



# Traffic Impact Study



# Matthiasson Winery Traffic Impact Study



Prepared for the County of Napa

Submitted by  
**W-Trans**

July 10, 2018



**TRAFFIC ENGINEERING  
TRANSPORTATION PLANNING**  
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- C. Roadway Segment Level of Service Calculations
- D. Trip Generation Spreadsheets
- E. Left-Turn Lane Warrant Graph and Roadway Volumes

# Executive Summary

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The Matthiasson Winery recently acquired the Chateau Phoenix Winery, which was approved under the 1986 small winery exemption. The proposed project seeks to modify the existing Use Permit to allow for an increase in production from the permitted 5,000 gallons to a proposed level of 18,000 gallons annually and to allow an increase from two to four full-time weekday employees. An increase in visitation to allow for an average of 15 weekday visitors and 17 weekend visitors is proposed. The largest marketing event would have 30 persons in attendance.

Using the County's winery trip generation assumptions, the proposed project would be expected to generate an average of 16 trips per day, including 6 weekday p.m. peak hour trips and 9 trips during the Crush Saturday midday peak hour. The largest proposed marketing event of 30 attendees would be expected to generate 11 trips ends before and after the event on either a weekday or weekend day.

The study area included the intersections of Dry Creek Road/Orchard Avenue and Dry Creek Road/Trower Avenue, which are both operating acceptably at LOS A or B during both peak hours under Existing, Baseline, and Future conditions. Both study intersections are expected to continue operating acceptably at these same levels of service upon adding project-generated traffic.

Operation of Dry Creek Road was also evaluated. Under all scenarios, the roadway is expected to operate at acceptable service levels.

While the study area lacks pedestrian facilities or transit service, given the rural nature of the area it is reasonable to assume there would not be any pedestrian travel or demand for transit service, and therefore, the lack of facilities is considered acceptable. Existing and planned future bicycle facilities provide adequate access for bicyclists; however, it is recommended that four bike parking spaces be provided on the site.

Sight distances to the north and south of the project driveway are adequate. A left-turn lane is not warranted, and therefore not recommended, at the project's driveway on Dry Creek Road.

The proposed 16-space parking supply is adequate to accommodate demand during the largest on-site marketing event.

# Introduction

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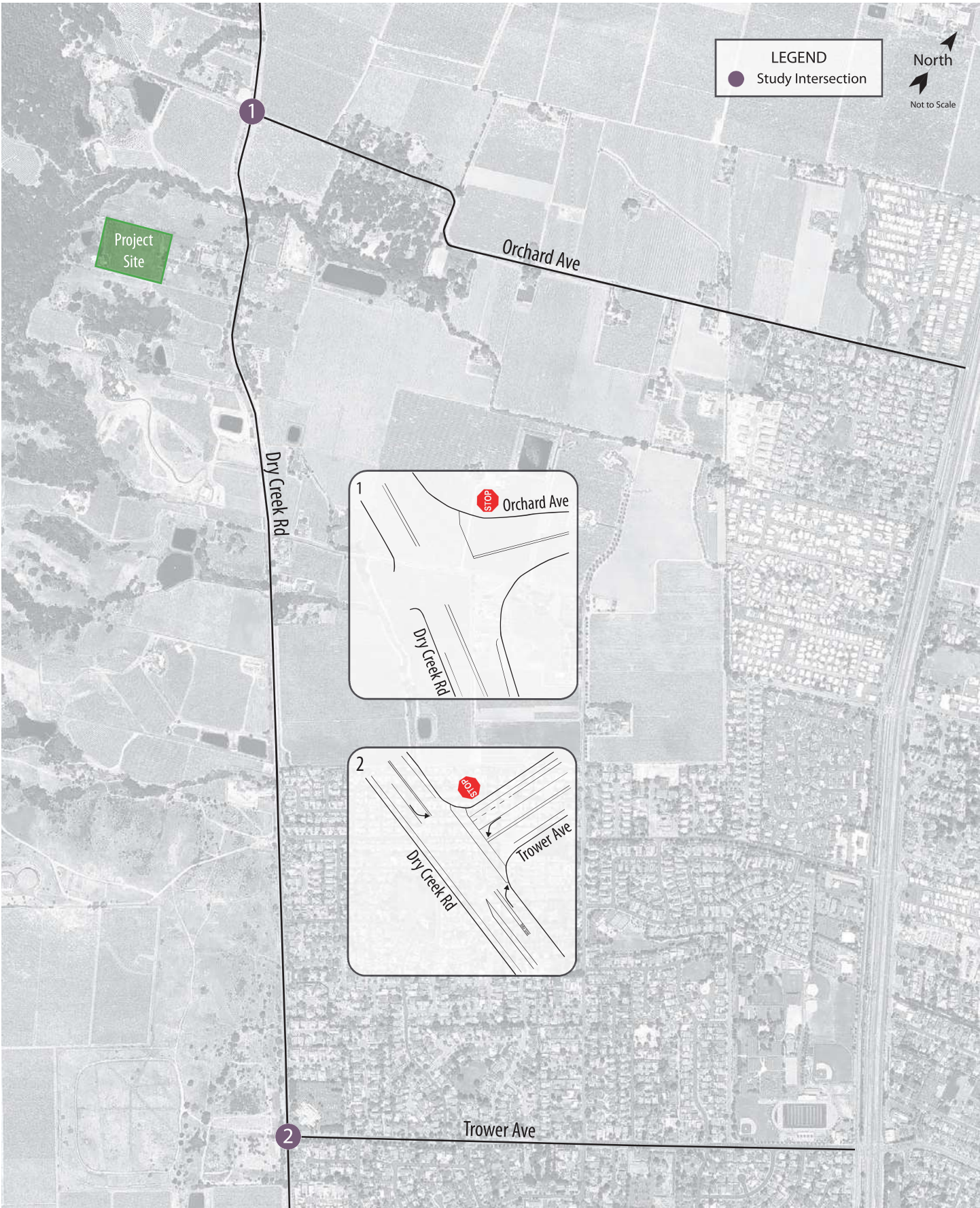
This report presents an analysis of the potential traffic impacts that would be associated with development of a proposed winery at 3175 Dry Creek Road in the County of Napa. The traffic study was completed in accordance with the criteria established by the County of Napa and is consistent with standard traffic engineering techniques.

## Prelude

The purpose of a traffic impact study is to provide County staff and policy makers with data that they can use to make an informed decision regarding the potential traffic impacts 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. Vehicular traffic impacts are 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 the impact the new traffic would be expected to have on critical intersections or roadway segments. Impacts relative to access for pedestrians, bicyclists, and to transit are also addressed.

## Project Profile

The proposed project would expand upon an existing Use Permit to increase production from the permitted level of 5,000 gallons per year to 18,000 gallons per year and increase employees from two full-time to four full-time during weekdays; there would continue to be two employees on weekends. Additionally, the proposed Use Permit modification would allow for an average of 15 visitors per day on weekdays and 17 visitors per day on weekends. The largest marketing event proposed would include 30 visitors. An existing driveway from Dry Creek Road provides access to the winery and four existing residences, the latter through an existing easement. This driveway would be improved to commercial road standards as part of the project. The project site is located at 3175 Dry Creek Road in the County of Napa, as shown in Figure 1.



**Matthiasson Winery Traffic Impact Study**  
**Figure 1 – Study Area and Lane Configurations**



# Transportation Setting

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## Operational Analysis

### Study Area and Periods

The study area consists of the following intersections:

1. Dry Creek Road/Orchard Avenue
2. Dry Creek Road/Trower Avenue

Operating conditions during the weekday p.m. and weekend midday peak periods were evaluated as these time periods reflect the highest traffic volumes areawide and for the proposed project. The weekday evening peak hour occurs between 4:00 and 6:00 p.m. and typically reflects the highest level of congestion of the day during the homeward bound commute, while the weekend midday peak occurs between 11:00 a.m. and 1:00 p.m.

### Study Intersections

**Dry Creek Road/Orchard Avenue** is a four-legged intersection stop-controlled on the westbound Orchard Avenue approach. The west leg of the intersection is a private driveway.

**Dry Creek Road/Trower Avenue** is an unsignalized tee-intersection with the westbound Trower Avenue approach stop-controlled. A crosswalk is marked on the east leg.

The locations of the study intersections and the existing lane configurations and controls are shown in Figure 1.

### Study Roadways

**Dry Creek Road** generally runs north to south. In the study area the road has two 12-foot travel lanes and five-foot paved shoulders with a posted speed limit of 40 miles per hour (mph). Based on count data obtained in January 2018 and collected south of the project driveway, Dry Creek Road carries an average of approximately 1,800 vehicles per day, which translates to approximately 2,200 vehicles per day after adjusting the volumes to peak summertime conditions.

**Orchard Avenue** is aligned east-west, with one 11-foot lane of traffic in each direction. The road is classified as a rural collector, with a speed limit of 35 mph; 25 mph curve advisory signs are posted in advance of the bends in the road.

**Trower Avenue** is also aligned east-west, with one 12-foot lane in each direction and a center lane for left turns. The road is classified as an arterial road, and has a speed limit of 35 mph.

### 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 January 1, 2013 through December 31, 2017.



As presented in Table 1, the calculated collision rates for the study intersections were compared to average collision rates for similar facilities statewide, as indicated in *2013 Collision Data on California State Highways*, California Department of Transportation (Caltrans). The calculated collision rate for the intersection of Dry Creek Road/ Trower Avenue is lower than the statewide average for similar facilities, indicating that this intersection is operating within acceptable safety parameters. It is noted that the intersection of Dry Creek Road/Orchard Avenue experienced two collisions over the five-year study period, which translates to a collision rate of 0.44 collisions per million vehicles entering (c/mve) the intersection. While this is higher than the statewide average of 0.16 c/mve for similar facilities, given the very low volumes it takes only one collision to exceed the statewide average rate. The two collisions in five years does not reasonably represent a safety concern; therefore, the above-average collision rate is not considered a safety concern. The collision rate calculations are provided in Appendix A.

**Table 1 – Collision Rates at the Study Intersections**

Study Intersection	Number of Collisions (2013-2017)	Calculated Collision Rate (c/mve)	Statewide Average Collision Rate (c/mve)
1. Dry Creek Rd/Orchard Ave	2	0.44	0.16
2. Dry Creek Rd/Trower Ave	1	0.09	0.14

Note: c/mve = collisions per million vehicles entering

The collision rate for the study segment of Dry Creek Road between Orchard Avenue and Trower Avenue was also compared to the statewide average for similar facilities. As indicated in Table 2, this segment experienced a below-average collision rate of 0.88 collisions per million vehicle miles (c/mvm) versus an average rate statewide of 0.98 c/mvm, indicating that the facility is operating in a generally safe manner.

**Table 2 – Collision Rates for the Study Segment**

Study Roadway Segments	Number of Collisions (2013-2017)	Calculated Collision Rate (c/mvm)	Statewide Average Collision Rate (c/mvm)
Dry Creek Rd between Orchard Ave and Trower Ave	6	0.88	0.98

Note: c/mvm = collisions per million vehicles miles

## Alternative Modes

### Pedestrian Facilities

Given the rural location of the project site, pedestrian trips are not anticipated except within the site.

### Bicycle Facilities

The *Highway Design Manual*, Caltrans, 2017, classifies bikeways into three categories:

- **Class I Multi-Use Path** – a completely separated right-of-way for the exclusive use of bicycles and pedestrians with cross flows of motorized traffic minimized.
- **Class II Bike Lane** – a striped and signed lane for one-way bike travel on a street or highway.
- **Class III Bike Route** – signing only for shared use with motor vehicles within the same travel lane on a street or highway.

In the project area, Class II bike lanes exist on Dry Creek Road and Trower Avenue. There are proposed Class II bike lanes on Orchard Avenue and Redwood Road and proposed Class III bike routes on Linda Vista Avenue and Vine Hill Drive. Bicyclists ride in the roadway along all other streets within the project study area. Table 3 summarizes the existing and planned bicycle facilities in the project vicinity, as contained in the 2012 Napa County Bicycle Plan.

<b>Table 3 – Bicycle Facility Summary</b>				
<b>Status Facility</b>	<b>Class</b>	<b>Length (miles)</b>	<b>Begin Point</b>	<b>End Point</b>
<b>Existing</b>				
Dry Creek Rd	II	2.10	Redwood Rd	Orchard Ave
Trower Ave	II	2.18	Dry Creek Rd	East end of Trower at Vintage High
<b>Planned</b>				
Linda Vista Ave	III	2.03	Redwood Rd	Dry Creek Rd
Orchard Ave	II	1.30	Dry Creek Rd	Solano Ave
Redwood Rd	II	1.85	Browns Valley Rd	Solano Ave
Vine Hill Dr	III	0.51	Dry Creek Rd	Linda Vista Ave

Source: Napa County Bicycle Plan, 2012

### **Transit Facilities**

There are no transit routes that serve the study area.

# Capacity Analysis

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## Intersection Level of Service Methodologies

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

The study intersections were analyzed using the “Two-Way Stop-Controlled” intersection capacity method from the *Highway Capacity Manual (HCM)*, Transportation Research Board, 2010. This source contains methodologies for various types of intersection control, all of which are related to a measurement of delay in average number of seconds per vehicle. The methodology for intersections with side street stop controls, or those which are unsignalized and have one or two approaches stop controlled, determines a level of service for each minor turning movement by estimating the level of average delay in seconds per vehicle. Results are presented for individual movements together with the weighted overall average delay for the intersection.

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

**Table 4 – Two-Way Stop-Controlled Intersection Level of Service Criteria**

LOS A	Delay of 0 to 10 seconds. Gaps in traffic are readily available for drivers exiting the minor street.
LOS B	Delay of 10 to 15 seconds. Gaps in traffic are somewhat less readily available than with LOS A, but no queuing occurs on the minor street.
LOS C	Delay of 15 to 25 seconds. Acceptable gaps in traffic are less frequent, and drivers may approach while another vehicle is already waiting to exit the side street.
LOS D	Delay of 25 to 35 seconds. There are fewer acceptable gaps in traffic, and drivers may enter a queue of one or two vehicles on the side street.
LOS E	Delay of 35 to 50 seconds. Few acceptable gaps in traffic are available, and longer queues may form on the side street.
LOS F	Delay of more than 50 seconds. Drivers may wait for long periods before there is an acceptable gap in traffic for exiting the side streets, creating long queues.

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

## Two-Lane Highway Segment Level of Service Methodology

The roadway segment Level of Service methodology found in Chapter 15, "Two-Lane Highways," of the HCM is the basis of the roadway 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. Dry Creek Road was considered a Class III highway.

The measure of effectiveness by which Level of Service is determined on Class III highways is percent free flow speed (PFFS), which represents the ability of vehicles to travel at or near the posted speed limit. The PFFS breakpoints are summarized in Table 5.

Table 5 – Roadway Level of Service Criteria	
LOS	Class III Highways PFFS (%)
A	>91.7
B	>83.3-91.7
C	>75.0-83.3
D	>66.7-75.0
E	≤66.7

Notes: LOS = Level of Service; PFFS = Percent Free Flow Speed

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

## Traffic Operation Standards

### Napa County

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

- **Policy CIR-13** – *The County seeks to provide a roadway system that maintains current roadway capacities in most locations and is both safe and efficient in terms of providing local access.*
- **Policy CIR-16** – *The County shall seek to maintain an arterial Level of Service D or better on all county roadways, except where maintaining this desired level of service would require the installation of more travel lanes than shown on the Circulation Map. SR 29 is shown as a 2-lane Rural Throughway on the Circulation Map (Figure CIR-1).*
- **Policy CIR-18** – *Traffic safety and adequate local access will be priorities on roadway segments and at signalized intersections where Level of Service D or better cannot be achieved. Therefore, proposed capital improvements and development projects in these areas shall be evaluated to determine their effect on safety or local access. Projects that improve safety, improve local access, or alleviate congestion will be prioritized.*

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

- *A signalized intersection operates at LOS A, B, C, or D during the selected peak hours without Project trips, and the LOS deteriorates to LOS E or F with the addition of Project trips; or*
- *A signalized intersection operates at LOS E or F during the selected peak hours without Project trips, and the addition of Project trips increases the total entering volume by one percent or more.*
  - *Project Contribution % = Project Trips ÷ Existing Volumes*

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

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

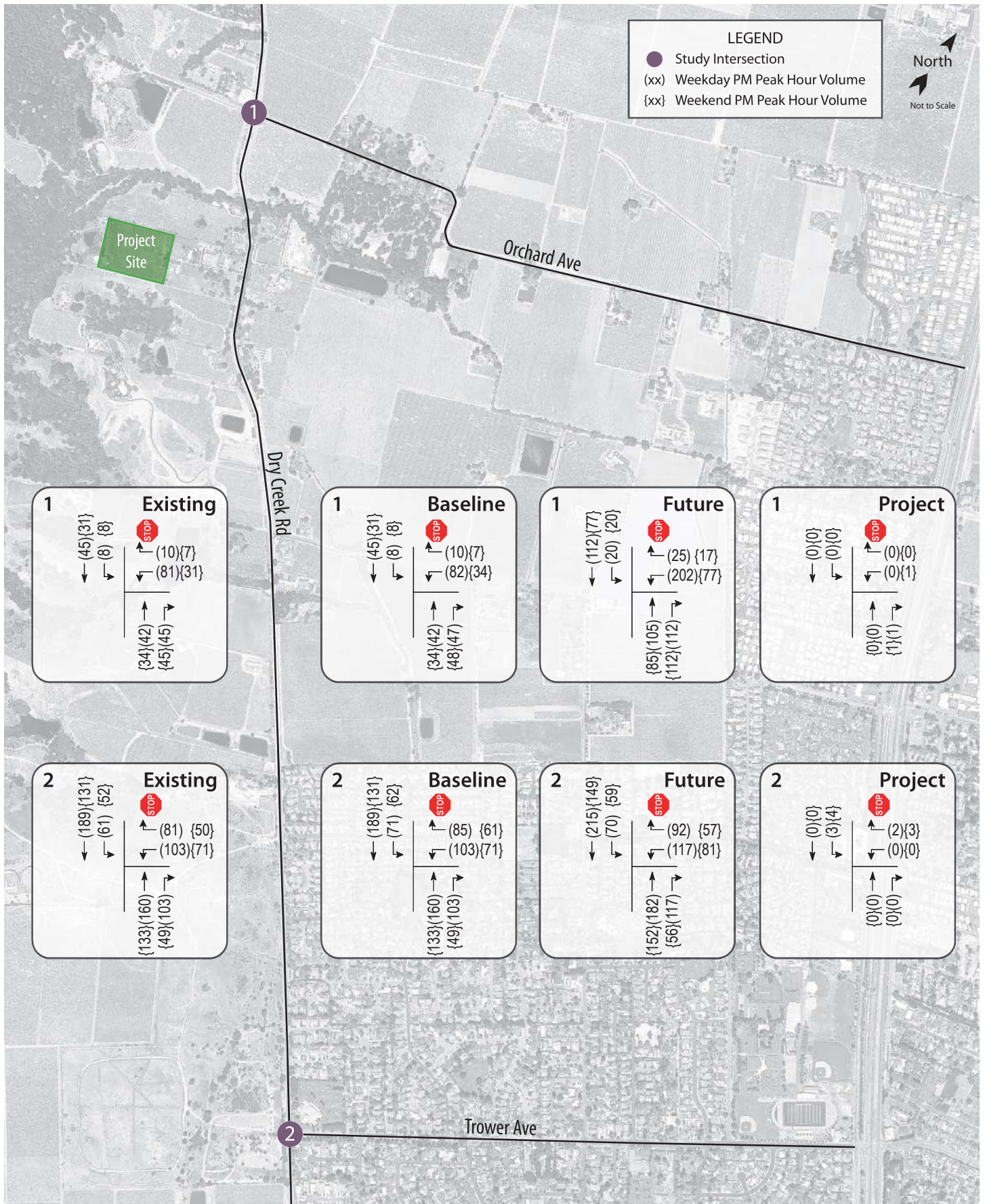
- Cumulative Conditions – A Project's contribution to a cumulative condition would be calculated as the Project's percentage contribution to the total growth in traffic. This calculation applies to arterials, signalized intersections, and unsignalized intersections.
  - $\text{Project Contribution \%}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

## Existing Conditions

The Existing Conditions scenario provides an evaluation of current operation based on existing traffic volumes during the weekday p.m. and weekend midday peak periods. This condition does not include project-generated traffic volumes. Volume data was collected in late January 2018 while local schools were in session and adjusted to reflect peak summertime conditions using count adjustment factors provided in *City of Napa Traffic Impact Study Guidelines*, City of Napa, 2004.

## Intersection Levels of Service

Under existing conditions, the study intersections operate acceptable at LOS A or B during both peak periods. The existing traffic volumes are shown in Figure 2. A summary of the intersection level of service calculations is contained in Table 6, and copies of the Level of Service calculations are provided in Appendix B.



Matthiasson Winery Traffic Impact Study  
**Figure 2 – Existing, Baseline, Future, and Project Traffic Volumes**

**Table 6 – Existing Peak Hour Intersection Levels of Service**

Study Intersection Approach	Weekday PM Peak		Weekend MD Peak	
	Delay	LOS	Delay	LOS
1. Dry Creek Rd/Orchard Ave <i>Westbound (Orchard Ave) Approach</i>	4.1 <i>9.7</i>	A <i>A</i>	2.6 <i>9.3</i>	A <i>A</i>
2. Dry Creek Rd/Trower Ave <i>Westbound (Trower Ave) Approach</i>	3.9 <i>12.2</i>	A <i>B</i>	3.7 <i>11.4</i>	A <i>B</i>

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service; Results for minor approaches to two-way stop-controlled intersections are indicated in *italics*

## Roadway Segment Levels of Service

Under existing conditions, the study segment operates acceptably at LOS A or B. A summary of the roadway segment level of service calculations is shown in Table 7, and copies of the Level of Service calculations are provided in Appendix C.

**Table 7 – Existing Peak Hour Roadway Segment Levels of Service**

Study Segment Direction	Weekday PM Peak		Weekend MD Peak	
	PFFS	LOS	PFFS	LOS
Dry Creek Rd – Orchard Ave to Trower Ave				
Northbound	86.9	B	92.0	A
Southbound	89.7	B	91.9	A

Notes: PFFS = Percent Free Flow Speed; LOS = Level of Service

## Baseline Conditions

Baseline (Existing plus Approved) operating conditions were determined with traffic from approved projects near the study area added to the existing volumes. As directed by staff, the following projects were considered for the Existing plus Approved Conditions; however, it is noted that trips to and from Woolly's Ranch Winery were assumed to use Redwood Road and Mount Veeder Road, which are outside of the study area. Therefore, no trips associated with Woolly's Ranch Winery were added to volumes for the study intersections or study roadway.

**Anthem Winery** is a planned winery to be located at 3123 Dry Creek Road. The winery is proposed to have a maximum annual production of 50,000 cases. Based on the Winery Trip Generation Form, the project is expected to generate an average of 50 trips per day, with 17 trips during the weekday p.m. peak hour (five inbound and 12 outbound) and 27 trips during the weekend peak hour (14 inbound and 13 outbound).

**Woolly's Ranch Winery** is a proposed winery that would produce a maximum of 50,000 gallons of wine annually. The winery would be located at 1032 Mount Veeder Road and is expected to generate an average of 65 daily trips, with 26 trips during the weekday evening peak hour (seven inbound and 19 outbound) and 31 trips during the weekend midday peak hour (15 inbound and 16 outbound).

Upon adding trips from the Anthem Winery project to existing volumes, the study intersections and the study roadway are expected to continue operating at acceptable service levels. These results are summarized in Table 8 and Table 9, and Baseline volumes are shown in Figure 2.

**Table 8 – Baseline Peak Hour Intersection Levels of Service**

Study Intersection Approach	Weekday PM Peak		Weekend MD Peak	
	Delay	LOS	Delay	LOS
1. Dry Creek Rd/Orchard Ave	4.1	A	2.7	A
<i>Westbound (Orchard Ave) Approach</i>	<i>9.7</i>	<i>A</i>	<i>9.3</i>	<i>A</i>
2. Dry Creek Rd/Trower Ave	4.1	A	3.9	A
<i>Westbound (Trower Ave) Approach</i>	<i>12.4</i>	<i>B</i>	<i>11.5</i>	<i>B</i>

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service; Results for minor approaches to two-way stop-controlled intersections are indicated in *italics*

**Table 9 – Baseline Peak Hour Roadway Segment Levels of Service**

Study Segment Direction	Weekday PM Peak		Weekend MD Peak	
	PFFS	LOS	PFFS	LOS
Dry Creek Rd – Orchard Ave to Trower Ave				
Northbound	86.7	B	91.4	B
Southbound	89.1	B	90.9	B

Notes: PFFS = Percent Free Flow Speed; 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 weekday p.m. peak period were used to calculate growth factors for the study intersections and roadway segments.

The growth factors projected by the model were then adjusted to account for the two years of growth that has already occurred since 2015 and the existing counts multiplied by the growth factor to project likely Future weekday p.m. turning movement volumes at the study intersections. The same growth factors used for the weekday p.m. peak hour were used for the weekend midday peak hour as the model does not contain information for weekend days. It is noted that the model is projecting substantial increases in traffic volumes in the area resulting in a growth factor of nearly 2.5 for Dry Creek Road/Orchard Avenue.

Under Future volumes, the study intersections are expected to continue operating acceptable at LOS A or B during both peak hours. Future volumes are shown in Figure 2 and operating conditions are summarized in Table 10.



**Table 10 – Future Peak Hour Intersection Levels of Service**

Study Intersection Approach	Weekday PM Peak		Weekend MD Peak	
	Delay	LOS	Delay	LOS
1. Dry Creek Rd/Orchard Ave <i>Westbound (Orchard Ave) Approach</i>	5.6 <i>13.4</i>	A <i>B</i>	3.1 <i>11.1</i>	A <i>B</i>
2. Dry Creek Rd/Trower Ave <i>Westbound (Trower Ave) Approach</i>	4.2 <i>13.3</i>	A <i>B</i>	3.9 <i>12.2</i>	A <i>B</i>

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service; Results for minor approaches to two-way stop-controlled intersections are indicated in *italics*

Likewise, under projected future volumes, the roadway study segments are expected to operate acceptably at LOS B. These results are summarized in Table 11.

**Table 11 – Future Peak Hour Roadway Segment Levels of Service**

Study Segment Direction	Weekday PM Peak		Weekend MD Peak	
	PFFS	LOS	PFFS	LOS
Dry Creek Rd – Orchard Ave to Trower Ave				
Northbound	86.0	B	88.5	B
Southbound	85.6	B	89.6	B

Notes: PFFS = Percent Free Flow Speed; LOS = Level of Service

## Project Description

The project is a change in use at an existing winery facility to increase production and visitation. The proposal would allow for an average of 15 visitors per day on weekdays and 17 visitors per day on weekends. Production would be increased from 5,000 to 18,000 gallons per year and employees from two full-time to four full-time during weekdays; there would continue to be two employees on weekends. The largest marketing event would include 30 visitors. An existing driveway from Dry Creek Road provides access to the winery and four existing residences, the latter through an existing easement. This driveway would be improved to commercial road standards as part of this project. The proposed project site plan is shown in Figure 3.

## Trip Generation

The Napa County Winery Traffic Information/Trip Generation Form was used to determine the potential trip generation for currently permitted and proposed conditions. The form estimates the number of daily and peak hour trips for weekdays and Saturdays based on the number of full- and part-time employees, average daily visitors, and production. Based on the current Use Permit parameters, the site is permitted for 3 trips during the weekday p.m. peak hour and 5 trips during the weekend midday peak hour. The proposed changes to the Use Permit would be expected to result in a total of 9 trips during the weekday p.m. peak hour and 9 trips during the weekend midday peak hour, or an increase of 6 and 4 trips during the two peaks, respectively, over permitted conditions.

The County's form does not include guidance on inbound versus outbound trips, so based on extensive data collected at a tasting facility in Sonoma County it was assumed that two-thirds of trips at the winery would be outbound during the weekday p.m. peak hour as employees and customers leave at closure of the winery; for the weekend midday peak hour it was assumed that inbound and outbound trips would be evenly split. The results



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DATE: 01/15/2019

PROJECT: MATTHIASON WINERY AND BOTTLE STORAGE

CLIENT: MATTHIASON WINERY AND BOTTLE STORAGE

SCALE: AS SHOWN

DATE: 01/15/2019

PROJECT: MATTHIASON WINERY AND BOTTLE STORAGE

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SCALE: AS SHOWN

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PROJECT: MATTHIASON WINERY AND BOTTLE STORAGE

CLIENT: MATTHIASON WINERY AND BOTTLE STORAGE

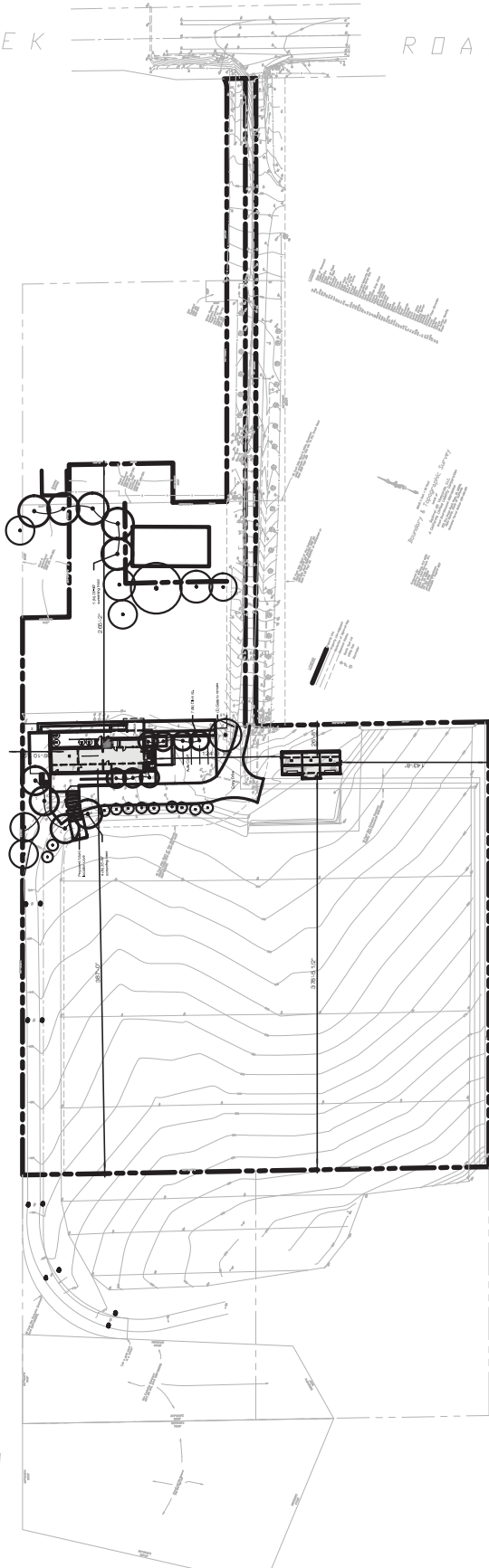
SCALE: AS SHOWN

DATE: 01/15/2019

PROJECT: MATTHIASON WINERY AND BOTTLE STORAGE

CLIENT: MATTHIASON WINERY AND BOTTLE STORAGE

DRY CREEK ROAD



SCALE: 1"=50'-0"

1 OVERALL SITE PLAN

DRAWN BY	MOCKLER
CHECKED BY	AA
DATE	1/15/19
SHEET NO.	1/1
PROJECT	MATTHIASON WINERY AND BOTTLE STORAGE
APN	035-490-012

nax131.ai 4/18

Source: James Jeffrey Architects

**Matthiason Winery Traffic Impact Study  
Figure 3 – Site Plan**



based on application of these assumptions are shown in Table 12. The Winery Traffic Information/Trip Generation Forms for both permitted and proposed conditions are provided in Appendix D.

Table 12 – Trip Generation Summary – Typical Conditions							
Condition	Weekday	Weekday PM Peak Hour			Weekend MD Peak Hour		
	Trips	Trips	In	Out	Trips	In	Out
Permitted	8	3	1	2	5	3	2
Proposed	24	9	3	6	9	5	4
<b>Net New Trips</b>	<b>16</b>	<b>6</b>	<b>2</b>	<b>4</b>	<b>4</b>	<b>2</b>	<b>2</b>

Traffic that would occur during a Crush Saturday was also tabulated, as shown in Table 13. The modified Use Permit would be expected to result in an average of 16 additional daily trips during a Crush Saturday including 9 trips during the peak hour; these trips represent the increase in traffic associated with the proposed use permit compared to currently permitted conditions.

Table 13 – Trip Generation Summary – Crush Saturday				
Condition	Daily	Weekend MD Peak Hour		
	Trips	Trips	In	Out
Permitted	8	5	3	2
Proposed	24	14	7	7
<b>Net New Trips</b>	<b>16</b>	<b>9</b>	<b>4</b>	<b>5</b>

In addition to typical daily and crush Saturday operations, the anticipated trip generation for the largest proposed event, one with 30 guests, was also estimated as shown in Table 14. Using the County’s Winery Traffic Information/ Trip Generation Form, a 30-person marketing event would be expected to generate a total of 25 trips, including 21 trips for guests, 2 trips for employees, and 2 trips for special event trucks. To estimate the peak hour trip generation, it was assumed that all guests would be arriving at the site during the peak hour on either weekdays or weekend days. Event employees would arrive outside of the arrival and departure hours of the guests as they would be expected to be on-site for set-up and clean-up and are therefore not included in the peak hour totals. Similarly, the trucks associated with such events would be expected to arrive at and depart from the site outside of the weekday and weekend peak hours for guests.

Table 14 – Trip Generation for 30-Person Events								
Trip Generator	Units	Total	Weekday PM Peak Hour			Weekend MD Peak Hour		
		Trips	Trips	In	Out	Trips	In	Out
Event Employees	1	2	0	0	0	0	0	0
Event Guests	30	21	11	11	0	11	11	0
Event Trucks	1	2	0	0	0	0	0	0
<b>Total</b>		<b>25</b>	<b>11</b>	<b>11</b>	<b>0</b>	<b>11</b>	<b>11</b>	<b>0</b>

## Trip Distribution

The pattern suggested to allocate new project trips to the street network was determined based on familiarity with the area and surrounding region as well as likely origins and destinations for patrons of the project. It is

anticipated that 20 percent of trips would be to/from the north via Orchard Avenue and the other 80 percent would travel to/ from the south using Trower Avenue.

## Intersection Operation

### Existing plus Project Conditions

Upon the addition of project-related traffic to the Existing volumes, the study intersections are expected to continue operating acceptably, at the same service levels as without the project and with increases in delay of 0.0 to 0.1 seconds. These results are summarized in Table 15. Project traffic volumes are shown in Figure 2.

**Table 15 – Existing and Existing plus Project Peak Hour Intersection Levels of Service**

Study Intersection Approach	Existing Conditions				Existing plus Project			
	Weekday PM Peak		Weekend MD Peak		Weekday PM Peak		Weekend MD Peak	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1. Dry Creek Rd/Orchard Ave <i>Westbound (Orchard Ave) Approach</i>	4.1	A	2.6	A	4.1	A	2.7	A
	<i>9.7</i>	<i>A</i>	<i>9.3</i>	<i>A</i>	<i>9.7</i>	<i>A</i>	<i>9.3</i>	<i>A</i>
2. Dry Creek Rd/Trower Ave <i>Westbound (Trower Ave) Approach</i>	3.9	A	3.7	A	4.0	A	3.8	A
	<i>12.2</i>	<i>B</i>	<i>11.4</i>	<i>B</i>	<i>12.3</i>	<i>B</i>	<i>11.4</i>	<i>B</i>

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service; Results for minor approaches to two-way stop-controlled intersections are indicated in *italics*

**Finding** – The study intersections are 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

With project-related traffic added to Baseline volumes, the study intersections are expected to operate acceptably at LOS A or B, with imperceptible increases in average delay of 0.0 to 0.2 seconds anticipated. These results are summarized in Table 16.

**Table 16 – Baseline and Baseline plus Project Peak Hour Intersection Levels of Service**

Study Intersection Approach	Baseline Conditions				Baseline plus Project			
	Weekday PM Peak		Weekend MD Peak		Weekday PM Peak		Weekend MD Peak	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1. Dry Creek Rd/Orchard Ave <i>Westbound (Orchard Ave) Approach</i>	4.1	A	2.7	A	4.1	A	2.8	A
	<i>9.7</i>	<i>A</i>	<i>9.3</i>	<i>A</i>	<i>9.7</i>	<i>A</i>	<i>9.3</i>	<i>A</i>
2. Dry Creek Rd/Trower Ave <i>Westbound (Trower Ave) Approach</i>	4.1	A	3.9	A	4.2	A	4.1	A
	<i>12.4</i>	<i>B</i>	<i>11.5</i>	<i>B</i>	<i>12.5</i>	<i>B</i>	<i>11.5</i>	<i>B</i>

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service; Results for minor approaches to two-way stop-controlled intersections are indicated in *italics*

**Finding** – Upon the addition of project-generated traffic, the study intersections are expected to continue operating acceptably at the same levels of service as without it.

## Future plus Project Conditions

Upon the addition of project-generated traffic to the anticipated Future volumes, the study intersections are expected to continue operating at acceptable service levels. The Future plus Project operating conditions are summarized in Table 17.

**Table 17 – Future and Future plus Project Peak Hour Intersection Levels of Service**

Study Intersection Approach	Future Conditions				Future plus Project			
	Weekday PM Peak		Weekend MD Peak		Weekday PM Peak		Weekend MD Peak	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1. Dry Creek Rd/Orchard Ave <i>Westbound (Orchard Ave) Approach</i>	5.6	A	3.1	A	5.5	A	3.1	A
	<i>13.4</i>	<i>B</i>	<i>11.1</i>	<i>B</i>	<i>13.4</i>	<i>B</i>	<i>11.1</i>	<i>B</i>
2. Dry Creek Rd/Trower Ave <i>Westbound (Trower Ave) Approach</i>	4.2	A	3.9	A	4.3	A	4.0	A
	<i>13.3</i>	<i>B</i>	<i>12.2</i>	<i>B</i>	<i>13.4</i>	<i>B</i>	<i>12.2</i>	<i>B</i>

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service; Results for minor approaches to two-way stop-controlled intersections are indicated in *italics*

**Finding** – The study intersections will continue operating acceptably with project traffic added, at the same service levels as without it. It is noted that delay at Dry Creek Road/Orchard Avenue is projected to decrease by 0.1 seconds under weekday p.m. peak hour volumes. This condition occurred due to rounding, though the nominal change is theoretically insignificant.

## Roadway Segment Operation

### Existing plus Project Conditions

Under Existing plus Project volumes, the study roadway segments are expected to operate acceptably. These results are summarized in Table 18.

**Table 18 – Existing and Existing plus Project Peak Hour Roadway Segment Levels of Service**

Study Segment Direction	Existing Conditions				Existing plus Project				
	Weekday PM Peak		Weekend MD Peak		Weekday PM Peak		Weekend MD Peak		
	PFFS	LOS	PFFS	LOS	PFFS	LOS	PFFS	LOS	
Dry Creek Rd – Orchard Ave to Trower Ave									
	Northbound	86.9	B	92.0	A	86.8	B	91.8	A
	Southbound	89.7	B	91.9	A	89.5	B	91.5	B

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

**Finding** – The study roadway is expected to continue operating acceptably at Level of Service A or B upon the addition of project-generated traffic to existing volumes.

## Baseline plus Project Conditions

Upon the addition of project-related traffic to Baseline volumes, both study roadway segments are expected to operate at an acceptable LOS B. These results are summarized in Table 19.

**Table 19 – Baseline and Baseline plus Project Peak Hour Roadway Segment Levels of Service**

Study Segment Direction	Baseline Conditions				Baseline plus Project				
	Weekday PM Peak		Weekend MD Peak		Weekday PM Peak		Weekend MD Peak		
	PFFS	LOS	PFFS	LOS	PFFS	LOS	PFFS	LOS	
Dry Creek Rd – Orchard Ave to Trower Ave									
Northbound	86.7	B	91.4	B	86.6	B	91.1	B	
Southbound	89.1	B	90.9	B	88.9	B	90.6	B	

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

**Finding** – With the addition of project traffic to Baseline volumes, the study roadway is expected to continue operating acceptably at the same levels of service as without it.

## Future plus Project Conditions

With project-generated traffic added to the anticipated Future volumes, the study roadway is expected to operate at an acceptable LOS B. The Future plus Project operating conditions are summarized in Table 20.

**Table 20 – Future and Future plus Project Peak Hour Roadway Segment Levels of Service**

Study Segment Direction	Future Conditions				Future plus Project			
	Weekday PM Peak		Weekend MD Peak		Weekday PM Peak		Weekend MD Peak	
	PFFS	LOS	PFFS	LOS	PFFS	LOS	PFFS	LOS
Dry Creek Rd – Orchard Ave to Trower Ave								
Northbound	86.0	B	88.5	B	85.9	B	88.2	B
Southbound	85.6	B	89.6	B	85.3	B	89.2	B

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

**Finding** – The study roadway will continue operating acceptably under anticipated Future plus Project volumes.

# Alternative Modes

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## Pedestrian Facilities

Given the rural nature of the project site, there are no existing pedestrian facilities except for the roadway shoulders which are approximately five feet wide on both sides of Dry Creek Road 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. Additionally, the shoulders along Dry Creek Road could be used for pedestrian travel if needed.

## Bicycle Facilities

Existing bicycle facilities, including bike lanes on Dry Creek Road and Trower Avenue, together with planned future facilities and the shared use of minor streets provide adequate access for bicyclists.

## Bicycle Storage

The County does not have specific bicycle parking requirements for wineries; however, the project should provide bicycle parking consistent with the requirements for the specific uses 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 seven permanent vehicle parking spaces, parking for bicycles is not required, though it is suggested that facilities to lock up at least four bicycles be provided.

**Finding** – Parking facilities for bicycles are not required.

**Recommendation** – It is recommended that facilities be provided to secure at least four bicycles on-site.

## Transit

There are no transit facilities serving the site; however, there is limited potential demand for transit, so this is considered an acceptable condition.

**Finding** – While there are no transit facilities serving the project site, there is also no anticipated need for such service.

# Access and Circulation

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## Site Access

An existing driveway from Dry Creek Road provides access to the winery and four existing residences. This driveway will be improved to commercial road standards as part of the project.

## Sight Distance

Anywhere a driver must enter moving traffic, a substantially clear line of sight between that driver and the driver of an approaching vehicle is necessary. Sight distances along Dry Creek Road at the project driveway were evaluated based on sight distance criteria contained in the *Highway Design Manual* published by Caltrans. The recommended sight distance for driveway approaches are based on stopping sight distance and the approach travel speeds. Additionally, the stopping sight distance needed for a following driver to stop if there is a vehicle waiting to turn into a driveway is evaluated based on stopping sight distance criterion and the approach speed on the major street. Based on a design speed of 40 mph, the minimum stopping sight distance needed is 300 feet.

**Finding** – Field measurements at the driveway indicate that sight lines are clear for more than 400 feet south and approximately 300 feet north along Dry Creek Road. It is noted that drivers would need to pull forward to the edge of traveled way to achieve adequate sight distance.

## 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. Because there are four existing homes that are also served by the driveway, trips for these residences were estimated using the standard rates for single-family detached housing at 9.44 trips per unit, or 38 trips total added to the 25 total project trips on an event day to achieve the driveway volume of 63.

Based on Baseline plus Project volumes, a left-turn lane would not be warranted with the proposed Use Permit Modification. A copy of the warrant graph is provided in Appendix E along with the traffic counts that were collected on Dry Creek Road and on the project driveway for the analysis.

**Finding** – A left-turn lane is not warranted on Dry Creek Road at the project driveway.



# Parking

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The project was analyzed to determine whether the proposed parking supply would be sufficient for the anticipated parking demand during harvest conditions and during events. The project site as proposed would provide six standard parking spaces, one accessible parking space, and nine temporary parking spaces for a total of 16 parking spaces.

With four employees and 17 visitors daily, the proposed permanent supply of seven spaces is expected to be adequate. The maximum number of parking spaces that would be needed on-site to accommodate employees and visitors during a 30-person marketing event was also estimated, using the County's standard vehicle occupancies of one employee or 2.8 visitors per vehicle. Based on these operational parameters, during a 30-person event, a total of 16 parking spaces would be needed, including 11 for guests, one for event staff, and four for winery employees. Therefore, the total parking supply at the winery is sufficient to meet the anticipated parking demand for the largest event.

**Finding** – The proposed parking supply is adequate for typical daily operation and for the anticipated peak demand during a 30-person marketing event.

# Conclusions and Recommendations

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## Conclusions

- The proposed project is expected to generate an average of 16 additional trips per day over existing conditions, including 6 weekday p.m. peak hour trips and 4 new trips during the midday peak hour for Saturday operations.
- The largest proposed marketing event would have 30 attendees and would be expected to generate 11 trip ends before and after the event on either a weekday or weekend day.
- Under Existing conditions, the study intersections operate acceptably at LOS A or B during both peak periods and they would be expected to continue operating at these service levels with the addition of project-generated traffic.
- The study roadways are operating acceptably at LOS A or B under existing conditions and are expected to continue operating acceptably with the addition of project-generated traffic.
- Under anticipated Baseline and Future volumes, the study intersections are expected to continue operating acceptably at LOS A or B overall and on the stop-controlled minor street approaches during both peak hours and upon the addition of project-related trips.
- The study roadways are expected to operate at acceptable service levels under anticipated Baseline and Future volumes during both peak hours and with the addition of project and event-produced traffic volumes.
- There are currently no pedestrian facilities providing access to the project site; however, due to the rural and agricultural nature of the study area, it would be reasonable to assume there would not be any pedestrian travel, and therefore, no additional facilities recommended.
- Similarly, the lack of transit service is not anticipated to result in a negative impact due to the lack of demand for such services.
- Existing Class II bike lanes on Dry Creek Road and Trower Avenue, in addition to planned future facilities, provide adequate access for bicycles to the site.
- Sight distances from and to the project driveway along Dry Creek Road are adequate toward the north and south.
- A left-turn lane is not warranted on Dry Creek Road at the project driveway.
- The proposed parking supply of seven permanent spaces and nine temporary spaces is adequate to accommodate demand during typical daily activity and during the largest on-site agriculture promotional event.

## Recommendations

- Secure parking facilities for at least four bicycles should be provided on site.

# Study Participants and References

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## Study Participants

Principal in Charge	Dalene J. Whitlock, PE, PTOE
Assistant Engineer	Kevin Rangel, EIT
Intern	Julia Walker
Graphics/Editing/Formatting	Alex Scrobonia

## References

- 2013 Collision Data on California State Highways*, California Department of Transportation, 2016  
*City of Napa Traffic Impact Study Guidelines*, City of Napa, 2004  
*Guide for the Preparation of Traffic Impact Studies*, California Department of Transportation, 2002  
*Guidelines for Interpretation of General Plan Circulation Policies on Significance Criteria*, Fehr & Peers, 2015  
*Highway Capacity Manual*, Transportation Research Board, 2010  
*Highway Design Manual*, 6<sup>th</sup> Edition, California Department of Transportation, 2017  
*Napa County Bicycle Plan*, W-Trans, 2012  
*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  
*Statewide Integrated Traffic Records System (SWITRS)*, California Highway Patrol, 2012-2017

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# Appendix A

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## Collision Rate Calculations



**Intersection Collision Rate Calculations**

**Matthiasson Winery TIS**

**Intersection # 1:** Dry Creek Road & Orchard Avenue

**Date of Count:** Wednesday, March 07, 2018

**Number of Collisions:** 2  
**Number of Injuries:** 1  
**Number of Fatalities:** 0  
**ADT:** 2500  
**Start Date:** January 1, 2013  
**End Date:** December 31, 2017  
**Number of Years:** 5

**Intersection Type:** Tee  
**Control Type:** Stop & Yield Controls  
**Area:** Rural

$$\text{collision rate} = \frac{\text{Number of Collisions} \times 1 \text{ Million}}{\text{ADT} \times 365 \text{ Days per Year} \times \text{Number of Years}}$$

$$\text{collision rate} = \frac{2}{2,500} \times \frac{1,000,000}{365 \times 5}$$

	<b>Collision Rate</b>	<b>Fatality Rate</b>	<b>Injury Rate</b>
<b>Study Intersection</b>	<b>0.44 c/mve</b>	<b>0.0%</b>	<b>50.0%</b>
<b>Statewide Average*</b>	<b>0.16 c/mve</b>	<b>1.7%</b>	<b>39.2%</b>

ADT = average daily total vehicles entering intersection  
c/mve = collisions per million vehicles entering intersection  
\* 2013 Collision Data on California State Highways, Caltrans

**Intersection # 2:** Dry Creek Road & Trower Avenue

**Date of Count:** Wednesday, March 07, 2018

**Number of Collisions:** 1  
**Number of Injuries:** 1  
**Number of Fatalities:** 0  
**ADT:** 6100  
**Start Date:** January 1, 2013  
**End Date:** December 31, 2017  
**Number of Years:** 5

**Intersection Type:** Tee  
**Control Type:** Stop & Yield Controls  
**Area:** Suburban

$$\text{collision rate} = \frac{\text{Number of Collisions} \times 1 \text{ Million}}{\text{ADT} \times 365 \text{ Days per Year} \times \text{Number of Years}}$$

$$\text{collision rate} = \frac{1}{6,100} \times \frac{1,000,000}{365 \times 5}$$

	<b>Collision Rate</b>	<b>Fatality Rate</b>	<b>Injury Rate</b>
<b>Study Intersection</b>	<b>0.09 c/mve</b>	<b>0.0%</b>	<b>100.0%</b>
<b>Statewide Average*</b>	<b>0.14 c/mve</b>	<b>0.7%</b>	<b>38.0%</b>

ADT = average daily total vehicles entering intersection  
c/mve = collisions per million vehicles entering intersection  
\* 2013 Collision Data on California State Highways, Caltrans

## SEGMENT COLLISION RATE CALCULATIONS

### Matthiasson Winery TIS

**Location:** Dry Creek Road from Orchard Ave to Trower Ave

**Date of Count:** Saturday, January 27, 2018

**ADT:** 2,200

**Number of Collisions:** 6

**Number of Injuries:** 4

**Number of Fatalities:** 0

**Start Date:** January 1, 2013

**End Date:** December 31, 2017

**Number of Years:** 5

**Highway Type:** Conventional 2 lanes or less

**Area:** Rural

**Design Speed:** ≤55

**Terrain:** Flat

**Segment Length:** 1.7 miles

**Direction:** North/South

$$\begin{array}{r}
 \text{Number of Collisions x 1 Million} \\
 \hline
 \text{ADT x 365 Days per Year x Segment Length x Number of Years} \\
 \hline
 \begin{array}{ccccccc}
 & 6 & \times & 1,000,000 & & & \\
 \hline
 2,200 & \times & 365 & \times & 1.7 & \times & 5
 \end{array}
 \end{array}$$

	<b>Collision Rate</b>		<b>Fatality Rate</b>		<b>Injury Rate</b>	
<b>Study Segment</b>	<b>0.88</b>	<b>c/mvm</b>	<b>0.0%</b>	<b>0.0%</b>	<b>66.7%</b>	<b>66.7%</b>
<b>Statewide Average*</b>	<b>0.98</b>	<b>c/mvm</b>	<b>2.4%</b>	<b>2.4%</b>	<b>40.1%</b>	<b>40.1%</b>

ADT = average daily traffic volume

c/mvm = collisions per million vehicle miles

\* 2013 Collision Data on California State Highways, Caltrans



# Appendix B

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## Intersection Level of Service Calculations





**Intersection Level of Service Report**  
**Intersection 1: Dry Creek Road/Orchard Avenue**

Control Type: Two-way stop  
 Analysis Method: HCM 2010  
 Analysis Period: 15 minutes

Delay (sec / veh): 9.7  
 Level Of Service: A  
 Volume to Capacity (v/c): 0.101

**Intersection Setup**

Name	Dry Creek Road	Dry Creek Road	Orchard Avenue
Approach	Northbound	Southbound	Westbound
Lane Configuration	Thru Right	Thru Left	Right
Turning Movement	Thru Right	Thru Left	Right
Lane Width [ft]	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0
Pocket Length [ft]	100.00	100.00	100.00
Speed [mph]	40.00	40.00	35.00
Grade [%]	0.00	0.00	0.00
Crosswalk	No	No	No

**Volumes**

Name	Dry Creek Road	Dry Creek Road	Orchard Avenue
Base Volume Input [veh/h]	37	7	71
Base Volume Adjustment Factor	1,1440	1,1440	1,1440
Heavy Vehicles Percentage [%]	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0
Site-Generated Trips [veh/h]	0	0	0
Diverted Trips [veh/h]	0	0	0
Pass-by Trips [veh/h]	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0
Other Volume [veh/h]	0	0	0
Total Hourly Volume [veh/h]	42	8	81
Peak Hour Factor	0.9400	0.9400	0.9400
Other Adjustment Factor	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	11	2	22
Total Analysis Volume [veh/h]	45	9	86
Pedestrian Volume [ped/h]	0	0	0

**Intersection Settings**

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Cap. Acceptance			No
Number of Storage Spaces in Median	0	0	0

**Movement, Approach, & Intersection Results**

V/C, Movement V/C Ratio	0.00	0.00	0.01	0.00	0.10	0.01
d_M, Delay for Movement [s/veh]	0.00	0.00	7.41	0.00	9.74	9.14
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.00	0.00	0.12	0.12	0.38	0.38
95th-Percentile Queue Length [ft]	0.00	0.00	2.86	2.96	9.41	9.41
d_A, Approach Delay [s/veh]	0.00	0.00	1.17	A	A	9.67
Approach LOS	A	A	A	A	A	A
d_I, Intersection Delay [s/veh]			4.07			
Intersection LOS			A			

**Intersection Level Of Service Report**

Control Type: Two-way stop  
 Analysis Method: HCM 2010  
 Analysis Period: 15 minutes  
 Delay (sec / veh): 14.3  
 Level Of Service: B  
 Volume to Capacity (v/c): 0.223

**Intersection Setup**

Name	Dry Creek Road	Dry Creek Road	Dry Creek Road	Trower Avenue
Approach	Northbound	Southbound	Westbound	
Lane Configuration	<b>IF</b>	<b>TI</b>	<b>TT</b>	
Turning Movement	Thru Right	Left Thru	Left Right	
Lane Width [ft]	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0 1	1 0	1 0	0
Pocket Length [ft]	100.00	50.00	100.00	100.00
Speed [mph]	40.00	40.00	35.00	
Grade [%]	0.00	0.00	0.00	
Crosswalk	No	No	Yes	

**Volumes**

Name	Dry Creek Road	Dry Creek Road	Dry Creek Road	Trower Avenue
Base Volume Input [veh/h]	140	53	165	71
Base Volume Adjustment Factor	1,1440	1,1440	1,1440	1,1440
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0
Other Volume [veh/h]	0	0	0	0
Total Hourly Volume [veh/h]	160	61	189	103
Peak Hour Factor	0.9300	0.9300	0.9300	0.9300
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	43	16	51	28
Total Analysis Volume [veh/h]	172	111	203	111
Pedestrian Volume [ped/h]	0	0	0	0

**Intersection Settings**

Priority Scheme	Free	Free	Stop
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

**Movement, Approach, & Intersection Results**

V/C, Movement V/C Ratio	0.00	0.00	0.05	0.00	0.22	0.10
d_M, Delay for Movement [s/veh]	0.00	0.00	7.97	0.00	14.28	9.59
Movement LOS	A	A	A	A	B	A
95th-Percentile Queue Length [veh]	0.00	0.00	0.16	0.00	0.85	0.33
95th-Percentile Queue Length [ft]	0.00	0.00	4.08	0.00	21.13	8.29
d_A, Approach Delay [s/veh]	0.00	0.00	1.95	A	12.22	B
Approach LOS	A	A	A	A	B	B
d_I, Intersection Delay [s/veh]			3.93	B		
Intersection LOS						

**Intersection Level of Service Report**

**Intersection 1: Dry Creek Road/Orchard Avenue**  
 Two-way stop  
 Analysis Method: HCM 2010  
 Analysis Period: 15 minutes  
 Delay (sec / veh): 9.4  
 Level Of Service: A  
 Volume to Capacity (v/c): 0.043

**Intersection Setup**

Name	Dry Creek Road Northbound	Dry Creek Road Southbound	Orchard Avenue Westbound
Approach	Northbound	Southbound	Westbound
Lane Configuration	Thru Right	Thru Left	Right
Turning Movement	Thru Right	Thru Left	Right
Lane Width [ft]	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0
Pocket Length [ft]	100.00	100.00	100.00
Speed [mph]	40.00	40.00	35.00
Grade [%]	0.00	0.00	0.00
Crosswalk	No	No	No

**Volumes**

Name	Dry Creek Road Northbound	Dry Creek Road Southbound	Orchard Avenue Westbound
Base Volume Input [veh/h]	30	7	27
Base Volume Adjustment Factor	1.1330	1.1330	1.1330
Heavy Vehicles Percentage [%]	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0
Site-Generated Trips [veh/h]	0	0	0
Diverted Trips [veh/h]	0	0	0
Pass-by Trips [veh/h]	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0
Other Volume [veh/h]	0	0	0
Total Hourly Volume [veh/h]	34	8	31
Peak Hour Factor	0.8400	0.8400	0.8400
Other Adjustment Factor	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	10	2	9
Total Analysis Volume [veh/h]	40	10	37
Pedestrian Volume [ped/h]	0	0	0



**Intersection Settings**

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Cap. Acceptance			No
Number of Storage Spaces in Median	0	0	0

**Movement, Approach, & Intersection Results**

V/C, Movement V/C Ratio	0.00	0.00	0.01	0.00	0.04	0.01
d_L_M, Delay for Movement [s/veh]	0.00	0.00	7.42	0.00	9.38	8.83
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.00	0.00	0.10	0.10	0.16	0.16
95th-Percentile Queue Length [ft]	0.00	0.00	2.42	2.42	4.01	4.01
d_L_A, Approach Delay [s/veh]	0.00	0.00	1.56	1.56	2.28	2.28
Approach LOS	A	A	A	A	A	A
d_I, Intersection Delay [s/veh]			2.64	2.64		
Intersection LOS			A	A		



**Intersection Level Of Service Report**

Control Type: Two-way stop  
 Analysis Method: HCM 2010  
 Analysis Period: 15 minutes  
 Delay (sec / veh): 12.8  
 Level Of Service: B  
 Volume to Capacity (v/c): 0.158

**Intersection Setup**

Name	Dry Creek Road	Dry Creek Road	Trower Avenue
Approach	Northbound	Southbound	Westbound
Lane Configuration	<b>IF</b>	<b>TI</b>	<b>TT</b>
Turning Movement	Thru Right	Left Thru	Left Right
Lane Width [ft]	12.00	12.00	12.00
No. of Lanes in Pocket	0 1	1 0	1 0
Pocket Length [ft]	100.00	50.00	100.00
Speed [mph]	40.00	40.00	35.00
Grade [%]	0.00	0.00	0.00
Crosswalk	No	No	Yes

**Volumes**

Name	Dry Creek Road	Dry Creek Road	Trower Avenue
Base Volume Input [veh/h]	117	46	63
Base Volume Adjustment Factor	1.1330	1.1330	1.1330
Heavy Vehicles Percentage [%]	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0
Site-Generated Trips [veh/h]	0	0	0
Diverted Trips [veh/h]	0	0	0
Pass-by Trips [veh/h]	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0
Other Volume [veh/h]	0	0	0
Total Hourly Volume [veh/h]	133	52	71
Peak Hour Factor	0.8300	0.8300	0.8300
Other Adjustment Factor	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	40	16	21
Total Analysis Volume [veh/h]	160	63	86
Pedestrian Volume [ped/h]	0	0	0

**Intersection Settings**

Priority Scheme	Free	Free	Stop
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Cap. Acceptance			No
Number of Storage Spaces in Median	0	0	0

**Movement, Approach, & Intersection Results**

V/C, Movement V/C Ratio	0.00	0.00	0.05	0.00	0.16	0.07
d_M, Delay for Movement [s/veh]	0.00	0.00	7.80	0.00	12.84	9.36
Movement LOS	A	A	A	A	B	A
95th-Percentile Queue Length [veh]	0.00	0.00	0.15	0.00	0.56	0.22
95th-Percentile Queue Length [ft]	0.00	0.00	3.67	0.00	13.92	5.44
d_A, Approach Delay [s/veh]	0.00	0.00	2.22	0.00	11.41	
Approach LOS	A	A	A	A	B	
d_I, Intersection Delay [s/veh]			3.68			
Intersection LOS			B			

**Intersection Level of Service Report**

Control Type: Two-way stop  
 Analysis Method: HCM 2010  
 Analysis Period: 15 minutes  
 Delay (sec / veh): 9.8  
 Level Of Service: A  
 Volume to Capacity (v/c): 0.102

**Intersection Setup**

Name	Dry Creek Road	Dry Creek Road	Orchard Avenue
Approach	Northbound	Southbound	Westbound
Lane Configuration	Thru Right	Thru Left	Right
Turning Movement	Thru Right	Thru Left	Right
Lane Width [ft]	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0
Pocket Length [ft]	100.00	100.00	100.00
Speed [mph]	40.00	40.00	35.00
Grade [%]	0.00	0.00	0.00
Crosswalk	No	No	No

**Volumes**

Name	Dry Creek Road	Dry Creek Road	Orchard Avenue
Base Volume Input [veh/h]	37	7	71
Base Volume Adjustment Factor	1,1440	1,1440	1,1440
Heavy Vehicles Percentage [%]	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0
Site-Generated Trips [veh/h]	0	0	1
Diverted Trips [veh/h]	0	0	0
Pass-by Trips [veh/h]	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0
Other Volume [veh/h]	0	0	0
Total Hourly Volume [veh/h]	42	8	82
Peak Hour Factor	0.9400	0.9400	0.9400
Other Adjustment Factor	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	11	2	22
Total Analysis Volume [veh/h]	45	9	87
Pedestrian Volume [ped/h]	0	0	0

**Intersection Settings**

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Cap. Acceptance			No
Number of Storage Spaces in Median	0	0	0

**Movement, Approach, & Intersection Results**

V/C, Movement V/C Ratio	0.00	0.00	0.01	0.00	0.10	0.01
d_M, Delay for Movement [s/veh]	0.00	0.00	7.42	0.00	9.75	9.16
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.00	0.00	0.12	0.12	0.38	0.38
95th-Percentile Queue Length [ft]	0.00	0.00	2.86	2.96	9.53	9.53
d_A, Approach Delay [s/veh]		0.00	1.17			9.69
Approach LOS		A	A			A
d_I, Intersection Delay [s/veh]			4.06			A
Intersection LOS			A			A

**Intersection Level Of Service Report**

Control Type: Two-way stop  
 Analysis Method: HCM 2010  
 Analysis Period: 15 minutes  
 Delay (sec / veh): 14.7  
 Level Of Service: B  
 Volume to Capacity (v/c): 0.231

**Intersection Setup**

Name	Dry Creek Road	Dry Creek Road	Trower Avenue
Approach	Northbound	Southbound	Westbound
Lane Configuration	<b>IF</b>	<b>TI</b>	<b>TT</b>
Turning Movement	Thru Right	Left Thru	Left Right
Lane Width [ft]	12.00	12.00	12.00
No. of Lanes in Pocket	0 1	1 0	1 0
Pocket Length [ft]	60.00	50.00	80.00
Speed [mph]	40.00	40.00	35.00
Grade [%]	0.00	0.00	0.00
Crosswalk	No	No	Yes

**Volumes**

Name	Dry Creek Road	Dry Creek Road	Trower Avenue
Base Volume Input [veh/h]	140	53	90
Base Volume Adjustment Factor	1,1440	1,1440	1,1440
Heavy Vehicles Percentage [%]	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0
Site-Generated Trips [veh/h]	0	10	0
Diverted Trips [veh/h]	0	0	0
Pass-by Trips [veh/h]	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0
Other Volume [veh/h]	0	0	0
Total Hourly Volume [veh/h]	160	71	103
Peak Hour Factor	0.9300	0.9300	0.9300
Other Adjustment Factor	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	43	19	28
Total Analysis Volume [veh/h]	172	111	203
Pedestrian Volume [ped/h]	0	0	0

**Intersection Settings**

Priority Scheme	Free	Free	Stop
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

**Movement, Approach, & Intersection Results**

V/C, Movement V/C Ratio	0.00	0.00	0.06	0.00	0.23	0.10
d_M, Delay for Movement [s/veh]	0.00	0.00	7.99	0.00	14.71	9.61
Movement LOS	A	A	A	A	B	A
95th-Percentile Queue Length [veh]	0.00	0.00	0.19	0.00	0.88	0.35
95th-Percentile Queue Length [ft]	0.00	0.00	4.73	0.00	22.07	8.71
d_A, Approach Delay [s/veh]		0.00				12.41
Approach LOS		A				B
d_I, Intersection Delay [s/veh]				4.08		
Intersection LOS				B		



**Intersection Level Of Service Report**

Control Type: Two-way stop  
 Analysis Method: HCM 2010  
 Analysis Period: 15 minutes

Delay (sec / veh): 9.4  
 Level Of Service: A  
 Volume to Capacity (v/c): 0.046

**Intersection Setup**

Name	Dry Creek Road	Dry Creek Road	Orchard Avenue
Approach	Northbound	Southbound	Westbound
Lane Configuration	Thru Right	Thru Left	Right
Turning Movement	Thru Right	Thru Left	Right
Lane Width [ft]	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0
Pocket Length [ft]	100.00	100.00	100.00
Speed [mph]	40.00	40.00	35.00
Grade [%]	0.00	0.00	0.00
Crosswalk	No	No	No

**Volumes**

Name	Dry Creek Road	Dry Creek Road	Orchard Avenue
Base Volume Input [veh/h]	30	7	27
Base Volume Adjustment Factor	1.1330	1.1330	1.1330
Heavy Vehicles Percentage [%]	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0
Site-Generated Trips [veh/h]	0	0	3
Diverted Trips [veh/h]	0	0	0
Pass-by Trips [veh/h]	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0
Other Volume [veh/h]	0	0	0
Total Hourly Volume [veh/h]	34	8	34
Peak Hour Factor	0.8400	0.8400	0.8400
Other Adjustment Factor	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	10	2	10
Total Analysis Volume [veh/h]	40	10	40
Pedestrian Volume [ped/h]	0	0	0

**Intersection Settings**

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Cap. Acceptance			No
Number of Storage Spaces in Median	0	0	0

**Movement, Approach, & Intersection Results**

V/C, Movement V/C Ratio	0.00	0.00	0.01	0.00	0.05	0.01
d_L_M, Delay for Movement [s/veh]	0.00	0.00	7.42	0.00	9.40	8.85
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.00	0.00	0.10	0.10	0.17	0.17
95th-Percentile Queue Length [ft]	0.00	0.00	2.43	2.43	4.31	4.31
d_L_A, Approach Delay [s/veh]	0.00	0.00	1.56	A	A	9.31
Approach LOS	A	A	A	A	A	A
d_I, Intersection Delay [s/veh]			2.71			
Intersection LOS			A			

**Intersection Level Of Service Report**

Control Type: Two-way stop  
 Analysis Method: HCM 2010  
 Analysis Period: 15 minutes  
 Delay (sec / veh): 13.2  
 Level Of Service: B  
 Volume to Capacity (v/c): 0.165

**Intersection Setup**

Name	Dry Creek Road	Dry Creek Road	Trower Avenue
Approach	Northbound	Southbound	Westbound
Lane Configuration	<b>IF</b>	<b>TI</b>	<b>TT</b>
Turning Movement	Thru Right	Thru Left	Left Right
Lane Width [ft]	12.00	12.00	12.00
No. of Lanes in Pocket	0	1	1
Pocket Length [ft]	60.00	50.00	80.00
Speed [mph]	40.00	40.00	35.00
Grade [%]	0.00	0.00	0.00
Crosswalk	No	No	Yes

**Volumes**

Name	Dry Creek Road	Dry Creek Road	Trower Avenue
Base Volume Input [veh/h]	117	46	63
Base Volume Adjustment Factor	1.1330	1.1330	1.1330
Heavy Vehicles Percentage [%]	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0
Site-Generated Trips [veh/h]	0	10	0
Diverted Trips [veh/h]	0	0	0
Pass-by Trips [veh/h]	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0
Other Volume [veh/h]	0	0	0
Total Hourly Volume [veh/h]	133	62	71
Peak Hour Factor	0.8300	0.8300	0.8300
Other Adjustment Factor	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	40	19	21
Total Analysis Volume [veh/h]	160	75	86
Pedestrian Volume [ped/h]	0	0	0

**Intersection Settings**

Priority Scheme	Free	Free	Stop
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

**Movement, Approach, & Intersection Results**

V/C, Movement V/C Ratio	0.00	0.00	0.06	0.00	0.16	0.08
d_M, Delay for Movement [s/veh]	0.00	0.00	7.82	0.00	13.24	9.43
Movement LOS	A	A	A	A	B	A
95th-Percentile Queue Length [veh]	0.00	0.00	0.18	0.00	0.59	0.27
95th-Percentile Queue Length [ft]	0.00	0.00	4.41	0.00	14.61	6.72
d_A, Approach Delay [s/veh]	0.00	0.00	2.52	0.00	11.49	0.00
Approach LOS	A	A	A	A	B	B
d_I, Intersection Delay [s/veh]			3.95			
Intersection LOS			B			

**Intersection Level Of Service Report**  
**Intersection 1: Dry Creek Road/Orchard Avenue**  
 Two-way stop  
 Analysis Method: HCM 2010  
 Analysis Period: 15 minutes  
 Delay (sec / veh): 13.5  
 Level Of Service: B  
 Volume to Capacity (v/c): 0.330

**Intersection Setup**

Name	Dry Creek Road	Dry Creek Road	Orchard Avenue
Approach	Northbound	Southbound	Westbound
Lane Configuration	→	←	←
Turning Movement	Thru Right	Thru Left	Left Right
Lane Width [ft]	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0
Pocket Length [ft]	100.00	100.00	100.00
Speed [mph]	40.00	40.00	35.00
Grade [%]	0.00	0.00	0.00
Crosswalk	No	No	No

**Volumes**

Name	Dry Creek Road	Dry Creek Road	Orchard Avenue
Base Volume Input [veh/h]	37	7	71
Base Volume Adjustment Factor	1.1440	1.1440	1.1440
Heavy Vehicles Percentage [%]	2.00	2.00	2.00
Growth Rate	2.49	2.49	2.49
In-Process Volume [veh/h]	0	0	0
Site-Generated Trips [veh/h]	0	0	0
Diverted Trips [veh/h]	0	0	0
Pass-by Trips [veh/h]	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0
Other Volume [veh/h]	0	0	0
Total Hourly Volume [veh/h]	105	20	202
Peak Hour Factor	0.9400	0.9400	0.9400
Other Adjustment Factor	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	28	5	54
Total Analysis Volume [veh/h]	112	21	215
Pedestrian Volume [ped/h]	0	0	0

**Intersection Settings**

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

**Movement, Approach, & Intersection Results**

V/C, Movement V/C Ratio	0.00	0.00	0.02	0.00	0.33	0.03
d_M, Delay for Movement [s/veh]	0.00	0.00	7.74	0.00	13.53	12.13
Movement LOS	A	A	A	A	B	B
85th-Percentile Queue Length [veh/ln]	0.00	0.00	0.05	0.05	1.64	1.64
95th-Percentile Queue Length [ft/ln]	0.00	0.00	1.14	1.14	41.12	41.12
d_A, Approach Delay [s/veh]	0.00	0.00	1.16	1.16	13.38	
Approach LOS	A	A	A	A	B	
d_I, Intersection Delay [s/veh]			5.55			
Intersection LOS			B			

**Intersection Level Of Service Report**

Control Type: Two-way stop  
 Analysis Method: HCM 2010  
 Analysis Period: 15 minutes

Delay (sec / veh): 16.1  
 Level Of Service: C  
 Volume to Capacity (v/c): 0.280

**Intersection Setup**

Name	Dry Creek Road	Dry Creek Road	Trower Avenue
Approach	Northbound	Southbound	Westbound
Lane Configuration	<b>IF</b>	<b>TI</b>	<b>TT</b>
Turning Movement	Thru Right	Left Thru	Left Right
Lane Width [ft]	12.00	12.00	12.00
No. of Lanes in Pocket	0 1	1 0	1 0
Pocket Length [ft]	60.00	50.00	80.00
Speed [mph]	40.00	40.00	35.00
Grade [%]	0.00	0.00	0.00
Crosswalk	No	No	Yes

**Volumes**

Name	Dry Creek Road	Dry Creek Road	Trower Avenue
Base Volume Input [veh/h]	140	53	90
Base Volume Adjustment Factor	1.1440	1.1440	1.1440
Heavy Vehicles Percentage [%]	2.00	2.00	2.00
Growth Rate	1.14	1.14	1.14
In-Process Volume [veh/h]	0	0	0
Site-Generated Trips [veh/h]	0	0	0
Diverted Trips [veh/h]	0	0	0
Pass-by Trips [veh/h]	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0
Other Volume [veh/h]	0	0	0
Total Hourly Volume [veh/h]	182	70	215
Peak Hour Factor	0.9300	0.9300	0.9300
Other Adjustment Factor	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	49	19	58
Total Analysis Volume [veh/h]	196	75	231
Pedestrian Volume [ped/h]	0	0	0

**Intersection Settings**

Priority Scheme	Free	Free	Stop
Flared Area			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

**Movement, Approach, & Intersection Results**

V/C, Movement V/C Ratio	0.00	0.00	0.06	0.00	0.28	0.12
d_M, Delay for Movement [s/veh]	0.00	0.00	8.10	0.00	16.10	9.82
Movement LOS	A	A	A	A	C	A
85th-Percentile Queue Length [veh/ln]	0.00	0.00	0.19	0.00	1.14	0.40
95th-Percentile Queue Length [ft/ln]	0.00	0.00	4.83	0.00	28.42	9.91
d_A, Approach Delay [s/veh]	0.00	0.00	1.98	A	13.34	B
Approach LOS	A	A	A	A	B	B
d_I, Intersection Delay [s/veh]			4.23	C		
Intersection LOS				C		

**Intersection Level Of Service Report**

Control Type: Two-way stop  
Analysis Method: HCM 2010  
Analysis Period: 15 minutes

Delay (sec / veh): 11.3  
Level Of Service: B  
Volume to Capacity (v/c): 0.137

**Intersection Setup**

Name	Dry Creek Road	Dry Creek Road	Orchard Avenue
Approach	Northbound	Southbound	Westbound
Lane Configuration	Thru Right	Thru Left	Left Right
Turning Movement	12.00	12.00	12.00
Lane Width [ft]	0	0	0
No. of Lanes in Pocket	100.00	100.00	100.00
Pocket Length [ft]	40.00	40.00	35.00
Speed [mph]	0.00	0.00	0.00
Grade [%]	No	No	No
Crosswalk			

**Volumes**

Name	Dry Creek Road	Dry Creek Road	Orchard Avenue
Base Volume Input [veh/h]	30	7	27
Base Volume Adjustment Factor	1.1330	1.1330	1.1330
Heavy Vehicles Percentage [%]	2.00	2.00	2.00
Growth Rate	2.49	2.49	2.49
In-Process Volume [veh/h]	0	0	0
Site-Generated Trips [veh/h]	0	0	0
Diverted Trips [veh/h]	0	0	0
Pass-by Trips [veh/h]	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0
Other Volume [veh/h]	0	0	0
Total Hourly Volume [veh/h]	85	20	77
Peak Hour Factor	0.8400	0.8400	0.8400
Other Adjustment Factor	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	25	6	23
Total Analysis Volume [veh/h]	101	24	92
Pedestrian Volume [ped/h]	0	0	0

**Intersection Settings**

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

**Movement, Approach, & Intersection Results**

V/C, Movement V/C Ratio	0.00	0.00	0.02	0.00	0.14	0.02
d_M, Delay for Movement [s/veh]	0.00	0.00	7.75	0.00	11.33	10.08
Movement LOS	A	A	A	A	B	B
85th-Percentile Queue Length [veh/ln]	0.00	0.00	0.05	0.05	0.57	0.57
95th-Percentile Queue Length [ft/ln]	0.00	0.00	1.14	1.14	14.15	14.15
d_A, Approach Delay [s/veh]	0.00	0.00	1.60	A	11.11	B
Approach LOS	A	A	A	A	B	B
d_I, Intersection Delay [s/veh]			3.10	B		
Intersection LOS						

**Intersection Level Of Service Report**

Control Type: Two-way stop  
Analysis Method: HCM 2010  
Analysis Period: 15 minutes

Delay (sec / veh): 14.0  
Level Of Service: B  
Volume to Capacity (v/c): 0.197

**Intersection Setup**

Name	Dry Creek Road	Dry Creek Road	Trower Avenue
Approach	Northbound	Southbound	Westbound
Lane Configuration	<b>IF</b>	<b>TI</b>	<b>TT</b>
Turning Movement	Thru Right	Left Thru	Left Right
Lane Width [ft]	12.00	12.00	12.00
No. of Lanes in Pocket	0 1	1 0	1 0
Pocket Length [ft]	60.00	50.00	80.00
Speed [mph]	40.00	40.00	35.00
Grade [%]	0.00	0.00	0.00
Crosswalk	No	No	Yes

**Volumes**

Name	Dry Creek Road	Dry Creek Road	Trower Avenue
Base Volume Input [veh/h]	117	46	63
Base Volume Adjustment Factor	1.1330	1.1330	1.1330
Heavy Vehicles Percentage [%]	2.00	2.00	2.00
Growth Rate	1.14	1.14	1.14
In-Process Volume [veh/h]	0	0	0
Site-Generated Trips [veh/h]	0	0	0
Diverted Trips [veh/h]	0	0	0
Pass-by Trips [veh/h]	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0
Other Volume [veh/h]	0	0	0
Total Hourly Volume [veh/h]	152	59	81
Peak Hour Factor	0.8300	0.8300	0.8300
Other Adjustment Factor	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	46	18	24
Total Analysis Volume [veh/h]	183	71	98
Pedestrian Volume [ped/h]	0	0	0

**Intersection Settings**

Priority Scheme	Free	Free	Stop
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

**Movement, Approach, & Intersection Results**

V/C, Movement V/C Ratio	0.00	0.00	0.05	0.00	0.20	0.08
d_M, Delay for Movement [s/veh]	0.00	0.00	7.89	0.00	13.98	9.55
Movement LOS	A	A	A	A	B	A
85th-Percentile Queue Length [veh/ln]	0.00	0.00	0.17	0.00	0.72	0.26
95th-Percentile Queue Length [ft/ln]	0.00	0.00	4.27	0.00	18.10	6.53
d_A, Approach Delay [s/veh]		0.00	2.23	A		12.15
Approach LOS		A		A		B
d_I, Intersection Delay [s/veh]			3.88			
Intersection LOS			B			

**Intersection Level of Service Report**

Control Type: Two-way stop  
 Analysis Method: HCM 2010  
 Analysis Period: 15 minutes

Intersection 1: Dry Creek Road/Orchard Avenue  
 Delay (sec / veh): 9.7  
 Level Of Service: A  
 Volume to Capacity (v/c): 0.101

**Intersection Setup**

Name	Dry Creek Road	Dry Creek Road	Orchard Avenue
Approach	Northbound	Southbound	Westbound
Lane Configuration	Thru Right	Thru Left	Right
Turning Movement	12.00	12.00	12.00
Lane Width [ft]	0	0	0
No. of Lanes in Pocket	100.00	100.00	100.00
Pocket Length [ft]	40.00	40.00	35.00
Speed [mph]	0.00	0.00	0.00
Grade [%]	No	No	No
Crosswalk			

**Volumes**

Name	Dry Creek Road	Dry Creek Road	Orchard Avenue
Base Volume Input [veh/h]	37	7	71
Base Volume Adjustment Factor	1,1440	1,1440	1,1440
Heavy Vehicles Percentage [%]	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0
Site-Generated Trips [veh/h]	0	0	0
Diverted Trips [veh/h]	0	0	0
Pass-by Trips [veh/h]	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0
Other Volume [veh/h]	0	0	0
Total Hourly Volume [veh/h]	42	8	81
Peak Hour Factor	0.9400	0.9400	0.9400
Other Adjustment Factor	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	11	2	22
Total Analysis Volume [veh/h]	45	9	86
Pedestrian Volume [ped/h]	0	0	0

**Intersection Settings**

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Cap. Acceptance			No
Number of Storage Spaces in Median	0	0	0

**Movement, Approach, & Intersection Results**

V/C, Movement V/C Ratio	0.00	0.00	0.01	0.00	0.10	0.01
d_M, Delay for Movement [s/veh]	0.00	0.00	7.41	0.00	9.74	9.15
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.00	0.00	0.12	0.12	0.38	0.38
95th-Percentile Queue Length [ft]	0.00	0.00	2.86	2.96	9.42	9.42
d_A, Approach Delay [s/veh]	0.00	0.00	1.17	A	A	A
Approach LOS	A	A	A	A	A	A
d_I, Intersection Delay [s/veh]			4.05			
Intersection LOS			A			

**Intersection Level Of Service Report**

Control Type: Two-way stop  
 Analysis Method: HCM 2010  
 Analysis Period: 15 minutes  
 Delay (sec / veh): 14.4  
 Level Of Service: B  
 Volume to Capacity (v/c): 0.225

**Intersection Setup**

Name	Dry Creek Road	Dry Creek Road	Trower Avenue
Approach	Northbound	Southbound	Westbound
Lane Configuration	<b>IF</b>	<b>TI</b>	<b>TT</b>
Turning Movement	Thru Right	Left Thru	Left Right
Lane Width [ft]	12.00	12.00	12.00
No. of Lanes in Pocket	0 1	1 0	1 0
Pocket Length [ft]	60.00	50.00	80.00
Speed [mph]	40.00	40.00	35.00
Grade [%]	0.00	0.00	0.00
Crosswalk	No	No	Yes

**Volumes**

Name	Dry Creek Road	Dry Creek Road	Trower Avenue
Base Volume Input [veh/h]	140	53	90
Base Volume Adjustment Factor	1,1440	1,1440	1,1440
Heavy Vehicles Percentage [%]	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0
Site-Generated Trips [veh/h]	0	3	0
Diverted Trips [veh/h]	0	0	0
Pass-by Trips [veh/h]	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0
Other Volume [veh/h]	0	0	0
Total Hourly Volume [veh/h]	160	64	103
Peak Hour Factor	0.9300	0.9300	0.9300
Other Adjustment Factor	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	43	17	28
Total Analysis Volume [veh/h]	172	69	111
Pedestrian Volume [ped/h]	0	0	0

**Intersection Settings**

Priority Scheme	Free	Free	Stop
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Cap. Acceptance			No
Number of Storage Spaces in Median	0	0	0

**Movement, Approach, & Intersection Results**

V/C, Movement V/C Ratio	0.00	0.00	0.05	0.00	0.23	0.10
d_M, Delay for Movement [s/veh]	0.00	0.00	7.97	0.00	14.41	9.00
Movement LOS	A	A	A	A	B	A
95th-Percentile Queue Length [veh]	0.00	0.00	0.17	0.00	0.86	0.34
95th-Percentile Queue Length [ft]	0.00	0.00	4.27	0.00	21.40	8.50
d_A, Approach Delay [s/veh]	0.00	0.00	2.02	A	12.27	B
Approach LOS	A	A	A	A	B	B
d_I, Intersection Delay [s/veh]			3.98			
Intersection LOS			B			



**Intersection Level Of Service Report**

Control Type: Two-way stop  
Analysis Method: HCM 2010  
Analysis Period: 15 minutes

Intersection 1: Dry Creek Road/Orchard Avenue  
Delay (sec / veh): 9.4  
Level Of Service: A  
Volume to Capacity (v/c): 0.044

**Intersection Setup**

Name	Dry Creek Road	Dry Creek Road	Orchard Avenue
Approach	Northbound	Southbound	Westbound
Lane Configuration	→	←	←
Turning Movement	Thru Right	Thru Left	Left Right
Lane Width [ft]	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0
Pocket Length [ft]	100.00	100.00	100.00
Speed [mph]	40.00	40.00	35.00
Grade [%]	0.00	0.00	0.00
Crosswalk	No	No	No

**Volumes**

Name	Dry Creek Road	Dry Creek Road	Orchard Avenue
Base Volume Input [veh/h]	30	7	27
Base Volume Adjustment Factor	1.1330	1.1330	1.1330
Heavy Vehicles Percentage [%]	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0
Site-Generated Trips [veh/h]	0	0	1
Diverted Trips [veh/h]	0	0	0
Pass-by Trips [veh/h]	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0
Other Volume [veh/h]	0	0	0
Total Hourly Volume [veh/h]	34	8	32
Peak Hour Factor	0.8400	0.8400	0.8400
Other Adjustment Factor	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	10	2	10
Total Analyse Volume [veh/h]	40	10	38
Pedestrian Volume [ped/h]	0	0	0



**Intersection Settings**

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

**Movement, Approach, & Intersection Results**

V/C, Movement V/C Ratio	0.00	0.00	0.01	0.00	0.04	0.01
d_M, Delay for Movement [s/veh]	0.00	0.00	7.42	0.00	9.39	8.84
Movement LOS	A	A	A	A	A	A
85th-Percentile Queue Length [veh/ln]	0.00	0.00	0.02	0.02	0.16	0.16
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.40	0.40	4.11	4.11
d_A, Approach Delay [s/veh]	0.00	0.00	1.58	0.40	9.29	9.29
Approach LOS	A	A	A	A	A	A
d_I, Intersection Delay [s/veh]			2.67			
Intersection LOS			A			



**Intersection Level Of Service Report**

Control Type: Two-way stop  
 Analysis Method: HCM 2010  
 Analysis Period: 15 minutes

Delay (sec / veh): 13.0  
 Level Of Service: B  
 Volume to Capacity (v/c): 0.160

**Intersection Setup**

Name	Dry Creek Road	Dry Creek Road	Trower Avenue
Approach	Northbound	Southbound	Westbound
Lane Configuration	<b>IF</b>	<b>TI</b>	<b>TT</b>
Turning Movement	Thru Right	Left Thru	Left Right
Lane Width [ft]	12.00	12.00	12.00
No. of Lanes in Pocket	0 1	1 0	1 0
Pocket Length [ft]	60.00	50.00	80.00
Speed [mph]	40.00	40.00	35.00
Grade [%]	0.00	0.00	0.00
Crosswalk	No	No	Yes

**Volumes**

Name	Dry Creek Road	Dry Creek Road	Trower Avenue
Base Volume Input [veh/h]	117	46	63
Base Volume Adjustment Factor	1.1330	1.1330	1.1330
Heavy Vehicles Percentage [%]	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0
Site-Generated Trips [veh/h]	0	4	0
Diverted Trips [veh/h]	0	0	0
Pass-by Trips [veh/h]	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0
Other Volume [veh/h]	0	0	0
Total Hourly Volume [veh/h]	133	49	71
Peak Hour Factor	0.8300	0.8300	0.8300
Other Adjustment Factor	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	40	17	21
Total Analysis Volume [veh/h]	160	59	86
Pedestrian Volume [ped/h]	0	0	0

**Intersection Settings**

Priority Scheme	Free	Free	Stop
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

**Movement, Approach, & Intersection Results**

V/C, Movement V/C Ratio	0.00	0.00	0.05	0.00	0.16	0.07
d_M, Delay for Movement [s/veh]	0.00	0.00	7.81	0.00	12.97	9.38
Movement LOS	A	A	A	A	B	A
85th-Percentile Queue Length [veh/ln]	0.00	0.00	0.16	0.00	0.57	0.23
95th-Percentile Queue Length [ft/ln]	0.00	0.00	3.81	0.00	14.15	5.83
d_A, Approach Delay [s/veh]		0.00	2.32		11.44	
Approach LOS		A	A		B	
d_I, Intersection Delay [s/veh]			3.77			
Intersection LOS			B			

**Intersection Level of Service Report**

Control Type: Two-way stop  
 Analysis Method: HCM 2010  
 Analysis Period: 15 minutes

Delay (sec / veh): 9.8  
 Level Of Service: A  
 Volume to Capacity (v/c): 0.102

**Intersection Setup**

Name	Dry Creek Road	Dry Creek Road	Orchard Avenue
Approach	Northbound	Southbound	Westbound
Lane Configuration	Thru Right	Thru Left	Right
Turning Movement	Thru Right	Thru Left	Right
Lane Width [ft]	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0
Pocket Length [ft]	100.00	100.00	100.00
Speed [mph]	40.00	40.00	35.00
Grade [%]	0.00	0.00	0.00
Crosswalk	No	No	No

**Volumes**

Name	Dry Creek Road	Dry Creek Road	Orchard Avenue
Base Volume Input [veh/h]	37	7	71
Base Volume Adjustment Factor	1,1440	1,1440	1,1440
Heavy Vehicles Percentage [%]	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0
Site-Generated Trips [veh/h]	0	0	1
Diverted Trips [veh/h]	0	0	0
Pass-by Trips [veh/h]	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0
Other Volume [veh/h]	0	0	0
Total Hourly Volume [veh/h]	42	8	82
Peak Hour Factor	0.9400	0.9400	0.9400
Other Adjustment Factor	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	11	2	22
Total Analysis Volume [veh/h]	45	9	87
Pedestrian Volume [ped/h]	0	0	0

**Intersection Settings**

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Cap. Acceptance			No
Number of Storage Spaces in Median	0	0	0

**Movement, Approach, & Intersection Results**

V/C, Movement V/C Ratio	0.00	0.00	0.01	0.00	0.10	0.01
d_M, Delay for Movement [s/veh]	0.00	0.00	7.42	0.00	9.76	9.16
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.00	0.00	0.12	0.12	0.38	0.38
95th-Percentile Queue Length [ft]	0.00	0.00	2.87	2.97	9.54	9.54
d_A, Approach Delay [s/veh]	0.00	0.00	1.17	A	9.69	A
Approach LOS	A	A	A	A	A	A
d_I, Intersection Delay [s/veh]			4.05			
Intersection LOS			A			

**Intersection Level Of Service Report**

Control Type: Two-way stop  
 Analysis Method: HCM 2010  
 Analysis Period: 15 minutes

Delay (sec / veh): 14.9  
 Level Of Service: B  
 Volume to Capacity (v/c): 0.234

**Intersection Setup**

Name	Dry Creek Road	Dry Creek Road	Trower Avenue
Approach	Northbound	Southbound	Westbound
Lane Configuration	<b>IF</b>	<b>TI</b>	<b>TT</b>
Turning Movement	Thru Right	Left Thru Right	Left Right
Lane Width [ft]	12.00	12.00	12.00
No. of Lanes in Pocket	0 1	1 0 1	0 0
Pocket Length [ft]	100.00	50.00	100.00
Speed [mph]	40.00	40.00	35.00
Grade [%]	0.00	0.00	0.00
Crosswalk	No	No	Yes

**Volumes**

Name	Dry Creek Road	Dry Creek Road	Trower Avenue
Base Volume Input [veh/h]	140	53	90
Base Volume Adjustment Factor	1,1440	1,1440	1,1440
Heavy Vehicles Percentage [%]	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0
Site-Generated Trips [veh/h]	0	13	0
Diverted Trips [veh/h]	0	0	0
Pass-by Trips [veh/h]	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0
Other Volume [veh/h]	0	0	0
Total Hourly Volume [veh/h]	160	74	103
Peak Hour Factor	0.9300	0.9300	0.9300
Other Adjustment Factor	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	43	20	28
Total Analysis Volume [veh/h]	172	111	203
Pedestrian Volume [ped/h]	0	0	0

**Intersection Settings**

Priority Scheme	Free	Free	Stop
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

**Movement, Approach, & Intersection Results**

V/C, Movement V/C Ratio	0.00	0.00	0.06	0.00	0.23	0.11
d_M, Delay for Movement [s/veh]	0.00	0.00	8.00	0.00	14.89	9.63
Movement LOS	A	A	A	A	B	A
95th-Percentile Queue Length [veh]	0.00	0.00	0.20	0.00	0.90	0.36
95th-Percentile Queue Length [ft]	0.00	0.00	5.00	0.00	22.46	9.03
d_A, Approach Delay [s/veh]		0.00	2.26	A	12.48	B
Approach LOS		A	A		B	
d_I, Intersection Delay [s/veh]			4.15			
Intersection LOS			B			

**Intersection Level Of Service Report**  
**Intersection 1: Dry Creek Road/Orchard Avenue**

Control Type: Two-way stop  
Analysis Method: HCM 2010  
Analysis Period: 15 minutes

Delay (sec / veh): 9.4  
Level Of Service: A  
Volume to Capacity (v/c): 0.049

**Intersection Setup**

Name	Dry Creek Road	Dry Creek Road	Orchard Avenue
Approach	Northbound	Southbound	Westbound
Lane Configuration	→	←	←
Turning Movement	Thru Right	Thru Left	Left Right
Lane Width [ft]	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0
Pocket Length [ft]	100.00	100.00	100.00
Speed [mph]	40.00	40.00	35.00
Grade [%]	0.00	0.00	0.00
Crosswalk	No	No	No

**Volumes**

Name	Dry Creek Road	Dry Creek Road	Orchard Avenue
Base Volume Input [veh/h]	30	7	27
Base Volume Adjustment Factor	1.1330	1.1330	1.1330
Heavy Vehicles Percentage [%]	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0
Site-Generated Trips [veh/h]	0	0	4
Diverted Trips [veh/h]	0	0	0
Pass-by Trips [veh/h]	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0
Other Volume [veh/h]	0	0	0
Total Hourly Volume [veh/h]	34	8	35
Peak Hour Factor	0.8400	0.8400	0.8400
Other Adjustment Factor	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	10	2	10
Total Analyse Volume [veh/h]	40	10	42
Pedestrian Volume [ped/h]	0	0	0



**Intersection Settings**

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

**Movement, Approach, & Intersection Results**

V/C, Movement V/C Ratio	0.00	0.00	0.01	0.00	0.05	0.01
d_M, Delay for Movement [s/veh]	0.00	0.00	7.42	0.00	942	8.87
Movement LOS	A	A	A	A	A	A
85th-Percentile Queue Length [veh/ln]	0.00	0.00	0.02	0.02	0.18	0.18
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.40	0.40	4.50	4.50
d_A, Approach Delay [s/veh]	0.00	0.00	1.58	0.40	4.50	9.33
Approach LOS	A	A	A	A	A	A
d_I, Intersection Delay [s/veh]			2.77			
Intersection LOS			A			



**Intersection Level Of Service Report**

Control Type: Two-way stop  
 Analysis Method: HCM 2010  
 Analysis Period: 15 minutes

Delay (sec / veh): 13.4  
 Level Of Service: B  
 Volume to Capacity (v/c): 0.167

**Intersection Setup**

Name	Dry Creek Road	Dry Creek Road	Trower Avenue
Approach	Northbound	Southbound	Westbound
Lane Configuration	<b>IF</b>	<b>TI</b>	<b>TT</b>
Turning Movement	Thru Right	Left Thru	Left Right
Lane Width [ft]	12.00	12.00	12.00
No. of Lanes in Pocket	0 1	1 0	1 0
Pocket Length [ft]	60.00	50.00	80.00
Speed [mph]	40.00	40.00	35.00
Grade [%]	0.00	0.00	0.00
Crosswalk	No	No	Yes

**Volumes**

Name	Dry Creek Road	Dry Creek Road	Trower Avenue
Base Volume Input [veh/h]	117	46	63
Base Volume Adjustment Factor	1.1330	1.1330	1.1330
Heavy Vehicles Percentage [%]	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0
Site-Generated Trips [veh/h]	0	14	0
Diverted Trips [veh/h]	0	0	0
Pass-by Trips [veh/h]	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0
Other Volume [veh/h]	0	0	0
Total Hourly Volume [veh/h]	133	66	71
Peak Hour Factor	0.8300	0.8300	0.8300
Other Adjustment Factor	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	40	20	21
Total Analysis Volume [veh/h]	160	80	86
Pedestrian Volume [ped/h]	0	0	0



**Intersection Settings**

Priority Scheme	Free	Free	Stop
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

**Movement, Approach, & Intersection Results**

V/C, Movement V/C Ratio	0.00	0.00	0.06	0.00	0.17	0.09
d_M, Delay for Movement [s/veh]	0.00	0.00	7.83	0.00	13.41	9.45
Movement LOS	A	A	A	A	B	A
85th-Percentile Queue Length [veh/ln]	0.00	0.00	0.19	0.00	0.60	0.29
95th-Percentile Queue Length [ft/ln]	0.00	0.00	4.72	0.00	14.91	7.13
d_A, Approach Delay [s/veh]	0.00	0.00	2.63	0.00	11.54	
Approach LOS	A	A	A	A	B	
d_I, Intersection Delay [s/veh]			4.05			
Intersection LOS			B			



**Intersection Level of Service Report**  
**Intersection 1: Dry Creek Road/Orchard Avenue**

Control Type: Two-way stop  
 Analysis Method: HCM 2010  
 Analysis Period: 15 minutes

Delay (sec / veh): 13.5  
 Level Of Service: B  
 Volume to Capacity (v/c): 0.330

**Intersection Setup**

Name	Dry Creek Road	Dry Creek Road	Orchard Avenue
Approach	Northbound	Southbound	Westbound
Lane Configuration	Thru Right	Thru Left	Right
Turning Movement	12.00	12.00	12.00
Lane Width [ft]	0	0	0
No. of Lanes in Pocket	100.00	100.00	100.00
Pocket Length [ft]	40.00	40.00	35.00
Speed [mph]	0.00	0.00	0.00
Grade [%]	No	No	No
Crosswalk			

**Volumes**

Name	Dry Creek Road	Dry Creek Road	Orchard Avenue
Base Volume Input [veh/h]	37	7	71
Base Volume Adjustment Factor	1,1440	1,1440	1,1440
Heavy Vehicles Percentage [%]	2.00	2.00	2.00
Growth Rate	2.49	2.49	2.49
In-Process Volume [veh/h]	0	0	0
Site-Generated Trips [veh/h]	0	0	0
Diverted Trips [veh/h]	0	0	0
Pass-by Trips [veh/h]	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0
Other Volume [veh/h]	0	0	0
Total Hourly Volume [veh/h]	105	20	202
Peak Hour Factor	0.9400	0.9400	0.9400
Other Adjustment Factor	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	28	5	54
Total Analysis Volume [veh/h]	112	21	215
Pedestrian Volume [ped/h]	0	0	0



**Intersection Settings**

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Cap. Acceptance			No
Number of Storage Spaces in Median	0	0	0

**Movement, Approach, & Intersection Results**

V/C, Movement V/C Ratio	0.00	0.00	0.02	0.00	0.33	0.03
d_M, Delay for Movement [s/veh]	0.00	0.00	7.74	0.00	13.54	12.14
Movement LOS	A	A	A	A	B	B
95th-Percentile Queue Length [veh]	0.00	0.00	0.35	0.35	1.65	1.65
95th-Percentile Queue Length [ft]	0.00	0.00	8.76	8.76	41.16	41.16
d_A, Approach Delay [s/veh]	0.00	0.00	1.16	A	13.38	B
Approach LOS	A	A	A	A	B	B
d_I, Intersection Delay [s/veh]			5.54	B		
Intersection LOS						



**Intersection Level Of Service Report**

Control Type: Two-way stop  
 Analysis Method: HCM 2010  
 Analysis Period: 15 minutes  
 Delay (sec / veh): 16.3  
 Level Of Service: C  
 Volume to Capacity (v/c): 0.283

**Intersection Setup**

Name	Dry Creek Road	Dry Creek Road	Trower Avenue
Approach	Northbound	Southbound	Westbound
Lane Configuration	<b>IF</b>	<b>TI</b>	<b>TT</b>
Turning Movement	Thru Right	Left Thru	Left Right
Lane Width [ft]	12.00	12.00	12.00
No. of Lanes in Pocket	0 1	1 0	1 0
Pocket Length [ft]	60.00	50.00	80.00
Speed [mph]	40.00	40.00	35.00
Grade [%]	0.00	0.00	0.00
Crosswalk	No	No	Yes

**Volumes**

Name	Dry Creek Road	Dry Creek Road	Trower Avenue
Base Volume Input [veh/h]	140	53	90
Base Volume Adjustment Factor	1,1440	1,1440	1,1440
Heavy Vehicles Percentage [%]	2.00	2.00	2.00
Growth Rate	1.14	1.14	1.14
In-Process Volume [veh/h]	0	0	0
Site-Generated Trips [veh/h]	0	3	0
Diverted Trips [veh/h]	0	0	0
Pass-by Trips [veh/h]	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0
Other Volume [veh/h]	0	0	0
Total Hourly Volume [veh/h]	182	73	117
Peak Hour Factor	0.9300	0.9300	0.9300
Other Adjustment Factor	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	49	20	56
Total Analysis Volume [veh/h]	196	78	231
Pedestrian Volume [ped/h]	0	0	0

**Intersection Settings**

Priority Scheme	Free	Free	Stop
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

**Movement, Approach, & Intersection Results**

V/C, Movement V/C Ratio	0.00	0.00	0.06	0.00	0.28	0.12
d_M, Delay for Movement [s/veh]	0.00	0.00	8.10	0.00	16.27	9.84
Movement LOS	A	A	A	A	C	A
95th-Percentile Queue Length [veh]	0.00	0.00	0.20	0.00	1.15	0.41
95th-Percentile Queue Length [ft]	0.00	0.00	5.04	0.00	28.82	10.13
d_A, Approach Delay [s/veh]		0.00	2.05			13.40
Approach LOS		A	A			B
d_I, Intersection Delay [s/veh]			4.28			C
Intersection LOS			C			



**Intersection Level Of Service Report**

Control Type: Two-way stop  
Analysis Method: HCM 2010  
Analysis Period: 15 minutes

Delay (sec / veh): 11.4  
Level Of Service: B  
Volume to Capacity (v/c): 0.139

**Intersection Setup**

Name	Dry Creek Road	Dry Creek Road	Orchard Avenue
Approach	Northbound	Southbound	Westbound
Lane Configuration	→	←	←
Turning Movement	Thru Right	Thru Left	Left Right
Lane Width [ft]	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0
Pocket Length [ft]	100.00	100.00	100.00
Speed [mph]	40.00	40.00	35.00
Grade [%]	0.00	0.00	0.00
Crosswalk	No	No	No

**Volumes**

Name	Dry Creek Road	Dry Creek Road	Orchard Avenue
Base Volume Input [veh/h]	30	7	27
Base Volume Adjustment Factor	1.1330	1.1330	1.1330
Heavy Vehicles Percentage [%]	2.00	2.00	2.00
Growth Rate	2.49	2.49	2.49
In-Process Volume [veh/h]	0	0	0
Site-Generated Trips [veh/h]	0	0	1
Diverted Trips [veh/h]	0	0	0
Pass-by Trips [veh/h]	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0
Other Volume [veh/h]	0	0	0
Total Hourly Volume [veh/h]	85	20	78
Peak Hour Factor	0.8400	0.8400	0.8400
Other Adjustment Factor	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	25	6	23
Total Analysis Volume [veh/h]	101	24	93
Pedestrian Volume [ped/h]	0	0	0

**Intersection Settings**

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

**Movement, Approach, & Intersection Results**

V/C, Movement V/C Ratio	0.00	0.00	0.02	0.00	0.14	0.02
d_M, Delay for Movement [s/veh]	0.00	0.00	7.75	0.00	11.36	10.10
Movement LOS	A	A	A	A	B	B
85th-Percentile Queue Length [veh/ln]	0.00	0.00	0.05	0.05	0.57	0.57
95th-Percentile Queue Length [ft/ln]	0.00	0.00	1.14	1.14	14.33	14.33
d_A, Approach Delay [s/veh]	0.00	0.00	1.60	1.60	11.13	11.13
Approach LOS	A	A	A	A	B	B
d_I, Intersection Delay [s/veh]			3.11			
Intersection LOS			B			

**Intersection Level Of Service Report**

Control Type: Two-way stop  
 Analysis Method: HCM 2010  
 Analysis Period: 15 minutes

Delay (sec / veh): 14.2  
 Level Of Service: B  
 Volume to Capacity (v/c): 0.200

**Intersection Setup**

Name	Dry Creek Road	Dry Creek Road	Trower Avenue
Approach	Northbound	Southbound	Westbound
Lane Configuration	<b>IF</b>	<b>TI</b>	<b>TT</b>
Turning Movement	Thru Right	Left Thru	Left Right
Lane Width [ft]	12.00	12.00	12.00
No. of Lanes in Pocket	0 1	1 0	1 0
Pocket Length [ft]	60.00	50.00	80.00
Speed [mph]	40.00	40.00	35.00
Grade [%]	0.00	0.00	0.00
Crosswalk	No	No	Yes

**Volumes**

Name	Dry Creek Road	Dry Creek Road	Trower Avenue
Base Volume Input [veh/h]	117	46	63
Base Volume Adjustment Factor	1.1330	1.1330	1.1330
Heavy Vehicles Percentage [%]	2.00	2.00	2.00
Growth Rate	1.14	1.14	1.14
In-Process Volume [veh/h]	0	0	0
Site-Generated Trips [veh/h]	0	4	0
Diverted Trips [veh/h]	0	0	0
Pass-by Trips [veh/h]	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0
Other Volume [veh/h]	0	0	0
Total Hourly Volume [veh/h]	152	63	81
Peak Hour Factor	0.8300	0.8300	0.8300
Other Adjustment Factor	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	46	19	24
Total Analysis Volume [veh/h]	183	76	98
Pedestrian Volume [ped/h]	0	0	0

**Intersection Settings**

Priority Scheme	Free	Free	Stop
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

**Movement, Approach, & Intersection Results**

V/C, Movement V/C Ratio	0.00	0.00	0.06	0.00	0.20	0.08
d_M, Delay for Movement [s/veh]	0.00	0.00	7.90	0.00	14.18	9.57
Movement LOS	A	A	A	A	B	A
85th-Percentile Queue Length [veh/ln]	0.00	0.00	0.18	0.00	0.74	0.27
95th-Percentile Queue Length [ft/ln]	0.00	0.00	4.59	0.00	18.48	6.64
d_A, Approach Delay [s/veh]	0.00	0.00	2.35	A	B	
Approach LOS	A	A	A	A	B	
d_I, Intersection Delay [s/veh]			3.96	B		
Intersection LOS				B		

# Appendix C

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## Roadway Segment Level of Service Calculations





Flow rate in outside lane, vol 102.3  
Effective width of outside lane, we 31.35  
Effective speed factor, Sc 4.92  
Bicycle LOS A 1.39

- Notes:  
1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific terrain adjustments are not made.  
2. If  $V_f (V_d \text{ or } V_o) \geq 1,700$  pc/h, terminate analysis—the LOS is F.  
3. For the analysis direction only and for  $V > 200$  veh/h,  
4. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.  
\* These items have been entered or edited to override calculated value

Direction NB PM Existing  
Analysis(d) 1.0  
Opposing (o) 1.0  
PCE for trucks, ET 1.0  
Heavy-vehicle adjustment factor, FHV 0.994  
Grade adjustment factor, (note-1), Fg 1.00  
Base percent time-spent-following, (note-4), BPTSPd 11.9 %  
Adjustment for no-passing zones, Fnp 1.00  
Percent time-spent-following, PFSpd 23.4 %

Level of service, LOS B  
Volume to capacity ratio, v/c 0.06  
Peak-hour vehicle-miles of travel, VMT60 0  
Peak 15-min total travel time, TT15 0.0  
Capacity from PMS, CAPMSP 1700  
Capacity from PMS, CAPMSPF 1700  
Directional Capacity 1700

Level of Service and Other Performance Measures  
Level of service, LOS B  
Volume to capacity ratio, v/c 0.06  
Peak-hour vehicle-miles of travel, VMT60 0  
Peak 15-min total travel time, TT15 0.0  
Capacity from PMS, CAPMSP 1700  
Capacity from PMS, CAPMSPF 1700  
Directional Capacity 1700

Direction NB PM Existing  
Analysis(d) 1.0  
Opposing (o) 1.0  
PCE for trucks, ET 1.0  
Heavy-vehicle adjustment factor, FHV 0.994  
Grade adjustment factor, (note-1), Fg 1.00  
Base percent time-spent-following, (note-4), BPTSPd 11.9 %  
Adjustment for no-passing zones, Fnp 1.00  
Percent time-spent-following, PFSpd 23.4 %

Level of service, LOS B  
Volume to capacity ratio, v/c 0.06  
Peak-hour vehicle-miles of travel, VMT60 0  
Peak 15-min total travel time, TT15 0.0  
Capacity from PMS, CAPMSP 1700  
Capacity from PMS, CAPMSPF 1700  
Directional Capacity 1700

Passing Lane Analysis

Total length of analysis segment, L 0.0 mi  
Length of passing lane including tapers, Lpl 22.3 mi  
Length of two-lane highway downstream of effective, Lde 23.4 mi  
Average travel speed, ATSD (from above) B  
Level of service, LOSd (from above) B

Downstream length of two-lane highway within effective, Ld 0.0 mi  
Length of two-lane highway downstream of effective, Lde 23.4 mi  
Adj. on average speed, Fpl -  
Average travel speed including passing lane, ATSpI 0.0 %  
Percent Free Flow Speed including passing lane, PFSPl -

Percent Time-Spent-Following with Passing Lane  
Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, Lde 23.4 mi  
Length of two-lane highway downstream of effective length of passing lane for percent time-spent-following, Lpl 22.3 mi  
Adj. factor for the effect of passing lane, Fp 1.00

Percent Time-Spent-Following, Fp 11.9 %  
Percent time-spent-following, including passing lane, PFSPl 23.4 %  
Level of service and other performance measures with passing lane  
Level of service including passing lane, LOSpl E  
Peak 15-min total travel time, TT15 0.0  
Bicycle Level of Service 45

Posted speed limit, Sp 0  
Percent of segment with occupied on-highway parking 0  
Pavement rating, P 3

Direction NB PM Existing  
Analysis(d) 1.0  
Opposing (o) 1.0  
PCE for trucks, ET 1.0  
Heavy-vehicle adjustment factor, FHV 0.994  
Grade adjustment factor, (note-1), Fg 1.00  
Base percent time-spent-following, (note-4), BPTSPd 11.9 %  
Adjustment for no-passing zones, Fnp 1.00  
Percent time-spent-following, PFSpd 23.4 %

Level of service, LOS B  
Volume to capacity ratio, v/c 0.06  
Peak-hour vehicle-miles of travel, VMT60 0  
Peak 15-min total travel time, TT15 0.0  
Capacity from PMS, CAPMSP 1700  
Capacity from PMS, CAPMSPF 1700  
Directional Capacity 1700

Input Data

Highway class Class 3  
Shoulder width 5.0 ft  
Lane width 12.0 ft  
Lane length 120.0 ft  
Terrain type Level  
Grade: Up/down -  
Access point density 20 /mi

Analysis direction volume, Vd 90 veh/h  
Opposing direction volume, Vo 174 veh/h  
Average travel speed  
Analysis(d) 1.0  
Opposing (o) 1.0  
PCE for trucks, ET 1.0  
Heavy-vehicle adj. factor, (note-5) FHV 0.949  
Grade adj. factor, (note-1) Fg 1.00  
Directional Flow rate, (note-2) vl 108 pc/h

Free-Flow Speed From Field Measurement: Observed total demand, (note-3) S, PM 5.0 mi/h  
Estimated Free-Flow Speed: FFS 5.0 mi/h  
Base Free-Flow Speed, (note-3) FFS 5.0 mi/h  
Adj. for access point density, (note-3) FA 5.0 mi/h  
Free-Flow speed, FFSd 48.7 mi/h

Adjustment for no-passing zones, Fnp 1.00  
Percent Free Flow Speed, PFS 86.3 %

Percent Time-Spent-Following  
Page 1

Agency/Contractor: Kevin Rangel  
 Highway: W-Trails  
 Analysis Time Period: PM Existing  
 Highway: Dry Creek Road  
 Jurisdiction: Napa County  
 Analysis Year: 2018  
 Description: Mathiasson Winery TIS

Direction: SB PM Existing  
 Analysis (d): 1.0  
 PCE for trucks, ET: 1.0  
 Heavy-vehicle adj. factor, (note-1), Fv: 0.994  
 Grade adjustment factor, (note-2), Fg: 1.00  
 Directional Flow rate, (note-2), Vt: 205 pc/h  
 Observed point density, (note-3), FFSd: 48.7 mi/h  
 Estimated Free-Flow Speed: 53.0 mi/h  
 Base Free-Flow Speed, (note-3), FFS: 5.0 mi/h  
 Adj. for access point density, (note-3), FA: 5.0 mi/h  
 Free-Flow Speed, FFSd: 48.7 mi/h

Level of service, LOS: B  
 Volume to capacity ratio, v/c: 0.12  
 Peak-hour vehicle-miles of travel, VMT60: 0  
 Peak 15-min total travel time, TT15: 0  
 Capacity from PIS: 1700 veh/h  
 Directional Capacity: 1700 veh/h

Level of service, LOS: B  
 Volume to capacity ratio, v/c: 0.12  
 Peak-hour vehicle-miles of travel, VMT60: 0  
 Peak 15-min total travel time, TT15: 0  
 Capacity from PIS: 1700 veh/h  
 Directional Capacity: 1700 veh/h

Direction: SB PM Existing  
 Analysis (d): 1.0  
 PCE for trucks, ET: 1.0  
 Heavy-vehicle adj. factor, (note-1), Fv: 0.994  
 Grade adjustment factor, (note-2), Fg: 1.00  
 Directional Flow rate, (note-2), Vt: 205 pc/h  
 Observed point density, (note-3), FFSd: 48.7 mi/h  
 Estimated Free-Flow Speed: 53.0 mi/h  
 Base Free-Flow Speed, (note-3), FFS: 5.0 mi/h  
 Adj. for access point density, (note-3), FA: 5.0 mi/h  
 Free-Flow Speed, FFSd: 48.7 mi/h

Level of service, LOS: B  
 Volume to capacity ratio, v/c: 0.12  
 Peak-hour vehicle-miles of travel, VMT60: 0  
 Peak 15-min total travel time, TT15: 0  
 Capacity from PIS: 1700 veh/h  
 Directional Capacity: 1700 veh/h

Level of service, LOS: B  
 Volume to capacity ratio, v/c: 0.12  
 Peak-hour vehicle-miles of travel, VMT60: 0  
 Peak 15-min total travel time, TT15: 0  
 Capacity from PIS: 1700 veh/h  
 Directional Capacity: 1700 veh/h

Level of service, LOS: B  
 Volume to capacity ratio, v/c: 0.12  
 Peak-hour vehicle-miles of travel, VMT60: 0  
 Peak 15-min total travel time, TT15: 0  
 Capacity from PIS: 1700 veh/h  
 Directional Capacity: 1700 veh/h

Direction: SB PM Existing  
 Analysis (d): 1.0  
 PCE for trucks, ET: 1.0  
 Heavy-vehicle adj. factor, (note-1), Fv: 0.994  
 Grade adjustment factor, (note-2), Fg: 1.00  
 Directional Flow rate, (note-2), Vt: 205 pc/h  
 Observed point density, (note-3), FFSd: 48.7 mi/h  
 Estimated Free-Flow Speed: 53.0 mi/h  
 Base Free-Flow Speed, (note-3), FFS: 5.0 mi/h  
 Adj. for access point density, (note-3), FA: 5.0 mi/h  
 Free-Flow Speed, FFSd: 48.7 mi/h

Level of service, LOS: B  
 Volume to capacity ratio, v/c: 0.12  
 Peak-hour vehicle-miles of travel, VMT60: 0  
 Peak 15-min total travel time, TT15: 0  
 Capacity from PIS: 1700 veh/h  
 Directional Capacity: 1700 veh/h

Level of service, LOS: B  
 Volume to capacity ratio, v/c: 0.12  
 Peak-hour vehicle-miles of travel, VMT60: 0  
 Peak 15-min total travel time, TT15: 0  
 Capacity from PIS: 1700 veh/h  
 Directional Capacity: 1700 veh/h

Level of service, LOS: B  
 Volume to capacity ratio, v/c: 0.12  
 Peak-hour vehicle-miles of travel, VMT60: 0  
 Peak 15-min total travel time, TT15: 0  
 Capacity from PIS: 1700 veh/h  
 Directional Capacity: 1700 veh/h

Analyst: Kevin Rangel

Agency/Client: W-Trails  
 Highway: NB MD Existing  
 Analysis Time Period: 2018  
 Description: Matchless Winery TIS

Input Data

Highway class: Class 3  
 Shoulder width: 5.0 ft  
 Lane width: 12.0 ft  
 Terrain type: Level  
 Grade: Up/down  
 Opposing direction volume, Vd: 85 veh/h  
 Average travel speed: 1.96 pc/h

Direction: NB MD Existing  
 PCE for trucks, ET: 1.0  
 Heavy-vehicle adj. factor, (note-1): Fg: 0.994  
 Grade adj. factor, (note-2): vi: 1.02  
 Directional Flow rate, (note-2): vl: 102 pc/h  
 Free-Flow Speed From Field Measurement: 55.0 mi/h  
 Observed travel speed, (note-3): S, Pm: 5.0 mi/h  
 Estimated Free-Flow Speed: 55.0 mi/h  
 Base Flow Speed, (note-3): FFS: 5.0 mi/h  
 Adj. for access point density, (note-3): FA: 48.7 mi/h

Level of service, LOS: A  
 Volume to capacity ratio, v/c: 0.06  
 Peak 15-min total travel time, WT60: 0.0  
 Capacity from PMS: 1700 veh/h  
 Directional Capacity: 1700 veh/h

Level of service, LOS: A  
 Volume to capacity ratio, v/c: 0.06  
 Peak 15-min total travel time, WT60: 0.0  
 Capacity from PMS: 1700 veh/h  
 Directional Capacity: 1700 veh/h

Percent Time-Spent-Following: 45

Posted speed limit, Sp: 0

Pavement rating, P: 3

Percent Time-Spent-Following: 45

Posted speed limit, Sp: 0

Pavement rating, P: 3

Analysis(d): 1.0

Opposing (o): 1.0

PCE for trucks, ET: 1.0

Heavy-vehicle adjustment factor, FHV: 0.994

Grade adjustment factor, (note-1), Fg: 0.994

Base percent time-spent-following, (note-4), BPTSF: 11.3 %

Adjustment for no-passing zones, Fnp: 53.0 %

Percent time-spent-following, PFSd: 40.3 %

Level of service, LOS: A

Volume to capacity ratio, v/c: 0.06

Peak 15-min total travel time, WT60: 0.0

Capacity from PMS: 1700 veh/h

Directional Capacity: 1700 veh/h

Level of service, LOS: A

Volume to capacity ratio, v/c: 0.06

Peak 15-min total travel time, WT60: 0.0

Capacity from PMS: 1700 veh/h

Directional Capacity: 1700 veh/h

Level of service, LOS: A

Volume to capacity ratio, v/c: 0.06

Peak 15-min total travel time, WT60: 0.0

Capacity from PMS: 1700 veh/h

Directional Capacity: 1700 veh/h

Level of service, LOS: A

Volume to capacity ratio, v/c: 0.06

Peak 15-min total travel time, WT60: 0.0

Capacity from PMS: 1700 veh/h

Directional Capacity: 1700 veh/h

Level of service, LOS: A

Volume to capacity ratio, v/c: 0.06

Peak 15-min total travel time, WT60: 0.0

Capacity from PMS: 1700 veh/h

Directional Capacity: 1700 veh/h

Level of service, LOS: A

Volume to capacity ratio, v/c: 0.06

Peak 15-min total travel time, WT60: 0.0

Capacity from PMS: 1700 veh/h

Directional Capacity: 1700 veh/h

Level of service, LOS: A

Volume to capacity ratio, v/c: 0.06

Peak 15-min total travel time, WT60: 0.0

Capacity from PMS: 1700 veh/h

Directional Capacity: 1700 veh/h

Level of service, LOS: A

Volume to capacity ratio, v/c: 0.06

Peak 15-min total travel time, WT60: 0.0

Capacity from PMS: 1700 veh/h

Directional Capacity: 1700 veh/h

Level of service, LOS: A

Volume to capacity ratio, v/c: 0.06

Analysis(d): 1.0

Opposing (o): 1.0

PCE for trucks, ET: 1.0

Heavy-vehicle adjustment factor, FHV: 0.994

Grade adjustment factor, (note-1), Fg: 0.994

Base percent time-spent-following, (note-4), BPTSF: 11.3 %

Adjustment for no-passing zones, Fnp: 53.0 %

Percent time-spent-following, PFSd: 40.3 %

Level of service, LOS: A

Volume to capacity ratio, v/c: 0.06

Peak 15-min total travel time, WT60: 0.0

Capacity from PMS: 1700 veh/h

Directional Capacity: 1700 veh/h

Level of service, LOS: A

Volume to capacity ratio, v/c: 0.06

Peak 15-min total travel time, WT60: 0.0

Capacity from PMS: 1700 veh/h

Directional Capacity: 1700 veh/h

Level of service, LOS: A

Volume to capacity ratio, v/c: 0.06

Peak 15-min total travel time, WT60: 0.0

Capacity from PMS: 1700 veh/h

Directional Capacity: 1700 veh/h

Level of service, LOS: A

Volume to capacity ratio, v/c: 0.06

Peak 15-min total travel time, WT60: 0.0

Capacity from PMS: 1700 veh/h

Directional Capacity: 1700 veh/h

Level of service, LOS: A

Volume to capacity ratio, v/c: 0.06

Peak 15-min total travel time, WT60: 0.0

Capacity from PMS: 1700 veh/h

Directional Capacity: 1700 veh/h

Level of service, LOS: A

Volume to capacity ratio, v/c: 0.06

Peak 15-min total travel time, WT60: 0.0

Capacity from PMS: 1700 veh/h

Directional Capacity: 1700 veh/h

Level of service, LOS: A

Volume to capacity ratio, v/c: 0.06

Peak 15-min total travel time, WT60: 0.0

Capacity from PMS: 1700 veh/h

Directional Capacity: 1700 veh/h

Level of service, LOS: A

Volume to capacity ratio, v/c: 0.06

Peak 15-min total travel time, WT60: 0.0

Capacity from PMS: 1700 veh/h

Directional Capacity: 1700 veh/h

Level of service, LOS: A

Volume to capacity ratio, v/c: 0.06

Flow rate in outside lane, vol: 96.6  
 Effective width of outside lane, we: 31.77  
 Effective speed factor, Se: 4.42  
 Bicycle LOS: A: 1.14

Notes:  
 1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific terrain adjustment factors are provided in Exhibit 15-14.  
 2. For the analysis direction only and for v>200 veh/h, terminate analysis if v/c (Vd or Vv) >= 1.700 pc/h, terminate analysis if the LOS is F.  
 3. For the analysis direction only and for v>200 veh/h, terminate analysis if the LOS is F.  
 4. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.  
 5. \* These items have been entered or edited to override calculated value

Agency/Contractor: Kevin Rangel  
 Highway: No Existing  
 Analysis Time Period: Dry Creek Road  
 Jurisdiction: Napa County  
 Analysis Year: 2018  
 Description: Mathiasson Winery TIS

Analysis direction volume, Vd: 70 veh/h  
 Opposing direction volume, Vo: 65 veh/h

Input Data

Highway class	Class 3	Peak hour factor, PHF	0.88
Shoulder width	5.0 Ft	% Trucks and buses	6 %
Lane width	12.0 Ft	% Trucks crawling	0.0 %
Lane length	0.0 mi	% Recreational vehicles	4.0 %
Terrain type	Level	% No-passing zones	100 %
Grade	Up/down	Access point density	2.0 /mi

Analysis direction volume, Vd: 70 veh/h  
 Opposing direction volume, Vo: 65 veh/h

Average Travel Speed

Direction	Analysis(d)	Opposing (o)
PCE for trucks, ET	1.9	1.9
Heavy-vehicle adj. factor, (note-1), Fg	0.949	0.949
Grade adj. factor, (note-2), vi	1.00	1.00
Directional Flow rate, (note-2)	84	102

Free-Flow Speed From Field Measurement: 55.0 mi/h  
 Observed travel speed, (note-3), SPM: 5.0 mi/h  
 Estimated Free-Flow Speed: 55.0 mi/h  
 Base Flow Speed, (note-3), FFS: 5.0 mi/h  
 Adj. for access point density, (note-3), FA: 5.0 mi/h

Free-Flow speed, FFSd: 48.7 mi/h

Adjustment for no-passing zones, fnp: 2.5 mi/h  
 Percent Free Flow Speed, PFFS: 91.9 %

Percent Time-Spent-Following: \_\_\_\_\_ Page 1

Direction: Opposing (o)

PCE for trucks, ET	1.9	1.9
Heavy-vehicle adj. factor, (note-1), Fg	0.994	0.994
Grade adjustment factor, (note-2), vi	1.00	1.00
Base percent time-spent-following, (note-4), BTRSPd	91.5 %	91.5 %
Adjustment for no-passing zones, fnp	53.0 %	53.0 %
Percent time-spent-following, PFSd	33.3 %	33.3 %

Level of Service and other Performance Measures

Level of service, LOS	A	0.05
Volume to capacity ratio, v/c	0.05	veh-mi
Peak-hour vehicle-miles of travel, VMT60	0	veh-h
Peak 15-min total travel time, TT15	0.0	veh-h
Capacity from PMS, CAPMSP	1700	veh/h
Directional Capacity	1700	veh/h

Passing Lane Analysis

Total length of analysis segment, L	0.0	mi
Length of two-lane highway within effective length of passing lane, Lu	0.0	mi
Length of two-lane highway downstream of effective length of passing lane, Ld	34.8	mi
Average travel speed, ATSD (from above)	33.3	mi/h
Adj. for access point density, (from above)	A	

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective length of passing lane, Lde

Length of two-lane highway downstream of effective length of passing lane, Lde	0.0	mi
Adj. factor for the effect of passing lane	0.0	%
Average travel speed including passing lane, ATSpI	0.0	%
Percent Free Flow Speed including passing lane, PFFSpI	0.0	%

Percent Time-Spent-Following with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, Lde

Length of two-lane highway downstream of effective length of passing lane, Lde	0.0	mi
Adj. factor for the effect of passing lane	0.0	%
Average travel speed including passing lane, ATSpI	0.0	%
Percent Free Flow Speed including passing lane, PFFSpI	0.0	%

Level of Service and other Performance Measures with Passing Lane

Level of service, LOS	E	veh-h
Peak 15-min total travel time, TT15	0	veh-h
Capacity from PMS, CAPMSP	1700	veh/h
Directional Capacity	1700	veh/h

Percent Time-Spent-Following: \_\_\_\_\_ Page 2

Flow rate in outside lane, vol: 79.5  
 Effective width of outside lane, we: 33.05  
 Effective speed factor, Se: 0.82  
 Bicycle LOS: A

Notes:

- Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific terrain analysis is not required.
- If v/c (Vd or Vo) >= 1.700 pc/h, terminate analysis-the LOS is F.
- For the analysis direction only and for v>200 veh/h, use alternative Exhibit 15-14.
- Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

\* These items have been entered or edited to override calculated value

Direction: Opposing (o)

PCE for trucks, ET	1.9	1.9
Heavy-vehicle adj. factor, (note-1), Fg	0.994	0.994
Grade adjustment factor, (note-2), vi	1.00	1.00
Base percent time-spent-following, (note-4), BTRSPd	91.5 %	91.5 %
Adjustment for no-passing zones, fnp	53.0 %	53.0 %
Percent time-spent-following, PFSd	33.3 %	33.3 %

Level of Service and other Performance Measures

Level of service, LOS	A	0.05
Volume to capacity ratio, v/c	0.05	veh-mi
Peak-hour vehicle-miles of travel, VMT60	0	veh-h
Peak 15-min total travel time, TT15	0.0	veh-h
Capacity from PMS, CAPMSP	1700	veh/h
Directional Capacity	1700	veh/h

Passing Lane Analysis

Total length of analysis segment, L	0.0	mi
Length of two-lane highway within effective length of passing lane, Lu	0.0	mi
Length of two-lane highway downstream of effective length of passing lane, Ld	34.8	mi
Average travel speed, ATSD (from above)	33.3	mi/h
Adj. for access point density, (from above)	A	

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective length of passing lane, Lde

Length of two-lane highway downstream of effective length of passing lane, Lde	0.0	mi
Adj. factor for the effect of passing lane	0.0	%
Average travel speed including passing lane, ATSpI	0.0	%
Percent Free Flow Speed including passing lane, PFFSpI	0.0	%

Percent Time-Spent-Following with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, Lde

Length of two-lane highway downstream of effective length of passing lane, Lde	0.0	mi
Adj. factor for the effect of passing lane	0.0	%
Average travel speed including passing lane, ATSpI	0.0	%
Percent Free Flow Speed including passing lane, PFFSpI	0.0	%

Level of Service and other Performance Measures with Passing Lane

Level of service, LOS	E	veh-h
Peak 15-min total travel time, TT15	0	veh-h
Capacity from PMS, CAPMSP	1700	veh/h
Directional Capacity	1700	veh/h

Percent Time-Spent-Following: \_\_\_\_\_ Page 3



Analyst: Kevin Rangel  
Agency/Client: W-Trails  
Highway: PM Baseline  
Analysis Time Period: Dry Creek Road  
Location: 1/2 mile to Orchard Ave  
Jurisdiction: Napa County  
Analysis Year: 2018  
Description: Mathiasson Winery TIS

Direction: NB  
Flow Rate: 109.1 pc/h  
Effective Speed Factor: 0.994  
Bicycle LOS: A

Notes:  
1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific terrain analysis was performed.  
2. For the analysis direction only and for v>200 veh/h, use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.  
\* These items have been entered or edited to override calculated value

Level of Service, LOS: B  
Volume to Capacity ratio, v/c: 0.06  
Peak 15-min total travel time, WT60: 0  
Capacity from PIS: 1700 veh/h  
Directional Capacity: 1700 veh/h

Level of Service and other Performance Measures:  
Level of service, LOS: B  
Volume to capacity ratio, v/c: 0.06  
Peak 15-min total travel time, WT60: 0  
Capacity from PIS: 1700 veh/h  
Directional Capacity: 1700 veh/h

Level of Service and other Performance Measures:  
Level of service, LOS: B  
Volume to capacity ratio, v/c: 0.06  
Peak 15-min total travel time, WT60: 0  
Capacity from PIS: 1700 veh/h  
Directional Capacity: 1700 veh/h

Level of Service and other Performance Measures:  
Level of service, LOS: B  
Volume to capacity ratio, v/c: 0.06  
Peak 15-min total travel time, WT60: 0  
Capacity from PIS: 1700 veh/h  
Directional Capacity: 1700 veh/h

Flow rate in outside lane, vol: 109.1  
Effective width of outside lane, we: 30.84  
Effective speed factor, Sf: 0.994  
Bicycle LOS: A

Notes:  
1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific terrain analysis was performed.  
2. For the analysis direction only and for v>200 veh/h, use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.  
\* These items have been entered or edited to override calculated value

Level of Service, LOS: B  
Volume to Capacity ratio, v/c: 0.06  
Peak 15-min total travel time, WT60: 0  
Capacity from PIS: 1700 veh/h  
Directional Capacity: 1700 veh/h

Level of Service and other Performance Measures:  
Level of service, LOS: B  
Volume to capacity ratio, v/c: 0.06  
Peak 15-min total travel time, WT60: 0  
Capacity from PIS: 1700 veh/h  
Directional Capacity: 1700 veh/h

Level of Service and other Performance Measures:  
Level of service, LOS: B  
Volume to capacity ratio, v/c: 0.06  
Peak 15-min total travel time, WT60: 0  
Capacity from PIS: 1700 veh/h  
Directional Capacity: 1700 veh/h

Level of Service and other Performance Measures:  
Level of service, LOS: B  
Volume to capacity ratio, v/c: 0.06  
Peak 15-min total travel time, WT60: 0  
Capacity from PIS: 1700 veh/h  
Directional Capacity: 1700 veh/h

Level of Service and other Performance Measures:  
Level of service, LOS: B  
Volume to capacity ratio, v/c: 0.06  
Peak 15-min total travel time, WT60: 0  
Capacity from PIS: 1700 veh/h  
Directional Capacity: 1700 veh/h

Flow rate in outside lane, vol: 109.1  
Effective width of outside lane, we: 30.84  
Effective speed factor, Sf: 0.994  
Bicycle LOS: A

Notes:  
1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific terrain analysis was performed.  
2. For the analysis direction only and for v>200 veh/h, use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.  
\* These items have been entered or edited to override calculated value

Level of Service, LOS: B  
Volume to Capacity ratio, v/c: 0.06  
Peak 15-min total travel time, WT60: 0  
Capacity from PIS: 1700 veh/h  
Directional Capacity: 1700 veh/h

Level of Service and other Performance Measures:  
Level of service, LOS: B  
Volume to capacity ratio, v/c: 0.06  
Peak 15-min total travel time, WT60: 0  
Capacity from PIS: 1700 veh/h  
Directional Capacity: 1700 veh/h

Level of Service and other Performance Measures:  
Level of service, LOS: B  
Volume to capacity ratio, v/c: 0.06  
Peak 15-min total travel time, WT60: 0  
Capacity from PIS: 1700 veh/h  
Directional Capacity: 1700 veh/h

Level of Service and other Performance Measures:  
Level of service, LOS: B  
Volume to capacity ratio, v/c: 0.06  
Peak 15-min total travel time, WT60: 0  
Capacity from PIS: 1700 veh/h  
Directional Capacity: 1700 veh/h

Level of Service and other Performance Measures:  
Level of service, LOS: B  
Volume to capacity ratio, v/c: 0.06  
Peak 15-min total travel time, WT60: 0  
Capacity from PIS: 1700 veh/h  
Directional Capacity: 1700 veh/h

Flow rate in outside lane, vol: 109.1  
Effective width of outside lane, we: 30.84  
Effective speed factor, Sf: 0.994  
Bicycle LOS: A

Notes:  
1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific terrain analysis was performed.  
2. For the analysis direction only and for v>200 veh/h, use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.  
\* These items have been entered or edited to override calculated value

Level of Service, LOS: B  
Volume to Capacity ratio, v/c: 0.06  
Peak 15-min total travel time, WT60: 0  
Capacity from PIS: 1700 veh/h  
Directional Capacity: 1700 veh/h

Level of Service and other Performance Measures:  
Level of service, LOS: B  
Volume to capacity ratio, v/c: 0.06  
Peak 15-min total travel time, WT60: 0  
Capacity from PIS: 1700 veh/h  
Directional Capacity: 1700 veh/h

Level of Service and other Performance Measures:  
Level of service, LOS: B  
Volume to capacity ratio, v/c: 0.06  
Peak 15-min total travel time, WT60: 0  
Capacity from PIS: 1700 veh/h  
Directional Capacity: 1700 veh/h

Level of Service and other Performance Measures:  
Level of service, LOS: B  
Volume to capacity ratio, v/c: 0.06  
Peak 15-min total travel time, WT60: 0  
Capacity from PIS: 1700 veh/h  
Directional Capacity: 1700 veh/h

Level of Service and other Performance Measures:  
Level of service, LOS: B  
Volume to capacity ratio, v/c: 0.06  
Peak 15-min total travel time, WT60: 0  
Capacity from PIS: 1700 veh/h  
Directional Capacity: 1700 veh/h

Directional Two-Lane Highway Segment Analysis  
Kevin Rangel  
W-Trails  
PM Baseline  
Analysis Time Period  
Dry Creek Road  
Napa County  
2018  
Matchless Winery TIS

Input Data  
Highway class Class 3  
Shoulder width 5.0 Ft  
Lane width 12.0 ft  
Terrain type Level  
Grade: Up/down -  
Access point density 20 /mi  
Opposing direction volume, Vd 185 veh/h  
Average travel speed  
Analysis(d) 1.66  
Opposing (G) 1.98

Direction  
PCE for trucks, ET 1.00  
Heavy-vehicle adj. factor, (note-1) fv 0.965  
Grade adj. factor, (note-1) fg 1.00  
Directional Flow rate, (note-2) vl 218 pc/h  
Free-Flow Speed From Field Measurement: 52.0 mi/h  
Observed travel speed, (note-3) SPM 5.0 mi/h  
Estimated Free-Flow Speed: 52.0 mi/h  
Base Free-Flow Speed, (note-3) FFS 5.0 mi/h  
Adj. for access point density, (note-3) FA 48.7 mi/h

Level of service, LOS E  
Volume to capacity ratio, v/c 0.88  
Peak-hour vehicle-miles of travel, VMT60 6  
Peak 15-min total travel time, TT15 0  
Capacity from PMS, CAPMSP 0  
Capacity from PMS, CAPMSP 0  
Directional Capacity 100  
Level of service, LOS E  
Volume to capacity ratio, v/c 0.88  
Peak-hour vehicle-miles of travel, VMT60 6  
Peak 15-min total travel time, TT15 0  
Capacity from PMS, CAPMSP 0  
Capacity from PMS, CAPMSP 0  
Directional Capacity 100

Analysis(d) 1.00  
Opposing (G) 1.00  
Heavy-vehicle adjustment factor, FHV 0.994  
Grade adjustment factor, (note-1) fg 1.00  
Base percent time-spent-following, (note-4) BPTSFd 22.6 %  
Adjustment for no-passing zones, Fnp 51.5 %  
Percent time-spent-following, PFSd 36.5 %  
Level of service, LOS B  
Volume to capacity ratio, v/c 0.12  
Peak-hour vehicle-miles of travel, VMT60 0  
Peak 15-min total travel time, TT15 0  
Capacity from PMS, CAPMSP 1700  
Capacity from PMS, CAPMSP 1700  
Directional Capacity 1700

Passing Lane Analysis  
Total length of analysis segment, L 0.0 mi  
Length of passing lane including tapers, Lpl 0.0 mi  
Length of passing lane for average travel speed, Ld 53.4 mi  
Average travel speed, ATSp (from above) 8.13 mi/h  
Level of service, LOS B  
Average travel speed with passing lane  
Downstream length of two-lane highway within effective length of passing lane, Lde 0.0 mi  
Length of two-lane highway downstream of effective length of the passing lane for average travel speed, Ld 53.4 mi  
Adj. on average speed, fp 0.0 %  
Average travel speed including passing lane, ATSppl 0.0 %  
Percent Free Flow Speed including passing lane, PFSpl 0.0 %  
Percent Time-Spent-Following with Passing Lane  
Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, Lde 0.0 mi  
Length of two-lane highway downstream of effective length of the passing lane for percent time-spent-following, Ld 53.4 mi  
Adj. factor for the effect of passing lane on percent time-spent-following, fp 0.0 %  
Percent time-spent-following including passing lane, PFSpl 0.0 %  
Percent Time-Spent-Following with Passing Lane

Level of service, LOS E  
Volume to capacity ratio, v/c 0.12  
Peak-hour vehicle-miles of travel, VMT60 0  
Peak 15-min total travel time, TT15 0  
Capacity from PMS, CAPMSP 1700  
Capacity from PMS, CAPMSP 1700  
Directional Capacity 1700

Level of service, LOS E  
Volume to capacity ratio, v/c 0.12  
Peak-hour vehicle-miles of travel, VMT60 0  
Peak 15-min total travel time, TT15 0  
Capacity from PMS, CAPMSP 1700  
Capacity from PMS, CAPMSP 1700  
Directional Capacity 1700

Flow rate in outside lane, vol 210.2  
Effective width of outside lane, we 22.00  
Effective speed factor, Sc 4.42  
Bicycle LOS D 2.26  
Notes:  
1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific terrain adjustments are not made.  
2. For the analysis direction only and for v>200 veh/h, terminate analysis if v1 (Vd or v0) >= 1.700 pc/h, terminate analysis if v2 (Vd or v0) >= 1.700 pc/h, terminate analysis if v3 (Vd or v0) >= 1.700 pc/h.  
3. For the analysis direction only and for v>200 veh/h, terminate analysis if v1 (Vd or v0) >= 1.700 pc/h, terminate analysis if v2 (Vd or v0) >= 1.700 pc/h, terminate analysis if v3 (Vd or v0) >= 1.700 pc/h.  
4. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.  
\* These items have been entered or edited to override calculated value

Direction  
PCE for trucks, ET 1.00  
Heavy-vehicle adjustment factor, FHV 0.994  
Grade adjustment factor, (note-1) fg 1.00  
Base percent time-spent-following, (note-4) BPTSFd 22.6 %  
Adjustment for no-passing zones, Fnp 51.5 %  
Percent time-spent-following, PFSd 36.5 %  
Level of service, LOS B  
Volume to capacity ratio, v/c 0.12  
Peak-hour vehicle-miles of travel, VMT60 0  
Peak 15-min total travel time, TT15 0  
Capacity from PMS, CAPMSP 1700  
Capacity from PMS, CAPMSP 1700  
Directional Capacity 1700

Passing Lane Analysis  
Total length of analysis segment, L 0.0 mi  
Length of passing lane including tapers, Lpl 0.0 mi  
Length of passing lane for average travel speed, Ld 53.4 mi  
Average travel speed, ATSp (from above) 8.13 mi/h  
Level of service, LOS B  
Average travel speed with passing lane  
Downstream length of two-lane highway within effective length of passing lane, Lde 0.0 mi  
Length of two-lane highway downstream of effective length of the passing lane for average travel speed, Ld 53.4 mi  
Adj. on average speed, fp 0.0 %  
Average travel speed including passing lane, ATSppl 0.0 %  
Percent Free Flow Speed including passing lane, PFSpl 0.0 %  
Percent Time-Spent-Following with Passing Lane  
Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, Lde 0.0 mi  
Length of two-lane highway downstream of effective length of the passing lane for percent time-spent-following, Ld 53.4 mi  
Adj. factor for the effect of passing lane on percent time-spent-following, fp 0.0 %  
Percent time-spent-following including passing lane, PFSpl 0.0 %  
Percent Time-Spent-Following with Passing Lane

Level of service, LOS E  
Volume to capacity ratio, v/c 0.12  
Peak-hour vehicle-miles of travel, VMT60 0  
Peak 15-min total travel time, TT15 0  
Capacity from PMS, CAPMSP 1700  
Capacity from PMS, CAPMSP 1700  
Directional Capacity 1700

Directional Two-Lane Highway Segment Analysis

Analyst: Kevin Rangel  
Agency/Client: W-Trails  
Highway: NB Baseline  
Analysis Time Period: Dry Creek Road  
Location: 1/2 mile to Orchard Ave  
Jurisdiction: Napa County  
Analysis Year: 2018  
Description: Mathiasson Winery TIS

Input Data  
Highway class: Class 3  
Shoulder width: 5.0 ft  
Lane width: 12.0 ft  
Terrain type: Level  
Grade: Up/down  
Opposing direction volume, Vd: 99 veh/h  
Opposing direction volume, Vo: 85 veh/h

Average Travel Speed  
Analysis(d): 1.9g  
PCE for trucks, ET: 1.00  
Heavy-vehicle adj. factor, (note-1): Fg: 0.949  
Directional Flow rate, (note-2): v1: 119 pc/h

Opposing (G): 1.9g  
Opposing (G): 0.949  
Opposing (G): 1.00  
Opposing (G): 99 pc/h

Free-Flow Speed From Field Measurement: 55.0 mi/h  
Observed total demand, (note-3): S, PM: 5.0 mi/h  
Estimated Free-Flow Speed: 53.0 mi/h  
Base Flow Speed, (note-3): dff: 5.0 mi/h  
Adj. for access point density, (note-3): FA: 5.0 mi/h  
Free-Flow speed, FFSd: 48.7 mi/h

Adjustment for no-passing zones, fnp: 2.5 mi/h  
Percent Free Flow Speed, PFFS: 91.4 %

Percent Time Spent Following: 0

Analysis(d): 1.0  
Opposing (G): 1.0

PCE for trucks, ET: 1.0  
Heavy-vehicle adjustment factor, fHV: 0.994  
Grade adjustment factor, (note-1): Fg: 1.00  
Base percent time-spent following, (note-4): BPTSpd: 13.0 %  
Adjustment for no-passing zones, fnp: 2.5 mi/h  
Percent time-spent following, PFSd: 42.0 %

Level of Service, LOS: B  
Volume to capacity ratio, v/c: 0.07  
Peak-hour vehicle-miles of travel, VMT60: 0 veh-mi  
Peak 15-min total travel time, TT15: 0.0 veh-h  
Capacity from PMS, CAPMS: 1700 veh/h  
Directional Capacity: 1700 veh/h

Passing Lane Analysis  
Total length of analysis segment, L: 0.0 mi  
Length of passing lane including tapers, Lpl: 44.5 mi  
Average travel speed, ATSD (from above): 42.0 mi/h  
Level of service, LOSd (from above): B

Average Travel Speed with Passing Lane  
Downstream length of two-lane highway within effective length of passing lane, Ld: 0.0 mi  
Length of two-lane highway downstream of effective length of passing lane for average travel speed, Ld: 0.0 mi  
Adj. on average speed, fp: -

Percent Time Spent Following with Passing Lane  
Downstream length of two-lane highway within effective length of passing lane for percent time-spent following, Lde: 0.0 mi  
Length of two-lane highway downstream of effective length of passing lane for percent time-spent following, Ld: 0.0 mi  
Adj. factor for the effect of passing lane on percent time-spent following, fp: -

Level of Service and other Performance Measures with Passing Lane  
Level of service including passing lane, LOSpl: E  
Peak 15-min total travel time, TT15: 0 veh-h

Percent Time Spent Following: 0

Analysis(d): 1.0  
Opposing (G): 1.0

Flow rate in outside lane, vol: 112.5  
Effective width of outside lane, we: 30.59  
Effective speed factor, Sc: 4.39  
Bicycle LOS: B

Notes:  
1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific terrain analysis is not required.  
2. If v/c (Vd or Vo) >= 1.700 pc/h, terminate analysis—the LOS is F.  
3. For the analysis direction only and for v>200 veh/h, use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.  
\* These items have been entered or edited to override calculated value

Level of Service and other Performance Measures  
Level of service, LOS: B  
Volume to capacity ratio, v/c: 0.07  
Peak-hour vehicle-miles of travel, VMT60: 0 veh-mi  
Peak 15-min total travel time, TT15: 0.0 veh-h  
Capacity from PMS, CAPMS: 1700 veh/h  
Directional Capacity: 1700 veh/h

Passing Lane Analysis  
Total length of analysis segment, L: 0.0 mi  
Length of passing lane including tapers, Lpl: 44.5 mi  
Average travel speed, ATSD (from above): 42.0 mi/h  
Level of service, LOSd (from above): B

Average Travel Speed with Passing Lane  
Downstream length of two-lane highway within effective length of passing lane, Ld: 0.0 mi  
Length of two-lane highway downstream of effective length of passing lane for average travel speed, Ld: 0.0 mi  
Adj. on average speed, fp: -

Percent Time Spent Following with Passing Lane  
Downstream length of two-lane highway within effective length of passing lane for percent time-spent following, Lde: 0.0 mi  
Length of two-lane highway downstream of effective length of passing lane for percent time-spent following, Ld: 0.0 mi  
Adj. factor for the effect of passing lane on percent time-spent following, fp: -

Level of Service and other Performance Measures with Passing Lane  
Level of service including passing lane, LOSpl: E  
Peak 15-min total travel time, TT15: 0 veh-h

Percent Time Spent Following: 0

Phone: E-Mail: Directional Two-Lane Highway Segment Analysis  
 Analyst Kevin Rangel  
 Agency/Client W-Trains  
 Highway Name Dry Creek Road  
 Analysis Time Period 2018  
 Jurisdiction Napa County  
 Description Mathiasson Winery TIS

Input Data  
 Highway class Class 3  
 Shoulder width 5.0 ft  
 Lane width 12.0 ft  
 Terrain type Level  
 Grade: Up/down -  
 Opposing direction volume, Vd 83 veh/h  
 Opposing direction volume, Vo 99 veh/h  
 Peak hour factor, PHF 0.88  
 % Trucks and buses 6 %  
 % Trucks crawling 0 %  
 % Recreational vehicles 4 %/hr  
 % No-passing zones 100 %  
 Access point density 20 /mi

Average Travel Speed  
 Analysis(d) Opposing (o)  
 PCE for trucks, ET 1.96 1.96  
 Heavy-vehicle adj. factor, (note-1) fHV 0.949 0.949  
 Grade adj. factor, (note-1) fG 1.00 1.00  
 Directional Flow rate, (note-2) v1 99 pc/h 119 pc/h

Free-Flow Speed From Field Measurement:  
 Observed total speed, (note-3) S, FPM -  
 Observed total speed, (note-3) S, MPH -  
 Estimated Free-Flow Speed: 52.0 mi/h  
 Base Flow Speed, (note-3) fFS 5.0 mi/h  
 Adj. for access point density, (note-3) fA 5.0 mi/h  
 Free-Flow speed, FFSd 48.7 mi/h

Adjustment for no-passing zones, fnp 2.8  
 Percent Free Flow Speed, PFFS 90.5 %

Analysis(d) Opposing (o)  
 PCE for trucks, ET 1.0 1.0  
 Heavy-vehicle adjustment factor, fHV 0.994 0.994  
 Grade adjustment factor, (note-1) fG 1.00 1.00  
 Base percent time-spent-following, (note-4) BPTSFd 11.1 % 11.1 %  
 Adjustment for no-passing zones, fnp 53.3 %  
 Percent time-spent-following, PFSd 35.4 %

Level of Service, LOS B  
 Volume to capacity ratio, v/c 0.06  
 Peak-hour vehicle-miles of travel, VMT60 0 veh-mi  
 Peak 15-min total travel time, TT15 0.0 veh-h  
 Capacity from PMS, CAPMS 1700 veh/h  
 Capacity from PMS, CAPMSF 1700 veh/h  
 Directional Capacity 1700 veh/h

Passing Lane Analysis  
 Total length of analysis segment, L 0.0 mi  
 Length of passing lane including tapers, Lpl 14.2 mi  
 Average travel speed, ATSD (from above) 35.4 mi/h  
 Level of service, LOSd (from above) B

Average Travel Speed with Passing Lane  
 Downstream length of two-lane highway within effective length of passing lane, Ld 0.0 mi  
 Length of two-lane highway downstream of effective length of passing lane, Lde -  
 Adj. on average speed, fpl -  
 Average travel speed including passing lane, ATSpI 0.0 %  
 Percent Free Flow Speed including passing lane, PFFSpI -

Percent Time-Spent-Following with Passing Lane  
 Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, Lde -  
 Length of two-lane highway downstream of effective length of passing lane, Lde -  
 Adj. factor for the effect of passing lane -  
 Percent time-spent-following, fp -  
 Including passing lane, PTFSpI -

Level of Service and other Performance Measures with Passing Lane  
 Level of service including passing lane, LOSpl E  
 Peak 15-min total travel time, TT15 - veh-h

Bicycle Level of Service 45

Posted speed limit, Sp 0

Percent of segment with occupied on-highway parking 0

Pavement rating, P 3

Flow rate in outside lane, vol 94.3  
 Effective width of outside lane, we 31.94  
 Effective speed factor, Sc 4.02  
 Bicycle LOS A

Notes:  
 1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific terrain analysis is not required.  
 2. If v/c (Vd or Vo) >= 1.700 pc/h, terminate analysis--the LOS is F.  
 3. For the analysis direction only and for v>200 veh/h, use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.  
 4. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

\* These items have been entered or edited to override calculated value

Analyst: Kevin Rangel  
Agency/Client: W-Trains  
Analysis Time Period: PM Future  
Highway: Dry Creek Road  
Location: 1/2 mile to Orchard Ave  
Jurisdiction: Napa County  
Analysis Year: 2018  
Description: Mathiasson Winery TIS

Input Data  
Highway class: Class 3  
Shoulder width: 5.0 ft  
Lane width: 12.0 ft  
Right-of-way: 60.0 ft  
Terrain type: Level  
Grade: Up/down  
Analysis direction volume, Vd: 112 veh/h  
Opposing direction volume, Vo: 331 veh/h

Average Travel Speed  
Direction: NB  
PCE for trucks, ET: 1.96  
Heavy-vehicle adj. factor, (note-1): f<sub>HV</sub>: 0.949  
Grade adj. factor, (note-2): f<sub>G</sub>: 1.00  
Directional Flow rate, (note-2): v<sub>i</sub>: 134 pc/h

Free-Flow Speed From Field Measurement:  
Observed travel speed, (note-3): S<sub>PM</sub>: -  
Estimated Free-Flow Speed: 55.0 mi/h  
Base Flow Speed, (note-3): f<sub>FS</sub>: 5.0 mi/h  
Adj. for access point density, (note-3): f<sub>A</sub>: 5.0 mi/h  
Free-Flow speed, FFSd: 48.7 mi/h

Adjustment for no-passing zones, f<sub>NP</sub>: 2.18 mi/h  
Percent Free Flow Speed, PFFS: 86.0 %

Percent Time Spent Following: Page 1

Direction: NB  
PCE for trucks, ET: 1.0  
Heavy-vehicle adj. factor, (note-1): f<sub>HV</sub>: 0.994  
Grade adjustment factor, (note-2): f<sub>G</sub>: 1.00  
Base percent time-spent following, (note-4): BPTSF: 17.3 %  
Adjustment for no-passing zones, f<sub>NP</sub>: 45.1 %  
Percent time-spent following, PFSd: 28.7 %

Level of Service, LOS: B  
Volume to capacity ratio, v/c: 0.08  
Peak-hour vehicle miles of travel, VMT60: 0 veh-mi  
Peak 15-min total travel time, TT15: 0.0 veh-h  
Capacity from PMS: CDPTSF: 1700 veh/h  
Directional Capacity: 1700 veh/h

Passing Lane Analysis  
Total length of analysis segment, L: 0.0 mi  
Length of passing lane including tapers, Lpl: - mi  
Average travel speed, ATSD (from above): 21.9 mi/h  
Level of service, LOSd (from above): B

Average Travel Speed with Passing Lane  
Downstream length of two-lane highway within effective length of passing lane, Ld: - mi  
Length of two-lane highway downstream of effective length of passing lane for average travel speed, Ld: - mi  
Adj. on average speed, f<sub>p</sub>: -  
Average travel speed including passing lane, ATSpI: 0.0 %  
Percent Free Flow Speed including passing lane, PFFSpI: -

Percent Time Spent Following with Passing Lane  
Downstream length of two-lane highway within effective length of passing lane for percent time-spent following, Lde: - mi  
Length of two-lane highway downstream of effective length of passing lane for percent time-spent following, Lde: - mi  
Adj. factor for the effect of passing lane on percent time-spent following, f<sub>p</sub>: -  
Percent time-spent following, PTFSpI: - %  
Including passing lane, PTFSpI: - %

Level of Service and other Performance Measures with Passing Lane  
Level of service including passing lane, LOSpl: E  
Peak 15-min total travel time, TT15: - veh-h  
Bicycle Level of Service: 45

Posted speed limit, Sp: 0  
Percent of segment with occupied on-highway parking: 0  
Pavement rating, P: 3  
Page 2

Notes:  
1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific terrain adjustment factors are provided for grades of 1% and 2%.  
2. If v<sub>i</sub> (Vd or Vo) >= 1,700 pc/h, terminate analysis—the LOS is F.  
3. For the analysis direction only and for v>200 veh/h.  
4. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.  
\* These items have been entered or edited to override calculated value

Directional Two-Lane Highway Segment Analysis  
 Analyst: Kevin Rangel  
 Agency/Client: W-Trains  
 Highway: PM Future  
 Analysis Time Period: Dry Creek Road  
 Location: From Trower Ave  
 Jurisdiction: Napa County  
 Analysis Year: 2018  
 Description: Mathiasson Winery TIS

Input Data  
 Highway class: Class 3  
 Shoulder width: 5.0 ft  
 Lane width: 0.0 ft  
 Terrain type: Level  
 Grade: Up/down  
 Opposing direction volume, Vd: 331 veh/h  
 Opposing direction volume, Vo: 112 veh/h  
 Peak hour factor, PHF: 0.88  
 % Trucks and buses: 6 %  
 % Trucks crawling: 0 %  
 % Recreational vehicles: 4 %/hr  
 % No-passing zones: 100 %  
 Access point density: 20 /mi

Average Travel Speed  
 Analysis(d) Opposing (o)  
 PCE for trucks, ET 1.4e 1.9e  
 Heavy-vehicle adj. factor, (note-1) fHV 0.977 0.949  
 Directional Flow rate, (note-2) v1 385 134 pc/h  
 Free-Flow Speed From Field Measurement: - mi/h  
 Observed total demand, (note-3) S, PM - veh/h  
 Estimated Free-Flow Speed: 52.0 mi/h  
 Base Flow Speed, (note-3) fFS (note-3) FA 5.0 mi/h  
 Adj. for access point density, (note-3) FA 5.0 mi/h  
 Free-Flow speed, FFSd 48.7 mi/h

Adjustment for no-passing zones, fnp 31.7 mi/h  
 Percent Free Flow Speed, PFFS 85.6 %  
 Percent Time-Spent-Following, PTF 0 %

Notes:  
 1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific terrain types are not included in the analysis.  
 2. If v1 (Vd or Vo) >= 1,700 pc/h, terminate analysis—the LOS is F.  
 3. For the analysis direction only and for v>200 veh/h.  
 4. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.  
 \* These items have been entered or edited to override calculated value

Level of Service and Other Performance Measures  
 Level of service, LOS B 0.22 veh-mi  
 Volume to capacity ratio, v/c 0.22 veh-mi  
 Peak-hour vehicle miles of travel, VMT60 0 veh-h  
 Peak 15-min total travel time, TT15 0.0 veh-h  
 Capacity from PISD, CAPISD 1700 veh/h  
 Directional Capacity CDPTSF 1700 veh/h

Passing Lane Analysis  
 Total length of analysis segment, L 0.0 mi  
 Length of two-lane highway within effective length of passing lane, Lu 0.0 mi  
 Length of two-lane highway downstream of effective length of passing lane, Ld 0.0 mi  
 Average travel speed, ATSp 21.7 mi/h  
 Adj. for access point density, (note-3) FA 5.0 mi/h  
 Level of service, LOSd (from above) B 0.0

Average Travel Speed with Passing Lane  
 Downstream length of two-lane highway within effective length of passing lane, Lu 0.0 mi  
 Length of two-lane highway downstream of effective length of passing lane, Ld 0.0 mi  
 Average travel speed including passing lane, ATSpI 0.0 %  
 Percent Free Flow Speed including passing lane, PFFSpI 0.0 %

Percent Time-Spent-Following with Passing Lane  
 Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, Lde - mi  
 Length of two-lane highway downstream of effective length of passing lane for percent time-spent-following, Ldd - mi  
 Adj. factor for the effect of passing lane, fP 0.0 %  
 Percent time-spent-following, fp 0.0 %  
 Including passing lane, PTFSpI 0.0 %

Level of Service and Other Performance Measures with Passing Lane  
 Level of service including passing lane, LOSpl E veh-h  
 Peak 15-min total travel time, TT15 0 veh-h  
 Bicycle Level of Service 45  
 Posted speed limit, Sp 0  
 Percent of segment with occupied on-highway parking 0 %  
 Pavement rating, P 3

Direction NB MD Future

Analysis(d) 1.0

Opposing (o) 1.0

PCE for trucks, ET 1.0

Heavy-vehicle adj. factor, (note-1), fhv 0.994

Grade adjustment factor, (note-1), fg 1.00

Estimated Free-Flow Speed, (note-2), vffs 13.7

Base Flow Speed, (note-3), fls 13.7

Adjusted Free-Flow Speed, (note-3), afss 13.7

Percent Time-Spent-Following, PFSF 38.3

Level of Service, LOS B

Volume to capacity ratio, v/c 0.07

Peak 15-min total travel time, WT60 0

Peak 15-min total travel time, TT15 0.0

Capacity from PMS, CAPMS 1700

Capacity from PMS, CAPMS 1700

Directional Capacity 1700

Level of Service and other Performance Measures

Level of Service, LOS B

Volume to capacity ratio, v/c 0.07

Peak 15-min total travel time, WT60 0

Peak 15-min total travel time, TT15 0.0

Capacity from PMS, CAPMS 1700

Capacity from PMS, CAPMS 1700

Directional Capacity 1700

Level of Service and other Performance Measures

Level of Service, LOS B

Volume to capacity ratio, v/c 0.07

Peak 15-min total travel time, WT60 0

Peak 15-min total travel time, TT15 0.0

Capacity from PMS, CAPMS 1700

Capacity from PMS, CAPMS 1700

Directional Capacity 1700

Level of Service and other Performance Measures

Level of Service, LOS B

Volume to capacity ratio, v/c 0.07

Peak 15-min total travel time, WT60 0

Peak 15-min total travel time, TT15 0.0

Capacity from PMS, CAPMS 1700

Capacity from PMS, CAPMS 1700

Directional Capacity 1700

Level of Service and other Performance Measures

Level of Service, LOS B

Volume to capacity ratio, v/c 0.07

Peak 15-min total travel time, WT60 0

Peak 15-min total travel time, TT15 0.0

Capacity from PMS, CAPMS 1700

Capacity from PMS, CAPMS 1700

Directional Capacity 1700

Level of Service and other Performance Measures

Level of Service, LOS B

Volume to capacity ratio, v/c 0.07

Peak 15-min total travel time, WT60 0

Peak 15-min total travel time, TT15 0.0

Capacity from PMS, CAPMS 1700

Capacity from PMS, CAPMS 1700

Directional Capacity 1700

Level of Service and other Performance Measures

Level of Service, LOS B

Volume to capacity ratio, v/c 0.07

Peak 15-min total travel time, WT60 0

Peak 15-min total travel time, TT15 0.0

Capacity from PMS, CAPMS 1700

Capacity from PMS, CAPMS 1700

Directional Capacity 1700

Level of Service and other Performance Measures

Level of Service, LOS B

Volume to capacity ratio, v/c 0.07

Peak 15-min total travel time, WT60 0

Peak 15-min total travel time, TT15 0.0

Capacity from PMS, CAPMS 1700

Capacity from PMS, CAPMS 1700

Directional Capacity 1700

Level of Service and other Performance Measures

Level of Service, LOS B

Volume to capacity ratio, v/c 0.07

Peak 15-min total travel time, WT60 0

Peak 15-min total travel time, TT15 0.0

Capacity from PMS, CAPMS 1700

Capacity from PMS, CAPMS 1700

Directional Capacity 1700

Level of Service and other Performance Measures

Level of Service, LOS B

Volume to capacity ratio, v/c 0.07

Peak 15-min total travel time, WT60 0

Peak 15-min total travel time, TT15 0.0

Capacity from PMS, CAPMS 1700

Capacity from PMS, CAPMS 1700

Directional Capacity 1700

Level of Service and other Performance Measures

Directional Two-Lane Highway Segment Analysis

Analyst: Kevin Rangel  
Agency/Client: W-Trains  
Highway: MD Future  
Analysis Time Period: Dry Creek Road  
Location: From Trower Ave  
Jurisdiction: Napa County  
Analysis Year: 2018  
Description: Mathiasson Winery TIS

Phase: E-8411:  
Flow rate in outside lane, vol: 151.1  
Effective width of outside lane, we: 27.69  
Effective speed factor, Sf: 2.58  
Bicycle LOS: C

Notes:  
1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific terrain analysis is not required.  
2. If  $V_f (V_d \text{ or } V_o) \geq 1,700 \text{ pc/h}$ , terminate analysis—the LOS is F.  
3. For the analysis direction only and for  $V > 200 \text{ veh/h}$ , use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.  
\* These items have been entered or edited to override calculated value

Level of Service, LOS: B  
Volume to capacity ratio, v/c: 0.09  
Peak 15-min total travel time, WT60: 0  
Capacity from PIS: 1700  
Capacity from CDRSF: 1700  
Directional Capacity: 1700

Level of Service and Other Performance Measures:  
Level of service, LOS: B  
Volume to capacity ratio, v/c: 0.09  
Peak 15-min total travel time, WT60: 0  
Capacity from PIS: 1700  
Capacity from CDRSF: 1700  
Directional Capacity: 1700

Level of Service and Other Performance Measures:  
Level of service, LOS: B  
Volume to capacity ratio, v/c: 0.09  
Peak 15-min total travel time, WT60: 0  
Capacity from PIS: 1700  
Capacity from CDRSF: 1700  
Directional Capacity: 1700

Level of Service and Other Performance Measures:  
Level of service, LOS: B  
Volume to capacity ratio, v/c: 0.09  
Peak 15-min total travel time, WT60: 0  
Capacity from PIS: 1700  
Capacity from CDRSF: 1700  
Directional Capacity: 1700

Level of Service and Other Performance Measures:  
Level of service, LOS: B  
Volume to capacity ratio, v/c: 0.09  
Peak 15-min total travel time, WT60: 0  
Capacity from PIS: 1700  
Capacity from CDRSF: 1700  
Directional Capacity: 1700

Level of Service and Other Performance Measures:  
Level of service, LOS: B  
Volume to capacity ratio, v/c: 0.09  
Peak 15-min total travel time, WT60: 0  
Capacity from PIS: 1700  
Capacity from CDRSF: 1700  
Directional Capacity: 1700

Flow rate in outside lane, vol: 151.1  
Effective width of outside lane, we: 27.69  
Effective speed factor, Sf: 2.58  
Bicycle LOS: C

Notes:  
1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific terrain analysis is not required.  
2. If  $V_f (V_d \text{ or } V_o) \geq 1,700 \text{ pc/h}$ , terminate analysis—the LOS is F.  
3. For the analysis direction only and for  $V > 200 \text{ veh/h}$ , use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.  
\* These items have been entered or edited to override calculated value

Level of Service, LOS: B  
Volume to capacity ratio, v/c: 0.09  
Peak 15-min total travel time, WT60: 0  
Capacity from PIS: 1700  
Capacity from CDRSF: 1700  
Directional Capacity: 1700

Level of Service and Other Performance Measures:  
Level of service, LOS: B  
Volume to capacity ratio, v/c: 0.09  
Peak 15-min total travel time, WT60: 0  
Capacity from PIS: 1700  
Capacity from CDRSF: 1700  
Directional Capacity: 1700

Level of Service and Other Performance Measures:  
Level of service, LOS: B  
Volume to capacity ratio, v/c: 0.09  
Peak 15-min total travel time, WT60: 0  
Capacity from PIS: 1700  
Capacity from CDRSF: 1700  
Directional Capacity: 1700

Level of Service and Other Performance Measures:  
Level of service, LOS: B  
Volume to capacity ratio, v/c: 0.09  
Peak 15-min total travel time, WT60: 0  
Capacity from PIS: 1700  
Capacity from CDRSF: 1700  
Directional Capacity: 1700

Level of Service and Other Performance Measures:  
Level of service, LOS: B  
Volume to capacity ratio, v/c: 0.09  
Peak 15-min total travel time, WT60: 0  
Capacity from PIS: 1700  
Capacity from CDRSF: 1700  
Directional Capacity: 1700

Level of Service and Other Performance Measures:  
Level of service, LOS: B  
Volume to capacity ratio, v/c: 0.09  
Peak 15-min total travel time, WT60: 0  
Capacity from PIS: 1700  
Capacity from CDRSF: 1700  
Directional Capacity: 1700

Level of Service and Other Performance Measures:  
Level of service, LOS: B  
Volume to capacity ratio, v/c: 0.09  
Peak 15-min total travel time, WT60: 0  
Capacity from PIS: 1700  
Capacity from CDRSF: 1700  
Directional Capacity: 1700

Level of Service and Other Performance Measures:  
Level of service, LOS: B  
Volume to capacity ratio, v/c: 0.09  
Peak 15-min total travel time, WT60: 0  
Capacity from PIS: 1700  
Capacity from CDRSF: 1700  
Directional Capacity: 1700

Level of Service and Other Performance Measures:  
Level of service, LOS: B  
Volume to capacity ratio, v/c: 0.09  
Peak 15-min total travel time, WT60: 0  
Capacity from PIS: 1700  
Capacity from CDRSF: 1700  
Directional Capacity: 1700



Phone: E-Mail: Fax: Directional Two-Lane Highway Segment Analysis  
 Analyst: Kevin Rangel  
 Agency/Client: W-Trains  
 Highway: PM Existing + Project  
 Analysis Time Period: Dry Creek Road  
 Location: 1/2 mile to Orchard Ave  
 Jurisdiction: Napa County  
 Analysis Year: 2018  
 Description: Mathiasson Winery TIS

Input Data  
 Highway class: Class 3  
 Shoulder width: 5.0 ft  
 Lane width: 0.0 ft  
 Lane length: 0.0 mi  
 Terrain type: Level  
 Grade: Up/down  
 Opposing direction volume, Vd: 93 veh/h  
 Opposing direction volume, Vo: 177 veh/h

Average Travel Speed  
 Analysis(d) Opposing (o)  
 PCE for trucks, ET 1.9% 1.7%  
 Heavy-vehicle adj. factor, (note-1) fHV 0.949 0.960  
 Grade adj. factor, (note-1) fG 1.00 1.00  
 Directional Flow rate, (note-2) v1 111 pc/h 210 pc/h

Free-Flow Speed From Field Measurement:  
 Observed travel speed, (note-3) SPM - mi/h  
 Observed travel speed, (note-3) SPM - mi/h  
 Estimated Free-Flow Speed: 53.0 mi/h  
 Base Flow Speed, (note-3) fFS (note-3) FA 5.0 mi/h  
 Adj. for access point density, (note-3) FA 5.0 mi/h  
 Free-Flow speed, FFSd 48.7 mi/h

Adjustment for no-passing zones, fnp 3.9 mi/h  
 Percent Free Flow Speed, PFFS 86.8 %  
 Percent Time-Spent-Following, PTF 0 %

PCE for trucks, ET 1.0 1.0  
 Heavy-vehicle adjustment factor, fHV 0.994 0.994  
 Grade adjustment factor, (note-1) fG 1.00 1.00  
 Base percent time-spent-following, (note-4) BPTSFd 12.2 % 202 pc/h  
 Adjustment for no-passing zones, fnp 30.0 %  
 Percent time-spent-following, PTFsd 30.0 %

Level of Service, LOS B 0.06  
 Volume to capacity ratio, v/c 0.06  
 Peak-hour vehicle-miles of travel, VMT60 0 veh-mi  
 Peak 15-min total travel time, TT15 0.0 veh-h  
 Capacity from PMS, CAPMSP 1700 veh/h  
 Directional Capacity CAPDSF 1700 veh/h

Passing Lane Analysis  
 Total length of analysis segment, L 0.0 mi  
 Length of passing lane including tapers, Lpl 32.3 mi  
 Average travel speed, ATSD (from above) 32.3 mi/h  
 Level of service, LOSd (from above) B

Average Travel Speed with Passing Lane  
 Downstream length of two-lane highway within effective length of passing lane, Ld 0.0 mi  
 Length of two-lane highway downstream of effective length of passing lane for average travel speed, Lde - mi  
 Adj. on average speed, fp1 - mi

Percent Time-Spent-Following with Passing Lane  
 Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, Lde - mi  
 Length of two-lane highway downstream of effective length of passing lane for percent time-spent-following, Lde - mi  
 Adj. factor for the effect of passing lane on percent time-spent-following, fp1 -

Level of Service and other Performance Measures with Passing Lane  
 Level of service including passing lane, LOSpl E  
 Peak 15-min total travel time, TT15 0 veh-h  
 Bicycle Level of Service 45  
 Posted speed limit, Sp 0  
 Percent of segment with occupied on-highway parking 0 %  
 Pavement rating, P 3

Notes:  
 1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific terrain types are not included in the analysis.  
 2. If v/c (Vd or Vo) >= 1.700 pc/h, terminate analysis—the LOS is F.  
 3. For the analysis direction only and for v>200 veh/h, use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.  
 4. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

\* These items have been entered or edited to override calculated value

Directional Two-Lane Highway Segment Analysis  
 Analyst: Kevin Rangel  
 Agency/Client: W-Trains  
 Highway: PM Existing + Project  
 Analysis Time Period: Dry Creek Road  
 Location: From Trower Ave to Trower Ave  
 Jurisdiction: Napa County  
 Analysis Year: 2018  
 Description: Mathiasson Winery TIS

Input Data  
 Highway class: Class 3  
 Shoulder width: 5.0 ft  
 Lane width: 12.0 ft  
 Lane length: 0.0 mi  
 Terrain type: Level  
 Grade: Up/down  
 Access point density: 20 /mi  
 Opposing direction volume, Vd: 177 veh/h  
 Opposing direction volume, Vo: 95 veh/h

Average Travel Speed  
 Analysis(d): 1.7%  
 Opposing (o): 1.9  
 PCE for trucks, ET: 1.00  
 Heavy-vehicle adj. factor, (note-1): f<sub>g</sub> 0.949  
 Grade adj. factor, (note-1): f<sub>g</sub> 1.00  
 Directional Flow rate, (note-2): v<sub>i</sub> 210 pc/h

Free-Flow Speed From Field Measurement:  
 Observed total demand, (note-3): S<sub>PM</sub> -  
 Observed total demand, (note-3): S<sub>PM</sub> -  
 Estimated Free-Flow Speed: 52.0 mi/h  
 Base Free-Flow Speed, (note-3): FF<sub>S</sub> (note-3) 52.0 mi/h  
 Base Free-Flow Speed, (note-3): FF<sub>S</sub> (note-3) 52.0 mi/h  
 Adj. for access point density, (note-3): FA 5.0 mi/h  
 Free-Flow speed, FFSD 48.7 mi/h

Adjustment for no-passing zones, f<sub>np</sub> 2.16 mi/h  
 Adjusted Free-Flow Speed, FF<sub>FS</sub> 89.5 %  
 Percent Free Flow Speed, PFFS 89.5 %  
 Percent Time-Spent-Following, 0  
 Page 1

Analysis(d): 1.0  
 Opposing (o): 1.0  
 PCE for trucks, ET: 1.0  
 Heavy-vehicle adjustment factor, f<sub>HV</sub> 0.994  
 Grade adjustment factor, (note-1): f<sub>g</sub> 1.00  
 Directional Flow rate, (note-2): v<sub>i</sub> 210 pc/h  
 Base percent time-spent-following, (note-4): BPTSF 21.7 %  
 Adjustment for no-passing zones, f<sub>np</sub> 51.6 %  
 Percent time-spent-following, PFSd 35.3 %

Level of Service and Other Performance Measures  
 Level of service, LOS B  
 Volume to capacity ratio, v/c 0.12  
 W-trains peak-hour vehicle-miles of travel, WVT60 0 veh-mi  
 Peak 15-min total travel time, TT15 0.0 veh-h  
 Capacity from PMS, CAPMSP 1700 veh/h  
 Capacity from PMS, CAPMSP 1700 veh/h  
 Directional Capacity 1700 veh/h

Passing Lane Analysis  
 Total length of analysis segment, L 0.0 mi  
 Length of passing lane, L<sub>pl</sub> 0.0 mi  
 Length of passing lane including tapers, L<sub>pl</sub> 0.0 mi  
 Average travel speed, ATSD (from above) 53.6 mi/h  
 Level of service, LOS B  
 Average travel speed with passing lane, 53.6 mi/h

Downstream length of two-lane highway within effective length of passing lane, L<sub>dl</sub> 0.0 mi  
 Length of two-lane highway downstream of effective length of passing lane for average travel speed, L<sub>d</sub> 0.0 mi  
 Adj. for access point density, (note-3): FA 5.0 mi/h  
 Average travel speed including passing lane, ATSP<sub>pl</sub> 0.0 %  
 Percent Free Flow Speed including passing lane, PFFSP<sub>pl</sub> 0.0 %  
 Percent Time-Spent-Following with Passing Lane 0.0 %

Level of Service and Other Performance Measures with Passing Lane  
 Level of service including passing lane, LOS<sub>pl</sub> E  
 Peak 15-min total travel time, TT15 0 veh-h  
 Bicycle Level of Service 45  
 Posted speed limit, S<sub>p</sub> 0  
 Percent of segment with occupied on-highway parking 0  
 Pavement rating, P 3  
 Page 2

Flow rate in outside lane, v<sub>o</sub> 201.1  
 Effective width of outside lane, w<sub>e</sub> 22.00  
 Effective speed factor, S<sub>e</sub> 4.42  
 Bicycle LOS D 1.14  
 D 1.14

Notes:  
 1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific terrain analysis is required.  
 2. If v<sub>i</sub> (Vd or Vo) >= 1,700 pc/h, terminate analysis—the LOS is F.  
 3. For the analysis direction only and for v>200 veh/h.  
 4. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.  
 \* These items have been entered or edited to override calculated value

Flow rate in outside lane, v<sub>o</sub> 102.3  
Effective width of outside lane, w<sub>e</sub> 31.35  
Effective speed factor, S<sub>e</sub> 4.32  
Bicycle LOS A 4.39  
A

Notes:  
1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific terrain analysis is required. If you have terrain analysis, terminate analysis with a note.  
2. If v<sub>o</sub> (vd or v<sub>o</sub>) < 1,700 pc/h, terminate analysis—the LOS is F.  
3. For the analysis direction only and for v > 200 veh/h.  
4. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.  
\* These items have been entered or edited to override calculated value

Direction Analysis(d) Opposing (G)  
PCE for trucks, ET 1.0 1.0  
Heavy-vehicle adjustment factor, f<sub>HV</sub> 0.994 0.994  
Grade adjustment factor, (note-1), f<sub>g</sub> 1.00 1.00  
Base percent time-spent-following, (note-4), BPTSpd 11.9 % 83 pc/h  
Adjustment for no-passing zones, F<sub>npz</sub> 53.0 %  
Percent time-spent-following, P<sub>TSFD</sub> 40.9 %

Level of Service, LOS A 0.06  
Volume to capacity ratio, v/c equal\_wtms 0  
Peak hour vehicle miles of travel, W<sub>1600</sub> 0 veh-mi  
Peak 15-min total travel time, T<sub>15</sub> 0 veh-h  
Capacity from PIS, C<sub>DRPS</sub> 1700 veh/h  
Directional Capacity 1700 veh/h

Level of Service and other Performance Measures

Direction Analysis(d) Opposing (G)  
PCE for trucks, ET 1.0 1.0  
Heavy-vehicle adjustment factor, f<sub>HV</sub> 0.994 0.994  
Grade adjustment factor, (note-1), f<sub>g</sub> 1.00 1.00  
Base percent time-spent-following, (note-4), BPTSpd 11.9 % 83 pc/h  
Adjustment for no-passing zones, F<sub>npz</sub> 53.0 %  
Percent time-spent-following, P<sub>TSFD</sub> 40.9 %

Level of Service, LOS A 0.06  
Volume to capacity ratio, v/c equal\_wtms 0  
Peak hour vehicle miles of travel, W<sub>1600</sub> 0 veh-mi  
Peak 15-min total travel time, T<sub>15</sub> 0 veh-h  
Capacity from PIS, C<sub>DRPS</sub> 1700 veh/h  
Directional Capacity 1700 veh/h

Level of Service and other Performance Measures

Direction Analysis(d) Opposing (G)  
PCE for trucks, ET 1.0 1.0  
Heavy-vehicle adjustment factor, f<sub>HV</sub> 0.994 0.994  
Grade adjustment factor, (note-1), f<sub>g</sub> 1.00 1.00  
Base percent time-spent-following, (note-4), BPTSpd 11.9 % 83 pc/h  
Adjustment for no-passing zones, F<sub>npz</sub> 53.0 %  
Percent time-spent-following, P<sub>TSFD</sub> 40.9 %

Level of Service, LOS A 0.06  
Volume to capacity ratio, v/c equal\_wtms 0  
Peak hour vehicle miles of travel, W<sub>1600</sub> 0 veh-mi  
Peak 15-min total travel time, T<sub>15</sub> 0 veh-h  
Capacity from PIS, C<sub>DRPS</sub> 1700 veh/h  
Directional Capacity 1700 veh/h

Level of Service and other Performance Measures

Direction Analysis(d) Opposing (G)  
PCE for trucks, ET 1.0 1.0  
Heavy-vehicle adjustment factor, f<sub>HV</sub> 0.994 0.994  
Grade adjustment factor, (note-1), f<sub>g</sub> 1.00 1.00  
Base percent time-spent-following, (note-4), BPTSpd 11.9 % 83 pc/h  
Adjustment for no-passing zones, F<sub>npz</sub> 53.0 %  
Percent time-spent-following, P<sub>TSFD</sub> 40.9 %

Level of Service, LOS A 0.06  
Volume to capacity ratio, v/c equal\_wtms 0  
Peak hour vehicle miles of travel, W<sub>1600</sub> 0 veh-mi  
Peak 15-min total travel time, T<sub>15</sub> 0 veh-h  
Capacity from PIS, C<sub>DRPS</sub> 1700 veh/h  
Directional Capacity 1700 veh/h

Level of Service and other Performance Measures

Direction Analysis(d) Opposing (G)  
PCE for trucks, ET 1.0 1.0  
Heavy-vehicle adjustment factor, f<sub>HV</sub> 0.994 0.994  
Grade adjustment factor, (note-1), f<sub>g</sub> 1.00 1.00  
Base percent time-spent-following, (note-4), BPTSpd 11.9 % 83 pc/h  
Adjustment for no-passing zones, F<sub>npz</sub> 53.0 %  
Percent time-spent-following, P<sub>TSFD</sub> 40.9 %

Level of Service, LOS A 0.06  
Volume to capacity ratio, v/c equal\_wtms 0  
Peak hour vehicle miles of travel, W<sub>1600</sub> 0 veh-mi  
Peak 15-min total travel time, T<sub>15</sub> 0 veh-h  
Capacity from PIS, C<sub>DRPS</sub> 1700 veh/h  
Directional Capacity 1700 veh/h

Level of Service and other Performance Measures

Direction Analysis(d) Opposing (G)  
PCE for trucks, ET 1.0 1.0  
Heavy-vehicle adjustment factor, f<sub>HV</sub> 0.994 0.994  
Grade adjustment factor, (note-1), f<sub>g</sub> 1.00 1.00  
Base percent time-spent-following, (note-4), BPTSpd 11.9 % 83 pc/h  
Adjustment for no-passing zones, F<sub>npz</sub> 53.0 %  
Percent time-spent-following, P<sub>TSFD</sub> 40.9 %

Level of Service, LOS A 0.06  
Volume to capacity ratio, v/c equal\_wtms 0  
Peak hour vehicle miles of travel, W<sub>1600</sub> 0 veh-mi  
Peak 15-min total travel time, T<sub>15</sub> 0 veh-h  
Capacity from PIS, C<sub>DRPS</sub> 1700 veh/h  
Directional Capacity 1700 veh/h

Level of Service and other Performance Measures

Direction Analysis(d) Opposing (G)  
PCE for trucks, ET 1.0 1.0  
Heavy-vehicle adjustment factor, f<sub>HV</sub> 0.994 0.994  
Grade adjustment factor, (note-1), f<sub>g</sub> 1.00 1.00  
Base percent time-spent-following, (note-4), BPTSpd 11.9 % 83 pc/h  
Adjustment for no-passing zones, F<sub>npz</sub> 53.0 %  
Percent time-spent-following, P<sub>TSFD</sub> 40.9 %

Level of Service, LOS A 0.06  
Volume to capacity ratio, v/c equal\_wtms 0  
Peak hour vehicle miles of travel, W<sub>1600</sub> 0 veh-mi  
Peak 15-min total travel time, T<sub>15</sub> 0 veh-h  
Capacity from PIS, C<sub>DRPS</sub> 1700 veh/h  
Directional Capacity 1700 veh/h

Level of Service and other Performance Measures

Direction Analysis(d) Opposing (G)  
PCE for trucks, ET 1.0 1.0  
Heavy-vehicle adjustment factor, f<sub>HV</sub> 0.994 0.994  
Grade adjustment factor, (note-1), f<sub>g</sub> 1.00 1.00  
Base percent time-spent-following, (note-4), BPTSpd 11.9 % 83 pc/h  
Adjustment for no-passing zones, F<sub>npz</sub> 53.0 %  
Percent time-spent-following, P<sub>TSFD</sub> 40.9 %

Level of Service, LOS A 0.06  
Volume to capacity ratio, v/c equal\_wtms 0  
Peak hour vehicle miles of travel, W<sub>1600</sub> 0 veh-mi  
Peak 15-min total travel time, T<sub>15</sub> 0 veh-h  
Capacity from PIS, C<sub>DRPS</sub> 1700 veh/h  
Directional Capacity 1700 veh/h

Level of Service and other Performance Measures

Direction Analysis(d) Opposing (G)  
PCE for trucks, ET 1.0 1.0  
Heavy-vehicle adjustment factor, f<sub>HV</sub> 0.994 0.994  
Grade adjustment factor, (note-1), f<sub>g</sub> 1.00 1.00  
Base percent time-spent-following, (note-4), BPTSpd 11.9 % 83 pc/h  
Adjustment for no-passing zones, F<sub>npz</sub> 53.0 %  
Percent time-spent-following, P<sub>TSFD</sub> 40.9 %

Level of Service, LOS A 0.06  
Volume to capacity ratio, v/c equal\_wtms 0  
Peak hour vehicle miles of travel, W<sub>1600</sub> 0 veh-mi  
Peak 15-min total travel time, T<sub>15</sub> 0 veh-h  
Capacity from PIS, C<sub>DRPS</sub> 1700 veh/h  
Directional Capacity 1700 veh/h

Level of Service and other Performance Measures

Direction Analysis(d) Opposing (G)  
PCE for trucks, ET 1.0 1.0  
Heavy-vehicle adjustment factor, f<sub>HV</sub> 0.994 0.994  
Grade adjustment factor, (note-1), f<sub>g</sub> 1.00 1.00  
Base percent time-spent-following, (note-4), BPTSpd 11.9 % 83 pc/h  
Adjustment for no-passing zones, F<sub>npz</sub> 53.0 %  
Percent time-spent-following, P<sub>TSFD</sub> 40.9 %

Level of Service, LOS A 0.06  
Volume to capacity ratio, v/c equal\_wtms 0  
Peak hour vehicle miles of travel, W<sub>1600</sub> 0 veh-mi  
Peak 15-min total travel time, T<sub>15</sub> 0 veh-h  
Capacity from PIS, C<sub>DRPS</sub> 1700 veh/h  
Directional Capacity 1700 veh/h

Level of Service and other Performance Measures

Direction Analysis(d) Opposing (G)  
PCE for trucks, ET 1.0 1.0  
Heavy-vehicle adjustment factor, f<sub>HV</sub> 0.994 0.994  
Grade adjustment factor, (note-1), f<sub>g</sub> 1.00 1.00  
Base percent time-spent-following, (note-4), BPTSpd 11.9 % 83 pc/h  
Adjustment for no-passing zones, F<sub>npz</sub> 53.0 %  
Percent time-spent-following, P<sub>TSFD</sub> 40.9 %

Level of Service, LOS A 0.06  
Volume to capacity ratio, v/c equal\_wtms 0  
Peak hour vehicle miles of travel, W<sub>1600</sub> 0 veh-mi  
Peak 15-min total travel time, T<sub>15</sub> 0 veh-h  
Capacity from PIS, C<sub>DRPS</sub> 1700 veh/h  
Directional Capacity 1700 veh/h

Level of Service and other Performance Measures

Direction Analysis(d) Opposing (G)  
PCE for trucks, ET 1.0 1.0  
Heavy-vehicle adjustment factor, f<sub>HV</sub> 0.994 0.994  
Grade adjustment factor, (note-1), f<sub>g</sub> 1.00 1.00  
Base percent time-spent-following, (note-4), BPTSpd 11.9 % 83 pc/h  
Adjustment for no-passing zones, F<sub>npz</sub> 53.0 %  
Percent time-spent-following, P<sub>TSFD</sub> 40.9 %

Level of Service, LOS A 0.06  
Volume to capacity ratio, v/c equal\_wtms 0  
Peak hour vehicle miles of travel, W<sub>1600</sub> 0 veh-mi  
Peak 15-min total travel time, T<sub>15</sub> 0 veh-h  
Capacity from PIS, C<sub>DRPS</sub> 1700 veh/h  
Directional Capacity 1700 veh/h

Level of Service and other Performance Measures

Direction Analysis(d) Opposing (G)  
PCE for trucks, ET 1.0 1.0  
Heavy-vehicle adjustment factor, f<sub>HV</sub> 0.994 0.994  
Grade adjustment factor, (note-1), f<sub>g</sub> 1.00 1.00  
Base percent time-spent-following, (note-4), BPTSpd 11.9 % 83 pc/h  
Adjustment for no-passing zones, F<sub>npz</sub> 53.0 %  
Percent time-spent-following, P<sub>TSFD</sub> 40.9 %

Level of Service, LOS A 0.06  
Volume to capacity ratio, v/c equal\_wtms 0  
Peak hour vehicle miles of travel, W<sub>1600</sub> 0 veh-mi  
Peak 15-min total travel time, T<sub>15</sub> 0 veh-h  
Capacity from PIS, C<sub>DRPS</sub> 1700 veh/h  
Directional Capacity 1700 veh/h

Level of Service and other Performance Measures

Phase: E-8411: Directional Two-Lane Highway Segment Analysis  
 Analyst: Kevin Rangel  
 Agency/Client: W-Trains  
 Highway: MD Existing + Project  
 Analysis Time Period: Dry Creek Road  
 Location: From Trower Ave to Trower Ave  
 Jurisdiction: Napa County  
 Analysis Year: 2018  
 Description: Mathiasson Winery TIS

Input Data  
 Highway class: Class 3  
 Shoulder width: 5.0 ft  
 Lane width: 12.0 ft  
 Lane length: 0.0 ft  
 Terrain type: Level  
 Grade: Up/down  
 Opposing direction volume: Vd 74 veh/h  
 Opposing direction volume: Vo 90 veh/h

Average Travel Speed  
 Analysis(d)  
 PCE for trucks, ET: 1.90  
 Heavy-vehicle adj. factor, (note-1): Fv 0.949  
 Grade adj. factor, (note-1): Fg 1.00  
 Directional Flow rate, (note-2): v1 89 pc/h  
 Opposing (o): 108 pc/h

Free-Flow Speed From Field Measurement:  
 Observed total speed, (note-3): S, Fm  
 Estimated Free-Flow Speed: 52.0 mi/h  
 Base Flow Speed, (note-3): FFS 5.0 mi/h  
 Adj. for access point density, (note-3): FA 5.0 mi/h  
 Free-Flow speed, FFSd 48.7 mi/h

Adjustment for no-passing zones, fnp 2.6 mi/h  
 Percent Free Flow Speed, PFFS 91.5 %

Analysis(d)  
 PCE for trucks, ET: 1.90  
 Heavy-vehicle adj. factor, (note-1): Fv 0.994  
 Grade adjustment factor, (note-1): Fg 1.00  
 Base percent time-spent-following, (note-4): BTRSPd 10.0 %  
 Adjustment for no-passing zones, fnp 13.0 %  
 Percent time-spent-following, PFSd 34.0 %

Level of Service and other Performance Measures  
 Level of service, LOS: B  
 Volume to capacity ratio, v/c: 0.05  
 Peak-hour vehicle-miles of travel, VMT60: 0 veh-mi  
 Peak 15-min total travel time, TT15: 0.0 veh-h  
 Capacity from PIS: 1700 veh/h  
 Capacity from CDPTS: 1700 veh/h  
 Directional Capacity: 1700 veh/h

Passing Lane Analysis  
 Total length of analysis segment, L: 0.0 mi  
 Length of passing lane including tapers, Lpl: 34.6 mi  
 Average travel speed, ATSD (from above): 44.6 mi/h  
 Level of service, LOSd (from above): B

Average Travel Speed with Passing Lane  
 Downstream length of two-lane highway within effective length of passing lane, Ld: 0.0 mi  
 Length of two-lane highway downstream of effective length of passing lane for average travel speed, Lde: 34.6 mi  
 Adj. on average speed, fp: -  
 Average travel speed including passing lane, ATSpI: 0.0 %  
 Percent Free Flow Speed including passing lane, PFFSpI: -

Percent Time-Spent-Following with Passing Lane  
 Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, Lde: 34.6 mi  
 Length of two-lane highway downstream of effective length of passing lane for percent time-spent-following, Lde: 34.6 mi  
 Adj. factor for the effect of passing lane on percent time-spent-following, fp: -  
 Percent time-spent-following, PTFSpI: -

Level of Service and other Performance Measures with Passing Lane  
 Level of service including passing lane, LOSpl: E  
 Peak 15-min total travel time, TT15: 0 veh-h  
 Bicycle Level of Service: 45

Posted speed limit, Sp: 0  
 Percent of segment with occupied on-highway parking: 0  
 Pavement rating, P: 3

Flow rate in outside lane, vov: 84.1  
 Effective width of outside lane, we: 32.71  
 Effective speed factor, Se: 0.92  
 Bicycle LOS: A

Notes:  
 1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific terrain types are not used.  
 2. If v1 (Vd or Vo) >= 1,700 pc/h, terminate analysis—the LOS is F.  
 3. For the analysis direction only and for v>200 veh/h.  
 4. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.  
 \* These items have been entered or edited to override calculated value

Analysis(d)  
 PCE for trucks, ET: 1.90  
 Heavy-vehicle adj. factor, (note-1): Fv 0.994  
 Grade adjustment factor, (note-1): Fg 1.00  
 Base percent time-spent-following, (note-4): BTRSPd 10.0 %  
 Adjustment for no-passing zones, fnp 13.0 %  
 Percent time-spent-following, PFSd 34.0 %

Level of Service and other Performance Measures  
 Level of service, LOS: B  
 Volume to capacity ratio, v/c: 0.05  
 Peak-hour vehicle-miles of travel, VMT60: 0 veh-mi  
 Peak 15-min total travel time, TT15: 0.0 veh-h  
 Capacity from PIS: 1700 veh/h  
 Capacity from CDPTS: 1700 veh/h  
 Directional Capacity: 1700 veh/h

Percent Time-Spent-Following with Passing Lane  
 Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, Lde: 34.6 mi  
 Length of two-lane highway downstream of effective length of passing lane for percent time-spent-following, Lde: 34.6 mi  
 Adj. factor for the effect of passing lane on percent time-spent-following, fp: -  
 Percent time-spent-following, PTFSpI: -

Level of Service and other Performance Measures with Passing Lane  
 Level of service including passing lane, LOSpl: E  
 Peak 15-min total travel time, TT15: 0 veh-h  
 Bicycle Level of Service: 45

Posted speed limit, Sp: 0  
 Percent of segment with occupied on-highway parking: 0  
 Pavement rating, P: 3

Agency/Co: Kevin Rangel  
 Highway: PM Baseline + Project  
 Analysis Time Period: Dry Creek Road  
 Jurisdiction: Napa County  
 Analysis Year: 2018  
 Description: Mathiasson Winery TIS

Analyst: Kevin Rangel  
 W-Trains: 0  
 Buses: 0  
 Trucks: 0  
 Heavy-vehicle adj. factor: 1.0  
 Grade adj. factor: 1.0  
 Directional Flow rate: 119 pc/h

Direction: NB  
 PCE for trucks, ET: 1.96  
 Heavy-vehicle adj. factor: 1.0  
 Grade adj. factor: 1.0  
 Directional Flow rate: 119 pc/h

Free-Flow Speed From Field Measurement: 55.0 mi/h  
 Observed Free-Flow Speed: 55.0 mi/h  
 Estimated Free-Flow Speed: 55.0 mi/h  
 Base Free-Flow Speed: 55.0 mi/h  
 Adj. for access point density: 5.0 mi/h

Percent Time-Spent-Following: 31.4%

Direction: NB  
 PCE for trucks, ET: 1.96  
 Heavy-vehicle adj. factor: 1.0  
 Grade adj. factor: 1.0  
 Directional Flow rate: 119 pc/h

Level of Service, LOS: B  
 Volume to capacity ratio, v/c: 0.07  
 Peak 15-min total travel time, T15: 0.0 min  
 Capacity from PIS: 1700 veh/h  
 Directional Capacity: 1700 veh/h

Downstream length of two-lane highway within effective length of passing lane, Ld: 0.0 mi  
 Length of two-lane highway downstream of effective length of passing lane, Lp: 32.2 mi  
 Adj. factor for the effect of passing lane: 1.0

Level of Service, LOS: B  
 Volume to capacity ratio, v/c: 0.07  
 Peak 15-min total travel time, T15: 0.0 min  
 Capacity from PIS: 1700 veh/h  
 Directional Capacity: 1700 veh/h

Percent Time-Spent-Following: 31.4%

Flow rate in outside lane, v<sub>o</sub>: 112.5  
 Effective width of outside lane, w<sub>e</sub>: 30.59  
 Effective speed factor, S<sub>e</sub>: 4.39  
 Bicycle LOS: B

Notes:  
 1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific terrain analysis is not required.  
 2. If v<sub>o</sub> (v<sub>d</sub> or v<sub>o</sub>) >= 1,700 pc/h, terminate analysis—the LOS is F.  
 3. For the analysis direction only and for v>200 veh/h.  
 4. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.  
 \* These items have been entered or edited to override calculated value

Percent Time-Spent-Following: 31.4%

Direction: NB  
 PCE for trucks, ET: 1.96  
 Heavy-vehicle adj. factor: 1.0  
 Grade adj. factor: 1.0  
 Directional Flow rate: 119 pc/h

Level of Service, LOS: B  
 Volume to capacity ratio, v/c: 0.07  
 Peak 15-min total travel time, T15: 0.0 min  
 Capacity from PIS: 1700 veh/h  
 Directional Capacity: 1700 veh/h

Downstream length of two-lane highway within effective length of passing lane, Ld: 0.0 mi  
 Length of two-lane highway downstream of effective length of passing lane, Lp: 32.2 mi  
 Adj. factor for the effect of passing lane: 1.0

Level of Service, LOS: B  
 Volume to capacity ratio, v/c: 0.07  
 Peak 15-min total travel time, T15: 0.0 min  
 Capacity from PIS: 1700 veh/h  
 Directional Capacity: 1700 veh/h

Percent Time-Spent-Following: 31.4%

Agency/Co: Kevin Rangel  
 Highway: PM Baseline + Project  
 Analysis Time Period: Dry Creek Road  
 Jurisdiction: Napa County  
 Analysis Year: 2018  
 Description: Mathiasson Winery TIS

Direction: 188  
 Opposing direction volume, Vd: 99  
 Highway class: Class 3  
 Shoulder width: 5.0  
 Lane width: 0.0  
 Terrain type: Level  
 Grade: Up/down

Analysis direction volume, Vd: 188  
 Opposing direction volume, Vo: 99  
 Trucks and buses: 0.88  
 Trucks crawling: 0.0  
 Recreational vehicles: 4.0  
 Access point density: 2.0

Analysis direction volume, Vd: 188  
 Opposing direction volume, Vo: 99  
 Trucks and buses: 0.88  
 Trucks crawling: 0.0  
 Recreational vehicles: 4.0  
 Access point density: 2.0

Direction: 188  
 Opposing direction volume, Vo: 99  
 Heavy-vehicle adj. factor, (note-1): Fg  
 Grade adjustment factor, (note-2): Fg  
 Base percent time-spent-following, (note-4): BPTSF  
 Adjustment for no-passing zones, Fnp  
 Percent time-spent-following, PFSd

Analysis(d): 1.0  
 Opposing (o): 1.0  
 Heavy-vehicle adj. factor, FHV: 0.994  
 Grade adjustment factor, Fg: 1.000  
 Base percent time-spent-following, BPTSF: 22.9  
 Adjustment for no-passing zones, Fnp: 51.8  
 Percent time-spent-following, PFSd: 36.9

Level of service, LOS: B  
 Volume to capacity ratio, v/c: 0.13  
 Peak 15-min total travel time, T15: 0  
 Capacity from PIS: 1700  
 Capacity from CDRSF: 1700

Level of service, LOS: B  
 Volume to capacity ratio, v/c: 0.13  
 Peak 15-min total travel time, T15: 0  
 Capacity from PIS: 1700  
 Capacity from CDRSF: 1700

Flow rate in outside lane, vof: 213.6  
 Effective width of outside lane, we: 22.00  
 Effective speed factor, Se: 4.42  
 Bicycle LOS: D

Notes:  
 1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific terrain analysis is required.  
 2. If v/c (Vd or Vo) >= 1.700 pc/h, terminate analysis—the LOS is F.  
 3. For the analysis direction only and for v>200 veh/h.  
 4. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.  
 \* These items have been entered or edited to override calculated value

Flow rate in outside lane, vof: 213.6  
 Effective width of outside lane, we: 22.00  
 Effective speed factor, Se: 4.42  
 Bicycle LOS: D

Notes:  
 1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific terrain analysis is required.  
 2. If v/c (Vd or Vo) >= 1.700 pc/h, terminate analysis—the LOS is F.  
 3. For the analysis direction only and for v>200 veh/h.  
 4. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.  
 \* These items have been entered or edited to override calculated value

Agency/Co: Kevin Rangel  
 Highway: NB MD Baseline + Project  
 Analysis Time Period: Dry Creek Road  
 Jurisdiction: Napa County  
 Analysis Year: 2018  
 Description: Mathiasson Winery TIS

Phase: E-8411  
 E-Mail:   
 Fax:   
 Directional Two-Lane Highway Segment Analysis

Analysis (d) Analysis (e)  
 PCE for trucks, ET 1.0 1.0  
 Heavy-vehicle adj. factor, (note-1) f<sub>h</sub> 0.994 0.994  
 Grade adj. factor, (note-1) f<sub>g</sub> 1.00 1.00  
 Directional Flow rate, (note-2) v<sub>i</sub> 123 pc/h 105 pc/h

Free-Flow Speed From Field Measurement: 55.0 mi/h  
 Observed Free-Flow Speed (Note-3) 55.0 mi/h  
 Estimated Free-Flow Speed: 55.0 mi/h  
 Base Flow Speed (Note-3) 55.0 mi/h  
 Adjusted Free-Flow Speed (Note-3) 55.0 mi/h  
 Adj. for access point density, (note-3) FA 5.0 mi/h

Free-Flow speed, FFSd 48.7 mi/h  
 Adjustment for no-passing zones, f<sub>np</sub> 2.6 mi/h  
 Adjusted Free-Flow Speed, PFFS 91.1 %

Percent Time-Spent-Following: 0  
 Page 1

Direction Analysis (d) Analysis (e)  
 PCE for trucks, ET 1.0 1.0  
 Heavy-vehicle adj. factor, f<sub>h</sub> 0.994 0.994  
 Grade adjustment factor, (note-1) f<sub>g</sub> 1.00 1.00  
 Base percent time-spent-following, (note-4) BPTSFd 13.5 % 10.1 pc/h  
 Adjustment for no-passing zones, f<sub>np</sub> 53.8 %  
 Percent time-spent-following, PFSd 42.3 %

Level of Service, LOS B 0.07  
 Volume to capacity ratio, v/c 0.07  
 Peak-hour vehicle-miles of travel, VMT60 0 veh-mi  
 Peak 15-min total travel time, TT15 0.0 veh-h  
 Capacity from PMS, CAPMS 1700 veh/h  
 Directional Capacity CAPDSF 1700 veh/h

Level of Service and other Performance Measures  
 Level of service, LOS B 0.07  
 Volume to capacity ratio, v/c 0.07  
 Peak-hour vehicle-miles of travel, VMT60 0 veh-mi  
 Peak 15-min total travel time, TT15 0.0 veh-h  
 Capacity from PMS, CAPMS 1700 veh/h  
 Directional Capacity CAPDSF 1700 veh/h

Passing Lane Analysis  
 Total length of analysis segment, L 0.0 mi  
 Length of passing lane including tapers, Lpl 44.4 mi  
 Average travel speed, ATSD (from above) 42.3 mi/h  
 Level of service, LOSd (from above) B

Downstream length of two-lane highway within effective length of passing lane, Ld 0.0 mi  
 Length of two-lane highway downstream of effective length of passing lane for average travel speed, Ld 0.0 mi  
 Adj. on average speed, fp 0.0 %  
 Average travel speed including passing lane, ATSpI 0.0 %  
 Percent Free Flow Speed including passing lane, PFFSpI 0.0 %

Percent Time-Spent-Following with Passing Lane  
 Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, Lde 0.0 mi  
 Length of two-lane highway downstream of effective length of passing lane for percent time-spent-following, Lde 0.0 mi  
 Adj. factor for the effect of passing lane on percent time-spent-following, fp 0.0 %  
 Percent time-spent-following, PTFSpI 0.0 %  
 Including passing lane, PTFSpI 0.0 %

Level of Service and other Performance Measures with Passing Lane  
 Level of service including passing lane, LOSpl E  
 Peak 15-min total travel time, TT15 0 veh-h  
 Bicycle Level of Service 45

Posted speed limit, Sp 0  
 Percent of segment with occupied on-highway parking 0  
 Pavement rating, P 3  
 Page 2

Flow rate in outside lane, v<sub>o</sub> 117.0  
 Effective width of outside lane, we 30.25  
 Effective speed factor, S<sub>e</sub> 4.42  
 Bicycle LOS B 8

Notes:  
 1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific terrain analysis should be performed.  
 2. If v<sub>i</sub> (vd or v<sub>o</sub>) ≥ 1,700 pc/h, terminate analysis—the LOS is F.  
 3. For the analysis direction only and for v > 200 veh/h.  
 4. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.  
 \* These items have been entered or edited to override calculated value

Direction Analysis (d) Analysis (e)  
 PCE for trucks, ET 1.0 1.0  
 Heavy-vehicle adj. factor, f<sub>h</sub> 0.994 0.994  
 Grade adjustment factor, (note-1) f<sub>g</sub> 1.00 1.00  
 Base percent time-spent-following, (note-4) BPTSFd 13.5 % 10.1 pc/h  
 Adjustment for no-passing zones, f<sub>np</sub> 53.8 %  
 Percent time-spent-following, PFSd 42.3 %

Level of Service, LOS B 0.07  
 Volume to capacity ratio, v/c 0.07  
 Peak-hour vehicle-miles of travel, VMT60 0 veh-mi  
 Peak 15-min total travel time, TT15 0.0 veh-h  
 Capacity from PMS, CAPMS 1700 veh/h  
 Directional Capacity CAPDSF 1700 veh/h

Level of Service and other Performance Measures  
 Level of service, LOS B 0.07  
 Volume to capacity ratio, v/c 0.07  
 Peak-hour vehicle-miles of travel, VMT60 0 veh-mi  
 Peak 15-min total travel time, TT15 0.0 veh-h  
 Capacity from PMS, CAPMS 1700 veh/h  
 Directional Capacity CAPDSF 1700 veh/h

Passing Lane Analysis  
 Total length of analysis segment, L 0.0 mi  
 Length of passing lane including tapers, Lpl 44.4 mi  
 Average travel speed, ATSD (from above) 42.3 mi/h  
 Level of service, LOSd (from above) B

Downstream length of two-lane highway within effective length of passing lane, Ld 0.0 mi  
 Length of two-lane highway downstream of effective length of passing lane for average travel speed, Ld 0.0 mi  
 Adj. on average speed, fp 0.0 %  
 Average travel speed including passing lane, ATSpI 0.0 %  
 Percent Free Flow Speed including passing lane, PFFSpI 0.0 %

Percent Time-Spent-Following with Passing Lane  
 Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, Lde 0.0 mi  
 Length of two-lane highway downstream of effective length of passing lane for percent time-spent-following, Lde 0.0 mi  
 Adj. factor for the effect of passing lane on percent time-spent-following, fp 0.0 %  
 Percent time-spent-following, PTFSpI 0.0 %  
 Including passing lane, PTFSpI 0.0 %

Level of Service and other Performance Measures with Passing Lane  
 Level of service including passing lane, LOSpl E  
 Peak 15-min total travel time, TT15 0 veh-h  
 Bicycle Level of Service 45

Posted speed limit, Sp 0  
 Percent of segment with occupied on-highway parking 0  
 Pavement rating, P 3  
 Page 3

Phone: E-Mail: Directional Two-Lane Highway Segment Analysis  
 Analyst: Kevin Rangel  
 Agency/Client: W-Trains  
 Highway: SB MD Baseline + Project  
 Analysis Time Period: Dry Creek Road  
 Location: From Trower Ave to Trower Ave  
 Jurisdiction: Napa County  
 Analysis Year: 2018  
 Description: Mathiasson Winery TIS

Input Data  
 Highway class: Class 3  
 Shoulder width: 5.0 ft  
 Lane width: 12.0 ft  
 Lane length: 0.0 mi  
 Terrain type: Level  
 Grade: Up/down  
 Opposing direction volume, Vd: 88 veh/h  
 Opposing direction volume, Vo: 109 veh/h

Average Travel Speed  
 Analysis(d) Opposing (o)  
 PCE for trucks, ET 1.96 1.96  
 Heavy-vehicle adj. factor, (note-1) fHV 0.949 0.949  
 Grade adj. factor, (note-1) fG 1.00 1.00  
 Directional Flow rate, (note-2) v1 105 pc/h 123 pc/h

Free-Flow Speed From Field Measurement:  
 Observed total demand, (note-3) S, Pm  
 Estimated Free-Flow Speed: 53.0 mi/h  
 Base Flow Speed, (note-3) fFS 5.0 mi/h  
 Adj. for access point density, (note-3) FA 5.0 mi/h  
 Free-Flow speed, FFSd 48.7 mi/h

Adjustment for no-passing zones, fnp 2.8 mi/h  
 Percent Free Flow Speed, PFFS 90.6 %  
 Percent Time-Spent-Following, PTF 0 %

PCE for trucks, ET 1.0 1.0  
 Heavy-vehicle adjustment factor, fHV 0.994 0.994  
 Grade adjustment factor, (note-1) fG 1.00 1.00  
 Base percent time-spent-following, (note-4) BPTSFd 11.7 % 11.8 %  
 Adjustment for no-passing zones, fnp 53.8 %  
 Percent time-spent-following, PTFsd 36.3 %

Level of Service, LOS B 0.06  
 Volume to capacity ratio, v/c 0.06  
 Peak-hour vehicle-miles of travel, VMT60 0 veh-mi  
 Peak 15-min total travel time, TT15 0.0 veh-h  
 Capacity from PMS, CAPMSP 1700 veh/h  
 Directional Capacity CAPDSF 1700 veh/h

Passing Lane Analysis  
 Total length of analysis segment, L 0.0 mi  
 Length of passing lane including tapers, Lpl 14.1 mi  
 Average travel speed, ATSD (from above) 36.3 mi/h  
 Level of service, LOSd (from above) B

Average Travel Speed with Passing Lane  
 Downstream length of two-lane highway within effective length of passing lane, Ld 0.0 mi  
 Length of two-lane highway downstream of effective length of passing lane, Lde 14.1 mi  
 Adj. on average speed, fpl -

Percent Time-Spent-Following with Passing Lane  
 Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, Lde 14.1 mi  
 Length of two-lane highway downstream of effective length of passing lane, Lde 14.1 mi  
 Adj. factor for the effect of passing lane on percent time-spent-following, fpl -

Level of Service and other Performance Measures with Passing Lane  
 Level of service including passing lane, LOSpl E  
 Peak 15-min total travel time, TT15 0 veh-h  
 Bicycle Level of Service 45  
 Posted speed limit, Sp 0  
 Percent of segment with occupied on-highway parking 0 %  
 Pavement rating, P 3

- Notes:  
 1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific terrain types are used to determine the LOS. If the terrain type is not listed, use the LOS for level terrain.  
 2. If v1 (Vd or Vo) >= 1,700 pc/h, terminate analysis—the LOS is F.  
 3. For the analysis direction only and for v>200 veh/h, use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.  
 4. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

\* These items have been entered or edited to override calculated value



Phase: E-8411: Directional Two-Lane Highway Segment Analysis  
 Analyst: Kevin Rangel  
 Agency/Client: W-Trains  
 Highway: PM Future + Project  
 Analysis Time Period: Dry Creek Road  
 Location: 1/2 mile to Orchard Ave  
 Jurisdiction: Napa County  
 Analysis Year: 2018  
 Description: Mathiasson Winery TIS

Input Data  
 Highway class: Class 3  
 Shoulder width: 5.0 ft  
 Lane width: 0.0 ft  
 Terrain type: Level  
 Grade: Up/down  
 Opposing direction volume, Vd: 115 veh/h  
 Peak hour factor, PHF: 0.88  
 % Trucks and buses: 6 %  
 % Trucks crawling: 0 %  
 % Recreational vehicles: 4 %/hr  
 % No-passing zones: 100 %  
 Access point density: 20 /mi

Average Travel Speed  
 Analysis(d) Opposing (o)  
 PCE for trucks, ET 1.9%  
 Heavy-vehicle adj. factor, (note-1) fHV 0.949  
 Grade adj. factor, (note-2) v1 1.00  
 Directional Flow rate, (note-2) v1 138 pc/h  
 Free-Flow Speed From Field Measurement: 50 mi/h  
 Observed travel speed, (note-3) SPM 5.0 mi/h  
 Estimated Free-Flow Speed: 50 mi/h  
 Base Flow Speed, (note-3) FFS 5.0 mi/h  
 Adj. for access point density, (note-3) FA 5.0 mi/h  
 Free-Flow speed, FFSd 48.7 mi/h

Adjustment for no-passing zones, fnp 2.8 mi/h  
 Percent Free Flow Speed, PFFS 85.9 %  
 Percent Time-Spent-Following 45 %  
 Page 1

Direction Analysis(d) Opposing (o)  
 PCE for trucks, ET 1.0  
 Heavy-vehicle adjustment factor, fHV 0.994  
 Grade adjustment factor, (note-1) fg 1.00  
 Base percent time-spent-following, (note-4) BPTSFd 17.5 %  
 Adjustment for no-passing zones, fnp 45.2 %  
 Percent time-spent-following, PFSd 23.0 %

Level of Service, LOS B  
 Volume to capacity ratio, v/c 0.08  
 Peak 15-min total travel time, WT60 0  
 Capacity from PMS, CAPMS 1700 veh/h  
 Directional Capacity 1700 veh/h

Passing Lane Analysis  
 Total length of analysis segment, L 0.0 mi  
 Length of passing lane including tapers, Lpl 21.8 mi  
 Average travel speed, ATSD (from above) 23.0 mi/h  
 Level of service, LOSd (from above) B

Average Travel Speed with Passing Lane  
 Downstream length of two-lane highway within effective length of passing lane, Ld 0.0 mi  
 Length of two-lane highway downstream of effective length of passing lane for average travel speed, Ld 21.8 mi  
 Adj. on average speed, fp 0.0 %  
 Average travel speed including passing lane, ATSpI 0.0 %  
 Percent Free Flow Speed including passing lane, PFFSpI 0.0 %

Percent Time-Spent-Following with Passing Lane  
 Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, Lde 0.0 mi  
 Length of two-lane highway downstream of effective length of passing lane for percent time-spent-following, Lde 21.8 mi  
 Adj. factor for the effect of passing lane on percent time-spent-following, fp 0.0 %  
 Percent time-spent-following, PTFSpI 0.0 %  
 Including passing lane, PTFSpI 0.0 %

Level of Service and other Performance Measures with Passing Lane  
 Level of service including passing lane, LOSpl E  
 Peak 15-min total travel time, T15 0 veh-h  
 Bicycle Level of Service 45  
 Posted speed limit, Sp 0  
 Percent of segment with occupied on-highway parking 0 %  
 Pavement rating, P 3  
 Page 2

Flow rate in outside lane, vol 130.7  
 Effective width of outside lane, we 29.23  
 Effective speed factor, Sc 2.07  
 Bicycle LOS B

Notes:  
 1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific terrain adjustment factors are provided in Exhibit 15-14.  
 2. If v/c (Vd or Vd) >= 1.700 pc/h, terminate analysis—the LOS is F.  
 3. For the analysis direction only and for v>200 veh/h.  
 4. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.  
 \* These items have been entered or edited to override calculated value

Agency/Co: Kevin Rangel  
 Highway: W-Trails  
 Analysis Time Period: PM Future + Project  
 Highway: Dry Creek Road  
 Location: From Trower Ave  
 Jurisdiction: Napa County  
 Analysis Year: 2018  
 Description: Mathiasson Winery TIS

Phase: E-8411:  
 Directional: Two-Lane Highway Segment Analysis

Analyst: Kevin Rangel  
 W-Trails  
 PM Future + Project  
 Dry Creek Road  
 From Trower Ave  
 Napa County  
 2018  
 Mathiasson Winery TIS

Input Data  
 Highway class: Class 3  
 Shoulder width: 5.0 ft  
 Lane width: 12.0 ft  
 Lane length: 0.0 mi  
 Terrain type: Level  
 Grade: Up/down  
 Access point density: 20 /mi

Peak hour factor: PHF 0.88  
 % Trucks and buses 6 %  
 % Trucks crawling 0 %  
 % Recreational vehicles 4 %/hr  
 % No-passing zones 100 %  
 Access point density 20 /mi

Analysis direction volume, Vd 334 veh/h  
 Opposing direction volume, Vo 115 veh/h  
 Average Travel Speed  
 Analysis(d) 1.4e  
 Opposing (o) 1.9g

PCE for trucks, ET 1.0  
 Heavy-vehicle adj. factor, (note-1) fgv 0.994  
 Grade adj. factor, (note-2) vi 1.00  
 Directional Flow rate, (note-2) vl 388 pc/h

Free-Flow Speed From Field Measurement: 50 mi/h  
 Observed total demand, (note-3) S, PM 388 pc/h  
 Estimated Free-Flow Speed: 50 mi/h  
 Base Flow Speed, (note-3) ffs 5.0 m/h  
 Base Flow Speed, (note-3) ffs 5.0 m/h  
 Adj. for access point density, (note-3) fa 48.7 m/h

Direction: SB PM Future + Project  
 Analysis(d) 1.0  
 Opposing (o) 1.0  
 PCE for trucks, ET 1.0  
 Heavy-vehicle adj. factor, fgv 0.994  
 Grade adjustment factor, (note-1) fg 0.994  
 Base percent time-spent-following, (note-4) BPTSFd 36.6 %  
 Adjustment for no-passing zones, ffp 45.2 %  
 Percent time-spent-following, PFSd 70.3 %

Level of Service, LOS B  
 Volume to capacity ratio, v/c 0.22  
 W-trails  
 Peak-hour vehicle miles of travel, VMT60 0  
 Peak 15-min total travel time, TT15 0.0  
 Capacity from PIS, CAPIS 1700 veh/h  
 Capacity from PIS, CAPIS 1700 veh/h  
 Directional Capacity 1700 veh/h

Level of Service and Other Performance Measures  
 Level of service, LOS B  
 Volume to capacity ratio, v/c 0.22  
 W-trails  
 Peak-hour vehicle miles of travel, VMT60 0  
 Peak 15-min total travel time, TT15 0.0  
 Capacity from PIS, CAPIS 1700 veh/h  
 Capacity from PIS, CAPIS 1700 veh/h  
 Directional Capacity 1700 veh/h

Passing Lane Analysis  
 Total length of analysis segment, L 0.0 mi  
 Length of passing lane including tapers, Lpl 0.0 mi  
 Length of two-lane highway downstream of effective length of passing lane, Ld 21.5 mi  
 Average travel speed, ATSp (from above) 8 m/h  
 Level of service, LOSd (from above) B

Downstream length of two-lane highway within effective length of passing lane, Lde 0.0 mi  
 Length of two-lane highway downstream of effective length of passing lane for average travel speed, Ld 21.5 mi  
 Adj. for average speed, fp 0.0 %  
 Average travel speed including passing lane, ATSppl 0.0 %  
 Percent Free Flow Speed including passing lane, PFSpl 0.0 %

Percent Time-Spent-Following with Passing Lane  
 Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, Lde 0.0 mi  
 Length of two-lane highway downstream of effective length of passing lane for percent time-spent-following, Ld 21.5 mi  
 Adj. factor for the effect of passing lane on percent time-spent-following, fp 0.0 %  
 Percent time-spent-following, PFSpl 0.0 %  
 Including passing lane, PFSplpl 0.0 %

Level of Service and Other Performance Measures with Passing Lane  
 Level of service including passing lane, LOSpl E  
 Peak 15-min total travel time, TT15 0.0  
 Bicycle Level of Service 45  
 Posted speed limit, Sp 0  
 Percent of segment with occupied on-highway parking 0  
 Pavement rating, P 3

Flow rate in outside lane, vol 379.5  
 Effective width of outside lane, we 22.00  
 Effective speed factor, Sc 4.42  
 Bicycle LOS D 4.46  
 D

Notes:  
 1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific terrain adjustments are not applicable.  
 2. If v/c (Vd or Vo) >= 1.700 pc/h, terminate analysis—the LOS is F.  
 3. For the analysis direction only and for v>200 veh/h.  
 4. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.  
 \* These items have been entered or edited to override calculated value

Flow rate in outside lane, vol 379.5  
 Effective width of outside lane, we 22.00  
 Effective speed factor, Sc 4.42  
 Bicycle LOS D 4.46  
 D

Notes:  
 1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific terrain adjustments are not applicable.  
 2. If v/c (Vd or Vo) >= 1.700 pc/h, terminate analysis—the LOS is F.  
 3. For the analysis direction only and for v>200 veh/h.  
 4. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.  
 \* These items have been entered or edited to override calculated value

Flow rate in outside lane, vol 123.9  
Effective width of outside lane, we 29.74  
Effective speed factor, Sf 4.86  
Bicycle LOS B

- Notes:
- Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific terrain adjustment factors are provided in Exhibit 15-14.
  - If  $V_f (V_d \text{ or } V_o) \geq 1,700 \text{ pc/h}$ , terminate analysis—the LOS is F.
  - For the analysis direction only and for  $V > 200 \text{ veh/h}$ , use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.
  - These items have been entered or edited to override calculated value

Directional Two-Lane Highway Segment Analysis

Analysis (d)	Opposing (o)
1.0	1.0
0.994	0.994
1.00	1.00
14.2 %	13.8 %
56.1 %	56.1 %
39.0 %	39.0 %

Level of Service and Other Performance Measures

Level of service, LOS	B	0.07	veh-mi
Volume to capacity ratio, v/c	0.07	veh-mi	veh-mi
Peak 15-min total travel time, T15	0	veh-h	veh-h
Capacity from PIS	1700	veh/h	veh/h
Capacity from CDPTS	1700	veh/h	veh/h
Directional Capacity	1700	veh/h	veh/h

Passing Lane Analysis

Total length of analysis segment, L	0.0	mi
Length of passing lane including tapers, Lpl	32.9	mi
Length of two-lane highway downstream of effective, Lde	33.0	mi
Average travel speed, ATSD (from above)	33.0	mi/h
Adj. factor for the effect of passing lane	B	
Level of service, LOS (from above)	B	

Input Data

Highway class	Class 3	0.88
Shoulder width	5.0	ft
Lane width	12.0	ft
Shoulder slope	0.0	%
Terrain type	Level	4.0
Grade	Up/down	100
Access point density		2.0
veh/h	109	
veh/h	138	
veh/h	138	

Average Travel Speed

Analysis (d)	Opposing (o)
1.96	1.96
0.949	0.949
1.00	1.00
131	165
pc/h	pc/h

Analysis (d)

PCE for trucks, ET	1.96	
Heavy-vehicle adj. factor, (note-1)	0.949	
Grade adj. factor, (note-2)	1.00	
Directional Flow rate, (note-2)	131	pc/h
Free-Flow Speed From Field Measurement:		
Observed travel speed, (note-3)	55.0	mi/h
Adjusted travel speed, (note-3)	55.0	mi/h
Estimated Free-Flow Speed:		
Base free-flow speed, (note-3)	55.0	mi/h
Adj. for access point density, (note-3)	5.0	mi/h
Free-Flow speed, FFSd	48.7	mi/h

Level of Service and Other Performance Measures with Passing Lane

Level of service, LOS	E	veh-h
Volume to capacity ratio, v/c	0	veh-h
Peak 15-min total travel time, T15	0	veh-h
Capacity from PIS	1700	veh/h
Capacity from CDPTS	1700	veh/h
Directional Capacity	1700	veh/h

Level of Service and Other Performance Measures

Level of service, LOS	B	0.07	veh-mi
Volume to capacity ratio, v/c	0.07	veh-mi	veh-mi
Peak 15-min total travel time, T15	0	veh-h	veh-h
Capacity from PIS	1700	veh/h	veh/h
Capacity from CDPTS	1700	veh/h	veh/h
Directional Capacity	1700	veh/h	veh/h

Downstream Length of Two-Lane Highway Within Effective Length of Passing Lane

Downstream length of two-lane highway within effective length of passing lane, Lde	33.0	mi
Length of two-lane highway downstream of effective, Lde	33.0	mi
Adj. factor for the effect of passing lane	B	
Level of service, LOS (from above)	B	

Downstream Length of Two-Lane Highway Within Effective Length of Passing Lane

Downstream length of two-lane highway within effective length of passing lane, Lde	33.0	mi
Length of two-lane highway downstream of effective, Lde	33.0	mi
Adj. factor for the effect of passing lane	B	
Level of service, LOS (from above)	B	

Level of Service and Other Performance Measures with Passing Lane

Level of service, LOS	E	veh-h
Volume to capacity ratio, v/c	0	veh-h
Peak 15-min total travel time, T15	0	veh-h
Capacity from PIS	1700	veh/h
Capacity from CDPTS	1700	veh/h
Directional Capacity	1700	veh/h

Level of Service and Other Performance Measures

Level of service, LOS	B	0.07	veh-mi
Volume to capacity ratio, v/c	0.07	veh-mi	veh-mi
Peak 15-min total travel time, T15	0	veh-h	veh-h
Capacity from PIS	1700	veh/h	veh/h
Capacity from CDPTS	1700	veh/h	veh/h
Directional Capacity	1700	veh/h	veh/h

Percent Time Spent Following

Percent time spent following, PFSd	48.7	mi/h
Adjustment for no-passing zones, fnp	3.5	mi/h
Percent free-flow speed, PFFS	88.2	%
Percent free-flow speed, PFFS	88.2	%

Percent Time Spent Following

Percent time spent following, PFSd	48.7	mi/h
Adjustment for no-passing zones, fnp	3.5	mi/h
Percent free-flow speed, PFFS	88.2	%
Percent free-flow speed, PFFS	88.2	%

Phone: \_\_\_\_\_  
E-Mail: \_\_\_\_\_  
Analyst: Kevin Rangel  
Agency/Client: W-Trains  
Analysis Period: SB MD Future + Project  
Highway: Dry Creek Road  
Location: From Trower Ave  
Jurisdiction: Napa County  
Analysis Year: 2018  
Description: Mathiasson Winery TIS

Directional Two-Lane Highway Segment Analysis  
Level of Service, LOS  
Volume to Capacity ratio, v/c  
Peak 15-min total travel time, TTT15  
Capacity from PMS, CAPMSP  
Directional Capacity

Direction: \_\_\_\_\_  
Analysis(d): \_\_\_\_\_  
Opposing (o): \_\_\_\_\_  
PCE for trucks, ET: 1.0  
Heavy-vehicle adj. factor, (note-1) f<sub>HV</sub>: 0.994  
Grade adj. factor, (note-1) f<sub>G</sub>: 1.000  
Directional Flow rate, (note-2) v<sub>i</sub>: 165 pc/h

Free-Flow Speed From Field Measurement: \_\_\_\_\_  
Observed total demand, (note-3) S<sub>PM</sub>: \_\_\_\_\_  
Estimated Free-Flow Speed: \_\_\_\_\_  
Base Flow Speed, (note-3) FFS: 53.0 mi/h  
Adj. for access point density, (note-3) FA: 5.0 mi/h  
Free-Flow speed, FFSd: 48.7 mi/h

Percent Time-Spent-Following: \_\_\_\_\_

Notes:  
1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific terrain adjustments are not made.  
2. If v<sub>i</sub> (vd or v<sub>o</sub>) ≥ 1,700 pc/h, terminate analysis—the LOS is F.  
3. For the analysis direction only and for v>200 veh/h.  
4. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.  
\* These items have been entered or edited to override calculated value

Direction: \_\_\_\_\_  
Analysis(d): \_\_\_\_\_  
Opposing (o): \_\_\_\_\_  
PCE for trucks, ET: 1.0  
Heavy-vehicle adjustment factor, f<sub>HV</sub>: 0.994  
Grade adjustment factor, (note-1) f<sub>G</sub>: 1.000  
Base percent time-spent-following, (note-4) BPTSF: 17.5 %  
Adjustment for no-passing zones, f<sub>np</sub>: 56.1 %  
Percent time-spent-following, PFSd: 48.8 %

Level of Service, LOS: B  
Volume to Capacity ratio, v/c: 0.09  
Peak 15-min total travel time, TTT15: 0  
Capacity from PMS, CAPMSP: 1700 veh/h  
Directional Capacity: 1700 veh/h

Passing Lane Analysis  
Total length of analysis segment, L: 0.0 mi  
Length of passing lane including tapers, L<sub>pl</sub>: 43.5 mi  
Average travel speed, ATSD (from above): 48.8 mi/h  
Level of service, LOSd (from above): B

Downstream length of two-lane highway within effective length of passing lane, L<sub>u</sub>: \_\_\_\_\_  
Length of two-lane highway downstream of effective length of the passing lane for average travel speed, L<sub>d</sub>: \_\_\_\_\_  
Adj. on average speed, f<sub>p</sub>: \_\_\_\_\_  
Average travel speed including passing lane, ATSpI: 0.0 %  
Percent Free Flow Speed including passing lane, PFSpl: \_\_\_\_\_

Percent Time-Spent-Following with Passing Lane  
Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, L<sub>de</sub>: \_\_\_\_\_  
Length of two-lane highway downstream of effective length of the passing lane for percent time-spent-following, L<sub>d</sub>: \_\_\_\_\_  
Adj. factor for the effect of passing lane on percent time-spent-following, f<sub>p</sub>: \_\_\_\_\_  
Percent time-spent-following, PTFSpI: \_\_\_\_\_

Level of Service and other Performance Measures with Passing Lane: \_\_\_\_\_

Level of service including passing lane, LOSpl: E  
Peak 15-min total travel time, TTT15: \_\_\_\_\_  
Bicycle Level of Service: \_\_\_\_\_  
Posted speed limit, S<sub>p</sub>: 45  
Percent of segment with occupied on-highway parking: 0  
Pavement rating, P: 3

# Appendix D

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## Trip Generation Spreadsheets





## Winery Traffic Information / Trip Generation Sheet

Project Name: Matthiason Winery

Project Scenario:

Permitted

### Traffic during a Typical Weekday

Number of FT employees: <u>2</u> x 3.05 one-way trips per employee	=	<u>6</u> daily trips.
Number of PT employees: <u>0</u> x 1.90 one-way trips per employee	=	<u>0</u> daily trips.
Average number of weekday visitors: <u>2</u> / 2.6 visitors per vehicle x 2 one-way trips	=	<u>2</u> daily trips.
Gallons of production: <u>5000</u> / 1,000 x .009 truck trips daily <sup>3</sup> x 2 one-way trips	=	<u>0</u> daily trips.
<b>Total</b>	<b>=</b>	<b><u>8</u> daily trips.</b>
Number of total weekday trips x .38	=	<u>3</u> <b>PM peak trips.</b>

### Traffic during a Typical Saturday

Number of FT employees (on Saturdays): <u>2</u> x 3.05 one-way trips per employee	=	<u>6</u> daily trips.
Number of PT employees (on Saturdays): <u>0</u> x 1.90 one-way trips per employee	=	<u>0</u> daily trips.
Average number of weekend visitors: <u>2</u> / 2.8 visitors per vehicle x 2 one-way trips	=	<u>1</u> daily trips.
<b>Total</b>	<b>=</b>	<b><u>8</u> daily trips.</b>
Number of total Saturday trips x .57	=	<u>5</u> <b>PM peak trips.</b>

### Traffic during a Crush Saturday

Number of FT employees (during crush): <u>2</u> x 3.05 one-way trips per employee	=	<u>6</u> daily trips.
Number of PT employees (during crush): <u>0</u> x 1.90 one-way trips per employee	=	<u>0</u> daily trips.
Average number of weekend visitors: <u>2</u> / 2.8 visitors per vehicle x 2 one-way trips	=	<u>1</u> daily trips.
Gallons of production: <u>5000</u> / 1,000 x .009 truck trips daily x 2 one-way trips	=	<u>0</u> daily trips.
Avg. annual tons of grape on-haul: <u>30</u> x .11 truck trips daily <sup>4</sup> x 2 one-way trips	=	<u>0</u> daily trips.
<b>Total</b>	<b>=</b>	<b><u>8</u> daily trips.</b>
Number of total Saturday trips x .57	=	<u>5</u> <b>PM peak trips.</b>

### Largest Marketing Event- Additional Traffic

Number of event staff (largest event): <u>0</u> x 2 one-way trips per staff person	=	<u>0</u> trips.
Number of visitors (largest event): <u>0</u> / 2.8 visitors per vehicle x 2 one-way trips	=	<u>0</u> trips.
Number of special event truck trips (largest event): <u>0</u> x 2 one-way trips	=	<u>0</u> trips.

<sup>3</sup> Assumes 1.47 materials & supplies trips + 0.8 case goods trips per 1,000 gallons of production / 250 days per year (see *Traffic Information Sheet Addendum* for reference).

<sup>4</sup> Assumes 4 tons per trip / 36 crush days per year (see *Traffic Information Sheet Addendum* for reference).

## Winery Traffic Information / Trip Generation Sheet

Project Name: Matthiason Winery

Project Scenario:

Proposed

### Traffic during a Typical Weekday

Number of FT employees: <u>4</u> x 3.05 one-way trips per employee	=	<u>12</u> daily trips.
Number of PT employees: <u>0</u> x 1.90 one-way trips per employee	=	<u>0</u> daily trips.
Average number of weekday visitors: <u>15</u> / 2.6 visitors per vehicle x 2 one-way trips	=	<u>12</u> daily trips.
Gallons of production: <u>18000</u> / 1,000 x .009 truck trips daily <sup>3</sup> x 2 one-way trips	=	<u>0</u> daily trips.
<b>Total</b>	<b>=</b>	<b><u>24</u> daily trips.</b>
Number of total weekday trips x .38	=	<u>9</u> <b>PM peak trips.</b>

### Traffic during a Typical Saturday

Number of FT employees (on Saturdays): <u>2</u> x 3.05 one-way trips per employee	=	<u>6</u> daily trips.
Number of PT employees (on Saturdays): <u>0</u> x 1.90 one-way trips per employee	=	<u>0</u> daily trips.
Average number of weekend visitors: <u>17</u> / 2.8 visitors per vehicle x 2 one-way trips	=	<u>12</u> daily trips.
<b>Total</b>	<b>=</b>	<b><u>18</u> daily trips.</b>
Number of total Saturday trips x .57	=	<u>10</u> <b>PM peak trips.</b>

### Traffic during a Crush Saturday

Number of FT employees (during crush): <u>2</u> x 3.05 one-way trips per employee	=	<u>6</u> daily trips.
Number of PT employees (during crush): <u>2</u> x 1.90 one-way trips per employee	=	<u>4</u> daily trips.
Average number of weekend visitors: <u>17</u> / 2.8 visitors per vehicle x 2 one-way trips	=	<u>12</u> daily trips.
Gallons of production: <u>18000</u> / 1,000 x .009 truck trips daily x 2 one-way trips	=	<u>0</u> daily trips.
Avg. annual tons of grape on-haul: <u>90</u> x .11 truck trips daily <sup>4</sup> x 2 one-way trips	=	<u>1</u> daily trips.
<b>Total</b>	<b>=</b>	<b><u>24</u> daily trips.</b>
Number of total Saturday trips x .57	=	<u>14</u> <b>PM peak trips.</b>

### Largest Marketing Event- Additional Traffic

Number of event staff (largest event): <u>1</u> x 2 one-way trips per staff person	=	<u>2</u> trips.
Number of visitors (largest event): <u>30</u> / 2.8 visitors per vehicle x 2 one-way trips	=	<u>21</u> trips.
Number of special event truck trips (largest event): <u>1</u> x 2 one-way trips	=	<u>2</u> trips.

<sup>3</sup> Assumes 1.47 materials & supplies trips + 0.8 case goods trips per 1,000 gallons of production / 250 days per year (see *Traffic Information Sheet Addendum* for reference).

<sup>4</sup> Assumes 4 tons per trip / 36 crush days per year (see *Traffic Information Sheet Addendum* for reference).



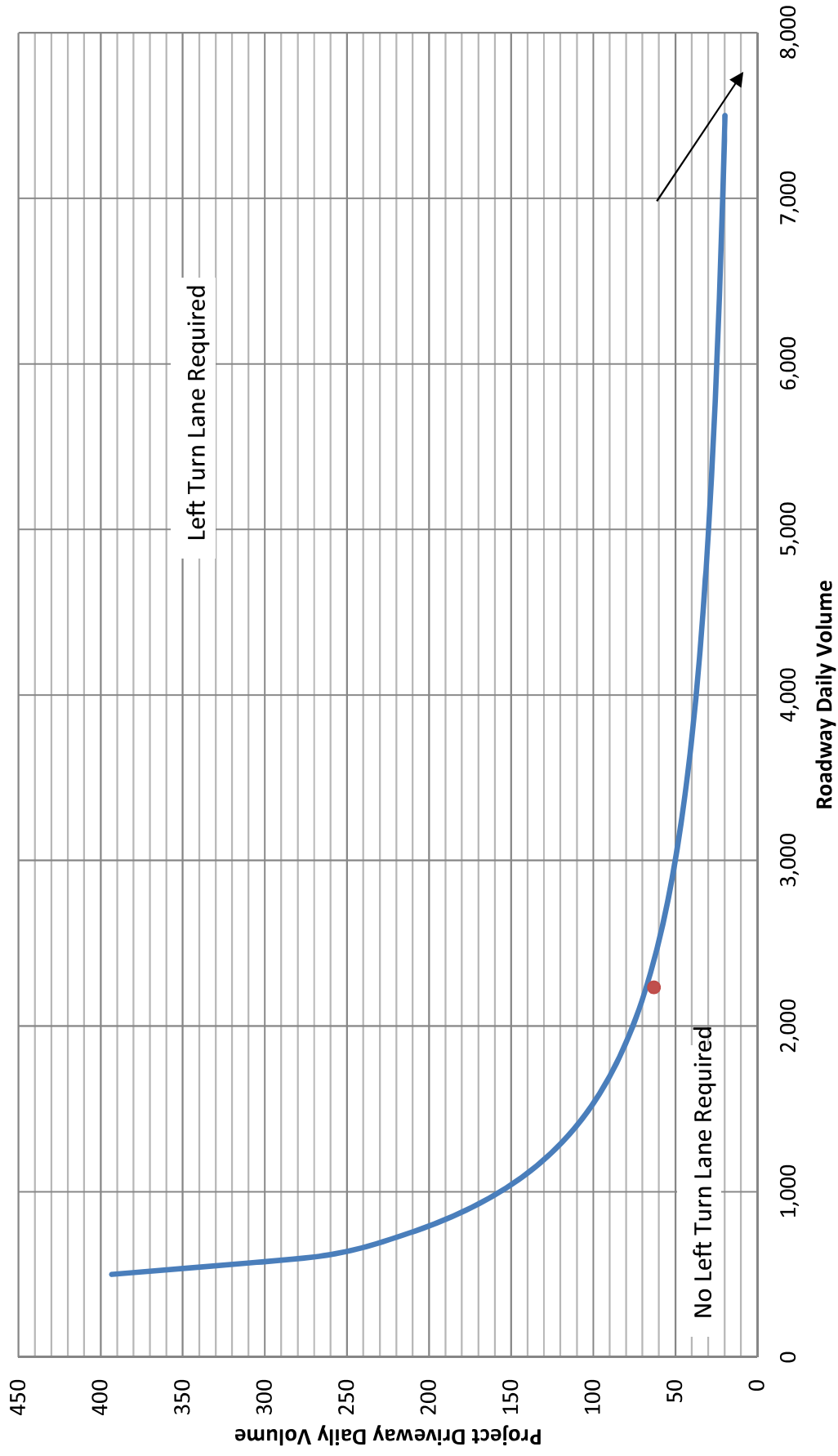
# Appendix E

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## Left-Turn Lane Warrant Graph and Roadway Volumes



# Napa County Left Turn Lane Warrant Graph



### VOLUME

Dry Creek Rd near 3175 Dry Creek Rd

Day: Tuesday  
Date: 1/30/2018

City: Napa  
Project #: CA18\_8023\_002

DAILY TOTALS					NB	SB	EB	WB	Total		
					937	877	0	0	1,814		
AM Period	NB	SB	EB	WB	TOTAL	PM Period	NB	SB	EB	WB	TOTAL
00:00	0	0			0	12:00	16	9			25
00:15	0	0			0	12:15	12	14			26
00:30	1	0			1	12:30	15	8			23
00:45	2	3	0		2	12:45	18	61	15	46	33
01:00	1	0			1	13:00	9	15			24
01:15	0	1			1	13:15	14	16			30
01:30	0	0			0	13:30	24	6			30
01:45	0	1	0	1	0	13:45	7	54	16	53	23
02:00	0	0			0	14:00	11	15			26
02:15	0	0			0	14:15	11	14			25
02:30	0	0			0	14:30	10	12			22
02:45	0	0			0	14:45	20	52	14	55	34
03:00	0	0			0	15:00	15	25			40
03:15	2	2			4	15:15	21	22			43
03:30	0	1			1	15:30	23	32			55
03:45	0	2	0	3	0	15:45	18	77	47	126	65
04:00	0	0			0	16:00	17	22			39
04:15	0	0			0	16:15	19	30			49
04:30	0	0			0	16:30	21	46			67
04:45	0	2	2		2	16:45	20	77	25	123	45
05:00	0	2			2	17:00	17	23			40
05:15	2	5			7	17:15	16	37			53
05:30	4	2			6	17:30	14	25			39
05:45	3	9	3	12	6	17:45	15	62	28	113	43
06:00	2	3			5	18:00	17	15			32
06:15	18	1			19	18:15	5	7			12
06:30	8	7			15	18:30	4	9			13
06:45	10	38	6	17	16	18:45	5	31	5	36	10
07:00	12	5			17	19:00	4	9			13
07:15	21	11			32	19:15	3	8			11
07:30	36	8			44	19:30	8	4			12
07:45	47	116	18	42	65	19:45	7	22	8	29	15
08:00	33	8			41	20:00	6	3			9
08:15	39	13			52	20:15	7	2			9
08:30	25	14			39	20:30	3	7			10
08:45	27	124	12	47	39	20:45	2	18	5	17	7
09:00	27	14			41	21:00	6	2			8
09:15	10	10			20	21:15	5	1			6
09:30	17	12			29	21:30	0	3			3
09:45	10	64	11	47	21	21:45	5	16	1	7	6
10:00	14	11			25	22:00	2	4			6
10:15	7	7			14	22:15	1	1			2
10:30	9	17			26	22:30	5	0			5
10:45	9	39	17	52	26	22:45	1	9	3	8	4
11:00	15	7			22	23:00	1	1			2
11:15	19	4			23	23:15	1	2			3
11:30	9	10			19	23:30	1	0			1
11:45	13	56	17	38	30	23:45	3	6	0	3	3
<b>TOTALS</b>	452	261			713	<b>TOTALS</b>	485	616			1101
<b>SPLIT %</b>	63.4%	36.6%			39.3%	<b>SPLIT %</b>	44.1%	55.9%			60.7%

DAILY TOTALS					NB	SB	EB	WB	Total		
					937	877	0	0	1,814		
AM Peak Hour	07:30	07:45			07:30	PM Peak Hour	14:45	15:45		15:45	
AM Pk Volume	155	53			202	PM Pk Volume	79	145		220	
Pk Hr Factor	0.824	0.736			0.777	Pk Hr Factor	0.859	0.771		0.821	
7 - 9 Volume	240	89	0	0	329	4 - 6 Volume	139	236	0	0	375
7 - 9 Peak Hour	07:30	07:45			07:30	4 - 6 Peak Hour	16:00	16:30			16:30
7 - 9 Pk Volume	155	53	0	0	202	4 - 6 Pk Volume	77	131	0	0	205
Pk Hr Factor	0.824	0.736	0.000	0.000	0.777	Pk Hr Factor	0.917	0.712	0.000	0.000	0.765

# VOLUME

Dwy @ 3175 Dry Creek Rd

Day: Thursday  
Date: 2/1/2018

City: Napa  
Project #: CA18\_8023\_001

DAILY TOTALS					NB	SB						Total
					0	0						10
							8			2		
AM Period	NB	SB	EB	WB	TOTAL	PM Period	NB	SB	EB	WB	TOTAL	
00:00			0	0	0	12:00			0	0	0	
00:15			0	0	0	12:15			0	0	0	
00:30			0	0	0	12:30			1	0	1	
00:45			0	0	0	12:45			1	2	1	
01:00			0	0	0	13:00			0	0	0	
01:15			0	0	0	13:15			0	0	0	
01:30			0	0	0	13:30			0	0	0	
01:45			0	0	0	13:45			0	1	1	
02:00			0	0	0	14:00			1	0	1	
02:15			0	0	0	14:15			0	0	0	
02:30			0	0	0	14:30			0	0	0	
02:45			0	0	0	14:45			0	1	0	
03:00			0	0	0	15:00			1	0	1	
03:15			0	0	0	15:15			0	0	0	
03:30			0	0	0	15:30			1	0	1	
03:45			0	0	0	15:45			0	2	0	
04:00			0	0	0	16:00			0	0	0	
04:15			0	0	0	16:15			0	0	0	
04:30			0	0	0	16:30			1	0	1	
04:45			0	0	0	16:45			0	1	0	
05:00			0	0	0	17:00			0	0	0	
05:15			0	0	0	17:15			0	0	0	
05:30			0	0	0	17:30			0	0	0	
05:45			0	0	0	17:45			0	0	0	
06:00			0	0	0	18:00			0	0	0	
06:15			0	0	0	18:15			0	0	0	
06:30			0	0	0	18:30			0	0	0	
06:45			0	1	1	18:45			0	0	0	
07:00			0	0	0	19:00			0	0	0	
07:15			0	0	0	19:15			0	0	0	
07:30			0	0	0	19:30			0	0	0	
07:45			1	1	1	19:45			0	0	0	
08:00			0	0	0	20:00			0	0	0	
08:15			1	0	1	20:15			0	0	0	
08:30			0	0	0	20:30			0	0	0	
08:45			0	1	0	20:45			0	0	0	
09:00			0	0	0	21:00			0	0	0	
09:15			0	0	0	21:15			0	0	0	
09:30			0	0	0	21:30			0	0	0	
09:45			0	0	0	21:45			0	0	0	
10:00			0	0	0	22:00			0	0	0	
10:15			0	0	0	22:15			0	0	0	
10:30			0	0	0	22:30			0	0	0	
10:45			0	0	0	22:45			0	0	0	
11:00			0	0	0	23:00			0	0	0	
11:15			0	0	0	23:15			0	0	0	
11:30			0	0	0	23:30			0	0	0	
11:45			0	0	0	23:45			0	0	0	
<b>TOTALS</b>			2	1	3	<b>TOTALS</b>			6	1	7	
<b>SPLIT %</b>			66.7%	33.3%	30.0%	<b>SPLIT %</b>			85.7%	14.3%	70.0%	

DAILY TOTALS					NB	SB						Total
					0	0						10
							8			2		
AM Peak Hour			07:30	06:00	07:30	PM Peak Hour			12:00	13:00	12:00	
AM Pk Volume			2	1	2	PM Pk Volume			2	1	2	
Pk Hr Factor			0.500	0.250	0.500	Pk Hr Factor			0.500	0.250	0.500	
7 - 9 Volume	0	0	2	0	2	4 - 6 Volume	0	0	1	0	1	
7 - 9 Peak Hour			07:30		07:30	4 - 6 Peak Hour			16:00		16:00	
7 - 9 Pk Volume	0	0	2	0	2	4 - 6 Pk Volume	0	0	1	0	1	
Pk Hr Factor	0.000	0.000	0.500	0.000	0.500	Pk Hr Factor	0.000	0.000	0.250	0.000	0.250	