



# State Route 49 Corridor System Management Plan 2018 Update

Prepared for: **Nevada County Transportation Commission**





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# 1. Introduction

The Nevada County Transportation Commission (NCTC) retained GHD to perform an update to the 2009 State Route (SR) 49 Corridor System Management Plan (CSMP). As part of this overall effort, this report presents the Performance Measures of the SR 49 corridor.

For the purposes of this CSMP effort, the study boundaries include a 13.6-mile segment of SR 49 from the Southern Nevada County line to the SR 49/McKnight Way Junction. The study segment and study scope, including performance metrics, were selected for inclusion in consultation with the NCTC (Client) and selected public agency stakeholders.

## 1.1 Background

Californians rely heavily on the SR 49 corridor for commute and recreational travel. Therefore, regardless of the agencies operating and funding the services within the SR 49 facility, it becomes necessary to maintain safe and efficient operations for all modes of travel present on this corridor. The development and update of a CSMP recognizes the importance of multi-jurisdictional collaboration to best support and manage multimodal transportation services and facilities for the traveling public.

### 1.1.1 Previous Studies

In 2009, a CSMP was prepared for a 23-mile long segment of SR 49, which spanned between the Interstate 80/SR 49 Interchange in Placer County and the SR 49/SR 20 Junction in Nevada County. The 2009 CSMP documented the existing facilities along the corridor and the recommended improvements to improve the quality of multimodal traffic within the specified study limits of the corridor, which was then supplemented with the 2012 State of the Corridor Report. **Table 1.1** presents the status of each project identified in the report by Year 2018.

Table 1.1 Summary of Improvement Status – SR 49 CSMP

Location	Project Description	Completion Status
SR 49 from Timberline Dr. to Lode Line Road	Widen SR 49 at La Barr Meadows	Complete
Construct turn lanes, median refuge areas, and frontage roads at various locations:		
Cerrito Road	Construct NB right turn lane with sight-distance wedge, and re-stripe median as a 2 lane left turn lane to the south of the intersection	Incomplete
Ladybird Drive	Construct SB right turn lane and widen NB shoulder	Incomplete
Carriage Road	Construct NB right turn lane and sight-distance wedge	Complete
Brewer Road	Construct NB right turn lane and median refuge area	Complete
Round valley Road to Ruby Road	Construct a two-way-left-turn lane	Incomplete



Table 1.1 Summary of Improvement Status – SR 49 CSMP

Location	Project Description	Completion Status
Travertine Court to Auburn Road	Construct frontage roads and intersection improvements	Incomplete
Alta Sierra Drive to Pingree Road	Construct frontage roads and intersection improvements	Incomplete
Wellswood Way to Christian Life Way	Construct frontage roads and intersection improvements	Incomplete
Smith Road	Construct right turn for SB traffic only	Complete
South of Cornette Way to Christian Life Way	Widen to 5 lanes; connect Wellswood to proposed intersection on the northern side near the church	Incomplete
Christian Life Way to McKnight Way Overcrossing	Widen to 5 lanes	Incomplete
South side of Alta Sierra to South of Kenwood Drive	Second SB through lane with median and shoulder widening; leave Pingree as a 3-way intersection, connect Ponderosa to Pingree; connect Lady Jane Road to Little Valley Rd intersection	Incomplete
North of Lime Kiln Road to South of Alta Sierra Drive	Widen to 5 lanes; connect Auburn further south as 3-way intersection, leave Pekolee as 3-way intersection; combine Round Valley and Quail Creek intersection	Incomplete
South of Lime Kiln Road to North of Cherry Creek Road	Lengthen 2 SB lanes; eliminate southerly connection and improve northerly connection with Cherry Creek Road	Incomplete
Cameo Drive to Holcomb/Cherry Creek Road	Complete widening to 5 lanes, eliminate Cameo Drive intersection	Incomplete

In 2017, a Transportation Concept Report (TCR) was prepared for the entire SR 49 Corridor, within Caltrans District 3, as a way to continue efforts in system planning for the corridor. The purpose of the TCR was to evaluate current and projected conditions along the route and communicate the vision for its future development during a 20-year planning horizon. The TCR was developed with the goals of Safety and Health; Stewardship and Efficiency; Sustainability; Livability and Economy; System Performance; and Organizational Excellence, and meeting community and environmental needs along the corridor through integrated management of the transportation network for all users. **Table 1.2** presents a summary of the programmed/planned projects in the TCR that relate to improvements in corridor system management within the 13.6-mile alignment evaluated in this report.

Although Table 1.2 lists the installation of safety lighting and radar feedback signs at Brewer Road and Alta Sierra Drive to be completed by 2018, field observations concluded that these improvements have yet to be implemented.



Table 1.2 Summary of Programmed/Planned Projects – SR 49 TCR

Project No.	Description	PM	Location	Proposed Completion Year
3 Planned	Install Traveler Information System/Vehicle Detection System	NEV 49 1.8/15.1	SR 49 at various locations NB and SB from Auburn to Grass Valley	2022
4 Programmed	Install safety lighting and 4 radar feedback signs	NEV 49 3.37/9.2	Nevada 49 at Brewer Rd and Alta Sierra Dr	2019
5 Planned	Project Development for the future construction of frontage road and widening of SR 49	NEV 49 2.19/13.7	Widening North of LaBarr Meadows Road to McKnight Way	2015-2025
6 Planned	Complete Widening to 5 lanes, eliminate Cameo Drive Intersection	NEV 49 2.71/5.8	From Cameo Drive to Holcomb/Cherry Creek Road	2015-2035
7 Planned	Construct NB right turn lane with sight-distance wedge, and restripe median as a two-lane left turn lane to the south of the intersection	NEV 49 5.34	SR 49 at Cerrito Road	TBD
8 Planned	Lengthen two SB lanes; eliminate southerly connection and improve northerly connection with Cherry Creek intersections	NEV 49 6.12/7.18	From North of Cherry Creek Road to South of Lime Kiln Road	2015-2035
10 Planned	Widen to 5 lanes; connect Auburn Rd. further south as T-intersection, leave Pekolee as T-intersection; combine Round Valley Rd. and Quail Rd. intersections. Construct Frontage Roads	NEV 49 7.17/9.22	SR 49 from North of Lime Kiln Rd. to South of Alta Sierra Dr.	2015-2035
12 Planned	Second SB through lane with median and shoulder widening; leave Pingree Rd. as T-intersection, connect Ponderosa Rd. to Pingree Rd.; connect Lady Jane Rd. to Little Valley Rd. intersection	NEV 49 9.22/10.3	SR 49 from South side of Alta Sierra Dr. to South of Kenwood Dr.	2015-2035
14 Planned	Widen shoulders, construct TWLTL, SB right turn lane, and NB truck climbing lane, install TMS elements, rehab pavement, and rehab culverts	NEV 49 10.8/13.7	In Nevada County on Route 49 from 0.1 mile north of La Barr Meadows Road to McKnight Way	2026
15 Programmed	Widen SR 49 to four lane conventional access control highway	NEV 49 11.1/13.3	SR 49 near Grass Valley from La Barr Meadows to .4 mile south of South Grass Valley OC	2024





## 1.2 Functional Classification of Facilities

The following section presents the functional classification of roadway, bike and pedestrian facilities within Nevada County.

### 1.2.1 Federal Functional Roadway Classification

The Federal Highway Administration (FHWA) provides the following functional classification of roadways within the continental United States (US):

1. **Interstates** – Designed primarily for long-distance travel, these roadway facilities provide a superior network of limited access, divided highways that offer high levels of mobility while linking major urban areas within the continental US.
2. **Other Freeways & Expressways** – Designed to maximize mobility for regional traffic, these roadway facilities contain directional travel lanes typically separated by a physical barrier. Additionally, access and egress points are limited to entry/exit by ramp, such that a limited number of at-grade intersections are provided.
3. **Other Principal Arterials** – Designed to improve mobility through rural areas and major metropolitan centers, these roadway facilities provide direct access to abutting land uses and provide numerous at-grade intersections with other roadways. Within urban contexts, multiple principal arterials typically radiate out from the urban core to serve surrounding regions. Within rural contexts, a single arterial would serve an expanse of rural area of equal size and provide an integrated network of continuous routes without stub connections.
4. **Minor Arterials** – Designed to accommodate trips of moderate length, minor arterials are provide connectivity to geographic areas that are within proximity to principal arterials. Within rural settings, minor arterials are typically spaced in intervals consistent with population density and are designed to operate at high overall travel speeds. In rural settings, minor arterials link cities and larger towns to form an integrated network providing interstate and inter-county service.
5. **Major & Minor Collectors** – Designed to route traffic from local roads to the arterial network, collector facilities are further sub-stratified as major and minor collector. Within rural contexts, collectors serve primarily intra-county travel at moderate speeds.
6. **Local Roads** – Designed to serve origin-destination trips of short lengths, Local Roads provide access to abutting lands. Typically, these roadways are classified by default, such that all remaining roads following the identification of Arterial and Collector facilities are classified as Local Roads.



### 1.2.2 Nevada County Roadway Classification

The *2010 Nevada County General Plan Circulation Element* included the following roadway classifications for Nevada County:

- a. **Interstate Highways and Freeways** - Limited access highways carrying regional and interstate traffic (e.g., Interstate 80 and the Golden Center Freeway);
- b. **Principal Arterials** - Roadways carrying some regional traffic and connecting the major population centers within the County (e.g., State Route 49 and State Route 20);
- c. **Minor Arterials** - Roadways providing primary access from freeways and principal arterials to major origins and destinations (e.g., Brunswick Road and Donner Pass Road);
- d. **Collectors (Major and Minor)** - Streets connecting arterials to local roads (e.g., East Bennett Street and Alta Sierra Drive);
- e. **Locals** - Streets providing primary access to individual properties (e.g., Jones Bar Road and Hobart Mills Road); and
- f. **Regional Emergency Access** - Roadways providing emergency access between arterial or collector roads but are not needed by the County for general circulation purposes.

### 1.2.3 Classification of Bicycle and Pedestrian Facilities

The Nevada County Bicycle Plan identifies the bicycle and pedestrian facilities as follows:

**Class I – Bicycle Path.** Class I facilities are multi-use facilities that provide a completely separated right-of-way for the exclusive use of bicycles and pedestrians with cross flows of motorized traffic minimized.

**Class II – Bicycle Lane.** Class II facilities provide a striped and signed lane for one-way bicycle travel within the paved area of a roadway that shares the roadway with motor vehicles. The minimum width for bike lanes ranges between four and six feet depending upon the edge of roadway conditions (curbs). Class II bike lanes are demarcated by a six-inch white stripe, signage and pavement legends.

**Class III – Bicycle Route.** Class III facilities provide signs for shared use with motor vehicles within the same travel lane on a street or highway. Bike routes may be enhanced with warning or guide signs and shared lane marking pavement stencils. While Class III routes do not provide measure of separation, they have an important function in providing continuity to the bikeway network.

**Class IV – Separated Bikeway.** An exclusive bikeway for bicyclists that is separated from the roadway. Separations may include grade separation, flexible posts, physical barriers, or on-street parking.

**Sidewalk** – A sidewalk is identified to be a pedestrian-dedicated paved walkway that is located adjacent to a roadway. Sidewalks maybe constructed using either Portland cement concrete (PCC) or asphalt concrete pavement materials.



### 1.3 Need and Purpose

The existing SR 49 CSMP set forth a planning approach that coalesces facility operations and transportation service provisions together with capital projects into one coordinated system management strategy. This CSMP is needed to update the 2009 CSMP for the SR 49 corridor to address the following:

- Traffic congestion that often exceeds the capacity of existing facilities
- Lack of parallel roadways that are in close proximity to the highway
- Transit facilities with available capacity for additional ridership, and
- Bicycle facilities that do not provide a fully linked network of bike routes.

The primary purpose of the updated CSMP is to create a partnership planning process and resulting guidance document that focuses on system management strategies and coordinated capital investments. The goal is to insure that all the pieces of the corridor function as an efficient transportation system. Performance evaluation measures to track the effectiveness of the strategies and projects. The secondary purpose of the CSMP is to improve mobility along the SR 49 corridor by focusing on the integrated management of a subset of the entire transportation network within the corridor. This includes select intersecting and connector roadways, transit, and bicycle facilities.

The Purpose of this Performance Measures Report is to establish the existing performance metrics along the SR 49 corridor and the status of the improvements that were proposed in the original CSMP and the 2012 State of the Corridor Report.

### 1.4 Organization of Report

This report presents an overall description of the corridor and context, followed by a summary of travel time reliability performance, by zone. Each zone is then presented individually, with a summary of performance metrics, historical safety concerns, and improvements planned or proposed to improve corridor performance and safety.

#### 1.4.1 Improvement Cost Estimate Ranges

For each study corridor zone, improvements were identified to address safety and operational concerns. Preliminary and generalized costs are attributed to each improvement type, following the legend below:

- \$: ≤100K
- \$\$: 100-250K
- \$\$\$: 250-500K
- \$\$\$\$: 500K-1M
- \$\$\$\$: >1M

*Note: Right of Way acquisition costs are not considered in these estimates.*



## 2. Corridor Description

State Route 49 is a major north-south state highway within rural California, that provides connectivity among many historic mining communities founded during the Gold Rush Era. The following sections presents the existing conditions from key roadway characteristics, operations, multimodal facilities that exist on SR 49.

### 2.1 SR 49 Corridor Characteristics and Study Area

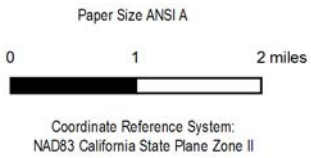
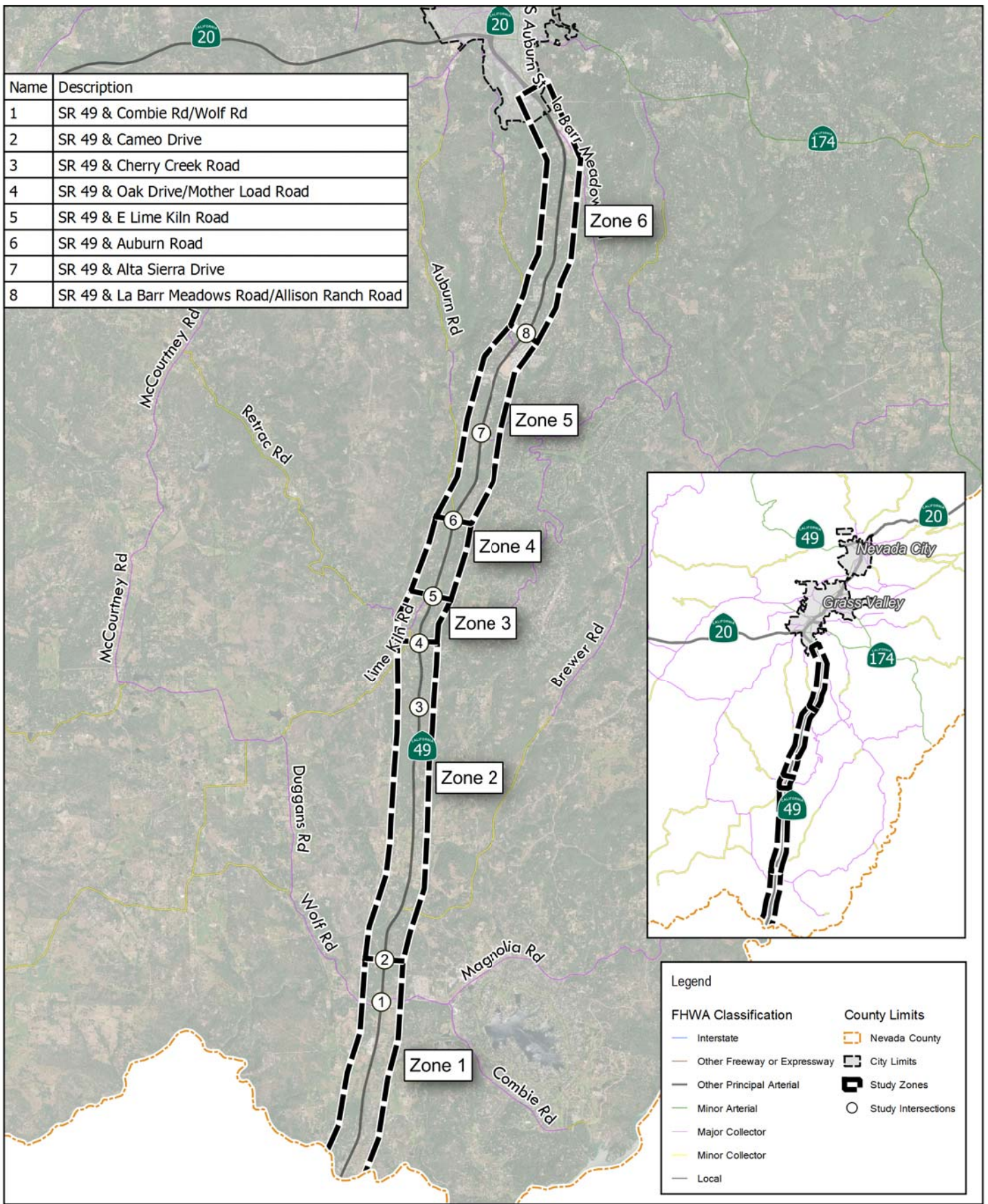
SR 49 is a Main Street Highway and National Highway System (NHS) designated route that runs on a north-south alignment within the study area. SR 49 is known regionally as the Golden Chain Highway, as it provided the primary north-south connection to mining towns of the Gold Country foothills along the western slope of the Sierra Nevada. The Federal Functional Classification classifies this segment of SR 49 as an Other Principal Arterial. The SR 49 TCR currently does not identify SR 49 as a scenic highway within the study limits. Furthermore, SR 49 is not a designated goods movement route within the study limits. However, it is a terminal access route for Surface Transportation Assistance Act (STAA) trucks.

The State Highway lies within Caltrans District 3, District 6, and District 10 jurisdictions. Within Nevada County, SR 49 varies between a two- and four-lane conventional highway, and transitions to a freeway south of Grass Valley, before the McKnight Way interchange. Additionally, select segments of SR 49 also contain a center two way left turn lane (TWLTL), making these portions of SR 49 a divided conventional highway.

The Nevada County Regional Transportation Plan, dated January 2018, included the following description of SR 49:

*State Route 49 (SR 49) runs north/south and is a principal arterial for Nevada County, connecting the cities of Grass Valley and Nevada City with I-80 in Auburn (Placer County) to the south. SR 20 and SR 49 also serve as an emergency detour route for I-80. SR 49 is the lifeline for much of Nevada County's freight and lumber traffic and also provides access to recreational and tourist attractions. To the west of Nevada City, this route continues in a northerly direction to the Nevada/Yuba County line.*

**Figure 2.1** presents the SR 49 study corridor, study intersections, and study zones. At its southern terminus (i.e. originating at the Nevada County line), SR 49 is a 4-lane, divided, conventional roadway operating at a posted speed limit of 65 mph. Following the intersection with Cameo Drive, SR 49 becomes a two-lane, undivided highway which operates at a posted speed of 55 mph.



Nevada County  
SR 49 CSMP

**SR 49 Study Corridor**

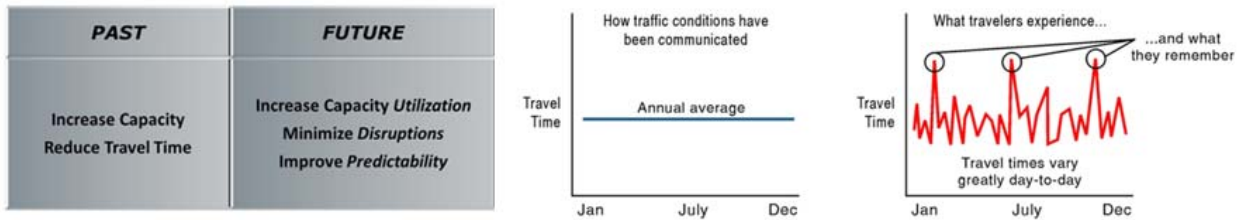
Project No. 25-4862-00  
Revision No. -  
Date. 11-21-2018

**FIGURE 2.1**

### 3. Travel Time Reliability

An important new transportation performance metric advocated at both the federal and state levels is travel time reliability. How predictable travel time is can be critical for commuters, goods movement, and transit provision. As such, the federal National Performance Management Rule now specifically mandates State Departments of Transportation and Metropolitan Planning Organizations to measure travel time reliability on the National Highway System (NHS). Travel time reliability is defined as the variation in travel time for the same trip from day to day (“same trip” implies a trip made with the same purpose, from the same origin, to the same destination, at the same time of the day, using the same mode, and by the same route). If variability is large, the travel time is considered to be unreliable, because it is difficult to generate consistent and accurate estimates for it. If there is little or no variation in the travel time for the same trip, the travel time is considered to be reliable. **Figure 3.1** illustrates the future emphasis on travel time reliability (to minimize disruptions and to improve predictability) and how travel time reliability influences travelers.

Figure 3.1 Reliability Graphics



The basic causes of unreliable travel times are an imbalance between demand and capacity and the congestion that can result. Once congestion occurs, travel times become more variable (less reliable and thus less predictable). Moreover, congested facilities lack the resilience to accommodate unexpected travel interruptions, which leads to flow breakdowns and serious degradation of reliability. Travel times vary from one day to the next because conditions influencing traffic differ each day. The seven sources of congestion that influence travel time reliability are:

- fluctuations in normal travel;
- physical bottlenecks;
- special events;
- traffic incidents;
- inclement weather;
- traffic-control devices; and,
- work zones<sup>1</sup>.

<sup>1</sup> National Academies, (2013). Evaluating Alternative Operations Strategies to Improve Travel Time Reliability. Library of Congress Control Number: 2013946101.

There are several measures available to determine travel time reliability. This study uses Buffer Time and the Buffer Time Index (BTI) to report reliability<sup>2</sup>. Buffer Time is the amount of extra time a person needs to account for above the average travel time to ensure being on time 95% of the time (approximately one day late per month). If a commute trip usually takes 30 minutes, but there are periodic issues with weather or traffic incidents that can cause the commute to take 45 minutes, the buffer time would be 15 minutes, causing the commuter to be 15 minutes early on an average day, and late only occasionally. Buffer time can be monetized similar to delay. A person's time has a value, and buffer time spent each day to account for unreliable roads has an opportunity cost that could otherwise be spent with family at home or elsewhere. The BTI value normalizes buffer time against the average travel time controlling for distance and typical daily congestion. The BTI is simply the ratio of Buffer Time against the average travel time and is expressed as an index. The index shows the amount of buffer time relative to average travel time. The relationship between travel time reliability indices is presented in **Figure 3.2** and **Figure 3.3**.

Figure 3.2 Travel Time Reliability Variable Chapter 36, HCM 6<sup>th</sup> Edition

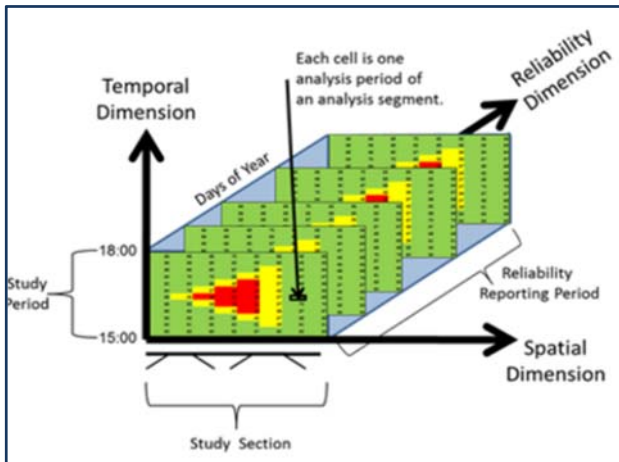
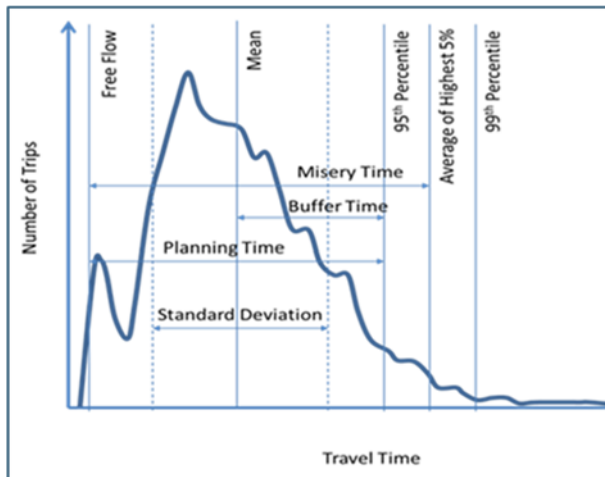


Figure 3.3 Travel Time Reliability Terminology



<sup>2</sup> Buffer Time and Buffer Time Index are based on the 95<sup>th</sup> percentile as described in Chapter 36, Highway Capacity Manual 6<sup>th</sup> Edition, Transportation Research Board, Washington DC, 2016.



### 3.1 Performance Measure Definitions (Congestion and Reliability)

The Highway Capacity Manual (HCM) 6<sup>th</sup> Edition definitions were used to define congestion and reliability. These thresholds reflect heavy congestion (with observed average speed less than 60 percent of the free-flow speed) and unreliable road segments (with a 95<sup>th</sup> percentile travel time more than 1.5 times longer than the 50<sup>th</sup> percentile travel time (i.e., average), quantified by Level of Travel Time Reliability or LOTTR). The scheme below was used to develop the thematic maps of the results. **Table 3.1** shows the Buffer Time Index (BTI) range and metrics for reliable, moderately reliable, and unreliable.

Table 3.1 Reliability-Congestion Matrix

	Reliable	Moderately Reliable	Unreliable
BTI <sup>A</sup> Range	BTI<0.25	0.25>=BTI<0.50	BTI>=0.50
Uncongested <sup>B</sup>	Predictable and efficient	Not always predictable, but usually efficient	Unpredictable, but not often congested
Congested <sup>B</sup>	Predictable and inefficient	Not always predictable, but usually inefficient	Unpredictable, and often congested

<sup>A</sup> BTI: A measure of reliability, measures percentage of travel time devoted to being on time above average travel time.

<sup>B</sup> Free flow speeds were estimated for each segment based on NPMRDS data during the hours of midnight and 3:00 AM.

Three measures of effectiveness (MOE) were utilized to determine the baseline quality of service on SR 49 from the motorist’s perspective. Per the HCM 6th Edition, percent time following is the MOE for two-lane highway LOS determinations and vehicle density is the MOE for multilane highway LOS determinations for SR 49. Based on these MOEs, quality of service is shown to be poor (LOS E or F) along all 2-lane segments of SR-49 in the study corridor. The third MOE based on the federal definition of congestion prescribed in the National Performance Management Rule (NPMR) is solely based on vehicular speed – regardless of highway characteristics (i.e., 2-lane highway versus multilane). The NPMR definition states if average weekday speed on a given segment of SR-49 (averaged over 12 months) is 60% or less of free flow speed (averaged over 12 months) the segment is considered congested. If this condition is not met, then the segment is considered uncongested. Based on this MOE, the entire length of SR 49 in the study corridor was determined to be uncongested. Given the differences in MOEs, data requirements, and approaches, congruent results for a given facility should not necessarily be expected.

### 3.2 Data Source and Data Reduction

Per the National Performance Management Measures Final Rule, the preferred data for complying with the National Highway Performance Program is the National Performance Management Research Data Set (NPMRDS) from FHWA. The NPMRDS provides average speed data (five-minute averaging time) for roadway segments designated as part of the National Highway System (NHS).





NPMRDS data for June 30<sup>th</sup> 2017 through June 29<sup>th</sup> 2018 was downloaded for analysis<sup>3</sup>.

Given the desire to reflect annual average weekday conditions, the data was filtered to isolate average weekday conditions: Tues-Thurs AM/PM peak periods for passenger vehicles and heavy-duty truck vehicles separately. To identify the AM/PM peak hour, the peak periods between 6:00 AM to 9:00 PM and 4:00 PM and 7:00 PM were analyzed to identify the most congested continuous 60-minute span for both passenger vehicles and trucks respectively. This was determined to be 7:40 AM to 8:40 AM during the morning peak period and 4:50 PM to 5:50 PM during the afternoon peak period for passenger vehicles and 7:50 AM to 8:50 AM during the morning peak period and 4:40 PM to 5:40 PM during the afternoon peak period for trucks. Additionally, the free flow speed (FFS) of the corridor was determined by analyzing the fastest average speeds for the peak hour from 12:00 AM to 3:00 AM for both passenger vehicles and trucks, which resulted to being 12:05 AM to 1:05 AM for passenger vehicles and 2:00 AM to 3:00 AM for trucks.

Passenger vehicles and trucks were analyzed separately for 20 NPMRDS segments (reflecting each direction of travel). Data cleansing was applied only to remove extreme high speed outliers (e.g., 90+ mph) from the free flow speed, congestion and reliability calculations. All data was processed and summarized based on the NPMRDS segmentation, included in **Table 3.2** and **Table 3.3**, which differs from the zones detailed in the SR-49 CSMP Existing Conditions Report.

For passenger vehicles, a total of 125,298 individual records were processed. Of these records, 3,687 records occurred during the three-hour FFS period, 68,290 records occurred during the three-hour AM peak period, and 53,321 records occurred during the three-hour PM peak period. Peak hour post-processing yielded a total of 1,290 records for the FFS peak hour, 24,140 records for the AM peak hour, and 19,168 records for the PM peak hour.

For trucks, a total of 29,250 individual records were processed. Of these records, 6,558 records occurred during the three-hour FFS period, 17,902 records occurred during the three-hour AM peak period, and 4,790 records occurred during the three-hour PM peak period. Peak hour post-processing yielded a total of 2,297 records for the FFS peak hour, 6,450 records for the AM peak hour, and 1,593 records for the PM peak hour.

### 3.3 Congestion Results

Table 3.2 and Table 3.3 provide the travel speed by SR-49 segment and direction for passenger vehicles and heavy-duty trucks respectively.

As illustrated in Tables 3.2 and 3.3, all of the segments of SR-49 within the CSMP study area are considered to be uncongested based on the HCM definition. This indicates that the corridor experiences its most constrained conditions at intersections. Per the Existing Conditions Report, the only intersection of the seven intersections studied determined to operate below the threshold LOS of D is Oak Drive/Mother Lode Road.

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<sup>3</sup> The National Performance Measurement Rule recommends using 12 months of data to reflect a “true” annual average.



Table 3.2 Passenger Car Speeds for SR-49

From	To	Zone(s)	Length (mi)	Free Flow Average Speed (mph) <sup>1</sup>	AM Average Speed (mph) <sup>1</sup>	PM Average Speed (mph) <sup>1</sup>	AM Average to Free Flow Speed Ratio	PM Average to Free Flow Speed Ratio	AM Congested (Yes/No)	PM Congested (Yes/No)
<i>Northbound</i>										
Cramer Road	Combie Road/Wolf Road	1*	4.06	60.26	57.06	60.26	0.95	1.00	No	No
Combie Road/Wolf Road	Cameo Drive	1	0.50	56.28	46.04	48.09	0.82	0.85	No	No
Cameo Drive	Lime Kiln Road	2, 3	4.46	58.02	53.13	53.06	0.92	0.91	No	No
Lime Kiln Road	Lady Jane Road	4, 5	2.84	53.25	49.20	50.22	0.92	0.94	No	No
Lady Jane Road	Lode Line Way	5, 6	1.14	54.86	47.14	48.92	0.86	0.89	No	No
Lode Line Way	Cornette Way	6	0.39	54.59	48.28	49.95	0.88	0.91	No	No
Cornette Way	Wellswood Way	6	0.36	53.90	49.89	51.26	0.93	0.95	No	No
Wellswood Way	Smith Road	6	0.70	55.51	52.26	53.29	0.94	0.96	No	No
Smith Road	South of McKnight Way	6	0.88	57.76	55.90	56.61	0.97	0.98	No	No
South of McKnight Way	North of McKnight Way	6*	0.34	58.93	58.54	58.93	0.99	1.00	No	No
<i>Southbound</i>										
North of McKnight Way	South of McKnight Way	6*	0.35	59.35	58.00	53.96	0.98	0.91	No	No
South of McKnight Way	Smith Road	6	0.92	58.06	56.68	49.22	0.98	0.85	No	No
Smith Road	Wellswood Way	6	0.70	58.27	56.14	51.84	0.96	0.89	No	No
Wellswood Way	Cornette Way	6	0.36	57.77	56.20	53.91	0.97	0.93	No	No
Cornette Way	Lode Line Way	6	0.39	58.22	55.31	53.95	0.95	0.93	No	No
Lode Line Way	Lady Jane Road	6, 5	1.14	57.59	51.83	49.24	0.90	0.85	No	No
Lady Jane Road	Lime Kiln Road	5, 4	2.84	57.72	51.48	49.86	0.89	0.86	No	No
Lime Kiln Road	Cameo Drive	3, 2	4.46	56.05	55.11	56.05	0.98	1.00	No	No
Cameo Drive	Combie Road/Wolf Road	1	0.50	51.06	45.26	48.16	0.89	0.94	No	No
Combie Road/Wolf Road	Cramer Road	1*	4.06	60.52	60.47	60.52	1.00	1.00	No	No

<sup>1</sup> Speed data from NPMRDS.

\*Section goes beyond the exterior limits of the indicated zone.



Table 3.3 Heavy Duty Truck Speeds for SR-49

From	To	Zone(s)	Length (mi)	Free Flow Average Speed (mph) <sup>1</sup>	AM Average Speed (mph) <sup>1</sup>	PM Average Speed (mph) <sup>1</sup>	AM Average to Free Flow Speed Ratio	PM Average to Free Flow Speed Ratio	AM Congested (Yes/No)	PM Congested (Yes/No)
<i>Northbound</i>										
Cramer Road	Combie Road/Wolf Road	1*	4.06	55.14	50.12	52.23	0.91	0.95	No	No
Combie Road/Wolf Road	Cameo Drive	1	0.50	54.52	42.66	45.77	0.78	0.84	No	No
Cameo Drive	Lime Kiln Road	2, 3	4.46	53.79	49.89	48.58	0.93	0.90	No	No
Lime Kiln Road	Lady Jane Road	4, 5	2.84	48.50	45.11	40.69	0.93	0.84	No	No
Lady Jane Road	Lode Line Way	5, 6	1.14	49.97	44.11	44.09	0.88	0.88	No	No
Lode Line Way	Cornette Way	6	0.39	51.02	46.02	46.20	0.90	0.91	No	No
Cornette Way	Wellswood Way	6	0.36	49.42	46.81	46.14	0.95	0.93	No	No
Wellswood Way	Smith Road	6	0.70	50.96	48.97	49.44	0.96	0.97	No	No
Smith Road	South of McKnight Way	6	0.88	52.86	50.92	52.32	0.96	0.99	No	No
South of McKnight Way	North of McKnight Way	6*	0.34	54.08	52.06	54.08	0.96	1.00	No	No
<i>Southbound</i>										
North of McKnight Way	South of McKnight Way	6*	0.35	55.78	55.78	51.11	1.00	0.92	No	No
South of McKnight Way	Smith Road	6	0.92	55.30	54.10	48.29	0.98	0.87	No	No
Smith Road	Wellswood Way	6	0.70	54.28	54.28	51.04	1.00	0.94	No	No
Wellswood Way	Cornette Way	6	0.36	55.15	55.15	52.44	1.00	0.95	No	No
Cornette Way	Lode Line Way	6	0.39	56.12	54.92	53.50	0.98	0.95	No	No
Lode Line Way	Lady Jane Road	6, 5	1.14	55.15	50.57	47.04	0.92	0.85	No	No
Lady Jane Road	Lime Kiln Road	5, 4	2.84	56.23	51.20	50.20	0.91	0.89	No	No
Lime Kiln Road	Cameo Drive	3, 2	4.46	55.05	52.84	54.29	0.96	0.99	No	No
Cameo Drive	Combie Road/Wolf Road	1	0.50	52.52	45.48	47.19	0.87	0.90	No	No
Combie Road/Wolf Road	Cramer Road	1*	4.06	53.03	53.03	52.46	1.00	0.99	No	No

<sup>1</sup> Speed data from NPMRDS.

\*Section goes beyond the exterior limits of the indicated zone.



### 3.4 Reliability Results

**Table 3.4** and **Table 3.5** provide the travel time reliability and total buffer time for passenger vehicles. Based on the criteria used ( $BTI > 0.50$ ), there are four NPMRDS segments that are considered unreliable during the AM peak hour. For three of the four segments the northbound direction experiences unreliable travel time variances. However, the most unreliable segment is the segment from Cameo Drive to Combie Road/Wolf Road (within Zone 1) in the southbound direction with a BTI of 0.99.

- Cramer Road to Combie Road/Wolf Road (NB)
- Combie Road/Wolf Road to Cameo Drive (NB)
- Lime Kiln Road to Lady Jane Road (NB)
- Cameo Drive to Combie Road/Wolf Road (SB).

During the PM peak hour, poor reliability is primarily experienced in the southbound direction. Of these, the southbound segments North of McKnight Way/Taylorville Road to South of McKnight Way/Taylorville Road (outside of study limits) and South of McKnight Way/Taylorville Road to Smith Road (within Zone 6) are the most unreliable with BTI's of 1.42 and 1.44, respectively.

- Cramer Road to Combie Road/Wolf Road (NB)
- North of McKnight Way/Taylorville Road to South of McKnight Way/Taylorville Road (SB)
- South of McKnight Way/Taylorville Road to Smith Road (SB)
- Cameo Drive to Combie Road/Wolf Road (SB).

**Table 3.5** sums the total buffer times for a single passenger car for each direction and peak hour. For both AM and PM peak hours, buffer time is greater for the northbound direction than the southbound direction. The northbound direction accounts for 76% of the total daily buffer time from both directions along the corridor (13.37 minutes out of a total 17.66 minutes).



Table 3.4 SR-49 Travel Time Reliability for Passenger Cars

From	To	Zone(s)	AM Average Travel Time (sec)	PM Average Travel Time (sec)	AM 95th Travel Time (sec)	PM 95th Travel Time (sec)	AM 95th Buffer Time Index	PM 95th Buffer Time Index	AM 95th Buffer Time (sec)	PM 95th Buffer Time (sec)
<i>Northbound</i>										
Cramer Road	Combie Road/Wolf Road	1*	256.21	242.62	438.38	366.41	0.71	0.51	182.17	123.79
Combie Road/Wolf Road	Cameo Drive	1	39.46	37.77	66.18	53.43	0.68	0.41	26.72	15.66
Cameo Drive	Lime Kiln Road	2, 3	302.48	302.88	395.82	369.85	0.31	0.22	93.34	66.97
Lime Kiln Road	Lady Jane Road	4, 5	208.02	203.79	314.89	262.41	0.51	0.29	106.87	58.61
Lady Jane Road	Lode Line Way	5, 6	86.96	83.79	124.22	112.31	0.43	0.34	37.26	28.52
Lode Line Way	Cornette Way	6	29.01	28.05	37.86	33.35	0.30	0.19	8.85	5.31
Cornette Way	Wellswood Way	6	25.73	25.04	32.09	28.91	0.25	0.15	6.36	3.87
Wellswood Way	Smith Road	6	47.92	47.00	56.92	53.28	0.19	0.13	9.00	6.29
Smith Road	South of McKnight Way	6	56.85	56.13	67.61	62.31	0.19	0.11	10.76	6.18
South of McKnight Way	North of McKnight Way	6*	21.03	20.89	24.40	23.01	0.16	0.10	3.37	2.12
<i>Southbound</i>										
North of McKnight Way	South of McKnight Way	6*	53.00	22.30	23.95	56.93	0.09	1.42	5.00	31.66
South of McKnight Way	Smith Road	6	50.15	20.20	65.91	163.62	0.13	1.44	6.53	29.02
Smith Road	Wellswood Way	6	50.00	41.00	50.09	61.08	0.12	0.26	6.14	10.84
Wellswood Way	Cornette Way	6	49.00	45.00	26.19	28.52	0.15	0.20	7.20	8.91
Cornette Way	Lode Line Way	6	47.00	44.65	29.80	31.37	0.18	0.21	8.31	9.30
Lode Line Way	Lady Jane Road	6, 5	41.00	36.90	99.98	111.09	0.26	0.33	10.83	12.34
Lady Jane Road	Lime Kiln Road	5, 4	40.00	38.00	255.85	269.31	0.29	0.31	11.48	11.86
Lime Kiln Road	Cameo Drive	3, 2	48.00	47.00	334.79	341.92	0.15	0.19	7.11	9.05
Cameo Drive	Combie Road/Wolf Road	1	22.70	25.45	80.03	71.38	0.99	0.89	22.56	22.71
Combie Road/Wolf Road	Cramer Road	1*	44.25	49.90	330.39	292.98	0.37	0.21	16.22	10.62

\*Section goes beyond the exterior limits of the indicated zone.

Table 3.5 SR-49 Total Buffer Time for Passenger Cars

Direction	Total AM Buffer Time (min)	Total PM Buffer Time (min)	Total Daily Buffer Time (min)
Northbound	8.08	5.29	13.37
Southbound	1.69	2.61	4.29
Both	9.77	7.89	17.66



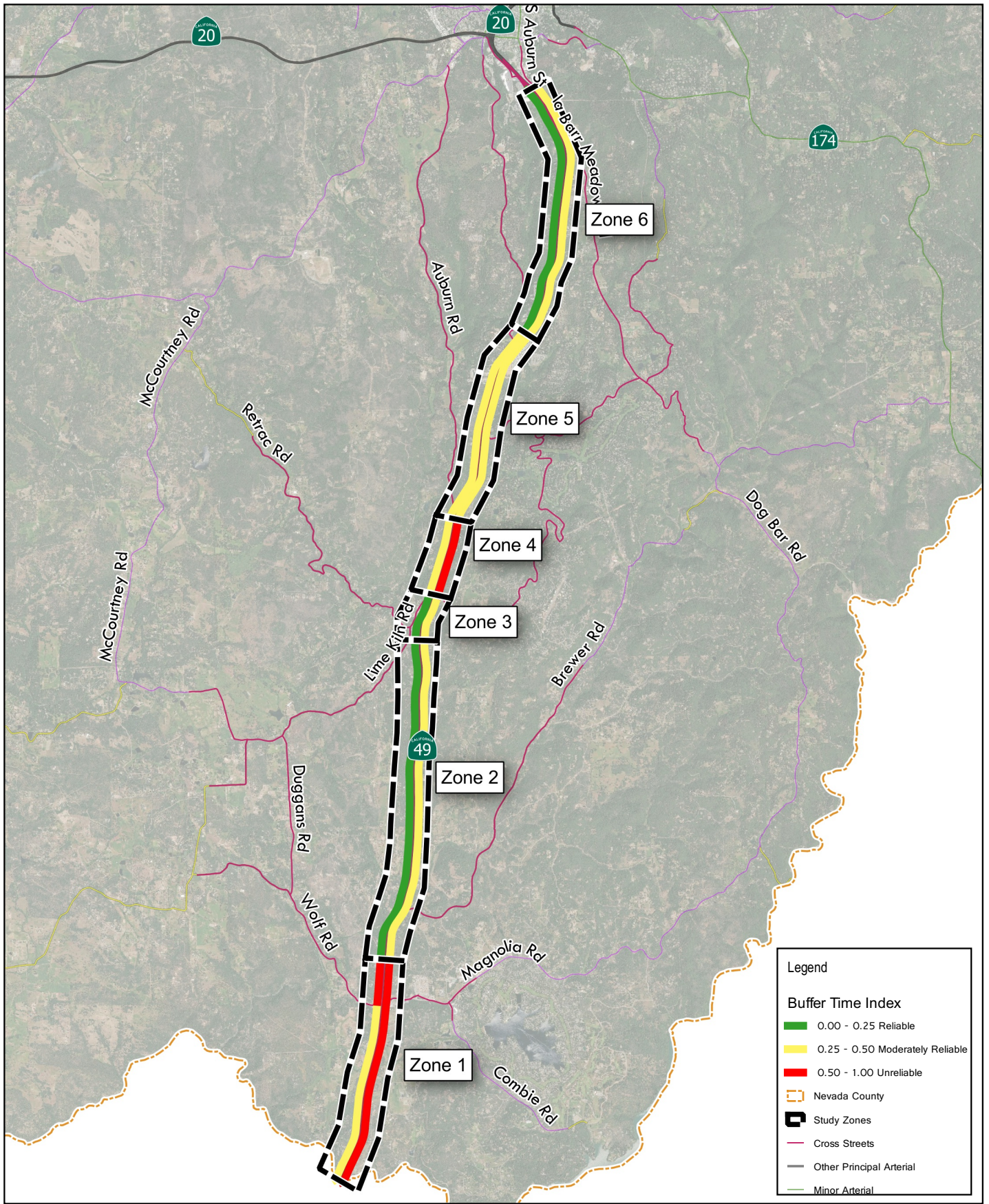
**Table 3.6** and **Table 3.7** provide the AM and PM peak hour travel time reliability and total buffer time for heavy-duty trucks respectively. Similar to the passenger vehicle results, during the AM peak hour, there are four NPMRDS segments that experience poor reliability, three of which are in the northbound direction. Of these, the most unreliable is the southbound segment from Cameo Drive to Combie Road/Wolf Road (within Zone 1) with a BTI of 0.89.

- Cramer Road to Combie Road/Wolf Road (NB)
- Combie Road/Wolf Road to Cameo Drive (NB)
- Lady Jane Road to Lode Line Way (NB)
- Cameo Drive to Combie Road/Wolf Road (SB).

There are five NPMRDS segments that experience poor reliability during the PM peak hour, one of which is in the northbound direction. Of these, the southbound segments South of McKnight Way/Taylorville Road to Smith Road and Cameo Drive to Combie Road/Wolf Road (Zones 1 and 6) are the most unreliable with BTI's of 1.56 and 0.88, respectively.

- Cramer Road to Combie Road/Wolf Road (NB)
- North of McKnight Way/Taylorville Road to South of McKnight Way/Taylorville Road (SB)
- South of McKnight Way/Taylorville Road to Smith Road (SB)
- Lode Line Way to Lady Jane Road (SB)
- Cameo Drive to Combie Road/Wolf Road (SB).

**Table 3.7** sums the total buffer times for heavy-duty trucks for each direction and peak hour. During the AM peak hour, the northbound buffer time (8.59 minutes) is almost twice the southbound buffer time (4.73 minutes). During the PM peak hour, there is a smaller buffer time for the northbound direction than the southbound direction (6.50 minutes and 7.85 minutes respectively), but the difference is not as noticeable as during the AM peak hour. The northbound direction accounts for 55% of the total daily buffer time from both directions along the corridor (15.09 minutes out of a total 27.68 minutes).

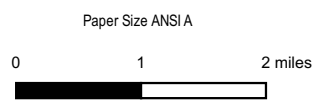


**Legend**

**Buffer Time Index**

- 0.00 - 0.25 Reliable
- 0.25 - 0.50 Moderately Reliable
- 0.50 - 1.00 Unreliable

- Nevada County
- Study Zones
- Cross Streets
- Other Principal Arterial
- Minor Arterial

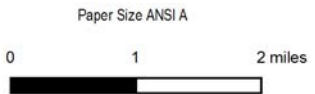
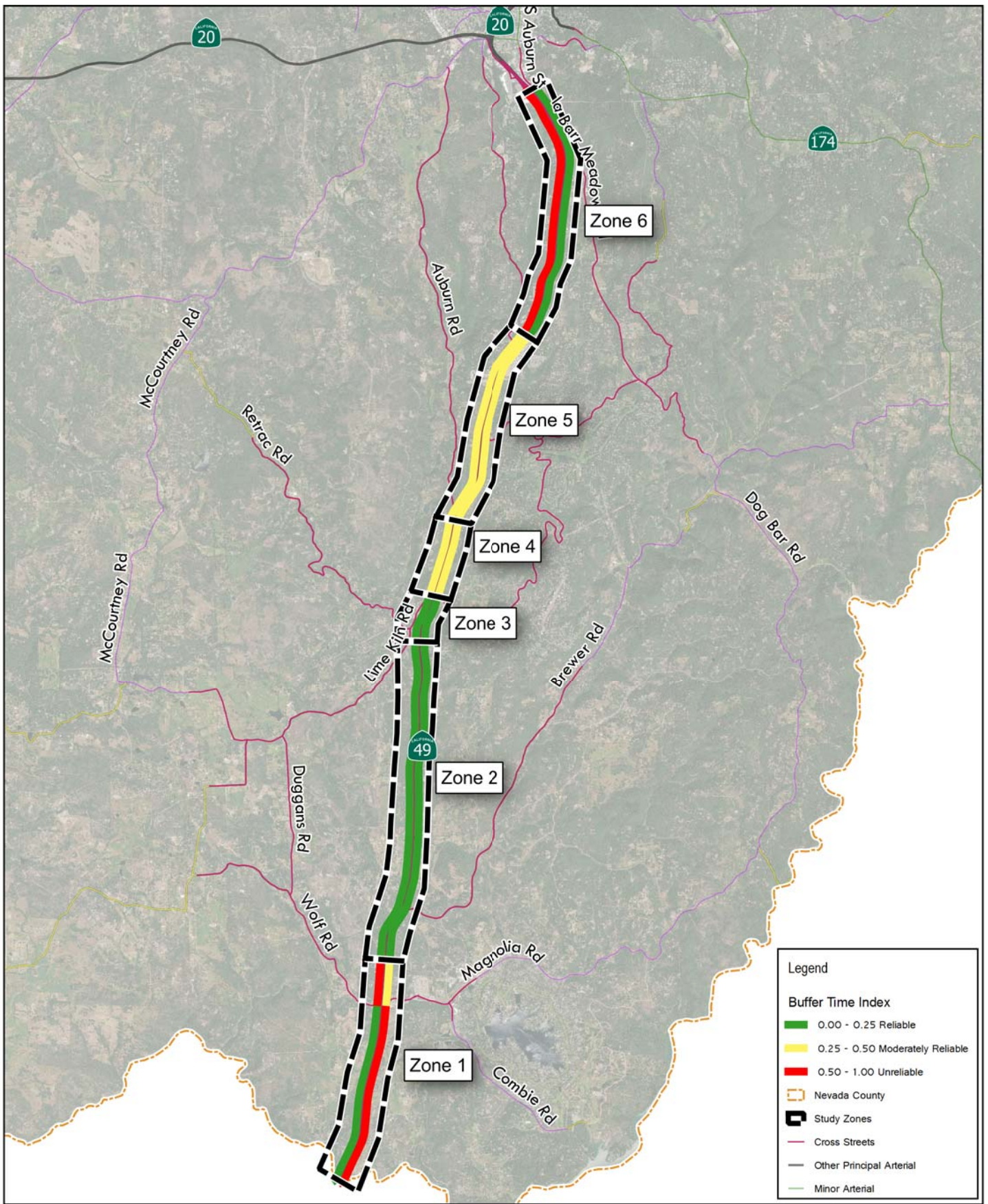


Nevada County  
SR 49 CSMP

Project No. 25-4862-00  
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Date. 10/5/2018

**Travel Time Reliability  
Passenger Car AM**

**FIGURE 3.4**



Nevada County  
SR 49 CSMP

Project No. 25-4862-00  
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**Travel Time Reliability  
Passenger Cars PM**

**FIGURE 3.5**





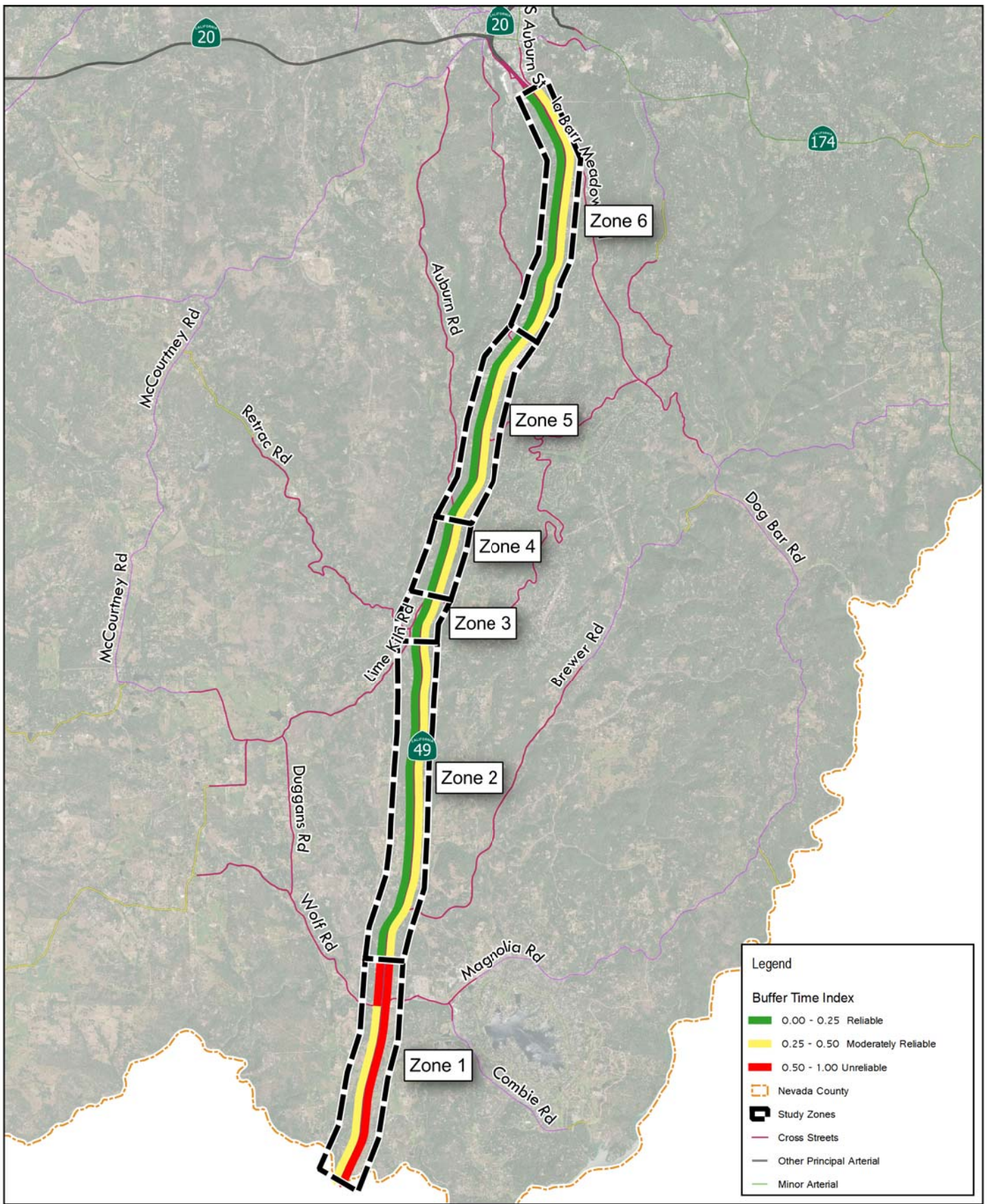
Table 3.6 SR-49 Travel Time Reliability for Heavy-Duty Trucks

From	To	Zone(s)	AM Average Travel Time (sec)	PM Average Travel Time (sec)	AM 95th Travel Time (sec)	PM 95th Travel Time (sec)	AM 95th Buffer Time Index	PM 95th Buffer Time Index	AM 95th Buffer Time (sec)	PM 95th Buffer Time (sec)
<i>Northbound</i>										
Cramer Road	Combie Road/Wolf Road	1*	291.68	279.90	495.59	356.58	0.70	0.27	203.91	76.68
Combie Road/Wolf Road	Cameo Drive	1	42.58	39.69	72.67	73.10	0.71	0.84	30.09	33.41
Cameo Drive	Lime Kiln Road	2, 3	322.14	330.81	412.05	424.01	0.28	0.28	89.91	93.20
Lime Kiln Road	Lady Jane Road	4, 5	226.87	251.51	319.81	355.96	0.41	0.42	92.93	104.45
Lady Jane Road	Lode Line Way	5, 6	92.94	92.97	141.36	126.52	0.52	0.36	48.42	33.55
Lode Line Way	Cornette Way	6	30.44	30.32	41.20	37.21	0.35	0.23	10.76	6.89
Cornette Way	Wellswood Way	6	27.42	27.82	34.69	33.91	0.27	0.22	7.27	6.09
Wellswood Way	Smith Road	6	51.14	50.66	62.61	62.76	0.22	0.24	11.47	12.11
Smith Road	South of McKnight Way	6	62.40	60.74	77.50	79.44	0.24	0.31	15.10	18.70
South of McKnight Way	North of McKnight Way	6*	23.65	22.77	29.31	27.85	0.24	0.22	5.66	5.09
<i>Southbound</i>										
North of McKnight Way	South of McKnight Way	6*	22.76	24.84	25.09	45.02	0.10	0.81	2.33	20.18
South of McKnight Way	Smith Road	6	61.09	68.44	68.86	174.88	0.13	1.56	7.77	106.43
Smith Road	Wellswood Way	6	46.14	49.06	52.17	67.68	0.13	0.38	6.04	18.62
Wellswood Way	Cornette Way	6	23.27	24.47	26.74	32.49	0.15	0.33	3.47	8.02
Cornette Way	Lode Line Way	6	25.51	26.18	29.71	34.85	0.16	0.33	4.20	8.66
Lode Line Way	Lady Jane Road	6, 5	81.06	87.15	116.79	136.19	0.44	0.56	35.73	49.05
Lady Jane Road	Lime Kiln Road	5, 4	199.87	203.87	238.00	255.21	0.19	0.25	38.13	51.33
Lime Kiln Road	Cameo Drive	3, 2	304.12	296.02	373.72	365.23	0.23	0.23	69.60	69.21
Cameo Drive	Combie Road/Wolf Road	1	39.95	38.50	75.69	72.23	0.89	0.88	35.75	33.73
Combie Road/Wolf Road	Cramer Road	1*	275.68	278.70	356.58	384.74	0.29	0.38	80.90	106.03

\*Section goes beyond the exterior limits of the indicated zone.

Table 3.7 SR-49 Total Buffer Time for Heavy-Duty Trucks

Direction	Total AM Buffer Time (min)	Total PM Buffer Time (min)	Total Daily Buffer Time (min)
Northbound	8.59	6.50	15.09
Southbound	4.73	7.85	12.59
Both	13.32	14.36	27.68



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0 1 2 miles

Map Projection: Lambert Conformal Conic  
 Horizontal Datum: NAD 1983 CORS96  
 Grid: NAD 1983 CORS96 StatePlane California II FIPS 0402 Ft US

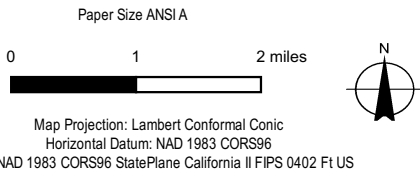
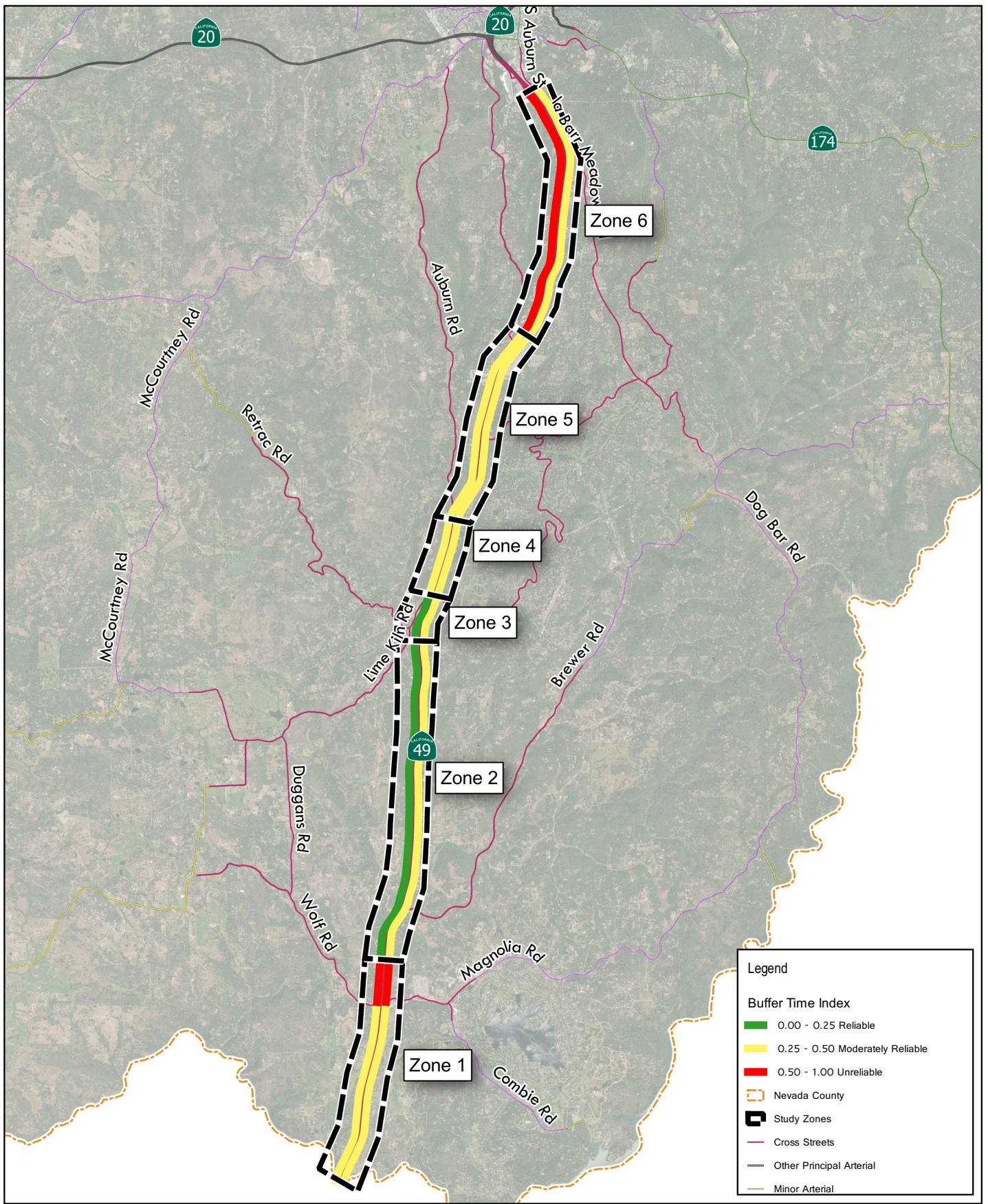


Nevada County  
 SR 49 CSMP

**Travel Time Reliability  
 Heavy Vehicle AM**

Project No. 25-4862-00  
 Revision No. -  
 Date. 10/5/2018

**FIGURE 3.6**



Nevada County  
SR 49 CSMP

**Travel Time Reliability  
Heavy Vehicle PM**

Project No. 25-4862-00  
Revision No. -  
Date. 10/5/2018

**FIGURE 3.7**



### 3.5 Societal Cost of Unreliability

To compute the societal cost associated with unreliability, the NPMRDS segmentation for SR-49 was reconciled with the six zones outlined in the Existing Conditions Report. For overlapping segments, buffer time results were apportioned based on length proportions of the respective segments.

**Table 3.8** and **Table 3.9** provide the societal costs of passenger vehicle buffer times on SR-49 for the AM and PM peak hours respectively. Per the Caltrans 2016 Parameters, peak hour directional volumes (Figure 4 of the Existing Conditions Report) were multiplied by a vehicle occupancy factor of 1.15 to yield total average weekday passengers by direction by SR-49 segment. Total directional passengers were then multiplied by the corresponding buffer time to yield total buffer time by segment and direction. A societal cost (i.e., the value of time) of \$13.65 per person per hour based on the Caltrans 2016 Parameters was applied. Peak hour societal costs were expanded to daily (summing the AM and PM peak hours); annual (x 250 weekdays), and design life (x 20-years). Results indicate that the daily northbound cost is 73% of the total daily societal cost (\$3,101 out of \$4,276). The costliest segment is Zone 1 in the northbound direction, at \$1,103 per day. Assuming that the degree of unreliability on SR-49 will remain constant into the future, a societal cost of \$21.4 million will be incurred over a 20-year period by motorists and passengers who rely on SR-49 to access jobs, shopping and services.

**Table 3.10** and **Table 3.11** provide the societal costs associated with trucks travel on SR-49. For this analysis, a vehicle occupancy factor of 1.0 was assumed and a societal cost of \$31.40 per person per hour (2016 Caltrans Parameters). Results indicate that the daily northbound cost is only 52% of the total daily societal cost (\$139 out of \$267). The costliest segment is Zone 6 in the southbound direction, at \$47 per day. Assuming that the degree of unreliability on SR-49 will remain constant into the future, an additional societal cost of \$1.3 million will be incurred over a 20-year period by truckers who rely on SR-49 to deliver goods.

Further discussion of travel time reliability will be included per Zone in the performance metrics sections.



Table 3.8 Passenger Car Buffer Time Societal Cost for SR-49 by Zone

Zone	From	To	Length (mi)	AM 95th Buffer Time (sec)	PM 95th Buffer Time (sec)	Volume		Daily	Annual	Design Life (20 yrs)
						AM Peak Volume PC Only	PM Peak Volume PC Only	Total 95th Societal Cost (\$/day)	Total 95th Societal Cost (\$/yr)	Total 95th Societal Cost (\$/20yr)
<i>Northbound</i>										
1	Nevada County Line	Cameo Drive	2.69	125.41	82.72	875	1689	\$1,088	\$271,946	\$5,438,915
2	Cameo Drive	Oak Drive/Mother Lode Road	3.90	81.54	58.51	768	1239	\$589	\$147,309	\$2,946,185
3	Oak Drive/Mother Lode Road	Lime Kiln Road	0.60	11.79	8.46	762	1167	\$82	\$20,564	\$411,278
4	Lime Kiln Road	Auburn Road	1.00	35.34	19.38	710	1102	\$203	\$50,637	\$1,012,750
5	Auburn Road	La Barr Meadows Road/Allison Ranch Road	2.50	89.53	53.01	1009	990	\$623	\$155,714	\$3,114,281
6	La Barr Meadows Road/Allison Ranch Road	McKnight	3.10	56.40	37.75	1225	1062	\$476	\$119,043	\$2,380,869
<i>Southbound</i>										
6	McKnight	La Barr Meadows Road/Allison Ranch Road	3.10	36.90	84.19	739	1391	\$630	\$157,380	\$3,147,605
5	La Barr Meadows Road/Allison Ranch Road	Auburn Road	2.50	12.91	13.90	784	1187	\$116	\$29,021	\$580,410
4	Auburn Road	Lime Kiln Road	1.00	3.80	3.92	892	1020	\$32	\$8,054	\$161,081
3	Lime Kiln Road	Oak Drive/Mother Lode Road	0.60	0.90	1.14	1030	894	\$8	\$2,122	\$42,447
2	Oak Drive/Mother Lode Road	Cameo Drive	3.90	6.21	7.91	1117	877	\$61	\$15,126	\$302,513
1	Cameo Drive	Nevada County Line	2.69	31.35	28.47	1427	1037	\$324	\$80,952	\$1,619,042

Table 3.9 Passenger Car Buffer Time Societal Cost for SR-49

Direction	Daily Total Societal Cost (\$/day)	Annual Total Societal Cost (\$/yr)	Design Life Total Societal Cost (\$/20yr)
Northbound	\$ 3,101	\$ 775,283	\$ 15,505,651
Southbound	\$ 1,175	\$ 293,817	\$ 5,876,348
Both	\$ 4,276	\$ 1,069,100	\$ 21,381,998



Table 3.10 Heavy-Duty Truck Buffer Time Societal Cost for SR-49 by Zone

Zone	From	To	Length (mi)	AM 95th Buffer Time (sec)	PM 95th Buffer Time (sec)	Volume		Daily	Annual	Design Life (20 yrs)
						AM Peak Volume Trucks Only	PM Peak Volume Trucks Only	Total 95th Societal Cost (\$/day)	Total 95th Societal Cost (\$/yr)	Total 95th Societal Cost (\$/20yr)
<i>Northbound</i>										
1	Nevada County Line	Cameo Drive	2.69	140.55	74.95	17	33	\$42	\$10,541	\$210,825
2	Cameo Drive	Oak Drive/Mother Lode Road	3.90	78.55	81.43	15	24	\$27	\$6,809	\$136,181
3	Oak Drive/Mother Lode Road	Lime Kiln Road	0.60	11.36	11.77	15	23	\$4	\$946	\$18,922
4	Lime Kiln Road	Auburn Road	1.00	30.73	34.54	14	21	\$10	\$2,529	\$50,574
5	Auburn Road	La Barr Meadows Road/Allison Ranch Road	2.50	85.59	86.11	20	19	\$29	\$7,249	\$144,974
6	La Barr Meadows Road/Allison Ranch Road	McKnight	3.10	73.28	64.41	24	21	\$27	\$6,682	\$133,637
<i>Southbound</i>										
6	McKnight	La Barr Meadows Road/Allison Ranch Road	3.10	41.40	179.68	14	27	\$47	\$11,848	\$236,954
5	La Barr Meadows Road/Allison Ranch Road	Auburn Road	2.50	42.78	58.05	15	23	\$17	\$4,326	\$86,523
4	Auburn Road	Lime Kiln Road	1.00	12.61	16.97	17	20	\$5	\$1,206	\$24,124
3	Lime Kiln Road	Oak Drive/Mother Lode Road	0.60	8.79	8.74	20	17	\$3	\$713	\$14,250
2	Oak Drive/Mother Lode Road	Cameo Drive	3.90	60.81	60.47	22	17	\$20	\$5,109	\$102,186
1	Cameo Drive	Nevada County Line	2.69	79.57	91.17	28	20	\$35	\$8,790	\$175,791

Table 3.11 Heavy-Duty Truck Buffer Time Societal Cost for SR-49

Direction	Daily Total Societal Cost (\$/day)	Annual Total Societal Cost (\$/yr)	Design Life Total Societal Cost (\$/20yr)
Northbound	\$ 139	\$ 34,756	\$ 695,114
Southbound	\$ 128	\$ 31,991	\$ 639,829
Both	\$ 267	\$ 66,747	\$ 1,334,943



## 4. Zone 1 (2.7 miles, PM 0 to PM 2.7)

### 4.1 Performance Metrics (Corridor Operations)

Zone 1 accounts for approximately 2.69 miles of the study corridor from Nevada County Line to Cameo Drive. While the segment of SR 49 in Zone 1 has four through lanes (two lanes in each direction), there is a center two way left-turn lane (TWLTL) from the County Line to the intersection of SR 49 at Combie Road/Wolf Road. Within Zone 1, there are nine access points along the roadway, with the only signalized access being provided at Combie/Wolf Road. The remaining eight access points are side street stop controlled. A center two-way left turn lane on SR 49 provides ingress/egress to most of the stop controlled access points. Additionally most access points have right turn pockets on SR 49 to improve ingress. Based on travel time runs, the average time to traverse the entire length of Zone 1 was determined to be 3 minutes and 24 seconds.

For overlapping segments, buffer time results were apportioned based on length proportions of the respective segments.

#### 4.1.1 Travel Time Reliability

Per the NPMRDS data and findings presented in Section 3, Zone 1 is the most unreliable zone out of the six study zones. The travel time reliability (BTI) was broken down for passenger car and heavy duty trucks for the following two segments due to the signalized intersection at Combie Road/Wolf Road within Zone 1:

- Nevada County Line to Combie Road/Wolf Road
- Combie Road/Wolf Road to Cameo Drive.

##### 4.1.1.1 Passenger Cars

In the AM and PM peak hours, the most unreliable segment for passenger cars is from Combie Road/Wolf Road to Cameo Drive for the northbound direction. In the southbound direction, the segment from Cameo Drive to Combie Road/Wolf Road was the most unreliable in both the AM and PM peak hours. This approximate 0.50-mile segment has different constraints on either end. At the southern end of the corridor zone, there are two travel lanes in each direction, through Cameo Drive. North of Cameo Drive, SR 49 tapers down to one lane in each direction. A signalized intersection at Combie Road/Wolf Road disrupts free-flow traffic, which introduces some delay and congestion. **Table 4.1** presents the Reliability BTI for passenger cars in the two segments. In the northbound direction, the segment from Nevada County Line to Combie Road is the most unreliable in the AM and PM peak hours.

Table 4.1 Zone 1 Passenger Car BTI Reliability

Segment	Reliability BTI (Passenger Vehicles)			
	NB		SB	
	AM	PM	AM	PM
Nevada County Line to Combie Road	0.71	0.51	0.37	0.21
Combie Road to Cameo Drive	0.68	0.41	0.99	0.89



#### 4.1.1.2 Heavy-Duty Truck

The heavy-duty trucks BTI reliability is presented in **Table 4.2**. The most unreliable segment for heavy-duty trucks in the AM and PM peak hours is from Combie Road to Cameo Drive. This coincides with the most unreliable segments for passenger cars.

Table 4.2 Zone 1 Heavy-Duty Trucks BTI Reliability

Segment	Reliability BTI (Trucks)			
	NB		SB	
	AM	PM	AM	PM
Nevada County Line to Combie Road	0.70	0.27	0.29	0.38
Combie Road to Cameo Drive	0.71	0.84	0.89	0.88

#### 4.1.2 Performance Measures

**Table 4.3** presents the performance measures for Zone 1 for Existing and Future (Year 2035) conditions.

Table 4.3 Zone 1 Performance Measures

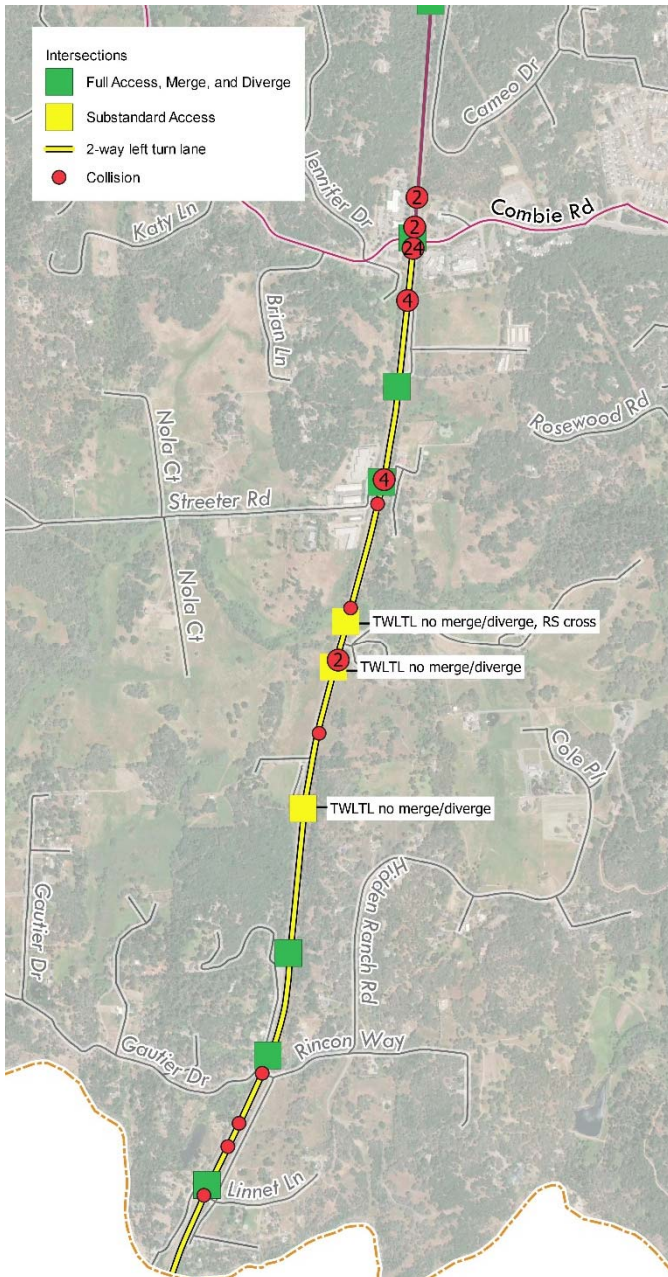
Zone 1: Nevada County Line to Cameo Drive			
Post Mile		0.0 - 2.7	
Existing Average Daily Traffic <sup>1</sup>		32,916	
Future (Year 2035) Average Daily Traffic <sup>2</sup>		36,208	
Existing LOS (Year 2018)	AM	NB	A
		SB	B
	PM	NB	B
		SB	A
Future LOS (Year 2035)	AM	NB	A
		SB	B
	PM	NB	C
		SB	A
Total Vehicle Hours of Delay	AM	NB	1.82
		SB	0.15
	PM	NB	0.07
		SB	0.00
Total Person Minutes of Delay <sup>3</sup>	AM	NB	125.06
		SB	10.34
	PM	NB	4.21
		SB	0.00
Minutes of Delay per Vehicle	AM	NB	0.12
		SB	0.01
	PM	NB	0.00
		SB	0.00

<sup>1</sup> Source: Average Daily Traffic based on 2018 traffic counts

<sup>2</sup> Source: Growth Rate used was obtained from the Nevada County Travel Demand Model

<sup>3</sup> Source: Delay is the average additional travel time by vehicles traveling is the difference between the average FFS and average speed. A vehicle occupancy factor of 1.15 was used for passenger car and vehicle occupancy factor of 1.0 for trucks.





## 4.2 Safety Analysis (89 collisions)

In Zone 1, out of 89 total collisions recorded from 2012 to 2016, three were fatal and 42 resulted in injury. Zone 1's overall collision rate per million vehicle miles (MVM) is 0.55 per MVM, which is lower than the statewide average for similar facilities (0.90 per MVM). However, the percentage of fatal collisions is higher at 3.4% (Statewide Average is 1.1%). There are two collision areas of primary concern:

### *SR 49 & Streeter Road*

This is a side-street stop controlled intersection with standard access. Of the five injury collisions at this intersection, three were broadside, and of those, one was fatal and one was a severe injury.

### *SR 49 & Wolf Road/Combie Road*

This is a signalized intersection with standard access. Of the 32 injury collisions at the intersection, 22 were rear-end collisions. As the intersection is signalized, these collisions could be due to unexpected stopping at the intersection, however, a warning sign is posted for the signal 1000 feet on both the north and south SR 49 approaches. In addition, these movements have a yellow time of 5 seconds. At the intersection, one collision was fatal, and two others were severe injury. The fatal collision was a sideswipe, one of the severe injuries was a rear-end collision south of the intersection, and the other severe injury was an overturned vehicle north of the intersection.

### *Other Significant Collisions*

In addition to the fatal and severe injury collisions at the intersections discussed above, the following collisions occurred:

- Fatal broadside collision at Sharonjack Road
- Severe injury broadside collision at Rincon Way
- Severe injury pedestrian collision occurred 700 feet south of Streeter Road.



## 4.3 Improvements

### 4.3.1 Planned/Programmed

District 3 is currently working on an auxiliary lane project that will add acceleration lanes on SR 49 at the Wolf Road/Combie Road signalized intersection.

### 4.3.2 Additional Considerations

#### *SR 49 & Streeter Road*

Additional lighting (\$\$) could be added at the intersection to aid in reducing collisions. Another possibility could be to widen the road to provide acceleration lanes into and out of the intersection (\$\$\$).

#### *SR 49 & Wolf Road/Combie Road*

In addition to the programmed project being implemented by District 3, additional lighting (\$\$) could be added at the intersection to aid in reducing the rear end collisions. Another possibility could be to update the signalized intersection to a roundabout (\$\$\$\$).

#### *Other Significant Collisions*

The following could potentially reduce other significant collisions in the Zone:

- High Visibility Striping (\$)
- Additional Lighting (\$\$)
- Additional/Upgraded Enhanced Headlight Corridor Signing, including Enforcement (\$)
- Advanced Warning Signs (Where Applicable) (\$)

### 4.3.3 Pedestrian and Bicycle Facilities

Bicyclists traveling along both northbound and southbound SR 49 for commuter and recreational purposes may potentially utilize the wide shoulders available along Zone 1. The 730 foot long northbound right turn lane approaching the intersection of SR 49 & Wolf Road/Combie Road presents the potential for conflicts between bicyclists and right turning motorists.

Currently, the intersection of SR 49 & Wolf Road/Combie Road is the only intersection within Zone 1 that provides pedestrian facilities. At this intersection, crosswalks are present on the north, west, and east legs (only). Currently, sidewalks are absent along all legs of this intersection with the exception of a short section of sidewalk at the southeast corner that extends to a pedestrian bridge. Also curb ramps at the crosswalks do not meet California ADA requirements. As a future improvement, the Nevada County Pedestrian Improvement Plan proposes to provide a pedestrian path on Combie Road between SR 49 and Magnolia Road on the northerly side.



## 5. Zone 2 (3.9 miles, PM 2.7 to 6.6)

### 5.1 Performance Metrics (Corridor Operations)

Zone 2 accounts for 3.9 miles of the study corridor. Within Zone 2, SR 49 is a two-lane, undivided conventional highway, and contains ten access points. The primary roads (which create six access points) intersecting with SR 49 Road are Mother Lode Road (west)/Oak Drive (east), North leg of Cherry Creek Road (west), Holcomb Drive (west)/South leg of Cherry Creek Road (east), Shady S Lane (west)/Cerrito Road (east), Carriage Road (east), Running M Drive(west)/Clivus Drive (east), and Brewer Road (east). Each of these intersections provide dedicated left-turn lanes, thereby enabling left-turning traffic to be out of the through lane. Based on travel time runs, the average time to traverse the entire length of Zone 2 was determined to be 3 minutes and 56 seconds.

#### 5.1.1 Travel Time Reliability

For Zone 2, the travel time reliability (BTI) was broken down for passenger cars and heavy duty trucks into one segment from Cameo Drive to Mother Lode Road. Per the NPMRDS segment limits, Zone 2 had an overlapping limit between Zones 2 and 3. Therefore, buffer time results were apportioned based on length proportions of the respective segments to the get results for Zone 2.

##### 5.1.1.1 Passenger Cars

As presented in **Table 5.1**, all were results showed reliable conditions except for the northbound AM peak hour that was moderately reliable. This approximately 3.9-mile segment has left turn lanes provided at all access points which enable the turning traffic to be removed from the through traffic.

Table 5.1 Zone 2 Passenger Car BTI Reliability

Segment	Reliability BTI (Passenger Vehicles)			
	NB		SB	
	AM	PM	AM	PM
Cameo Drive to Mother Lode Road	0.31	0.22	0.15	0.19

##### 5.1.1.1 Heavy-Duty Trucks

As presented in **Table 5.2**, heavy-duty trucks had similar BTI reliability in comparison to passenger cars. On Cameo Drive to Mother Lode Road, the northbound direction had moderately reliable results and the southbound direction had reliable results.

Table 5.2 Zone 2 Heavy Duty Trucks BTI Reliability

Segment	Reliability BTI (Trucks)			
	NB		SB	
	AM	PM	AM	PM
Cameo Drive to Mother Lode Road	0.28	0.28	0.23	0.23



### 5.1.2 Performance Measures

**Table 5.3** presents the performance measures for Zone 2 for Existing and Future (Year 2035) conditions.

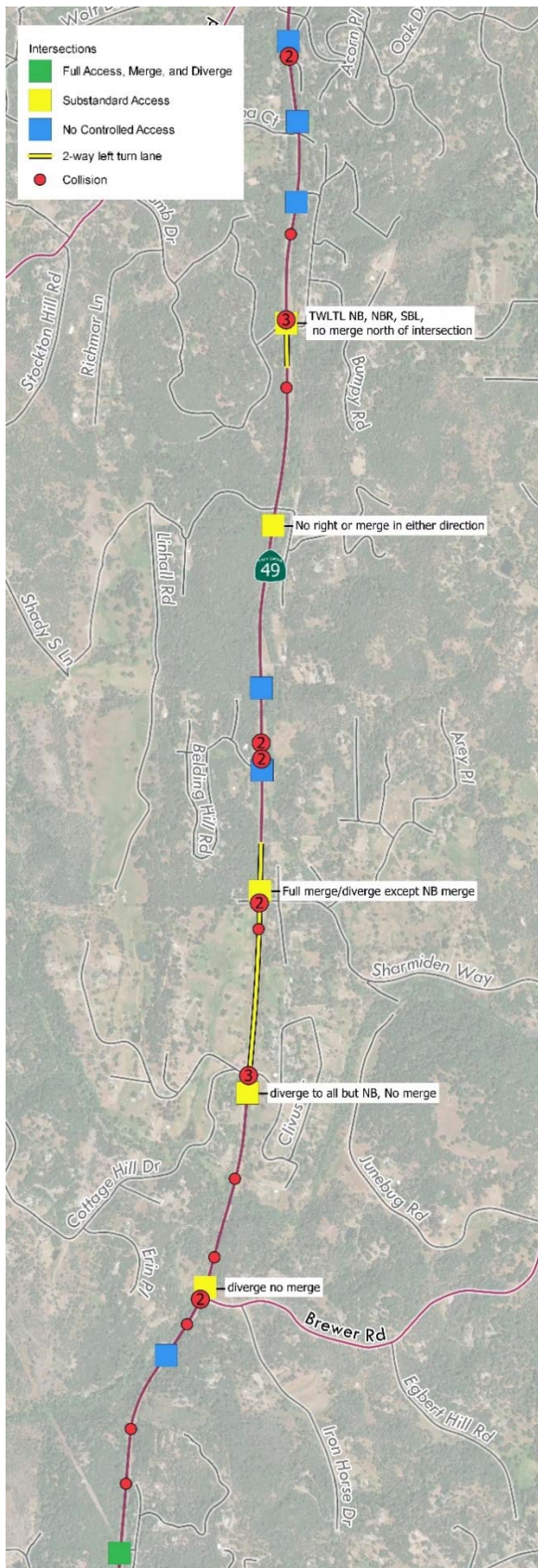
Table 5.3 Zone 2 Performance Measures

Zone 2: Cameo Drive to Mother Lode Road			
Post Mile		2.7 - 6.6	
Existing Average Daily Traffic <sup>1</sup>		24,666	
Future (Year 2035) Average Daily Traffic <sup>2</sup>		27,133	
Existing LOS (Year 2018)	AM	NB	E
		SB	E
	PM	NB	E
		SB	E
Future LOS (Year 2035)	AM	NB	E
		SB	E
	PM	NB	E
		SB	E
Total Vehicle Hours of Delay	AM	NB	4.81
		SB	1.57
	PM	NB	7.81
		SB	0.03
Total Person Minutes of Delay <sup>3</sup>	AM	NB	331.34
		SB	107.84
	PM	NB	537.13
		SB	1.51
Minutes of Delay per Vehicle	AM	NB	0.37
		SB	0.08
	PM	NB	0.37
		SB	0.00

<sup>1</sup> Source: Average Daily Traffic based on 2018 traffic counts

<sup>2</sup> Source: Growth Rate used was obtained from the Nevada County Travel Demand Model

<sup>3</sup> Source: Delay is the average additional travel time by vehicles traveling is the difference between the average FFS and average speed. A vehicle occupancy factor of 1.15 was used for passenger car and vehicle occupancy factor of 1.0 for trucks.



## 5.2 Safety Analysis (66 collisions)

In Zone 2, out of 66 total collisions recorded from 2012 to 2016, two were fatal and 22 resulted in injury. Zone 2's overall collision rate is 0.36 per MVM, which is lower than the statewide average for similar facilities (1.08 per MVM). Even though the overall collision rate is lower than the statewide rate, the percentage of fatal is above at 3.0% (State Average is 2.5%). There are four collision areas of primary concern:

### *SR 49 & Brewer Road*

This is a side-street stop controlled intersection with substandard access. Of the three injury collisions at this intersection, one was a fatal head-on collision.

### *SR 49 & Carriage Road*

This is a side-street stop controlled intersection with substandard access and three injury collisions. The wedge and northbound-to-eastbound right-turn lane channelization were constructed summer of 2015. Two of the collisions at this intersection occurred prior to this construction.

### *SR 49 & Ladybird Drive*

This is a side-street stop controlled intersection with no turn lanes onto the private roadway. All four injury collisions at this intersection were rear-end collisions.

### *SR 49 & Holcomb Drive/Cherry Creek Road*

This is a side-street stop controlled intersection with substandard access. Two of the three injury collisions at the intersection are hit object collisions.

### *Other Significant Collisions*

In addition to the fatal and severe injury collisions at the intersections discussed above, the following collisions occurred:

- A fatal broadside collision occurred 630 feet south of Oak Drive, near a private driveway.
- A severe injury sideswipe collision 1360 feet north of Cameo Drive.
- A severe injury broadside collision occurred 530 feet south of Cherry Creek Road due to a driver making a U-turn.
- The last was a bicycle collision 300 feet south of Cherry Creek Road, both the cyclist and the vehicle were traveling south, and the cyclist was making a right turn.



## 5.3 Improvements

### 5.3.1 Planned/Programmed

There is a programmed project to install safety lighting and radar feedback signs along the zone. In addition, there are planned projects at Cerrito Road, Ladybird Drive, Carriage Road, and Brewer Road to construct various access improvements (i.e additional turn lanes) and there are planned projects to eliminate southerly connection/improve the northerly connection with Cherry Creek Road and to eliminate the Cameo Drive intersection.

### 5.3.2 Additional Considerations

#### *SR 49 & Brewer Road, SR 49 & Carriage Road, and SR 49 & Ladybird Drive*

In addition to lighting (\$\$), accelerating the already planned project to widen the road to provide a combination of acceleration lanes, median widening, shoulder improvements, and sight-distance wedges to allow safer access into and out of the intersection (\$\$\$\$).

#### *SR 49 & Holcomb Drive/Cherry Creek Road*

Additional lighting (\$\$) could be added at the intersection to aid in reducing collisions. Another possibility could be accelerating the already planned project to widen the road to 5 lanes (\$\$\$\$), though an interim solution may be to widen the shoulders in the area (\$\$\$) or clear objects outside of the clear recovery zone in order to reduce the amount of hit objects (\$\$).

#### *Other Significant Collisions*

The following could potentially reduce other significant collisions in the Zone:

- High Visibility Striping (\$)
- Additional Lighting (\$\$)
- Additional/Upgraded Enhanced Headlight Corridor Signing, including Enforcement (\$)
- Advanced Warning Signs (Where Applicable) (\$)

### 5.3.3 Pedestrian and Bicycle Facilities

The majority of SR 49 within Zone 2 contains wide shoulders that may potentially be utilized by non-motorized traffic. However, there are certain locations containing narrow shoulders and improper transition striping that can potentially lead to conflict between cyclists. This feature is most noticeable at Brewer Road in the northbound direction where a separation between the right-turn lane and through lane for the bicycles is not provided. Additionally, the southbound shoulder is very narrow at Brewer Road.

Dedicated pedestrian facilities are not provided along either northbound or southbound SR 49 within Zone 2. However, it is acknowledged that pedestrians could and would likely utilize the shoulder to travel, as necessary. As funds become available, consideration should be given to providing standard shoulder or enhanced shoulder widths to accommodate non-motorized users.



## 6. Zone 3 (0.6 miles, PM 6.6 to 7.2)

### 6.1 Performance Metrics (Corridor Operations)

Zone 3 accounts for approximately 0.6 miles of the study corridor, the shortest segment of the study corridor. Within this zone, the SR 49 segment is a two-lane segment in the northbound direction, and a two-lane transitioning to a single lane in the southbound direction. Only two access points currently exist within Zone 3, both of which are situated at the zone termini. The access point on the south terminus (at Mother Lode Road) is a side-street stop controlled intersection, while the access point at the northern terminus (at Lime Kiln Road) is an intersection controlled by a traffic signal. Based on travel time runs, the average time to traverse the entire length of Zone 3 was determined to be 42 seconds.

#### 6.1.1 Travel Time Reliability

For Zone 3, the travel time reliability (BTI) was broken down for passenger cars and heavy duty trucks into one segment from Mother Lode Road to Lime Kiln Road. Per the NPMRDS data segment limits from Cameo Drive to Lime Kin Road, Zone 3 overlapped Zone 2. Therefore, buffer time results were apportioned based on length proportions of the respective segments to the get results for Zone 3.

##### 6.1.1.1 Passenger Cars

**Table 6.1** presents the passenger car BTI reliability for the northbound and southbound direction in the AM and PM peak hours. All were reliable except for the northbound AM peak hour that had a moderately reliable BTI at 0.31.

Table 6.1 Zone 3 Passenger Car BTI Reliability

Segment	Reliability BTI (Passenger Vehicles)			
	NB		SB	
	AM	PM	AM	PM
Mother Lode Road to Lime Kiln Road	0.31	0.22	0.15	0.19

##### 6.1.1.2 Heavy-Duty Trucks

The BTI reliability for heavy-duty trucks is presented in **Table 6.2** for the segment from Mother Lode Road to Lime Kiln Road. The northbound direction has moderately reliable conditions for AM and PM peak hours and the southbound direction shows reliable conditions for AM and PM peak hours.

Table 6.2 Zone 3 Heavy Duty Trucks BTI Reliability

Segment	Reliability BTI (Trucks)			
	NB		SB	
	AM	PM	AM	PM
Mother Lode Road to Lime Kiln Road	0.28	0.28	0.23	0.23



### 6.1.2 Performance Measures

**Table 6.3** presents the performance measures for Zone 3 for Existing and Future (Year 2035) conditions.

**Table 6.3 Zone 3 Performance Measures**

Zone 3: Mother Lode Road to Lime Kiln Road			
Post Mile		6.6 - 7.2	
Existing Average Daily Traffic <sup>1</sup>		24,926	
Future (Year 2035) Average Daily Traffic <sup>2</sup>		27,419	
Existing LOS (Year 2018)	AM	NB	B
		SB	B
	PM	NB	B
		SB	B
Future LOS (Year 2035)	AM	NB	B
		SB	B
	PM	NB	B
		SB	B
Total Vehicle Hours of Delay	AM	NB	0.73
		SB	0.22
	PM	NB	1.13
		SB	0.00
Total Person Minutes of Delay <sup>3</sup>	AM	NB	50.59
		SB	15.29
	PM	NB	77.86
		SB	0.24
Minutes of Delay per Vehicle	AM	NB	0.06
		SB	0.01
	PM	NB	0.06
		SB	0.00

<sup>1</sup> Source: Average Daily Traffic based on 2018 traffic counts

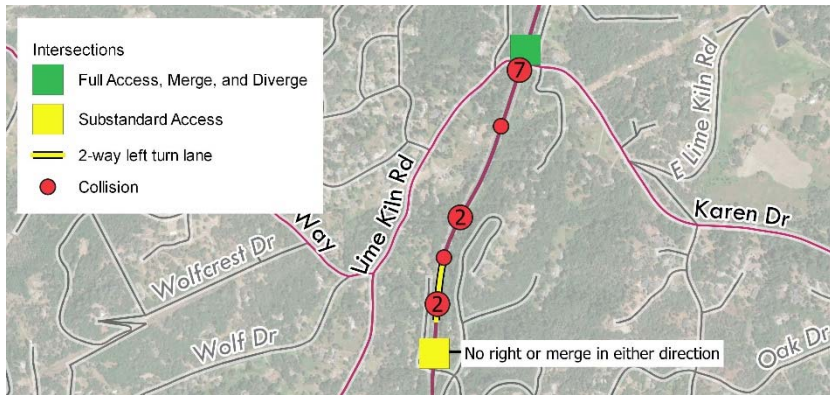
<sup>2</sup> Source: Growth Rate used was obtained from the Nevada County Travel Demand Model

<sup>3</sup> Source: Delay is the average additional travel time by vehicles traveling is the difference between the average FFS and average speed. A vehicle occupancy factor of 1.15 was used for passenger car and vehicle occupancy factor of 1.0 for trucks.





## 6.2 Safety Analysis (24 Collisions)



In Zone 3, out of 24 total collisions recorded from 2012 to 2016, none were fatal and 13 resulted in injury. The collision rate analysis is based on roadway geometry, resulting in two segments within Zone 3. In the three-lane section of Zone 3, the overall collision rate is 0.37 per MVM (lower than the statewide rate of 0.94 per MVM). In the undivided four-lane section of Zone 3, the overall collision rate is 1.22 per MVM (higher than the statewide rate is 0.9 per MVM).

In both sections of Zone 3, the fatal rate is 0%, lower than the statewide rates of 2.3% and 1%, respectively. There are two collision areas of primary concern:

### *SR 49 & Lime Kiln Road*

This is a signalized intersection with standard access. Six of the seven injury collisions at the intersection are rear-end collisions. As the intersection is signalized, these collisions could be due to unexpected stopping at the intersection. However, a warning sign is posted for the signal 1000 feet from the intersection to both the north and south on SR 49. For the NBT and SBT, the yellow time is 5 seconds.

### *Southern Segment of Zone 3*

The southern segment of Zone 3 does not have any access points, but it does have a two-lane road turning into a one-lane road along a curve. The five collisions along this stretch of roadway are most likely due to vehicles not merging properly at the transition zone or having issues with sight distance through the nonstandard curves along the highway.



## 6.3 Improvements

### 6.3.1 Planned/Programmed

There is a planned project to lengthen the two southbound lanes for the entirety of zone 3, and down to Cherry Creek Road. There is a programmed project to install safety lighting and radar feedback signs along the zone.

### 6.3.2 Additional Considerations

#### *SR 49 & Lime Kiln Road*

Additional lighting (\$\$) could be added at the intersection to aid in reducing the rear end collisions. Another possibility could be to update the signalized intersection to a roundabout (\$\$\$\$\$).

#### *Southern Segment of Zone 3*

Additional lighting (\$\$) could be added to aid in reducing collisions. Another possibility would be for better median delineation (\$) with delineators or high visibility striping (\$) to aid drivers in visualizing the curve and the transition zones. Additionally, advanced warning signs (where applicable) (\$) could be added.

### 6.3.3 Pedestrian and Bicycle Facilities

SR 49 in Zone 3 contains wide shoulders that may potentially be utilized by non-motorized traffic. No dashed transition striping for bicyclists are currently provided between the right turn pockets and thru lane (in either the northbound or southbound directions). A wider paved shoulder exists at the majority of the right-turns to aid right-turning vehicles.

Dedicated pedestrian facilities are not provided along either northbound or southbound SR 49 within Zone 3. However, it is acknowledged that pedestrians could and would likely utilize the shoulder to travel, as necessary. As funds become available, consideration should be given to providing standard shoulder or enhanced shoulder widths to accommodate non-motorized users.



## 7. Zone 4 (0.9 miles, PM 7.2 to 8.1)

### 7.1 Performance Metrics (Corridor Operations)

Zone 4 accounts for approximately 0.9 mile of the study corridor. Within Zone 4, the SR 49 segment is a two-lane, undivided highway with six access points, excluding Lime Kiln Road. The access point at the southern terminus at Lime Kiln Road is controlled by a traffic signal, while the access point at the northern terminus at Auburn Road is a side-street stop controlled intersection. Four of the access points do not have dedicated turn lanes on SR 49. Each of these uncontrolled intersections creates a conflict point. With the growth in traffic on SR 49, this may potentially result in an increasing number of accidents without the benefit of dedicated turn lanes. The access points are located within 700 feet of each other. Based on travel time runs, the average time to traverse the entire length of Zone 4 was determined to be 1 minute and 5 seconds.

#### 7.1.1 Travel Time Reliability

For Zone 4, the travel time reliability (BTI) was broken down for passenger cars and heavy duty trucks into one segment from Lime Kiln Road to Auburn Road. Per the NPMRDS data segment limits from Lime Kiln Road to Lady Jane Road, Zones 4 and 5 overlapped. Therefore, buffer time results were apportioned based on length proportions of the respective segments.

##### 7.1.1.1 Passenger Cars

As presented in **Table 7.1**, Zone 4 passenger cars had an unreliable BTI at 0.51 for the northbound direction in the AM peak hour. The northbound PM and southbound AM and PM peak hours were showing moderately reliable conditions. The three access points with no dedicated left turn lanes along the segment cause the turning vehicles to wait in the through lanes for gaps to cross traffic.

Table 7.1 Zone 4 Passenger Car BTI Reliability

Segment	Reliability BTI (Passenger Vehicles)			
	NB		SB	
	AM	PM	AM	PM
Lime Kiln Road to Auburn Road	0.51	0.29	0.29	0.31

##### 7.1.1.2 Heavy-Duty Trucks

**Table 7.2** presents the heavy-duty truck BTI reliability for Zone 4. The heavy-duty trucks had better reliability results when compared to the passenger cars. The northbound AM and PM peak hours and southbound PM peak hour had moderately reliable conditions. The southbound AM peak hour showed reliable conditions.

Table 7.2 Zone 4 Heavy Duty Trucks BTI Reliability

Segment	Reliability BTI (Trucks)			
	NB		SB	
	AM	PM	AM	PM
Lime Kiln Road to Auburn Road	0.41	0.42	0.19	0.25



7.1.2 Performance Measures

**Table 7.3** presents the performance measures for Zone 4 for Existing and Future (Year 2035) conditions.

Table 7.3 Zone 4 Performance Measures

Zone 4: Lime Kiln Road to Auburn Road			
Post Mile		7.2 - 8.1	
Existing Average Daily Traffic <sup>1</sup>		26,838	
Future (Year 2035) Average Daily Traffic <sup>2</sup>		29,522	
Existing LOS (Year 2018)	AM	NB	E
		SB	E
	PM	NB	E
		SB	E
Future LOS (Year 2035)	AM	NB	E
		SB	E
	PM	NB	E
		SB	E
Total Vehicle Hours of Delay	AM	NB	0.98
		SB	1.69
	PM	NB	1.57
		SB	2.51
Total Person Minutes of Delay <sup>3</sup>	AM	NB	67.47
		SB	116.67
	PM	NB	107.41
		SB	173.00
Minutes of Delay per Vehicle	AM	NB	0.08
		SB	0.11
	PM	NB	0.08
		SB	0.14

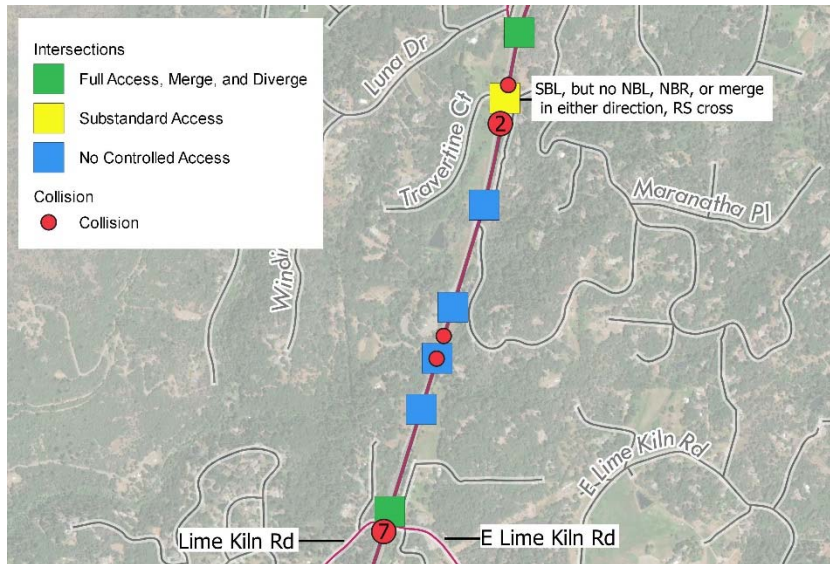
<sup>1</sup> Source: Average Daily Traffic based on 2018 traffic counts

<sup>2</sup> Source: Growth Rate used was obtained from the Nevada County Travel Demand Model

<sup>3</sup> Source: Delay is the average additional travel time by vehicles traveling is the difference between the average FFS and average speed. A vehicle occupancy factor of 1.15 was used for passenger car and vehicle occupancy factor of 1.0 for trucks.



## 7.2 Safety Analysis (26 Collisions)



In Zone 4, out of 26 total collisions recorded from 2012 to 2016, none were fatal and 12 resulted in injury. Zone 4's overall collision rate is 0.59 per MVM, which is lower than the statewide average for similar facilities (1.08 per MVM). The percentage of fatal (0%) is also lower than the statewide average of 2.5%. There is one collision area of primary concern:

### *SR 49 & Travertine Court/Pekolee Drive*

This is a two-way stop controlled intersection with substandard access. Two of the three injury collisions are rear-end collisions. This is most likely from unexpected stopping near the intersection due to the lack of merging or diverging lanes.

## 7.3 Improvements

### 7.3.1 Planned/Programmed

There is a programmed project to install safety lighting and radar feedback signs along the zone. In addition, there is a planned project to construct a frontage road and intersection improvements from Travertine Court to Auburn Road.

### 7.3.2 Additional Considerations

#### *SR 49 & Travertine Court/Pekolee Drive*

Additional lighting (\$\$) could be added at the intersection to aid in reducing collisions. Another possibility could be accelerating the already planned project to add frontage roads (\$\$\$\$) and provide intersection improvements (\$\$\$). A more implementable fix however, could be to separate the frontage road/widening work from the intersection work and prioritize upgrading the intersection/access control elements first (\$\$\$).

### 7.3.3 Pedestrian and Bicycle Facilities

For the most part, SR 49 in Zone 4 has wide shoulders that may potentially be used by non-motorized traffic. However, the east shoulder just north of Lime Kiln Road is lacking a separation between the right-turn lane and the through lane to accommodate bicycles.

Dedicated pedestrian facilities are not provided along either northbound or southbound SR 49 within Zone 4. However, it is acknowledged that pedestrians could and would likely utilize the shoulder to travel, as necessary. As funds become available, consideration should be given to providing standard shoulder or enhanced shoulder widths to accommodate non-motorized users.



## 8. Zone 5 (2.5 miles, PM 8.1 to 10.6)

### 8.1 Performance Metrics (Corridor Operations)

Zone 5 accounts for approximately 2.5 miles of the study corridor. Within this zone, SR 49 is a two-lane segment in the northbound direction and a two lane transitioning to a single lane in the southbound direction south of La Barr Meadows Road. There are 14 access points within this Zone, with the access point on the south end at Auburn Road being stop controlled and the northern access point at La Barr Meadows Road being controlled by a traffic signal. The other major intersections are at Alta Sierra (also controlled by a traffic signal), and Ponderosa Pines Way, which provides three-quarters access. Based on travel time runs, the average time to traverse the entire length of Zone 5 was determined to be 2 minutes and 55 seconds.

#### 8.1.1 Travel Time Reliability

The travel time reliability (BTI) was broken down for passenger cars and heavy-duty trucks into one segment from Auburn Road to La Barr Meadows/Allison Ranch Road for Zone 5. Per the NPMRDS data segment limits from Lady Jane Road to Lode Line Way, Zone 5 overlapped Zone 6. Therefore, buffer time results were apportioned based on length proportions of the respective segments to the get results for Zone 5.

##### 8.1.1.1 Passenger Cars

As presented in **Table 8.1**, the passenger car BTI reliability for the northbound and southbound direction in the AM and PM peak hours were all moderately reliable. However, the northbound AM peak hour was at the top of the range with a BTI of 0.49.

Table 8.1 Zone 5 Passenger Car BTI Reliability

Segment	Reliability BTI (Passenger Vehicles)			
	NB		SB	
	AM	PM	AM	PM
Auburn Road to La Barr Meadows/Allison Ranch Road	0.49	0.30	0.28	0.32

##### 8.1.1.2 Heavy-Duty Trucks

**Table 8.2** presents the heavy-duty trucks BTI reliability for Zone 5. Table 8.2 shows similar results in comparison to the passenger cars. Both directions for the peak hours were moderately reliable.

Table 8.2 Zone 5 Heavy Duty Trucks BTI Reliability

Segment	Reliability BTI (Trucks)			
	NB		SB	
	AM	PM	AM	PM
Auburn Road to La Barr Meadows/Allison Ranch Road	0.44	0.40	0.25	0.33



### 8.1.2 Performance Measures

**Table 8.3** presents the performance measures for Zone 5 for Existing and Future (Year 2035) conditions.

Table 8.3 Zone 5 Performance Measures

Zone 5: Auburn Road to La Barr Meadows/Allison Ranch Road			
Post Mile		8.1 - 10.6	
Existing Average Daily Traffic <sup>1</sup>		26,536	
Future (Year 2035) Average Daily Traffic <sup>2</sup>		29,190	
Existing LOS (Year 2018)	AM	NB	B
		SB	E
	PM	NB	B
		SB	E
Future LOS (Year 2035)	AM	NB	B
		SB	E
	PM	NB	B
		SB	E
Total Vehicle Hours of Delay	AM	NB	4.69
		SB	4.06
	PM	NB	4.69
		SB	8.28
Total Person Minutes of Delay <sup>3</sup>	AM	NB	322.77
		SB	279.51
	PM	NB	321.85
		SB	570.41
Minutes of Delay per Vehicle	AM	NB	0.27
		SB	0.30
	PM	NB	0.28
		SB	0.41

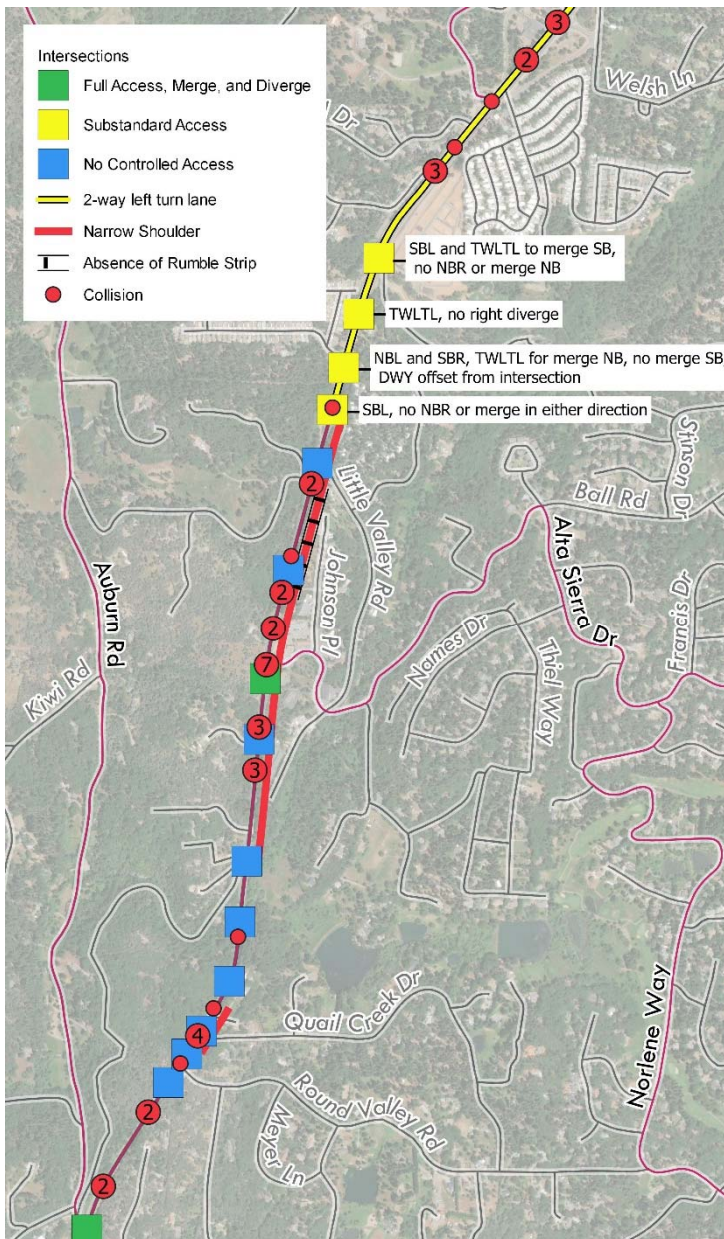
<sup>1</sup> Source: Average Daily Traffic based on 2018 traffic counts

<sup>2</sup> Source: Growth Rate used was obtained from the Nevada County Travel Demand Model

<sup>3</sup> Source: Delay is the average additional travel time by vehicles traveling is the difference between the average FFS and average speed. A vehicle occupancy factor of 1.15 was used for passenger car and vehicle occupancy factor of 1.0 for trucks.



## 8.1 Safety Analysis (81 Collisions)



In Zone 5, out of 81 total collisions recorded from 2012 to 2016, one was fatal and 41 resulted in injury. In the three-lane section of Zone 5, the overall collision rate is 0.66 per MVM (lower than the statewide rate of 0.94 per MVM). In the undivided four-lane section of Zone 5, the overall collision rate is 1.08 per MVM (higher than the statewide rate is 0.9 per MVM).

In the three-lane section of Zone 5, the fatal rate is 1.6%, lower than the statewide rate of 2.3%. There are five collision areas of primary concern:

### *SR 49 & Quail Creek Drive*

This is a side-street stop controlled intersection with no controlled access. The intersection access is further complicated by two more intersections with no controlled access in very close proximity, Round Valley Road to the south and Ruby Road to the north. There are four collisions at Quail Creek Drive, as well as an additional collision each at both Round Valley Road and Ruby Road. There is no pattern to the collision types, indicating that it is more the clustering of access points than any distinct access issue.

### *SR 49 & Meadowbrook Court*

This is a side-street stop controlled intersection with no controlled access. Five of the six collisions at the intersection are rear-end collisions. This is most likely from unexpected stopping near the intersection due to the lack of merging or diverging lanes, and the significant downgrade from Alta Sierra Drive.

### *SR 49 & Alta Sierra Drive*

This is a signalized intersection with standard access. Four of the collisions are broadside collisions and the other three collisions are rear-ends.

### *SR 49 & Johnson Place*

This is a side-street stop controlled intersection with access restricted to right-in right-out only. There is no pattern to the three collisions at this intersection. This intersection has a narrow shoulder on the northbound side.

### *Northern Segment of Zone 5*

The northern segment of Zone 5 does not have any access points, however, it has seven collisions.

### *Other Significant Collisions*

There were two severe injury collisions at the intersection of SR 49 & Pingree Road. One was a pedestrian collision and the other was a broadside.





## 8.2 Improvements

### 8.2.1 Planned/Programmed

There is a programmed project to install safety lighting and radar feedback signs along the zone. In addition, there is a planned project to construct a second southbound thru lane with median shoulder widening while upgrading/connecting the frontage road and intersections between Alta Sierra Drive to Kenwood Drive. There is also a programmed project to construct a two-way-left-turn lane from Round Valley Road to Ruby Road.

### 8.2.2 Additional Considerations

#### *SR 49 & Quail Creek Drive*

In addition to lighting (\$\$), accelerating the already planned project to construct frontage roads and connections between Round Valley Road and Quail Road could help in reducing collisions in the vicinity by consolidating access points on SR 49 (\$\$\$\$).

#### *SR 49 & Meadowbrook Court*

In addition to lighting (\$\$), acceleration/deceleration lanes could be added to reduce collisions (\$\$\$\$).

#### *SR 49 & Alta Sierra Drive*

Additional lighting (\$\$) could be added at the intersection to aid in reducing collisions. Another possibility could be to update the signalized intersection to a roundabout which is proven to eliminate broadside collisions (\$\$\$\$). Based on correspondence with Caltrans, signal modification that would allow right turn overlap for the westbound direction has been determined as a condition of approval for a proposed project.

#### *SR 49 & Johnson Place*

In addition to lighting (\$\$), the northbound shoulder could be widened (\$\$\$) in order to provide a better refuge for cars to help reduce collisions.

#### *Northern Segment of Zone 5*

The following could potentially reduce other significant collisions in the Zone:

- High Visibility Striping (\$)
- Additional Lighting (\$\$)
- Additional/Upgraded Enhanced Headlight Corridor Signing, including Enforcement (\$)
- Advanced Warning Signs (Where Applicable) (\$)



### 8.2.3 Pedestrian and Bicycle Facilities

For the majority of Zone 5, SR 49 is observed to contain wide shoulders along the southbound lane that may be utilized by non-motorized traffic. However, the northbound lane generally has narrow shoulders and select existing locations have improper transitions for bikes where striped separations between the right-turn lane and through lane for the bicycles are not provided.

Dedicated pedestrian facilities are not provided along either northbound or southbound SR 49 within Zone 5. However, it is acknowledged that pedestrians could and would likely utilize the shoulder to travel, as necessary. As funds become available, consideration should be given to providing standard shoulder or enhanced shoulder widths to accommodate non-motorized users.



## 9. Zone 6 (3.1 miles, PM 10.6 to 13.7)

### 9.1 Performance Metrics (Corridor Operations)

Zone 6 accounts for the remaining 3.1-mile portion of the study corridor. With the exception of the transition areas at La Barr Meadows and McKnight Way (where SR 49 has two lanes in each direction), SR 49 segment in this zone is a two-lane highway with approximately 14 access points. All of the access points (with the exception of La Barr Meadows Road at the southern terminus) are side-street stop controlled intersections. The majority of those access points do not have dedicated turn lanes on SR 49. Each of these uncontrolled intersections creates multiple conflict points on the corridor. With the growth in traffic on SR 49, this may potentially result in an increase in the number of collisions involving vehicles entering and exiting SR 49 without the benefit of dedicated turn lanes. Based on travel time runs, the average time to traverse the entire length of Zone 6 was determined to be 3 minutes and 36 seconds.

#### 9.1.1 Travel Time Reliability

The travel time reliability (BTI) was broken down for passenger cars and heavy-duty trucks for Zone 6. This zone is from La Barr Meadows Road/Allison Ranch Road to South of McKnight interchange. Per the NPMRDS data segment limits, these limits for Zone 6 were apportioned based on length proportions of the respective segments.

##### 9.1.1.1 Passenger Cars

As presented in **Table 9.1**, the passenger car BTI reliability for the southbound direction in PM peak hours showed unreliable conditions. However, the AM peak hour for the southbound direction showed reliable results. This is likely due to the increase in traffic volumes (PM peak hour are almost double the AM peak hour). The other BTI results for the northbound direction showed moderately reliable conditions in the AM peak hour and reliable conditions in the PM peak hour.

Table 9.1 Zone 6 Passenger Car BTI Reliability

Segment	Reliability BTI (Passenger Vehicles)			
	NB		SB	
	AM	PM	AM	PM
La Barr Meadows Road/Allison Ranch Road to S. of McKnight Interchange	0.26	0.18	0.16	0.69



### 9.1.1.2 Heavy-Duty Trucks

**Table 9.2** presents the BTI reliability for heavy-duty trucks. This showed similar results in comparison to the passenger cars except the trucks had slightly less reliability. The southbound direction in the PM peak hour had a BTI of 0.79 (unreliable) and the AM peak hour had a BTI of 0.20 (reliable). The northbound directions showed moderately reliable conditions for AM and PM peak hours.

Table 9.2 Zone 6 Heavy Duty Trucks BTI Reliability

Segment	Reliability BTI (Trucks)			
	NB		SB	
	AM	PM	AM	PM
La Barr Meadows Road/Allison Ranch Road to S. of McKnight Interchange	0.31	0.28	0.20	0.79

### 9.1.2 Performance Measures

**Table 9.3** presents the performance measures for Zone 6 for Existing and Future (Year 2035) conditions.

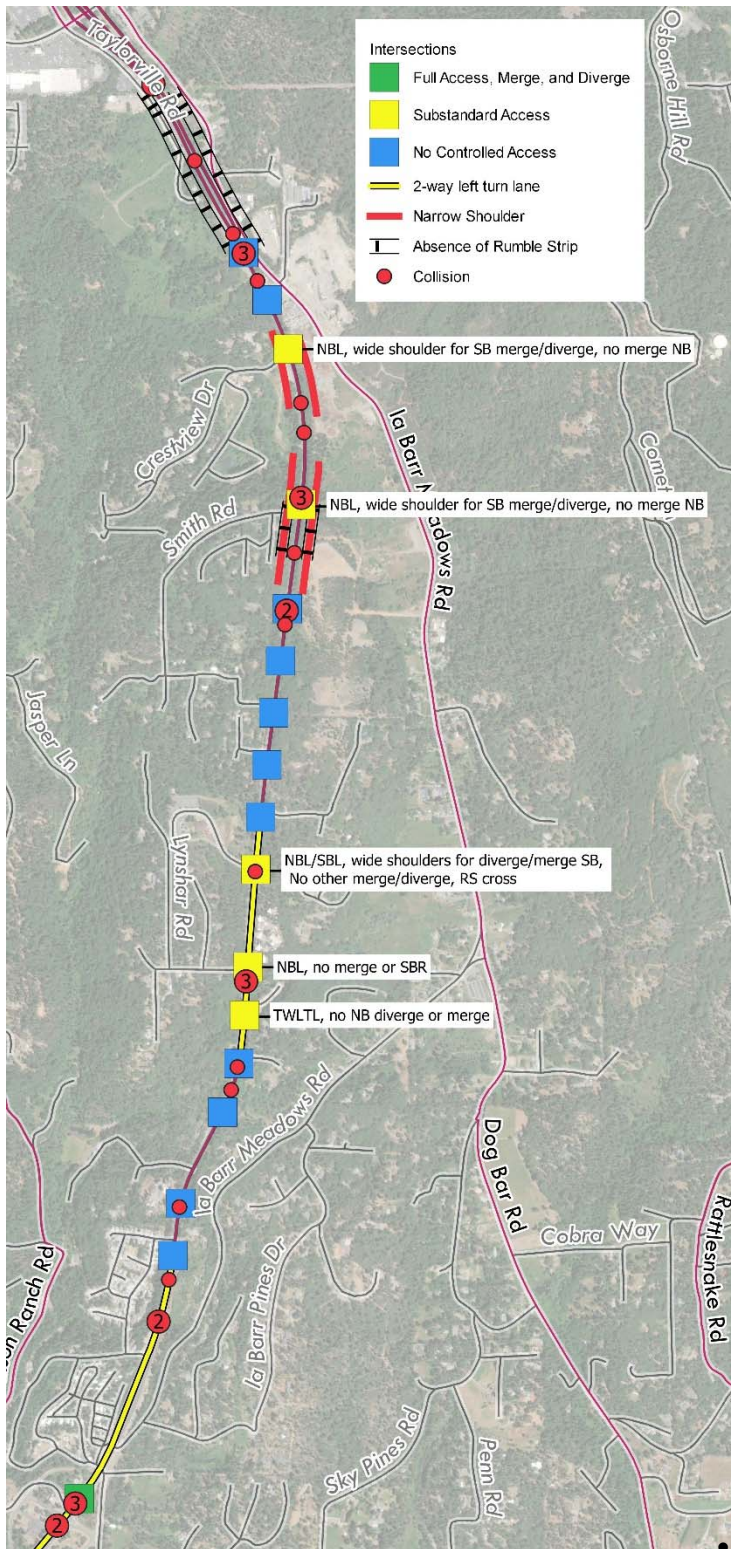
Table 9.3 Zone 6 Performance Measures

Zone 6: La Barr Meadows Road/Allison Ranch Road to McKnight Interchange			
Post Mile		10.6 - 13.7	
Existing Average Daily Traffic <sup>1</sup>		30,495	
Future (Year 2035) Average Daily Traffic <sup>2</sup>		33,545	
Existing LOS (Year 2018)	AM	NB	E
		SB	E
	PM	NB	E
		SB	E
Future LOS (Year 2035)	AM	NB	E
		SB	E
	PM	NB	E
		SB	E
Total Vehicle Hours of Delay	AM	NB	4.84
		SB	1.65
	PM	NB	4.19
		SB	8.92
Total Person Minutes of Delay <sup>3</sup>	AM	NB	333.57
		SB	113.72
	PM	NB	288.66
		SB	614.12
Minutes of Delay per Vehicle	AM	NB	0.23
		SB	0.13
	PM	NB	0.23
		SB	0.38

<sup>1</sup> Source: Average Daily Traffic based on 2018 traffic counts

<sup>2</sup> Source: Growth Rate used was obtained from the Nevada County Travel Demand Model

<sup>3</sup> Source: Delay is the average additional travel time by vehicles traveling is the difference between the average FFS and average speed. A vehicle occupancy factor of 1.15 was used for passenger car and vehicle occupancy factor of 1.0 for trucks.



## 9.2 Safety Analysis (81 Collisions)

In Zone 6, out of 81 total collisions recorded from 2012 to 2016, one was fatal and 34 resulted in injury. In the undivided four-lane section of Zone 6, the overall collision rate is 0.65 per MVM (lower than the statewide rate of 0.9 per MVM). In the two-lane section of Zone 6, the overall collision rate is 0.52 per MVM (lower than the statewide rate is 1.08 per MVM). In the undivided four-lane section of Zone 6, the fatal rate is 8.3%, higher than the statewide rate of 1.1%. There are four collision areas of primary concern:

### *SR 49 & Allison Ranch Road/La Barr Meadows Road*

This is a signalized intersection with standard access. Four of the eight injury collisions at the intersection are rear-end collisions. One of the collisions is a severe injury sideswipe collision. Another collision is a fatal pedestrian collision.

### *SR 49 & Wellswood Way*

This is a side-street stop controlled intersection with substandard access with three injury collisions.

### *SR 49 & Smith Road*

This a side-street stop controlled intersection with substandard access. Of the four injury collisions, two are sideswipes, likely due to the left turn from Smith Road not having a merge lane. One of the sideswipe collisions is a severe injury collision.

### *Northern Segment of Zone 6*

The northern segment of Zone 6 does not have any significant access points, but it has ten collisions. One of those collisions was a severe injury sideswipe collision 910 feet north of Crestview Drive.

### *Other Significant Collision*

In addition to the fatal and severe injury collisions at the intersections discussed above, the following collision occurred:

- A severe injury sideswipe collision on SR 49 occurred 900 feet south of Smith Road.



## 9.3 Improvements

### 9.3.1 Planned/Programmed

Widening along the Zone north of La Barr Meadows Road to McKnight Way as well as frontage road implementation is planned for project development from 2015-2025. In addition, there are planned projects to widen and/or construct frontage roads and intersection improvements at the following locations: Alta Sierra Drive to Pingree Road, Wellswood Way to Christian Life Way, Smith Road, South of Cornette Way to Christian Life Way, and Christian Life Way to McKnight Way Overcrossing. There is also a planned project to widen SR 49 to a four-lane conventional access control highway from La Barr Meadows to just south of the Grass Valley Overcrossing.

### 9.3.2 Additional Considerations

#### *SR 49 & Allison Ranch Road/La Barr Meadows Road*

Additional lighting (\$\$) could be added at the intersection to aid in reducing collisions. Another possibility could be to update the signalized intersection to a roundabout which is proven to reduce sideswipe collisions (\$\$\$\$).

#### *SR 49 & Wellswood Way*

In addition to lighting (\$\$), acceleration/deceleration lanes could be added to reduce collisions (\$\$\$), however accelerating the already planned project to construct frontage roads and intersection improvements (\$\$\$\$) may be a better way to reduce collisions without significant reconstruction.

#### *SR 49 & Smith Road*

In addition to lighting (\$\$), acceleration/deceleration lanes could be added to reduce collisions (\$\$\$).

#### *Northern Segment of Zone 6*

The following could potentially reduce other significant collisions in the Zone:

- High Visibility Striping (\$)
- Additional Lighting (\$\$)
- Additional/Upgraded Enhanced Headlight Corridor Signing, including Enforcement (\$)
- Advanced Warning Signs (Where Applicable) (\$)

### 9.3.3 Pedestrian and Bicycle Facilities

For the majority of Zone 6, SR 49 consists of shoulders that may potentially be utilized by non-motorized traffic. Narrow shoulders that may potentially impact bicycle travel is present in select locations of northbound and southbound SR 49 within Zone 6.

Dedicated pedestrian facilities are not provided along either northbound or southbound SR 49 within Zone 6. However, it is acknowledged that pedestrians could and would likely utilize the shoulder to travel, as necessary. As funds become available, consideration should be given to providing standard shoulder or enhanced shoulder widths to accommodate non-motorized users.



# Appendix

Appendix A – Congestion Data

Appendix B – Travel Time Data

Appendix C – Segment Collision Analysis

Appendix D – SR 49 CSMP Existing Conditions Report



# Appendix A – Congestion Data



Passenger Car Congestion

tmc	road	direction	intersection	miles	road_order	Zone	FFS avg adjusted to be max	AM Avg Speed (7:40-8:35)	AM Congested	PM Avg Speed (4:50-5:45)	PM Congested
105+07105	CA-49	NORTHBOUND	CR-10/COMBIE RD/WOLF RD	4.061094	32	extra+1	60.26	57.06	0	60.26	0
105+07106	CA-49	NORTHBOUND	CAMEO DR	0.504622	33	1	56.28	46.04	0	48.09	0
105+08272	CA-49	NORTHBOUND	LIME KILN RD	4.463917	34	2+3	58.02	53.13	0	53.06	0
105+07107	CA-49	NORTHBOUND	LADY JANE RD	2.842735	35	4+5	53.25	49.20	0	50.22	0
105+07108	CA-49	NORTHBOUND	LODE LINE WAY	1.138712	36	5+6	54.86	47.14	0	48.92	0
105+07109	CA-49	NORTHBOUND	CORNETTE WAY	0.389115	37	6	54.59	48.28	0	49.95	0
105+07110	CA-49	NORTHBOUND	FOUR SEASONS TRL	0.356518	38	6	53.90	49.89	0	51.26	0
105+07111	CA-49	NORTHBOUND	SMITH RD	0.695643	39	6	55.51	52.26	0	53.29	0
105+07112	CA-49	NORTHBOUND	MCKNIGHT WAY/TAYLORVILLE RD	0.88267	40	6	57.76	55.90	0	56.61	0
105P07112	CA-49	NORTHBOUND	MCKNIGHT WAY/TAYLORVILLE RD	0.34199	41	6+extra	58.93	58.54	0	58.93	0
105N07112	CA-49	SOUTHBOUND	MCKNIGHT WAY/TAYLORVILLE RD	0.352622	48	extra+6	59.35	58.00	0	53.96	0
105-07111	CA-49	SOUTHBOUND	SMITH RD	0.918101	49	6	58.06	56.68	0	49.22	0
105-07110	CA-49	SOUTHBOUND	FOUR SEASONS TRL	0.695643	50	6	58.27	56.14	0	51.84	0
105-07109	CA-49	SOUTHBOUND	CORNETTE WAY	0.356518	51	6	57.77	56.20	0	53.91	0
105-07108	CA-49	SOUTHBOUND	LODE LINE WAY	0.389115	52	6	58.22	55.31	0	53.95	0
105-07107	CA-49	SOUTHBOUND	LADY JANE RD	1.138712	53	6+5	57.59	51.83	0	49.24	0
105-08272	CA-49	SOUTHBOUND	LIME KILN RD	2.842735	54	5+4	57.72	51.48	0	49.86	0
105-07106	CA-49	SOUTHBOUND	CAMEO DR	4.463917	55	3+2	56.05	55.11	0	56.05	0
105-07105	CA-49	SOUTHBOUND	CR-10/COMBIE RD/WOLF RD	0.504622	56	1	51.06	45.26	0	48.16	0
105-07104	CA-49	SOUTHBOUND	CRAMER RD	4.061094	57	1+extra	60.52	60.47	0	60.52	0

Truck Congestion

tmc	road	direction	intersection	miles	road_order	Zone	FFS avg adjusted to be max	AM Avg Speed (7:50-8:45)	AM Congested	PM Avg Speed (4:40-5:35)	PM Congested
105+07105	CA-49	NORTHBOUND	CR-10/COMBIE RD/WOLF RD	4.061094	32	extra+1	55.14	50.12	0	52.23	0
105+07106	CA-49	NORTHBOUND	CAMEO DR	0.504622	33	1	54.52	42.66	0	45.77	0
105+08272	CA-49	NORTHBOUND	LIME KILN RD	4.463917	34	2+3	53.79	49.89	0	48.58	0
105+07107	CA-49	NORTHBOUND	LADY JANE RD	2.842735	35	4+5	48.50	45.11	0	40.69	0
105+07108	CA-49	NORTHBOUND	LODE LINE WAY	1.138712	36	5+6	49.97	44.11	0	44.09	0
105+07109	CA-49	NORTHBOUND	CORNETTE WAY	0.389115	37	6	51.02	46.02	0	46.20	0
105+07110	CA-49	NORTHBOUND	FOUR SEASONS TRL	0.356518	38	6	49.42	46.81	0	46.14	0
105+07111	CA-49	NORTHBOUND	SMITH RD	0.695643	39	6	50.96	48.97	0	49.44	0
105+07112	CA-49	NORTHBOUND	MCKNIGHT WAY/TAYLORVILLE RD	0.88267	40	6	52.86	50.92	0	52.32	0
105P07112	CA-49	NORTHBOUND	MCKNIGHT WAY/TAYLORVILLE RD	0.34199	41	6+extra	54.08	52.06	0	54.08	0
105N07112	CA-49	SOUTHBOUND	MCKNIGHT WAY/TAYLORVILLE RD	0.352622	48	extra+6	55.78	55.78	0	51.11	0
105-07111	CA-49	SOUTHBOUND	SMITH RD	0.918101	49	6	55.30	54.10	0	48.29	0
105-07110	CA-49	SOUTHBOUND	FOUR SEASONS TRL	0.695643	50	6	54.28	54.28	0	51.04	0
105-07109	CA-49	SOUTHBOUND	CORNETTE WAY	0.356518	51	6	55.15	55.15	0	52.44	0
105-07108	CA-49	SOUTHBOUND	LODE LINE WAY	0.389115	52	6	56.12	54.92	0	53.50	0
105-07107	CA-49	SOUTHBOUND	LADY JANE RD	1.138712	53	6+5	55.15	50.57	0	47.04	0
105-08272	CA-49	SOUTHBOUND	LIME KILN RD	2.842735	54	5+4	56.23	51.20	0	50.20	0
105-07106	CA-49	SOUTHBOUND	CAMEO DR	4.463917	55	3+2	55.05	52.84	0	54.29	0
105-07105	CA-49	SOUTHBOUND	CR-10/COMBIE RD/WOLF RD	0.504622	56	1	52.52	45.48	0	47.19	0
105-07104	CA-49	SOUTHBOUND	CRAMER RD	4.061094	57	1+extra	53.03	53.03	0	52.46	0



# Appendix B – Travel Time Data

Passenger Car Travel Time

tmc	road	direction	intersection	Zone	miles	road_order	AM Avg Travel Time (7:40-8:35 AM) (sec)	PM Avg Travel Time (4:50-5:45 PM) (sec)	AM 5th Speed	PM 5th Speed	AM 95th Travel Time	PM 95th Travel Time	AM BTI	PM BTI
105+07105	CA-49	NORTHBOUND	CR-10/COMBIE RD/WOLF RD	extra+1	4.061094	32	256.21	242.62	33.35	39.90	438.38	366.41	0.71	0.51
105+07106	CA-49	NORTHBOUND	CAMEO DR	1	0.504622	33	39.46	37.77	27.45	34.00	66.18	53.43	0.68	0.41
105+08272	CA-49	NORTHBOUND	LIME KILN RD	2+3	4.463917	34	302.48	302.88	40.60	43.45	395.82	369.85	0.31	0.22
105+07107	CA-49	NORTHBOUND	LADY JANE RD	4+5	2.842735	35	208.02	203.79	32.50	39.00	314.89	262.41	0.51	0.29
105+07108	CA-49	NORTHBOUND	LODE LINE WAY	5+6	1.138712	36	86.96	83.79	33.00	36.50	124.22	112.31	0.43	0.34
105+07109	CA-49	NORTHBOUND	CORNETTE WAY	6	0.389115	37	29.01	28.05	37.00	42.00	37.86	33.35	0.30	0.19
105+07110	CA-49	NORTHBOUND	FOUR SEASONS TRL	6	0.356518	38	25.73	25.04	40.00	44.40	32.09	28.91	0.25	0.15
105+07111	CA-49	NORTHBOUND	SMITH RD	6	0.695643	39	47.92	47.00	44.00	47.00	56.92	53.28	0.19	0.13
105+07112	CA-49	NORTHBOUND	MCKNIGHT WAY/TAYLORVILLE RD	6	0.88267	40	56.85	56.13	47.00	51.00	67.61	62.31	0.19	0.11
105P07112	CA-49	NORTHBOUND	MCKNIGHT WAY/TAYLORVILLE RD	6+extra	0.34199	41	21.03	20.89	50.45	53.50	24.40	23.01	0.16	0.10
105N07112	CA-49	SOUTHBOUND	MCKNIGHT WAY/TAYLORVILLE RD	extra+6	0.352622	48	21.89	23.53	53.00	22.30	23.95	56.93	0.09	1.42
105-07111	CA-49	SOUTHBOUND	SMITH RD	6	0.918101	49	58.31	67.15	50.15	20.20	65.91	163.62	0.13	1.44
105-07110	CA-49	SOUTHBOUND	FOUR SEASONS TRL	6	0.695643	50	44.61	48.31	50.00	41.00	50.09	61.08	0.12	0.26
105-07109	CA-49	SOUTHBOUND	CORNETTE WAY	6	0.356518	51	22.84	23.81	49.00	45.00	26.19	28.52	0.15	0.20
105-07108	CA-49	SOUTHBOUND	LODE LINE WAY	6	0.389115	52	25.33	25.97	47.00	44.65	29.80	31.37	0.18	0.21
105-07107	CA-49	SOUTHBOUND	LADY JANE RD	6+5	1.138712	53	79.10	83.26	41.00	36.90	99.98	111.09	0.26	0.33
105-08272	CA-49	SOUTHBOUND	LIME KILN RD	5+4	2.842735	54	198.79	205.23	40.00	38.00	255.85	269.31	0.29	0.31
105-07106	CA-49	SOUTHBOUND	CAMEO DR	3+2	4.463917	55	291.60	286.71	48.00	47.00	334.79	341.92	0.15	0.19
105-07105	CA-49	SOUTHBOUND	CR-10/COMBIE RD/WOLF RD	1	0.504622	56	40.14	37.72	22.70	25.45	80.03	71.38	0.99	0.89
105-07104	CA-49	SOUTHBOUND	CRAMER RD	1+extra	4.061094	57	241.77	241.56	44.25	49.90	330.39	292.98	0.37	0.21

Truck Travel Time

tmc	road	direction	intersection	Zone	miles	road_order	AM Avg Travel Time (7:50-8:45 AM) (sec)	PM Avg Travel Time (4:40-5:35 PM) (sec)	AM 5th Speed	PM 5th Speed	AM 95th Travel Time (sec)	PM 95th Travel Time (sec)	AM BTI	PM BTI
105+07105	CA-49	NORTHBOUND	CR-10/COMBIE RD/WOLF RD	extra+1	4.061094	32	291.68	279.90	29.50	41.00	495.59	356.58	0.70	0.27
105+07106	CA-49	NORTHBOUND	CAMEO DR	1	0.504622	33	42.58	39.69	25.00	24.85	72.67	73.10	0.71	0.84
105+08272	CA-49	NORTHBOUND	LIME KILN RD	2+3	4.463917	34	322.14	330.81	39.00	37.90	412.05	424.01	0.28	0.28
105+07107	CA-49	NORTHBOUND	LADY JANE RD	4+5	2.842735	35	226.87	251.51	32.00	28.75	319.81	355.96	0.41	0.42
105+07108	CA-49	NORTHBOUND	LODE LINE WAY	5+6	1.138712	36	92.94	92.97	29.00	32.40	141.36	126.52	0.52	0.36
105+07109	CA-49	NORTHBOUND	CORNETTE WAY	6	0.389115	37	30.44	30.32	34.00	37.65	41.20	37.21	0.35	0.23
105+07110	CA-49	NORTHBOUND	FOUR SEASONS TRL	6	0.356518	38	27.42	27.82	37.00	37.85	34.69	33.91	0.27	0.22
105+07111	CA-49	NORTHBOUND	SMITH RD	6	0.695643	39	51.14	50.66	40.00	39.90	62.61	62.76	0.22	0.24
105+07112	CA-49	NORTHBOUND	MCKNIGHT WAY/TAYLORVILLE RD	6	0.88267	40	62.40	60.74	41.00	40.00	77.50	79.44	0.24	0.31
105P07112	CA-49	NORTHBOUND	MCKNIGHT WAY/TAYLORVILLE RD	6+extra	0.34199	41	23.65	22.77	42.00	44.20	29.31	27.85	0.24	0.22
105N07112	CA-49	SOUTHBOUND	MCKNIGHT WAY/TAYLORVILLE RD	extra+6	0.352622	48	22.76	24.84	50.60	28.20	25.09	45.02	0.10	0.81
105-07111	CA-49	SOUTHBOUND	SMITH RD	6	0.918101	49	61.09	68.44	48.00	18.90	68.86	174.88	0.13	1.56
105-07110	CA-49	SOUTHBOUND	FOUR SEASONS TRL	6	0.695643	50	46.14	49.06	48.00	37.00	52.17	67.68	0.13	0.38
105-07109	CA-49	SOUTHBOUND	CORNETTE WAY	6	0.356518	51	23.27	24.47	48.00	39.50	26.74	32.49	0.15	0.33
105-07108	CA-49	SOUTHBOUND	LODE LINE WAY	6	0.389115	52	25.51	26.18	47.15	40.20	29.71	34.85	0.16	0.33
105-07107	CA-49	SOUTHBOUND	LADY JANE RD	6+5	1.138712	53	81.06	87.15	35.10	30.10	116.79	136.19	0.44	0.56
105-08272	CA-49	SOUTHBOUND	LIME KILN RD	5+4	2.842735	54	199.87	203.87	43.00	40.10	238.00	255.21	0.19	0.25
105-07106	CA-49	SOUTHBOUND	CAMEO DR	3+2	4.463917	55	304.12	296.02	43.00	44.00	373.72	365.23	0.23	0.23
105-07105	CA-49	SOUTHBOUND	CR-10/COMBIE RD/WOLF RD	1	0.504622	56	39.95	38.50	24.00	25.15	75.69	72.23	0.89	0.88
105-07104	CA-49	SOUTHBOUND	CRAMER RD	1+extra	4.061094	57	275.68	278.70	41.00	38.00	356.58	384.74	0.29	0.38



# Appendix C – Segment Collision Analysis

# Segment Collision Rates

Zone	Segment	Highway Type	Length (Miles)	ADT	Total Travel (MVM)	# of Accidents	Fatal	Injury	Accident Rate	State Average Rate	PCT F	State Average PCT F	PCT F+I	State Average PCT F+I
1	Nevada County Line to Combie Drive	Undivided 4 Lane	2.7	32,916	162.2	89	3	42	0.55	0.9	<b>3.4%</b>	1.1%	<b>50.6%</b>	40.3%
2	Cameo Road to Mother Lode Road	2 Lane	3.9	25,641	182.5	66	2	22	0.36	1.08	<b>3.0%</b>	2.5%	36.4%	49.2%
3	Mother Lode Road to Lane Drop	3 Lane	0.24	24,926	10.9	4	0	3	0.37	0.94	0.0%	2.3%	<b>75.0%</b>	42.2%
	Lane Drop to Lime Kiln Road	Undivided 4 Lane	0.36	24,926	16.4	20	0	10	<b>1.22</b>	0.9	0.0%	1.1%	<b>50.0%</b>	40.3%
4	Lime Kiln Road to Auburn Road	2 Lane	0.9	26,838	44.1	26	0	12	0.59	1.08	0.0%	2.5%	46.2%	49.2%
5	Auburn Road to Lane Drop	3 Lane	2.1	24,200	91.9	61	1	31	0.66	0.94	1.6%	2.3%	<b>52.5%</b>	42.2%
	Lane Drop to La Barr Meadows Road / Allison Ranch Road	Undivided 4 Lane	0.4	24,200	18.5	20	0	10	<b>1.08</b>	0.9	0.0%	1.1%	<b>50.0%</b>	40.3%
6	La Barr Meadows Road / Allison Ranch Road to Lane Drop	Undivided 4 Lane	0.4	26,800	18.6	12	1	5	0.65	0.90	<b>8.3%</b>	1.1%	<b>50.0%</b>	48.2%
	Lane Drop to McKnight Way Interchange	2 Lane	2.7	26,800	133.0	69	0	29	0.52	1.08	0.0%	2.5%	42.0%	49.2%



# Appendix D – SR 49 CSMP Existing Conditions Report



**State Route 49  
Corridor System Management  
Plan**

Existing Conditions Report

Prepared for:

**Nevada County Transportation  
Commission**

Prepared by:



**omni · means**  
A **GHD** Company



**State Route 49  
Corridor System Management Plan  
Existing Conditions Report**

**Prepared for:  
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## Introduction

Omni-Means, a GHD Company, has been retained by the Nevada County Transportation Commission (NCTC) to perform an update to both the 2009 State Route (SR) 49 Corridor System Management Plan (CSMP) and the 2012 State of the Corridor Report. This Existing Conditions report (supplementing the CSMP) presents the study's purpose and need, and summarizes the existing multimodal transportation conditions along the SR 49 corridor and the status of the improvements that were proposed in the original CSMP and the 2012 State of the Corridor Report.

## Route Setting

Nevada County is located within the Sierra Nevada region of Northern California. The county which spans an area of approximately 974 square miles, is noted for its substantial areas of forest and riparian ecosystems that attract recreational travelers to the area. Cities and towns supported by Nevada County include the City of Grass Valley, Nevada City and the Town of Truckee. In addition to State Route 49, major highways that support Nevada County include Interstate 80 (I-80) and State Routes 20, 89, 174, and 267.

Figure 1 presents a map of the study area.

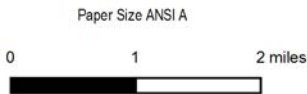
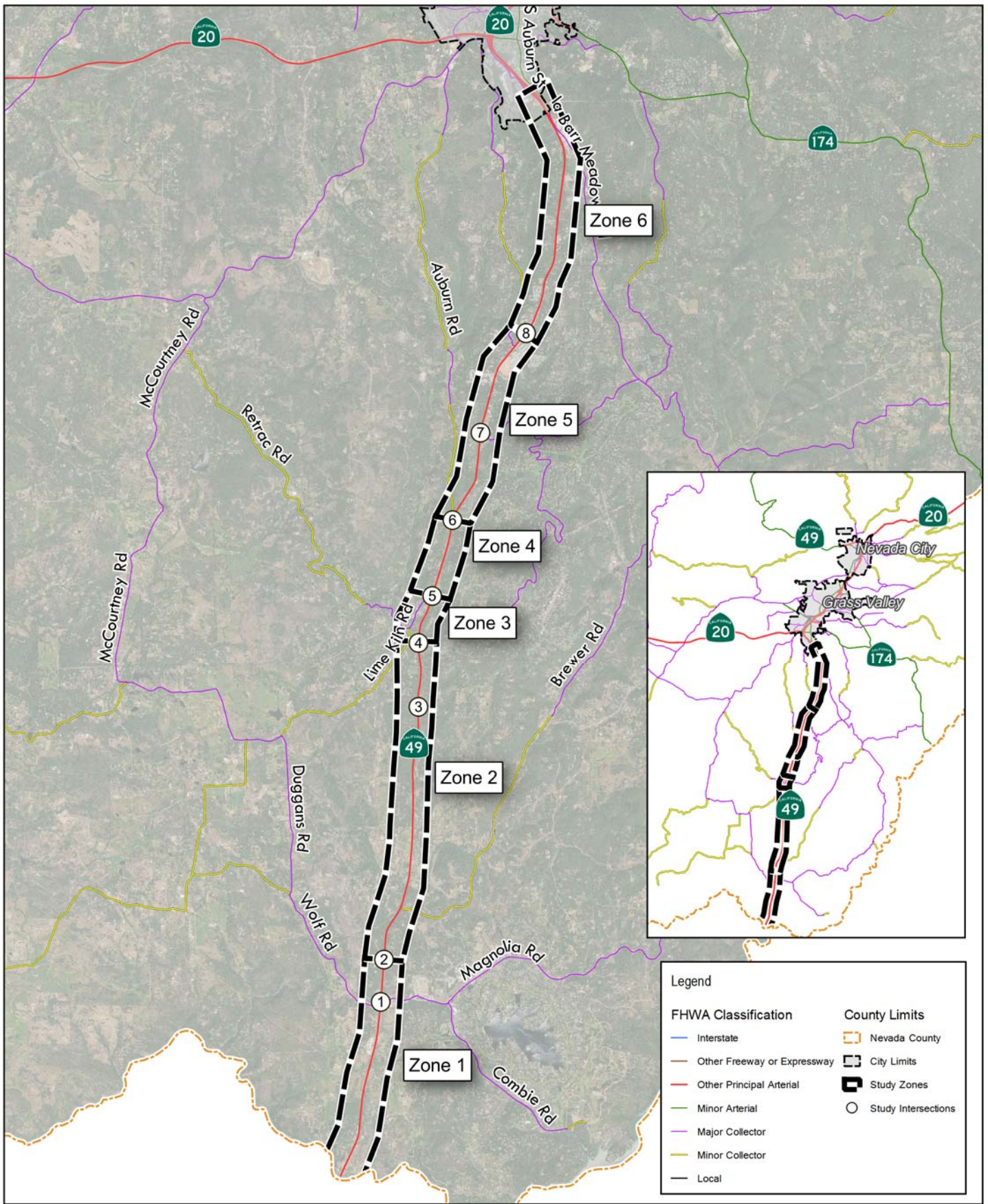
In 2009, a CSMP was prepared for a 23-mile long segment of SR 49, which spanned between the Interstate 80/SR 49 Interchange in Placer County and the SR 49/SR 20 Junction in Nevada County. For the purposes of this report, only the portion of SR 49 that begins at the Southern Nevada County line and ends at the SR 49/McKnight Way Junction (in addition to select parallel and connector roadways and bike routes) will be analyzed. The length of this segment of SR 49 is 13.6 miles. The parallel and connector roadways, transit, and bicycle route components were selected for inclusion in the corridor in consultation with the respective local agencies. It is anticipated that as the CSMP concept matures, additional facilities will be added to the managed network.

## Background

Californians rely heavily on the SR 49 corridor for commute, goods movement and recreational travel. Therefore, regardless of the agencies operating and funding the services within the SR 49 facility, it becomes necessary to maintain safe and efficient operations for all modes of travel present on this corridor. The development and update of a CSMP recognizes the importance of multi-jurisdictional collaboration to best support and manage multi-modal transportation services and facilities for the traveling public.

A Corridor System Management Plan (CSMP) is a strategic planning document that supports the partnership-based, integrated management of various travel modes (i.e. cars, trucks, bicycles, pedestrian) and infrastructure (roads, highways, information systems, bike routes) in a corridor so that mobility along the corridor is provided in the most efficient and effective manner possible. CSMPs are created for corridors associated with the Corridor Mobility Improvement Account (CMIA) and Proposition 1B (also known as the Highway Safety, Traffic Reduction, Air Quality, and Port Security Bond Act of 2006).

The success of a CSMP is based on the premise of managing a key selection of transportation components within a designated corridor as a system, as opposed to independent units. Therefore, the CSMP focuses on strengthening institutional partnerships, gathering and analyzing



Nevada County  
SR 49 CSMP

SR 49 Study  
Corridor

Project No. 25-4862-00  
Revision No. -  
Date. 06/29/2018

**FIGURE 1**

data, monitoring system performance, implementing operational strategies, and identifying strategic capital investments. Being a dynamic strategic planning document, a CSMP is anticipated to evolve with changing development patterns, travel demands, and technological innovations. An annual State of the Corridor Report will be produced to document system performance and track CSMP implementation progress. Per the findings of this annual report, the CSMP document will be updated every two years or more frequently as needed.

The CSMP is consistent with the NCTC and Placer County Transportation Planning Agency (PCTPA) Regional Transportation Plans (RTPs), and the Sacramento Area Council of Governments (SACOG) Metropolitan Transportation Plan (MTP), and general plans, regional blueprint planning, and multimodal planning. The CSMP, by reference, incorporates all projects listed in the current MTP and RTP. As a CSMP is corridor focused, it highlights key locations where modes interact and land use decisions may have the greatest potential of reducing the need for travel and influencing modal choice.

## CSMP Proposed Improvements

The 2009 SR 49 CSMP and the 2012 State of the Corridor Report presented a collection of programmed and planned capital projects that were proposed to incrementally improve the corridor. Table 1 presents the status of each project by Year 2018.

**TABLE 1  
SUMMARY OF IMPROVEMENT STATUS – SR 49 CSMP**

Location	Project Description	Completion Status
SR 49 from Timberline Dr. to Lode Line Road	Widen SR 49 at La Barr Meadows	Complete
Construct turn lanes, median refuge areas, and frontage roads at various locations including, but not limited to, the following locations:		
Cerrito Road	Construct NB right turn lane with sight-distance wedge, and re-stripe median as a 2 lane left turn lane to the south of the intersection	Incomplete
Ladybird Drive	Construct southbound (SB) right turn lane and wide NB shoulder	Incomplete
Carriage Road	Construct NB right turn lane and sight-distance wedge	Complete
Brewer Road	Construct NB right turn lane and median refuge area	Complete
Round Valley Road to Ruby Road	Construct a two-way left-turn lane	Incomplete
Travertine Court to Auburn Road	Construct frontage roads and intersection improvements	Incomplete
Alta Sierra Drive to Pingree Road		
Wellswood Way to Christian Life Way		
Smith Road	Construct right turn for SB traffic only	Complete
South of Cornette Way to Christian Life Way	Widen to 5 lanes; connect Wellswood to proposed intersection on the northern side near the church	Incomplete
Christian Life Way to McKnight Way Over Crossing	Widen to 5 lanes	Incomplete
South side of Alta Sierra to South of Kenwood Drive	Second SB through lane with median and shoulder widening; leave Pingree as a 3-way intersection, connect Ponderosa to Pingree; connect Lady Jane Road to Little Valley Rd intersection	Incomplete
North of Lime Kiln Road to South of Alta Sierra Drive	Widen to 5 lanes; connect Auburn further south as 3-way intersection, leave Pekolee as 3-way-intersection; combine Round Valley and Quail Creek intersection	Incomplete
South of Lime Kiln Road to north of Cherry Creek Road	Lengthen 2 SB lanes; eliminate southerly connection and improve northerly connection with Cherry Creek Road	Incomplete
Cameo Drive to Holcomb/Cherry Creek Road	Complete widening to 5 lanes, eliminate Cameo Drive intersection	Incomplete

As presented in Table 1, four of the projects have been completed since the 2009 CSMP came out, the SR 49 widening at La Barr Meadows, the improvements at Carriage Road, and the improvements at Brewer Road. The latest completion year for the projects listed above range between year 2027 and year 2030.



The SR 49 TCR presents additional programmed and planned capital improvements projects that benefit the SR 49 corridor. Table 2 presents the proposed year of completion for each of the planned projects.

**TABLE 2  
SUMMARY OF PLANNED PROJECTS - SR 49 TCR**

Location	Project Description	Completion Year
Nevada County Line to Alta Sierra Drive	Construct Class III Bicycle facilities	TBD
Nevada County Line to Lime Kiln Road	Culvert rehabilitation	2022
Various Locations	Install Traveler Information System/Vehicle Detection System	2022
Brewer Road and Alta Sierra Drive	Install safety lighting and 4 radar feedback signs	2018
North of La Barr Meadows Road to McKnight Way	Project Development for the future construction of frontage road and widening of SR 49	2015-2025
0.2 miles north of Cherry Creek Road to 0.2 miles north of Mother Lode Drive/Oak Drive	SR 49 superelevation	2018
Lime Kiln Road to SR 20/49 separation	Culvert rehabilitation	2020
Alta Sierra Drive to McKnight Interchange	Construct Class II bicycle facilities	TBD
0.1 miles north of La Barr Meadows Road to McKnight Way	Widen shoulders, construct TWLTL, 4 SB right turn lanes, and NB truck climbing lane, install TMS elements, rehab pavement, and rehab culverts	2026
From La Barr Meadows Roads to .4 miles south of Grass Valley	Widen SR 49 to four lane conventional access control highway	2024
0.2 miles south of McKnight Way	McKnight sinkhole: Abandon existing culvert and install new	2017
McKnight Way Interchange SR 49 SB and NB Ramps	Intersection Improvements	2025-2035

Although Table 2 lists the installation of safety lighting and radar feedback signs at Brewer Road and Alta Sierra Drive to be completed by Year 2018, field observations concluded that these improvements have yet to be implemented.

## Need and Purpose

The existing SR 49 CSMP set forth a planning approach that coalesces facility operations and transportation service provisions together with capital projects into one coordinated system management strategy. This CSMP is needed to update the 2009 CSMP for the SR 49 corridor to address the following:

- Traffic congestion that often exceeds the capacity of existing facilities
- Lack of parallel roadways that are in close proximity to the highway
- Transit facilities with available capacity for additional ridership, and
- Bicycle facilities that do not provide a fully linked network of bike routes.

The primary purpose of the updated CSMP is to create a partnership planning process and resulting guidance document that focuses on system management strategies and coordinated capital investments. The goal is to insure that all the pieces of the corridor function as an efficient transportation system. Performance evaluation measures to track the effectiveness of the strategies and projects. The secondary purpose of the CSMP is to improve mobility along the SR 49 corridor by focusing on the integrated management of a subset of the entire transportation network within the corridor. This includes select intersecting and connector roadways, transit, and bicycle facilities.

The Purpose of this Existing Conditions Report is to summarize the existing multimodal transportation conditions along the SR 49 corridor and the status of the improvements that were proposed in the original CSMP and the 2012 State of the Corridor Report.

## **Regulatory and Planning Framework**

This section summarizes the current policies and planning documents that guide and/or regulate transportation planning decisions within Nevada County. The following documents, policies, and goals will be incorporated and referenced for this study, to provide support and justification for proposed improvement concepts.

### ***Nevada County General Plan Circulation Element, 2016***

The Nevada County General Plan was adopted in 1996 and last amended in 2016. The General Plan aims to meet local and regional planning requirements, and guides City development. Therefore, the General Plan provides the basis for decision-making on land use, housing, city services, public works, conservation, safety, and economic development. The Circulation Element provides objectives and policies related to:

- Roadway standards
- Level of Service (LOS)
- Circulation for alternative transportation systems
- Coordination with the Housing and Land Use Elements.

### ***Nevada County Regional Transportation Plan, 2016***

The Nevada County Regional Transportation Plan (RTP) is a Master Planning Document developed by the Nevada County Transportation Commission (NCTC) to document the region's transportation needs. This document provides the planning framework necessary for the systematic development of a comprehensive multimodal transportation system within Nevada County. The Nevada County RTP was last amended in 2016.

### ***Nevada County Bicycle Plan, 2016***

The Bicycle Plan is a Master Planning Document that provides the framework and guidance for identifying existing bike infrastructure within the County. The Plan, which manifests a vision of sustaining the existing high levels of utilitarian and recreational bicycling within the county, emphasizes the need for multi-use shoulders for improving the conditions for bicycling on state highways within the county. The Nevada County Bicycle Plan was last amended in 2016.

### ***Caltrans District 3 State Route 49 Transportation Concept Report, October 2017***

The SR 49 Transportation Concept Report (TCR) is a long range planning document that provides guidance and logical framework for the development of the state highway system as required by the CA Gov. Code §65086, and as necessitated by the public, stakeholders and users of the state highway system. Provided by Caltrans, the TCR evaluates current and projected conditions along the route and communicates the vision for developing each route within the jurisdiction of each Caltrans District during a 20-year planning horizon.

### ***State Route 49 Corridor System Management Plan, 2009***

The SR 49 CSMP (dated 2009) is a Strategic Planning Document that provides the framework for developing a comprehensive plan to operate and manage the SR 49 corridor across modal and jurisdictional boundaries. The 2009 CSMP documents the existing facilities along the SR 49 corridor and the recommended improvements to improve the quality of multimodal traffic within

the specified study limits of the I-80/SR 49 Interchange in Placer County and the intersection of SR 49/SR 20 in Grass Valley.

### **State of the Corridor Report, 2012**

The SR 49 State of the Corridor Report (SOTC) released in 2012, is a document which monitors and reports the annual corridor performance and status of ongoing implementation of improvement strategies identified within the CSMP. The 2012 SOTC documents the status of the corridor between July 1, 2011 and December 31, 2011. The State of the Corridor Report reinforces the strategies for improving bike and pedestrian access in the CSMP transportation network.

### **Interregional Transportation Strategic Plan, 2015**

The Interregional Transportation Strategic Plan (ITSP) is a California Department of Transportation (Caltrans) long range planning document that provides guidance for the identification and prioritization of interregional transportation projects identified on the State's Interregional Transportation System. The policies of the plan focus on improving the interregional movement of people and freight in a safe and sustainable manner that supports the economy. The SR 49 Corridor is included within the San Jose/San Francisco Bay Area-Sacramento-Northern Nevada strategic interregional corridor.

### **California Freight Mobility Plan, 2014**

The California Freight Mobility Plan (CFMP) vision provides a common platform for informing and guiding the development of freight transportation policy, programs, and project prioritization across all sectors of California's freight system, public and private. The CFMP categorizes the designated highway and freight rail networks into 3 tiers for each facility type, with those portions of the network having the highest truck and rail volumes being Tier 1 and those with lower volumes being Tier 2 or Tier 3. Priority consideration is also given for some freight network components having lower freight volumes but providing key interstate or international connections. The SR 49 corridor is designated a Tier 3 facility on the Highway Freight Network.

## **Classification of Facilities**

The following section presents the classification of roadway, bike and pedestrian facilities within Nevada County.

### **Federal Classification of Roadway and Highway Facilities**

The Federal Highway Administration (FHWA) provides the following classification of roadways within the continental US:

- 1) **Interstates** - Designed primarily for long-distance travel, these roadway facilities provide a superior network of limited access, divided highways that offers high levels of mobility while linking major urban areas within the continental US.
- 2) **Other Freeways & Expressways** – Designed to maximize mobility for regional traffic, these roadway facilities contain directional travel lanes typically separated by a physical barrier. Additionally, access and egress points are limited to entry/exit by ramp, such that a limited number of at-grade intersections are provided.

- 3) **Other Principal Arterials** – Designed to improve mobility through rural areas and major metropolitan centers, these roadway facilities provide direct access to abutting land uses and provide numerous at-grade intersections with other roadways. Within urban contexts, multiple principal arterials typically radiate out from the urban core to serve surrounding regions. Within rural contexts, a single arterial would serve an expanse of rural area of equal size and provide an integrated network of continuous routes without stub connections.
- 4) **Minor Arterials** – Designed to accommodate trips of moderate length, minor arterials provide connectivity to geographic areas that are within proximity to principal arterials. Within rural settings, minor arterials are typically spaced in intervals consistent with population density and are designed to operate at high overall travel speeds. In rural settings, minor arterials link cities and larger towns to form an integrated network providing interstate and inter-county service.
- 5) **Major & Minor Collectors** – Designed to route traffic from local roads to the arterial network, collector facilities are further sub-stratified as major and minor collector. Within rural contexts, collectors serve primarily intra-county travel at moderate speeds.
- 6) **Local Roads** – Designed to serve origin-destination trips of short lengths, Local Roads provide access to abutting lands. Typically, these roadways are classified by default, such that all remaining roads following the identification of Arterial and Collector facilities are classified as Local Roads.

## Nevada County Classification of Roadway Facilities

The *2010 Nevada County General Plan Circulation Element* included the following roadway classifications for Nevada County:

- a. **Interstate Highways and Freeways** - Limited access highways carrying regional and interstate traffic (e.g., Interstate 80 and the Golden Center Freeway);
- b. **Principal Arterials** - Roadways carrying some regional traffic and connecting the major population centers within the County (e.g., State Route 49 and State Route 20);
- c. **Minor Arterials** - Roadways providing primary access from freeways and principal arterials to major origins and destinations (e.g., Brunswick Road and Donner Pass Road);
- d. **Collectors (Major and Minor)** - Streets connecting arterials to local roads (e.g., East Bennett Street and Alta Sierra Drive);
- e. **Locals** - Streets providing primary access to individual properties (e.g., Jones Bar Road and Hobart Mills Road); and
- f. **Regional Emergency Access** - Roadways providing emergency access between arterial or collector roads but are not needed by the County for general circulation purposes.

## Classification of Bicycle and Pedestrian Facilities

The Nevada County Bicycle Plan identifies the bicycle and pedestrian facilities as follows:

**Class I – Bicycle Path.** Class I facilities are multi-use facilities that provide a completely separated right-of-way for the exclusive use of bicycles and pedestrians with cross flows of motorized traffic minimized.

**Class II – Bicycle Lane.** Class II facilities provide a striped and signed lane for one-way bicycle travel within the paved area of a roadway that shares the roadway with motor vehicles. The minimum width for bike lanes ranges between four and six feet depending upon the edge of roadway conditions (curbs). Class II bike lanes are demarcated by a six-inch white stripe, signage and pavement legends.

**Class III – Bicycle Route.** Class III facilities provide signs for shared use with motor vehicles within the same travel lane on a street or highway. Bike routes may be enhanced with warning or guide signs and shared lane marking pavement stencils. While Class III routes do not provide measure of separation, they have an important function in providing continuity to the bikeway network.

**Class IV – Separated Bikeway.** An exclusive bikeway for bicyclists that is separated from the roadway. Separations may include grade separation, flexible posts, physical barriers, or on-street parking.

**Sidewalk** – A sidewalk is identified to be a pedestrian-dedicated paved walkway that is located adjacent to a roadway. Sidewalks may be constructed using either Portland cement concrete (PCC) or asphalt concrete pavement materials.

## State Route 49 Corridor Characteristics

State Route 49 is a major north-south state highway within rural California, that provides connectivity among many historic mining communities founded during the Gold Rush Era. The following section presents key roadway characteristics and multimodal facilities that exist on SR 49.

## Highway Characteristics

SR 49 is a Main Street Highway and National Highway System (NHS) designated route that runs on a north-south alignment within the study area. SR 49 is known regionally as the Golden Chain Highway, as it provided the primary north-south connection to mining towns of the Gold Country foothills along the western slope of the Sierra Nevada. The Federal Functional Classification classifies this segment of SR 49 as an Other Principal Arterial. The SR 49 TCR currently does not identify SR 49 as a scenic highway within the study limits. The SR 49 corridor in Nevada County is part of the Interregional Road Systems (IRRS) and is included within 1 of the 11 Strategic Interregional Corridors (San Jose/San Francisco Bay Area - Sacramento - Northern Nevada Corridor) identified in the Caltrans 2015 Interregional Transportation Strategic Plan (ITSP). These strategic corridors have been identified as the most significant interregional travel corridors in California and are typically characterized by high volumes of freight movement and significant recreational tourism. The SR 49 corridor is also identified in the Caltrans California Freight Mobility Plan as a Tier 3 facility on the Highway Freight Network, and is designated as a terminal access route for Surface Transportation Assistance Act (STAA) trucks.

The SR 49 corridor within Nevada County is within Caltrans District 3 jurisdiction. Within Nevada County, SR 49 varies between a two- and four-lane conventional highway. Additionally, select segments of the SR 49 also contains a center two way left turn lane (TWLTL), thereby making these portions of the SR 49 a divided conventional highway.

The Nevada County Regional Transportation Plan, dated January 2018, included the following description of SR 49:

*State Route 49 (SR 49) runs north/south and is a principal arterial for Nevada County, connecting the cities of Grass Valley and Nevada City with I-80 in Auburn (Placer County) to the south. SR 20 and SR 49 also serve as an emergency detour route for I-80. SR 49 is the lifeline for much of Nevada County's freight and lumber traffic and also provides access to recreational and tourist attractions. To the west of Nevada City, this route continues in a northerly direction to the Nevada/Yuba County line.*

At its southern terminus (i.e. originating at the Nevada County line), SR 49 highway is a 4-lane, divided, conventional roadway operating at a posted speed limit of 65 mph. Following the intersection with Cameo Drive, SR 49 becomes a two-lane, undivided highway which operates at a posted speed of 55 mph.

## Highway Study Segments

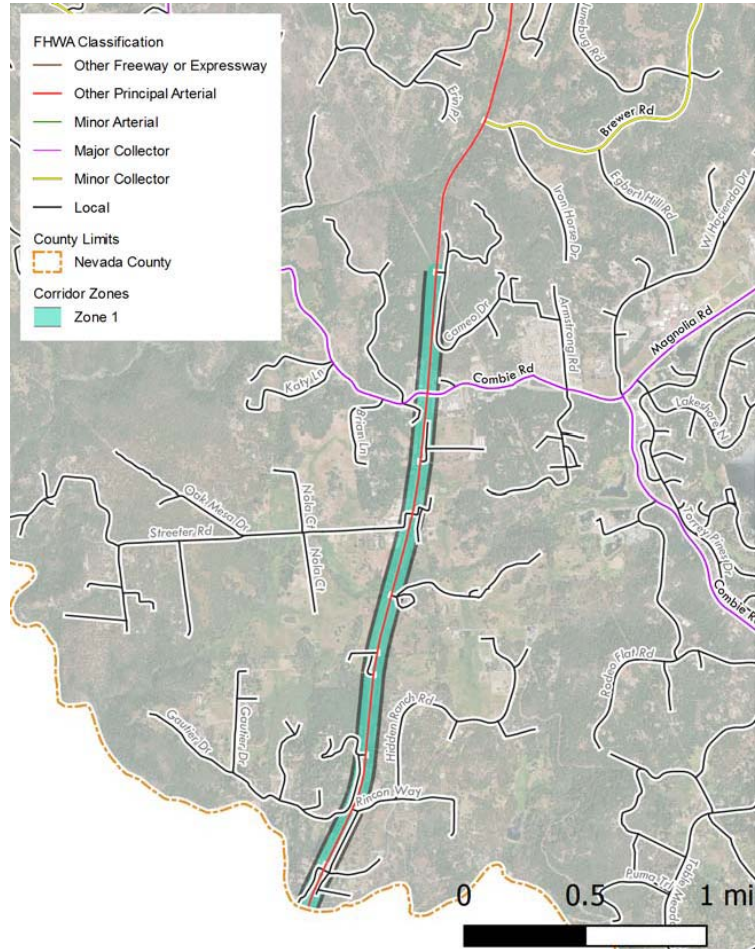
For the purposes of this report, only the portion of SR 49 that begins at the Southern Nevada County line and ends at the SR 49/McKnight Way Junction (in addition to select parallel and connector roadways and bike routes) was analyzed. As the segment of the SR 49 corridor analyzed within this report is approximately 13.6 miles in length, the corridor was divided into six (6) segments. These six (6) segments of SR 49 subjected to analysis are as follows:

- Zone 1 - SR 49 from Nevada County line to Cameo Drive
- Zone 2 - SR 49 from Cameo Drive to Oak Drive/Mother Lode Road
- Zone 3 - SR 49 from Oak Drive/Mother Lode Road to Lime Kiln Road
- Zone 4 - SR 49 from Lime Kiln Road to Auburn Road
- Zone 5 - SR 49 from Auburn Road to La Barr Meadows Road/Allison Ranch Road
- Zone 6 - SR 49 from La Barr Meadows Road/Allison Ranch Road to McKnight Interchange

Each zone was evaluated for existing multimodal infrastructure and operational deficiencies. There are no existing bicycle facilities along SR 49. Although some segments within the SR 49 corridor have been improved to include 10 foot paved shoulders, these areas have not been officially designated as Class III bicycle facilities due to existing gaps where the shoulders vary in width to portions with no shoulder. However, the Nevada County Master Bike Plan, proposes the construction of a Class III bike route with multi-use shoulders from the Placer County line to Alta Sierra Drive. Per this recommended improvement, the roadway segments will be analyzed for available room for a multi-use shoulder. A Class II bicycle lane or a Class III bicycle route is proposed from Alta Sierra Drive to the McKnight Way. Based on travel time runs, the average time to traverse the entire corridor was determined to be 15 minutes and 39 seconds.

## Zone 1 – Nevada County line to Cameo Drive

Zone 1 accounts for approximately 2.69 miles of the study corridor. While the segment of SR 49 in Zone 1 has four lanes, the center left-turn lane extends only from the County Line to the intersection of SR 49 & Wolf Road/Combie Road. Within Zone 1, there are nine (9) access points along the roadway, with the only signalized access being provided at Combie/Wolf Road. The remaining eight (8) access points are side street stop controlled. Most of stop controlled access points have turn pockets on SR 49 to improve both ingress/egress. Based on travel time runs, the average time to traverse the entire length of Zone 1 was determined to be 3 minutes and 24 seconds.



### Safety Features

Existing conditions indicate the presence of guard rail on the westerly side of SR 49, approximately 1100 feet north of the intersection of Wolf Road/Combie Road. Additionally, a flashing yellow warning light is provided at this location to inform drivers on southbound SR 49 that they are approaching a traffic signal within approximately 1100 feet (of Wolf Road/Combie Road). Additionally, guardrail is provided on the westerly side of SR 49 at the Bear River Bridge.

Within Zone 1, rumble strips are provided along the easterly and westerly sides of SR 49.

### Shoulder Geometry

Within the first 1800 feet of the Nevada County Line (along northbound SR 49), the highway contains a shoulder of width 10 feet, beyond which the shoulder width is observed to decrease to a width of approximately 4 feet. The shoulder remains at four feet until the intersection of SR 49 and Rincon Way, where it widens to 7 feet. For the majority of Zone 1, the shoulder width is observed to range between 5-7 feet, with 10 foot-wide shoulders provided within the vicinity of intersections. In select locations of Zone 1, the shoulder is observed to become narrow with a width of 3 feet. Oftentimes, these paved shoulders are observed to extend into soft, unpaved gravel shoulders of width 10 feet. Additionally an asphalt dike is provided on SR 49 within the vicinity of the northbound right turn pocket at the intersection of SR 49 & Wolf Road/Combie Road.

In the southbound direction, the paved shoulder width is observed to range within 5-8 feet. Additionally, this paved shoulder is observed to extend into a soft, unpaved gravel shoulder of width 10 ft. There are a few narrow spots, but all of those can expand into available gravel area.

## Bicycle Facilities

The wide shoulders described above for Zone 1 may potentially be utilized by bicyclists traveling along both northbound and southbound SR 49 for utilitarian and recreational purposes. Additionally the provision of a northbound right turn pocket with a length of 730 feet at the intersection of SR 49 & Wolf Road/Combie Road presents the potential for conflicts between bicyclists and right turning motorists.

## Pedestrian Facilities

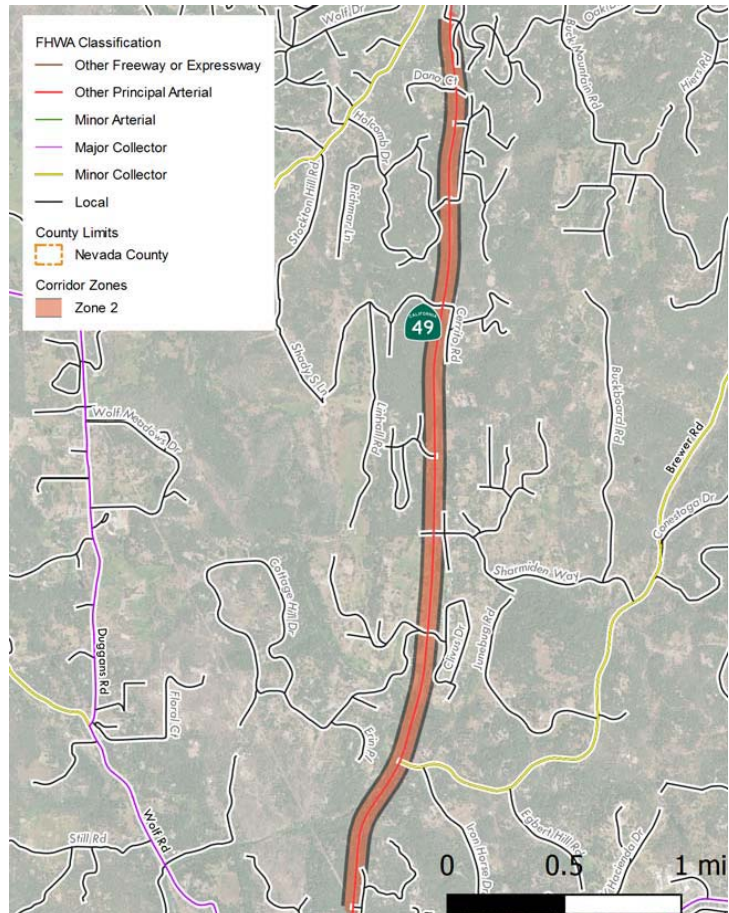
Currently, the intersection of SR 49 & Wolf Road/Combie Road is the only intersection within Zone 1 that provides pedestrian facilities. At this intersection, crosswalks are present on the north, west, and east legs (only). Currently, sidewalks are absent along all legs of this intersection, and curb ramps at the crosswalks do not meet California ADA requirements. As a future improvement, the Nevada County Pedestrian Improvement Plan proposes to provide a pedestrian path on Combie Road between SR 49 and Magnolia Road on the northerly side.



## Zone 2 – Cameo Drive to Oak Drive/Mother Lode Road

Zone 2 accounts for 3.9 miles of the study corridor. Within Zone 2, SR 49 is a two-lane, undivided conventional highway, and contains ten access points. The primary roads (which create six access points) intersecting with SR 49 Road are Mother Lode Road, Cherry Creek Road, Cerrito Road, Carriage Road, Cottage Hill Drive, and Brewer Road. Each of these intersections provide dedicated left-turn lanes, thereby enabling left-turning traffic to be out of the through lane. Based on travel time runs, the average time to traverse the entire length of Zone 2 was determined to be 3 minutes and 56 seconds.

Select intersections are observed to provide right-turn pockets, and wider, paved shoulders exists at the majority of these right-turn. Four of these





intersections do not contain dedicated turn lanes to provide ingress/egress from SR 49. Each of these uncontrolled intersections creates a conflict point. A short passing lane (of length 335 feet) is provided along northbound SR 49, approximately 525 feet north of Cottage Hill Drive.

### *Safety Features*

Existing conditions indicate the presence of guard rail on the westerly side of SR 49, approximately 1250 feet from the intersection of SR 49 and Cameo Drive. The guard rail extends for a length of approximately 1000 feet, along a rolling, curving downhill terrain. Additional guardrail is provided both before and after the South Wolf Creek Bridge.

Within Zone 2, rumble strips are provided along the easterly and westerly sides of SR 49.

### *Shoulder Geometry*

On the easterly side, the shoulder width is observed to range between 5-8 feet for the majority of Zone 2. The first half of Zone 2 has soft, unpaved shoulders beyond the 3-ft paved shoulder.

On the westerly side, within the vicinity of Oak Drive, the shoulder is observed to be 10 feet in width. However, this paved shoulder is observed to continuously decrease in width along the southbound direction, until a width of 8 feet is reached. Immediately before the intersection of SR 49 & Cherry Creek Road, the paved shoulder is observed to narrow to a width of 3 ft. A soft unpaved shoulder of width of 10 feet is provided adjacent to this narrow paved shoulder. Beyond the Cherry Creek Road intersection, the shoulder width is observed to fluctuate, with adequate soft, unpaved shoulder provided beyond the edge of pavement.

Additionally, within Zone 2, asphalt dikes are provided at the edge of pavement along select locations on both northbound and southbound SR 49.

### *Bicycle Facilities*

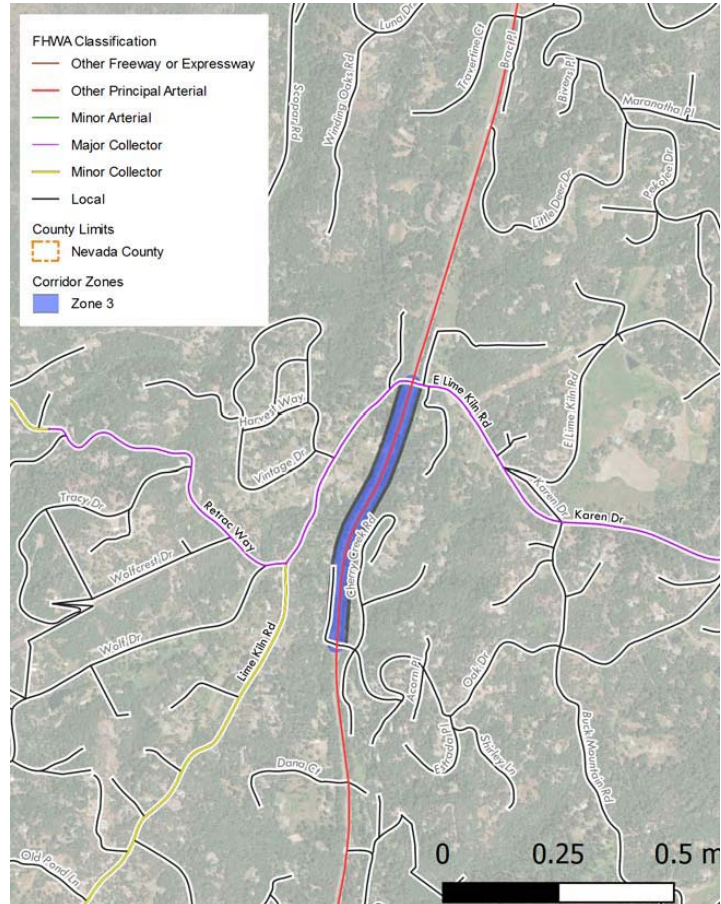
The majority of SR 49 within Zone 2 contains wide shoulders that may potentially be utilized by non-motorized traffic. However, there are certain locations containing narrow shoulders and improper transition striping that can potentially lead to conflict between cyclists. This feature is most noticeable at Brewer Road in the northbound direction where a separation between the right-turn lane and through lane for the bicycles is not provided.

### *Pedestrian Facilities*

Currently, pedestrian facilities are not provided along either northbound or southbound SR 49 within Zone 2.

## Zone 3 – Oak Drive/Mother Lode Road to Lime Kiln Road

Zone 3 accounts for approximately 0.6 miles of the study corridor, thereby becoming the shortest segment of the study corridor. Within this zone, the SR 49 segment is a two-lane segment in the northbound direction, and a two-lane transitioning to a single lane in the southbound direction. Only two access points currently exist within Zone 3, both of which are situated at the zone termini. The access point on the south terminus (at Mother Lode Road) is a two-way stop controlled intersection, while the access point at the northern terminus (at Lime Kiln Road) is an intersection controlled by a traffic signal. Based on travel time runs, the average time to traverse the entire length of Zone 3 was determined to be 42 seconds.



### *Shoulder Geometry*

On the easterly side, the shoulder is about five feet wide the entire stretch, with very little room to widen the shoulder. Due to the presence of a steep downward slope in the northbound direction, an asphalt dike is provided along the entire length of Zone 3 to mark the edge of pavement in this direction.

On the westerly side, the paved shoulder is approximately 7 feet in width. A soft, unpaved shoulder of width 8 feet is provided as an extension to the paved shoulder.

### *Safety Features*

Existing conditions indicate the absence of guardrail along both the westerly and easterly sides of the road for the entirety of Zone 3.

Rumble strips are provided within Zone 3 as follows:

- On the easterly side, rumble strips are provided 100 feet north of Oak Drive and terminate 500 feet south of Lime Kiln Road.
- On the westerly side, rumble strips are provided 100 feet south of Lime Kiln Road and terminate approximately 100 feet north of Oak Drive.

### *Bicycle Facilities*

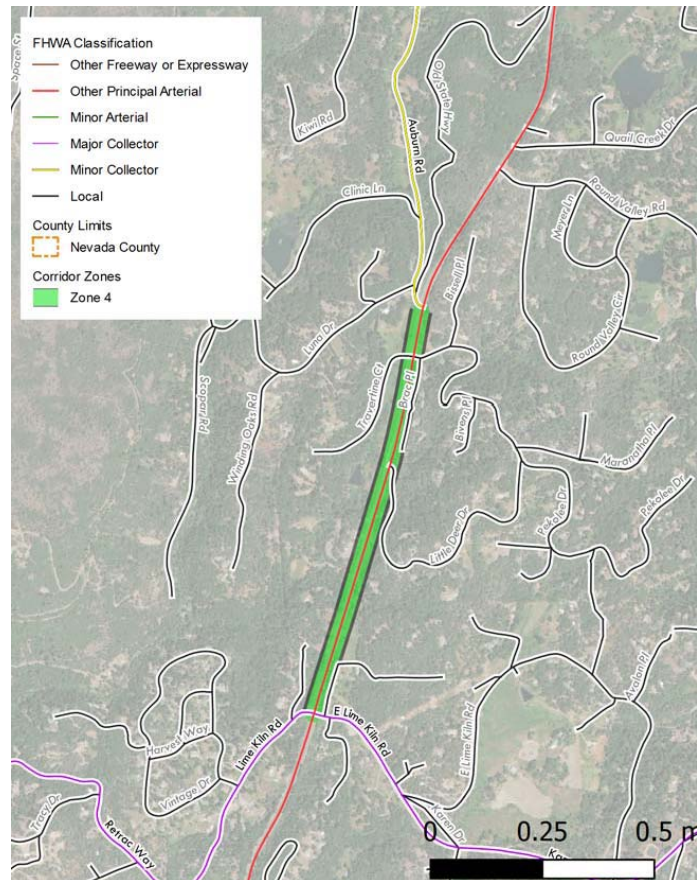
SR 49 in Zone 3 contains wide shoulders that may potentially be utilized by non-motorized traffic. No dashed transition striping for bicyclists are currently provided between the right turn pockets and thru lane (in either the northbound or southbound directions). A wider paved shoulder exists at the majority of the right-turns to aid right-turning vehicles.

## Pedestrian Facilities

Currently, pedestrian facilities are not provided along either northbound or southbound SR 49 within Zone 3.

### Zone 4 – Lime Kiln Road to Auburn Road

Zone 4 accounts for approximately 1 mile of the study corridor. Within Zone 4, the SR 49 segment is a two-lane, undivided highway with five access points, excluding Lime Kiln Road. The access point at the southern terminus at Lime Kiln Road is controlled by a traffic signal, while the access point at the northern terminus at Auburn Road is a one-way stop controlled intersection. Three of the access points within Zone 3 do not have dedicated turn lanes on SR 49. Each of these uncontrolled intersections creates a conflict point. With the growth in traffic on SR 49, this may potentially result in an increasing number of accidents involving vehicles entering and exiting SR 49 without the benefit of dedicated turn lanes. The access points are located within 700 feet of each other. Based on travel time runs, the average time to traverse the entire length of Zone 4 was determined to be 1 minute and 5 seconds.



### Shoulder Geometry

In the northbound direction, a paved shoulder with an approximate width of 5 feet is provided. Additionally, minimal unpaved shoulder is provided. About 2,300 feet north of Lime Kiln Road, the paved shoulder is observed to expand to width of 7 feet, with additional soft, unpaved shoulder provided.

In the southbound direction, a paved shoulder of width eight feet, with six feet of soft unpaved shoulder, is provided. Within proximity to the southern end of this segment, minimal soft, unpaved shoulder is provided.



### *Safety Features*

Existing conditions indicate the presence of guardrail on both the easterly and westerly sides of the roadway, approximately 100 feet north of Lime Kiln Road. The guardrail extends for approximately 100 feet on the easterly side, and 1450 feet on the westerly side of SR 49.

Rumble strips are provided within Zone 3 as follows:

- Rumble strips are provided on the westerly side approximately 150 feet south of Auburn Street, and terminates approximately 550 feet north of Lime Kiln Road.
- Rumble strips are provided on the easterly side, approximately 100 feet north of Lime Kiln Road.

Additionally, a flashing yellow warning sign is provided on the westerly side of SR 49, approximately 1100 feet north of Lime Kiln Road to alert drivers of the upcoming traffic signal.

### *Bicycle Facilities*

For the most part, SR 49 in Zone 4 has wide shoulders that may potentially be used by non-motorized traffic. Field observations conducted between 4:00 pm – 6:00 pm on Wednesday, June 14, 2018 indicated an absence of bicyclists on Zone 4 during the PM peak commuting hour.

There exists select locations with narrow shoulders and improper transitions for bikes where a separation between the right-turn lane and through lane for the bicycles is not provided.

### *Pedestrian Facilities*

Currently, pedestrian facilities are not provided along either northbound or southbound SR 49 within Zone 4. Field observations conducted between 4:00 pm – 6:00 pm on Wednesday, June 14, 2018 indicated an absence of pedestrians on Zone 4 during the PM peak commuting hour.

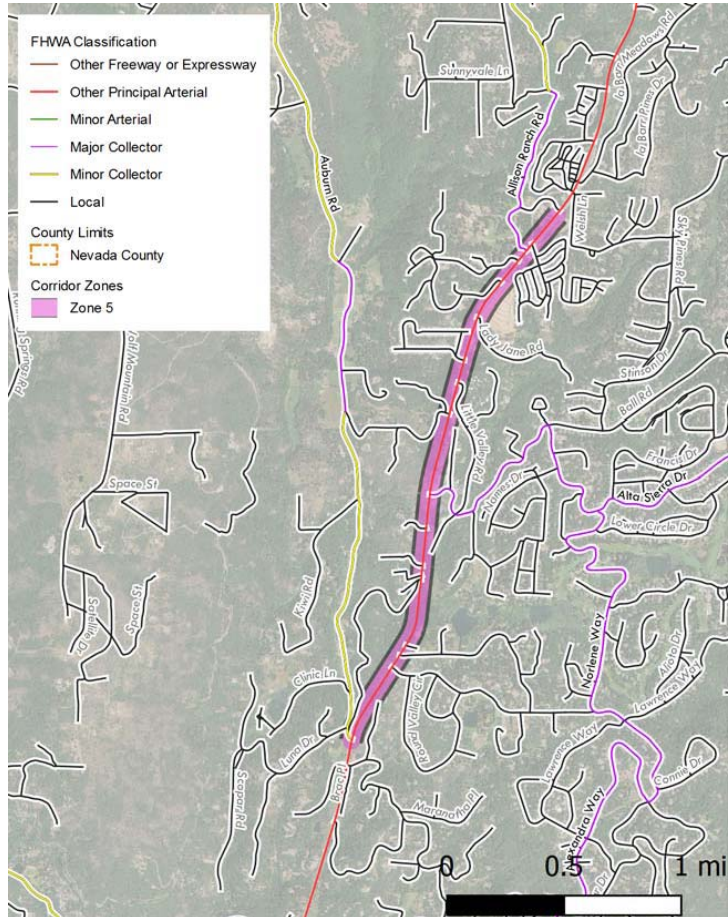
## **Zone 5 – Auburn Road to La Barr Meadows Road/Allison Ranch Road**

Zone 5 accounts for approximately 2.5 miles of the study corridor. Within this zone, SR 49 is a two-lane segment in the northbound direction and a two lane transitioning to a single lane in the southbound direction south of La Barr Meadows Road. There are 14 access points within this Zone, with the access point on the south end at Auburn Road being stop controlled and the northern access point at La Barr Meadows Road being controlled by a traffic signal. The other major intersections are at Alta Sierra (also controlled by a traffic signal), and Ponderosa Pines Way, which provides three-quarters access. Based on travel time runs, the average time to traverse the entire length of Zone 5 was determined to be 2 minutes and 55 seconds.

A majority of the intersecting local roads within this zone do not have dedicated turn lanes on SR 49. Each of these uncontrolled intersections creates a conflict point. With the growth in traffic on SR 49, this may potentially result in increasing number of accidents involving vehicles entering and exiting SR 49 without the benefit of dedicated turn lanes.

### Shoulder Geometry

In the northbound direction, the paved shoulder has a minimum width of 6 feet, and extends approximately 3 feet further as a soft, unpaved shoulder. However, approximately 550 feet north of Auburn Road, the shoulder is observed to decrease to an approximate width of 1 feet, with an extension of approximately 6-8 feet as a soft, unpaved shoulder. After Quail Creek Drive, only a soft, unpaved shoulder is provided for a length of approximately 400 feet. Beyond 400 feet of Quail Creek Drive, the paved shoulder widens to approximately 8 feet in width. With no soft shoulder provided beyond Quail Creek Drive; an asphalt dike is instead provided to mark the edge of pavement. A paved shoulder of width 3 feet or less is observed to be provided between Tadpole Creek Road and Pingree Road. North of Pingree Road, the paved shoulder is observed to widen to a width of 5 ft. Beyond Ponderosa Pines Way, the shoulder widens to 8 feet and remains at this width for the remainder of the zone. Approximately 1,000 feet north of Ponderosa Pines Way, the soft, unpaved shoulder is seen to be provided.



In the southbound direction, the paved shoulder is approximately 8 feet in width, with the exception of a portion of the zone that is currently bordered by a sound wall. Most of the segment in the southbound direction has a soft, unpaved shoulder of width 6 feet, which is seen to be reduced to a hinge point north of Ponderosa Pines Way. North of Quail Court the paved shoulder is observed to decrease to approximately 5 feet in width, with about 6 feet of soft, unpaved shoulder provided. South of Round Valley Road, the shoulder is observed to decrease to an approximate width of 3 feet; a soft shoulder is not provided.

In the southbound direction, the paved shoulder is approximately 8 feet in width, with the exception of a portion of the zone that is currently bordered by a sound wall. Most of the segment in the southbound direction has a soft, unpaved shoulder of width 6 feet, which is seen to be reduced to a hinge point north of Ponderosa Pines Way. North of Quail Court the paved shoulder is observed to decrease to approximately 5 feet in width, with about 6 feet of soft, unpaved shoulder provided. South of Round Valley Road, the shoulder is observed to decrease to an approximate width of 3 feet; a soft shoulder is not provided.

### Safety Features

Existing conditions indicate the presence of guardrail along SR 49 as follows:

- On the westerly side of SR 49, guard rail is provided within the vicinity of Ponderosa Pines Way, Pingree Road, Old State Highway and Old Auburn Road. Guardrail is provided on locations containing primarily rolling terrain.

- On the easterly side of SR 49, guardrail is provided within the vicinity of Old State Highway, Alta Sierra Drive and Ponderosa Pines Way. The majority of the guardrail is provided along locations with rolling terrain.

Due to the existing hilly terrain of Zone 5, guardrail is seen to be provided along select segments along both northbound and southbound SR 49.

Within Zone 5 rumble strips are provided along easterly and westerly sides of SR 49. Gaps in in the rumble strips provided is observed within proximity to existing intersections of SR 49 with local roads.

Additionally, a signal warning sign is provided approximately 1000 feet south of Alta Sierra Drive to warn drivers of the approach of a signalized intersection.

### *Bicycle Facilities*

For the majority of Zone 5, SR 49 is observed to contain wide shoulders that may be utilized by non-motorized traffic. However, there exists select locations with narrow shoulders and improper transitions for bikes where striped separations between the right-turn lane and through lane for the bicycles are not provided. Field observations conducted between 4:00 pm – 6:00 pm on Wednesday, June 14, 2018 indicated an absence of pedestrians on Zone 5 during the PM peak commuting hour.



### *Pedestrian Facilities*

Currently, pedestrian facilities are not provided along either northbound or southbound SR 49 within Zone 5. Field observations conducted between 4:00 pm – 6:00 pm on Wednesday, June 14, 2018 indicated an absence of pedestrians on Zone 5 during the PM peak commuting hour.

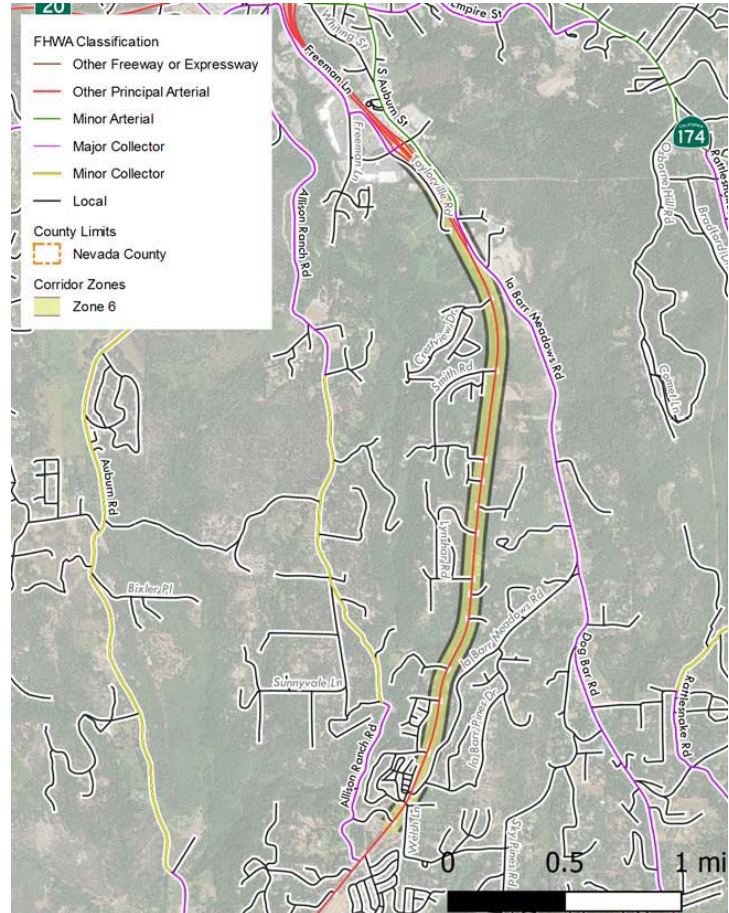
## **Zone 6 – La Barr Meadows Road/Allison Ranch Road to McKnight Interchange**

Zone 6 accounts for the remaining 3.1-mile portion of the study corridor. With the exception of the transition areas at La Barr Meadows and McKnight Way (where SR 49 has two lanes in each direction), SR 49 segment in this zone is a two-lane highway with approximately 14 access points. All of the access points (with the exception of La Barr Meadows Road at the southern terminus) are two-way stop controlled intersections. The majority of those access points do not have dedicated turn lanes on SR 49. Each of these uncontrolled intersections creates a potential conflict point on the corridor. With the growth in traffic on SR 49, this may potentially result in an increase in the number of collisions involving vehicles entering and exiting SR 49 without the benefit of dedicated turn lanes. Based on travel time runs, the average time to traverse the entire length of Zone 6 was determined to be 3 minutes and 36 seconds.

## Shoulder Geometry

In the northbound direction, the paved shoulder is approximately 7 feet in width. The width of the soft, unpaved shoulder is observed to fluctuate through the length of Zone 6. Initially, the soft, unpaved shoulder is approximately 5 feet in width. However, approximately 1400 feet north of the southern terminus of the zone, this unpaved shoulder is seen to transition into a hinge point. Although the soft, unpaved shoulder is provided approximately 2400 feet north of the southern terminus, it is seen to transition back to a hinge point north of Lode Line Way. The unpaved shoulder is observed to be approximately 5 feet in width about 600 feet north of Smith Road. This soft shoulder is discontinued 800 feet south of the McKnight off-ramp.

In the southbound direction, the paved shoulder is approximately 10 feet in width, and does not transition into an unpaved, soft shoulder. Within the vicinity of the southbound SR 49 on ramp at the McKnight interchange, asphalt dikes and guardrail are also provided to delineate the edge of pavement. Approximately 1,700 feet south of the McKnight on-ramp, the unpaved shoulder width is observed to expand to a width of 10 feet. Both the paved and unpaved shoulders were observed to be discontinued approximately 300 feet south of Crestview Drive.



## Safety Features

Existing conditions indicate the presence of guard rail along SR 49 at select locations. The provision of guardrail is as follows:

- **South of Cornette Way** - The guardrail on the westerly side of SR 49 is observed to extend approximately 515 feet southwards. The guardrail on the easterly side of SR 49 is observed to extend approximately 250 feet southwards.
- **South of Wellswood Way** - The guardrail provided on the westerly side of SR 49 is observed to extend approximately 560

feet southwards. The guardrail provided on the easterly side of SR 49 is observed to extend approximately 380 feet southwards. Majority of this guardrail is provided on rolling terrain.

- **North of Upward Way** – Guardrail is provided on the westerly side of SR 49, approximately 1060 feet north of Upward Way. This guardrail is observed to extend for a length of 950 feet. The majority of this guardrail is provided on rolling downward terrain.
- **North of Smith Road** – Guardrail is provided on both sides of SR 49, north of Smith Road. This guardrail is observed to extend for a length of 650 feet. The majority of this guardrail is provided on rolling downward terrain.
- **South of McKnight Interchange** - Guardrail is provided on the westerly side of SR 49, adjacent to the southbound SR 49 on ramp at the McKnight Interchange. The guardrail, which originates at the SR 49 southbound on ramp of the McKnight Interchange, is observed to terminate immediately prior to the lane reduction on southbound SR 49. This guardrail is observed to extend for a length of 1305 feet, and is provided on rolling downward slope.

In addition to guardrail, safety measures such as rumble strips are provided along both sides of SR 49 along the entire length of Zone 6.

### *Bicycle Facilities*

For the majority of Zone 6, SR 49 consists of shoulders that may potentially be utilized by non-motorized traffic. Narrow shoulders that may potentially impact bicycle travel is present in select locations of northbound and southbound SR 49 within Zone 6. Field observations conducted between 4:00 pm – 6:00 pm on Wednesday, June 14, 2018 indicated an absence of bicyclists on Zone 6 during the PM peak commuting hour.



### *Pedestrian Facilities*

Currently, pedestrian facilities are not provided along either northbound or southbound SR 49 within Zone 6. Field observations conducted between 4:00 pm – 6:00 pm on Wednesday, June 14, 2018 indicated an absence of pedestrians on Zone 6 during the PM peak commuting hour.

## **Adjacent Roadways**

The SR 49 Corridor through Nevada County between the Nevada County Line and the McKnight Way Interchange encompasses a network of local roadways linked to a State highway. These roadways create intersections with SR 49, thereby providing access points through which ingress/egress is maintained to the hillside communities of Nevada County. These local roadways that are observed to intersect the study corridor are included below (in the order of appearance if one was to traverse the corridor in the northbound direction from the southern terminus of the study corridor):

- Wolf Road – Major Collector
- Combie Road – Minor Collector
- Cameo Drive – Local
- Cherry Creek Road – Local
- Oak Drive – Minor Collector



- Mother Lode Road – Local
- Lime Kiln Road – Major Collector
- E Lime Kiln Road – Minor Collector
- Auburn Road – Minor Collector
- Alta Sierra Drive – Major Collector
- La Barr Meadows Road – Major Collector
- Allison Ranch Road – Minor Collector

## Adjacent Roadway Descriptions

The following section presents the descriptions for adjacent roadways that intersect with SR 49 corridor within the study limits.

**Wolf Road** is a two-lane undivided major collector that runs in the east-west direction through Nevada County. SR 49 provides the southern terminus for Wolf Road. Wolf Road operates at a posted speed limit of 40 mph.

**Combie Road** is a four-lane, undivided minor collector that provides connectivity in the east-west direction between SR 49 and Magnolia Road. South of the intersection of Combie Road & Magnolia Road, Combie Road forms a two-lane undivided collector facility which provides circulation for the residential developments within the Lake of the Pines community of Nevada County. Combie Road operates at a speed limit of 40 mph.

**Cameo Drive** is a narrow undivided local street that forms a two-way stop controlled intersection on the easterly side of SR 49. Cameo Drive primarily provides access to residential establishments located within rural Nevada County.

**Cherry Creek Road** is a narrow undivided local street that forms a two-way stop controlled intersection on the easterly side of SR 49. Cherry Creek Road primarily provides access to residential establishments located within rural Nevada County.

**Oak Drive** is a narrow undivided minor collector that forms a two-way stop controlled intersection on the easterly side of SR 49 with Mother Load Road. Oak Drive primarily provides access to residential establishments located within rural Nevada County.

**Mother Lode Road** is a narrow undivided local road that forms a two-way stop controlled intersection on the westerly side of SR 49 with Oak Drive. Mother Lode Road primarily provides access to residential establishments located within rural Nevada County.

**East Lime Kiln Road** is a two-lane, undivided minor collector that forms a two-way stop controlled intersection on the easterly side of SR 49 with Lime Kiln Road. East Lime Kiln Road primarily provides access to residential establishments.

**Lime Kiln Road** is a two-lane, undivided minor collector that forms a two-way stop controlled intersection on the westerly side of SR 49 with East Lime Kiln Road. Lime Kiln Road primarily provides access to residential establishments.

**Auburn Road** is a two-lane, undivided minor collector that forms a two-way stop controlled intersection on the westerly side of SR 49. Auburn Road primarily provides access to residential establishments.

**Alta Sierra Drive** is a two-lane, undivided major collector that forms a signalized intersection on the easterly side of SR 49. Alta Sierra Drive operates at a posted speed limit of 25 mph.

**La Barr Meadows Road** is a two-lane, undivided major collector that forms a signalized intersection on the easterly side of SR 49. La Barr Meadows Road operates at a posted speed limit of 35 mph.

**Allison Ranch Road** is a two-lane, undivided major collector that forms a signalized intersection on the easterly side of SR 49 and La Barr Meadows. Allison Ranch Road operates at a posted speed limit of 35 mph.

## SR 49 Corridor Transit Facilities

Transit services within Nevada County is provided by the Gold Country Stage, which operates a total of seven fixed-route services within Nevada County. Along the SR 49 study corridor, transit needs are met by the Route 5, which operates between Grass Valley and Auburn. Route 5 passengers can transfer to and from Placer County Transit, Auburn Transit, Sacramento Light Rail connectors, and provides connection to the Amtrak/Capitol Corridor at the Auburn Station. Route 5 provides transit services during weekdays (only) within the hours of 5:30 am and 7:30 pm. Transit stops are currently not provided directly on either the westerly or easterly sides of the SR 49 corridor, but are located on adjacent facilities. Transit stops within the vicinity of the SR 49 corridor include the following:

- Higgins Village at Combie Road
- SR 49 at Mountain Air Mobile Home Park (On Demand)
- SR 49 at Forest Springs Mobile Home Park (On Demand)
- Alta Sierra Drive at Little Valley Road
- Alta Sierra Drive at Johnson Place
- SR 49 at Combie Higgins Village
- Lake Center at Lake of the Pines

Additional information on transit stops and service times for Route 5 may be obtained from the Nevada County Community Development webpage.

## Study Intersections

The following list of critical study intersections were selected in coordination with the Nevada County staff for analysis within this report for weekday AM and PM peak hours to establish an understanding of existing conditions:

1. State Route 49 & Combie Road/Wolf Road
2. State Route 49 & Cameo Drive
3. State Route 49 & Cherry Creek Road
4. State Route 49 & Oak Drive/Mother Lode Road
5. State Route 49 & Lime Kiln Road
6. State Route 49 & Auburn Road
7. State Route 49 & Alta Sierra Drive
8. State Route 49 & La Barr Meadows Road/Allison Ranch Road

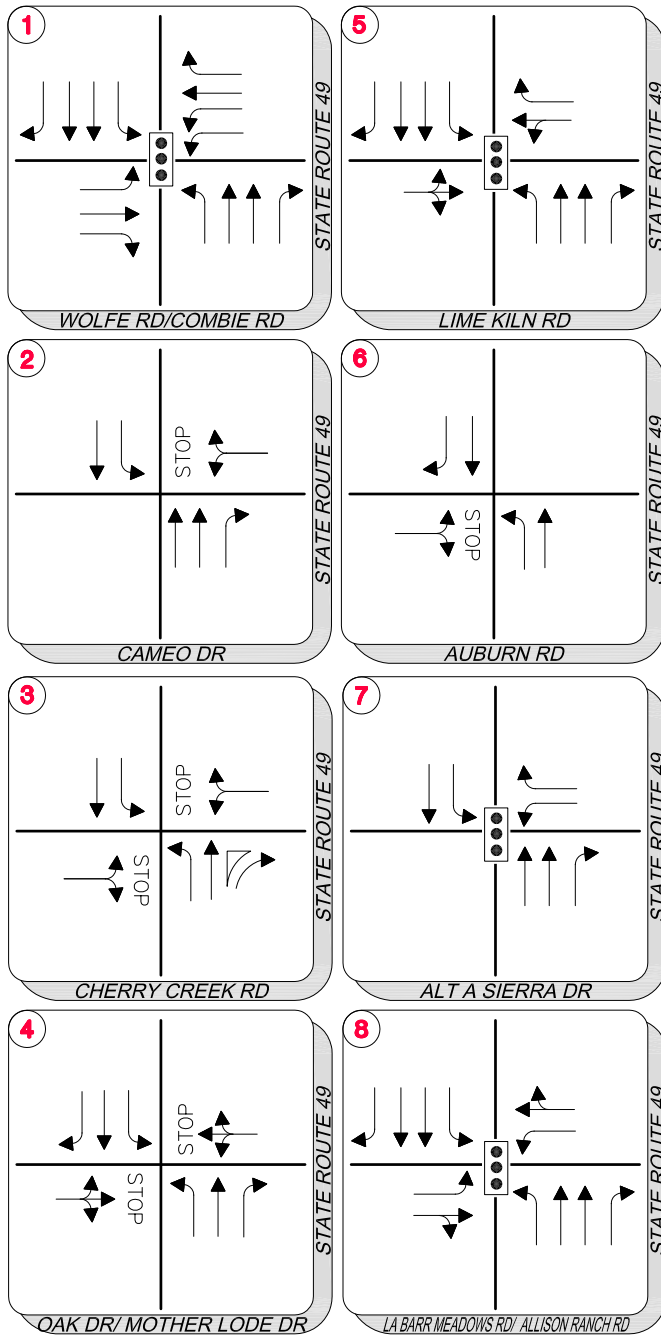
Figure 2 presents an overview of the locations of the study intersections, and their respective lane geometries and intersection control types.

## Roadway Study Segments

As the segment of the SR 49 corridor analyzed within this report is approximately 13.6 miles in length, the corridor was divided into six (6) segments, such that traffic operations can be assessed for the corridor. The six (6) segments of SR 49 subjected to analysis are as follows:

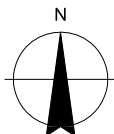
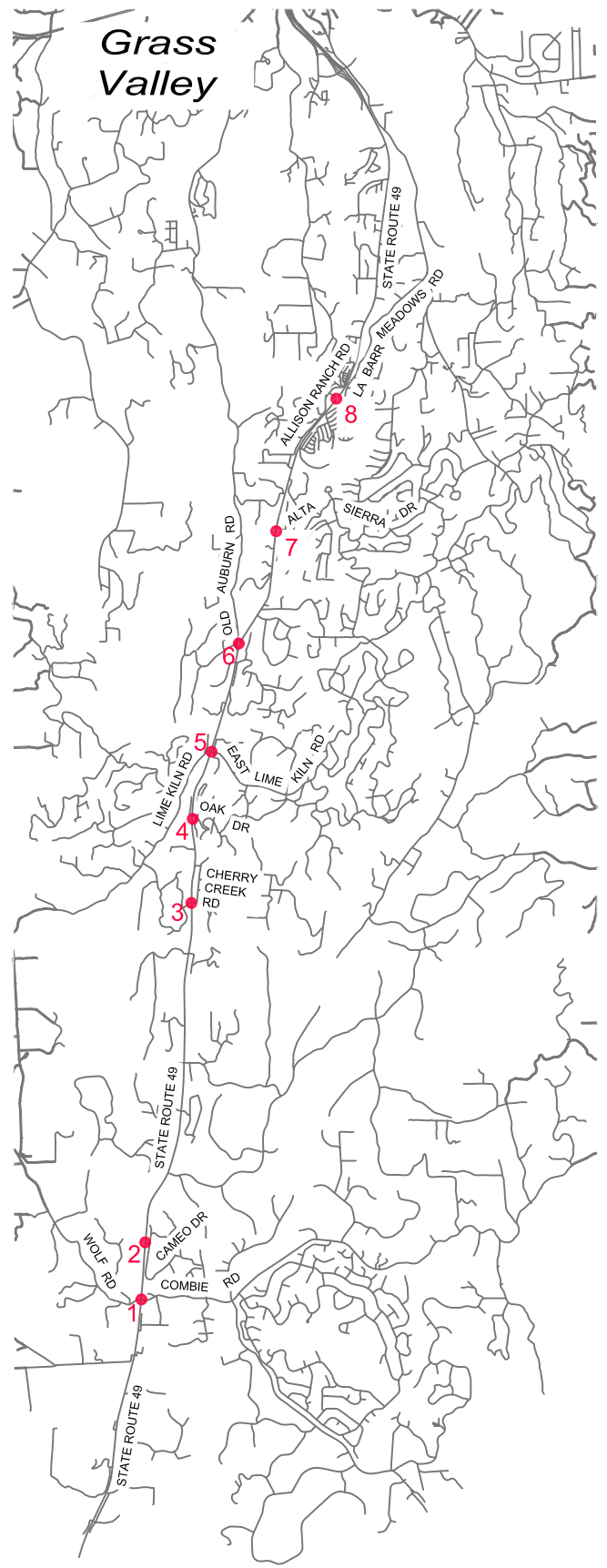
- Zone 1 - SR 49 from Nevada County line to Cameo Drive
- Zone 2 - SR 49 from Cameo Drive to Oak Drive/Mother Lode Road
- Zone 3 - SR 49 from Oak Drive/Mother Lode Road to Lime Kiln Road
- Zone 4 - SR 49 from Lime Kiln Road to Auburn Road
- Zone 5 - SR 49 from Auburn Road to La Barr Meadows Road/Allison Ranch Road
- Zone 6 - SR 49 from La Barr Meadows Road/Allison Ranch Road to McKnight Interchange

Figure 1 (presented earlier within this report) provides the locations of these study segments.



**LEGEND:**

- BICYCLE LANE
- VEHICLE LANE
- TRAFFIC SIGNAL
- ROUNDABOUT



Nevada County Transportation Commission  
 State Route 49 Corridor Systems Management  
 Program Existing Conditions Report

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**EXISTING LANE GEOMETRICS  
 AND CONTROL**

**FIGURE 2**

## Traffic Data Collection and Analysis

### ***Intersection Turning Movement Counts***

All intersections were analyzed during the weekday AM and PM peak hour periods only. The AM peak hour is defined as the highest continuous hour of peak traffic flow counted between 7:00 am and 9:00 am, and the PM peak hour is defined as the highest continuous hour of peak traffic flow counted between 4:00 pm and 6:00 pm under typical weekday conditions.

Weekday AM and PM peak hour intersection turn movement traffic counts were collected at all study intersections by Omni-Means/GHD on Tuesday, April 17, 2018. Schools in the area were in regular session and no known special events were occurring in the area at the time of the traffic counts.

Figure 3 presents the existing peak hour turning movement volumes at the study intersections.

### ***Average Daily Traffic (ADT) Counts***

Average daily traffic volume (ADT) counts were performed for each of the Zones 1-4 on Tuesday, May 1, 2018. These counts were supplemented with ADT data estimated from peak hour intersection turning movement counts obtained on April 17, 2018. According to Caltrans AADT data (released in 2016), the distribution of trucks consisting of 3-axle, 4-axle and 5-axle (and above) configurations are as follows:

- 3-axle – 0.6% of all vehicular traffic
- 4-axle – 0.2% of all vehicular traffic
- 5-axles (and above) – 1.1% of all vehicular traffic

Figure 4 presents the peak hour directional traffic volumes obtained for the SR 49 study corridor.

### ***Historical Collision Data Collection***

Collision data for the study roadways and intersections were obtained from the Transportation Injury Mapping System (TIMS) database supported by UC Berkeley. It is important to note that the accuracy of the data is subject to the accuracy of police reports filed by law enforcement agencies recording these collisions. Collision data for the SR 49 study corridor was obtained for a five-year period between January 1, 2012 and December 31, 2016. Based on the collision data obtained, there are 170 reported (non-PDO) collisions along the SR 49 corridor.

Further analysis of collision data obtained for the SR 49 corridor is provided in later sections of this report.

**1**

53(27) ↓	745(703) ↓	328(217) ↖	237(191) ↗
20(31) ↖	133(99) ↖	167(88) ↖	72(156) ↗
			480(946) ↗
			277(539) ↗

WOLF RD/COMBIE RD

**5**

51(126) ↓	847(872) ↓	26(123) ↖	117(57) ↗
111(60) ↖	6(9) ↖	41(17) ↖	15(29) ↗
			389(957) ↗
			39(138) ↗

LIME KILN RD

**2**

0(0) ↓	1117(950) ↓	1(3) ↖	0(2) ↗
			0(0) ↗
			13(8) ↗
			0(0) ↗

CAMEO DR

**6**

6(8) ↓	875(1115) ↓		
3(3) ↖	29(17) ↖		

AUBURN RD

**3**

1(1) ↓	1066(930) ↓	3(8) ↖	3(2) ↗
1(0) ↖	3(2) ↖		
3(2) ↖	2(5) ↖		
	734(1128) ↖		2(5) ↖

CHERRY CREEK DR

**7**

	742(1005) ↓	59(116) ↖	177(90) ↗
			130(82) ↗

ALTA SIERRA DR

**4**

0(1) ↓	1063(938) ↓	1(7) ↖	11(3) ↗
1(1) ↖	0(0) ↖	0(0) ↖	7(5) ↖
0(0) ↖	0(1) ↖		
0(0) ↖	743(1111) ↖		3(11) ↖

OAK DR/MOTHER LODE DR

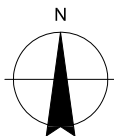
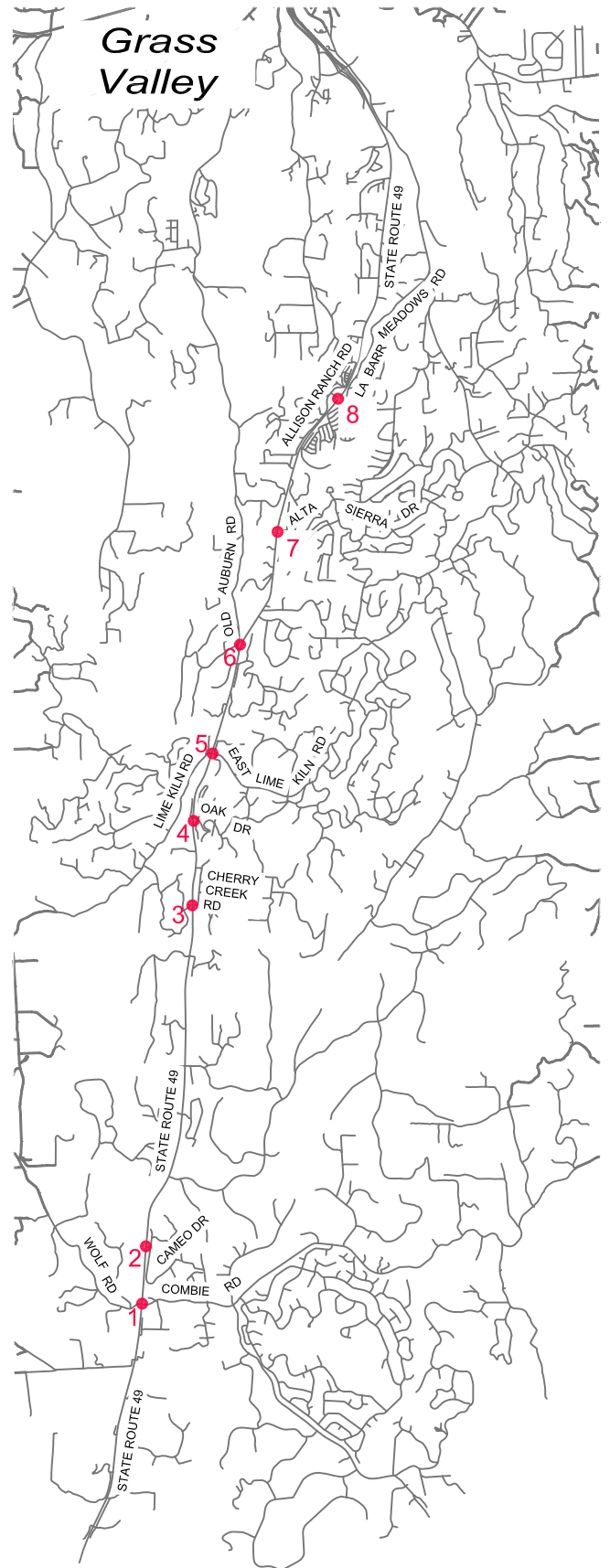
**8**

13(64) ↓	775(1198) ↓	15(55) ↖	40(35) ↗
56(40) ↖	4(0) ↖	27(15) ↖	12(37) ↖
			1087(955) ↖
			19(35) ↖

LA BARR MEADOWS RD/ALLISON RANCH RD

**LEGEND:**

- XX - AM PEAK HOUR TRAFFIC VOLUMES
- (XX) - PM PEAK HOUR TRAFFIC VOLUMES

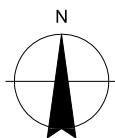
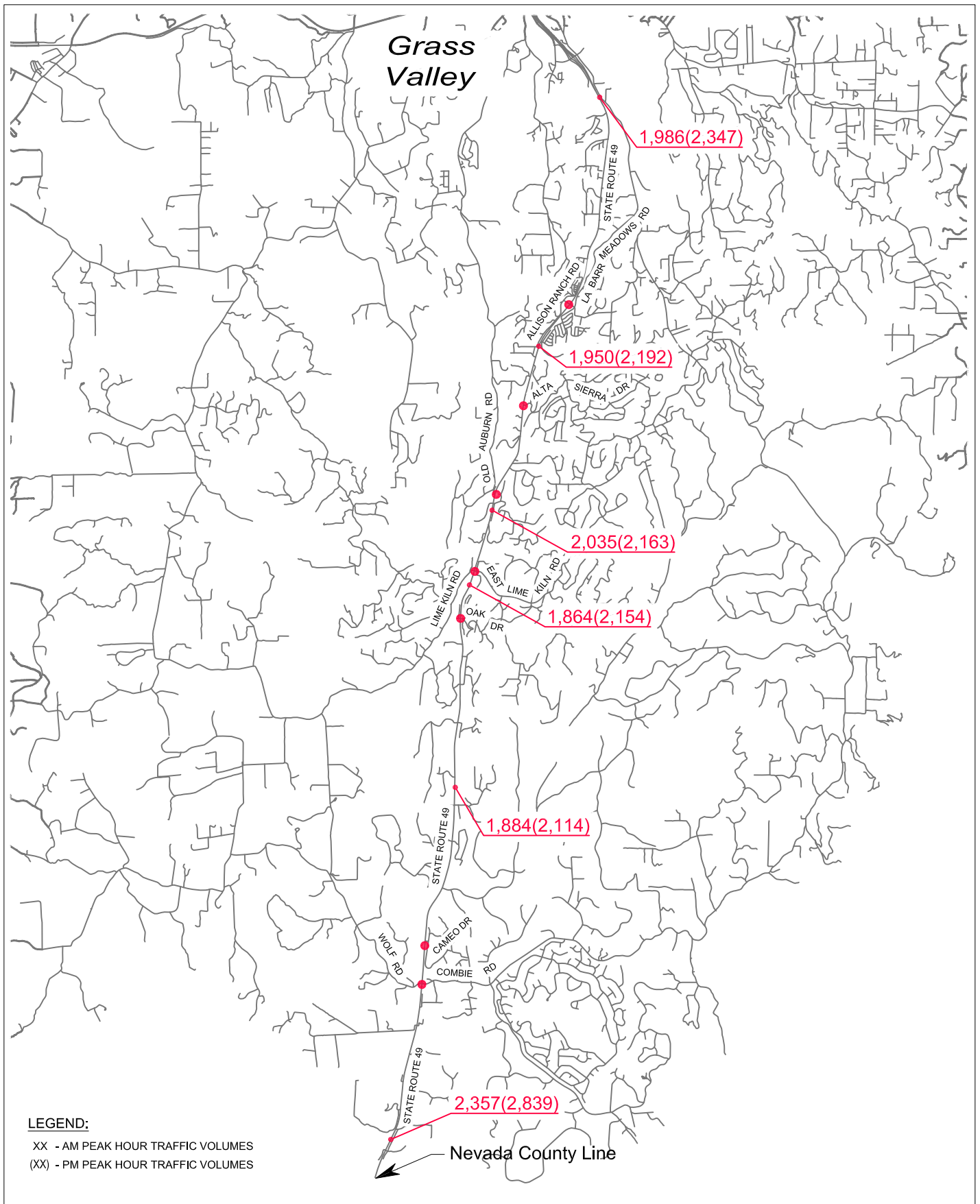


Nevada County Transportation Commission  
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**EXISTING PEAK HOUR TURNING  
 MOVEMENT VOLUMES**

**FIGURE**



Nevada County Transportation Commission  
 State Route 49 Corridor Systems Management  
 Program Existing Conditions Report  
**PEAK HOUR ROADWAY VOLUMES**

Project No. 25-4862-00  
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**FIGURE 4**

## Analysis Policies and Methodologies

The following section presents a summary of the policies and methodologies used in the analysis of intersections.

### Level of Service Methodologies

Traffic operations are quantified through the determination of "Level of Service" (LOS). Level of service is a qualitative measure of traffic operating conditions, whereby a letter grade "A" through "F" is assigned to an intersection, representing progressively worsening traffic operations as determined by vehicle delay or congestion. LOS "A" represents free-flow operating conditions and LOS "F" represents over-capacity conditions. Levels of Service were calculated for all study intersection control types using the methods documented in the Transportation Research Board Publication *Highway Capacity Manual, Sixth Edition* (HCM 6).

### Intersection LOS Methodologies

Level of Service (LOS) was calculated for all intersection control types using the methods documented in the Transportation Research Board's *Highway Capacity Manual Sixth Edition*. Level of service is a qualitative measure of traffic operating conditions, whereby a letter grade A through F is assigned to an intersection or roadway segment representing progressively worsening traffic conditions.

For signalized intersections, intersection delays and LOS are average values for all intersection movements. For two-way stop-controlled (TWSC) intersections, the intersection delays and LOS are represented by the worst approach. Table 3 presents the delay-based LOS criteria for different types of intersection control.



**TABLE 3  
INTERSECTION LEVEL OF SERVICE CRITERIA**

Level of Service	Type of Flow	Delay	Maneuverability	Stopped Delay/Vehicle (sec)	
				Signalized/ Roundabouts	Unsignalized/ All-Way Stop
A	Stable Flow	Very slight delay. Progression is very favorable, with most vehicles arriving during the green phase not stopping at all.	Turning movements are easily made, and nearly all drivers find freedom of operation.	≤ 10.0	≤ 10.0
B	Stable Flow	Good progression and/or short cycle lengths. More vehicles stop than for LOS A, causing higher levels of average delay.	Vehicle platoons are formed. Many drivers begin to feel somewhat restricted within groups of vehicles.	>10 and ≤ 20.0	>10 and ≤ 15.0
C	Stable Flow	Higher delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures may begin to appear at this level. The number of vehicles stopping is significant, although many still pass through the intersection without stopping.	Back-ups may develop behind turning vehicles. Most drivers feel somewhat restricted.	>20 and ≤ 35.0	>15 and ≤ 25.0
D	Approaching Unstable Flow	The influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high volume-to-capacity ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.	Maneuverability is severely limited during short periods due to temporary back-ups.	>35 and ≤ 55.0	>25 and ≤ 35.0
E	Unstable Flow	Generally considered to be the limit of acceptable delay. Indicative of poor progression, long cycle lengths, and high volume-to-capacity ratios. Individual cycle failures are frequent occurrences.	There are typically long queues of vehicles waiting upstream of the intersection.	>55 and ≤ 80.0	>35 and ≤ 50.0
F	Forced Flow	Generally considered to be unacceptable to most drivers. Often occurs with over saturation. May also occur at high volume-to-capacity ratios. There are many individual cycle failures. Poor progression and long cycle lengths may also be major contributing factors.	Jammed conditions. Back-ups from other locations restrict or prevent movement. Volumes may vary widely, depending principally on the downstream back-up conditions.	> 80.0	> 50.0

## Highway LOS Methodologies

Highway LOS was calculated for the 6 zones of SR 49 by using HCS 7.0 highway analysis software by McTrans. The methodology used in the assessment of highway capacity was based off the guidelines provided within HCM 6.

### *Two-Lane Highway*

Due to the range of functions served by two-lane highways, the automobile methodology detailed within HCM 6 establishes three classes of highways. The HCM establishes the classification of highways as follows:

- *Class I Two-lane highways are highways where motorists expect to travel at relatively high speeds. Two-lane highways that are major intercity routes, primary connectors of major traffic generators, daily commuter routes, or major links in state or national highway networks are generally assigned to Class I. These facilities serve mostly long-*

distance trips or provide the connections between facilities that serve long-distance trips.

- *Class II two-lane highways where motorists do not necessarily expect to travel at high speeds. Two-lane highways that are access routes to Class I facilities, that serve as scenic or recreational routes (and not as primary arterials), or that pass through rugged terrain (where high-speed operation would be impossible) are assigned to Class II. These facilities most often serve relatively short trips, the beginning or ending portions of longer trips, or trips for which sightseeing plays a significant role.*
- *Class III two-lane highways serve moderately developed areas. They may be portions of a Class I or Class II highway that pass through small towns or developed recreational areas. Local traffic often mixes with through traffic on these segments, and the number of unsignalized driveways and cross-streets is noticeably higher than in a purely rural area. Class III highways can include longer roadway segments passing through more spread-out recreational areas, also with increased roadside densities. Such segments are often accompanied by reduced speed limits that reflect the higher activity level.*

For two-lane highways, the measure of effectiveness to assign LOS varies based on the roadway classification. *Class I* highways have a measure of effectiveness based on the speed and delay due to passing restrictions and platooning. *Class II* highways have a measure of effectiveness based only on the delay due to passing restrictions and platooning. *Class III* highways are typically shorter segment lengths and have a measure of effectiveness based on speed. Table 4 presents the LOS thresholds for varying roadway classifications.

**TABLE 4  
TWO-LANE HIGHWAY SEGMENT LOS CRITERIA**

LOS	Class I Highways		Class II Highways	Class III Highways
	ATS (mph)	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:

1. LOS F exists when demand in at least one direction exceeds the capacity of the segment
2. ATS - Average Travel Speed
3. PTSF - Percent Time Spent Following
4. PFFS - Percent Free Flow Speed

State Route 49, within its entirety, may contain characteristics attributable to *Class I*, *Class II* and *Class III* two-lane highway facilities. Based on the descriptions provided within the HCM, portions of the SR 49 study corridor (specifically between Nevada County Line and the McKnight Interchange) containing two-lane highway configurations were classified as Class I facilities, for analysis purposes.

### *Multi-Lane Highway*

Multi-lane highway LOS was calculated using HCS 7.0 software. LOS was calculated on a density basis in passenger cars per mile per lane (pc/mi/ln). Table 5 presents the LOS thresholds for multi-lane highways.

**TABLE 5  
MULTI-LANE HIGHWAY LOS CRITERIA**

<b>LOS</b>	<b>FFS (mi/h)</b>	<b>Density (pc/mi/ln)</b>
A	All	> 0-11
B	All	> 11-18
C	All	> 18-26
D	All	> 26-35
E	60	> 35-40
	55	> 35-41
	50	> 35-43
	45	> 35-45
Demand Exceeds Capacity		
F	60	> 40
	55	> 41
	50	> 43
	45	> 45

Notes:

1. FFS - Free Flow Speed

## Agency LOS Guidelines and Policies

### Caltrans LOS Guidelines

The Caltrans published Guide for the Preparation of Traffic Impact Studies (dated December 2002) states the following:

*“Caltrans endeavors to maintain a target LOS at the transition between LOS “C” and LOS “D” on State highway facilities, however, Caltrans acknowledges that this may not be always feasible and recommends that the lead agency consult with Caltrans to determine the appropriate target LOS.”*

For the purposes of this study, the Caltrans recommended LOS “D” will be used.

## Technical Analysis Parameters and Assumptions

Table 6 presents the technical parameters assumed for the evaluation of the study intersections for the analysis scenarios. All parameters not listed should be assumed as default or calculated values based on HCM methodology.

**TABLE 6  
INTERSECTION TECHNICAL ANALYSIS PARAMETERS**

<b>Technical Parameters</b>	<b>Assumption</b>
1. Intersection Peak Hour Factor (PHF)	Intersection Overall, based on Existing Counts
2. Intersection Heavy Vehicle Percentage	Intersection Overall, based on Existing Counts, min. 2%
3. Signal Timings	Based on current Caltrans signal timing plans

## Warrant Analysis

A supplemental traffic signal “warrant” analysis was completed for unsignalized intersections determined to be operating at an unacceptable LOS. The term “signal warrant” refers to the list of established criteria used by public agencies to quantitatively justify or ascertain the need for installation of a traffic signal at an unsignalized intersection. This study has employed the signal warrant criteria presented in the latest edition of the California Manual on Uniform Traffic Control Devices (MUTCD) for all unsignalized study intersection.

The California MUTCD indicates that the installation of a traffic signal should be considered if one or more of the signal warrants are met. Specifically, this study utilizes the peak hour volume-based Warrant 3 as one representative type of traffic signal warrant analysis. It should be noted that the Peak Hour Volume Warrant was only applied when the intersection was found to be operating at an unacceptable LOS. Therefore, there may be instances when the unsignalized intersection operates at acceptable LOS conditions but still meets the Peak Hour Volume Warrant.

## Existing Conditions

Existing traffic operations were calculated using intersection AM and PM peak hour traffic counts and average daily traffic (ADT) counts.

## Intersection Operations

Existing weekday AM and PM peak hour intersection traffic operations were quantified utilizing the existing traffic volumes and existing intersection lane geometrics and control. Table 7 presents intersection operations for the *Existing* conditions.

**TABLE 7  
EXISTING INTERSECTION OPERATIONS**

#	Intersection	Control Type <sup>1,2</sup>	Target LOS	AM Peak Hour			PM Peak Hour		
				Delay	LOS	Warrant Met? <sup>3</sup>	Delay	LOS	Warrant Met? <sup>3</sup>
1	SR 49 & Combie Rd/Wolf Rd	Signal	D	23.8	C	-	22.3	C	-
2	SR 49 & Cameo Dr	TWSC	D	27.7	D	-	29.0	D	-
3	SR 49 & Cherry Creek Rd	TWSC	D	34.8	D	-	29.9	D	-
4	<b>SR 49 &amp; Oak Dr/Mother Lode Rd</b>	<b>TWSC</b>	<b>D</b>	<b>93.0</b>	<b>F</b>	<b>No</b>	<b>162.3</b>	<b>F</b>	<b>No</b>
5	SR 49 & Lime Kiln Rd	Signal	D	12.9	B	-	13.1	B	-
6	SR 49 & Auburn Rd	TWSC	D	18.5	C	-	27.6	D	-
7	SR 49 & Alta Sierra Dr	Signal	D	11.8	B	-	12.4	B	-
8	SR 49 & La Barr Meadows Rd/Allison Ranch Rd	Signal	D	16.6	B	-	18.2	B	-

Notes:

1. TWSC = Two Way Stop Control

2. LOS = Delay based on worst minor street approach for TWSC intersections, average of all approaches for Signal

3. Warrant = Based on California MUTCD Warrant 3

As presented in Table 7 all study intersections, except the following, are currently found to operate at or above the threshold LOS:

- Intersection 4 – State Route 49 & Oak Drive/Mother Lode Road

# Roadway Segment Operations

Existing weekday AM and PM peak hour roadway traffic operations were quantified utilizing the existing traffic volumes and existing roadway geometrics. Tables 8A and 8B presents roadway operations for the *Existing* conditions.

**TABLE 8A  
EXISTING HIGHWAY OPERATIONS – AM PEAK HOUR**

Zone	Roadway	Location	Facility Type	LOS Threshold	Avg. Travel Speed		Percent Time Spent Following (PTSF %)		Density pc/mi/ln		Segment LOS	
					NB/EB	SB/WB	NB	SB	NB	SB	NB	SB
1	SR 49	Nevada County Line to Combie Dr	4 Lane Multi-Lane Hwy	D	-	-			8.7	12.3	A	B
2	<b>SR 49</b>	<b>Cameo Rd to Mother Lode Rd</b>	<b>2 Lane Hwy</b>	D	35.0	36.9	84.1	91.3			E	E
3	SR 49	Mother Lode Rd to Lime Kiln Rd	3-4 Lane Multi-Lane Hwy	D	-	-			10.0	11.6	B	B
4	<b>SR 49</b>	<b>Lime Kiln Rd to Auburn Rd</b>	<b>2 Lane Hwy</b>	D	35.4	34.6	89.4	90.7			E	E
5	<b>SR 49</b>	<b>Auburn Road to La Barr Meadows/Allision Ranch Road</b>	<b>3-4 Lane Multi-Lane Hwy</b>	D		35.6		86.7	11.7		B	E
6	<b>SR 49</b>	<b>La Barr Meadows Road/Allison Ranch Road to McKnight Interchange</b>	<b>2 Lane Hwy</b>	D	35.0	34.3	93.1	85.6			E	E

Notes:

1. **Bold Text** indicates deficient operations.

As presented within Table 8A, the following four Zones currently provide unacceptable operations during the AM peak hour of the Existing Condition:

- Zone 2 – SR 49, from Cameo Road to Mother Lode Road
- Zone 4 – SR 49, from Lime Kiln Road to Auburn Road
- Zone 5 – SR 49, from Auburn Road to La Barr Meadows Road/Allison Ranch Road
- Zone 6 – SR 49, from La Barr Meadows Road/Allison Ranch Road to McKnight Interchange

**TABLE 8B  
EXISTING HIGHWAY OPERATIONS – PM PEAK HOUR**

Zone	Roadway	Location	Facility Type	LOS Threshold	Avg. Travel Speed		Percent Time Spent Following (PTSF %)		Density pc/mi/ln		Segment LOS	
					NB/EB	SB/WB	NB	SB	NB	SB	NB	SB
1	SR 49	Nevada County Line to Combie Dr	4 Lane Multi-Lane Hwy	D	-	-			17.5	9.2	B	A
2	SR 49	Cameo Rd to Mother Lode Rd	2 Lane Hwy	D	35.2	35.1	92.6	85.2			E	E
3	SR 49	Mother Lode Rd to Lime Kiln Rd	3-4 Lane Multi-Lane Hwy	D	-	-			12.8	11.6	B	B
4	SR 49	Lime Kiln Rd to Auburn Rd	2 Lane Hwy	D	35.5	32.5	90.5	90.9			E	E
5	SR 49	Auburn Road to La Barr Meadows/Allision Ranch Road	3-4 Lane Multi-Lane Hwy	D		33.3		92.4	11.8		B	E
6	SR 49	La Barr Meadows Road/Allison Ranch Road to McKnight Interchange	2 Lane Hwy	D	32.8	31.9	89.5	94.9			E	E

Notes:

1. **Bold Text** indicates deficient operations.

As presented within Table 8B, the following four Zones currently provide unacceptable operations during the PM peak hour of the Existing Condition:

- Zone 2 – SR 49, from Cameo Road to Mother Lode Road
- Zone 4 – SR 49, from Lime Kiln Road to Auburn Road
- Zone 5 – SR 49, from Auburn Road to La Barr Meadows Road/Allison Ranch Road
- Zone 6 – SR 49, from La Barr Meadows Road/Allison Ranch Road to McKnight Interchange

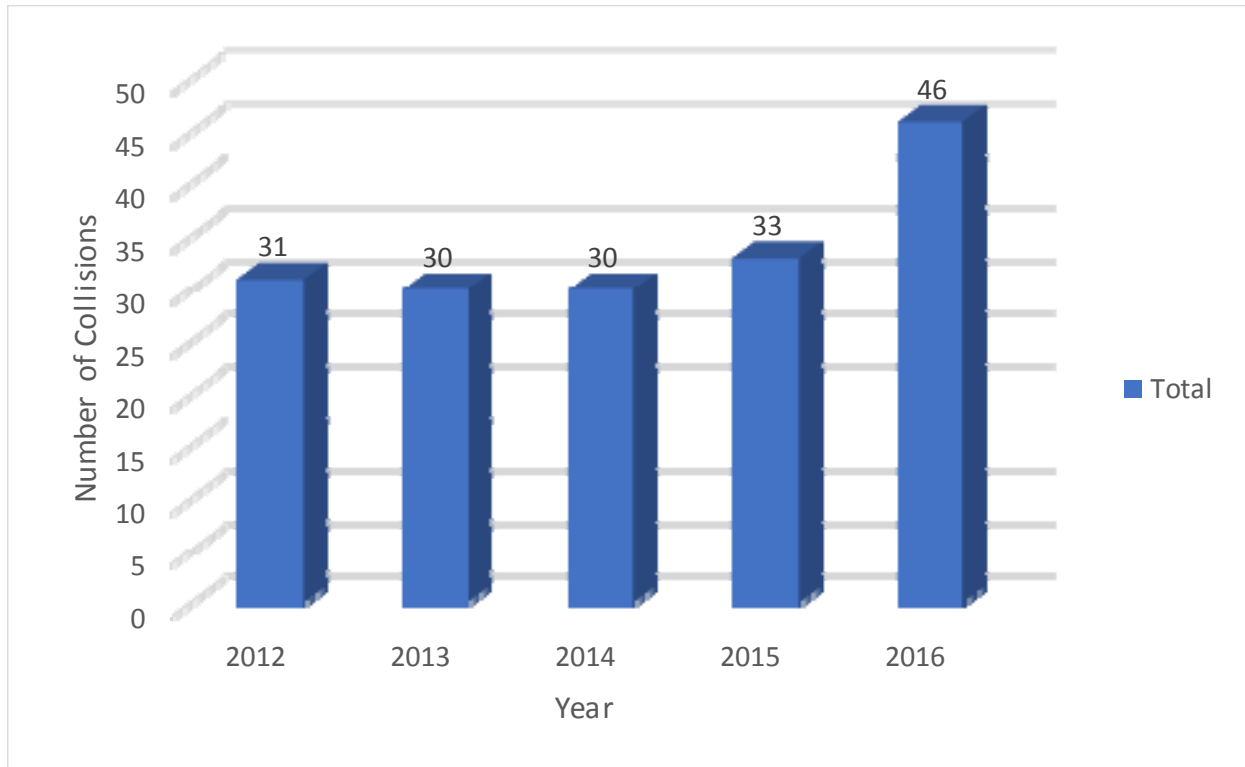
## Traffic Collision Analysis

State Departments of Transportation are required to create a safety plan specific to their state's safety needs under the current transportation funding bill (MAP-21) and the Highway Safety Improvement Program (HSIP). A Strategic Highway Safety Plan (SHSP) is a statewide-coordinate safety plan that provides the necessary planning framework for reducing highway fatalities and severe injuries on all public roadways. SHSPs are critical planning tools for states to keep moving towards zero deaths related to motor vehicles and roadways. California's SHSP for 2015-2019 has adopted a "Towards Zero Deaths" (TZD) tolerance for reducing traffic fatalities and injuries. The TZD is also a national strategy supported by the Federal Highway Administration (FHWA) among other organizations.

## Corridor Level Collision Trends

As stated previously, the average number of non-PDO collisions recorded along the SR 49, within the limits of Nevada County line and the McKnight Interchange, is 170 collisions. The number of collisions per year on the SR 49 corridor is observed to increase between the years 2014 and 2016. Within this 2-year period, a 53% increase in collision numbers is noted for the SR 49 corridor. Additionally, within the 5-year period between 2012 and 2016, the average number of collisions on the SR 49 corridor (within the specified study limits) is observed to be 34 collisions/year. Figure 5 presents a graph of the annual collision trends along the corridor.

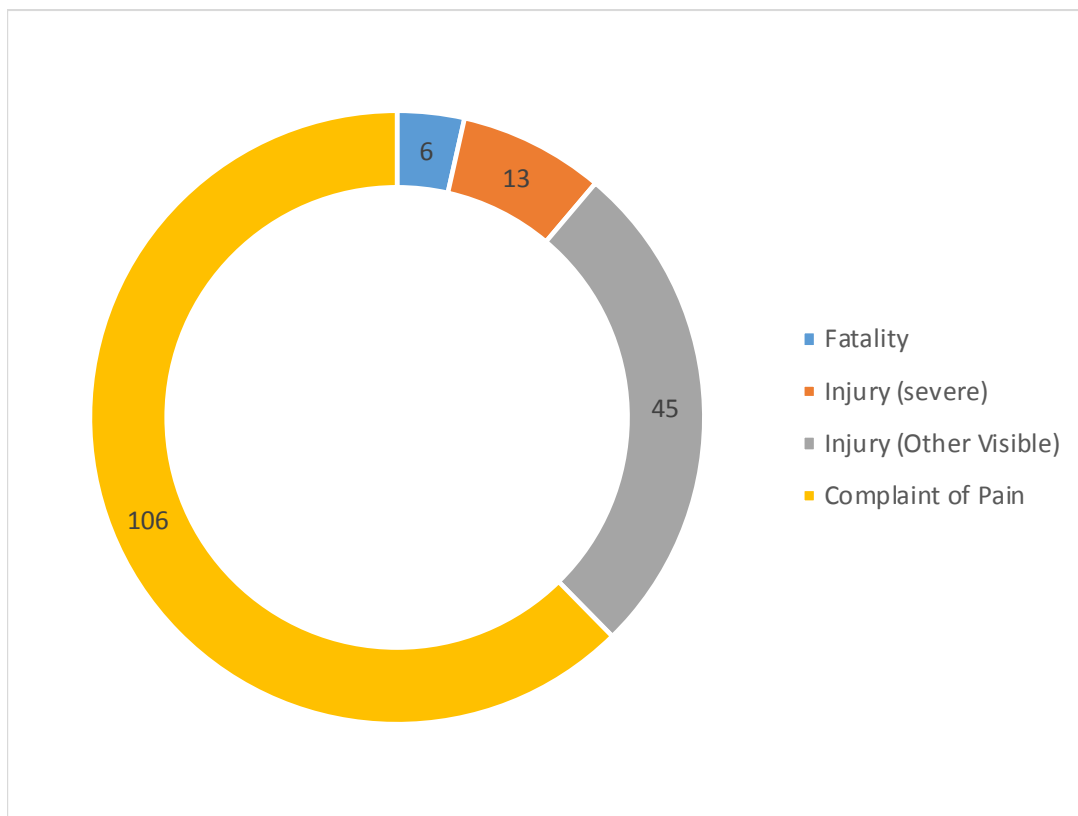
**FIGURE 5 – COLLISIONS BY YEAR**



## Collision Severity

Figure 6 presents a summary of the severity of collisions recorded along the SR 49 study corridor within the 5-year period that spans between 2012 and 2016. As presented within Figure 6, there have been six fatalities within the 13.6-mile long corridor. Three of these 6 fatalities occurred on Zone 1 of SR 49 (i.e. between the Nevada County Line and Wolf Road/Combie Road). One of the six fatalities was a pedestrian fatality, caused by a collision between a vehicle and a jaywalking pedestrian on SR 49, approximately 54 feet south of La Barr Meadows Road. Three of the fatalities on SR 49 were the result of broadside collisions, while the remaining three were the result of sideswipe, head-on and pedestrian/vehicle conflicts. The majority of the remaining recorded collisions resulted in minor injuries (106 cases under “complaint of pain” category), followed by other visible injury (45 cases) and severe injury (13 cases).

**FIGURE 6 – SUMMARY OF COLLISION SEVERITY**

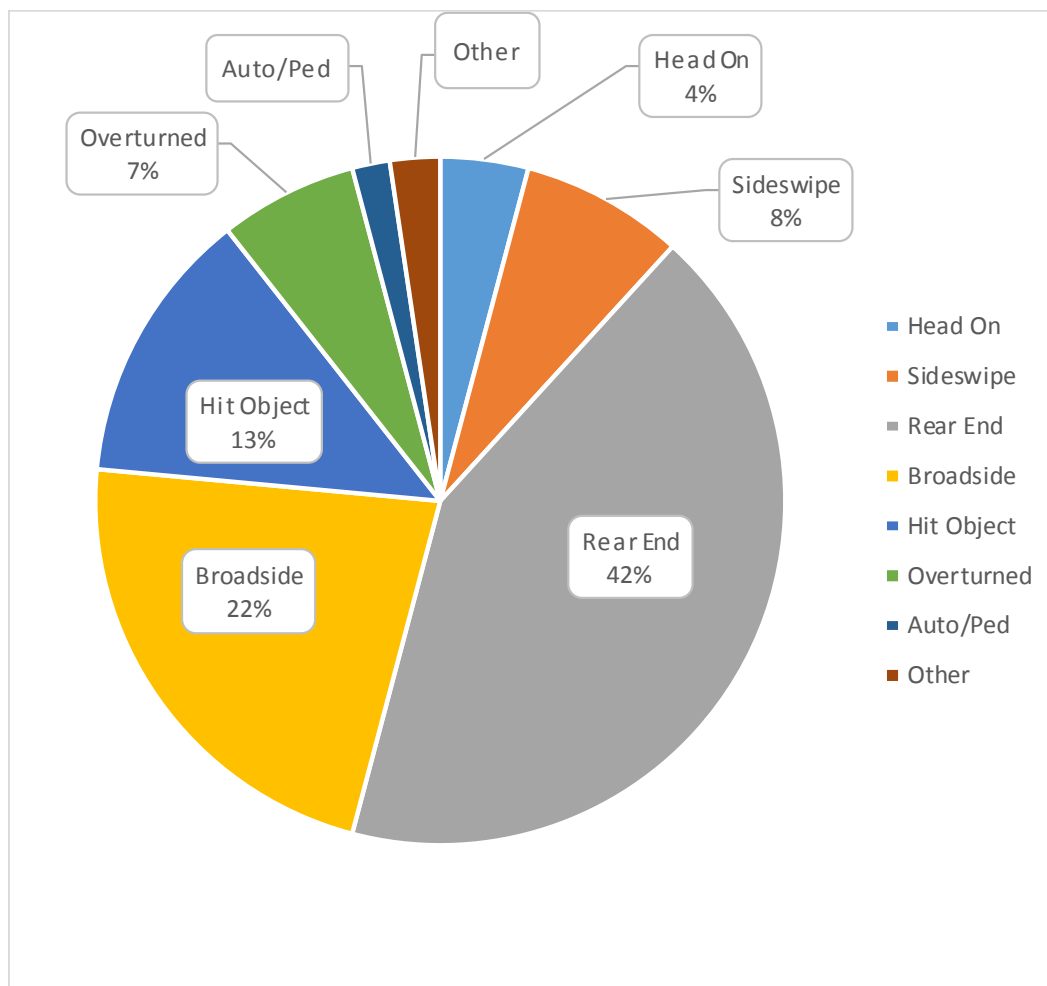




## Collision Types

Figure 7 presents a summary of the types of collisions that were recorded along SR 49 within the 5-year analysis period. As presented within Figure 7, the majority of the collisions were rear end (42% of all collisions), followed by broadside (22%) and hit object collisions (13%). Generally, rear end collisions are predominantly caused by traveling at unsafe speeds and tailgating driving behaviors (both of which are indicators of traffic congestion). Broadside collisions may occur due to failing to yield right of way and poor assessment of on-coming vehicle speed and proximity by vehicles entering/exiting SR 49 from side streets.

**FIGURE 7 – SUMMARY OF COLLISION TYPES**



## Contributing Cause of Collisions

Figure 8 presents a summary of the contributing causes associated with the recorded collisions for SR 49 within the 5-year analysis period. As Figure 8 presents, the most common contributing cause is traveling at unsafe speeds (63 recorded cases). The potential for speeding along the SR 49 corridor may be influenced by a combination of factors such as the hilly/rolling terrain of the corridor, the presence of few signalized intersections, and a posted speed limit of 55 mph for the majority of the corridor. Other major contributing causes for collisions along the corridor include driving under the influence (24 cases), improper turning (21 cases), failing to yield right of way (20 cases), and violation of traffic signs/signal rules (8 cases).

**FIGURE 8 – SUMMARY OF CONTRIBUTING CAUSE OF COLLISIONS**

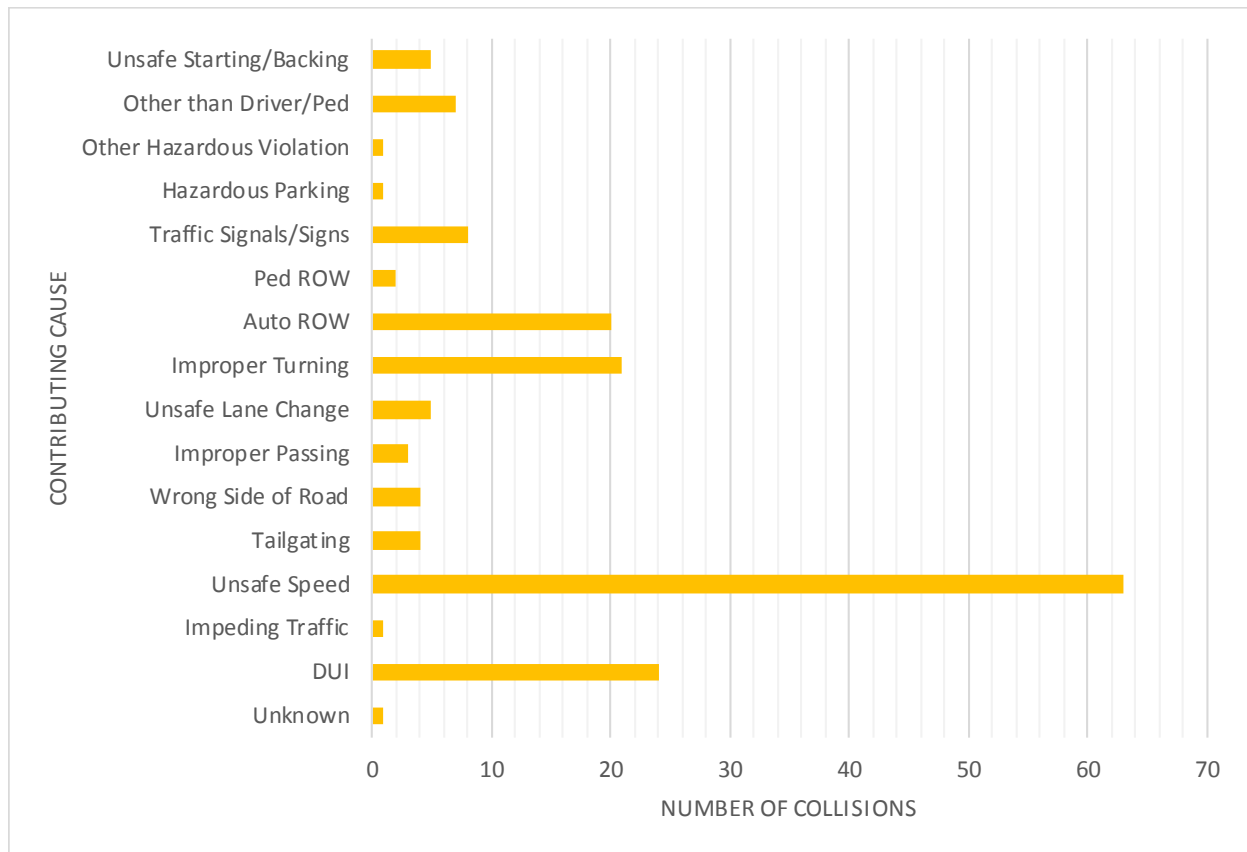
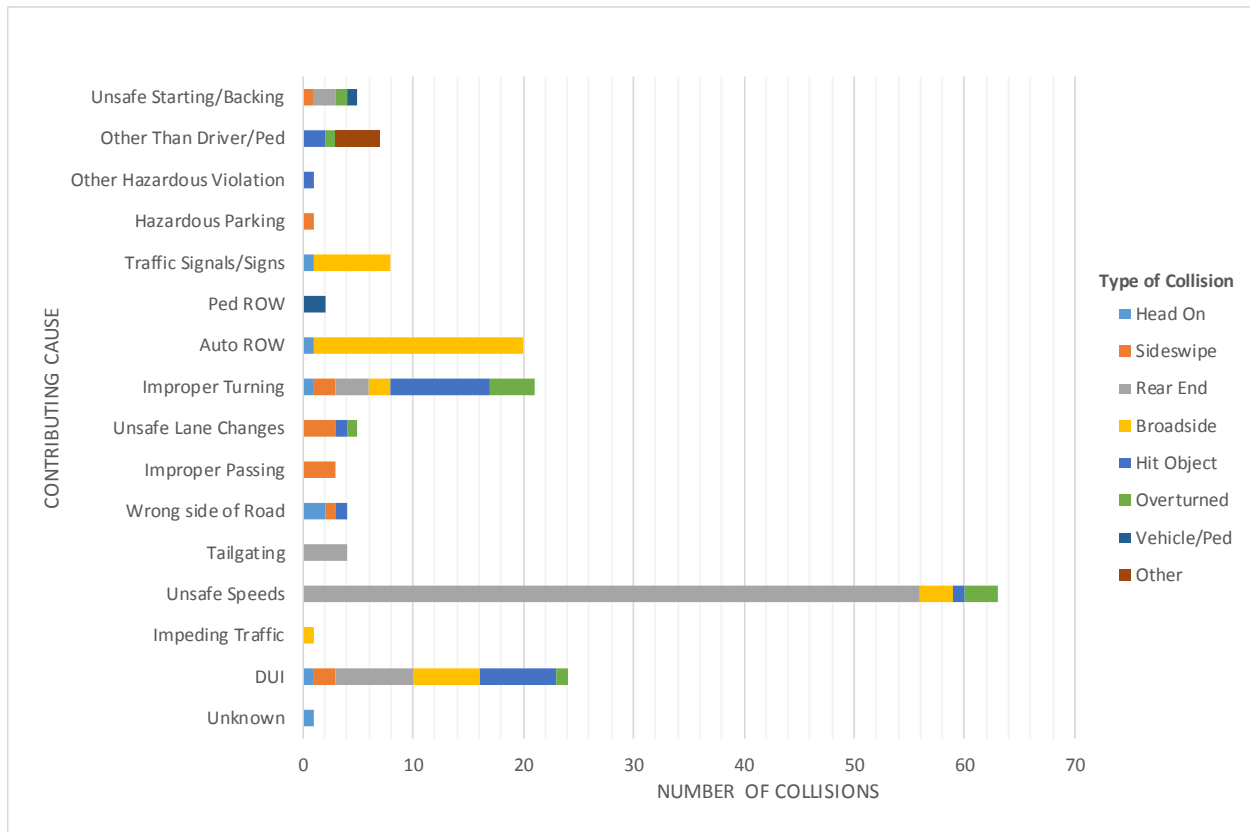


Figure 9 presents a comparison of the contributing cases associated with the recorded collisions and the type of collision that resulted. As presented within this figure, 56 of the rear end collisions within this corridor were caused primarily by motorists traveling at unsafe speeds. Incidentally, 19 of the broadside collisions were caused by violation of automobile right of way, while 9 of the hit object collisions were caused by improper turning maneuvers and driving under the influence. Driving while intoxicated has resulted in many different types of collisions with the most common being rear end, broadside and hit object collisions.

**FIGURE 9 – COMPARISON OF CONTRIBUTING CAUSE AND COLLISION TYPE**



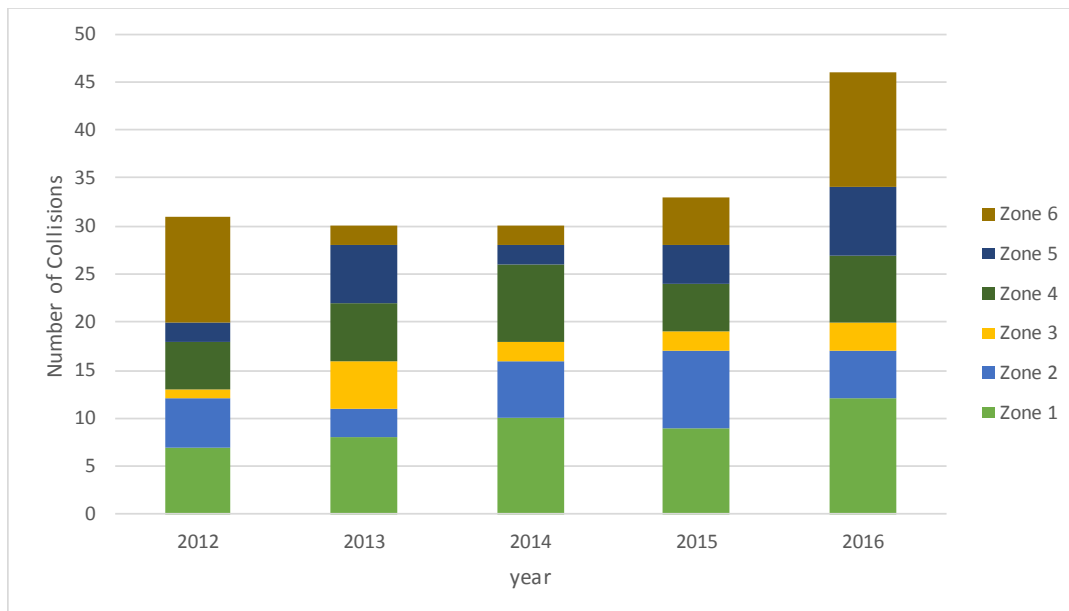
## Zonal Collision Trends

Figure 10 presents a summary of the collisions observed between the years 2012-2016 for each analysis zone (i.e. Zones 1-6). As presented, Zone 1 is observed to consistently be the segment to report the highest number of crashes in any given year. Notably, the number of collisions within Zone 1 is observed to increase between 2015 and 2016. Being the third longest analysis sub-segment, Zone 1 contains the most number of collisions within the five year analysis period (a total of 46 collisions). The 6 zones ranks as follows for containing the most number of collisions:

- Zone 1 – 46 collisions
- Zone 6 – 32 collisions
- Zone 4 – 31 collisions
- Zone 2 – 27 collisions
- Zone 5 – 21 collisions
- Zone 3 – 13 collisions

A fluctuation in the number of collisions recorded (with the progression of the years) is noted for Zones 2, 3, 4 and 5. Zone 6, indicates a steady increase in collisions between the years 2013 and 2015, followed by the number of recorded collisions increasing by more than double between the years 2015 and 2016.

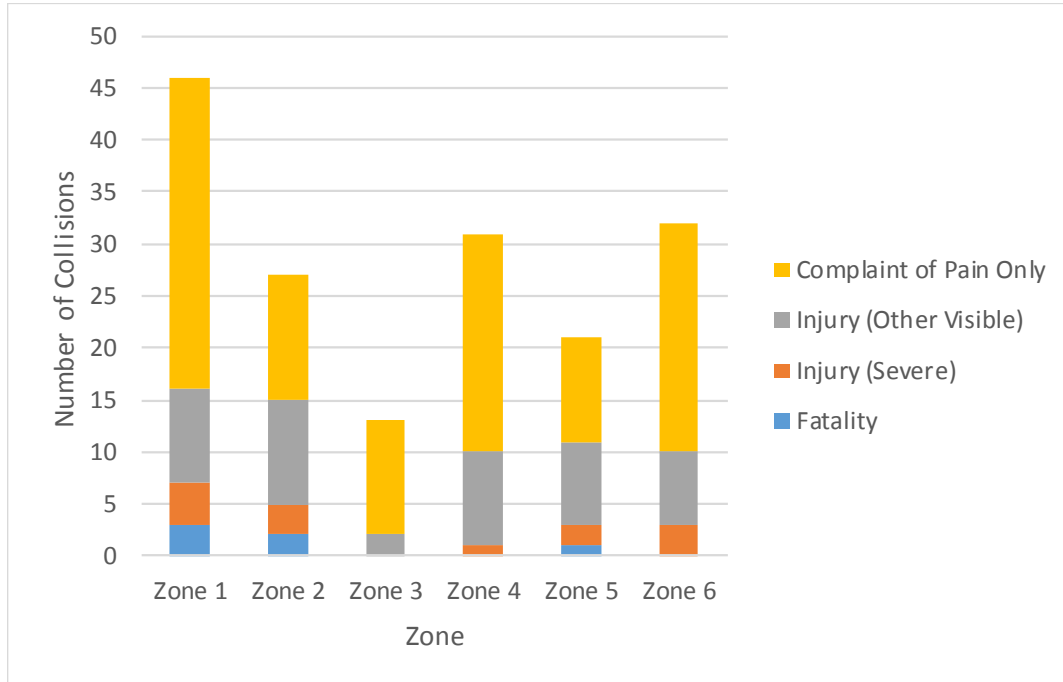
**FIGURE 10 – SUMMARY OF COLLISIONS BY YEAR AND ZONE**



## Collision Severity

Figure 11 presents a summary of the collision severities recorded for each zone, within the 5-year analysis period. As presented within the figure, the majority of the collisions recorded across the six zones, have resulted in minor injuries (with severity as complaint of pain). Zone 1 contains the highest number of reported minor injury collisions, while Zone 2 contains the highest number of collisions with other visible injuries. Fatalities have been reported with Zones 1, 2 and 5 (with Zone 1 reporting 3 of these six reported fatalities).

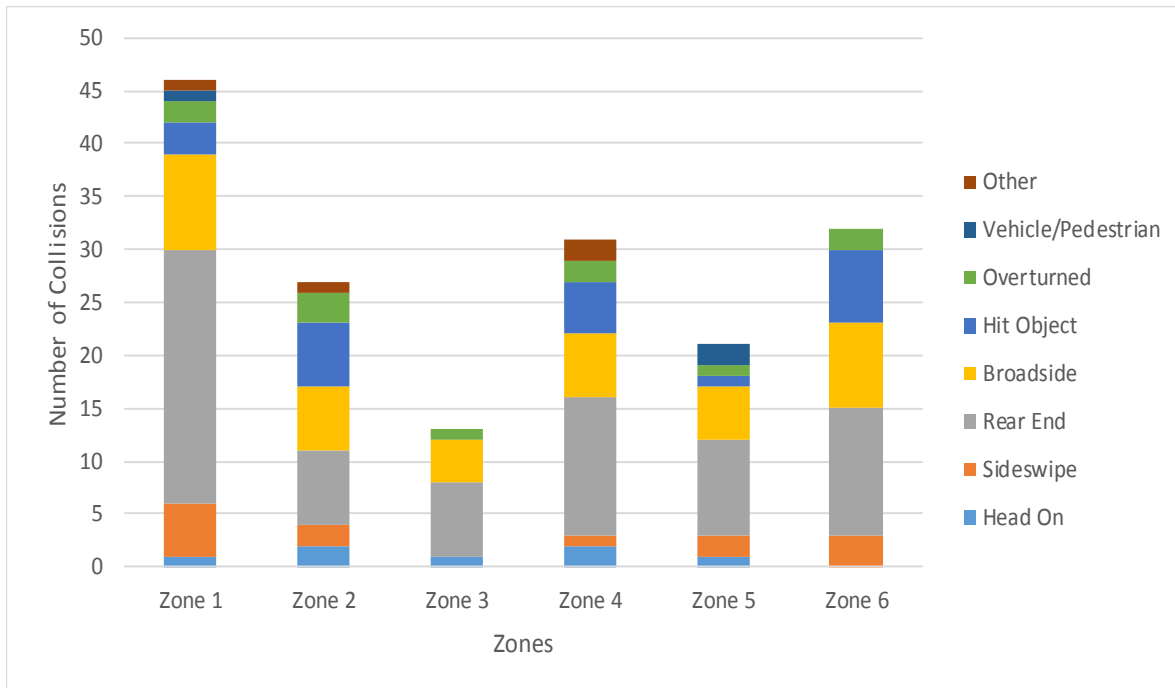
**FIGURE 11 – SUMMARY OF COLLISIONS SEVERITY BY ZONE**



## Collision Types

Figure 12 presents a summary of the collision types observed for the different analysis zones within the 5-year analysis period that spans between 2012 and 2016. As indicated within Figure 6, rear end collisions, followed by broadside and hit object collisions, were the most common type of collision recorded for all study zones within the SR 49 corridor. Both rear end and broadside collisions were observed to occur most frequently within Zone 1.

**FIGURE 12 – SUMMARY OF COLLISIONS BY TYPE AND ZONE**



## Contributing Causes of Collisions

Figure 13 presents a comparative summary of the contributing cause and type of collisions for each of the zones. As presented within this figure, traveling at unsafe speeds is the most frequently recorded contributing cause for collisions, across all zones. Zone 1 is noted to contain the most number of collisions caused by unsafe speeds (a total of 23 collisions within this segment). Driving under the influence and improper turning are two contributing causes that were observed to be common across the zones analyzed.

**FIGURE 13 – COLLISIONS BY ZONE AND CONTRIBUTING CAUSE**

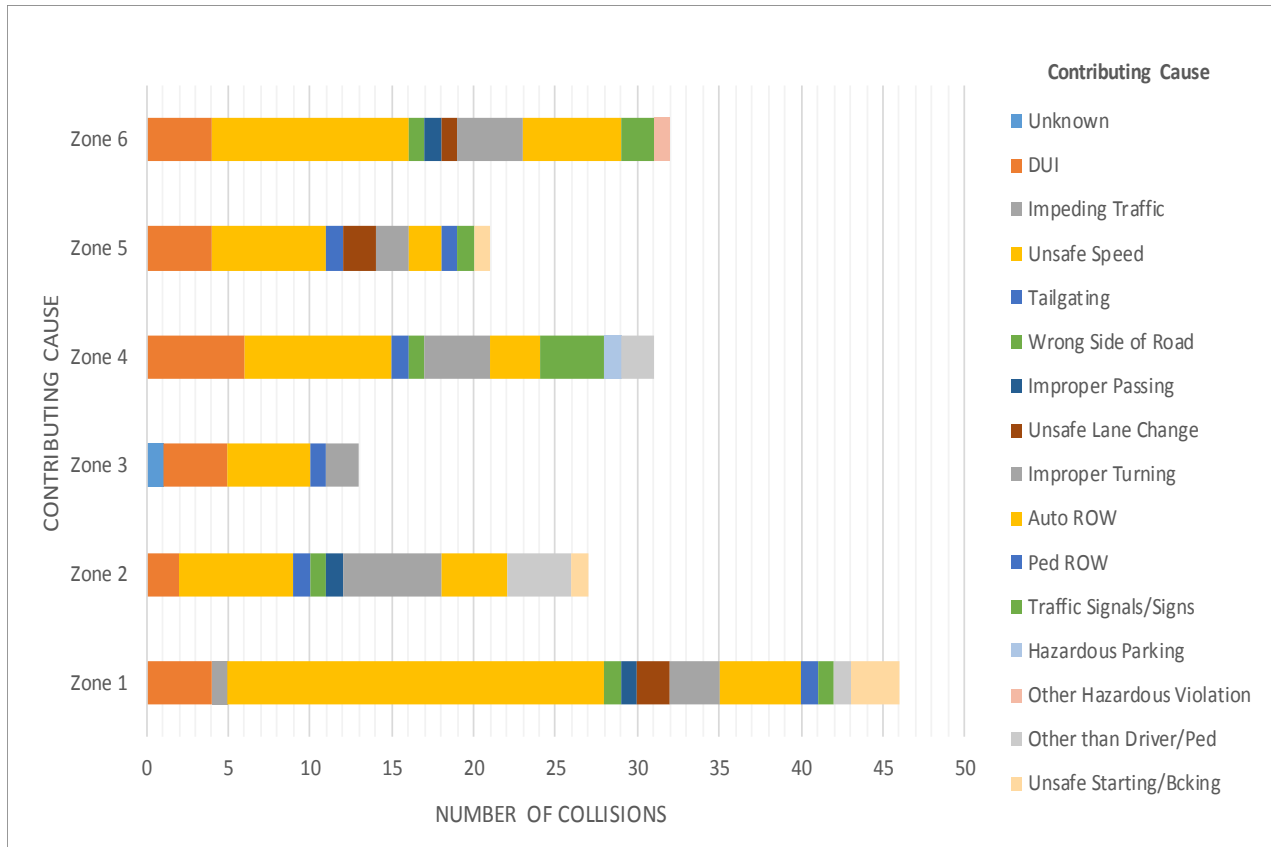
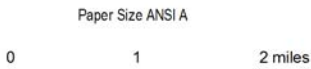
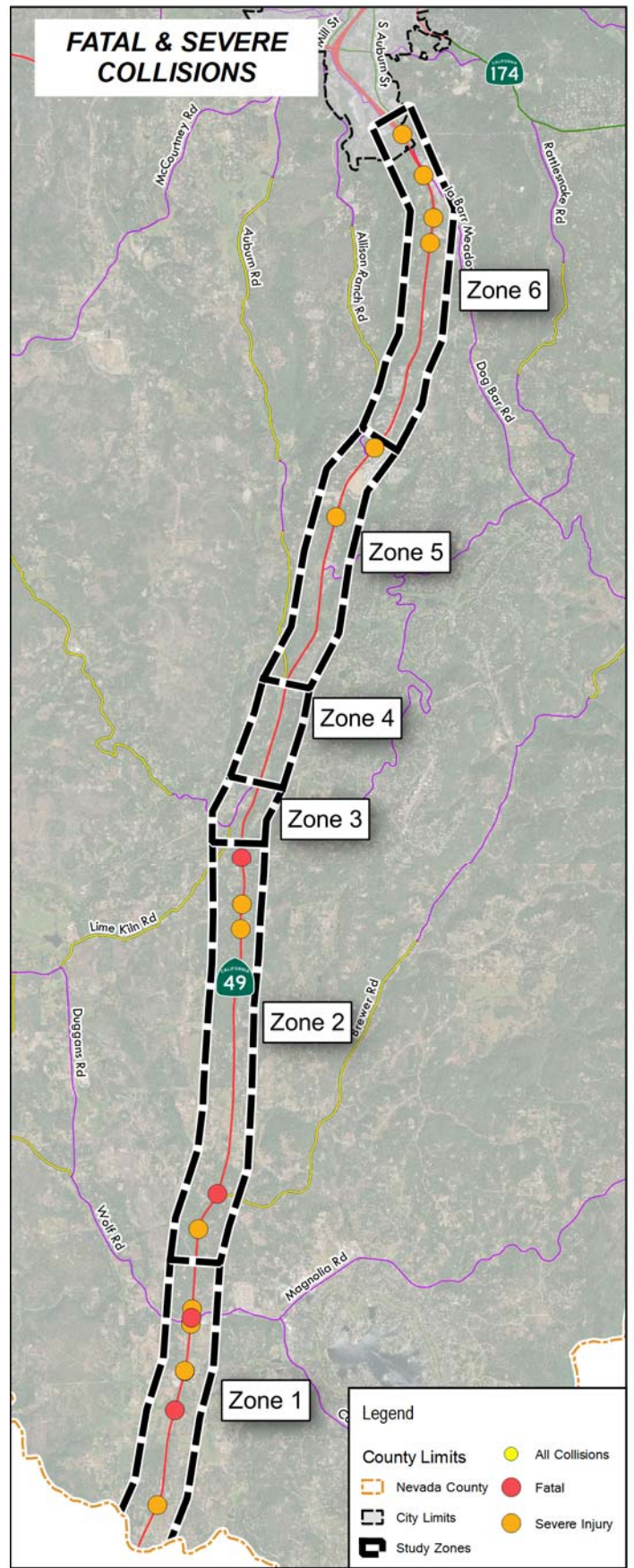
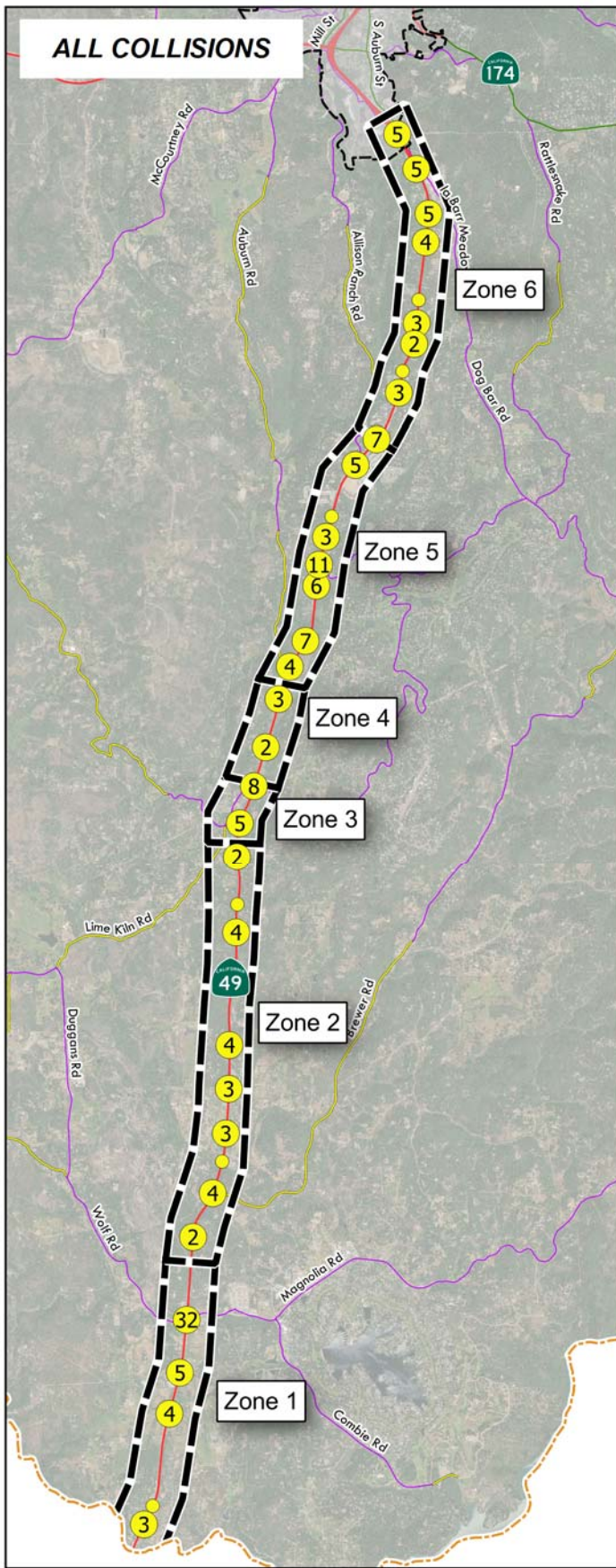


Figure 14 presents a heat map of the collisions recorded along the SR 49 corridor within the years 2012 and 2016.



Coordinate Reference System:  
NAD83 California State Plane Zone II

Nevada County  
SR 49 CSMP  
  
SR 49 Study  
Corridor  
Collision Maps

Project No. 25-4862-00  
Revision No. -  
Date. 06/29/2018

**FIGURE 14**



## Bicycle and Pedestrian Collisions

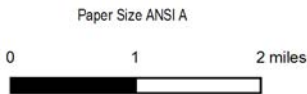
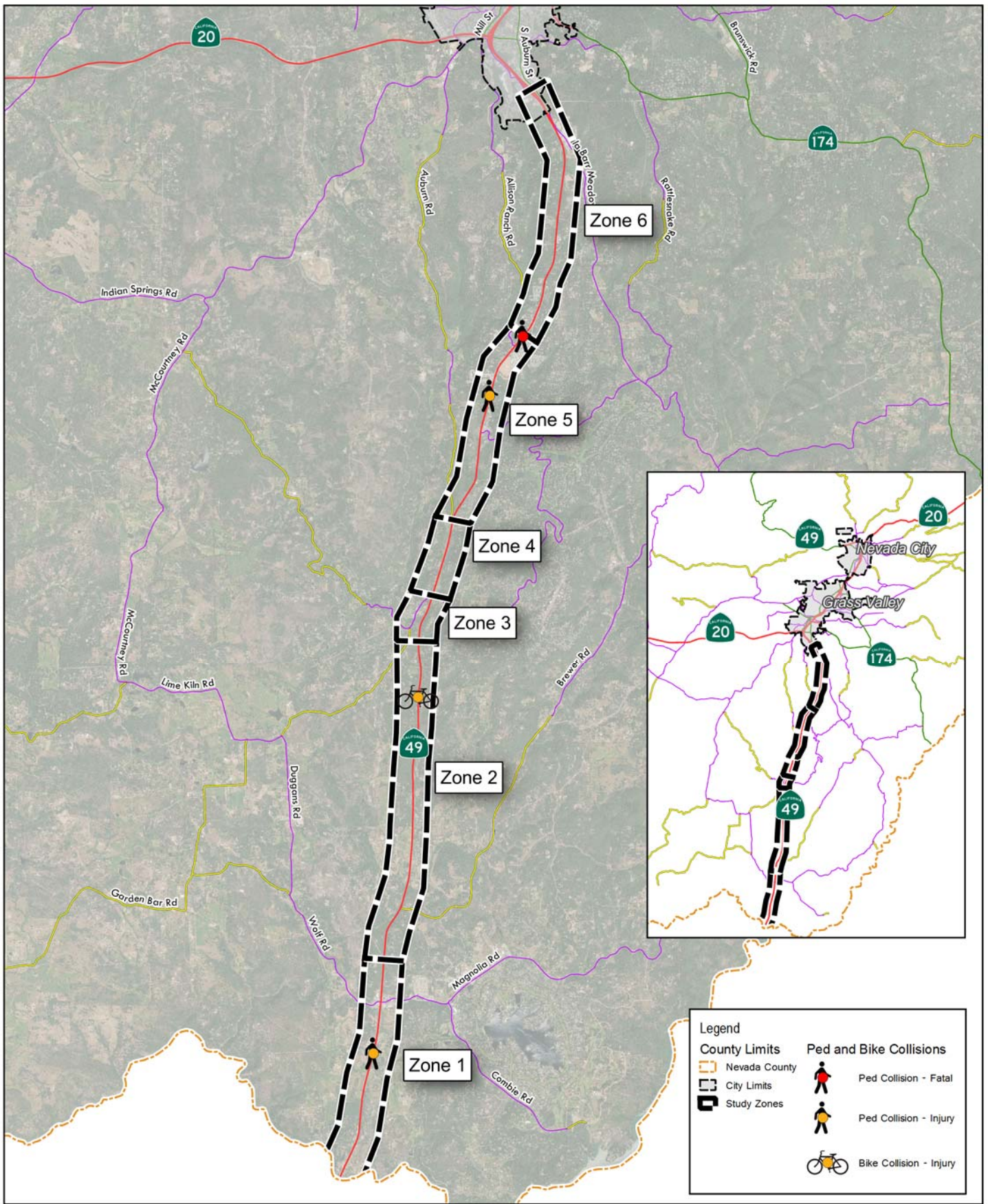
Within the five-year collision analysis period, four (4) bicycle and pedestrian collisions have been recorded along the 13.6-mile long corridor of SR 49. Figure 15 presents a map of the bicycle and pedestrian collisions along the SR 49 corridor. Of these four collisions, three (3) were vehicle-pedestrian collisions while only one (1) was a vehicle-bicycle collision.

The four bicycle/pedestrian collisions recorded for the corridor were located within Zones 1, 2, and 5. While Zone 5 has recorded two collision, both Zones 1 and 2 have only one collision each. Both Zones 1 and 5 are sites of pedestrian collisions only, and no bicycle collisions were recorded within either of these study segments.

The descriptions of these collisions are as follows:

- **Zone 1 – Nevada County Line to Wolf Road/Combie Road intersection**
  - Pedestrian collision was recorded approximately 700 feet south of Streeter Road. The pedestrian sustained minor injuries, and the collision severity was recorded as “complaint of pain”. The contributing cause of this collision was a pedestrian violation, in which the pedestrian was present in either the roadway or the shoulder. This incidence was a night time collision, and occurred in the dark, and in the absence of street lighting. The road surface was recorded to be as either snowy/icy at the time of occurrence.
- **Zone 2 – Cameo Drive to Oak Drive/Mother Load Road**
  - Bicycle collision was recorded approximately 300 feet south of Cherry Creek Road. The bicyclist sustained injuries, and the collisions severity was recorded as “injury other visible”. The contributing cause of this collision was recorded as the failure to yield right of way (automobile ROW violation). This incidence occurred in the afternoon, and occurred in the dark, and in the absence of street lighting. Weather not stated. Dark with no street lights. For this collision, no descriptions were provided on the condition of the road surface.
- **Zone 5 – Auburn Road to La Barr Meadows Road/Allison Ranch Road**
  - Pedestrian collision was recorded approximately 54 ft south of La Barr Meadows Road. This collision resulted in a pedestrian fatality. The contributing cause of this collision was a pedestrian violation, in which the pedestrian was found to be crossing SR 49 in the absence of a crosswalk. This incidence occurred at either a construction/roadway repair zone under daylight conditions. The collision resulted in the tow-away of the vehicle involved.
  - Pedestrian collision was recorded approximately 528 feet north of Pingree Road. This collision resulted in the pedestrian sustaining other visible injuries. The contributing cause of this collision was the unsafe starting and/or backing of a vehicle into a pedestrian who was present on either the roadway or the shoulder. This incidence occurred at the absence of unusual road surface, lighting and weather conditions.

Figure 15 presents a heat map of the bicycle and pedestrian collisions recorded along the SR 49 corridor within the years 2012 and 2016.



Coordinate Reference System:  
NAD83 California State Plane Zone II

Nevada County  
SR 49 CSMP

**SR 49 Study Corridor  
Bicycle and  
Pedestrian Collisions**

Project No. 25-4862-00  
Revision No. -  
Date. 06/29/2018

**FIGURE 15**

# Appendices

## **Appendix A: Data Collection**

# ALL TRAFFIC DATA

(916) 771-8700

[orders@atdtraffic.com](mailto:orders@atdtraffic.com)

File Name : 18-07074-001

Date : 04/17/2018

## Unshifted Count = All Vehicles & Utturns

START TIME	SR 49 Southbound					Combie Rd /Wolf Rd Westbound					SR 49 Northbound					Combie Rd /Wolf Rd Eastbound					Total	Utturns Total
	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL		
7:00	29	188	8	0	225	84	11	18	0	113	8	93	26	0	127	0	13	30	0	43	508	0
7:15	46	220	4	0	270	111	5	38	0	154	7	118	40	0	165	5	20	32	0	57	646	0
7:30	67	227	8	0	302	142	22	46	0	210	8	161	50	0	219	3	25	44	0	72	803	0
7:45	81	173	12	0	266	106	30	71	0	207	17	101	61	1	180	5	26	47	0	78	731	1
<b>Total</b>	<b>223</b>	<b>808</b>	<b>32</b>	<b>0</b>	<b>1063</b>	<b>443</b>	<b>68</b>	<b>173</b>	<b>0</b>	<b>684</b>	<b>40</b>	<b>473</b>	<b>177</b>	<b>1</b>	<b>691</b>	<b>13</b>	<b>84</b>	<b>153</b>	<b>0</b>	<b>250</b>	<b>2688</b>	<b>1</b>
8:00	86	172	12	0	270	98	33	57	0	188	20	108	64	0	192	5	37	38	0	80	730	0
8:15	94	173	21	0	288	112	45	63	0	220	27	110	102	0	239	7	45	38	0	90	837	0
8:30	57	198	9	0	264	120	22	58	0	200	15	118	59	0	192	7	34	54	0	95	751	0
8:45	50	221	9	0	280	90	23	51	0	164	13	85	44	0	142	6	27	43	0	76	662	0
<b>Total</b>	<b>287</b>	<b>764</b>	<b>51</b>	<b>0</b>	<b>1102</b>	<b>420</b>	<b>123</b>	<b>229</b>	<b>0</b>	<b>772</b>	<b>75</b>	<b>421</b>	<b>269</b>	<b>0</b>	<b>765</b>	<b>25</b>	<b>143</b>	<b>173</b>	<b>0</b>	<b>341</b>	<b>2980</b>	<b>0</b>
16:00	49	161	9	0	219	78	17	61	0	156	46	223	117	0	386	10	20	32	0	62	823	0
16:15	65	169	12	0	246	72	30	53	0	155	31	198	122	0	351	19	21	38	0	78	830	0
16:30	45	156	15	0	216	85	25	53	0	163	41	244	131	0	416	11	16	24	0	51	846	0
16:45	57	167	9	0	233	49	30	38	0	117	58	213	122	0	393	5	33	31	0	69	812	0
<b>Total</b>	<b>216</b>	<b>653</b>	<b>45</b>	<b>0</b>	<b>914</b>	<b>284</b>	<b>102</b>	<b>205</b>	<b>0</b>	<b>591</b>	<b>176</b>	<b>878</b>	<b>492</b>	<b>0</b>	<b>1546</b>	<b>45</b>	<b>90</b>	<b>125</b>	<b>0</b>	<b>260</b>	<b>3311</b>	<b>0</b>
17:00	45	138	3	0	186	83	31	60	0	174	26	237	140	0	403	7	23	15	0	45	808	0
17:15	53	192	6	0	251	48	22	46	0	116	33	289	155	0	477	10	25	22	0	57	901	0
17:30	62	206	9	0	277	81	31	47	0	159	39	207	122	1	369	9	18	20	0	47	852	1
17:45	60	145	12	0	217	71	30	65	0	166	41	207	109	0	357	8	14	21	0	43	783	0
<b>Total</b>	<b>220</b>	<b>681</b>	<b>30</b>	<b>0</b>	<b>931</b>	<b>283</b>	<b>114</b>	<b>218</b>	<b>0</b>	<b>615</b>	<b>139</b>	<b>940</b>	<b>526</b>	<b>1</b>	<b>1606</b>	<b>34</b>	<b>80</b>	<b>78</b>	<b>0</b>	<b>192</b>	<b>3344</b>	<b>1</b>
<b>Grand Total</b>	<b>946</b>	<b>2906</b>	<b>158</b>	<b>0</b>	<b>4010</b>	<b>1430</b>	<b>407</b>	<b>825</b>	<b>0</b>	<b>2662</b>	<b>430</b>	<b>2712</b>	<b>1464</b>	<b>2</b>	<b>4608</b>	<b>117</b>	<b>397</b>	<b>529</b>	<b>0</b>	<b>1043</b>	<b>12323</b>	<b>2</b>
Apprch %	23.6%	72.5%	3.9%	0.0%		53.7%	15.3%	31.0%	0.0%		9.3%	58.9%	31.8%	0.0%		11.2%	38.1%	50.7%	0.0%			
Total %	7.7%	23.6%	1.3%	0.0%	32.5%	11.6%	3.3%	6.7%	0.0%	21.6%	3.5%	22.0%	11.9%	0.0%	37.4%	0.9%	3.2%	4.3%	0.0%	8.5%	100.0%	

AM PEAK HOUR	SR 49 Southbound					Combie Rd /Wolf Rd Westbound					SR 49 Northbound					Combie Rd /Wolf Rd Eastbound					Total	
	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL		
Peak Hour Analysis From 07:30 to 08:30																						
Peak Hour For Entire Intersection Begins at 07:30																						
7:30	67	227	8	0	302	142	22	46	0	210	8	161	50	0	219	3	25	44	0	72	803	
7:45	81	173	12	0	266	106	30	71	0	207	17	101	61	1	180	5	26	47	0	78	731	
8:00	86	172	12	0	270	98	33	57	0	188	20	108	64	0	192	5	37	38	0	80	730	
8:15	94	173	21	0	288	112	45	63	0	220	27	110	102	0	239	7	45	38	0	90	837	
Total Volume	328	745	53	0	1126	458	130	237	0	825	72	480	277	1	830	20	133	167	0	320	3101	
% App Total	29.1%	66.2%	4.7%	0.0%		55.5%	15.8%	28.7%	0.0%		8.7%	57.8%	33.4%	0.1%		6.3%	41.6%	52.2%	0.0%			
PHF	.872	.820	.631	.000	.932	.806	.722	.835	.000	.938	.667	.745	.679	.250	.868	.714	.739	.888	.000	.889	.926	

PM PEAK HOUR	SR 49 Southbound					Combie Rd /Wolf Rd Westbound					SR 49 Northbound					Combie Rd /Wolf Rd Eastbound					Total	
	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL		
Peak Hour Analysis From 16:45 to 17:45																						
Peak Hour For Entire Intersection Begins at 16:45																						
16:45	57	167	9	0	233	49	30	38	0	117	58	213	122	0	393	5	33	31	0	69	812	
17:00	45	138	3	0	186	83	31	60	0	174	26	237	140	0	403	7	23	15	0	45	808	
17:15	53	192	6	0	251	48	22	46	0	116	33	289	155	0	477	10	25	22	0	57	901	
17:30	62	206	9	0	277	81	31	47	0	159	39	207	122	1	369	9	18	20	0	47	852	
Total Volume	217	703	27	0	947	261	114	191	0	566	156	946	539	1	1642	31	99	88	0	218	3373	
% App Total	22.9%	74.2%	2.9%	0.0%		46.1%	20.1%	33.7%	0.0%		9.5%	57.6%	32.8%	0.1%		14.2%	45.4%	40.4%	0.0%			
PHF	.875	.853	.750	.000	.855	.786	.919	.796	.000	.813	.672	.818	.869	.250	.861	.775	.750	.710	.000	.790	.936	



# ALL TRAFFIC DATA

(916) 771-8700

[orders@atdtraffic.com](mailto:orders@atdtraffic.com)

File Name : 18-07074-003

Date : 04/17/2018

## Unshifted Count = All Vehicles & Uturns

START TIME	SR 49 Southbound					Cherry Creek Rd Westbound					SR 49 Northbound					Cherry Creek Rd Eastbound					Total	Uturns Total
	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL		
7:00	0	211	0	0	211	4	0	0	1	5	0	121	0	0	121	0	0	1	0	1	338	1
7:15	0	268	0	0	268	1	0	0	0	1	0	160	1	0	161	0	0	2	0	2	432	0
7:30	0	278	0	0	278	1	0	0	0	1	0	197	0	0	197	0	0	1	0	1	477	0
7:45	1	259	0	0	260	0	0	0	0	0	0	193	0	0	193	0	0	1	0	1	454	0
<b>Total</b>	<b>1</b>	<b>1016</b>	<b>0</b>	<b>0</b>	<b>1017</b>	<b>6</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>7</b>	<b>0</b>	<b>671</b>	<b>1</b>	<b>0</b>	<b>672</b>	<b>0</b>	<b>0</b>	<b>5</b>	<b>0</b>	<b>5</b>	<b>1701</b>	<b>1</b>
8:00	0	263	0	0	263	1	0	2	0	3	0	157	0	0	157	1	0	0	0	1	424	0
8:15	2	266	1	0	269	1	0	1	0	2	2	187	2	0	191	0	0	1	0	1	463	0
8:30	0	258	0	0	258	0	0	0	0	0	1	185	1	0	187	0	0	1	0	1	446	0
8:45	2	226	0	1	229	1	0	0	0	1	0	151	0	0	151	0	0	2	0	2	383	1
<b>Total</b>	<b>4</b>	<b>1013</b>	<b>1</b>	<b>1</b>	<b>1019</b>	<b>3</b>	<b>0</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>3</b>	<b>680</b>	<b>3</b>	<b>0</b>	<b>686</b>	<b>1</b>	<b>0</b>	<b>4</b>	<b>0</b>	<b>5</b>	<b>1716</b>	<b>1</b>
16:00	1	212	1	0	214	0	0	0	0	0	0	264	0	0	264	0	0	0	0	0	478	0
16:15	1	255	0	0	256	2	0	0	0	2	1	265	3	0	269	0	0	1	0	1	528	0
16:30	1	213	0	0	214	0	0	2	0	2	1	272	1	0	274	0	0	0	0	0	490	0
16:45	3	212	0	0	215	0	0	0	0	0	0	271	2	0	273	0	0	0	0	0	488	0
<b>Total</b>	<b>6</b>	<b>892</b>	<b>1</b>	<b>0</b>	<b>899</b>	<b>2</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>2</b>	<b>1072</b>	<b>6</b>	<b>0</b>	<b>1080</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>1984</b>	<b>0</b>
17:00	0	216	0	0	216	1	0	2	0	3	2	260	0	0	262	0	0	0	0	0	481	0
17:15	3	262	1	0	266	0	0	0	0	0	2	310	1	0	313	0	0	0	0	0	579	0
17:30	2	240	0	0	242	1	0	0	0	1	1	287	2	0	290	0	0	2	0	2	535	0
17:45	2	208	0	0	210	2	0	0	0	2	3	258	3	0	264	0	0	0	0	0	476	0
<b>Total</b>	<b>7</b>	<b>926</b>	<b>1</b>	<b>0</b>	<b>934</b>	<b>4</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>6</b>	<b>8</b>	<b>1115</b>	<b>6</b>	<b>0</b>	<b>1129</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>2</b>	<b>2071</b>	<b>0</b>
<b>Grand Total</b>	<b>18</b>	<b>3847</b>	<b>3</b>	<b>1</b>	<b>3869</b>	<b>15</b>	<b>0</b>	<b>7</b>	<b>1</b>	<b>23</b>	<b>13</b>	<b>3538</b>	<b>16</b>	<b>0</b>	<b>3567</b>	<b>1</b>	<b>0</b>	<b>12</b>	<b>0</b>	<b>13</b>	<b>7472</b>	<b>2</b>
Apprch %	0.5%	99.4%	0.1%	0.0%		65.2%	0.0%	30.4%	4.3%		0.4%	99.2%	0.4%	0.0%		7.7%	0.0%	92.3%	0.0%			
Total %	0.2%	51.5%	0.0%	0.0%	51.8%	0.2%	0.0%	0.1%	0.0%	0.3%	0.2%	47.4%	0.2%	0.0%	47.7%	0.0%	0.0%	0.2%	0.0%	0.2%	100.0%	

AM PEAK HOUR	SR 49 Southbound					Cherry Creek Rd Westbound					SR 49 Northbound					Cherry Creek Rd Eastbound					Total
	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	
Peak Hour Analysis From 07:30 to 08:30																					
Peak Hour For Entire Intersection Begins at 07:30																					
7:30	0	278	0	0	278	1	0	0	0	1	0	197	0	0	197	0	0	1	0	1	477
7:45	1	259	0	0	260	0	0	0	0	0	0	193	0	0	193	0	0	1	0	1	454
8:00	0	263	0	0	263	1	0	2	0	3	0	157	0	0	157	1	0	0	0	1	424
8:15	2	266	1	0	269	1	0	1	0	2	2	187	2	0	191	0	0	1	0	1	463
Total Volume	3	1066	1	0	1070	3	0	3	0	6	2	734	2	0	738	1	0	3	0	4	1818
% App Total	0.3%	99.6%	0.1%	0.0%		50.0%	0.0%	50.0%	0.0%		0.3%	99.5%	0.3%	0.0%		25.0%	0.0%	75.0%	0.0%		
PHF	.375	.959	.250	.000	.962	.750	.000	.375	.000	.500	.250	.931	.250	.000	.937	.250	.000	.750	.000	1.000	.953

PM PEAK HOUR	SR 49 Southbound					Cherry Creek Rd Westbound					SR 49 Northbound					Cherry Creek Rd Eastbound					Total
	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	
Peak Hour Analysis From 16:45 to 17:45																					
Peak Hour For Entire Intersection Begins at 16:45																					
16:45	3	212	0	0	215	0	0	0	0	0	0	271	2	0	273	0	0	0	0	0	488
17:00	0	216	0	0	216	1	0	2	0	3	2	260	0	0	262	0	0	0	0	0	481
17:15	3	262	1	0	266	0	0	0	0	0	2	310	1	0	313	0	0	0	0	0	579
17:30	2	240	0	0	242	1	0	0	0	1	1	287	2	0	290	0	0	2	0	2	535
Total Volume	8	930	1	0	939	2	0	2	0	4	5	1128	5	0	1138	0	0	2	0	2	2083
% App Total	0.9%	99.0%	0.1%	0.0%		50.0%	0.0%	50.0%	0.0%		0.4%	99.1%	0.4%	0.0%		0.0%	0.0%	100.0%	0.0%		
PHF	.667	.887	.250	.000	.883	.500	.000	.250	.000	.333	.625	.910	.625	.000	.909	.000	.000	.250	.000	.250	.899

# ALL TRAFFIC DATA

(916) 771-8700

[orders@atdtraffic.com](mailto:orders@atdtraffic.com)

File Name : 18-07074-004

Date : 04/17/2018

## Unshifted Count = All Vehicles & Uturns

START TIME	SR 49 Southbound					Oak Dr/Mother Lode Rd Westbound					SR 49 Northbound					Oak Dr/Mother Lode Rd Eastbound					Total	Uturns Total
	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL		
7:00	0	207	0	0	207	2	0	1	0	3	0	113	0	0	113	0	0	0	0	0	323	0
7:15	0	261	0	0	261	2	0	2	0	4	0	140	0	0	140	0	0	0	0	0	405	0
7:30	0	284	0	0	284	3	0	0	0	3	0	219	0	0	219	1	0	0	0	1	507	0
7:45	1	257	0	0	258	2	0	2	0	4	0	194	1	0	195	0	0	0	0	0	457	0
<b>Total</b>	<b>1</b>	<b>1009</b>	<b>0</b>	<b>0</b>	<b>1010</b>	<b>9</b>	<b>0</b>	<b>5</b>	<b>0</b>	<b>14</b>	<b>0</b>	<b>666</b>	<b>1</b>	<b>0</b>	<b>667</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1692</b>	<b>0</b>
8:00	0	263	0	0	263	2	0	6	0	8	0	159	2	0	161	0	0	0	0	0	432	0
8:15	0	259	0	0	259	0	0	3	0	3	0	171	0	0	171	0	0	0	0	0	433	0
8:30	1	257	0	0	258	2	0	3	0	5	0	192	1	0	193	1	0	0	0	1	457	0
8:45	1	234	0	0	235	6	0	2	0	8	0	168	0	0	168	0	0	0	0	0	411	0
<b>Total</b>	<b>2</b>	<b>1013</b>	<b>0</b>	<b>0</b>	<b>1015</b>	<b>10</b>	<b>0</b>	<b>14</b>	<b>0</b>	<b>24</b>	<b>0</b>	<b>690</b>	<b>3</b>	<b>0</b>	<b>693</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1733</b>	<b>0</b>
16:00	1	213	0	0	214	2	0	1	0	3	0	248	4	1	253	0	0	0	0	0	470	1
16:15	2	248	0	0	250	1	0	2	0	3	1	264	2	0	267	0	0	0	0	0	520	0
16:30	2	211	0	0	213	0	0	2	0	2	0	281	1	1	283	0	0	0	0	0	498	1
16:45	2	214	0	0	216	1	0	1	0	2	0	258	5	0	263	1	0	0	0	1	482	0
<b>Total</b>	<b>7</b>	<b>886</b>	<b>0</b>	<b>0</b>	<b>893</b>	<b>4</b>	<b>0</b>	<b>6</b>	<b>0</b>	<b>10</b>	<b>1</b>	<b>1051</b>	<b>12</b>	<b>2</b>	<b>1066</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1970</b>	<b>2</b>
17:00	0	210	0	0	210	2	0	0	0	2	0	276	3	0	279	0	0	0	0	0	491	0
17:15	3	266	0	0	269	1	0	1	0	2	0	317	2	0	319	0	0	0	0	0	590	0
17:30	2	248	1	0	251	1	0	1	0	2	1	260	1	1	263	0	0	0	0	0	516	1
17:45	2	195	1	0	198	2	0	1	0	3	0	266	2	0	268	1	0	1	0	2	471	0
<b>Total</b>	<b>7</b>	<b>919</b>	<b>2</b>	<b>0</b>	<b>928</b>	<b>6</b>	<b>0</b>	<b>3</b>	<b>0</b>	<b>9</b>	<b>1</b>	<b>1119</b>	<b>8</b>	<b>1</b>	<b>1129</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>2</b>	<b>2068</b>	<b>1</b>
<b>Grand Total</b>	<b>17</b>	<b>3827</b>	<b>2</b>	<b>0</b>	<b>3846</b>	<b>29</b>	<b>0</b>	<b>28</b>	<b>0</b>	<b>57</b>	<b>2</b>	<b>3526</b>	<b>24</b>	<b>3</b>	<b>3555</b>	<b>4</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>5</b>	<b>7463</b>	<b>3</b>
Apprch %	0.4%	99.5%	0.1%	0.0%		50.9%	0.0%	49.1%	0.0%		0.1%	99.2%	0.7%	0.1%		80.0%	0.0%	20.0%	0.0%			
Total %	0.2%	51.3%	0.0%	0.0%	51.5%	0.4%	0.0%	0.4%	0.0%	0.8%	0.0%	47.2%	0.3%	0.0%	47.6%	0.1%	0.0%	0.0%	0.0%	0.1%	100.0%	

AM PEAK HOUR	SR 49 Southbound					Oak Dr/Mother Lode Rd Westbound					SR 49 Northbound					Oak Dr/Mother Lode Rd Eastbound					Total
	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	
Peak Hour Analysis From 07:30 to 08:30																					
Peak Hour For Entire Intersection Begins at 07:30																					
7:30	0	284	0	0	284	3	0	0	0	3	0	219	0	0	219	1	0	0	0	1	507
7:45	1	257	0	0	258	2	0	2	0	4	0	194	1	0	195	0	0	0	0	0	457
8:00	0	263	0	0	263	2	0	6	0	8	0	159	2	0	161	0	0	0	0	0	432
8:15	0	259	0	0	259	0	0	3	0	3	0	171	0	0	171	0	0	0	0	0	433
Total Volume	1	1063	0	0	1064	7	0	11	0	18	0	743	3	0	746	1	0	0	0	1	1829
% App Total	0.1%	99.9%	0.0%	0.0%		38.9%	0.0%	61.1%	0.0%		0.0%	99.6%	0.4%	0.0%		100.0%	0.0%	0.0%	0.0%		
PHF	.250	.936	.000	.000	.937	.583	.000	.458	.000	.563	.000	.848	.375	.000	.852	.250	.000	.000	.000	.250	.902

PM PEAK HOUR	SR 49 Southbound					Oak Dr/Mother Lode Rd Westbound					SR 49 Northbound					Oak Dr/Mother Lode Rd Eastbound					Total
	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	
Peak Hour Analysis From 16:45 to 17:45																					
Peak Hour For Entire Intersection Begins at 16:45																					
16:45	2	214	0	0	216	1	0	1	0	2	0	258	5	0	263	1	0	0	0	1	482
17:00	0	210	0	0	210	2	0	0	0	2	0	276	3	0	279	0	0	0	0	0	491
17:15	3	266	0	0	269	1	0	1	0	2	0	317	2	0	319	0	0	0	0	0	590
17:30	2	248	1	0	251	1	0	1	0	2	1	260	1	1	263	0	0	0	0	0	516
Total Volume	7	938	1	0	946	5	0	3	0	8	1	1111	11	1	1124	1	0	0	0	1	2079
% App Total	0.7%	99.2%	0.1%	0.0%		62.5%	0.0%	37.5%	0.0%		0.1%	98.8%	1.0%	0.1%		100.0%	0.0%	0.0%	0.0%		
PHF	.583	.882	.250	.000	.879	.625	.000	.750	.000	1.000	.250	.876	.550	.250	.881	.250	.000	.000	.000	.250	.881



# ALL TRAFFIC DATA

(916) 771-8700

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File Name : 18-07074-005

Date : 04/17/2018

## Unshifted Count = All Vehicles & Uturns

START TIME	SR 49 Southbound					E Lime Kiln Rd Westbound					SR 49 Northbound					E Lime Kiln Rd Eastbound					Total	Uturns Total
	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL		
7:00	4	161	4	0	169	40	0	21	0	61	2	110	3	0	115	18	1	10	0	29	374	0
7:15	5	224	4	0	233	39	2	23	0	64	4	147	5	0	156	10	2	10	0	22	475	0
7:30	2	216	8	0	226	42	1	28	0	71	1	198	9	0	208	31	2	12	0	45	550	0
7:45	8	200	10	0	218	41	2	28	0	71	5	173	9	0	187	22	3	9	0	34	510	0
<b>Total</b>	<b>19</b>	<b>801</b>	<b>26</b>	<b>0</b>	<b>846</b>	<b>162</b>	<b>5</b>	<b>100</b>	<b>0</b>	<b>267</b>	<b>12</b>	<b>628</b>	<b>26</b>	<b>0</b>	<b>666</b>	<b>81</b>	<b>8</b>	<b>41</b>	<b>0</b>	<b>130</b>	<b>1909</b>	<b>0</b>
8:00	4	217	15	0	236	52	2	32	0	86	4	155	11	0	170	23	1	6	0	30	522	0
8:15	12	214	18	0	244	28	5	29	0	62	5	163	10	0	178	35	0	14	0	49	533	0
8:30	6	215	21	0	242	28	2	23	0	53	6	164	14	0	184	46	2	11	0	59	538	0
8:45	19	185	14	0	218	24	4	19	0	47	4	158	8	0	170	32	2	9	0	43	478	0
<b>Total</b>	<b>41</b>	<b>831</b>	<b>68</b>	<b>0</b>	<b>940</b>	<b>132</b>	<b>13</b>	<b>103</b>	<b>0</b>	<b>248</b>	<b>19</b>	<b>640</b>	<b>43</b>	<b>0</b>	<b>702</b>	<b>136</b>	<b>5</b>	<b>40</b>	<b>0</b>	<b>181</b>	<b>2071</b>	<b>0</b>
16:00	25	192	21	0	238	16	1	18	0	35	11	214	29	0	254	25	1	8	0	34	561	0
16:15	21	216	24	0	261	18	1	14	0	33	9	230	27	0	266	24	1	8	0	33	593	0
16:30	21	199	27	0	247	14	2	12	0	28	12	237	27	0	276	16	1	5	0	22	573	0
16:45	31	204	28	1	264	10	1	20	0	31	5	212	33	0	250	19	2	1	0	22	567	1
<b>Total</b>	<b>98</b>	<b>811</b>	<b>100</b>	<b>1</b>	<b>1010</b>	<b>58</b>	<b>5</b>	<b>64</b>	<b>0</b>	<b>127</b>	<b>37</b>	<b>893</b>	<b>116</b>	<b>0</b>	<b>1046</b>	<b>84</b>	<b>5</b>	<b>22</b>	<b>0</b>	<b>111</b>	<b>2294</b>	<b>1</b>
17:00	36	189	30	2	257	16	1	16	0	33	5	247	37	0	289	13	2	3	0	18	597	2
17:15	34	246	37	0	317	15	0	11	0	26	13	264	33	0	310	13	2	9	0	24	677	0
17:30	22	233	31	0	286	15	1	10	0	26	6	234	35	0	275	15	3	4	0	22	609	0
17:45	30	167	22	0	219	9	3	15	0	27	8	216	41	0	265	16	2	4	0	22	533	0
<b>Total</b>	<b>122</b>	<b>835</b>	<b>120</b>	<b>2</b>	<b>1079</b>	<b>55</b>	<b>5</b>	<b>52</b>	<b>0</b>	<b>112</b>	<b>32</b>	<b>961</b>	<b>146</b>	<b>0</b>	<b>1139</b>	<b>57</b>	<b>9</b>	<b>20</b>	<b>0</b>	<b>86</b>	<b>2416</b>	<b>2</b>
<b>Grand Total</b>	<b>280</b>	<b>3278</b>	<b>314</b>	<b>3</b>	<b>3875</b>	<b>407</b>	<b>28</b>	<b>319</b>	<b>0</b>	<b>754</b>	<b>100</b>	<b>3122</b>	<b>331</b>	<b>0</b>	<b>3553</b>	<b>358</b>	<b>27</b>	<b>123</b>	<b>0</b>	<b>508</b>	<b>8690</b>	<b>3</b>
Apprch %	7.2%	84.6%	8.1%	0.1%		54.0%	3.7%	42.3%	0.0%		2.8%	87.9%	9.3%	0.0%		70.5%	5.3%	24.2%	0.0%			
Total %	3.2%	37.7%	3.6%	0.0%	44.6%	4.7%	0.3%	3.7%	0.0%	8.7%	1.2%	35.9%	3.8%	0.0%	40.9%	4.1%	0.3%	1.4%	0.0%	5.8%	100.0%	

AM PEAK HOUR	SR 49 Southbound					E Lime Kiln Rd Westbound					SR 49 Northbound					E Lime Kiln Rd Eastbound					Total	
	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL		
Peak Hour Analysis From 07:30 to 08:30																						
Peak Hour For Entire Intersection Begins at 07:30																						
7:30	2	216	8	0	226	42	1	28	0	71	1	198	9	0	208	31	2	12	0	45	550	
7:45	8	200	10	0	218	41	2	28	0	71	5	173	9	0	187	22	3	9	0	34	510	
8:00	4	217	15	0	236	52	2	32	0	86	4	155	11	0	170	23	1	6	0	30	522	
8:15	12	214	18	0	244	28	5	29	0	62	5	163	10	0	178	35	0	14	0	49	533	
Total Volume	26	847	51	0	924	163	10	117	0	290	15	689	39	0	743	111	6	41	0	158	2115	
% App Total	2.8%	91.7%	5.5%	0.0%		56.2%	3.4%	40.3%	0.0%		2.0%	92.7%	5.2%	0.0%		70.3%	3.8%	25.9%	0.0%			
PHF	.542	.976	.708	.000	.947	.784	.500	.914	.000	.843	.750	.870	.886	.000	.893	.793	.500	.732	.000	.806	.961	

PM PEAK HOUR	SR 49 Southbound					E Lime Kiln Rd Westbound					SR 49 Northbound					E Lime Kiln Rd Eastbound					Total	
	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL		
Peak Hour Analysis From 16:45 to 17:45																						
Peak Hour For Entire Intersection Begins at 16:45																						
16:45	31	204	28	1	264	10	1	20	0	31	5	212	33	0	250	19	2	1	0	22	567	
17:00	36	189	30	2	257	16	1	16	0	33	5	247	37	0	289	13	2	3	0	18	597	
17:15	34	246	37	0	317	15	0	11	0	26	13	264	33	0	310	13	2	9	0	24	677	
17:30	22	233	31	0	286	15	1	10	0	26	6	234	35	0	275	15	3	4	0	22	609	
Total Volume	123	872	126	3	1124	56	3	57	0	116	29	957	138	0	1124	60	9	17	0	86	2450	
% App Total	10.9%	77.6%	11.2%	0.3%		48.3%	2.6%	49.1%	0.0%		2.6%	85.1%	12.3%	0.0%		69.8%	10.5%	19.8%	0.0%			
PHF	.854	.886	.851	.375	.886	.875	.750	.713	.000	.879	.558	.906	.932	.000	.906	.789	.750	.472	.000	.896	.905	

# ALL TRAFFIC DATA

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File Name : 18-07074-006

Date : 04/17/2018

## Unshifted Count = All Vehicles & Uturns

START TIME	SR 49 Southbound					Auburn Rd Westbound					SR 49 Northbound					Auburn Rd Eastbound					Total	Uturns Total
	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL		
7:00	0	176	2	0	178	0	0	0	0	0	3	142	0	1	146	1	0	5	1	7	331	2
7:15	0	221	0	0	221	0	0	0	0	0	5	167	0	0	172	5	0	3	0	8	401	0
7:30	0	226	0	0	226	0	0	0	0	0	0	263	0	1	264	0	0	5	0	5	495	1
7:45	0	204	1	0	205	0	0	0	0	0	4	230	0	0	234	2	0	9	1	12	451	1
<b>Total</b>	<b>0</b>	<b>827</b>	<b>3</b>	<b>0</b>	<b>830</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>12</b>	<b>802</b>	<b>0</b>	<b>2</b>	<b>816</b>	<b>8</b>	<b>0</b>	<b>22</b>	<b>2</b>	<b>32</b>	<b>1678</b>	<b>4</b>
8:00	0	227	3	1	231	0	0	0	0	0	2	217	0	0	219	0	0	8	0	8	458	1
8:15	0	218	2	0	220	0	0	0	0	0	5	223	0	2	230	1	0	7	0	8	458	2
8:30	0	248	1	0	249	0	0	0	0	0	6	231	0	0	237	0	0	5	0	5	491	0
8:45	0	205	0	0	205	0	0	0	0	0	5	211	0	0	216	2	0	4	0	6	427	0
<b>Total</b>	<b>0</b>	<b>898</b>	<b>6</b>	<b>1</b>	<b>905</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>18</b>	<b>882</b>	<b>0</b>	<b>2</b>	<b>902</b>	<b>3</b>	<b>0</b>	<b>24</b>	<b>0</b>	<b>27</b>	<b>1834</b>	<b>3</b>
16:00	0	238	2	0	240	0	0	0	0	0	8	256	0	0	264	1	0	8	0	9	513	0
16:15	0	270	1	0	271	0	0	0	0	0	6	275	0	1	282	1	0	3	1	5	558	2
16:30	0	238	3	1	242	0	0	0	0	0	10	263	0	1	274	0	0	1	0	1	517	2
16:45	0	275	2	0	277	0	0	0	0	0	13	256	0	2	271	1	0	4	0	5	553	2
<b>Total</b>	<b>0</b>	<b>1021</b>	<b>8</b>	<b>1</b>	<b>1030</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>37</b>	<b>1050</b>	<b>0</b>	<b>4</b>	<b>1091</b>	<b>3</b>	<b>0</b>	<b>16</b>	<b>1</b>	<b>20</b>	<b>2141</b>	<b>6</b>
17:00	0	254	5	2	261	0	0	0	0	0	7	245	0	0	252	0	0	5	0	5	518	2
17:15	0	322	0	1	323	0	0	0	0	0	11	302	0	0	313	1	0	4	0	5	641	1
17:30	0	264	1	0	265	0	0	0	0	0	5	248	0	1	254	1	0	4	0	5	524	1
17:45	0	221	1	2	224	0	0	0	0	0	9	227	0	0	236	0	0	2	0	2	462	2
<b>Total</b>	<b>0</b>	<b>1061</b>	<b>7</b>	<b>5</b>	<b>1073</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>32</b>	<b>1022</b>	<b>0</b>	<b>1</b>	<b>1055</b>	<b>2</b>	<b>0</b>	<b>15</b>	<b>0</b>	<b>17</b>	<b>2145</b>	<b>6</b>
Grand Total	0	3807	24	7	3838	0	0	0	0	0	99	3756	0	9	3864	16	0	77	3	96	7798	19
Apprch %	0.0%	99.2%	0.6%	0.2%		0.0%	0.0%	0.0%	0.0%		2.6%	97.2%	0.0%	0.2%		16.7%	0.0%	80.2%	3.1%			
Total %	0.0%	48.8%	0.3%	0.1%	49.2%	0.0%	0.0%	0.0%	0.0%	0.0%	1.3%	48.2%	0.0%	0.1%	49.6%	0.2%	0.0%	1.0%	0.0%	1.2%	100.0%	

AM PEAK HOUR	SR 49 Southbound					Auburn Rd Westbound					SR 49 Northbound					Auburn Rd Eastbound					Total
	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	
Peak Hour Analysis From 07:30 to 08:30																					
Peak Hour For Entire Intersection Begins at 07:30																					
7:30	0	226	0	0	226	0	0	0	0	0	0	263	0	1	264	0	0	5	0	5	495
7:45	0	204	1	0	205	0	0	0	0	0	4	230	0	0	234	2	0	9	1	12	451
8:00	0	227	3	1	231	0	0	0	0	0	2	217	0	0	219	0	0	8	0	8	458
8:15	0	218	2	0	220	0	0	0	0	0	5	223	0	2	230	1	0	7	0	8	458
Total Volume	0	875	6	1	882	0	0	0	0	0	11	933	0	3	947	3	0	29	1	33	1862
% App Total	0.0%	99.2%	0.7%	0.1%		0.0%	0.0%	0.0%	0.0%		1.2%	98.5%	0.0%	0.3%		9.1%	0.0%	87.9%	3.0%		
PHF	.000	.964	.500	.250	.955	.000	.000	.000	.000	.000	.550	.887	.000	.375	.897	.375	.000	.806	.250	.688	.940

PM PEAK HOUR	SR 49 Southbound					Auburn Rd Westbound					SR 49 Northbound					Auburn Rd Eastbound					Total
	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	
Peak Hour Analysis From 16:45 to 17:45																					
Peak Hour For Entire Intersection Begins at 16:45																					
16:45	0	275	2	0	277	0	0	0	0	0	13	256	0	2	271	1	0	4	0	5	553
17:00	0	254	5	2	261	0	0	0	0	0	7	245	0	0	252	0	0	5	0	5	518
17:15	0	322	0	1	323	0	0	0	0	0	11	302	0	0	313	1	0	4	0	5	641
17:30	0	264	1	0	265	0	0	0	0	0	5	248	0	1	254	1	0	4	0	5	524
Total Volume	0	1115	8	3	1126	0	0	0	0	0	36	1051	0	3	1090	3	0	17	0	20	2236
% App Total	0.0%	99.0%	0.7%	0.3%		0.0%	0.0%	0.0%	0.0%		3.3%	96.4%	0.0%	0.3%		15.0%	0.0%	85.0%	0.0%		
PHF	.000	.866	.400	.375	.872	.000	.000	.000	.000	.000	.692	.870	.000	.375	.871	.750	.000	.850	.000	1.000	.872



# ALL TRAFFIC DATA

(916) 771-8700

[orders@atdtraffic.com](mailto:orders@atdtraffic.com)

File Name : 18-07074-008

Date : 04/17/2018

## Unshifted Count = All Vehicles & Uturns

START TIME	SR 49 Southbound					La Barr Meadows Rd/Allison Ranch Rd Westbound					SR 49 Northbound					La Barr Meadows Rd/Allison Ranch Rd Eastbound					Total	Uturns Total
	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL		
7:00	1	131	1	0	133	12	0	8	0	20	2	152	1	0	155	4	0	6	0	10	318	0
7:15	5	176	0	0	181	8	0	7	0	15	3	178	3	0	184	13	0	7	0	20	400	0
7:30	4	173	4	0	181	13	0	11	0	24	3	281	6	0	290	7	2	12	0	21	516	0
7:45	2	171	4	0	177	12	1	15	0	28	5	318	8	0	331	16	1	8	0	25	561	0
<b>Total</b>	<b>12</b>	<b>651</b>	<b>9</b>	<b>0</b>	<b>672</b>	<b>45</b>	<b>1</b>	<b>41</b>	<b>0</b>	<b>87</b>	<b>13</b>	<b>929</b>	<b>18</b>	<b>0</b>	<b>960</b>	<b>40</b>	<b>3</b>	<b>33</b>	<b>0</b>	<b>76</b>	<b>1795</b>	<b>0</b>
8:00	5	171	2	0	178	14	1	12	0	27	2	243	3	0	248	10	0	6	0	16	469	0
8:15	0	199	1	0	200	4	0	2	0	6	2	259	6	0	267	20	1	8	0	29	502	0
8:30	8	234	6	0	248	12	1	11	0	24	3	267	2	0	272	10	2	5	0	17	561	0
8:45	6	190	7	0	203	9	2	9	0	20	5	254	4	0	263	19	2	10	0	31	517	0
<b>Total</b>	<b>19</b>	<b>794</b>	<b>16</b>	<b>0</b>	<b>829</b>	<b>39</b>	<b>4</b>	<b>34</b>	<b>0</b>	<b>77</b>	<b>12</b>	<b>1023</b>	<b>15</b>	<b>0</b>	<b>1050</b>	<b>59</b>	<b>5</b>	<b>29</b>	<b>0</b>	<b>93</b>	<b>2049</b>	<b>0</b>
16:00	6	251	7	0	264	6	3	5	0	14	4	241	14	0	259	5	1	6	0	12	549	0
16:15	18	266	12	0	296	12	1	14	0	27	8	237	9	0	254	6	0	4	0	10	587	0
16:30	12	274	17	0	303	12	2	8	0	22	5	269	10	0	284	13	0	5	0	18	627	0
16:45	10	304	18	0	332	5	1	6	0	12	12	226	6	0	244	6	0	3	0	9	597	0
<b>Total</b>	<b>46</b>	<b>1095</b>	<b>54</b>	<b>0</b>	<b>1195</b>	<b>35</b>	<b>7</b>	<b>33</b>	<b>0</b>	<b>75</b>	<b>29</b>	<b>973</b>	<b>39</b>	<b>0</b>	<b>1041</b>	<b>30</b>	<b>1</b>	<b>18</b>	<b>0</b>	<b>49</b>	<b>2360</b>	<b>0</b>
17:00	21	274	12	0	307	6	1	12	0	19	8	213	7	0	228	12	0	2	0	14	568	0
17:15	12	346	17	0	375	5	1	9	0	15	12	247	12	0	271	9	0	5	0	14	675	0
17:30	14	271	15	0	300	10	3	4	0	17	12	232	13	0	257	8	1	8	0	17	591	0
17:45	9	240	12	0	261	8	0	9	0	17	4	191	14	0	209	11	2	3	0	16	503	0
<b>Total</b>	<b>56</b>	<b>1131</b>	<b>56</b>	<b>0</b>	<b>1243</b>	<b>29</b>	<b>5</b>	<b>34</b>	<b>0</b>	<b>68</b>	<b>36</b>	<b>883</b>	<b>46</b>	<b>0</b>	<b>965</b>	<b>40</b>	<b>3</b>	<b>18</b>	<b>0</b>	<b>61</b>	<b>2337</b>	<b>0</b>
<b>Grand Total</b>	<b>133</b>	<b>3671</b>	<b>135</b>	<b>0</b>	<b>3939</b>	<b>148</b>	<b>17</b>	<b>142</b>	<b>0</b>	<b>307</b>	<b>90</b>	<b>3808</b>	<b>118</b>	<b>0</b>	<b>4016</b>	<b>169</b>	<b>12</b>	<b>98</b>	<b>0</b>	<b>279</b>	<b>8541</b>	<b>0</b>
Apprch %	3.4%	93.2%	3.4%	0.0%		48.2%	5.5%	46.3%	0.0%		2.2%	94.8%	2.9%	0.0%		60.6%	4.3%	35.1%	0.0%			
Total %	1.6%	43.0%	1.6%	0.0%	46.1%	1.7%	0.2%	1.7%	0.0%	3.6%	1.1%	44.6%	1.4%	0.0%	47.0%	2.0%	0.1%	1.1%	0.0%	3.3%	100.0%	

AM PEAK HOUR	SR 49 Southbound					La Barr Meadows Rd/Allison Ranch Rd Westbound					SR 49 Northbound					La Barr Meadows Rd/Allison Ranch Rd Eastbound					Total
	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	
Peak Hour Analysis From 07:45 to 08:45																					
Peak Hour For Entire Intersection Begins at 07:45																					
7:45	2	171	4	0	177	12	1	15	0	28	5	318	8	0	331	16	1	8	0	25	561
8:00	5	171	2	0	178	14	1	12	0	27	2	243	3	0	248	10	0	6	0	16	469
8:15	0	199	1	0	200	4	0	2	0	6	2	259	6	0	267	20	1	8	0	29	502
8:30	8	234	6	0	248	12	1	11	0	24	3	267	2	0	272	10	2	5	0	17	561
Total Volume	15	775	13	0	803	42	3	40	0	85	12	1087	19	0	1118	56	4	27	0	87	2093
% App Total	1.9%	96.5%	1.6%	0.0%		49.4%	3.5%	47.1%	0.0%		1.1%	97.2%	1.7%	0.0%		64.4%	4.6%	31.0%	0.0%		
PHF	.469	.828	.542	.000	.809	.750	.750	.667	.000	.759	.600	.855	.594	.000	.844	.700	.500	.844	.000	.750	.933

PM PEAK HOUR	SR 49 Southbound					La Barr Meadows Rd/Allison Ranch Rd Westbound					SR 49 Northbound					La Barr Meadows Rd/Allison Ranch Rd Eastbound					Total
	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	
Peak Hour Analysis From 16:30 to 17:30																					
Peak Hour For Entire Intersection Begins at 16:30																					
16:30	12	274	17	0	303	12	2	8	0	22	5	269	10	0	284	13	0	5	0	18	627
16:45	10	304	18	0	332	5	1	6	0	12	12	226	6	0	244	6	0	3	0	9	597
17:00	21	274	12	0	307	6	1	12	0	19	8	213	7	0	228	12	0	2	0	14	568
17:15	12	346	17	0	375	5	1	9	0	15	12	247	12	0	271	9	0	5	0	14	675
Total Volume	55	1198	64	0	1317	28	5	35	0	68	37	955	35	0	1027	40	0	15	0	55	2467
% App Total	4.2%	91.0%	4.9%	0.0%		41.2%	7.4%	51.5%	0.0%		3.6%	93.0%	3.4%	0.0%		72.7%	0.0%	27.3%	0.0%		
PHF	.655	.866	.889	.000	.878	.583	.625	.729	.000	.773	.771	.888	.729	.000	.904	.769	.000	.750	.000	.764	.914

**VOLUME**

SR 49 & Nevada County Line to Combie Road

Day: Tuesday  
Date: 5/1/2018

City: Grass Valley  
Project #: 18-7075-001

DAILY TOTALS					NB	SB	EB	WB	Total		
					16,437	16,479	0	0	32,916		
AM Period	NB	SB	EB	WB	TOTAL	PM Period	NB	SB	EB	WB	TOTAL
0:00	32	4			36	12:00	219	255			474
0:15	18	6			24	12:15	216	268			484
0:30	15	11			26	12:30	233	262			495
0:45	18	83	7	28	25 111	12:45	273	941	237	1022	510 1963
1:00	15	10			25	13:00	257	234			491
1:15	15	10			25	13:15	267	256			523
1:30	13	2			15	13:30	264	243			507
1:45	6	49	6	28	12 77	13:45	240	1028	261	994	501 2022
2:00	7	6			13	14:00	282	259			541
2:15	4	9			13	14:15	277	257			534
2:30	6	12			18	14:30	355	263			618
2:45	11	28	12	39	23 67	14:45	354	1268	294	1073	648 2341
3:00	7	9			16	15:00	336	266			602
3:15	6	23			29	15:15	354	265			619
3:30	15	30			45	15:30	350	302			652
3:45	15	43	18	80	33 123	15:45	392	1432	292	1125	684 2557
4:00	12	34			46	16:00	356	281			637
4:15	13	48			61	16:15	408	278			686
4:30	17	60			77	16:30	422	288			710
4:45	15	57	54	196	69 253	16:45	498	1684	230	1077	728 2761
5:00	30	79			109	17:00	405	266			671
5:15	32	106			138	17:15	441	289			730
5:30	43	135			178	17:30	380	272			652
5:45	57	162	181	501	238 663	17:45	398	1624	249	1076	647 2700
6:00	64	198			262	18:00	318	220			538
6:15	108	241			349	18:15	338	153			491
6:30	125	270			395	18:30	259	180			439
6:45	113	410	339	1048	452 1458	18:45	228	1143	158	711	386 1854
7:00	147	302			449	19:00	230	132			362
7:15	216	383			599	19:15	201	108			309
7:30	232	380			612	19:30	166	85			251
7:45	184	779	371	1436	555 2215	19:45	176	773	103	428	279 1201
8:00	212	349			561	20:00	170	88			258
8:15	266	358			624	20:15	189	66			255
8:30	230	377			607	20:30	178	94			272
8:45	184	892	381	1465	565 2357	20:45	131	668	55	303	186 971
9:00	187	320			507	21:00	132	43			175
9:15	181	332			513	21:15	109	56			165
9:30	168	317			485	21:30	126	50			176
9:45	191	727	267	1236	458 1963	21:45	119	486	43	192	162 678
10:00	180	310			490	22:00	111	35			146
10:15	204	278			482	22:15	102	40			142
10:30	188	300			488	22:30	73	31			104
10:45	194	766	284	1172	478 1938	22:45	58	344	19	125	77 469
11:00	187	260			447	23:00	53	17			70
11:15	251	257			508	23:15	46	16			62
11:30	205	280			485	23:30	37	14			51
11:45	243	886	267	1064	510 1950	23:45	28	164	13	60	41 224
<b>TOTALS</b>	<b>4882</b>	<b>8293</b>			<b>13175</b>	<b>TOTALS</b>	<b>11555</b>	<b>8186</b>			<b>19741</b>
<b>SPLIT %</b>	<b>37.1%</b>	<b>62.9%</b>			<b>40.0%</b>	<b>SPLIT %</b>	<b>58.5%</b>	<b>41.5%</b>			<b>60.0%</b>

DAILY TOTALS					NB	SB	EB	WB	Total
					16,437	16,479	0	0	32,916

AM Peak Hour	11:15	7:15			8:00	PM Peak Hour	16:30	15:30			16:30
AM Pk Volume	918	1483			2357	PM Pk Volume	1766	1153			2839
Pk Hr Factor	0.914	0.968			0.944	Pk Hr Factor	0.887	0.954			0.972
7 - 9 Volume	1671	2901	0	0	4572	4 - 6 Volume	3308	2153	0	0	5461
7 - 9 Peak Hour	7:30	7:15			8:00	4 - 6 Peak Hour	16:30	16:00			16:30
7 - 9 Pk Volume	894	1483			2357	4 - 6 Pk Volume	1766	1077			2839
Pk Hr Factor	0.840	0.968	0.000	0.000	0.944	Pk Hr Factor	0.887	0.935	0.000	0.000	0.972

**VOLUME**

SR 49 & Cameo Dr / Oak Dr / Mother Lode Rd

Day: Tuesday  
Date: 5/1/2018

City: Grass Valley  
Project #: 18-7075-002

DAILY TOTALS					NB	SB	EB	WB	Total		
					12,780	12,861	0	0	25,641		
AM Period	NB	SB	EB	WB	TOTAL	PM Period	NB	SB	EB	WB	TOTAL
0:00	30	6			36	12:00	183	175			358
0:15	13	5			18	12:15	175	222			397
0:30	11	13			24	12:30	193	183			376
0:45	12	66	6	30	18 96	12:45	195	746	158	738	353 1484
1:00	10	9			19	13:00	195	169			364
1:15	9	8			17	13:15	203	201			404
1:30	17	5			22	13:30	197	195			392
1:45	7	43	7	29	14 72	13:45	204	799	198	763	402 1562
2:00	8	6			14	14:00	205	198			403
2:15	4	7			11	14:15	211	197			408
2:30	5	8			13	14:30	253	204			457
2:45	10	27	10	31	20 58	14:45	244	913	217	816	461 1729
3:00	11	8			19	15:00	256	217			473
3:15	3	18			21	15:15	243	222			465
3:30	15	20			35	15:30	305	243			548
3:45	15	44	17	63	32 107	15:45	285	1089	257	939	542 2028
4:00	11	25			36	16:00	291	206			497
4:15	14	35			49	16:15	293	238			531
4:30	12	49			61	16:30	292	223			515
4:45	17	54	40	149	57 203	16:45	317	1193	187	854	504 2047
5:00	24	58			82	17:00	332	209			541
5:15	29	81			110	17:15	322	275			597
5:30	42	92			134	17:30	246	216			462
5:45	55	150	118	349	173 499	17:45	309	1209	220	920	529 2129
6:00	61	133			194	18:00	239	192			431
6:15	105	180			285	18:15	249	136			385
6:30	114	190			304	18:30	211	168			379
6:45	112	392	241	744	353 1136	18:45	169	868	123	619	292 1487
7:00	129	229			358	19:00	126	95			221
7:15	167	289			456	19:15	153	101			254
7:30	234	316			550	19:30	150	71			221
7:45	198	728	270	1104	468 1832	19:45	115	544	98	365	213 909
8:00	152	285			437	20:00	142	73			215
8:15	196	312			508	20:15	139	56			195
8:30	237	272			509	20:30	118	85			203
8:45	178	763	267	1136	445 1899	20:45	103	502	61	275	164 777
9:00	181	246			427	21:00	99	52			151
9:15	155	242			397	21:15	85	57			142
9:30	156	220			376	21:30	85	55			140
9:45	138	630	213	921	351 1551	21:45	84	353	36	200	120 553
10:00	148	244			392	22:00	77	32			109
10:15	161	207			368	22:15	77	26			103
10:30	160	240			400	22:30	50	29			79
10:45	145	614	180	871	325 1485	22:45	46	250	16	103	62 353
11:00	159	184			343	23:00	37	18			55
11:15	202	205			407	23:15	29	12			41
11:30	162	204			366	23:30	25	13			38
11:45	167	690	192	785	359 1475	23:45	22	113	14	57	36 170
<b>TOTALS</b>	4201	6212			10413	<b>TOTALS</b>	8579	6649			15228
<b>SPLIT %</b>	40.3%	59.7%			40.6%	<b>SPLIT %</b>	56.3%	43.7%			59.4%

DAILY TOTALS					NB	SB	EB	WB	Total
					12,780	12,861	0	0	25,641

AM Peak Hour	8:15	7:30	7:30	PM Peak Hour	16:30	15:30	16:30
AM Pk Volume	792	1183	1963	PM Pk Volume	1263	944	2157
Pk Hr Factor	0.835	0.936	0.892	Pk Hr Factor	0.951	0.918	0.903
7 - 9 Volume	1491	2240	3731	4 - 6 Volume	2402	1774	4176
7 - 9 Peak Hour	7:45	7:30	7:30	4 - 6 Peak Hour	16:30	17:00	16:30
7 - 9 Pk Volume	783	1183	1963	4 - 6 Pk Volume	1263	920	2157
Pk Hr Factor	0.826	0.936	0.892	Pk Hr Factor	0.951	0.836	0.903

### VOLUME

SR 49 & Oak Dr/Mother Load Rd / Lime Kiln Rd

Day: Tuesday  
Date: 5/1/2018

City: Grass Valley  
Project #: 18-7075-003

DAILY TOTALS						NB	SB	EB	WB	Total	
						12,427	12,494	4	1	24,926	
AM Period	NB	SB	EB	WB	TOTAL	PM Period	NB	SB	EB	WB	TOTAL
0:00	21	14	0	0	35	12:00	180	157	0	0	337
0:15	26	5	0	0	31	12:15	163	227	0	0	390
0:30	24	8	0	0	32	12:30	174	172	0	0	346
0:45	16	87	6	33	120	12:45	195	712	153	709	1421
1:00	12	9	0	0	21	13:00	192	183	0	0	375
1:15	12	9	0	0	21	13:15	172	191	0	0	363
1:30	11	5	0	0	16	13:30	213	179	0	0	392
1:45	6	41	5	28	69	13:45	203	780	197	750	1530
2:00	12	8	0	0	20	14:00	173	197	0	0	370
2:15	5	6	0	0	11	14:15	200	191	0	0	391
2:30	11	7	0	0	18	14:30	254	224	0	0	478
2:45	7	35	8	29	64	14:45	242	869	211	823	1692
3:00	7	12	0	0	19	15:00	246	210	0	0	456
3:15	8	17	0	0	25	15:15	219	221	0	0	440
3:30	8	16	0	0	24	15:30	289	232	0	0	521
3:45	18	41	18	63	104	15:45	284	1038	244	907	1945
4:00	11	34	0	0	45	16:00	269	204	0	0	473
4:15	15	30	0	0	45	16:15	269	239	0	0	508
4:30	8	49	0	0	57	16:30	296	217	0	0	513
4:45	21	55	39	152	207	16:45	300	1134	196	856	1990
5:00	25	61	0	0	86	17:00	313	228	0	0	541
5:15	26	73	0	0	99	17:15	317	287	0	0	604
5:30	47	99	0	0	146	17:30	260	200	0	0	460
5:45	45	143	112	345	488	17:45	274	1164	206	921	2085
6:00	67	153	0	0	220	18:00	249	180	0	0	429
6:15	105	175	0	0	280	18:15	230	148	0	0	378
6:30	115	196	0	0	311	18:30	198	133	0	0	331
6:45	110	397	201	725	1122	18:45	165	842	132	593	1435
7:00	143	238	0	0	381	19:00	126	89	0	0	215
7:15	156	288	0	0	444	19:15	144	90	0	0	234
7:30	234	286	1	0	521	19:30	141	79	0	0	220
7:45	203	736	230	1042	1780	19:45	101	512	92	350	862
8:00	155	292	0	0	447	20:00	124	69	0	0	193
8:15	195	269	1	0	465	20:15	130	59	0	0	189
8:30	224	264	0	0	488	20:30	129	82	0	0	211
8:45	188	762	243	1068	1831	20:45	105	488	61	271	759
9:00	180	241	0	0	421	21:00	91	53	0	0	144
9:15	151	218	0	0	369	21:15	75	50	0	0	125
9:30	163	222	1	0	386	21:30	82	52	0	0	134
9:45	131	625	213	894	1520	21:45	78	326	34	189	515
10:00	151	222	0	1	374	22:00	69	29	0	0	98
10:15	141	198	0	0	339	22:15	75	28	0	0	103
10:30	169	203	0	0	372	22:30	59	30	0	0	89
10:45	141	602	169	792	1395	22:45	46	249	21	108	357
11:00	165	197	0	0	362	23:00	35	20	0	0	55
11:15	176	221	0	0	397	23:15	31	14	0	0	45
11:30	168	175	0	0	343	23:30	26	20	0	0	46
11:45	165	674	190	783	1457	23:45	23	115	9	63	178
<b>TOTALS</b>	4198	5954	4	1	10157	<b>TOTALS</b>	8229	6540			14769
<b>SPLIT %</b>	41.3%	58.6%	0.0%	0.0%	40.7%	<b>SPLIT %</b>	55.7%	44.3%			59.3%

DAILY TOTALS						NB	SB	EB	WB	Total	
						12,427	12,494	4	1	24,926	
AM Peak Hour	7:30	7:15	7:30	9:15	7:30	PM Peak Hour	16:30	16:30		16:30	
AM Pk Volume	787	1096	3	1	1867	PM Pk Volume	1226	928		2154	
Pk Hr Factor	0.841	0.938	0.750	0.250	0.896	Pk Hr Factor	0.967	0.808		0.892	
7 - 9 Volume	1498	2110	3	0	3611	4 - 6 Volume	2298	1777	0	0	4075
7 - 9 Peak Hour	7:30	7:15	7:30		7:30	4 - 6 Peak Hour	16:30	16:30			16:30
7 - 9 Pk Volume	787	1096	3	0	1867	4 - 6 Pk Volume	1226	928	0	0	2154
Pk Hr Factor	0.841	0.938	0.750	0.000	0.896	Pk Hr Factor	0.967	0.808	0.000	0.000	0.892

# VOLUME

SR 49 & Lime Kiln Rd / Auburn Rd

Day: Tuesday  
Date: 5/1/2018

City: Grass Valley  
Project #: 18-7075-004

DAILY TOTALS					NB	SB	EB	WB	Total		
					13,551	13,287	0	0	26,838		
AM Period	NB	SB	EB	WB	TOTAL	PM Period	NB	SB	EB	WB	TOTAL
0:00	11	6			17	12:00	202	236			438
0:15	14	12			26	12:15	192	209			401
0:30	18	14			32	12:30	195	236			431
0:45	17	60	8	40	125	12:45	226	815	187	868	1683
1:00	17	8			25	13:00	198	198			396
1:15	10	3			13	13:15	199	198			397
1:30	9	5			14	13:30	210	220			430
1:45	6	42	7	23	78	13:45	209	816	181	797	1613
2:00	5	4			9	14:00	219	203			422
2:15	7	3			10	14:15	221	261			482
2:30	9	6			15	14:30	236	219			455
2:45	10	31	12	25	78	14:45	270	946	220	903	1849
3:00	8	10			18	15:00	290	239			529
3:15	10	13			23	15:15	270	249			519
3:30	9	10			19	15:30	302	228			530
3:45	13	40	16	49	118	15:45	300	1162	271	987	2149
4:00	9	23			32	16:00	279	248			527
4:15	17	26			43	16:15	254	281			535
4:30	16	35			51	16:30	288	215			503
4:45	26	68	34	118	236	16:45	282	1103	259	1003	2106
5:00	28	43			71	17:00	284	234			518
5:15	32	95			127	17:15	273	305			578
5:30	65	88			153	17:30	284	242			526
5:45	72	197	105	331	705	17:45	278	1119	212	993	2112
6:00	85	129			214	18:00	235	175			410
6:15	110	165			275	18:15	238	178			416
6:30	150	175			325	18:30	200	150			350
6:45	125	470	184	653	1322	18:45	165	838	138	641	1479
7:00	152	215			367	19:00	141	132			273
7:15	198	212			410	19:15	157	119			276
7:30	249	298			547	19:30	144	106			250
7:45	282	881	236	961	2360	19:45	141	583	106	463	1046
8:00	230	247			477	20:00	119	89			208
8:15	229	264			493	20:15	103	92			195
8:30	272	234			506	20:30	125	78			203
8:45	239	970	239	984	2432	20:45	97	444	87	346	790
9:00	197	237			434	21:00	81	64			145
9:15	200	239			439	21:15	121	66			187
9:30	199	235			434	21:30	79	61			140
9:45	230	826	207	918	2181	21:45	63	344	50	241	585
10:00	166	224			390	22:00	62	52			114
10:15	144	227			371	22:15	47	33			80
10:30	224	237			461	22:30	37	35			72
10:45	202	736	207	895	2040	22:45	48	194	34	154	348
11:00	173	203			376	23:00	27	16			43
11:15	191	183			374	23:15	32	21			53
11:30	204	212			416	23:30	21	13			34
11:45	192	760	232	830	2014	23:45	26	106	14	64	170
<b>TOTALS</b>	<b>5081</b>	<b>5827</b>			<b>10908</b>	<b>TOTALS</b>	<b>8470</b>	<b>7460</b>			<b>15930</b>
<b>SPLIT %</b>	<b>46.6%</b>	<b>53.4%</b>			<b>40.6%</b>	<b>SPLIT %</b>	<b>53.2%</b>	<b>46.8%</b>			<b>59.4%</b>

DAILY TOTALS					NB	SB	EB	WB	Total
					13,551	13,287	0	0	26,838

























AM Peak Hour	7:45	7:30		7:30	PM Peak Hour	15:00	16:45		15:30		
AM Pk Volume	1013	1045		2035	PM Pk Volume	1162	1040		2163		
Pk Hr Factor	0.898	0.877		0.930	Pk Hr Factor	0.962	0.852		0.947		
7 - 9 Volume	1851	1945	0	0	3796	4 - 6 Volume	2222	1996	0	0	4218
7 - 9 Peak Hour	7:45	7:30		7:30	4 - 6 Peak Hour	16:30	16:45				16:45
7 - 9 Pk Volume	1013	1045	0	0	2035	4 - 6 Pk Volume	1127	1040	0	0	2163
Pk Hr Factor	0.898	0.877	0.000	0.000	0.930	Pk Hr Factor	0.978	0.852	0.000	0.000	0.936



## **Appendix B: Synchro LOS Worksheets**

HCM 6th Signalized Intersection Summary  
1: SR 49 & Wolf Rd/Combie Rd

Existing Conditions  
AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	133	167	458	130	237	72	480	277	328	745	53
Future Volume (veh/h)	20	133	167	458	130	237	72	480	277	328	745	53
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	22	143	180	492	140	255	77	516	298	353	801	57
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	79	276	233	611	507	430	178	766	622	402	1214	612
Arrive On Green	0.04	0.15	0.15	0.18	0.27	0.27	0.10	0.22	0.22	0.23	0.34	0.34
Sat Flow, veh/h	1767	1856	1572	3428	1856	1572	1767	3526	1572	1767	3526	1572
Grp Volume(v), veh/h	22	143	180	492	140	255	77	516	298	353	801	57
Grp Sat Flow(s),veh/h/ln	1767	1856	1572	1714	1856	1572	1767	1763	1572	1767	1763	1572
Q Serve(g_s), s	0.8	4.9	7.6	9.5	4.1	9.7	2.8	9.3	9.8	13.3	13.3	1.6
Cycle Q Clear(g_c), s	0.8	4.9	7.6	9.5	4.1	9.7	2.8	9.3	9.8	13.3	13.3	1.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	79	276	233	611	507	430	178	766	622	402	1214	612
V/C Ratio(X)	0.28	0.52	0.77	0.80	0.28	0.59	0.43	0.67	0.48	0.88	0.66	0.09
Avail Cap(c_a), veh/h	894	670	568	1239	536	455	639	3312	1758	894	2548	1207
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	32.0	27.2	28.3	27.3	19.8	21.8	29.3	24.8	15.6	25.8	19.2	13.4
Incr Delay (d2), s/veh	0.7	0.6	2.0	1.0	0.1	1.2	0.6	0.8	0.4	2.5	0.5	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	2.1	0.1	3.7	1.6	3.4	1.1	3.4	3.1	5.1	4.5	0.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	32.7	27.7	30.4	28.2	19.9	23.0	29.9	25.6	16.0	28.2	19.7	13.4
LnGrp LOS	C	C	C	C	B	C	C	C	B	C	B	B
Approach Vol, veh/h		345			887			891			1211	
Approach Delay, s/veh		29.4			25.4			22.8			21.9	
Approach LOS		C			C			C			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	19.9	19.1	15.8	14.4	11.1	27.9	7.2	23.0				
Change Period (Y+Rc), s	4.1	4.1	3.5	4.1	4.1	4.1	4.1	4.1				
Max Green Setting (Gmax), s	35.0	65.0	25.0	25.0	25.0	50.0	35.0	20.0				
Max Q Clear Time (g_c+I1), s	15.3	11.8	11.5	9.6	4.8	15.3	2.8	11.7				
Green Ext Time (p_c), s	0.4	3.2	0.8	0.7	0.1	4.3	0.0	0.6				
<b>Intersection Summary</b>												
HCM 6th Ctrl Delay				23.8								
HCM 6th LOS				C								
<b>Notes</b>												
User approved pedestrian interval to be less than phase max green.												

Intersection						
Int Delay, s/veh	0.2					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↘↗		↑↑	↗	↘	↑
Traffic Vol, veh/h	13	0	734	5	1	1117
Future Vol, veh/h	13	0	734	5	1	1117
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	315	265	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	4	4	4	4	4	4
Mvmt Flow	14	0	798	5	1	1214

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	2014	399	0	0	803
Stage 1	798	-	-	-	-
Stage 2	1216	-	-	-	-
Critical Hdwy	6.66	6.96	-	-	4.16
Critical Hdwy Stg 1	5.86	-	-	-	-
Critical Hdwy Stg 2	5.46	-	-	-	-
Follow-up Hdwy	3.538	3.338	-	-	2.238
Pot Cap-1 Maneuver	56	597	-	-	808
Stage 1	401	-	-	-	-
Stage 2	276	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	56	597	-	-	808
Mov Cap-2 Maneuver	173	-	-	-	-
Stage 1	401	-	-	-	-
Stage 2	276	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	27.7	0	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	173	808
HCM Lane V/C Ratio	-	-	0.082	0.001
HCM Control Delay (s)	-	-	27.7	9.5
HCM Lane LOS	-	-	D	A
HCM 95th %tile Q(veh)	-	-	0.3	0

HCM 6th TWSC  
 3: SR 49 & Holcomb Dr/Cherry Creek Rd

Existing Conditions  
 AM Peak Hour

Intersection												
Int Delay, s/veh	0.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↗	↑	↖	↗	↖	↖
Traffic Vol, veh/h	1	0	3	3	0	3	2	734	2	3	1066	1
Future Vol, veh/h	1	0	3	3	0	3	2	734	2	3	1066	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	Free	-	-	None
Storage Length	-	-	-	-	-	-	150	-	535	370	-	-
Veh in Median Storage, #	-	0	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	4	4	4	4	4	4	4	4	4	4	4	4
Mvmt Flow	1	0	3	3	0	3	2	773	2	3	1122	1

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1908	1906	1123	1907	1906	773	1123	0	-	773	0	0
Stage 1	1129	1129	-	777	777	-	-	-	-	-	-	-
Stage 2	779	777	-	1130	1129	-	-	-	-	-	-	-
Critical Hdwy	7.14	6.54	6.24	7.14	6.54	6.24	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.14	5.54	-	6.14	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.14	5.54	-	6.14	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.536	4.036	3.336	3.536	4.036	3.336	2.236	-	-	2.236	-	-
Pot Cap-1 Maneuver	51	68	248	51	68	396	615	-	0	833	-	-
Stage 1	246	277	-	387	404	-	-	-	0	-	-	-
Stage 2	386	404	-	245	277	-	-	-	0	-	-	-
Platoon blocked, %								-			-	-
Mov Cap-1 Maneuver	50	68	248	50	68	396	615	-	-	833	-	-
Mov Cap-2 Maneuver	50	68	-	156	179	-	-	-	-	-	-	-
Stage 1	245	276	-	386	403	-	-	-	-	-	-	-
Stage 2	382	403	-	241	276	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	34.8		21.5		0		0	
HCM LOS	D		C					

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	615	-	125	224	833	-	-
HCM Lane V/C Ratio	0.003	-	0.034	0.028	0.004	-	-
HCM Control Delay (s)	10.9	-	34.8	21.5	9.3	-	-
HCM Lane LOS	B	-	D	C	A	-	-
HCM 95th %tile Q(veh)	0	-	0.1	0.1	0	-	-

HCM 6th TWSC  
4: SR 49 & Mother Lode Rd/Oak Dr

Existing Conditions  
AM Peak Hour

Intersection												
Int Delay, s/veh	0.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕	↕		↕	↕	
Traffic Vol, veh/h	1	0	0	7	0	11	0	743	3	1	1063	0
Future Vol, veh/h	1	0	0	7	0	11	0	743	3	1	1063	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	220	-	-	310	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	4	4	4	4	4	4	4	4	4	4	4	4
Mvmt Flow	1	0	0	8	0	12	0	826	3	1	1181	0

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	2017	2012	1181	2011	2011	828	1181	0	0	829	0	0
Stage 1	1183	1183	-	828	828	-	-	-	-	-	-	-
Stage 2	834	829	-	1183	1183	-	-	-	-	-	-	-
Critical Hdwy	7.14	6.54	6.24	7.14	6.54	6.24	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.14	5.54	-	6.14	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.14	5.54	-	6.14	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.536	4.036	3.336	3.536	4.036	3.336	2.236	-	-	2.236	-	-
Pot Cap-1 Maneuver	43	58	229	43	58	368	584	-	-	794	-	-
Stage 1	229	261	-	362	383	-	-	-	-	-	-	-
Stage 2	360	382	-	229	261	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	42	58	229	43	58	368	584	-	-	794	-	-
Mov Cap-2 Maneuver	42	58	-	43	58	-	-	-	-	-	-	-
Stage 1	229	261	-	362	383	-	-	-	-	-	-	-
Stage 2	348	382	-	229	261	-	-	-	-	-	-	-





















Approach	EB		WB		NB		SB	
HCM Control Delay, s	93		54		0		0	
HCM LOS	F		F					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	584	-	-	42	93	794	-	-
HCM Lane V/C Ratio	-	-	-	0.026	0.215	0.001	-	-
HCM Control Delay (s)	0	-	-	93	54	9.5	-	-
HCM Lane LOS	A	-	-	F	F	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0.8	0	-	-

# HCM 6th Signalized Intersection Summary

## 5: SR 49 & Lime Kiln Rd

Existing Conditions  
AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	111	6	41	163	10	117	15	689	39	26	847	51
Future Volume (veh/h)	111	6	41	163	10	117	15	689	39	26	847	51
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841
Adj Flow Rate, veh/h	116	6	43	170	10	122	16	718	41	27	882	53
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	4	4	4	4	4	4	4	4	4	4	4	4
Cap, veh/h	364	37	92	328	30	156	64	1259	562	101	1221	545
Arrive On Green	0.25	0.25	0.25	0.25	0.25	0.25	0.04	0.36	0.36	0.06	0.35	0.35
Sat Flow, veh/h	908	148	372	809	122	630	1753	3497	1560	1753	3497	1560
Grp Volume(v), veh/h	165	0	0	302	0	0	16	718	41	27	882	53
Grp Sat Flow(s),veh/h/ln	1428	0	0	1561	0	0	1753	1749	1560	1753	1749	1560
Q Serve(g_s), s	0.0	0.0	0.0	3.5	0.0	0.0	0.4	7.3	0.8	0.6	9.6	1.0
Cycle Q Clear(g_c), s	4.1	0.0	0.0	7.6	0.0	0.0	0.4	7.3	0.8	0.6	9.6	1.0
Prop In Lane	0.70		0.26	0.56		0.40	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	493	0	0	514	0	0	64	1259	562	101	1221	545
V/C Ratio(X)	0.33	0.00	0.00	0.59	0.00	0.00	0.25	0.57	0.07	0.27	0.72	0.10
Avail Cap(c_a), veh/h	921	0	0	976	0	0	799	4785	2134	799	4785	2134
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	13.9	0.0	0.0	15.1	0.0	0.0	20.6	11.3	9.2	19.8	12.4	9.6
Incr Delay (d2), s/veh	0.3	0.0	0.0	0.8	0.0	0.0	0.8	0.2	0.0	0.5	0.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	0.0	0.0	2.3	0.0	0.0	0.1	1.7	0.2	0.2	2.4	0.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	14.2	0.0	0.0	15.9	0.0	0.0	21.3	11.5	9.2	20.3	12.7	9.6
LnGrp LOS	B	A	A	B	A	A	C	B	A	C	B	A
Approach Vol, veh/h		165			302			775			962	
Approach Delay, s/veh		14.2			15.9			11.5			12.8	
Approach LOS		B			B			B			B	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	6.6	22.3		14.9	7.1	21.8		14.9				
Change Period (Y+Rc), s	4.1	6.5		4.1	5.5	6.5		4.1				
Max Green Setting (Gmax), s	20.0	60.0		25.0	20.0	60.0		25.0				
Max Q Clear Time (g_c+I1), s	2.6	9.3		6.1	2.4	11.6		9.6				
Green Ext Time (p_c), s	0.0	2.9		0.7	0.0	3.7		1.3				

### Intersection Summary

HCM 6th Ctrl Delay	12.9
HCM 6th LOS	B

### Notes

User approved pedestrian interval to be less than phase max green.

Intersection						
Int Delay, s/veh	0.4					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↘		↘	↑	↑	↘
Traffic Vol, veh/h	3	29	11	933	875	6
Future Vol, veh/h	3	29	11	933	875	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	230	-	-	300
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	3	31	12	993	931	6

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	1948	931	937	0	-	0
Stage 1	931	-	-	-	-	-
Stage 2	1017	-	-	-	-	-
Critical Hdwy	6.45	6.25	4.15	-	-	-
Critical Hdwy Stg 1	5.45	-	-	-	-	-
Critical Hdwy Stg 2	5.45	-	-	-	-	-
Follow-up Hdwy	3.545	3.345	2.245	-	-	-
Pot Cap-1 Maneuver	70	319	719	-	-	-
Stage 1	379	-	-	-	-	-
Stage 2	345	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	69	319	719	-	-	-
Mov Cap-2 Maneuver	192	-	-	-	-	-
Stage 1	373	-	-	-	-	-
Stage 2	345	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	18.5	0.1	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	719	-	300	-	-
HCM Lane V/C Ratio	0.016	-	0.113	-	-
HCM Control Delay (s)	10.1	-	18.5	-	-
HCM Lane LOS	B	-	C	-	-
HCM 95th %tile Q(veh)	0.1	-	0.4	-	-

HCM 6th Signalized Intersection Summary  
7: SR 49 & Alta Sierra Dr

Existing Conditions  
AM Peak Hour



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	130	177	901	47	59	742
Future Volume (veh/h)	130	177	901	47	59	742
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No			No
Adj Sat Flow, veh/h/ln	1826	1826	1826	1826	1826	1826
Adj Flow Rate, veh/h	135	184	939	49	61	773
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	5	5	5	5	5	5
Cap, veh/h	337	300	1272	567	185	1028
Arrive On Green	0.19	0.19	0.37	0.37	0.11	0.56
Sat Flow, veh/h	1739	1547	3561	1547	1739	1826
Grp Volume(v), veh/h	135	184	939	49	61	773
Grp Sat Flow(s),veh/h/ln	1739	1547	1735	1547	1739	1826
Q Serve(g_s), s	3.1	5.0	10.7	0.9	1.5	14.6
Cycle Q Clear(g_c), s	3.1	5.0	10.7	0.9	1.5	14.6
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	337	300	1272	567	185	1028
V/C Ratio(X)	0.40	0.61	0.74	0.09	0.33	0.75
Avail Cap(c_a), veh/h	953	848	4564	2036	1144	2402
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	16.1	16.8	12.5	9.4	18.9	7.6
Incr Delay (d2), s/veh	0.3	0.8	0.3	0.0	0.4	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.1	1.6	2.6	0.2	0.5	2.2
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	16.4	17.6	12.9	9.5	19.3	8.0
LnGrp LOS	B	B	B	A	B	A
Approach Vol, veh/h	319		988			834
Approach Delay, s/veh	17.1		12.7			8.8
Approach LOS	B		B			A
Timer - Assigned Phs	1	2			6	8
Phs Duration (G+Y+Rc), s	8.9	23.2			32.2	13.4
Change Period (Y+Rc), s	4.1	6.5			6.5	4.6
Max Green Setting (Gmax), s	30.0	60.0			60.0	25.0
Max Q Clear Time (g_c+I1), s	3.5	12.7			16.6	7.0
Green Ext Time (p_c), s	0.1	4.0			2.9	0.5

Intersection Summary

HCM 6th Ctrl Delay	11.8
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.



HCM 6th Signalized Intersection Summary  
 8: SR 49 & Allison Ranch Rd/La Barr Meadows Rd

Existing Conditions  
 AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↑↑	↗	↖	↑↑	↗
Traffic Volume (veh/h)	56	4	27	42	3	40	12	1087	19	15	775	13
Future Volume (veh/h)	56	4	27	42	3	40	12	1087	19	15	775	13
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841
Adj Flow Rate, veh/h	60	4	29	45	3	43	13	1169	20	16	833	14
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	4	4	4	4	4	4	4	4	4	4	4	4
Cap, veh/h	145	29	211	124	14	205	55	1758	784	65	1779	794
Arrive On Green	0.08	0.15	0.15	0.07	0.14	0.14	0.03	0.50	0.50	0.04	0.51	0.51
Sat Flow, veh/h	1753	193	1397	1753	103	1473	1753	3497	1560	1753	3497	1560
Grp Volume(v), veh/h	60	0	33	45	0	46	13	1169	20	16	833	14
Grp Sat Flow(s),veh/h/ln	1753	0	1589	1753	0	1576	1753	1749	1560	1753	1749	1560
Q Serve(g_s), s	2.6	0.0	1.5	2.0	0.0	2.1	0.6	20.1	0.5	0.7	12.4	0.4
Cycle Q Clear(g_c), s	2.6	0.0	1.5	2.0	0.0	2.1	0.6	20.1	0.5	0.7	12.4	0.4
Prop In Lane	1.00		0.88	1.00		0.93	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	145	0	240	124	0	220	55	1758	784	65	1779	794
V/C Ratio(X)	0.41	0.00	0.14	0.36	0.00	0.21	0.24	0.66	0.03	0.24	0.47	0.02
Avail Cap(c_a), veh/h	326	0	591	326	0	586	435	2601	1160	435	2601	1160
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	35.2	0.0	29.7	35.7	0.0	30.8	38.1	15.0	10.1	37.7	12.8	9.8
Incr Delay (d2), s/veh	0.7	0.0	0.1	0.7	0.0	0.2	0.8	0.9	0.0	0.7	0.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.1	0.0	0.5	0.9	0.0	0.8	0.2	6.5	0.2	0.3	3.9	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	35.9	0.0	29.8	36.4	0.0	30.9	39.0	15.9	10.1	38.4	13.2	9.8
LnGrp LOS	D	A	C	D	A	C	D	B	B	D	B	A
Approach Vol, veh/h		93			91			1202			863	
Approach Delay, s/veh		33.7			33.6			16.1			13.6	
Approach LOS		C			C			B			B	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	7.1	47.0	9.8	16.8	6.6	47.5	10.8	15.9				
Change Period (Y+Rc), s	4.1	6.4	4.1	4.6	4.1	6.4	4.1	4.6				
Max Green Setting (Gmax), s	20.0	60.0	15.0	30.0	20.0	60.0	15.0	30.0				
Max Q Clear Time (g_c+1/2), s	12.5	22.1	4.0	3.5	2.6	14.4	4.6	4.1				
Green Ext Time (p_c), s	0.0	18.4	0.0	0.1	0.0	12.5	0.0	0.1				

Intersection Summary

























HCM 6th Ctrl Delay	16.6
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

HCM 6th Signalized Intersection Summary  
1: SR 49 & Wolf Rd/Combie Rd

Existing Conditions  
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	31	99	88	261	114	191	156	946	539	217	703	27
Future Volume (veh/h)	31	99	88	261	114	191	156	946	539	217	703	27
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	33	105	94	278	121	203	166	1006	573	231	748	29
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	106	221	187	407	315	267	206	1430	825	275	1568	794
Arrive On Green	0.06	0.12	0.12	0.12	0.17	0.17	0.12	0.40	0.40	0.15	0.44	0.44
Sat Flow, veh/h	1781	1870	1585	3456	1870	1585	1781	3554	1585	1781	3554	1585
Grp Volume(v), veh/h	33	105	94	278	121	203	166	1006	573	231	748	29
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1728	1870	1585	1781	1777	1585	1781	1777	1585
Q Serve(g_s), s	1.4	4.0	4.2	5.9	4.4	9.3	6.9	18.0	20.7	9.6	11.4	0.7
Cycle Q Clear(g_c), s	1.4	4.0	4.2	5.9	4.4	9.3	6.9	18.0	20.7	9.6	11.4	0.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	106	221	187	407	315	267	206	1430	825	275	1568	794
V/C Ratio(X)	0.31	0.48	0.50	0.68	0.38	0.76	0.81	0.70	0.69	0.84	0.48	0.04
Avail Cap(c_a), veh/h	818	613	520	1133	491	416	584	3029	1538	818	2330	1133
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	34.4	31.4	31.5	32.3	28.2	30.2	32.9	19.0	13.7	31.3	15.1	9.7
Incr Delay (d2), s/veh	0.6	0.6	0.8	0.8	0.3	1.7	2.8	0.5	0.8	2.6	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	1.7	1.6	2.4	1.9	3.4	2.9	6.2	6.3	3.9	3.7	0.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	35.0	32.0	32.3	33.0	28.5	31.9	35.7	19.5	14.5	33.9	15.2	9.7
LnGrp LOS	C	C	C	C	C	C	D	B	B	C	B	A
Approach Vol, veh/h		232			602			1745			1008	
Approach Delay, s/veh		32.6			31.7			19.4			19.4	
Approach LOS		C			C			B			B	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	15.9	34.8	12.5	13.1	12.9	37.8	8.6	16.9				
Change Period (Y+Rc), s	4.1	4.1	3.5	4.1	4.1	4.1	4.1	4.1				
Max Green Setting (Gmax), s	35.0	65.0	25.0	25.0	25.0	50.0	35.0	20.0				
Max Q Clear Time (g_c+I1), s	11.6	22.7	7.9	6.2	8.9	13.4	3.4	11.3				
Green Ext Time (p_c), s	0.3	8.0	0.4	0.4	0.2	3.9	0.0	0.5				
<b>Intersection Summary</b>												
HCM 6th Ctrl Delay				22.3								
HCM 6th LOS				C								
<b>Notes</b>												
User approved pedestrian interval to be less than phase max green.												

Intersection						
Int Delay, s/veh	0.1					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↘↗		↑↑	↗	↘	↑
Traffic Vol, veh/h	8	2	1140	12	3	950
Future Vol, veh/h	8	2	1140	12	3	950
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	315	265	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	9	2	1267	13	3	1056

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	2329	634	0	0	1280
Stage 1	1267	-	-	-	-
Stage 2	1062	-	-	-	-
Critical Hdwy	6.63	6.93	-	-	4.13
Critical Hdwy Stg 1	5.83	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-
Follow-up Hdwy	3.519	3.319	-	-	2.219
Pot Cap-1 Maneuver	36	423	-	-	540
Stage 1	229	-	-	-	-
Stage 2	331	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	36	423	-	-	540
Mov Cap-2 Maneuver	139	-	-	-	-
Stage 1	228	-	-	-	-
Stage 2	331	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	29	0	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	161	540
HCM Lane V/C Ratio	-	-	0.069	0.006
HCM Control Delay (s)	-	-	29	11.7
HCM Lane LOS	-	-	D	B
HCM 95th %tile Q(veh)	-	-	0.2	0

HCM 6th TWSC  
 3: SR 49 & Holcomb Dr/Cherry Creek Rd

Existing Conditions  
 PM Peak Hour

Intersection												
Int Delay, s/veh	0.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↗	↖	↗	↖	↗	↖
Traffic Vol, veh/h	0	0	2	2	0	2	5	1128	5	8	930	1
Future Vol, veh/h	0	0	2	2	0	2	5	1128	5	8	930	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	Free	-	-	None
Storage Length	-	-	-	-	-	-	150	-	535	370	-	-
Veh in Median Storage, #	-	0	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	2	2	0	2	6	1253	6	9	1033	1

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	2318	2317	1034	2318	2317	1253	1034	0	-	1253	0	0
Stage 1	1052	1052	-	1265	1265	-	-	-	-	-	-	-
Stage 2	1266	1265	-	1053	1052	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	26	38	282	26	38	210	672	-	0	555	-	-
Stage 1	274	303	-	208	240	-	-	-	0	-	-	-
Stage 2	207	240	-	274	303	-	-	-	0	-	-	-
Platoon blocked, %								-			-	-
Mov Cap-1 Maneuver	25	37	282	25	37	210	672	-	-	555	-	-
Mov Cap-2 Maneuver	25	37	-	116	136	-	-	-	-	-	-	-
Stage 1	272	298	-	206	238	-	-	-	-	-	-	-
Stage 2	203	238	-	267	298	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	17.9		29.9		0		0.1	
HCM LOS	C		D					

Minor Lane/Major Mvmt	NBL	NBT	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	672	-	282	149	555	-
HCM Lane V/C Ratio	0.008	-	0.008	0.03	0.016	-
HCM Control Delay (s)	10.4	-	17.9	29.9	11.6	-
HCM Lane LOS	B	-	C	D	B	-
HCM 95th %tile Q(veh)	0	-	0	0.1	0	-

HCM 6th TWSC  
4: SR 49 & Mother Lode Rd/Oak Dr

Existing Conditions  
PM Peak Hour

Intersection												
Int Delay, s/veh	0.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕	↕		↕	↕	
Traffic Vol, veh/h	1	0	0	5	0	3	1	1111	11	7	938	1
Future Vol, veh/h	1	0	0	5	0	3	1	1111	11	7	938	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	220	-	-	310	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	0	0	6	0	3	1	1263	13	8	1066	1

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	2356	2361	1067	2355	2355	1270	1067	0	0	1276	0	0
Stage 1	1083	1083	-	1272	1272	-	-	-	-	-	-	-
Stage 2	1273	1278	-	1083	1083	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	25	35	270	25	36	205	653	-	-	544	-	-
Stage 1	263	293	-	206	239	-	-	-	-	-	-	-
Stage 2	205	237	-	263	293	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	24	34	270	25	35	205	653	-	-	544	-	-
Mov Cap-2 Maneuver	24	34	-	25	35	-	-	-	-	-	-	-
Stage 1	262	289	-	206	239	-	-	-	-	-	-	-
Stage 2	201	237	-	259	289	-	-	-	-	-	-	-





















Approach	EB		WB		NB		SB	
HCM Control Delay, s	162.3		131.5		0		0.1	
HCM LOS	F		F					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	653	-	-	24	37	544	-
HCM Lane V/C Ratio	0.002	-	-	0.047	0.246	0.015	-
HCM Control Delay (s)	10.5	-	-	162.3	131.5	11.7	-
HCM Lane LOS	B	-	-	F	F	B	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0.8	0	-

# HCM 6th Signalized Intersection Summary

## 5: SR 49 & Lime Kiln Rd

Existing Conditions  
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	60	9	17	56	3	57	29	957	138	123	872	126
Future Volume (veh/h)	60	9	17	56	3	57	29	957	138	123	872	126
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	67	10	19	62	3	63	32	1063	153	137	969	140
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	284	49	53	201	37	129	114	1398	624	269	1608	717
Arrive On Green	0.17	0.17	0.17	0.17	0.17	0.17	0.06	0.39	0.39	0.15	0.45	0.45
Sat Flow, veh/h	978	290	313	570	220	765	1781	3554	1585	1781	3554	1585
Grp Volume(v), veh/h	96	0	0	128	0	0	32	1063	153	137	969	140
Grp Sat Flow(s),veh/h/ln	1581	0	0	1555	0	0	1781	1777	1585	1781	1777	1585
Q Serve(g_s), s	0.0	0.0	0.0	1.2	0.0	0.0	0.9	13.2	3.3	3.6	10.5	2.7
Cycle Q Clear(g_c), s	2.4	0.0	0.0	3.6	0.0	0.0	0.9	13.2	3.3	3.6	10.5	2.7
Prop In Lane	0.70		0.20	0.48		0.49	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	386	0	0	367	0	0	114	1398	624	269	1608	717
V/C Ratio(X)	0.25	0.00	0.00	0.35	0.00	0.00	0.28	0.76	0.25	0.51	0.60	0.20
Avail Cap(c_a), veh/h	841	0	0	841	0	0	696	4166	1858	696	4166	1858
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	18.7	0.0	0.0	19.1	0.0	0.0	22.8	13.4	10.4	20.0	10.5	8.4
Incr Delay (d2), s/veh	0.2	0.0	0.0	0.4	0.0	0.0	0.5	0.3	0.1	0.6	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.9	0.0	0.0	1.2	0.0	0.0	0.3	3.6	0.8	1.2	2.5	0.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	18.9	0.0	0.0	19.5	0.0	0.0	23.3	13.8	10.5	20.5	10.7	8.5
LnGrp LOS	B	A	A	B	A	A	C	B	B	C	B	A
Approach Vol, veh/h		96			128			1248			1246	
Approach Delay, s/veh		18.9			19.5			13.6			11.5	
Approach LOS		B			B			B			B	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	11.8	26.6		12.7	8.8	29.7		12.7				
Change Period (Y+Rc), s	4.1	6.5		4.1	5.5	6.5		4.1				
Max Green Setting (Gmax), s	20.0	60.0		25.0	20.0	60.0		25.0				
Max Q Clear Time (g_c+I1), s	5.6	15.2		4.4	2.9	12.5		5.6				
Green Ext Time (p_c), s	0.1	4.9		0.3	0.0	4.3		0.5				

### Intersection Summary

HCM 6th Ctrl Delay	13.1
HCM 6th LOS	B

### Notes

User approved pedestrian interval to be less than phase max green.

Intersection						
Int Delay, s/veh	0.4					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↘		↘	↑	↑	↘
Traffic Vol, veh/h	3	17	36	1051	1115	8
Future Vol, veh/h	3	17	36	1051	1115	8
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	230	-	-	300
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	87	87	87	87	87	87
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	3	20	41	1208	1282	9

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	2572	1282	1291	0	-	0
Stage 1	1282	-	-	-	-	-
Stage 2	1290	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	29	202	537	-	-	-
Stage 1	260	-	-	-	-	-
Stage 2	258	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	27	202	537	-	-	-
Mov Cap-2 Maneuver	116	-	-	-	-	-
Stage 1	240	-	-	-	-	-
Stage 2	258	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	27.6	0.4	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	537	-	182	-	-
HCM Lane V/C Ratio	0.077	-	0.126	-	-
HCM Control Delay (s)	12.3	-	27.6	-	-
HCM Lane LOS	B	-	D	-	-
HCM 95th %tile Q(veh)	0.2	-	0.4	-	-

HCM 6th Signalized Intersection Summary  
7: SR 49 & Alta Sierra Dr

Existing Conditions  
PM Peak Hour



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↶	↶	↕	↷	↶	↷
Traffic Volume (veh/h)	82	90	913	158	116	1005
Future Volume (veh/h)	82	90	913	158	116	1005
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No			No
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	88	97	982	170	125	1081
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	281	250	1479	660	253	1187
Arrive On Green	0.16	0.16	0.42	0.42	0.14	0.63
Sat Flow, veh/h	1781	1585	3647	1585	1781	1870
Grp Volume(v), veh/h	88	97	982	170	125	1081
Grp Sat Flow(s),veh/h/ln	1781	1585	1777	1585	1781	1870
Q Serve(g_s), s	2.3	2.9	11.9	3.8	3.5	26.7
Cycle Q Clear(g_c), s	2.3	2.9	11.9	3.8	3.5	26.7
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	281	250	1479	660	253	1187
V/C Ratio(X)	0.31	0.39	0.66	0.26	0.49	0.91
Avail Cap(c_a), veh/h	833	741	3988	1779	999	2099
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	20.0	20.2	12.6	10.2	21.2	8.4
Incr Delay (d2), s/veh	0.2	0.4	0.2	0.1	0.6	1.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.9	1.0	3.2	0.9	1.2	4.2
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	20.2	20.6	12.8	10.3	21.7	10.0
LnGrp LOS	C	C	B	B	C	B
Approach Vol, veh/h	185		1152			1206
Approach Delay, s/veh	20.4		12.4			11.3
Approach LOS	C		B			B
Timer - Assigned Phs	1	2			6	8
Phs Duration (G+Y+Rc), s	11.7	28.8			40.4	13.0
Change Period (Y+Rc), s	4.1	6.5			6.5	4.6
Max Green Setting (Gmax), s	30.0	60.0			60.0	25.0
Max Q Clear Time (g_c+I1), s	5.5	13.9			28.7	4.9
Green Ext Time (p_c), s	0.1	4.4			5.2	0.3

Intersection Summary

HCM 6th Ctrl Delay	12.4
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.



HCM 6th Signalized Intersection Summary  
 8: SR 49 & Allison Ranch Rd/La Barr Meadows Rd

Existing Conditions  
 PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↑↑	↗	↖	↑↑	↗
Traffic Volume (veh/h)	40	0	15	28	5	35	37	955	35	55	1198	64
Future Volume (veh/h)	40	0	15	28	5	35	37	955	35	55	1198	64
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	44	0	16	31	5	38	41	1049	38	60	1316	70
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	119	0	211	96	23	171	127	1817	811	154	1871	835
Arrive On Green	0.07	0.00	0.13	0.05	0.12	0.12	0.07	0.51	0.51	0.09	0.53	0.53
Sat Flow, veh/h	1781	0	1585	1781	188	1426	1781	3554	1585	1781	3554	1585
Grp Volume(v), veh/h	44	0	16	31	0	43	41	1049	38	60	1316	70
Grp Sat Flow(s),veh/h/ln	1781	0	1585	1781	0	1614	1781	1777	1585	1781	1777	1585
Q Serve(g_s), s	2.1	0.0	0.8	1.5	0.0	2.2	2.0	18.3	1.1	2.8	24.9	2.0
Cycle Q Clear(g_c), s	2.1	0.0	0.8	1.5	0.0	2.2	2.0	18.3	1.1	2.8	24.9	2.0
Prop In Lane	1.00		1.00	1.00		0.88	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	119	0	211	96	0	194	127	1817	811	154	1871	835
V/C Ratio(X)	0.37	0.00	0.08	0.32	0.00	0.22	0.32	0.58	0.05	0.39	0.70	0.08
Avail Cap(c_a), veh/h	299	0	533	299	0	542	399	2388	1065	399	2388	1065
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	39.9	0.0	33.9	40.7	0.0	35.5	39.4	15.1	10.9	38.5	15.9	10.5
Incr Delay (d2), s/veh	0.7	0.0	0.1	0.7	0.0	0.2	0.5	0.6	0.1	0.6	1.2	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.9	0.0	0.3	0.7	0.0	0.8	0.8	6.2	0.4	1.2	8.4	0.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	40.6	0.0	34.0	41.4	0.0	35.7	39.9	15.7	11.0	39.1	17.1	10.6
LnGrp LOS	D	A	C	D	A	D	D	B	B	D	B	B
Approach Vol, veh/h		60			74			1128			1446	
Approach Delay, s/veh		38.8			38.1			16.5			17.7	
Approach LOS		D			D			B			B	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	11.8	52.1	8.9	16.5	10.5	53.4	10.1	15.3				
Change Period (Y+Rc), s	4.1	6.4	4.1	4.6	4.1	6.4	4.1	4.6				
Max Green Setting (Gmax), s	20.0	60.0	15.0	30.0	20.0	60.0	15.0	30.0				
Max Q Clear Time (g_c+1), s	11.8	20.3	3.5	2.8	4.0	26.9	4.1	4.2				
Green Ext Time (p_c), s	0.0	16.5	0.0	0.0	0.0	20.2	0.0	0.1				

Intersection Summary

HCM 6th Ctrl Delay	18.2
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

## **Appendix C: HCS Analysis Worksheets**

## MULTILANE HIGHWAY SEGMENT ANALYSIS

File Name:	1 - Nevada County Line to Combie Lane AM.xuf
Analyst:	ZRS
Agency:	Omni-Means, a GHD company
Jurisdiction:	Caltrans-District 3
Date:	6/22/2018
Analysis Year:	2018
Time Period Analyzed:	AM peak hour
Project Description:	SR 49 CSMP Update
Units:	U.S. Customary

## Direction 1: NB

## LOS and Performance Measures

Flow rate, $v$	1115	pc/h/ln
Capacity, C	4568	pc/h/ln
Speed, S	64.2	mi/h
Density, D	8.7	pc/mi/ln
Level of Service, LOS	A	

## Step 1: Input Data

Number of Lanes, N	2	ln
Lane Width	12	ft
Segment length	-	ft
Terrain Type	Specific Grade	
Percent Grade	2.00	%
Grade Length	2.70	mi
Right-Side Lateral Clearance, LCR	6	ft
Left-Side Lateral Clearance, LCL	6	ft
Median Type	Divided	
Access Point Density	3.0	access points/mi
Demand Volume, V	892	veh/h
Peak Hour Factor, PHF	0.91	
Percent Total Trucks	7.00	%
Percent Single-Unit Trucks, SUT	30	%
Percent Tractor-Trailers, TT	70	%

## Step 2: Estimate and Adjust FFS

Estimating FFS		
Measured or Base FFS	Base	
Base Free-Flow Speed, BFFS	65.0	mi/h
Lane Width	12	ft
Lane Width Adjustment, fLW	0.0	mi/h
Right-Side Lateral Clearance, LCR	6	ft
Left-Side Lateral Clearance, LCL	6	ft
Total Lateral Clearance, TLC	12.00	ft
Total Lateral Clearance Adjustment, fTLC	0.0	mi/h
Median Type	Divided	
Median Type Adjustment, fM	0.0	mi/h
Access Point Density	3.0	access points/mi
Access Point Density Adjustment, fA	0.8	mi/h
Free-Flow Speed, FFS	64.3	mi/h
Speed Adjustments		
Driver Population	All Familiar	
Speed Adjustment Factor, SAF	1.000	
Adjusted Free-Flow Speed, FFSadj	64.2	mi/h

## Step 3: Estimate and Adjust Capacity

Adjusted Free-flow Speed, FFSadj	64.2	mi/h
Capacity, c	2284	pc/h/ln
Capacity Adjustments		
Driver Population	All Familiar	
Capacity Adjustment Factor, CAF	1.000	
Adjusted Capacity, cadj	2284	pc/h/ln

---

Step 4: Adjust Demand Volume

---

Demand Volume, V	892	veh/h
Peak Hour Factor, PHF	0.91	
Number of Lanes, N	2	ln
Terrain type	Specific Grade	
Percent Grade	2.00	%
Grade Length	2.70	mi
Percent Total Trucks	7.00	%
Percent Single-Unit Trucks, SUT	30	%
Percent Tractor-Trailers, TT	70	%
Proportion of Total Trucks, PT	0.07	
Heavy Vehicle PCE, ET	2.975	
Heavy Vehicle Adjustment, fHV	0.879	
Demand Adjustment Factor, DAF	1.000	
Demand Flow Rate, v <sub>D</sub>	558	pc/h/ln

---

Steps 5 and 6: Estimate Speed and Density and Determine LOS

---

Demand Flow Rate, v <sub>D</sub>	558	pc/h/ln
Free-Flow Speed, FFS	65.0	mi/h
Capacity, c	2284	pc/h/ln
Breakpoint, BP	1400	pc/h/ln
Density at Capacity, D <sub>c</sub>	45	pc/mi/ln
Mean Speed under Base Conditions, S	64.2	mi/h
Density, D	8.7	pc/mi/ln
Level of service, LOS	A	

This Multilane Highway Segment text report was created on 6/29/2018 08:44:22

## MULTILANE HIGHWAY SEGMENT ANALYSIS

File Name:	1 - Nevada County Line to Combie Lane AM.xuf
Analyst:	ZRS
Agency:	Omni-Means, a GHD company
Jurisdiction:	Caltrans-District 3
Date:	6/22/2018
Analysis Year:	2018
Time Period Analyzed:	AM peak hour
Project Description:	SR 49 CSMP Update
Units:	U.S. Customary

Direction 2: SB

## LOS and Performance Measures

Flow rate, $v$	1593	pc/h/ln
Capacity, C	4580	pc/h/ln
Speed, S	64.5	mi/h
Density, D	12.3	pc/mi/ln
Level of Service, LOS	B	

## Step 1: Input Data

Number of Lanes, N	2	ln
Lane Width	12	ft
Segment Length	-	ft
Terrain Type	Specific Grade	
Percent Grade	-2.00	%
Grade Length	2.70	mi
Right-Side Lateral Clearance, LCR	6	ft
Left-Side Lateral Clearance, LCL	6	ft
Median Type	Divided	
Access Point Density	0.5	access points/mi
Demand Volume, V	1465	veh/h
Peak Hour Factor, PHF	0.97	
Percent Total Trucks	4.00	%
Percent Single-Unit Trucks, SUT	30	%
Percent Tractor-Trailers, TT	70	%

## Step 2: Estimate and Adjust FFS

Estimating FFS		
Measured or Base FFS	Base	
Base Free-Flow Speed, BFFS	65.0	mi/h
Lane width	12	ft
Lane Width Adjustment, fLW	0.0	mi/h
Right-Side Lateral Clearance, LCR	6	ft
Left-Side Lateral Clearance, LCL	6	ft
Total Lateral Clearance, TLC	12.00	ft
Total Lateral Clearance Adjustment, fTLC	0.0	mi/h
Median Type	Divided	
Median Type Adjustment, fM	0.0	mi/h
Access Point Density	2.0	access points/mi
Access Point Density Adjustment, fA	0.5	mi/h
Free-Flow Speed, FFS	64.5	mi/h
Speed Adjustments		
Driver Population	All Familiar	
Speed Adjustment Factor, SAF	1.000	
Adjusted Free-Flow Speed, FFSadj	64.5	mi/h

## Step 3: Estimate and Adjust Capacity

Adjusted Free-flow Speed, FFSadj	64.5	mi/h
Capacity, c	2290	pc/h/ln
Capacity Adjustments		
Driver Population	All Familiar	
Capacity Adjustment Factor, CAF	1.000	
Adjusted Capacity, cadj	2290	pc/h/ln

---

Step 4: Adjust Demand Volume

---

Demand Volume, V	1465	veh/h
Peak Hour Factor, PHF	0.97	
Number of Lanes, N	2	ln
Terrain Type	Specific Grade	
Percent Grade	-2.00	%
Grade Length	2.70	mi
Percent Total Trucks	4.00	%
Percent Single-Unit Trucks, SUT	30	%
Percent Tractor-Trailers, TT	70	%
Proportion of Total Trucks, PT	0.04	
Heavy Vehicle PCE, ET	2.370	
Heavy Vehicle Adjustment, fHV	0.948	
Demand Adjustment Factor, DAF	1.000	
Demand Flow Rate, v <sub>D</sub>	796	pc/h/ln

---

Steps 5 and 6: Estimate Speed and Density and Determine LOS

---

Demand Flow Rate, v <sub>D</sub>	796	pc/h/ln
Free-Flow Speed, FFS	65.0	mi/h
Capacity, c	2290	pc/h/ln
Breakpoint, BP	1400	pc/h/ln
Density at Capacity, D <sub>c</sub>	45	pc/mi/ln
Mean Speed under Base Conditions, S	64.5	mi/h
Density, D	12.3	pc/mi/ln
Level of service, LOS	B	

This Multilane Highway Segment text report was created on 6/29/2018 08:45:03

Phone: Fax:  
E-Mail:

-----Directional Two-Lane Highway Segment Analysis-----

Analyst ZS  
Agency/Co. Omni-Means, a GHD Company  
Date Performed 6/21/2018  
Analysis Time Period AM Peak Hour  
Highway SR 49 NB  
From/To Cameo Rd/Mother Lode Rd  
Jurisdiction Caltrans - District 3  
Analysis Year 2018  
Description SR 49 CSMP Update

-----Input Data-----

Highway class	Class 1		Peak hour factor, PHF	0.83	
Shoulder width	6.5	ft	% Trucks and buses	8	%
Lane width	11.5	ft	% Trucks crawling	0.0	%
Segment length	3.9	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Rolling		% Recreational vehicles	2	%
Grade: Length	-	mi	% No-passing zones	96	%
Up/down	-	%	Access point density	3	/mi

Analysis direction volume, Vd 742 veh/h  
Opposing direction volume, Vo 1142 veh/h

-----Average Travel Speed-----

Direction	Analysis(d)	Opposing (o)
PCE for trucks, ET	1.3	1.3
PCE for RVs, ER	1.1	1.1
Heavy-vehicle adj. factor,(note-5) fHV	0.975	0.975
Grade adj. factor,(note-1) fg	1.00	1.00
Directional flow rate,(note-2) vi	917 pc/h	1411 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 0.4 mi/h  
Adj. for access point density,(note-3) fA 0.8 mi/h

Free-flow speed, FFfSd 53.8 mi/h

Adjustment for no-passing zones, fnp 0.8 mi/h  
Average travel speed, ATfSd 35.0 mi/h  
Percent Free Flow Speed, PFfS 64.9 %

-----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	894	1376	pc/h
Base percent time-spent-following,(note-4) BPTSFD	78.5	%	
Adjustment for no-passing zones, fnp	14.1		
Percent time-spent-following, PTSFD	84.1	%	

-----Level of Service and Other Performance Measures-----

Level of service, LOS	E	
Volume to capacity ratio, v/c	0.54	
Peak 15-min vehicle-miles of travel, VMT15	872	veh-mi
Peak-hour vehicle-miles of travel, VMT60	2894	veh-mi
Peak 15-min total travel time, TT15	24.9	veh-h
Capacity from ATS, CdATS	1658	veh/h
Capacity from PTSF, CdPTSF	1700	veh/h
Directional Capacity	1658	veh/h

-----Passing Lane Analysis-----

Total length of analysis segment, Lt	3.9	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)	35.0	mi/h
Percent time-spent-following, PTSFD (from above)	84.1	
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, ATSp1	-	
Percent free flow speed including passing lane, PFFSp1	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	E	
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	894.0
Effective width of outside lane, We	24.50
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	5.20
Bicycle LOS	E

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  $v_i$  ( $v_d$  or  $v_o$ )  $\geq 1,700$  pc/h, terminate analysis-the LOS is F.
3. For the analysis direction only and for  $v > 200$  veh/h.
4. For the analysis direction only.
5. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

Phone: Fax:  
E-Mail:

----- Directional Two-Lane Highway Segment Analysis -----

Analyst ZS  
Agency/Co. Omni-Means, a GHD Company  
Date Performed 6/21/2018  
Analysis Time Period AM Peak Hour  
Highway SR 49 SB  
From/To Cameo Rd/Mother Lode Rd  
Jurisdiction Caltrans - District 3  
Analysis Year 2018  
Description SR 49 CSMP Update

----- Input Data -----

Highway class	Class 1		Peak hour factor, PHF	0.94	
Shoulder width	6.5	ft	% Trucks and buses	4	%
Lane width	11.5	ft	% Trucks crawling	0.0	%
Segment length	3.9	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Rolling		% Recreational vehicles	1	%
Grade: Length	-	mi	% No-passing zones	100	%
Up/down	-	%	Access point density	2	/mi

Analysis direction volume, Vd 1142 veh/h  
Opposing direction volume, Vo 742 veh/h

----- Average Travel Speed -----

Direction	Analysis(d)	Opposing (o)
PCE for trucks, ET	1.3	1.4
PCE for RVs, ER	1.1	1.1
Heavy-vehicle adj. factor,(note-5) fHV	0.987	0.983
Grade adj. factor,(note-1) fg	1.00	0.99
Directional flow rate,(note-2) vi	1231 pc/h	811 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 0.4 mi/h  
Adj. for access point density,(note-3) fA 0.5 mi/h

Free-flow speed, FFfSd 54.1 mi/h

Adjustment for no-passing zones, fnp 1.4 mi/h  
Average travel speed, ATfSd 36.9 mi/h  
Percent Free Flow Speed, PFfS 68.2 %

-----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	1215 pc/h	789 pc/h	
Base percent time-spent-following,(note-4) BPTSFd	80.9 %		
Adjustment for no-passing zones, fnp	17.1		
Percent time-spent-following, PTSFd	91.3 %		

-----Level of Service and Other Performance Measures-----

Level of service, LOS	E	
Volume to capacity ratio, v/c	0.72	
Peak 15-min vehicle-miles of travel, VMT15	1185	veh-mi
Peak-hour vehicle-miles of travel, VMT60	4454	veh-mi
Peak 15-min total travel time, TT15	32.1	veh-h
Capacity from ATS, CdATS	1678	veh/h
Capacity from PTSF, CdPTSF	1700	veh/h
Directional Capacity	1678	veh/h

-----Passing Lane Analysis-----

Total length of analysis segment, Lt	3.9	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)	36.9	mi/h
Percent time-spent-following, PTSFd (from above)	91.3	
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, ATSp1	-	
Percent free flow speed including passing lane, PFFSp1	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	E	
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	1214.9
Effective width of outside lane, We	24.50
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	4.06
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  $v_i$  ( $v_d$  or  $v_o$ )  $\geq 1,700$  pc/h, terminate analysis-the LOS is F.
3. For the analysis direction only and for  $v > 200$  veh/h.
4. For the analysis direction only.
5. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

MULTILANE HIGHWAY SEGMENT ANALYSIS

File Name: 3 - Mother Lode to Lime Kiln AM\_xhm.xuf  
 Analyst: ZRS  
 Agency: Omni-Means, a GHD company  
 Jurisdiction: Caltrans - District 3  
 Date: 6/22/2018  
 Analysis Year: 2018  
 Time Period Analyzed: AM Peak Hour  
 Project Description: SR 49 CSMP Update  
 Units: U.S. Customary

Direction 1: NB

LOS and Performance Measures

Flow rate, v <sub>95</sub>	1087	pc/h/ln
Capacity, C	4180	pc/h/ln
Speed, S	54.5	mi/h
Density, D	10.0	pc/mi/ln
Level of Service, LOS	A	

Step 1: Input Data

Number of Lanes, N	2	ln
Lane Width	12	ft
Segment length	-	ft
Terrain Type	Rolling	
Percent Grade	-	%
Grade Length	-	mi
Right-Side Lateral Clearance, LCR	6	ft
Left-Side Lateral Clearance, LCL	6	ft
Median Type	Divided	
Access Point Density	2.0	access points/mi
Demand Volume, V	787	veh/h
Peak Hour Factor, PHF	0.84	
Percent Total Trucks	8.00	%
Percent Single-Unit Trucks, SUT	-	%
Percent Tractor-Trailers, TT	-	%

Step 2: Estimate and Adjust FFS

Estimating FFS		
Measured or Base FFS	Base	
Base Free-Flow Speed, BFFS	55.0	mi/h
Lane Width	12	ft
Lane Width Adjustment, fLW	0.0	mi/h
Right-Side Lateral Clearance, LCR	6	ft
Left-Side Lateral Clearance, LCL	6	ft
Total Lateral Clearance, TLC	12.00	ft
Total Lateral Clearance Adjustment, fTLC	0.0	mi/h
Median Type	Divided	
Median Type Adjustment, fM	0.0	mi/h
Access Point Density	2.0	access points/mi
Access Point Density Adjustment, fA	0.5	mi/h
Free-Flow Speed, FFS	54.5	mi/h
Speed Adjustments		
Driver Population	All Familiar	
Speed Adjustment Factor, SAF	1.000	
Adjusted Free-Flow Speed, FFSadj	54.5	mi/h

Step 3: Estimate and Adjust Capacity

Adjusted Free-flow Speed, FFSadj	54.5	mi/h
Capacity, c	2090	pc/h/ln
Capacity Adjustments		
Driver Population	All Familiar	
Capacity Adjustment Factor, CAF	1.000	
Adjusted Capacity, cadj	2090	pc/h/ln

---

Step 4: Adjust Demand Volume

---

Demand Volume, V	787	veh/h
Peak Hour Factor, PHF	0.84	
Number of Lanes, N	2	ln
Terrain type	Rolling	
Percent Grade	-	%
Grade Length	-	mi
Percent Total Trucks	8.00	%
Percent Single-Unit Trucks, SUT	-	%
Percent Tractor-Trailers, TT	-	%
Proportion of Total Trucks, PT	0.08	
Heavy Vehicle PCE, ET	3.000	
Heavy Vehicle Adjustment, fHV	0.862	
Demand Adjustment Factor, DAF	1.000	
Demand Flow Rate, v <sub>D</sub>	544	pc/h/ln

---

Steps 5 and 6: Estimate Speed and Density and Determine LOS

---

Demand Flow Rate, v <sub>D</sub>	544	pc/h/ln
Free-Flow Speed, FFS	55.0	mi/h
Capacity, c	2090	pc/h/ln
Breakpoint, BP	1400	pc/h/ln
Density at Capacity, D <sub>c</sub>	45	pc/mi/ln
Mean Speed under Base Conditions, S	54.5	mi/h
Density, D	10.0	pc/mi/ln
Level of service, LOS	A	

This Multilane Highway Segment text report was created on 6/29/2018 08:47:42

MULTILANE HIGHWAY SEGMENT ANALYSIS

File Name: 3 - Mother Lode to Lime Kiln AM\_xhm.xuf  
 Analyst: ZRS  
 Agency: Omni-Means, a GHD company  
 Jurisdiction: Caltrans - District 3  
 Date: 6/22/2018  
 Analysis Year: 2018  
 Time Period Analyzed: AM Peak Hour  
 Project Description: SR 49 CSMP Update  
 Units: U.S. Customary

Direction 2: SB

LOS and Performance Measures

Flow rate, v <sub>95</sub>	1260	pc/h/ln
Capacity, C	4180	pc/h/ln
Speed, S	54.5	mi/h
Density, D	11.6	pc/mi/ln
Level of Service, LOS	B	

Step 1: Input Data

Number of Lanes, N	2	ln
Lane Width	12	ft
Segment Length	-	ft
Terrain Type	Rolling	
Percent Grade	-	%
Grade Length	-	mi
Right-Side Lateral Clearance, LCR	6	ft
Left-Side Lateral Clearance, LCL	6	ft
Median Type	Divided	
Access Point Density	0.5	access points/mi
Demand Volume, V	1077	veh/h
Peak Hour Factor, PHF	0.94	
Percent Total Trucks	5.00	%
Percent Single-Unit Trucks, SUT	-	%
Percent Tractor-Trailers, TT	-	%

Step 2: Estimate and Adjust FFS

Estimating FFS		
Measured or Base FFS	Base	
Base Free-Flow Speed, BFFS	55.0	mi/h
Lane width	12	ft
Lane Width Adjustment, fLW	0.0	mi/h
Right-Side Lateral Clearance, LCR	6	ft
Left-Side Lateral Clearance, LCL	6	ft
Total Lateral Clearance, TLC	12.00	ft
Total Lateral Clearance Adjustment, fTLC	0.0	mi/h
Median Type	Divided	
Median Type Adjustment, fM	0.0	mi/h
Access Point Density	2.0	access points/mi
Access Point Density Adjustment, fA	0.5	mi/h
Free-Flow Speed, FFS	54.5	mi/h
Speed Adjustments		
Driver Population	All Familiar	
Speed Adjustment Factor, SAF	1.000	
Adjusted Free-Flow Speed, FFSadj	54.5	mi/h

Step 3: Estimate and Adjust Capacity

Adjusted Free-flow Speed, FFSadj	54.5	mi/h
Capacity, c	2090	pc/h/ln
Capacity Adjustments		
Driver Population	All Familiar	
Capacity Adjustment Factor, CAF	1.000	
Adjusted Capacity, cadj	2090	pc/h/ln

---

Step 4: Adjust Demand Volume

---

Demand Volume, V	1077	veh/h
Peak Hour Factor, PHF	0.94	
Number of Lanes, N	2	ln
Terrain Type	Rolling	
Percent Grade	-	%
Grade Length	-	mi
Percent Total Trucks	5.00	%
Percent Single-Unit Trucks, SUT	-	%
Percent Tractor-Trailers, TT	-	%
Proportion of Total Trucks, PT	0.05	
Heavy Vehicle PCE, ET	3.000	
Heavy Vehicle Adjustment, fHV	0.909	
Demand Adjustment Factor, DAF	1.000	
Demand Flow Rate, v <sub>D</sub>	630	pc/h/ln

---

Steps 5 and 6: Estimate Speed and Density and Determine LOS

---

Demand Flow Rate, v <sub>D</sub>	630	pc/h/ln
Free-Flow Speed, FFS	55.0	mi/h
Capacity, c	2090	pc/h/ln
Breakpoint, BP	1400	pc/h/ln
Density at Capacity, D <sub>c</sub>	45	pc/mi/ln
Mean Speed under Base Conditions, S	54.5	mi/h
Density, D	11.6	pc/mi/ln
Level of service, LOS	B	

This Multilane Highway Segment text report was created on 6/29/2018 08:48:07



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E-Mail:

----- Directional Two-Lane Highway Segment Analysis -----

Analyst ZS  
Agency/Co. Omni-Means, a GHD Company  
Date Performed 6/22/2018  
Analysis Time Period AM Peak Hour  
Highway SR 49 NB  
From/To Lime Kiln/Auburn  
Jurisdiction Caltrans - District 3  
Analysis Year 2018  
Description SR 49 CSMP Update

----- Input Data -----

Highway class	Class 1		Peak hour factor, PHF	0.90	
Shoulder width	6.5	ft	% Trucks and buses	6	%
Lane width	12.0	ft	% Trucks crawling	0.0	%
Segment length	1.0	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Rolling		% Recreational vehicles	2	%
Grade: Length	-	mi	% No-passing zones	91	%
Up/down	-	%	Access point density	3	/mi

Analysis direction volume, Vd 990 veh/h  
Opposing direction volume, Vo 1045 veh/h

----- Average Travel Speed -----

Direction	Analysis(d)	Opposing (o)
PCE for trucks, ET	1.3	1.3
PCE for RVs, ER	1.1	1.1
Heavy-vehicle adj. factor, (note-5) fHV	0.980	0.980
Grade adj. factor, (note-1) fg	1.00	1.00
Directional flow rate, (note-2) vi	1122 pc/h	1185 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 0.8 mi/h

Free-flow speed, FFsd 54.3 mi/h

Adjustment for no-passing zones, fnp 1.0 mi/h  
Average travel speed, ATsd 35.4 mi/h  
Percent Free Flow Speed, PFFS 65.2 %

-----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	1100 pc/h	1161 pc/h
Base percent time-spent-following,(note-4) BPTSFD	82.2 %	
Adjustment for no-passing zones, fnp	14.8	
Percent time-spent-following, PTSFD	89.4 %	

-----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	275	veh-mi
Peak-hour vehicle-miles of travel, VMT60	990	veh-mi
Peak 15-min total travel time, TT15	7.8	veh-h
Capacity from ATS, CdATS	1666	veh/h
Capacity from PTSF, CdPTSF	1700	veh/h
Directional Capacity	1666	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)	35.4	mi/h
Percent time-spent-following, PTSFD (from above)	89.4	
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, ATSp1	-	
Percent free flow speed including passing lane, PFFSp1	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	E	
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	1100.0
Effective width of outside lane, We	25.00
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	4.49
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  $v_i$  ( $v_d$  or  $v_o$ )  $\geq 1,700$  pc/h, terminate analysis-the LOS is F.
3. For the analysis direction only and for  $v > 200$  veh/h.
4. For the analysis direction only.
5. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

Phone: Fax:  
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----- Directional Two-Lane Highway Segment Analysis -----

Analyst ZS  
Agency/Co. Omni-Means, a GHD Company  
Date Performed 6/21/2018  
Analysis Time Period AM Peak Hour  
Highway SR 49 SB  
From/To Lime Kiln/Auburn  
Jurisdiction Caltrans - District 3  
Analysis Year 2018  
Description SR 49 CSMP Update

----- Input Data -----

Highway class	Class 1		Peak hour factor, PHF	0.88	
Shoulder width	6.5	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	Rolling		% Recreational vehicles	1	%
Grade: Length	-	mi	% No-passing zones	89	%
Up/down	-	%	Access point density	5	/mi

Analysis direction volume, Vd 1045 veh/h  
Opposing direction volume, Vo 990 veh/h

----- Average Travel Speed -----

Direction	Analysis(d)	Opposing (o)
PCE for trucks, ET	1.3	1.3
PCE for RVs, ER	1.1	1.1
Heavy-vehicle adj. factor, (note-5) fHV	0.984	0.984
Grade adj. factor, (note-1) fg	1.00	1.00
Directional flow rate, (note-2) vi	1207 pc/h	1143 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 1.3 mi/h

Free-flow speed, FFfSd 53.8 mi/h

Adjustment for no-passing zones, fnp 0.9 mi/h  
Average travel speed, ATfSd 34.6 mi/h  
Percent Free Flow Speed, PFfS 64.3 %

-----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	1188 pc/h	1125 pc/h
Base percent time-spent-following,(note-4) BPTSFD	83.5 %	
Adjustment for no-passing zones, fnp	14.1	
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	0.71	
Peak 15-min vehicle-miles of travel, VMT15	297	veh-mi
Peak-hour vehicle-miles of travel, VMT60	1045	veh-mi
Peak 15-min total travel time, TT15	8.6	veh-h
Capacity from ATS, CdATS	1673	veh/h
Capacity from PTSF, CdPTSF	1700	veh/h
Directional Capacity	1673	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)	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, ATSp1	-	
Percent free flow speed including passing lane, PFFSp1	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	E	
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	1187.5
Effective width of outside lane, We	25.00
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	4.22
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  $v_i$  ( $v_d$  or  $v_o$ )  $\geq 1,700$  pc/h, terminate analysis-the LOS is F.
3. For the analysis direction only and for  $v > 200$  veh/h.
4. For the analysis direction only.
5. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

## MULTILANE HIGHWAY SEGMENT ANALYSIS

File Name:	5- Auburn to La Barr AM NB.xuf
Analyst:	ZRS
Agency:	Omni-Means, a GHD company
Jurisdiction:	Caltrans - District 3
Date:	6/22/2018
Analysis Year:	2018
Time Period Analyzed:	AM Peak Hour
Project Description:	SR 49 CSMP Update
Units:	U.S. Customary

## Direction 1: NB

## LOS and Performance Measures

Flow rate, $v$	1293	pc/h/ln
Capacity, C	4200	pc/h/ln
Speed, S	55.0	mi/h
Density, D	11.7	pc/mi/ln
Level of Service, LOS	B	

## Step 1: Input Data

Number of Lanes, N	2	ln
Lane Width	12	ft
Segment length	-	ft
Terrain Type	Level	
Percent Grade	-	%
Grade Length	-	mi
Right-Side Lateral Clearance, LCR	6	ft
Left-Side Lateral Clearance, LCL	6	ft
Median Type	Divided	
Access Point Density	0.0	access points/mi
Demand Volume, V	1078	veh/h
Peak Hour Factor, PHF	0.94	
Percent Total Trucks	12.70	%
Percent Single-Unit Trucks, SUT	-	%
Percent Tractor-Trailers, TT	-	%

## Step 2: Estimate and Adjust FFS

Estimating FFS		
Measured or Base FFS	Base	
Base Free-Flow Speed, BFFS	55.0	mi/h
Lane Width	12	ft
Lane Width Adjustment, fLW	0.0	mi/h
Right-Side Lateral Clearance, LCR	6	ft
Left-Side Lateral Clearance, LCL	6	ft
Total Lateral Clearance, TLC	12.00	ft
Total Lateral Clearance Adjustment, fTLC	0.0	mi/h
Median Type	Divided	
Median Type Adjustment, fM	0.0	mi/h
Access Point Density	0.0	access points/mi
Access Point Density Adjustment, fA	0.0	mi/h
Free-Flow Speed, FFS	55.0	mi/h
Speed Adjustments		
Driver Population	All Familiar	
Speed Adjustment Factor, SAF	1.000	
Adjusted Free-Flow Speed, FFSadj	55.0	mi/h

## Step 3: Estimate and Adjust Capacity

Adjusted Free-flow Speed, FFSadj	55.0	mi/h
Capacity, c	2100	pc/h/ln
Capacity Adjustments		
Driver Population	All Familiar	
Capacity Adjustment Factor, CAF	1.000	
Adjusted Capacity, cadj	2100	pc/h/ln

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Step 4: Adjust Demand Volume

---

Demand Volume, V	1078	veh/h
Peak Hour Factor, PHF	0.94	
Number of Lanes, N	2	ln
Terrain type	Level	
Percent Grade	-	%
Grade Length	-	mi
Percent Total Trucks	12.70	%
Percent Single-Unit Trucks, SUT	-	%
Percent Tractor-Trailers, TT	-	%
Proportion of Total Trucks, PT	0.13	
Heavy Vehicle PCE, ET	2.000	
Heavy Vehicle Adjustment, fHV	0.887	
Demand Adjustment Factor, DAF	1.000	
Demand Flow Rate, v <sub>D</sub>	646	pc/h/ln

---

Steps 5 and 6: Estimate Speed and Density and Determine LOS

---

Demand Flow Rate, v <sub>D</sub>	646	pc/h/ln
Free-Flow Speed, FFS	55.0	mi/h
Capacity, c	2100	pc/h/ln
Breakpoint, BP	1400	pc/h/ln
Density at Capacity, D <sub>c</sub>	45	pc/mi/ln
Mean Speed under Base Conditions, S	55.0	mi/h
Density, D	11.7	pc/mi/ln
Level of service, LOS	B	

This Multilane Highway Segment text report was created on 6/29/2018 08:52:14



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----- Directional Two-Lane Highway Segment Analysis -----

Analyst ZRS  
Agency/Co. Omni-Means, a GHD company  
Date Performed 6/22/2018  
Analysis Time Period AM Peak Hour  
Highway SR 49 SB  
From/To From Auburn to La Barr  
Jurisdiction Caltrans - District 3  
Analysis Year 2018  
Description SR 49 CSMP Update

----- Input Data -----

Highway class	Class 1		Peak hour factor, PHF	0.88	
Shoulder width	6.0	ft	% Trucks and buses	5	%
Lane width	12.0	ft	% Trucks crawling	0.0	%
Segment length	2.5	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Rolling		% Recreational vehicles	2	%
Grade: Length	-	mi	% No-passing zones	100	%
Up/down	-	%	Access point density	4	/mi

Analysis direction volume, Vd 872 veh/h  
Opposing direction volume, Vo 1072 veh/h

----- Average Travel Speed -----

Direction	Analysis(d)	Opposing (o)
PCE for trucks, ET	1.3	1.3
PCE for RVs, ER	1.1	1.1
Heavy-vehicle adj. factor,(note-5) fHV	0.983	0.983
Grade adj. factor,(note-1) fg	1.00	1.00
Directional flow rate,(note-2) vi	1008 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 1.0 mi/h

Free-flow speed, FFfSd 54.0 mi/h

Adjustment for no-passing zones, fnp 1.0 mi/h  
Average travel speed, ATfSd 35.6 mi/h  
Percent Free Flow Speed, PFfS 65.9 %

-----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	991	1218	pc/h
Base percent time-spent-following,(note-4) BPTSFD	79.8	%	
Adjustment for no-passing zones, fnp	15.3		
Percent time-spent-following, PTSFD	86.7	%	

-----Level of Service and Other Performance Measures-----

Level of service, LOS	E	
Volume to capacity ratio, v/c	0.59	
Peak 15-min vehicle-miles of travel, VMT15	619	veh-mi
Peak-hour vehicle-miles of travel, VMT60	2180	veh-mi
Peak 15-min total travel time, TT15	17.4	veh-h
Capacity from ATS, CdATS	1671	veh/h
Capacity from PTSF, CdPTSF	1700	veh/h
Directional Capacity	1671	veh/h

-----Passing Lane Analysis-----

Total length of analysis segment, Lt	2.5	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)	35.6	mi/h
Percent time-spent-following, PTSFD (from above)	86.7	
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, ATSp1	-	
Percent free flow speed including passing lane, PFFSp1	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	E	
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	990.9
Effective width of outside lane, We	24.00
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	4.37
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  $v_i$  ( $v_d$  or  $v_o$ )  $\geq 1,700$  pc/h, terminate analysis-the LOS is F.
3. For the analysis direction only and for  $v > 200$  veh/h.
4. For the analysis direction only.
5. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

Phone: Fax:  
 E-Mail:

-----Directional Two-Lane Highway Segment Analysis-----

Analyst ZRS  
 Agency/Co. Omni-Means, a GHD company  
 Date Performed 6/22/2018  
 Analysis Time Period AM Peak Hour  
 Highway SR 49 NB  
 From/To From La Barr to McKnight  
 Jurisdiction Caltrans - District 3  
 Analysis Year 2018  
 Description SR 49 CSMP Update

-----Input Data-----

Highway class	Class 1		Peak hour factor, PHF	0.88	
Shoulder width	6.0	ft	% Trucks and buses	4	%
Lane width	12.0	ft	% Trucks crawling	0.0	%
Segment length	3.1	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Rolling		% Recreational vehicles	2	%
Grade: Length	-	mi	% No-passing zones	100	%
Up/down	-	%	Access point density	4	/mi

Analysis direction volume, Vd 1183 veh/h  
 Opposing direction volume, Vo 803 veh/h

-----Average Travel Speed-----

Direction	Analysis(d)	Opposing (o)
PCE for trucks, ET	1.3	1.3
PCE for RVs, ER	1.1	1.1
Heavy-vehicle adj. factor,(note-5) fHV	0.986	0.986
Grade adj. factor,(note-1) fg	1.00	1.00
Directional flow rate,(note-2) vi	1363 pc/h	925 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 1.0 mi/h

Free-flow speed, FFfSd 54.0 mi/h

Adjustment for no-passing zones, fnp 1.2 mi/h  
 Average travel speed, ATfSd 35.0 mi/h  
 Percent Free Flow Speed, PFFfS 64.9 %

-----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	1344 pc/h	913 pc/h	
Base percent time-spent-following,(note-4) BPTSFD	84.6	%	
Adjustment for no-passing zones, fnp	14.3		
Percent time-spent-following, PTSFD	93.1	%	

-----Level of Service and Other Performance Measures-----

Level of service, LOS	E	
Volume to capacity ratio, v/c	0.80	
Peak 15-min vehicle-miles of travel, VMT15	1042	veh-mi
Peak-hour vehicle-miles of travel, VMT60	3667	veh-mi
Peak 15-min total travel time, TT15	29.7	veh-h
Capacity from ATS, CdATS	1676	veh/h
Capacity from PTSF, CdPTSF	1700	veh/h
Directional Capacity	1676	veh/h

-----Passing Lane Analysis-----

Total length of analysis segment, Lt	3.1	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)	35.0	mi/h
Percent time-spent-following, PTSFD (from above)	93.1	
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, ATSp1	-	
Percent free flow speed including passing lane, PFFSp1	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	E	
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	1344.3
Effective width of outside lane, We	24.00
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	4.24
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  $v_i$  ( $v_d$  or  $v_o$ )  $\geq 1,700$  pc/h, terminate analysis-the LOS is F.
3. For the analysis direction only and for  $v > 200$  veh/h.
4. For the analysis direction only.
5. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

Phone: Fax:  
E-Mail:

-----Directional Two-Lane Highway Segment Analysis-----

Analyst ZRS  
Agency/Co. Omni-Means, a GHD company  
Date Performed 6/22/2018  
Analysis Time Period AM Peak Hour  
Highway SR 49 SB  
From/To From La Barr to McKnight  
Jurisdiction Caltrans - District 3  
Analysis Year 2018  
Description SR 49 CSMP Update

-----Input Data-----

Highway class	Class 1		Peak hour factor, PHF	0.84	
Shoulder width	6.0	ft	% Trucks and buses	4	%
Lane width	12.0	ft	% Trucks crawling	0.0	%
Segment length	3.1	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Rolling		% Recreational vehicles	2	%
Grade: Length	-	mi	% No-passing zones	100	%
Up/down	-	%	Access point density	5	/mi

Analysis direction volume, Vd 803 veh/h  
Opposing direction volume, Vo 1183 veh/h

-----Average Travel Speed-----

Direction	Analysis(d)	Opposing (o)
PCE for trucks, ET	1.3	1.3
PCE for RVs, ER	1.1	1.1
Heavy-vehicle adj. factor,(note-5) fHV	0.986	0.986
Grade adj. factor,(note-1) fg	1.00	1.00
Directional flow rate,(note-2) vi	970 pc/h	1428 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 1.3 mi/h

Free-flow speed, FFfSd 53.8 mi/h

Adjustment for no-passing zones, fnp 0.8 mi/h  
Average travel speed, ATfSd 34.3 mi/h  
Percent Free Flow Speed, PFFfS 63.8 %

-----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	956	1408	pc/h
Base percent time-spent-following,(note-4) BPTSFD	80.3	%	
Adjustment for no-passing zones, fnp	13.0		
Percent time-spent-following, PTSFD	85.6	%	

-----Level of Service and Other Performance Measures-----

Level of service, LOS	E	
Volume to capacity ratio, v/c	0.57	
Peak 15-min vehicle-miles of travel, VMT15	741	veh-mi
Peak-hour vehicle-miles of travel, VMT60	2489	veh-mi
Peak 15-min total travel time, TT15	21.6	veh-h
Capacity from ATS, CdATS	1676	veh/h
Capacity from PTSF, CdPTSF	1700	veh/h
Directional Capacity	1676	veh/h

-----Passing Lane Analysis-----

Total length of analysis segment, Lt	3.1	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)	34.3	mi/h
Percent time-spent-following, PTSFD (from above)	85.6	
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, ATSp1	-	
Percent free flow speed including passing lane, PFFSp1	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	E	
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	956.0
Effective width of outside lane, We	24.00
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	4.06
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  $v_i$  ( $v_d$  or  $v_o$ )  $\geq 1,700$  pc/h, terminate analysis-the LOS is F.
3. For the analysis direction only and for  $v > 200$  veh/h.
4. For the analysis direction only.
5. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

MULTILANE HIGHWAY SEGMENT ANALYSIS

File Name: 1 - Nevada County Line to Combie Lane PM\_xhm.xuf  
 Analyst: ZRS  
 Agency: Omni-Means, a GHD company  
 Jurisdiction: Caltrans - District 3  
 Date: 6/22/2018  
 Analysis Year: 2018  
 Time Period Analyzed: PM Peak Hour  
 Project Description: SR 49 CSMP Update  
 Units: U.S. Customary

Direction 1: NB

LOS and Performance Measures

Flow rate, v <sub>95</sub>	2183	pc/h/ln
Capacity, C	4496	pc/h/ln
Speed, S	62.4	mi/h
Density, D	17.5	pc/mi/ln
Level of Service, LOS	B	

Step 1: Input Data

Number of Lanes, N	2	ln
Lane Width	12	ft
Segment length	-	ft
Terrain Type	Specific Grade	
Percent Grade	2.00	%
Grade Length	2.70	mi
Right-Side Lateral Clearance, LCR	6	ft
Left-Side Lateral Clearance, LCL	6	ft
Median Type	Divided	
Access Point Density	3.0	access points/mi
Demand Volume, V	1766	veh/h
Peak Hour Factor, PHF	0.89	
Percent Total Trucks	3.00	%
Percent Single-Unit Trucks, SUT	30	%
Percent Tractor-Trailers, TT	70	%

Step 2: Estimate and Adjust FFS

Estimating FFS		
Measured or Base FFS	Base	
Base Free-Flow Speed, BFFS	65.0	mi/h
Lane Width	12	ft
Lane Width Adjustment, fLW	1.9	mi/h
Right-Side Lateral Clearance, LCR	6	ft
Left-Side Lateral Clearance, LCL	6	ft
Total Lateral Clearance, TLC	12.00	ft
Total Lateral Clearance Adjustment, fTLC	0.0	mi/h
Median Type	Divided	
Median Type Adjustment, fM	0.0	mi/h
Access Point Density	3.0	access points/mi
Access Point Density Adjustment, fA	0.8	mi/h
Free-Flow Speed, FFS	62.4	mi/h
Speed Adjustments		
Driver Population	All Familiar	
Speed Adjustment Factor, SAF	1.000	
Adjusted Free-Flow Speed, FFSadj	62.4	mi/h

Step 3: Estimate and Adjust Capacity

Adjusted Free-flow Speed, FFSadj	62.4	mi/h
Capacity, c	2248	pc/h/ln
Capacity Adjustments		
Driver Population	All Familiar	
Capacity Adjustment Factor, CAF	1.000	
Adjusted Capacity, cadj	2248	pc/h/ln

---

Step 4: Adjust Demand Volume

---

Demand Volume, V	1766	veh/h
Peak Hour Factor, PHF	0.89	
Number of Lanes, N	2	ln
Terrain type	Specific Grade	
Percent Grade	2.00	%
Grade Length	2.70	mi
Percent Total Trucks	3.00	%
Percent Single-Unit Trucks, SUT	30	%
Percent Tractor-Trailers, TT	70	%
Proportion of Total Trucks, PT	0.03	
Heavy Vehicle PCE, ET	4.330	
Heavy Vehicle Adjustment, fHV	0.909	
Demand Adjustment Factor, DAF	1.000	
Demand Flow Rate, v <sub>D</sub>	1092	pc/h/ln

---

Steps 5 and 6: Estimate Speed and Density and Determine LOS

---

Demand Flow Rate, v <sub>D</sub>	1092	pc/h/ln
Free-Flow Speed, FFS	65.0	mi/h
Capacity, c	2248	pc/h/ln
Breakpoint, BP	1400	pc/h/ln
Density at Capacity, D <sub>c</sub>	45	pc/mi/ln
Mean Speed under Base Conditions, S	62.4	mi/h
Density, D	17.5	pc/mi/ln
Level of service, LOS	B	

This Multilane Highway Segment text report was created on 6/29/2018 08:18:38

## MULTILANE HIGHWAY SEGMENT ANALYSIS

File Name:	1 - Nevada County Line to Combie Lane PM_xhm.xuf
Analyst:	ZRS
Agency:	Omni-Means, a GHD company
Jurisdiction:	Caltrans - District 3
Date:	6/22/2018
Analysis Year:	2018
Time Period Analyzed:	PM Peak Hour
Project Description:	SR 49 CSMP Update
Units:	U.S. Customary

## Direction 2: SB

## LOS and Performance Measures

Flow rate, $v$	1191	pc/h/ln
Capacity, C	4580	pc/h/ln
Speed, S	64.5	mi/h
Density, D	9.2	pc/mi/ln
Level of Service, LOS	A	

## Step 1: Input Data

Number of Lanes, N	2	ln
Lane Width	12	ft
Segment Length	-	ft
Terrain Type	Specific Grade	
Percent Grade	-2.00	%
Grade Length	2.70	mi
Right-Side Lateral Clearance, LCR	6	ft
Left-Side Lateral Clearance, LCL	6	ft
Median Type	Divided	
Access Point Density	0.5	access points/mi
Demand Volume, V	1073	veh/h
Peak Hour Factor, PHF	0.95	
Percent Total Trucks	4.00	%
Percent Single-Unit Trucks, SUT	30	%
Percent Tractor-Trailers, TT	70	%

## Step 2: Estimate and Adjust FFS

Estimating FFS		
Measured or Base FFS	Base	
Base Free-Flow Speed, BFFS	65.0	mi/h
Lane width	12	ft
Lane Width Adjustment, fLW	0.0	mi/h
Right-Side Lateral Clearance, LCR	6	ft
Left-Side Lateral Clearance, LCL	6	ft
Total Lateral Clearance, TLC	12.00	ft
Total Lateral Clearance Adjustment, fTLC	0.0	mi/h
Median Type	Divided	
Median Type Adjustment, fM	0.0	mi/h
Access Point Density	2.0	access points/mi
Access Point Density Adjustment, fA	0.5	mi/h
Free-Flow Speed, FFS	64.5	mi/h
Speed Adjustments		
Driver Population	All Familiar	
Speed Adjustment Factor, SAF	1.000	
Adjusted Free-Flow Speed, FFSadj	64.5	mi/h

## Step 3: Estimate and Adjust Capacity

Adjusted Free-flow Speed, FFSadj	64.5	mi/h
Capacity, c	2290	pc/h/ln
Capacity Adjustments		
Driver Population	All Familiar	
Capacity Adjustment Factor, CAF	1.000	
Adjusted Capacity, cadj	2290	pc/h/ln

---

Step 4: Adjust Demand Volume

---

Demand Volume, V	1073	veh/h
Peak Hour Factor, PHF	0.95	
Number of Lanes, N	2	ln
Terrain Type	Specific Grade	
Percent Grade	-2.00	%
Grade Length	2.70	mi
Percent Total Trucks	4.00	%
Percent Single-Unit Trucks, SUT	30	%
Percent Tractor-Trailers, TT	70	%
Proportion of Total Trucks, PT	0.04	
Heavy Vehicle PCE, ET	2.370	
Heavy Vehicle Adjustment, fHV	0.948	
Demand Adjustment Factor, DAF	1.000	
Demand Flow Rate, v <sub>D</sub>	596	pc/h/ln

---

Steps 5 and 6: Estimate Speed and Density and Determine LOS

---

Demand Flow Rate, v <sub>D</sub>	596	pc/h/ln
Free-Flow Speed, FFS	65.0	mi/h
Capacity, c	2290	pc/h/ln
Breakpoint, BP	1400	pc/h/ln
Density at Capacity, D <sub>c</sub>	45	pc/mi/ln
Mean Speed under Base Conditions, S	64.5	mi/h
Density, D	9.2	pc/mi/ln
Level of service, LOS	A	

This Multilane Highway Segment text report was created on 6/29/2018 08:18:53

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
 E-Mail: \_\_\_\_\_

----- Directional Two-Lane Highway Segment Analysis -----

Analyst ZS  
 Agency/Co. Omni-Means, a GHD Company  
 Date Performed 6/21/2018  
 Analysis Time Period PM Peak Hour  
 Highway SR 49 NB  
 From/To Cameo Rd/Mother Lode Rd  
 Jurisdiction Caltrans - District 3  
 Analysis Year 2018  
 Description SR 49 CSMP Update

----- Input Data -----

Highway class	Class 1		Peak hour factor, PHF	0.95	
Shoulder width	6.5	ft	% Trucks and buses	4	%
Lane width	11.5	ft	% Trucks crawling	0.0	%
Segment length	3.9	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Rolling		% Recreational vehicles	1	%
Grade: Length	-	mi	% No-passing zones	96	%
Up/down	-	%	Access point density	3	/mi

Analysis direction volume, Vd 1247 veh/h  
 Opposing direction volume, Vo 867 veh/h

----- Average Travel Speed -----

Direction	Analysis(d)	Opposing (o)
PCE for trucks, ET	1.3	1.3
PCE for RVs, ER	1.1	1.1
Heavy-vehicle adj. factor, (note-5) fHV	0.987	0.987
Grade adj. factor, (note-1) fg	1.00	1.00
Directional flow rate, (note-2) vi	1330 pc/h	925 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 0.4 mi/h  
 Adj. for access point density, (note-3) fA 0.8 mi/h

Free-flow speed, FFfSd 53.8 mi/h

Adjustment for no-passing zones, fnp 1.2 mi/h  
 Average travel speed, ATfSd 35.2 mi/h  
 Percent Free Flow Speed, PFFfS 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	1313 pc/h	913 pc/h
Base percent time-spent-following,(note-4) BPTSFd	84.0 %	
Adjustment for no-passing zones, fnp	14.6	
Percent time-spent-following, PTSFd	92.6 %	

-----Level of Service and Other Performance Measures-----

Level of service, LOS	E	
Volume to capacity ratio, v/c	0.78	
Peak 15-min vehicle-miles of travel, VMT15	1280	veh-mi
Peak-hour vehicle-miles of travel, VMT60	4863	veh-mi
Peak 15-min total travel time, TT15	36.4	veh-h
Capacity from ATS, CdATS	1678	veh/h
Capacity from PTSF, CdPTSF	1700	veh/h
Directional Capacity	1678	veh/h

-----Passing Lane Analysis-----

Total length of analysis segment, Lt	3.9	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)	35.2	mi/h
Percent time-spent-following, PTSFd (from above)	92.6	
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, ATSp1	-	
Percent free flow speed including passing lane, PFFSp1	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	E	
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	1312.6
Effective width of outside lane, We	24.50
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	4.10
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  $v_i$  ( $v_d$  or  $v_o$ )  $\geq 1,700$  pc/h, terminate analysis-the LOS is F.
3. For the analysis direction only and for  $v > 200$  veh/h.
4. For the analysis direction only.
5. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.



Phone: Fax:  
E-Mail:

-----Directional Two-Lane Highway Segment Analysis-----

Analyst ZS  
Agency/Co. Omni-Means, a GHD Company  
Date Performed 6/21/2018  
Analysis Time Period AM Peak Hour  
Highway SR 49 SB  
From/To Cameo Rd/Mother Lode Rd  
Jurisdiction Caltrans - District 3  
Analysis Year 2018  
Description SR 49 CSMP Update

-----Input Data-----

Highway class	Class 1		Peak hour factor, PHF	0.92	
Shoulder width	6.5	ft	% Trucks and buses	4	%
Lane width	11.5	ft	% Trucks crawling	0.0	%
Segment length	3.9	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Rolling		% Recreational vehicles	1	%
Grade: Length	-	mi	% No-passing zones	100	%
Up/down	-	%	Access point density	2	/mi

Analysis direction volume, Vd 867 veh/h  
Opposing direction volume, Vo 1247 veh/h

-----Average Travel Speed-----

Direction	Analysis(d)	Opposing (o)
PCE for trucks, ET	1.3	1.3
PCE for RVs, ER	1.1	1.1
Heavy-vehicle adj. factor,(note-5) fHV	0.987	0.987
Grade adj. factor,(note-1) fg	1.00	1.00
Directional flow rate,(note-2) vi	955 pc/h	1373 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 0.4 mi/h  
Adj. for access point density,(note-3) fA 0.5 mi/h

Free-flow speed, FFfSd 54.1 mi/h

Adjustment for no-passing zones, fnp 0.9 mi/h  
Average travel speed, ATfSd 35.1 mi/h  
Percent Free Flow Speed, PFfS 64.9 %

-----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	942	1355	pc/h
Base percent time-spent-following,(note-4) BPTSFD	79.5	%	
Adjustment for no-passing zones, fnp	13.9		
Percent time-spent-following, PTSFD	85.2	%	

-----Level of Service and Other Performance Measures-----

Level of service, LOS	E	
Volume to capacity ratio, v/c	0.56	
Peak 15-min vehicle-miles of travel, VMT15	919	veh-mi
Peak-hour vehicle-miles of travel, VMT60	3381	veh-mi
Peak 15-min total travel time, TT15	26.2	veh-h
Capacity from ATS, CdATS	1678	veh/h
Capacity from PTSF, CdPTSF	1700	veh/h
Directional Capacity	1678	veh/h

-----Passing Lane Analysis-----

Total length of analysis segment, Lt	3.9	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)	35.1	mi/h
Percent time-spent-following, PTSFD (from above)	85.2	
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, ATSp1	-	
Percent free flow speed including passing lane, PFFSp1	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	E	
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	942.4
Effective width of outside lane, We	24.50
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	3.93
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  $v_i$  ( $v_d$  or  $v_o$ )  $\geq 1,700$  pc/h, terminate analysis-the LOS is F.
3. For the analysis direction only and for  $v > 200$  veh/h.
4. For the analysis direction only.
5. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

## MULTILANE HIGHWAY SEGMENT ANALYSIS

File Name: 3 - Mother Lode to Lime Kiln PM\_xhm.xuf  
 Analyst: ZRS  
 Agency: Omni-Means, a GHD company  
 Jurisdiction: Caltrans - District 3  
 Date: 6/22/2018  
 Analysis Year: 2018  
 Time Period Analyzed: PM Peak Hour  
 Project Description: SR 49 CSMP Update  
 Units: U.S. Customary

## Direction 1: NB

## LOS and Performance Measures

Flow rate, v <sub>f</sub>	1390	pc/h/ln
Capacity, C	4180	pc/h/ln
Speed, S	54.5	mi/h
Density, D	12.8	pc/mi/ln
Level of Service, LOS	B	

## Step 1: Input Data

Number of Lanes, N	2	ln
Lane Width	12	ft
Segment length	-	ft
Terrain Type	Rolling	
Percent Grade	-	%
Grade Length	-	mi
Right-Side Lateral Clearance, LCR	6	ft
Left-Side Lateral Clearance, LCL	6	ft
Median Type	Divided	
Access Point Density	2.0	access points/mi
Demand Volume, V	1226	veh/h
Peak Hour Factor, PHF	0.97	
Percent Total Trucks	5.00	%
Percent Single-Unit Trucks, SUT	-	%
Percent Tractor-Trailers, TT	-	%

## Step 2: Estimate and Adjust FFS

Estimating FFS		
Measured or Base FFS	Base	
Base Free-Flow Speed, BFFS	55.0	mi/h
Lane Width	12	ft
Lane Width Adjustment, fLW	0.0	mi/h
Right-Side Lateral Clearance, LCR	6	ft
Left-Side Lateral Clearance, LCL	6	ft
Total Lateral Clearance, TLC	12.00	ft
Total Lateral Clearance Adjustment, fTLC	0.0	mi/h
Median Type	Divided	
Median Type Adjustment, fM	0.0	mi/h
Access Point Density	2.0	access points/mi
Access Point Density Adjustment, fA	0.5	mi/h
Free-Flow Speed, FFS	54.5	mi/h
Speed Adjustments		
Driver Population	All Familiar	
Speed Adjustment Factor, SAF	1.000	
Adjusted Free-Flow Speed, FFSadj	54.5	mi/h

## Step 3: Estimate and Adjust Capacity

Adjusted Free-flow Speed, FFSadj	54.5	mi/h
Capacity, c	2090	pc/h/ln
Capacity Adjustments		
Driver Population	All Familiar	
Capacity Adjustment Factor, CAF	1.000	
Adjusted Capacity, cadj	2090	pc/h/ln

---

Step 4: Adjust Demand Volume

---

Demand Volume, V	1226	veh/h
Peak Hour Factor, PHF	0.97	
Number of Lanes, N	2	ln
Terrain type	Rolling	
Percent Grade	-	%
Grade Length	-	mi
Percent Total Trucks	5.00	%
Percent Single-Unit Trucks, SUT	-	%
Percent Tractor-Trailers, TT	-	%
Proportion of Total Trucks, PT	0.05	
Heavy Vehicle PCE, ET	3.000	
Heavy Vehicle Adjustment, fHV	0.909	
Demand Adjustment Factor, DAF	1.000	
Demand Flow Rate, v <sub>D</sub>	695	pc/h/ln

---

Steps 5 and 6: Estimate Speed and Density and Determine LOS

---

Demand Flow Rate, v <sub>D</sub>	695	pc/h/ln
Free-Flow Speed, FFS	55.0	mi/h
Capacity, c	2090	pc/h/ln
Breakpoint, BP	1400	pc/h/ln
Density at Capacity, D <sub>c</sub>	45	pc/mi/ln
Mean Speed under Base Conditions, S	54.5	mi/h
Density, D	12.8	pc/mi/ln
Level of service, LOS	B	

This Multilane Highway Segment text report was created on 6/29/2018 08:24:50

## MULTILANE HIGHWAY SEGMENT ANALYSIS

File Name: 3 - Mother Lode to Lime Kiln PM\_xhm.xuf  
 Analyst: ZRS  
 Agency: Omni-Means, a GHD company  
 Jurisdiction: Caltrans - District 3  
 Date: 6/22/2018  
 Analysis Year: 2018  
 Time Period Analyzed: PM Peak Hour  
 Project Description: SR 49 CSMP Update  
 Units: U.S. Customary

## Direction 2: SB

## LOS and Performance Measures

Flow rate, v <sub>f</sub>	1260	pc/h/ln
Capacity, C	4180	pc/h/ln
Speed, S	54.5	mi/h
Density, D	11.6	pc/mi/ln
Level of Service, LOS	B	

## Step 1: Input Data

Number of Lanes, N	2	ln
Lane Width	12	ft
Segment Length	-	ft
Terrain Type	Rolling	
Percent Grade	-	%
Grade Length	-	mi
Right-Side Lateral Clearance, LCR	6	ft
Left-Side Lateral Clearance, LCL	6	ft
Median Type	Divided	
Access Point Density	0.5	access points/mi
Demand Volume, V	928	veh/h
Peak Hour Factor, PHF	0.81	
Percent Total Trucks	5.00	%
Percent Single-Unit Trucks, SUT	-	%
Percent Tractor-Trailers, TT	-	%

## Step 2: Estimate and Adjust FFS

Estimating FFS		
Measured or Base FFS	Base	
Base Free-Flow Speed, BFFS	55.0	mi/h
Lane width	12	ft
Lane Width Adjustment, fLW	0.0	mi/h
Right-Side Lateral Clearance, LCR	6	ft
Left-Side Lateral Clearance, LCL	6	ft
Total Lateral Clearance, TLC	12.00	ft
Total Lateral Clearance Adjustment, fTLC	0.0	mi/h
Median Type	Divided	
Median Type Adjustment, fM	0.0	mi/h
Access Point Density	2.0	access points/mi
Access Point Density Adjustment, fA	0.5	mi/h
Free-Flow Speed, FFS	54.5	mi/h
Speed Adjustments		
Driver Population	All Familiar	
Speed Adjustment Factor, SAF	1.000	
Adjusted Free-Flow Speed, FFSadj	54.5	mi/h

## Step 3: Estimate and Adjust Capacity

Adjusted Free-flow Speed, FFSadj	54.5	mi/h
Capacity, c	2090	pc/h/ln
Capacity Adjustments		
Driver Population	All Familiar	
Capacity Adjustment Factor, CAF	1.000	
Adjusted Capacity, cadj	2090	pc/h/ln

---

Step 4: Adjust Demand Volume

---

Demand Volume, V	928	veh/h
Peak Hour Factor, PHF	0.81	
Number of Lanes, N	2	ln
Terrain Type	Rolling	
Percent Grade	-	%
Grade Length	-	mi
Percent Total Trucks	5.00	%
Percent Single-Unit Trucks, SUT	-	%
Percent Tractor-Trailers, TT	-	%
Proportion of Total Trucks, PT	0.05	
Heavy Vehicle PCE, ET	3.000	
Heavy Vehicle Adjustment, fHV	0.909	
Demand Adjustment Factor, DAF	1.000	
Demand Flow Rate, v <sub>D</sub>	630	pc/h/ln

---

Steps 5 and 6: Estimate Speed and Density and Determine LOS

---

Demand Flow Rate, v <sub>D</sub>	630	pc/h/ln
Free-Flow Speed, FFS	55.0	mi/h
Capacity, c	2090	pc/h/ln
Breakpoint, BP	1400	pc/h/ln
Density at Capacity, D <sub>c</sub>	45	pc/mi/ln
Mean Speed under Base Conditions, S	54.5	mi/h
Density, D	11.6	pc/mi/ln
Level of service, LOS	B	

This Multilane Highway Segment text report was created on 6/29/2018 09:22:07

Phone: Fax:  
E-Mail:

-----Directional Two-Lane Highway Segment Analysis-----

Analyst ZS  
Agency/Co. Omni-Means, a GHD Company  
Date Performed 6/21/2018  
Analysis Time Period PM Peak Hour  
Highway SR 49 NB  
From/To Lime Kiln/Auburn  
Jurisdiction Caltrans - District 3  
Analysis Year 2018  
Description SR 49 CSMP Update

-----Input Data-----

Highway class	Class 1		Peak hour factor, PHF	0.96	
Shoulder width	6.5	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	Rolling		% Recreational vehicles	1	%
Grade: Length	-	mi	% No-passing zones	91	%
Up/down	-	%	Access point density	3	/mi

Analysis direction volume, Vd 1123 veh/h  
Opposing direction volume, Vo 1040 veh/h

-----Average Travel Speed-----

Direction	Analysis(d)	Opposing (o)
PCE for trucks, ET	1.3	1.3
PCE for RVs, ER	1.1	1.1
Heavy-vehicle adj. factor,(note-5) fHV	0.984	0.984
Grade adj. factor,(note-1) fg	1.00	1.00
Directional flow rate,(note-2) vi	1189 pc/h	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 0.8 mi/h

Free-flow speed, FFfSd 54.3 mi/h

Adjustment for no-passing zones, fnp 1.0 mi/h  
Average travel speed, ATfSd 35.5 mi/h  
Percent Free Flow Speed, PFFfS 65.4 %



-----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	1170 pc/h	1083	pc/h
Base percent time-spent-following,(note-4) BPTSFD	82.8	%	
Adjustment for no-passing zones, fnp	14.9		
Percent time-spent-following, PTSFD	90.5	%	

-----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	292	veh-mi
Peak-hour vehicle-miles of travel, VMT60	1123	veh-mi
Peak 15-min total travel time, TT15	8.2	veh-h
Capacity from ATS, CdATS	1673	veh/h
Capacity from PTSF, CdPTSF	1700	veh/h
Directional Capacity	1673	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)	35.5	mi/h
Percent time-spent-following, PTSFD (from above)	90.5	
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, ATSp1	-	
Percent free flow speed including passing lane, PFFSp1	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	E	
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	1169.8
Effective width of outside lane, We	25.00
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	4.21
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  $v_i$  ( $v_d$  or  $v_o$ )  $\geq 1,700$  pc/h, terminate analysis-the LOS is F.
3. For the analysis direction only and for  $v > 200$  veh/h.
4. For the analysis direction only.
5. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

Phone: Fax:  
E-Mail:

----- Directional Two-Lane Highway Segment Analysis -----

Analyst ZS  
Agency/Co. Omni-Means, a GHD Company  
Date Performed 6/21/2018  
Analysis Time Period AM Peak Hour  
Highway SR 49 SB  
From/To Lime Kiln/Auburn  
Jurisdiction Caltrans - District 3  
Analysis Year 2018  
Description SR 49 CSMP Update

----- Input Data -----

Highway class	Class 1		Peak hour factor, PHF	0.85	
Shoulder width	6.5	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	Rolling		% Recreational vehicles	1	%
Grade: Length	-	mi	% No-passing zones	89	%
Up/down	-	%	Access point density	5	/mi

Analysis direction volume, Vd 1040 veh/h  
Opposing direction volume, Vo 1162 veh/h

----- Average Travel Speed -----

Direction	Analysis(d)	Opposing (o)
PCE for trucks, ET	1.3	1.3
PCE for RVs, ER	1.1	1.1
Heavy-vehicle adj. factor, (note-5) fHV	0.984	0.984
Grade adj. factor, (note-1) fg	1.00	1.00
Directional flow rate, (note-2) vi	1243 pc/h	1389 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 1.3 mi/h

Free-flow speed, FFfSd 53.8 mi/h

Adjustment for no-passing zones, fnp 0.8 mi/h  
Average travel speed, ATfSd 32.5 mi/h  
Percent Free Flow Speed, PFfS 60.5 %

-----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	1224 pc/h	1367 pc/h	
Base percent time-spent-following,(note-4) BPTSFD	86.0	%	
Adjustment for no-passing zones, fnp	10.3		
Percent time-spent-following, PTSFD	90.9	%	

-----Level of Service and Other Performance Measures-----

Level of service, LOS	E	
Volume to capacity ratio, v/c	0.73	
Peak 15-min vehicle-miles of travel, VMT15	306	veh-mi
Peak-hour vehicle-miles of travel, VMT60	1040	veh-mi
Peak 15-min total travel time, TT15	9.4	veh-h
Capacity from ATS, CdATS	1673	veh/h
Capacity from PTSF, CdPTSF	1700	veh/h
Directional Capacity	1673	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)	32.5	mi/h
Percent time-spent-following, PTSFD (from above)	90.9	
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, ATSp1	-	
Percent free flow speed including passing lane, PFFSp1	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	E	
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	1223.5
Effective width of outside lane, We	25.00
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	4.24
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  $v_i$  ( $v_d$  or  $v_o$ )  $\geq 1,700$  pc/h, terminate analysis-the LOS is F.
3. For the analysis direction only and for  $v > 200$  veh/h.
4. For the analysis direction only.
5. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

## MULTILANE HIGHWAY SEGMENT ANALYSIS

File Name:	5- Auburn to La Barr PM NB.xuf
Analyst:	ZRS
Agency:	Omni-Means, a GHD company
Jurisdiction:	Caltrans - District 3
Date:	6/22/2018
Analysis Year:	2018
Time Period Analyzed:	AM Peak Hour
Project Description:	SR 49 CSMP Update
Units:	U.S. Customary

## Direction 1: NB

## LOS and Performance Measures

Flow rate, $v$	1268	pc/h/ln
Capacity, C	4156	pc/h/ln
Speed, S	53.9	mi/h
Density, D	11.8	pc/mi/ln
Level of Service, LOS	B	

## Step 1: Input Data

Number of Lanes, N	2	ln
Lane Width	12	ft
Segment length	-	ft
Terrain Type	Rolling	
Percent Grade	-	%
Grade Length	-	mi
Right-Side Lateral Clearance, LCR	6	ft
Left-Side Lateral Clearance, LCL	6	ft
Median Type	Divided	
Access Point Density	4.5	access points/mi
Demand Volume, V	1071	veh/h
Peak Hour Factor, PHF	0.87	
Percent Total Trucks	1.50	%
Percent Single-Unit Trucks, SUT	-	%
Percent Tractor-Trailers, TT	-	%

## Step 2: Estimate and Adjust FFS

Estimating FFS		
Measured or Base FFS	Base	
Base Free-Flow Speed, BFFS	55.0	mi/h
Lane Width	12	ft
Lane Width Adjustment, fLW	0.0	mi/h
Right-Side Lateral Clearance, LCR	6	ft
Left-Side Lateral Clearance, LCL	6	ft
Total Lateral Clearance, TLC	12.00	ft
Total Lateral Clearance Adjustment, fTLC	0.0	mi/h
Median Type	Divided	
Median Type Adjustment, fM	0.0	mi/h
Access Point Density	4.5	access points/mi
Access Point Density Adjustment, fA	1.1	mi/h
Free-Flow Speed, FFS	53.9	mi/h
Speed Adjustments		
Driver Population	All Familiar	
Speed Adjustment Factor, SAF	1.000	
Adjusted Free-Flow Speed, FFSadj	53.9	mi/h

## Step 3: Estimate and Adjust Capacity

Adjusted Free-flow Speed, FFSadj	53.9	mi/h
Capacity, c	2078	pc/h/ln
Capacity Adjustments		
Driver Population	All Familiar	
Capacity Adjustment Factor, CAF	1.000	
Adjusted Capacity, cadj	2078	pc/h/ln

---

Step 4: Adjust Demand Volume

---

Demand Volume, V	1071	veh/h
Peak Hour Factor, PHF	0.87	
Number of Lanes, N	2	ln
Terrain type	Rolling	
Percent Grade	-	%
Grade Length	-	mi
Percent Total Trucks	1.50	%
Percent Single-Unit Trucks, SUT	-	%
Percent Tractor-Trailers, TT	-	%
Proportion of Total Trucks, PT	0.02	
Heavy Vehicle PCE, ET	3.000	
Heavy Vehicle Adjustment, fHV	0.971	
Demand Adjustment Factor, DAF	1.000	
Demand Flow Rate, v <sub>D</sub>	634	pc/h/ln

---

Steps 5 and 6: Estimate Speed and Density and Determine LOS

---

Demand Flow Rate, v <sub>D</sub>	634	pc/h/ln
Free-Flow Speed, FFS	55.0	mi/h
Capacity, c	2078	pc/h/ln
Breakpoint, BP	1400	pc/h/ln
Density at Capacity, D <sub>c</sub>	45	pc/mi/ln
Mean Speed under Base Conditions, S	53.9	mi/h
Density, D	11.8	pc/mi/ln
Level of service, LOS	B	

This Multilane Highway Segment text report was created on 6/29/2018 08:41:15

Phone: Fax:  
E-Mail:

-----Directional Two-Lane Highway Segment Analysis-----

Analyst ZRS  
Agency/Co. Omni-Means, a GHD company  
Date Performed 6/22/2018  
Analysis Time Period PM Peak Hour  
Highway SR 49 SB  
From/To From Auburn to La Barr  
Jurisdiction Caltrans - District 3  
Analysis Year 2018  
Description SR 49 CSMP Update

-----Input Data-----

Highway class	Class 1		Peak hour factor, PHF	0.87	
Shoulder width	6.0	ft	% Trucks and buses	2	%
Lane width	12.0	ft	% Trucks crawling	0.0	%
Segment length	2.5	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Rolling		% Recreational vehicles	2	%
Grade: Length	-	mi	% No-passing zones	100	%
Up/down	-	%	Access point density	4	/mi

Analysis direction volume, Vd 1121 veh/h  
Opposing direction volume, Vo 1071 veh/h

-----Average Travel Speed-----

Direction	Analysis(d)	Opposing (o)
PCE for trucks, ET	1.3	1.3
PCE for RVs, ER	1.1	1.1
Heavy-vehicle adj. factor,(note-5) fHV	0.992	0.992
Grade adj. factor,(note-1) fg	1.00	1.00
Directional flow rate,(note-2) vi	1299 pc/h	1241 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 1.0 mi/h

Free-flow speed, FFsd 54.0 mi/h

Adjustment for no-passing zones, fnp 1.0 mi/h  
Average travel speed, ATsd 33.3 mi/h  
Percent Free Flow Speed, PFFS 61.7 %



-----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	1289 pc/h	1231 pc/h
Base percent time-spent-following,(note-4) BPTSFD	86.6 %	
Adjustment for no-passing zones, fnp	11.4	
Percent time-spent-following, PTSFD	92.4 %	

-----Level of Service and Other Performance Measures-----

Level of service, LOS	E	
Volume to capacity ratio, v/c	0.76	
Peak 15-min vehicle-miles of travel, VMT15	805	veh-mi
Peak-hour vehicle-miles of travel, VMT60	2803	veh-mi
Peak 15-min total travel time, TT15	24.2	veh-h
Capacity from ATS, CdATS	1686	veh/h
Capacity from PTSF, CdPTSF	1700	veh/h
Directional Capacity	1686	veh/h

-----Passing Lane Analysis-----

Total length of analysis segment, Lt	2.5	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)	33.3	mi/h
Percent time-spent-following, PTSFD (from above)	92.4	
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, ATSp1	-	
Percent free flow speed including passing lane, PFFSp1	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	E	
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	1288.5
Effective width of outside lane, We	24.00
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	3.69
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  $v_i$  ( $v_d$  or  $v_o$ )  $\geq 1,700$  pc/h, terminate analysis-the LOS is F.
3. For the analysis direction only and for  $v > 200$  veh/h.
4. For the analysis direction only.
5. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

Phone: Fax:  
 E-Mail:

-----Directional Two-Lane Highway Segment Analysis-----

Analyst ZRS  
 Agency/Co. Omni-Means, a GHD company  
 Date Performed 6/22/2018  
 Analysis Time Period PM Peak Hour  
 Highway SR 49 NB  
 From/To From La Barr to McKnight  
 Jurisdiction Caltrans - District 3  
 Analysis Year 2018  
 Description SR 49 CSMP Update

-----Input Data-----

Highway class	Class 1		Peak hour factor, PHF	0.90	
Shoulder width	6.0	ft	% Trucks and buses	2	%
Lane width	12.0	ft	% Trucks crawling	0.0	%
Segment length	3.1	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Rolling		% Recreational vehicles	2	%
Grade: Length	-	mi	% No-passing zones	100	%
Up/down	-	%	Access point density	4	/mi

Analysis direction volume, Vd 1030 veh/h  
 Opposing direction volume, Vo 1317 veh/h

-----Average Travel Speed-----

Direction	Analysis(d)	Opposing (o)
PCE for trucks, ET	1.3	1.3
PCE for RVs, ER	1.1	1.1
Heavy-vehicle adj. factor,(note-5) fHV	0.992	0.992
Grade adj. factor,(note-1) fg	1.00	1.00
Directional flow rate,(note-2) vi	1154 pc/h	1475 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 1.0 mi/h

Free-flow speed, FFSd 54.0 mi/h

Adjustment for no-passing zones, fnp 0.8 mi/h  
 Average travel speed, ATSD 32.8 mi/h  
 Percent Free Flow Speed, PFFS 60.7 %

-----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	1144 pc/h	1463 pc/h	
Base percent time-spent-following,(note-4) BPTSFD	85.0	%	
Adjustment for no-passing zones, fnp	10.2		
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	0.68	
Peak 15-min vehicle-miles of travel, VMT15	887	veh-mi
Peak-hour vehicle-miles of travel, VMT60	3193	veh-mi
Peak 15-min total travel time, TT15	27.0	veh-h
Capacity from ATS, CdATS	1686	veh/h
Capacity from PTSF, CdPTSF	1700	veh/h
Directional Capacity	1686	veh/h

-----Passing Lane Analysis-----

Total length of analysis segment, Lt	3.1	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)	32.8	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, ATSp1	-	
Percent free flow speed including passing lane, PFFSp1	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	E	
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	1144.4
Effective width of outside lane, We	24.00
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	3.63
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  $v_i$  ( $v_d$  or  $v_o$ )  $\geq 1,700$  pc/h, terminate analysis-the LOS is F.
3. For the analysis direction only and for  $v > 200$  veh/h.
4. For the analysis direction only.
5. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

Phone: Fax:  
E-Mail:

-----Directional Two-Lane Highway Segment Analysis-----

Analyst ZRS  
Agency/Co. Omni-Means, a GHD company  
Date Performed 6/22/2018  
Analysis Time Period PM Peak Hour  
Highway SR 49 SB  
From/To From La Barr to McKnight  
Jurisdiction Caltrans - District 3  
Analysis Year 2018  
Description SR 49 CSMP Update

-----Input Data-----

Highway class	Class 1		Peak hour factor, PHF	0.88	
Shoulder width	6.0	ft	% Trucks and buses	2	%
Lane width	12.0	ft	% Trucks crawling	0.0	%
Segment length	3.1	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Rolling		% Recreational vehicles	2	%
Grade: Length	-	mi	% No-passing zones	100	%
Up/down	-	%	Access point density	5	/mi

Analysis direction volume, Vd 1317 veh/h  
Opposing direction volume, Vo 1030 veh/h

-----Average Travel Speed-----

Direction	Analysis(d)	Opposing (o)
PCE for trucks, ET	1.3	1.3
PCE for RVs, ER	1.1	1.1
Heavy-vehicle adj. factor,(note-5) fHV	0.992	0.992
Grade adj. factor,(note-1) fg	1.00	1.00
Directional flow rate,(note-2) vi	1509 pc/h	1180 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 1.3 mi/h

Free-flow speed, FFsd 53.8 mi/h

Adjustment for no-passing zones, fnp 1.0 mi/h  
Average travel speed, ATsd 31.9 mi/h  
Percent Free Flow Speed, PFFS 59.3 %

-----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	1497 pc/h	1170 pc/h	
Base percent time-spent-following,(note-4) BPTSFD	89.2	%	
Adjustment for no-passing zones, fnp	10.1		
Percent time-spent-following, PTSFD	94.9	%	

-----Level of Service and Other Performance Measures-----

Level of service, LOS	E	
Volume to capacity ratio, v/c	0.89	
Peak 15-min vehicle-miles of travel, VMT15	1160	veh-mi
Peak-hour vehicle-miles of travel, VMT60	4083	veh-mi
Peak 15-min total travel time, TT15	36.4	veh-h
Capacity from ATS, CdATS	1686	veh/h
Capacity from PTSF, CdPTSF	1700	veh/h
Directional Capacity	1686	veh/h

-----Passing Lane Analysis-----

Total length of analysis segment, Lt	3.1	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)	31.9	mi/h
Percent time-spent-following, PTSFD (from above)	94.9	
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, ATSp1	-	
Percent free flow speed including passing lane, PFFSp1	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	E	
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	1496.6
Effective width of outside lane, We	24.00
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	3.77
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  $v_i$  ( $v_d$  or  $v_o$ )  $\geq 1,700$  pc/h, terminate analysis-the LOS is F.
3. For the analysis direction only and for  $v > 200$  veh/h.
4. For the analysis direction only.
5. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.