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Traffic Study

Sam Jasper Winery, P15-00077 - UP
Planning Commission Hearing, January 18, 2017

W-Trans

Traffic Impact Study
for Sam Jasper Winery

Prepared for the County of Napa

Submitted by
W-Trans

September 16, 2015

TRAFFIC ENGINEERING
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Executive Summary

The Sam Jasper Winery project is a winery with a proposed 20,000 gallons of wine per year, ten employees, 25 daily visitors, and special events with up to 50 people. The project's anticipated trip generation includes 50 daily trips on average during a weekday, with 19 trips during the p.m. peak hour and 27 during the weekend midday peak hour.

The study area was established by the County and includes Silverado Trail abutting the project site, as well as between Oak Knoll Avenue to the north and Petra Drive and Soda Canyon Road to the south. Analysis indicates that the study segment is operating acceptably for some peak periods and unacceptably for other peak periods under Existing, Cumulative, and Future conditions both with and without project traffic added. The project volumes have a less-than-significant impact under all scenarios, including those where the study segment is operating unacceptably without project-added volumes, as the project-added volumes represent less than one percent of projected future volumes.

Vehicles will access the project via an existing driveway on Silverado Trail. A left-turn lane is warranted under Existing plus Project conditions, and is recommended as part of the project. Sight distance at the project driveway location for both entering and exiting drivers as well as for approaching drivers is adequate.

Although the project's traffic impacts are expected to be less-than-significant, the applicant should consider implementing a transportation demand management program to limit employee trips during peak traffic periods through shift changes, carpooling, and similar measures.

Introduction

Introduction

This report presents an analysis of the potential traffic impacts that would be associated with development of a proposed winery to be located at 4059 Silverado Trail 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 in order 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 roadway segments.

Project Profile

The proposed project would include production of up to 20,000 gallons of wine annually and operation of a tasting room. Visitation to the tasting room would be by appointment-only and 23 special events per year are proposed. The project site is located at 4059 Silverado Trail, as shown in Figure 1.
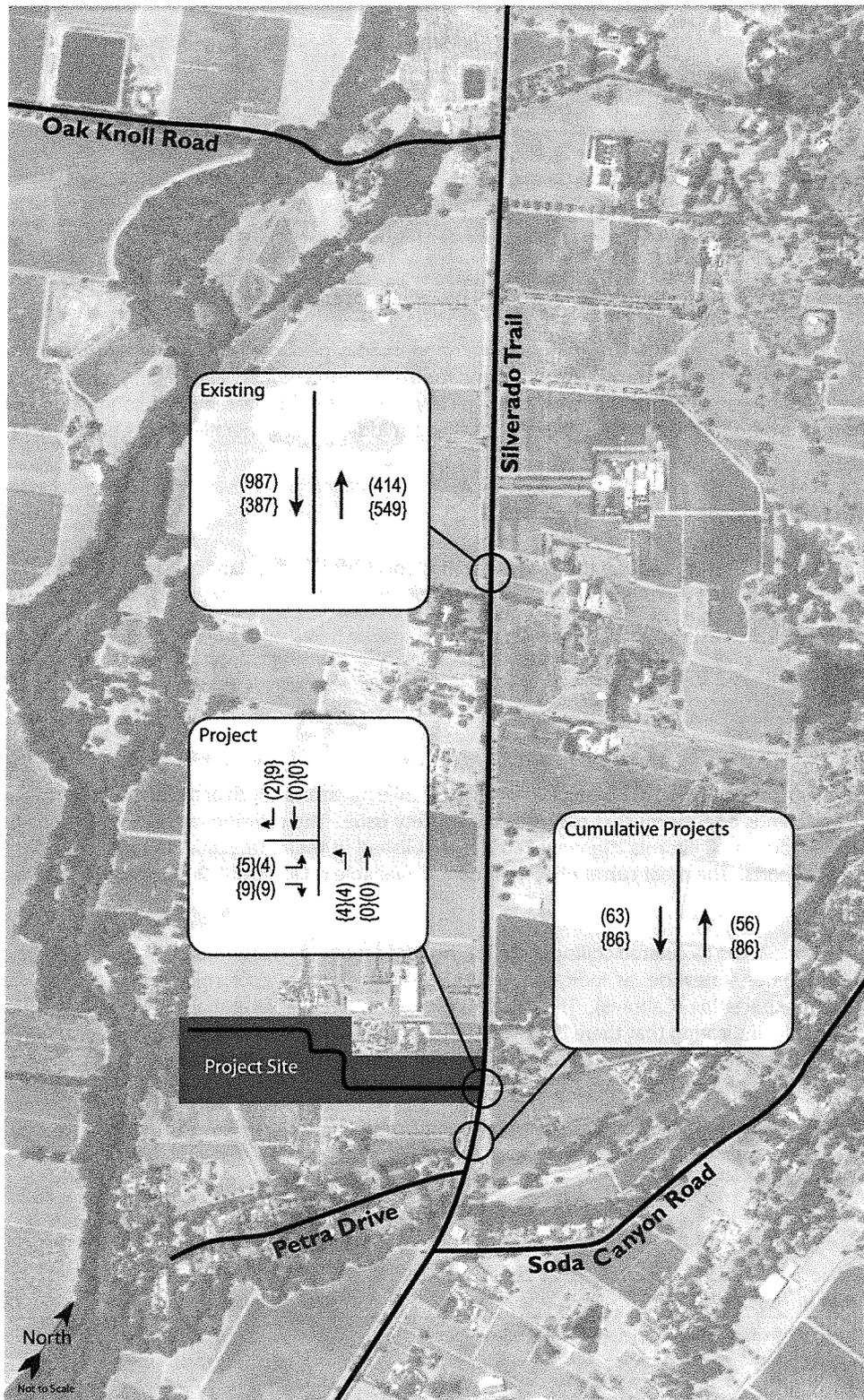
Existing

(987) ↓ ↑ (414)
{387}   {549}

Project

(2){9} (0){0}
↳   ↓
{5}(4) →┐ ┌→ ↑
{9}(9) →┘ └→ {4}{4} {0}{0}

Cumulative Projects

(63) ↓ ↑ (56)
{86}   {86}

Project Site

North
Not to Scale

Oak Knoll Road

Silverado Trail

Petra Drive

Soda Canyon Road

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Traffic Impact Study for Sam Jasper Winery
Figure 1 – Study Area and Traffic Volumes

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Transportation Setting

Operational Analysis

Study Area and Periods

The study area consists of the section of Silverado Trail providing access to the project site.

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 winery and tasting room. The 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 generally occurs between 11:00 a.m. and 1:00 p.m.

Study Roadway

Silverado Trail runs north-south through the study area, has one 12-foot travel lane in each direction, bike lanes, and a posted speed limit of 55 miles per hour (mph). Based on the *Napa County General Plan*, 2013, Silverado Trail is classified as a rural throughway.

The study area is shown in Figure 1.

Collision History

The collision history for the section of Silverado Trail one-half mile north and south of the project site was reviewed to determine any trends or patterns that may indicate a safety issue. The collision rate was calculated based on records available from the California Highway Patrol as published in their Statewide Integrated Traffic Records System (SWITRS) reports. The most current five-year period available is October 1, 2008, through September 30, 2013.

As presented in Table 1, the calculated collision rate for the study segment was compared to the average collision rate for similar facilities statewide, as indicated in *2012 Collision Data on California State Highways*, California Department of Transportation (Caltrans). The calculated collision rate is substantially lower than the statewide average collision rate, indicating that there is unlikely to be a specific safety concern. It was noted that 10 of the 16 crashes involved southbound drivers, and of these, seven occurred during the evening peak period when the predominant commute pattern is southbound. The collision rate spreadsheet is provided in Appendix A.

Table 1 – Collision Rates for the Study Segments			
Study Roadway Segments	**Number of Collisions (2008-2013)**	**Calculated Collision Rate (c/mvm)**	**Statewide Average Collision Rate (c/mvm)**
Silverado Trail near 4059	16	0.63	1.29

Note: c/mvm = collisions per million vehicles miles

Capacity Analysis

Roadway Segment Level of Service Methodology

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

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

Table 2 – Automobile Level of Service Criteria				
LOS	**Class I Highways**		**Class II Highways**	**Class III Highways**
	ATS (mi/h)	**PTSF (%)**	**PTSF (%)**	**PFFS (%)**
A	>55	≤35	≤40	>91.7
B	>50-55	>35-50	>40-55	>83.3-91.7
C	>45-50	>50-65	>55-70	>75.0-83.3
D	>40-45	>65-80	>70-85	>66.7-75.0
E	≤40	>80	≤85	≤66.7

Notes: LOS = Level of Service; ATS = Average Travel Speed
PTSF = Percent Time Spent Following
PFFS = Percent of Free-Flow Speed
Reference: *Highway Capacity Manual*, Transportation Research Board, 2010

A point just south of the project driveway was chosen to represent segment volumes on Silverado Trail in the vicinity of the project site. Choosing a point just south of the project site captures more of the trips projected to be added to the roadway network due to Cumulative conditions and plus Project conditions because of the assumed trip distribution, resulting in a more conservative analysis.

Traffic Operation Standards

Policy CIR-13 in the *Napa County General Plan* states, "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 of the *Napa County General Plan* provides guidance for roadways, indicating that, "The County shall seek to maintain an arterial Level of Service D or better on all county roadways, except where maintaining this desired level of service would require the installation of more travel lanes than shown on the Circulation Map. Silverado Trail is shown as a 2-lane Rural Collector on the Circulation Map (Figure CIR-1). A one-percent criteria for the threshold of significance is used for this analysis because it is well within the range of daily variation in traffic as well as the range of accuracy of travel demand forecast models and therefore not likely to be noticeable to drivers. While the traffic study relies on the County's LOS D standard, if operation falls below this threshold, an increase which is less than one-percent of cumulative volumes is considered less-than-significant.

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 April 8 to April 12, 2015.

The existing traffic volumes on Silverado Trail are summarized in Table 3.

Table 3 – Existing Traffic Volumes				
Study Segment	**Weekday**		**Saturday**	
	NB	**SB**	**NB**	**SB**
Silverado Trail near 4059	414	987	549	387

Notes: NB = Northbound; SB = Southbound

Roadway Segment Levels of Service

Under existing conditions, the roadway operates acceptably at LOS C or D or better northbound during both peak periods and southbound during the weekend midday peak period, but unacceptably at LOS E during the weekday p.m. peak hour in the southbound direction. A summary of the roadway segment level of service calculations is shown in Table 4, and copies of the Level of Service calculations are provided in Appendix B.

Table 4 – Existing Peak Hour Roadway Segment Levels of Service								
Study Segment	**Weekday PM Peak**				**Weekend Midday Peak**			
	NB		**SB**		**NB**		**SB**	
	PTSF	**LOS**	**PTSF**	**LOS**	**PTSF**	**LOS**	**PTSF**	**LOS**
Silverado Trail near 4059	59.9%	C	**89.7%**	**E**	78.4%	D	63.1%	C

Notes: NB = Northbound; SB = Southbound; PTSF = Percent Time Spent Following
LOS = Level of Service; **Bold** text = deficient operation

Cumulative Conditions

Cumulative operating conditions were determined with trips generated by other approved and pending projects that would add traffic to the segment of Silverado Trail within four miles of Sam Jasper Winery added to existing volumes. As directed by County staff, the following projects were included to evaluate Cumulative Conditions.

- **Krupp Winery** – 3150 Silverado Trail, approximately 0.6 miles south of the project site; new winery with an annual production of 50,000 gallons; six full-time employees and four part-time employees; maximum of 124 visitors per day; maximum of 125 guests at special events
- **Melka Winery** – 2900 Silverado Trail, approximately 1.2 miles south of the project site; new winery with an annual production of 10,000 gallons; one full-time employee and one part-time employee; maximum of 7 visitors per day; maximum of 100 guests at special events
- **Reynolds Winery** – 3720 Silverado Trail, approximately 0.4 miles south of the project site; use permit update to produce 20,000 additional gallons annually; 10 additional employees; maximum of 30 additional visitors per day; maximum of 125 guests at special events
- **Davis Estates Winery** – 4060 Silverado Trail, approximately 0.1 miles north of the project site; use permit update to produce an additional 80,000 gallons annually; 10 additional employees; maximum of 190 additional visitors per day; maximum of 200 guests at special events
- **Mountain Peak Winery** – 3265 Soda Canyon Road, approximately 6.5 miles from the project site; new winery with an annual production of 100,000 gallons; 29 full-time employees and eight part-time employees; maximum of 80 visitors per day; maximum of 125 guests at special events (although this winery is more than four miles from the project site, it will add trips to the study segment via the lone connection to Soda Canyon Road)
- **Stag's Leap Winery** – 5766 Silverado Trail, approximately 3.6 miles north of the project site; use permit update to have an additional 25 employees; maximum of 250 guests at special events
- **Corona Winery** – 3165 Silverado Trail, approximately 0.4 miles south of the project site; new winery with an annual production of 100,000 gallons; 25 employees; maximum of 48 visitors per day; maximum of 125 guests at special events
- **Beau Vigne Winery** – 4057 Silverado Trail, 300 feet south of the project site; use permit update to increase production to 14,000 gallons; three full-time employees and one part-time employee; maximum of 15 visitors per day; maximum of 30 guests at special events

The traffic volumes on the study segment under cumulative conditions are summarized in Table 5. Some visitors to Sam Jasper Winery would be expected to visit multiple wineries during their time in Napa Valley, including those wineries included in the list of approved projects.

Table 5 – Cumulative Traffic Volumes				
Study Segment	**Weekday**		**Saturday**	
	NB	**SB**	**NB**	**SB**
Silverado Trail near 4059	470	1,050	635	473

Notes: NB = Northbound; SB = Southbound

Under cumulative conditions, Silverado Trail is expected to operate acceptably at LOS C or D northbound during both peak periods and southbound during the weekend midday peak period, but would continue to operate unacceptably at LOS E during the weekday p.m. peak hour in the southbound direction. These results are summarized in Table 6, and cumulative volumes are shown in Figure 1.

Table 6 – Cumulative Peak Hour Roadway Segment Levels of Service								
Study Segment	**Weekday PM Peak**				**Weekend Midday Peak**			
	NB		**SB**		**NB**		**SB**	
	PTSF	LOS	PTSF	LOS	PTSF	LOS	PTSF	LOS
Silverado Trail near 4059	64.7%	C	**90.7%**	**E**	81.3%	D	68.7%	C

Notes: NB = Northbound; SB = Southbound; PTSF = Percent Time Spent Following
LOS = Level of Service; **Bold** text = deficient operation

In keeping with Policies CIR-13 and CIR-16 of the *Napa County General Plan*, because it would require adding lanes to achieve a higher service level, the County would instead be expected to focus on improving access, especially at intersections of public roads, so no measures are recommended to achieve LOS D operation on Silverado Trail.

Future Conditions

Segment volumes for the horizon year of 2030 were obtained from the County's gravity demand model. Because the projected 2030 volumes for Silverado Trail near the project driveway are approximately equal to existing volumes from April 2015 and less than cumulative volumes, a growth factor of 2.15 was calculated based on 2010 and 2030 model volumes and applied to existing volumes to arrive at future volumes.

Table 7 shows the projected future traffic volumes on Silverado Trail near the project site achieved through application of the growth factor.

Table 7 – Future Traffic Volumes				
Study Segment	**Weekday**		**Saturday**	
	NB	**SB**	**NB**	**SB**
Silverado Trail near 4059	890	2,122	1,180	832

Notes: NB = Northbound; SB = Southbound

Under projected future volumes, the roadway study segment is expected to operate unacceptably at LOS E during the weekday p.m. peak in the southbound direction and during the weekend midday peak in the northbound direction and acceptably at LOS D during the weekday p.m. peak in the northbound direction and during the weekend midday peak in the southbound direction. As noted for Cumulative Conditions, capacity enhancements to achieve LOS D operation are not suggested. These results are summarized in Table 8.

Table 8 – Future Peak Hour Roadway Segment Levels of Service								
Study Segment	**Weekday PM Peak**				**Weekend Midday Peak**			
	NB		**SB**		**NB**		**SB**	
	PTSF	LOS	PTSF	LOS	PTSF	LOS	PTSF	LOS
Silverado Trail near 4059	83.9%	D	**100%**	**E**	**91.1%**	**E**	82.2%	D

Notes: NB = Northbound; SB = Southbound; PTSF = Percent Time Spent Following
LOS = Level of Service; **Bold** text = deficient operation

Project Description

The project consists of a 20,000 gallon winery with fewer than 10 employees, a maximum of 25 visitors per day, and 10 special events per year with 15 guests, 10 special events with 25 guests, and three special events with 50 guests. The proposed project site plan is shown in Figure 2.

Trip Generation

The anticipated trip generation for a proposed project is typically estimated using standard rates published by the Institute of Transportation Engineers (ITE) in *Trip Generation Manual*, 9th Edition, 2012. However, the publication contains no such information for a winery. Therefore, the County of Napa's Winery Traffic Information/Trip Generation Sheet was used to determine the anticipated traffic generated with the current staff as well as that would be generated by both production that is already permitted at the site and with the proposed tasting room. Copies of the worksheets are enclosed for reference.

Since the County of Napa's Winery Traffic Information/Trip Generation Sheet does not include guidance on inbound versus outbound trips, it was assumed that two-thirds of trip ends at the winery would be outbound during the weekday p.m. peak hour since most of the trips would be associated with employees and customers leaving at closure of the winery. For the Saturday midday peak hour it was assumed that inbound and outbound trip ends would be evenly split. The trip generation estimates for the proposed project are shown in Table 9 and the Trip Generation Sheet is included in Appendix C.

Table 9 – Trip Generation							
Trip Type	**Daily**	**Weekday PM Peak**			**Saturday Midday Peak**		
	Trips	Trips	In	Out	Trips	In	Out
Winery plus Tasting Room	50	19	6	13	27	13	14

Trip Distribution

The pattern used to allocate new project trips to the street network was based on the directional split of the traffic volume during the p.m. peak period and weekend midday peak period. It was assumed 30 percent of projects trips would be to and from the north, while 70 percent of the project trips would be to and from the south.

Special Events

Three different sized wine marketing and agricultural promotion events are proposed as part of the project, including ten 15-person events, ten 25-person events, and three 50-person events. It was assumed that a maximum-sized 50-person event would require a staff of four in addition to any winery staff that would also assist with the event. Using an occupancy of 2.8 persons per vehicle for guests and solo occupancy for staff, a maximum-sized 50-person event would be expected to generate 44 trip ends at the driveway, including 22 inbound trips and 22 outbound trips. These events are proposed to take place between 11:00 a.m. to 10:00 p.m., with staff arriving an hour or more prior to the start of the event and leaving an hour or more after its conclusion. Guests would generate 18 trips for arrival and 18 for departure, with these trips generally occurring over an hour's time. Distributed evenly to the north and south, the maximum-sized special event would be expected to generate nine trips an hour on each of the segments of Silverado Trail to the north and south of the driveway. Given that these events are infrequent, are not part of typical daily operation, and often occur outside the peak period for traffic, together with the minimal increase in traffic associated with them, special event traffic was not included in the daily trip generation and resulting intersection operation analysis.

APN 038-390-022
15.33 acres

PROPOSED WINERY
AND HOSPITALITY
FACILITY
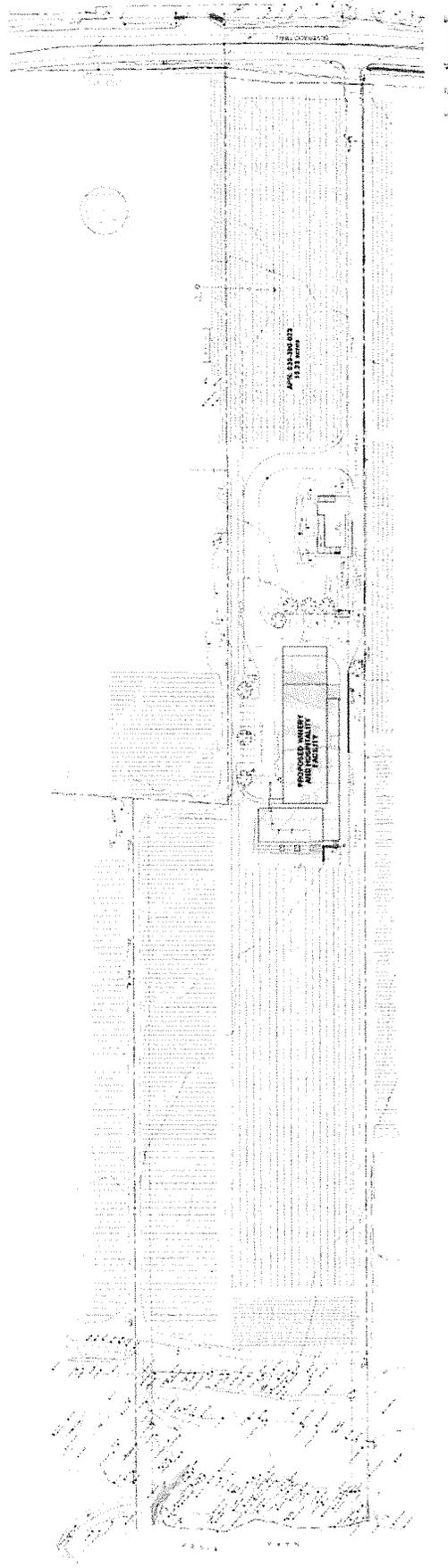
Source: Hall & Bartley Architecture and Planning   3/15

Traffic Impact Study for Sam Jasper Winery
Figure 2 – Site Plan

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Intersection Operation

Existing plus Project Conditions

The existing and existing plus project traffic volumes on this segment are summarized in Table 10.

Table 10 – Existing and Existing plus Project Traffic Volumes near 4059 Silverado Trail							
Existing Conditions				**Existing plus Project**			
PM Peak		**Weekend Midday Peak**		**PM Peak**		**Weekend Midday Peak**	
NB	**SB**	**NB**	**SB**	**NB**	**SB**	**NB**	**SB**
414	987	549	387	418	996	558	397

Notes: NB = Northbound; SB = Southbound

Upon the addition of project-related traffic to the Existing volumes, the study segment is expected to continue to operate acceptably at LOS C or D northbound during both peak periods and unacceptably at LOS E during the weekday p.m. peak hour in the southbound direction during the weekday p.m. peak period. These results are summarized in Table 11. Project traffic volumes are shown in Figure 1.

Table 11 – Existing and Existing plus Project Peak Hour Intersection Levels of Service on Silverado Trail															
Existing Conditions								**Existing plus Project**							
PM Peak				**Weekend Midday Peak**				**PM Peak**				**Weekend Midday Peak**			
NB		**SB**		**NB**		**SB**		**NB**		**SB**		**NB**		**SB**	
PTSF	**LOS**	**PTSF**	**LOS**	**PTSF**	**LOS**	**PTSF**	**LOS**	**PTSF**	**LOS**	**PTSF**	**LOS**	**PTSF**	**LOS**	**PTSF**	**LOS**
59.9%	C	**89.7%**	**E**	78.4%	D	63.1%	C	60.2%	C	**89.5%**	**E**	77.9%	D	63.4%	C

Notes: NB = Northbound; SB = Southbound; PTSF = Percent Time Spent Following
LOS = Level of Service; **Bold** text = deficient operation

It is noted that the percent time spent following actually decreases in the southbound direction during the weekday p.m. peak hour and the northbound direction during the weekend midday peak period with project trips added. This result is counter-intuitive, but occurs occasionally when the flow is such that the added vehicles will theoretically have delays below the average, thereby reducing it. In practical terms, this result essentially indicates that the change would be imperceptible and drivers would not notice the minor increase in traffic.

Finding – The study segment is expected to continue operating at the same levels of service upon the addition of project-generated traffic to existing volumes. Because the project-added trips result in a reduction in the percent time spent following, or improved operation, the impact is considered less-than significant.

Cumulative plus Project Conditions

The cumulative and cumulative plus project traffic volumes on this segment are summarized in Table 12.

Table 12 – Cumulative and Cumulative plus Project Traffic Volumes near 4059 Silverado Trail

Cumulative Conditions				Cumulative plus Project			
PM Peak		Weekend Midday Peak		PM Peak		Weekend Midday Peak	
NB	SB	NB	SB	NB	SB	NB	SB
470	1,050	635	473	475	1,059	644	483

Notes: NB = Northbound; SB = Southbound

Upon the addition of project-related traffic to the Cumulative volumes, the study segment is expected to continue to operate unacceptably at LOS E in the southbound direction during the weekday p.m. peak hour. These results are summarized in Table 13. Cumulative traffic volumes are shown in Figure 1.

Table 13 – Cumulative and Cumulative plus Project Peak Hour Intersection LOS on Silverado Trail

Cumulative Conditions								Cumulative plus Project							
PM Peak				Weekend Midday Peak				PM Peak				Weekend Midday Peak			
NB		SB		NB		SB		NB		SB		NB		SB	
PTSF	LOS	PTSF	LOS	PTSF	LOS	PTSF	LOS	PTSF	LOS	PTSF	LOS	PTSF	LOS	PTSF	LOS
64.7%	C	**90.7%**	**E**	81.3%	D	68.7%	C	65.0%	C	**90.3%**	**E**	81.9%	D	70.0%	C

Notes: LOS = Level of Service; PTSF = Percent Time Spent Following; **Bold** text = deficient operation

Finding – The study segment is expected to continue operating at the same levels of service upon the addition of project-generated traffic. Because the project-added trips translate to less than 1 percent of the total p.m. peak hour trips on Silverado Trail, the project's impact is considered less-than-significant.

Future plus Project Conditions

The future and future plus project traffic volumes on this segment are summarized in Table 14.

Table 14 – Future and Future plus Project Traffic Volumes near 4059 Silverado Trail

Future Conditions				Future plus Project			
PM Peak		Weekend Midday Peak		PM Peak		Weekend Midday Peak	
NB	SB	NB	SB	NB	SB	NB	SB
890	2,122	1,180	832	894	2,131	1,189	842

Notes: NB = Northbound; SB = Southbound

Upon the addition of project-related traffic to the Future volumes, the study segment is expected to continue operating unacceptably at LOS E during the weekday p.m. peak in the southbound direction and during the weekend midday peak in the northbound direction. These results are summarized in Table 15.

Future Conditions								Future plus Project							
PM Peak				Weekend Midday Peak				PM Peak				Weekend Midday Peak			
NB		SB		NB		SB		NB		SB		NB		SB	
PTSF	LOS	PTSF	LOS	PTSF	LOS	PTSF	LOS	PTSF	LOS	PTSF	LOS	PTSF	LOS	PTSF	LOS
83.9%	D	**100%**	**E**	**91.1%**	**E**	82.2%	D	84.0%	D	**100%**	**E**	**91.1%**	**E**	82.4%	D

Notes: LOS = Level of Service; PTSF = Percent Time Spent Following; **Bold** text = deficient operation

Finding – The study segment is expected to continue operating at the same levels of service upon the addition of project-generated traffic, with no change to the percent time spent following. Because the project-added trips do not change the measure of effectiveness and contribute less than 1 percent of the total projected future trips on Silverado Trail, the impact is considered less-than-significant.

Transportation Demand Management Program

Although the project is expected to have less-than-significant traffic impacts, to reduce the number of peak hour trips added to the roadway network and minimize impacts, the proposed project should consider promoting the use of carpooling as options for employees arriving at and leaving the project site.

Access and Circulation

Site Access

The project would be accessed via an existing driveway on Silverado Trail. The nearest driveway to the south is 280 feet away and the nearest driveway to the north is 250 feet away.

Sight Distance

At driveways a substantially clear line of sight should be maintained between the driver of a vehicle waiting on the driveway and the driver of an approaching vehicle. Adequate time must be provided for the waiting vehicle to either cross, turn left, or turn right, without requiring the through traffic to radically alter their speed. Sight distance should be measured from a 3.5-foot height at the location of the driver on the driveway to a 4.25-foot object height in the center of the approaching lane of the major road. Set-back for the driver on the driveway shall be a minimum of 15 feet, measured from the edge of the traveled way.

Sight distance along Silverado Trail at the project driveway was evaluated based on stopping sight distance criteria contained in the *Highway Design Manual* published by Caltrans. The approach travel speed is used as the basis for determining the recommended sight distance. Additionally, the stopping sight distance needed for a following driver to stop if there is a vehicle waiting to turn into a side street or driveway is evaluated based on stopping sight distance criterion and the approach speed on the major street.

Sight distance at the project driveway was field measured. Although sight distance requirements are not technically applicable to urban driveways, the stopping sight distance criterion for private street intersections was applied for evaluation purposes. Based on a design speed of 55 mph, the minimum stopping sight distance needed is 500 feet. Sight distance to the north of the project driveway is 500 feet and sight distance to the south of the project driveway is to Soda Canyon Road, which is more than 900 feet away. Stopping sight distance exceeds 500 feet for a southbound driver following a vehicle that might slow or stop to turn left into the driveway.

Finding – Stopping sight distance at the project driveway is adequate to meet the applied criteria from the *Highway Design Manual* for both entering and exiting movements.

Access Analysis

Left-Turn Lane Warrants

The need for a left-turn lane on Silverado Trail at the project driveway was evaluated based on criteria contained in the *Napa County Road and Street Standards*, 2011. Based on the volumes obtained on Silverado Trail near the project driveway in April 2015, Silverado Trail has an average daily traffic (ADT) volume of 13,100 vehicles near the project driveway.

Using the County's criteria, for an average daily traffic volume of 13,120 vehicles on Silverado Trail, a left-turn lane is warranted if a project driveway has an ADT of 11 or more vehicles. The ADT at the project driveway is expected to be 50 trips daily. Based on these traffic levels, a left-turn lane is warranted at the project driveway. The left-turn lane warrant graph is provided in Appendix D.

Finding – A left turn lane is warranted at the project driveway and should be provided.

Conclusions and Recommendations

Conclusions

- The proposed project would be expected to generate an average of 50 daily trips, including 19 trips during the weekday p.m. peak hour and 27 trips during the weekend midday peak hour.

- A total of 23 special events are proposed, with the largest special event having 50 attendees and four employees; three such events are proposed annually. The remaining 20 events would have 15 to 25 attendees.

- Silverado Trail currently operates acceptably at LOS D or better northbound during both peak periods and southbound during the weekend midday peak period and unacceptably at LOS E in the southbound direction during the weekday p.m. peak hour.

- Acceptably LOS D or better operation on Silverado Trail is projected under Cumulative Conditions for the northbound direction during both peak periods and southbound during the weekend midday peak period. Unacceptable LOS E operation is projected in the southbound direction during the weekday p.m. peak hour.

- Under Future conditions, Silverado Trail is expected to operate unacceptably at LOS E during the weekday p.m. peak in the southbound direction and in the northbound direction during the weekend midday peak and acceptably at LOS D during the weekday p.m. peak in the northbound direction and in the southbound direction during the weekend midday peak.

- Because the project-added trips result in no change to the measures of effectiveness under most scenarios and contribute less than 1 percent of the total trips on Silverado Trail, the impact is considered less-than-significant under Existing, Cumulative, and Future plus Project conditions.

- Sight distance at the project driveway is adequate to meet *Highway Design Manual* requirements in both directions as well as for following drivers.

- A left-turn lane is warranted on Silverado Trail at the project driveway.

- A Transportation Demand Management plan for the project is not currently proposed.

Recommendations

- A left-turn lane should be installed on Silverado Trail at the project driveway as part of the proposed project.

- The project applicant should consider developing a Transportation Demand Management plan for the project, including promoting carpooling for employees.

Study Participants and References

Study Participants

Principal in Charge	Dalene J. Whitlock, PE, PTOE
Assistant Engineer	Lauren Davini, EIT
Technician/Graphics	Deborah J. Mizell
Editing/Formatting	Angela McCoy

References

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NAX091
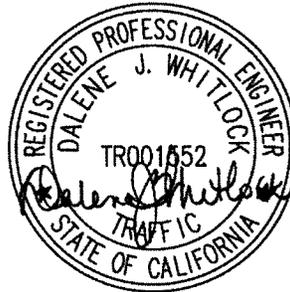
Appendix A

Collision Rate Calculations

SEGMENT COLLISION RATE CALCULATIONS
Sam Jasper Winery

Location: 4059 Silverado Trail

Date of Count: Friday, April 10, 2015
ADT: 14,000

Number of Collisions: 16
Number of Injuries: 5
Number of Fatalities: 0
Start Date: October 1, 2008
End Date: September 30, 2013
Number of Years: 5

Highway Type: Conventional 2 lanes or less
Area: Urban
Design Speed: >45

Segment Length: 1.0 miles
Direction: North/South

$$\frac{\text{Number of Collisions x 1 Million}}{\text{ADT x 365 Days per Year x Segment Length x Number of Years}}$$

$$\frac{16 \quad \times \quad 1,000,000}{14,000 \quad \times \quad 365 \quad \times \quad 1 \quad \times \quad 5}$$

	Collision Rate		Fatality Rate	Injury Rate
Study Segment	0.63	c/mvm	0.0%	31.3%
Statewide Average*	1.29	c/mvm	1.0%	41.2%

ADT = average daily traffic volume
c/mvm = collisions per million vehicle miles
* 2012 Collision Data on California State Highways, Caltrans

Appendix B

Intersection Level of Service Calculations

HCS 2010: Two-Lane Highways Release 6.70

Phone: Fax:
E-Mail:

Directional Two-Lane Highway Segment Analysis

Analyst	Lauren Davini
Agency/Co.	Napa County
Date Performed	9/8/15
Analysis Time Period	Weekday PM Peak
Highway	Silverado Trail
From/To	0.5mi N/o & S/o 4059 SilvTrail
Jurisdiction	County of Napa
Analysis Year	2015
Description NB Existing	

Input Data

Highway class	Class 2				
Shoulder width	7.0	ft	Peak hour factor, PHF	0.95	
Lane width	12.0	ft	% Trucks and buses	5	%
Segment length	1.0	mi	% Trucks crawling	0.0	%
Terrain type	Level		Truck crawl speed	0.0	mi/hr
Grade: Length	-	mi	% Recreational vehicles	2	%
Up/down	-	%	% No-passing zones	100	%
			Access point density	15	/mi

Analysis direction volume, Vd 414 veh/h
Opposing direction volume, Vo 987 veh/h

Average Travel Speed

Direction	Analysis(d)		Opposing (o)	
PCE for trucks, ET	2.0*		2.0*	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adj. factor,(note-5) fHV	0.952		0.952	
Grade adj. factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	458	pc/h	1091	pc/h

Free-Flow Speed from Field Measurement:
Field measured speed,(note-3) S FM   -   mi/h
Observed total demand,(note-3) V   -   veh/h
Estimated Free-Flow Speed:
Base free-flow speed,(note-3) BFFS   55.0   mi/h
Adj. for lane and shoulder width,(note-3) fLS 0.0 mi/h
Adj. for access point density,(note-3) fA 3.8 mi/h

Free-flow speed, FFSd   51.3   mi/h

Adjustment for no-passing zones, fnp   1.1   mi/h
Average travel speed, ATSd   38.2   mi/h
Percent Free Flow Speed, PFFS   74.5   %

Percent Time-Spent-Following

Direction	Analysis(d)		Opposing (o)	
PCE for trucks, ET	1.0		1.0	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adjustment factor, fHV	1.000		1.000	
Grade adjustment factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	436	pc/h	1039	pc/h
Base percent time-spent-following,(note-4) BPTSFd	53.5	%		
Adjustment for no-passing zones, fnp	21.7			
Percent time-spent-following, PTSFd	59.9	%		

Level of Service and Other Performance Measures

Level of service, LOS   C
Volume to capacity ratio, v/c   0.26
Peak 15-min vehicle-miles of travel, VMT15   109   veh-mi
Peak-hour vehicle-miles of travel, VMT60   414   veh-mi
Peak 15-min total travel time, TT15   2.9   veh-h
Capacity from ATS, CdATS   1700   veh/h
Capacity from PTSF, CdPTSF   1700   veh/h
Directional Capacity   1700   veh/h

Passing Lane Analysis

Total length of analysis segment, Lt   1.0   mi
Length of two-lane highway upstream of the passing lane, Lu - mi
Length of passing lane including tapers, Lpl   -   mi
Average travel speed, ATSd (from above)   38.2   mi/h
Percent time-spent-following, PTSFd (from above) 59.9 %
Level of service, LOSd (from above)   C

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective
 length of passing lane for average travel speed, Lde   -   mi
Length of two-lane highway downstream of effective
 length of the passing lane for average travel speed, Ld - mi
Adj. factor for the effect of passing lane
 on average speed, fpl   -
Average travel speed including passing lane, ATSpl -
Percent free flow speed including passing lane, PFFSpl 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
 the passing lane for percent time-spent-following, Ld - mi
Adj. factor for the effect of passing lane
 on percent time-spent-following, fpl   -
Percent time-spent-following
 including passing lane, PTSFpl   -   %

Level of Service and Other Performance Measures with Passing Lane

Level of service including passing lane, LOSpl   A
Peak 15-min total travel time, TT15   -   veh-h

Bicycle Level of Service

HCS 2010: Two-Lane Highways Release 6.70

Phone: Fax:
E-Mail:

Directional Two-Lane Highway Segment Analysis

Analyst   Lauren Davini
Agency/Co.   Napa County
Date Performed   9/8/15
Analysis Time Period   Weekday PM Peak
Highway   Silverado Trail
From/To   0.5mi N/o & S/o 4059 SilvTrail
Jurisdiction   County of Napa
Analysis Year   2015
Description SB Existing

Input Data

Highway class Class 2			Peak hour factor, PHF	0.95	
Shoulder width 7.0	ft		% Trucks and buses	5	%
Lane width 12.0	ft		% Trucks crawling	0.0	%
Segment length 1.0	mi		Truck crawl speed	0.0	mi/hr
Terrain type Level			% Recreational vehicles	2	%
Grade: Length -	mi		% No-passing zones	100	%
Up/down -	%		Access point density	12	/mi

Analysis direction volume, Vd   987   veh/h
Opposing direction volume, Vo   414   veh/h

Average Travel Speed

	Analysis(d)		Opposing (o)	
Direction				
PCE for trucks, ET	2.0*		2.0*	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adj. factor,(note-5) fHV	0.952		0.952	
Grade adj. factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	1091	pc/h	458	pc/h

Free-Flow Speed from Field Measurement:
Field measured speed,(note-3) S FM	-	mi/h
Observed total demand,(note-3) V	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed,(note-3) BFFS	55.0	mi/h
Adj. for lane and shoulder width,(note-3) fLS	0.0	mi/h
Adj. for access point density,(note-3) fA	3.0	mi/h
Free-flow speed, FFSd	52.0	mi/h
Adjustment for no-passing zones, fnp	2.5	mi/h
Average travel speed, ATSd	37.5	mi/h
Percent Free Flow Speed, PFFS	72.1	%

Posted speed limit, Sp   55
Percent of segment with occupied on-highway parking   0
Pavement rating, P   3
Flow rate in outside lane, vOL   435.8
Effective width of outside lane, We   26.00
Effective speed factor, St   4.79
Bicycle LOS Score, BLOS   2.75
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
   dewngrade segments are treated as level terrain.
2. If vi (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. For the analysis direction only.
5. 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

	Analysis(d)	Opposing (o)
Direction		
PCE for trucks, ET	1.0	1.0
PCE for RVs, ER	1.0	1.0
Heavy-vehicle adjustment factor, fHV	1.000	1.000
Grade adjustment factor,(note-1) fg	1.00	1.00
Directional flow rate,(note-2) vi	1039 pc/h	436 pc/h
Base percent time-spent-following,(note-4) BPTSFd	74.4 %	
Adjustment for no-passing zones, fnp	21.7 %	
Percent time-spent-following, PTSFd	89.7 %	

Level of Service and Other Performance Measures

Level of service, LOS	E	
Volume to capacity ratio, v/c	0.61	
Peak 15-min vehicle-miles of travel, VMT15	260	veh-mi
Peak-hour vehicle-miles of travel, VMT60	987	veh-mi
Peak 15-min total travel time, TT15	6.9	veh-h
Capacity from ATS, CdATS	0	veh/h
Capacity from PTSF, CdPTSF	1700	veh/h
Directional Capacity	1700	veh/h

Passing Lane Analysis

Total length of analysis segment, Lt	1.0	mi
Length of two-lane highway upstream of the passing lane, Lu	-	mi
Length of passing lane including tapers, Lpl	-	mi
Average travel speed, ATSd (from above)	37.5	mi/h
Percent time-spent-following, PTSFd (from above)	89.7	
Level of service, LOSd (from above)	E	

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for average travel speed, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for average travel speed, Ld	-	mi
Adj. factor for the effect of passing lane on average speed, fpl	-	
Average travel speed including passing lane, ATSpl	-	
Percent free flow speed including passing lane, PFFSpl	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 the passing lane for percent time-spent-following, Ld	-	mi
Adj. factor for the effect of passing lane on percent time-spent-following, fpl	-	
Percent time-spent-following including passing lane, PTSFpl	-	

Level of Service and Other Performance Measures with Passing Lane

Level of service including passing lane, LOSpl	A	
Peak 15-min total travel time, TT15	-	veh-h

Bicycle Level of Service

Posted speed limit, Sp	55
Percent of segment with occupied on-highway parking	0
Pavement rating, P	3
Flow rate in outside lane, vOL	1038.9
Effective width of outside lane, We	26.00
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	3.19
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 downgrade segments are treated as level terrain.
2. If vi (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. For the analysis direction only.
5. 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

HCS 2010: Two-Lane Highways Release 6.70

Phone:
E-Mail: Fax:

Directional Two-Lane Highway Segment Analysis

Analyst   Lauren Davini
Agency/Co.   Napa County
Date Performed   9/8/15
Analysis Time Period   Weekend Midday Peak
Highway   Silverado Trail
From/To   0.5mi N/o & S/o 4059 SilvTrail
Jurisdiction   County of Napa
Analysis Year   2015
Description NB Existing

Input Data

Highway class Class 2		
Shoulder width	7.0	ft
Lane width	12.0	ft
Segment length	1.0	mi
Terrain type	Level	
Grade: Length	-	mi
Up/down	-	%

Peak hour factor, PHF	0.90	
% Trucks and buses	5	%
% Trucks crawling	0.0	%
Truck crawl speed	0.0	mi/hr
% Recreational vehicles	2	%
% No-passing zones	100	%
Access point density	15	/mi

Analysis direction volume, Vd 549 veh/h
Opposing direction volume, Vo 387 veh/h

Average Travel Speed

Direction	Analysis(d)	Opposing (o)	
PCE for trucks, ET	2.0*	2.0*	
PCE for RVs, ER	1.0	1.0	
Heavy-vehicle adj. factor,(note-5) fHV	0.952	0.952	
Grade adj. factor,(note-1) fg	1.00	1.00	
Directional flow rate,(note-2) vi	641	452	pc/h

Free-Flow Speed from Field Measurement:
Field measured speed,(note-3) S FM   -   mi/h
Observed total demand,(note-3) V   -   veh/h
Estimated Free-Flow Speed:
Base free-flow speed,(note-3) BFFS   55.0   mi/h
Adj. for lane and shoulder width,(note-3) fLS 0.0 mi/h
Adj. for access point density,(note-3) fA 3.8 mi/h

Free-flow speed, FFSd   51.3   mi/h

Adjustment for no-passing zones, fnp 2.5   mi/h
Average travel speed, ATSd   40.3 mi/h
Percent Free Flow Speed, PFFS   78.6 %

Percent Time-Spent-Following

Direction	Analysis(d)	Opposing (o)	
PCE for trucks, ET	1.0	1.0	
PCE for RVs, ER	1.0	1.0	
Heavy-vehicle adjustment factor, fHV	1.000	1.000	
Grade adjustment factor,(note-1) fg	1.00	1.00	
Directional flow rate,(note-2) vi	610	430	pc/h
Base percent time-spent-following,(note-4) BPTSFd	57.2		%
Adjustment for no-passing zones, fnp	36.2		
Percent time-spent-following, PTSFd	78.4		%

Level of Service and Other Performance Measures

Level of service, LOS	D	
Volume to capacity ratio, v/c	0.36	
Peak 15-min vehicle-miles of travel, VMT15	153	veh-mi
Peak-hour vehicle-miles of travel, VMT60	549	veh-mi
Peak 15-min total travel time, TT15	3.8	veh/h
Capacity from ATS, CdATS	0	veh/h
Capacity from PTSF, CdPTSF	1700	veh/h
Directional Capacity	1700	veh/h

Passing Lane Analysis

Total length of analysis segment, Lt	1.0	mi
Length of two-lane highway upstream of the passing lane, Lu	-	mi
Length of passing lane including tapers, Lpl	-	mi
Average travel speed, ATSd (from above)	40.3	mi/h
Percent time-spent-following, PTSFd (from above)	78.4	
Level of service, LOSd (from above)	D	

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective
  length of passing lane for average travel speed, Lde - mi
Length of two-lane highway downstream of effective
  length of the passing lane for average travel speed, Ld - mi
Adj. factor for the effect of passing lane
  on average speed, fpl -
Average travel speed including passing lane, ATSpl -
Percent free flow speed including passing lane, PFFSpl 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
  the passing lane for percent time-spent-following, Ld - mi
Adj. factor for the effect of passing lane
  on percent time-spent-following, fpl -
Percent time-spent-following
  including passing lane, PTSFpl - %

Level of Service and Other Performance Measures with Passing Lane

Level of service including passing lane, LOSpl A
Peak 15-min total travel time, TT15 - veh-h

Bicycle Level of Service

HCS 2010: Two-Lane Highways Release 6.70

Phone: Fax:
E-Mail:

_____Directional Two-Lane Highway Segment Analysis_____

Analyst   Lauren Davini
Agency/Co.   Napa County
Date Performed   9/8/15
Analysis Time Period   Weekend Midday Peak
Highway   Silverado Trail
From/To   0.5mi N/o & S/o 4059 SilvTrail
Jurisdiction   County of Napa
Analysis Year   2015
Description SB Existing

_____Input Data_____

Highway class   Class 2   Peak hour factor, PHF   0.90
Shoulder width   7.0   ft   % Trucks and buses   5   %
Lane width   12.0   ft   % Trucks crawling   0.0   %
Segment length   1.0   mi   Truck crawl speed   0.0   mi/hr
Terrain type   Level   % Recreational vehicles   0.0   %
Grade: Length   -   mi   % No-passing zones   100   %
       Up/down   -   %   Access point density   12   /mi

Analysis direction volume, Vd   387 veh/h
Opposing direction volume, Vo   549 veh/h

_____Average Travel Speed_____

Direction   Analysis(d)   Opposing (o)
PCE for trucks, ET   2.0*   2.0*
PCE for RVs, ER   1.0   1.0
Heavy-vehicle adj. factor,(note-5) fHV   0.952   0.952
Grade adj. factor,(note-1) fg   1.00   1.00
Directional flow rate,(note-2) vi 452   pc/h   641   pc/h

Free-Flow Speed from Field Measurement:
Field measured speed,(note-3) S FM   -   mi/h
Observed total demand,(note-3) V   -   veh/h
Estimated Free-Flow Speed:
Base free-flow speed,(note-3) BFFS   55.0   mi/h
Adj. for lane and shoulder width,(note-3) fLS   0.0   mi/h
Adj. for access point density,(note-3) fA   3.0   mi/h

Free-flow speed, FFSd   52.0   mi/h

Adjustment for no-passing zones, fnp   1.8   mi/h
Average travel speed, ATSd   41.7   mi/h
Percent Free Flow Speed, PFFS   80.3   %

Posted speed limit, Sp   55
Percent of segment with occupied on-highway parking   0
Pavement rating, P   3
Flow rate in outside lane, vOL   610.0
Effective width of outside lane, We   26.00
Effective speed factor, St   4.79
Bicycle LOS Score, BLOS   2.92
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
   downgrade segments are treated as level terrain.
2. If vi (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. For the analysis direction only.
5. 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

Direction	Analysis(d)	Opposing (o)	
PCE for trucks, ET	1.0	1.0	
PCE for RVs, ER	1.0	1.0	
Heavy-vehicle adjustment factor, fHV	1.000	1.000	
Grade adjustment factor,(note-1) fg	1.00	1.00	
Directional flow rate,(note-2) vi	430	610	pc/h
Base percent time-spent-following,(note-4) BPTSFd	48.1		%
Adjustment for no-passing zones, fnp	36.2		
Percent time-spent-following, PTSFd	63.1		%

Level of Service and Other Performance Measures

Level of service, LOS	C	
Volume to capacity ratio, v/c	0.25	
Peak 15-min vehicle-miles of travel, VMT15	108	veh-mi
Peak-hour vehicle-miles of travel, VMT60	387	veh-mi
Peak 15-min total travel time, TT15	2.6	veh-h
Capacity from ATS, CdATS	1692	veh/h
Capacity from PTSF, CdPTSF	1700	veh/h
Directional Capacity	1700	veh/h

Passing Lane Analysis

Total length of analysis segment, Lt	1.0	mi
Length of two-lane highway upstream of the passing lane, Lu	-	mi
Length of passing lane including tapers, Lpl	-	mi
Average travel speed, ATSd (from above)	41.7	mi/h
Percent time-spent-following, PTSFd (from above)	63.1	
Level of service, LOSd (from above)	C	

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for average travel speed, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for average travel speed, Ld	-	mi
Adj. factor for the effect of passing lane on average speed, fpl	-	
Average travel speed including passing lane, ATSpl	-	
Percent free flow speed including passing lane, PFFSpl	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 the passing lane for percent time-spent-following, Ld	-	mi
Adj. factor for the effect of passing lane on percent time-spent-following, fpl	-	
Percent time-spent-following including passing lane, PTSFpl	-	%

Level of Service and Other Performance Measures with Passing Lane

Level of service including passing lane, LOSpl	A	
Peak 15-min total travel time, TT15	-	veh-h

Bicycle Level of Service

Posted speed limit, Sp	55
Percent of segment with occupied on-highway parking	0
Pavement rating, P	3
Flow rate in outside lane, vOL	430.0
Effective width of outside lane, We	26.00
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	2.75
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 downgrade segments are treated as level terrain.
2. If vi (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. For the analysis direction only.
5. 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

Phone:
E-Mail:
Fax:

Directional Two-Lane Highway Segment Analysis

Analyst   Lauren Davini
Agency/Co.   Napa County
Date Performed   9/8/15
Analysis Time Period   Weekday PM Peak
Highway   Silverado Trail
From/To   0.5mi N/o & S/o 4059 SilvTrail
Jurisdiction   County of Napa
Analysis Year   2015
Description NB Existing + Project

Input Data

Highway class   Class 2
Shoulder width 7.0 ft
Lane width   12.0 ft
Segment length 1.0 mi
Terrain type   Level
Grade: Length   -   mi
       Up/down -   %

Peak hour factor, PHF   0.95
% Trucks and buses   5   %
% Trucks crawling   0.0   %
Truck crawl speed   0.0   mi/hr
% Recreational vehicles   2   %
% No-passing zones   100   %
Access point density   15   /mi

Analysis direction volume, Vd   418 veh/h
Opposing direction volume, Vo   996 veh/h

Average Travel Speed

	Analysis(d)	Opposing (o)	
Direction			
PCE for trucks, ET	2.0*	2.0*	
PCE for RVs, ER	1.0	1.0	
Heavy-vehicle adj. factor,(note-5) fHV	0.952	0.952	
Grade adj. factor (note-1) fg	1.00	1.00	
Directional flow rate,(note-2) vi	462	1101	pc/h

Free-Flow Speed from Field Measurement:
Field measured speed,(note-3) S FM   -   mi/h
Observed total demand,(note-3) V   -   veh/h
Estimated Free-Flow Speed:
Base free-flow speed,(note-3) BFFS   55.0   mi/h
Adj. for lane and shoulder width,(note-3) fLS   0.0   mi/h
Adj. for access point density,(note-3) fA   3.8   mi/h

Free-flow speed, FFSd   51.3   mi/h

Adjustment for no-passing zones, fnp   1.0   mi/h
Average travel speed, ATSd   38.1   mi/h
Percent Free Flow Speed, PFFS   74.3   %

Percent Time-Spent-Following

	Analysis(d)	Opposing (o)	
Direction			
PCE for trucks, ET	1.0	1.0	
PCE for RVs, ER	1.0	1.0	
Heavy-vehicle adjustment factor, fHV	1.000	1.000	
Grade adjustment factor,(note-1) fg	1.00	1.00	
Directional flow rate,(note-2) vi	440	1048	pc/h
Base percent time-spent-following,(note-4) BPTSFd	53.8		%
Adjustment for no-passing zones, fnp	21.5		
Percent time-spent-following, PTSFd	60.2		%

Level of Service and Other Performance Measures

Level of service, LOS   C
Volume to capacity ratio, v/c   0.26
Peak 15-min vehicle-miles of travel, VMT15   110   veh-mi
Peak-hour vehicle-miles of travel, VMT60   418   veh-mi
Peak 15-min total travel time, TT15   2.9   veh-h
Capacity from ATS, CdATS   1700   veh/h
Capacity from PTSF, CdPTSF   1700   veh/h
Directional Capacity   1700   veh/h

Passing Lane Analysis

Total length of analysis segment, Lt   1.0   mi
Length of two-lane highway upstream of the passing lane, Lu   -   mi
Length of passing lane including tapers, Lpl   -   mi
Average travel speed, ATSd (from above)   38.1   mi/h
Percent time-spent-following, PTSFd (from above)   60.2
Level of service, LOSd (from above)   C

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective
length of passing lane for average travel speed, Lde   -   mi
Length of two-lane highway downstream of effective
length of the passing lane for average travel speed, Ld   -   mi
Adj. factor for the effect of passing lane
on average speed, fpl   -
Average travel speed including passing lane, ATSpl   -
Percent free flow speed including passing lane, PFFSpl   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
the passing lane for percent time-spent-following, Ld   -   mi
Adj. factor for the effect of passing lane
on percent time-spent-following, fpl   -
Percent time-spent-following
including passing lane, PTSFpl   -

Level of Service and Other Performance Measures with Passing Lane

Level of service including passing lane, LOSpl   A
Peak 15-min total travel time, TT15   -   veh-h

Bicycle Level of Service

HCS 2010: Two-Lane Highways Release 6.70

Phone: Fax:
E-Mail:

Directional Two-Lane Highway Segment Analysis

Analyst   Lauren Davini
Agency/Co.   Napa County
Date Performed   9/8/15
Analysis Time Period Weekday PM Peak
Highway   Silverado Trail
From/To   0.5mi N/o & S/o 4059 SilvTrail
Jurisdiction   County of Napa
Analysis Year   2015
Description SB   Existing + Project

Input Data

Highway class	Class 2		Peak hour factor, PHF	0.95	
Shoulder width	7.0	ft	% Trucks and buses	5	%
Lane width	12.0	ft	% Trucks crawling	0.0	%
Segment length	1.0	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Level		% Recreational vehicles	2	%
Grade: Length	–	mi	% No-passing zones	100	%
Up/down	–	%	Access point density	12	/mi

Analysis direction volume, Vd   996   veh/h
Opposing direction volume, Vo   418   veh/h

Average Travel Speed

Direction	Analysis(d)	Opposing (o)	
PCE for trucks, ET	2.0*	2.0*	
PCE for RVs, ER	1.0	1.0	
Heavy-vehicle adj. factor,(note-5) fHV	0.952	0.952	
Grade adj. factor,(note-1) fg	1.00	1.00	
Directional flow rate,(note-2) vi	1101	pc/h	462	pc/h

Free-Flow Speed from Field Measurement:
Field measured speed,(note-3) S FM   –   mi/h
Observed total demand,(note-3) V   –   veh/h
Estimated Free-Flow Speed:
Base free-flow speed,(note-3) BFFS   55.0   mi/h
Adj. for lane and shoulder width,(note-3) fLS   0.0   mi/h
Adj. for access point density,(note-3) fA   3.0   mi/h

Free-flow speed, FFSd   52.0   mi/h

Adjustment for no-passing zones, fnp   2.5   mi/h
Average travel speed, ATSd   37.4   mi/h
Percent Free Flow Speed, PFFS   71.9   %

Posted speed limit, Sp   55
Percent of segment with occupied on-highway parking   0
Pavement rating, P   3
Flow rate in outside lane, vOL   440.0
Effective width of outside lane, We   26.00
Effective speed factor, St   4.79
Bicycle LOS Score, BLOS   2.76
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 downgrade segments are treated as level terrain.
2. If vi (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. For the analysis direction only.
5. 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

Posted speed limit, Sp   55
Percent of segment with occupied on-highway parking   0
Pavement rating, P   3
Flow rate in outside lane, vOL   1048.4
Effective width of outside lane, We   26.00
Effective speed factor, St   4.79
Bicycle LOS Score, BLOS   3.20
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 downgrade segments are treated as level terrain.
2. If vi (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. For the analysis direction only.
5. 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

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Percent Time-Spent-Following

Direction	Analysis(d)	Opposing (o)	
PCE for trucks, ET	1.0	1.0	
PCE for RVs, ER	1.0	1.0	
Heavy-vehicle adjustment factor, fHV	1.000	1.000	
Grade adjustment factor,(note-1) fg	1.00	1.00	
Directional flow rate,(note-2) vi	1048 pc/h	440	pc/h
Base percent time-spent-following,(note-4) BPTSFd	74.4 pc/h		%
Adjustment for no-passing zones, fnp	21.5		
Percent time-spent-following, PTSFd	89.5		%

Level of Service and Other Performance Measures

Level of service, LOS	E	
Volume to capacity ratio, v/c	0.62	
Peak 15-min vehicle-miles of travel, VMT15	262	veh-mi
Peak-hour vehicle-miles of travel, VMT60	996	veh-mi
Peak 15-min total travel time, TT15	7.0	veh-h
Capacity from ATS, CdATS	0	veh/h
Capacity from PTSF, CdPTSF	1700	veh/h
Directional Capacity	1700	veh/h

Passing Lane Analysis

Total length of analysis segment, Lt	1.0	mi
Length of two-lane highway upstream of the passing lane, Lu	–	mi
Length of passing lane including tapers, Lpl	–	mi
Average travel speed, ATSd (from above)	37.4	mi/h
Percent time-spent-following, PTSFd (from above)	89.5	
Level of service, LOSd (from above)	E	

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for average travel speed, Lde	–	mi
Length of two-lane highway downstream of effective length of the passing lane for average travel speed, Ld	–	mi
Adj. factor for the effect of passing lane on average speed, fpl	–	
Average travel speed including passing lane, ATSpl	–	
Percent free flow speed including passing lane, PFFSpl	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 the passing lane for percent time-spent-following, Ld	–	mi
Adj. factor for the effect of passing lane on percent time-spent-following, fpl	–	
Percent time-spent-following including passing lane, PTSFpl	–	

Level of Service and Other Performance Measures with Passing Lane

Level of service including passing lane, LOSpl	A	
Peak 15-min total travel time, TT15	–	veh-h

Bicycle Level of Service

HCS 2010: Two-Lane Highways Release 6.70

Phone: Fax:
E-Mail:

Directional Two-Lane Highway Segment Analysis

Analyst   Lauren Davini
Agency/Co.   Napa County
Date Performed   9/8/15
Analysis Time Period   Weekend Midday Peak
Highway   Silverado Trail
From/To   0.5mi N/o & S/o 4059 SilvTrail
Jurisdiction   County of Napa
Analysis Year   2015
Description NB Existing + Project

Input Data

Highway class Class	2		Peak hour factor, PHF	0.90
Shoulder width	7.0	ft	% Trucks and buses	5 %
Lane width	12.0	ft	% Trucks crawling	0.0 %
Segment length	1.0	mi	Truck crawl speed	0.0 mi/hr
Terrain type	Level		% Recreational vehicles	2 %
Grade: Length	-	mi	% No-passing zones	100 %
Up/down	-	%	Access point density	15 /mi

Analysis direction volume, Vd   558   veh/h
Opposing direction volume, Vo   397   veh/h

Average Travel Speed

Direction	Analysis(d)	Opposing (o)	
PCE for trucks, ET	2.0*	2.0*	
PCE for RVs, ER	1.0	1.0	
Heavy-vehicle adj. factor,(note-5) fHV	0.952	0.952	
Grade adj. factor,(note-1) fg	1.00	1.00	
Directional flow rate,(note-2) vi	651	463	pc/h

Free-Flow Speed from Field Measurement:
Field measured speed,(note-3) S FM   --   mi/h
Observed total demand,(note-3) V   --   veh/h
Estimated Free-flow Speed:
Base free-flow speed,(note-3) BFFS   55.0 mi/h
Adj. for lane and shoulder width,(note-3) fLS   0.0   mi/h
Adj. for access point density,(note-3) fA   3.8   mi/h

Free-flow speed, FFSd   51.3   mi/h

Adjustment for no-passing zones, fnp   2.5   mi/h
Average travel speed, ATSd   40.1   mi/h
Percent Free Flow Speed, PFFS   78.3   %

Percent Time-Spent-Following

Direction	Analysis(d)	Opposing (o)	
PCE for trucks, ET	1.0	1.0	
PCE for RVs, ER	1.0	1.0	
Heavy-vehicle adjustment factor, fHV	1.000	1.000	
Grade adjustment factor,(note-1) fg	1.00	1.00	
Directional flow rate,(note-2) vi	620	441	pc/h
Base percent time-spent-following,(note-4) BPTSFd	57.0		%
Adjustment for no-passing zones, fnp	35.8		
Percent time-spent-following, PTSFd	77.9		%

Level of Service and Other Performance Measures

Level of service, LOS   D
Volume to capacity ratio, v/c   0.36
Peak 15-min vehicle-miles of travel, VMT15   155   veh-mi
Peak-hour vehicle-miles of travel, VMT60   558   veh-mi
Peak 15-min total travel time, TT15   3.9   veh-h
Capacity from ATS, CdATS   0   veh/h
Capacity from PTSF, CdPTSF   1700   veh/h
Directional Capacity   1700   veh/h

Passing Lane Analysis

Total length of analysis segment, Lt   1.0   mi
Length of two-lane highway upstream of the passing lane, Lu   --   mi
Length of passing lane including tapers, Lpl   --   mi
Average travel speed, ATSd (from above)   40.1   mi/h
Percent time-spent-following, PTSFd (from above)   77.9
Level of service, LOSd (from above)   D

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective
   length of passing lane for average travel speed, Lde   --   mi
Length of two-lane highway downstream of effective
   length of the passing lane for average travel speed, Ld   --   mi
Adj. factor for the effect of passing lane
   on average speed, fpl   --
Average travel speed including passing lane, ATSpl   --
Percent free flow speed including passing lane, PFFSpl   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
   the passing lane for percent time-spent-following, Ld   --   mi
Adj. factor for the effect of passing lane
   on percent time-spent-following, fpl   --
Percent time-spent-following
   including passing lane, PTSFpl   --

Level of Service and Other Performance Measures with Passing Lane

Level of service including passing lane, LOSpl   A
Peak 15-min total travel time, TT15   --   veh-h

Bicycle Level of Service

Phone: Fax:
E-Mail:

_____ Directional Two-Lane Highway Segment Analysis _____

Analyst   Lauren Davini
Agency/Co.   Napa County
Date Performed   9/8/15
Analysis Time Period Weekend Midday Peak
Highway   Silverado Trail
From/To   0.5mi N/o & S/o 4059 SilvTrail
Jurisdiction   County of Napa
Analysis Year   2015
Description   SB Existing + Project

_____ Input Data _____

Highway class	Class	2		Peak hour factor, PHF	0.90	
Shoulder width		7.0	ft	% Trucks and buses	5	%
Lane width		12.0	ft	% Trucks crawling	0.0	%
Segment length		1.0	mi	Truck crawl speed	0.0	mi/hr
Terrain type		Level		% Recreational vehicles	2	%
Grade:	Length	-	mi	% No-passing zones	100	%
	Up/down	-	%	Access point density	12	/mi

Analysis direction volume, Vd   397   veh/h
Opposing direction volume, Vo   558   veh/h

_____ Average Travel Speed _____

	Analysis(d)	Opposing (o)	
Direction			
PCE for trucks, ET	2.0*	2.0*	
PCE for RVs, ER	1.0	1.0	
Heavy-vehicle adj. factor,(note-5) fHV	0.952	0.952	
Grade adj. factor,(note-1) fg	1.00	1.00	
Directional flow rate,(note-2) vi	463	651	pc/h

Free-Flow Speed from Field Measurement:
Field measured speed,(note-3) S FM   -   mi/h
Observed total demand,(note-3) V   -   veh/h
Estimated Free-Flow Speed:
Base free-flow speed,(note-3) BFFS   55.0   mi/h
Adj. for lane and shoulder width,(note-3) fLS   0.0 mi/h
Adj. for access point density,(note-3) fA   3.0   mi/h

Free-flow speed, FFSd   52.0   mi/h

Adjustment for no-passing zones, fnp   1.8   mi/h
Average travel speed, ATSd   41.6   mi/h
Percent Free Flow Speed, PFFS   80.0   %

Posted speed limit, Sp   55
Percent of segment with occupied on-highway parking   0
Pavement rating, P   3
Flow rate in outside lane, vOL   620.0
Effective width of outside lane, We   26.00
Effective speed factor, St   4.79
Bicycle LOS Score, BLOS   2.93
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 dewngrade segments are treated as level terrain.
2. If vi (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. For the analysis direction only.
5. 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

	Analysis(d)	Opposing (o)	
Direction			
PCE for trucks, ET	1.0	1.0	
PCE for RVs, ER	1.0	1.0	
Heavy-vehicle adjustment factor, fHV	1.000	1.000	
Grade adjustment factor,(note-1) fg	1.00	1.00	
Directional flow rate,(note-2) vi	441 pc/h	620	pc/h
Base percent time-spent-following,(note-4) BPTSFd	48.5 %		
Adjustment for no-passing zones, fnp	35.8		
Percent time-spent-following, PTSFd	63.4 %		

Level of Service and Other Performance Measures

Level of service, LOS	C	
Volume to capacity ratio, v/c	0.26	
Peak 15-min vehicle-miles of travel, VMT15	110	veh-mi
Peak-hour vehicle-miles of travel, VMT60	397	veh-mi
Peak 15-min total travel time, TT15	2.6	veh-h
Capacity from ATS, CdATS	1692	veh/h
Capacity from PTSF, CdPTSF	1700	veh/h
Directional Capacity	1700	veh/h

Passing Lane Analysis

Total length of analysis segment, Lt	1.0	mi
Length of two-lane highway upstream of the passing lane, Lu	–	mi
Length of passing lane including tapers, Lpl	–	mi
Average travel speed, ATSd (from above)	41.6	mi/h
Percent time-spent-following, PTSFd (from above)	63.4	
Level of service, LOSd (from above)	C	

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective		
length of passing lane for average travel speed, Lde	–	mi
Length of two-lane highway downstream of effective		
length of the passing lane for average travel speed, Ld	–	mi
Adj. factor for the effect of passing lane		
on average speed, fpl	–	
Average travel speed including passing lane, ATSpl	–	
Percent free flow speed including passing lane, PFFSpl	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		
the passing lane for percent time-spent-following, Ld	–	mi
Adj. factor for the effect of passing lane		
on percent time-spent-following, fpl	–	
Percent time-spent-following		
including passing lane, PTSFpl	–	%

Level of Service and Other Performance Measures with Passing Lane

| Level of service including passing lane, LOSpl | A | |
| Peak 15-min total travel time, TT15 | – | veh-h |

Bicycle Level of Service

Posted speed limit, Sp	55
Percent of segment with occupied on-highway parking	0
Pavement rating, P	3
Flow rate in outside lane, vOL	441.1
Effective width of outside lane, We	26.00
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	2.76
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 downgrade segments are treated as level terrain.
2. If vi (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. For the analysis direction only.
5. 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

HCS 2010: Two-Lane Highways Release 6.70

Phone:
E-Mail: Fax:

Directional Two-Lane Highway Segment Analysis

Analyst	Lauren Davini
Agency/Co.	Napa County
Date Performed	9/8/15
Analysis Time Period	Weekday PM Peak
Highway	Silverado Trail
From/To	0.5mi N/o & S/o 4059 SilvTrail
Jurisdiction	County of Napa
Analysis Year	2015
Description NB Cumulative	

Input Data

Highway class Class	2	
Shoulder width	7.0	ft
Lane width	12.0	ft
Segment length	1.0	mi
Terrain type	Level	
Grade: Length	-	mi
Up/down	-	%

Peak hour factor, PHF	0.95	
% Trucks and buses	5	%
% Trucks crawling	0.0	%
Truck crawl speed	0.0	mi/hr
% Recreational vehicles	2	%
% No-passing zones	100	%
Access point density	15	/mi

Analysis direction volume, Vd	470	veh/h
Opposing direction volume, Vo	1050	veh/h

Average Travel Speed

Direction	Analysis(d)	Opposing (o)	
PCE for trucks, ET	2.0*	2.0*	
PCE for RVs, ER	1.0	1.0	
Heavy-vehicle adj. factor,(note-5) fHV	0.952	0.952	
Grade adj. factor,(note-1) fg	1.00	1.00	
Directional flow rate,(note-2) vi	520	1161	pc/h

Free-Flow Speed from Field Measurement:

Field measured speed,(note-3) S FM	-	mi/h
Observed total demand,(note-3) V	-	veh/h

Estimated Free-Flow Speed:

Base free-flow speed,(note-3) BFFS	55.0	mi/h
Adj. for lane and shoulder width,(note-3) fLS	0.0	mi/h
Adj. for access point density,(note-3) fA	3.8	mi/h
Free-flow speed, FFSd	51.3	mi/h

Adjustment for no-passing zones, fnp	1.0	mi/h
Average travel speed, ATSd	37.2	mi/h
Percent Free Flow Speed, PFFS	72.6	%

Percent Time-Spent-Following

Direction	Analysis(d)	Opposing (o)	
PCE for trucks, ET	1.0	1.0	
PCE for RVs, ER	1.0	1.0	
Heavy-vehicle adjustment factor, fHV	1.000	1.000	
Grade adjustment factor,(note-1) fg	1.00	1.00	
Directional flow rate,(note-2) vi	495	1105	pc/h
Base percent time-spent-following,(note-4) BPTSFd	58.5		%
Adjustment for no-passing zones, fnp	20.1		
Percent time-spent-following, PTSFd	64.7		%

Level of Service and Other Performance Measures

Level of service, LOS	C	
Volume to capacity ratio, v/c	0.29	
Peak 15-min vehicle-miles of travel, VMT15	124	veh-mi
Peak-hour vehicle-miles of travel, VMT60	470	veh-mi
Peak 15-min total travel time, TT15	3.3	veh-h
Capacity from ATS, CdATS	1700	veh/h
Capacity from PTSF, CdPTSF	1700	veh/h
Directional Capacity	1700	veh/h

Passing Lane Analysis

Total length of analysis segment, Lt	1.0	mi
Length of two-lane highway upstream of the passing lane, Lu	-	mi
Length of passing lane including tapers, Lpl	-	mi
Average travel speed, ATSd (from above)	37.2	mi/h
Percent time-spent-following, PTSFd (from above)	64.7	
Level of service, LOSd (from above)	C	

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for average travel speed, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for average travel speed, Ld	-	mi
Adj. factor for the effect of passing lane on average speed, fpl	-	
Average travel speed including passing lane, ATSpl	-	
Percent free flow speed including passing lane, PFFSpl	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 the passing lane for percent time-spent-following, Ld	-	mi
Adj. factor for the effect of passing lane on percent time-spent-following, fpl	-	
Percent time-spent-following including passing lane, PTSFpl	-	%

Level of Service and Other Performance Measures with Passing Lane

Level of service including passing lane, LOSpl	A	
Peak 15-min total travel time, TT15	-	veh-h

Bicycle Level of Service

HCS 2010: Two-Lane Highways Release 6.70

Phone: Fax:
E-Mail:

Directional Two-Lane Highway Segment Analysis

Analyst   Lauren Davini
Agency/Co.   Napa County
Date Performed   9/8/15
Analysis Time Period Weekday PM Peak
Highway   Silverado Trail
From/To   0.5mi N/o & S/o 4059 SilvTrail
Jurisdiction   County of Napa
Analysis Year   2015
Description   SB Cumulative

Input Data

Highway class	Class 2		Peak hour factor, PHF	0.95	
Shoulder width	7.0	ft	% Trucks and buses	5	%
Lane width	12.0	ft	% Trucks crawling	0.0	%
Segment length	1.0	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Level		% Recreational vehicles	2	%
Grade: Length	-	mi	% No-passing zones	100	%
Up/down	-	%	Access point density	12	/mi

Analysis direction volume, Vd   1050   veh/h
Opposing direction volume, Vo   470   veh/h

Average Travel Speed

Direction	Analysis(d)	Opposing(o)	
PCE for trucks, ET	2.0*	2.0*	
PCE for RVs, ER	1.0	1.0	
Heavy-vehicle adj. factor,(note-5) fHV	0.952	0.952	
Grade adj. factor,(note-1) fg	1.00	1.00	
Directional flow rate,(note-2) vi	1161	520	pc/h

Free-Flow Speed from Field Measurement:
Field measured speed,(note-3) S FM   -   mi/h
Observed total demand,(note-3) V   -   veh/h
Estimated Free-Flow Speed:
Base free-flow speed,(note-3) BFFS   55.0   mi/h
Adj. for lane and shoulder width,(note-3) fLS   0.0   mi/h
Adj. for access point density,(note-3) fA   3.0   mi/h

Free-flow speed, FFSd   52.0   mi/h

Adjustment for no-passing zones, fnp   2.2   mi/h
Average travel speed, ATSd   36.7   mi/h
Percent Free Flow Speed, PFFS   70.6   %

Posted speed limit, Sp   55
Percent of segment with occupied on-highway parking   0
Pavement rating, P   3
Flow rate in outside lane, vOL   494.7
Effective width of outside lane, We   26.00
Effective speed factor, St   4.79
Bicycle LOS Score, BLOS   2.82
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 downgrade segments are treated as level terrain.
2. If vi (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. For the analysis direction only.
5. 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

Direction	Analysis(d)	Opposing (o)	
PCE for trucks, ET	1.0	1.0	
PCE for RVs, ER	1.0	1.0	
Heavy-vehicle adjustment factor, fHV	1.000	1.000	
Grade adjustment factor,(note-1) fg	1.00	1.00	
Directional flow rate,(note-2) vi	1105 pc/h	495	pc/h
Base percent time-spent-following,(note-4) BPTSFd	76.8		%
Adjustment for no-passing zones, fnp	20.1		%
Percent time-spent-following, PTSFd	90.7		%

_____ Level of Service and Other Performance Measures _____

Level of service, LOS	E	
Volume to capacity ratio, v/c	0.65	
Peak 15-min vehicle-miles of travel, VMT15	276	veh-mi
Peak-hour vehicle-miles of travel, VMT60	1050	veh-mi
Peak 15-min total travel time, TT15	7.5	veh-h
Capacity from ATS, CdATS	0	veh/h
Capacity from PTSF, CdPTSF	1700	veh/h
Directional Capacity	1700	veh/h

_____ Passing Lane Analysis _____

Total length of analysis segment, Lt	1.0	mi
Length of two-lane highway upstream of the passing lane, Lu	-	mi
Length of passing lane including tapers, Lpl	-	mi
Average travel speed, ATSd (from above)	36.7	mi/h
Percent time-spent-following, PTSFd (from above)	90.7	
Level of service, LOSd (from above)	E	

_____ Average Travel Speed with Passing Lane _____

Downstream length of two-lane highway within effective length of passing lane for average travel speed, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for average travel speed, Ld	-	mi
Adj. factor for the effect of passing lane on average speed, fpl	-	
Average travel speed including passing lane, ATSpl	-	
Percent free flow speed including passing lane, PFFSpl	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 the passing lane for percent time-spent-following, Ld	-	mi
Adj. factor for the effect of passing lane on percent time-spent-following, fpl	-	
Percent time-spent-following including passing lane, PTSFpl	-	

_____ Level of Service and Other Performance Measures with Passing Lane _____

Level of service including passing lane, LOSpl	A	
Peak 15-min total travel time, TT15	-	veh-h

_____ Bicycle Level of Service _____

Posted speed limit, Sp	55
Percent of segment with occupied on-highway parking	0
Pavement rating, P	3
Flow rate in outside lane, vOL	1105.3
Effective width of outside lane, We	26.00
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	3.23
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 downgrade segments are treated as level terrain.
2. If vi (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. For the analysis direction only.
5. 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

HCS 2010: Two-Lane Highways Release 6.70

Phone: Fax:
E-Mail:

Directional Two-Lane Highway Segment Analysis

Analyst   Lauren Davini
Agency/Co.   Napa County
Date Performed   9/8/15
Analysis Time Period   Weekend Midday Peak
Highway   Silverado Trail
From/To   0.5mi N/o & S/o 4059 SilvTrail
Jurisdiction   County of Napa
Analysis Year   2015
Description NB Cumulative

Input Data

Highway class Class 2			Peak hour factor, PHF	0.90	
Shoulder width	7.0	ft	% Trucks and buses	5	%
Lane width	12.0	ft	% Trucks crawling	0.0	%
Segment length	1.0	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Level		% Recreational vehicles	2	%
Grade: Length	-	mi	% No-passing zones	100	%
Up/down	-	%	Access point density	15	/mi

Analysis direction volume, Vd   635   veh/h
Opposing direction volume, Vo   473   veh/h

Average Travel Speed

	Analysis(d)	Opposing (o)	
Direction			
PCE for trucks, ET	2.0*	2.0*	
PCE for RVs, ER	1.0	1.0	
Heavy-vehicle adj. factor,(note-5) fHV	0.952	0.952	
Grade adj. factor,(note-1) fg	1.00	1.00	
Directional flow rate,(note-2) vi	741	552	pc/h

Free-Flow Speed from Field Measurement:
Field measured speed,(note-3) S FM   --   mi/h
Observed total demand,(note-3) V   --   veh/h
Estimated Free-Flow Speed:
Base free-flow speed,(note-3) BFFS   55.0 mi/h
Adj. for lane and shoulder width,(note-3) fLS   0.0   mi/h
Adj. for access point density,(note-3) fA   3.8   mi/h

Free-flow speed, FFSd   51.3 mi/h

Adjustment for no-passing zones, fnp   2.1   mi/h
Average travel speed, ATSd   39.1 mi/h
Percent Free Flow Speed, PFFS   76.3 %

Percent Time-Spent-Following

	Analysis(d)	Opposing (o)	
Direction			
PCE for trucks, ET	1.0	1.0	
PCE for RVs, ER	1.0	1.0	
Heavy-vehicle adjustment factor, fHV	1.000	1.000	
Grade adjustment factor,(note-1) fg	1.00	1.00	
Directional flow rate,(note-2) vi	706	526	pc/h
Base percent time-spent-following,(note-4) BPTSFd	63.0		%
Adjustment for no-passing zones, fnp	31.9		
Percent time-spent-following, PTSFd	81.3		%

Level of Service and Other Performance Measures

Level of service, LOS   D
Volume to capacity ratio, v/c   0.42
Peak 15-min vehicle-miles of travel, VMT15   176   veh-mi
Peak-hour vehicle-miles of travel, VMT60   635   veh-mi
Peak 15-min total travel time, TT15   4.5   veh-h
Capacity from ATS, CdATS   0   veh/h
Capacity from PTSF, CdPTSF   1700 veh/h
Directional Capacity   1700 veh/h

Passing Lane Analysis

Total length of analysis segment, Lt   1.0   mi
Length of two-lane highway upstream of the passing lane, Lu   -   mi
Length of passing lane including tapers, Lpl   -   mi
Average travel speed, ATSd (from above)   39.1 mi/h
Percent time-spent-following, PTSFd (from above)   81.3
Level of service, LOSd (from above)   D

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective
   length of passing lane for average travel speed, Lde   -   mi
Length of two-lane highway downstream of effective
   length of the passing lane for average travel speed, Ld   -   mi
Adj. factor for the effect of passing lane
   on average speed, fpl   -
Average travel speed including passing lane, ATSpl   -
Percent free flow speed including passing lane, PFFSpl   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
   the passing lane for percent time-spent-following, Ld   -   mi
Adj. factor for the effect of passing lane
   on percent time-spent-following, fpl   -
Percent time-spent-following
   including passing lane, PTSFpl   -

Level of Service and Other Performance Measures with Passing Lane

Level of service including passing lane, LOSpl   A
Peak 15-min total travel time, TT15   -   veh-h

Bicycle Level of Service

HCS 2010: Two-Lane Highways Release 6.70

Phone:
E-Mail: Fax:

Directional Two-Lane Highway Segment Analysis

Analyst   Lauren Davini
Agency/Co.   Napa County
Date Performed   9/8/15
Analysis Time Period Weekend Midday Peak
Highway   Silverado Trail
From/To   0.5mi N/o & S/o 4059 SilvrTrail
Jurisdiction   County of Napa
Analysis Year   2015
Description SB Cumulative

Input Data

Highway class Class 2			Peak hour factor, PHF	0.90	
Shoulder width	7.0	ft	% Trucks and buses	5	%
Lane width	12.0	ft	% Trucks crawling	0.0	%
Segment length	1.0	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Level		% Recreational vehicles	2	%
Grade: Length	-	mi	% No-passing zones	100	%
Up/down	-	%	Access point density	12	/mi

Analysis direction volume, Vd   473   veh/h
Opposing direction volume, Vo   635   veh/h

Average Travel Speed

Direction	Analysis(d)	Opposing (o)	
PCE for trucks, ET	2.0*	2.0*	
PCE for RVs, ER	1.0	1.0	
Heavy-vehicle adj. factor,(note-5) fHV	0.952	0.952	
Grade adj. factor,(note-1) fg	1.00	1.00	
Directional flow rate,(note-2) vi	552	741	pc/h

Free-Flow Speed from Field Measurement:
Field measured speed,(note-3) S FM   -   mi/h
Observed total demand,(note-3) V   -   veh/h
Estimated Free-Flow Speed:
Base free-flow speed,(note-3) BFFS   55.0   mi/h
Adj. for lane and shoulder width,(note-3) fLS   0.0   mi/h
Adj. for access point density,(note-3) fA   3.0   mi/h

Free-flow speed, FFSd   52.0   mi/h

Adjustment for no-passing zones, fnp   1.5   mi/h
Average travel speed, ATSd   40.5   mi/h
Percent Free Flow Speed, PFFS   77.8   %

Posted speed limit, Sp   55
Percent of segment with occupied on-highway parking   0
Pavement rating, P   3
Flow rate in outside lane, vOL   705.6
Effective width of outside lane, We   26.00
Effective speed factor, St   4.79
Bicycle LOS Score, BLOS   3.00
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
   dewngrade segments are treated as level terrain.
2. If vi (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. For the analysis direction only.
5. 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

Direction	Analysis(d)	Opposing (o)
PCE for trucks, ET	1.0	1.0
PCE for RVs, ER	1.0	1.0
Heavy-vehicle adjustment factor, fHV	1.000	1.000
Grade adjustment factor, (note-1) fg	1.00	1.00
Directional flow rate, (note-2) vi	526 pc/h	706 pc/h
Base percent time-spent-following, (note-4) BPTSFd	55.1 %	
Adjustment for no-passing zones, fnp	31.9 %	
Percent time-spent-following, PTSFd	68.7 %	

Level of Service and Other Performance Measures

Level of service, LOS	C	
Volume to capacity ratio, v/c	0.31	
Peak 15-min vehicle-miles of travel, VMT15	131	veh-mi
Peak-hour vehicle-miles of travel, VMT60	473	veh-mi
Peak 15-min total travel time, TT15	3.2	veh-h
Capacity from ATS, CdATS	1692	veh/h
Capacity from PTSF, CdPTSF	1700	veh/h
Directional Capacity	1700	veh/h

Passing Lane Analysis

Total length of analysis segment, Lt	1.0	mi
Length of two-lane highway upstream of the passing lane, Lu	–	mi
Length of passing lane including tapers, Lpl	–	mi
Average travel speed, ATSd (from above)	40.5	mi/h
Percent time-spent-following, PTSFd (from above)	68.7	
Level of service, LOSd (from above)	C	

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for average travel speed, Lde	–	mi
Length of two-lane highway downstream of effective length of the passing lane for average travel speed, Ld	–	mi
Adj. factor for the effect of passing lane on average speed, fpl	–	
Average travel speed including passing lane, ATSpl	–	
Percent free flow speed including passing lane, PFFSpl	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 the passing lane for percent time-spent-following, Ld	–	mi
Adj. factor for the effect of passing lane on percent time-spent-following, fpl	–	
Percent time-spent-following including passing lane, PTSFpl	–	%

Level of Service and Other Performance Measures with Passing Lane

Level of service including passing lane, LOSpl	A	
Peak 15-min total travel time, TT15	–	veh-h

Bicycle Level of Service

Posted speed limit, Sp	55
Percent of segment with occupied on-highway parking	0
Pavement rating, P	3
Flow rate in outside lane, vOL	525.6
Effective width of outside lane, We	26.00
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	2.85
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 downgrade segments are treated as level terrain.
2. If vi (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. For the analysis direction only.
5. 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

HCS 2010: Two-Lane Highways Release 6.70

Phone: Fax:
E-Mail:

_____ Directional Two-Lane Highway Segment Analysis _____

Analyst   Lauren Davini
Agency/Co.   Napa County
Date Performed   9/8/15
Analysis Time Period   Weekday PM Peak
Highway   Silverado Trail
From/To   0.5mi N/o & S/o 4059 SilvTrail
Jurisdiction   County of Napa
Analysis Year   2015
Description   NB Cumulative + Project

_____ Input Data _____

Highway class	Class 2		Peak hour factor, PHF	0.95	
Shoulder width	7.0	ft	% Trucks and buses	5	%
Lane width	12.0	ft	% Trucks crawling	0.0	%
Segment length	1.0	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Level		% Recreational vehicles	2	%
Grade: Length	-	mi	% No-passing zones	100	%
Up/down	-	%	Access point density	15	/mi

Analysis direction volume, Vd   475   veh/h
Opposing direction volume, Vo   1059   veh/h

_____ Average Travel Speed _____

Direction	Analysis(d)	Opposing (o)	
PCE for trucks, ET	2.0*	2.0*	
PCE for RVs, ER	1.0	1.0	
Heavy-vehicle adj. factor,(note-5) fHV	0.952	0.952	
Grade adj. factor,(note-1) fg	1.00	1.00	
Directional flow rate,(note-2) vi	525	1171	pc/h

Free-Flow Speed from Field Measurement:
Field measured speed,(note-3) S FM   -   mi/h
Observed total demand,(note-3) V   -   veh/h
Estimated Free-Flow Speed:
Base free-flow speed,(note-3) BFFS   55.0   mi/h
Adj. for lane and shoulder width,(note-3) fLS   0.0   mi/h
Adj. for access point density,(note-3) fA   3.8   mi/h

Free-flow speed, FFSd   51.3   mi/h

Adjustment for no-passing zones, fnp   1.0   mi/h
Average travel speed, ATSd   37.1   mi/h
Percent Free Flow Speed, PFFS   72.3   %

_____ Percent Time-Spent-Following _____

Direction	Analysis(d)	Opposing (o)	
PCE for trucks, ET	1.0	1.0	
PCE for RVs, ER	1.0	1.0	
Heavy-vehicle adjustment factor, fHV	1.000	1.000	
Grade adjustment factor,(note-1) fg	1.00	1.00	
Directional flow rate,(note-2) vi	500	1115	pc/h
Base percent time-spent-following,(note-4) BPTSFd	58.8		%
Adjustment for no-passing zones, fnp	19.9		
Percent time-spent-following, PTSFd	65.0		%

_____ Level of Service and Other Performance Measures _____

Level of service, LOS   C
Volume to capacity ratio, v/c   0.29
Peak 15-min vehicle-miles of travel, VMT15   125   veh-mi
Peak-hour vehicle-miles of travel, VMT60   475   veh-mi
Peak 15-min total travel time, TT15   3.4   veh-h
Capacity from ATS, CdATS   1700   veh/h
Capacity from PTSF, CdPTSF   1700   veh/h
Directional Capacity   1700   veh/h

_____ Passing Lane Analysis _____

Total length of analysis segment, Lt   1.0   mi
Length of two-lane highway upstream of the passing lane, Lu   -   mi
Length of passing lane including tapers, Lpl   -   mi
Average travel speed, ATSd (from above)   37.1   mi/h
Percent time-spent-following, PTSFd (from above)   65.0
Level of service, LOSd (from above)   C

_____ Average Travel Speed with Passing Lane _____

Downstream length of two-lane highway within effective
  length of passing lane for average travel speed, Lde   -   mi
Length of two-lane highway downstream of effective
  length of the passing lane for average travel speed, Ld   -   mi
Adj. factor for the effect of passing lane
  on average speed, fpl   -
Average travel speed including passing lane, ATSpl   -
Percent free flow speed including passing lane, PFFSpl   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
  the passing lane for percent time-spent-following, Ld   -   mi
Adj. factor for the effect of passing lane
  on percent time-spent-following, fpl   -
Percent time-spent-following
  including passing lane, PTSFpl   -

_____ Level of Service and Other Performance Measures with Passing Lane _____

Level of service including passing lane, LOSpl   A
Peak 15-min total travel time, TT15   -   veh-h

_____ Bicycle Level of Service _____

HCS 2010: Two-Lane Highways Release 6.70

Phone: Fax:
E-Mail:

Directional Two-Lane Highway Segment Analysis

Analyst   Lauren Davini
Agency/Co.   Napa County
Date Performed   9/8/15
Analysis Time Period   Weekday PM Peak
Highway   Silverado Trail
From/To   0.5mi N/o & S/o 4059 SilvTrail
Jurisdiction   County of Napa
Analysis Year   2015
Description SB Cumulative + Project

Input Data

Highway class Class	2		Peak hour factor, PHF	0.95	
Shoulder width	7.0	ft	% Trucks and buses	5	%
Lane width	12.0	ft	% Trucks crawling	0.0	%
Segment length	1.0	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Level		% Recreational vehicles	2	%
Grade: Length	-	mi	% No-passing zones	100	%
Up/down	-	%	Access point density	12	/mi

Analysis direction volume, Vd   1059   veh/h
Opposing direction volume, Vo   475   veh/h

Average Travel Speed

	Analysis(d)		Opposing (o)	
Direction				
PCE for trucks, ET	2.0*		2.0*	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adj. factor,(note-5) fHV	0.952		0.952	
Grade adj. factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	1171	pc/h	525	pc/h

Free-Flow Speed from Field Measurement:
Field measured speed,(note-3) S FM   -   mi/h
Observed total demand,(note-3) V   -   veh/h
Estimated Free-Flow Speed:
Base free-flow speed,(note-3) BFFS   55.0   mi/h
Adj. for lane and shoulder width,(note-3) fLS   0.0   mi/h
Adj. for access point density,(note-3) fA   3.0   mi/h

Free-flow speed, FFSd   52.0   mi/h

Adjustment for no-passing zones, fnp   2.2   mi/h
Average travel speed, ATSd   36.6   mi/h
Percent Free Flow Speed, PFFS   70.4   %

Posted speed limit, Sp   55
Percent of segment with occupied on-highway parking   0
Pavement rating, P   3
Flow rate in outside lane, vOL   500.0
Effective width of outside lane, We   26.00
Effective speed factor, St   4.79
Bicycle LOS Score, BLOS   2.82
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 downgrade segments are treated as level terrain.
2. If vi (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. For the analysis direction only.
5. 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

Direction	Analysis(d)	Opposing (o)
PCE for trucks, ET	1.0	1.0
PCE for RVs, ER	1.0	1.0
Heavy-vehicle adjustment factor, fHV	1.000	1.000
Grade adjustment factor,(note-1) fg	1.00	1.00
Directional flow rate,(note-2) vi	1115 pc/h	500 pc/h
Base percent time-spent-following,(note-4) BPTSFd	76.6 %	
Adjustment for no-passing zones, fnp	19.9 %	
Percent time-spent-following, PTSFd	90.3 %	

Level of Service and Other Performance Measures

Level of service, LOS	E	
Volume to capacity ratio, v/c	0.66	
Peak 15-min vehicle-miles of travel, VMT15	279	veh-mi
Peak-hour vehicle-miles of travel, VMT60	1059	veh-mi
Peak 15-min total travel time, TT15	7.6	veh-h
Capacity from ATS, CdATS	0	veh/h
Capacity from PTSF, CdPTSF	1700	veh/h
Directional Capacity	1700	veh/h

Passing Lane Analysis

Total length of analysis segment, Lt	1.0	mi
Length of two-lane highway upstream of the passing lane, Lu	-	mi
Length of passing lane including tapers, Lpl	-	mi
Average travel speed, ATSd (from above)	36.6	mi/h
Percent time-spent-following, PTSFd (from above)	90.3	
Level of service, LOSd (from above)	E	

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for average travel speed, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for average travel speed, Ld	-	mi
Adj. factor for the effect of passing lane on average speed, fpl	-	
Average travel speed including passing lane, ATSpl	-	
Percent free flow speed including passing lane, PFFSpl	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 the passing lane for percent time-spent-following, Ld	-	mi
Adj. factor for the effect of passing lane on percent time-spent-following, fpl	-	
Percent time-spent-following including passing lane, PTSFpl	-	

Level of Service and Other Performance Measures with Passing Lane

Level of service including passing lane, LOSpl	A	
Peak 15-min total travel time, TT15	-	veh-h

Bicycle Level of Service

Posted speed limit, Sp	55
Percent of segment with occupied on-highway parking	0
Pavement rating, P	3
Flow rate in outside lane, vOL	1114.7
Effective width of outside lane, We	26.00
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	3.23
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 downgrade segments are treated as level terrain.
2. If vi (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. For the analysis direction only.
5. 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

HCS 2010: Two-Lane Highways Release 6.70

Phone: Fax:
E-Mail:

Directional Two-Lane Highway Segment Analysis

Analyst   Lauren Davini
Agency/Co.   Napa County
Date Performed   9/8/15
Analysis Time Period   Weekend Midday Peak
Highway   Silverado Trail
From/To   0.5mi N/o & S/o 4059 SilvTrail
Jurisdiction   County of Napa
Analysis Year   2015
Description NB Cumulative + Project

Input Data

Highway class Class	2	
Shoulder width	7.0	ft
Lane width	12.0	ft
Segment length	1.0	mi
Terrain type	Level	
Grade: Length	-	mi
Up/down	-	%
Peak hour factor, PHF	0.90	
% Trucks and buses	5	%
% Trucks crawling	0.0	%
Truck crawl speed	0.0	mi/hr
% Recreational vehicles	2	%
% No-passing zones	100	%
Access point density	15	/mi

Analysis direction volume, Vd   644   veh/h
Opposing direction volume, Vo   483   veh/h

Average Travel Speed

Direction	Analysis(d)		Opposing (o)	
PCE for trucks, ET	2.0*		2.0*	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adj. factor,(note-5) fHV	0.952		0.952	
Grade adj. factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	752	pc/h	564	pc/h

Free-Flow Speed from Field Measurement:
Field measured speed,(note-3) S FM   -   mi/h
Observed total demand,(note-3) V   -   veh/h
Estimated Free-Flow Speed:
Base free-flow speed,(note-3) BFFS   55.0   mi/h
Adj. for lane and shoulder width,(note-3) fLS   0.0   mi/h
Adj. for access point density,(note-3) fA   3.8   mi/h

Free-flow speed, FFSd   51.3   mi/h

Adjustment for no-passing zones, fnp   2.0   mi/h
Average travel speed, ATSd   39.0   mi/h
Percent Free Flow Speed, PFFS   76.1   %

Percent Time-Spent-Following

Direction	Analysis(d)		Opposing (o)	
PCE for trucks, ET	1.0		1.0	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adjustment factor, fHV	1.000		1.000	
Grade adjustment factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	716	pc/h	537	pc/h
Base percent time-spent-following,(note-4) BPTSFd	64.0	%		
Adjustment for no-passing zones, fnp	31.4			
Percent time-spent-following, PTSFd	81.9	%		

Level of Service and Other Performance Measures

Level of service, LOS   D
Volume to capacity ratio, v/c   0.42
Peak 15-min vehicle-miles of travel, VMT15 179   veh-mi
Peak-hour vehicle-miles of travel, VMT60   644   veh-mi
Peak 15-min total travel time, TT15   4.6   veh-h
Capacity from ATS, CdATS   0   veh/h
Capacity from PTSF, CdPTSF   1700   veh/h
Directional Capacity   1700   veh/h

Passing Lane Analysis

Total length of analysis segment, Lt   1.0   mi
Length of two-lane highway upstream of the passing lane, Lu   -   mi
Length of passing lane including tapers, Lpl -   mi
Average travel speed, ATSd (from above)   39.0   mi/h
Percent time-spent-following, PTSFd (from above)   81.9
Level of service, LOSd (from above)   D

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective
   length of passing lane for average travel speed, Lde   -   mi
Length of two-lane highway downstream of effective
   length of the passing lane for average travel speed, Ld   -   mi
Adj. factor for the effect of passing lane
   on average speed, fpl   -
Average travel speed including passing lane, ATSpl   -
Percent free flow speed including passing lane, PFFSpl   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
   the passing lane for percent time-spent-following, Ld   -   mi
Adj. factor for the effect of passing lane
   on percent time-spent-following, fpl   -
Percent time-spent-following
   including passing lane, PTSFpl   -

Level of Service and Other Performance Measures with Passing Lane

Level of service including passing lane, LOSpl   A
Peak 15-min total travel time, TT15   -   veh-h

Bicycle Level of Service

Phone: Fax:
E-Mail:

Directional Two-Lane Highway Segment Analysis

Analyst	Lauren Davini
Agency/Co.	Napa County
Date Performed	9/8/15
Analysis Time Period	Weekend Midday Peak
Highway	Silverado Trail
From/To	0.5mi N/o & S/o 4059 SilvTrail
Jurisdiction	County of Napa
Analysis Year	2015
Description	SB Cumulative + Project

Input Data

Highway class	Class 2		Peak hour factor, PHF	0.90	
Shoulder width	7.0	ft	% Trucks and buses	5	%
Lane width	12.0	ft	% Trucks crawling	0.0	%
Segment length	1.0	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Level		% Recreational vehicles	2	%
Grade: Length	-	mi	% No-passing zones	100	%
Up/down	-	%	Access point density	12	/mi

Analysis direction volume, Vd	483	veh/h
Opposing direction volume, Vo	644	veh/h

Average Travel Speed

			Analysis(d)			Opposing (o)	
Direction							
PCE for trucks, ET			2.0*			2.0*	
PCE for RVs, ER			1.0			1.0	
Heavy-vehicle adj. factor,(note-5) fHV			0.952			0.952	
Grade adj.factor,(note-1) fg			1.00			1.00	
Directional flow rate,(note-2) vi			564	pc/h		752	pc/h

Free-Flow Speed from Field Measurement:
Field measured speed,(note-3) S FM	--	mi/h	
Observed total demand,(note-3) V	--	veh/h	
Estimated Free-Flow Speed:			
Base free-flow speed,(note-3) BFFS	55.0	mi/h	
Adj. for lane and shoulder width,(note-3) fLS	0.0	mi/h	
Adj. for access point density,(note-3) fA	3.0	mi/h	
Free-flow speed, FFSd	52.0	mi/h	
Adjustment for no-passing zones, fnp	1.5	mi/h	
Average travel speed, ATSd	40.3	mi/h	
Percent Free Flow Speed, PFFS	77.5	%	

Posted speed limit, Sp	55
Percent of segment with occupied on-highway parking	0
Pavement rating, P	3
Flow rate in outside lane, vOL	715.6
Effective width of outside lane, We	26.00
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	3.01
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
   dewngrade segments are treated as level terrain.
2. If vi (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. For the analysis direction only.
5. 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

Direction	Analysis(d)		Opposing (o)	
PCE for trucks, ET	1.0		1.0	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adjustment factor, fHV	1.000		1.000	
Grade adjustment factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	537	pc/h	716	pc/h
Base percent time-spent-following,(note-4) BPTSFd	56.5	%		
Adjustment for no-passing zones, fnp	31.4			
Percent time-spent-following, PTSFd	70.0	%		

Level of Service and Other Performance Measures

Level of service, LOS	C	
Volume to capacity ratio, v/c	0.32	
Peak 15-min vehicle-miles of travel, VMT15	134	veh-mi
Peak-hour vehicle-miles of travel, VMT60	483	veh-mi
Peak 15-min total travel time, TT15	3.3	veh-h
Capacity from ATS, CdATS	1692	veh/h
Capacity from PTSF, CdPTSF	1700	veh/h
Directional Capacity	1700	veh/h

Passing Lane Analysis

Total length of analysis segment, Lt	1.0	mi
Length of two-lane highway upstream of the passing lane, Lu	-	mi
Length of passing lane including tapers, Lpl	-	mi
Average travel speed, ATSd (from above)	40.3	mi/h
Percent time-spent-following, PTSFd (from above)	70.0	
Level of service, LOSd (from above)	C	

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for average travel speed, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for average travel speed, Ld	-	mi
Adj. factor for the effect of passing lane on average speed, fpl	-	
Average travel speed including passing lane, ATSpl	-	
Percent free flow speed including passing lane, PFFSpl	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 the passing lane for percent time-spent-following, Ld	-	mi
Adj. factor for the effect of passing lane on percent time-spent-following, fpl	-	
Percent time-spent-following including passing lane, PTSFpl	-	

Level of Service and Other Performance Measures with Passing Lane

Level of service including passing lane, LOSpl	A	
Peak 15-min total travel time, TT15	-	veh-h

Bicycle Level of Service

Posted speed limit, Sp	55
Percent of segment with occupied on-highway parking	0
Pavement rating, P	3
Flow rate in outside lane, vOL	536.7
Effective width of outside lane, We	26.00
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	2.86
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 downgrade segments are treated as level terrain.
2. If vi (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. For the analysis direction only.
5. 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

HCS 2010: Two-Lane Highways Release 6.70

Phone:
E-Mail: Fax:

Directional Two-Lane Highway Segment Analysis

Analyst	Lauren Davini
Agency/Co.	Napa County
Date Performed	9/8/15
Analysis Time Period	Weekday PM Peak
Highway	Silverado Trail
From/To	0.5mi N/o & S/o 4059 SilvTrail
Jurisdiction	County of Napa
Analysis Year	2015
Description NB Future	

Input Data

Highway class Class 2			Peak hour factor, PHF	1.00	
Shoulder width	7.0	ft	% Trucks and buses	5	%
Lane width	12.0	ft	% Trucks crawling	0.0	%
Segment length	1.0	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Level		% Recreational vehicles	2	%
Grade: Length	-	mi	% No-passing zones	100	%
Up/down	-	%	Access point density	15	/mi

Analysis direction volume, Vd 890 veh/h
Opposing direction volume, Vo 2122 veh/h

Average Travel Speed

	Analysis(d)	Opposing (o)	
Direction			
PCE for trucks, ET	2.0*	2.0*	
PCE for RVs, ER	1.0	1.0	
Heavy-vehicle adj. factor,(note-5) fHV	0.952	0.952	
Grade adj. factor,(note-1) fg	1.00	1.00	
Directional flow rate,(note-2) vi	935	2229	pc/h

Free-Flow Speed from Field Measurement:
Field measured speed,(note-3) S FM   -   mi/h
Observed total demand,(note-3) V   -   veh/h
Estimated Free-Flow Speed:
Base free-flow speed,(note-3) BFFS   55.0   mi/h
Adj. for lane and shoulder width,(note-3) fLS   0.0   mi/h
Adj. for access point density,(note-3) fA   3.8   mi/h

Free-flow speed, FFSd   51.3   mi/h

Adjustment for no-passing zones, fnp   0.6   mi/h
Average travel speed, ATSd   26.1   mi/h
Percent Free Flow Speed, PFFS   51.0   %

Percent Time-Spent-Following

	Analysis(d)	Opposing (o)	
Direction			
PCE for trucks, ET	1.0	1.0	
PCE for RVs, ER	1.0	1.0	
Heavy-vehicle adjustment factor, fHV	1.000	1.000	
Grade adjustment factor,(note-1) fg	1.00	1.00	
Directional flow rate,(note-2) vi	890	2122	pc/h
Base percent time-spent-following,(note-4) BPTSFd	79.7		%
Adjustment for no-passing zones, fnp	14.3		
Percent time-spent-following, PTSFd	83.9		%

Level of Service and Other Performance Measures

Level of service, LOS	F	
Volume to capacity ratio, v/c	0.52	
Peak 15-min vehicle-miles of travel, VMT15	223	veh-mi
Peak-hour vehicle-miles of travel, VMT60	890	veh-mi
Peak 15-min total travel time, TT15	8.5	veh-h
Capacity from ATS, CdATS	1700	veh/h
Capacity from PTSF, CdPTSF	1700	veh/h
Directional Capacity	1700	veh/h

Passing Lane Analysis

Total length of analysis segment, Lt	1.0	mi
Length of two-lane highway upstream of the passing lane, Lu	-	mi
Length of passing lane including tapers, Lpl	-	mi
Average travel speed, ATSd (from above)	26.1	mi/h
Percent time-spent-following, PTSFd (from above)	83.9	%
Level of service, LOSd (from above)	F	

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective
  length of passing lane for average travel speed, Lde   -   mi
Length of two-lane highway downstream of effective
  length of the passing lane for average travel speed, Ld   -   mi
Adj. factor for the effect of passing lane
  on average speed, fpl   -
Average travel speed including passing lane, ATSpl   -
Percent free flow speed including passing lane, PFFSpl   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
  the passing lane for percent time-spent-following, Ld   -   mi
Adj. factor for the effect of passing lane
  on percent time-spent-following, fpl   -
Percent time-spent-following
  including passing lane, PTSFpl   -

Bicycle Level of Service

Level of service including passing lane, LOSpl   A
Peak 15-min total travel time, TT15   -   veh-h

HCS 2010: Two-Lane Highways Release 6.70

Phone: Fax:
E-Mail:

Directional Two-Lane Highway Segment Analysis

Analyst   Lauren Davini
Agency/Co.   Napa County
Date Performed   9/8/15
Analysis Time Period   Weekday PM Peak
Highway   Silverado Trail
From/To   0.5mi N/o & S/o 4059 SilvTrail
Jurisdiction   County of Napa
Analysis Year   2015
Description SB Future

Input Data

Highway class Class 2			Peak hour factor, PHF	1.00	
Shoulder width 7.0	ft		% Trucks and buses	5	%
Lane width 12.0	ft		% Trucks crawling	0.0	%
Segment length 1.0	mi		Truck crawl speed	0.0	mi/hr
Terrain type Level			% Recreational vehicles	2	%
Grade: Length -	mi		% No-passing zones	100	%
Up/down -	%		Access point density	12	/mi

Analysis direction volume, Vd   2122   veh/h
Opposing direction volume, Vo   890   veh/h

Average Travel Speed

	Analysis(d)			Opposing (o)	
Direction					
PCE for trucks, ET	2.0*			2.0*	
PCE for RVs, ER	1.0			1.0	
Heavy-vehicle adj. factor,(note-5) fHV	0.952			0.952	
Grade adj. factor,(note-1) fg	1.00			1.00	
Directional flow rate,(note-2) vi	2229	pc/h		935	pc/h

Free-Flow Speed from Field Measurement:
Field measured speed,(note-3) S FM   -   mi/h
Observed total demand,(note-3) V   -   veh/h
Estimated Free-Flow Speed:
Base free-flow speed,(note-3) BFFS   55.0   mi/h
Adj. for lane and shoulder width,(note-3) fLS   0.0   mi/h
Adj. for access point density,(note-3) fA   3.0   mi/h

Free-flow speed, FFSd   52.0   mi/h

Adjustment for no-passing zones, fnp   1.2   mi/h
Average travel speed, ATSd   26.3   mi/h
Percent Free Flow Speed, PFFS   50.5   %

Posted speed limit, Sp   55
Percent of segment with occupied on-highway parking 0
Pavement rating, P   3
Flow rate in outside lane, vOL   890.0
Effective width of outside lane, We   26.00
Effective speed factor, St   4.79
Bicycle LOS Score, BLOS   3.12
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
   dewngrade segments are treated as level terrain.
2. If vi (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. For the analysis direction only.
5. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a
   specific dewngrade.

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

Percent Time-Spent-Following

Direction	Analysis(d)		Opposing (o)	
PCE for trucks, ET	1.0		1.0	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adjustment factor, fHV	1.000		1.000	
Grade adjustment factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	2122	pc/h	890	pc/h
Base percent time-spent-following,(note-4) BPTSFd	93.5	%		
Adjustment for no-passing zones, fnp	14.3			
Percent time-spent-following, PTSFd	100.0	%		

Level of Service and Other Performance Measures

Level of service, LOS	F	
Volume to capacity ratio, v/c	1.25	
Peak 15-min vehicle-miles of travel, VMT15	531	veh-mi
Peak-hour vehicle-miles of travel, VMT60	2122	veh-mi
Peak 15-min total travel time, TT15	20.2	veh/h
Capacity from ATS, CdATS	0	veh/h
Capacity from PTSF, CdPTSF	1700	veh/h
Directional Capacity	1700	veh/h

Passing Lane Analysis

Total length of analysis segment, Lt	1.0	mi
Length of two-lane highway upstream of the passing lane, Lu	-	mi
Length of passing lane including tapers, Lpl	-	mi
Average travel speed, ATSd (from above)	26.3	mi/h
Percent time-spent-following, PTSFd (from above)	100.0	%
Level of service, LOSd (from above)	F	

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for average travel speed, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for average travel speed, Ld	-	mi
Adj. factor for the effect of passing lane on average speed, fpl	-	
Average travel speed including passing lane, ATSpl	-	
Percent free flow speed including passing lane, PFFSpl	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 the passing lane for percent time-spent-following, Ld	-	mi
Adj. factor for the effect of passing lane on percent time-spent-following, fpl	-	
Percent time-spent-following including passing lane, PTSFpl	-	%

Level of Service and Other Performance Measures with Passing Lane

Level of service including passing lane, LOSpl	A	
Peak 15-min total travel time, TT15	-	veh-h

Bicycle Level of Service

Posted speed limit, Sp	55
Percent of segment with occupied on-highway parking	0
Pavement rating, P	3
Flow rate in outside lane, vOL	2122.0
Effective width of outside lane, We	26.00
Effective speed factor, St	4.79
Bicycle LOS score, BLOS	3.56
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 dewngrade segments are treated as level terrain.
2. If vi (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. For the analysis direction only.
5. 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

HCS 2010: Two-Lane Highways Release 6.70

Phone: Fax:
E-Mail:

_____ Directional Two-Lane Highway Segment Analysis _____

Analyst   Lauren Davini
Agency/Co.   Napa County
Date Performed   9/8/15
Analysis Time Period   Weekend Midday Peak
Highway   Silverado Trail
From/To   0.5mi N/o & S/o 4059 SilvTrail
Jurisdiction   County of Napa
Analysis Year   2015
Description NB Future

_____ Input Data _____

Highway class   Class 2
Shoulder width   7.0   ft   Peak hour factor, PHF   1.00
Lane width   12.0   ft   % Trucks and buses   5   %
Segment length   1.0   mi   % Trucks crawling   0.0   %
Terrain type   Level   Truck crawl speed   0.0   mi/hr
Grade: Length   -   mi   % Recreational vehicles   2   %
        Up/down -   %   % No-passing zones   100   %
                                       Access point density   15   /mi

Analysis direction volume, Vd   1180   veh/h
Opposing direction volume, Vo   832   veh/h

_____ Average Travel Speed _____

                                              Analysis(d)   Opposing (o)
Direction   2.0*   2.0*
PCE for trucks, ET   1.0   1.0
PCE for RVs, ER   0.952   0.952
Heavy-vehicle adj. factor,(note-5) fHV   1.00   1.00
Grade adj. factor,(note-1) fg   1239   874   pc/h
Directional flow rate,(note-2) vi

Free-Flow Speed from Field Measurement:
Field measured speed,(note-3) S FM   -   mi/h
Observed total demand,(note-3) V   -   veh/h
Estimated Free-Flow Speed:
Base free-flow speed,(note-3) BFFS   55.0   mi/h
Adj. for lane and shoulder width,(note-3) fLS   0.0   mi/h
Adj. for access point density (note-3) fA   3.8   mi/h

Free-flow speed, FFSd   51.3   mi/h

Adjustment for no-passing zones, fnp   1.2   mi/h
Average travel speed, ATSd   33.6   mi/h
Percent Free Flow Speed, PFFS   65.6   %

_____ Percent Time-Spent-Following _____

                                              Analysis(d)   Opposing (o)
Direction   1.0   1.0
PCE for trucks, ET   1.0   1.0
PCE for RVs, ER   1.000   1.000
Heavy-vehicle adjustment factor, fHV   1.00   1.00
Grade adjustment factor,(note-1) fg   1180   832   pc/h
Directional flow rate,(note-2) vi
Base percent time-spent-following,(note-4) BPTSFd   80.9   %
Adjustment for no-passing zones, fnp   17.4   %
Percent time-spent-following, PTSFd   91.1

_____ Level of Service and Other Performance Measures _____

Level of service, LOS   E
Volume to capacity ratio, v/c   0.69
Peak 15-min vehicle-miles of travel, VMT15   295   veh-mi
Peak-hour vehicle-miles of travel, VMT60   1180   veh-mi
Peak 15-min total travel time, TT15   8.8   veh-h
Capacity from ATS, CdATS   0   veh/h
Capacity from PTSF, CdPTSF   1700   veh/h
Directional Capacity   1700   veh/h

_____ Passing Lane Analysis _____

Total length of analysis segment, Lt   1.0   mi
Length of two-lane highway upstream of the passing lane, Lu   -   mi
Length of passing lane including tapers, Lpl   -   mi
Average travel speed, ATSd (from above)   33.6   mi/h
Percent time-spent-following, PTSFd (from above)   91.1
Level of service, LOSd (from above)   E

_____ Average Travel Speed with Passing Lane _____

Downstream length of two-lane highway within effective
    length of passing lane for average travel speed, Lde   -   mi
Length of two-lane highway downstream of effective
    length of the passing lane for average travel speed, Ld   -   mi
Adj. factor for the effect of passing lane
    on average speed, fpl   -
Average travel speed including passing lane, ATSpl   -
Percent free flow speed including passing lane, PFFSpl   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
    the passing lane for percent time-spent-following, Ld   -   mi
Adj. factor for the effect of passing lane
    on percent time-spent-following, fpl   -
Percent time-spent-following
    including passing lane, PTSFpl   -   %

_____ Level of Service and Other Performance Measures with Passing Lane _____

Level of service including passing lane, LOSpl   A
Peak 15-min total travel time, TT15   -   veh-h

_____ Bicycle Level of Service _____

HCS 2010: Two-Lane Highways Release 6.70

Phone: Fax:
E-Mail:

_____ Directional Two-Lane Highway Segment Analysis _____

Analyst   Lauren Davini
Agency/Co.   Napa County
Date Performed   9/8/15
Analysis Time Period   Weekend Midday Peak
Highway   Silverado Trail
From/To   0.5mi N/o & S/o 4059 SilvTrail
Jurisdiction   County of Napa
Analysis Year   2015
Description SB Future

_____ Input Data _____

Highway class	Class 2		Peak hour factor, PHF	1.00	
Shoulder width	7.0	ft	% Trucks and buses	5	%
Lane width	12.0	ft	% Trucks crawling	0.0	%
Segment length	1.0	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Level		% Recreational vehicles	2	%
Grade: Length	-	mi	% No-passing zones	100	%
Up/down	-	%	Access point density	12	/mi

Analysis direction volume, Vd   832   veh/h
Opposing direction volume, Vo 1180   veh/h

_____ Average Travel Speed _____

Direction	Analysis(d)		Opposing (o)	
PCE for trucks, ET	2.0*		2.0*	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adj. factor,(note-5) fHV	0.952		0.952	
Grade adj. factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	874	pc/h	1239	pc/h

Free-Flow Speed from Field Measurement:
Field measured speed,(note-3) S FM   -   mi/h
Observed total demand,(note-3) V   -   veh/h
Estimated Free-Flow Speed:
Base free-flow speed,(note-3) BFFS   55.0   mi/h
Adj. for lane and shoulder width,(note-3) fLS   0.0   mi/h
Adj. for access point density,(note-3) fA   3.0   mi/h

Free-flow speed, FFSd   52.0   mi/h

Adjustment for no-passing zones, fnp   1.0   mi/h
Average travel speed, ATSd   34.6   mi/h
Percent Free Flow Speed, PFFS   66.6   %

Posted speed limit, Sp   55
Percent of segment with occupied on-highway parking 0
Pavement rating, P   3
Flow rate in outside lane, vOL   1180.0
Effective width of outside lane, We   26.00
Effective speed factor, St   4.79
Bicycle LOS Score, BLOS   3.26
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
   downgrade segments are treated as level terrain.
2. If vi (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. For the analysis direction only.
5. 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

Direction	Analysis(d)	Opposing (o)	
PCE for trucks, ET	1.0	1.0	
PCE for RVs, ER	1.0	1.0	
Heavy-vehicle adjustment factor, fHV	1.000	1.000	
Grade adjustment factor,(note-1) fg	1.00	1.00	
Directional flow rate,(note-2) vi	832	1180	pc/h
Base percent time-spent-following,(note-4) BPTSFd	75.0		%
Adjustment for no-passing zones, fnp	17.4		
Percent time-spent-following, PTSFd	82.2		%

Level of Service and Other Performance Measures

Level of service, LOS	D	
Volume to capacity ratio, v/c	0.49	
Peak 15-min vehicle-miles of travel, VMT15	208	veh-mi
Peak-hour vehicle-miles of travel, VMT60	832	veh-mi
Peak 15-min total travel time, TT15	6.0	veh-h
Capacity from ATS, CdATS	1700	veh/h
Capacity from PTSF, CdPTSF	1700	veh/h
Directional Capacity	1700	veh/h

Passing Lane Analysis

Total length of analysis segment, Lt	1.0	mi
Length of two-lane highway upstream of the passing lane, Lu	-	mi
Length of passing lane including tapers, Lpl	-	mi
Average travel speed, ATSd (from above)	34.6	mi/h
Percent time-spent-following, PTSFd (from above)	82.2	
Level of service, LOSd (from above)	D	

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for average travel speed, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for average travel speed, Ld	-	mi
Adj. factor for the effect of passing lane on average speed, fpl	-	
Average travel speed including passing lane, ATSpl	-	
Percent free flow speed including passing lane, PFFSpl	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 the passing lane for percent time-spent-following, Ld	-	mi
Adj. factor for the effect of passing lane on percent time-spent-following, fpl	-	
Percent time-spent-following including passing lane, PTSFpl	-	%

Level of Service and Other Performance Measures with Passing Lane

Level of service including passing lane, LOSpl	A	
Peak 15-min total travel time, TT15	-	veh-h

Bicycle Level of Service

Posted speed limit, Sp	55
Percent of segment with occupied on-highway parking	0
Pavement rating, P	3
Flow rate in outside lane, vOL	832.0
Effective width of outside lane, We	26.00
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	3.08
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 downgrade segments are treated as level terrain.
2. If vi (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. For the analysis direction only.
5. 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

HCS 2010: Two-Lane Highways Release 6.70

Phone: Fax:
E-Mail:

_____Directional Two-Lane Highway Segment Analysis_____

Analyst   Lauren Davini
Agency/Co.   Napa County
Date Performed   9/8/15
Analysis Time Period   Weekday PM Peak
Highway   Silverado Trail
From/To   0.5mi N/o & S/o 4059 SilvTrail
Jurisdiction   County of Napa
Analysis Year   2015
Description NB Future + Project

_____Input Data_____

			Analysis(d)	Opposing (o)	
Highway class Class 2					
Shoulder width	7.0	ft			
Lane width	12.0	ft			
Segment length	1.0	mi			
Terrain type	Level				
Grade: Length	-	mi			
Up/down	-	%			
Peak hour factor, PHF			0.95		
% Trucks and buses			5		%
% Trucks crawling			0.0		%
Truck crawl speed			0.0		mi/hr
% Recreational vehicles			2		%
% No-passing zones			100		%
Access point density			15		/mi
Analysis direction volume, Vd	894	veh/h			
Opposing direction volume, Vo	2131	veh/h			

_____Average Travel Speed_____

		Analysis(d)	Opposing (o)	
Direction				
PCE for trucks, ET		2.0*	2.0*	
PCE for RVs, ER		1.0	1.0	
Heavy-vehicle adj. factor,(note-5) fHV		0.952	0.952	
Grade adj.factor,(note-1) fg		1.00	1.00	
Directional flow rate,(note-2) vi		989	2356	pc/h
Free-Flow Speed from Field Measurement:				
Field measured speed,(note-3) S FM		-	-	mi/h
Observed total demand,(note-3) V		-	-	veh/h
Estimated Free-Flow Speed:				
Base free-flow speed,(note-3) BFFS		55.0		mi/h
Adj. for lane and shoulder width,(note-3) fLS		0.0		mi/h
Adj. for access point density,(note-3) fA		3.8		mi/h
Free-flow speed, FFSd		51.3		mi/h
Adjustment for no-passing zones, fnp		0.6		mi/h
Average travel speed, ATSd		24.7		mi/h
Percent Free Flow Speed, PFFS		48.3		%

_____Percent Time-Spent-Following_____

		Analysis(d)	Opposing (o)	
Direction				
PCE for trucks, ET		1.0	1.0	
PCE for RVs, ER		1.0	1.0	
Heavy-vehicle adjustment factor, fHV		1.000	1.000	
Grade adjustment factor,(note-1) fg		1.00	1.00	
Directional flow rate,(note-2) vi		941	2243	pc/h
Base percent time-spent-following,(note-4) BPTSFd		81.1		%
Adjustment for no-passing zones, fnp		14.3		
Percent time-spent-following, PTSFd		85.3		%

_____Level of Service and Other Performance Measures_____

Level of service, LOS	F	
Volume to capacity ratio, v/c	0.55	
Peak 15-min vehicle-miles of travel, VMT15	235	veh-mi
Peak-hour vehicle-miles of travel, VMT60	894	veh-mi
Peak 15-min total travel time, TT15	9.5	veh-h
Capacity from ATS, CdATS	1700	veh/h
Capacity from PTSF, CdPTSF	1700	veh/h
Directional Capacity	1700	veh/h

_____Passing Lane Analysis_____

Total length of analysis segment, Lt	1.0	mi
Length of two-lane highway upstream of the passing lane, Lu	-	mi
Length of passing lane including tapers, Lpl	-	mi
Average travel speed, ATSd (from above)	24.7	mi/h
Percent time-spent-following, PTSFd (from above)	85.3	
Level of service, LOSd (from above)	F	

_____Average Travel Speed with Passing Lane_____

Downstream length of two-lane highway within effective		
length of passing lane for average travel speed, Lde	-	mi
Length of two-lane highway downstream of effective		
length of the passing lane for average travel speed, Ld	-	mi
Adj. factor for the effect of passing lane		
on average speed, fpl	-	
Average travel speed including passing lane, ATSpl	-	
Percent free flow speed including passing lane, PFFSpl	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		
the passing lane for percent time-spent-following, Ld	-	mi
Adj. factor for the effect of passing lane		
on percent time-spent-following, fpl	-	
Percent time-spent-following		
including passing lane, PTSFpl	-	%

_____Level of Service and Other Performance Measures with Passing Lane_____

Level of service including passing lane, LOSpl	A	
Peak 15-min total travel time, TT15	-	veh-h

_____Bicycle Level of Service_____

HCS 2010: Two-Lane Highways Release 6.70

Phone: Fax:
E-Mail:

_____ Directional Two-Lane Highway Segment Analysis _____

Analyst   Lauren Davini
Agency/Co.   Napa County
Date Performed   9/8/15
Analysis Time Period Weekday PM Peak
Highway   Silverado Trail
From/To   0.5mi N/o & S/o 4059 SilvTrail
Jurisdiction   County of Napa
Analysis Year   2015
Description SB   Future + Project

_____ Input Data _____

Highway class   Class 2   Peak hour factor, PHF   0.95
Shoulder width   7.0   ft   % Trucks and buses   5   %
Lane width   12.0   ft   % Trucks crawling   0.0   %
Segment length   1.0   mi   Truck crawl speed   0.0   mi/hr
Terrain type   Level   % Recreational vehicles   2   %
Grade: Length   -   mi   % No-passing zones   100   %
       Up/down   -   %   Access point density   12   /mi

Analysis direction volume, Vd   2131   veh/h
Opposing direction volume, Vo   894   veh/h

_____ Average Travel Speed _____

                                    Analysis(d)   Opposing (o)
Direction
PCE for trucks, ET   2.0*   2.0*
PCE for RVs, ER   1.0   1.0
Heavy-vehicle adj. factor,(note-5) fHV   0.952   0.952
Grade adj. factor,(note-1) fg   1.00   1.00
Directional flow rate,(note-2) vi   2356   pc/h   989   pc/h

Free-Flow Speed from Field Measurement:
Field measured speed,(note-3) S FM   -   mi/h
Observed total demand,(note-3) V   -   veh/h
Estimated Free-Flow Speed:
Base free-flow speed,(note-3) BFFS   55.0   mi/h
Adj. for lane and shoulder width,(note-3) fLS 0.0   mi/h
Adj. for access point density,(note-3) fA   3.0   mi/h

Free-flow speed, FFSd   52.0   mi/h

Adjustment for no-passing zones, fnp   1.1   mi/h
Average travel speed, ATSd   24.9   mi/h
Percent Free Flow Speed, PFFS   47.9   %

Posted speed limit, Sp   55
Percent of segment with occupied on-highway parking   0
Pavement rating, P   3
Flow rate in outside lane, vOL   941.1
Effective width of outside lane, We   26.00
Effective speed factor, St   4.79
Bicycle LOS Score, BLOS   3.14
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
   downgrade segments are treated as level terrain.
2. If vi (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. For the analysis direction only.
5. 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

	Analysis(d)	Opposing (o)	
Direction			
PCE for trucks, ET	1.0	1.0	
PCE for RVs, ER	1.0	1.0	
Heavy-vehicle adjustment factor, fHV	1.000	1.000	
Grade adjustment factor,(note-1) fg	1.00	1.00	
Directional flow rate,(note-2) vi	2243	941	pc/h
Base percent time-spent-following,(note-4) BPTSFd	94.5		%
Adjustment for no-passing zones, fnp	14.3		
Percent time-spent-following, PTSFd	100.0		%

Level of Service and Other Performance Measures

Level of service, LOS	F	
Volume to capacity ratio, v/c	1.32	
Peak 15-min vehicle-miles of travel, VMT15	561	veh-mi
Peak-hour vehicle-miles of travel, VMT60	2131	veh-mi
Peak 15-min total travel time, TT15	22.5	veh/h
Capacity from ATS, CdATS	0	veh/h
Capacity from PTSF, CdPTSF	1700	veh/h
Directional Capacity	1700	veh/h

Passing Lane Analysis

Total length of analysis segment, Lt	1.0	mi
Length of two-lane highway upstream of the passing lane, Lu	-	mi
Length of passing lane including tapers, Lpl	-	mi
Average travel speed, ATSd (from above)	24.9	mi/h
Percent time-spent-following, PTSFd (from above)	100.0	%
Level of service, LOSd (from above)	F	

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for average travel speed, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for average travel speed, Ld	-	mi
Adj. factor for the effect of passing lane on average speed, fpl	-	
Average travel speed including passing lane, ATSpl	-	
Percent free flow speed including passing lane, PFFSpl	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 the passing lane for percent time-spent-following, Ld	-	mi
Adj. factor for the effect of passing lane on percent time-spent-following, fpl	-	
Percent time-spent-following including passing lane, PTSFpl	-	%

Level of Service and Other Performance Measures with Passing Lane

Level of service including passing lane, LOSpl	A	
Peak 15-min total travel time, TT15	-	veh-h

Bicycle Level of Service

Posted speed limit, Sp	55
Percent of segment with occupied on-highway parking	0
Pavement rating, P	3
Flow rate in outside lane, vOL	2243.2
Effective width of outside lane, We	26.00
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	3.58
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 downgrade segments are treated as level terrain.
2. If vi (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. For the analysis direction only.
5. 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

HCS 2010: Two-Lane Highways Release 6.70

Phone: Fax:
E-Mail:

Directional Two-Lane Highway Segment Analysis

Analyst   Lauren Davini
Agency/Co.   Napa County
Date Performed   9/8/15
Analysis Time Period Weekend Midday Peak
Highway   Silverado Trail
From/To   0.5mi N/o & S/o 4059 SilvTrail
Jurisdiction   County of Napa
Analysis Year   2015
Description   NB Future + Project

Input Data

Highway class Class 2		Peak hour factor, PHF	1.00
Shoulder width 7.0	ft	% Trucks and buses	5 %
Lane width 12.0	ft	% Trucks crawling	0.0 %
Segment length 1.0	mi	Truck crawl speed	0.0 mi/hr
Terrain type Level		% Recreational vehicles	2 %
Grade: Length -	mi	% No-passing zones	100 %
Up/down -	%	Access point density	15 /mi

Analysis direction volume, Vd   1189   veh/h
Opposing direction volume, Vo   842   veh/h

Average Travel Speed

Direction	Analysis(d)	Opposing (o)	
PCE for trucks, ET	2.0*	2.0*	
PCE for RVs, ER	1.0	1.0	
Heavy-vehicle adj. factor,(note-5) fHV	0.952	0.952	
Grade adj. factor,(note-1) fg	1.00	1.00	
Directional flow rate,(note-2) vi	1249	884	pc/h

Free-Flow Speed from Field Measurement:
Field measured speed,(note-3) S FM   --   mi/h
Observed total demand,(note-3) V   --   veh/h
Estimated Free-Flow Speed:
Base free-flow speed,(note-3) BFFS   55.0   mi/h
Adj. for lane and shoulder width,(note-3) fLS 0.0   mi/h
Adj. for access point density,(note-3) fA   3.8   mi/h

Free-flow speed, FFSd   51.3   mi/h

Adjustment for no-passing zones, fnp   1.2   mi/h
Average travel speed, ATSd   33.5   mi/h
Percent Free Flow Speed, PFFS   65.3   %

Percent Time-Spent-Following

Direction	Analysis(d)	Opposing (o)	
PCE for trucks, ET	1.0	1.0	
PCE for RVs, ER	1.0	1.0	
Heavy-vehicle adjustment factor, fHV	1.000	1.000	
Grade adjustment factor,(note-1) fg	1.00	1.00	
Directional flow rate,(note-2) vi	1189	842	pc/h
Base percent time-spent-following,(note-4) BPTSFd	81.1		%
Adjustment for no-passing zones, fnp	17.1		
Percent time-spent-following, PTSFd	91.1		%

Level of Service and Other Performance Measures

Level of service, LOS   E
Volume to capacity ratio, v/c   0.70
Peak 15-min vehicle-miles of travel, VMT15   297   veh-mi
Peak-hour vehicle-miles of travel, VMT60   1189   veh-mi
Peak 15-min total travel time, TT15   8.9   veh-h
Capacity from ATS, CdATS   0   veh/h
Capacity from PTSF, CdPTSF   1700   veh/h
Directional Capacity   1700   veh/h

Passing Lane Analysis

Total length of analysis segment, Lt   1.0   mi
Length of two-lane highway upstream of the passing lane, Lu   -   mi
Length of passing lane including tapers, Lpl   -   mi
Average travel speed, ATSd (from above)   33.5   mi/h
Percent time-spent-following, PTSFd (from above)   91.1
Level of service, LOSd (from above)   E

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective
  length of passing lane for average travel speed, Lde   -   mi
Length of two-lane highway downstream of effective
  length of the passing lane for average travel speed, Ld   -   mi
Adj. factor for the effect of passing lane
  on average speed, fpl   -
Average travel speed including passing lane, ATSpl   -
Percent free flow speed including passing lane, PFFSpl   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
  the passing lane for percent time-spent-following, Ld   -   mi
Adj. factor for the effect of passing lane
  on percent time-spent-following, fpl   -
Percent time-spent-following
  including passing lane, PTSFpl   -   %

Level of Service and Other Performance Measures with Passing Lane

Level of service including passing lane, LOSpl   A
Peak 15-min total travel time, TT15   -   veh-h

Bicycle Level of Service

Directional Two-Lane Highway Segment Analysis

Phone:
E-Mail:
Fax:

Analyst   Lauren Davini
Agency/Co.   Napa County
Date Performed   9/8/15
Analysis Time Period   Weekend Midday Peak
Highway   Silverado Trail
From/To   0.5mi N/o & S/o 4059 SilvrTrail
Jurisdiction   County of Napa
Analysis Year   2015
Description SB Future + Project

_____Input Data_____

Highway class Class 2			Peak hour factor, PHF	1.00	
Shoulder width 7.0	ft		% Trucks and buses	5	%
Lane width 12.0	ft		% Trucks crawling	0.0	%
Segment length 1.0	mi		Truck crawl speed	0.0	mi/hr
Terrain type Level			% Recreational vehicles	2	%
Grade: Length -	mi		% No-passing zones	100	%
Up/down -	%		Access point density	12	/mi

Analysis direction volume, Vd   842   veh/h
Opposing direction volume, Vo   1189 veh/h

_____Average Travel Speed_____

	Analysis(d)	Opposing (o)	
Direction			
PCE for trucks, ET	2.0*	2.0*	
PCE for RVs, ER	1.0	1.0	
Heavy-vehicle adj. factor,(note-5) fHV	0.952	0.952	
Grade adj. factor,(note-1) fg	1.00	1.00	
Directional flow rate,(note-2) vi	884	1249	pc/h

Free-Flow Speed from Field Measurement:
Field measured speed,(note-3) S FM   -   mi/h
Observed total demand,(note-3) V   -   veh/h
Estimated Free-Flow Speed:
Base free-flow speed,(note-3) BFFS   55.0   mi/h
Adj. for lane and shoulder width,(note-3) fLS   0.0   mi/h
Adj. for access point density,(note-3) fA   3.0   mi/h

Free-flow speed, FFSd   52.0   mi/h

Adjustment for no-passing zones, fnp   1.0   mi/h
Average travel speed, ATSd   34.5   mi/h
Percent Free Flow Speed, PFFS   66.3   %

Posted speed limit, Sp   55
Percent of segment with occupied on-highway parking   0
Pavement rating, P   3
Flow rate in outside lane, vOL   1189.0
Effective width of outside lane, We   26.00
Effective speed factor, St   4.79
Bicycle LOS Score, BLOS   3.26
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
   dewngrade segments are treated as level terrain.
2. If vi (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. For the analysis direction only.
5. 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

Posted speed limit, Sp   55
Percent of segment with occupied on-highway parking   0
Pavement rating, P   3
Flow rate in outside lane, voL   842.0
Effective width of outside lane, We   26.00
Effective speed factor, St   4.79
Bicycle LOS Score, BLOS   3.09
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
   downgrade segments are treated as level terrain.
2. If vi (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. For the analysis direction only.
5. 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 _____

Direction   Analysis(d)   Opposing (o)
PCE for trucks, ET   1.0   1.0
PCE for RVs, ER   1.0   1.0
Heavy-vehicle adjustment factor, fHV   1.000   1.000
Grade adjustment factor,(note-1) fg   1.00   1.00
Directional flow rate,(note-2) vi   842 pc/h   1189 pc/h
Base percent time-spent-following,(note-4) BPTSFd 75.3 %
Adjustment for no-passing zones, fnp   17.1
Percent time-spent-following, PTSFd   82.4 %

_____ Level of Service and Other Performance Measures _____

Level of service, LOS   D
Volume to capacity ratio, v/c   0.50
Peak 15-min vehicle-miles of travel, VMT15   211   veh-mi
Peak-hour vehicle-miles of travel, VMT60   842   veh-mi
Peak 15-min total travel time, TT15   6.1   veh-h
Capacity from ATS, CdATS   1700   veh/h
Capacity from PTSF, CdPTSF   1700   veh/h
Directional Capacity   1700   veh/h

_____ Passing Lane Analysis _____

Total length of analysis segment, Lt   1.0   mi
Length of two-lane highway upstream of the passing lane, Lu   -   mi
Length of passing lane including tapers, Lpl   -   mi
Average travel speed, ATSd (from above)   34.5   mi/h
Percent time-spent-following, PTSFd (from above)   82.4
Level of service, LOSd (from above)   D

_____ Average Travel Speed with Passing Lane _____

Downstream length of two-lane highway within effective
   length of passing lane for average travel speed, Lde   -   mi
Length of two-lane highway downstream of effective
   length of the passing lane for average travel speed, Ld   -   mi
Adj. factor for the effect of passing lane
   on average speed, fpl   -
Average travel speed including passing lane, ATSpl   -
Percent free flow speed including passing lane, PFFSpl   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
   the passing lane for percent time-spent-following, Ld   -   mi
Adj. factor for the effect of passing lane
   on percent time-spent-following, fpl   -
Percent time-spent-following
   including passing lane, PTSFpl   -

____ Level of Service and Other Performance Measures with Passing Lane ____

Level of service including passing lane, LOSpl   A
Peak 15-min total travel time, TT15   -   veh-h

_____ Bicycle Level of Service _____

Appendix C

Trip Generation Worksheet

Winery Traffic Information / Trip Generation Sheet

Sam Jasper Winery   Project Scenario:

Traffic during a Typical Weekday

Number of FT employees: __10__	x 3.05 one-way trips per employee	=	__31__	daily trips.
Number of PT employees: __0__	x 1.90 one-way trips per employee	=	__0__	daily trips.
Average number of weekday visitors: __25__	/ 2.6 visitors per vehicle x 2 one-way trips	=	__19__	daily trips.
Gallons of production: __20000__	/ 1,000 x .009 truck trips daily[3] x 2 one-way trips	=	__0__	daily trips.
	Total	=	__50__	daily trips.
	Number of total weekday trips x .38	=	__19__	PM peak trips.

Traffic during a Typical Saturday

Number of FT employees (on Saturdays): __10__	x 3.05 one-way trips per employee	=	__31__	daily trips.
Number of PT employees (on Saturdays): __0__	x 1.90 one-way trips per employee	=	__0__	daily trips.
Average number of weekend visitors: __25__	/ 2.8 visitors per vehicle x 2 one-way trips	=	__18__	daily trips.
	Total	=	__48__	daily trips.
	Number of total Saturday trips x .57	=	__27__	PM peak trips.

Traffic during a Crush Saturday

Number of FT employees (during crush): __10__	x 3.05 one-way trips per employee	=	__31__	daily trips.
Number of PT employees (during crush): __0__	x 1.90 one-way trips per employee	=	__0__	daily trips.
Average number of weekend visitors: __25__	/ 2.8 visitors per vehicle x 2 one-way trips	=	__18__	daily trips.
Gallons of production: __20000__	/ 1,000 x .009 truck trips daily x 2 one-way trips	=	__0__	daily trips.
Avg. annual tons of grape on-haul: __150__	x .11 truck trips daily[4] x 2 one-way trips	=	__2__	daily trips.
	Total	=	__51__	daily trips.
	Number of total Saturday trips x .57	=	__29__	PM peak trips.

Largest Marketing Event- Additional Traffic

|				
Number of event staff (largest event): __4__	x 2 one-way trips per staff person	=	__8__	trips.
Number of visitors (largest event): __50__	/ 2.8 visitors per vehicle x 2 one-way trips	=	__36__	trips.
Number of special event truck trips (largest event): __2__	x 2 one-way trips	=	__4__	trips.

---

[3] 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).

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

REVISED 06/08/2015

Appendix D

Left-Turn Lane Warrant

Napa County Left Turn Lane Warrant Graph

Left Turn Lane Required

No Left Turn Lane Required

Project Driveway Daily Volume

Roadway Daily Volume

300
250
200
150
100
50
0

500
1,000
1,500
2,000
2,500
3,000
3,500
4,000
4,500
5,000
5,500
6,000
6,500
7,000
7,500
8,000
8,500
9,000
9,500
10,000
10,500
11,000
11,500
12,000
12,500
13,000
13,500
14,000