11	19:00	2	1			3
07:15	6	6			12	19:15	9	4			13
07:30	3	3			6	19:30	6	5			11
07:45	5	22	9	21	43	19:45	4	21	2	12	33
08:00	9	6			15	20:00	3	5			8
08:15	8	7			15	20:15	6	3			9
08:30	4	3			7	20:30	0	4			4
08:45	2	23	7	23	46	20:45	0	9	3	15	24
09:00	13	12			25	21:00	5	3			8
09:15	4	6			10	21:15	4	0			4
09:30	15	5			20	21:30	2	1			3
09:45	4	36	4	27	63	21:45	4	15	1	5	20
10:00	11	13			24	22:00	3	1			4
10:15	20	5			25	22:15	1	0			1
10:30	8	7			15	22:30	3	0			3
10:45	8	47	7	32	79	22:45	4	11	0	1	12
11:00	6	6			12	23:00	4	0			4
11:15	7	7			14	23:15	1	0			1
11:30	10	4			14	23:30	2	0			2
11:45	9	32	8	25	57	23:45	0	7	1	1	8
TOTALS	277	193			470	TOTALS	344	318			662
SPLIT %	58.9%	41.1%			41.5%	SPLIT %	52.0%	48.0%			58.5%

DAILY TOTALS					NB	SB	EB	WB	Total
					621	511	0	0	1,132
AM Peak Hour	05:00	05:45			05:00	PM Peak Hour	15:15	14:15	14:45
AM Pk Volume	76	32			107	PM Pk Volume	60	79	129
Pk Hr Factor	0.704	0.667			0.686	Pk Hr Factor	0.833	0.859	0.750
7 - 9 Volume	45	44	0	0	89	4 - 6 Volume	78	58	136
7 - 9 Peak Hour	07:45	07:30			07:45	4 - 6 Peak Hour	16:45	16:00	16:00
7 - 9 Pk Volume	26	25	0	0	51	4 - 6 Pk Volume	46	35	77
Pk Hr Factor	0.722	0.694	0.000	0.000	0.850	Pk Hr Factor	0.639	0.729	0.000

VOLUME

Chiles Pope Valley Rd Near Maxville Lake Winery

Day: Saturday
Date: 7/11/2020

City: St. Helena
Project #: CA20_8105_001

DAILY TOTALS					NB	SB	EB	WB	Total		
					453	417	0	0	870		
AM Period	NB	SB	EB	WB	TOTAL	PM Period	NB	SB	EB	WB	TOTAL
00:00	2	1			3	12:00	6	9			15
00:15	1	0			1	12:15	13	9			22
00:30	1	0			1	12:30	5	9			14
00:45	0	4	1	2	7	12:45	9	33	9	36	69
01:00	0	0			0	13:00	13	12			25
01:15	1	0			1	13:15	5	8			13
01:30	0	0			0	13:30	6	10			16
01:45	1	2	0		3	13:45	11	35	11	41	76
02:00	0	0			0	14:00	2	10			12
02:15	0	0			0	14:15	8	3			11
02:30	0	1			1	14:30	8	5			13
02:45	0	0	1		1	14:45	12	30	3	21	51
03:00	0	0			0	15:00	11	4			15
03:15	0	0			0	15:15	5	5			10
03:30	0	0			0	15:30	9	7			16
03:45	2	2	0		4	15:45	8	33	8	24	57
04:00	1	1			2	16:00	6	8			14
04:15	4	0			4	16:15	10	11			21
04:30	6	0			6	16:30	6	4			10
04:45	4	15	0	1	20	16:45	7	29	6	29	58
05:00	11	1			12	17:00	7	6			13
05:15	5	3			8	17:15	7	4			11
05:30	8	2			10	17:30	2	3			5
05:45	13	37	8	14	52	17:45	3	19	11	24	43
06:00	6	1			7	18:00	6	6			12
06:15	2	2			4	18:15	6	9			15
06:30	5	3			8	18:30	5	4			9
06:45	1	14	1	7	23	18:45	1	18	3	22	40
07:00	4	5			9	19:00	3	3			6
07:15	2	2			4	19:15	5	2			7
07:30	1	2			3	19:30	2	2			4
07:45	3	10	3	12	28	19:45	4	14	2	9	23
08:00	6	6			12	20:00	7	8			15
08:15	3	2			5	20:15	4	4			8
08:30	3	3			6	20:30	3	1			4
08:45	13	25	16	27	51	20:45	3	17	2	15	32
09:00	8	5			13	21:00	2	5			7
09:15	3	7			10	21:15	3	0			3
09:30	6	9			15	21:30	2	1			3
09:45	9	26	3	24	52	21:45	5	12	0	6	18
10:00	5	7			12	22:00	5	2			7
10:15	4	15			19	22:15	3	1			4
10:30	6	4			10	22:30	2	1			3
10:45	10	25	12	38	65	22:45	0	10	0	4	14
11:00	12	20			32	23:00	2	4			6
11:15	9	12			21	23:15	0	1			1
11:30	11	10			21	23:30	2	0			2
11:45	7	39	13	55	94	23:45	0	4	0	5	9
TOTALS	199	181			380	TOTALS	254	236			490
SPLIT %	52.4%	47.6%			43.7%	SPLIT %	51.8%	48.2%			56.3%

DAILY TOTALS					NB	SB	EB	WB	Total
					453	417	0	0	870
AM Peak Hour	10:45	11:00			10:45	PM Peak Hour	12:15	13:00	12:15
AM Pk Volume	42	55			96	PM Pk Volume	40	41	79
Pk Hr Factor	0.875	0.688			0.750	Pk Hr Factor	0.769	0.854	0.790
7 - 9 Volume	35	39	0	0	74	4 - 6 Volume	48	53	101
7 - 9 Peak Hour	08:00	08:00			08:00	4 - 6 Peak Hour	16:15	16:00	16:00
7 - 9 Pk Volume	25	27	0	0	52	4 - 6 Pk Volume	30	29	58
Pk Hr Factor	0.481	0.422	0.000	0.000	0.448	Pk Hr Factor	0.750	0.659	0.000

VOLUME

1225 Howell Mountain Rd Near Project Site Access

Day: Friday
Date: 7/10/2020

City: Angwin
Project #: CA20_8105_002

DAILY TOTALS					NB	SB	EB	WB	Total		
					0	0	873	810	1,683		
AM Period	NB	SB	EB	WB	TOTAL	PM Period	NB	SB	EB	WB	TOTAL
00:00			0	0	0	12:00			19	11	30
00:15			2	1	3	12:15			13	16	29
00:30			0	0	0	12:30			14	11	25
00:45			0	2	2	12:45		65	19	15	53
				3	5						34
01:00			0	0	0	13:00			15	12	27
01:15			0	0	0	13:15			14	19	33
01:30			1	1	2	13:30			26	10	36
01:45			0	1	0	13:45		65	10	15	56
				1	2						25
02:00			0	0	0	14:00			14	16	30
02:15			1	0	1	14:15			21	20	41
02:30			2	0	2	14:30			13	12	25
02:45			0	3	0	14:45		68	20	14	62
				0	3						34
03:00			1	0	1	15:00			19	11	30
03:15			0	1	1	15:15			22	10	32
03:30			0	0	0	15:30			30	12	42
03:45			0	1	0	15:45		86	15	12	45
				1	2						27
04:00			0	0	0	16:00			24	16	40
04:15			2	3	5	16:15			17	11	28
04:30			1	1	2	16:30			18	9	27
04:45			5	8	5	16:45		76	17	9	45
				9	10						26
05:00			4	7	11	17:00			21	14	35
05:15			10	9	19	17:15			18	10	28
05:30			15	14	29	17:30			15	7	22
05:45			5	34	11	17:45		68	14	9	40
				41	16						23
06:00			9	9	18	18:00			15	4	19
06:15			7	21	28	18:15			18	9	27
06:30			6	8	14	18:30			12	9	21
06:45			10	32	21	18:45		56	11	3	25
				59	31						14
07:00			7	11	18	19:00			14	6	20
07:15			14	21	35	19:15			10	2	12
07:30			7	19	26	19:30			8	5	13
07:45			12	40	17	19:45		50	18	3	16
				68	29						21
08:00			6	15	21	20:00			8	6	14
08:15			5	18	23	20:15			9	4	13
08:30			11	22	33	20:30			5	1	6
08:45			14	36	11	20:45		28	6	1	12
				66	25						7
09:00			9	13	22	21:00			2	7	9
09:15			8	10	18	21:15			5	4	9
09:30			10	13	23	21:30			2	3	5
09:45			6	33	20	21:45		15	6	3	17
				56	26						9
10:00			11	14	25	22:00			0	4	4
10:15			5	13	18	22:15			1	1	2
10:30			8	12	20	22:30			1	3	4
10:45			7	31	10	22:45		5	3	2	10
				49	17						5
11:00			18	19	37	23:00			2	1	3
11:15			17	15	32	23:15			3	1	4
11:30			7	24	31	23:30			2	1	3
11:45			20	62	15	23:45		8	1	0	3
				73	35						1
TOTALS			283	426	709	TOTALS			590	384	974
SPLIT %			39.9%	60.1%	42.1%	SPLIT %			60.6%	39.4%	57.9%

DAILY TOTALS					NB	SB	EB	WB	Total		
					0	0	873	810	1,683		
AM Peak Hour			11:45	11:00	11:00	PM Peak Hour			14:45	13:45	15:15
AM Pk Volume			66	73	135	PM Pk Volume			91	63	141
Pk Hr Factor			0.825	0.760	0.912	Pk Hr Factor			0.758	0.788	0.839
7 - 9 Volume	0	0	76	134	210	4 - 6 Volume	0	0	144	85	229
7 - 9 Peak Hour			07:00	07:15	07:15	4 - 6 Peak Hour			16:00	16:00	16:00
7 - 9 Pk Volume	0	0	40	72	111	4 - 6 Pk Volume	0	0	76	45	121
Pk Hr Factor	0.000	0.000	0.714	0.857	0.793	Pk Hr Factor	0.000	0.000	0.792	0.703	0.756

VOLUME

1225 Howell Mountain Rd Near Project Site Access

Day: Saturday
Date: 7/11/2020

City: Angwin
Project #: CA20_8105_002

DAILY TOTALS					NB	SB	EB	WB	Total					
					0	0	625	581	1,206					
AM Period	NB	SB	EB	WB	TOTAL	PM Period	NB	SB	EB	WB	TOTAL			
00:00			3	3	6	12:00			10	20	30			
00:15			0	0	0	12:15			5	13	18			
00:30			1	1	2	12:30			19	17	36			
00:45			1	5	1	12:45		5	6	40	7	57	13	97
01:00			0	0	0	13:00			18	11	29			
01:15			0	0	0	13:15			12	6	18			
01:30			0	0	0	13:30			16	7	23			
01:45			0	1	1	13:45		1	13	59	8	32	21	91
02:00			0	0	0	14:00			9	10	19			
02:15			1	0	1	14:15			8	6	14			
02:30			0	1	1	14:30			12	9	21			
02:45			0	1	0	14:45		1	13	42	10	35	23	77
03:00			0	1	1	15:00			14	16	30			
03:15			0	1	1	15:15			13	5	18			
03:30			3	0	3	15:30			21	11	32			
03:45			0	3	0	15:45		2	15	63	6	38	21	101
04:00			0	0	0	16:00			9	12	21			
04:15			2	2	4	16:15			9	8	17			
04:30			1	1	2	16:30			5	14	19			
04:45			0	3	2	16:45		5	13	36	8	42	21	78
05:00			6	4	10	17:00			9	12	21			
05:15			3	3	6	17:15			7	7	14			
05:30			9	7	16	17:30			11	4	15			
05:45			1	19	2	17:45		1	8	35	9	32	17	67
06:00			4	3	7	18:00			11	3	14			
06:15			2	3	5	18:15			7	9	16			
06:30			6	7	13	18:30			10	5	15			
06:45			3	15	3	18:45		1	4	32	4	21	8	53
07:00			4	8	12	19:00			2	14	16			
07:15			3	3	6	19:15			4	2	6			
07:30			4	5	9	19:30			11	6	17			
07:45			10	21	8	19:45		1	6	23	5	27	11	50
08:00			7	4	11	20:00			6	7	13			
08:15			8	7	15	20:15			8	6	14			
08:30			10	7	17	20:30			4	3	7			
08:45			11	36	8	20:45		1	8	26	3	19	11	45
09:00			2	8	10	21:00			7	9	16			
09:15			8	9	17	21:15			4	6	10			
09:30			5	4	9	21:30			4	6	10			
09:45			8	23	8	21:45		1	3	18	5	26	8	44
10:00			13	12	25	22:00			3	3	6			
10:15			14	19	33	22:15			2	4	6			
10:30			11	8	19	22:30			7	8	15			
10:45			8	46	21	22:45		1	1	13	3	18	4	31
11:00			8	7	15	23:00			2	0	2			
11:15			12	11	23	23:15			4	2	6			
11:30			16	8	24	23:30			2	4	6			
11:45			21	57	15	23:45		1	1	9	2	8	3	17
TOTALS				229	226	455	TOTALS			396	355	751		
SPLIT %				50.3%	49.7%	37.7%	SPLIT %			52.7%	47.3%	62.3%		

DAILY TOTALS					NB	SB	EB	WB	Total		
					0	0	625	581	1,206		
AM Peak Hour			11:15	11:45	11:45	PM Peak Hour			15:00	12:00	14:45
AM Pk Volume			59	65	120	PM Pk Volume			63	57	103
Pk Hr Factor			0.702	0.813	0.833	Pk Hr Factor			0.750	0.713	0.805
7 - 9 Volume	0	0	57	50	107	4 - 6 Volume	0	0	71	74	145
7 - 9 Peak Hour			08:00	07:45	08:00	4 - 6 Peak Hour			16:45	16:00	16:00
7 - 9 Pk Volume	0	0	36	26	62	4 - 6 Pk Volume	0	0	40	42	78
Pk Hr Factor	0.000	0.000	0.818	0.813	0.816	Pk Hr Factor	0.000	0.000	0.769	0.750	0.929

Growth Factors

ADT: PM Weekday			
Segment	2017	2020	Growth Factor
Chiles Valley Pope Road	974	1117	N/A
Howell Mountain Road	N/A	1690	N/A

ADT: PM Weekend			
Segment	2017	2020	Growth Factor
Chiles Valley Pope Road	1141	873	1.307
Howell Mountain Road	1604	1227	1.307

Intersection				
Study Intersection	PM 2015	PM 2040	PM Growth Factor	Adjusted for 2020
Silverado Trail/Deer Park Rd	5471	8018	1.47	1.06

Use the PM Growth Factors to calculate Future volumes from Existing Volumes.



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Appendix B

Collision Rate Calculations



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Intersection Collision Rate Worksheet

Howell Mountain Conservation Cemetery TIS

Intersection # 1: Silverado Trail & Deer Park Road

Date of Count: Tuesday, October 24, 2017

Number of Collisions: 7

Number of Injuries: 1

Number of Fatalities: 0

Average Daily Traffic (ADT): 14400

Start Date: October 1, 2014

End Date: September 30, 2019

Number of Years: 5

Intersection Type: Four-Legged

Control Type: 4 Way Stop

Area: Suburban

$$\text{Collision Rate} = \frac{\text{Number of Collisions} \times 1 \text{ Million}}{\text{ADT} \times \text{Days per Year} \times \text{Number of Years}}$$

$$\text{Collision Rate} = \frac{7}{14,400} \times \frac{1,000,000}{365 \times 5}$$

	<u>Collision Rate</u>	<u>Fatality Rate</u>	<u>Injury Rate</u>
Study Intersection	0.27 c/mve	0.0%	14.3%
Statewide Average*	0.27 c/mve	1.8%	32.9%

Notes

ADT = average daily total vehicles entering intersection

c/mve = collisions per million vehicles entering intersection

* 2016 Collision Data on California State Highways, Caltrans

Roadway Segment Collision Rate Worksheet

Howell Mountain Conservation Cemetery TIS

Location: Howell Mountain Road: White Cottage Rd S to Chiles
 Pope Valley Rd
Date of Count: Friday, July 10, 2020
Average Daily Traffic (ADT): 1,700

Number of Collisions: 15
Number of Injuries: 8
Number of Fatalities: 0
Start Date: October 1, 2014
End Date: September 30, 2019
Number of Years: 5

Highway Type: Conventional 2 lanes or less
Area: Rural
Design Speed: ≤55
Terrain: Mountain

Segment Length: 5.9 miles
Direction: North/South

$$\text{Collision Rate} = \frac{\text{Number of Collisions} \times 1 \text{ Million}}{\text{ADT} \times \text{Days per Year} \times \text{Segment Length} \times \text{Number of Years}}$$

$$\text{Collision Rate} = \frac{15 \times 1,000,000}{1,700 \times 365 \times 5.9 \times 5}$$

	<u>Collision Rate</u>	<u>Fatality Rate</u>	<u>Injury Rate</u>
Study Segment	0.82 c/mvm	0.0%	53.3%
Statewide Average*	1.58 c/mvm	2.4%	47.4%

Notes

ADT = average daily traffic volume
 c/mvm = collisions per million vehicle miles
 * 2016 Collision Data on California State Highways, Caltrans

Appendix C

Intersection Level of Service Calculations





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Intersection Level Of Service Report
Intersection 1: Silverado Trail/Deer Park Rd

Control Type: All-way stop
 Analysis Method: HCM 2010
 Analysis Period: 15 minutes
 Delay (sec / veh): 25.0
 Level Of Service: D
 Volume to Capacity (v/c): 0.848

Intersection Setup

Name	Deer Park Rd			Southbound			Silverado Trail			Silverado Trail		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	←→			←→			←→			←→		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	1	0	0	1	0	0	1	0	0	1
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	50.00	100.00	100.00	100.00
Speed [mph]	50.00			45.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Deer Park Rd						Silverado Trail			Silverado Trail		
Base Volume Input [veh/h]	25	162	131	240	103	27	11	232	9	72	191	155
Base Volume Adjustment Factor	1.0600	1.0600	1.0600	1.0600	1.0600	1.0600	1.0600	1.0600	1.0600	1.0600	1.0600	1.0600
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	27	172	139	254	109	29	12	246	10	76	202	164
Peak Hour Factor	0.9700	0.9700	0.9700	0.9700	0.9700	0.9700	0.9700	0.9700	0.9700	0.9700	0.9700	0.9700
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	7	44	36	65	28	7	3	63	3	20	52	42
Total Analysis Volume [veh/h]	28	177	143	262	112	30	12	254	10	78	208	169
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Lanes

Capacity per Entry Lane [veh/h]	437	482	441	507	440	484	443	495
Degree of Utilization, x	0.47	0.30	0.85	0.06	0.60	0.02	0.65	0.34

Movement, Approach, & Intersection Results

95th-Percentile Queue Length [veh]	2.45	1.23	8.37	0.19	3.89	0.06	4.46	1.50
95th-Percentile Queue Length [ft]	61.29	30.72	209.22	4.70	97.28	1.58	111.41	37.51
Approach Delay [s/veh]	16.09		39.73		22.18		20.47	
Approach LOS	C		E		C		C	
Intersection Delay [s/veh]	25.01							
Intersection LOS	D							

Intersection Level Of Service Report
Intersection 1: Silverado Trail/Deer Park Rd

Control Type:	All-way stop	Delay (sec / veh):	16.7
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.710

Intersection Setup

Name	Deer Park Rd			Silverado Trail			Silverado Trail					
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	⇌			⇌			⇌			⇌		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	1	0	0	1	0	0	1	0	0	1
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	50.00	100.00	100.00	100.00
Speed [mph]	50.00			45.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Deer Park Rd						Silverado Trail					
Base Volume Input [veh/h]	16	137	52	195	147	45	32	131	11	64	137	89
Base Volume Adjustment Factor	1.0600	1.0600	1.0600	1.0600	1.0600	1.0600	1.0600	1.0600	1.0600	1.0600	1.0600	1.0600
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	17	145	55	207	156	48	34	139	12	68	145	94
Peak Hour Factor	0.9700	0.9700	0.9700	0.9700	0.9700	0.9700	0.9700	0.9700	0.9700	0.9700	0.9700	0.9700
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	4	37	14	53	40	12	9	36	3	18	37	24
Total Analysis Volume [veh/h]	18	149	57	213	161	49	35	143	12	70	149	97
Pedestrian Volume [ped/h]	0						0					

Intersection Settings

Lanes

Capacity per Entry Lane [veh/h]	513	576	527	617	499	561	506	576
Degree of Utilization, x	0.33	0.10	0.71	0.08	0.36	0.02	0.43	0.17

Movement, Approach, & Intersection Results

95th-Percentile Queue Length [veh]	1.40	0.33	5.66	0.26	1.60	0.07	2.16	0.60
95th-Percentile Queue Length [ft]	35.05	8.20	141.48	6.45	40.01	1.64	54.00	15.03
Approach Delay [s/veh]	12.19		22.72		13.57		13.63	
Approach LOS	B		C		B		B	
Intersection Delay [s/veh]	16.68							
Intersection LOS	C							

Intersection Level Of Service Report
Intersection 1: Silverado Trail/Deer Park Rd

Control Type: All-way stop
 Analysis Method: HCM 6th Edition
 Analysis Period: 15 minutes
 Delay (sec / veh): 83.1
 Level Of Service: F
 Volume to Capacity (v/c): 1.351

Intersection Setup

Name	Deer Park Rd			Southbound			Silverado Trail			Silverado Trail		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	←→			←→			←→			←→		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	1	0	0	1	0	0	1	0	0	1
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	50.00	100.00	100.00	100.00
Speed [mph]	50.00			45.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Deer Park Rd						Silverado Trail			Silverado Trail		
Base Volume Input [veh/h]	25	162	131	240	103	27	11	232	9	72	191	155
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.4700	1.4700	1.4700	1.4700	1.4700	1.4700	1.4700	1.4700	1.4700	1.4700	1.4700	1.4700
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	37	238	193	353	151	40	16	341	13	106	281	228
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	9	60	48	88	38	10	4	85	3	27	70	57
Total Analysis Volume [veh/h]	37	238	193	353	151	40	16	341	13	106	281	228
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Lanes

Capacity per Entry Lane [veh/h]	382	416	504	421	396	429	396	434
Degree of Utilization, x	0.72	0.46	1.35	0.10	0.90	0.03	0.98	0.52

Movement, Approach, & Intersection Results

95th-Percentile Queue Length [veh]	5.47	2.39	24.18	0.31	9.41	0.09	11.53	2.97
95th-Percentile Queue Length [ft]	136.71	59.86	604.59	7.83	235.27	2.34	288.18	74.30
Approach Delay [s/veh]	27.02		187.44		53.00		51.67	
Approach LOS	D		F		F		F	
Intersection Delay [s/veh]	83.12							
Intersection LOS	F							

Intersection Level Of Service Report
Intersection 1: Silverado Trail/Deer Park Rd

Control Type: All-way stop
 Analysis Method: HCM 6th Edition
 Analysis Period: 15 minutes
 Delay (sec / veh): 45.3
 Level Of Service: E
 Volume to Capacity (v/c): 1.101

Intersection Setup

Name	Deer Park Rd			Southbound			Silverado Trail			Silverado Trail		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	⇌			⇌			⇌			⇌		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	1	0	0	1	0	0	1	0	0	1
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	50.00	100.00	100.00	100.00
Speed [mph]	50.00			45.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Deer Park Rd						Silverado Trail			Silverado Trail		
Base Volume Input [veh/h]	16	137	52	195	147	45	32	131	11	64	137	89
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.4700	1.4700	1.4700	1.4700	1.4700	1.4700	1.4700	1.4700	1.4700	1.4700	1.4700	1.4700
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	24	201	76	287	216	66	47	193	16	94	201	131
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	6	50	19	72	54	17	12	48	4	24	50	33
Total Analysis Volume [veh/h]	24	201	76	287	216	66	47	193	16	94	201	131
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Lanes

Capacity per Entry Lane [veh/h]	443	487	503	523	436	481	446	498
Degree of Utilization, x	0.51	0.16	1.10	0.13	0.55	0.03	0.66	0.26

Movement, Approach, & Intersection Results

95th-Percentile Queue Length [veh]	2.81	0.55	16.93	0.43	3.24	0.10	4.69	1.05
95th-Percentile Queue Length [ft]	70.34	13.73	423.15	10.76	81.01	2.57	117.24	26.19
Approach Delay [s/veh]	17.07		89.53		19.95		21.26	
Approach LOS	C		F		C		C	
Intersection Delay [s/veh]	45.26							
Intersection LOS	E							

Intersection Level Of Service Report
Intersection 1: Silverado Trail/Deer Park Rd

Control Type: Signalized
 Analysis Method: HCM 6th Edition
 Analysis Period: 15 minutes
 Delay (sec / veh): 43.3
 Level Of Service: D
 Volume to Capacity (v/c): 0.750

Intersection Setup

Name	Deer Park Rd			Deer Park Rd			Silverado Trail			Silverado Trail		
	Northbound			Southbound			Eastbound			Westbound		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	TT			TT			TT			TT		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	1	0	0	1	0	0	1	0	0	1
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	50.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	55.00			50.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	No			No			No			No		

Volumes

Name	Deer Park Rd			Deer Park Rd			Silverado Trail			Silverado Trail		
Base Volume Input [veh/h]	25	162	131	240	103	27	11	232	9	72	191	155
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.4700	1.4700	1.4700	1.4700	1.4700	1.4700	1.4700	1.4700	1.4700	1.4700	1.4700	1.4700
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	37	238	193	353	151	40	16	341	13	106	281	228
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	9	60	48	88	38	10	4	85	3	27	70	57
Total Analysis Volume [veh/h]	37	238	193	353	151	40	16	341	13	106	281	228
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [1/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [1/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	80
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal Group	5	2	0	1	6	0	7	4	0	3	8	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	5	5	0	5	5	0	5	5	0	5	5	0
Maximum Green [s]	30	30	0	30	30	0	30	30	0	30	30	0
Amber [s]	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
All red [s]	1.0	1.0	0.0	1.0	1.0	0.0	1.0	1.0	0.0	1.0	1.0	0.0
Split [s]	11	26	0	20	35	0	9	9	0	25	25	0
Vehicle Extension [s]	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	10	0	0	10	0	0	10	0	0	10	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk	No			No			No			No		
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
Minimum Recall	No	No		No	No		No	No		No	No	
Maximum Recall	No	No		No	No		No	No		No	No	
Pedestrian Recall	No	No		No	No		No	No		No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	L	C	L	C	L	C
C, Cycle Length [s]	80	80	80	80	80	80	80	80
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
I1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
I2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
g_l, Effective Green Time [s]	3	22	16	35	2	20	6	24
g / C, Green / Cycle	0.04	0.28	0.20	0.44	0.02	0.25	0.08	0.31
(v / s)_i Volume / Saturation Flow Rate	0.02	0.25	0.20	0.11	0.01	0.19	0.06	0.29
s, saturation flow rate [veh/h]	1781	1733	1781	1803	1781	1858	1781	1733
c, Capacity [veh/h]	63	480	356	796	34	457	138	528
d1, Uniform Delay [s]	38.03	27.86	31.93	13.95	38.86	28.10	36.21	27.40
k, delay calibration	0.11	0.50	0.11	0.50	0.11	0.11	0.11	0.29
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	8.58	22.35	20.14	0.71	10.17	2.84	8.71	22.49
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.59	0.90	0.99	0.24	0.48	0.77	0.77	0.96
d, Delay for Lane Group [s/veh]	46.61	50.21	52.07	14.67	49.03	30.94	44.92	49.89
Lane Group LOS	D	D	D	B	D	C	D	D
Critical Lane Group	No	Yes	Yes	No	Yes	No	No	Yes
50th-Percentile Queue Length [veh/ln]	0.81	9.90	8.15	2.00	0.38	5.92	2.19	11.52
50th-Percentile Queue Length [ft/ln]	20.19	247.55	203.75	50.05	9.55	148.07	54.78	288.12
95th-Percentile Queue Length [veh/ln]	1.45	15.06	12.83	3.60	0.69	9.91	3.94	17.09
95th-Percentile Queue Length [ft/ln]	36.34	376.57	320.80	90.09	17.18	247.85	98.61	427.31

Movement, Approach, & Intersection Results												
d_M, Delay for Movement [s/veh]	46.61	50.21	50.21	52.07	14.67	14.67	49.03	30.94	30.94	44.92	49.89	49.89
Movement LOS	D	D	D	D	B	B	D	C	C	D	D	D
d_A, Approach Delay [s/veh]	49.92			38.94			31.73			49.04		
Approach LOS	D			D			C			D		
d_I, Intersection Delay [s/veh]	43.28											
Intersection LOS	D											
Intersection V/C	0.750											

Other Modes				
g_Walk,mi, Effective Walk Time [s]	0.0	0.0	0.0	0.0
M_comer, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	0.00	0.00	0.00
I_p,int, Pedestrian LOS Score for Intersection	0.000	0.000	0.000	0.000
Crosswalk LOS	F	F	F	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	550	775	125	525
d_b, Bicycle Delay [s]	21.03	15.01	35.16	21.76
I_b,int, Bicycle LOS Score for Intersection	2.332	2.457	2.170	2.574
Bicycle LOS	B	B	B	B

Sequence												
Ring 1	1	2	3	4	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 1: Silverado Trail/Deer Park Rd

Control Type:	Signalized	Delay (sec / veh):	24.9
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.533

Intersection Setup												
Name	Deer Park Rd			Deer Park Rd			Silverado Trail			Silverado Trail		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	T T			T T			T T			T T		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	1	0	0	1	0	0	1	0	0	1
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	50.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	55.00			50.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	No			No			No			No		

Volumes												
Name	Deer Park Rd			Deer Park Rd			Silverado Trail			Silverado Trail		
Base Volume Input [veh/h]	16	137	52	195	147	45	32	131	11	64	137	89
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.4700	1.4700	1.4700	1.4700	1.4700	1.4700	1.4700	1.4700	1.4700	1.4700	1.4700	1.4700
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	24	201	76	287	216	66	47	193	16	94	201	131
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	6	50	19	72	54	17	12	48	4	24	50	33
Total Analysis Volume [veh/h]	24	201	76	287	216	66	47	193	16	94	201	131
Presence of On-Street Parking	No	No	No	No	No	No	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0	0	0	0	0	0	0	0	0	0	0	0
v_di, Inbound Pedestrian Volume crossing m	0	0	0	0	0	0	0	0	0	0	0	0
v_co, Outbound Pedestrian Volume crossing	0	0	0	0	0	0	0	0	0	0	0	0
v_ci, Inbound Pedestrian Volume crossing mi	0	0	0	0	0	0	0	0	0	0	0	0
v_ab, Corner Pedestrian Volume [ped/h]	0	0	0	0	0	0	0	0	0	0	0	0
Bicycle Volume [bicycles/h]	0	0	0	0	0	0	0	0	0	0	0	0

Intersection Settings												
Located in CBD	No											
Signal Coordination Group	-											
Cycle Length [s]	60											
Active Pattern	Pattern 1											
Coordination Type	Time of Day Pattern Isolated											
Actuation Type	Fully actuated											
Offset [s]	0.0											
Offset Reference	Lead Green - Beginning of First Green											
Permissive Mode	SingleBand											
Lost time [s]	0.00											
Phasing & Timing												
Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal Group	5	2	0	1	6	0	7	4	0	3	8	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	5	5	0	5	5	0	5	5	0	5	5	0
Maximum Green [s]	30	30	0	30	30	0	30	30	0	30	30	0
Amber [s]	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
All red [s]	1.0	1.0	0.0	1.0	1.0	0.0	1.0	1.0	0.0	1.0	1.0	0.0
Split [s]	9	12	0	15	18	0	9	10	0	23	24	0
Vehicle Extension [s]	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	10	0	0	10	0	0	10	0	0	10	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk	No	No	No	No	No	No	No	No	No	No	No	No
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
Minimum Recall	No	No	No	No	No	No	No	No	No	No	No	No
Maximum Recall	No	No	No	No	No	No	No	No	No	No	No	No
Pedestrian Recall	No	No	No	No	No	No	No	No	No	No	No	No
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Exclusive Pedestrian Phase												
Pedestrian Signal Group	0											
Pedestrian Walk [s]	0											
Pedestrian Clearance [s]	0											

Lane Group Calculations

Lane Group	L	C	L	C	L	C	L	C
C, Cycle Length [s]	60	60	60	60	60	60	60	60
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
g_l, Effective Green Time [s]	2	17	11	26	3	12	4	14
g / C, Green / Cycle	0.03	0.28	0.18	0.43	0.05	0.20	0.07	0.23
(v / s)_l Volume / Saturation Flow Rate	0.01	0.16	0.16	0.16	0.03	0.11	0.05	0.19
s, saturation flow rate [veh/h]	1781	1784	1781	1796	1781	1845	1781	1748
c, Capacity [veh/h]	53	494	327	774	85	372	128	395
d1, Uniform Delay [s]	28.76	18.65	23.95	11.59	28.08	21.66	27.41	22.29
k, delay calibration	0.11	0.50	0.11	0.50	0.11	0.11	0.11	0.11
l, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	5.84	4.54	7.49	1.33	5.49	1.33	7.78	4.83
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.45	0.56	0.88	0.36	0.55	0.56	0.73	0.84
d, Delay for Lane Group [s/veh]	34.60	23.19	31.44	12.92	33.57	22.99	35.19	27.12
Lane Group LOS	C	C	C	B	C	C	D	C
Critical Lane Group	No	Yes	Yes	No	Yes	No	No	Yes
50th-Percentile Queue Length [veh/ln]	0.38	3.26	4.05	2.18	0.70	2.34	1.42	4.19
50th-Percentile Queue Length [ft/ln]	9.59	81.41	101.27	54.57	17.62	58.40	35.48	104.72
95th-Percentile Queue Length [veh/ln]	0.69	5.86	7.29	3.93	1.27	4.20	2.55	7.54
95th-Percentile Queue Length [ft/ln]	17.26	146.54	182.28	98.23	31.71	105.12	63.87	188.49

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	34.60	23.19	23.19	31.44	12.92	12.92	33.57	22.99	22.99	35.19	27.12	27.12
Movement LOS	C	C	C	C	B	B	C	C	C	D	C	C
d_A, Approach Delay [s/veh]	24.10		22.26		24.93		28.90					
Approach LOS	C		C		C		C					
d_I, Intersection Delay [s/veh]	24.88											
Intersection LOS	C											
Intersection V/C	0.533											

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	0.0	0.0	0.0
M_comer, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	0.00	0.00	0.00
I_p,int, Pedestrian LOS Score for Intersectio	0.000	0.000	0.000	0.000
Crosswalk LOS	F	F	F	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	266	466	200	665
d_b, Bicycle Delay [s]	22.61	17.70	24.37	13.40
I_b,int, Bicycle LOS Score for Intersection	2.056	2.498	1.982	2.263
Bicycle LOS	B	B	A	B

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 1: Silverado Trail/Deer Park Rd

Control Type: All-way stop
 Analysis Method: HCM 6th Edition
 Analysis Period: 15 minutes
 Delay (sec / veh): 25.9
 Level Of Service: D
 Volume to Capacity (v/c): 0.865

Intersection Setup

Name	Deer Park Rd			Southbound			Silverado Trail			Silverado Trail		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	←→			←→			←→			←→		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	1	0	0	1	0	0	1	0	0	1
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	50.00	100.00	100.00	100.00
Speed [mph]	50.00			45.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Deer Park Rd						Silverado Trail					
Base Volume Input [veh/h]	25	162	131	240	103	27	11	232	9	72	191	155
Base Volume Adjustment Factor	1.0600	1.0600	1.0600	1.0600	1.0600	1.0600	1.0600	1.0600	1.0600	1.0600	1.0600	1.0600
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	6	0	3	2	0	0	0	0	3
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	27	172	139	260	109	32	14	246	10	76	202	167
Peak Hour Factor	0.9700	0.9700	0.9700	0.9700	0.9700	0.9700	0.9700	0.9700	0.9700	0.9700	0.9700	0.9700
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	7	44	36	67	28	8	4	63	3	20	52	43
Total Analysis Volume [veh/h]	28	177	143	268	112	33	14	254	10	78	208	172
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Lanes

Capacity per Entry Lane [veh/h]	433	479	439	505	437	480	440	491
Degree of Utilization, x	0.47	0.30	0.87	0.07	0.61	0.02	0.65	0.35

Movement, Approach, & Intersection Results

95th-Percentile Queue Length [veh]	2.48	1.24	8.80	0.21	4.00	0.06	4.52	1.56
95th-Percentile Queue Length [ft]	62.00	31.05	219.94	5.23	99.98	1.59	112.92	38.90
Approach Delay [s/veh]	16.26		41.94		22.68		20.76	
Approach LOS	C		E		C		C	
Intersection Delay [s/veh]	25.91							
Intersection LOS	D							

Intersection Level Of Service Report
Intersection 1: Silverado Trail/Deer Park Rd

Control Type:	All-way stop	Delay (sec / veh):	17.9
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.751

Intersection Setup

Name	Deer Park Rd			Southbound			Silverado Trail			Silverado Trail		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	←→←			←→←			←→←			←→←		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	1	0	0	1	0	0	1	0	0	1
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	50.00	100.00	100.00	100.00
Speed [mph]	50.00			45.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Deer Park Rd						Silverado Trail			Silverado Trail		
Base Volume Input [veh/h]	16	137	52	195	147	45	32	131	11	64	137	89
Base Volume Adjustment Factor	1.0600	1.0600	1.0600	1.0600	1.0600	1.0600	1.0600	1.0600	1.0600	1.0600	1.0600	1.0600
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	15	0	7	7	0	0	0	0	17
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	17	145	55	222	156	55	41	139	12	68	145	111
Peak Hour Factor	0.9700	0.9700	0.9700	0.9700	0.9700	0.9700	0.9700	0.9700	0.9700	0.9700	0.9700	0.9700
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	4	37	14	57	40	14	11	36	3	18	37	29
Total Analysis Volume [veh/h]	18	149	57	229	161	57	42	143	12	70	149	114
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Lanes

Capacity per Entry Lane [veh/h]	502	562	519	606	489	550	497	565
Degree of Utilization, x	0.33	0.10	0.75	0.09	0.38	0.02	0.44	0.20

Movement, Approach, & Intersection Results

95th-Percentile Queue Length [veh]	1.44	0.34	6.47	0.31	1.75	0.07	2.22	0.75
95th-Percentile Queue Length [ft]	36.12	8.42	161.82	7.75	43.63	1.67	55.52	18.71
Approach Delay [s/veh]	12.49		25.34		14.16		13.86	
Approach LOS	B		D		B		B	
Intersection Delay [s/veh]	17.93							
Intersection LOS	C							

Intersection Level Of Service Report
Intersection 1: Silverado Trail/Deer Park Rd

Control Type:	All-way stop	Delay (sec / veh):	85.6
Analysis Method:	HCM 6th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.370

Intersection Setup

Name	Deer Park Rd			Southbound			Silverado Trail			Silverado Trail		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	←→			←→			←→			←→		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	1	0	0	1	0	0	1	0	0	1
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	50.00	100.00	100.00	100.00
Speed [mph]	50.00			45.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Deer Park Rd						Silverado Trail					
Base Volume Input [veh/h]	25	162	131	240	103	27	11	232	9	72	191	155
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.4700	1.4700	1.4700	1.4700	1.4700	1.4700	1.4700	1.4700	1.4700	1.4700	1.4700	1.4700
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	6	0	3	2	0	0	0	0	3
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	37	238	193	359	151	43	18	341	13	106	281	231
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	9	60	48	90	38	11	5	85	3	27	70	58
Total Analysis Volume [veh/h]	37	238	193	359	151	43	18	341	13	106	281	231
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Lanes

Capacity per Entry Lane [veh/h]	382	415	510	420	395	428	395	434
Degree of Utilization, x	0.72	0.47	1.37	0.10	0.91	0.03	0.98	0.53

Movement, Approach, & Intersection Results

95th-Percentile Queue Length [veh]	5.49	2.40	24.90	0.34	9.57	0.09	11.56	3.05
95th-Percentile Queue Length [ft]	137.16	60.04	622.50	8.50	239.22	2.35	289.07	76.30
Approach Delay [s/veh]	27.12		193.88		54.16		51.89	
Approach LOS	D		F		F		F	
Intersection Delay [s/veh]	85.59							
Intersection LOS	F							

Intersection Level Of Service Report
Intersection 1: Silverado Trail/Deer Park Rd

Control Type: All-way stop
 Analysis Method: HCM 6th Edition
 Analysis Period: 15 minutes
 Delay (sec / veh): 50.5
 Level Of Service: F
 Volume to Capacity (v/c): 1.145

Intersection Setup

Name	Deer Park Rd			Silverado Trail			Silverado Trail					
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	⇌			⇌			⇌			⇌		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	1	0	0	1	0	0	1	0	0	1
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	50.00	100.00	100.00	100.00
Speed [mph]	50.00			45.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Deer Park Rd						Silverado Trail					
Base Volume Input [veh/h]	16	137	52	195	147	45	32	131	11	64	137	89
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.4700	1.4700	1.4700	1.4700	1.4700	1.4700	1.4700	1.4700	1.4700	1.4700	1.4700	1.4700
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	15	0	7	7	0	0	0	0	17
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	24	201	76	302	216	73	54	193	16	94	201	148
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	6	50	19	76	54	18	14	48	4	24	50	37
Total Analysis Volume [veh/h]	24	201	76	302	216	73	54	193	16	94	201	148
Pedestrian Volume [ped/h]	0						0					

Intersection Settings

Lanes

Capacity per Entry Lane [veh/h]	439	482	518	518	434	480	444	495
Degree of Utilization, x	0.51	0.16	1.15	0.14	0.57	0.03	0.66	0.30

Movement, Approach, & Intersection Results

95th-Percentile Queue Length [veh]	2.85	0.56	18.64	0.49	3.45	0.10	4.73	1.24
95th-Percentile Queue Length [ft]	71.36	13.88	466.05	12.21	86.32	2.59	118.33	31.08
Approach Delay [s/veh]	17.30		102.41		20.73		21.29	
Approach LOS	C		F		C		C	
Intersection Delay [s/veh]	50.45							
Intersection LOS	F							

Intersection Level Of Service Report
Intersection 1: Silverado Trail/Deer Park Rd

Control Type: Signalized
 Analysis Method: HCM 6th Edition
 Analysis Period: 15 minutes
 Delay (sec / veh): 44.8
 Level Of Service: D
 Volume to Capacity (v/c): 0.756

Intersection Setup

Name	Deer Park Rd			Deer Park Rd			Silverado Trail			Silverado Trail		
	Northbound			Southbound			Eastbound			Westbound		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	TT			TT			TT			TT		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	1	0	0	1	0	0	1	0	0	1
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	50.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	55.00			50.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	No			No			No			No		

Volumes

Name	Deer Park Rd			Deer Park Rd			Silverado Trail			Silverado Trail		
Base Volume Input [veh/h]	25	162	131	240	103	27	11	232	9	72	191	155
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.4700	1.4700	1.4700	1.4700	1.4700	1.4700	1.4700	1.4700	1.4700	1.4700	1.4700	1.4700
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	6	0	3	2	0	0	0	0	3
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	37	238	193	359	151	43	18	341	13	106	281	231
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	9	60	48	90	38	11	5	85	3	27	70	58
Total Analysis Volume [veh/h]	37	238	193	359	151	43	18	341	13	106	281	231
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [1/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [1/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	80
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal Group	5	2	0	1	6	0	7	4	0	3	8	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	5	5	0	5	5	0	5	5	0	5	5	0
Maximum Green [s]	30	30	0	30	30	0	30	30	0	30	30	0
Amber [s]	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
All red [s]	1.0	1.0	0.0	1.0	1.0	0.0	1.0	1.0	0.0	1.0	1.0	0.0
Split [s]	10	26	0	20	36	0	9	9	0	25	25	0
Vehicle Extension [s]	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	10	0	0	10	0	0	10	0	0	10	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk	No			No			No			No		
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
Minimum Recall	No	No		No	No		No	No		No	No	
Maximum Recall	No	No		No	No		No	No		No	No	
Pedestrian Recall	No	No		No	No		No	No		No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	L	C	L	C	L	C
C, Cycle Length [s]	80	80	80	80	80	80	80	80
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
I1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
I2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	3	22	16	35	2	20	6	24
g / C, Green / Cycle	0.04	0.28	0.20	0.44	0.02	0.25	0.08	0.30
(v / s)_i Volume / Saturation Flow Rate	0.02	0.25	0.20	0.11	0.01	0.19	0.06	0.30
s, saturation flow rate [veh/h]	1781	1733	1781	1800	1781	1858	1781	1732
c, Capacity [veh/h]	63	480	356	795	37	457	138	524
d1, Uniform Delay [s]	38.03	27.86	32.01	13.98	38.76	28.10	36.21	27.62
k, delay calibration	0.11	0.50	0.11	0.50	0.11	0.11	0.11	0.30
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	8.58	22.35	24.41	0.73	9.64	2.84	8.71	25.13
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.59	0.90	1.01	0.24	0.49	0.77	0.77	0.98
d, Delay for Lane Group [s/veh]	46.61	50.20	56.42	14.71	48.39	30.94	44.92	52.75
Lane Group LOS	D	D	F	B	D	C	D	D
Critical Lane Group	No	Yes	Yes	No	Yes	No	No	Yes
50th-Percentile Queue Length [veh/ln]	0.81	9.90	8.64	2.04	0.42	5.92	2.19	11.99
50th-Percentile Queue Length [ft/ln]	20.19	247.55	216.08	50.96	10.54	148.07	54.78	299.69
95th-Percentile Queue Length [veh/ln]	1.45	15.06	13.52	3.67	0.76	9.91	3.94	17.67
95th-Percentile Queue Length [ft/ln]	36.34	376.57	337.95	91.74	18.96	247.85	98.61	441.64

Movement, Approach, & Intersection Results												
d_M, Delay for Movement [s/veh]	46.61	50.20	50.20	56.42	14.71	14.71	48.39	30.94	30.94	44.92	52.75	52.75
Movement LOS	D	D	D	F	B	B	D	C	C	D	D	D
d_A, Approach Delay [s/veh]	49.92			41.79			31.79			51.41		
Approach LOS	D			D			C			D		
d_I, Intersection Delay [s/veh]	44.79											
Intersection LOS	D											
Intersection V/C	0.756											

Other Modes				
g_Walk,mi, Effective Walk Time [s]	0.0	0.0	0.0	0.0
M_comer, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	0.00	0.00	0.00
I_p,int, Pedestrian LOS Score for Intersection	0.000	0.000	0.000	0.000
Crosswalk LOS	F	F	F	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	550	800	125	525
d_b, Bicycle Delay [s]	21.03	14.40	35.16	21.76
I_b,int, Bicycle LOS Score for Intersection	2.332	2.472	2.173	2.579
Bicycle LOS	B	B	B	B

Sequence												
Ring 1	1	2	3	4	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report			
Intersection 1: Silverado Trail/Deer Park Rd			
Control Type:	Signalized	Delay (sec / veh):	25.9
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.556

Intersection Setup												
Name	Deer Park Rd			Deer Park Rd			Silverado Trail			Silverado Trail		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	T T			T T			T T			T T		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	1	0	0	1	0	0	1	0	0	1
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	50.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	55.00			50.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	No			No			No			No		

Volumes												
Name	Deer Park Rd			Deer Park Rd			Silverado Trail			Silverado Trail		
Base Volume Input [veh/h]	16	137	52	195	147	45	32	131	11	64	137	89
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.4700	1.4700	1.4700	1.4700	1.4700	1.4700	1.4700	1.4700	1.4700	1.4700	1.4700	1.4700
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	15	0	7	7	0	0	0	0	17
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	24	201	76	302	216	73	54	193	16	94	201	148
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	6	50	19	76	54	18	14	48	4	24	50	37
Total Analysis Volume [veh/h]	24	201	76	302	216	73	54	193	16	94	201	148
Presence of On-Street Parking	No	No	No	No	No	No	No	No	No	No	No	No
On-Street Parking Maneuver Rate [1/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [1/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0	0	0	0	0	0	0	0	0	0	0	0
v_di, Inbound Pedestrian Volume crossing m	0	0	0	0	0	0	0	0	0	0	0	0
v_co, Outbound Pedestrian Volume crossing	0	0	0	0	0	0	0	0	0	0	0	0
v_ci, Inbound Pedestrian Volume crossing mi	0	0	0	0	0	0	0	0	0	0	0	0
v_ab, Corner Pedestrian Volume [ped/h]	0	0	0	0	0	0	0	0	0	0	0	0
Bicycle Volume [bicycles/h]	0	0	0	0	0	0	0	0	0	0	0	0

Intersection Settings												
Located in CBD	No											
Signal Coordination Group	-											
Cycle Length [s]	60											
Active Pattern	Pattern 1											
Coordination Type	Time of Day Pattern Isolated											
Actuation Type	Fully actuated											
Offset [s]	0.0											
Offset Reference	Lead Green - Beginning of First Green											
Permissive Mode	SingleBand											
Lost time [s]	0.00											
Phasing & Timing												
Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal Group	5	2	0	1	6	0	7	4	0	3	8	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	5	5	0	5	5	0	5	5	0	5	5	0
Maximum Green [s]	30	30	0	30	30	0	30	30	0	30	30	0
Amber [s]	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
All red [s]	1.0	1.0	0.0	1.0	1.0	0.0	1.0	1.0	0.0	1.0	1.0	0.0
Split [s]	9	12	0	15	18	0	9	10	0	23	24	0
Vehicle Extension [s]	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	10	0	0	10	0	0	10	0	0	10	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk	No	No	No	No	No	No	No	No	No	No	No	No
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
Minimum Recall	No	No	No	No	No	No	No	No	No	No	No	No
Maximum Recall	No	No	No	No	No	No	No	No	No	No	No	No
Pedestrian Recall	No	No	No	No	No	No	No	No	No	No	No	No
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Exclusive Pedestrian Phase												
Pedestrian Signal Group	0											
Pedestrian Walk [s]	0											
Pedestrian Clearance [s]	0											

Lane Group Calculations

Lane Group	L	C	L	C	L	C	L	C
C, Cycle Length [s]	60	60	60	60	60	60	60	60
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
g_l, Effective Green Time [s]	2	16	11	25	3	13	4	14
g / C, Green / Cycle	0.03	0.26	0.18	0.42	0.05	0.22	0.07	0.24
(v / s)_l Volume / Saturation Flow Rate	0.01	0.16	0.17	0.16	0.03	0.11	0.05	0.20
s, saturation flow rate [veh/h]	1781	1784	1781	1790	1781	1845	1781	1740
c, Capacity [veh/h]	53	468	327	745	92	399	128	412
d1, Uniform Delay [s]	28.76	19.42	24.19	12.25	27.95	20.87	27.41	21.98
k, delay calibration	0.11	0.50	0.11	0.50	0.11	0.11	0.11	0.11
l, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	5.84	5.41	10.88	1.52	5.72	1.06	7.78	4.91
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.45	0.59	0.92	0.39	0.58	0.52	0.73	0.85
d, Delay for Lane Group [s/veh]	34.60	24.83	35.08	13.78	33.67	21.94	35.19	26.89
Lane Group LOS	C	C	D	B	C	C	D	C
Critical Lane Group	No	Yes	Yes	No	Yes	No	No	Yes
50th-Percentile Queue Length [veh/ln]	0.38	3.42	4.57	2.35	0.81	2.26	1.42	4.38
50th-Percentile Queue Length [ft/ln]	9.59	85.43	114.26	58.86	20.16	56.47	35.48	109.55
95th-Percentile Queue Length [veh/ln]	0.69	6.15	8.08	4.24	1.45	4.07	2.55	7.82
95th-Percentile Queue Length [ft/ln]	17.26	153.78	201.92	105.95	36.29	101.65	63.87	195.38

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	34.60	24.83	24.83	35.08	13.78	13.78	33.67	21.94	21.94	35.19	26.89	26.89
Movement LOS	C	C	C	D	B	B	C	C	C	D	C	C
d_A, Approach Delay [s/veh]	25.61		24.66		24.35		28.65					
Approach LOS	C		C		C		C					
d_I, Intersection Delay [s/veh]	25.89											
Intersection LOS	C											
Intersection V/C	0.556											

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	0.0	0.0	0.0
M_comer, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	0.00	0.00	0.00
I_p,int, Pedestrian LOS Score for Intersectio	0.000	0.000	0.000	0.000
Crosswalk LOS	F	F	F	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	266	466	200	665
d_b, Bicycle Delay [s]	22.61	17.70	24.37	13.40
I_b,int, Bicycle LOS Score for Intersection	2.056	2.535	1.994	2.291
Bicycle LOS	B	B	A	B

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Option 1: Restripe SB approach to a LT lane and T/RT lane

Number	1											
Intersection	Silverado Trail/Deer Park Rd											
Control Type	All-way stop											
Analysis Method	HCM 6th Edition											
Name	Deer Park Rd			Southbound			Silverado Trail			Silverado Trail		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Base Volume Input [veh/h]	25	162	131	240	103	27	11	232	9	72	191	155
Total Analysis Volume [veh/h]	37	238	193	359	151	43	18	341	13	106	281	231

Intersection Settings

Lanes

Capacity per Entry Lane [veh/h]	382	415	376	403	387	419	387	419
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Movement, Approach, & Intersection Results

Average Lane Delay [s/veh]	32.98	18.73	66.85	19.65	60.10	11.58	81.98	21.37				
95th-Percentile Queue Length [veh]	5.48	2.41	10.57	2.54	9.98	0.10	12.46	3.24				
95th-Percentile Queue Length [ft]	136.99	60.13	264.33	63.45	249.54	2.40	311.61	81.06				
Approach Delay [s/veh]	27.10			50.29			58.41			59.32		
Approach LOS	D			F			F			F		
Intersection Delay [s/veh]	49.17											
Intersection LOS	E											

Option 1: Restripe SB approach to a LT lane and T/RT lane

Number	1											
Intersection	Silverado Trail/Deer Park Rd											
Control Type	All-way stop											
Analysis Method	HCM 6th Edition											
Name	Deer Park Rd			Southbound			Silverado Trail			Silverado Trail		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Base Volume Input [veh/h]	16	137	52	195	147	45	32	131	11	64	137	89
Total Analysis Volume [veh/h]	24	201	76	302	216	73	54	193	16	94	201	148

Intersection Settings

Lanes

Capacity per Entry Lane [veh/h]	442	487	443	484	439	487	447	501
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Movement, Approach, & Intersection Results

Average Lane Delay [s/veh]	19.04	11.46	26.55	20.61	20.94	10.34	25.07	12.87				
95th-Percentile Queue Length [veh]	2.83	0.55	5.01	3.85	3.38	0.10	4.68	1.22				
95th-Percentile Queue Length [ft]	70.64	13.73	125.26	96.25	84.58	2.54	116.91	30.60				
Approach Delay [s/veh]	17.13			23.65			20.30			20.99		
Approach LOS	C			C			C			C		
Intersection Delay [s/veh]	21.13											
Intersection LOS	C											



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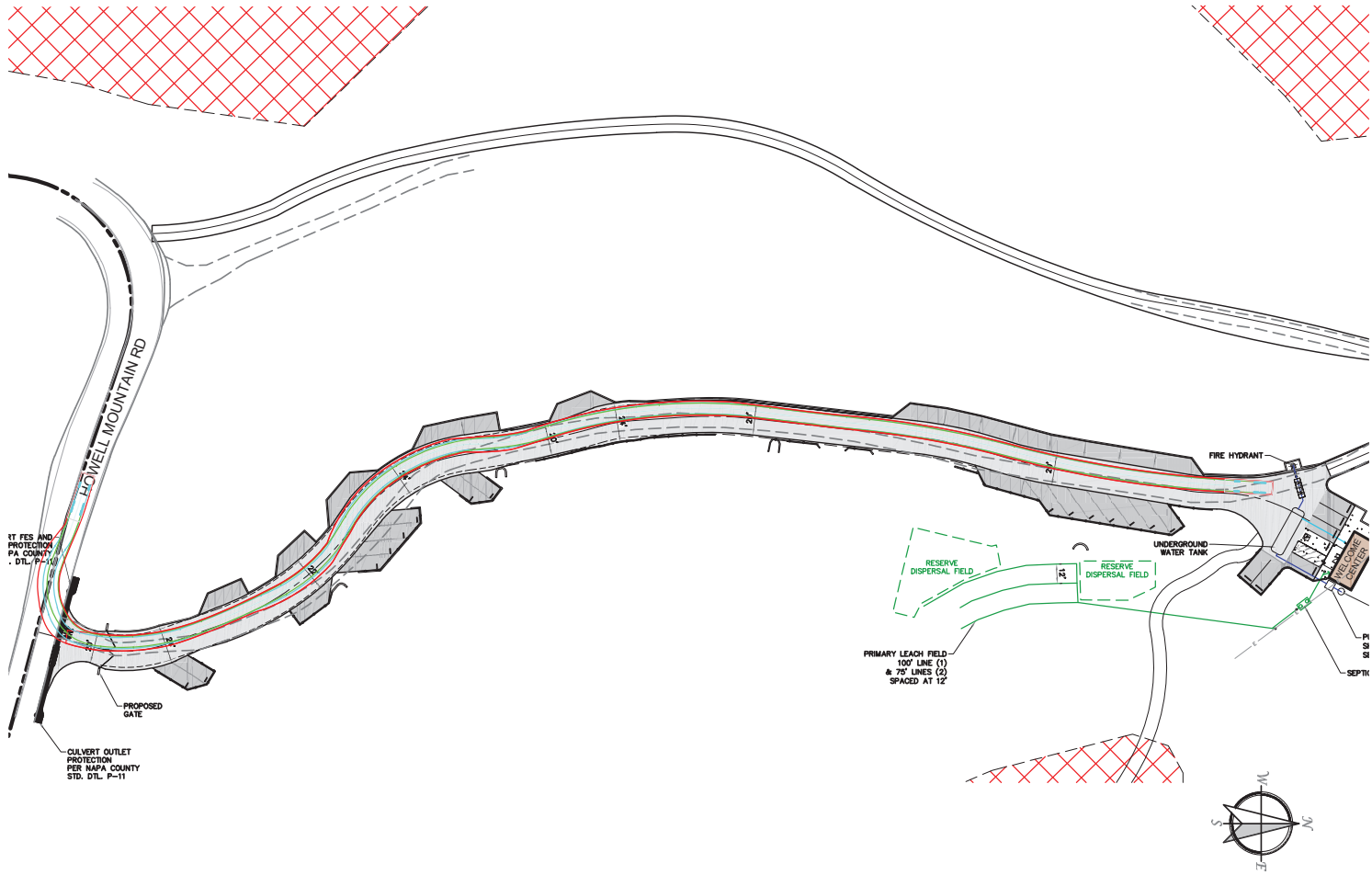
Appendix D

Access Exhibits



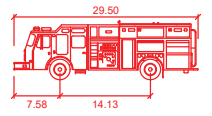


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LEGEND

- Vehicle Body
- Front Tires
- Rear Tires



Napa County Fire Truck

	feet
Width	: 8.00
Track	: 6.91
Lock to Lock Time	: 6.0
Steering Angle	: 38.8

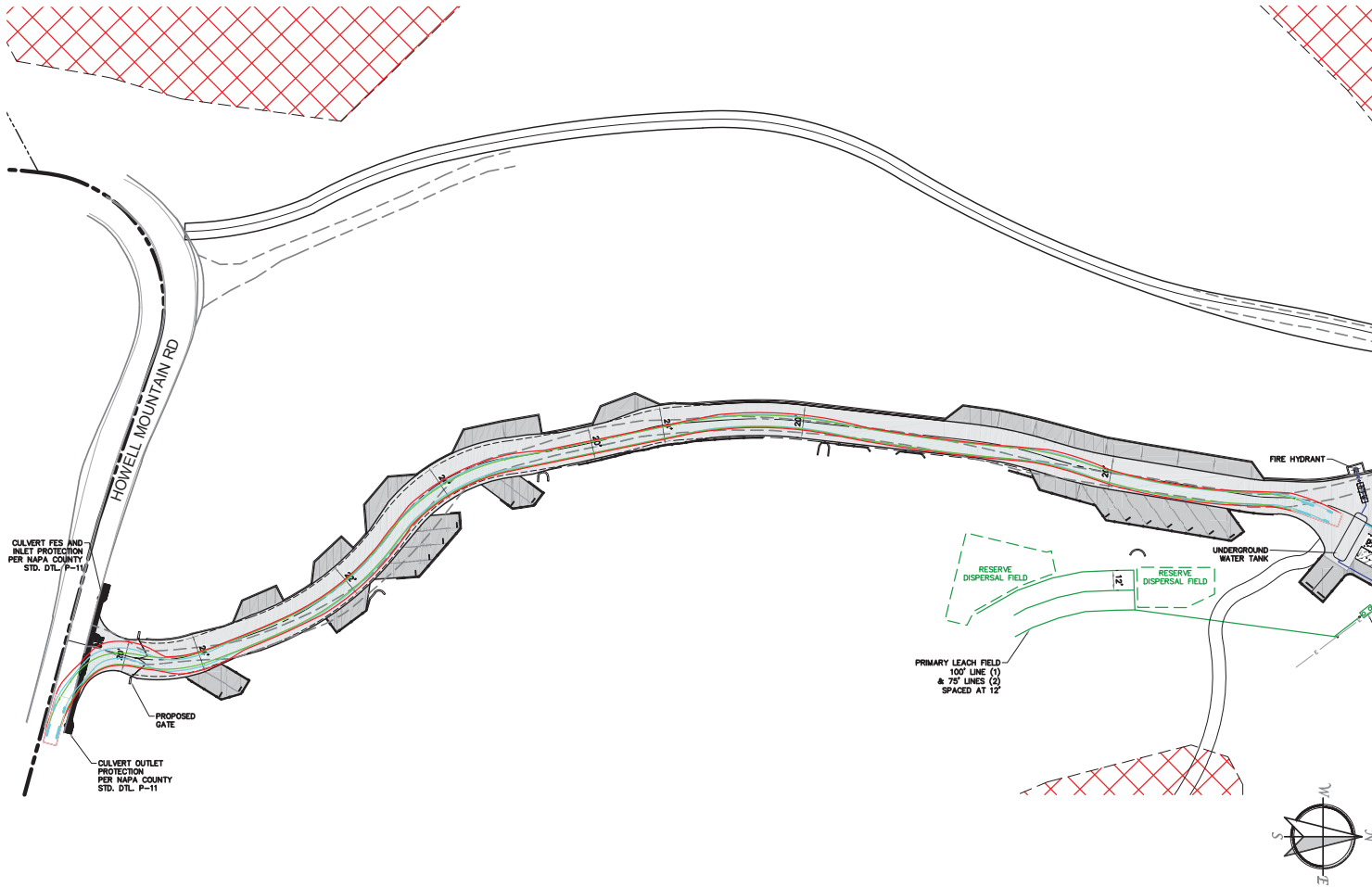
Exiting the Project Site

1225 Howell Mountain Road

NAX163

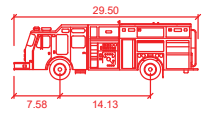
Fire Truck Access

January 2023



LEGEND

- Vehicle Body
- Front Tires
- Rear Tires



Napa County Fire Truck

	feet
Width	: 8.00
Track	: 6.91
Lock to Lock Time	: 6.0
Steering Angle	: 38.8

Entering the Project Site

1225 Howell Mountain Road

NAX163

Fire Truck Access

January 2023

Appendix E

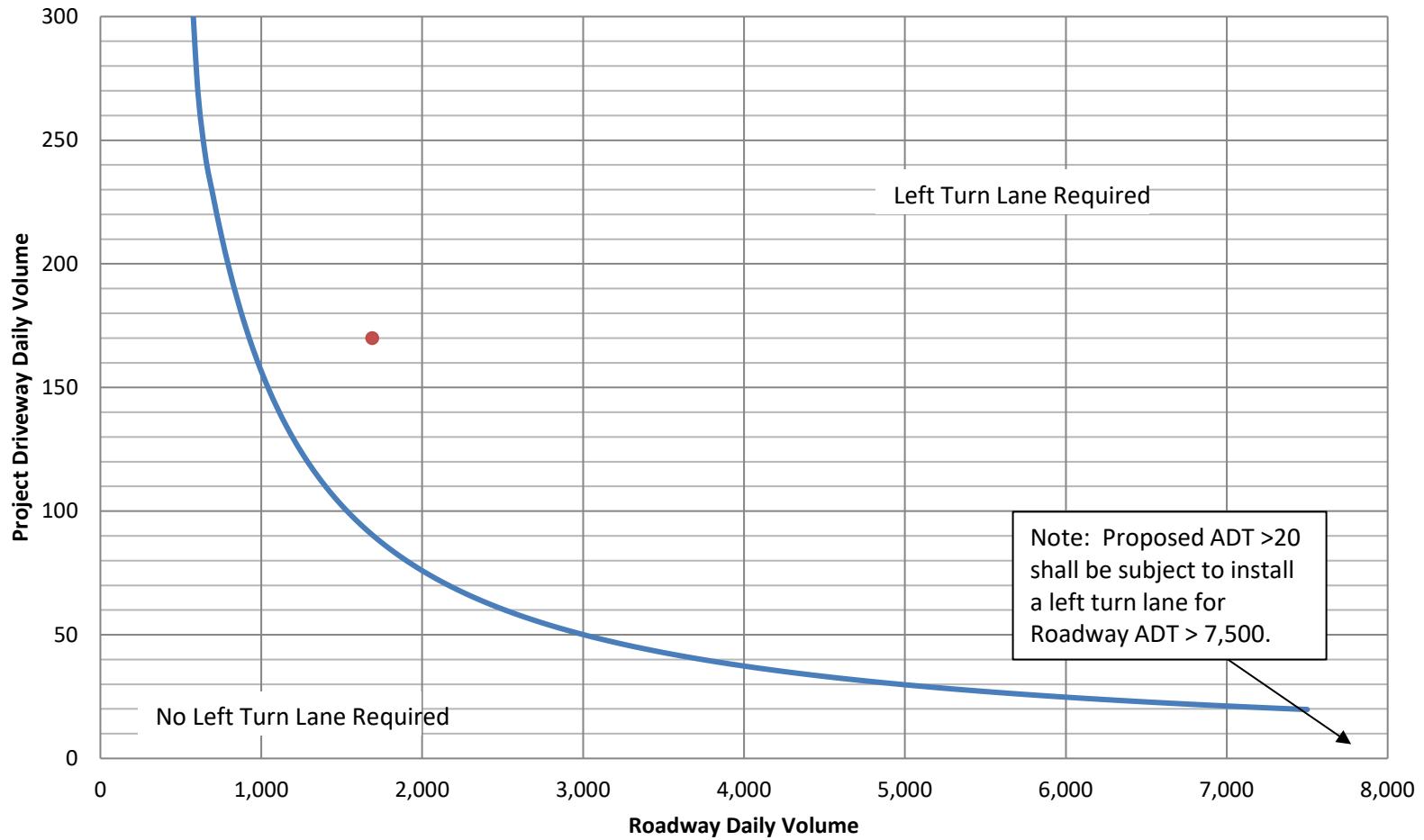
Left-Turn Lane Warrant Graph





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Napa County Left Turn Lane Warrant Graph

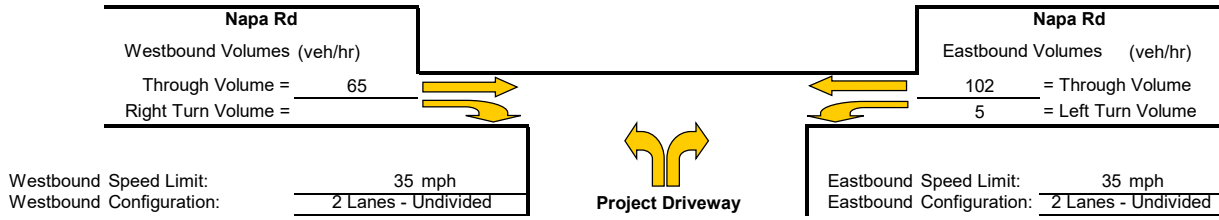


Turn Lane Warrant Analysis - Tee Intersections

Study Intersection: Howell Mountain Road/Project Driveway
 Study Scenario: Friday PM

Direction of Analysis Street: East/West

Cross Street Intersects: From the North



Westbound Right Turn Lane Warrants

1. Check for right turn volume criteria

Thresholds not met, continue to next step

2. Check advance volume threshold criteria for turn lane

Advancing Volume Threshold	AV =	1050.1
Advancing Volume	Va =	65
If $AV < Va$ then warrant is met		
No		

Right Turn Lane Warranted: NO

Westbound Right Turn Taper Warrants

(evaluate if right turn lane is unwarranted)

1. Check taper volume criteria

NOT WARRANTED - Less than 20 vehicles

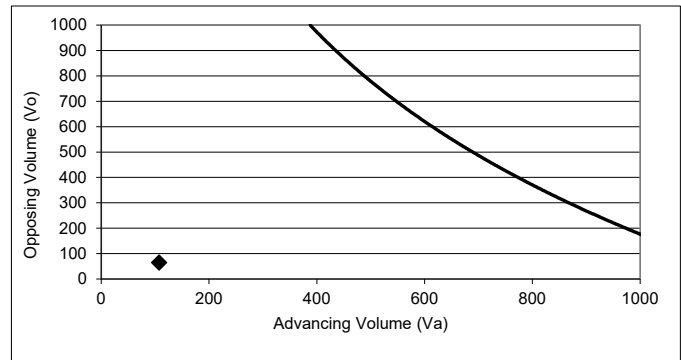
2. Check advance volume threshold criteria for taper

Advancing Volume Threshold	AV =	-
Advancing Volume	Va =	65
If $AV < Va$ then warrant is met		
-		

Right Turn Taper Warranted: NO

Eastbound Left Turn Lane Warrants

Percentage Left Turns %lt	4.7 %
Advancing Volume Threshold AV	1137 veh/hr
If $AV < Va$ then warrant is met	



◆ Study Intersection
 Two lane roadway warrant threshold for: 35 mph
 Turn lane warranted if point falls to right of warrant threshold line

Left Turn Lane Warranted: NO

Methodology based on Washington State Transportation Center Research Report *Method For Prioritizing Intersection Improvements*, January 1997.
 The right turn lane and taper analysis is based on work conducted by Cottrell in 1981.
 The left turn lane analysis is based on work conducted by M.D. Harmelink in 1967, and modified by Kikuchi and Chakrobority in 1991.

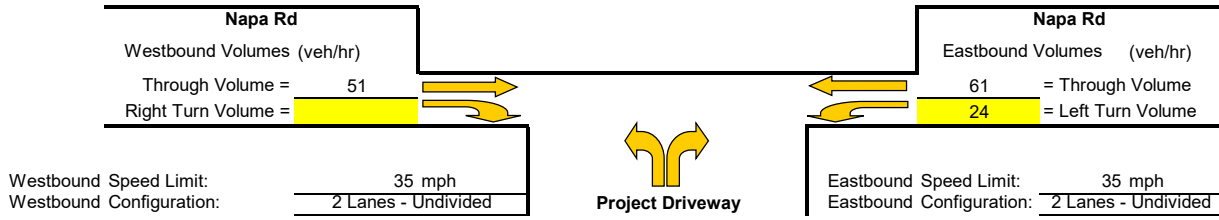
Turn Lane Warrant Analysis - Tee Intersections

Study Intersection: Howell Mountain Road/Project Driveway

Study Scenario: Saturday PM

Direction of Analysis Street: East/West

Cross Street Intersects: From the North



Westbound Right Turn Lane Warrants

1. Check for right turn volume criteria

Thresholds not met, continue to next step

2. Check advance volume threshold criteria for turn lane

Advancing Volume Threshold	AV =	1050.1
Advancing Volume	Va =	51
If $AV < Va$ then warrant is met		
No		

Right Turn Lane Warranted: NO

Westbound Right Turn Taper Warrants

(evaluate if right turn lane is unwarranted)

1. Check taper volume criteria

NOT WARRANTED - Less than 20 vehicles

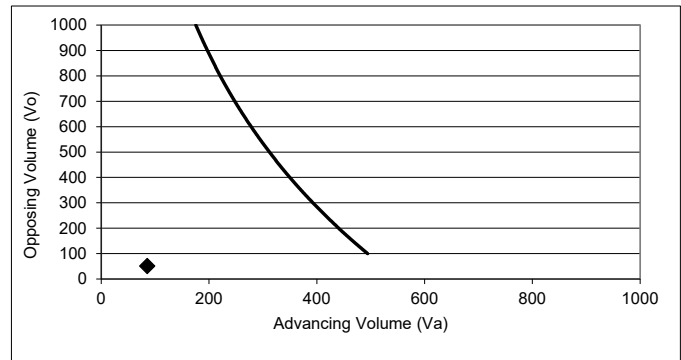
2. Check advance volume threshold criteria for taper

Advancing Volume Threshold	AV =	-
Advancing Volume	Va =	51
If $AV < Va$ then warrant is met		
-		

Right Turn Taper Warranted: NO

Eastbound Left Turn Lane Warrants

Percentage Left Turns %lt	28.2 %
Advancing Volume Threshold AV	523 veh/hr
If $AV < Va$ then warrant is met	



◆ Study Intersection
 Two lane roadway warrant threshold for: 35 mph
 Turn lane warranted if point falls to right of warrant threshold line

Left Turn Lane Warranted: NO

Methodology based on Washington State Transportation Center Research Report *Method For Prioritizing Intersection Improvements*, January 1997.
 The right turn lane and taper analysis is based on work conducted by Cottrell in 1981.
 The left turn lane analysis is based on work conducted by M.D. Harmelink in 1967, and modified by Kikuchi and Chakrobority in 1991.