“J”

Traffic Impact Study

Vineyard 29 P20-00062-MOD
Planning Commission Hearing Date November 1, 2023

Traffic Impact Study for the Vineyard 29 Winery

Prepared for the County of Napa

File Number: P20-00062

Submitted by

W-Trans

April 7, 2021

TRAFFIC ENGINEERING
TRANSPORTATION PLANNING
Balancing Functionality and Livability since 1995
w-trans.com

This page intentionally left blank

Table of Contents

Figures

Tables

Appendices

A. Collision Rate Calculations
B. Traffic Counts
C. Roadway Segment Level of Service Calculations
D. Napa County Winery Traffic Information/Trip Generation
E. Emergency Access Exhibits
F. Left-Turn Lane Warrant Graph

Executive Summary

The proposed modification to the existing Conditional Use Permit (CUP) for the Vineyard 29 Winery would increase annual production from 48,500 gallons to 75,000 gallons, increase visitation from 30 to 60 people per day, and increase staffing. The requested modification would allow an increase in the number of employees from three full-time and two part-time employees under current conditions to fifteen full-time and six part-time staff plus six interns during harvest.

Based on application of the County's winery trip generation rates, the proposed project would be expected to generate 60 additional daily trips on Fridays and 66 on Saturdays, including 20 new trips during the Friday p.m. peak hour and 26 during the Saturday p.m. peak hour compared to the operation as permitted under the existing CUP. With an anticipated daily volume of fewer than 110 trips, the project would have a less-than-significant impact in terms of VMT under the standards applied. Despite this finding, implementation of transportation demand management measures to further reduce the winery's VMT is recommended.

The study area consisted of the section of SR 29 fronting the project site and the project access point. The study segment is operating within normal safety parameters based on its below-average collision rate. The analysis addressed operation under Existing, Baseline (Existing plus Approved) and Future volumes without and with project traffic added. SR 29 is expected to operate acceptably at LOS D or better under all volume scenarios evaluated.

While the study area lacks pedestrian facilities and transit service, there is not expected to be a demand, and therefore, the lack of facilities is considered acceptable. Planned future bicycle facilities on SR 29, including Class II bike lanes along this roadway and a segment of the proposed Vine Trail that would be located across from the project site, would provide adequate bicycle access. Vineyard 29 is arranging for an easement grant to the County for the construction of the trail on property that is owned by Vineyard 29. To accommodate cyclists, the project should provide ten bicycle parking spaces on-site.

On-site circulation and emergency access are expected to operate acceptably. Sight lines along SR 29 from the proposed project driveway are adequate. A left-turn pocket is warranted on SR 29 at the project driveway and will be provided as part of the proposed project.

The proposed 32 on-site parking spaces would accommodate the anticipated daily parking demand for the tasting room.

Introduction

This report presents an analysis of the potential traffic impacts that would be associated with the proposed modification to the Conditional Use Permit (CUP) for Vineyard 29 located at 2929 St. Helena Highway (SR 29) 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 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 includes an expansion of production at the Vineyard 29 Winery located at 2929 St. Helena Highway (SR 29) in the County of Napa. The proposal includes an increase in annual production from 48,500 gallons to 75,000 gallons, an increase in visitation from 30 to 60 people per day, and an increase in staffing. The requested modification would allow an increase in the number of employees from three full-time and two part-time employees under current conditions to fifteen full-time and six part-time staff plus six interns during harvest. The County of Napa file number for this project is P20-00062. The site is accessed from SR 29.

Transportation Setting

Operational Analysis

Study Area and Periods

The study area consists of the section of SR 29 fronting the project site and the project access point.

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. Though the County's established peak periods are 4:00 to 5:00 p.m. on weekdays and 1:45 to 2:45 p.m. on Saturdays, based on count data collected at SR 29/Lodi Lane October 2019, the Friday afternoon peak hour was determined to have occurred between 2:30 and 3:30 p.m., while the Saturday afternoon peak hour occurred between 2:00 p.m. and 3:00 p.m. These peak periods for traffic on SR 29 were used in combination with the peak hour volumes for the project to provide a conservative analysis.

Study Roadways

SR 29 generally runs north-south and has two 12-foot travel lanes with a posted speed limit of 50 miles per hour (mph). The roadway is mostly straight adjacent to the site. SR 29 varies in width between approximately 36 and 46 feet depending on the width of the shoulders and the presence of a left-turn lane. Based on count data collected during harvest in August 2017, the average daily traffic (ADT) near Lodi Lane is approximately 15,000 on Fridays and 14,000 on Saturdays.

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 October 1, 2014 to September 30, 2019.

Collision rates for the study segments are compared to statewide averages for similar facilities in Table 1. Pratt Avenue was used as the northern boundary for the study segment while Bea Lane was used as the southern boundary. SR 29 experienced collisions at a below-average rate for the five-year period studied, indicating that the segment is operating in a generally safe manner. The collision rate calculations for the study intersections and segments are provided in Appendix A.

Table 1 – Collision Rates for the Study Segments

Study Roadway Segment	Number of Collisions (2014-2019)	Calculated Collision Rate (c/mvm)	Statewide Average Collision Rate (c/mvm)
1. SR 29 between Pratt Ave and Bea Ln	37	0.72	0.81

Note: c/mvm = collisions per million vehicles miles

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. There are no pedestrian facilities in the study area given the rural area.

Bicycle Facilities

The *Highway Design Manual*, Caltrans, 2017, classifies bikeways into four categories, three of which are applied in the County's Bicycle Plan:

- **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.

There are currently no bicycle facilities on SR 29 along the project frontage. There are two planned bicycle facilities in the project vicinity, as contained in the *Napa Countywide Bicycle Plan,* Napa Valley Transportation Authority (NVTA), 2019. Class II bike lanes are planned along SR 29 connecting St. Helena to Calistoga. The proposed Vine Trail extension is a Class I bike path and will connect all Napa County Jurisdictions. A segment of the proposed Vine Trail would be located on the east side of SR 29, across from the project site. This segment would safely accommodate nonmotorized bicycle and pedestrian traffic separately from the vehicle traffic on Highway 29. Vineyard 29 is granting an easement to the County for the construction of the trail on Vineyard 29property.

Transit Facilities

Transit services throughout Napa County are provided by Napa Valley Transit (VINE). The nearest transit stop to the project site is on SR 29 at Lodi Lane, approximately 0.3 miles north of the site. VINE Route 10 provides service between Napa Valley College and Calistoga seven days a week and stops on SR 29 to the north of Lodi Lane in both directions. Both stops are equipped with benches and the southbound stop has an overhead shelter. While these bus stops are not within one-quarter of a mile of the project site, which is typically considered an acceptable walking distance, it is only slightly more than one-quarter of a mile or employees could reasonably bike between the project site and the bus stops.

All vehicles used by VINE are wheelchair accessible and conform to standards set forth by the Americans with Disabilities Act (ADA). However, dial-a-ride, also known as paratransit or door-to-door service, is available for those who are unable to independently use the transit system due to a physical or mental disability. VINE Go is VINE's paratransit service and is designed to serve the needs of individuals with disabilities in the Cities of Calistoga, St. Helena, Napa, American Canyon, the Town of Yountville, and the unincorporated areas of Napa County. Reservations are required and, while they can be made the same day of the trip, it is recommended that they be made in advance.

Capacity Analysis

Two-Lane Highway Segment Level of Service Methodology

The roadway segment Level of Service methodology found in Chapter 15, "Two-Lane Highways," of the *Highway Capacity Manual* is the basis of the automobile LOS analysis. The methodology considers traffic volumes, terrain, roadway cross-section, the proportion of heavy vehicles, and the availability of passing zones. The LOS criteria for two-lane highways differs depending on whether the highway is considered "Class I," "Class II," or "Class III." Class I highways are typically long-distance routes connecting major traffic generators or national highway networks where motorists expect to travel at high speeds. Motorists do not necessarily expect to travel at high speeds on Class II highways, which often function as scenic or recreational routes and typically serve shorter trips. Class III highways may be portions of Class I or Class II highways that pass-through towns and communities and have a mix of local traffic and through traffic.

The measure of effectiveness by which Level of Service is determined on Class I highways is average travel speed (ATS) and percent time spent following (PTSF), or the proportion of time that drivers on the highway are limited in their speed by a driver in front of them, is applied to both Class I and Class II highways. Class III highways are measured by percent of free-flow speed (PFFS), which represents the ability of vehicles to travel at or near the posted speed limit. Because the speed limit is less than 55 mph, SR 29 was defined as a Class II roadway for the purposes of this analysis. A summary of the ATS, PTSF, and PFFS breakpoints is shown in Table 2.

Table 2 – Automobile Level of Service Criteria

LOS	Class I Highways		Class II Highways	Class III Highways
	ATS (mi/h)	PTSF (%)	PTSF (%)	PFFS (%)
A	>55	≤35	≤40	>91.7
B	>50-55	>35-50	>40-55	>83.3-91.7
C	>45-50	>50-65	>55-70	>75.0-83.3
D	>40-45	>65-80	>70-85	>66.7-75.0
E	≤40	>80	≤85	≤66.7

Notes: LOS = Level of Service; ATS = Average Travel Speed; PTSF = Percent Time Spent Following; PFFS = Percent of Free-Flow Speed

Reference: *Highway Capacity Manual,* 6th Edition, Transportation Research Board, 2018

Traffic Operation Standards

Napa County

In the Circulation Element of the *Napa County General Plan*, the following policies applicable to this study 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 a memorandum titled G*uidelines for Application of Updated General Plan Circulation Policies on Significance Criteria Related to Vehicle Level of Service* (Fehr & Peers, 2020). The document establishes thresholds for road segments and different intersection control types. The memorandum states a project would cause an adverse effect requiring mitigation if, for Existing Conditions:

- 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*

A project would cause an adverse effect requiring mitigation if, for Future (Cumulative) Conditions, the Project's volume is equal to, or greater than **one percent** of the difference between Future and Existing volumes for an arterial, signalized intersection, or all-way stop-controlled intersection and **10 percent** for the impacted approach at two-way stop-controlled intersections.

- 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)*

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. Intersection turning movement volumes for SR 29/Lodi Lane from the Duckhorn Vineyards traffic impact study were used for this analysis. The turning movement counts were collected between 2:00 and 5:00 p.m. on two Fridays and between 2:00 and 4:00 p.m. on two Saturdays in mid-October 2019. All count data was collected during typical harvest operations and clear weather conditions. The higher of the two counts was retained for the analysis. Peak hour segment volumes for the study roadway segment were derived from the intersection counts. Additionally, the percentage of heavy vehicles at each intersection was calculated based on previous data collected during harvest in September 2017. For the purpose of this study, heavy vehicles were considered to be trucks hauling grapes or those with five or more axles. The data indicates that heavy vehicles represent four percent of all vehicles through the intersection of SR 29/Lodi Lane during the Friday p.m. peak hour and two percent during the Saturday p.m. peak hour. Copies of the count data relied upon for the study are provided in Appendix B.

Under Existing Conditions, the study segment is operating at LOS C or better during both peak hours, which meets the County's standard of LOS D. The Existing segment volumes are shown in Figure 1. A summary of the roadway segment level of service calculations is shown in Table 3, and copies of the Level of Service calculations are provided in Appendix C.

Table 3 – Existing Peak Hour Roadway Segment Levels of Service

Study Segment Direction	Friday PM		Saturday PM	
	PTSF	LOS	PTSF	LOS
Saint Helena Hwy (SR 29)				
Northbound	65.6	C	65.6	C
Southbound	65.8	C	64.8	C

Notes: PTSF = Percent Time Spent Following; LOS = Level of Service

Baseline Conditions

Trips associated with the pending Inn at the Abbey project to be located on the Freemark Abbey Winery property on SR 29 were added to the Existing segment volumes in order to develop volumes that would be representative of conditions once the lodging project is open. The Inn at the Abbey project consists of 79 hotel rooms and is expected to generate an average of 645 new trips per day, including 33 Friday p.m. peak hour trips and 57 trips during the Saturday peak hour, as documented in the *Traffic Impact Study for the Inn at the Abbey*, W-Trans, 2019. The "Project" volumes from this prior analysis were used to evaluate the Baseline Conditions scenario.

nax151-1.ai 12/20

Traffic Impact Study for the Vineyard 29 Winery

Figure 1 – Existing Traffic Volumes, Baseline Traffic Volumes, and Future Traffic Volumes

Under Baseline Conditions, the study segment is expected to continue operating at LOS C during both peak hours. Baseline segment volumes are shown in Figure 1 and a summary of the roadway segment level of service calculations is shown in Table 4.

Table 4 – Baseline Peak Hour Roadway Segment Levels of Service

Study Segment Direction	Friday PM		Saturday PM	
	PTSF	LOS	PTSF	LOS
Saint Helena Hwy (SR 29)				
Northbound	65.9	C	65.5	C
Southbound	66.2	C	65.3	C

Notes: PTSF = Percent Time Spent Following; LOS = Level of Service

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 Friday p.m. peak period were used to calculate growth factors in each direction for the study roadway segment.

The growth factors projected by the model were adjusted to account for the four years of growth that had already occurred between the base year (2015) and existing (2019) count data, resulting in a growth factor of 1.46 to achieve year 2040 volumes. The same growth factor derived for the Friday p.m. peak hour was used for the Saturday p.m. peak hour as the model does not contain information for Saturday days.

Under the anticipated Future volumes, the study segment is expected to operate acceptably at LOS D during both peak hours. Future volumes for the roadway segment are shown in Figure 1. LOS results are summarized in Table 5.

Table 5 – Future Peak Hour Roadway Segment Levels of Service

Study Segment Direction	Friday PM		Saturday PM	
	PTSF	LOS	PTSF	LOS
Saint Helena Hwy (SR 29)				
Northbound	74.3	D	74.5	D
Southbound	74.1	D	73.6	D

Notes: PTSF = Percent Time Spent Following; LOS = Level of Service

Project Description

The proposed project includes an expansion of production at the Vineyard 29 Winery located at 2929 St. Helena Highway (SR 29) in the County of Napa from 48,500 gallons to 75,000 gallons. Further, an increase in visitation from 30 to 60 people per day is proposed along with an increase in the number of employees from three full-time and two part-time employees under current conditions to fifteen full-time and six

part-time staff plus six interns during harvest. The site is accessed from SR 29. The proposed project site plan is shown in Figure 2.

Trip Generation

The County of Napa's Winery Traffic Information/Trip Generation Sheet was used to determine the anticipated trip generation for permitted, existing and proposed conditions. The form estimates the number of daily and peak hour trips for Fridays and Saturdays based on the number of full- and part-time employees, average daily visitors, and production. It is noted that the form does not include guidance on inbound versus outbound trips, so it was assumed that two-thirds of trips at the winery would be outbound during the Friday p.m. peak hour as employees and customers leave at closure of the winery. For the Saturday p.m. peak hour, it was assumed that inbound and outbound trips would be evenly split. Copies of the Napa County Winery Traffic Information/Trip Generation Sheets are enclosed in Appendix D.

Based on application of these assumptions, the proposed winery would be expected to generate an average of 97 trips during a typical Friday and 100 trips during the Saturday, with 33 trips during the Friday p.m. peak hour and 43 trips during the Saturday p.m. peak hour. The anticipated daily volume for a Friday or Saturday peak hour during harvest season would be 114 or 110 trips respectively. Compared to the permitted conditions, the change in the Use Permit would be expected to result in 60 additional daily trips on Fridays and 66 on Saturdays, including 20 new trips during the Friday p.m. peak hour and 26 during the Saturday p.m. peak hour. These volumes are summarized in Table 6.

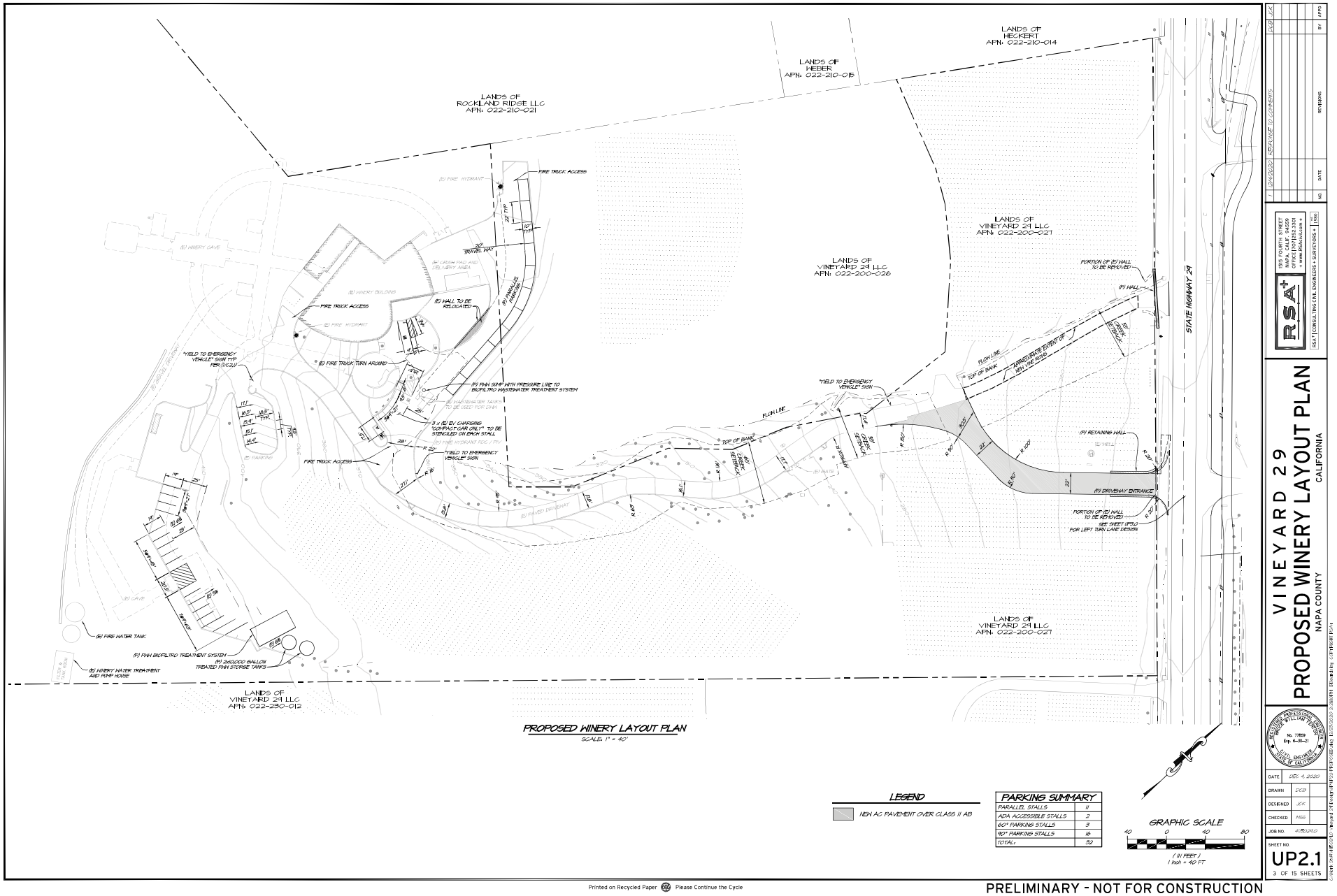
Table 6 – Trip Generation Summary

Scenario	Daily		Friday PM			Saturday PM		
	Friday	Saturday	Trips	In	Out	Trips	In	Out
Permitted	37 (43)	34 (41)	13 (15)	4 (5)	9 (10)	17 (20)	8 (10)	8 (10)
Existing (actual)	75 (85)	54(71)	26 (29)	9 (10)	17 (19)	16 (31)	8 (15)	8 (16)
Proposed	97 (114)	100 (110)	33 (38)	11 (13)	22 (25)	43 (48)	21 (24)	22 (24)
Net Increase (vs. Permitted)	**60 (71)**	**66 (69)**	**20 (23)**	**7 (8)**	**13 (15)**	**26 (28)**	**13 (14)**	**13 (14)**

Notes: Trips for harvest conditions are shown in parentheses

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 employees and patrons of the project. A distribution of 50 percent to the south and 50 percent to the north via SR 29 was used since, according to counts obtained from Caltrans, the directional split for traffic volumes on SR 29 is relatively equal for both the Friday p.m. and Saturday p.m. peak hours.



Source: RSA+ | Consulting Civil Engineers + Surveyors 1/21

nax151-1.ai 1/21

Traffic Impact Study for the Vineyard 29 Winery

Figure 2 – Site Plan

Roadway Segment Operation

Existing plus Project Conditions

Under Existing plus Project volumes, the study roadway segment is expected to continue operating at the same levels of service as without project traffic in both directions during both peak hours. These results are summarized in Table 7. Existing plus Project volumes for the roadway segment are shown in Figure 3.

Table 7 – Existing and Existing plus Project Peak Hour Roadway Segment Levels of Service

Study Segment Direction	Existing Conditions				Existing plus Project			
	Friday PM		Saturday PM		Friday PM		Saturday PM	
	PTSF	LOS	PTSF	LOS	PTSF	LOS	PTSF	LOS
Saint Helena Hwy (SR 29)								
Northbound	65.6	C	65.6	C	66.0	C	66.1	C
Southbound	65.8	C	64.8	C	66.2	C	65.4	C

Notes: Speed is measured in miles per hour; LOS = Level of Service

Finding – Under Existing plus Project conditions, the study roadway is expected to continue operating acceptably at the same levels of service upon the addition of project-generated traffic to existing volumes.

Baseline plus Project Conditions

Upon the addition of project-related traffic to Baseline volumes, the study roadway segment is expected to continue operating acceptably at the same levels of service as without project traffic in both directions during both peak hours. These results are summarized in Table 8. Baseline plus Project volumes for the roadway segment are shown in Figure 3.

Table 8 – Baseline and Baseline plus Project Peak Hour Roadway Segment Levels of Service

Study Segment Direction	Baseline Conditions				Baseline plus Project			
	Friday PM		Saturday PM		Friday PM		Saturday PM	
	PTSF	LOS	PTSF	LOS	PTSF	LOS	PTSF	LOS
Saint Helena Hwy (SR 29)								
Northbound	65.9	C	65.5	C	66.2	C	66.0	C
Southbound	66.2	C	65.3	C	66.5	C	65.8	C

Notes: Speed is measured in miles per hour; LOS = Level of Service

Finding – Under Baseline plus Project conditions the study roadway is expected to continue operating acceptably at the same levels of service upon the addition of project-generated traffic as without it.

nax151-1.ai 12/20

Traffic Impact Study for the Vineyard 29 Winery

Figure 3 – Existing Plus Project Traffic Volumes, Baseline Plus Project Traffic Volumes, and Future Plus Project Traffic Volumes

Future plus Project Conditions

With project-generated traffic added to the anticipated Future volumes, the study roadway is expected to operate acceptably. The Future plus Project operating conditions are summarized in Table 9. Future plus Project volumes for the roadway segment are shown in Figure 3.

Table 9 – Future and Future plus Project Peak Hour Roadway Segment Levels of Service

Study Segment Direction	Future Conditions				Future plus Project			
	Friday PM		Saturday PM		Friday PM		Saturday PM	
	PTSF	LOS	PTSF	LOS	PTSF	LOS	PTSF	LOS
Saint Helena Hwy (SR 29)								
Northbound	74.3	D	74.5	D	74.5	D	74.8	D
Southbound	74.1	D	73.6	D	74.3	D	73.9	D

Notes: Speed is measured in miles per hour; LOS = Level of Service

Finding – Under Future plus Project conditions, the study roadway will continue operating at the same acceptable Levels of Service with the project as without it.

Alternative Modes

Pedestrian Facilities

Consistent with expectations for a rural area, there are no existing pedestrian facilities in the project vicinity except for the roadway shoulders, which are approximately eight feet wide on both sides of SR 29 along the project frontage.

Finding – While there are no pedestrian facilities serving the project site, pedestrian trips to and from the site are not expected, so this condition is acceptable.

Bicycle Facilities

The planned Class II bicycle lanes on SR 29 and Vine Trail extension would provide adequate access for bicyclists. Under existing conditions, the shoulders are of adequate width to accommodate bicycle traffic.

Finding – Access for bicyclists would be adequate considering the rural nature of the study area and the anticipated demand.

Bicycle Storage

The County does not have specific bicycle parking requirements for wineries; however, the project should provide bicycle parking consistent with the requirements outlined in Chapter 18.110.040 of the Napa County Code of Ordinances which states that ten bicycle parking spaces should be provided for all nonresidential uses where ten or more automobile parking spaces are required. With a proposed supply of 32 permanent vehicle parking spaces, the project would need to provide ten bicycle spaces on-site.

Recommendation – The applicant should ensure that parking for a minimum of ten bicycles is provided somewhere on-site, preferably near the tasting room.

Transit

Existing stops are slightly further than one-quarter mile from the site, but still within an acceptable walking distance of the site.

Finding – Transit facilities serving the project site are adequate considering the anticipated demand.

Vehicle Miles Traveled

Background and Threshold of Significance

Senate Bill (SB) 743 established a change in the metric to be applied for determining transportation impacts associated with development projects. Rather than the delay-based criteria associated with a Level of Service (LOS) analysis, the increase in Vehicle Miles Traveled (VMT) as a result of a project is now the basis for determining California Environmental Quality Act (CEQA) impacts with respect to transportation and traffic. As of the date of this analysis, the County of Napa has not yet established thresholds of significance related to VMT. As a result, the project related VMT impacts were assessed based on guidance provided by the California Governor's Office of Planning and Research (OPR) in the publication *Transportation Impacts (SB 743) CEQA Guidelines Update and Technical Advisory*, 2018.

Project Impact

The OPR Technical Advisory identifies several criteria that may be used to identify certain types of projects that are unlikely to have a significant VMT impact and can be "screened" from further analysis. One of these screening criteria pertains to small projects, which OPR defines as generating fewer than 110 new vehicle trips per day on average. OPR specifies that VMT should be based on a typical weekday and should take into consideration seasonal fluctuations. The proposed project is anticipated to result in 71 new daily vehicle trips on a Friday during harvest and 60 new daily vehicle trips on a non-harvest Friday. As Fridays typically represent the highest-volume weekday, the average for the week would be even less, so well below the 110-trip threshold.

Finding – Based on OPR guidance, the project would be expected to have a less-than-significant transportation impact on VMT.

Transportation Demand Management

Transportation Demand Management (TDM) measures aim to reduce single-occupancy vehicle trips during peak hours, parking demand, and total vehicle miles traveled (VMT) through use of alternative modes of transportation and more efficiently planned trips. As of July 2020, VMT analysis is required as part of the California Environmental Quality Act (CEQA) review process. In recognition of the statewide goal to reduce VMT, the applicant has included TDM measures as part of the project. Due to the project's rural location, the site does not have as many options to reduce VMT as one located in an urban environment, but the winery would have up to 15 full-time and 11 part-time employees during harvest as well as up to 60 daily visitors so there is potential to reduce vehicular trips and parking demand with implementation of a TDM program.

Proposed TDM Program

The focus of the project's TDM Program would be to provide information, encouragement, and access to travel options to reduce the number of vehicle trips during peak hours and overall, thus reducing VMT. The following measures are proposed as part of the project and are consistent with the goals of Caltrans' *Smart Mobility 2010: A Call to Action for the New Decade*. It is recommended that the incentives offered as part of the program be available for the first two years of operation, after which the effectiveness of the program should be reevaluated and modified, if needed.

It should be noted that although most measures described below are intended for employees and can be implemented relatively easily, typically the bulk of vehicle miles traveled (VMT) and greenhouse gas (GHG) emissions associated with wineries are generated by visitors. However, while this group represents a greater opportunity for reductions, successful implementation of TDM measures for visitors can be challenging.

Ridesharing Program

Carpooling is one of the most common and cost-effective alternative modes of transportation and one which commuters can adopt part-time. There are numerous benefits to ridesharing. Carpooling can reduce peak-period vehicle trips and increase commuters' travel choices. Further, it reduces congestion, road and parking facility costs and pollution emissions. Carpooling tends to have the lowest cost per passenger-mile of any motorized mode of transportation, since it makes use of a vehicle seat that would otherwise be empty. Carpooling also provides consumer financial savings by decreasing fuel and parking costs.

Ridematching

The greatest barrier to workplace carpooling is often simply being able to identify and travel with other nearby employees. Fortunately, there are many services that can assist in pairing employees within the same organization or across organizations. The most basic publicly available service is 511.org's free ridematching service. There are also various private ridematching providers (e.g. Zimride, RideAmigos, Via, Scoop) that can effectively create carpool networks while making them safe and convenient for their users. The Napa Valley Transportation Authority (NVTA) uses RideAmigos as a resource for local employers as part of its V-Commute program.

Tele-Work/Compressed/Flex Schedules

Telework (i.e. working from home) and compressed schedules (i.e. working more than eight hours each day and shortening the work week) are among the most commonly employed scheduling means to reduce vehicle trips. While many winery employees are required to be on-site to perform their jobs, some staff may be able to take advantage of these options.

Guaranteed Ride Home Program

One of the reasons that many employees do not carpool to work is the fear of being stranded should they need to leave in an emergency. Employees who carpool to work should be guaranteed a ride home in the case of an emergency or unique situation. The Napa Valley Transportation Authority (NVTA) offers a Guaranteed Ride Home (GRH) program, which is available to employees who carpool or commute via alternative modes. Participants are be able to use a taxi, rental car, Lyft, Uber, or other means to get home in an emergency – such as taking care of a sick child or other unexpected need – and are reimbursed for the full cost of the service. The program is available to all who work or attend college in Napa County and is free to join, but registration is required. As part of the project's TDM program, employees would be provided information about V-Commute and would be encouraged to register for the service.

On-Site Amenities

Although it is not a transportation program in itself, on-site employee and visitor amenities serve to reduce vehicle trips. This can take many forms depending on the need. For example, providing lunch or food options on-site allows workers and visitors to forgo midday trips to purchase lunch.

Cash-Out

A cash-out program operates when employers pay their employees a cash incentive for the days they use an alternative mode of transportation (transit, bike, walk, or carpool to work) to help reduce vehicle commute trips and emissions. The cash value of the subsidy can be equal to the cost they would otherwise incur for travel and would be offered to both employees who carpool to provide an equitable benefit.

Education, Outreach & Marketing

Transportation Coordinator

The presence of a staff person dedicated part-time to overseeing and managing the TDM program is helpful in ensuring the ongoing success of these programs. This would not be a distinct position, but instead would be a role that is integrated into the on-site manager. The duties for this position could include the following:

- Create and distribute employee transportation information welcome packets
- Maintain and update a bulletin board or other physical source of transportation information
- Distribute Napa Bicycle Coalition maps
- Monitor bicycle facilities
- Administer the cash-out program
- Promote the ride-matching program

Welcome Packet for New Employees

New employees should be provided with a welcome packet containing relevant transportation information. The packet could include information about NVTA's V-Commute program, which offers resources related to non-automobile transportation options, such as bicycle transportation information, ride-matching services, and the guaranteed ride home program. Transit maps for Vine Transit service could also be provided.

Visitor Transportation Information

Providing guests with on-line information regarding transportation options for travel to the winery can help encourage guests to consider non-auto or rideshare options. This information should be emailed or mailed to guests as part of their registration confirmation process to assist in their logistics planning. Guests making appointments for four or more persons should be encouraged to use private vans or a shuttle for their entire group.

Monitor Performance

It is important to continually monitor the performance of a TDM program and adjust measures as necessary to ensure its success. Employers should conduct mode split and VMT surveys before the implementation of a TDM program and each year thereafter to both make adjustments and use as a marketing material. Employee satisfaction surveys are also an effective way of ensuring a quality TDM program.

Bicycle Benefits

Bicycle Parking

The provision of both short-term and long-term bicycle parking is important. Secure long-term parking (e.g. bike lockers) is a critical component in encouraging employees to bike to work as the lack of secure parking is often cited by employees as a deterrent. Short-term parking (e.g. bike racks) can be utilized by employees or visitors and is generally an inexpensive way to accommodate visitors traveling between wineries.

Changing & Shower Facilities

Bicycling to work can be an attractive option for employees, but it is less so if the employee appears sweaty or unkempt after a long ride. By offering a basic shower and changing facility, employers give workers the reassurance that they can bike to work and still appear presentable to visitors.

Shared Bicycles & Maintenance Tools

Many businesses have experience in providing one or more vehicles on-site for employee use during work hours. Today, many employers are offering the same benefit in the form of shared bicycles for employee or guest use. These bicycles are ideal for short trips and are a cost-effective way of providing a new mobility option to nearby wineries or other destinations during the workday. Bicycles that are shared or used by individuals can be serviced with simple tools such as a pump and tire patches that are kept on-site.

Vehicle Trip Reduction

Based on the California Air Pollution Officers Association (CAPCOA) report *Quantifying Greenhouse Gas Mitigation Measures*, CAPCOA, 2010, it is estimated that voluntary commute trip reduction measures with incentives to carpool can reduce a project's total VMT by about 1.0 to 6.2 percent. Although implementation of alternative shift schedules may not have as much of an impact on VMT reduction as carpooling, many employee trips would be moved to off-peak hours, which would be beneficial to peak hour operation of the surrounding roadways, thereby reducing congestion and the associated greenhouse gases.

Recommendation – It is recommended that the winery implement a TDM plan to reduce peak-hour vehicle trips through some or all the measures identified above.

Access and Circulation

Site Access

The project site is accessed from the driveway at SR 29, as shown on the site plan.

Sight Distance

At driveways a substantially clear line of sight should be maintained between the driver of a vehicle waiting to enter the street and the driver of an approaching vehicle. Sight distances along SR 29 from the proposed driveway were evaluated based on sight distance criteria contained in the *Highway Design Manual* published by Caltrans. The recommended sight distance for driveway approaches is based on stopping sight distance and uses the approach travel speed as the basis for determining the recommended sight distance.

At a posted speed limit of 50 mph, the recommended minimum stopping sight distance is 430 feet. Due to the relatively level terrain of the paved area combined with the straight roadway geometry, over 430 feet of sight distance was observed in each direction from the project driveway, exceeding the recommended minimum stopping sight distance.

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 E.

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 is warranted on SR 29 at the project driveway using Existing volumes. It would continue to be warranted under the Existing plus Project scenario. The project as proposed would provide this left-turn lane. The left-turn lane warrant graph is provided in Appendix F.

Finding – Upon the addition of project trips to existing volumes, a left-turn lane would continue to be warranted at the project driveway. The left-turn lane should be provided, as planned.

Parking

The project was analyzed to determine whether the proposed parking supply would be sufficient for the anticipated peak daily demand. The project site, as proposed, would have 32 standard parking spaces, including two accessible parking spaces.

To accommodate the daily parking demand for the tasting room, there should be at least one space provided for every employee on-site, as well as parking stalls for about 25 percent of the expected daily tasting room visitors. During typical daily operations there would be 15 full-time and 11 part-time employees and a maximum of 60 visitors per day to the tasting room. Assuming the County's standard occupancy rate of 2.8 guests per vehicle, a total of 21 guest vehicles would visit the site over the course of the day. Therefore, the proposed project would need at least 32 parking spaces, including 26 for employees and 6 for guests assuming one-quarter of the guests would be there at any one time. The proposed supply of 32 spaces would accommodate the approximate peak demand of 32 spaces.

Finding – The proposed parking supply is adequate for the anticipated peak demand.

Conclusions and Recommendations

Conclusions

- The change in the Use Permit would be expected to result in 60 additional daily trips on Fridays and 66 on Saturdays, including 20 new trips during the Friday p.m. peak hour and 26 during the Saturday p.m. peak hour.
- SR 29 has experienced collisions at a below-average rate and is expected to operate acceptably at LOS D or better under all volume scenarios evaluated.
- While there are no pedestrian facilities serving the project site other than the existing roadway shoulders, pedestrian trips to and from the site are not expected, so this condition is acceptable.
- Access for bicyclists is adequate considering the rural nature of the study area and the anticipated demand together with the availability of shoulders on SR 29. The planned future provision of the Vine Trail on the east side of SR 29 will improve bicycle access.
- The project would be expected to have a less-than-significant impact in terms of vehicle miles traveled (VMT).
- Transit facilities serving the project site are adequate considering the anticipated demand.
- Sight distance from the driveway location is adequate.
- A left-turn lane on SR 29 at the project driveway is warranted under existing conditions.
- Emergency access to the site is adequate.
- The proposed parking supply is adequate for the anticipated peak demand.

Recommendations

- Parking for a minimum of ten bicycles should be provided on-site, preferably near the tasting room.
- Despite having a less-than-significant impact in terms of VMT, it is recommended that the winery implement a TDM plan to reduce peak-hour vehicle trips through some or all the measures identified above.
- A left-turn lane should be provided on SR 29 at the project driveway, as currently planned.

Study Participants and References

Study Participants

Principal in Charge	Dalene J. Whitlock, PE, PTOE
Senior Planner	Barry Bergman, AICP
Assistant Engineer	Kimberly Tellez
Graphics	Cameron Wong
Editing/Formatting	Alex Scrobonia, Hannah Yung-Boxdell
Quality Control	Dalene J. Whitlock, PE, PTOE

References

2016 Collision Data on California State Highways, California Department of Transportation, 2018

G*uidelines for Application of Updated General Plan Circulation Policies on Significance Criteria Related to Vehicle Level of* Service, Fehr & Peers, 2020

Guidelines for Interpretation of General Plan Circulation Policies on Significance Criteria, Fehr & Peers, 2015

Highway Capacity Manual, 6th Edition, Transportation Research Board, 2018

Highway Design Manual, 6th Edition, California Department of Transportation, 2017

Intersection Channelization Design Guide, National Cooperative Highway Research Program (NCHRP) Report No. 279, Transportation Research Board, 1985

Napa County Code, Municipal Code Corporation, 2017

Napa County General Plan, County of Napa, 2013

Napa County Road and Street Standards, County of Napa, 2016

Napa Countywide Bicycle Plan, Napa Valley Transportation Authority, 2019

Quantifying Greenhouse Gas Mitigation Measures, California Air Pollution Officers Association (CAPCOA), 2010

Smart Mobility 2010: A Call to Action for the New Decade, California Department of Transportation, 2010

Statewide Integrated Traffic Records System (SWITRS), California Highway Patrol, 2014-2019

Technical Advisory on Evaluating Transportation Impacts in CEQA, Governor's Office of Planning and Research, 2018

Transportation Impacts (SB 743), https://opr.ca.gov/ceqa/updates/sb-743/

Trip Generation Manual, 10th Edition, Institute of Transportation Engineers, 2017

VINE Transit, http://www.ridethevine.com

NAX151-1

Appendix A

Collision Rate Calculations

This page intentionally left blank

Roadway Segment Collision Rate Worksheet

TIS for the Vineyard 29 Project

Location: 2929 St Helena Highway

Date of Count: Friday, October 18, 2019
Average Daily Traffic (ADT): 14,100

Number of Collisions: 37
Number of Injuries: 11
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: Flat

Segment Length: 2.0 miles
Direction: North/South

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

$$\text{Collision Rate} = \frac{37 \times 1{,}000{,}000}{14{,}100 \times 365 \times 2 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Segment	**0.72 c/mvm**	**0.0%**	**29.7%**
Statewide Average*	**0.81 c/mvm**	**1.1%**	**39.5%**

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

This page intentionally left blank

Appendix B

Traffic Counts

This page intentionally left blank

Prepared by National Data & Surveying Services

SR 29 and St Helena Hwy & Lodi Ln

Peak Hour Turning Movement Count

ID: 19-08530-001
City: St Helena

Day: Friday
Date: 10/18/2019

PEAK HOURS

AM	NONE
NOON	NONE
PM	02:30 PM - 03:30 PM

COUNT PERIODS

AM	NONE
NOON	NONE
PM	01:45 PM - 05:00 PM

SR 29 and St Helena Hwy — SOUTHBOUND

AM	0	0	0	0	0	AM
NOON	0	0	0	0	0	NOON
PM	0	622	22	0	704	PM

Lodi Ln — EASTBOUND

AM	NOON	PM	
0	0	0	
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
AM	NOON	PM	

CONTROL

0

	AM	NOON	PM
TEV	0	0	1473
PHF			0.96

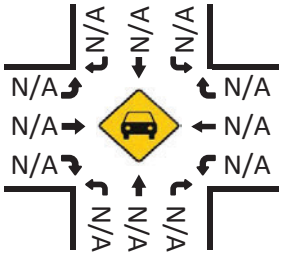
WESTBOUND — Lodi Ln

PM	NOON	AM	
37	0	0	0
0	0	0	0
85	0	0	0
0	0	0	0
62	0	0	
PM	NOON	AM	

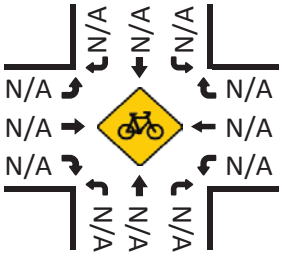
SR 29 and St Helena Hwy — NORTHBOUND

PM	707	0	0	667	40	PM
NOON	0	0	0	0	0	NOON
AM	0	0	0	0	0	AM

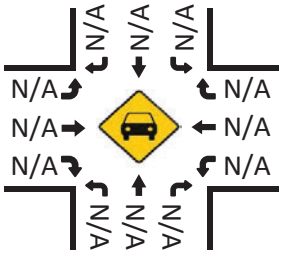
Total Vehicles (AM)



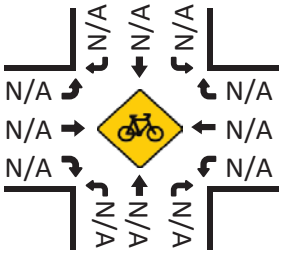
Bikes (AM)



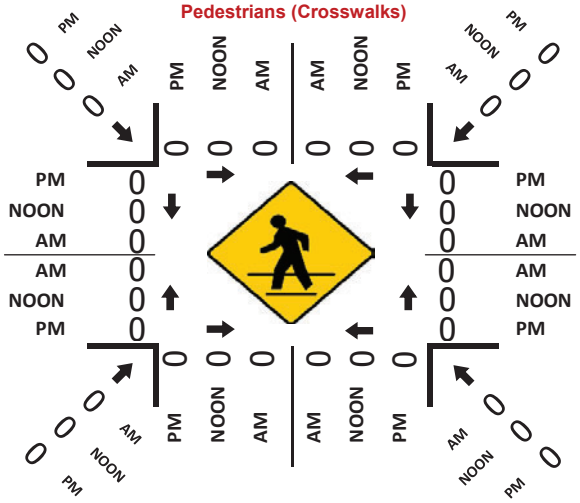
Total Vehicles (Noon)



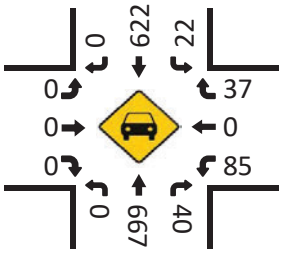
Bikes (NOON)



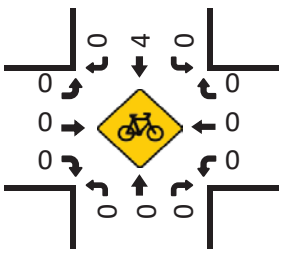
Pedestrians (Crosswalks)



Total Vehicles (PM)



Bikes (PM)



Prepared by National Data & Surveying Services

Silverado Trail N & Lodi Ln

Peak Hour Turning Movement Count

ID: 19-08530-002
City: St Helena

Day: Friday
Date: 10/18/2019

PEAK HOURS

AM	NONE
NOON	NONE
PM	02:45 PM - 03:45 PM

COUNT PERIODS

AM	NONE
NOON	NONE
PM	01:45 PM - 05:00 PM

Silverado Trail N

SOUTHBOUND

AM	0	0	0	0	0	AM
NOON	0	0	0	0	0	NOON
PM	50	265	0	0	331	PM

Lodi Ln — EASTBOUND

AM	NOON	PM		
0	0	112	⇦	
0	0	0	↶	0
0	0	32	↱	0
0	0	0	→	0
0	0	46	↴	0
AM	NOON	PM		

WESTBOUND — Lodi Ln

	PM	NOON	AM
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
⇨	0	0	0
	PM	NOON	AM

CONTROL

0

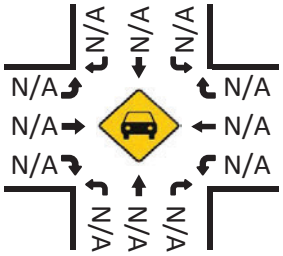
TEV	0 AM	0 NOON	755 PM
PHF			0.96

	0	0	0	0		
⇩					⇧	
PM	312	1	62	299	0	PM
NOON	0	0	0	0	0	NOON
AM	0	0	0	0	0	AM

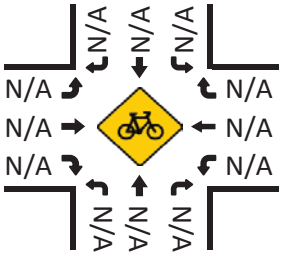
NORTHBOUND

Silverado Trail N

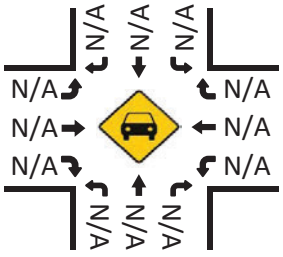
Total Vehicles (AM)



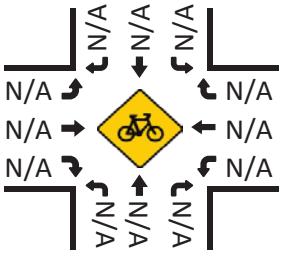
Bikes (AM)



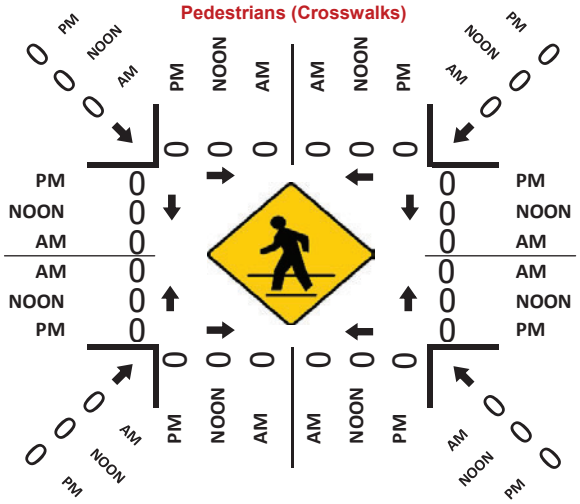
Total Vehicles (Noon)



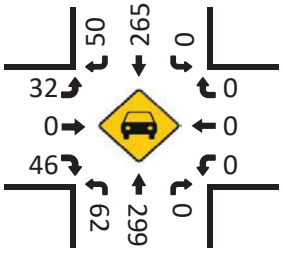
Bikes (NOON)



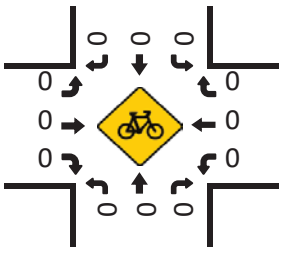
Pedestrians (Crosswalks)



Total Vehicles (PM)



Bikes (PM)



Prepared by National Data & Surveying Services

SR 29/St Helena Hwy & Lodi Ln

Peak Hour Turning Movement Count

ID: 19-08530-001
City: St Helena

Day: Saturday
Date: 10/19/2019

PEAK HOURS

AM	NONE
NOON	NONE
PM	03:00 PM - 04:00 PM

COUNT PERIODS

AM	NONE
NOON	NONE
PM	01:45 PM - 04:00 PM

SR 29/St Helena Hwy

SOUTHBOUND

AM	0	0	0	0	0	AM
NOON	0	0	0	0	0	NOON
PM	0	649	27	0	699	PM

EASTBOUND (Lodi Ln)

AM	NOON	PM
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0

AM NOON PM

WESTBOUND (Lodi Ln)

PM	NOON	AM
13	0	0
0	0	0
39	0	0
0	0	0
49	0	0

PM NOON AM

CONTROL

0

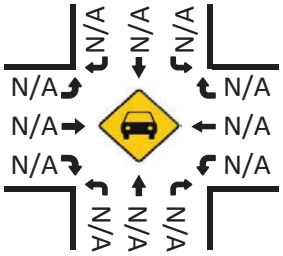
TEV	0 AM	0 NOON	1436 PM
PHF			0.96

PM	688	0	0	686	22	PM
NOON	0	0	0	0	0	NOON
AM	0	0	0	0	0	AM

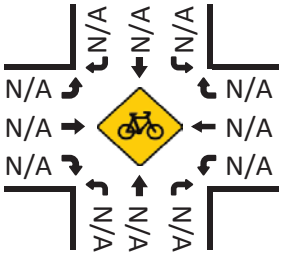
NORTHBOUND

SR 29/St Helena Hwy

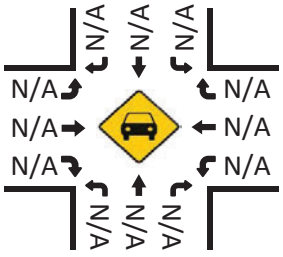
Total Vehicles (AM)



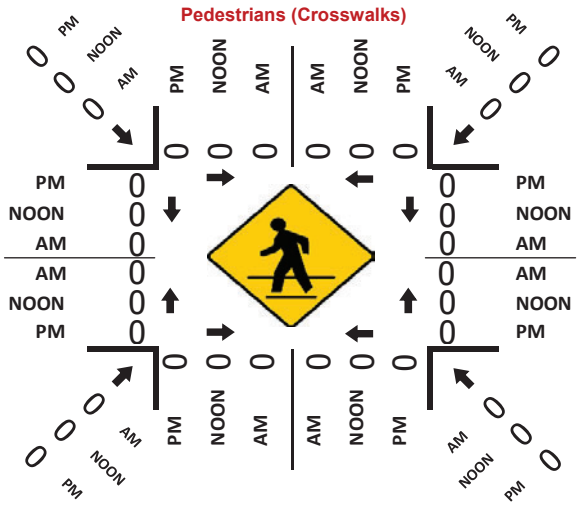
Bikes (AM)



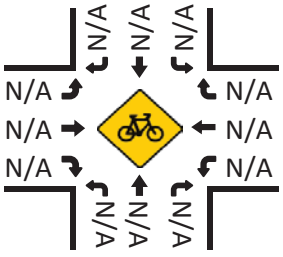
Total Vehicles (Noon)



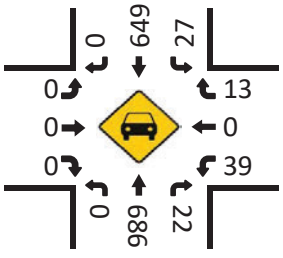
Pedestrians (Crosswalks)



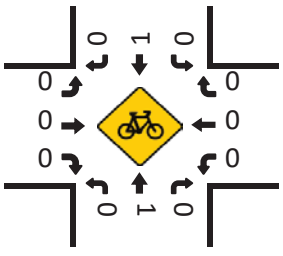
Bikes (NOON)



Total Vehicles (PM)



Bikes (PM)



Prepared by National Data & Surveying Services

Silverado Trail N & Lodi Ln

Peak Hour Turning Movement Count

ID: 19-08530-002
City: St Helena

Day: Saturday
Date: 10/19/2019

PEAK HOURS

AM: NONE
NOON: NONE
PM: 02:00 PM - 03:00 PM

COUNT PERIODS

AM: NONE
NOON: NONE
PM: 01:45 PM - 04:00 PM

Silverado Trail N — SOUTHBOUND

AM	0	0	0	0	0	AM
NOON	0	0	0	0	0	NOON
PM	31	253	0	0	311	PM

Lodi Ln — EASTBOUND

AM	NOON	PM		
0	0	61		
0	0	0	0	
0	0	15	0	
0	0	0	0	
0	0	31	0	
AM	NOON	PM		

CONTROL

0

TEV	0 AM	0 NOON	656 PM
PHF			0.91

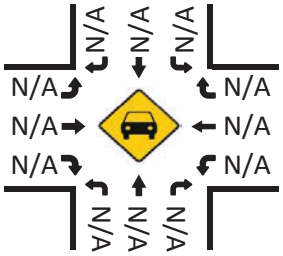
Lodi Ln — WESTBOUND

0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	
PM	NOON	AM	

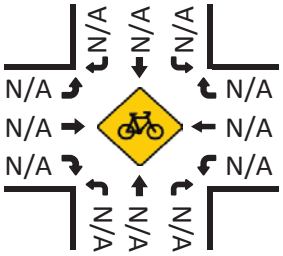
Silverado Trail N — NORTHBOUND

PM	284	0	30	296	0	PM
NOON	0	0	0	0	0	NOON
AM	0	0	0	0	0	AM

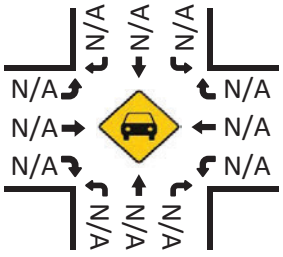
Total Vehicles (AM)



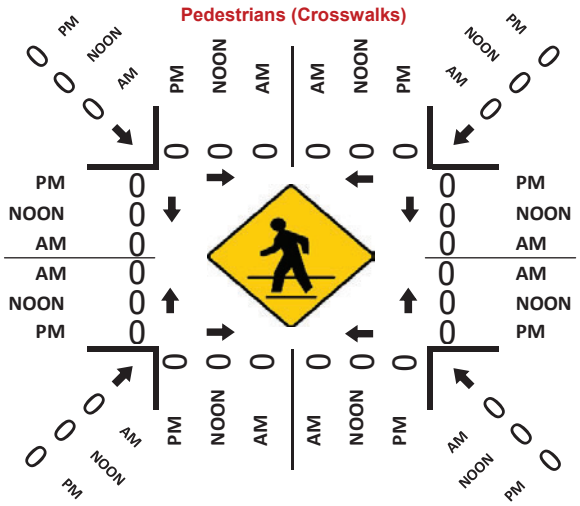
Bikes (AM)



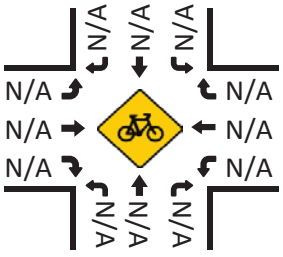
Total Vehicles (Noon)



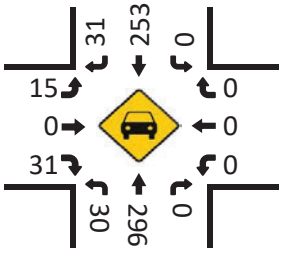
Pedestrians (Crosswalks)



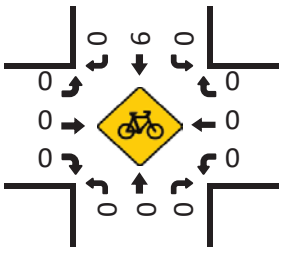
Bikes (NOON)



Total Vehicles (PM)



Bikes (PM)



Appendix C

Roadway Segment Level of Service Calculations

This page intentionally left blank

HCS7 Two-Lane Highway Report

Project Information

Analyst	KT	Date	12/4/2020
Agency	W-Trans	Analysis Year	2020
Jurisdiction	County of Napa	Time Period Analyzed	
Project Description	SR 29 North - Friday PM Existing	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	12	Shoulder Width, ft	6
Speed Limit, mi/h	50	Access Point Density, pts/mi	10.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	736	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.96	Total Trucks, %	4.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.43

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	54.4
Speed Slope Coefficient	3.50685	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.34047	PF Power Coefficient	0.74585
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	9.4
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	51.5

Vehicle Results

Average Speed, mi/h	51.5	Percent Followers, %	65.6
Segment Travel Time, minutes	1.17	Followers Density, followers/mi/ln	9.4
Vehicle LOS	C		

HCS7 Two-Lane Highway Report

Project Information

Analyst	KT	Date	12/4/2020
Agency	W-Trans	Analysis Year	2020
Jurisdiction	County of Napa	Time Period Analyzed	
Project Description	SR 29 South - Friday PM Existing	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	12	Shoulder Width, ft	6
Speed Limit, mi/h	50	Access Point Density, pts/mi	14.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	736	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.96	Total Trucks, %	4.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.43

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	53.4
Speed Slope Coefficient	3.45265	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.34716	PF Power Coefficient	0.74302
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	9.6
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	50.5

Vehicle Results

Average Speed, mi/h	50.5	Percent Followers, %	65.8
Segment Travel Time, minutes	1.19	Followers Density, followers/mi/ln	9.6
Vehicle LOS	C		

HCS7 Two-Lane Highway Report

Project Information

Analyst	KT	Date	12/4/2020
Agency	W-Trans	Analysis Year	2020
Jurisdiction	County of Napa	Time Period Analyzed	
Project Description	SR 29 North - Saturday PM Existing	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	12	Shoulder Width, ft	6
Speed Limit, mi/h	50	Access Point Density, pts/mi	10.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	738	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.96	Total Trucks, %	2.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.43

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	54.4
Speed Slope Coefficient	3.51046	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.34026	PF Power Coefficient	0.74575
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	9.4
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	51.5

Vehicle Results

Average Speed, mi/h	51.5	Percent Followers, %	65.6
Segment Travel Time, minutes	1.16	Followers Density, followers/mi/ln	9.4
Vehicle LOS	C		

HCS7 Two-Lane Highway Report

Project Information

Analyst	KT	Date	12/4/2020
Agency	W-Trans	Analysis Year	2020
Jurisdiction	County of Napa	Time Period Analyzed	
Project Description	SR 29 South - Saturday PM Existing	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	12	Shoulder Width, ft	6
Speed Limit, mi/h	50	Access Point Density, pts/mi	10.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	717	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.96	Total Trucks, %	2.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.42

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	54.4
Speed Slope Coefficient	3.51046	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.34026	PF Power Coefficient	0.74575
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	9.0
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	51.6

Vehicle Results

Average Speed, mi/h	51.6	Percent Followers, %	64.8
Segment Travel Time, minutes	1.16	Followers Density, followers/mi/ln	9.0
Vehicle LOS	C		

HCS7 Two-Lane Highway Report

Project Information

Analyst	KT	Date	12/4/2020
Agency	W-Trans	Analysis Year	2020
Jurisdiction	County of Napa	Time Period Analyzed	
Project Description	SR 29 North - Friday PM Baseline	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	12	Shoulder Width, ft	6
Speed Limit, mi/h	50	Access Point Density, pts/mi	10.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	744	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.96	Total Trucks, %	4.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.44

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	54.4
Speed Slope Coefficient	3.50685	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.34047	PF Power Coefficient	0.74585
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	9.5
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	51.4

Vehicle Results

Average Speed, mi/h	51.4	Percent Followers, %	65.9
Segment Travel Time, minutes	1.17	Followers Density, followers/mi/ln	9.5
Vehicle LOS	C		

HCS7 Two-Lane Highway Report

Project Information

Analyst	KT	Date	12/4/2020
Agency	W-Trans	Analysis Year	2020
Jurisdiction	County of Napa	Time Period Analyzed	
Project Description	SR 29 South - Friday PM Baseline	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	12	Shoulder Width, ft	6
Speed Limit, mi/h	50	Access Point Density, pts/mi	14.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	746	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.96	Total Trucks, %	4.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.44

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	53.4
Speed Slope Coefficient	3.45265	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.34716	PF Power Coefficient	0.74302
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	9.8
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	50.5

Vehicle Results

Average Speed, mi/h	50.5	Percent Followers, %	66.2
Segment Travel Time, minutes	1.19	Followers Density, followers/mi/ln	9.8
Vehicle LOS	C		

HCS7 Two-Lane Highway Report

Project Information

Analyst	KT	Date	12/4/2020
Agency	W-Trans	Analysis Year	2020
Jurisdiction	County of Napa	Time Period Analyzed	
Project Description	SR 29 North - Saturday PM Baseline	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	12	Shoulder Width, ft	6
Speed Limit, mi/h	50	Access Point Density, pts/mi	10.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	733	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.96	Total Trucks, %	2.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.43

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	54.4
Speed Slope Coefficient	3.51046	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.34026	PF Power Coefficient	0.74575
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	9.3
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	51.5

Vehicle Results

Average Speed, mi/h	51.5	Percent Followers, %	65.5
Segment Travel Time, minutes	1.16	Followers Density, followers/mi/ln	9.3
Vehicle LOS	C		

HCS7 Two-Lane Highway Report

Project Information

Analyst	KT	Date	12/4/2020
Agency	W-Trans	Analysis Year	2020
Jurisdiction	County of Napa	Time Period Analyzed	
Project Description	SR 29 South - Saturday PM Baseline	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	12	Shoulder Width, ft	6
Speed Limit, mi/h	50	Access Point Density, pts/mi	10.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	729	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.96	Total Trucks, %	2.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.43

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	54.4
Speed Slope Coefficient	3.51046	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.34026	PF Power Coefficient	0.74575
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	9.2
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	51.5

Vehicle Results

Average Speed, mi/h	51.5	Percent Followers, %	65.3
Segment Travel Time, minutes	1.16	Followers Density, followers/mi/ln	9.2
Vehicle LOS	C		

HCS7 Two-Lane Highway Report

Project Information

Analyst	KT	Date	12/4/2020
Agency	W-Trans	Analysis Year	2020
Jurisdiction	County of Napa	Time Period Analyzed	
Project Description	SR 29 North - Friday PM Future	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	12	Shoulder Width, ft	6
Speed Limit, mi/h	50	Access Point Density, pts/mi	10.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	1018	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	1.00	Total Trucks, %	4.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.60

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	54.4
Speed Slope Coefficient	3.50685	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.34047	PF Power Coefficient	0.74585
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	14.8
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	51.0

Vehicle Results

Average Speed, mi/h	51.0	Percent Followers, %	74.3
Segment Travel Time, minutes	1.18	Followers Density, followers/mi/ln	14.8
Vehicle LOS	D		

HCS7 Two-Lane Highway Report

Project Information

Analyst	KT	Date	12/4/2020
Agency	W-Trans	Analysis Year	2020
Jurisdiction	County of Napa	Time Period Analyzed	
Project Description	SR 29 South - Friday PM Future	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	12	Shoulder Width, ft	6
Speed Limit, mi/h	50	Access Point Density, pts/mi	14.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	1002	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	1.00	Total Trucks, %	4.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.59

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	53.4
Speed Slope Coefficient	3.45265	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.34716	PF Power Coefficient	0.74302
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	14.8
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	50.1

Vehicle Results

Average Speed, mi/h	50.1	Percent Followers, %	74.1
Segment Travel Time, minutes	1.20	Followers Density, followers/mi/ln	14.8
Vehicle LOS	D		

HCS7 Two-Lane Highway Report

Project Information

Analyst	KT	Date	12/4/2020
Agency	W-Trans	Analysis Year	2020
Jurisdiction	County of Napa	Time Period Analyzed	
Project Description	SR 29 North - Saturday PM Future	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	12	Shoulder Width, ft	6
Speed Limit, mi/h	50	Access Point Density, pts/mi	10.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	1026	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	1.00	Total Trucks, %	2.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.60

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	54.4
Speed Slope Coefficient	3.51046	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.34026	PF Power Coefficient	0.74575
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	15.0
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	51.0

Vehicle Results

Average Speed, mi/h	51.0	Percent Followers, %	74.5
Segment Travel Time, minutes	1.18	Followers Density, followers/mi/ln	15.0
Vehicle LOS	D		

HCS7 Two-Lane Highway Report

Project Information

Analyst	KT	Date	12/4/2020
Agency	W-Trans	Analysis Year	2020
Jurisdiction	County of Napa	Time Period Analyzed	
Project Description	SR 29 South - Saturday PM Future	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	12	Shoulder Width, ft	6
Speed Limit, mi/h	50	Access Point Density, pts/mi	10.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	991	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	1.00	Total Trucks, %	2.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.58

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	54.4
Speed Slope Coefficient	3.51046	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.34026	PF Power Coefficient	0.74575
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	14.3
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	51.1

Vehicle Results

Average Speed, mi/h	51.1	Percent Followers, %	73.6
Segment Travel Time, minutes	1.17	Followers Density, followers/mi/ln	14.3
Vehicle LOS	D		

HCS7 Two-Lane Highway Report

Project Information

Analyst	KT	Date	12/4/2020
Agency	W-Trans	Analysis Year	2020
Jurisdiction	County of Napa	Time Period Analyzed	
Project Description	SR 29 North - Friday PM Existing Plus Project	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	12	Shoulder Width, ft	6
Speed Limit, mi/h	50	Access Point Density, pts/mi	10.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	747	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.96	Total Trucks, %	4.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.44

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	54.4
Speed Slope Coefficient	3.50685	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.34047	PF Power Coefficient	0.74585
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	9.6
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	51.4

Vehicle Results

Average Speed, mi/h	51.4	Percent Followers, %	66.0
Segment Travel Time, minutes	1.17	Followers Density, followers/mi/ln	9.6
Vehicle LOS	C		

HCS7 Two-Lane Highway Report

Project Information

Analyst	KT	Date	12/4/2020
Agency	W-Trans	Analysis Year	2020
Jurisdiction	County of Napa	Time Period Analyzed	
Project Description	SR 29 South - Friday PM Existing Plus Project	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	12	Shoulder Width, ft	6
Speed Limit, mi/h	50	Access Point Density, pts/mi	14.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	747	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.96	Total Trucks, %	4.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.44

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	53.4
Speed Slope Coefficient	3.45265	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.34716	PF Power Coefficient	0.74302
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	9.8
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	50.5

Vehicle Results

Average Speed, mi/h	50.5	Percent Followers, %	66.2
Segment Travel Time, minutes	1.19	Followers Density, followers/mi/ln	9.8
Vehicle LOS	C		

HCS7 Two-Lane Highway Report

Project Information

Analyst	KT	Date	12/4/2020
Agency	W-Trans	Analysis Year	2020
Jurisdiction	County of Napa	Time Period Analyzed	
Project Description	SR 29 North - Saturday PM Existing Plus Project	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	12	Shoulder Width, ft	6
Speed Limit, mi/h	50	Access Point Density, pts/mi	10.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	751	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.96	Total Trucks, %	2.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.44

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	54.4
Speed Slope Coefficient	3.51046	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.34026	PF Power Coefficient	0.74575
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	9.6
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	51.5

Vehicle Results

Average Speed, mi/h	51.5	Percent Followers, %	66.1
Segment Travel Time, minutes	1.17	Followers Density, followers/mi/ln	9.6
Vehicle LOS	C		

HCS7 Two-Lane Highway Report

Project Information

Analyst	KT	Date	12/4/2020
Agency	W-Trans	Analysis Year	2020
Jurisdiction	County of Napa	Time Period Analyzed	
Project Description	SR 29 South - Saturday PM Existing Plus Project	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	12	Shoulder Width, ft	6
Speed Limit, mi/h	50	Access Point Density, pts/mi	10.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	730	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.96	Total Trucks, %	2.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.43

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	54.4
Speed Slope Coefficient	3.51046	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.34026	PF Power Coefficient	0.74575
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	9.3
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	51.5

Vehicle Results

Average Speed, mi/h	51.5	Percent Followers, %	65.4
Segment Travel Time, minutes	1.16	Followers Density, followers/mi/ln	9.3
Vehicle LOS	C		

HCS7 Two-Lane Highway Report

Project Information

Analyst	KT	Date	12/4/2020
Agency	W-Trans	Analysis Year	2020
Jurisdiction	County of Napa	Time Period Analyzed	
Project Description	SR 29 North - Friday PM Baseline Plus Project	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	12	Shoulder Width, ft	6
Speed Limit, mi/h	50	Access Point Density, pts/mi	10.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	754	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.96	Total Trucks, %	4.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.44

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	54.4
Speed Slope Coefficient	3.50685	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.34047	PF Power Coefficient	0.74585
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	9.7
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	51.4

Vehicle Results

Average Speed, mi/h	51.4	Percent Followers, %	66.2
Segment Travel Time, minutes	1.17	Followers Density, followers/mi/ln	9.7
Vehicle LOS	C		

HCS7 Two-Lane Highway Report

Project Information

Analyst	KT	Date	12/4/2020
Agency	W-Trans	Analysis Year	2020
Jurisdiction	County of Napa	Time Period Analyzed	
Project Description	SR 29 South - Friday PM Baseline Plus Project	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	12	Shoulder Width, ft	6
Speed Limit, mi/h	50	Access Point Density, pts/mi	14.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	756	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.96	Total Trucks, %	4.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.44

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	53.4
Speed Slope Coefficient	3.45265	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.34716	PF Power Coefficient	0.74302
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	10.0
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	50.5

Vehicle Results

Average Speed, mi/h	50.5	Percent Followers, %	66.5
Segment Travel Time, minutes	1.19	Followers Density, followers/mi/ln	10.0
Vehicle LOS	C		

HCS7 Two-Lane Highway Report

Project Information

Analyst	KT	Date	12/4/2020
Agency	W-Trans	Analysis Year	2020
Jurisdiction	County of Napa	Time Period Analyzed	
Project Description	SR 29 North - Saturday PM Baseline Plus Project	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	12	Shoulder Width, ft	6
Speed Limit, mi/h	50	Access Point Density, pts/mi	10.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	747	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.96	Total Trucks, %	2.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.44

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	54.4
Speed Slope Coefficient	3.51046	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.34026	PF Power Coefficient	0.74575
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	9.6
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	51.5

Vehicle Results

Average Speed, mi/h	51.5	Percent Followers, %	66.0
Segment Travel Time, minutes	1.16	Followers Density, followers/mi/ln	9.6
Vehicle LOS	C		

HCS7 Two-Lane Highway Report

Project Information

Analyst	KT	Date	12/4/2020
Agency	W-Trans	Analysis Year	2020
Jurisdiction	County of Napa	Time Period Analyzed	
Project Description	SR 29 South - Saturday PM Baseline Plus Project	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	12	Shoulder Width, ft	6
Speed Limit, mi/h	50	Access Point Density, pts/mi	10.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	743	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.96	Total Trucks, %	2.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.44

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	54.4
Speed Slope Coefficient	3.51046	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.34026	PF Power Coefficient	0.74575
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	9.5
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	51.5

Vehicle Results

Average Speed, mi/h	51.5	Percent Followers, %	65.8
Segment Travel Time, minutes	1.16	Followers Density, followers/mi/ln	9.5
Vehicle LOS	C		

HCS7 Two-Lane Highway Report

Project Information

Analyst	KT	Date	12/4/2020
Agency	W-Trans	Analysis Year	2020
Jurisdiction	County of Napa	Time Period Analyzed	
Project Description	SR 29 North - Friday PM Future Plus Project	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	12	Shoulder Width, ft	6
Speed Limit, mi/h	50	Access Point Density, pts/mi	10.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	1028	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	1.00	Total Trucks, %	4.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.60

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	54.4
Speed Slope Coefficient	3.50685	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.34047	PF Power Coefficient	0.74585
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	15.0
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	51.0

Vehicle Results

Average Speed, mi/h	51.0	Percent Followers, %	74.5
Segment Travel Time, minutes	1.18	Followers Density, followers/mi/ln	15.0
Vehicle LOS	E		

HCS7 Two-Lane Highway Report

Project Information

Analyst	KT	Date	12/4/2020
Agency	W-Trans	Analysis Year	2020
Jurisdiction	County of Napa	Time Period Analyzed	
Project Description	SR 29 South - Friday PM Future Plus Project	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	12	Shoulder Width, ft	6
Speed Limit, mi/h	50	Access Point Density, pts/mi	14.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	1012	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	1.00	Total Trucks, %	4.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.60

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	53.4
Speed Slope Coefficient	3.45265	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.34716	PF Power Coefficient	0.74302
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	15.0
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	50.0

Vehicle Results

Average Speed, mi/h	50.0	Percent Followers, %	74.3
Segment Travel Time, minutes	1.20	Followers Density, followers/mi/ln	15.0
Vehicle LOS	E		

HCS7 Two-Lane Highway Report

Project Information

Analyst	KT	Date	12/4/2020
Agency	W-Trans	Analysis Year	2020
Jurisdiction	County of Napa	Time Period Analyzed	
Project Description	SR 29 North - Saturday PM Future Plus Project	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	12	Shoulder Width, ft	6
Speed Limit, mi/h	50	Access Point Density, pts/mi	10.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	1039	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	1.00	Total Trucks, %	2.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.61

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	54.4
Speed Slope Coefficient	3.51046	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.34026	PF Power Coefficient	0.74575
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	15.2
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	51.0

Vehicle Results

Average Speed, mi/h	51.0	Percent Followers, %	74.8
Segment Travel Time, minutes	1.18	Followers Density, followers/mi/ln	15.2
Vehicle LOS	E		

HCS7 Two-Lane Highway Report

Project Information

Analyst	KT	Date	12/4/2020
Agency	W-Trans	Analysis Year	2020
Jurisdiction	County of Napa	Time Period Analyzed	
Project Description	SR 29 South - Saturday PM Future Plus Project	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	12	Shoulder Width, ft	6
Speed Limit, mi/h	50	Access Point Density, pts/mi	10.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	1004	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	1.00	Total Trucks, %	2.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.59

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	54.4
Speed Slope Coefficient	3.51046	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.34026	PF Power Coefficient	0.74575
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	14.5
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	51.1

Vehicle Results

Average Speed, mi/h	51.1	Percent Followers, %	73.9
Segment Travel Time, minutes	1.17	Followers Density, followers/mi/ln	14.5
Vehicle LOS	D		

Appendix D

Napa County Winery Traffic Information/Trip Generation

This page intentionally left blank

Permitted Conditions Winery Traffic Information / Trip Generation

Determine Winery Daily Trips. ***Complete Sections A through I below to determine your winery project's estimated baseline daily and peak hour trips.***

Project Name: Vineyard 29 Winery **Project Scenario:** **Permitted**

Section A. Maximum Daily Weekday Traffic (Friday, non-harvest season)

1.	Total number of FT employees:	3	x 3.05 one-way trips per employee	=	9.2	daily trips
2.	Total number of PT employees:	2	x 1.90 one-way trips per employee	=	3.8	daily trips
3.	Maximum weekday visitors:	30	/2.6 visitors per vehicle x 2 one-way trips	=	23.1	daily trips
4.	Gallons of production:	48500	/1,000 x 0.009 daily truck trips x 2 one-way trips	=	0.9	daily trips
5.			TOTAL	=	37	daily trips

Section B. Maximum Daily Weekday Traffic (Friday, harvest season)

6.	Total number of FT employees:	3	x 3.05 one-way trips per employee	=	9.2	daily trips
7.	Total number of PT employees:	2	x 1.90 one-way trips per employee	=	3.8	daily trips
8.	Maximum weekday visitors:	30	/2.6 visitors per vehicle x 2 one-way trips	=	23.1	daily trips
9.	Gallons of production:	48500	/1,000 x 0.009 daily truck trips x 2 one-way trips	=	0.9	daily trips
10.	Avg. annual tons of grape on-haul:	400	/ 144 truck trips x 2 one-way trips	=	5.6	daily trips
11.			TOTAL	=	43	daily trips

Section C. Maximum Daily Weekend Traffic (Saturday, non-harvest season)

12.	Total number of FT Sat. employees:	3	x 3.05 one-way trips per employee	=	9.2	daily trips
13.	Total number of PT Sat. employees:	2	x 1.90 one-way trips per employee	=	3.8	daily trips
14.	Maximum Saturday visitors:	30	/2.8 visitors per vehicle x 2 one-way trips	=	21.4	daily trips
15.	Gallons of Production:	48500	/1,000 x 0.009 daily truck trips x 2 one-way trips	=	0.9	daily trips
16.			TOTAL	=	35	daily trips

Section D. Maximum Daily Weekend Traffic (Saturday, harvest season)

17.	Total number of FT Sat. employees:	3	x 3.05 one-way trips per employee	=	9.2	daily trips
18.	Total number of PT Sat. employees:	2	x 1.90 one-way trips per employee	=	3.8	daily trips
19.	Maximum Saturday visitors:	30	/2.8 visitors per vehicle x 2 one-way trips	=	21.4	daily trips
20.	Gallons of production:	48500	/1,000 x 0.009 daily truck trips2 x 2 one-way trips	=	0.9	daily trips
21.	Avg. annual tons of grape on-haul:	400	/ 144 truck trips x 2 one-way trips	=	5.6	daily trips
22.			TOTAL	=	41	daily trips

Section E. PM Peak Hour Trip Generation (Friday, non-harvest season)

(Sum of daily trips from Sec. A, lines 3 and 4) x 0.38 + (No. of FTE) + (line 2 / 2) = 13 PM peak trips

Section F. PM Peak Hour Trip Generation (Friday, harvest season)

(Sum of daily trips, Sec. B, lines 8, 9, 10) x 0.38 + (No. of FTE) + (line 7 / 2) = 15 PM peak trips

Section G. PM Peak Hour Trip Generation (Saturday, non-harvest season)

(Daily trips from Sec. C, line 14 and 15) x 0.57 + (No. of FTE) + (line 13 / 2) = 17 PM peak trips

Section H. PM Peak Hour Trip Generation (Saturday, harvest season)

(Sum of daily trips Sec. D, lines 19, 20, 21) x 0.57 + (No. of FTE) + (line 18 / 2) = 20 PM peak trips

Section I. Maximum Annual Trips

(Sec. A, line 5 x 206) + (Sec. B, line 11 x 55) + (Sec. C, line 16 x 82) + (Sec. D, line 22 x 22) = 13759 Annual trips

Existing Conditions Winery Traffic Information / Trip Generation

Determine Winery Daily Trips. ***Complete Sections A through I below to determine your winery project's estimated baseline daily and peak hour trips.***

Project Name: Vineyard 29 Winery **Project Scenario:** **Existing**

Section A. Maximum Daily Weekday Traffic (Friday, non-harvest season)

1.	Total number of FT employees:	13	x 3.05 one-way trips per employee	=	39.7	daily trips
2.	Total number of PT employees:	2	x 1.90 one-way trips per employee	=	3.8	daily trips
3.	Maximum weekday visitors:	40	/2.6 visitors per vehicle x 2 one-way trips	=	30.8	daily trips
4.	Gallons of production:	48500	/1,000 x 0.009 daily truck trips2 x 2 one-way trips	=	0.9	daily trips
5.			TOTAL	=	75	daily trips

Section B. Maximum Daily Weekday Traffic (Friday, harvest season)

6.	Total number of FT employees:	13	x 3.05 one-way trips per employee	=	39.7	daily trips
7.	Total number of PT employees:	5	x 1.90 one-way trips per employee	=	9.5	daily trips
8.	Maximum weekday visitors:	40	/2.6 visitors per vehicle x 2 one-way trips	=	30.8	daily trips
9.	Gallons of production:	48500	/1,000 x 0.009 daily truck trips2 x 2 one-way trips	=	0.9	daily trips
10.	Avg. annual tons of grape on-haul:	304	/ 144 truck trips x 2 one-way trips	=	4.2	daily trips
11.			TOTAL	=	85	daily trips

Section C. Maximum Daily Weekend Traffic (Saturday, non-harvest season)

12.	Total number of FT Sat. employees:	7	x 3.05 one-way trips per employee	=	21.4	daily trips
13.	Total number of PT Sat. employees:	2	x 1.90 one-way trips per employee	=	3.8	daily trips
14.	Maximum Saturday visitors:	40	/2.8 visitors per vehicle x 2 one-way trips	=	28.6	daily trips
15.	Gallons of Production:	48500	/1,000 x 0.009 daily truck trips x 2 one-way trips	=	0.9	daily trips
16.			TOTAL	=	55	daily trips

Section D. Maximum Daily Weekend Traffic (Saturday, harvest season)

17.	Total number of FT Sat. employees:	9	x 3.05 one-way trips per employee	=	27.5	daily trips
18.	Total number of PT Sat. employees:	5	x 1.90 one-way trips per employee	=	9.5	daily trips
19.	Maximum Saturday visitors:	40	/2.8 visitors per vehicle x 2 one-way trips	=	28.6	daily trips
20.	Gallons of production:	48500	/1,000 x 0.009 daily truck trips2 x 2 one-way trips	=	0.9	daily trips
21.	Avg. annual tons of grape on-haul:	304	/ 144 truck trips x 2 one-way trips	=	4.2	daily trips
22.			TOTAL	=	71	daily trips

Section E. PM Peak Hour Trip Generation (Friday, non-harvest season)

(Sum of daily trips from Sec. A, lines 3 and 4) x 0.38 + (No. of FTE) + (line 2 / 2) = 26 PM peak trips

Section F. PM Peak Hour Trip Generation (Friday, harvest season)

(Sum of daily trips, Sec. B, lines 8, 9, 10) x 0.38 + (No. of FTE) + (line 7 / 2) = 29 PM peak trips

Section G. PM Peak Hour Trip Generation (Saturday, non-harvest season)

(Daily trips from Sec. C, line 14 and 15) x 0.57 + (No. of FTE) + (line 13 / 2) = 25 PM peak trips

Section H. PM Peak Hour Trip Generation (Saturday, harvest season)

(Sum of daily trips Sec. D, lines 19, 20, 21) x 0.57 + (No. of FTE) + (line 18 / 2) = 31 PM peak trips

Section I. Maximum Annual Trips

(Sec. A, line 5 x 206) + (Sec. B, line 11 x 55) + (Sec. C, line 16 x 82) + (Sec. D, line 22 x 22) = 26197 Annual trips

Proposed Project Winery Traffic Information / Trip Generation

Determine Winery Daily Trips. ***Complete Sections J through R below to determine your winery project's estimated future and peak hour trips.***

Project Name: Vineyard 29 Winery **Project Scenario:** **Proposed**

Section J. Maximum Daily Weekday Traffic (Friday, non-harvest season)

1.	Total number of FT employees:	15	x 3.05 one-way trips per employee	=	45.8	daily trips
2.	Total number of PT employees:	6	x 1.90 one-way trips per employee	=	11.4	daily trips
3.	Maximum weekday visitors:	50	/2.6 visitors per vehicle x 2 one-way trips	=	38.5	daily trips
4.	Gallons of production: 75000		/1,000 x 0.009 daily truck trips2 x 2 one-way trips	=	1.4	daily trips
5.			TOTAL	=	97	daily trips

Section K. Maximum Daily Weekday Traffic (Friday, harvest season)

6.	Total number of FT employees:	15	x 3.05 one-way trips per employee	=	45.8	daily trips
7.	Total number of PT employees:	11	x 1.90 one-way trips per employee	=	20.9	daily trips
8.	Maximum weekday visitors:	50	/2.6 visitors per vehicle x 2 one-way trips	=	38.5	daily trips
9.	Gallons of production: 75000		/1,000 x 0.009 daily truck trips2 x 2 one-way trips	=	1.4	daily trips
10.	Avg. annual tons of grape on-haul:	504	/ 144 truck trips x 2 one-way trips	=	7.0	daily trips
11.			TOTAL	=	114	daily trips

Section L. Maximum Daily Weekend Traffic (Saturday, non-harvest season)

12.	Total number of FT Sat. employees:	15	x 3.05 one-way trips per employee	=	45.8	daily trips
13.	Total number of PT Sat. employees:	6	x 1.90 one-way trips per employee	=	11.4	daily trips
14.	Maximum Saturday visitors:	60	/2.8 visitors per vehicle x 2 one-way trips	=	42.9	daily trips
15.	Gallons of Production: 75000		/1,000 x 0.009 daily truck trips x 2 one-way trips	=	1.4	daily trips
16.			TOTAL	=	102	daily trips

Section M. Maximum Daily Weekend Traffic (Saturday, harvest season)

17.	Total number of FT Sat. employees:	15	x 3.05 one-way trips per employee	=	45.8	daily trips
18.	Total number of PT Sat. employees:	7	x 1.90 one-way trips per employee	=	13.3	daily trips
19.	Maximum Saturday visitors:	60	/2.8 visitors per vehicle x 2 one-way trips	=	42.9	daily trips
20.	Gallons of production: 75000		/1,000 x 0.009 daily truck trips2 x 2 one-way trips	=	1.4	daily trips
21.	Avg. annual tons of grape on-haul:	504	/ 144 truck trips x 2 one-way trips	=	7.0	daily trips
22.			TOTAL	=	110	daily trips

Section N. PM Peak Hour Trip Generation (Friday, non-harvest season)

(Sum of daily trips from Sec. J, lines 3 and 4) x 0.38 + (No. of FTE) + (line 2 / 2) = 33 PM peak trips

Section O. PM Peak Hour Trip Generation (Friday, harvest season)

(Sum of daily trips, Sec. K, lines 8, 9, 10) x 0.38 + (No. of FTE) + (line 7 / 2) = 38 PM peak trips

Section P. PM Peak Hour Trip Generation (Saturday, non-harvest season)

(Daily trips from Sec. L, line 14 and 15) x 0.57 + (No. of FTE) + (line 13 / 2) = 43 PM peak trips

Section Q. PM Peak Hour Trip Generation (Saturday, harvest season)

(Sum of daily trips Sec. M, lines 19, 20, 21) x 0.57 + (No. of FTE) + (line 18 / 2) = 48 PM peak trips

Section R. Maximum Annual Trips

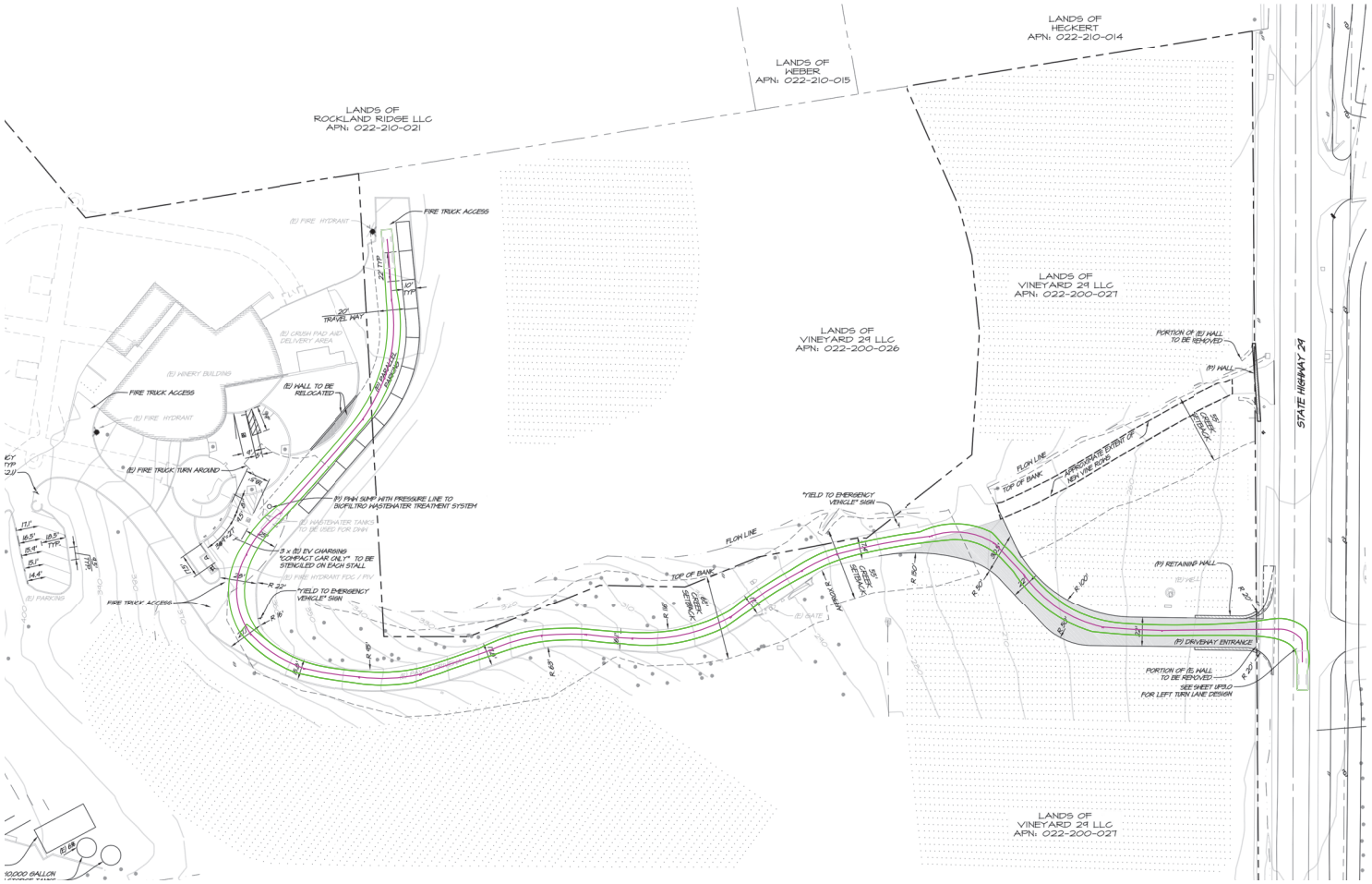
(Sec. J, line 5 x 206) + (Sec. K, line 11 x 55) + (Sec. L, line 16 x 82) + (Sec. M, line 22 x 22) = 37036 Annual trips

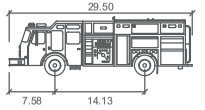
This page intentionally left blank

Appendix E

Emergency Access Exhibits

This page intentionally left blank

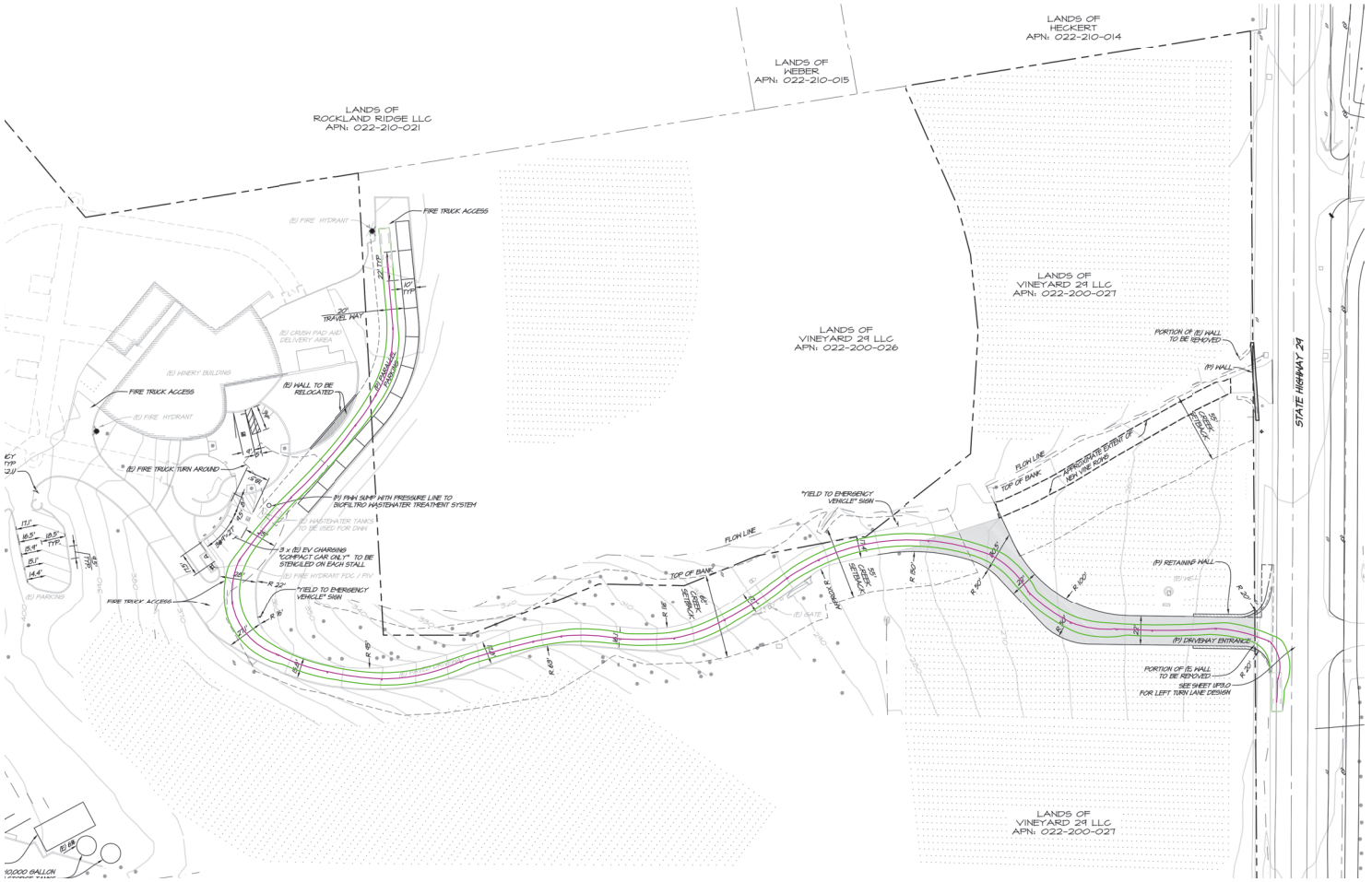


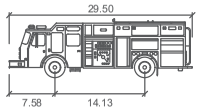


Napa County Fire Truck

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

Entering the Project Site





Napa County Fire Truck

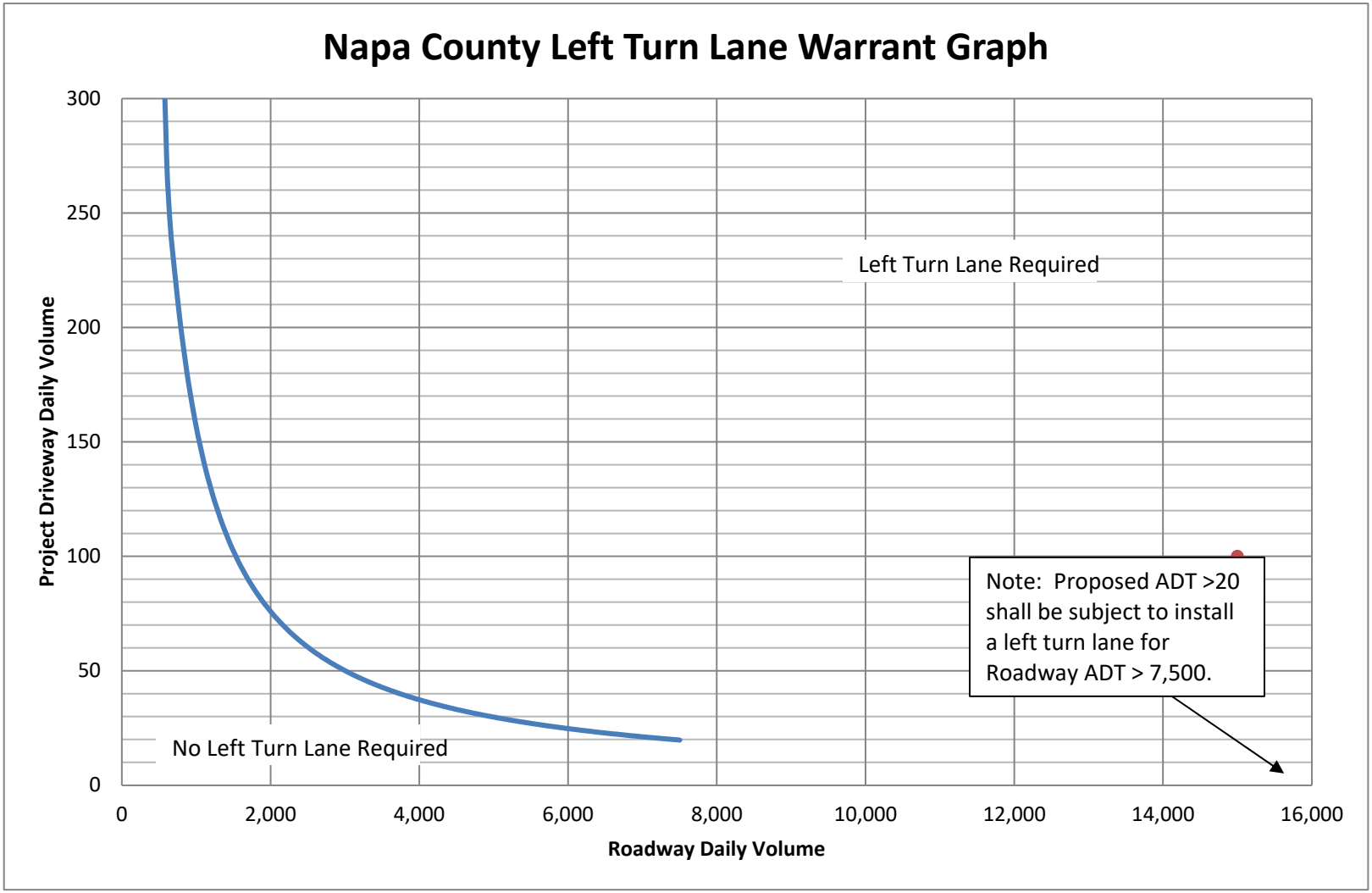
	feet
Width	: 8.00
Track	: 6.91
Lock to Lock Time	: 6.0
Steering Angle	: 38.8

Exiting the Project Site

Appendix F

Left-Turn Lane Warrant Graph

This page intentionally left blank


Napa County Left Turn Lane Warrant Graph
Project Driveway Daily Volume
300
250
200
150
100
50
0
0
2,000
4,000
6,000
8,000
10,000
12,000
14,000
16,000
Roadway Daily Volume
Left Turn Lane Required
No Left Turn Lane Required
Note: Proposed ADT >20 shall be subject to install a left turn lane for Roadway ADT > 7,500.