# Traffic Impact Study for Ehlers Estate Winery

Prepared for the County of Napa

File Number: P19-00146

Submitted by

**W-Trans**

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# Executive Summary

The proposed project is a Use Permit Modification that would allow the Ehlers Estate Winery to receive up to 100 visitors per day and to increase its production capacity from 25,000 gallons per year to 35,000 gallons per year. The winery would also be allowed to increase the number of permitted full-time employees from two to 14 and to add four part-time employees for harvest and non-harvest operations.

Based on the County's winery trip generation assumptions, the project would generate an average of 18 new trips per weekday and 17 trips on the weekend compared to existing levels. This includes six trips during the weekday p.m. peak hour and seven trips during the weekend midday peak hour.

The study area consisted of the Ehlers Lane along the project frontage, the project access point, the intersection of SR 29/Ehlers Lane, and the segments of SR 29 north and south of the Ehlers Lane intersection. The study intersection is currently operating at LOS A overall, but and at LOS D on the stop-controlled approach during both peak hours under Existing and projected Near-Term volumes. With the addition of project trips, the overall intersection LOS and that of the stop-controlled approach would remain unchanged during the weekend midday peak hour, but during the weekday p.m. peak hour the increased delay would result in a change from LOS D to LOS E. However, as the increase in delay would be only 0.5 seconds, this is seen as an acceptable effect.

Under Cumulative volumes, the study intersection would continue to operate at LOS A during the weekday p.m. and weekend midday peak hours, while the stop-controlled approach would operate at LOS F during both peak hours. However, as delay would be expected to increase by more than five seconds during the weekday p.m. peak hour, this is seen as an adverse effect. With the addition of striping to create a right-turn pocket on the Ehlers Lane approach, the project-related delay could be reduced to less than five seconds, which would be considered an acceptable effect.

Access to the site would continue to be at the existing project driveway on Ehlers Lane. Sight distance is adequate, and a left-turn lane would not be warranted based on the application of Napa County criteria.

The project is expected to generate fewer than 110 trips per day. Based on guidance from the Governor's Office of Planning and Research, the project is therefore expected to have a less-than-significant impact in terms of vehicle miles traveled (VMT). Despite this finding, it is recommended that the project implement a Transportation Demand Management (TDM) program to further reduce its impact on the regional circulation system and greenhouse gas emissions.

The on-site parking supply is expected to be adequate to meet the needs of employees and visitors.

Access for pedestrians, while limited, is considered adequate given the anticipated lack of demand at this rural location. Similarly, while the closest transit stop is not within what is normally considered a comfortable walking distance, it is adequate for the rural conditions. Upon provision of bicycle parking, facilities for this mode would be adequate.

# Introduction

This report presents an analysis of the potential traffic impacts and operational effects that would be associated with a proposed change to the Conditional Use Permit (CUP) for the Ehlers Estate Winery located at 3222 Ehlers Lane in the County of Napa. The traffic study was completed in accordance with the criteria established by the County and is consistent with standard traffic engineering techniques.

## Prelude

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

## Project Profile

The project is a proposed 2019 compliance program Use Permit Modification that would allow an increase in visitation and production capacity. Under the proposed change, up to 100 visitors per day would be permitted and production could be increased from 25,000 gallons per year to 35,000 gallons per year. An increase in the number of full-time employees from two to 14 and the addition of four part-time employees are also proposed during harvest and non-harvest operations. The County of Napa file number for this project is P19-00146. The project site is located at 3222 Ehlers Lane in the County of Napa, as shown in Figure 1.


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Traffic Impact Study for Ehlers Estate Winery

**Figure 1 – Study Area and Existing Lane Configurations**

# Transportation Setting

## Operational Analysis

### Study Area and Periods

The study area consists of the section of Ehlers Lane fronting the project site and the project access point, as well as the intersection of SR 29/Ehlers Lane and the segments of SR 29 to the north and south of Ehlers Lane. Operating conditions during the Friday and Saturday p.m. peak periods were evaluated as these time periods reflect the highest traffic volumes areawide and for the proposed project.

### Study Intersections

**SR 29/Ehlers Lane** is an unsignalized tee-intersection, stop-controlled on the westbound Ehlers Lane approach. The Ehlers Lane approach has a flared right-turn area with storage space to accommodate approximately one vehicle.

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

### Study Roadways

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

**Ehlers Lane** is a rural two-lane roadway that runs east-west between SR 29 and the Ehlers Estate Winery, and north-south along the winery frontage. The roadway is approximately 24 feet wide, does not include a marked centerline, and has a posted speed limit of 25 mph. North of the winery entrance, Ehlers Lane is narrower, approximately 18 feet wide. The ADT along the roadway segment between SR 29 and the project site is approximately 400 on weekdays and 270 on weekend days.

## Collision History

The collision history for the study area was reviewed to determine any trends or patterns that may indicate a safety issue. Collision rates were calculated based on records available from the California Highway Patrol as published in their Statewide Integrated Traffic Records System (SWITRS) reports. The five-year period selected for this analysis was October 1, 2014 through September 30, 2019 as it reflects pre-pandemic travel patterns.

As presented in Table 1, the calculated collision rate for the study intersection was compared to the average collision rate for similar facilities statewide, as indicated in *2016 Collision Data on California State Highways*, California Department of Transportation (Caltrans). These average rates statewide are for intersections in the same environment (urban, suburban, or rural), with the same number of approaches

(three or four), and the same controls (all-way stop, two-way stop, or roundabout). One collision was reported during the five-year study period, with a resulting rate below the statewide average, indicating that the intersection is operating in a generally safe manner. The collision rate calculations are provided in Appendix A.

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

| Study Intersection | Number of Collisions (2014-2019) | Calculated Collision Rate (c/mve) | Statewide Average Collision Rate (c/mve) |
|---|---|---|---|
| 1. SR 29/Ehlers Ln | 1 | 0.04 | 0.16 |

Note: c/mve = collisions per million vehicles entering

Collision rates for the study roadway segments are compared to statewide averages for similar facilities in Table 2. Bale Lane was used as the northern boundary for the SR 29 segment north of Ehlers Lane while Weinberg Road was used as the southern boundary for the SR 29 segment south of Ehlers Lane. Collisions were reported at a below-average rate for the SR 29 segment south of Ehlers Lane while the collision rate for the segment north of Ehlers Lane was higher than the statewide average.

**Table 2 – Collision Rates for the Study Roadway Segments**

| Study Intersection | Number of Collisions (2014-2019) | Calculated Collision Rate (c/mve) | Statewide Average Collision Rate (c/mve) |
|---|---|---|---|
| 1. SR 29 – North of Ehlers Lane | 38 | **1.53** | 0.82 |
| 2. SR 29 – South of Ehlers Lane | 17 | 0.69 | 0.82 |

Note: c/mve = collisions per million vehicles entering

For the SR 29 segment north of Ehlers Lane, there were 16 hit object and 13 rear-end collisions among the 38 reported collisions. There were also five sideswipe, three broadside, and one head on collision. The hit object crashes were primarily due to improper turning or unsafe speed and all of the rear-end crashes were attributed to unsafe speed. Additionally, a pattern of rear-end crashes at side streets or driveways may indicate that a left-turn pocket is needed since vehicles were hit from behind while stopped or turning. The sideswipe collisions were associated with improper turning and driving on the wrong side of the road. Increased enforcement and installation of a two-way left-turn lane on SR 29 could help reduce the incidence of rear-end collisions.

## Alternative Modes

### Pedestrian Facilities

Pedestrian facilities include sidewalks, crosswalks, pedestrian signal phases, curb ramps, curb extensions, and various streetscape amenities such as lighting, benches, etc. There are no pedestrian facilities in the study area given the rural nature.

## Bicycle Facilities

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

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

There are currently no bicycle facilities on Ehlers Lane. While not providing direct access to the project, bike lanes along Silverado Trail serve bicyclists traveling north-south through the area. There are two planned bicycle facilities in the project vicinity identified in the *Napa Countywide Bicycle Plan,* Napa Valley Transportation Authority (NVTA), 2019. Class II bike lanes are planned along SR 29 connecting St. Helena to Calistoga. The proposed Napa Valley Vine Trail would be a Class I bike path parallel to SR 29, which will connect from Calistoga to Vallejo when completed.

## Transit Facilities

Transit services throughout Napa County are provided by Vine Transit. Route 10 provides service between Napa Valley College and Calistoga seven days a week. Service is available hourly on weekdays from 5:30 a.m. to 10:00 p.m. and on weekends from 6:00 a.m. to 8:00 p.m. The stops nearest the project site are on SR 29 just south of Byrd Hill Lane, approximately 0.7 miles from the project site. Both stops are equipped with benches and the southbound stop includes a shelter.

According to their website, all vehicles used by Vine Transit are wheelchair accessible and conform to standards set forth by the Americans with Disabilities Act (ADA). Dial-a-ride, which is paratransit or door-to-door service, is available for those who are unable to independently use the transit system due to a physical or mental disability. VineGo is VINE's paratransit service and is designed to serve the needs of individuals with disabilities in the cities of Calistoga, St. Helena, Napa, American Canyon, the Town of Yountville, and the unincorporated areas of Napa County. While reservations can be made for same day service, VineGo recommends reserving rides in advance.

# Capacity Analysis

## Intersection Level of Service Methodologies

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

The study intersection was analyzed using the "Two-Way Stop-Controlled" methodology published in the *Highway Capacity Manual* (HCM), 6th Edition, Transportation Research Board, 2018. This source contains methodologies for various types of intersection control, all of which are related to a measurement of delay in average number of seconds per vehicle. The "Two-Way Stop-Controlled" intersection capacity methodology determines a level of service for each minor turning movement by estimating the level of average delay in seconds per vehicle. Results are presented for individual movements together with the weighted overall average delay for the intersection.

The ranges of delay associated with the various levels of service are indicated in Table 3.

| Table 3 – Two-Way Stop-Controlled Intersection Level of Service Criteria | |
|---|---|
| LOS A | Delay of 0 to 10 seconds. Gaps in traffic are readily available for drivers exiting the minor street. |
| LOS B | Delay of 10 to 15 seconds. Gaps in traffic are somewhat less readily available than with LOS A, but no queuing occurs on the minor street. |
| LOS C | Delay of 15 to 25 seconds. Acceptable gaps in traffic are less frequent, and drivers may approach while another vehicle is already waiting to exit the side street. |
| LOS D | Delay of 25 to 35 seconds. There are fewer acceptable gaps in traffic, and drivers may enter a queue of one or two vehicles on the side street. |
| LOS E | Delay of 35 to 50 seconds. Few acceptable gaps in traffic are available, and longer queues may form on the side street. |
| LOS F | Delay of more than 50 seconds. Drivers may wait for long periods before there is an acceptable gap in traffic for exiting the side streets, creating long queues. |

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

## Two-Lane Highway Segment Level of Service Methodology

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

portions of Class I or Class II highways that pass through towns and communities and have a mix of local traffic and through traffic.

The measure of effectiveness by which Level of Service is determined on Class I and II highways is average travel speed (ATS) and percent time spent following (PTSF), or the proportion of time that drivers on the highway are limited in their speed by a driver in front of them. Class III highways are measured by percent of free-flow speed (PFFS), which represents the ability of vehicles to travel at or near the posted speed limit. SR 29 was defined as a Class II roadway for the purposes of this analysis. A summary of the PTSF breakpoints for Class II highways is shown in Table 4.

**Table 4 – Automobile Level of Service Criteria**

| LOS | Class II Highways<br>PTSF (%) |
|---|---|
| A | ≤40 |
| B | >40-55 |
| C | >55-70 |
| D | >70-85 |
| E | ≤85 |

Notes: LOS = Level of Service; PTSF = Percent Time Spent Following
Reference: *Highway Capacity Manual*, 6th Edition, Transportation Research Board, 2018

## Traffic Operation Standards

### Napa County

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

- **Policy CIR-31** – The County seeks to provide a roadway system that maintains current roadway capacities in most locations and is efficient in providing local access.

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

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

*the project's operational impacts (see the County's Transportation Impact Study Guidelines for a list of potential mitigation measures).*

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

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

To provide a more quantitative method of adhering to the above standards, the County refers to a memorandum titled, *Napa County Traffic Impact Study (TIS) Guidelines*, County of Napa, 2021. The document establishes thresholds for road segments and different intersection control types. The memorandum states a project would cause an adverse effect requiring mitigation if, for Existing Conditions:

- An arterial segment operates at LOS A, B, C or D during the selected peak hours without Project trips, and deteriorates to LOS E or F with the addition of Project trips; or

- An arterial segment operates at LOS E or F during the selected peak hours without Project trips, and the addition of Project trips increases the total segment volume by **one percent** or more. The following equation should be used if the arterial segment operates at LOS E or F without the Project:

  - *Project Contribution % = Project Trips ÷ Existing Volumes*

- A signalized intersection operates at LOS A, B, C, or D during the selected peak hours without Project trips, and the LOS deteriorates to LOS E or F with the addition of Project trips; or

- A signalized intersection operates at LOS E or F during the selected peak hours without Project trips, and the addition of Project trips increases the total entering volume by **one percent** or more. The following equation should be applied:

  - *Project Contribution % = Project Trips ÷ Existing Volumes*

- An unsignalized intersection operates at LOS A, B, C, or D during the selected peak hours without Project trips, and the LOS deteriorates to LOS E or F with the addition of Project traffic; the peak hour traffic signal warrant criteria should also be evaluated and presented for informational purposes; or

- An unsignalized intersection operates at LOS E or F during the selected peak hours without Project trips, and the Project increases the delay by **five seconds** or more; the peak hour traffic signal warrant criteria should also be evaluated and presented for informational purposes.

  - *<u>All-Way Stop-Controlled Intersections</u> – The increase in delay should be calculated based on the overall average delay for the intersection.*
  - *<u>Side-Street Stop-Controlled Intersections</u> – The increase in delay should be calculated based on the delay for the worst-case approach(es). Each stop-controlled approach that operates at LOS E or F should be analyzed individually.*

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

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

**Significance threshold for failing intersections:** General Plan policy accepts LOS E and F in certain instances. If an unsignalized intersection is operating acceptably (LOS A through LOS D), and the project would cause the intersection to fall to LOS E or LOS F, the applicant must mitigate the impact to restore to LOS D at minimum, or the project is considered to adversely affect operation of the intersection. If an intersection is already LOS E or LOS F, and the project would increase delay by five or more seconds, the applicant must mitigate the impact to lower the increase in delay, or else the project would be considered to adversely affect the intersection. The same standards apply to the analysis of minor approaches to unsignalized intersections. As CEQA Guidelines have shifted away from LOS and toward VMT as the determining factor in identifying significant transportation impacts, adverse effects to intersections may still be the basis for conditioning transportation improvements to improve or maintain existing LOS or denying a project for the project's potentially negative effects on public safety.

## Existing Conditions

The Existing Conditions scenario provides an evaluation of current operations based on existing traffic volumes during the afternoon p.m. peak hour on both Fridays and Saturdays. This condition does not include project-generated traffic volumes. Due to the COVID-19 pandemic, traffic volumes were below typical levels at the time this study was undertaken, so the analysis relied on data collected in 2018 and 2019. All count data was collected during typical harvest operations.

Turning movement volumes for SR 29/Ehlers Lane were estimated based on September/October 2018 daily counts on Ehlers Lane as cited in the *Ehlers Lane Traffic Study* by Parisi Transportation Consulting. Since recent pre-pandemic volume counts were not available for the SR 29 study segments, peak hour segment volumes were derived from October 2019 SR 29/Lodi Lane intersection counts and the calculated turning movement volumes at SR 29/Ehlers Lane. The percentage of heavy vehicles at the SR 29/Ehlers Lane intersection was estimated based on data collected in September 2017 at the SR 29/Lodi Lane intersection, which was selected due to its proximity and similar roadway configuration to the project intersection. For the purposes of this study, heavy vehicles were considered to be trucks hauling grapes or those with five or more axles. The data indicates that heavy vehicles represent four percent of all vehicles through the intersection of SR 29/Lodi Lane during the Friday p.m. peak hour and two percent during the Saturday p.m. peak hour. Copies of the count data relied upon for the study are provided in Appendix B.

### Intersection Levels of Service

Under Existing Conditions, SR 29/Ehlers Lane is operating acceptably at LOS A overall and at LOS D on the stop-controlled Ehlers Lane approach during the weekday and weekend peak periods. The Existing traffic volumes are shown in Figure 2. A summary of the intersection Level of Service calculations is contained in Table 5, and copies of the calculations are provided in Appendix C.

**Table 5 – Existing Peak Hour Intersection Levels of Service**

| Study Intersection<br>*Approach* | Friday PM Peak | | Saturday PM Peak | |
|---|---|---|---|---|
| | Delay | LOS | Delay | LOS |
| 1. SR 29/Ehlers Ln | 1.5 | A | 0.7 | A |
| *Westbound (Ehlers Ln) Approach* | *34.6* | *D* | *31.2* | *D* |

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

### Roadway Segment Levels of Service

Under Existing Conditions, the study segments all operate at LOS C during both peak hours, which meets the County's standard of LOS D. Existing roadway segment volumes are shown in Figure 2. A summary of the roadway segment calculations is shown in Table 6, and copies of the Level of Service calculations are provided in Appendix D.

**Table 6 – Existing Peak Hour Roadway Segment Levels of Service**

| Study Segment<br>Direction | Friday PM Peak | | Saturday PM Peak | |
|---|---|---|---|---|
| | PTSF | LOS | PTSF | LOS |
| SR 29 – North of Ehlers Lane | | | | |
| Northbound | 64.4 | C | 64.5 | C |
| Southbound | 64.3 | C | 65.4 | C |
| SR 29 – South of Ehlers Lane | | | | |
| Northbound | 65.4 | C | 65.2 | C |
| Southbound | 64.8 | C | 65.2 | C |

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

## Near-Term Conditions

Near-Term (Existing plus Approved) operating conditions were assessed with traffic from approved projects in and near the study area added to the Existing volumes. As directed by staff, the Bergman Family Winery project located at 3285 St Helena Highway (0.6 miles north of Ehlers Lane) was included in the evaluation of Near-Term Conditions. Based on information provided by staff, the project would generate an average of 27 trips per day during the harvest period, including five peak hour trips.


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**Figure 2 – Existing Traffic Volumes**

### Intersection Levels of Service

Under Near-Term Conditions, SR 29/Ehlers Lane intersection would operate at LOS A overall and the stop-controlled approach at SR 29/Ehlers Lane would operate at LOS D during the Friday p.m. peak hour and Saturday p.m. peak hour. The intersection volumes are shown in Figure 3 and a summary of the intersection Level of Service calculations is shown in Table 7.

**Table 7 – Near-Term Peak Hour Intersection Levels of Service**

| Study Intersection<br>*Approach* | Friday PM Peak | | Saturday PM Peak | |
|---|---|---|---|---|
| | Delay | LOS | Delay | LOS |
| 1. SR 29/Ehlers Ln | 1.5 | A | 0.7 | A |
| *Westbound (Ehlers Ln) Approach* | *34.7* | *D* | *31.2* | *D* |

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

### Roadway Segment Levels of Service

Under Near-Term Conditions, both study roadway segments are expected to operate at LOS C during both peak hours. Near-Term segment volumes are shown in Figure 3 and a summary of the roadway segment Level of Service calculations is shown in Table 8.

**Table 8 – Near-Term Peak Hour Roadway Segment Levels of Service**

| Study Segment<br>Direction | Friday PM Peak | | Saturday PM Peak | |
|---|---|---|---|---|
| | PTSF | LOS | PTSF | LOS |
| SR 29 - North of Ehlers Lane | | | | |
| Northbound | 64.4 | C | 64.5 | C |
| Southbound | 64.4 | C | 65.5 | C |
| SR 29 - South of Ehlers Lane | | | | |
| Northbound | 65.4 | C | 65.2 | C |
| Southbound | 64.9 | C | 65.2 | C |

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

## Cumulative Conditions

Cumulative volumes for the horizon year 2040 were calculated based on output from the *Napa Solano Travel Demand Model*, maintained by the Solano Transportation Authority (STA). Base year (2015) and future (2040) segment volumes for the weekday p.m. peak hour were used to calculate growth factors for SR 29. Since Ehlers Lane is not included in the model, growth on this roadway was assumed to increase at one-half percent annually as there are limited opportunities for growth on the segment.


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**Figure 3 – Near-Term Traffic Volumes**

The growth factors projected by the model were adjusted to account for the four years of growth that had already occurred between the base year (2015) and Existing (2019) count data, resulting in a growth factor of 1.46 for SR 29. The Existing volumes were then multiplied by the adjusted growth factors to estimate the future Friday p.m. peak hour and Saturday p.m. peak hour turning movement volumes at the study intersection. Roadway segment volumes for each segment were then derived from the projected future intersection turning movement volumes.

## Intersection Levels of Service

Under Cumulative Conditions, and with no changes to the intersection's configuration or controls, the intersection is expected to operate at LOS A overall; the stop-controlled approach at SR 29/Ehlers Lane would be expected to operate at LOS F during the Friday p.m. and Saturday p.m. peak hours. Cumulative volumes are shown in Figure 4 and operating conditions are summarized in Table 9.

**Table 9 – Cumulative Peak Hour Intersection Levels of Service**

| Study Intersection<br>*Approach* | Friday PM Peak | | Saturday PM Peak | |
|---|---|---|---|---|
| | Delay | LOS | Delay | LOS |
| 1. SR 29/Ehlers Ln | 4.1 | A | 1.3 | A |
| *Westbound (Ehlers Ln) Approach* | ***136.0*** | ***F*** | ***86.1*** | ***F*** |

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

## Roadway Segment Levels of Service

Under Cumulative Conditions both study roadway segments are expected to operate at LOS D both peak hours, which is acceptable based on County standards. Cumulative segment volumes are shown in Figure 4 and a summary of the roadway segment Level of Service calculations is shown in Table 10.

**Table 10 – Cumulative Peak Hour Roadway Segment Levels of Service**

| Study Segment<br>Direction | Friday PM Peak | | Saturday PM Peak | |
|---|---|---|---|---|
| | PTSF | LOS | PTSF | LOS |
| SR 29 - North of Ehlers Lane | | | | |
| Northbound | 73.3 | D | 73.6 | D |
| Southbound | 73.4 | D | 74.4 | D |
| SR 29 - South of Ehlers Lane | | | | |
| Northbound | 74.4 | D | 74.2 | D |
| Southbound | 73.5 | D | 74.0 | D |

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


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**Figure 4 – Cumulative Traffic Volumes**

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## Project Description

The project is a proposed 2019 compliance program Use Permit Modification that would allow for visitation and increased production capacity. Under the proposed change up to 100 visitors per day would be permitted and production would increase from 25,000 gallons per year to 35,000 gallons per year. An increase in the number of full-time employees from two to 14 and the addition of four part-time employees is also proposed during harvest and non-harvest seasons. The proposed project site plan is shown in Figure 5.

## Trip Generation

The County of Napa's Winery Traffic Information/Trip Generation Sheet was used to determine the anticipated trip generation for the permitted, existing, and proposed conditions. The form estimates the number of daily trips for Fridays and Saturdays based on the number of full- and part-time employees, maximum daily visitors, and production. Copies of the worksheets are provided in Appendix E.

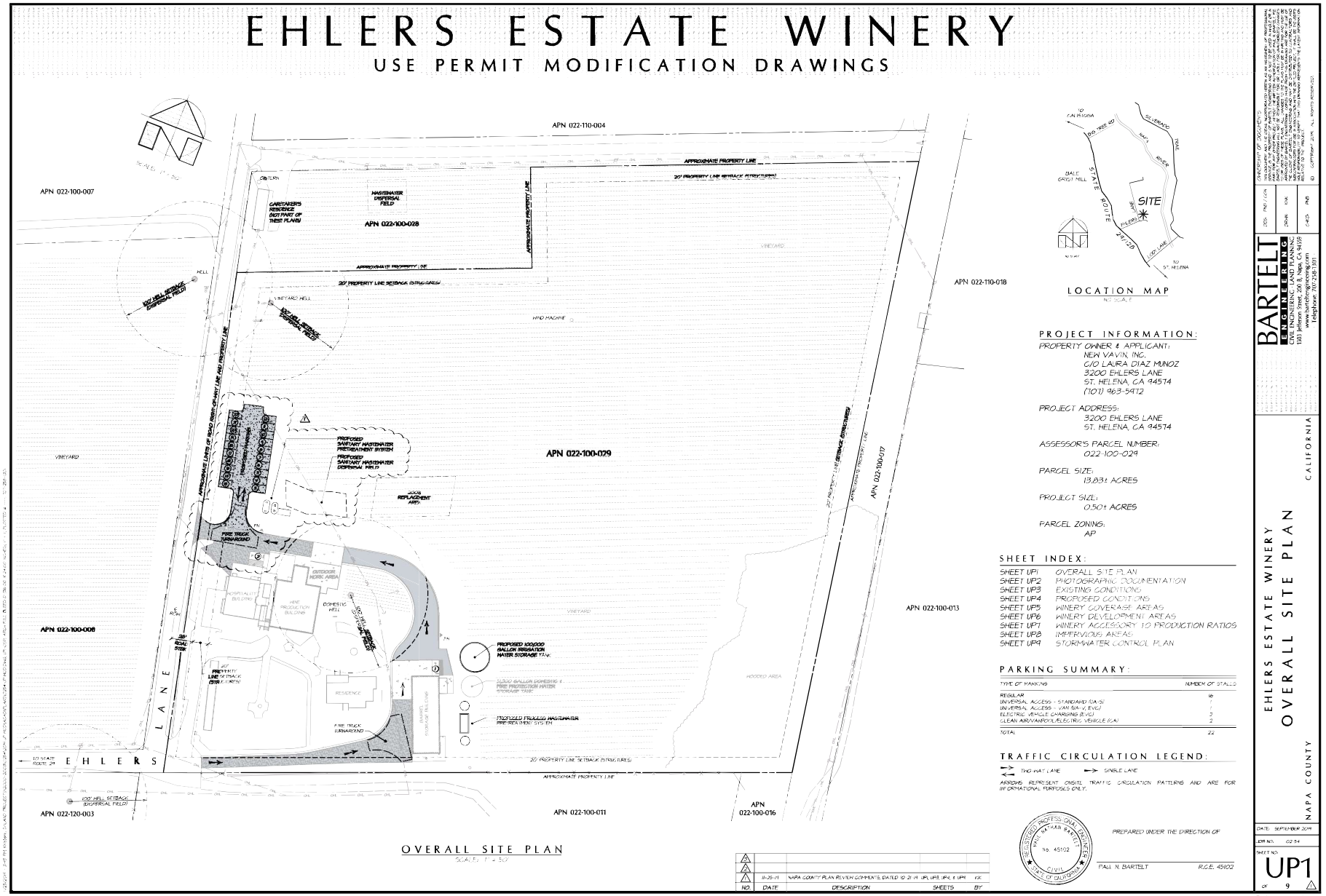
As the County of Napa's Winery Traffic Information/Trip Generation Sheet does not include guidance on inbound versus outbound trips during the peak hours, based on driveway counts collected at various wineries in Napa and Sonoma counties it was assumed that two-thirds of trip ends at the winery would be outbound during the Friday p.m. peak hour since most of the trips would be associated with employees and customers leaving at closure of the winery. For the Saturday midday peak-hour it was assumed that inbound and outbound trip ends would be evenly split.

Based on the change in production and visitation, the winery would be expected to generate 46 trips during the Friday p.m. peak hour compared to 41 trips under existing conditions and two trips for conditions under the current permit. Similarly, during the Saturday peak hour the increase in visitation and production would result in 58 trips as compared to 52 under existing conditions, while there are two trips currently permitted. As shown in Table 11, this would result in a net increase of 18 trips per Friday and 17 trips per Saturday compared to existing conditions.

**Table 11 – Trip Generation Summary – Harvest Conditions**

| Scenario | Daily | | Friday PM Peak Hour | | | Saturday PM Peak Hour | | |
|---|---|---|---|---|---|---|---|---|
| | Friday | Saturday | Trips | In | Out | Trips | In | Out |
| Permitted | 7 | 7 | 2 | 1 | 1 | 2 | 1 | 1 |
| Existing (actual) | 110 | 105 | 39 | 13 | 26 | 50 | 25 | 25 |
| Proposed | 128 | 122 | 45 | 15 | 30 | 57 | 28 | 29 |
| **Net Increase (vs. Existing)** | **18** | **17** | **6** | **2** | **4** | **7** | **3** | **4** |

Note: Trip generation as estimated above does not include special events




Source: Bartelt Engineering 2/17

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**Traffic Impact Study for Ehlers Estate Winery**

**Figure 5 – Site Plan**

## Trip Distribution

The pattern used to allocate new project trips to the street network was determined based on a review of existing traffic patterns. A distribution of 50 percent to the south and 50 percent to the north via SR

29 was used since, according to counts obtained from Caltrans, the directional split for traffic volumes on SR 29 is relatively equal for both the Friday p.m. and Saturday p.m. peak hours.

## Intersection Operation

### Existing plus Project Conditions

Upon the addition of project-related traffic to the Existing volumes, SR 29/Ehlers Lane would continue to operate at LOS A overall and it would operate at LOS D on the stop-controlled approach during the Saturday p.m. peak hour. During the Friday p.m. peak hour, the intersection would operate at LOS E with the addition of project-related trips, but the delay would increase only 0.5 seconds compared to Existing conditions. These results are summarized in Table 12. Project traffic volumes are shown in Figure 6.

**Table 12 – Existing and Existing plus Project Peak Hour Intersection Levels of Service**

| Study Intersection<br>*Approach* | Existing Conditions | | | | Existing plus Project | | | |
|---|---|---|---|---|---|---|---|---|
| | Friday PM | | Saturday PM | | Friday PM | | Saturday PM | |
| | Delay | LOS | Delay | LOS | Delay | LOS | Delay | LOS |
| 1. SR 29/Ehlers Ln | 1.5 | A | 0.7 | A | 1.6 | A | 0.7 | A |
| *Westbound (Ehlers Ln) Approach* | *34.6* | *D* | *31.2* | *D* | *35.1* | *E* | *30.7* | *D* |

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

It should be noted that with the addition of project-related traffic volumes, the westbound approach delay at the SR 29/Ehlers Lane intersection would decrease during the Saturday p.m. peak hour. Since the project adds traffic predominantly to the right-turn movement, and these turning movements typically have a low delay, it resulted in a slight reduction in the approach delay. Drivers would therefore experience little, if any, change in conditions as a result of the project.

**Finding** – The study intersection is expected to continue to operate acceptably at LOS A with the addition of project-related traffic. The stop-controlled approach at the study intersection is expected to continue operating acceptably Saturday peak hour and to change from LOS D to LOS E during the Friday p.m. peak hour upon the addition of project-generated traffic to Existing volumes. However, because operation without the project is on the verge of dropping to LOS E without the project and the projected 0.5-second increase in delay to a 35.1-second average is only 0.1 seconds over the threshold, given the conservative nature taken in estimating volumes it is reasonable to assume that this effect would be acceptable.


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**Traffic Impact Study for Ehlers Estate Winery**

**Figure 6 – Project Traffic Volumes**

W-Trans

## Near-Term plus Project Conditions

With project-related traffic added to Near-Term volumes, SR 29/Ehlers Lane would continue to operate at LOS D on the stop-controlled approach during the Saturday p.m. peak hour but would operate at LOS E during the Friday p.m. peak. As in the Existing conditions scenario, the change in the LOS during the p.m. peak reflects an increase in delay of 0.5 seconds. These results are summarized in Table 13.

**Table 13 – Near-Term and Near-Term plus Project Peak Hour Intersection Levels of Service**

| Study Intersection<br>*Approach* | Near-Term Conditions | | | | Near-Term plus Project | | | |
|---|---|---|---|---|---|---|---|---|
| | Friday PM | | Saturday PM | | Friday PM | | Saturday PM | |
| | Delay | LOS | Delay | LOS | Delay | LOS | Delay | LOS |
| 1. SR 29/Ehlers Ln | 1.5 | A | 0.7 | A | 2.6 | A | 1.4 | A |
| *Westbound (Ehlers Ln) Approach* | *34.7* | *D* | *31.2* | *D* | ***35.2*** | ***E*** | *30.8* | *D* |

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

As under the Existing Conditions scenario, with the addition of project-related traffic volumes, the westbound approach delay at the SR 29/Ehlers Lane intersection would be expected to decrease during the Saturday p.m. peak hour due to the project-related trips largely impacting the right-turn movement, which typically has minimal delay.

**Finding** – The study intersection is expected to continue to operate acceptably overall with the addition of project-related traffic. With the addition of project-related traffic to Near-Term volumes, the stop-controlled approach would operate at LOS E during the Friday p.m. peak hour, but as the increase in delay is 0.5 seconds this is seen as an acceptable effect.

## Cumulative plus Project Conditions

Upon the addition of project-generated traffic to the anticipated Cumulative volumes, SR 29/Ehlers Lane would continue to operate acceptably overall and unacceptably at LOS F on the stop-controlled approach during both peak hours. The Cumulative plus Project operating conditions are summarized in Table 14.

**Table 14 – Cumulative and Cumulative plus Project Peak Hour Intersection Levels of Service**

| Study Intersection<br>*Approach* | Cumulative Conditions | | | | Cumulative plus Project | | | |
|---|---|---|---|---|---|---|---|---|
| | Friday PM | | Saturday PM | | Friday PM | | Saturday PM | |
| | Delay | LOS | Delay | LOS | Delay | LOS | Delay | LOS |
| 1. SR 29/Ehlers Ln | 4.1 | A | 1.3 | A | 4.6 | A | 1.4 | A |
| *Westbound (Ehlers Ln) Approach* | ***136.0*** | ***F*** | ***86.1*** | ***F*** | ***143.9*** | ***F*** | ***86.4*** | ***F*** |
| *Restripe to Provide Right-Turn Lane* | - | - | - | - | ***116.9*** | ***F*** | ***80.4*** | ***F*** |

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

**Finding** – Under Cumulative conditions, SR 29/Ehlers Lane would operate acceptably overall. The stop-controlled approach would operate at LOS F without the project, and the addition of project-related

volumes would result in an increase in delay that would be greater than five seconds during the Friday p.m. peak period. Therefore, without mitigation the project would result in an adverse effect on intersection operations.

**Recommendation** – In order to achieve an acceptable effect on operation of the minor street approach at SR 29/Ehlers Lane, it is recommended that the westbound approach be restriped to include a dedicated right-turn lane to accommodate two vehicles. This would reduce the project-related delay during the Friday p.m. peak to less than five seconds, while the delay during the Saturday p.m. peak would be reduced below Cumulative conditions without the project.

## Roadway Segment Operation

### Existing plus Project Conditions

Under Existing plus Project Conditions, the study roadway segments are expected to continue operating acceptably at the same Levels of Service as without project traffic in both directions during both peak hours. These results are summarized in Table 15.

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

| Study Segment Direction | Existing Conditions | | | | Existing plus Project | | | |
|---|---|---|---|---|---|---|---|---|
| | Friday PM | | Saturday PM | | Friday PM | | Saturday PM | |
| | PTSF | LOS | PTSF | LOS | PTSF | LOS | PTSF | LOS |
| SR 29 - North of Ehlers Ln | | | | | | | | |
| Northbound | 64.4 | C | 64.5 | C | 64.4 | C | 64.6 | C |
| Southbound | 64.3 | C | 65.4 | C | 64.4 | C | 65.5 | C |
| SR 29 - South of Ehlers Ln | | | | | | | | |
| Northbound | 65.4 | C | 65.2 | C | 65.4 | C | 65.2 | C |
| Southbound | 64.8 | C | 65.2 | C | 64.9 | C | 65.2 | C |

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

**Finding** – The study roadways are expected to continue operating acceptably at the same Levels of Service upon the addition of project-generated traffic.

### Near-Term plus Project Conditions

Upon the addition of project-related traffic to Near-Term volumes, the study roadway segments are expected to continue operating acceptably at the same service levels as without project traffic in both directions during both peak hours. These results are summarized in Table 16.

| Table 16 – Near-Term and Near-Term plus Project Peak Hour Roadway Segment Levels of Service | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Study Segment Direction** | **Near-Term Conditions** | | | | **Near-Term plus Project** | | | |
| | **Friday PM** | | **Saturday PM** | | **Friday PM** | | **Saturday PM** | |
| | **PTSF** | **LOS** | **PTSF** | **LOS** | **PTSF** | **LOS** | **PTSF** | **LOS** |
| SR 29 - North of Ehlers Ln | | | | | | | | |
| Northbound | 64.4 | C | 64.5 | C | 64.5 | C | 64.6 | C |
| Southbound | 64.4 | C | 65.5 | C | 64.4 | C | 65.5 | C |
| SR 29 - South of Ehlers Ln | | | | | | | | |
| Northbound | 65.4 | C | 65.2 | C | 65.4 | C | 65.3 | C |
| Southbound | 64.9 | C | 65.2 | C | 65.0 | C | 65.2 | C |

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

**Finding** – Under the Near-Term scenario, the study roadway segments are expected to continue operating acceptably at the same Levels of Service upon the addition of project-generated traffic.

## Cumulative plus Project Conditions

With project-generated traffic added to the anticipated Cumulative volumes, the study roadways are expected to operate acceptably. The Cumulative plus Project operating conditions are summarized in Table 17.

| Table 17 – Cumulative and Cumulative plus Project Peak Hour Roadway Segment Levels of Service | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Study Segment Direction** | **Cumulative Conditions** | | | | **Cumulative plus Project** | | | |
| | **Friday PM** | | **Saturday PM** | | **Friday PM** | | **Saturday PM** | |
| | **PTSF** | **LOS** | **PTSF** | **LOS** | **PTSF** | **LOS** | **PTSF** | **LOS** |
| SR 29 - North of Ehlers Ln | | | | | | | | |
| Northbound | 73.3 | D | 73.6 | D | 73.4 | D | 73.6 | D |
| Southbound | 73.4 | D | 74.4 | D | 73.4 | D | 74.5 | D |
| SR 29 - South of Ehlers Ln | | | | | | | | |
| Northbound | 74.4 | D | 74.2 | D | 74.5 | D | 74.3 | D |
| Southbound | 73.5 | D | 74.0 | D | 73.6 | D | 74.1 | D |

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

**Finding** – Under Cumulative conditions, the study roadway segments are expected to continue operating acceptably at the same Levels of Service with the addition of project-related trips.

# Vehicle Miles Traveled (VMT)

## Background and Threshold of Significance

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

## Project Impact

The OPR Technical Advisory identifies several criteria that may be used to identify certain types of projects that are unlikely to have a significant VMT impact and can be "screened" from further analysis. One of these screening criteria pertains to small projects, which OPR defines as generating fewer than 110 new vehicle trips per day on average. OPR specifies that VMT should be based on a typical weekday and should take into consideration seasonal fluctuations. The proposed project is anticipated to result in 15 new daily vehicle trips on harvest Friday and 27 new daily vehicle trips on a non-harvest Friday compared to actual, existing operation, which is the basis for CEQA evaluations. Since this is below the small-project threshold of 110 trips, it is reasonable to conclude that the project can be presumed to have a less-than-significant transportation impact on VMT.

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

# Alternative Modes

## Pedestrian Facilities

Consistent with expectations for a rural area, there are no existing pedestrian facilities in the project vicinity. Shoulders are present along SR 29.

**Finding** – While there are no pedestrian facilities serving the project site, nominal demand for pedestrian trips to and from the site is expected, so this condition is acceptable.

## Bicycle Facilities

Existing bike lanes along the nearby Silverado Trail and shoulders on SR 29, together with planned future facilities and the shared use of minor streets, provide adequate access for bicyclists. The project will include an easement for the Napa Valley Vine Trail along the SR 29 frontage, which will further enhance bicycle access.

**Finding** – Bicycle facilities serving the project site are adequate.

### Bicycle Storage

The County does not have specific bicycle parking requirements for wineries; however, the project should provide bicycle parking consistent with the requirements outlined in Chapter 18.110.040 of the Napa County Code of Ordinances which states that ten bicycle parking spaces should be provided for all nonresidential uses where ten or more automobile parking spaces are required. With a proposed supply of 22 permanent vehicle parking spaces, the project would need to provide ten bicycle spaces on-site.

## Transit

Bus service is available along the SR 29 corridor. Existing stops are slightly further than one-half mile from the site, which is generally considered a comfortable walking distance. To access the stops pedestrians are required to walk along the roadway on Ehlers Lane and along the shoulders on SR 29.

**Finding** – Transit facilities serving the project site are adequate considering the rural location and limited anticipated demand.

# Access and Circulation

## Site Access

Ehlers Estate Winery would continue to be accessed from the existing driveway on Ehlers Lane.

### Sight Distance

At driveway approaches a substantially clear line of sight should be maintained between the driver of a vehicle waiting on the driveway and the driver of an approaching vehicle. Sight distances along Ehlers Lane at the project driveway were evaluated based on sight distance criteria contained in the *Highway Design Manual* published by Caltrans. The recommended sight distances for driveways are based on stopping sight distance, with approach travel speeds used as the basis for determining the recommended sight distance.

Since Ehlers Lane does not have a speed limit sign, a prima facie speed limit of 25 miles per hour, which applies to private roads, was used. For an approach speed of 25 mph the recommended stopping sight distance is 150 feet. Based on a review of field conditions, sight distance at the driveway extends approximately 300 feet to the south and over 150 feet to the north. It was noted that north of the project driveway the roadway is narrower, with a width of approximately 18 feet. It can therefore be expected that travel speeds are reduced.

**Finding** – Adequate sight distance is available at the project driveway in both travel directions.

### Access Analysis

#### *Left-Turn Lane Warrants*

The need for a left-turn lane on Ehlers Lane at the project driveways was evaluated based on the County of Napa's published guidance for where a turn lane is needed based on the daily traffic volume projected to use the driveway as a function of roadway ADT (Average Daily Traffic). The left-turn lane warrant is met when the corresponding value plots above the curve indicated on the Left Turn Lane Warrant Graph from the *Napa County Road and Street Standards* and is unwarranted if the value plots below the curve.

Based on the Napa County left turn lane warrant graph, a left-turn lane is not warranted on Ehlers Lane at the project driveway using Cumulative Plus Project volumes. The left-turn lane warrant graph is provided in Appendix F.

**Finding** – Upon the addition of project trips to Cumulative volumes, a left-turn lane would not be warranted at the project driveway.

# Parking

The project was analyzed to determine whether the proposed parking supply would be sufficient for the anticipated daily demand during harvest conditions. The project site, as proposed, would have a total of 22 parking spaces.

Napa County does not currently have parking requirements for winery projects. Applying guidelines employed in other Napa County winery traffic studies, daily parking demand for the winery and tasting room could be accommodated by providing at least one space for every employee, as well as parking stalls for about 25 percent of the expected daily tasting room visitors. During typical operation, there would be a maximum of 13 employees (nine full-time and four part-time) on site at any one time, which would be monitored through the scheduling of shifts. The use permit would allow for a maximum of 100 daily visitors to the tasting room. Assuming the County's standard occupancy rate of 2.8 guests per vehicle, a total of 36 guest vehicles would visit the site over the course of the day; to accommodate 25 percent of the visitors at one time, nine parking spaces would be required. Therefore, 13 spaces would be required to accommodate employee parking needs and nine spaces would be needed for guest parking; the proposed on-site parking supply of 22 spaces would be sufficient for the estimated number of employees and guests. To discourage off-site parking, signs indicating that parking is prohibited should be posted along the west side of Ehlers Lane during events.

**Finding** – The proposed parking supply is expected to be adequate to accommodate the anticipated peak demand during typical operations.

# Transportation Demand Management

Transportation Demand Management (TDM) measures aim to reduce single-occupancy vehicle trips during peak hours, parking demand, and total vehicle miles traveled (VMT) through use of alternative modes of transportation and more efficiently planned trips. As of July 2020, VMT analysis is required as part of the California Environmental Quality Act (CEQA) review process. While TDM measures would not be needed to offset project impacts, the implementation of such a program would help to support state and county goals to reduce VMT and to encourage the use of non-vehicle modes of transportation.

Due to the project's rural location, the site does not have as many options to reduce VMT as one located in an urban environment, but the winery would have up to 13 employees on site at one time as well as up to 100 daily visitors so there is potential to reduce vehicular trips and parking demand with implementation of a TDM program.

## Proposed TDM Program

The focus of the project's TDM Program would be to provide information, encouragement, and access to travel options to reduce the number of vehicle trips. The following measures are proposed as part of the project and are consistent with the goals of Caltrans' *Smart Mobility 2010: A Call to Action for the New Decade*.

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

### Ridesharing Programs

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

#### *Ridematching*

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

### *Guaranteed Ride Home Program*

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

## On-Site Amenities

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

## Cash-Out

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

## Education, Outreach & Marketing

### *Transportation Coordinator*

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

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

### *Welcome Packet for New Employees*

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

### *Visitor Transportation Information*

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

## Monitor Performance

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

## Bicycle Benefits

### *Bicycle Parking*

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

### *Changing and Shower Facilities*

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

### *Shared Bicycles & Maintenance Tools*

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

**Recommendation** – While the project would have a less-than-significant impact on VMT, it is recommended that the winery implement some or all of the TDM measures described above to reduce peak-hour vehicle trips, support the increase use of non-vehicle modes of transportation, and help reduce greenhouse gas emissions.

# Conclusions and Recommendations

## Conclusions

- The proposed modifications to the Use Permit would be expected to result in a net increase of 18 daily trips on a Friday during harvest season, including six new trips during the p.m. peak hour, and a net increase of 17 new trips on a Saturday during harvest season, with seven new trips during the p.m. peak hour compared to existing conditions.

- The study intersection of SR 29/Ehlers Lane is operating acceptably at LOS A overall under Existing conditions and would be expected to continue doing so under Near-Term and Cumulative Conditions and with project-related traffic added.

- The stop-controlled approach at the SR 29/Ehlers Lane intersection is operating acceptably at LOS D under Existing Conditions and would continue to do so under Near-Term Conditions. Upon the addition of project trips, the stop-controlled approach is expected to operate unacceptably at LOS E during the Friday p.m. peak. Under Cumulative Conditions, the stop-controlled approach is expected to operate unacceptably at LOS F during both peak hours. With the addition of project-related traffic to Cumulative volumes, the approach is expected to continue to operate at LOS F; however, the increase in delay is expected to be more than five seconds during the Friday p.m. peak period, resulting in an adverse effect.

- The study roadway segments of SR 29 are projected to operate acceptably at LOS D or better under Existing, Near-Term, and Cumulative Conditions, and would continue to do so with the addition of project traffic.

- While there are no pedestrian facilities serving the project site, pedestrian trips to and from the site are not expected given the rural context of the project, so this condition is acceptable.

- Bicycle facilities serving the project site are adequate to serve the project site.

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

- Adequate sight distance is available at the project driveway in both travel directions.

- Upon the addition of project trips to Cumulative volumes, a left-turn lane would not be warranted at the project driveway.

- The proposed on-site parking supply would be adequate for the anticipated peak demand during typical operations.

## Recommendations

- To achieve acceptable operation on the stop-controlled approach at the SR 29/Ehlers Lane intersection under Existing plus Project, Near-Term plus Project, and Cumulative plus Project

conditions, it is recommended that the westbound approach be restriped to include a short dedicated right-turn lane. This would reduce the increase in delay to less than five seconds.

- While not required to mitigate transportation impacts, it is recommended that the winery implement a TDM program to encourage vehicle trip reduction and the use of non-vehicle transportation modes to reduce project-related VMT and greenhouse gas emissions.

- Ten bicycle parking spaces should be provided on-site to encourage bicycle transportation to the site.

# Study Participants and References

## Study Participants

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

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# Appendix A

## Collision Rate Calculations

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## Intersection Collision Rate Worksheet

**Ehlers Estate Winery**

**Intersection # 1:** SR 29 & Ehlers Lane
**Date of Count:** Saturday, January 00, 1900

**Number of Collisions:** 1
**Number of Injuries:** 1
**Number of Fatalities:** 0
**Average Daily Traffic (ADT):** 14800
**Start Date:** October 1, 2014
**End Date:** September 30, 2019
**Number of Years:** 5

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

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

$$\text{Collision Rate} = \frac{1 \times 1{,}000{,}000}{14{,}800 \times 365 \times 5}$$

| | Collision Rate | Fatality Rate | Injury Rate |
|---|---|---|---|
| **Study Intersection** | **0.04 c/mve** | **0.0%** | **100.0%** |
| **Statewide Average*** | **0.16 c/mve** | **1.8%** | **39.5%** |

**Notes**
ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2016 Collision Data on California State Highways, Caltrans

# Roadway Segment Collision Rate Worksheet

**Ehlers Estate Winery**

**Location:** Between Ehlers Lane and Bale Lane

**Date of Count:** Friday, October 18, 2019
**Average Daily Traffic (ADT):** 13,600

**Number of Collisions:** 38
**Number of Injuries:** 18
**Number of Fatalities:** 0
**Start Date:** October 1, 2014
**End Date:** September 30, 2019
**Number of Years:** 5

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

**Segment Length:** 1.0 miles
**Direction:** North/South

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

$$\text{Collision Rate} = \frac{38 \times 1{,}000{,}000}{13{,}600 \times 365 \times 1 \times 5}$$

| | Collision Rate | Fatality Rate | Injury Rate |
|---|---|---|---|
| **Study Segment** | **1.53 c/mvm** | **0.0%** | **47.4%** |
| **Statewide Average*** | **0.82 c/mvm** | **1.1%** | **39.5%** |

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

---

**Location:** Between Weinberg Road and Ehlers Lane

**Date of Count:** Friday, October 18, 2019
**Average Daily Traffic (ADT):** 13,500

**Number of Collisions:** 17
**Number of Injuries:** 5
**Number of Fatalities:** 0
**Start Date:** October 1, 2014
**End Date:** September 30, 2019
**Number of Years:** 5

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

**Segment Length:** 1.0 miles
**Direction:** North/South

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

$$\text{Collision Rate} = \frac{17 \times 1{,}000{,}000}{13{,}500 \times 365 \times 1 \times 5}$$

| | Collision Rate | Fatality Rate | Injury Rate |
|---|---|---|---|
| **Study Segment** | **0.69 c/mvm** | **0.0%** | **29.4%** |
| **Statewide Average*** | **ERROR c/mvm** | **0.0%** | **0.0%** |

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

# Appendix B

## Traffic Counts

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# Daily Traffic Volume Counts

## Week 1, Saturday September 15 through Friday September 21, 2018

| Week 1 | Ehlers Ln e/o SR 29 | | | Ehlers Ln, n/o Ehlers Est | | |
|---|---|---|---|---|---|---|
| **Day** | **EB** | **WB** | **Total** | **NB** | **SB** | **Total** |
| Saturday, 9/15 | 160 | 159 | 319 | 63 | 58 | 121 |
| Sunday, 9/16 | 95 | 100 | 195 | 36 | 37 | 73 |
| Monday, 9/17 | 192 | 190 | 382 | 73 | 71 | 144 |
| Tuesday, 9/18 | 213 | 221 | 434 | 92 | 78 | 170 |
| Wednesday, 9/19 | 206 | 202 | 408 | 93 | 90 | 183 |
| Thursday, 9/20 | 218 | 207 | 425 | 92 | 103 | 195 |
| Friday, 9/21 | 223 | 227 | 450 | 99 | 92 | 191 |
| **Weekday Average** | 210 | 209 | 420 | 90 | 87 | 177 |
| **Sat/Sun Average** | 128 | 130 | 257 | 50 | 48 | 97 |

## Week 2, Saturday September 22 through Friday September 28, 2018

| Week 2 | Ehlers Ln e/o SR 29 | | | Ehlers Ln, n/o Ehlers Est | | |
|---|---|---|---|---|---|---|
| **Day** | **EB** | **WB** | **Total** | **NB** | **SB** | **Total** |
| Saturday, 9/22 | 159 | 160 | 319 | 72 | 69 | 141 |
| Sunday, 9/23 | 108 | 105 | 213 | 52 | 53 | 105 |
| Monday, 9/24 | 181 | 172 | 353 | 91 | 91 | 182 |
| Tuesday, 9/25 | 214 | 209 | 423 | 97 | 94 | 191 |
| Wednesday, 9/26 | 164 | 172 | 336 | 87 | 78 | 165 |
| Thursday, 9/27 | 195 | 198 | 393 | 96 | 89 | 185 |
| Friday, 9/28 | 257 | 265 | 522 | 123 | 105 | 228 |
| **Weekday Average** | 202 | 203 | 405 | 99 | 91 | 190 |
| **Sat/Sun Average** | 134 | 133 | 266 | 62 | 61 | 123 |

## Week 3, Saturday September 29 through Friday October 5, 2018

| Week 3 | Ehlers Ln e/o SR 29 | | | Ehlers Ln, n/o Ehlers Est | | |
|---|---|---|---|---|---|---|
| **Day** | **EB** | **WB** | **Total** | **NB** | **SB** | **Total** |
| Saturday, 9/29 | 207 | 199 | 406 | 93 | 95 | 188 |
| Sunday, 9/30 | 96 | 93 | 189 | 47 | 53 | 100 |
| Monday, 10/1 | 209 | 206 | 415 | 83 | 74 | 157 |
| Tuesday, 10/2 | 177 | 178 | 355 | 81 | 79 | 160 |
| Wednesday, 10/3 | 194 | 200 | 394 | 86 | 76 | 162 |
| Thursday, 10/4 | 223 | 219 | 442 | 101 | 91 | 192 |
| Friday, 10/5 | 260 | 265 | 525 | 113 | 108 | 221 |
| **Weekday Average** | 213 | 214 | 426 | 93 | 86 | 178 |
| **Sat/Sun Average** | 152 | 146 | 298 | 70 | 74 | 144 |

Source: *Ehlers Lane Traffic Study,* Parisi Consulting, 2020

Prepared by National Data & Surveying Services

# SR 29/St Helena Hwy & Lodi Ln

## Peak Hour Turning Movement Count

**ID:** 19-08530-001
**City:** St Helena

**Day:** Saturday
**Date:** 10/19/2019

**PEAK HOURS**

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

**COUNT PERIODS**

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

### SR 29/St Helena Hwy — SOUTHBOUND

| | | | | | | |
|---|---|---|---|---|---|---|
| AM | 0 | 0 | 0 | 0 | 0 | AM |
| NOON | 0 | 0 | 0 | 0 | 0 | NOON |
| PM | 0 | 649 | 27 | 0 | 699 | PM |

### EASTBOUND (Lodi Ln)

| AM | NOON | PM | |
|---|---|---|---|
| 0 | 0 | 0 | ⇦ |
| 0 | 0 | 0 | ↩ 0 |
| 0 | 0 | 0 | → 0 |
| 0 | 0 | 0 | ↪ 0 |
| 0 | 0 | 0 | ⇩ |
| AM | NOON | PM | |

### WESTBOUND (Lodi Ln)

| PM | NOON | AM | |
|---|---|---|---|
| 13 | 0 | 0 | 0 ↩ |
| 0 | 0 | 0 | 0 ← |
| 39 | 0 | 0 | 0 ↪ |
| 0 | 0 | 0 | 0 ↪ |
| 49 | 0 | 0 | ⇨ |
| PM | NOON | AM | |

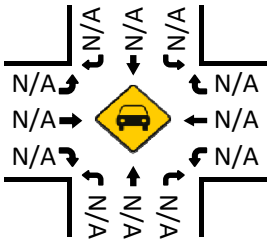
**CONTROL:** 0

| | AM | NOON | PM |
|---|---|---|---|
| TEV | 0 | 0 | 1436 |
| PHF | | | 0.96 |

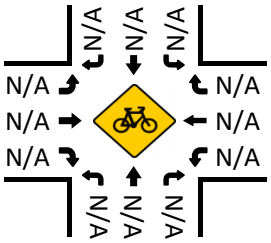
| | | | | | | |
|---|---|---|---|---|---|---|
| PM | 688 | 0 | 0 | 686 | 22 | PM |
| NOON | 0 | 0 | 0 | 0 | 0 | NOON |
| AM | 0 | 0 | 0 | 0 | 0 | AM |

### NORTHBOUND — SR 29/St Helena Hwy

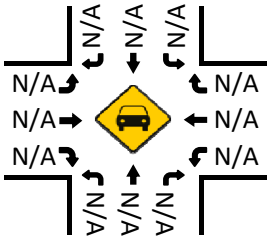
**Total Vehicles (AM)**



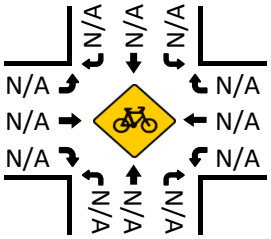
**Bikes (AM)**



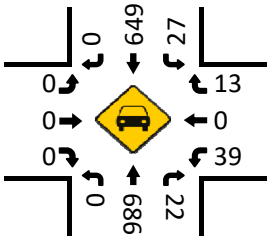
**Total Vehicles (Noon)**



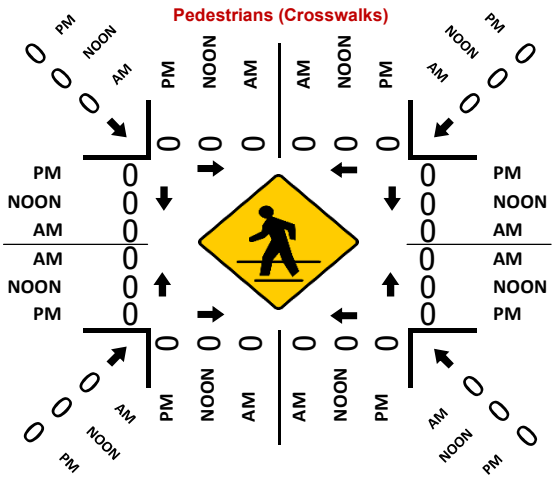
**Bikes (NOON)**



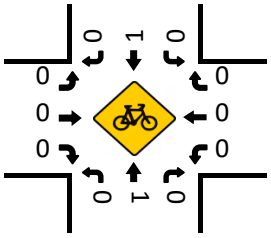
**Total Vehicles (PM)**




**Pedestrians (Crosswalks)**



**Bikes (PM)**



Prepared by National Data & Surveying Services

# SR 29 and St Helena Hwy & Lodi Ln

## Peak Hour Turning Movement Count

**ID:** 19-08530-001
**City:** St Helena

**Day:** Friday
**Date:** 10/18/2019

| PEAK HOURS | COUNT PERIODS |
|---|---|
| NONE | NONE |
| NONE | NONE |
| 02:30 PM - 03:30 PM | 01:45 PM - 05:00 PM |

### SR 29 and St Helena Hwy — SOUTHBOUND

| | | | | | | |
|---|---|---|---|---|---|---|
| AM | 0 | 0 | 0 | 0 | 0 | AM |
| NOON | 0 | 0 | 0 | 0 | 0 | NOON |
| PM | 0 | 622 | 22 | 0 | 704 | PM |

### EASTBOUND (Lodi Ln)

| AM | NOON | PM | |
|---|---|---|---|
| 0 | 0 | 0 | |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| AM | NOON | PM | |

### WESTBOUND (Lodi Ln)

| PM | NOON | AM | |
|---|---|---|---|
| 37 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 85 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 62 | 0 | 0 | |
| PM | NOON | AM | |

### CONTROL

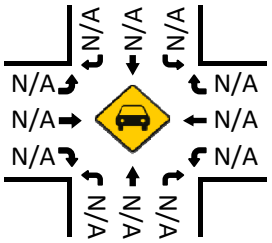
0

| | AM | NOON | PM |
|---|---|---|---|
| TEV | 0 | 0 | 1473 |
| PHF | | | 0.96 |

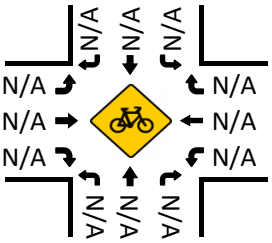
### SR 29 and St Helena Hwy — NORTHBOUND

| | | | | | | |
|---|---|---|---|---|---|---|
| PM | 707 | 0 | 0 | 667 | 40 | PM |
| NOON | 0 | 0 | 0 | 0 | 0 | NOON |
| AM | 0 | 0 | 0 | 0 | 0 | AM |

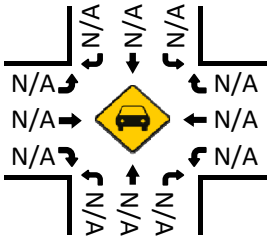
Total Vehicles (AM)



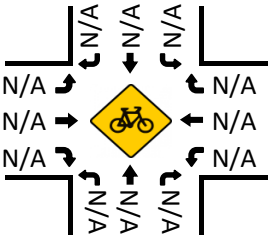
Bikes (AM)



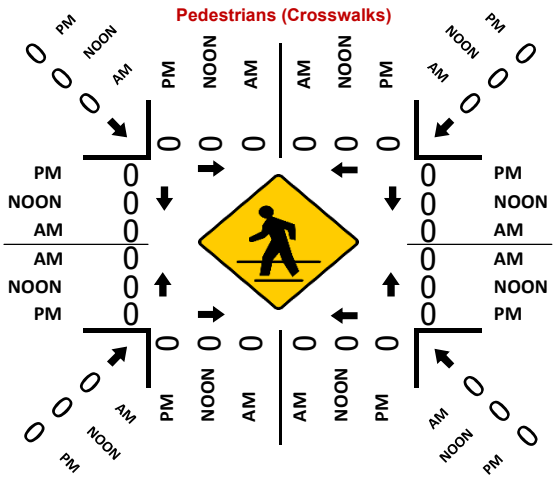
Total Vehicles (Noon)



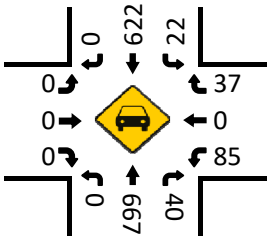
Bikes (NOON)



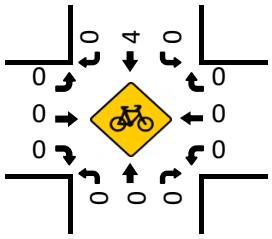
Pedestrians (Crosswalks)



Total Vehicles (PM)



Bikes (PM)



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# Appendix C

## Intersection Level of Service Calculations

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**Intersection Level Of Service Report**
**Intersection 1: SR 29/Ehlers Ln**

| | | | |
|---|---|---|---|
| Control Type: | Two-way stop | Delay (sec / veh): | 39.8 |
| Analysis Method: | HCM 6th Edition | Level Of Service: | E |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 0.277 |

**Intersection Setup**

| Name | SR 29 | | | | Ehlers Ln | |
|---|---|---|---|---|---|---|
| Approach | Northbound | | Southbound | | Westbound | |
| Lane Configuration | | | | | | |
| Turning Movement | Thru | Right | Left | Thru | Left | Right |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 0 | 0 | 0 | 0 | 0 | 0 |
| Pocket Length [ft] | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Speed [mph] | 50.00 | | 50.00 | | 25.00 | |
| Grade [%] | 0.00 | | 0.00 | | 0.00 | |
| Crosswalk | No | | No | | No | |

**Volumes**

| Name | SR 29 | | | | Ehlers Ln | |
|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 664 | 40 | 22 | 644 | 37 | 16 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 |
| Growth Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 664 | 40 | 22 | 644 | 37 | 16 |
| Peak Hour Factor | 0.9600 | 0.9600 | 0.9600 | 0.9600 | 0.9600 | 0.9600 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 173 | 10 | 6 | 168 | 10 | 4 |
| Total Analysis Volume [veh/h] | 692 | 42 | 23 | 671 | 39 | 17 |
| Pedestrian Volume [ped/h] | 0 | | 0 | | 0 | |



Generated with PTV VISTRO
Version 7.00-08

**Intersection Settings**

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

**Movement, Approach, & Intersection Results**

| V/C, Movement V/C Ratio | 0.01 | 0.00 | 0.03 | 0.01 | 0.28 | 0.04 |
|---|---|---|---|---|---|---|
| d_M, Delay for Movement [s/veh] | 0.00 | 0.00 | 9.29 | 0.00 | 39.81 | 22.60 |
| Movement LOS | A | A | A | A | E | C |
| 95th-Percentile Queue Length [veh/ln] | 0.00 | 0.00 | 0.08 | 0.08 | 1.28 | 1.28 |
| 95th-Percentile Queue Length [ft/ln] | 0.00 | 0.00 | 2.05 | 2.05 | 32.10 | 32.10 |
| d_A, Approach Delay [s/veh] | 0.00 | | 0.31 | | 34.59 | |
| Approach LOS | A | | A | | D | |
| d_I, Intersection Delay [s/veh] | 1.45 | | | | | |
| Intersection LOS | E | | | | | |

**Intersection Level Of Service Report**
**Intersection 1: SR 29/Ehlers Ln**

| | | | |
|---|---|---|---|
| Control Type: | Two-way stop | Delay (sec / veh): | 35.5 |
| Analysis Method: | HCM 6th Edition | Level Of Service: | E |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 0.140 |

**Intersection Setup**

| Name | SR 29 | | | | Ehlers Ln | |
|---|---|---|---|---|---|---|
| Approach | Northbound | | Southbound | | Westbound | |
| Lane Configuration | | | | | | |
| Turning Movement | Thru | Right | Left | Thru | Left | Right |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 0 | 0 | 0 | 0 | 0 | 0 |
| Pocket Length [ft] | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Speed [mph] | 50.00 | | 50.00 | | 25.00 | |
| Grade [%] | 0.00 | | 0.00 | | 0.00 | |
| Crosswalk | No | | No | | No | |

**Volumes**

| Name | SR 29 | | | | Ehlers Ln | |
|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 677 | 22 | 22 | 671 | 18 | 6 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Growth Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 677 | 22 | 22 | 671 | 18 | 6 |
| Peak Hour Factor | 0.9600 | 0.9600 | 0.9600 | 0.9600 | 0.9600 | 0.9600 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 176 | 6 | 6 | 175 | 5 | 2 |
| Total Analysis Volume [veh/h] | 705 | 23 | 23 | 699 | 19 | 6 |
| Pedestrian Volume [ped/h] | 0 | | 0 | | 0 | |



Generated with PTV VISTRO
Version 7.00-08

**Intersection Settings**

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

**Movement, Approach, & Intersection Results**

| V/C, Movement V/C Ratio | 0.01 | 0.00 | 0.03 | 0.01 | 0.14 | 0.01 |
|---|---|---|---|---|---|---|
| d_M, Delay for Movement [s/veh] | 0.00 | 0.00 | 9.22 | 0.00 | 35.50 | 17.36 |
| Movement LOS | A | A | A | A | E | C |
| 95th-Percentile Queue Length [veh/ln] | 0.00 | 0.00 | 0.08 | 0.08 | 0.53 | 0.53 |
| 95th-Percentile Queue Length [ft/ln] | 0.00 | 0.00 | 2.02 | 2.02 | 13.23 | 13.23 |
| d_A, Approach Delay [s/veh] | 0.00 | | 0.29 | | 31.15 | |
| Approach LOS | A | | A | | D | |
| d_I, Intersection Delay [s/veh] | 0.67 | | | | | |
| Intersection LOS | E | | | | | |

**Intersection Level Of Service Report**
**Intersection 1: SR 29/Ehlers Ln**

| | | | |
|---|---|---|---|
| Control Type: | Two-way stop | Delay (sec / veh): | 39.9 |
| Analysis Method: | HCM 6th Edition | Level Of Service: | E |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 0.278 |

**Intersection Setup**

| Name | SR 29 | | | | Ehlers Ln | |
|---|---|---|---|---|---|---|
| Approach | Northbound | | Southbound | | Westbound | |
| Lane Configuration | | | | | | |
| Turning Movement | Thru | Right | Left | Thru | Left | Right |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 0 | 0 | 0 | 0 | 0 | 0 |
| Pocket Length [ft] | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Speed [mph] | 50.00 | | 50.00 | | 25.00 | |
| Grade [%] | 0.00 | | 0.00 | | 0.00 | |
| Crosswalk | No | | No | | No | |

**Volumes**

| Name | SR 29 | | | | Ehlers Ln | |
|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 664 | 40 | 22 | 644 | 37 | 16 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 |
| Growth Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 1 | 0 | 0 | 1 | 0 | 0 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 665 | 40 | 22 | 645 | 37 | 16 |
| Peak Hour Factor | 0.9600 | 0.9600 | 0.9600 | 0.9600 | 0.9600 | 0.9600 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 173 | 10 | 6 | 168 | 10 | 4 |
| Total Analysis Volume [veh/h] | 693 | 42 | 23 | 672 | 39 | 17 |
| Pedestrian Volume [ped/h] | 0 | | 0 | | 0 | |



Generated with PTV VISTRO
Version 7.00-08

**Intersection Settings**

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

**Movement, Approach, & Intersection Results**

| V/C, Movement V/C Ratio | 0.01 | 0.00 | 0.03 | 0.01 | 0.28 | 0.04 |
|---|---|---|---|---|---|---|
| d_M, Delay for Movement [s/veh] | 0.00 | 0.00 | 9.29 | 0.00 | 39.94 | 22.67 |
| Movement LOS | A | A | A | A | E | C |
| 95th-Percentile Queue Length [veh/ln] | 0.00 | 0.00 | 0.08 | 0.08 | 1.29 | 1.29 |
| 95th-Percentile Queue Length [ft/ln] | 0.00 | 0.00 | 2.06 | 2.06 | 32.21 | 32.21 |
| d_A, Approach Delay [s/veh] | 0.00 | | 0.31 | | 34.70 | |
| Approach LOS | A | | A | | D | |
| d_I, Intersection Delay [s/veh] | 1.45 | | | | | |
| Intersection LOS | E | | | | | |

**Intersection Level Of Service Report**
**Intersection 1: SR 29/Ehlers Ln**

| | | | |
|---|---|---|---|
| Control Type: | Two-way stop | Delay (sec / veh): | 35.6 |
| Analysis Method: | HCM 6th Edition | Level Of Service: | E |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 0.140 |

**Intersection Setup**

| Name | SR 29 | | | | Ehlers Ln | |
|---|---|---|---|---|---|---|
| Approach | Northbound | | Southbound | | Westbound | |
| Lane Configuration | | | | | | |
| Turning Movement | Thru | Right | Left | Thru | Left | Right |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 0 | 0 | 0 | 0 | 0 | 0 |
| Pocket Length [ft] | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Speed [mph] | 50.00 | | 50.00 | | 25.00 | |
| Grade [%] | 0.00 | | 0.00 | | 0.00 | |
| Crosswalk | No | | No | | No | |

**Volumes**

| Name | SR 29 | | | | Ehlers Ln | |
|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 677 | 22 | 22 | 671 | 18 | 6 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Growth Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 1 | 0 | 0 | 1 | 0 | 0 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 678 | 22 | 22 | 672 | 18 | 6 |
| Peak Hour Factor | 0.9600 | 0.9600 | 0.9600 | 0.9600 | 0.9600 | 0.9600 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 177 | 6 | 6 | 175 | 5 | 2 |
| Total Analysis Volume [veh/h] | 706 | 23 | 23 | 700 | 19 | 6 |
| Pedestrian Volume [ped/h] | 0 | | 0 | | 0 | |



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**Intersection Settings**

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

**Movement, Approach, & Intersection Results**

| V/C, Movement V/C Ratio | 0.01 | 0.00 | 0.03 | 0.01 | 0.14 | 0.01 |
|---|---|---|---|---|---|---|
| d_M, Delay for Movement [s/veh] | 0.00 | 0.00 | 9.23 | 0.00 | 35.60 | 17.40 |
| Movement LOS | A | A | A | A | E | C |
| 95th-Percentile Queue Length [veh/ln] | 0.00 | 0.00 | 0.08 | 0.08 | 0.53 | 0.53 |
| 95th-Percentile Queue Length [ft/ln] | 0.00 | 0.00 | 2.02 | 2.02 | 13.27 | 13.27 |
| d_A, Approach Delay [s/veh] | 0.00 | | 0.29 | | 31.23 | |
| Approach LOS | A | | A | | D | |
| d_I, Intersection Delay [s/veh] | 0.67 | | | | | |
| Intersection LOS | E | | | | | |

## Intersection Level Of Service Report
## Intersection 1: SR 29/Ehlers Ln

| | | | |
|---|---|---|---|
| Control Type: | Two-way stop | Delay (sec / veh): | 151.1 |
| Analysis Method: | HCM 6th Edition | Level Of Service: | F |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 0.703 |

**Intersection Setup**

| Name | SR 29 | | | | Ehlers Ln | |
|---|---|---|---|---|---|---|
| Approach | Northbound | | Southbound | | Westbound | |
| Lane Configuration | | | | | | |
| Turning Movement | Thru | Right | Left | Thru | Left | Right |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 0 | 0 | 0 | 0 | 0 | 0 |
| Pocket Length [ft] | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Speed [mph] | 50.00 | | 50.00 | | 25.00 | |
| Grade [%] | 0.00 | | 0.00 | | 0.00 | |
| Crosswalk | No | | No | | No | |

**Volumes**

| Name | SR 29 | | | | Ehlers Ln | |
|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 664 | 40 | 22 | 644 | 37 | 16 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 |
| Growth Factor | 1.4600 | 1.4600 | 1.4600 | 1.4600 | 1.1100 | 1.1100 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 969 | 58 | 32 | 940 | 41 | 18 |
| Peak Hour Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 242 | 15 | 8 | 235 | 10 | 5 |
| Total Analysis Volume [veh/h] | 969 | 58 | 32 | 940 | 41 | 18 |
| Pedestrian Volume [ped/h] | 0 | | 0 | | 0 | |



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**Intersection Settings**

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

**Movement, Approach, & Intersection Results**

| V/C, Movement V/C Ratio | 0.01 | 0.00 | 0.05 | 0.01 | 0.70 | 0.06 |
|---|---|---|---|---|---|---|
| d_M, Delay for Movement [s/veh] | 0.00 | 0.00 | 10.66 | 0.00 | 151.08 | 101.61 |
| Movement LOS | A | A | B | A | F | F |
| 95th-Percentile Queue Length [veh/ln] | 0.00 | 0.00 | 0.15 | 0.15 | 3.70 | 3.70 |
| 95th-Percentile Queue Length [ft/ln] | 0.00 | 0.00 | 3.76 | 3.76 | 92.58 | 92.58 |
| d_A, Approach Delay [s/veh] | 0.00 | | 0.35 | | 135.99 | |
| Approach LOS | A | | A | | F | |
| d_I, Intersection Delay [s/veh] | 4.06 | | | | | |
| Intersection LOS | F | | | | | |

**Intersection Level Of Service Report**
**Intersection 1: SR 29/Ehlers Ln**

| | | | |
|---|---|---|---|
| Control Type: | Two-way stop | Delay (sec / veh): | 99.8 |
| Analysis Method: | HCM 6th Edition | Level Of Service: | F |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 0.363 |

**Intersection Setup**

| Name | SR 29 | | | | Ehlers Ln | |
|---|---|---|---|---|---|---|
| Approach | Northbound | | Southbound | | Westbound | |
| Lane Configuration | | | | | | |
| Turning Movement | Thru | Right | Left | Thru | Left | Right |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 0 | 0 | 0 | 0 | 0 | 0 |
| Pocket Length [ft] | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Speed [mph] | 50.00 | | 50.00 | | 25.00 | |
| Grade [%] | 0.00 | | 0.00 | | 0.00 | |
| Crosswalk | No | | No | | No | |

**Volumes**

| Name | SR 29 | | | | Ehlers Ln | |
|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 677 | 22 | 22 | 671 | 18 | 6 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Growth Factor | 1.4600 | 1.4600 | 1.4600 | 1.4600 | 1.1100 | 1.1100 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 988 | 32 | 32 | 980 | 20 | 7 |
| Peak Hour Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 247 | 8 | 8 | 245 | 5 | 2 |
| Total Analysis Volume [veh/h] | 988 | 32 | 32 | 980 | 20 | 7 |
| Pedestrian Volume [ped/h] | 0 | | 0 | | 0 | |



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**Intersection Settings**

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

**Movement, Approach, & Intersection Results**

| V/C, Movement V/C Ratio | 0.01 | 0.00 | 0.05 | 0.01 | 0.36 | 0.02 |
|---|---|---|---|---|---|---|
| d_M, Delay for Movement [s/veh] | 0.00 | 0.00 | 10.55 | 0.00 | 99.81 | 46.71 |
| Movement LOS | A | A | B | A | F | E |
| 95th-Percentile Queue Length [veh/ln] | 0.00 | 0.00 | 0.15 | 0.15 | 1.48 | 1.48 |
| 95th-Percentile Queue Length [ft/ln] | 0.00 | 0.00 | 3.70 | 3.70 | 37.07 | 37.07 |
| d_A, Approach Delay [s/veh] | 0.00 | | 0.33 | | 86.05 | |
| Approach LOS | A | | A | | F | |
| d_I, Intersection Delay [s/veh] | 1.29 | | | | | |
| Intersection LOS | F | | | | | |

**Intersection Level Of Service Report**
**Intersection 1: SR 29/Ehlers Ln**

| | | | |
|---|---|---|---|
| Control Type: | Two-way stop | Delay (sec / veh): | 40.5 |
| Analysis Method: | HCM 6th Edition | Level Of Service: | E |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 0.292 |

**Intersection Setup**

| Name | SR 29 | | | | Ehlers Ln | |
|---|---|---|---|---|---|---|
| Approach | Northbound | | Southbound | | Westbound | |
| Lane Configuration | | | | | | |
| Turning Movement | Thru | Right | Left | Thru | Left | Right |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 0 | 0 | 0 | 0 | 0 | 0 |
| Pocket Length [ft] | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Speed [mph] | 50.00 | | 50.00 | | 25.00 | |
| Grade [%] | 0.00 | | 0.00 | | 0.00 | |
| Crosswalk | No | | No | | No | |

**Volumes**

| Name | SR 29 | | | | Ehlers Ln | |
|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 664 | 40 | 22 | 644 | 37 | 16 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 |
| Growth Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 0 | 1 | 0 | 0 | 2 | 2 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 664 | 41 | 22 | 644 | 39 | 18 |
| Peak Hour Factor | 0.9600 | 0.9600 | 0.9600 | 0.9600 | 0.9600 | 0.9600 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 173 | 11 | 6 | 168 | 10 | 5 |
| Total Analysis Volume [veh/h] | 692 | 43 | 23 | 671 | 41 | 19 |
| Pedestrian Volume [ped/h] | 0 | | 0 | | 0 | |



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**Intersection Settings**

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

**Movement, Approach, & Intersection Results**

| V/C, Movement V/C Ratio | 0.01 | 0.00 | 0.03 | 0.01 | 0.29 | 0.04 |
|---|---|---|---|---|---|---|
| d_M, Delay for Movement [s/veh] | 0.00 | 0.00 | 9.29 | 0.00 | 40.53 | 23.30 |
| Movement LOS | A | A | A | A | E | C |
| 95th-Percentile Queue Length [veh/ln] | 0.00 | 0.00 | 0.08 | 0.08 | 1.39 | 1.39 |
| 95th-Percentile Queue Length [ft/ln] | 0.00 | 0.00 | 2.06 | 2.06 | 34.74 | 34.74 |
| d_A, Approach Delay [s/veh] | 0.00 | | 0.31 | | 35.08 | |
| Approach LOS | A | | A | | E | |
| d_I, Intersection Delay [s/veh] | 1.56 | | | | | |
| Intersection LOS | E | | | | | |

**Intersection Level Of Service Report**
**Intersection 1: SR 29/Ehlers Ln**

| | | | |
|---|---|---|---|
| Control Type: | Two-way stop | Delay (sec / veh): | 35.9 |
| Analysis Method: | HCM 6th Edition | Level Of Service: | E |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 0.148 |

**Intersection Setup**

| Name | SR 29 | | | | Ehlers Ln | |
|---|---|---|---|---|---|---|
| Approach | Northbound | | Southbound | | Westbound | |
| Lane Configuration | | | | | | |
| Turning Movement | Thru | Right | Left | Thru | Left | Right |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 0 | 0 | 0 | 0 | 0 | 0 |
| Pocket Length [ft] | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Speed [mph] | 50.00 | | 50.00 | | 25.00 | |
| Grade [%] | 0.00 | | 0.00 | | 0.00 | |
| Crosswalk | No | | No | | No | |

**Volumes**

| Name | SR 29 | | | | Ehlers Ln | |
|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 677 | 22 | 22 | 671 | 18 | 6 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Growth Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 0 | 2 | 1 | 0 | 1 | 2 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 677 | 24 | 23 | 671 | 19 | 8 |
| Peak Hour Factor | 0.9600 | 0.9600 | 0.9600 | 0.9600 | 0.9600 | 0.9600 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 176 | 6 | 6 | 175 | 5 | 2 |
| Total Analysis Volume [veh/h] | 705 | 25 | 24 | 699 | 20 | 8 |
| Pedestrian Volume [ped/h] | 0 | | 0 | | 0 | |



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**Intersection Settings**

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

**Movement, Approach, & Intersection Results**

| V/C, Movement V/C Ratio | 0.01 | 0.00 | 0.03 | 0.01 | 0.15 | 0.02 |
|---|---|---|---|---|---|---|
| d_M, Delay for Movement [s/veh] | 0.00 | 0.00 | 9.24 | 0.00 | 35.93 | 17.63 |
| Movement LOS | A | A | A | A | E | C |
| 95th-Percentile Queue Length [veh/ln] | 0.00 | 0.00 | 0.08 | 0.08 | 0.58 | 0.58 |
| 95th-Percentile Queue Length [ft/ln] | 0.00 | 0.00 | 2.12 | 2.12 | 14.54 | 14.54 |
| d_A, Approach Delay [s/veh] | 0.00 | | 0.31 | | 30.70 | |
| Approach LOS | A | | A | | D | |
| d_I, Intersection Delay [s/veh] | 0.73 | | | | | |
| Intersection LOS | E | | | | | |

**Intersection Level Of Service Report**
**Intersection 1: SR 29/Ehlers Ln**

| | | | |
|---|---|---|---|
| Control Type: | Two-way stop | Delay (sec / veh): | 40.7 |
| Analysis Method: | HCM 6th Edition | Level Of Service: | E |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 0.293 |

**Intersection Setup**

| Name | SR 29 | | | | Ehlers Ln | |
|---|---|---|---|---|---|---|
| Approach | Northbound | | Southbound | | Westbound | |
| Lane Configuration | | | | | | |
| Turning Movement | Thru | Right | Left | Thru | Left | Right |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 0 | 0 | 0 | 0 | 0 | 0 |
| Pocket Length [ft] | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Speed [mph] | 50.00 | | 50.00 | | 25.00 | |
| Grade [%] | 0.00 | | 0.00 | | 0.00 | |
| Crosswalk | No | | No | | No | |

**Volumes**

| Name | SR 29 | | | | Ehlers Ln | |
|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 664 | 40 | 22 | 644 | 37 | 16 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 |
| Growth Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 1 | 1 | 0 | 1 | 2 | 2 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 665 | 41 | 22 | 645 | 39 | 18 |
| Peak Hour Factor | 0.9600 | 0.9600 | 0.9600 | 0.9600 | 0.9600 | 0.9600 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 173 | 11 | 6 | 168 | 10 | 5 |
| Total Analysis Volume [veh/h] | 693 | 43 | 23 | 672 | 41 | 19 |
| Pedestrian Volume [ped/h] | 0 | | 0 | | 0 | |



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**Intersection Settings**

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

**Movement, Approach, & Intersection Results**

| V/C, Movement V/C Ratio | 0.01 | 0.00 | 0.03 | 0.01 | 0.29 | 0.04 |
|---|---|---|---|---|---|---|
| d_M, Delay for Movement [s/veh] | 0.00 | 0.00 | 9.30 | 0.00 | 40.67 | 23.38 |
| Movement LOS | A | A | A | A | E | C |
| 95th-Percentile Queue Length [veh/ln] | 0.00 | 0.00 | 0.08 | 0.08 | 1.39 | 1.39 |
| 95th-Percentile Queue Length [ft/ln] | 0.00 | 0.00 | 2.06 | 2.06 | 34.86 | 34.86 |
| d_A, Approach Delay [s/veh] | 0.00 | | 0.31 | | 35.20 | |
| Approach LOS | A | | A | | E | |
| d_I, Intersection Delay [s/veh] | 1.56 | | | | | |
| Intersection LOS | E | | | | | |

**Intersection Level Of Service Report**
**Intersection 1: SR 29/Ehlers Ln**

| | | | |
|---|---|---|---|
| Control Type: | Two-way stop | Delay (sec / veh): | 36.0 |
| Analysis Method: | HCM 6th Edition | Level Of Service: | E |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 0.149 |

**Intersection Setup**

| Name | SR 29 | | | | Ehlers Ln | |
|---|---|---|---|---|---|---|
| Approach | Northbound | | Southbound | | Westbound | |
| Lane Configuration | | | | | | |
| Turning Movement | Thru | Right | Left | Thru | Left | Right |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 0 | 0 | 0 | 0 | 0 | 0 |
| Pocket Length [ft] | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Speed [mph] | 50.00 | | 50.00 | | 25.00 | |
| Grade [%] | 0.00 | | 0.00 | | 0.00 | |
| Crosswalk | No | | No | | No | |

**Volumes**

| Name | SR 29 | | | | Ehlers Ln | |
|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 677 | 22 | 22 | 671 | 18 | 6 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Growth Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 1 | 2 | 1 | 1 | 1 | 2 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 678 | 24 | 23 | 672 | 19 | 8 |
| Peak Hour Factor | 0.9600 | 0.9600 | 0.9600 | 0.9600 | 0.9600 | 0.9600 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 177 | 6 | 6 | 175 | 5 | 2 |
| Total Analysis Volume [veh/h] | 706 | 25 | 24 | 700 | 20 | 8 |
| Pedestrian Volume [ped/h] | 0 | | 0 | | 0 | |



Generated with PTV VISTRO
Version 7.00-08

**Intersection Settings**

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

**Movement, Approach, & Intersection Results**

| V/C, Movement V/C Ratio | 0.01 | 0.00 | 0.03 | 0.01 | 0.15 | 0.02 |
|---|---|---|---|---|---|---|
| d_M, Delay for Movement [s/veh] | 0.00 | 0.00 | 9.24 | 0.00 | 36.03 | 17.67 |
| Movement LOS | A | A | A | A | E | C |
| 95th-Percentile Queue Length [veh/ln] | 0.00 | 0.00 | 0.08 | 0.08 | 0.58 | 0.58 |
| 95th-Percentile Queue Length [ft/ln] | 0.00 | 0.00 | 2.12 | 2.12 | 14.58 | 14.58 |
| d_A, Approach Delay [s/veh] | 0.00 | | 0.31 | | 30.78 | |
| Approach LOS | A | | A | | D | |
| d_I, Intersection Delay [s/veh] | 0.73 | | | | | |
| Intersection LOS | E | | | | | |

**Intersection Level Of Service Report**
**Intersection 1: SR 29/Ehlers Ln**

| | | | |
|---|---|---|---|
| Control Type: | Two-way stop | Delay (sec / veh): | 159.7 |
| Analysis Method: | HCM 6th Edition | Level Of Service: | F |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 0.738 |

**Intersection Setup**

| Name | SR 29 | | | | Ehlers Ln | |
|---|---|---|---|---|---|---|
| Approach | Northbound | | Southbound | | Westbound | |
| Lane Configuration | | | | | | |
| Turning Movement | Thru | Right | Left | Thru | Left | Right |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 0 | 0 | 0 | 0 | 0 | 0 |
| Pocket Length [ft] | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Speed [mph] | 50.00 | | 50.00 | | 25.00 | |
| Grade [%] | 0.00 | | 0.00 | | 0.00 | |
| Crosswalk | No | | No | | No | |

**Volumes**

| Name | SR 29 | | | | Ehlers Ln | |
|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 664 | 40 | 22 | 644 | 37 | 16 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 |
| Growth Factor | 1.4600 | 1.4600 | 1.4600 | 1.4600 | 1.1100 | 1.1100 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 0 | 1 | 0 | 0 | 2 | 2 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 969 | 59 | 32 | 940 | 43 | 20 |
| Peak Hour Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 242 | 15 | 8 | 235 | 11 | 5 |
| Total Analysis Volume [veh/h] | 969 | 59 | 32 | 940 | 43 | 20 |
| Pedestrian Volume [ped/h] | 0 | | 0 | | 0 | |



Generated with PTV VISTRO
Version 7.00-08

**Intersection Settings**

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

**Movement, Approach, & Intersection Results**

| V/C, Movement V/C Ratio | 0.01 | 0.00 | 0.05 | 0.01 | 0.74 | 0.07 |
|---|---|---|---|---|---|---|
| d_M, Delay for Movement [s/veh] | 0.00 | 0.00 | 10.66 | 0.00 | 159.66 | 110.15 |
| Movement LOS | A | A | B | A | F | F |
| 95th-Percentile Queue Length [veh/ln] | 0.00 | 0.00 | 0.15 | 0.15 | 4.01 | 4.01 |
| 95th-Percentile Queue Length [ft/ln] | 0.00 | 0.00 | 3.77 | 3.77 | 100.15 | 100.15 |
| d_A, Approach Delay [s/veh] | 0.00 | | 0.35 | | 143.94 | |
| Approach LOS | A | | A | | F | |
| d_I, Intersection Delay [s/veh] | 4.56 | | | | | |
| Intersection LOS | F | | | | | |

**Intersection Level Of Service Report**
**Intersection 1: SR 29/Ehlers Ln**

| | | | |
|---|---|---|---|
| Control Type: | Two-way stop | Delay (sec / veh): | 162.8 |
| Analysis Method: | HCM 6th Edition | Level Of Service: | F |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 0.738 |

**Intersection Setup**

| Name | SR 29 | | | | Ehlers Ln | |
|---|---|---|---|---|---|---|
| Approach | Northbound | | Southbound | | Westbound | |
| Lane Configuration | | | | | | |
| Turning Movement | Thru | Right | Left | Thru | Left | Right |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 0 | 0 | 0 | 0 | 0 | 1 |
| Pocket Length [ft] | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 50.00 |
| Speed [mph] | 50.00 | | 50.00 | | 25.00 | |
| Grade [%] | 0.00 | | 0.00 | | 0.00 | |
| Crosswalk | No | | No | | No | |

**Volumes**

| Name | SR 29 | | | | Ehlers Ln | |
|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 664 | 40 | 22 | 644 | 37 | 16 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 |
| Growth Factor | 1.4600 | 1.4600 | 1.4600 | 1.4600 | 1.1100 | 1.1100 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 0 | 1 | 0 | 0 | 2 | 2 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 969 | 59 | 32 | 940 | 43 | 20 |
| Peak Hour Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 242 | 15 | 8 | 235 | 11 | 5 |
| Total Analysis Volume [veh/h] | 969 | 59 | 32 | 940 | 43 | 20 |
| Pedestrian Volume [ped/h] | 0 | | 0 | | 0 | |



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Version 7.00-08

**Intersection Settings**

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

**Movement, Approach, & Intersection Results**

| V/C, Movement V/C Ratio | 0.01 | 0.00 | 0.05 | 0.01 | 0.74 | 0.07 |
|---|---|---|---|---|---|---|
| d_M, Delay for Movement [s/veh] | 0.00 | 0.00 | 10.66 | 0.00 | 162.76 | 18.18 |
| Movement LOS | A | A | B | A | F | C |
| 95th-Percentile Queue Length [veh/ln] | 0.00 | 0.00 | 0.15 | 0.15 | 3.17 | 0.22 |
| 95th-Percentile Queue Length [ft/ln] | 0.00 | 0.00 | 3.77 | 3.77 | 79.34 | 5.46 |
| d_A, Approach Delay [s/veh] | 0.00 | | 0.35 | | 116.86 | |
| Approach LOS | A | | A | | F | |
| d_I, Intersection Delay [s/veh] | 3.73 | | | | | |
| Intersection LOS | F | | | | | |

**Intersection Level Of Service Report**
**Intersection 1: SR 29/Ehlers Ln**

| | | | |
|---|---|---|---|
| Control Type: | Two-way stop | Delay (sec / veh): | 102.5 |
| Analysis Method: | HCM 6th Edition | Level Of Service: | F |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 0.384 |

**Intersection Setup**

| Name | SR 29 | | | | Ehlers Ln | |
|---|---|---|---|---|---|---|
| Approach | Northbound | | Southbound | | Westbound | |
| Lane Configuration | | | | | | |
| Turning Movement | Thru | Right | Left | Thru | Left | Right |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 0 | 0 | 0 | 0 | 0 | 0 |
| Pocket Length [ft] | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Speed [mph] | 50.00 | | 50.00 | | 25.00 | |
| Grade [%] | 0.00 | | 0.00 | | 0.00 | |
| Crosswalk | No | | No | | No | |

**Volumes**

| Name | SR 29 | | | | Ehlers Ln | |
|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 677 | 22 | 22 | 671 | 18 | 6 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Growth Factor | 1.4600 | 1.4600 | 1.4600 | 1.4600 | 1.1100 | 1.1100 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 0 | 2 | 1 | 0 | 1 | 2 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 988 | 34 | 33 | 980 | 21 | 9 |
| Peak Hour Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 247 | 9 | 8 | 245 | 5 | 2 |
| Total Analysis Volume [veh/h] | 988 | 34 | 33 | 980 | 21 | 9 |
| Pedestrian Volume [ped/h] | 0 | | 0 | | 0 | |



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**Intersection Settings**

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

**Movement, Approach, & Intersection Results**

| V/C, Movement V/C Ratio | 0.01 | 0.00 | 0.05 | 0.01 | 0.38 | 0.03 |
|---|---|---|---|---|---|---|
| d_M, Delay for Movement [s/veh] | 0.00 | 0.00 | 10.57 | 0.00 | 102.49 | 48.86 |
| Movement LOS | A | A | B | A | F | E |
| 95th-Percentile Queue Length [veh/ln] | 0.00 | 0.00 | 0.15 | 0.15 | 1.63 | 1.63 |
| 95th-Percentile Queue Length [ft/ln] | 0.00 | 0.00 | 3.82 | 3.82 | 40.70 | 40.70 |
| d_A, Approach Delay [s/veh] | 0.00 | | 0.34 | | 86.40 | |
| Approach LOS | A | | A | | F | |
| d_I, Intersection Delay [s/veh] | 1.42 | | | | | |
| Intersection LOS | F | | | | | |

**Intersection Level Of Service Report**
**Intersection 1: SR 29/Ehlers Ln**

| | | | |
|---|---|---|---|
| Control Type: | Two-way stop | Delay (sec / veh): | 107.3 |
| Analysis Method: | HCM 6th Edition | Level Of Service: | F |
| Analysis Period: | 15 minutes | Volume to Capacity (v/c): | 0.384 |

**Intersection Setup**

| Name | SR 29 | | | | Ehlers Ln | |
|---|---|---|---|---|---|---|
| Approach | Northbound | | Southbound | | Westbound | |
| Lane Configuration | | | | | | |
| Turning Movement | Thru | Right | Left | Thru | Left | Right |
| Lane Width [ft] | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| No. of Lanes in Pocket | 0 | 0 | 0 | 0 | 0 | 1 |
| Pocket Length [ft] | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 50.00 |
| Speed [mph] | 50.00 | | 50.00 | | 25.00 | |
| Grade [%] | 0.00 | | 0.00 | | 0.00 | |
| Crosswalk | No | | No | | No | |

**Volumes**

| Name | SR 29 | | | | Ehlers Ln | |
|---|---|---|---|---|---|---|
| Base Volume Input [veh/h] | 677 | 22 | 22 | 671 | 18 | 6 |
| Base Volume Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Heavy Vehicles Percentage [%] | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Growth Factor | 1.4600 | 1.4600 | 1.4600 | 1.4600 | 1.1100 | 1.1100 |
| In-Process Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Site-Generated Trips [veh/h] | 0 | 2 | 1 | 0 | 1 | 2 |
| Diverted Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-by Trips [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing Site Adjustment Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Volume [veh/h] | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Hourly Volume [veh/h] | 988 | 34 | 33 | 980 | 21 | 9 |
| Peak Hour Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Other Adjustment Factor | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Total 15-Minute Volume [veh/h] | 247 | 9 | 8 | 245 | 5 | 2 |
| Total Analysis Volume [veh/h] | 988 | 34 | 33 | 980 | 21 | 9 |
| Pedestrian Volume [ped/h] | 0 | | 0 | | 0 | |



Generated with PTV VISTRO
Version 7.00-08

**Intersection Settings**

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

**Movement, Approach, & Intersection Results**

| V/C, Movement V/C Ratio | 0.01 | 0.00 | 0.05 | 0.01 | 0.38 | 0.03 |
|---|---|---|---|---|---|---|
| d_M, Delay for Movement [s/veh] | 0.00 | 0.00 | 10.57 | 0.00 | 107.30 | 17.67 |
| Movement LOS | A | A | B | A | F | C |
| 95th-Percentile Queue Length [veh/ln] | 0.00 | 0.00 | 0.15 | 0.15 | 1.40 | 0.09 |
| 95th-Percentile Queue Length [ft/ln] | 0.00 | 0.00 | 3.82 | 3.82 | 35.11 | 2.37 |
| d_A, Approach Delay [s/veh] | 0.00 | | 0.34 | | 80.41 | |
| Approach LOS | A | | A | | F | |
| d_I, Intersection Delay [s/veh] | 1.34 | | | | | |
| Intersection LOS | F | | | | | |

# Appendix D

## Roadway Segment Level of Service Calculations

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# HCS7 Two-Lane Highway Report

## Project Information

| | | | |
|---|---|---|---|
| Analyst | KT | Date | 2/10/2021 |
| Agency | W-Trans | Analysis Year | |
| Jurisdiction | County of Napa | Time Period Analyzed | Friday PM Existing |
| Project Description | SR 29 – North of Ehlers Lane (NB) – Friday PM | Unit | United States Customary |

# Segment 1

## Vehicle Inputs

| | | | |
|---|---|---|---|
| Segment Type | Passing Constrained | Length, ft | 5280 |
| Lane Width, ft | 12 | Shoulder Width, ft | 6 |
| Speed Limit, mi/h | 50 | Access Point Density, pts/mi | 7.0 |

## Demand and Capacity

| | | | |
|---|---|---|---|
| Directional Demand Flow Rate, veh/h | 708 | Opposing Demand Flow Rate, veh/h | - |
| Peak Hour Factor | 0.96 | Total Trucks, % | 4.00 |
| Segment Capacity, veh/h | 1700 | Demand/Capacity (D/C) | 0.42 |

## Intermediate Results

| | | | |
|---|---|---|---|
| Segment Vertical Class | 1 | Free-Flow Speed, mi/h | 55.1 |
| Speed Slope Coefficient | 3.54750 | Speed Power Coefficient | 0.41674 |
| PF Slope Coefficient | -1.33524 | PF Power Coefficient | 0.74794 |
| In Passing Lane Effective Length? | No | Total Segment Density, veh/mi/ln | 8.7 |
| %Improved % Followers | 0.0 | % Improved Avg Speed | 0.0 |

## Subsegment Data

| # | Segment Type | Length, ft | Radius, ft | Superelevation, % | Average Speed, mi/h |
|---|---|---|---|---|---|
| 1 | Tangent | 5280 | - | - | 52.2 |

## Vehicle Results

| | | | |
|---|---|---|---|
| Average Speed, mi/h | 52.2 | Percent Followers, % | 64.4 |
| Segment Travel Time, minutes | 1.15 | Followers Density, followers/mi/ln | 8.7 |
| Vehicle LOS | C | | |

# HCS7 Two-Lane Highway Report

## Project Information

| | | | |
|---|---|---|---|
| Analyst | KT | Date | 2/10/2021 |
| Agency | W-Trans | Analysis Year | |
| Jurisdiction | County of Napa | Time Period Analyzed | Friday PM Existing |
| Project Description | SR 29 – North of Ehlers Lane (SB) – Friday PM | Unit | United States Customary |

## Segment 1

### Vehicle Inputs

| | | | |
|---|---|---|---|
| Segment Type | Passing Constrained | Length, ft | 5280 |
| Lane Width, ft | 12 | Shoulder Width, ft | 6 |
| Speed Limit, mi/h | 50 | Access Point Density, pts/mi | 17.0 |

### Demand and Capacity

| | | | |
|---|---|---|---|
| Directional Demand Flow Rate, veh/h | 694 | Opposing Demand Flow Rate, veh/h | - |
| Peak Hour Factor | 0.96 | Total Trucks, % | 4.00 |
| Segment Capacity, veh/h | 1700 | Demand/Capacity (D/C) | 0.41 |

### Intermediate Results

| | | | |
|---|---|---|---|
| Segment Vertical Class | 1 | Free-Flow Speed, mi/h | 52.6 |
| Speed Slope Coefficient | 3.41200 | Speed Power Coefficient | 0.41674 |
| PF Slope Coefficient | -1.35195 | PF Power Coefficient | 0.74086 |
| In Passing Lane Effective Length? | No | Total Segment Density, veh/mi/ln | 9.0 |
| %Improved % Followers | 0.0 | % Improved Avg Speed | 0.0 |

### Subsegment Data

| # | Segment Type | Length, ft | Radius, ft | Superelevation, % | Average Speed, mi/h |
|---|---|---|---|---|---|
| 1 | Tangent | 5280 | - | - | 49.9 |

### Vehicle Results

| | | | |
|---|---|---|---|
| Average Speed, mi/h | 49.9 | Percent Followers, % | 64.3 |
| Segment Travel Time, minutes | 1.20 | Followers Density, followers/mi/ln | 9.0 |
| Vehicle LOS | C | | |

# HCS7 Two-Lane Highway Report

## Project Information

| | | | |
|---|---|---|---|
| Analyst | KT | Date | 2/10/2021 |
| Agency | W-Trans | Analysis Year | |
| Jurisdiction | County of Napa | Time Period Analyzed | Friday PM Existing |
| Project Description | SR 29 – South of Ehlers Lane (NB) – Friday PM | Unit | United States Customary |

# Segment 1

## Vehicle Inputs

| | | | |
|---|---|---|---|
| Segment Type | Passing Constrained | Length, ft | 5280 |
| Lane Width, ft | 12 | Shoulder Width, ft | 6 |
| Speed Limit, mi/h | 50 | Access Point Density, pts/mi | 8.0 |

## Demand and Capacity

| | | | |
|---|---|---|---|
| Directional Demand Flow Rate, veh/h | 733 | Opposing Demand Flow Rate, veh/h | - |
| Peak Hour Factor | 0.96 | Total Trucks, % | 4.00 |
| Segment Capacity, veh/h | 1700 | Demand/Capacity (D/C) | 0.43 |

## Intermediate Results

| | | | |
|---|---|---|---|
| Segment Vertical Class | 1 | Free-Flow Speed, mi/h | 54.9 |
| Speed Slope Coefficient | 3.53395 | Speed Power Coefficient | 0.41674 |
| PF Slope Coefficient | -1.33700 | PF Power Coefficient | 0.74725 |
| In Passing Lane Effective Length? | No | Total Segment Density, veh/mi/ln | 9.2 |
| %Improved % Followers | 0.0 | % Improved Avg Speed | 0.0 |

## Subsegment Data

| # | Segment Type | Length, ft | Radius, ft | Superelevation, % | Average Speed, mi/h |
|---|---|---|---|---|---|
| 1 | Tangent | 5280 | - | - | 51.9 |

## Vehicle Results

| | | | |
|---|---|---|---|
| Average Speed, mi/h | 51.9 | Percent Followers, % | 65.4 |
| Segment Travel Time, minutes | 1.16 | Followers Density, followers/mi/ln | 9.2 |
| Vehicle LOS | C | | |

# HCS7 Two-Lane Highway Report

## Project Information

| | | | |
|---|---|---|---|
| Analyst | KT | Date | 2/10/2021 |
| Agency | W-Trans | Analysis Year | |
| Jurisdiction | County of Napa | Time Period Analyzed | Friday PM Existing |
| Project Description | SR 29 – South of Ehlers Lane (SB) – Friday PM | Unit | United States Customary |

## Segment 1

### Vehicle Inputs

| | | | |
|---|---|---|---|
| Segment Type | Passing Constrained | Length, ft | 5280 |
| Lane Width, ft | 12 | Shoulder Width, ft | 6 |
| Speed Limit, mi/h | 50 | Access Point Density, pts/mi | 15.0 |

### Demand and Capacity

| | | | |
|---|---|---|---|
| Directional Demand Flow Rate, veh/h | 709 | Opposing Demand Flow Rate, veh/h | - |
| Peak Hour Factor | 0.96 | Total Trucks, % | 4.00 |
| Segment Capacity, veh/h | 1700 | Demand/Capacity (D/C) | 0.42 |

### Intermediate Results

| | | | |
|---|---|---|---|
| Segment Vertical Class | 1 | Free-Flow Speed, mi/h | 53.1 |
| Speed Slope Coefficient | 3.43910 | Speed Power Coefficient | 0.41674 |
| PF Slope Coefficient | -1.34878 | PF Power Coefficient | 0.74231 |
| In Passing Lane Effective Length? | No | Total Segment Density, veh/mi/ln | 9.1 |
| %Improved % Followers | 0.0 | % Improved Avg Speed | 0.0 |

### Subsegment Data

| # | Segment Type | Length, ft | Radius, ft | Superelevation, % | Average Speed, mi/h |
|---|---|---|---|---|---|
| 1 | Tangent | 5280 | - | - | 50.3 |

### Vehicle Results

| | | | |
|---|---|---|---|
| Average Speed, mi/h | 50.3 | Percent Followers, % | 64.8 |
| Segment Travel Time, minutes | 1.19 | Followers Density, followers/mi/ln | 9.1 |
| Vehicle LOS | C | | |

# HCS7 Two-Lane Highway Report

## Project Information

| | | | |
|---|---|---|---|
| Analyst | KT | Date | 2/10/2021 |
| Agency | W-Trans | Analysis Year | |
| Jurisdiction | County of Napa | Time Period Analyzed | Saturday PM Existing |
| Project Description | SR 29 – North of Ehlers Lane (NB) – Saturday PM | Unit | United States Customary |

## Segment 1

### Vehicle Inputs

| | | | |
|---|---|---|---|
| Segment Type | Passing Constrained | Length, ft | 5280 |
| Lane Width, ft | 12 | Shoulder Width, ft | 6 |
| Speed Limit, mi/h | 50 | Access Point Density, pts/mi | 7.0 |

### Demand and Capacity

| | | | |
|---|---|---|---|
| Directional Demand Flow Rate, veh/h | 711 | Opposing Demand Flow Rate, veh/h | - |
| Peak Hour Factor | 0.96 | Total Trucks, % | 2.00 |
| Segment Capacity, veh/h | 1700 | Demand/Capacity (D/C) | 0.42 |

### Intermediate Results

| | | | |
|---|---|---|---|
| Segment Vertical Class | 1 | Free-Flow Speed, mi/h | 55.2 |
| Speed Slope Coefficient | 3.55111 | Speed Power Coefficient | 0.41674 |
| PF Slope Coefficient | -1.33501 | PF Power Coefficient | 0.74784 |
| In Passing Lane Effective Length? | No | Total Segment Density, veh/mi/ln | 8.8 |
| %Improved % Followers | 0.0 | % Improved Avg Speed | 0.0 |

### Subsegment Data

| # | Segment Type | Length, ft | Radius, ft | Superelevation, % | Average Speed, mi/h |
|---|---|---|---|---|---|
| 1 | Tangent | 5280 | - | - | 52.3 |

### Vehicle Results

| | | | |
|---|---|---|---|
| Average Speed, mi/h | 52.3 | Percent Followers, % | 64.5 |
| Segment Travel Time, minutes | 1.15 | Followers Density, followers/mi/ln | 8.8 |
| Vehicle LOS | C | | |

# HCS7 Two-Lane Highway Report

## Project Information

| | | | |
|---|---|---|---|
| Analyst | KT | Date | 2/10/2021 |
| Agency | W-Trans | Analysis Year | |
| Jurisdiction | County of Napa | Time Period Analyzed | Saturday PM Existing |
| Project Description | SR 29 – North of Ehlers Lane (SB) – Saturday PM | Unit | United States Customary |

# Segment 1

## Vehicle Inputs

| | | | |
|---|---|---|---|
| Segment Type | Passing Constrained | Length, ft | 5280 |
| Lane Width, ft | 12 | Shoulder Width, ft | 6 |
| Speed Limit, mi/h | 50 | Access Point Density, pts/mi | 17.0 |

## Demand and Capacity

| | | | |
|---|---|---|---|
| Directional Demand Flow Rate, veh/h | 722 | Opposing Demand Flow Rate, veh/h | - |
| Peak Hour Factor | 0.96 | Total Trucks, % | 2.00 |
| Segment Capacity, veh/h | 1700 | Demand/Capacity (D/C) | 0.42 |

## Intermediate Results

| | | | |
|---|---|---|---|
| Segment Vertical Class | 1 | Free-Flow Speed, mi/h | 52.7 |
| Speed Slope Coefficient | 3.41561 | Speed Power Coefficient | 0.41674 |
| PF Slope Coefficient | -1.35177 | PF Power Coefficient | 0.74077 |
| In Passing Lane Effective Length? | No | Total Segment Density, veh/mi/ln | 9.5 |
| %Improved % Followers | 0.0 | % Improved Avg Speed | 0.0 |

## Subsegment Data

| # | Segment Type | Length, ft | Radius, ft | Superelevation, % | Average Speed, mi/h |
|---|---|---|---|---|---|
| 1 | Tangent | 5280 | - | - | 49.9 |

## Vehicle Results

| | | | |
|---|---|---|---|
| Average Speed, mi/h | 49.9 | Percent Followers, % | 65.4 |
| Segment Travel Time, minutes | 1.20 | Followers Density, followers/mi/ln | 9.5 |
| Vehicle LOS | C | | |

# HCS7 Two-Lane Highway Report

## Project Information

| | | | |
|---|---|---|---|
| Analyst | KT | Date | 2/10/2021 |
| Agency | W-Trans | Analysis Year | |
| Jurisdiction | County of Napa | Time Period Analyzed | Saturday PM Existing |
| Project Description | SR 29 – South of Ehlers Lane (NB) – Saturday PM | Unit | United States Customary |

# Segment 1

## Vehicle Inputs

| | | | |
|---|---|---|---|
| Segment Type | Passing Constrained | Length, ft | 5280 |
| Lane Width, ft | 12 | Shoulder Width, ft | 6 |
| Speed Limit, mi/h | 50 | Access Point Density, pts/mi | 8.0 |

## Demand and Capacity

| | | | |
|---|---|---|---|
| Directional Demand Flow Rate, veh/h | 728 | Opposing Demand Flow Rate, veh/h | - |
| Peak Hour Factor | 0.96 | Total Trucks, % | 2.00 |
| Segment Capacity, veh/h | 1700 | Demand/Capacity (D/C) | 0.43 |

## Intermediate Results

| | | | |
|---|---|---|---|
| Segment Vertical Class | 1 | Free-Flow Speed, mi/h | 54.9 |
| Speed Slope Coefficient | 3.53756 | Speed Power Coefficient | 0.41674 |
| PF Slope Coefficient | -1.33678 | PF Power Coefficient | 0.74714 |
| In Passing Lane Effective Length? | No | Total Segment Density, veh/mi/ln | 9.1 |
| %Improved % Followers | 0.0 | % Improved Avg Speed | 0.0 |

## Subsegment Data

| # | Segment Type | Length, ft | Radius, ft | Superelevation, % | Average Speed, mi/h |
|---|---|---|---|---|---|
| 1 | Tangent | 5280 | - | - | 52.0 |

## Vehicle Results

| | | | |
|---|---|---|---|
| Average Speed, mi/h | 52.0 | Percent Followers, % | 65.2 |
| Segment Travel Time, minutes | 1.15 | Followers Density, followers/mi/ln | 9.1 |
| Vehicle LOS | C | | |

# HCS7 Two-Lane Highway Report

## Project Information

| | | | |
|---|---|---|---|
| Analyst | KT | Date | 2/10/2021 |
| Agency | W-Trans | Analysis Year | |
| Jurisdiction | County of Napa | Time Period Analyzed | Saturday PM Existing |
| Project Description | SR 29 – South of Ehlers Lane (SB) – Saturday PM | Unit | United States Customary |

## Segment 1

### Vehicle Inputs

| | | | |
|---|---|---|---|
| Segment Type | Passing Constrained | Length, ft | 5280 |
| Lane Width, ft | 12 | Shoulder Width, ft | 6 |
| Speed Limit, mi/h | 50 | Access Point Density, pts/mi | 15.0 |

### Demand and Capacity

| | | | |
|---|---|---|---|
| Directional Demand Flow Rate, veh/h | 718 | Opposing Demand Flow Rate, veh/h | - |
| Peak Hour Factor | 0.96 | Total Trucks, % | 2.00 |
| Segment Capacity, veh/h | 1700 | Demand/Capacity (D/C) | 0.42 |

### Intermediate Results

| | | | |
|---|---|---|---|
| Segment Vertical Class | 1 | Free-Flow Speed, mi/h | 53.2 |
| Speed Slope Coefficient | 3.44271 | Speed Power Coefficient | 0.41674 |
| PF Slope Coefficient | -1.34859 | PF Power Coefficient | 0.74221 |
| In Passing Lane Effective Length? | No | Total Segment Density, veh/mi/ln | 9.3 |
| %Improved % Followers | 0.0 | % Improved Avg Speed | 0.0 |

### Subsegment Data

| # | Segment Type | Length, ft | Radius, ft | Superelevation, % | Average Speed, mi/h |
|---|---|---|---|---|---|
| 1 | Tangent | 5280 | - | - | 50.4 |

### Vehicle Results

| | | | |
|---|---|---|---|
| Average Speed, mi/h | 50.4 | Percent Followers, % | 65.2 |
| Segment Travel Time, minutes | 1.19 | Followers Density, followers/mi/ln | 9.3 |
| Vehicle LOS | C | | |

# HCS7 Two-Lane Highway Report

## Project Information

| | | | |
|---|---|---|---|
| Analyst | KT | Date | 2/10/2021 |
| Agency | W-Trans | Analysis Year | |
| Jurisdiction | County of Napa | Time Period Analyzed | Friday PM Baseline |
| Project Description | SR 29 – North of Ehlers Lane (NB) – Friday PM | Unit | United States Customary |

# Segment 1

## Vehicle Inputs

| | | | |
|---|---|---|---|
| Segment Type | Passing Constrained | Length, ft | 5280 |
| Lane Width, ft | 12 | Shoulder Width, ft | 6 |
| Speed Limit, mi/h | 50 | Access Point Density, pts/mi | 7.0 |

## Demand and Capacity

| | | | |
|---|---|---|---|
| Directional Demand Flow Rate, veh/h | 709 | Opposing Demand Flow Rate, veh/h | - |
| Peak Hour Factor | 0.96 | Total Trucks, % | 4.00 |
| Segment Capacity, veh/h | 1700 | Demand/Capacity (D/C) | 0.42 |

## Intermediate Results

| | | | |
|---|---|---|---|
| Segment Vertical Class | 1 | Free-Flow Speed, mi/h | 55.1 |
| Speed Slope Coefficient | 3.54750 | Speed Power Coefficient | 0.41674 |
| PF Slope Coefficient | -1.33524 | PF Power Coefficient | 0.74794 |
| In Passing Lane Effective Length? | No | Total Segment Density, veh/mi/ln | 8.7 |
| %Improved % Followers | 0.0 | % Improved Avg Speed | 0.0 |

## Subsegment Data

| # | Segment Type | Length, ft | Radius, ft | Superelevation, % | Average Speed, mi/h |
|---|---|---|---|---|---|
| 1 | Tangent | 5280 | - | - | 52.2 |

## Vehicle Results

| | | | |
|---|---|---|---|
| Average Speed, mi/h | 52.2 | Percent Followers, % | 64.4 |
| Segment Travel Time, minutes | 1.15 | Followers Density, followers/mi/ln | 8.7 |
| Vehicle LOS | C | | |

# HCS7 Two-Lane Highway Report

## Project Information

| | | | |
|---|---|---|---|
| Analyst | KT | Date | 2/10/2021 |
| Agency | W-Trans | Analysis Year | |
| Jurisdiction | County of Napa | Time Period Analyzed | Friday PM Baseline |
| Project Description | SR 29 – North of Ehlers Lane (SB) – Friday PM | Unit | United States Customary |

## Segment 1

### Vehicle Inputs

| | | | |
|---|---|---|---|
| Segment Type | Passing Constrained | Length, ft | 5280 |
| Lane Width, ft | 12 | Shoulder Width, ft | 6 |
| Speed Limit, mi/h | 50 | Access Point Density, pts/mi | 17.0 |

### Demand and Capacity

| | | | |
|---|---|---|---|
| Directional Demand Flow Rate, veh/h | 695 | Opposing Demand Flow Rate, veh/h | - |
| Peak Hour Factor | 0.96 | Total Trucks, % | 4.00 |
| Segment Capacity, veh/h | 1700 | Demand/Capacity (D/C) | 0.41 |

### Intermediate Results

| | | | |
|---|---|---|---|
| Segment Vertical Class | 1 | Free-Flow Speed, mi/h | 52.6 |
| Speed Slope Coefficient | 3.41200 | Speed Power Coefficient | 0.41674 |
| PF Slope Coefficient | -1.35195 | PF Power Coefficient | 0.74086 |
| In Passing Lane Effective Length? | No | Total Segment Density, veh/mi/ln | 9.0 |
| %Improved % Followers | 0.0 | % Improved Avg Speed | 0.0 |

### Subsegment Data

| # | Segment Type | Length, ft | Radius, ft | Superelevation, % | Average Speed, mi/h |
|---|---|---|---|---|---|
| 1 | Tangent | 5280 | - | - | 49.9 |

### Vehicle Results

| | | | |
|---|---|---|---|
| Average Speed, mi/h | 49.9 | Percent Followers, % | 64.4 |
| Segment Travel Time, minutes | 1.20 | Followers Density, followers/mi/ln | 9.0 |
| Vehicle LOS | C | | |

# HCS7 Two-Lane Highway Report

## Project Information

| | | | |
|---|---|---|---|
| Analyst | KT | Date | 2/10/2021 |
| Agency | W-Trans | Analysis Year | |
| Jurisdiction | County of Napa | Time Period Analyzed | Friday PM Baseline |
| Project Description | SR 29 – South of Ehlers Lane (NB) – Friday PM | Unit | United States Customary |

## Segment 1

### Vehicle Inputs

| | | | |
|---|---|---|---|
| Segment Type | Passing Constrained | Length, ft | 5280 |
| Lane Width, ft | 12 | Shoulder Width, ft | 6 |
| Speed Limit, mi/h | 50 | Access Point Density, pts/mi | 8.0 |

### Demand and Capacity

| | | | |
|---|---|---|---|
| Directional Demand Flow Rate, veh/h | 734 | Opposing Demand Flow Rate, veh/h | - |
| Peak Hour Factor | 0.96 | Total Trucks, % | 4.00 |
| Segment Capacity, veh/h | 1700 | Demand/Capacity (D/C) | 0.43 |

### Intermediate Results

| | | | |
|---|---|---|---|
| Segment Vertical Class | 1 | Free-Flow Speed, mi/h | 54.9 |
| Speed Slope Coefficient | 3.53395 | Speed Power Coefficient | 0.41674 |
| PF Slope Coefficient | -1.33700 | PF Power Coefficient | 0.74725 |
| In Passing Lane Effective Length? | No | Total Segment Density, veh/mi/ln | 9.2 |
| %Improved % Followers | 0.0 | % Improved Avg Speed | 0.0 |

### Subsegment Data

| # | Segment Type | Length, ft | Radius, ft | Superelevation, % | Average Speed, mi/h |
|---|---|---|---|---|---|
| 1 | Tangent | 5280 | - | - | 51.9 |

### Vehicle Results

| | | | |
|---|---|---|---|
| Average Speed, mi/h | 51.9 | Percent Followers, % | 65.4 |
| Segment Travel Time, minutes | 1.16 | Followers Density, followers/mi/ln | 9.2 |
| Vehicle LOS | C | | |

# HCS7 Two-Lane Highway Report

## Project Information

| | | | |
|---|---|---|---|
| Analyst | KT | Date | 2/10/2021 |
| Agency | W-Trans | Analysis Year | |
| Jurisdiction | County of Napa | Time Period Analyzed | Friday PM Baseline |
| Project Description | SR 29 – South of Ehlers Lane (SB) – Friday PM | Unit | United States Customary |

## Segment 1

### Vehicle Inputs

| | | | |
|---|---|---|---|
| Segment Type | Passing Constrained | Length, ft | 5280 |
| Lane Width, ft | 12 | Shoulder Width, ft | 6 |
| Speed Limit, mi/h | 50 | Access Point Density, pts/mi | 15.0 |

### Demand and Capacity

| | | | |
|---|---|---|---|
| Directional Demand Flow Rate, veh/h | 710 | Opposing Demand Flow Rate, veh/h | - |
| Peak Hour Factor | 0.96 | Total Trucks, % | 4.00 |
| Segment Capacity, veh/h | 1700 | Demand/Capacity (D/C) | 0.42 |

### Intermediate Results

| | | | |
|---|---|---|---|
| Segment Vertical Class | 1 | Free-Flow Speed, mi/h | 53.1 |
| Speed Slope Coefficient | 3.43910 | Speed Power Coefficient | 0.41674 |
| PF Slope Coefficient | -1.34878 | PF Power Coefficient | 0.74231 |
| In Passing Lane Effective Length? | No | Total Segment Density, veh/mi/ln | 9.2 |
| %Improved % Followers | 0.0 | % Improved Avg Speed | 0.0 |

### Subsegment Data

| # | Segment Type | Length, ft | Radius, ft | Superelevation, % | Average Speed, mi/h |
|---|---|---|---|---|---|
| 1 | Tangent | 5280 | - | - | 50.3 |

### Vehicle Results

| | | | |
|---|---|---|---|
| Average Speed, mi/h | 50.3 | Percent Followers, % | 64.9 |
| Segment Travel Time, minutes | 1.19 | Followers Density, followers/mi/ln | 9.2 |
| Vehicle LOS | C | | |

# HCS7 Two-Lane Highway Report

## Project Information

| | | | |
|---|---|---|---|
| Analyst | KT | Date | 2/10/2021 |
| Agency | W-Trans | Analysis Year | |
| Jurisdiction | County of Napa | Time Period Analyzed | Saturday PM Baseline |
| Project Description | SR 29 – North of Ehlers Lane (NB) – Saturday PM | Unit | United States Customary |

## Segment 1

### Vehicle Inputs

| | | | |
|---|---|---|---|
| Segment Type | Passing Constrained | Length, ft | 5280 |
| Lane Width, ft | 12 | Shoulder Width, ft | 6 |
| Speed Limit, mi/h | 50 | Access Point Density, pts/mi | 7.0 |

### Demand and Capacity

| | | | |
|---|---|---|---|
| Directional Demand Flow Rate, veh/h | 713 | Opposing Demand Flow Rate, veh/h | - |
| Peak Hour Factor | 0.96 | Total Trucks, % | 2.00 |
| Segment Capacity, veh/h | 1700 | Demand/Capacity (D/C) | 0.42 |

### Intermediate Results

| | | | |
|---|---|---|---|
| Segment Vertical Class | 1 | Free-Flow Speed, mi/h | 55.2 |
| Speed Slope Coefficient | 3.55111 | Speed Power Coefficient | 0.41674 |
| PF Slope Coefficient | -1.33501 | PF Power Coefficient | 0.74784 |
| In Passing Lane Effective Length? | No | Total Segment Density, veh/mi/ln | 8.8 |
| %Improved % Followers | 0.0 | % Improved Avg Speed | 0.0 |

### Subsegment Data

| # | Segment Type | Length, ft | Radius, ft | Superelevation, % | Average Speed, mi/h |
|---|---|---|---|---|---|
| 1 | Tangent | 5280 | - | - | 52.3 |

### Vehicle Results

| | | | |
|---|---|---|---|
| Average Speed, mi/h | 52.3 | Percent Followers, % | 64.5 |
| Segment Travel Time, minutes | 1.15 | Followers Density, followers/mi/ln | 8.8 |
| Vehicle LOS | C | | |

# HCS7 Two-Lane Highway Report

## Project Information

| | | | |
|---|---|---|---|
| Analyst | KT | Date | 2/10/2021 |
| Agency | W-Trans | Analysis Year | |
| Jurisdiction | County of Napa | Time Period Analyzed | Saturday PM Baseline |
| Project Description | SR 29 – North of Ehlers Lane (SB) – Saturday PM | Unit | United States Customary |

## Segment 1

### Vehicle Inputs

| | | | |
|---|---|---|---|
| Segment Type | Passing Constrained | Length, ft | 5280 |
| Lane Width, ft | 12 | Shoulder Width, ft | 6 |
| Speed Limit, mi/h | 50 | Access Point Density, pts/mi | 17.0 |

### Demand and Capacity

| | | | |
|---|---|---|---|
| Directional Demand Flow Rate, veh/h | 723 | Opposing Demand Flow Rate, veh/h | - |
| Peak Hour Factor | 0.96 | Total Trucks, % | 2.00 |
| Segment Capacity, veh/h | 1700 | Demand/Capacity (D/C) | 0.43 |

### Intermediate Results

| | | | |
|---|---|---|---|
| Segment Vertical Class | 1 | Free-Flow Speed, mi/h | 52.7 |
| Speed Slope Coefficient | 3.41561 | Speed Power Coefficient | 0.41674 |
| PF Slope Coefficient | -1.35177 | PF Power Coefficient | 0.74077 |
| In Passing Lane Effective Length? | No | Total Segment Density, veh/mi/ln | 9.5 |
| %Improved % Followers | 0.0 | % Improved Avg Speed | 0.0 |

### Subsegment Data

| # | Segment Type | Length, ft | Radius, ft | Superelevation, % | Average Speed, mi/h |
|---|---|---|---|---|---|
| 1 | Tangent | 5280 | - | - | 49.9 |

### Vehicle Results

| | | | |
|---|---|---|---|
| Average Speed, mi/h | 49.9 | Percent Followers, % | 65.5 |
| Segment Travel Time, minutes | 1.20 | Followers Density, followers/mi/ln | 9.5 |
| Vehicle LOS | C | | |

# HCS7 Two-Lane Highway Report

## Project Information

| | | | |
|---|---|---|---|
| Analyst | KT | Date | 2/10/2021 |
| Agency | W-Trans | Analysis Year | |
| Jurisdiction | County of Napa | Time Period Analyzed | Saturday PM Baseline |
| Project Description | SR 29 – South of Ehlers Lane (NB) – Saturday PM | Unit | United States Customary |

## Segment 1

### Vehicle Inputs

| | | | |
|---|---|---|---|
| Segment Type | Passing Constrained | Length, ft | 5280 |
| Lane Width, ft | 12 | Shoulder Width, ft | 6 |
| Speed Limit, mi/h | 50 | Access Point Density, pts/mi | 8.0 |

### Demand and Capacity

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

### Intermediate Results

| | | | |
|---|---|---|---|
| Segment Vertical Class | 1 | Free-Flow Speed, mi/h | 54.9 |
| Speed Slope Coefficient | 3.53756 | Speed Power Coefficient | 0.41674 |
| PF Slope Coefficient | -1.33678 | PF Power Coefficient | 0.74714 |
| In Passing Lane Effective Length? | No | Total Segment Density, veh/mi/ln | 9.1 |
| %Improved % Followers | 0.0 | % Improved Avg Speed | 0.0 |

### Subsegment Data

| # | Segment Type | Length, ft | Radius, ft | Superelevation, % | Average Speed, mi/h |
|---|---|---|---|---|---|
| 1 | Tangent | 5280 | - | - | 52.0 |

### Vehicle Results

| | | | |
|---|---|---|---|
| Average Speed, mi/h | 52.0 | Percent Followers, % | 65.2 |
| Segment Travel Time, minutes | 1.15 | Followers Density, followers/mi/ln | 9.1 |
| Vehicle LOS | C | | |

# HCS7 Two-Lane Highway Report

## Project Information

| | | | |
|---|---|---|---|
| Analyst | KT | Date | 2/10/2021 |
| Agency | W-Trans | Analysis Year | |
| Jurisdiction | County of Napa | Time Period Analyzed | Saturday PM Baseline |
| Project Description | SR 29 – South of Ehlers Lane (SB) – Saturday PM | Unit | United States Customary |

## Segment 1

### Vehicle Inputs

| | | | |
|---|---|---|---|
| Segment Type | Passing Constrained | Length, ft | 5280 |
| Lane Width, ft | 12 | Shoulder Width, ft | 6 |
| Speed Limit, mi/h | 50 | Access Point Density, pts/mi | 15.0 |

### Demand and Capacity

| | | | |
|---|---|---|---|
| Directional Demand Flow Rate, veh/h | 719 | Opposing Demand Flow Rate, veh/h | - |
| Peak Hour Factor | 0.96 | Total Trucks, % | 2.00 |
| Segment Capacity, veh/h | 1700 | Demand/Capacity (D/C) | 0.42 |

### Intermediate Results

| | | | |
|---|---|---|---|
| Segment Vertical Class | 1 | Free-Flow Speed, mi/h | 53.2 |
| Speed Slope Coefficient | 3.44271 | Speed Power Coefficient | 0.41674 |
| PF Slope Coefficient | -1.34859 | PF Power Coefficient | 0.74221 |
| In Passing Lane Effective Length? | No | Total Segment Density, veh/mi/ln | 9.3 |
| %Improved % Followers | 0.0 | % Improved Avg Speed | 0.0 |

### Subsegment Data

| # | Segment Type | Length, ft | Radius, ft | Superelevation, % | Average Speed, mi/h |
|---|---|---|---|---|---|
| 1 | Tangent | 5280 | - | - | 50.4 |

### Vehicle Results

| | | | |
|---|---|---|---|
| Average Speed, mi/h | 50.4 | Percent Followers, % | 65.2 |
| Segment Travel Time, minutes | 1.19 | Followers Density, followers/mi/ln | 9.3 |
| Vehicle LOS | C | | |

# HCS7 Two-Lane Highway Report

## Project Information

| | | | |
|---|---|---|---|
| Analyst | KT | Date | 2/10/2021 |
| Agency | W-Trans | Analysis Year | |
| Jurisdiction | County of Napa | Time Period Analyzed | Friday PM Future |
| Project Description | SR 29 – North of Ehlers Lane (NB) – Friday PM | Unit | United States Customary |

## Segment 1

### Vehicle Inputs

| | | | |
|---|---|---|---|
| Segment Type | Passing Constrained | Length, ft | 5280 |
| Lane Width, ft | 12 | Shoulder Width, ft | 6 |
| Speed Limit, mi/h | 50 | Access Point Density, pts/mi | 7.0 |

### Demand and Capacity

| | | | |
|---|---|---|---|
| Directional Demand Flow Rate, veh/h | 987 | Opposing Demand Flow Rate, veh/h | - |
| Peak Hour Factor | 1.00 | Total Trucks, % | 4.00 |
| Segment Capacity, veh/h | 1700 | Demand/Capacity (D/C) | 0.58 |

### Intermediate Results

| | | | |
|---|---|---|---|
| Segment Vertical Class | 1 | Free-Flow Speed, mi/h | 55.1 |
| Speed Slope Coefficient | 3.54750 | Speed Power Coefficient | 0.41674 |
| PF Slope Coefficient | -1.33524 | PF Power Coefficient | 0.74794 |
| In Passing Lane Effective Length? | No | Total Segment Density, veh/mi/ln | 14.0 |
| %Improved % Followers | 0.0 | % Improved Avg Speed | 0.0 |

### Subsegment Data

| # | Segment Type | Length, ft | Radius, ft | Superelevation, % | Average Speed, mi/h |
|---|---|---|---|---|---|
| 1 | Tangent | 5280 | - | - | 51.7 |

### Vehicle Results

| | | | |
|---|---|---|---|
| Average Speed, mi/h | 51.7 | Percent Followers, % | 73.3 |
| Segment Travel Time, minutes | 1.16 | Followers Density, followers/mi/ln | 14.0 |
| Vehicle LOS | D | | |

# HCS7 Two-Lane Highway Report

## Project Information

| | | | |
|---|---|---|---|
| Analyst | KT | Date | 2/10/2021 |
| Agency | W-Trans | Analysis Year | |
| Jurisdiction | County of Napa | Time Period Analyzed | Friday PM Future |
| Project Description | SR 29 – North of Ehlers Lane (SB) – Friday PM | Unit | United States Customary |

## Segment 1

### Vehicle Inputs

| | | | |
|---|---|---|---|
| Segment Type | Passing Constrained | Length, ft | 5280 |
| Lane Width, ft | 12 | Shoulder Width, ft | 6 |
| Speed Limit, mi/h | 50 | Access Point Density, pts/mi | 17.0 |

### Demand and Capacity

| | | | |
|---|---|---|---|
| Directional Demand Flow Rate, veh/h | 972 | Opposing Demand Flow Rate, veh/h | - |
| Peak Hour Factor | 1.00 | Total Trucks, % | 4.00 |
| Segment Capacity, veh/h | 1700 | Demand/Capacity (D/C) | 0.57 |

### Intermediate Results

| | | | |
|---|---|---|---|
| Segment Vertical Class | 1 | Free-Flow Speed, mi/h | 52.6 |
| Speed Slope Coefficient | 3.41200 | Speed Power Coefficient | 0.41674 |
| PF Slope Coefficient | -1.35195 | PF Power Coefficient | 0.74086 |
| In Passing Lane Effective Length? | No | Total Segment Density, veh/mi/ln | 14.4 |
| %Improved % Followers | 0.0 | % Improved Avg Speed | 0.0 |

### Subsegment Data

| # | Segment Type | Length, ft | Radius, ft | Superelevation, % | Average Speed, mi/h |
|---|---|---|---|---|---|
| 1 | Tangent | 5280 | - | - | 49.4 |

### Vehicle Results

| | | | |
|---|---|---|---|
| Average Speed, mi/h | 49.4 | Percent Followers, % | 73.4 |
| Segment Travel Time, minutes | 1.21 | Followers Density, followers/mi/ln | 14.4 |
| Vehicle LOS | D | | |

# HCS7 Two-Lane Highway Report

## Project Information

| | | | |
|---|---|---|---|
| Analyst | KT | Date | 2/10/2021 |
| Agency | W-Trans | Analysis Year | |
| Jurisdiction | County of Napa | Time Period Analyzed | Friday PM Future |
| Project Description | SR 29 – South of Ehlers Lane (NB) – Friday PM | Unit | United States Customary |

# Segment 1

## Vehicle Inputs

| | | | |
|---|---|---|---|
| Segment Type | Passing Constrained | Length, ft | 5280 |
| Lane Width, ft | 12 | Shoulder Width, ft | 6 |
| Speed Limit, mi/h | 50 | Access Point Density, pts/mi | 8.0 |

## Demand and Capacity

| | | | |
|---|---|---|---|
| Directional Demand Flow Rate, veh/h | 1027 | Opposing Demand Flow Rate, veh/h | - |
| Peak Hour Factor | 1.00 | Total Trucks, % | 4.00 |
| Segment Capacity, veh/h | 1700 | Demand/Capacity (D/C) | 0.60 |

## Intermediate Results

| | | | |
|---|---|---|---|
| Segment Vertical Class | 1 | Free-Flow Speed, mi/h | 54.9 |
| Speed Slope Coefficient | 3.53395 | Speed Power Coefficient | 0.41674 |
| PF Slope Coefficient | -1.33700 | PF Power Coefficient | 0.74725 |
| In Passing Lane Effective Length? | No | Total Segment Density, veh/mi/ln | 14.9 |
| %Improved % Followers | 0.0 | % Improved Avg Speed | 0.0 |

## Subsegment Data

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

## Vehicle Results

| | | | |
|---|---|---|---|
| Average Speed, mi/h | 51.4 | Percent Followers, % | 74.4 |
| Segment Travel Time, minutes | 1.17 | Followers Density, followers/mi/ln | 14.9 |
| Vehicle LOS | D | | |

# HCS7 Two-Lane Highway Report

## Project Information

| | | | |
|---|---|---|---|
| Analyst | KT | Date | 2/10/2021 |
| Agency | W-Trans | Analysis Year | |
| Jurisdiction | County of Napa | Time Period Analyzed | Friday PM Future |
| Project Description | SR 29 – South of Ehlers Lane (SB) – Friday PM | Unit | United States Customary |

## Segment 1

### Vehicle Inputs

| | | | |
|---|---|---|---|
| Segment Type | Passing Constrained | Length, ft | 5280 |
| Lane Width, ft | 12 | Shoulder Width, ft | 6 |
| Speed Limit, mi/h | 50 | Access Point Density, pts/mi | 15.0 |

### Demand and Capacity

| | | | |
|---|---|---|---|
| Directional Demand Flow Rate, veh/h | 981 | Opposing Demand Flow Rate, veh/h | - |
| Peak Hour Factor | 1.00 | Total Trucks, % | 4.00 |
| Segment Capacity, veh/h | 1700 | Demand/Capacity (D/C) | 0.58 |

### Intermediate Results

| | | | |
|---|---|---|---|
| Segment Vertical Class | 1 | Free-Flow Speed, mi/h | 53.1 |
| Speed Slope Coefficient | 3.43910 | Speed Power Coefficient | 0.41674 |
| PF Slope Coefficient | -1.34878 | PF Power Coefficient | 0.74231 |
| In Passing Lane Effective Length? | No | Total Segment Density, veh/mi/ln | 14.5 |
| %Improved % Followers | 0.0 | % Improved Avg Speed | 0.0 |

### Subsegment Data

| # | Segment Type | Length, ft | Radius, ft | Superelevation, % | Average Speed, mi/h |
|---|---|---|---|---|---|
| 1 | Tangent | 5280 | - | - | 49.9 |

### Vehicle Results

| | | | |
|---|---|---|---|
| Average Speed, mi/h | 49.9 | Percent Followers, % | 73.5 |
| Segment Travel Time, minutes | 1.20 | Followers Density, followers/mi/ln | 14.5 |
| Vehicle LOS | D | | |

# HCS7 Two-Lane Highway Report

## Project Information

| | | | |
|---|---|---|---|
| Analyst | KT | Date | 2/10/2021 |
| Agency | W-Trans | Analysis Year | |
| Jurisdiction | County of Napa | Time Period Analyzed | Saturday PM Future |
| Project Description | SR 29 – North of Ehlers Lane (NB) – Saturday PM | Unit | United States Customary |

## Segment 1

### Vehicle Inputs

| | | | |
|---|---|---|---|
| Segment Type | Passing Constrained | Length, ft | 5280 |
| Lane Width, ft | 12 | Shoulder Width, ft | 6 |
| Speed Limit, mi/h | 50 | Access Point Density, pts/mi | 7.0 |

### Demand and Capacity

| | | | |
|---|---|---|---|
| Directional Demand Flow Rate, veh/h | 995 | Opposing Demand Flow Rate, veh/h | - |
| Peak Hour Factor | 1.00 | Total Trucks, % | 2.00 |
| Segment Capacity, veh/h | 1700 | Demand/Capacity (D/C) | 0.59 |

### Intermediate Results

| | | | |
|---|---|---|---|
| Segment Vertical Class | 1 | Free-Flow Speed, mi/h | 55.2 |
| Speed Slope Coefficient | 3.55111 | Speed Power Coefficient | 0.41674 |
| PF Slope Coefficient | -1.33501 | PF Power Coefficient | 0.74784 |
| In Passing Lane Effective Length? | No | Total Segment Density, veh/mi/ln | 14.1 |
| %Improved % Followers | 0.0 | % Improved Avg Speed | 0.0 |

### Subsegment Data

| # | Segment Type | Length, ft | Radius, ft | Superelevation, % | Average Speed, mi/h |
|---|---|---|---|---|---|
| 1 | Tangent | 5280 | - | - | 51.8 |

### Vehicle Results

| | | | |
|---|---|---|---|
| Average Speed, mi/h | 51.8 | Percent Followers, % | 73.6 |
| Segment Travel Time, minutes | 1.16 | Followers Density, followers/mi/ln | 14.1 |
| Vehicle LOS | D | | |

# HCS7 Two-Lane Highway Report

## Project Information

| | | | |
|---|---|---|---|
| Analyst | KT | Date | 2/10/2021 |
| Agency | W-Trans | Analysis Year | |
| Jurisdiction | County of Napa | Time Period Analyzed | Saturday PM Future |
| Project Description | SR 29 – North of Ehlers Lane (SB) – Saturday PM | Unit | United States Customary |

## Segment 1

### Vehicle Inputs

| | | | |
|---|---|---|---|
| Segment Type | Passing Constrained | Length, ft | 5280 |
| Lane Width, ft | 12 | Shoulder Width, ft | 6 |
| Speed Limit, mi/h | 50 | Access Point Density, pts/mi | 17.0 |

### Demand and Capacity

| | | | |
|---|---|---|---|
| Directional Demand Flow Rate, veh/h | 1012 | Opposing Demand Flow Rate, veh/h | - |
| Peak Hour Factor | 1.00 | Total Trucks, % | 2.00 |
| Segment Capacity, veh/h | 1700 | Demand/Capacity (D/C) | 0.60 |

### Intermediate Results

| | | | |
|---|---|---|---|
| Segment Vertical Class | 1 | Free-Flow Speed, mi/h | 52.7 |
| Speed Slope Coefficient | 3.41561 | Speed Power Coefficient | 0.41674 |
| PF Slope Coefficient | -1.35177 | PF Power Coefficient | 0.74077 |
| In Passing Lane Effective Length? | No | Total Segment Density, veh/mi/ln | 15.2 |
| %Improved % Followers | 0.0 | % Improved Avg Speed | 0.0 |

### Subsegment Data

| # | Segment Type | Length, ft | Radius, ft | Superelevation, % | Average Speed, mi/h |
|---|---|---|---|---|---|
| 1 | Tangent | 5280 | - | - | 49.4 |

### Vehicle Results

| | | | |
|---|---|---|---|
| Average Speed, mi/h | 49.4 | Percent Followers, % | 74.4 |
| Segment Travel Time, minutes | 1.21 | Followers Density, followers/mi/ln | 15.2 |
| Vehicle LOS | E | | |

# HCS7 Two-Lane Highway Report

## Project Information

| | | | |
|---|---|---|---|
| Analyst | KT | Date | 2/10/2021 |
| Agency | W-Trans | Analysis Year | |
| Jurisdiction | County of Napa | Time Period Analyzed | Saturday PM Future |
| Project Description | SR 29 – South of Ehlers Lane (NB) – Saturday PM | Unit | United States Customary |

## Segment 1

### Vehicle Inputs

| | | | |
|---|---|---|---|
| Segment Type | Passing Constrained | Length, ft | 5280 |
| Lane Width, ft | 12 | Shoulder Width, ft | 6 |
| Speed Limit, mi/h | 50 | Access Point Density, pts/mi | 8.0 |

### Demand and Capacity

| | | | |
|---|---|---|---|
| Directional Demand Flow Rate, veh/h | 1020 | Opposing Demand Flow Rate, veh/h | - |
| Peak Hour Factor | 1.00 | Total Trucks, % | 2.00 |
| Segment Capacity, veh/h | 1700 | Demand/Capacity (D/C) | 0.60 |

### Intermediate Results

| | | | |
|---|---|---|---|
| Segment Vertical Class | 1 | Free-Flow Speed, mi/h | 54.9 |
| Speed Slope Coefficient | 3.53756 | Speed Power Coefficient | 0.41674 |
| PF Slope Coefficient | -1.33678 | PF Power Coefficient | 0.74714 |
| In Passing Lane Effective Length? | No | Total Segment Density, veh/mi/ln | 14.7 |
| %Improved % Followers | 0.0 | % Improved Avg Speed | 0.0 |

### Subsegment Data

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

### Vehicle Results

| | | | |
|---|---|---|---|
| Average Speed, mi/h | 51.5 | Percent Followers, % | 74.2 |
| Segment Travel Time, minutes | 1.16 | Followers Density, followers/mi/ln | 14.7 |
| Vehicle LOS | D | | |

# HCS7 Two-Lane Highway Report

## Project Information

| | | | |
|---|---|---|---|
| Analyst | KT | Date | 2/10/2021 |
| Agency | W-Trans | Analysis Year | |
| Jurisdiction | County of Napa | Time Period Analyzed | Saturday PM Future |
| Project Description | SR 29 – South of Ehlers Lane (SB) – Saturday PM | Unit | United States Customary |

## Segment 1

### Vehicle Inputs

| | | | |
|---|---|---|---|
| Segment Type | Passing Constrained | Length, ft | 5280 |
| Lane Width, ft | 12 | Shoulder Width, ft | 6 |
| Speed Limit, mi/h | 50 | Access Point Density, pts/mi | 15.0 |

### Demand and Capacity

| | | | |
|---|---|---|---|
| Directional Demand Flow Rate, veh/h | 1000 | Opposing Demand Flow Rate, veh/h | - |
| Peak Hour Factor | 1.00 | Total Trucks, % | 2.00 |
| Segment Capacity, veh/h | 1700 | Demand/Capacity (D/C) | 0.59 |

### Intermediate Results

| | | | |
|---|---|---|---|
| Segment Vertical Class | 1 | Free-Flow Speed, mi/h | 53.2 |
| Speed Slope Coefficient | 3.44271 | Speed Power Coefficient | 0.41674 |
| PF Slope Coefficient | -1.34859 | PF Power Coefficient | 0.74221 |
| In Passing Lane Effective Length? | No | Total Segment Density, veh/mi/ln | 14.8 |
| %Improved % Followers | 0.0 | % Improved Avg Speed | 0.0 |

### Subsegment Data

| # | Segment Type | Length, ft | Radius, ft | Superelevation, % | Average Speed, mi/h |
|---|---|---|---|---|---|
| 1 | Tangent | 5280 | - | - | 49.9 |

### Vehicle Results

| | | | |
|---|---|---|---|
| Average Speed, mi/h | 49.9 | Percent Followers, % | 74.0 |
| Segment Travel Time, minutes | 1.20 | Followers Density, followers/mi/ln | 14.8 |
| Vehicle LOS | D | | |

# HCS7 Two-Lane Highway Report

## Project Information

| | | | |
|---|---|---|---|
| Analyst | KT | Date | 2/10/2021 |
| Agency | W-Trans | Analysis Year | |
| Jurisdiction | County of Napa | Time Period Analyzed | Friday PM Existing plus Project |
| Project Description | SR 29 – North of Ehlers Lane (NB) – Friday PM | Unit | United States Customary |

# Segment 1

## Vehicle Inputs

| | | | |
|---|---|---|---|
| Segment Type | Passing Constrained | Length, ft | 5280 |
| Lane Width, ft | 12 | Shoulder Width, ft | 6 |
| Speed Limit, mi/h | 50 | Access Point Density, pts/mi | 7.0 |

## Demand and Capacity

| | | | |
|---|---|---|---|
| Directional Demand Flow Rate, veh/h | 710 | Opposing Demand Flow Rate, veh/h | - |
| Peak Hour Factor | 0.96 | Total Trucks, % | 4.00 |
| Segment Capacity, veh/h | 1700 | Demand/Capacity (D/C) | 0.42 |

## Intermediate Results

| | | | |
|---|---|---|---|
| Segment Vertical Class | 1 | Free-Flow Speed, mi/h | 55.1 |
| Speed Slope Coefficient | 3.54750 | Speed Power Coefficient | 0.41674 |
| PF Slope Coefficient | -1.33524 | PF Power Coefficient | 0.74794 |
| In Passing Lane Effective Length? | No | Total Segment Density, veh/mi/ln | 8.8 |
| %Improved % Followers | 0.0 | % Improved Avg Speed | 0.0 |

## Subsegment Data

| # | Segment Type | Length, ft | Radius, ft | Superelevation, % | Average Speed, mi/h |
|---|---|---|---|---|---|
| 1 | Tangent | 5280 | - | - | 52.2 |

## Vehicle Results

| | | | |
|---|---|---|---|
| Average Speed, mi/h | 52.2 | Percent Followers, % | 64.4 |
| Segment Travel Time, minutes | 1.15 | Followers Density, followers/mi/ln | 8.8 |
| Vehicle LOS | C | | |

# HCS7 Two-Lane Highway Report

## Project Information

| | | | |
|---|---|---|---|
| Analyst | KT | Date | 2/10/2021 |
| Agency | W-Trans | Analysis Year | |
| Jurisdiction | County of Napa | Time Period Analyzed | Friday PM Existing plus Project |
| Project Description | SR 29 – North of Ehlers Lane (SB) – Friday PM | Unit | United States Customary |

# Segment 1

## Vehicle Inputs

| | | | |
|---|---|---|---|
| Segment Type | Passing Constrained | Length, ft | 5280 |
| Lane Width, ft | 12 | Shoulder Width, ft | 6 |
| Speed Limit, mi/h | 50 | Access Point Density, pts/mi | 17.0 |

## Demand and Capacity

| | | | |
|---|---|---|---|
| Directional Demand Flow Rate, veh/h | 695 | Opposing Demand Flow Rate, veh/h | - |
| Peak Hour Factor | 0.96 | Total Trucks, % | 4.00 |
| Segment Capacity, veh/h | 1700 | Demand/Capacity (D/C) | 0.41 |

## Intermediate Results

| | | | |
|---|---|---|---|
| Segment Vertical Class | 1 | Free-Flow Speed, mi/h | 52.6 |
| Speed Slope Coefficient | 3.41200 | Speed Power Coefficient | 0.41674 |
| PF Slope Coefficient | -1.35195 | PF Power Coefficient | 0.74086 |
| In Passing Lane Effective Length? | No | Total Segment Density, veh/mi/ln | 9.0 |
| %Improved % Followers | 0.0 | % Improved Avg Speed | 0.0 |

## Subsegment Data

| # | Segment Type | Length, ft | Radius, ft | Superelevation, % | Average Speed, mi/h |
|---|---|---|---|---|---|
| 1 | Tangent | 5280 | - | - | 49.9 |

## Vehicle Results

| | | | |
|---|---|---|---|
| Average Speed, mi/h | 49.9 | Percent Followers, % | 64.4 |
| Segment Travel Time, minutes | 1.20 | Followers Density, followers/mi/ln | 9.0 |
| Vehicle LOS | C | | |

# HCS7 Two-Lane Highway Report

## Project Information

| | | | |
|---|---|---|---|
| Analyst | KT | Date | 2/10/2021 |
| Agency | W-Trans | Analysis Year | |
| Jurisdiction | County of Napa | Time Period Analyzed | Friday PM Existing plus Project |
| Project Description | SR 29 – South of Ehlers Lane (NB) – Friday PM | Unit | United States Customary |

# Segment 1

## Vehicle Inputs

| | | | |
|---|---|---|---|
| Segment Type | Passing Constrained | Length, ft | 5280 |
| Lane Width, ft | 12 | Shoulder Width, ft | 6 |
| Speed Limit, mi/h | 50 | Access Point Density, pts/mi | 8.0 |

## Demand and Capacity

| | | | |
|---|---|---|---|
| Directional Demand Flow Rate, veh/h | 733 | Opposing Demand Flow Rate, veh/h | - |
| Peak Hour Factor | 0.96 | Total Trucks, % | 4.00 |
| Segment Capacity, veh/h | 1700 | Demand/Capacity (D/C) | 0.43 |

## Intermediate Results

| | | | |
|---|---|---|---|
| Segment Vertical Class | 1 | Free-Flow Speed, mi/h | 54.9 |
| Speed Slope Coefficient | 3.53395 | Speed Power Coefficient | 0.41674 |
| PF Slope Coefficient | -1.33700 | PF Power Coefficient | 0.74725 |
| In Passing Lane Effective Length? | No | Total Segment Density, veh/mi/ln | 9.2 |
| %Improved % Followers | 0.0 | % Improved Avg Speed | 0.0 |

## Subsegment Data

| # | Segment Type | Length, ft | Radius, ft | Superelevation, % | Average Speed, mi/h |
|---|---|---|---|---|---|
| 1 | Tangent | 5280 | - | - | 51.9 |

## Vehicle Results

| | | | |
|---|---|---|---|
| Average Speed, mi/h | 51.9 | Percent Followers, % | 65.4 |
| Segment Travel Time, minutes | 1.16 | Followers Density, followers/mi/ln | 9.2 |
| Vehicle LOS | C | | |

# HCS7 Two-Lane Highway Report

## Project Information

| | | | |
|---|---|---|---|
| Analyst | KT | Date | 2/10/2021 |
| Agency | W-Trans | Analysis Year | |
| Jurisdiction | County of Napa | Time Period Analyzed | Friday PM Existing plus Project |
| Project Description | SR 29 – South of Ehlers Lane (SB) – Friday PM | Unit | United States Customary |

# Segment 1

## Vehicle Inputs

| | | | |
|---|---|---|---|
| Segment Type | Passing Constrained | Length, ft | 5280 |
| Lane Width, ft | 12 | Shoulder Width, ft | 6 |
| Speed Limit, mi/h | 50 | Access Point Density, pts/mi | 15.0 |

## Demand and Capacity

| | | | |
|---|---|---|---|
| Directional Demand Flow Rate, veh/h | 711 | Opposing Demand Flow Rate, veh/h | - |
| Peak Hour Factor | 0.96 | Total Trucks, % | 4.00 |
| Segment Capacity, veh/h | 1700 | Demand/Capacity (D/C) | 0.42 |

## Intermediate Results

| | | | |
|---|---|---|---|
| Segment Vertical Class | 1 | Free-Flow Speed, mi/h | 53.1 |
| Speed Slope Coefficient | 3.43910 | Speed Power Coefficient | 0.41674 |
| PF Slope Coefficient | -1.34878 | PF Power Coefficient | 0.74231 |
| In Passing Lane Effective Length? | No | Total Segment Density, veh/mi/ln | 9.2 |
| %Improved % Followers | 0.0 | % Improved Avg Speed | 0.0 |

## Subsegment Data

| # | Segment Type | Length, ft | Radius, ft | Superelevation, % | Average Speed, mi/h |
|---|---|---|---|---|---|
| 1 | Tangent | 5280 | - | - | 50.3 |

## Vehicle Results

| | | | |
|---|---|---|---|
| Average Speed, mi/h | 50.3 | Percent Followers, % | 64.9 |
| Segment Travel Time, minutes | 1.19 | Followers Density, followers/mi/ln | 9.2 |
| Vehicle LOS | C | | |

# HCS7 Two-Lane Highway Report

## Project Information

| | | | |
|---|---|---|---|
| Analyst | KT | Date | 2/10/2021 |
| Agency | W-Trans | Analysis Year | |
| Jurisdiction | County of Napa | Time Period Analyzed | Saturday PM Existing plus Project |
| Project Description | SR 29 – North of Ehlers Lane (NB) – Saturday PM | Unit | United States Customary |

# Segment 1

## Vehicle Inputs

| | | | |
|---|---|---|---|
| Segment Type | Passing Constrained | Length, ft | 5280 |
| Lane Width, ft | 12 | Shoulder Width, ft | 6 |
| Speed Limit, mi/h | 50 | Access Point Density, pts/mi | 7.0 |

## Demand and Capacity

| | | | |
|---|---|---|---|
| Directional Demand Flow Rate, veh/h | 714 | Opposing Demand Flow Rate, veh/h | - |
| Peak Hour Factor | 0.96 | Total Trucks, % | 2.00 |
| Segment Capacity, veh/h | 1700 | Demand/Capacity (D/C) | 0.42 |

## Intermediate Results

| | | | |
|---|---|---|---|
| Segment Vertical Class | 1 | Free-Flow Speed, mi/h | 55.2 |
| Speed Slope Coefficient | 3.55111 | Speed Power Coefficient | 0.41674 |
| PF Slope Coefficient | -1.33501 | PF Power Coefficient | 0.74784 |
| In Passing Lane Effective Length? | No | Total Segment Density, veh/mi/ln | 8.8 |
| %Improved % Followers | 0.0 | % Improved Avg Speed | 0.0 |

## Subsegment Data

| # | Segment Type | Length, ft | Radius, ft | Superelevation, % | Average Speed, mi/h |
|---|---|---|---|---|---|
| 1 | Tangent | 5280 | - | - | 52.3 |

## Vehicle Results

| | | | |
|---|---|---|---|
| Average Speed, mi/h | 52.3 | Percent Followers, % | 64.6 |
| Segment Travel Time, minutes | 1.15 | Followers Density, followers/mi/ln | 8.8 |
| Vehicle LOS | C | | |

# HCS7 Two-Lane Highway Report

## Project Information

| | | | |
|---|---|---|---|
| Analyst | KT | Date | 2/10/2021 |
| Agency | W-Trans | Analysis Year | |
| Jurisdiction | County of Napa | Time Period Analyzed | Saturday PM Existing plus Project |
| Project Description | SR 29 – North of Ehlers Lane (SB) – Saturday PM | Unit | United States Customary |

# Segment 1

## Vehicle Inputs

| | | | |
|---|---|---|---|
| Segment Type | Passing Constrained | Length, ft | 5280 |
| Lane Width, ft | 12 | Shoulder Width, ft | 6 |
| Speed Limit, mi/h | 50 | Access Point Density, pts/mi | 17.0 |

## Demand and Capacity

| | | | |
|---|---|---|---|
| Directional Demand Flow Rate, veh/h | 724 | Opposing Demand Flow Rate, veh/h | - |
| Peak Hour Factor | 0.96 | Total Trucks, % | 2.00 |
| Segment Capacity, veh/h | 1700 | Demand/Capacity (D/C) | 0.43 |

## Intermediate Results

| | | | |
|---|---|---|---|
| Segment Vertical Class | 1 | Free-Flow Speed, mi/h | 52.7 |
| Speed Slope Coefficient | 3.41561 | Speed Power Coefficient | 0.41674 |
| PF Slope Coefficient | -1.35177 | PF Power Coefficient | 0.74077 |
| In Passing Lane Effective Length? | No | Total Segment Density, veh/mi/ln | 9.5 |
| %Improved % Followers | 0.0 | % Improved Avg Speed | 0.0 |

## Subsegment Data

| # | Segment Type | Length, ft | Radius, ft | Superelevation, % | Average Speed, mi/h |
|---|---|---|---|---|---|
| 1 | Tangent | 5280 | - | - | 49.9 |

## Vehicle Results

| | | | |
|---|---|---|---|
| Average Speed, mi/h | 49.9 | Percent Followers, % | 65.5 |
| Segment Travel Time, minutes | 1.20 | Followers Density, followers/mi/ln | 9.5 |
| Vehicle LOS | C | | |

# HCS7 Two-Lane Highway Report

## Project Information

| | | | |
|---|---|---|---|
| Analyst | KT | Date | 2/10/2021 |
| Agency | W-Trans | Analysis Year | |
| Jurisdiction | County of Napa | Time Period Analyzed | Saturday PM Existing plus Project |
| Project Description | SR 29 – South of Ehlers Lane (NB) – Saturday PM | Unit | United States Customary |

# Segment 1

## Vehicle Inputs

| | | | |
|---|---|---|---|
| Segment Type | Passing Constrained | Length, ft | 5280 |
| Lane Width, ft | 12 | Shoulder Width, ft | 6 |
| Speed Limit, mi/h | 50 | Access Point Density, pts/mi | 8.0 |

## Demand and Capacity

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

## Intermediate Results

| | | | |
|---|---|---|---|
| Segment Vertical Class | 1 | Free-Flow Speed, mi/h | 54.9 |
| Speed Slope Coefficient | 3.53756 | Speed Power Coefficient | 0.41674 |
| PF Slope Coefficient | -1.33678 | PF Power Coefficient | 0.74714 |
| In Passing Lane Effective Length? | No | Total Segment Density, veh/mi/ln | 9.1 |
| %Improved % Followers | 0.0 | % Improved Avg Speed | 0.0 |

## Subsegment Data

| # | Segment Type | Length, ft | Radius, ft | Superelevation, % | Average Speed, mi/h |
|---|---|---|---|---|---|
| 1 | Tangent | 5280 | - | - | 52.0 |

## Vehicle Results

| | | | |
|---|---|---|---|
| Average Speed, mi/h | 52.0 | Percent Followers, % | 65.2 |
| Segment Travel Time, minutes | 1.15 | Followers Density, followers/mi/ln | 9.1 |
| Vehicle LOS | C | | |

# HCS7 Two-Lane Highway Report

## Project Information

| | | | |
|---|---|---|---|
| Analyst | KT | Date | 2/10/2021 |
| Agency | W-Trans | Analysis Year | |
| Jurisdiction | County of Napa | Time Period Analyzed | Saturday PM Existing plus Project |
| Project Description | SR 29 – South of Ehlers Lane (SB) – Saturday PM | Unit | United States Customary |

# Segment 1

## Vehicle Inputs

| | | | |
|---|---|---|---|
| Segment Type | Passing Constrained | Length, ft | 5280 |
| Lane Width, ft | 12 | Shoulder Width, ft | 6 |
| Speed Limit, mi/h | 50 | Access Point Density, pts/mi | 15.0 |

## Demand and Capacity

| | | | |
|---|---|---|---|
| Directional Demand Flow Rate, veh/h | 719 | Opposing Demand Flow Rate, veh/h | - |
| Peak Hour Factor | 0.96 | Total Trucks, % | 2.00 |
| Segment Capacity, veh/h | 1700 | Demand/Capacity (D/C) | 0.42 |

## Intermediate Results

| | | | |
|---|---|---|---|
| Segment Vertical Class | 1 | Free-Flow Speed, mi/h | 53.2 |
| Speed Slope Coefficient | 3.44271 | Speed Power Coefficient | 0.41674 |
| PF Slope Coefficient | -1.34859 | PF Power Coefficient | 0.74221 |
| In Passing Lane Effective Length? | No | Total Segment Density, veh/mi/ln | 9.3 |
| %Improved % Followers | 0.0 | % Improved Avg Speed | 0.0 |

## Subsegment Data

| # | Segment Type | Length, ft | Radius, ft | Superelevation, % | Average Speed, mi/h |
|---|---|---|---|---|---|
| 1 | Tangent | 5280 | - | - | 50.4 |

## Vehicle Results

| | | | |
|---|---|---|---|
| Average Speed, mi/h | 50.4 | Percent Followers, % | 65.2 |
| Segment Travel Time, minutes | 1.19 | Followers Density, followers/mi/ln | 9.3 |
| Vehicle LOS | C | | |

# HCS7 Two-Lane Highway Report

## Project Information

| | | | |
|---|---|---|---|
| Analyst | KT | Date | 2/10/2021 |
| Agency | W-Trans | Analysis Year | |
| Jurisdiction | County of Napa | Time Period Analyzed | Friday PM Baseline plus Project |
| Project Description | SR 29 – North of Ehlers Lane (NB) – Friday PM | Unit | United States Customary |

# Segment 1

## Vehicle Inputs

| | | | |
|---|---|---|---|
| Segment Type | Passing Constrained | Length, ft | 5280 |
| Lane Width, ft | 12 | Shoulder Width, ft | 6 |
| Speed Limit, mi/h | 50 | Access Point Density, pts/mi | 7.0 |

## Demand and Capacity

| | | | |
|---|---|---|---|
| Directional Demand Flow Rate, veh/h | 711 | Opposing Demand Flow Rate, veh/h | - |
| Peak Hour Factor | 0.96 | Total Trucks, % | 4.00 |
| Segment Capacity, veh/h | 1700 | Demand/Capacity (D/C) | 0.42 |

## Intermediate Results

| | | | |
|---|---|---|---|
| Segment Vertical Class | 1 | Free-Flow Speed, mi/h | 55.1 |
| Speed Slope Coefficient | 3.54750 | Speed Power Coefficient | 0.41674 |
| PF Slope Coefficient | -1.33524 | PF Power Coefficient | 0.74794 |
| In Passing Lane Effective Length? | No | Total Segment Density, veh/mi/ln | 8.8 |
| %Improved % Followers | 0.0 | % Improved Avg Speed | 0.0 |

## Subsegment Data

| # | Segment Type | Length, ft | Radius, ft | Superelevation, % | Average Speed, mi/h |
|---|---|---|---|---|---|
| 1 | Tangent | 5280 | - | - | 52.2 |

## Vehicle Results

| | | | |
|---|---|---|---|
| Average Speed, mi/h | 52.2 | Percent Followers, % | 64.5 |
| Segment Travel Time, minutes | 1.15 | Followers Density, followers/mi/ln | 8.8 |
| Vehicle LOS | C | | |

# HCS7 Two-Lane Highway Report

## Project Information

| | | | |
|---|---|---|---|
| Analyst | KT | Date | 2/10/2021 |
| Agency | W-Trans | Analysis Year | |
| Jurisdiction | County of Napa | Time Period Analyzed | Friday PM Baseline plus Project |
| Project Description | SR 29 – North of Ehlers Lane (SB) – Friday PM | Unit | United States Customary |

# Segment 1

## Vehicle Inputs

| | | | |
|---|---|---|---|
| Segment Type | Passing Constrained | Length, ft | 5280 |
| Lane Width, ft | 12 | Shoulder Width, ft | 6 |
| Speed Limit, mi/h | 50 | Access Point Density, pts/mi | 17.0 |

## Demand and Capacity

| | | | |
|---|---|---|---|
| Directional Demand Flow Rate, veh/h | 695 | Opposing Demand Flow Rate, veh/h | - |
| Peak Hour Factor | 0.96 | Total Trucks, % | 4.00 |
| Segment Capacity, veh/h | 1700 | Demand/Capacity (D/C) | 0.41 |

## Intermediate Results

| | | | |
|---|---|---|---|
| Segment Vertical Class | 1 | Free-Flow Speed, mi/h | 52.6 |
| Speed Slope Coefficient | 3.41200 | Speed Power Coefficient | 0.41674 |
| PF Slope Coefficient | -1.35195 | PF Power Coefficient | 0.74086 |
| In Passing Lane Effective Length? | No | Total Segment Density, veh/mi/ln | 9.0 |
| %Improved % Followers | 0.0 | % Improved Avg Speed | 0.0 |

## Subsegment Data

| # | Segment Type | Length, ft | Radius, ft | Superelevation, % | Average Speed, mi/h |
|---|---|---|---|---|---|
| 1 | Tangent | 5280 | - | - | 49.9 |

## Vehicle Results

| | | | |
|---|---|---|---|
| Average Speed, mi/h | 49.9 | Percent Followers, % | 64.4 |
| Segment Travel Time, minutes | 1.20 | Followers Density, followers/mi/ln | 9.0 |
| Vehicle LOS | C | | |

# HCS7 Two-Lane Highway Report

## Project Information

| | | | |
|---|---|---|---|
| Analyst | KT | Date | 2/10/2021 |
| Agency | W-Trans | Analysis Year | |
| Jurisdiction | County of Napa | Time Period Analyzed | Friday PM Baseline plus Project |
| Project Description | SR 29 – South of Ehlers Lane (NB) – Friday PM | Unit | United States Customary |

# Segment 1

## Vehicle Inputs

| | | | |
|---|---|---|---|
| Segment Type | Passing Constrained | Length, ft | 5280 |
| Lane Width, ft | 12 | Shoulder Width, ft | 6 |
| Speed Limit, mi/h | 50 | Access Point Density, pts/mi | 8.0 |

## Demand and Capacity

| | | | |
|---|---|---|---|
| Directional Demand Flow Rate, veh/h | 735 | Opposing Demand Flow Rate, veh/h | - |
| Peak Hour Factor | 0.96 | Total Trucks, % | 4.00 |
| Segment Capacity, veh/h | 1700 | Demand/Capacity (D/C) | 0.43 |

## Intermediate Results

| | | | |
|---|---|---|---|
| Segment Vertical Class | 1 | Free-Flow Speed, mi/h | 54.9 |
| Speed Slope Coefficient | 3.53395 | Speed Power Coefficient | 0.41674 |
| PF Slope Coefficient | -1.33700 | PF Power Coefficient | 0.74725 |
| In Passing Lane Effective Length? | No | Total Segment Density, veh/mi/ln | 9.3 |
| %Improved % Followers | 0.0 | % Improved Avg Speed | 0.0 |

## Subsegment Data

| # | Segment Type | Length, ft | Radius, ft | Superelevation, % | Average Speed, mi/h |
|---|---|---|---|---|---|
| 1 | Tangent | 5280 | - | - | 51.9 |

## Vehicle Results

| | | | |
|---|---|---|---|
| Average Speed, mi/h | 51.9 | Percent Followers, % | 65.4 |
| Segment Travel Time, minutes | 1.16 | Followers Density, followers/mi/ln | 9.3 |
| Vehicle LOS | C | | |

# HCS7 Two-Lane Highway Report

## Project Information

| | | | |
|---|---|---|---|
| Analyst | KT | Date | 2/10/2021 |
| Agency | W-Trans | Analysis Year | |
| Jurisdiction | County of Napa | Time Period Analyzed | Friday PM Baseline plus Project |
| Project Description | SR 29 – South of Ehlers Lane (SB) – Friday PM | Unit | United States Customary |

# Segment 1

## Vehicle Inputs

| | | | |
|---|---|---|---|
| Segment Type | Passing Constrained | Length, ft | 5280 |
| Lane Width, ft | 12 | Shoulder Width, ft | 6 |
| Speed Limit, mi/h | 50 | Access Point Density, pts/mi | 15.0 |

## Demand and Capacity

| | | | |
|---|---|---|---|
| Directional Demand Flow Rate, veh/h | 713 | Opposing Demand Flow Rate, veh/h | - |
| Peak Hour Factor | 0.96 | Total Trucks, % | 4.00 |
| Segment Capacity, veh/h | 1700 | Demand/Capacity (D/C) | 0.42 |

## Intermediate Results

| | | | |
|---|---|---|---|
| Segment Vertical Class | 1 | Free-Flow Speed, mi/h | 53.1 |
| Speed Slope Coefficient | 3.43910 | Speed Power Coefficient | 0.41674 |
| PF Slope Coefficient | -1.34878 | PF Power Coefficient | 0.74231 |
| In Passing Lane Effective Length? | No | Total Segment Density, veh/mi/ln | 9.2 |
| %Improved % Followers | 0.0 | % Improved Avg Speed | 0.0 |

## Subsegment Data

| # | Segment Type | Length, ft | Radius, ft | Superelevation, % | Average Speed, mi/h |
|---|---|---|---|---|---|
| 1 | Tangent | 5280 | - | - | 50.3 |

## Vehicle Results

| | | | |
|---|---|---|---|
| Average Speed, mi/h | 50.3 | Percent Followers, % | 65.0 |
| Segment Travel Time, minutes | 1.19 | Followers Density, followers/mi/ln | 9.2 |
| Vehicle LOS | C | | |

# HCS7 Two-Lane Highway Report

## Project Information

| | | | |
|---|---|---|---|
| Analyst | KT | Date | 2/10/2021 |
| Agency | W-Trans | Analysis Year | |
| Jurisdiction | County of Napa | Time Period Analyzed | Saturday PM Baseline plus Project |
| Project Description | SR 29 – North of Ehlers Lane (NB) – Saturday PM | Unit | United States Customary |

# Segment 1

## Vehicle Inputs

| | | | |
|---|---|---|---|
| Segment Type | Passing Constrained | Length, ft | 5280 |
| Lane Width, ft | 12 | Shoulder Width, ft | 6 |
| Speed Limit, mi/h | 50 | Access Point Density, pts/mi | 7.0 |

## Demand and Capacity

| | | | |
|---|---|---|---|
| Directional Demand Flow Rate, veh/h | 715 | Opposing Demand Flow Rate, veh/h | - |
| Peak Hour Factor | 0.96 | Total Trucks, % | 2.00 |
| Segment Capacity, veh/h | 1700 | Demand/Capacity (D/C) | 0.42 |

## Intermediate Results

| | | | |
|---|---|---|---|
| Segment Vertical Class | 1 | Free-Flow Speed, mi/h | 55.2 |
| Speed Slope Coefficient | 3.55111 | Speed Power Coefficient | 0.41674 |
| PF Slope Coefficient | -1.33501 | PF Power Coefficient | 0.74784 |
| In Passing Lane Effective Length? | No | Total Segment Density, veh/mi/ln | 8.8 |
| %Improved % Followers | 0.0 | % Improved Avg Speed | 0.0 |

## Subsegment Data

| # | Segment Type | Length, ft | Radius, ft | Superelevation, % | Average Speed, mi/h |
|---|---|---|---|---|---|
| 1 | Tangent | 5280 | - | - | 52.3 |

## Vehicle Results

| | | | |
|---|---|---|---|
| Average Speed, mi/h | 52.3 | Percent Followers, % | 64.6 |
| Segment Travel Time, minutes | 1.15 | Followers Density, followers/mi/ln | 8.8 |
| Vehicle LOS | C | | |

# HCS7 Two-Lane Highway Report

## Project Information

| | | | |
|---|---|---|---|
| Analyst | KT | Date | 2/10/2021 |
| Agency | W-Trans | Analysis Year | |
| Jurisdiction | County of Napa | Time Period Analyzed | Saturday PM Baseline plus Project |
| Project Description | SR 29 – North of Ehlers Lane (SB) – Saturday PM | Unit | United States Customary |

# Segment 1

## Vehicle Inputs

| | | | |
|---|---|---|---|
| Segment Type | Passing Constrained | Length, ft | 5280 |
| Lane Width, ft | 12 | Shoulder Width, ft | 6 |
| Speed Limit, mi/h | 50 | Access Point Density, pts/mi | 17.0 |

## Demand and Capacity

| | | | |
|---|---|---|---|
| Directional Demand Flow Rate, veh/h | 724 | Opposing Demand Flow Rate, veh/h | - |
| Peak Hour Factor | 0.96 | Total Trucks, % | 2.00 |
| Segment Capacity, veh/h | 1700 | Demand/Capacity (D/C) | 0.43 |

## Intermediate Results

| | | | |
|---|---|---|---|
| Segment Vertical Class | 1 | Free-Flow Speed, mi/h | 52.7 |
| Speed Slope Coefficient | 3.41561 | Speed Power Coefficient | 0.41674 |
| PF Slope Coefficient | -1.35177 | PF Power Coefficient | 0.74077 |
| In Passing Lane Effective Length? | No | Total Segment Density, veh/mi/ln | 9.5 |
| %Improved % Followers | 0.0 | % Improved Avg Speed | 0.0 |

## Subsegment Data

| # | Segment Type | Length, ft | Radius, ft | Superelevation, % | Average Speed, mi/h |
|---|---|---|---|---|---|
| 1 | Tangent | 5280 | - | - | 49.9 |

## Vehicle Results

| | | | |
|---|---|---|---|
| Average Speed, mi/h | 49.9 | Percent Followers, % | 65.5 |
| Segment Travel Time, minutes | 1.20 | Followers Density, followers/mi/ln | 9.5 |
| Vehicle LOS | C | | |

# HCS7 Two-Lane Highway Report

## Project Information

| | | | |
|---|---|---|---|
| Analyst | KT | Date | 2/10/2021 |
| Agency | W-Trans | Analysis Year | |
| Jurisdiction | County of Napa | Time Period Analyzed | Saturday PM Baseline plus Project |
| Project Description | SR 29 – South of Ehlers Lane (NB) – Saturday PM | Unit | United States Customary |

# Segment 1

## Vehicle Inputs

| | | | |
|---|---|---|---|
| Segment Type | Passing Constrained | Length, ft | 5280 |
| Lane Width, ft | 12 | Shoulder Width, ft | 6 |
| Speed Limit, mi/h | 50 | Access Point Density, pts/mi | 8.0 |

## Demand and Capacity

| | | | |
|---|---|---|---|
| Directional Demand Flow Rate, veh/h | 731 | Opposing Demand Flow Rate, veh/h | - |
| Peak Hour Factor | 0.96 | Total Trucks, % | 2.00 |
| Segment Capacity, veh/h | 1700 | Demand/Capacity (D/C) | 0.43 |

## Intermediate Results

| | | | |
|---|---|---|---|
| Segment Vertical Class | 1 | Free-Flow Speed, mi/h | 54.9 |
| Speed Slope Coefficient | 3.53756 | Speed Power Coefficient | 0.41674 |
| PF Slope Coefficient | -1.33678 | PF Power Coefficient | 0.74714 |
| In Passing Lane Effective Length? | No | Total Segment Density, veh/mi/ln | 9.2 |
| %Improved % Followers | 0.0 | % Improved Avg Speed | 0.0 |

## Subsegment Data

| # | Segment Type | Length, ft | Radius, ft | Superelevation, % | Average Speed, mi/h |
|---|---|---|---|---|---|
| 1 | Tangent | 5280 | - | - | 52.0 |

## Vehicle Results

| | | | |
|---|---|---|---|
| Average Speed, mi/h | 52.0 | Percent Followers, % | 65.3 |
| Segment Travel Time, minutes | 1.15 | Followers Density, followers/mi/ln | 9.2 |
| Vehicle LOS | C | | |

# HCS7 Two-Lane Highway Report

## Project Information

| | | | |
|---|---|---|---|
| Analyst | KT | Date | 2/10/2021 |
| Agency | W-Trans | Analysis Year | |
| Jurisdiction | County of Napa | Time Period Analyzed | Saturday PM Baseline plus Project |
| Project Description | SR 29 – South of Ehlers Lane (SB) – Saturday PM | Unit | United States Customary |

# Segment 1

## Vehicle Inputs

| | | | |
|---|---|---|---|
| Segment Type | Passing Constrained | Length, ft | 5280 |
| Lane Width, ft | 12 | Shoulder Width, ft | 6 |
| Speed Limit, mi/h | 50 | Access Point Density, pts/mi | 15.0 |

## Demand and Capacity

| | | | |
|---|---|---|---|
| Directional Demand Flow Rate, veh/h | 720 | Opposing Demand Flow Rate, veh/h | - |
| Peak Hour Factor | 0.96 | Total Trucks, % | 2.00 |
| Segment Capacity, veh/h | 1700 | Demand/Capacity (D/C) | 0.42 |

## Intermediate Results

| | | | |
|---|---|---|---|
| Segment Vertical Class | 1 | Free-Flow Speed, mi/h | 53.2 |
| Speed Slope Coefficient | 3.44271 | Speed Power Coefficient | 0.41674 |
| PF Slope Coefficient | -1.34859 | PF Power Coefficient | 0.74221 |
| In Passing Lane Effective Length? | No | Total Segment Density, veh/mi/ln | 9.3 |
| %Improved % Followers | 0.0 | % Improved Avg Speed | 0.0 |

## Subsegment Data

| # | Segment Type | Length, ft | Radius, ft | Superelevation, % | Average Speed, mi/h |
|---|---|---|---|---|---|
| 1 | Tangent | 5280 | - | - | 50.4 |

## Vehicle Results

| | | | |
|---|---|---|---|
| Average Speed, mi/h | 50.4 | Percent Followers, % | 65.2 |
| Segment Travel Time, minutes | 1.19 | Followers Density, followers/mi/ln | 9.3 |
| Vehicle LOS | C | | |

# HCS7 Two-Lane Highway Report

## Project Information

| | | | |
|---|---|---|---|
| Analyst | KT | Date | 2/10/2021 |
| Agency | W-Trans | Analysis Year | |
| Jurisdiction | County of Napa | Time Period Analyzed | Friday PM Future plus Project |
| Project Description | SR 29 – North of Ehlers Lane (NB) – Friday PM | Unit | United States Customary |

# Segment 1

## Vehicle Inputs

| | | | |
|---|---|---|---|
| Segment Type | Passing Constrained | Length, ft | 5280 |
| Lane Width, ft | 12 | Shoulder Width, ft | 6 |
| Speed Limit, mi/h | 50 | Access Point Density, pts/mi | 7.0 |

## Demand and Capacity

| | | | |
|---|---|---|---|
| Directional Demand Flow Rate, veh/h | 989 | Opposing Demand Flow Rate, veh/h | - |
| Peak Hour Factor | 1.00 | Total Trucks, % | 4.00 |
| Segment Capacity, veh/h | 1700 | Demand/Capacity (D/C) | 0.58 |

## Intermediate Results

| | | | |
|---|---|---|---|
| Segment Vertical Class | 1 | Free-Flow Speed, mi/h | 55.1 |
| Speed Slope Coefficient | 3.54750 | Speed Power Coefficient | 0.41674 |
| PF Slope Coefficient | -1.33524 | PF Power Coefficient | 0.74794 |
| In Passing Lane Effective Length? | No | Total Segment Density, veh/mi/ln | 14.0 |
| %Improved % Followers | 0.0 | % Improved Avg Speed | 0.0 |

## Subsegment Data

| # | Segment Type | Length, ft | Radius, ft | Superelevation, % | Average Speed, mi/h |
|---|---|---|---|---|---|
| 1 | Tangent | 5280 | - | - | 51.7 |

## Vehicle Results

| | | | |
|---|---|---|---|
| Average Speed, mi/h | 51.7 | Percent Followers, % | 73.4 |
| Segment Travel Time, minutes | 1.16 | Followers Density, followers/mi/ln | 14.0 |
| Vehicle LOS | D | | |

# HCS7 Two-Lane Highway Report

## Project Information

| | | | |
|---|---|---|---|
| Analyst | KT | Date | 2/10/2021 |
| Agency | W-Trans | Analysis Year | |
| Jurisdiction | County of Napa | Time Period Analyzed | Friday PM Future plus Project |
| Project Description | SR 29 – North of Ehlers Lane (SB) – Friday PM | Unit | United States Customary |

# Segment 1

## Vehicle Inputs

| | | | |
|---|---|---|---|
| Segment Type | Passing Constrained | Length, ft | 5280 |
| Lane Width, ft | 12 | Shoulder Width, ft | 6 |
| Speed Limit, mi/h | 50 | Access Point Density, pts/mi | 17.0 |

## Demand and Capacity

| | | | |
|---|---|---|---|
| Directional Demand Flow Rate, veh/h | 972 | Opposing Demand Flow Rate, veh/h | - |
| Peak Hour Factor | 1.00 | Total Trucks, % | 4.00 |
| Segment Capacity, veh/h | 1700 | Demand/Capacity (D/C) | 0.57 |

## Intermediate Results

| | | | |
|---|---|---|---|
| Segment Vertical Class | 1 | Free-Flow Speed, mi/h | 52.6 |
| Speed Slope Coefficient | 3.41200 | Speed Power Coefficient | 0.41674 |
| PF Slope Coefficient | -1.35195 | PF Power Coefficient | 0.74086 |
| In Passing Lane Effective Length? | No | Total Segment Density, veh/mi/ln | 14.4 |
| %Improved % Followers | 0.0 | % Improved Avg Speed | 0.0 |

## Subsegment Data

| # | Segment Type | Length, ft | Radius, ft | Superelevation, % | Average Speed, mi/h |
|---|---|---|---|---|---|
| 1 | Tangent | 5280 | - | - | 49.4 |

## Vehicle Results

| | | | |
|---|---|---|---|
| Average Speed, mi/h | 49.4 | Percent Followers, % | 73.4 |
| Segment Travel Time, minutes | 1.21 | Followers Density, followers/mi/ln | 14.4 |
| Vehicle LOS | D | | |

# HCS7 Two-Lane Highway Report

## Project Information

| | | | |
|---|---|---|---|
| Analyst | KT | Date | 2/10/2021 |
| Agency | W-Trans | Analysis Year | |
| Jurisdiction | County of Napa | Time Period Analyzed | Friday PM Future plus Project |
| Project Description | SR 29 – South of Ehlers Lane (NB) – Friday PM | Unit | United States Customary |

# Segment 1

## Vehicle Inputs

| | | | |
|---|---|---|---|
| Segment Type | Passing Constrained | Length, ft | 5280 |
| Lane Width, ft | 12 | Shoulder Width, ft | 6 |
| Speed Limit, mi/h | 50 | Access Point Density, pts/mi | 8.0 |

## Demand and Capacity

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

## Intermediate Results

| | | | |
|---|---|---|---|
| Segment Vertical Class | 1 | Free-Flow Speed, mi/h | 54.9 |
| Speed Slope Coefficient | 3.53395 | Speed Power Coefficient | 0.41674 |
| PF Slope Coefficient | -1.33700 | PF Power Coefficient | 0.74725 |
| In Passing Lane Effective Length? | No | Total Segment Density, veh/mi/ln | 14.9 |
| %Improved % Followers | 0.0 | % Improved Avg Speed | 0.0 |

## Subsegment Data

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

## Vehicle Results

| | | | |
|---|---|---|---|
| Average Speed, mi/h | 51.4 | Percent Followers, % | 74.5 |
| Segment Travel Time, minutes | 1.17 | Followers Density, followers/mi/ln | 14.9 |
| Vehicle LOS | D | | |

# HCS7 Two-Lane Highway Report

## Project Information

| | | | |
|---|---|---|---|
| Analyst | KT | Date | 2/10/2021 |
| Agency | W-Trans | Analysis Year | |
| Jurisdiction | County of Napa | Time Period Analyzed | Friday PM Future plus Project |
| Project Description | SR 29 – South of Ehlers Lane (SB) – Friday PM | Unit | United States Customary |

# Segment 1

## Vehicle Inputs

| | | | |
|---|---|---|---|
| Segment Type | Passing Constrained | Length, ft | 5280 |
| Lane Width, ft | 12 | Shoulder Width, ft | 6 |
| Speed Limit, mi/h | 50 | Access Point Density, pts/mi | 15.0 |

## Demand and Capacity

| | | | |
|---|---|---|---|
| Directional Demand Flow Rate, veh/h | 983 | Opposing Demand Flow Rate, veh/h | - |
| Peak Hour Factor | 1.00 | Total Trucks, % | 4.00 |
| Segment Capacity, veh/h | 1700 | Demand/Capacity (D/C) | 0.58 |

## Intermediate Results

| | | | |
|---|---|---|---|
| Segment Vertical Class | 1 | Free-Flow Speed, mi/h | 53.1 |
| Speed Slope Coefficient | 3.43910 | Speed Power Coefficient | 0.41674 |
| PF Slope Coefficient | -1.34878 | PF Power Coefficient | 0.74231 |
| In Passing Lane Effective Length? | No | Total Segment Density, veh/mi/ln | 14.5 |
| %Improved % Followers | 0.0 | % Improved Avg Speed | 0.0 |

## Subsegment Data

| # | Segment Type | Length, ft | Radius, ft | Superelevation, % | Average Speed, mi/h |
|---|---|---|---|---|---|
| 1 | Tangent | 5280 | - | - | 49.9 |

## Vehicle Results

| | | | |
|---|---|---|---|
| Average Speed, mi/h | 49.9 | Percent Followers, % | 73.6 |
| Segment Travel Time, minutes | 1.20 | Followers Density, followers/mi/ln | 14.5 |
| Vehicle LOS | D | | |

# HCS7 Two-Lane Highway Report

## Project Information

| | | | |
|---|---|---|---|
| Analyst | KT | Date | 2/10/2021 |
| Agency | W-Trans | Analysis Year | |
| Jurisdiction | County of Napa | Time Period Analyzed | Saturday PM Future plus Project |
| Project Description | SR 29 – North of Ehlers Lane (NB) – Saturday PM | Unit | United States Customary |

# Segment 1

## Vehicle Inputs

| | | | |
|---|---|---|---|
| Segment Type | Passing Constrained | Length, ft | 5280 |
| Lane Width, ft | 12 | Shoulder Width, ft | 6 |
| Speed Limit, mi/h | 50 | Access Point Density, pts/mi | 7.0 |

## Demand and Capacity

| | | | |
|---|---|---|---|
| Directional Demand Flow Rate, veh/h | 997 | Opposing Demand Flow Rate, veh/h | - |
| Peak Hour Factor | 1.00 | Total Trucks, % | 2.00 |
| Segment Capacity, veh/h | 1700 | Demand/Capacity (D/C) | 0.59 |

## Intermediate Results

| | | | |
|---|---|---|---|
| Segment Vertical Class | 1 | Free-Flow Speed, mi/h | 55.2 |
| Speed Slope Coefficient | 3.55111 | Speed Power Coefficient | 0.41674 |
| PF Slope Coefficient | -1.33501 | PF Power Coefficient | 0.74784 |
| In Passing Lane Effective Length? | No | Total Segment Density, veh/mi/ln | 14.2 |
| %Improved % Followers | 0.0 | % Improved Avg Speed | 0.0 |

## Subsegment Data

| # | Segment Type | Length, ft | Radius, ft | Superelevation, % | Average Speed, mi/h |
|---|---|---|---|---|---|
| 1 | Tangent | 5280 | - | - | 51.8 |

## Vehicle Results

| | | | |
|---|---|---|---|
| Average Speed, mi/h | 51.8 | Percent Followers, % | 73.6 |
| Segment Travel Time, minutes | 1.16 | Followers Density, followers/mi/ln | 14.2 |
| Vehicle LOS | D | | |

# HCS7 Two-Lane Highway Report

## Project Information

| | | | |
|---|---|---|---|
| Analyst | KT | Date | 2/10/2021 |
| Agency | W-Trans | Analysis Year | |
| Jurisdiction | County of Napa | Time Period Analyzed | Saturday PM Future plus Project |
| Project Description | SR 29 – North of Ehlers Lane (SB) – Saturday PM | Unit | United States Customary |

# Segment 1

## Vehicle Inputs

| | | | |
|---|---|---|---|
| Segment Type | Passing Constrained | Length, ft | 5280 |
| Lane Width, ft | 12 | Shoulder Width, ft | 6 |
| Speed Limit, mi/h | 50 | Access Point Density, pts/mi | 17.0 |

## Demand and Capacity

| | | | |
|---|---|---|---|
| Directional Demand Flow Rate, veh/h | 1013 | Opposing Demand Flow Rate, veh/h | - |
| Peak Hour Factor | 1.00 | Total Trucks, % | 2.00 |
| Segment Capacity, veh/h | 1700 | Demand/Capacity (D/C) | 0.60 |

## Intermediate Results

| | | | |
|---|---|---|---|
| Segment Vertical Class | 1 | Free-Flow Speed, mi/h | 52.7 |
| Speed Slope Coefficient | 3.41561 | Speed Power Coefficient | 0.41674 |
| PF Slope Coefficient | -1.35177 | PF Power Coefficient | 0.74077 |
| In Passing Lane Effective Length? | No | Total Segment Density, veh/mi/ln | 15.3 |
| %Improved % Followers | 0.0 | % Improved Avg Speed | 0.0 |

## Subsegment Data

| # | Segment Type | Length, ft | Radius, ft | Superelevation, % | Average Speed, mi/h |
|---|---|---|---|---|---|
| 1 | Tangent | 5280 | - | - | 49.4 |

## Vehicle Results

| | | | |
|---|---|---|---|
| Average Speed, mi/h | 49.4 | Percent Followers, % | 74.5 |
| Segment Travel Time, minutes | 1.21 | Followers Density, followers/mi/ln | 15.3 |
| Vehicle LOS | E | | |

# HCS7 Two-Lane Highway Report

## Project Information

| | | | |
|---|---|---|---|
| Analyst | KT | Date | 2/10/2021 |
| Agency | W-Trans | Analysis Year | 1 |
| Jurisdiction | County of Napa | Time Period Analyzed | Saturday PM Future plus Project |
| Project Description | SR 29 – South of Ehlers Lane (NB) – Saturday PM | Unit | United States Customary |

# Segment 1

## Vehicle Inputs

| | | | |
|---|---|---|---|
| Segment Type | Passing Constrained | Length, ft | 5280 |
| Lane Width, ft | 12 | Shoulder Width, ft | 6 |
| Speed Limit, mi/h | 50 | Access Point Density, pts/mi | 8.0 |

## Demand and Capacity

| | | | |
|---|---|---|---|
| Directional Demand Flow Rate, veh/h | 1022 | Opposing Demand Flow Rate, veh/h | - |
| Peak Hour Factor | 1.00 | Total Trucks, % | 2.00 |
| Segment Capacity, veh/h | 1700 | Demand/Capacity (D/C) | 0.60 |

## Intermediate Results

| | | | |
|---|---|---|---|
| Segment Vertical Class | 1 | Free-Flow Speed, mi/h | 54.9 |
| Speed Slope Coefficient | 3.53756 | Speed Power Coefficient | 0.41674 |
| PF Slope Coefficient | -1.33678 | PF Power Coefficient | 0.74714 |
| In Passing Lane Effective Length? | No | Total Segment Density, veh/mi/ln | 14.7 |
| %Improved % Followers | 0.0 | % Improved Avg Speed | 0.0 |

## Subsegment Data

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

## Vehicle Results

| | | | |
|---|---|---|---|
| Average Speed, mi/h | 51.5 | Percent Followers, % | 74.3 |
| Segment Travel Time, minutes | 1.16 | Followers Density, followers/mi/ln | 14.7 |
| Vehicle LOS | D | | |

# HCS7 Two-Lane Highway Report

## Project Information

| | | | |
|---|---|---|---|
| Analyst | KT | Date | 2/10/2021 |
| Agency | W-Trans | Analysis Year | |
| Jurisdiction | County of Napa | Time Period Analyzed | Saturday PM Future plus Project |
| Project Description | SR 29 – South of Ehlers Lane (SB) – Saturday PM | Unit | United States Customary |

# Segment 1

## Vehicle Inputs

| | | | |
|---|---|---|---|
| Segment Type | Passing Constrained | Length, ft | 5280 |
| Lane Width, ft | 12 | Shoulder Width, ft | 6 |
| Speed Limit, mi/h | 50 | Access Point Density, pts/mi | 15.0 |

## Demand and Capacity

| | | | |
|---|---|---|---|
| Directional Demand Flow Rate, veh/h | 1001 | Opposing Demand Flow Rate, veh/h | - |
| Peak Hour Factor | 1.00 | Total Trucks, % | 2.00 |
| Segment Capacity, veh/h | 1700 | Demand/Capacity (D/C) | 0.59 |

## Intermediate Results

| | | | |
|---|---|---|---|
| Segment Vertical Class | 1 | Free-Flow Speed, mi/h | 53.2 |
| Speed Slope Coefficient | 3.44271 | Speed Power Coefficient | 0.41674 |
| PF Slope Coefficient | -1.34859 | PF Power Coefficient | 0.74221 |
| In Passing Lane Effective Length? | No | Total Segment Density, veh/mi/ln | 14.9 |
| %Improved % Followers | 0.0 | % Improved Avg Speed | 0.0 |

## Subsegment Data

| # | Segment Type | Length, ft | Radius, ft | Superelevation, % | Average Speed, mi/h |
|---|---|---|---|---|---|
| 1 | Tangent | 5280 | - | - | 49.9 |

## Vehicle Results

| | | | |
|---|---|---|---|
| Average Speed, mi/h | 49.9 | Percent Followers, % | 74.1 |
| Segment Travel Time, minutes | 1.20 | Followers Density, followers/mi/ln | 14.9 |
| Vehicle LOS | D | | |

# Appendix E

## Trip Generation Spreadsheets

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# Existing Conditions Winery Traffic Information / Trip Generation

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

**Project Name: Ehlers Estate Winery** **Project Scenario:** **Permitted**

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

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1. | Total number of FT employees: | 2 | x 3.05 one-way trips per employee | = | 6.1 | daily trips |
| 2. | Total number of PT employees: | 0 | x 1.90 one-way trips per employee | = | 0.0 | daily trips |
| 3. | Maximum weekday visitors: | 0 | /2.6 visitors per vehicle x 2 one-way trips | = | 0.0 | daily trips |
| 4. | Gallons of production: | 25000 | /1,000 x 0.009 daily truck trips x 2 one-way trips | = | 0.5 | daily trips |
| 5. | | | TOTAL | = | 7 | daily trips |

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

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 6. | Total number of FT employees: | 2 | x 3.05 one-way trips per employee | = | 6.1 | daily trips |
| 7. | Total number of PT employees: | 0 | x 1.90 one-way trips per employee | = | 0.0 | daily trips |
| 8. | Maximum weekday visitors: | 0 | /2.6 visitors per vehicle x 2 one-way trips | = | 0.0 | daily trips |
| 9. | Gallons of production: | 25000 | /1,000 x 0.009 daily truck trips x 2 one-way trips | = | 0.5 | daily trips |
| 10. | Avg. annual tons of grape on-haul: | 0 | / 144 truck trips x 2 one-way trips | = | 0.0 | daily trips |
| 11. | | | TOTAL | = | 7 | daily trips |

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

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 12. | Total number of FT Sat. employees: | 2 | x 3.05 one-way trips per employee | = | 6.1 | daily trips |
| 13. | Total number of PT Sat. employees: | 0 | x 1.90 one-way trips per employee | = | 0.0 | daily trips |
| 14. | Maximum Saturday visitors: | 0 | /2.8 visitors per vehicle x 2 one-way trips | = | 0.0 | daily trips |
| 15. | Gallons of Production: | 0 | /1,000 x 0.009 daily truck trips x 2 one-way trips | = | 0.0 | daily trips |
| 16. | | | TOTAL | = | 6 | daily trips |

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

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 17. | Total number of FT Sat. employees: | 2 | x 3.05 one-way trips per employee | = | 6.1 | daily trips |
| 18. | Total number of PT Sat. employees: | 0 | x 1.90 one-way trips per employee | = | 0.0 | daily trips |
| 19. | Maximum Saturday visitors: | 0 | /2.8 visitors per vehicle x 2 one-way trips | = | 0.0 | daily trips |
| 20. | Gallons of production: | 25000 | /1,000 x 0.009 daily truck trips2 x 2 one-way trips | = | 0.5 | daily trips |
| 21. | Avg. annual tons of grape on-haul: | 0 | / 144 truck trips x 2 one-way trips | = | 0.0 | daily trips |
| 22. | | | TOTAL | = | 7 | daily trips |

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

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

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

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

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

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

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

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

## Section I. Maximum Annual Trips

(Sec. A, line 5 x 206) + (Sec. B, line 11 x 55) + (Sec. C, line 16 x 82) + (Sec. D, line 22 x 22) = 2473 Annual trips

# Existing Conditions Winery Traffic Information / Trip Generation

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

**Project Name: Ehlers Estate Winery** **Project Scenario:** **Existing**

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

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1. | Total number of FT employees: | 12 | x 3.05 one-way trips per employee | = | 36.6 | daily trips |
| 2. | Total number of PT employees: | 2 | x 1.90 one-way trips per employee | = | 3.8 | daily trips |
| 3. | Maximum weekday visitors: | 90 | /2.6 visitors per vehicle x 2 one-way trips | = | 69.2 | daily trips |
| 4. | Gallons of production: | 29000 | /1,000 x 0.009 daily truck trips2 x 2 one-way trips | = | 0.5 | daily trips |
| 5. | | | TOTAL | = | 110 | daily trips |

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

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 6. | Total number of FT employees: | 12 | x 3.05 one-way trips per employee | = | 36.6 | daily trips |
| 7. | Total number of PT employees: | 2 | x 1.90 one-way trips per employee | = | 3.8 | daily trips |
| 8. | Maximum weekday visitors: | 90 | /2.6 visitors per vehicle x 2 one-way trips | = | 69.2 | daily trips |
| 9. | Gallons of production: | 29000 | /1,000 x 0.009 daily truck trips2 x 2 one-way trips | = | 0.5 | daily trips |
| 10. | Avg. annual tons of grape on-haul: | 0 | / 144 truck trips x 2 one-way trips | = | 0.0 | daily trips |
| 11. | | | TOTAL | = | 110 | daily trips |

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

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 12. | Total number of FT Sat. employees: | 5 | x 3.05 one-way trips per employee | = | 15.3 | daily trips |
| 13. | Total number of PT Sat. employees: | 1 | x 1.90 one-way trips per employee | = | 1.9 | daily trips |
| 14. | Maximum Saturday visitors: | 90 | /2.8 visitors per vehicle x 2 one-way trips | = | 64.3 | daily trips |
| 15. | Gallons of Production: | 0 | /1,000 x 0.009 daily truck trips x 2 one-way trips | = | 0.0 | daily trips |
| 16. | | | TOTAL | = | 82 | daily trips |

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

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 17. | Total number of FT Sat. employees: | 12 | x 3.05 one-way trips per employee | = | 36.6 | daily trips |
| 18. | Total number of PT Sat. employees: | 2 | x 1.90 one-way trips per employee | = | 3.8 | daily trips |
| 19. | Maximum Saturday visitors: | 90 | /2.8 visitors per vehicle x 2 one-way trips | = | 64.3 | daily trips |
| 20. | Gallons of production: | 29000 | /1,000 x 0.009 daily truck trips2 x 2 one-way trips | = | 0.5 | daily trips |
| 21. | Avg. annual tons of grape on-haul: | 0 | / 144 truck trips x 2 one-way trips | = | 0.0 | daily trips |
| 22. | | | TOTAL | = | 105 | daily trips |

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

(Sum of daily trips from Sec. A, lines 3 and 4) x 0.38 + (No. of FTE) + (line 2 / 2) = 39 PM peak trips

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

(Sum of daily trips, Sec. B, lines 8, 9, 10) x 0.38 + (No. of FTE) + (line 7 / 2) = 39 PM peak trips

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

(Daily trips from Sec. C, line 14 and 15) x 0.57 + (No. of FTE) + (line 13 / 2) = 42 PM peak trips

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

(Sum of daily trips Sec. D, lines 19, 20, 21) x 0.57 + (No. of FTE) + (line 18 / 2) = 50 PM peak trips

## Section I. Maximum Annual Trips

(Sec. A, line 5 x 206) + (Sec. B, line 11 x 55) + (Sec. C, line 16 x 82) + (Sec. D, line 22 x 22) = 37744 Annual trips

# Proposed Project Winery Traffic Information / Trip Generation

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

**Project Name: Ehlers Estate Winery** **Project Scenario:** **Proposed**

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

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1. | Total number of FT employees: | 14 | x 3.05 one-way trips per employee | = | 42.7 | daily trips |
| 2. | Total number of PT employees: | 4 | x 1.90 one-way trips per employee | = | 7.6 | daily trips |
| 3. | Maximum weekday visitors: | 100 | /2.6 visitors per vehicle x 2 one-way trips | = | 76.9 | daily trips |
| 4. | Gallons of production: 35000 | | /1,000 x 0.009 daily truck trips2 x 2 one-way trips | = | 0.6 | daily trips |
| 5. | | | TOTAL | = | 128 | daily trips |

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

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 6. | Total number of FT employees: | 14 | x 3.05 one-way trips per employee | = | 42.7 | daily trips |
| 7. | Total number of PT employees: | 4 | x 1.90 one-way trips per employee | = | 7.6 | daily trips |
| 8. | Maximum weekday visitors: | 100 | /2.6 visitors per vehicle x 2 one-way trips | = | 76.9 | daily trips |
| 9. | Gallons of production: 35000 | | /1,000 x 0.009 daily truck trips2 x 2 one-way trips | = | 0.6 | daily trips |
| 10. | Avg. annual tons of grape on-haul: | 0 | / 144 truck trips x 2 one-way trips | = | 0.0 | daily trips |
| 11. | | | TOTAL | = | 128 | daily trips |

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

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 12. | Total number of FT Sat. employees: | 5 | x 3.05 one-way trips per employee | = | 15.3 | daily trips |
| 13. | Total number of PT Sat. employees: | 2 | x 1.90 one-way trips per employee | = | 3.8 | daily trips |
| 14. | Maximum Saturday visitors: | 100 | /2.8 visitors per vehicle x 2 one-way trips | = | 71.4 | daily trips |
| 15. | Gallons of Production: 0 | | /1,000 x 0.009 daily truck trips x 2 one-way trips | = | 0.0 | daily trips |
| 16. | | | TOTAL | = | 91 | daily trips |

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

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 17. | Total number of FT Sat. employees: | 14 | x 3.05 one-way trips per employee | = | 42.7 | daily trips |
| 18. | Total number of PT Sat. employees: | 4 | x 1.90 one-way trips per employee | = | 7.6 | daily trips |
| 19. | Maximum Saturday visitors: | 100 | /2.8 visitors per vehicle x 2 one-way trips | = | 71.4 | daily trips |
| 20. | Gallons of production: 35000 | | /1,000 x 0.009 daily truck trips2 x 2 one-way trips | = | 0.6 | daily trips |
| 21. | Avg. annual tons of grape on-haul: | 0 | / 144 truck trips x 2 one-way trips | = | 0.0 | daily trips |
| 22. | | | TOTAL | = | 122 | daily trips |

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

(Sum of daily trips from Sec. J, lines 3 and 4) x 0.38 + (No. of FTE) + (line 2 / 2) = 45 PM peak trips

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

(Sum of daily trips, Sec. K, lines 8, 9, 10) x 0.38 + (No. of FTE) + (line 7 / 2) = 45 PM peak trips

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

(Daily trips from Sec. L, line 14 and 15) x 0.57 + (No. of FTE) + (line 13 / 2) = 47 PM peak trips

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

(Sum of daily trips Sec. M, lines 19, 20, 21) x 0.57 + (No. of FTE) + (line 18 / 2) = 57 PM peak trips

## Section R. Maximum Annual Trips

(Sec. J, line 5 x 206) + (Sec. K, line 11 x 55) + (Sec. L, line 16 x 82) + (Sec. M, line 22 x 22) = 43554 Annual trips

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# Appendix F

## Left-Turn Lane Warrant Graph

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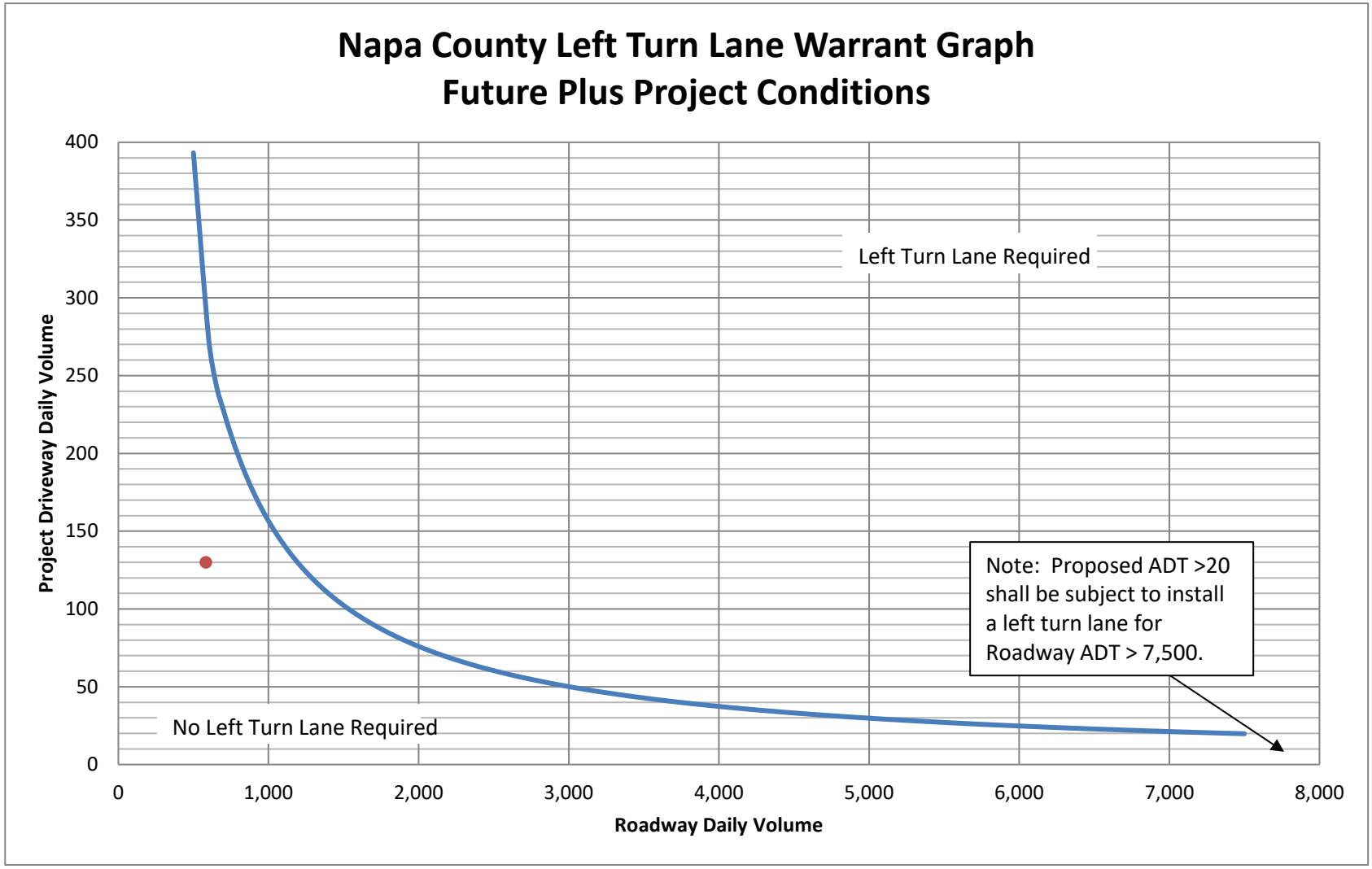
Napa County Left Turn Lane Warrant Graph
Future Plus Project Conditions
Project Driveway Daily Volume
400
350
300
250
200
150
100
50
0
0
1,000
2,000
3,000
4,000
5,000
6,000
7,000
8,000
Roadway Daily Volume
Left Turn Lane Required
No Left Turn Lane Required
Note: Proposed ADT >20 shall be subject to install a left turn lane for Roadway ADT > 7,500.