# JH Ranch Planned Development Plan Amendment

# Z-11-01

{240027;1 }

Table of Contents

# 1.0 Intent of Planned Development Plan Amendment

## 1.1 Project Objectives

JH Ranch is applying for a Planned Development Plan Amendment ("PDPA"). This amendment will increase the amount of land included in the existing Planned Development ("PD") District and modify the existing PD Plan to accommodate JH Ranch's existing operations.

The proposed amendment to JH Ranch's existing PD Plan (Z-93-11) includes the following objectives:

- Incorporate existing JH Ranch property contiguous to the current PD District into the PDPA, increasing the amount of land zoned as PD from 79 acres to 201 acres.
- Retain the existing maximum occupancy of 482 persons within the new 201-acre PD area.
- Establish the PDPA Master Plan (attached to this Application as Sheet C-2), which provides a clear description of the re-development of existing facilities, including the alteration, restoration, rehabilitation, reconstruction, and replacement of existing facilities.
- Conform all existing Ranch property and uses to the Siskiyou County Code ("SCC"), enhance guest experience and optimize JH Ranch's current program model.

## 1.2 Environmental Baseline Conditions

For CEQA purposes, the environmental baseline is determined by existing conditions on the ground, regardless of how those conditions came to be. (*Riverwatch v. County of San Diego* (1999) 76 Cal.App.4th 1428, 1452-53.) CEQA analysis must focus exclusively on the delta between the existing conditions on the site and changes proposed by the Project.

As explained in sections 1.2.1 to 1.2.4.3 below, the PDPA will not change the existing conditions at JH Ranch. Occupancy, site access, programs and staffing will all remain as is. The PDPA does not increase JH Ranch's occupancy. JH Ranch has consistently utilized the PD District to support 440 occupants, and JH Ranch's surrounding property will continue to support 42 occupants. The PDPA will simply incorporate this contiguous property to the current PD District and renovate or replace existing cabins and houses. The renovations and replacements will occur only on existing building footprints. Importantly, none of these alterations will change existing conditions or increase occupancy at JH Ranch. As explained further in 1.2.3, access to the site will also remain unchanged from existing conditions.

JH Ranch's current occupancy levels are based on existing programs and operations, which are described in section 1.2.4, below. In short, guests, employees, and volunteers participate in organized family and student leadership programs, which are staggered throughout the summer. Since the PDPA does not support an increase in occupancy above existing conditions, the PDPA likewise does not support expansion of existing programs offered by JH Ranch, and the physical conditions at the Ranch will remain unchanged from existing conditions.

### 1.2.1 Occupancy

The proposed changes in this application will not increase the total occupancy rate of JH Ranch. The application focuses on the redistribution of existing occupancy capacity and compliance with the SCC. In fact, with this PDPA, JH Ranch has conceded most of its ability to redistribute occupancy between cabins.

Within the existing PD District, JH Ranch's overnight occupancy is 440 occupants. JH Ranch has maintained this occupancy level for the last six years under its current approvals, except during the 2015 Summer Season, when JH Ranch agreed with County planning staff to voluntarily limit overnight guest and staff occupancy to a maximum of 387 occupants within the 1993 PD boundary until the approval of the PDPA.

The 1993 PD Amendment does not address occupancy limits. While the 1993 PD Amendment mentions the Ranch's estimate of then-current usage levels when describing existing conditions, this estimate is not identified as an "occupancy limit." Furthermore, the estimate of then-current usage levels was not incorporated as an occupancy limit into County Ordinance No. 93-41, which approved the 1993 PDP Amendment. The County's approval documents also did not address an occupancy limit.

### 1.2.2. Contiguous Property

JH Ranch plans to incorporate property contiguous to the current Planned Development District into the proposed PDPA. This includes several existing properties zoned for single-family use, which have a total capacity of 42 people and have been used for employee housing. **Including these existing properties, the baseline occupancy rate of the housing units within the proposed PD boundary is 482 occupants.** (*Fat v. County of Sacramento* (2002) 97 Cal.App.4th 1270; 14 CCR § 15125.) To ensure compliance with the SCC, JH Ranch will not increase the occupancy level above 482 overnight occupants without future approvals from the County.

The current PD entitlement approved in 1993 (see Sheet C-1) contains a combination of housing types, including:

- Five single-story duplex guest cabins;

- Five two-story duplex guest cabins;
- Fourteen single-story tent-like cabins;
- Five single-story staff cabins;
- One two-story home (described as the Ranch House);
- One single story home (described as the Manor House);
- Two single-story staff bunk cabins.

The PDPA will allow JH Ranch to alter, restore, rehabilitate, reconstruct, and/or replace existing facilities in order to provide modernized guest accommodations and amenities. These changes qualify as Class 1 and/or Class 2 categorical exemptions and are exempt from CEQA review. (14 CCR §§ 15301-15302.)

### 1.2.3 Site Access

Primary access to the property is provided via a single lane bridge (Bridge A) across French Creek at the main JH Ranch entrance. This provides a central access point for guests, staff, and deliveries. As shown in Attachment C4 (JH Ranch Circulation Plan), vehicular traffic primarily occurs from the main access point at Bridge A, up to the main lodge, and down to the guest cabin area. This access point will continue to be the main access to JH Ranch. No changes to the access road use patterns or vehicle trips are required for current or anticipated future uses.

Secondary access to JH Ranch properties is provided by the bridge and access road at Homestead Lane (Bridge B). This road provides access to private residences and other JH Ranch properties. Built at the expense of JH Ranch, the bridge and access road were constructed to eliminate conflicts between local residents and JH Ranch staff and visitors along the access road through the JH Ranch guest housing area. The road and bridge provide public access, as well as secondary guest ranch access, emergency vehicle access, and large highway load vehicle access, which might not have been accommodated by the main access road. Bridge B can accommodate tractor trailers and it exceeds the minimum CAL FIRE Fire Safety Regulations (see Section 3.6).

### 1.2.4 Program Overview

The intent of this section is to provide a baseline of current program use and operations which have developed since the 1993 PD Amendment. This baseline represents the <u>minimum</u> sustainable business model for JH Ranch. This section is provided in order to:

1. Validate the ADT traffic model referenced herein;

2. Demonstrate that the existing land use has not deviated from the solitary land use and activities described and approved in the 1993 PD Amendment;

3. Demonstrate that the current use is consistent with the SCC definition of a single use "Planned Development District" with a solitary land use.

As of 2014, programming during the summer season consists of the following Ranch facilitated programs:

1. Five 1-week long **Parent/Child (PC)** programs, consisting of approximately 250 guests per program. During selected weeks of the PC programs, JH Ranch also hosts its **Husband & Wife (HW)** programs and **Cloud Nine (C9)** programs. The guest numbers of both HW and C9 are included in the 250 total guest number referenced above. The PC program does not run concurrently with the Student Leadership program described below.

2. Two 12-day **Student Leadership** (SL) programs, consisting of up to 325 students per program.

### 1.2.4.1 Parent/Child (PC), Husband & Wife (HW) and Cloud 9 (C9) Programs

Guests arrive and depart from the Ranch by private car. They typically arrive between 2 p.m. and 6 p.m. on the day of arrival and depart between 6 a.m. and 10 a.m. on the day of departure. **The days of arrival and departure occur on different days**. During the program, a combination of private guest vehicles and bus transportation are used to transport guests to off-site activities. All off-site activities are permitted through the Forest Service or private guide companies.

Lodging is provided for guests in one of several guest units (see Master Plan). Housing is determined based on the program needs and varies depending on participant numbers and availability.

### 1.2.4.2 Student Leadership (SL) Programs

Students arrive and depart from the Ranch by bus. They typically arrive at the Main Lodge between 8 p.m. and 9 p.m. on the day of arrival and depart in the early morning on the day of departure. During the program, busses are used to transport students to off-site activities. All off-site activities are permitted through the Forest Service or private guide companies.

Lodging is provided for students in one of several housing units (see Sheet C-2 Master Plan). Housing is determined based on the program needs and varies depending on participant numbers and availability.

#### 1.2.4.3 Staffing

As of 2014, JH Ranch employs approximately 10-15 full time staff based in the Etna area who provide maintenance, program management, and other administrative functions for the Ranch. During the summer season, approximately 15-30 additional full time staff members and their families are employed at the Ranch. These staff members augment the full time staff and assist in administrative and program management for operations of the Ranch. JH Ranch also utilizes approximately 120 volunteer summer staff (VSS) from across the United States to serve in many different program areas.

All VSS staff members arrive and depart from the Ranch by mass transportation. During the summer season, all VSS and full time staff live within the proposed PD boundary and walk to their work site. Vehicle parking for full time staff is provided at their housing units.

Housing is provided for all VSS and Birmingham based full time staff in one of several staff housing units. These include those units described below. (See C-3 Housing Spreadsheet.)

# 2.0 Project Description

## 2.1 Summary

This application provides a description of the alterations, restoration, rehabilitation, additions to, and/or replacement of existing facilities within the amended PD boundary. A detailed overview of existing conditions and the proposed Master Plan are described on:

- Sheet C-1 (Existing Conditions);
- Sheet C-2 (Master Plan).

The PDPA Master Plan (sheet C-2) describes the proposed housing facilities which will allow a redistribution of the existing Ranch occupancy to a maximum of 482 overnight occupants. The Housing Spreadsheet (sheet C-3) included with the PDPA Master Plan provides a detailed summary of building enhancements. **This plan provides an enforceable framework for the approval of any housing and non-housing structures within the PDPA Master Plan**.

## 2.2 CEQA Review Standards

In order to provide long-term protection to the environment, CEQA prescribes review procedures a public agency must follow before approving or carrying out certain projects. (*Berkeley Hillside Preservation v. City of Berkeley* (2015) 60 Cal.4th 1086, 1091.) The Legislature has expressly exempted several categories of projects from review under CEQA. In addition, the Secretary of the Natural Resources Agency established certain classes of projects which "do not have a significant effect on the environment" and declared them to be "categorically exempt from the requirement for the preparation of environmental documents." (14 CCR §§ 15300-15333.)

Class 1 categorical exemptions cover the operation, repair, maintenance, permitting, leasing, or minor alteration of existing public or private structures or facilities. (14 CCR § 15301.) Additions to existing structures are also covered under this exemption as long as the addition will not result in an increase of more than 50 percent of the floor area of the structure before the addition, or 2,500 square feet, whichever is less. The key consideration when determining whether a project falls under Class 1 is whether the project involves negligible or no expansion of an existing use. (*Ibid*.) The renovations and repairs to existing facilities contemplated by the PDPA meet these criteria and do not expand the existing use of the facilities. Therefore, these renovations, repairs, and additions are categorically exempt from CEQA review.

Class 2 categorical exemptions cover the replacement or reconstruction of existing structures and facilities in cases where the new structure will be located on the same site and have substantially the same purpose and capacity as the structure replaced. (14 CCR § 15302.) The structures which JH Ranch proposes to replace will be located on the same sites and retain the same capacity and purposes as existing structures. In fact, replacement structures will actually be smaller than the existing facilities. Therefore, the replacement and reconstruction of structures contemplated by the PDPA is categorically exempt from CEQA review.

An agency may combine several categorical exemptions to find an entire project exempt from CEQA review. (*Surfrider Foundation v. California Coastal Commission* (1994) 26 Cal.App.4th 151, 155-156 [finding a project exempt from CEQA review where two different categorical exemptions combined to cover the project]; see also *Berkeley Hillside Preservation, supra,* 60 Cal.4th at 1093.) Because all of the alterations proposed in this PDPA application are covered under either Class 1 or Class 2 categorical exemptions, the PDPA is exempt from CEQA review.

Once an agency determines that a project is categorically exempt from CEQA, the agency must ensure that "the application of that categorical exemption is not barred by one of the exceptions set forth in Section 15300.2." (*Berkeley Hillside Preservation, supra,* 60 Cal.4th at 1103 [quoting 14 CCR § 15061, subd. (b)(2)].) If a project meets the requirements of a categorical exemption, the party challenging the exemption bears the burden of producing evidence supporting an exception. In this case, it is clear that no exceptions are applicable to JH Ranch's PDPA.

For example, there is no evidence that unusual circumstances exist in this case which would make application of a categorical exemption inappropriate. The court in *Berkeley Hillside* made clear that for this exception to a CEQA exemption to apply, "it is not alone enough that there is a reasonable probability that the activity will have a significant effect on the environment." (*Berkeley Hillside* at 1097.) Instead, there must be a reasonable possibility that the project "will have a significant effect on the environment *due to unusual circumstances*." (*Id.* quoting 14 CCR § 15300.2, subd. (c), italics added.) There are no unusual circumstances involved in JH Ranch's proposed PDPA, and as such, this exception is inapplicable.

Similarly, there is no evidence that the project will result in cumulative impacts caused by successive projects of the same type in the same place, over time. At the outset, the critical question when considering whether the cumulative impact exception applies is whether there is substantial evidence of any environmental impact caused by the project. (*Santa Monica Chamber of Commerce v. City of Santa Monica* (2002) 101 Cal.App. 4th 786, 798.) So, the exception does not apply even if projects of the same type are proposed in the same area, but these projects do not result in new substantial adverse impacts. Put another way, "[j]ust as zero when added to any other sum results in no change to the final amount, so, too, when no environmental impacts cognizable under CEQA are added to the alleged environmental impacts of past projects, there is no cumulative increased impact." (*Id.* at 799.) In any event, the PDPA proposes updates to existing structures, so this is not a situation where successive projects of the same type are being approved in the same place. For example, no other summer camp or similar summer visitor projects are proposed in the area. Rather, the PDPA represents a reshuffling of existing users among existing structures, and the modernization of those structures. (Compare with *Id.* at p. 798 [exemption appropriate where city had already adopted 49 preferential parking zone plans because subsequent amendment via exemption did not increase visitors or need for more parking — instead, project "caused reshuffling of existing users into existing parking spaces"].) For these reasons, and because the alterations to and the replacement of existing structures proposed in the PDPA will have no impact on the environment, the cumulative impact exception does not apply.

### 2.3 Proposed Changes

The PDPA master plan identifies which housing facilities will remain unchanged, which facilities will undergo interior and/or exterior alterations, restoration, and rehabilitation, and which facilities will be replaced or reconstructed. Any changes to existing facilities will take place on existing building sites and will not result in the expansion of an existing use.

The PDPA will allow for the removal, alteration, addition, restoration and/or rehabilitation of proposed housing facilities. **All changes to enhance guest and staff amenities**

**will occur without triggering an increase in occupancy** above 482 occupants, and these activities are exempt from CEQA review under Class 1 (Existing Facilities) and/or Class 2 (Replacement or Reconstruction) categorical exemptions. (14 CCR §§ 15301-15302.)

### 2.3.1 Rezoning

The PDPA includes the rezoning of JH Ranch property contiguous to the current PD District which would increase the amount of land zoned as PD from 79 acres to 201 acres. This rezoning is exempt from CEQA review pursuant to the "common sense" exemption because the rezoning will have no significant effect on the environment. (14 CCR § 15061(b)(3).) The common sense exemption from CEQA review is applicable where "it can be seen with certainty that there is no possibility that the activity in question may have a significant effect on the environment." (14 CCR § 15061, subd. (b)(3).)

JH Ranch is not proposing any operational changes to its current Ranch activities. The maximum Ranch occupancy will not exceed the existing occupancy levels and the Ranch will continue operating within the existing program parameters that have been established since the 1993 PD Amendment. Nearly all of the restoration and reconstruction associated with the project will take place within the existing PD boundary. Again, no significant changes in the current use or occupancy of the Ranch are proposed, and timberland will continue to be the predominant feature across the Ranch's acreage. Accordingly, no significant impacts to the environment will result from rezoning the property. (See *Muzzy Ranch Co. v. Solano County Airport Land Use Commission* (2007) 41 Cal.4th 372, 388 [airport land use plan incorporating existing county general plan and zoning provisions concerning dwelling units properly exempted from CEQA pursuant to common sense exemption].)

### 2.3.2 Class 1 Exemptions

All modifications are described in detail on Sheet C-2 (Master Plan), Housing specific Site Plans (Sheet D1-D14) and the Housing Spreadsheet (Sheet C-3). The following narrative provides an explanation of the proposed modifications. It is important to note that at no time will the maximum overnight guest occupancy exceed 482 people.

#### 2.3.2.1 Changes to Two-Story Duplex Cabins

Currently, there are five 2-story duplex cabins named:

a. Cottonwoods (32 persons);
b. Dogwoods (32 persons);
c. Ponderosa (28 persons);
d. Evergreens (28 persons);
e. Redwoods (28 persons).

JH Ranch proposes to make minor interior alterations to these duplex cabins and incrementally add to the footprint of the Cottonwoods and Dogwoods cabins in order to accommodate improved guest amenities. The footprint of each cabin would increase by 208 SF and the total size of each cabin would increase by 598 SF over two floors as shown on Sheet D-1 and Sheet D-2. These renovations will result in an increase of 29 percent to the total size of each cabin. This 29 percent increase in size falls squarely within the Class 1 categorical exemption, which allows additions to existing structures, as long as the addition does not result in an increase of 50 percent or more. Alterations to both cabins will be located on the same site as the existing structures and will have exactly the same purpose and capacity as the existing structures. Five trees immediately adjacent to the Cottonwoods cabin will be removed and no additional parking will be required. All necessary utility, sewer, and water service lines currently exist. These proposed changes will not increase the maximum overnight occupancy and are categorically exempt from CEQA review under the Class 1-Existing Facilities exemption. (14 CCR § 15301.)

JH Ranch also proposes to make interior alterations and add to the footprint of the Ponderosa, Evergreens and Redwoods cabins to accommodate improved guest amenities. The footprint would increase by 208 SF per cabin to provide additional facilities and improved guest amenities. The proposed addition will result in an increase of 13 percent to the footprint of the Ponderosa (see Sheet D-8), Redwoods (see Sheet D-9), and Evergreen (see Sheet D-10) cabins. Alterations to these three cabins will take place on the same site as the existing structures and will have exactly the same purpose and capacity. Only one tree immediately in front of the Ponderosa cabin will be removed and no additional parking will be required. All necessary utility, sewer, and water service lines currently exist. These proposed changes will not increase the maximum overnight occupancy and are categorically exempt from CEQA review under the Class 1-Existing Facilities exemption. (14 CCR § 15301.)

#### 2.3.2.2 Changes to Single-Story Duplex Cabins

Currently, there are five single story duplex cabins named:

a. Hemlocks (20 persons);
b. Birches (20 persons);
c. Willows (20 persons);
d. Maples (20 persons);
e. Madrones (20 persons).

JH Ranch proposes to make interior alterations and incrementally add to the footprint of each of these single story duplex cabins to accommodate improved guest amenities. The footprint of each cabin would increase by 230 SF to provide additional facilities as shown on

Sheet D-4 – D-7. Specifically, seven feet will be added to the length of each cabin. These additions will result in an increase of 29 percent to the footprint of each cabin. All cabins will be located on the same site as the existing structures, will have exactly the same purpose, and will result in a decrease in each cabin's maximum overnight occupancy from 20 to 16 persons. Only one tree immediately adjacent to the Hemlocks will be removed and no additional parking will be required. All necessary utility, sewer, and water service lines currently exist. These proposed changes will not increase the maximum overnight occupancy and are categorically exempt from CEQA review under the Class 1-Existing Facilities exemption. (14 CCR § 15301.)

### 2.3.2.3 Changes to Single-Story Cabins

Currently, there are five single story cabins named:

a. Alders (8 persons);
b. Oaks (8 persons);
c. Cedars (8 persons).
d. Firs (8 persons).
e. Pines (8 Persons).

JH Ranch proposes to make only minor interior alterations to the Alders cabin. The Alders will not increase in size and the overnight occupancy will be reduced from eight to four overnight occupants. Additionally, JH Ranch proposes to make interior alterations and incrementally add to the footprint of the Oaks, Cedars, Firs, and Pines cabins to improve guest amenities. The footprint of each cabin would increase by 90 SF to provide additional facilities as shown on Sheet D-11 – D-14. Specifically, five feet will be added to the length of each cabin. These additions will result in an increase of 13 percent to the footprint of each cabin. All cabins will be located on the same site as the existing structures and will have exactly the same purpose and maximum overnight occupancy. Only one tree immediately adjacent to the Cedars cabin will be removed and no additional parking will be required. All necessary utility, sewer, and water service lines currently exist. These proposed changes will not incur any changes to the maximum overnight occupancy and are categorically exempt from CEQA review under the Class 1-Existing Facilities exemption (14 CCR § 15301.).

### 2.3.2.4 Changes to the Ranch House

Currently, there is a single-family house called the Ranch House. JH Ranch proposes to make interior and exterior alterations to this home. Alterations to the Ranch House will take place on the same site as the existing structure. The purpose, capacity, and size of the altered structure will remain the same as will the existing structure. The proposed alterations will not increase the maximum overnight occupancy or size of this house and are categorically exempt from CEQA review under the Class 1-Existing Facilities exemption (14 CCR § 15301.).

#### 2.3.2.5 Changes to Single-Story Bunk Cabins

There are two single story bunk cabins named the Eden and the Breezeway. JH Ranch proposes to make interior and exterior alterations to both the Eden and Breezeway cabins. Alterations to the both of these cabins will take place on the same site as the existing structures. The size, purpose and capacity will remain the same as the existing structures. The proposed alterations will not increase the maximum overnight occupancy or size of the cabins and are categorically exempt from CEQA review under the Class 1-Existing Facilities exemption (14 CCR § 15301.)

#### 2.3.2.6 Changes to Equipment Storage and Maintenance Buildings

Currently, there are three equipment storage and maintenance buildings. JH Ranch proposes to make alterations to the interior and exterior of these buildings. These alterations will take place on the same site as the existing structures and are categorically exempt from CEQA review under the Class 1-Existing Facilities exemption. (14 CCR § 15301.)

#### 2.3.2.7 Changes to Single-Family Homes currently used as Employee Housing

The Wrangler is a single-family house currently used as employee housing. JH Ranch proposes to make interior and exterior alterations to Wrangler. Alterations to Wrangler will take place on the same site as the existing structure. The purpose and capacity will remain the same as the existing structure and maximum overnight occupancy will not increase. The proposed alterations are categorically exempt from CEQA review under the Class 1-Existing Facilities exemption. (14 CCR § 15301.)

The Ritz is a single-family house used as employee housing. JH Ranch proposes to make interior and exterior alterations to the Ritz cabin. Alterations will take place on the same site as the existing structure and will result in no changes to the footprint, purpose or size of this house. The interior and exterior alterations will provide for increased occupancy capacity which will allow for occupancy to be redistributed to the Ritz cabin. This will not result in an expansion of the existing use beyond the purpose of guest and/or staff housing. No tree removal or additional parking will be required. All necessary utility, sewer, and water service lines needed for the update currently exist. These proposed changes are categorically exempt from CEQA review under the Class 1-Existing Facilities exemption. (14 CCR § 15301.)

The Woodlands is a single-family house used as employee housing. JH Ranch proposes to make interior and exterior alterations to improve guest amenities (see Sheet C-2). Alterations will take place on the same site as the existing structure and will result in no changes to the purpose or size of this house. No tree removal or additional parking required. All necessary utility, sewer, and water service lines needed for the update currently exist. These proposed changes are categorically exempt from CEQA review under the Class 1-Existing Facilities exemption. (14 CCR § 15301.)

### 2.3.3 Class 2 Exemptions

#### 2.3.3.1 Replacement of the Manor House

Currently, the single-family house called Manor House is 4,205 SF and has a maximum overnight occupancy of 24 occupants. JH Ranch proposes to replace the Manor House with one cabin (see Sheet C-2) on the same site as the Manor. The replacement cabin be 3,580 SF, resulting in a decrease of 15 percent of the floor area. The proposed replacement cabin will not increase the current footprint of the Manor House, and due to the nature of the replacement, there will no tree removal or additional parking required. All necessary utility, sewer, and water service lines currently exist. These proposed changes will not increase the maximum overnight occupancy and are categorically exempt from CEQA review under the Class 2-Replacement or Reconstruction exemption. (14 CCR § 15302.)

#### 2.3.3.2 Replacement of Single Family Homes Currently Used as Employee Housing

The Convent is a single family home currently used as employee housing. JH Ranch proposes to replace the Convent with one cabin (see Sheet C-2) on the same site as the Convent that will have exactly the same area, purpose, and overnight occupancy of six occupants. There will be no tree removal or additional parking required. All necessary utility, sewer, and water service lines currently exist. These proposed changes will not increase the maximum overnight occupancy and are categorically exempt from CEQA review under the Class 2 Replacement or Reconstruction exemption (14 CCR § 15302.)

Currently, there is a single-family house used as employee housing named the Green Bean with a maximum overnight occupancy of six occupants. JH Ranch proposes to replace the Green Bean with one cabin (see Sheet C-2) on the same site as the Green Bean, which will have exactly the same purpose with the same maximum overnight occupancy of six occupants. In addition, the replacement structure will be about 193 square feet smaller than the existing structure. There will be no tree removal or additional parking required. All necessary utility, sewer, and water service lines currently exist. These proposed changes will not increase the maximum overnight occupancy and are categorically exempt from CEQA review under the Class 2-Replacement or Reconstruction exemption. (14 CCR § 15302.)

### 2.3.4 Summary

In summary, the current total square footage of existing housing facilities is 41,834 SF. The proposed total square footage of housing facilities is 44,346 SF.[1] This represents a marginal increase in total square footage of 6 percent. No single modification to an existing structure exceeds the maximum allowable increase of more than 50 percent or 2,500 square feet. All existing uses and capacities will remain the same. A maximum of eight trees immediately adjacent to existing cabins will be removed. Therefore, all housing facilities are categorically exempt from CEQA review under Class 1 (Existing Facilities) and/or Class 2 (Replacement or Reconstruction) exemptions. (14 CCR §§ 15301-15302.)

## 3.0 General Development and Use

### 3.1 Overall Use and Intent

The properties shown in the proposed PDPA are used as a year-round guest ranch operation. This use has not deviated from the Guest Ranch activities described and approved in the 1993 PDPA (See J.H. Ranch Planned Development Amendment Z-93-11, Staff Report for Siskiyou County Board of Supervisors Resolution approving amendment, Oct, 26, 1993). Furthermore, the guest ranch use is consistent with the SCC's definition of a Planned Development District with a solitary land use. (SCC § 10-61183(c).)

Further information on JH Ranch programs can be found in Section 1.2.4, "Program Overview." This section provides a description of program uses and operations that have developed since the 1993 PD Amendment. This discussion reflects all current Ranch operations and was used as the baseline reference point for the analysis of Biological, Noise and Traffic assessments prepared by SHN, Consulting Engineers & Geologists, Inc. (SHN) in 2010 (see Attachments A1 & B1, B4-B6 respectively).

### 3.2. Utility Systems

### 3.2.1. Wastewater Capacity

JH Ranch has an on-site sewage treatment facility that was approved for use by the Siskiyou County Environmental Health Department (SCEHD). Refer to Attachment C5 (JH Ranch Existing Utilities Plan) for the location of wastewater infrastructure components. The system currently treats all wastewater from all Ranch facilities except Hillside 1 & 2, which are serviced though individual septic tanks approved for use by the SCEHD. All existing

---

[1] There are several facilities which will undergo no alterations: two single-family houses called Hillside 1 & 2 and 14 single story tent-like cabins named the Upper and Lower Village.

wastewater treatment systems are capable of treating waste for a total of 562 persons (2010 California Plumbing Code), or 45,000 gallons a day.

At the request of the North Coast Regional Water Quality Control Board (RWQCB), JH Ranch has submitted an application for the above referenced waste water facility to be regulated by the North Coast RWQCB. A draft Waste Discharge Requirements Order No. R1-2016-0013 (WDR) (see http://www.waterboards.ca.gov/northcoast/public_notices/public_hearings/npdes_permits_and_wdrs.shtml) and a Response to Comments for the JH Ranch Wastewater Treatment Facility has been prepared by the North Coast RWQCB. A public hearing is scheduled for April 7, 2016 to adopt the above referenced Order, which imposes effluent limitations and other requirements for the discharge of waste from the wastewater treatment facility to leach field areas adjacent to the treatment facility.

### 3.2.2 Potable Water Capacity

JH Ranch provides water that is monitored and regulated by the State Water Resources Control Board to its facilities through a series of existing groundwater wells with storage tanks. JH Ranch's potable water system is regulated by the California Department of Public Health (CDPH) as a Type N1, Transient Non-Community System; System No. 4700807. Testing is performed on a quarterly basis by Basic Labs in Redding, CA and is submitted directly to the CDPH. As shown in Table 3.0, current water storage capacity is 44,200 gallons of potable water. See Attachment C5 (JH Ranch Existing Utilities Plan) for locations of wells and storage tanks.

JH Ranch's existing water system is designed to provide daily and peak flow demands to meet the needs of up to 553 persons (80 gallons per person per day) and the system is sufficient for the existing maximum occupancy of 482 persons. The existing well supply system is sufficient to provide for existing demands and includes routing flexibility to allow associated wells and storage facilities to service all demands.

A Technical Evaluation of Groundwater and Surface Water Interaction (see attachment B3) has been prepared to study the potential for interaction between the groundwater extracted by the wells at JH Ranch and the surface water flows in Paynes Lake Creek and French Creek. This study concluded that the existing wells have sufficient capacity to supply the required water volumes for the changes addressed in this application. Therefore, the continued use of Wells 4 and 5 for current operations will not have an impact on the flows in Paynes Lake Creek and French Creek.

Additionally, because JH Ranch is not an industrial, manufacturing, or processing plant or industrial park, and the alterations proposed in this PDPA application do not demand an amount of water equivalent to the amount of water required by a 500 dwelling unit project,[2] a Water Supply Assessment is not required. (Cal. Water Code § 10912.)

| **Table 3.0**<br>**Potable Water Storage Capacity (see Sheet C-5)** | |
|---|---|
| Storage Tank (location) | Tank Capacity (gallons) |
| Storage Tank "A" | 12000 |
| Storage Tank "B","C","D","E","F",'G" | 5,000/each |
| Storage Tank "H" & "I" | 1,100/each |
| Total Storage Capacity | 44200 |

| **Table 3.1**<br>**Well Location and Supply Summary (see Sheet C-5)** | |
|---|---|
| **Well (location)** | **Approximate capacity (gallons per minute)** |
| **Well #3 (Green Bean)** | **20 gallons per minute** |
| **Well #4 (Near Laundry)** | **45 gallons per minute** |
| **Well #5 (Big Top)** | **45 gallons per minute** |

## 3.3 Noise

Two different noise analysis reports were prepared for this PDPA application. The first report, which analyzed the noise conditions during summer and winter periods of 2010, was prepared by SHN. This report was updated with a revised report in August 2011. The sound level measurements (Attachment B1, Revised Sound Analysis Results for JH Ranch – Table 2) indicate similar sound measurements were recorded in the Winter and Summer periods.

[2] The amount of water required by a 500 dwelling unit project is approximately 133,912 gallons per day if water is used year round. This gallon capacity equates to slightly over 1600 occupants, which is far more than sufficient for the proposed changes addressed in this application. (See Attachment B-2, Water Supply Assessment Memorandum.)

JH Ranch identified the summer Student Leadership program as having the highest daytime noise potential. Daytime sound level measurements taken during the Student Leadership program are not significantly different from the Winter sound level measurements. As for nighttime sound levels, JH Ranch identified events at the Big Top as having the highest noise potential. The noise analyses determined that sound levels were below 50 dBA immediately adjacent to the Big Top tent and extending to the property line during the anticipated loudest time of the peak summer period (i.e., during events at the Big Top).

The Siskiyou County General Plan Noise Element identifies the Ldn noise level necessary to protect public health and welfare (i.e., prevention of interference and annoyance) within an adequate margin of safety for land uses such as "outdoors in residential areas and farms and other outdoor areas … in which quiet is a basis for use" as 55 dBA. (County General Plan, Noise Element, Table A-6.) This outdoor Ldn noise level was chosen to "assure that a 45 Ldn indoor level will be achieved by the noise attenuation of regular construction materials." (County General Plan, Noise Element, pp. 56-57.) With peak noise levels measured below 50 dBA, JH Ranch operations under the proposed PDPA will be in compliance with the applicable Siskiyou County noise regulations. Furthermore, the PDPA does not involve any change in occupancy or use at JH Ranch from currently existing conditions, so no new or increased noise impacts will result from the Project.

### 3.4 Traffic

#### 3.4.1 Overview

Traffic to and from JH Ranch is typically generated from three sources: (1) guests arriving and departing for their programs at the Ranch; (2) program traffic that departs and returns to the Ranch during the week, taking guests to various destinations; and (3) staff and operational traffic, such as delivery trucks.

A substantial effort has been made by both Siskiyou County and JH Ranch to evaluate the potential environmental traffic impacts generated from the proposed PDPA amendment. Technical studies undertaken include the following:

1. Traffic volume analysis prepared by SHN. (See Attachment A1, Revised JH Ranch Traffic Volume Study, August 8, 2012). This traffic analysis collected and analyzed roadway information and existing traffic data for French Creek Road;
2. Peer Review of Applicant-prepared Traffic Analysis dated October 18, 2012;
3. Response to Omni-Means Peer Review of SHN Traffic Analysis, JH Ranch Planned Development Plan Amendment Application, #Z-11-01;

4. VISSIM micro-simulation analysis prepared by Kittleson and Associates dated May 10, 2013.

As explained above, current Ranch overnight occupancy is limited to 482 occupants, and the PDPA application does not change the Ranch's occupancy from existing conditions. Since the PDPA will not result in changes to existing occupancy levels, the Project will not result in any traffic impacts above current conditions.

### 3.4.2 Traffic Analysis

The traffic analysis conducted by SHN captured the peak traffic volumes by counting trips during the peak summer season in 2010, during the program for which guests utilize their own vehicles (as compared with the Student Leadership (SL) program where students are brought in by bus), thereby capturing maximum incoming and outgoing traffic levels. The report showed an ADT of 225 along French Creek Road during the non-Summer period. To ascertain the level of summer program traffic, traffic counters were set up at three locations on French Creek Road and the main access point to JH Ranch to conduct a volume survey during a portion of the summer guest season. To be conservative, the traffic counts were taken during the Parent/Child (PC) and Husband & Wife (HW) program because the participants provide their own transportation to and from the Ranch.

During the monitoring period, French Creek Road was open to the public and provided unimpeded access to National Forest lands and wilderness areas, as well as to other residential, agriculture and timberlands. Additionally, at JH Ranch, there were approximately 125 seasonal staff, 40 full-time staff, and 175 guests from the PC and HW programs. Guests arrived and left (program transition periods) on the Saturdays of July 31 and August 7, 2010. Based on the data collected, French Creek Road had an ADT of 439 vehicles, in comparison to the ADT of 225 vehicles during the non-Summer period. Neither ADT figure accounts for a projected 10-year growth rate of 1.5% for non-Ranch traffic on French Creek Road.

Since the completion of the 2010 traffic studies, JH Ranch implemented operational changes to help reduce the overall traffic ADT volumes on French Creek Road. This includes separating all guest arrival and departure days (program transition periods). JH Ranch has also eliminated late evening outbound guest traffic from JH Ranch associated with the Parent Child program. Separating all guest arrival and departure days has resulted in a loss of 10% peak season revenue for JH Ranch, however it has resulted in a public benefit by reducing the overall traffic ADT volumes on French Creek Road during peak season.

## p3.5 Emergency Vehicle Access

Emergency vehicle access at JH Ranch is provided by two vehicle bridges. (See Attachment C4, JH Circulation Plan and Section 1.2.3.) The bridges have been constructed to provide emergency vehicle access and meet the current CalFire and County standards for fire truck load ratings. Paved and gravel roads provide all-weather access to developed portions of the Ranch property, and circular driveways and hammerhead turn-a-rounds are provided at all structures. The limited changes to facilities outlined in this application will continue to provide emergency vehicle access pursuant to the County's standard design requirements that are in place at the time of building permit application.

## 3.6 State Responsibility Area Regulations

As set forth in section 1.2.1, CEQA analysis must focus exclusively on the delta between the existing baseline conditions on the site and the changes proposed by the Project. Thus, the existing condition of French Creek Road, the Ranch's attendance levels, and existing structures and uses are all part of the baseline conditions and are not a separate consideration presently under review.

The scope of the State Responsibility Area ("SRA") Regulations are clear that the Regulations do <u>not</u> apply to existing structures, roads, streets or facilities. The road width regulation specified in the California Code of Regulations, Title 14, Section 1273.01 only applies to new roadway construction — specifically: "the perimeters and access to all residential, commercial, and industrial building construction within state responsibility areas approved after January 1, 1991". (*Ennabe v. Manosa* (2014) 58 Cal. 4th 697; see also *Tucker Land Co. v. State of California* (2011) 94 Cal. App. 4th 1191 [Stating that the primary focus of statutory interpretation is on the plain meaning of the statute, "giving the words their usual and ordinary meaning"].)

From a practical perspective, JH Ranch is not proposing to change existing conditions at the Ranch, increase existing capacity, or undertake new construction of buildings or roads without complying with the SRA Regulations. The scope of the SRA Fire Safe Regulations "do not apply to existing structures, roads, streets, and private lanes or facilities" and they specifically apply only to "…construction approved after January 1, 1991." (14 Cal. Code Regs. §1270.02.) Thus, the regulation does not apply to JH Ranch according to the plain meaning of Section 1270.02, which governs the scope and applicability of Section 1273.01. Any future increase in capacity or new construction will be premised on compliance with the SRA Regulations.

JH Ranch has been in communication with CalFire counsel regarding compliance with CalFire regulations. CalFire counsel agrees that Section 1273.01 does not apply to JH Ranch's proposal to repair or improve the existing facilities, and case law provides support for this position. In *James B. Dean v. Deerwood Corp.*, the 5th District Court of Appeals found that even moving and improving an existing road did not constitute "new construction," and thus the fire safety regulations did not apply. (*James B. Dean v. Deerwood Corp.*, (2009) WL 540220 [citing 14 Cal. Code Regs., § 1270.02 and §1273.00 et seq.].) Similarly, since JH Ranch's Project simply seeks to repair, renovate and update existing structures and amend its PD District and will not build any new roads or buildings, its actions do not fall within the scope of Section 1270.02 or 1273.01.

### 3.7 Emergency Evacuation Plan

SHN Consulting Engineers & Geologists (SHN) has been working with JH Ranch to develop an emergency evacuation plan. This plan provides procedures for fire emergencies and facility evacuation of guests and employees from the JH Ranch property in case evacuation is necessary.

In order to comply with the SRA Regulations, JH Ranch has provided reasonable evacuation routes from its facility along existing public roads. These routes include paved & non-paved County roads and non-paved Forest Service roads. These public roads are open for public use and are also used by emergency vehicles to access private and public lands in the French Creek area. (See Attachment B7, Fire Emergency Procedure Plan.**)** A description of these routes is listed below:

**Route 1** takes guests and staff from JH Ranch down French Creek Road to State Highway 3. This route is a Siskiyou County paved and maintained road and is the main North/South access road in the area. This route also provides daily access to the JH Ranch. Using this route, JH Ranch is approximately 4.5 miles from State Highway 3.

**Route 2** takes guests from the JH Ranch to Miners Creek Road which is located to the East of JH Ranch. Miners Creek Road eventually turns North/South. Turning south along Miners Creek Road, continuing on Miners Creek Road to Forest Service Road 40N37, then south until it intersects with Sugar Creek/Tiger Fork (40N22). From there, the road provides access to State Highway 3 north of Callahan. Using this route, JH Ranch is approximately eight miles from State Highway 3.

These access routes have provided JH Ranch and surrounding private and public lands with both daily access (residential, construction, deliveries, maintenance, etc.) and emergency access (Scott Valley Fire, CALFIRE, US Forest Service, Ambulance, Sheriff) since the JH Ranch facility was originally opened in 1980.

Attachment A1

SHN CONSULTING ENGINEERS & GEOLOGISTS, INC.
812 W. Wabash • Eureka, CA 95501-2138 • 707/441-8855 • FAX: 707/441-8877 •shninfo@shn-engr.com

Reference: 509051.100

August 8, 2012

Greg Plucker
Deputy Director for Planning
806 South Main Street
Yreka, CA 96097

**Subject: French Creek Road Traffic Analysis**
**JH Ranch, Siskiyou County, California**

Dear Mr. Plucker:

This analysis has been prepared to augment the previous SHN Consulting Engineers & Geologists, Inc. (SHN) traffic analysis for French Creek Road in relation to the on-going operations at JH Ranch. It also responds to questions raised by Siskiyou County about traffic and roadway characteristics on French Creek, the county road that accesses JH Ranch.

## 1.0 Scope of Report

This traffic analysis has been prepared by SHN to collect and analyze roadway information and existing traffic data for French Creek Road. Data was collected and assessed from the intersection of French Creek Road and California Route 3 to approximately 4.7 miles south at the intersection of French Creek Road and Homestead Lane (Figure 1).

## 2.0 Existing Conditions

The area tributary to French Creek Road is currently developed with a mixture of uses, such as agriculture, timber production on private forest lands, multiple uses on National Forest lands, single-family residential and planned development, and commercial operations at JH Ranch. French Creek Road is open year-round to public uses and provides access to public and private lands along its route. It is one of the routes for public access to the Klamath National Forest and the Marble Mountain Wilderness area.

French Creek Road in this area has characteristics fairly typical of roadways in the vicinity and contains a number of curves and limited shoulder widths in some areas. French Creek Road is paved its entire length from the intersection of State Highway 3 to past the JH Ranch. Roadside ditches are maintained in locations along its length. Siskiyou County has signed various portions of French Creek Road with warning (intersection and curve signs) and regulatory speed signs (speed limits), with a maximum speed posting of 40 miles per hour (mph). Several public and private roads connect to French Creek Road and provide access to other areas in the vicinity.

## 2.1 Existing Traffic Counts

The Highway Capacity Manual indicates that the ideal capacity of any road segment is approximately 1,800 vehicles per hour (vph) per direction. This number is based on free-flow conditions; and it varies due to road conditions, sight distances, intersections, and other site-specific roadway conditions. Additionally, the Circulation Element of the Siskiyou County General Plan identifies roadways in the county that have at least an 18-foot pavement width and are under free-flow conditions as Level of Service (LOS) A. French Creek Road meets these county definitions except in one location where the pavement width is limited to 14-feet due to an existing rock outcrop and utility pole. As such, the county has calculated that the service volume (the volume of traffic that a roadway can accommodate and continue to meet LOS A standards) is 1,408 average daily traffic (ADT), or 169 vph (Siskiyou County Circulation Element, 1988).

SHN conducted volume counts on French Creek Road from May 19 to May 25, 2010, and from July 27 to August 9, 2010 (SHN, 2011). For this analysis, the May 2010 data was considered to be the off-season, or winter traffic volume. Summer traffic data collected in July and August includes traffic generated by JH Ranch during full summer operation. During the period of data collection, JH Ranch had approximately 40 full-time staff, 125 seasonal staff, and 175 guests onsite. Guest arrival and departure times occurred during the analysis period. French Creek Road was also open to the public and provided unimpeded access to National Forest lands and wilderness areas, as well as to other residential, agriculture, and timber lands during both winter and summer data-collection periods.

As shown in Table 1, the combined peak volumes for French Creek Road are well below the service volumes calculated for the roadway (1,408 ADT) based on the County Circulation Element.

**Table 1**
**Traffic Volumes for French Creek Road**
**2010**

| Season | Volumes (vehicles) | | | | | | |
|---|---|---|---|---|---|---|---|
| | Average Daily Traffic | Weekday Average Daily Traffic | Weekday Peak Hour, a.m. | Weekday Peak Hour, p.m. | Weekend Average Daily Traffic | Weekend Peak Hour, a.m. | Weekend Peak Hour, p.m. |
| Winter | 225 | 229 | 32 | 52 | 216 | 17 | 23 |
| Summer | 439 | 449 | 104 | 76 | 409 | 72 | 56 |

## 2.2 French Creek Road Characterization

French Creek Road was characterized to provide a better understanding of current road conditions. Characterization included dividing the road into six sections between the intersection of French

Creek Road and California Route 3 and the intersection of French Creek Road with Homestead Lane (Figure 1). Sections were chosen based on the similarity of road characteristics. General section descriptions are as follows:

- Sections 1 and 2: Roadway has wide lanes and shoulders, and mild slopes.
- Section 3: Lanes narrow slightly with varying shoulder widths and more frequent curves.
- Section 4: Short section (0.2 miles) that includes the narrowest road and shoulder widths.
- Section 5: Lane widths, grade, and shoulder widths increase.
- Section 6: Lane and shoulder widths are similar to section 5, but grade increases.

On July 11, 2012, measurements of lane width, grade, and shoulder width were taken within each section at approximately one-quarter-mile increments, or when road characteristics changed noticeably (Table 2). Photos were taken at each measured location and are included in Appendix A.

**Table 2**
**French Creek Road Measurements**
**Wednesday, July 11, 2012**

| Section | Location | Distance from CA Route 3 (miles) | Road Width (ft)[1] | West Shoulder Width (ft) | East Shoulder Width (ft) | Grade (%) |
|---|---|---|---|---|---|---|
| 1 | 1 | 0.1 | 24 | 3 | 1 | 2.5 |
| 1 | 2 | 0.4 | 24 | 4 | 1 | 2.8 |
| 1 | 3 | 0.7 | 22 | 1 | 2 | 1.2 |
| 2 | 0 | 1.0 | 25 | 2 | 3 | 2.9 |
| 2 | 1 | 1.2 | 22 | 1 | 3 | 0.6 |
| 3 | 0 | 1.4 | 22 | 3 | 2 | 1.8 |
| 3 | 1 | 1.5 | 23 | 1 | 2 | 1.3 |
| 3 | 2 | 1.7 | 23 | 7 | 2 | 4.5 |
| 3 | 3 | 2.0 | 22 | 1 | 3 | 1.3 |
| 3 | 4 | 2.3 | 23 | 3 | 0 | 0.6 |
| 3 | 5 | 2.5 | 25 | 2 | 3 | 2.7 |
| 3 | 6 | 2.9 | 24 | 0 | 0 | 0.4 |
| 3 | 7 | 3.2 | 20 | 0 | 1 | 1.0 |
| 3 | 8 | 3.4 | 20 | 2 | 2 | 1.7 |
| 4 | 0 | 3.5 | 21.5 | 1 | 2 | 1.1 |
| 4 | 1 | 3.6 | 11.5 | 1 | 1 | 1.8 |
| 4 | 2 | 3.65 | 24.5 | 0 | 0 | NM[1] |
| 5 | 0 | 3.7 | 21 | 3 | 1 | 3.5 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 5 | 1 | 4.0 | 19 | 4 | 1 | 2.4 |
| 5 | 2 | 4.2 | 22 | 3 | 1 | 1.8 |
| 6 | 0 | 4.3 | 19 | 1 | 2 | 4.5 |
| 6 | 1 | 4.55 | 19.5 | 4 | 1 | 3.7 |
| End | | 4.7 | 22 | 2 | <1 | 7.6 |

1. ft: feet
2. NM: Not Measured

# 3.0 Cumulative Traffic Growth

Cumulative traffic growth occurs over time based on population and traffic growth estimates that is from normal population growth, and project related traffic that may be above the background growth estimates. These two values help to estimate cumulative traffic growth over time.

## 3.1 Background Growth

Background growth is general growth in traffic not related to traffic from specific projects (such as JH Ranch). Future traffic levels for this analysis were calculated using two growth rates:

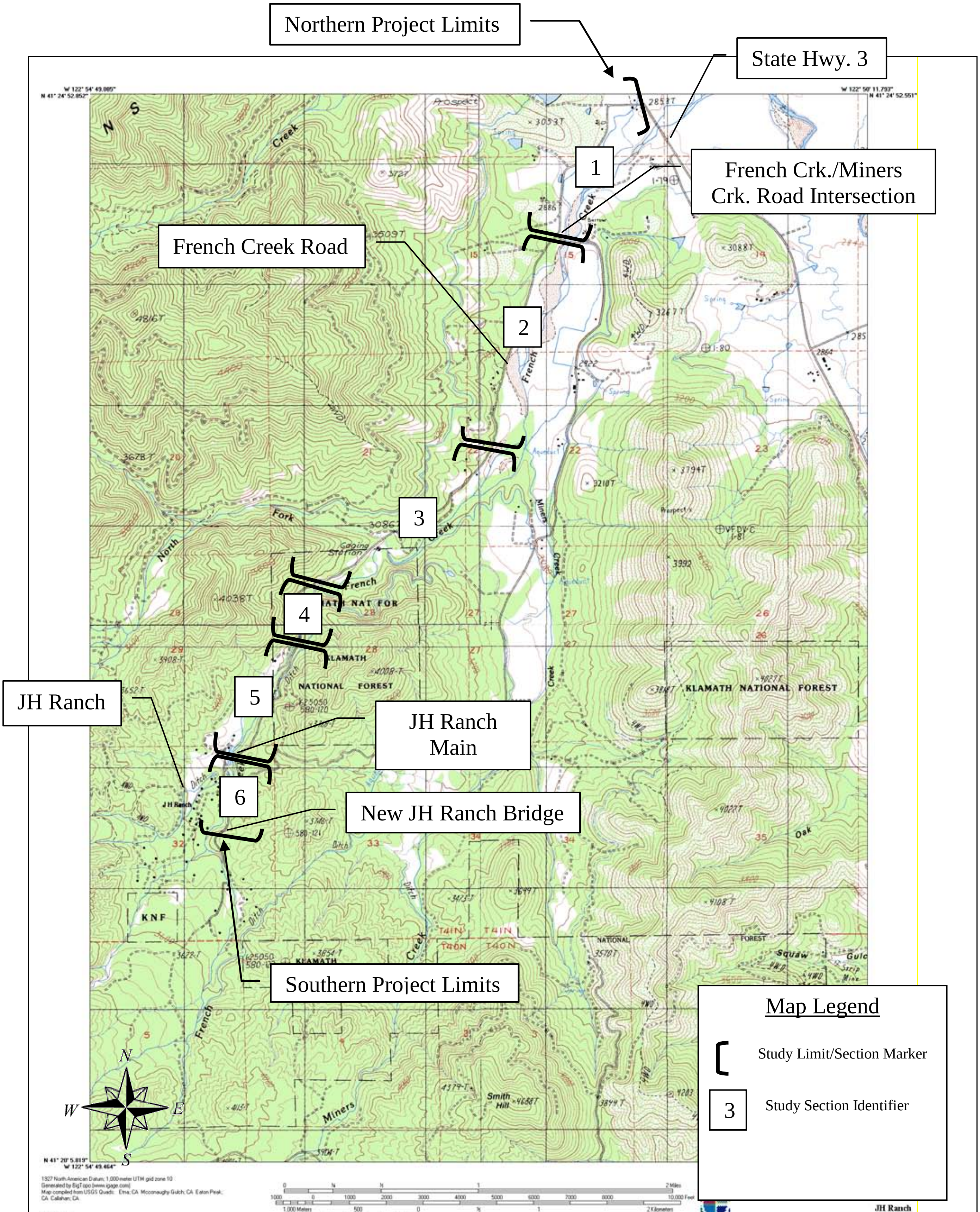
- **2% Growth Rate**. A 2% growth rate was used for area traffic based on historical standards for the industry. Research, especially in California, has shown that this rate overestimates the future potential traffic volumes. This very conservative approach provides the highest potential traffic volumes, based on local growth only.

- **1% Growth Rate**. A 1% growth rate was also used based on California data that shows this to be closer to realistic traffic-related growth projections in the state. This rate is also close to the typical Siskiyou County growth rate over the last several decades.

Table 3 presents current and projected values for ADT and peak hour traffic.

**Table 3**
**Current and Projected Average Daily Traffic and Peak Hour Vehicle Count**
**French Creek Road**

| Season | 2010 | | 2015 | | 2020 | |
|---|---|---|---|---|---|---|
| | ADT | Peak Hour | ADT | Peak Hour | ADT | Peak Hour |
| **Winter (2%)** | 225 | 52 | 248 | 57 | 270 | 62 |
| **Summer (2%)** | 439 | 104 | 483 | 114 | 527 | 125 |
| **Winter (1%)** | 225 | 52 | 236 | 55 | 248 | 57 |
| **Summer (1%)** | 439 | 104 | 461 | 109 | 483 | 114 |




| | | |
|---|---|---|
| SHN Consulting Engineers & Geologists, Inc. | JH RANCH<br>FRENCH CREEK ROAD STUDY<br>SISKIYOU COUNTY, CA | PROJECT STUDY LIMITS<br>STUDY SECTION LOCATIONS<br>JOB #509051.100 |
| | July 2012 | W:\2009\509051-JHRanchPlanning\100-Traffic-Studies\Figs\Figure 1.doc |
| | | Figure **#1** |

Using county information that indicated that there are 66 undeveloped parcels that could be developed for single-family housing uses, SHN calculated that the build-out of parcels in the next 10 years could potentially be 12 parcels (2% per year development). Using this information and a conservative trip generation value of 10 vehicle trips per day from each parcel, background traffic associated with residential development could increased by as much as 120 vehicles per day.

## 4.0 Roadway Analysis

Roadway analysis was conducted using roadway analysis worksheets from the 2000 Highway Capacity Manual. The worksheets require a set of inputs based on roadway characteristics and traffic volume, from which the allow calculation of the Level of Service (LOS) and other performance measures.

These are the required inputs:

- **Highway class:** French Creek Road is a Class II highway. Class II highways are two lane highways on which motorists do not expect to travel at high speeds (HCM, 2000).
- **Terrain:** Grades on French Creek Road in the analysis area are short and range from 0.4% to 4.5% making an assumption of rolling terrain reasonable.
- **Two-way hourly volume:** The maximum or peak hourly volume was used to provide the most conservative LOS estimate.
- **Directional split:** Traffic was assumed to be split equally between north and southbound lanes.
- **Peak hour factor (PHF):** A peak hour factor is used to estimate a peak hour from average hour data. The peak hour data was used instead of average data so the PHF is 1.
- **Percent trucks and buses:** A conservative value of 2 percent truck and bus traffic was used.
- **Percent recreational vehicles:** Recreational vehicles were assumed to be minimal, and can be accounted for by the conservative percent truck rate. Therefore a value of 0 percent was used.
- **Percent no passing zone:** To be as conservative as possible the roadway was considered to be a no passing zone for 100 percent of its length. This factor has the greatest impact on the LOS when compared to the other input parameters.
- **Access points:** No access points in the project area have a measurable impact on traffic flow.
- **Lane and shoulder width:** Lane and shoulder widths were based on data provided in Table 2. The most representative lane widths were used, except for section 4. The minimum lane width for a two lane road is 9 ft and was used in section 4 due to the single lane location in this segment.
- **Base free flow speed (BFFS):** Base free flow speed of 40 mi/h was used in sections 1 and 2, based on the posted speed limit. A BFFS of 30 mi/h was used in all other sections due to increased grade and reduced sight distances.

A sample worksheet from the 2000 Highway Capacity Manual and calculation sheets are included in Appendix B.

### 4.1 Section Capacity and Level of Service

Under the conservative assumptions listed above, all sections meet LOS A criteria, with both current and projected peak hour traffic volumes. The peak hour volumes (PHV) required for the roadway to be classified as LOS B or LOS C were calculated using the calculation sheets provided in Appendix B. Peak hour traffic volumes of 143 vph and 365 vph would be required to reduce the roadway to LOS B and LOS C, respectively. It should be noted that LOS calculations are designed for two lane roads, and they may not adequately address the single-lane location on French Creek Road that is approximately 3.6 miles south of California Route 3. However, French Creek Road exhibits conditions that meet the two lane criteria for virtually all of the roadway evaluated.

Volume-to-capacity ratios were calculated under current and projected conditions using both 1% and 2% percent growth rates (Table 4).

### 4.2 Project Related Traffic

The level of service and capacity calculations summarized in Table 4 indicates that French Creek Road has capacity to support additional project traffic. Specifically, the 2020 future year projection is for 125 vph during the peak hour which leaves approximately 240 vehicles of reserve capacity.

The previous report approximated 75% of the summer volume increase was associated with JH Ranch, which is 39 vehicles during the peak hour. Comparing this volume to the reserve capacity, the traffic from JH Ranch programs, participants could increase approximately six-fold (600%) before the level of service would drop below the county standard of LOS C.

**Table 4**
**Current and Projected Volume to Capacity Ratio**
**French Creek Road**

| Season | 2010 | 2015 | 2020 |
|---|---|---|---|
| **Winter (2%)** | 0.021 | 0.024 | 0.026 |
| **Summer (2%)** | 0.043 | 0.047 | 0.052 |
| **Winter (1%)** | 0.021 | 0.023 | 0.024 |
| **Summer (1%)** | 0.043 | 0.045 | 0.047 |

## 5.0 Conclusions and Recommendations

Based on the review of the information above and discussions about LOS conditions (current and potential future) for French Creek Road, our conclusions from our earlier studies have not changed.

The Circulation Element of the Siskiyou County General Plan identifies roadways in the county that have at least an 18-foot pavement width and are under free-flow conditions as LOS A. French Creek Road meets these county definitions except in one location where the road narrows to a single lane. As such, the county has calculated that the service volume (the traffic that a roadway can accommodate and continue to meet LOS A standards) is 1,408 ADT, or 169 vehicles per hour (Siskiyou County Circulation Element, 1988). Even at 2% growth, the projected ADT in 2020 is 527 vehicles, which is less than 40% of the county's calculated service volume. The projected PHV in 2020, based on a growth rate of 2%, is 125 vehicles, would meet the County's LOS A criteria.

Based on the 2000 Highway Capacity Manual, a PHV of 365 vph would be required before the roadway could be categorized as LOS C. At 2% annual growth, it will take approximately 125 years for French Creek Road to reach this PHV during the summer. It would take approximately 300 years at 2% growth to reach LOS C during the rest of the year.

The reserve capacity of French Creek Road in 2020 for a 2% growth rate could accommodate an additional 240 vehicles during the peak hour before reaching the threshold for mitigation. JH Ranch currently accounts for approximately 39 vehicles during the peak hour; thus, JH Ranch programs could increase approximately 600% before reaching LOS C standards for the future year.

In conclusion, JH Ranch does not trigger mitigation thresholds from its programs on French Creek Road. Please call me at 707-441-8855 if you have any questions or concerns.

Sincerely,

**SHN Consulting Engineers & Geologists, Inc.**

Brian A. Freeman, P.E., T.E.
Senior Civil Engineer

BAF:bgh:lms
Appendix A: Photographs
Appendix B: Roadway Analysis Forms

## Appendix A

# Photographs

**Figure A-1**
Section 1, Location 1. Road width is 24 feet, with east and west shoulder widths of 1 and 3 feet, respectively. Grade is 2.5%.

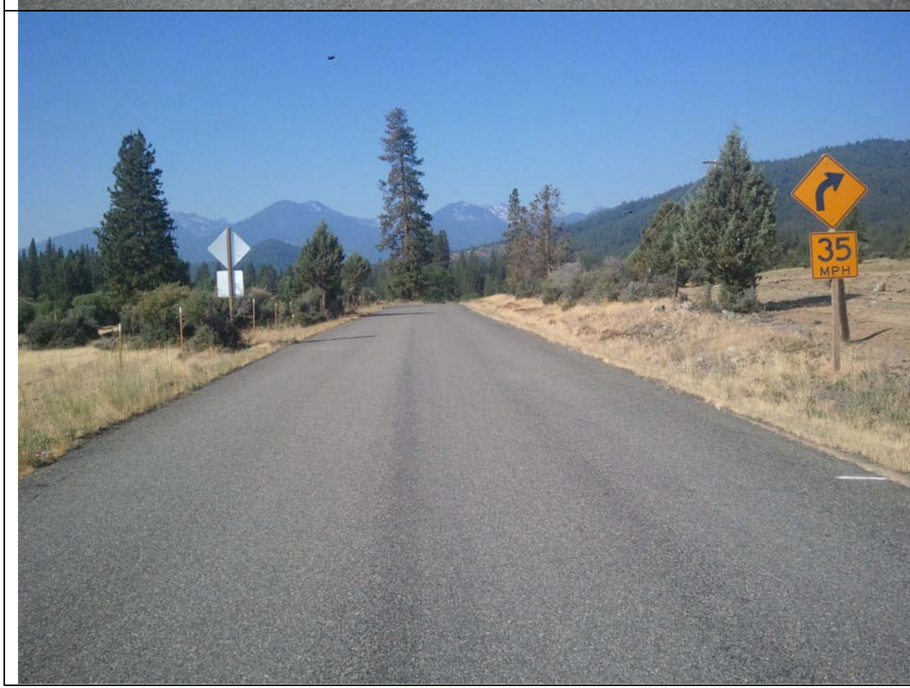
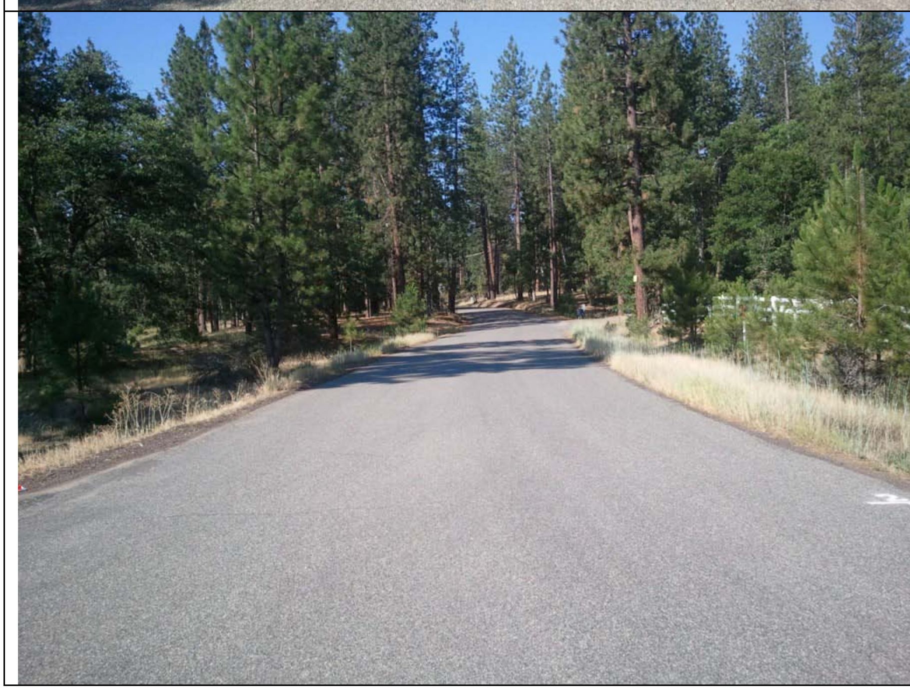
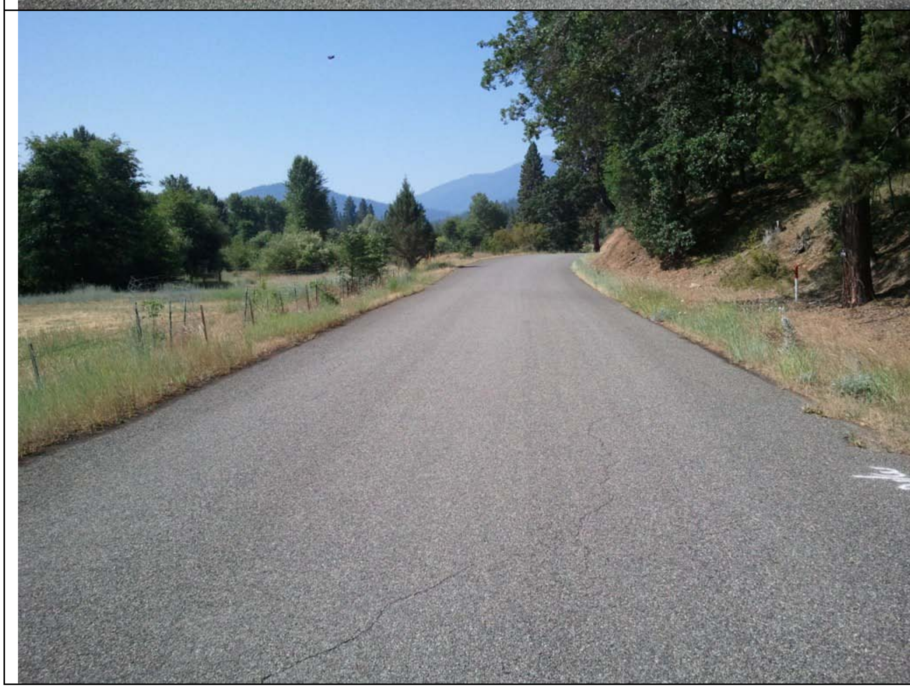
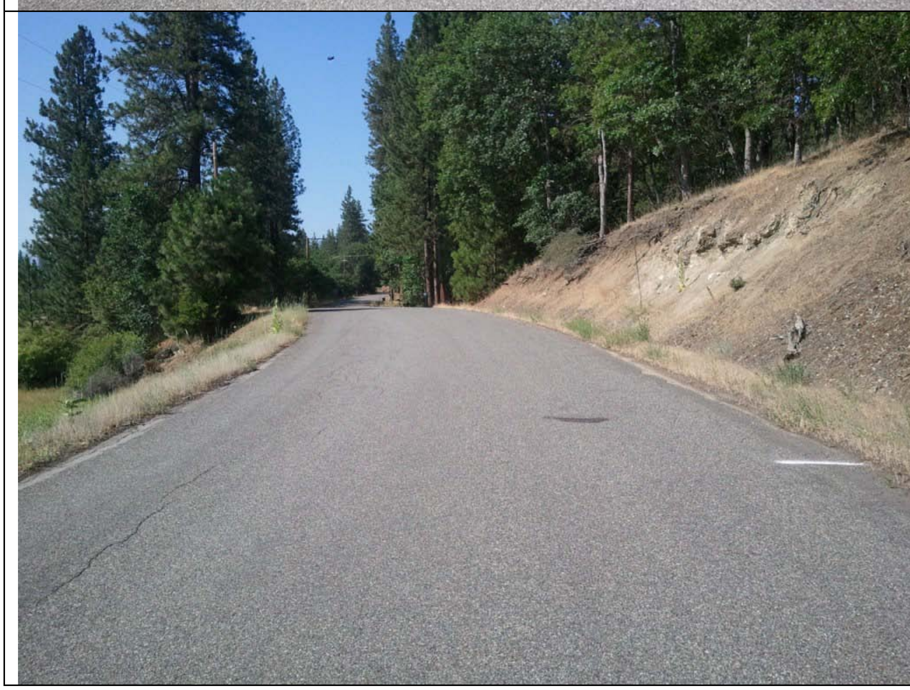
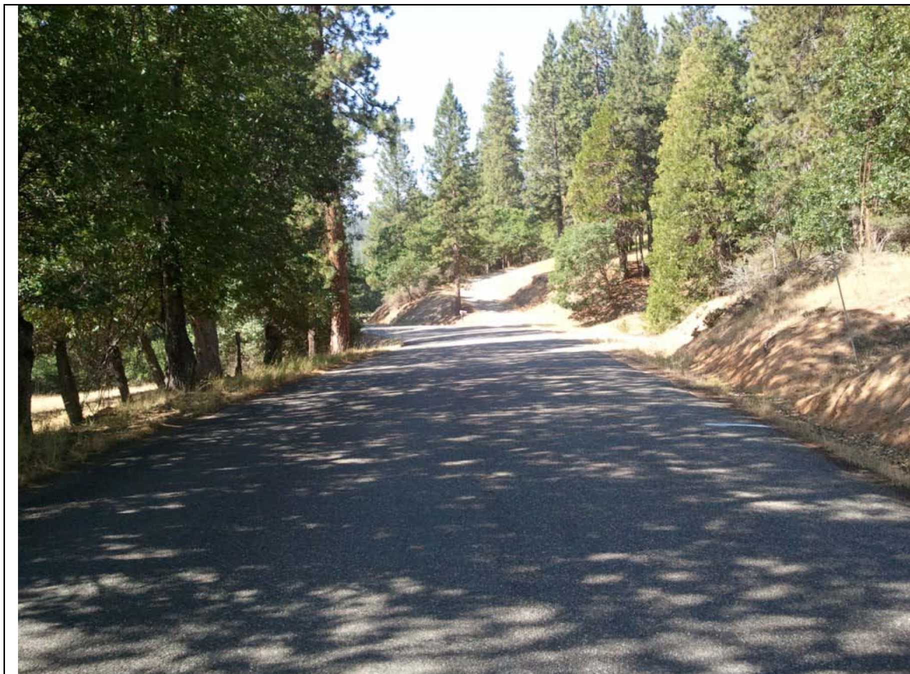
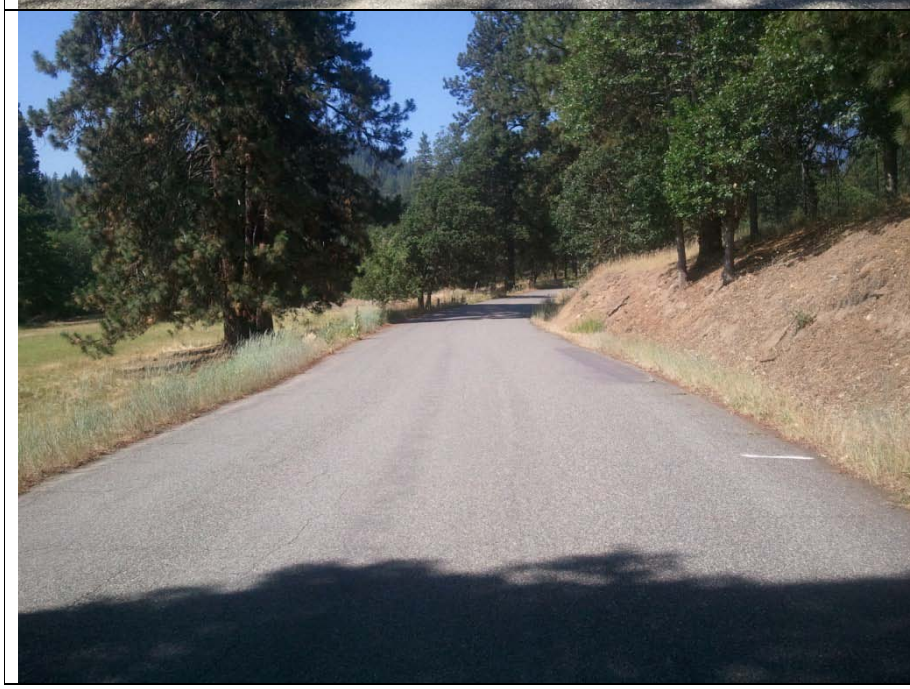



**Figure A-2**
Section 1, Location 2. Road width is 24 feet, with east and west shoulder widths of 1 and 4 feet, respectively. Grade is 2.8%.

| | |
|---|---|
|  | **Figure A-3**<br>Section 1, Location 3. Road width is 22 feet, with east and west shoulder widths of 2 feet and 1 foot, respectively. Grade is 1.2%. |
|  | **Figure A-4**<br>Section 2, Location 0. Road width is 25 feet, with east and west shoulder widths of 3 and 2 feet, respectively. Grade is 2.9%. |

| | |
|---|---|
|  | **Figure A-5**<br>Section 2, Location 1. Road width is 22 feet, with east and west shoulder widths of 3 feet and 1 foot, respectively. Grade is 0.6%. |
|  | **Figure A-6**<br>Section 3, Location 0. Road width is 22 feet, with east and west shoulder widths of 2 and 3 feet, respectively. Grade is 1.8%. |

| | |
|---|---|
|  | **Figure A-7**<br>Section 3, Location 1. Road width is 23 feet, with east and west shoulder widths of 2 feet and 1 foot, respectively. Grade is 1.3%. |
|  | **Figure A-8**<br>Section 3, Location 2. Road width is 23 feet, with east and west shoulder widths of 2 and 7 feet, respectively. Grade is 4.5%. |

| | |
|---|---|
|  | **Figure A-9**<br>Section 3, Location 3. Road width is 22 feet, with east and west shoulder widths of 3 feet and 1 foot, respectively. Grade is 1.3%. |
|  | **Figure A-10**<br>Section 3, Location 4. Road width is 23 feet, with east and west shoulder widths of 0 and 3 feet, respectively. Grade is 0.6%. |

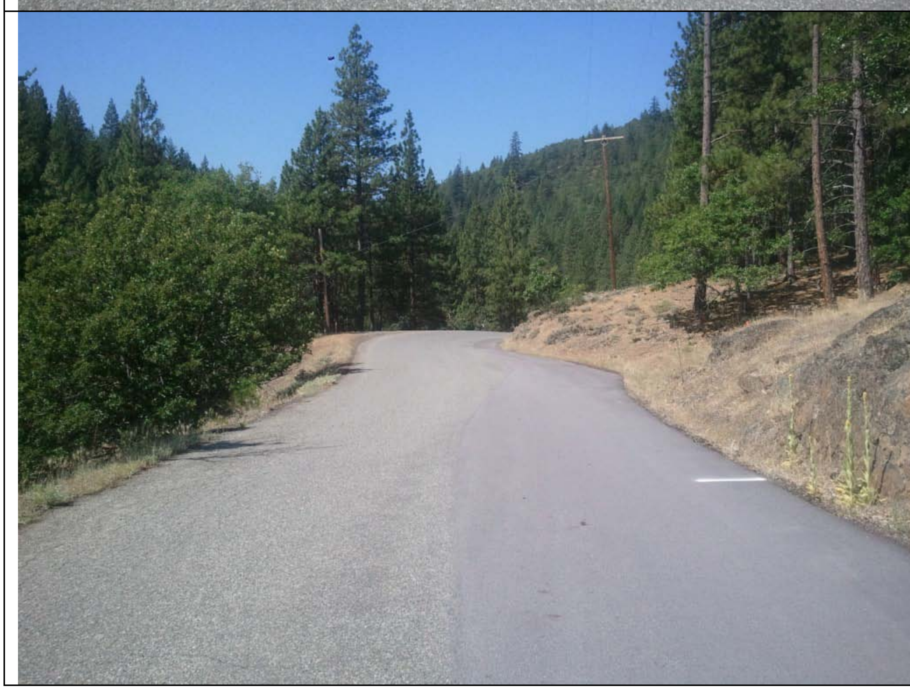
| | |
|---|---|
|  | **Figure A-11** Section 3, Location 5. Road width is 25 feet, with east and west shoulder widths of 3 feet and 2 feet, respectively. Grade is 2.7%. |
|  | **Figure A-12** Section 3, Location 7. Road width is 20 feet, with east and west shoulder widths of 1 and 0 feet, respectively. Grade is 1.0%. |

**Figure A-13**
Section 3, Location 8. Road width is 20 feet, with east and west shoulder widths of 2 feet. Grade is 1.7%.

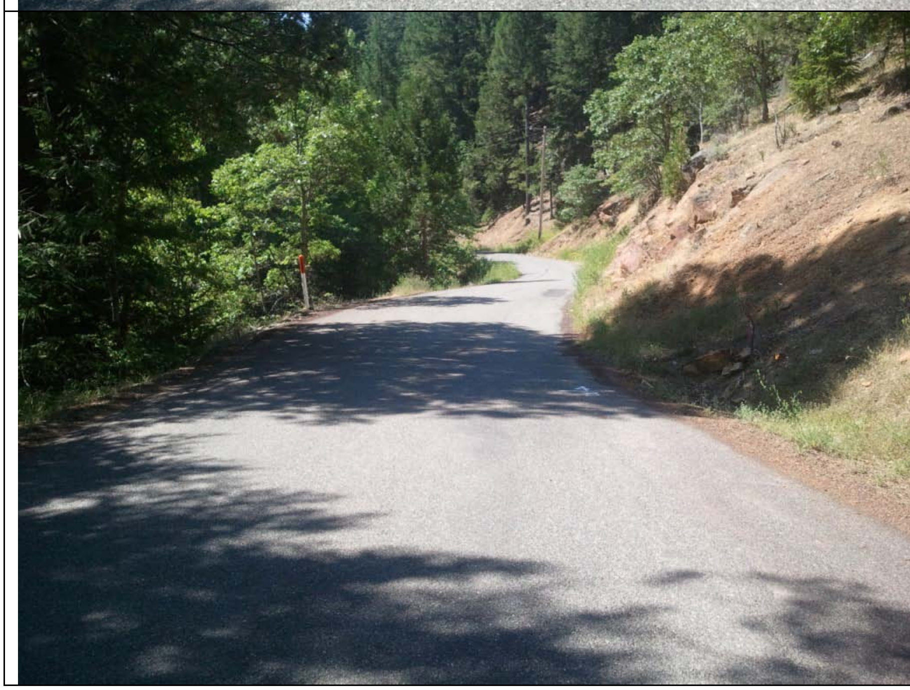


**Figure A-14**
Section 4, Location 0. Road width is 21.5 feet, with east and west shoulder widths of 2 feet and 1 foot, respectively. Grade is 1.1%.

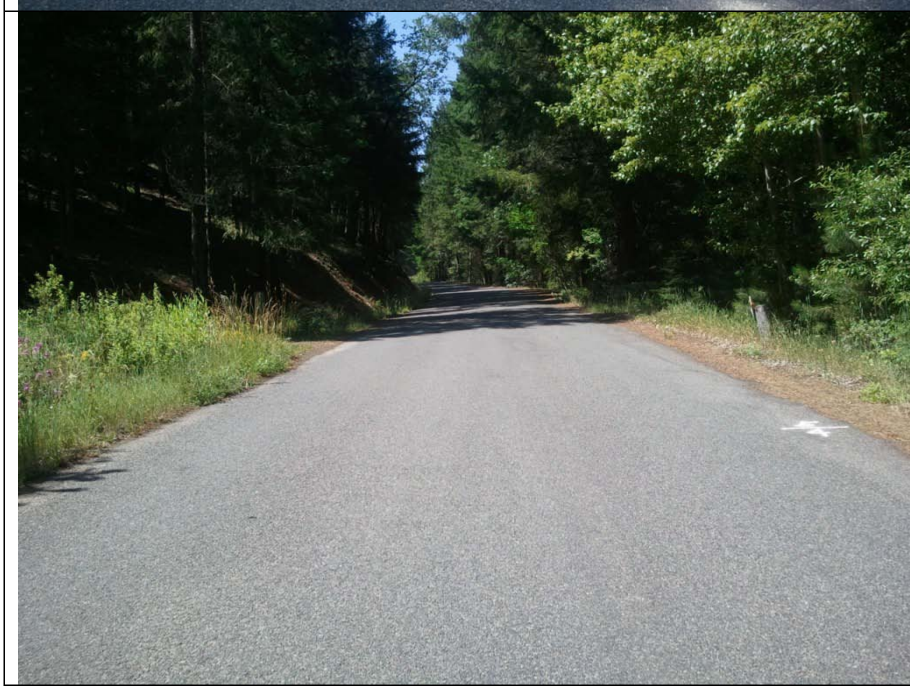
| | |
|---|---|
|  | **Figure A-15**<br>Section 4, Location 1. Road width is 11.5 feet, with east and west shoulder widths of 1 foot. Grade is 1.8%. |
|  | **Figure A-16**<br>Section 5, Location 0. Road width is 21 feet, with east and west shoulder widths of 1 foot and 3 feet, respectively. Grade is 3.5%. |

**Figure A-17**
Section 5, Location 1. Road width is 19 feet, with east and west shoulder widths of 1 and 4 feet, respectively. Grade is 2.4%.

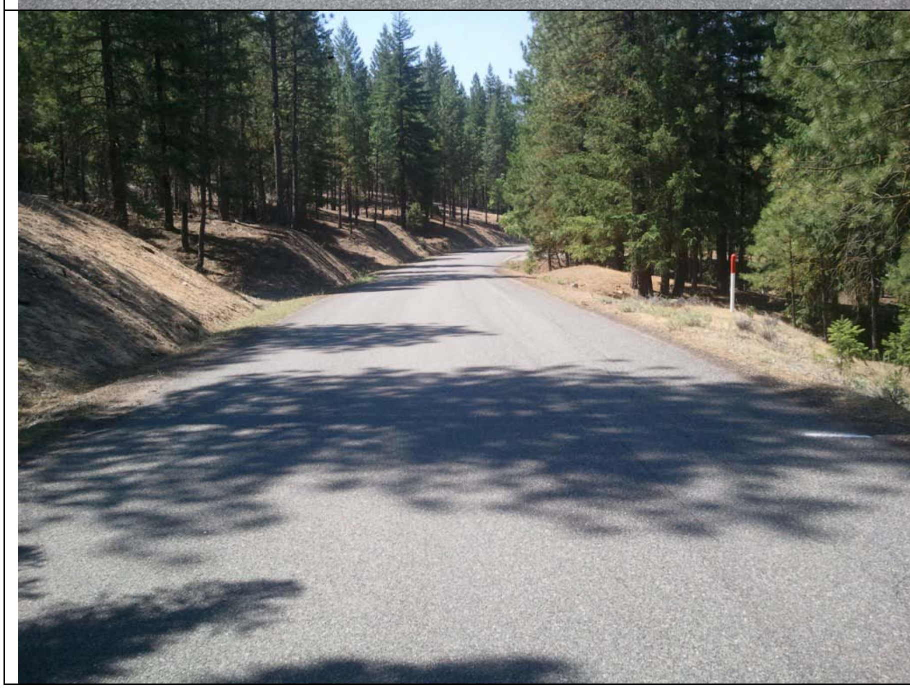


**Figure A-18**
Section 5, Location 2. Road width is 22 feet, with east and west shoulder widths of 1 foot and 3 feet, respectively. Grade is 1.8%.

**Figure A-19**
Section 6, Location 0. Road width is 19 feet, with east and west shoulder widths of 2 feet and 1 foot, respectively. Grade is 4.5%.

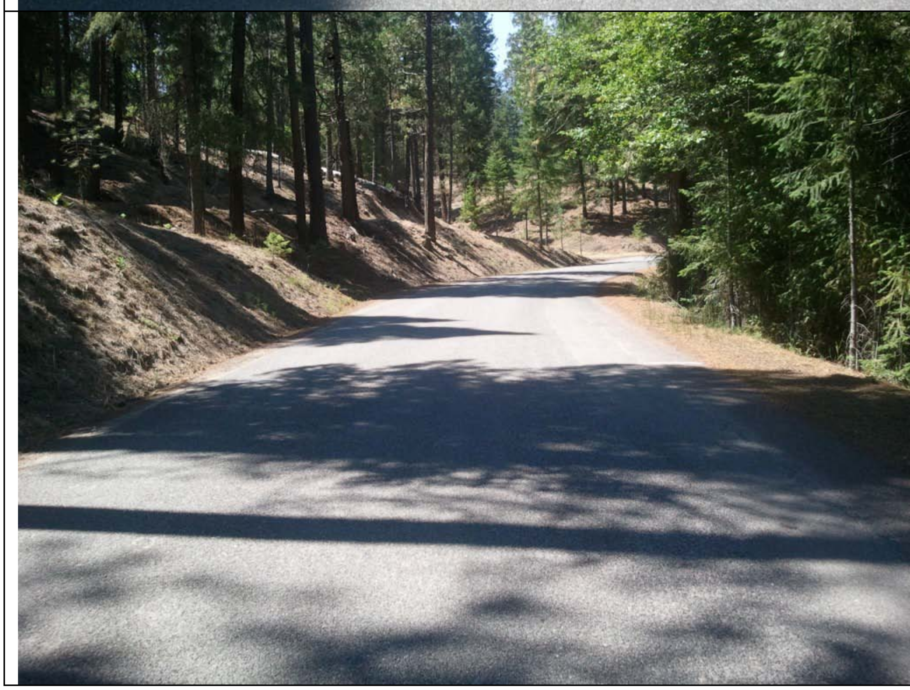


**Figure A-20**
Section 6, Location 1. Road width is 19.5 feet, with east and west shoulder widths of 1 foot and 4 feet, respectively. Grade is 3.7%.

| | |
|---|---|
|  | **Figure A-21**<br>End Section at intersection of French Creek Road and Homestead Lane.<br>Road width is 22 feet, with east and west shoulder widths of less than 1 foot and 2 feet, respectively. Grade is 7.6%. |

## Appendix B

# Roadway Analysis Forms

**Two-Way Two Lane Highway Segment Worksheet***

| | |
|---|---|
| Section | 1 |
| Time Period | Winter 2020 |
| Projected Growth Rate | 2% |

| Level of Service Criteria | |
|---|---|
| **LOS** | **PTSF** |
| A | ≤40 |
| B | >40-55 |
| C | >55-70 |
| D | >70-85 |
| E | >85 |

| Input Data | |
|---|---|
| Highway Class | II |
| Terrain | Rolling |
| Two way hourly volume (veh/hour) (V) | 62 |
| Highest Directional Split Proportion | 0.5 |
| Peak hour factor (PHF) | 1 |
| % Trucks and Buses ($P_{t)}$) | 2% |
| % Recreational Vehicles ($P_{R)}$) | 0% |
| % No passing zone | 100% |
| Access points/mile | 0 |
| Shoulder width (ft) | 1 |
| Lane width (ft) | 12 |
| Lane width (ft) | 12 |
| Shoulder width (ft) | 2 |
| Segment Length (Lt) | 1 |

| Level of Service and Other Performance Measures | |
|---|---|
| Level of Service (LOS) | A |
| Volume to capacity ratio (v/c) | 0.026 |
| Peak 15-min vehicle miles of travel (VMT15) (veh-mi) | 15.5 |
| Peak-hour vehicle-miles of travel (VMT60) (veh-mi) | 62 |
| Peak 15-min total travel time (TT15) (veh-h) | 0.49 |

| Average Travel Speed | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.71 |
| Passenger-car equivalents for trucks (ET) | 2.5 |
| Passenger-car equivalents for RVs (ER) | 1.1 |
| Heavy vehicle adjustment factor (FHV) | 0.971 |
| Two way flow rate (vp) (pc/h) | 89.9 |
| vp*highest directional proportion (pc/h) | 45.0 |
| Base free flow speed (BFFS) | 40 |
| Adjustment for lane and shoulder width (fLS) | 4.2 |
| Adjustment for access points (fA) | 0 |
| Free flow speed (FFS) | 35.8 |
| Adjustment for no-passing zones (fnp) (mi/h) | 3.5 |
| Average Travel Speed (ATS) (mi/h) | 31.6 |

| Percent Time Spent Following | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.77 |
| Passenger-car equivalents for trucks (ET) | 1.8 |
| Passenger-car equivalents for RVs (ER) | 1 |
| Heavy vehicle adjustment factor (FHV) | 0.984 |
| Two way flow rate (vp) (pc/h) | 81.8 |
| vp*highest directional proportion (pc/h) | 40.9 |
| Base percent time spent following (BPTSF) | 6.94 |
| Adjustment for directional distribution and no passing zones (fd/np) | 21.8 |
| Percent Time Spent Following (PTSF) | 28.74 |

*Worksheet based on worksheet provided in the Highway Capacity Manual 2000

## Two-Way Two Lane Highway Segment Worksheet*

| | |
|---|---|
| Section | 2 |
| Time Period | Winter 2020 |
| Projected Growth Rate | 2% |

| Level of Service Criteria | |
|---|---|
| **LOS** | **PTSF** |
| A | ≤40 |
| B | >40-55 |
| C | >55-70 |
| D | >70-85 |
| E | >85 |

| Input Data | |
|---|---|
| Highway Class | II |
| Terrain | Rolling |
| Two way hourly volume (veh/hour) (V) | 62 |
| Highest Directional Split Proportion | 0.5 |
| Peak hour factor (PHF) | 1 |
| % Trucks and Buses ($P_{t)}$) | 2% |
| % Recreational Vehicles ($P_{R)}$) | 0% |
| % No passing zone | 100% |
| Access points/mile | 0 |
| Shoulder width (ft) | 3 |
| Lane width (ft) | 12 |
| Lane width (ft) | 12 |
| Shoulder width (ft) | 1 |
| Segment Length (Lt) | 0.4 |

| Level of Service and Other Performance Measures | |
|---|---|
| Level of Service (LOS) | A |
| Volume to capacity ratio (v/c) | 0.026 |
| Peak 15-min vehicle miles of travel (VMT15) (veh-mi) | 6.2 |
| Peak-hour vehicle-miles of travel (VMT60) (veh-mi) | 24.8 |
| Peak 15-min total travel time (TT15) (veh-h) | 0.20 |

| Average Travel Speed | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.71 |
| Passenger-car equivalents for trucks (ET) | 2.5 |
| Passenger-car equivalents for RVs (ER) | 1.1 |
| Heavy vehicle adjustment factor (FHV) | 0.971 |
| Two way flow rate (vp) (pc/h) | 89.9 |
| vp*highest directional proportion (pc/h) | 45.0 |
| Base free flow speed (BFFS) | 40 |
| Adjustment for lane and shoulder width (fLS) | 4.2 |
| Adjustment for access points (fA) | 0 |
| Free flow speed (FFS) | 35.8 |
| Adjustment for no-passing zones (fnp) (mi/h) | 3.5 |
| Average Travel Speed (ATS) (mi/h) | 31.6 |

| Percent Time Spent Following | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.77 |
| Passenger-car equivalents for trucks (ET) | 1.8 |
| Passenger-car equivalents for RVs (ER) | 1 |
| Heavy vehicle adjustment factor (FHV) | 0.984 |
| Two way flow rate (vp) (pc/h) | 81.8 |
| vp*highest directional proportion (pc/h) | 40.9 |
| Base percent time spent following (BPTSF) | 6.94 |
| Adjustment for directional distribution and no passing zones (fd/np) | 21.8 |
| Percent Time Spent Following (PTSF) | 28.74 |

*Worksheet based on worksheet provided in the Highway Capacity Manual 2000

**Two-Way Two Lane Highway Segment Worksheet***

| | |
|---|---|
| Section | 3 |
| Time Period | Winter 2020 |
| Projected Growth Rate | 2% |

| Level of Service Criteria | |
|---|---|
| **LOS** | **PTSF** |
| A | ≤40 |
| B | >40-55 |
| C | >55-70 |
| D | >70-85 |
| E | >85 |

| Input Data | |
|---|---|
| Highway Class | II |
| Terrain | Rolling |
| Two way hourly volume (veh/hour) (V) | 62 |
| Highest Directional Split Proportion | 0.5 |
| Peak hour factor (PHF) | 1 |
| % Trucks and Buses ($P_{t)}$) | 2% |
| % Recreational Vehicles ($P_{R)}$) | 0% |
| % No passing zone | 100% |
| Access points/mile | 0 |
| Shoulder width (ft) | 0 |
| Lane width (ft) | 10 |
| Lane width (ft) | 10 |
| Shoulder width (ft) | 1 |
| Segment Length (Lt) | 2 |

| Level of Service and Other Performance Measures | |
|---|---|
| Level of Service (LOS) | A |
| Volume to capacity ratio (v/c) | 0.026 |
| Peak 15-min vehicle miles of travel (VMT15) (veh-mi) | 31 |
| Peak-hour vehicle-miles of travel (VMT60) (veh-mi) | 124 |
| Peak 15-min total travel time (TT15) (veh-h) | 1.51 |

| Average Travel Speed | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.71 |
| Passenger-car equivalents for trucks (ET) | 2.5 |
| Passenger-car equivalents for RVs (ER) | 1.1 |
| Heavy vehicle adjustment factor (FHV) | 0.971 |
| Two way flow rate (vp) (pc/h) | 89.9 |
| vp*highest directional proportion (pc/h) | 45.0 |
| Base free flow speed (BFFS) | 30 |
| Adjustment for lane and shoulder width (fLS) | 5.3 |
| Adjustment for access points (fA) | 0 |
| Free flow speed (FFS) | 24.7 |
| Adjustment for no-passing zones (fnp) (mi/h) | 3.5 |
| Average Travel Speed (ATS) (mi/h) | 20.5 |

| Percent Time Spent Following | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.77 |
| Passenger-car equivalents for trucks (ET) | 1.8 |
| Passenger-car equivalents for RVs (ER) | 1 |
| Heavy vehicle adjustment factor (FHV) | 0.984 |
| Two way flow rate (vp) (pc/h) | 81.8 |
| vp*highest directional proportion (pc/h) | 40.9 |
| Base percent time spent following (BPTSF) | 6.94 |
| Adjustment for directional distribution and no passing zones (fd/np) | 21.8 |
| Percent Time Spent Following (PTSF) | 28.74 |

*Worksheet based on worksheet provided in the Highway Capacity Manual 2000

**Two-Way Two Lane Highway Segment Worksheet***

| | |
|---|---|
| Section | 4 |
| Time Period | Winter 2020 |
| Projected Growth Rate | 2% |

| Level of Service Criteria | |
|---|---|
| **LOS** | **PTSF** |
| A | ≤40 |
| B | >40-55 |
| C | >55-70 |
| D | >70-85 |
| E | >85 |

| Input Data | |
|---|---|
| Highway Class | II |
| Terrain | Rolling |
| Two way hourly volume (veh/hour) (V) | 62 |
| Highest Directional Split Proportion | 0.5 |
| Peak hour factor (PHF) | 1 |
| % Trucks and Buses ($P_{t)}$) | 2% |
| % Recreational Vehicles ($P_{R)}$) | 0% |
| % No passing zone | 100% |
| Access points/mile | 0 |
| Shoulder width (ft) | 1 |
| Lane width (ft) | 9 |
| Lane width (ft) | 9 |
| Shoulder width (ft) | 1 |
| Segment Length (Lt) | 0.2 |

| Level of Service and Other Performance Measures | |
|---|---|
| Level of Service (LOS) | A |
| Volume to capacity ratio (v/c) | 0.026 |
| Peak 15-min vehicle miles of travel (VMT15) (veh-mi) | 3.1 |
| Peak-hour vehicle-miles of travel (VMT60) (veh-mi) | 12.4 |
| Peak 15-min total travel time (TT15) (veh-h) | 0.16 |

| Average Travel Speed | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.71 |
| Passenger-car equivalents for trucks (ET) | 2.5 |
| Passenger-car equivalents for RVs (ER) | 1.1 |
| Heavy vehicle adjustment factor (FHV) | 0.971 |
| Two way flow rate (vp) (pc/h) | 89.9 |
| vp*highest directional proportion (pc/h) | 45.0 |
| Base free flow speed (BFFS) | 30 |
| Adjustment for lane and shoulder width (fLS) | 6.4 |
| Adjustment for access points (fA) | 0 |
| Free flow speed (FFS) | 23.6 |
| Adjustment for no-passing zones (fnp) (mi/h) | 3.5 |
| Average Travel Speed (ATS) (mi/h) | 19.4 |

| Percent Time Spent Following | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.77 |
| Passenger-car equivalents for trucks (ET) | 1.8 |
| Passenger-car equivalents for RVs (ER) | 1 |
| Heavy vehicle adjustment factor (FHV) | 0.984 |
| Two way flow rate (vp) (pc/h) | 81.8 |
| vp*highest directional proportion (pc/h) | 40.9 |
| Base percent time spent following (BPTSF) | 6.94 |
| Adjustment for directional distribution and no passing zones (fd/np) | 21.8 |
| Percent Time Spent Following (PTSF) | 28.74 |

*Worksheet based on worksheet provided in the Highway Capacity Manual 2000

**Two-Way Two Lane Highway Segment Worksheet***

| | |
|---|---|
| Section | 5 |
| Time Period | Winter 2020 |
| Projected Growth Rate | 2% |

| **Level of Service Criteria** | |
|---|---|
| **LOS** | **PTSF** |
| A | ≤40 |
| B | >40-55 |
| C | >55-70 |
| D | >70-85 |
| E | >85 |

| **Input Data** | |
|---|---|
| Highway Class | II |
| Terrain | Rolling |
| Two way hourly volume (veh/hour) (V) | 62 |
| Highest Directional Split Proportion | 0.5 |
| Peak hour factor (PHF) | 1 |
| % Trucks and Buses ($P_{t)}$) | 2% |
| % Recreational Vehicles ($P_{R)}$) | 0% |
| % No passing zone | 100% |
| Access points/mile | 0 |
| Shoulder width (ft) | 3 |
| Lane width (ft) | 10 |
| Lane width (ft) | 10 |
| Shoulder width (ft) | 1 |
| Segment Length (Lt) | 0.6 |

| **Level of Service and Other Performance Measures** | |
|---|---|
| Level of Service (LOS) | A |
| Volume to capacity ratio (v/c) | 0.026 |
| Peak 15-min vehicle miles of travel (VMT15) (veh-mi) | 9.3 |
| Peak-hour vehicle-miles of travel (VMT60) (veh-mi) | 37.2 |
| Peak 15-min total travel time (TT15) (veh-h) | 0.45 |

| **Average Travel Speed** | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.71 |
| Passenger-car equivalents for trucks (ET) | 2.5 |
| Passenger-car equivalents for RVs (ER) | 1.1 |
| Heavy vehicle adjustment factor (FHV) | 0.971 |
| Two way flow rate (vp) (pc/h) | 89.9 |
| vp*highest directional proportion (pc/h) | 45.0 |
| Base free flow speed (BFFS) | 30 |
| Adjustment for lane and shoulder width (fLS) | 5.3 |
| Adjustment for access points (fA) | 0 |
| Free flow speed (FFS) | 24.7 |
| Adjustment for no-passing zones (fnp) (mi/h) | 3.5 |
| Average Travel Speed (ATS) (mi/h) | 20.5 |

| **Percent Time Spent Following** | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.77 |
| Passenger-car equivalents for trucks (ET) | 1.8 |
| Passenger-car equivalents for RVs (ER) | 1 |
| Heavy vehicle adjustment factor (FHV) | 0.984 |
| Two way flow rate (vp) (pc/h) | 81.8 |
| vp*highest directional proportion (pc/h) | 40.9 |
| Base percent time spent following (BPTSF) | 6.94 |
| Adjustment for directional distribution and no passing zones (fd/np) | 21.8 |
| Percent Time Spent Following (PTSF) | 28.74 |

*Worksheet based on worksheet provided in the Highway Capacity Manual 2000

**Two-Way Two Lane Highway Segment Worksheet***

| | |
|---|---|
| Section | 6 |
| Time Period | Winter 2020 |
| Projected Growth Rate | 2% |

| Level of Service Criteria | |
|---|---|
| **LOS** | **PTSF** |
| A | ≤40 |
| B | >40-55 |
| C | >55-70 |
| D | >70-85 |
| E | >85 |

| Input Data | |
|---|---|
| Highway Class | II |
| Terrain | Rolling |
| Two way hourly volume (veh/hour) (V) | 62 |
| Highest Directional Split Proportion | 0.5 |
| Peak hour factor (PHF) | 1 |
| % Trucks and Buses ($P_{t)}$ | 2% |
| % Recreational Vehicles ($P_{R)}$ | 0% |
| % No passing zone | 100% |
| Access points/mile | 0 |
| Shoulder width (ft) | 1 |
| Lane width (ft) | 10 |
| Lane width (ft) | 10 |
| Shoulder width (ft) | 1 |
| Segment Length (Lt) | 0.4 |

| Level of Service and Other Performance Measures | |
|---|---|
| Level of Service (LOS) | A |
| Volume to capacity ratio (v/c) | 0.026 |
| Peak 15-min vehicle miles of travel (VMT15) (veh-mi) | 6.2 |
| Peak-hour vehicle-miles of travel (VMT60) (veh-mi) | 24.8 |
| Peak 15-min total travel time (TT15) (veh-h) | 0.30 |

| Average Travel Speed | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.71 |
| Passenger-car equivalents for trucks (ET) | 2.5 |
| Passenger-car equivalents for RVs (ER) | 1.1 |
| Heavy vehicle adjustment factor (FHV) | 0.971 |
| Two way flow rate (vp) (pc/h) | 89.9 |
| vp*highest directional proportion (pc/h) | 45.0 |
| Base free flow speed (BFFS) | 30 |
| Adjustment for lane and shoulder width (fLS) | 5.3 |
| Adjustment for access points (fA) | 0 |
| Free flow speed (FFS) | 24.7 |
| Adjustment for no-passing zones (fnp) (mi/h) | 3.5 |
| Average Travel Speed (ATS) (mi/h) | 20.5 |

| Percent Time Spent Following | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.77 |
| Passenger-car equivalents for trucks (ET) | 1.8 |
| Passenger-car equivalents for RVs (ER) | 1 |
| Heavy vehicle adjustment factor (FHV) | 0.984 |
| Two way flow rate (vp) (pc/h) | 81.8 |
| vp*highest directional proportion (pc/h) | 40.9 |
| Base percent time spent following (BPTSF) | 6.94 |
| Adjustment for directional distribution and no passing zones (fd/np) | 21.8 |
| Percent Time Spent Following (PTSF) | 28.74 |

*Worksheet based on worksheet provided in the Highway Capacity Manual 2000

**Two-Way Two Lane Highway Segment Worksheet***

| | |
|---|---|
| Section | 1 |
| Time Period | Winter 2020 |
| Projected Growth Rate | 1% |

| Level of Service Criteria | |
|---|---|
| **LOS** | **PTSF** |
| A | ≤40 |
| B | >40-55 |
| C | >55-70 |
| D | >70-85 |
| E | >85 |

| Input Data | |
|---|---|
| Highway Class | II |
| Terrain | Rolling |
| Two way hourly volume (veh/hour) (V) | 57 |
| Highest Directional Split Proportion | 0.5 |
| Peak hour factor (PHF) | 1 |
| % Trucks and Buses ($P_{t)}$) | 2% |
| % Recreational Vehicles ($P_{R)}$) | 0% |
| % No passing zone | 100% |
| Access points/mile | 0 |
| Shoulder width (ft) | 1 |
| Lane width (ft) | 12 |
| Lane width (ft) | 12 |
| Shoulder width (ft) | 2 |
| Segment Length (Lt) | 1 |

| Level of Service and Other Performance Measures | |
|---|---|
| Level of Service (LOS) | A |
| Volume to capacity ratio (v/c) | 0.024 |
| Peak 15-min vehicle miles of travel (VMT15) (veh-mi) | 14.25 |
| Peak-hour vehicle-miles of travel (VMT60) (veh-mi) | 57 |
| Peak 15-min total travel time (TT15) (veh-h) | 0.45 |

| Average Travel Speed | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.71 |
| Passenger-car equivalents for trucks (ET) | 2.5 |
| Passenger-car equivalents for RVs (ER) | 1.1 |
| Heavy vehicle adjustment factor (FHV) | 0.971 |
| Two way flow rate (vp) (pc/h) | 82.7 |
| vp*highest directional proportion (pc/h) | 41.3 |
| Base free flow speed (BFFS) | 40 |
| Adjustment for lane and shoulder width (fLS) | 4.2 |
| Adjustment for access points (fA) | 0 |
| Free flow speed (FFS) | 35.8 |
| Adjustment for no-passing zones (fnp) (mi/h) | 3.5 |
| Average Travel Speed (ATS) (mi/h) | 31.7 |

| Percent Time Spent Following | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.77 |
| Passenger-car equivalents for trucks (ET) | 1.8 |
| Passenger-car equivalents for RVs (ER) | 1 |
| Heavy vehicle adjustment factor (FHV) | 0.984 |
| Two way flow rate (vp) (pc/h) | 75.2 |
| vp*highest directional proportion (pc/h) | 37.6 |
| Base percent time spent following (BPTSF) | 6.40 |
| Adjustment for directional distribution and no passing zones (fd/np) | 21.8 |
| Percent Time Spent Following (PTSF) | 28.20 |

*Worksheet based on worksheet provided in the Highway Capacity Manual 2000

**Two-Way Two Lane Highway Segment Worksheet***

| | |
|---|---|
| Section | 2 |
| Time Period | Winter 2020 |
| Projected Growth Rate | 1% |

| Level of Service Criteria | |
|---|---|
| **LOS** | **PTSF** |
| A | ≤40 |
| B | >40-55 |
| C | >55-70 |
| D | >70-85 |
| E | >85 |

| Input Data | |
|---|---|
| Highway Class | II |
| Terrain | Rolling |
| Two way hourly volume (veh/hour) (V) | 57 |
| Highest Directional Split Proportion | 0.5 |
| Peak hour factor (PHF) | 1 |
| % Trucks and Buses ($P_{t)}$) | 2% |
| % Recreational Vehicles ($P_{R)}$) | 0% |
| % No passing zone | 100% |
| Access points/mile | 0 |
| Shoulder width (ft) | 3 |
| Lane width (ft) | 12 |
| Lane width (ft) | 12 |
| Shoulder width (ft) | 1 |
| Segment Length (Lt) | 0.4 |

| Level of Service and Other Performance Measures | |
|---|---|
| Level of Service (LOS) | A |
| Volume to capacity ratio (v/c) | 0.024 |
| Peak 15-min vehicle miles of travel (VMT15) (veh-mi) | 5.7 |
| Peak-hour vehicle-miles of travel (VMT60) (veh-mi) | 22.8 |
| Peak 15-min total travel time (TT15) (veh-h) | 0.18 |

| Average Travel Speed | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.71 |
| Passenger-car equivalents for trucks (ET) | 2.5 |
| Passenger-car equivalents for RVs (ER) | 1.1 |
| Heavy vehicle adjustment factor (FHV) | 0.971 |
| Two way flow rate (vp) (pc/h) | 82.7 |
| vp*highest directional proportion (pc/h) | 41.3 |
| Base free flow speed (BFFS) | 40 |
| Adjustment for lane and shoulder width (fLS) | 4.2 |
| Adjustment for access points (fA) | 0 |
| Free flow speed (FFS) | 35.8 |
| Adjustment for no-passing zones (fnp) (mi/h) | 3.5 |
| Average Travel Speed (ATS) (mi/h) | 31.7 |

| Percent Time Spent Following | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.77 |
| Passenger-car equivalents for trucks (ET) | 1.8 |
| Passenger-car equivalents for RVs (ER) | 1 |
| Heavy vehicle adjustment factor (FHV) | 0.984 |
| Two way flow rate (vp) (pc/h) | 75.2 |
| vp*highest directional proportion (pc/h) | 37.6 |
| Base percent time spent following (BPTSF) | 6.40 |
| Adjustment for directional distribution and no passing zones (fd/np) | 21.8 |
| Percent Time Spent Following (PTSF) | 28.20 |

*Worksheet based on worksheet provided in the Highway Capacity Manual 2000

## Two-Way Two Lane Highway Segment Worksheet*

| | |
|---|---|
| Section | 3 |
| Time Period | Winter 2020 |
| Projected Growth Rate | 1% |

| Level of Service Criteria | |
|---|---|
| **LOS** | **PTSF** |
| A | ≤40 |
| B | >40-55 |
| C | >55-70 |
| D | >70-85 |
| E | >85 |

| Input Data | |
|---|---|
| Highway Class | II |
| Terrain | Rolling |
| Two way hourly volume (veh/hour) (V) | 57 |
| Highest Directional Split Proportion | 0.5 |
| Peak hour factor (PHF) | 1 |
| % Trucks and Buses ($P_{t)}$) | 2% |
| % Recreational Vehicles ($P_{R)}$) | 0% |
| % No passing zone | 100% |
| Access points/mile | 0 |
| Shoulder width (ft) | 0 |
| Lane width (ft) | 10 |
| Lane width (ft) | 10 |
| Shoulder width (ft) | 1 |
| Segment Length (Lt) | 2 |

| Level of Service and Other Performance Measures | |
|---|---|
| Level of Service (LOS) | A |
| Volume to capacity ratio (v/c) | 0.024 |
| Peak 15-min vehicle miles of travel (VMT15) (veh-mi) | 28.5 |
| Peak-hour vehicle-miles of travel (VMT60) (veh-mi) | 114 |
| Peak 15-min total travel time (TT15) (veh-h) | 1.39 |

| Average Travel Speed | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.71 |
| Passenger-car equivalents for trucks (ET) | 2.5 |
| Passenger-car equivalents for RVs (ER) | 1.1 |
| Heavy vehicle adjustment factor (FHV) | 0.971 |
| Two way flow rate (vp) (pc/h) | 82.7 |
| vp*highest directional proportion (pc/h) | 41.3 |
| Base free flow speed (BFFS) | 30 |
| Adjustment for lane and shoulder width (fLS) | 5.3 |
| Adjustment for access points (fA) | 0 |
| Free flow speed (FFS) | 24.7 |
| Adjustment for no-passing zones (fnp) (mi/h) | 3.5 |
| Average Travel Speed (ATS) (mi/h) | 20.6 |

| Percent Time Spent Following | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.77 |
| Passenger-car equivalents for trucks (ET) | 1.8 |
| Passenger-car equivalents for RVs (ER) | 1 |
| Heavy vehicle adjustment factor (FHV) | 0.984 |
| Two way flow rate (vp) (pc/h) | 75.2 |
| vp*highest directional proportion (pc/h) | 37.6 |
| Base percent time spent following (BPTSF) | 6.40 |
| Adjustment for directional distribution and no passing zones (fd/np) | 21.8 |
| Percent Time Spent Following (PTSF) | 28.20 |

*Worksheet based on worksheet provided in the Highway Capacity Manual 2000

## Two-Way Two Lane Highway Segment Worksheet*

| | |
|---|---|
| Section | 4 |
| Time Period | Winter 2020 |
| Projected Growth Rate | 1% |

| Level of Service Criteria | |
|---|---|
| **LOS** | **PTSF** |
| A | ≤40 |
| B | >40-55 |
| C | >55-70 |
| D | >70-85 |
| E | >85 |

| Input Data | |
|---|---|
| Highway Class | II |
| Terrain | Rolling |
| Two way hourly volume (veh/hour) (V) | 57 |
| Highest Directional Split Proportion | 0.5 |
| Peak hour factor (PHF) | 1 |
| % Trucks and Buses ($P_{t)}$ | 2% |
| % Recreational Vehicles ($P_{R)}$ | 0% |
| % No passing zone | 100% |
| Access points/mile | 0 |
| Shoulder width (ft) | 1 |
| Lane width (ft) | 9 |
| Lane width (ft) | 9 |
| Shoulder width (ft) | 1 |
| Segment Length (Lt) | 0.2 |

| Level of Service and Other Performance Measures | |
|---|---|
| Level of Service (LOS) | A |
| Volume to capacity ratio (v/c) | 0.024 |
| Peak 15-min vehicle miles of travel (VMT15) (veh-mi) | 2.85 |
| Peak-hour vehicle-miles of travel (VMT60) (veh-mi) | 11.4 |
| Peak 15-min total travel time (TT15) (veh-h) | 0.15 |

| Average Travel Speed | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.71 |
| Passenger-car equivalents for trucks (ET) | 2.5 |
| Passenger-car equivalents for RVs (ER) | 1.1 |
| Heavy vehicle adjustment factor (FHV) | 0.971 |
| Two way flow rate (vp) (pc/h) | 82.7 |
| vp*highest directional proportion (pc/h) | 41.3 |
| Base free flow speed (BFFS) | 30 |
| Adjustment for lane and shoulder width (fLS) | 6.4 |
| Adjustment for access points (fA) | 0 |
| Free flow speed (FFS) | 23.6 |
| Adjustment for no-passing zones (fnp) (mi/h) | 3.5 |
| Average Travel Speed (ATS) (mi/h) | 19.5 |

| Percent Time Spent Following | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.77 |
| Passenger-car equivalents for trucks (ET) | 1.8 |
| Passenger-car equivalents for RVs (ER) | 1 |
| Heavy vehicle adjustment factor (FHV) | 0.984 |
| Two way flow rate (vp) (pc/h) | 75.2 |
| vp*highest directional proportion (pc/h) | 37.6 |
| Base percent time spent following (BPTSF) | 6.40 |
| Adjustment for directional distribution and no passing zones (fd/np) | 21.8 |
| Percent Time Spent Following (PTSF) | 28.20 |

*Worksheet based on worksheet provided in the Highway Capacity Manual 2000

**Two-Way Two Lane Highway Segment Worksheet***

| | |
|---|---|
| Section | 5 |
| Time Period | Winter 2020 |
| Projected Growth Rate | 1% |

| Level of Service Criteria | |
|---|---|
| **LOS** | **PTSF** |
| A | ≤40 |
| B | >40-55 |
| C | >55-70 |
| D | >70-85 |
| E | >85 |

| Input Data | |
|---|---|
| Highway Class | II |
| Terrain | Rolling |
| Two way hourly volume (veh/hour) (V) | 57 |
| Highest Directional Split Proportion | 0.5 |
| Peak hour factor (PHF) | 1 |
| % Trucks and Buses ($P_t$) | 2% |
| % Recreational Vehicles ($P_R$) | 0% |
| % No passing zone | 100% |
| Access points/mile | 0 |
| Shoulder width (ft) | 3 |
| Lane width (ft) | 10 |
| Lane width (ft) | 10 |
| Shoulder width (ft) | 1 |
| Segment Length (Lt) | 0.6 |

| Level of Service and Other Performance Measures | |
|---|---|
| Level of Service (LOS) | A |
| Volume to capacity ratio (v/c) | 0.024 |
| Peak 15-min vehicle miles of travel (VMT15) (veh-mi) | 8.55 |
| Peak-hour vehicle-miles of travel (VMT60) (veh-mi) | 34.2 |
| Peak 15-min total travel time (TT15) (veh-h) | 0.42 |

| Average Travel Speed | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.71 |
| Passenger-car equivalents for trucks (ET) | 2.5 |
| Passenger-car equivalents for RVs (ER) | 1.1 |
| Heavy vehicle adjustment factor (FHV) | 0.971 |
| Two way flow rate (vp) (pc/h) | 82.7 |
| vp*highest directional proportion (pc/h) | 41.3 |
| Base free flow speed (BFFS) | 30 |
| Adjustment for lane and shoulder width (fLS) | 5.3 |
| Adjustment for access points (fA) | 0 |
| Free flow speed (FFS) | 24.7 |
| Adjustment for no-passing zones (fnp) (mi/h) | 3.5 |
| Average Travel Speed (ATS) (mi/h) | 20.6 |

| Percent Time Spent Following | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.77 |
| Passenger-car equivalents for trucks (ET) | 1.8 |
| Passenger-car equivalents for RVs (ER) | 1 |
| Heavy vehicle adjustment factor (FHV) | 0.984 |
| Two way flow rate (vp) (pc/h) | 75.2 |
| vp*highest directional proportion (pc/h) | 37.6 |
| Base percent time spent following (BPTSF) | 6.40 |
| Adjustment for directional distribution and no passing zones (fd/np) | 21.8 |
| Percent Time Spent Following (PTSF) | 28.20 |

*Worksheet based on worksheet provided in the Highway Capacity Manual 2000

**Two-Way Two Lane Highway Segment Worksheet***

| | |
|---|---|
| Section | 6 |
| Time Period | Winter 2020 |
| Projected Growth Rate | 1% |

| Level of Service Criteria | |
|---|---|
| **LOS** | **PTSF** |
| A | ≤40 |
| B | >40-55 |
| C | >55-70 |
| D | >70-85 |
| E | >85 |

| Input Data | |
|---|---|
| Highway Class | II |
| Terrain | Rolling |
| Two way hourly volume (veh/hour) (V) | 57 |
| Highest Directional Split Proportion | 0.5 |
| Peak hour factor (PHF) | 1 |
| % Trucks and Buses ($P_t$) | 2% |
| % Recreational Vehicles ($P_R$) | 0% |
| % No passing zone | 100% |
| Access points/mile | 0 |
| Shoulder width (ft) | 1 |
| Lane width (ft) | 10 |
| Lane width (ft) | 10 |
| Shoulder width (ft) | 1 |
| Segment Length (Lt) | 0.4 |

| Level of Service and Other Performance Measures | |
|---|---|
| Level of Service (LOS) | A |
| Volume to capacity ratio (v/c) | 0.024 |
| Peak 15-min vehicle miles of travel (VMT15) (veh-mi) | 5.7 |
| Peak-hour vehicle-miles of travel (VMT60) (veh-mi) | 22.8 |
| Peak 15-min total travel time (TT15) (veh-h) | 0.28 |

| Average Travel Speed | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.71 |
| Passenger-car equivalents for trucks (ET) | 2.5 |
| Passenger-car equivalents for RVs (ER) | 1.1 |
| Heavy vehicle adjustment factor (FHV) | 0.971 |
| Two way flow rate (vp) (pc/h) | 82.7 |
| vp*highest directional proportion (pc/h) | 41.3 |
| Base free flow speed (BFFS) | 30 |
| Adjustment for lane and shoulder width (fLS) | 5.3 |
| Adjustment for access points (fA) | 0 |
| Free flow speed (FFS) | 24.7 |
| Adjustment for no-passing zones (fnp) (mi/h) | 3.5 |
| Average Travel Speed (ATS) (mi/h) | 20.6 |

| Percent Time Spent Following | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.77 |
| Passenger-car equivalents for trucks (ET) | 1.8 |
| Passenger-car equivalents for RVs (ER) | 1 |
| Heavy vehicle adjustment factor (FHV) | 0.984 |
| Two way flow rate (vp) (pc/h) | 75.2 |
| vp*highest directional proportion (pc/h) | 37.6 |
| Base percent time spent following (BPTSF) | 6.40 |
| Adjustment for directional distribution and no passing zones (fd/np) | 21.8 |
| Percent Time Spent Following (PTSF) | 28.20 |

*Worksheet based on worksheet provided in the Highway Capacity Manual 2000

**Two-Way Two Lane Highway Segment Worksheet***

| | |
|---|---|
| Section | 1 |
| Time Period | Winter 2015 |
| Projected Growth Rate | 2% |

| Level of Service Criteria | |
|---|---|
| **LOS** | **PTSF** |
| A | ≤40 |
| B | >40-55 |
| C | >55-70 |
| D | >70-85 |
| E | >85 |

| Input Data | |
|---|---|
| Highway Class | II |
| Terrain | Rolling |
| Two way hourly volume (veh/hour) (V) | 57 |
| Highest Directional Split Proportion | 0.5 |
| Peak hour factor (PHF) | 1 |
| % Trucks and Buses ($P_{t)}$ | 2% |
| % Recreational Vehicles ($P_{R)}$ | 0% |
| % No passing zone | 100% |
| Access points/mile | 0 |
| Shoulder width (ft) | 1 |
| Lane width (ft) | 12 |
| Lane width (ft) | 12 |
| Shoulder width (ft) | 2 |
| Segment Length (Lt) | 1 |

| Level of Service and Other Performance Measures | |
|---|---|
| Level of Service (LOS) | A |
| Volume to capacity ratio (v/c) | 0.024 |
| Peak 15-min vehicle miles of travel (VMT15) (veh-mi) | 14.25 |
| Peak-hour vehicle-miles of travel (VMT60) (veh-mi) | 57 |
| Peak 15-min total travel time (TT15) (veh-h) | 0.45 |

| Average Travel Speed | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.71 |
| Passenger-car equivalents for trucks (ET) | 2.5 |
| Passenger-car equivalents for RVs (ER) | 1.1 |
| Heavy vehicle adjustment factor (FHV) | 0.971 |
| Two way flow rate (vp) (pc/h) | 82.7 |
| vp*highest directional proportion (pc/h) | 41.3 |
| Base free flow speed (BFFS) | 40 |
| Adjustment for lane and shoulder width (fLS) | 4.2 |
| Adjustment for access points (fA) | 0 |
| Free flow speed (FFS) | 35.8 |
| Adjustment for no-passing zones (fnp) (mi/h) | 3.5 |
| Average Travel Speed (ATS) (mi/h) | 31.7 |

| Percent Time Spent Following | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.77 |
| Passenger-car equivalents for trucks (ET) | 1.8 |
| Passenger-car equivalents for RVs (ER) | 1 |
| Heavy vehicle adjustment factor (FHV) | 0.984 |
| Two way flow rate (vp) (pc/h) | 75.2 |
| vp*highest directional proportion (pc/h) | 37.6 |
| Base percent time spent following (BPTSF) | 6.40 |
| Adjustment for directional distribution and no passing zones (fd/np) | 21.8 |
| Percent Time Spent Following (PTSF) | 28.20 |

*Worksheet based on worksheet provided in the Highway Capacity Manual 2000

**Two-Way Two Lane Highway Segment Worksheet***

| | |
|---|---|
| Section | 2 |
| Time Period | Winter 2015 |
| Projected Growth Rate | 2% |

| Level of Service Criteria | |
|---|---|
| **LOS** | **PTSF** |
| A | ≤40 |
| B | >40-55 |
| C | >55-70 |
| D | >70-85 |
| E | >85 |

| Input Data | |
|---|---|
| Highway Class | II |
| Terrain | Rolling |
| Two way hourly volume (veh/hour) (V) | 57 |
| Highest Directional Split Proportion | 0.5 |
| Peak hour factor (PHF) | 1 |
| % Trucks and Buses ($P_{t)}$ | 2% |
| % Recreational Vehicles ($P_{R)}$ | 0% |
| % No passing zone | 100% |
| Access points/mile | 0 |
| Shoulder width (ft) | 3 |
| Lane width (ft) | 12 |
| Lane width (ft) | 12 |
| Shoulder width (ft) | 1 |
| Segment Length (Lt) | 0.4 |

| Level of Service and Other Performance Measures | |
|---|---|
| Level of Service (LOS) | A |
| Volume to capacity ratio (v/c) | 0.024 |
| Peak 15-min vehicle miles of travel (VMT15) (veh-mi) | 5.7 |
| Peak-hour vehicle-miles of travel (VMT60) (veh-mi) | 22.8 |
| Peak 15-min total travel time (TT15) (veh-h) | 0.18 |

| Average Travel Speed | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.71 |
| Passenger-car equivalents for trucks (ET) | 2.5 |
| Passenger-car equivalents for RVs (ER) | 1.1 |
| Heavy vehicle adjustment factor (FHV) | 0.971 |
| Two way flow rate (vp) (pc/h) | 82.7 |
| vp*highest directional proportion (pc/h) | 41.3 |
| Base free flow speed (BFFS) | 40 |
| Adjustment for lane and shoulder width (fLS) | 4.2 |
| Adjustment for access points (fA) | 0 |
| Free flow speed (FFS) | 35.8 |
| Adjustment for no-passing zones (fnp) (mi/h) | 3.5 |
| Average Travel Speed (ATS) (mi/h) | 31.7 |

| Percent Time Spent Following | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.77 |
| Passenger-car equivalents for trucks (ET) | 1.8 |
| Passenger-car equivalents for RVs (ER) | 1 |
| Heavy vehicle adjustment factor (FHV) | 0.984 |
| Two way flow rate (vp) (pc/h) | 75.2 |
| vp*highest directional proportion (pc/h) | 37.6 |
| Base percent time spent following (BPTSF) | 6.40 |
| Adjustment for directional distribution and no passing zones (fd/np) | 21.8 |
| Percent Time Spent Following (PTSF) | 28.20 |

*Worksheet based on worksheet provided in the Highway Capacity Manual 2000

**Two-Way Two Lane Highway Segment Worksheet***

| | |
|---|---|
| Section | 3 |
| Time Period | Winter 2015 |
| Projected Growth Rate | 2% |

| Level of Service Criteria | |
|---|---|
| **LOS** | **PTSF** |
| A | ≤40 |
| B | >40-55 |
| C | >55-70 |
| D | >70-85 |
| E | >85 |

| Input Data | |
|---|---|
| Highway Class | II |
| Terrain | Rolling |
| Two way hourly volume (veh/hour) (V) | 57 |
| Highest Directional Split Proportion | 0.5 |
| Peak hour factor (PHF) | 1 |
| % Trucks and Buses ($P_{t)}$ | 2% |
| % Recreational Vehicles ($P_{R)}$ | 0% |
| % No passing zone | 100% |
| Access points/mile | 0 |
| Shoulder width (ft) | 0 |
| Lane width (ft) | 10 |
| Lane width (ft) | 10 |
| Shoulder width (ft) | 1 |
| Segment Length (Lt) | 2 |

| Level of Service and Other Performance Measures | |
|---|---|
| Level of Service (LOS) | A |
| Volume to capacity ratio (v/c) | 0.024 |
| Peak 15-min vehicle miles of travel (VMT15) (veh-mi) | 28.5 |
| Peak-hour vehicle-miles of travel (VMT60) (veh-mi) | 114 |
| Peak 15-min total travel time (TT15) (veh-h) | 1.39 |

| Average Travel Speed | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.71 |
| Passenger-car equivalents for trucks (ET) | 2.5 |
| Passenger-car equivalents for RVs (ER) | 1.1 |
| Heavy vehicle adjustment factor (FHV) | 0.971 |
| Two way flow rate (vp) (pc/h) | 82.7 |
| vp*highest directional proportion (pc/h) | 41.3 |
| Base free flow speed (BFFS) | 30 |
| Adjustment for lane and shoulder width (fLS) | 5.3 |
| Adjustment for access points (fA) | 0 |
| Free flow speed (FFS) | 24.7 |
| Adjustment for no-passing zones (fnp) (mi/h) | 3.5 |
| Average Travel Speed (ATS) (mi/h) | 20.6 |

| Percent Time Spent Following | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.77 |
| Passenger-car equivalents for trucks (ET) | 1.8 |
| Passenger-car equivalents for RVs (ER) | 1 |
| Heavy vehicle adjustment factor (FHV) | 0.984 |
| Two way flow rate (vp) (pc/h) | 75.2 |
| vp*highest directional proportion (pc/h) | 37.6 |
| Base percent time spent following (BPTSF) | 6.40 |
| Adjustment for directional distribution and no passing zones (fd/np) | 21.8 |
| Percent Time Spent Following (PTSF) | 28.20 |

*Worksheet based on worksheet provided in the Highway Capacity Manual 2000

## Two-Way Two Lane Highway Segment Worksheet*

| | |
|---|---|
| Section | 4 |
| Time Period | Winter 2015 |
| Projected Growth Rate | 2% |

| Level of Service Criteria | |
|---|---|
| **LOS** | **PTSF** |
| A | ≤40 |
| B | >40-55 |
| C | >55-70 |
| D | >70-85 |
| E | >85 |

| Input Data | |
|---|---|
| Highway Class | II |
| Terrain | Rolling |
| Two way hourly volume (veh/hour) (V) | 57 |
| Highest Directional Split Proportion | 0.5 |
| Peak hour factor (PHF) | 1 |
| % Trucks and Buses ($P_{t)}$) | 2% |
| % Recreational Vehicles ($P_{R)}$) | 0% |
| % No passing zone | 100% |
| Access points/mile | 0 |
| Shoulder width (ft) | 1 |
| Lane width (ft) | 9 |
| Lane width (ft) | 9 |
| Shoulder width (ft) | 1 |
| Segment Length (Lt) | 0.2 |

| Level of Service and Other Performance Measures | |
|---|---|
| Level of Service (LOS) | A |
| Volume to capacity ratio (v/c) | 0.024 |
| Peak 15-min vehicle miles of travel (VMT15) (veh-mi) | 2.85 |
| Peak-hour vehicle-miles of travel (VMT60) (veh-mi) | 11.4 |
| Peak 15-min total travel time (TT15) (veh-h) | 0.15 |

| Average Travel Speed | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.71 |
| Passenger-car equivalents for trucks (ET) | 2.5 |
| Passenger-car equivalents for RVs (ER) | 1.1 |
| Heavy vehicle adjustment factor (FHV) | 0.971 |
| Two way flow rate (vp) (pc/h) | 82.7 |
| vp*highest directional proportion (pc/h) | 41.3 |
| Base free flow speed (BFFS) | 30 |
| Adjustment for lane and shoulder width (fLS) | 6.4 |
| Adjustment for access points (fA) | 0 |
| Free flow speed (FFS) | 23.6 |
| Adjustment for no-passing zones (fnp) (mi/h) | 3.5 |
| Average Travel Speed (ATS) (mi/h) | 19.5 |

| Percent Time Spent Following | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.77 |
| Passenger-car equivalents for trucks (ET) | 1.8 |
| Passenger-car equivalents for RVs (ER) | 1 |
| Heavy vehicle adjustment factor (FHV) | 0.984 |
| Two way flow rate (vp) (pc/h) | 75.2 |
| vp*highest directional proportion (pc/h) | 37.6 |
| Base percent time spent following (BPTSF) | 6.40 |
| Adjustment for directional distribution and no passing zones (fd/np) | 21.8 |
| Percent Time Spent Following (PTSF) | 28.20 |

*Worksheet based on worksheet provided in the Highway Capacity Manual 2000

**Two-Way Two Lane Highway Segment Worksheet***

| | |
|---|---|
| Section | 5 |
| Time Period | Winter 2015 |
| Projected Growth Rate | 2% |

| Level of Service Criteria | |
|---|---|
| **LOS** | **PTSF** |
| A | ≤40 |
| B | >40-55 |
| C | >55-70 |
| D | >70-85 |
| E | >85 |

| Input Data | |
|---|---|
| Highway Class | II |
| Terrain | Rolling |
| Two way hourly volume (veh/hour) (V) | 57 |
| Highest Directional Split Proportion | 0.5 |
| Peak hour factor (PHF) | 1 |
| % Trucks and Buses ($P_{t)}$) | 2% |
| % Recreational Vehicles ($P_{R)}$) | 0% |
| % No passing zone | 100% |
| Access points/mile | 0 |
| Shoulder width (ft) | 3 |
| Lane width (ft) | 10 |
| Lane width (ft) | 10 |
| Shoulder width (ft) | 1 |
| Segment Length (Lt) | 0.6 |

| Level of Service and Other Performance Measures | |
|---|---|
| Level of Service (LOS) | A |
| Volume to capacity ratio (v/c) | 0.024 |
| Peak 15-min vehicle miles of travel (VMT15) (veh-mi) | 8.55 |
| Peak-hour vehicle-miles of travel (VMT60) (veh-mi) | 34.2 |
| Peak 15-min total travel time (TT15) (veh-h) | 0.42 |

| Average Travel Speed | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.71 |
| Passenger-car equivalents for trucks (ET) | 2.5 |
| Passenger-car equivalents for RVs (ER) | 1.1 |
| Heavy vehicle adjustment factor (FHV) | 0.971 |
| Two way flow rate (vp) (pc/h) | 82.7 |
| vp*highest directional proportion (pc/h) | 41.3 |
| Base free flow speed (BFFS) | 30 |
| Adjustment for lane and shoulder width (fLS) | 5.3 |
| Adjustment for access points (fA) | 0 |
| Free flow speed (FFS) | 24.7 |
| Adjustment for no-passing zones (fnp) (mi/h) | 3.5 |
| Average Travel Speed (ATS) (mi/h) | 20.6 |

| Percent Time Spent Following | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.77 |
| Passenger-car equivalents for trucks (ET) | 1.8 |
| Passenger-car equivalents for RVs (ER) | 1 |
| Heavy vehicle adjustment factor (FHV) | 0.984 |
| Two way flow rate (vp) (pc/h) | 75.2 |
| vp*highest directional proportion (pc/h) | 37.6 |
| Base percent time spent following (BPTSF) | 6.40 |
| Adjustment for directional distribution and no passing zones (fd/np) | 21.8 |
| Percent Time Spent Following (PTSF) | 28.20 |

*Worksheet based on worksheet provided in the Highway Capacity Manual 2000

## Two-Way Two Lane Highway Segment Worksheet*

| | |
|---|---|
| Section | 6 |
| Time Period | Winter 2015 |
| Projected Growth Rate | 2% |

| Level of Service Criteria | |
|---|---|
| **LOS** | **PTSF** |
| A | ≤40 |
| B | >40-55 |
| C | >55-70 |
| D | >70-85 |
| E | >85 |

| Input Data | |
|---|---|
| Highway Class | II |
| Terrain | Rolling |
| Two way hourly volume (veh/hour) (V) | 57 |
| Highest Directional Split Proportion | 0.5 |
| Peak hour factor (PHF) | 1 |
| % Trucks and Buses ($P_{t)}$) | 2% |
| % Recreational Vehicles ($P_{R)}$) | 0% |
| % No passing zone | 100% |
| Access points/mile | 0 |
| Shoulder width (ft) | 1 |
| Lane width (ft) | 10 |
| Lane width (ft) | 10 |
| Shoulder width (ft) | 1 |
| Segment Length (Lt) | 0.4 |

| Level of Service and Other Performance Measures | |
|---|---|
| Level of Service (LOS) | A |
| Volume to capacity ratio (v/c) | 0.024 |
| Peak 15-min vehicle miles of travel (VMT15) (veh-mi) | 5.7 |
| Peak-hour vehicle-miles of travel (VMT60) (veh-mi) | 22.8 |
| Peak 15-min total travel time (TT15) (veh-h) | 0.28 |

| Average Travel Speed | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.71 |
| Passenger-car equivalents for trucks (ET) | 2.5 |
| Passenger-car equivalents for RVs (ER) | 1.1 |
| Heavy vehicle adjustment factor (FHV) | 0.971 |
| Two way flow rate (vp) (pc/h) | 82.7 |
| vp*highest directional proportion (pc/h) | 41.3 |
| Base free flow speed (BFFS) | 30 |
| Adjustment for lane and shoulder width (fLS) | 5.3 |
| Adjustment for access points (fA) | 0 |
| Free flow speed (FFS) | 24.7 |
| Adjustment for no-passing zones (fnp) (mi/h) | 3.5 |
| Average Travel Speed (ATS) (mi/h) | 20.6 |

| Percent Time Spent Following | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.77 |
| Passenger-car equivalents for trucks (ET) | 1.8 |
| Passenger-car equivalents for RVs (ER) | 1 |
| Heavy vehicle adjustment factor (FHV) | 0.984 |
| Two way flow rate (vp) (pc/h) | 75.2 |
| vp*highest directional proportion (pc/h) | 37.6 |
| Base percent time spent following (BPTSF) | 6.40 |
| Adjustment for directional distribution and no passing zones (fd/np) | 21.8 |
| Percent Time Spent Following (PTSF) | 28.20 |

*Worksheet based on worksheet provided in the Highway Capacity Manual 2000

**Two-Way Two Lane Highway Segment Worksheet***

| | |
|---|---|
| Section | 1 |
| Time Period | Winter 2015 |
| Projected Growth Rate | 1% |

| Level of Service Criteria | |
|---|---|
| **LOS** | **PTSF** |
| A | ≤40 |
| B | >40-55 |
| C | >55-70 |
| D | >70-85 |
| E | >85 |

| Input Data | |
|---|---|
| Highway Class | II |
| Terrain | Rolling |
| Two way hourly volume (veh/hour) (V) | 55 |
| Highest Directional Split Proportion | 0.5 |
| Peak hour factor (PHF) | 1 |
| % Trucks and Buses ($P_{t)}$) | 2% |
| % Recreational Vehicles ($P_{R)}$) | 0% |
| % No passing zone | 100% |
| Access points/mile | 0 |
| Shoulder width (ft) | 1 |
| Lane width (ft) | 12 |
| Lane width (ft) | 12 |
| Shoulder width (ft) | 2 |
| Segment Length (Lt) | 1 |

| Level of Service and Other Performance Measures | |
|---|---|
| Level of Service (LOS) | A |
| Volume to capacity ratio (v/c) | 0.023 |
| Peak 15-min vehicle miles of travel (VMT15) (veh-mi) | 13.75 |
| Peak-hour vehicle-miles of travel (VMT60) (veh-mi) | 55 |
| Peak 15-min total travel time (TT15) (veh-h) | 0.43 |

| Average Travel Speed | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.71 |
| Passenger-car equivalents for trucks (ET) | 2.5 |
| Passenger-car equivalents for RVs (ER) | 1.1 |
| Heavy vehicle adjustment factor (FHV) | 0.971 |
| Two way flow rate (vp) (pc/h) | 79.8 |
| vp*highest directional proportion (pc/h) | 39.9 |
| Base free flow speed (BFFS) | 40 |
| Adjustment for lane and shoulder width (fLS) | 4.2 |
| Adjustment for access points (fA) | 0 |
| Free flow speed (FFS) | 35.8 |
| Adjustment for no-passing zones (fnp) (mi/h) | 3.5 |
| Average Travel Speed (ATS) (mi/h) | 31.7 |

| Percent Time Spent Following | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.77 |
| Passenger-car equivalents for trucks (ET) | 1.8 |
| Passenger-car equivalents for RVs (ER) | 1 |
| Heavy vehicle adjustment factor (FHV) | 0.984 |
| Two way flow rate (vp) (pc/h) | 72.6 |
| vp*highest directional proportion (pc/h) | 36.3 |
| Base percent time spent following (BPTSF) | 6.18 |
| Adjustment for directional distribution and no passing zones (fd/np) | 21.8 |
| Percent Time Spent Following (PTSF) | 27.98 |

*Worksheet based on worksheet provided in the Highway Capacity Manual 2000

**Two-Way Two Lane Highway Segment Worksheet***

| | |
|---|---|
| Section | 2 |
| Time Period | Winter 2015 |
| Projected Growth Rate | 1% |

| **Level of Service Criteria** | |
|---|---|
| **LOS** | **PTSF** |
| A | ≤40 |
| B | >40-55 |
| C | >55-70 |
| D | >70-85 |
| E | >85 |

| **Input Data** | |
|---|---|
| Highway Class | II |
| Terrain | Rolling |
| Two way hourly volume (veh/hour) (V) | 55 |
| Highest Directional Split Proportion | 0.5 |
| Peak hour factor (PHF) | 1 |
| % Trucks and Buses ($P_{t)}$ | 2% |
| % Recreational Vehicles ($P_{R)}$ | 0% |
| % No passing zone | 100% |
| Access points/mile | 0 |
| Shoulder width (ft) | 3 |
| Lane width (ft) | 12 |
| Lane width (ft) | 12 |
| Shoulder width (ft) | 1 |
| Segment Length (Lt) | 0.4 |

| **Level of Service and Other Performance Measures** | |
|---|---|
| Level of Service (LOS) | A |
| Volume to capacity ratio (v/c) | 0.023 |
| Peak 15-min vehicle miles of travel (VMT15) (veh-mi) | 5.5 |
| Peak-hour vehicle-miles of travel (VMT60) (veh-mi) | 22 |
| Peak 15-min total travel time (TT15) (veh-h) | 0.17 |

| **Average Travel Speed** | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.71 |
| Passenger-car equivalents for trucks (ET) | 2.5 |
| Passenger-car equivalents for RVs (ER) | 1.1 |
| Heavy vehicle adjustment factor (FHV) | 0.971 |
| Two way flow rate (vp) (pc/h) | 79.8 |
| vp*highest directional proportion (pc/h) | 39.9 |
| Base free flow speed (BFFS) | 40 |
| Adjustment for lane and shoulder width (fLS) | 4.2 |
| Adjustment for access points (fA) | 0 |
| Free flow speed (FFS) | 35.8 |
| Adjustment for no-passing zones (fnp) (mi/h) | 3.5 |
| Average Travel Speed (ATS) (mi/h) | 31.7 |

| **Percent Time Spent Following** | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.77 |
| Passenger-car equivalents for trucks (ET) | 1.8 |
| Passenger-car equivalents for RVs (ER) | 1 |
| Heavy vehicle adjustment factor (FHV) | 0.984 |
| Two way flow rate (vp) (pc/h) | 72.6 |
| vp*highest directional proportion (pc/h) | 36.3 |
| Base percent time spent following (BPTSF) | 6.18 |
| Adjustment for directional distribution and no passing zones (fd/np) | 21.8 |
| Percent Time Spent Following (PTSF) | 27.98 |

*Worksheet based on worksheet provided in the Highway Capacity Manual 2000

**Two-Way Two Lane Highway Segment Worksheet***

| | |
|---|---|
| Section | 3 |
| Time Period | Winter 2015 |
| Projected Growth Rate | 1% |

| Level of Service Criteria | |
|---|---|
| **LOS** | **PTSF** |
| A | ≤40 |
| B | >40-55 |
| C | >55-70 |
| D | >70-85 |
| E | >85 |

| Input Data | |
|---|---|
| Highway Class | II |
| Terrain | Rolling |
| Two way hourly volume (veh/hour) (V) | 55 |
| Highest Directional Split Proportion | 0.5 |
| Peak hour factor (PHF) | 1 |
| % Trucks and Buses ($P_{t)}$) | 2% |
| % Recreational Vehicles ($P_{R)}$) | 0% |
| % No passing zone | 100% |
| Access points/mile | 0 |
| Shoulder width (ft) | 0 |
| Lane width (ft) | 10 |
| Lane width (ft) | 10 |
| Shoulder width (ft) | 1 |
| Segment Length (Lt) | 2 |

| Level of Service and Other Performance Measures | |
|---|---|
| Level of Service (LOS) | A |
| Volume to capacity ratio (v/c) | 0.023 |
| Peak 15-min vehicle miles of travel (VMT15) (veh-mi) | 27.5 |
| Peak-hour vehicle-miles of travel (VMT60) (veh-mi) | 110 |
| Peak 15-min total travel time (TT15) (veh-h) | 1.34 |

| Average Travel Speed | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.71 |
| Passenger-car equivalents for trucks (ET) | 2.5 |
| Passenger-car equivalents for RVs (ER) | 1.1 |
| Heavy vehicle adjustment factor (FHV) | 0.971 |
| Two way flow rate (vp) (pc/h) | 79.8 |
| vp*highest directional proportion (pc/h) | 39.9 |
| Base free flow speed (BFFS) | 30 |
| Adjustment for lane and shoulder width (fLS) | 5.3 |
| Adjustment for access points (fA) | 0 |
| Free flow speed (FFS) | 24.7 |
| Adjustment for no-passing zones (fnp) (mi/h) | 3.5 |
| Average Travel Speed (ATS) (mi/h) | 20.6 |

| Percent Time Spent Following | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.77 |
| Passenger-car equivalents for trucks (ET) | 1.8 |
| Passenger-car equivalents for RVs (ER) | 1 |
| Heavy vehicle adjustment factor (FHV) | 0.984 |
| Two way flow rate (vp) (pc/h) | 72.6 |
| vp*highest directional proportion (pc/h) | 36.3 |
| Base percent time spent following (BPTSF) | 6.18 |
| Adjustment for directional distribution and no passing zones (fd/np) | 21.8 |
| Percent Time Spent Following (PTSF) | 27.98 |

*Worksheet based on worksheet provided in the Highway Capacity Manual 2000

**Two-Way Two Lane Highway Segment Worksheet***

| | |
|---|---|
| Section | 4 |
| Time Period | Winter 2015 |
| Projected Growth Rate | 1% |

| **Level of Service Criteria** | |
|---|---|
| **LOS** | **PTSF** |
| A | ≤40 |
| B | >40-55 |
| C | >55-70 |
| D | >70-85 |
| E | >85 |

| **Input Data** | |
|---|---|
| Highway Class | II |
| Terrain | Rolling |
| Two way hourly volume (veh/hour) (V) | 55 |
| Highest Directional Split Proportion | 0.5 |
| Peak hour factor (PHF) | 1 |
| % Trucks and Buses ($P_{t)}$) | 2% |
| % Recreational Vehicles ($P_{R)}$) | 0% |
| % No passing zone | 100% |
| Access points/mile | 0 |
| Shoulder width (ft) | 1 |
| Lane width (ft) | 9 |
| Lane width (ft) | 9 |
| Shoulder width (ft) | 1 |
| Segment Length (Lt) | 0.2 |

| **Level of Service and Other Performance Measures** | |
|---|---|
| Level of Service (LOS) | A |
| Volume to capacity ratio (v/c) | 0.023 |
| Peak 15-min vehicle miles of travel (VMT15) (veh-mi) | 2.75 |
| Peak-hour vehicle-miles of travel (VMT60) (veh-mi) | 11 |
| Peak 15-min total travel time (TT15) (veh-h) | 0.14 |

| **Average Travel Speed** | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.71 |
| Passenger-car equivalents for trucks (ET) | 2.5 |
| Passenger-car equivalents for RVs (ER) | 1.1 |
| Heavy vehicle adjustment factor (FHV) | 0.971 |
| Two way flow rate (vp) (pc/h) | 79.8 |
| vp*highest directional proportion (pc/h) | 39.9 |
| Base free flow speed (BFFS) | 30 |
| Adjustment for lane and shoulder width (fLS) | 6.4 |
| Adjustment for access points (fA) | 0 |
| Free flow speed (FFS) | 23.6 |
| Adjustment for no-passing zones (fnp) (mi/h) | 3.5 |
| Average Travel Speed (ATS) (mi/h) | 19.5 |

| **Percent Time Spent Following** | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.77 |
| Passenger-car equivalents for trucks (ET) | 1.8 |
| Passenger-car equivalents for RVs (ER) | 1 |
| Heavy vehicle adjustment factor (FHV) | 0.984 |
| Two way flow rate (vp) (pc/h) | 72.6 |
| vp*highest directional proportion (pc/h) | 36.3 |
| Base percent time spent following (BPTSF) | 6.18 |
| Adjustment for directional distribution and no passing zones (fd/np) | 21.8 |
| Percent Time Spent Following (PTSF) | 27.98 |

*Worksheet based on worksheet provided in the Highway Capacity Manual 2000

**Two-Way Two Lane Highway Segment Worksheet***

| | |
|---|---|
| Section | 5 |
| Time Period | Winter 2015 |
| Projected Growth Rate | 1% |

| Level of Service Criteria | |
|---|---|
| **LOS** | **PTSF** |
| A | ≤40 |
| B | >40-55 |
| C | >55-70 |
| D | >70-85 |
| E | >85 |

| Input Data | |
|---|---|
| Highway Class | II |
| Terrain | Rolling |
| Two way hourly volume (veh/hour) (V) | 55 |
| Highest Directional Split Proportion | 0.5 |
| Peak hour factor (PHF) | 1 |
| % Trucks and Buses ($P_{t)}$) | 2% |
| % Recreational Vehicles ($P_{R)}$) | 0% |
| % No passing zone | 100% |
| Access points/mile | 0 |
| Shoulder width (ft) | 3 |
| Lane width (ft) | 10 |
| Lane width (ft) | 10 |
| Shoulder width (ft) | 1 |
| Segment Length (Lt) | 0.6 |

| Level of Service and Other Performance Measures | |
|---|---|
| Level of Service (LOS) | A |
| Volume to capacity ratio (v/c) | 0.023 |
| Peak 15-min vehicle miles of travel (VMT15) (veh-mi) | 8.25 |
| Peak-hour vehicle-miles of travel (VMT60) (veh-mi) | 33 |
| Peak 15-min total travel time (TT15) (veh-h) | 0.40 |

| Average Travel Speed | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.71 |
| Passenger-car equivalents for trucks (ET) | 2.5 |
| Passenger-car equivalents for RVs (ER) | 1.1 |
| Heavy vehicle adjustment factor (FHV) | 0.971 |
| Two way flow rate (vp) (pc/h) | 79.8 |
| vp*highest directional proportion (pc/h) | 39.9 |
| Base free flow speed (BFFS) | 30 |
| Adjustment for lane and shoulder width (fLS) | 5.3 |
| Adjustment for access points (fA) | 0 |
| Free flow speed (FFS) | 24.7 |
| Adjustment for no-passing zones (fnp) (mi/h) | 3.5 |
| Average Travel Speed (ATS) (mi/h) | 20.6 |

| Percent Time Spent Following | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.77 |
| Passenger-car equivalents for trucks (ET) | 1.8 |
| Passenger-car equivalents for RVs (ER) | 1 |
| Heavy vehicle adjustment factor (FHV) | 0.984 |
| Two way flow rate (vp) (pc/h) | 72.6 |
| vp*highest directional proportion (pc/h) | 36.3 |
| Base percent time spent following (BPTSF) | 6.18 |
| Adjustment for directional distribution and no passing zones (fd/np) | 21.8 |
| Percent Time Spent Following (PTSF) | 27.98 |

*Worksheet based on worksheet provided in the Highway Capacity Manual 2000

**Two-Way Two Lane Highway Segment Worksheet***

| | |
|---|---|
| Section | 6 |
| Time Period | Winter 2015 |
| Projected Growth Rate | 1% |

| Level of Service Criteria | |
|---|---|
| **LOS** | **PTSF** |
| A | ≤40 |
| B | >40-55 |
| C | >55-70 |
| D | >70-85 |
| E | >85 |

| Input Data | |
|---|---|
| Highway Class | II |
| Terrain | Rolling |
| Two way hourly volume (veh/hour) (V) | 55 |
| Highest Directional Split Proportion | 0.5 |
| Peak hour factor (PHF) | 1 |
| % Trucks and Buses ($P_{t)}$) | 2% |
| % Recreational Vehicles ($P_{R)}$) | 0% |
| % No passing zone | 100% |
| Access points/mile | 0 |
| Shoulder width (ft) | 1 |
| Lane width (ft) | 10 |
| Lane width (ft) | 10 |
| Shoulder width (ft) | 1 |
| Segment Length (Lt) | 0.4 |

| Level of Service and Other Performance Measures | |
|---|---|
| Level of Service (LOS) | A |
| Volume to capacity ratio (v/c) | 0.023 |
| Peak 15-min vehicle miles of travel (VMT15) (veh-mi) | 5.5 |
| Peak-hour vehicle-miles of travel (VMT60) (veh-mi) | 22 |
| Peak 15-min total travel time (TT15) (veh-h) | 0.27 |

| Average Travel Speed | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.71 |
| Passenger-car equivalents for trucks (ET) | 2.5 |
| Passenger-car equivalents for RVs (ER) | 1.1 |
| Heavy vehicle adjustment factor (FHV) | 0.971 |
| Two way flow rate (vp) (pc/h) | 79.8 |
| vp*highest directional proportion (pc/h) | 39.9 |
| Base free flow speed (BFFS) | 30 |
| Adjustment for lane and shoulder width (fLS) | 5.3 |
| Adjustment for access points (fA) | 0 |
| Free flow speed (FFS) | 24.7 |
| Adjustment for no-passing zones (fnp) (mi/h) | 3.5 |
| Average Travel Speed (ATS) (mi/h) | 20.6 |

| Percent Time Spent Following | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.77 |
| Passenger-car equivalents for trucks (ET) | 1.8 |
| Passenger-car equivalents for RVs (ER) | 1 |
| Heavy vehicle adjustment factor (FHV) | 0.984 |
| Two way flow rate (vp) (pc/h) | 72.6 |
| vp*highest directional proportion (pc/h) | 36.3 |
| Base percent time spent following (BPTSF) | 6.18 |
| Adjustment for directional distribution and no passing zones (fd/np) | 21.8 |
| Percent Time Spent Following (PTSF) | 27.98 |

*Worksheet based on worksheet provided in the Highway Capacity Manual 2000

**Two-Way Two Lane Highway Segment Worksheet***

| | |
|---|---|
| Section | 1 |
| Time Period | Winter 2010 |
| Projected Growth Rate | NA |

| Level of Service Criteria | |
|---|---|
| **LOS** | **PTSF** |
| A | ≤40 |
| B | >40-55 |
| C | >55-70 |
| D | >70-85 |
| E | >85 |

| Input Data | |
|---|---|
| Highway Class | II |
| Terrain | Rolling |
| Two way hourly volume (veh/hour) (V) | 52 |
| Highest Directional Split Proportion | 0.5 |
| Peak hour factor (PHF) | 1 |
| % Trucks and Buses ($P_{t)}$) | 2% |
| % Recreational Vehicles ($P_{R)}$) | 0% |
| % No passing zone | 100% |
| Access points/mile | 0 |
| Shoulder width (ft) | 1 |
| Lane width (ft) | 12 |
| Lane width (ft) | 12 |
| Shoulder width (ft) | 2 |
| Segment Length (Lt) | 1 |

| Level of Service and Other Performance Measures | |
|---|---|
| Level of Service (LOS) | A |
| Volume to capacity ratio (v/c) | 0.021 |
| Peak 15-min vehicle miles of travel (VMT15) (veh-mi) | 13 |
| Peak-hour vehicle-miles of travel (VMT60) (veh-mi) | 52 |
| Peak 15-min total travel time (TT15) (veh-h) | 0.41 |

| Average Travel Speed | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.71 |
| Passenger-car equivalents for trucks (ET) | 2.5 |
| Passenger-car equivalents for RVs (ER) | 1.1 |
| Heavy vehicle adjustment factor (FHV) | 0.971 |
| Two way flow rate (vp) (pc/h) | 75.4 |
| vp*highest directional proportion (pc/h) | 37.7 |
| Base free flow speed (BFFS) | 40 |
| Adjustment for lane and shoulder width (fLS) | 4.2 |
| Adjustment for access points (fA) | 0 |
| Free flow speed (FFS) | 35.8 |
| Adjustment for no-passing zones (fnp) (mi/h) | 3.5 |
| Average Travel Speed (ATS) (mi/h) | 31.7 |

| Percent Time Spent Following | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.77 |
| Passenger-car equivalents for trucks (ET) | 1.8 |
| Passenger-car equivalents for RVs (ER) | 1 |
| Heavy vehicle adjustment factor (FHV) | 0.984 |
| Two way flow rate (vp) (pc/h) | 68.6 |
| vp*highest directional proportion (pc/h) | 34.3 |
| Base percent time spent following (BPTSF) | 5.85 |
| Adjustment for directional distribution and no passing zones (fd/np) | 21.8 |
| Percent Time Spent Following (PTSF) | 27.65 |

*Worksheet based on worksheet provided in the Highway Capacity Manual 2000

**Two-Way Two Lane Highway Segment Worksheet***

| | |
|---|---|
| Section | 2 |
| Time Period | Winter 2010 |
| Projected Growth Rate | NA |

| Level of Service Criteria | |
|---|---|
| **LOS** | **PTSF** |
| A | ≤40 |
| B | >40-55 |
| C | >55-70 |
| D | >70-85 |
| E | >85 |

| Input Data | |
|---|---|
| Highway Class | II |
| Terrain | Rolling |
| Two way hourly volume (veh/hour) (V) | 52 |
| Highest Directional Split Proportion | 0.5 |
| Peak hour factor (PHF) | 1 |
| % Trucks and Buses ($P_{t)}$) | 2% |
| % Recreational Vehicles ($P_{R)}$) | 0% |
| % No passing zone | 100% |
| Access points/mile | 0 |
| Shoulder width (ft) | 3 |
| Lane width (ft) | 12 |
| Lane width (ft) | 12 |
| Shoulder width (ft) | 1 |
| Segment Length (Lt) | 0.4 |

| Level of Service and Other Performance Measures | |
|---|---|
| Level of Service (LOS) | A |
| Volume to capacity ratio (v/c) | 0.021 |
| Peak 15-min vehicle miles of travel (VMT15) (veh-mi) | 5.2 |
| Peak-hour vehicle-miles of travel (VMT60) (veh-mi) | 20.8 |
| Peak 15-min total travel time (TT15) (veh-h) | 0.16 |

| Average Travel Speed | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.71 |
| Passenger-car equivalents for trucks (ET) | 2.5 |
| Passenger-car equivalents for RVs (ER) | 1.1 |
| Heavy vehicle adjustment factor (FHV) | 0.971 |
| Two way flow rate (vp) (pc/h) | 75.4 |
| vp*highest directional proportion (pc/h) | 37.7 |
| Base free flow speed (BFFS) | 40 |
| Adjustment for lane and shoulder width (fLS) | 4.2 |
| Adjustment for access points (fA) | 0 |
| Free flow speed (FFS) | 35.8 |
| Adjustment for no-passing zones (fnp) (mi/h) | 3.5 |
| Average Travel Speed (ATS) (mi/h) | 31.7 |

| Percent Time Spent Following | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.77 |
| Passenger-car equivalents for trucks (ET) | 1.8 |
| Passenger-car equivalents for RVs (ER) | 1 |
| Heavy vehicle adjustment factor (FHV) | 0.984 |
| Two way flow rate (vp) (pc/h) | 68.6 |
| vp*highest directional proportion (pc/h) | 34.3 |
| Base percent time spent following (BPTSF) | 5.85 |
| Adjustment for directional distribution and no passing zones (fd/np) | 21.8 |
| Percent Time Spent Following (PTSF) | 27.65 |

*Worksheet based on worksheet provided in the Highway Capacity Manual 2000

**Two-Way Two Lane Highway Segment Worksheet***

| | |
|---|---|
| Section | 3 |
| Time Period | Winter 2010 |
| Projected Growth Rate | NA |

| **Level of Service Criteria** | |
|---|---|
| **LOS** | **PTSF** |
| A | ≤40 |
| B | >40-55 |
| C | >55-70 |
| D | >70-85 |
| E | >85 |

| **Input Data** | |
|---|---|
| Highway Class | II |
| Terrain | Rolling |
| Two way hourly volume (veh/hour) (V) | 52 |
| Highest Directional Split Proportion | 0.5 |
| Peak hour factor (PHF) | 1 |
| % Trucks and Buses ($P_{t)}$ | 2% |
| % Recreational Vehicles ($P_{R)}$ | 0% |
| % No passing zone | 100% |
| Access points/mile | 0 |
| Shoulder width (ft) | 0 |
| Lane width (ft) | 10 |
| Lane width (ft) | 10 |
| Shoulder width (ft) | 1 |
| Segment Length (Lt) | 2 |

| **Level of Service and Other Performance Measures** | |
|---|---|
| Level of Service (LOS) | A |
| Volume to capacity ratio (v/c) | 0.021 |
| Peak 15-min vehicle miles of travel (VMT15) (veh-mi) | 26 |
| Peak-hour vehicle-miles of travel (VMT60) (veh-mi) | 104 |
| Peak 15-min total travel time (TT15) (veh-h) | 1.26 |

| **Average Travel Speed** | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.71 |
| Passenger-car equivalents for trucks (ET) | 2.5 |
| Passenger-car equivalents for RVs (ER) | 1.1 |
| Heavy vehicle adjustment factor (FHV) | 0.971 |
| Two way flow rate (vp) (pc/h) | 75.4 |
| vp*highest directional proportion (pc/h) | 37.7 |
| Base free flow speed (BFFS) | 30 |
| Adjustment for lane and shoulder width (fLS) | 5.3 |
| Adjustment for access points (fA) | 0 |
| Free flow speed (FFS) | 24.7 |
| Adjustment for no-passing zones (fnp) (mi/h) | 3.5 |
| Average Travel Speed (ATS) (mi/h) | 20.6 |

| **Percent Time Spent Following** | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.77 |
| Passenger-car equivalents for trucks (ET) | 1.8 |
| Passenger-car equivalents for RVs (ER) | 1 |
| Heavy vehicle adjustment factor (FHV) | 0.984 |
| Two way flow rate (vp) (pc/h) | 68.6 |
| vp*highest directional proportion (pc/h) | 34.3 |
| Base percent time spent following (BPTSF) | 5.85 |
| Adjustment for directional distribution and no passing zones (fd/np) | 21.8 |
| Percent Time Spent Following (PTSF) | 27.65 |

*Worksheet based on worksheet provided in the Highway Capacity Manual 2000

## Two-Way Two Lane Highway Segment Worksheet*

| | |
|---|---|
| Section | 4 |
| Time Period | Winter 2010 |
| Projected Growth Rate | NA |

| Level of Service Criteria | |
|---|---|
| **LOS** | **PTSF** |
| A | ≤40 |
| B | >40-55 |
| C | >55-70 |
| D | >70-85 |
| E | >85 |

| Input Data | |
|---|---|
| Highway Class | II |
| Terrain | Rolling |
| Two way hourly volume (veh/hour) (V) | 52 |
| Highest Directional Split Proportion | 0.5 |
| Peak hour factor (PHF) | 1 |
| % Trucks and Buses ($P_{t)}$) | 2% |
| % Recreational Vehicles ($P_{R)}$) | 0% |
| % No passing zone | 100% |
| Access points/mile | 0 |
| Shoulder width (ft) | 1 |
| Lane width (ft) | 9 |
| Lane width (ft) | 9 |
| Shoulder width (ft) | 1 |
| Segment Length (Lt) | 0.2 |

| Level of Service and Other Performance Measures | |
|---|---|
| Level of Service (LOS) | A |
| Volume to capacity ratio (v/c) | 0.021 |
| Peak 15-min vehicle miles of travel (VMT15) (veh-mi) | 2.6 |
| Peak-hour vehicle-miles of travel (VMT60) (veh-mi) | 10.4 |
| Peak 15-min total travel time (TT15) (veh-h) | 0.13 |

| Average Travel Speed | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.71 |
| Passenger-car equivalents for trucks (ET) | 2.5 |
| Passenger-car equivalents for RVs (ER) | 1.1 |
| Heavy vehicle adjustment factor (FHV) | 0.971 |
| Two way flow rate (vp) (pc/h) | 75.4 |
| vp*highest directional proportion (pc/h) | 37.7 |
| Base free flow speed (BFFS) | 30 |
| Adjustment for lane and shoulder width (fLS) | 6.4 |
| Adjustment for access points (fA) | 0 |
| Free flow speed (FFS) | 23.6 |
| Adjustment for no-passing zones (fnp) (mi/h) | 3.5 |
| Average Travel Speed (ATS) (mi/h) | 19.5 |

| Percent Time Spent Following | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.77 |
| Passenger-car equivalents for trucks (ET) | 1.8 |
| Passenger-car equivalents for RVs (ER) | 1 |
| Heavy vehicle adjustment factor (FHV) | 0.984 |
| Two way flow rate (vp) (pc/h) | 68.6 |
| vp*highest directional proportion (pc/h) | 34.3 |
| Base percent time spent following (BPTSF) | 5.85 |
| Adjustment for directional distribution and no passing zones (fd/np) | 21.8 |
| Percent Time Spent Following (PTSF) | 27.65 |

*Worksheet based on worksheet provided in the Highway Capacity Manual 2000

## Two-Way Two Lane Highway Segment Worksheet*

| | |
|---|---|
| Section | 5 |
| Time Period | Winter 2010 |
| Projected Growth Rate | NA |

| **Level of Service Criteria** | |
|---|---|
| **LOS** | **PTSF** |
| A | ≤40 |
| B | >40-55 |
| C | >55-70 |
| D | >70-85 |
| E | >85 |

| **Input Data** | |
|---|---|
| Highway Class | II |
| Terrain | Rolling |
| Two way hourly volume (veh/hour) (V) | 52 |
| Highest Directional Split Proportion | 0.5 |
| Peak hour factor (PHF) | 1 |
| % Trucks and Buses ($P_t$) | 2% |
| % Recreational Vehicles ($P_R$) | 0% |
| % No passing zone | 100% |
| Access points/mile | 0 |
| Shoulder width (ft) | 3 |
| Lane width (ft) | 10 |
| Lane width (ft) | 10 |
| Shoulder width (ft) | 1 |
| Segment Length (Lt) | 0.6 |

| **Level of Service and Other Performance Measures** | |
|---|---|
| Level of Service (LOS) | A |
| Volume to capacity ratio (v/c) | 0.021 |
| Peak 15-min vehicle miles of travel (VMT15) (veh-mi) | 7.8 |
| Peak-hour vehicle-miles of travel (VMT60) (veh-mi) | 31.2 |
| Peak 15-min total travel time (TT15) (veh-h) | 0.38 |

| **Average Travel Speed** | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.71 |
| Passenger-car equivalents for trucks (ET) | 2.5 |
| Passenger-car equivalents for RVs (ER) | 1.1 |
| Heavy vehicle adjustment factor (FHV) | 0.971 |
| Two way flow rate (vp) (pc/h) | 75.4 |
| vp*highest directional proportion (pc/h) | 37.7 |
| Base free flow speed (BFFS) | 30 |
| Adjustment for lane and shoulder width (fLS) | 5.3 |
| Adjustment for access points (fA) | 0 |
| Free flow speed (FFS) | 24.7 |
| Adjustment for no-passing zones (fnp) (mi/h) | 3.5 |
| Average Travel Speed (ATS) (mi/h) | 20.6 |

| **Percent Time Spent Following** | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.77 |
| Passenger-car equivalents for trucks (ET) | 1.8 |
| Passenger-car equivalents for RVs (ER) | 1 |
| Heavy vehicle adjustment factor (FHV) | 0.984 |
| Two way flow rate (vp) (pc/h) | 68.6 |
| vp*highest directional proportion (pc/h) | 34.3 |
| Base percent time spent following (BPTSF) | 5.85 |
| Adjustment for directional distribution and no passing zones (fd/np) | 21.8 |
| Percent Time Spent Following (PTSF) | 27.65 |

*Worksheet based on worksheet provided in the Highway Capacity Manual 2000

## Two-Way Two Lane Highway Segment Worksheet*

| | |
|---|---|
| Section | 6 |
| Time Period | Winter 2010 |
| Projected Growth Rate | NA |

| Level of Service Criteria | |
|---|---|
| **LOS** | **PTSF** |
| A | ≤40 |
| B | >40-55 |
| C | >55-70 |
| D | >70-85 |
| E | >85 |

| Input Data | |
|---|---|
| Highway Class | II |
| Terrain | Rolling |
| Two way hourly volume (veh/hour) (V) | 52 |
| Highest Directional Split Proportion | 0.5 |
| Peak hour factor (PHF) | 1 |
| % Trucks and Buses ($P_{t)}$) | 2% |
| % Recreational Vehicles ($P_{R)}$) | 0% |
| % No passing zone | 100% |
| Access points/mile | 0 |
| Shoulder width (ft) | 1 |
| Lane width (ft) | 10 |
| Lane width (ft) | 10 |
| Shoulder width (ft) | 1 |
| Segment Length (Lt) | 0.4 |

| Level of Service and Other Performance Measures | |
|---|---|
| Level of Service (LOS) | A |
| Volume to capacity ratio (v/c) | 0.021 |
| Peak 15-min vehicle miles of travel (VMT15) (veh-mi) | 5.2 |
| Peak-hour vehicle-miles of travel (VMT60) (veh-mi) | 20.8 |
| Peak 15-min total travel time (TT15) (veh-h) | 0.25 |

| Average Travel Speed | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.71 |
| Passenger-car equivalents for trucks (ET) | 2.5 |
| Passenger-car equivalents for RVs (ER) | 1.1 |
| Heavy vehicle adjustment factor (FHV) | 0.971 |
| Two way flow rate (vp) (pc/h) | 75.4 |
| vp*highest directional proportion (pc/h) | 37.7 |
| Base free flow speed (BFFS) | 30 |
| Adjustment for lane and shoulder width (fLS) | 5.3 |
| Adjustment for access points (fA) | 0 |
| Free flow speed (FFS) | 24.7 |
| Adjustment for no-passing zones (fnp) (mi/h) | 3.5 |
| Average Travel Speed (ATS) (mi/h) | 20.6 |

| Percent Time Spent Following | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.77 |
| Passenger-car equivalents for trucks (ET) | 1.8 |
| Passenger-car equivalents for RVs (ER) | 1 |
| Heavy vehicle adjustment factor (FHV) | 0.984 |
| Two way flow rate (vp) (pc/h) | 68.6 |
| vp*highest directional proportion (pc/h) | 34.3 |
| Base percent time spent following (BPTSF) | 5.85 |
| Adjustment for directional distribution and no passing zones (fd/np) | 21.8 |
| Percent Time Spent Following (PTSF) | 27.65 |

*Worksheet based on worksheet provided in the Highway Capacity Manual 2000

## Two-Way Two Lane Highway Segment Worksheet*

| | |
|---|---|
| Section | 1 |
| Time Period | Summer 2020 |
| Projected Growth Rate | 2% |

| Level of Service Criteria | |
|---|---|
| **LOS** | **PTSF** |
| A | ≤40 |
| B | >40-55 |
| C | >55-70 |
| D | >70-85 |
| E | >85 |

| Input Data | |
|---|---|
| Highway Class | II |
| Terrain | Rolling |
| Two way hourly volume (veh/hour) (V) | 125 |
| Highest Directional Split Proportion | 0.5 |
| Peak hour factor (PHF) | 1 |
| % Trucks and Buses ($P_{t)}$ | 2% |
| % Recreational Vehicles ($P_{R)}$ | 0% |
| % No passing zone | 100% |
| Access points/mile | 0 |
| Shoulder width (ft) | 1 |
| Lane width (ft) | 12 |
| Lane width (ft) | 12 |
| Shoulder width (ft) | 2 |
| Segment Length (Lt) | 1 |

| Level of Service and Other Performance Measures | |
|---|---|
| Level of Service (LOS) | A |
| Volume to capacity ratio (v/c) | 0.052 |
| Peak 15-min vehicle miles of travel (VMT15) (veh-mi) | 31.25 |
| Peak-hour vehicle-miles of travel (VMT60) (veh-mi) | 125 |
| Peak 15-min total travel time (TT15) (veh-h) | 1.01 |

| Average Travel Speed | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.71 |
| Passenger-car equivalents for trucks (ET) | 2.5 |
| Passenger-car equivalents for RVs (ER) | 1.1 |
| Heavy vehicle adjustment factor (FHV) | 0.971 |
| Two way flow rate (vp) (pc/h) | 181.3 |
| vp*highest directional proportion (pc/h) | 90.7 |
| Base free flow speed (BFFS) | 40 |
| Adjustment for lane and shoulder width (fLS) | 4.2 |
| Adjustment for access points (fA) | 0 |
| Free flow speed (FFS) | 35.8 |
| Adjustment for no-passing zones (fnp) (mi/h) | 3.5 |
| Average Travel Speed (ATS) (mi/h) | 30.9 |

| Percent Time Spent Following | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.77 |
| Passenger-car equivalents for trucks (ET) | 1.8 |
| Passenger-car equivalents for RVs (ER) | 1 |
| Heavy vehicle adjustment factor (FHV) | 0.984 |
| Two way flow rate (vp) (pc/h) | 164.9 |
| vp*highest directional proportion (pc/h) | 82.5 |
| Base percent time spent following (BPTSF) | 13.50 |
| Adjustment for directional distribution and no passing zones (fd/np) | 21.8 |
| Percent Time Spent Following (PTSF) | 35.30 |

*Worksheet based on worksheet provided in the Highway Capacity Manual 2000

**Two-Way Two Lane Highway Segment Worksheet***

| | |
|---|---|
| Section | 2 |
| Time Period | Summer 2020 |
| Projected Growth Rate | 2% |

| **Level of Service Criteria** | |
|---|---|
| **LOS** | **PTSF** |
| A | ≤40 |
| B | >40-55 |
| C | >55-70 |
| D | >70-85 |
| E | >85 |

| **Input Data** | |
|---|---|
| Highway Class | II |
| Terrain | Rolling |
| Two way hourly volume (veh/hour) (V) | 125 |
| Highest Directional Split Proportion | 0.5 |
| Peak hour factor (PHF) | 1 |
| % Trucks and Buses ($P_{t}$) | 2% |
| % Recreational Vehicles ($P_{R}$) | 0% |
| % No passing zone | 100% |
| Access points/mile | 0 |
| Shoulder width (ft) | 3 |
| Lane width (ft) | 12 |
| Lane width (ft) | 12 |
| Shoulder width (ft) | 1 |
| Segment Length (Lt) | 0.4 |

| **Level of Service and Other Performance Measures** | |
|---|---|
| Level of Service (LOS) | A |
| Volume to capacity ratio (v/c) | 0.052 |
| Peak 15-min vehicle miles of travel (VMT15) (veh-mi) | 12.5 |
| Peak-hour vehicle-miles of travel (VMT60) (veh-mi) | 50 |
| Peak 15-min total travel time (TT15) (veh-h) | 0.40 |

| **Average Travel Speed** | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.71 |
| Passenger-car equivalents for trucks (ET) | 2.5 |
| Passenger-car equivalents for RVs (ER) | 1.1 |
| Heavy vehicle adjustment factor (FHV) | 0.971 |
| Two way flow rate (vp) (pc/h) | 181.3 |
| vp*highest directional proportion (pc/h) | 90.7 |
| Base free flow speed (BFFS) | 40 |
| Adjustment for lane and shoulder width (fLS) | 4.2 |
| Adjustment for access points (fA) | 0 |
| Free flow speed (FFS) | 35.8 |
| Adjustment for no-passing zones (fnp) (mi/h) | 3.5 |
| Average Travel Speed (ATS) (mi/h) | 30.9 |

| **Percent Time Spent Following** | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.77 |
| Passenger-car equivalents for trucks (ET) | 1.8 |
| Passenger-car equivalents for RVs (ER) | 1 |
| Heavy vehicle adjustment factor (FHV) | 0.984 |
| Two way flow rate (vp) (pc/h) | 164.9 |
| vp*highest directional proportion (pc/h) | 82.5 |
| Base percent time spent following (BPTSF) | 13.50 |
| Adjustment for directional distribution and no passing zones (fd/np) | 21.8 |
| Percent Time Spent Following (PTSF) | 35.30 |

*Worksheet based on worksheet provided in the Highway Capacity Manual 2000

## Two-Way Two Lane Highway Segment Worksheet*

| | |
|---|---|
| Section | 3 |
| Time Period | Summer 2020 |
| Projected Growth Rate | 2% |

| **Level of Service Criteria** | |
|---|---|
| **LOS** | **PTSF** |
| A | ≤40 |
| B | >40-55 |
| C | >55-70 |
| D | >70-85 |
| E | >85 |

| **Input Data** | |
|---|---|
| Highway Class | II |
| Terrain | Rolling |
| Two way hourly volume (veh/hour) (V) | 125 |
| Highest Directional Split Proportion | 0.5 |
| Peak hour factor (PHF) | 1 |
| % Trucks and Buses ($P_{t)}$) | 2% |
| % Recreational Vehicles ($P_{R)}$) | 0% |
| % No passing zone | 100% |
| Access points/mile | 0 |
| Shoulder width (ft) | 0 |
| Lane width (ft) | 10 |
| Lane width (ft) | 10 |
| Shoulder width (ft) | 1 |
| Segment Length (Lt) | 2 |

| **Level of Service and Other Performance Measures** | |
|---|---|
| Level of Service (LOS) | A |
| Volume to capacity ratio (v/c) | 0.052 |
| Peak 15-min vehicle miles of travel (VMT15) (veh-mi) | 62.5 |
| Peak-hour vehicle-miles of travel (VMT60) (veh-mi) | 250 |
| Peak 15-min total travel time (TT15) (veh-h) | 3.16 |

| **Average Travel Speed** | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.71 |
| Passenger-car equivalents for trucks (ET) | 2.5 |
| Passenger-car equivalents for RVs (ER) | 1.1 |
| Heavy vehicle adjustment factor (FHV) | 0.971 |
| Two way flow rate (vp) (pc/h) | 181.3 |
| vp*highest directional proportion (pc/h) | 90.7 |
| Base free flow speed (BFFS) | 30 |
| Adjustment for lane and shoulder width (fLS) | 5.3 |
| Adjustment for access points (fA) | 0 |
| Free flow speed (FFS) | 24.7 |
| Adjustment for no-passing zones (fnp) (mi/h) | 3.5 |
| Average Travel Speed (ATS) (mi/h) | 19.8 |

| **Percent Time Spent Following** | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.77 |
| Passenger-car equivalents for trucks (ET) | 1.8 |
| Passenger-car equivalents for RVs (ER) | 1 |
| Heavy vehicle adjustment factor (FHV) | 0.984 |
| Two way flow rate (vp) (pc/h) | 164.9 |
| vp*highest directional proportion (pc/h) | 82.5 |
| Base percent time spent following (BPTSF) | 13.50 |
| Adjustment for directional distribution and no passing zones (fd/np) | 21.8 |
| Percent Time Spent Following (PTSF) | 35.30 |

*Worksheet based on worksheet provided in the Highway Capacity Manual 2000

## Two-Way Two Lane Highway Segment Worksheet*

| | |
|---|---|
| Section | 4 |
| Time Period | Summer 2020 |
| Projected Growth Rate | 2% |

| Level of Service Criteria | |
|---|---|
| **LOS** | **PTSF** |
| A | ≤40 |
| B | >40-55 |
| C | >55-70 |
| D | >70-85 |
| E | >85 |

| Input Data | |
|---|---|
| Highway Class | II |
| Terrain | Rolling |
| Two way hourly volume (veh/hour) (V) | 125 |
| Highest Directional Split Proportion | 0.5 |
| Peak hour factor (PHF) | 1 |
| % Trucks and Buses ($P_{t)}$) | 2% |
| % Recreational Vehicles ($P_{R)}$) | 0% |
| % No passing zone | 100% |
| Access points/mile | 0 |
| Shoulder width (ft) | 1 |
| Lane width (ft) | 9 |
| Lane width (ft) | 9 |
| Shoulder width (ft) | 1 |
| Segment Length (Lt) | 0.2 |

| Level of Service and Other Performance Measures | |
|---|---|
| Level of Service (LOS) | A |
| Volume to capacity ratio (v/c) | 0.052 |
| Peak 15-min vehicle miles of travel (VMT15) (veh-mi) | 6.25 |
| Peak-hour vehicle-miles of travel (VMT60) (veh-mi) | 25 |
| Peak 15-min total travel time (TT15) (veh-h) | 0.33 |

| Average Travel Speed | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.71 |
| Passenger-car equivalents for trucks (ET) | 2.5 |
| Passenger-car equivalents for RVs (ER) | 1.1 |
| Heavy vehicle adjustment factor (FHV) | 0.971 |
| Two way flow rate (vp) (pc/h) | 181.3 |
| vp*highest directional proportion (pc/h) | 90.7 |
| Base free flow speed (BFFS) | 30 |
| Adjustment for lane and shoulder width (fLS) | 6.4 |
| Adjustment for access points (fA) | 0 |
| Free flow speed (FFS) | 23.6 |
| Adjustment for no-passing zones (fnp) (mi/h) | 3.5 |
| Average Travel Speed (ATS) (mi/h) | 18.7 |

| Percent Time Spent Following | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.77 |
| Passenger-car equivalents for trucks (ET) | 1.8 |
| Passenger-car equivalents for RVs (ER) | 1 |
| Heavy vehicle adjustment factor (FHV) | 0.984 |
| Two way flow rate (vp) (pc/h) | 164.9 |
| vp*highest directional proportion (pc/h) | 82.5 |
| Base percent time spent following (BPTSF) | 13.50 |
| Adjustment for directional distribution and no passing zones (fd/np) | 21.8 |
| Percent Time Spent Following (PTSF) | 35.30 |

*Worksheet based on worksheet provided in the Highway Capacity Manual 2000

## Two-Way Two Lane Highway Segment Worksheet*

| | |
|---|---|
| Section | 5 |
| Time Period | Summer 2020 |
| Projected Growth Rate | 2% |

| Level of Service Criteria | |
|---|---|
| **LOS** | **PTSF** |
| A | ≤40 |
| B | >40-55 |
| C | >55-70 |
| D | >70-85 |
| E | >85 |

| Input Data | |
|---|---|
| Highway Class | II |
| Terrain | Rolling |
| Two way hourly volume (veh/hour) (V) | 125 |
| Highest Directional Split Proportion | 0.5 |
| Peak hour factor (PHF) | 1 |
| % Trucks and Buses ($P_t$) | 2% |
| % Recreational Vehicles ($P_R$) | 0% |
| % No passing zone | 100% |
| Access points/mile | 0 |
| Shoulder width (ft) | 3 |
| Lane width (ft) | 10 |
| Lane width (ft) | 10 |
| Shoulder width (ft) | 1 |
| Segment Length (Lt) | 0.6 |

| Level of Service and Other Performance Measures | |
|---|---|
| Level of Service (LOS) | A |
| Volume to capacity ratio (v/c) | 0.052 |
| Peak 15-min vehicle miles of travel (VMT15) (veh-mi) | 18.75 |
| Peak-hour vehicle-miles of travel (VMT60) (veh-mi) | 75 |
| Peak 15-min total travel time (TT15) (veh-h) | 0.95 |

| Average Travel Speed | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.71 |
| Passenger-car equivalents for trucks (ET) | 2.5 |
| Passenger-car equivalents for RVs (ER) | 1.1 |
| Heavy vehicle adjustment factor (FHV) | 0.971 |
| Two way flow rate (vp) (pc/h) | 181.3 |
| vp*highest directional proportion (pc/h) | 90.7 |
| Base free flow speed (BFFS) | 30 |
| Adjustment for lane and shoulder width (fLS) | 5.3 |
| Adjustment for access points (fA) | 0 |
| Free flow speed (FFS) | 24.7 |
| Adjustment for no-passing zones (fnp) (mi/h) | 3.5 |
| Average Travel Speed (ATS) (mi/h) | 19.8 |

| Percent Time Spent Following | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.77 |
| Passenger-car equivalents for trucks (ET) | 1.8 |
| Passenger-car equivalents for RVs (ER) | 1 |
| Heavy vehicle adjustment factor (FHV) | 0.984 |
| Two way flow rate (vp) (pc/h) | 164.9 |
| vp*highest directional proportion (pc/h) | 82.5 |
| Base percent time spent following (BPTSF) | 13.50 |
| Adjustment for directional distribution and no passing zones (fd/np) | 21.8 |
| Percent Time Spent Following (PTSF) | 35.30 |

*Worksheet based on worksheet provided in the Highway Capacity Manual 2000

## Two-Way Two Lane Highway Segment Worksheet*

| | |
|---|---|
| Section | 6 |
| Time Period | Summer 2020 |
| Projected Growth Rate | 2% |

| Level of Service Criteria | |
|---|---|
| **LOS** | **PTSF** |
| A | ≤40 |
| B | >40-55 |
| C | >55-70 |
| D | >70-85 |
| E | >85 |

| Input Data | |
|---|---|
| Highway Class | II |
| Terrain | Rolling |
| Two way hourly volume (veh/hour) (V) | 125 |
| Highest Directional Split Proportion | 0.5 |
| Peak hour factor (PHF) | 1 |
| % Trucks and Buses ($P_{t)}$) | 2% |
| % Recreational Vehicles ($P_{R)}$) | 0% |
| % No passing zone | 100% |
| Access points/mile | 0 |
| Shoulder width (ft) | 1 |
| Lane width (ft) | 10 |
| Lane width (ft) | 10 |
| Shoulder width (ft) | 1 |
| Segment Length (Lt) | 0.4 |

| Level of Service and Other Performance Measures | |
|---|---|
| Level of Service (LOS) | A |
| Volume to capacity ratio (v/c) | 0.052 |
| Peak 15-min vehicle miles of travel (VMT15) (veh-mi) | 12.5 |
| Peak-hour vehicle-miles of travel (VMT60) (veh-mi) | 50 |
| Peak 15-min total travel time (TT15) (veh-h) | 0.63 |

| Average Travel Speed | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.71 |
| Passenger-car equivalents for trucks (ET) | 2.5 |
| Passenger-car equivalents for RVs (ER) | 1.1 |
| Heavy vehicle adjustment factor (FHV) | 0.971 |
| Two way flow rate (vp) (pc/h) | 181.3 |
| vp*highest directional proportion (pc/h) | 90.7 |
| Base free flow speed (BFFS) | 30 |
| Adjustment for lane and shoulder width (fLS) | 5.3 |
| Adjustment for access points (fA) | 0 |
| Free flow speed (FFS) | 24.7 |
| Adjustment for no-passing zones (fnp) (mi/h) | 3.5 |
| Average Travel Speed (ATS) (mi/h) | 19.8 |

| Percent Time Spent Following | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.77 |
| Passenger-car equivalents for trucks (ET) | 1.8 |
| Passenger-car equivalents for RVs (ER) | 1 |
| Heavy vehicle adjustment factor (FHV) | 0.984 |
| Two way flow rate (vp) (pc/h) | 164.9 |
| vp*highest directional proportion (pc/h) | 82.5 |
| Base percent time spent following (BPTSF) | 13.50 |
| Adjustment for directional distribution and no passing zones (fd/np) | 21.8 |
| Percent Time Spent Following (PTSF) | 35.30 |

*Worksheet based on worksheet provided in the Highway Capacity Manual 2000

**Two-Way Two Lane Highway Segment Worksheet***

| | |
|---|---|
| Section | 1 |
| Time Period | Summer 2020 |
| Projected Growth Rate | 1% |

| Level of Service Criteria | |
|---|---|
| **LOS** | **PTSF** |
| A | ≤40 |
| B | >40-55 |
| C | >55-70 |
| D | >70-85 |
| E | >85 |

| Input Data | |
|---|---|
| Highway Class | II |
| Terrain | Rolling |
| Two way hourly volume (veh/hour) (V) | 114 |
| Highest Directional Split Proportion | 0.5 |
| Peak hour factor (PHF) | 1 |
| % Trucks and Buses ($P_{t}$) | 2% |
| % Recreational Vehicles ($P_{R}$) | 0% |
| % No passing zone | 100% |
| Access points/mile | 0 |
| Shoulder width (ft) | 1 |
| Lane width (ft) | 12 |
| Lane width (ft) | 12 |
| Shoulder width (ft) | 2 |
| Segment Length (Lt) | 1 |

| Level of Service and Other Performance Measures | |
|---|---|
| Level of Service (LOS) | A |
| Volume to capacity ratio (v/c) | 0.047 |
| Peak 15-min vehicle miles of travel (VMT15) (veh-mi) | 28.5 |
| Peak-hour vehicle-miles of travel (VMT60) (veh-mi) | 114 |
| Peak 15-min total travel time (TT15) (veh-h) | 0.92 |

| Average Travel Speed | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.71 |
| Passenger-car equivalents for trucks (ET) | 2.5 |
| Passenger-car equivalents for RVs (ER) | 1.1 |
| Heavy vehicle adjustment factor (FHV) | 0.971 |
| Two way flow rate (vp) (pc/h) | 165.4 |
| vp*highest directional proportion (pc/h) | 82.7 |
| Base free flow speed (BFFS) | 40 |
| Adjustment for lane and shoulder width (fLS) | 4.2 |
| Adjustment for access points (fA) | 0 |
| Free flow speed (FFS) | 35.8 |
| Adjustment for no-passing zones (fnp) (mi/h) | 3.5 |
| Average Travel Speed (ATS) (mi/h) | 31.0 |

| Percent Time Spent Following | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.77 |
| Passenger-car equivalents for trucks (ET) | 1.8 |
| Passenger-car equivalents for RVs (ER) | 1 |
| Heavy vehicle adjustment factor (FHV) | 0.984 |
| Two way flow rate (vp) (pc/h) | 150.4 |
| vp*highest directional proportion (pc/h) | 75.2 |
| Base percent time spent following (BPTSF) | 12.39 |
| Adjustment for directional distribution and no passing zones (fd/np) | 21.8 |
| Percent Time Spent Following (PTSF) | 34.19 |

*Worksheet based on worksheet provided in the Highway Capacity Manual 2000

**Two-Way Two Lane Highway Segment Worksheet***

| | |
|---|---|
| Section | 2 |
| Time Period | Summer 2020 |
| Projected Growth Rate | 1% |

| Level of Service Criteria | |
|---|---|
| **LOS** | **PTSF** |
| A | ≤40 |
| B | >40-55 |
| C | >55-70 |
| D | >70-85 |
| E | >85 |

| Input Data | |
|---|---|
| Highway Class | II |
| Terrain | Rolling |
| Two way hourly volume (veh/hour) (V) | 114 |
| Highest Directional Split Proportion | 0.5 |
| Peak hour factor (PHF) | 1 |
| % Trucks and Buses ($P_{t)}$) | 2% |
| % Recreational Vehicles ($P_{R)}$) | 0% |
| % No passing zone | 100% |
| Access points/mile | 0 |
| Shoulder width (ft) | 3 |
| Lane width (ft) | 12 |
| Lane width (ft) | 12 |
| Shoulder width (ft) | 1 |
| Segment Length (Lt) | 0.4 |

| Level of Service and Other Performance Measures | |
|---|---|
| Level of Service (LOS) | A |
| Volume to capacity ratio (v/c) | 0.047 |
| Peak 15-min vehicle miles of travel (VMT15) (veh-mi) | 11.4 |
| Peak-hour vehicle-miles of travel (VMT60) (veh-mi) | 45.6 |
| Peak 15-min total travel time (TT15) (veh-h) | 0.37 |

| Average Travel Speed | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.71 |
| Passenger-car equivalents for trucks (ET) | 2.5 |
| Passenger-car equivalents for RVs (ER) | 1.1 |
| Heavy vehicle adjustment factor (FHV) | 0.971 |
| Two way flow rate (vp) (pc/h) | 165.4 |
| vp*highest directional proportion (pc/h) | 82.7 |
| Base free flow speed (BFFS) | 40 |
| Adjustment for lane and shoulder width (fLS) | 4.2 |
| Adjustment for access points (fA) | 0 |
| Free flow speed (FFS) | 35.8 |
| Adjustment for no-passing zones (fnp) (mi/h) | 3.5 |
| Average Travel Speed (ATS) (mi/h) | 31.0 |

| Percent Time Spent Following | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.77 |
| Passenger-car equivalents for trucks (ET) | 1.8 |
| Passenger-car equivalents for RVs (ER) | 1 |
| Heavy vehicle adjustment factor (FHV) | 0.984 |
| Two way flow rate (vp) (pc/h) | 150.4 |
| vp*highest directional proportion (pc/h) | 75.2 |
| Base percent time spent following (BPTSF) | 12.39 |
| Adjustment for directional distribution and no passing zones (fd/np) | 21.8 |
| Percent Time Spent Following (PTSF) | 34.19 |

*Worksheet based on worksheet provided in the Highway Capacity Manual 2000

**Two-Way Two Lane Highway Segment Worksheet***

| | |
|---|---|
| Section | 3 |
| Time Period | Summer 2020 |
| Projected Growth Rate | 1% |

| Level of Service Criteria | |
|---|---|
| **LOS** | **PTSF** |
| A | ≤40 |
| B | >40-55 |
| C | >55-70 |
| D | >70-85 |
| E | >85 |

| Input Data | |
|---|---|
| Highway Class | II |
| Terrain | Rolling |
| Two way hourly volume (veh/hour) (V) | 114 |
| Highest Directional Split Proportion | 0.5 |
| Peak hour factor (PHF) | 1 |
| % Trucks and Buses ($P_{t)}$ | 2% |
| % Recreational Vehicles ($P_{R)}$ | 0% |
| % No passing zone | 100% |
| Access points/mile | 0 |
| Shoulder width (ft) | 0 |
| Lane width (ft) | 10 |
| Lane width (ft) | 10 |
| Shoulder width (ft) | 1 |
| Segment Length (Lt) | 2 |

| Level of Service and Other Performance Measures | |
|---|---|
| Level of Service (LOS) | A |
| Volume to capacity ratio (v/c) | 0.047 |
| Peak 15-min vehicle miles of travel (VMT15) (veh-mi) | 57 |
| Peak-hour vehicle-miles of travel (VMT60) (veh-mi) | 228 |
| Peak 15-min total travel time (TT15) (veh-h) | 2.86 |

| Average Travel Speed | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.71 |
| Passenger-car equivalents for trucks (ET) | 2.5 |
| Passenger-car equivalents for RVs (ER) | 1.1 |
| Heavy vehicle adjustment factor (FHV) | 0.971 |
| Two way flow rate (vp) (pc/h) | 165.4 |
| vp*highest directional proportion (pc/h) | 82.7 |
| Base free flow speed (BFFS) | 30 |
| Adjustment for lane and shoulder width (fLS) | 5.3 |
| Adjustment for access points (fA) | 0 |
| Free flow speed (FFS) | 24.7 |
| Adjustment for no-passing zones (fnp) (mi/h) | 3.5 |
| Average Travel Speed (ATS) (mi/h) | 19.9 |

| Percent Time Spent Following | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.77 |
| Passenger-car equivalents for trucks (ET) | 1.8 |
| Passenger-car equivalents for RVs (ER) | 1 |
| Heavy vehicle adjustment factor (FHV) | 0.984 |
| Two way flow rate (vp) (pc/h) | 150.4 |
| vp*highest directional proportion (pc/h) | 75.2 |
| Base percent time spent following (BPTSF) | 12.39 |
| Adjustment for directional distribution and no passing zones (fd/np) | 21.8 |
| Percent Time Spent Following (PTSF) | 34.19 |

*Worksheet based on worksheet provided in the Highway Capacity Manual 2000

**Two-Way Two Lane Highway Segment Worksheet***

| | |
|---|---|
| Section | 4 |
| Time Period | Summer 2020 |
| Projected Growth Rate | 1% |

| Level of Service Criteria | |
|---|---|
| **LOS** | **PTSF** |
| A | ≤40 |
| B | >40-55 |
| C | >55-70 |
| D | >70-85 |
| E | >85 |

| Input Data | |
|---|---|
| Highway Class | II |
| Terrain | Rolling |
| Two way hourly volume (veh/hour) (V) | 114 |
| Highest Directional Split Proportion | 0.5 |
| Peak hour factor (PHF) | 1 |
| % Trucks and Buses ($P_{t)}$) | 2% |
| % Recreational Vehicles ($P_{R)}$) | 0% |
| % No passing zone | 100% |
| Access points/mile | 0 |
| Shoulder width (ft) | 1 |
| Lane width (ft) | 9 |
| Lane width (ft) | 9 |
| Shoulder width (ft) | 1 |
| Segment Length (Lt) | 0.2 |

| Level of Service and Other Performance Measures | |
|---|---|
| Level of Service (LOS) | A |
| Volume to capacity ratio (v/c) | 0.047 |
| Peak 15-min vehicle miles of travel (VMT15) (veh-mi) | 5.7 |
| Peak-hour vehicle-miles of travel (VMT60) (veh-mi) | 22.8 |
| Peak 15-min total travel time (TT15) (veh-h) | 0.30 |

| Average Travel Speed | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.71 |
| Passenger-car equivalents for trucks (ET) | 2.5 |
| Passenger-car equivalents for RVs (ER) | 1.1 |
| Heavy vehicle adjustment factor (FHV) | 0.971 |
| Two way flow rate (vp) (pc/h) | 165.4 |
| vp*highest directional proportion (pc/h) | 82.7 |
| Base free flow speed (BFFS) | 30 |
| Adjustment for lane and shoulder width (fLS) | 6.4 |
| Adjustment for access points (fA) | 0 |
| Free flow speed (FFS) | 23.6 |
| Adjustment for no-passing zones (fnp) (mi/h) | 3.5 |
| Average Travel Speed (ATS) (mi/h) | 18.8 |

| Percent Time Spent Following | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.77 |
| Passenger-car equivalents for trucks (ET) | 1.8 |
| Passenger-car equivalents for RVs (ER) | 1 |
| Heavy vehicle adjustment factor (FHV) | 0.984 |
| Two way flow rate (vp) (pc/h) | 150.4 |
| vp*highest directional proportion (pc/h) | 75.2 |
| Base percent time spent following (BPTSF) | 12.39 |
| Adjustment for directional distribution and no passing zones (fd/np) | 21.8 |
| Percent Time Spent Following (PTSF) | 34.19 |

*Worksheet based on worksheet provided in the Highway Capacity Manual 2000

**Two-Way Two Lane Highway Segment Worksheet***

| | |
|---|---|
| Section | 5 |
| Time Period | Summer 2020 |
| Projected Growth Rate | 1% |

| Level of Service Criteria | |
|---|---|
| **LOS** | **PTSF** |
| A | ≤40 |
| B | >40-55 |
| C | >55-70 |
| D | >70-85 |
| E | >85 |

| Input Data | |
|---|---|
| Highway Class | II |
| Terrain | Rolling |
| Two way hourly volume (veh/hour) (V) | 114 |
| Highest Directional Split Proportion | 0.5 |
| Peak hour factor (PHF) | 1 |
| % Trucks and Buses ($P_t$) | 2% |
| % Recreational Vehicles ($P_R$) | 0% |
| % No passing zone | 100% |
| Access points/mile | 0 |
| Shoulder width (ft) | 3 |
| Lane width (ft) | 10 |
| Lane width (ft) | 10 |
| Shoulder width (ft) | 1 |
| Segment Length (Lt) | 0.6 |

| Level of Service and Other Performance Measures | |
|---|---|
| Level of Service (LOS) | A |
| Volume to capacity ratio (v/c) | 0.047 |
| Peak 15-min vehicle miles of travel (VMT15) (veh-mi) | 17.1 |
| Peak-hour vehicle-miles of travel (VMT60) (veh-mi) | 68.4 |
| Peak 15-min total travel time (TT15) (veh-h) | 0.86 |

| Average Travel Speed | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.71 |
| Passenger-car equivalents for trucks (ET) | 2.5 |
| Passenger-car equivalents for RVs (ER) | 1.1 |
| Heavy vehicle adjustment factor (FHV) | 0.971 |
| Two way flow rate (vp) (pc/h) | 165.4 |
| vp*highest directional proportion (pc/h) | 82.7 |
| Base free flow speed (BFFS) | 30 |
| Adjustment for lane and shoulder width (fLS) | 5.3 |
| Adjustment for access points (fA) | 0 |
| Free flow speed (FFS) | 24.7 |
| Adjustment for no-passing zones (fnp) (mi/h) | 3.5 |
| Average Travel Speed (ATS) (mi/h) | 19.9 |

| Percent Time Spent Following | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.77 |
| Passenger-car equivalents for trucks (ET) | 1.8 |
| Passenger-car equivalents for RVs (ER) | 1 |
| Heavy vehicle adjustment factor (FHV) | 0.984 |
| Two way flow rate (vp) (pc/h) | 150.4 |
| vp*highest directional proportion (pc/h) | 75.2 |
| Base percent time spent following (BPTSF) | 12.39 |
| Adjustment for directional distribution and no passing zones (fd/np) | 21.8 |
| Percent Time Spent Following (PTSF) | 34.19 |

*Worksheet based on worksheet provided in the Highway Capacity Manual 2000

## Two-Way Two Lane Highway Segment Worksheet*

| | |
|---|---|
| Section | 6 |
| Time Period | Summer 2020 |
| Projected Growth Rate | 1% |

| Level of Service Criteria | |
|---|---|
| **LOS** | **PTSF** |
| A | ≤40 |
| B | >40-55 |
| C | >55-70 |
| D | >70-85 |
| E | >85 |

| Input Data | |
|---|---|
| Highway Class | II |
| Terrain | Rolling |
| Two way hourly volume (veh/hour) (V) | 114 |
| Highest Directional Split Proportion | 0.5 |
| Peak hour factor (PHF) | 1 |
| % Trucks and Buses ($P_{t)}$) | 2% |
| % Recreational Vehicles ($P_{R)}$) | 0% |
| % No passing zone | 100% |
| Access points/mile | 0 |
| Shoulder width (ft) | 1 |
| Lane width (ft) | 10 |
| Lane width (ft) | 10 |
| Shoulder width (ft) | 1 |
| Segment Length (Lt) | 0.4 |

| Level of Service and Other Performance Measures | |
|---|---|
| Level of Service (LOS) | A |
| Volume to capacity ratio (v/c) | 0.047 |
| Peak 15-min vehicle miles of travel (VMT15) (veh-mi) | 11.4 |
| Peak-hour vehicle-miles of travel (VMT60) (veh-mi) | 45.6 |
| Peak 15-min total travel time (TT15) (veh-h) | 0.57 |

| Average Travel Speed | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.71 |
| Passenger-car equivalents for trucks (ET) | 2.5 |
| Passenger-car equivalents for RVs (ER) | 1.1 |
| Heavy vehicle adjustment factor (FHV) | 0.971 |
| Two way flow rate (vp) (pc/h) | 165.4 |
| vp*highest directional proportion (pc/h) | 82.7 |
| Base free flow speed (BFFS) | 30 |
| Adjustment for lane and shoulder width (fLS) | 5.3 |
| Adjustment for access points (fA) | 0 |
| Free flow speed (FFS) | 24.7 |
| Adjustment for no-passing zones (fnp) (mi/h) | 3.5 |
| Average Travel Speed (ATS) (mi/h) | 19.9 |

| Percent Time Spent Following | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.77 |
| Passenger-car equivalents for trucks (ET) | 1.8 |
| Passenger-car equivalents for RVs (ER) | 1 |
| Heavy vehicle adjustment factor (FHV) | 0.984 |
| Two way flow rate (vp) (pc/h) | 150.4 |
| vp*highest directional proportion (pc/h) | 75.2 |
| Base percent time spent following (BPTSF) | 12.39 |
| Adjustment for directional distribution and no passing zones (fd/np) | 21.8 |
| Percent Time Spent Following (PTSF) | 34.19 |

*Worksheet based on worksheet provided in the Highway Capacity Manual 2000

## Two-Way Two Lane Highway Segment Worksheet*

| | |
|---|---|
| Section | 1 |
| Time Period | Summer 2015 |
| Projected Growth Rate | 2% |

| Level of Service Criteria | |
|---|---|
| **LOS** | **PTSF** |
| A | ≤40 |
| B | >40-55 |
| C | >55-70 |
| D | >70-85 |
| E | >85 |

| Input Data | |
|---|---|
| Highway Class | II |
| Terrain | Rolling |
| Two way hourly volume (veh/hour) (V) | 114 |
| Highest Directional Split Proportion | 0.5 |
| Peak hour factor (PHF) | 1 |
| % Trucks and Buses ($P_t$) | 2% |
| % Recreational Vehicles ($P_R$) | 0% |
| % No passing zone | 100% |
| Access points/mile | 0 |
| Shoulder width (ft) | 1 |
| Lane width (ft) | 12 |
| Lane width (ft) | 12 |
| Shoulder width (ft) | 2 |
| Segment Length (Lt) | 1 |

| Level of Service and Other Performance Measures | |
|---|---|
| Level of Service (LOS) | A |
| Volume to capacity ratio (v/c) | 0.047 |
| Peak 15-min vehicle miles of travel (VMT15) (veh-mi) | 28.5 |
| Peak-hour vehicle-miles of travel (VMT60) (veh-mi) | 114 |
| Peak 15-min total travel time (TT15) (veh-h) | 0.92 |

| Average Travel Speed | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.71 |
| Passenger-car equivalents for trucks (ET) | 2.5 |
| Passenger-car equivalents for RVs (ER) | 1.1 |
| Heavy vehicle adjustment factor (FHV) | 0.971 |
| Two way flow rate (vp) (pc/h) | 165.4 |
| vp*highest directional proportion (pc/h) | 82.7 |
| Base free flow speed (BFFS) | 40 |
| Adjustment for lane and shoulder width (fLS) | 4.2 |
| Adjustment for access points (fA) | 0 |
| Free flow speed (FFS) | 35.8 |
| Adjustment for no-passing zones (fnp) (mi/h) | 3.5 |
| Average Travel Speed (ATS) (mi/h) | 31.0 |

| Percent Time Spent Following | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.77 |
| Passenger-car equivalents for trucks (ET) | 1.8 |
| Passenger-car equivalents for RVs (ER) | 1 |
| Heavy vehicle adjustment factor (FHV) | 0.984 |
| Two way flow rate (vp) (pc/h) | 150.4 |
| vp*highest directional proportion (pc/h) | 75.2 |
| Base percent time spent following (BPTSF) | 12.39 |
| Adjustment for directional distribution and no passing zones (fd/np) | 21.8 |
| Percent Time Spent Following (PTSF) | 34.19 |

*Worksheet based on worksheet provided in the Highway Capacity Manual 2000

**Two-Way Two Lane Highway Segment Worksheet***

| | |
|---|---|
| Section | 2 |
| Time Period | Summer 2015 |
| Projected Growth Rate | 2% |

| Level of Service Criteria | |
|---|---|
| **LOS** | **PTSF** |
| A | ≤40 |
| B | >40-55 |
| C | >55-70 |
| D | >70-85 |
| E | >85 |

| Input Data | |
|---|---|
| Highway Class | II |
| Terrain | Rolling |
| Two way hourly volume (veh/hour) (V) | 114 |
| Highest Directional Split Proportion | 0.5 |
| Peak hour factor (PHF) | 1 |
| % Trucks and Buses ($P_t$) | 2% |
| % Recreational Vehicles ($P_R$) | 0% |
| % No passing zone | 100% |
| Access points/mile | 0 |
| Shoulder width (ft) | 3 |
| Lane width (ft) | 12 |
| Lane width (ft) | 12 |
| Shoulder width (ft) | 1 |
| Segment Length (Lt) | 0.4 |

| Level of Service and Other Performance Measures | |
|---|---|
| Level of Service (LOS) | A |
| Volume to capacity ratio (v/c) | 0.047 |
| Peak 15-min vehicle miles of travel (VMT15) (veh-mi) | 11.4 |
| Peak-hour vehicle-miles of travel (VMT60) (veh-mi) | 45.6 |
| Peak 15-min total travel time (TT15) (veh-h) | 0.37 |

| Average Travel Speed | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.71 |
| Passenger-car equivalents for trucks (ET) | 2.5 |
| Passenger-car equivalents for RVs (ER) | 1.1 |
| Heavy vehicle adjustment factor (FHV) | 0.971 |
| Two way flow rate (vp) (pc/h) | 165.4 |
| vp*highest directional proportion (pc/h) | 82.7 |
| Base free flow speed (BFFS) | 40 |
| Adjustment for lane and shoulder width (fLS) | 4.2 |
| Adjustment for access points (fA) | 0 |
| Free flow speed (FFS) | 35.8 |
| Adjustment for no-passing zones (fnp) (mi/h) | 3.5 |
| Average Travel Speed (ATS) (mi/h) | 31.0 |

| Percent Time Spent Following | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.77 |
| Passenger-car equivalents for trucks (ET) | 1.8 |
| Passenger-car equivalents for RVs (ER) | 1 |
| Heavy vehicle adjustment factor (FHV) | 0.984 |
| Two way flow rate (vp) (pc/h) | 150.4 |
| vp*highest directional proportion (pc/h) | 75.2 |
| Base percent time spent following (BPTSF) | 12.39 |
| Adjustment for directional distribution and no passing zones (fd/np) | 21.8 |
| Percent Time Spent Following (PTSF) | 34.19 |

*Worksheet based on worksheet provided in the Highway Capacity Manual 2000

**Two-Way Two Lane Highway Segment Worksheet***

| | |
|---|---|
| Section | 3 |
| Time Period | Summer 2015 |
| Projected Growth Rate | 2% |

| Level of Service Criteria | |
|---|---|
| LOS | PTSF |
| A | ≤40 |
| B | >40-55 |
| C | >55-70 |
| D | >70-85 |
| E | >85 |

| Input Data | |
|---|---|
| Highway Class | II |
| Terrain | Rolling |
| Two way hourly volume (veh/hour) (V) | 114 |
| Highest Directional Split Proportion | 0.5 |
| Peak hour factor (PHF) | 1 |
| % Trucks and Buses ($P_t$) | 2% |
| % Recreational Vehicles ($P_R$) | 0% |
| % No passing zone | 100% |
| Access points/mile | 0 |
| Shoulder width (ft) | 0 |
| Lane width (ft) | 10 |
| Lane width (ft) | 10 |
| Shoulder width (ft) | 1 |
| Segment Length (Lt) | 2 |

| Level of Service and Other Performance Measures | |
|---|---|
| Level of Service (LOS) | A |
| Volume to capacity ratio (v/c) | 0.047 |
| Peak 15-min vehicle miles of travel (VMT15) (veh-mi) | 57 |
| Peak-hour vehicle-miles of travel (VMT60) (veh-mi) | 228 |
| Peak 15-min total travel time (TT15) (veh-h) | 2.86 |

| Average Travel Speed | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.71 |
| Passenger-car equivalents for trucks (ET) | 2.5 |
| Passenger-car equivalents for RVs (ER) | 1.1 |
| Heavy vehicle adjustment factor (FHV) | 0.971 |
| Two way flow rate (vp) (pc/h) | 165.4 |
| vp*highest directional proportion (pc/h) | 82.7 |
| Base free flow speed (BFFS) | 30 |
| Adjustment for lane and shoulder width (fLS) | 5.3 |
| Adjustment for access points (fA) | 0 |
| Free flow speed (FFS) | 24.7 |
| Adjustment for no-passing zones (fnp) (mi/h) | 3.5 |
| Average Travel Speed (ATS) (mi/h) | 19.9 |

| Percent Time Spent Following | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.77 |
| Passenger-car equivalents for trucks (ET) | 1.8 |
| Passenger-car equivalents for RVs (ER) | 1 |
| Heavy vehicle adjustment factor (FHV) | 0.984 |
| Two way flow rate (vp) (pc/h) | 150.4 |
| vp*highest directional proportion (pc/h) | 75.2 |
| Base percent time spent following (BPTSF) | 12.39 |
| Adjustment for directional distribution and no passing zones (fd/np) | 21.8 |
| Percent Time Spent Following (PTSF) | 34.19 |

*Worksheet based on worksheet provided in the Highway Capacity Manual 2000

**Two-Way Two Lane Highway Segment Worksheet***

| | |
|---|---|
| Section | 4 |
| Time Period | Summer 2015 |
| Projected Growth Rate | 2% |

| Level of Service Criteria | |
|---|---|
| **LOS** | **PTSF** |
| A | ≤40 |
| B | >40-55 |
| C | >55-70 |
| D | >70-85 |
| E | >85 |

| Input Data | |
|---|---|
| Highway Class | II |
| Terrain | Rolling |
| Two way hourly volume (veh/hour) (V) | 114 |
| Highest Directional Split Proportion | 0.5 |
| Peak hour factor (PHF) | 1 |
| % Trucks and Buses ($P_t$) | 2% |
| % Recreational Vehicles ($P_R$) | 0% |
| % No passing zone | 100% |
| Access points/mile | 0 |
| Shoulder width (ft) | 1 |
| Lane width (ft) | 9 |
| Lane width (ft) | 9 |
| Shoulder width (ft) | 1 |
| Segment Length (Lt) | 0.2 |

| Level of Service and Other Performance Measures | |
|---|---|
| Level of Service (LOS) | A |
| Volume to capacity ratio (v/c) | 0.047 |
| Peak 15-min vehicle miles of travel (VMT15) (veh-mi) | 5.7 |
| Peak-hour vehicle-miles of travel (VMT60) (veh-mi) | 22.8 |
| Peak 15-min total travel time (TT15) (veh-h) | 0.30 |

| Average Travel Speed | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.71 |
| Passenger-car equivalents for trucks (ET) | 2.5 |
| Passenger-car equivalents for RVs (ER) | 1.1 |
| Heavy vehicle adjustment factor (FHV) | 0.971 |
| Two way flow rate (vp) (pc/h) | 165.4 |
| vp*highest directional proportion (pc/h) | 82.7 |
| Base free flow speed (BFFS) | 30 |
| Adjustment for lane and shoulder width (fLS) | 6.4 |
| Adjustment for access points (fA) | 0 |
| Free flow speed (FFS) | 23.6 |
| Adjustment for no-passing zones (fnp) (mi/h) | 3.5 |
| Average Travel Speed (ATS) (mi/h) | 18.8 |

| Percent Time Spent Following | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.77 |
| Passenger-car equivalents for trucks (ET) | 1.8 |
| Passenger-car equivalents for RVs (ER) | 1 |
| Heavy vehicle adjustment factor (FHV) | 0.984 |
| Two way flow rate (vp) (pc/h) | 150.4 |
| vp*highest directional proportion (pc/h) | 75.2 |
| Base percent time spent following (BPTSF) | 12.39 |
| Adjustment for directional distribution and no passing zones (fd/np) | 21.8 |
| Percent Time Spent Following (PTSF) | 34.19 |

*Worksheet based on worksheet provided in the Highway Capacity Manual 2000

**Two-Way Two Lane Highway Segment Worksheet***

| | |
|---|---|
| Section | 5 |
| Time Period | Summer 2015 |
| Projected Growth Rate | 2% |

| Level of Service Criteria | |
|---|---|
| LOS | PTSF |
| A | ≤40 |
| B | >40-55 |
| C | >55-70 |
| D | >70-85 |
| E | >85 |

| Input Data | |
|---|---|
| Highway Class | II |
| Terrain | Rolling |
| Two way hourly volume (veh/hour) (V) | 114 |
| Highest Directional Split Proportion | 0.5 |
| Peak hour factor (PHF) | 1 |
| % Trucks and Buses ($P_t$) | 2% |
| % Recreational Vehicles ($P_R$) | 0% |
| % No passing zone | 100% |
| Access points/mile | 0 |
| Shoulder width (ft) | 3 |
| Lane width (ft) | 10 |
| Lane width (ft) | 10 |
| Shoulder width (ft) | 1 |
| Segment Length (Lt) | 0.6 |

| Level of Service and Other Performance Measures | |
|---|---|
| Level of Service (LOS) | A |
| Volume to capacity ratio (v/c) | 0.047 |
| Peak 15-min vehicle miles of travel (VMT15) (veh-mi) | 17.1 |
| Peak-hour vehicle-miles of travel (VMT60) (veh-mi) | 68.4 |
| Peak 15-min total travel time (TT15) (veh-h) | 0.86 |

| Average Travel Speed | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.71 |
| Passenger-car equivalents for trucks (ET) | 2.5 |
| Passenger-car equivalents for RVs (ER) | 1.1 |
| Heavy vehicle adjustment factor (FHV) | 0.971 |
| Two way flow rate (vp) (pc/h) | 165.4 |
| vp*highest directional proportion (pc/h) | 82.7 |
| Base free flow speed (BFFS) | 30 |
| Adjustment for lane and shoulder width (fLS) | 5.3 |
| Adjustment for access points (fA) | 0 |
| Free flow speed (FFS) | 24.7 |
| Adjustment for no-passing zones (fnp) (mi/h) | 3.5 |
| Average Travel Speed (ATS) (mi/h) | 19.9 |

| Percent Time Spent Following | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.77 |
| Passenger-car equivalents for trucks (ET) | 1.8 |
| Passenger-car equivalents for RVs (ER) | 1 |
| Heavy vehicle adjustment factor (FHV) | 0.984 |
| Two way flow rate (vp) (pc/h) | 150.4 |
| vp*highest directional proportion (pc/h) | 75.2 |
| Base percent time spent following (BPTSF) | 12.39 |
| Adjustment for directional distribution and no passing zones (fd/np) | 21.8 |
| Percent Time Spent Following (PTSF) | 34.19 |

*Worksheet based on worksheet provided in the Highway Capacity Manual 2000

## Two-Way Two Lane Highway Segment Worksheet*

| | |
|---|---|
| Section | 6 |
| Time Period | Summer 2015 |
| Projected Growth Rate | 2% |

| Level of Service Criteria | |
|---|---|
| **LOS** | **PTSF** |
| A | ≤40 |
| B | >40-55 |
| C | >55-70 |
| D | >70-85 |
| E | >85 |

| Input Data | |
|---|---|
| Highway Class | II |
| Terrain | Rolling |
| Two way hourly volume (veh/hour) (V) | 114 |
| Highest Directional Split Proportion | 0.5 |
| Peak hour factor (PHF) | 1 |
| % Trucks and Buses ($P_{t)}$) | 2% |
| % Recreational Vehicles ($P_{R)}$) | 0% |
| % No passing zone | 100% |
| Access points/mile | 0 |
| Shoulder width (ft) | 1 |
| Lane width (ft) | 10 |
| Lane width (ft) | 10 |
| Shoulder width (ft) | 1 |
| Segment Length (Lt) | 0.4 |

| Level of Service and Other Performance Measures | |
|---|---|
| Level of Service (LOS) | A |
| Volume to capacity ratio (v/c) | 0.047 |
| Peak 15-min vehicle miles of travel (VMT15) (veh-mi) | 11.4 |
| Peak-hour vehicle-miles of travel (VMT60) (veh-mi) | 45.6 |
| Peak 15-min total travel time (TT15) (veh-h) | 0.57 |

| Average Travel Speed | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.71 |
| Passenger-car equivalents for trucks (ET) | 2.5 |
| Passenger-car equivalents for RVs (ER) | 1.1 |
| Heavy vehicle adjustment factor (FHV) | 0.971 |
| Two way flow rate (vp) (pc/h) | 165.4 |
| vp*highest directional proportion (pc/h) | 82.7 |
| Base free flow speed (BFFS) | 30 |
| Adjustment for lane and shoulder width (fLS) | 5.3 |
| Adjustment for access points (fA) | 0 |
| Free flow speed (FFS) | 24.7 |
| Adjustment for no-passing zones (fnp) (mi/h) | 3.5 |
| Average Travel Speed (ATS) (mi/h) | 19.9 |

| Percent Time Spent Following | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.77 |
| Passenger-car equivalents for trucks (ET) | 1.8 |
| Passenger-car equivalents for RVs (ER) | 1 |
| Heavy vehicle adjustment factor (FHV) | 0.984 |
| Two way flow rate (vp) (pc/h) | 150.4 |
| vp*highest directional proportion (pc/h) | 75.2 |
| Base percent time spent following (BPTSF) | 12.39 |
| Adjustment for directional distribution and no passing zones (fd/np) | 21.8 |
| Percent Time Spent Following (PTSF) | 34.19 |

*Worksheet based on worksheet provided in the Highway Capacity Manual 2000

**Two-Way Two Lane Highway Segment Worksheet***

| | |
|---|---|
| Section | 1 |
| Time Period | Summer 2015 |
| Projected Growth Rate | 1% |

| Level of Service Criteria | |
|---|---|
| **LOS** | **PTSF** |
| A | ≤40 |
| B | >40-55 |
| C | >55-70 |
| D | >70-85 |
| E | >85 |

| Input Data | |
|---|---|
| Highway Class | II |
| Terrain | Rolling |
| Two way hourly volume (veh/hour) (V) | 109 |
| Highest Directional Split Proportion | 0.5 |
| Peak hour factor (PHF) | 1 |
| % Trucks and Buses ($P_{t)}$ | 2% |
| % Recreational Vehicles ($P_{R)}$ | 0% |
| % No passing zone | 100% |
| Access points/mile | 0 |
| Shoulder width (ft) | 1 |
| Lane width (ft) | 12 |
| Lane width (ft) | 12 |
| Shoulder width (ft) | 2 |
| Segment Length (Lt) | 1 |

| Level of Service and Other Performance Measures | |
|---|---|
| Level of Service (LOS) | A |
| Volume to capacity ratio (v/c) | 0.045 |
| Peak 15-min vehicle miles of travel (VMT15) (veh-mi) | 27.25 |
| Peak-hour vehicle-miles of travel (VMT60) (veh-mi) | 109 |
| Peak 15-min total travel time (TT15) (veh-h) | 0.88 |

| Average Travel Speed | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.71 |
| Passenger-car equivalents for trucks (ET) | 2.5 |
| Passenger-car equivalents for RVs (ER) | 1.1 |
| Heavy vehicle adjustment factor (FHV) | 0.971 |
| Two way flow rate (vp) (pc/h) | 158.1 |
| vp*highest directional proportion (pc/h) | 79.1 |
| Base free flow speed (BFFS) | 40 |
| Adjustment for lane and shoulder width (fLS) | 4.2 |
| Adjustment for access points (fA) | 0 |
| Free flow speed (FFS) | 35.8 |
| Adjustment for no-passing zones (fnp) (mi/h) | 3.5 |
| Average Travel Speed (ATS) (mi/h) | 31.1 |

| Percent Time Spent Following | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.77 |
| Passenger-car equivalents for trucks (ET) | 1.8 |
| Passenger-car equivalents for RVs (ER) | 1 |
| Heavy vehicle adjustment factor (FHV) | 0.984 |
| Two way flow rate (vp) (pc/h) | 143.8 |
| vp*highest directional proportion (pc/h) | 71.9 |
| Base percent time spent following (BPTSF) | 11.88 |
| Adjustment for directional distribution and no passing zones (fd/np) | 21.8 |
| Percent Time Spent Following (PTSF) | 33.68 |

*Worksheet based on worksheet provided in the Highway Capacity Manual 2000

## Two-Way Two Lane Highway Segment Worksheet*

| | |
|---|---|
| Section | 2 |
| Time Period | Summer 2015 |
| Projected Growth Rate | 1% |

| Level of Service Criteria | |
|---|---|
| **LOS** | **PTSF** |
| A | ≤40 |
| B | >40-55 |
| C | >55-70 |
| D | >70-85 |
| E | >85 |

| Input Data | |
|---|---|
| Highway Class | II |
| Terrain | Rolling |
| Two way hourly volume (veh/hour) (V) | 109 |
| Highest Directional Split Proportion | 0.5 |
| Peak hour factor (PHF) | 1 |
| % Trucks and Buses ($P_{t)}$) | 2% |
| % Recreational Vehicles ($P_{R)}$) | 0% |
| % No passing zone | 100% |
| Access points/mile | 0 |
| Shoulder width (ft) | 3 |
| Lane width (ft) | 12 |
| Lane width (ft) | 12 |
| Shoulder width (ft) | 1 |
| Segment Length (Lt) | 0.4 |

| Level of Service and Other Performance Measures | |
|---|---|
| Level of Service (LOS) | A |
| Volume to capacity ratio (v/c) | 0.045 |
| Peak 15-min vehicle miles of travel (VMT15) (veh-mi) | 10.9 |
| Peak-hour vehicle-miles of travel (VMT60) (veh-mi) | 43.6 |
| Peak 15-min total travel time (TT15) (veh-h) | 0.35 |

| Average Travel Speed | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.71 |
| Passenger-car equivalents for trucks (ET) | 2.5 |
| Passenger-car equivalents for RVs (ER) | 1.1 |
| Heavy vehicle adjustment factor (FHV) | 0.971 |
| Two way flow rate (vp) (pc/h) | 158.1 |
| vp*highest directional proportion (pc/h) | 79.1 |
| Base free flow speed (BFFS) | 40 |
| Adjustment for lane and shoulder width (fLS) | 4.2 |
| Adjustment for access points (fA) | 0 |
| Free flow speed (FFS) | 35.8 |
| Adjustment for no-passing zones (fnp) (mi/h) | 3.5 |
| Average Travel Speed (ATS) (mi/h) | 31.1 |

| Percent Time Spent Following | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.77 |
| Passenger-car equivalents for trucks (ET) | 1.8 |
| Passenger-car equivalents for RVs (ER) | 1 |
| Heavy vehicle adjustment factor (FHV) | 0.984 |
| Two way flow rate (vp) (pc/h) | 143.8 |
| vp*highest directional proportion (pc/h) | 71.9 |
| Base percent time spent following (BPTSF) | 11.88 |
| Adjustment for directional distribution and no passing zones (fd/np) | 21.8 |
| Percent Time Spent Following (PTSF) | 33.68 |

*Worksheet based on worksheet provided in the Highway Capacity Manual 2000

**Two-Way Two Lane Highway Segment Worksheet***

| | |
|---|---|
| Section | 3 |
| Time Period | Summer 2015 |
| Projected Growth Rate | 1% |

| Level of Service Criteria | |
|---|---|
| **LOS** | **PTSF** |
| A | ≤40 |
| B | >40-55 |
| C | >55-70 |
| D | >70-85 |
| E | >85 |

| Input Data | |
|---|---|
| Highway Class | II |
| Terrain | Rolling |
| Two way hourly volume (veh/hour) (V) | 109 |
| Highest Directional Split Proportion | 0.5 |
| Peak hour factor (PHF) | 1 |
| % Trucks and Buses ($P_{t)}$ | 2% |
| % Recreational Vehicles ($P_{R)}$ | 0% |
| % No passing zone | 100% |
| Access points/mile | 0 |
| Shoulder width (ft) | 0 |
| Lane width (ft) | 10 |
| Lane width (ft) | 10 |
| Shoulder width (ft) | 1 |
| Segment Length (Lt) | 2 |

| Level of Service and Other Performance Measures | |
|---|---|
| Level of Service (LOS) | A |
| Volume to capacity ratio (v/c) | 0.045 |
| Peak 15-min vehicle miles of travel (VMT15) (veh-mi) | 54.5 |
| Peak-hour vehicle-miles of travel (VMT60) (veh-mi) | 218 |
| Peak 15-min total travel time (TT15) (veh-h) | 2.73 |

| Average Travel Speed | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.71 |
| Passenger-car equivalents for trucks (ET) | 2.5 |
| Passenger-car equivalents for RVs (ER) | 1.1 |
| Heavy vehicle adjustment factor (FHV) | 0.971 |
| Two way flow rate (vp) (pc/h) | 158.1 |
| vp*highest directional proportion (pc/h) | 79.1 |
| Base free flow speed (BFFS) | 30 |
| Adjustment for lane and shoulder width (fLS) | 5.3 |
| Adjustment for access points (fA) | 0 |
| Free flow speed (FFS) | 24.7 |
| Adjustment for no-passing zones (fnp) (mi/h) | 3.5 |
| Average Travel Speed (ATS) (mi/h) | 20.0 |

| Percent Time Spent Following | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.77 |
| Passenger-car equivalents for trucks (ET) | 1.8 |
| Passenger-car equivalents for RVs (ER) | 1 |
| Heavy vehicle adjustment factor (FHV) | 0.984 |
| Two way flow rate (vp) (pc/h) | 143.8 |
| vp*highest directional proportion (pc/h) | 71.9 |
| Base percent time spent following (BPTSF) | 11.88 |
| Adjustment for directional distribution and no passing zones (fd/np) | 21.8 |
| Percent Time Spent Following (PTSF) | 33.68 |

*Worksheet based on worksheet provided in the Highway Capacity Manual 2000

## Two-Way Two Lane Highway Segment Worksheet*

| | |
|---|---|
| Section | 4 |
| Time Period | Summer 2015 |
| Projected Growth Rate | 1% |

| Level of Service Criteria | |
|---|---|
| **LOS** | **PTSF** |
| A | ≤40 |
| B | >40-55 |
| C | >55-70 |
| D | >70-85 |
| E | >85 |

| Input Data | |
|---|---|
| Highway Class | II |
| Terrain | Rolling |
| Two way hourly volume (veh/hour) (V) | 109 |
| Highest Directional Split Proportion | 0.5 |
| Peak hour factor (PHF) | 1 |
| % Trucks and Buses ($P_{t}$) | 2% |
| % Recreational Vehicles ($P_{R}$) | 0% |
| % No passing zone | 100% |
| Access points/mile | 0 |
| Shoulder width (ft) | 1 |
| Lane width (ft) | 9 |
| Lane width (ft) | 9 |
| Shoulder width (ft) | 1 |
| Segment Length (Lt) | 0.2 |

| Level of Service and Other Performance Measures | |
|---|---|
| Level of Service (LOS) | A |
| Volume to capacity ratio (v/c) | 0.045 |
| Peak 15-min vehicle miles of travel (VMT15) (veh-mi) | 5.45 |
| Peak-hour vehicle-miles of travel (VMT60) (veh-mi) | 21.8 |
| Peak 15-min total travel time (TT15) (veh-h) | 0.29 |

| Average Travel Speed | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.71 |
| Passenger-car equivalents for trucks (ET) | 2.5 |
| Passenger-car equivalents for RVs (ER) | 1.1 |
| Heavy vehicle adjustment factor (FHV) | 0.971 |
| Two way flow rate (vp) (pc/h) | 158.1 |
| vp*highest directional proportion (pc/h) | 79.1 |
| Base free flow speed (BFFS) | 30 |
| Adjustment for lane and shoulder width (fLS) | 6.4 |
| Adjustment for access points (fA) | 0 |
| Free flow speed (FFS) | 23.6 |
| Adjustment for no-passing zones (fnp) (mi/h) | 3.5 |
| Average Travel Speed (ATS) (mi/h) | 18.9 |

| Percent Time Spent Following | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.77 |
| Passenger-car equivalents for trucks (ET) | 1.8 |
| Passenger-car equivalents for RVs (ER) | 1 |
| Heavy vehicle adjustment factor (FHV) | 0.984 |
| Two way flow rate (vp) (pc/h) | 143.8 |
| vp*highest directional proportion (pc/h) | 71.9 |
| Base percent time spent following (BPTSF) | 11.88 |
| Adjustment for directional distribution and no passing zones (fd/np) | 21.8 |
| Percent Time Spent Following (PTSF) | 33.68 |

*Worksheet based on worksheet provided in the Highway Capacity Manual 2000

## Two-Way Two Lane Highway Segment Worksheet*

| | |
|---|---|
| Section | 5 |
| Time Period | Summer 2015 |
| Projected Growth Rate | 1% |

| Level of Service Criteria | |
|---|---|
| **LOS** | **PTSF** |
| A | ≤40 |
| B | >40-55 |
| C | >55-70 |
| D | >70-85 |
| E | >85 |

| Input Data | |
|---|---|
| Highway Class | II |
| Terrain | Rolling |
| Two way hourly volume (veh/hour) (V) | 109 |
| Highest Directional Split Proportion | 0.5 |
| Peak hour factor (PHF) | 1 |
| % Trucks and Buses ($P_{t}$) | 2% |
| % Recreational Vehicles ($P_{R}$) | 0% |
| % No passing zone | 100% |
| Access points/mile | 0 |
| Shoulder width (ft) | 3 |
| Lane width (ft) | 10 |
| Lane width (ft) | 10 |
| Shoulder width (ft) | 1 |
| Segment Length (Lt) | 0.6 |

| Level of Service and Other Performance Measures | |
|---|---|
| Level of Service (LOS) | A |
| Volume to capacity ratio (v/c) | 0.045 |
| Peak 15-min vehicle miles of travel (VMT15) (veh-mi) | 16.35 |
| Peak-hour vehicle-miles of travel (VMT60) (veh-mi) | 65.4 |
| Peak 15-min total travel time (TT15) (veh-h) | 0.82 |

| Average Travel Speed | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.71 |
| Passenger-car equivalents for trucks (ET) | 2.5 |
| Passenger-car equivalents for RVs (ER) | 1.1 |
| Heavy vehicle adjustment factor (FHV) | 0.971 |
| Two way flow rate (vp) (pc/h) | 158.1 |
| vp*highest directional proportion (pc/h) | 79.1 |
| Base free flow speed (BFFS) | 30 |
| Adjustment for lane and shoulder width (fLS) | 5.3 |
| Adjustment for access points (fA) | 0 |
| Free flow speed (FFS) | 24.7 |
| Adjustment for no-passing zones (fnp) (mi/h) | 3.5 |
| Average Travel Speed (ATS) (mi/h) | 20.0 |

| Percent Time Spent Following | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.77 |
| Passenger-car equivalents for trucks (ET) | 1.8 |
| Passenger-car equivalents for RVs (ER) | 1 |
| Heavy vehicle adjustment factor (FHV) | 0.984 |
| Two way flow rate (vp) (pc/h) | 143.8 |
| vp*highest directional proportion (pc/h) | 71.9 |
| Base percent time spent following (BPTSF) | 11.88 |
| Adjustment for directional distribution and no passing zones (fd/np) | 21.8 |
| Percent Time Spent Following (PTSF) | 33.68 |

*Worksheet based on worksheet provided in the Highway Capacity Manual 2000

**Two-Way Two Lane Highway Segment Worksheet***

| | |
|---|---|
| Section | 6 |
| Time Period | Summer 2015 |
| Projected Growth Rate | 1% |

| Level of Service Criteria | |
|---|---|
| **LOS** | **PTSF** |
| A | ≤40 |
| B | >40-55 |
| C | >55-70 |
| D | >70-85 |
| E | >85 |

| Input Data | |
|---|---|
| Highway Class | II |
| Terrain | Rolling |
| Two way hourly volume (veh/hour) (V) | 109 |
| Highest Directional Split Proportion | 0.5 |
| Peak hour factor (PHF) | 1 |
| % Trucks and Buses ($P_{t)}$ | 2% |
| % Recreational Vehicles ($P_{R)}$ | 0% |
| % No passing zone | 100% |
| Access points/mile | 0 |
| Shoulder width (ft) | 1 |
| Lane width (ft) | 10 |
| Lane width (ft) | 10 |
| Shoulder width (ft) | 1 |
| Segment Length (Lt) | 0.4 |

| Level of Service and Other Performance Measures | |
|---|---|
| Level of Service (LOS) | A |
| Volume to capacity ratio (v/c) | 0.045 |
| Peak 15-min vehicle miles of travel (VMT15) (veh-mi) | 10.9 |
| Peak-hour vehicle-miles of travel (VMT60) (veh-mi) | 43.6 |
| Peak 15-min total travel time (TT15) (veh-h) | 0.55 |

| Average Travel Speed | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.71 |
| Passenger-car equivalents for trucks (ET) | 2.5 |
| Passenger-car equivalents for RVs (ER) | 1.1 |
| Heavy vehicle adjustment factor (FHV) | 0.971 |
| Two way flow rate (vp) (pc/h) | 158.1 |
| vp*highest directional proportion (pc/h) | 79.1 |
| Base free flow speed (BFFS) | 30 |
| Adjustment for lane and shoulder width (fLS) | 5.3 |
| Adjustment for access points (fA) | 0 |
| Free flow speed (FFS) | 24.7 |
| Adjustment for no-passing zones (fnp) (mi/h) | 3.5 |
| Average Travel Speed (ATS) (mi/h) | 20.0 |

| Percent Time Spent Following | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.77 |
| Passenger-car equivalents for trucks (ET) | 1.8 |
| Passenger-car equivalents for RVs (ER) | 1 |
| Heavy vehicle adjustment factor (FHV) | 0.984 |
| Two way flow rate (vp) (pc/h) | 143.8 |
| vp*highest directional proportion (pc/h) | 71.9 |
| Base percent time spent following (BPTSF) | 11.88 |
| Adjustment for directional distribution and no passing zones (fd/np) | 21.8 |
| Percent Time Spent Following (PTSF) | 33.68 |

*Worksheet based on worksheet provided in the Highway Capacity Manual 2000

## Two-Way Two Lane Highway Segment Worksheet*

| | |
|---|---|
| Section | 1 |
| Time Period | Summer 2010 |
| Projected Growth Rate | NA |

| **Level of Service Criteria** | |
|---|---|
| **LOS** | **PTSF** |
| A | ≤40 |
| B | >40-55 |
| C | >55-70 |
| D | >70-85 |
| E | >85 |

| **Input Data** | |
|---|---|
| Highway Class | II |
| Terrain | Rolling |
| Two way hourly volume (veh/hour) (V) | 104 |
| Highest Directional Split Proportion | 0.5 |
| Peak hour factor (PHF) | 1 |
| % Trucks and Buses ($P_{t)}$ | 2% |
| % Recreational Vehicles ($P_{R)}$ | 0% |
| % No passing zone | 100% |
| Access points/mile | 0 |
| Shoulder width (ft) | 1 |
| Lane width (ft) | 12 |
| Lane width (ft) | 12 |
| Shoulder width (ft) | 2 |
| Segment Length (Lt) | 1 |

| **Level of Service and Other Performance Measures** | |
|---|---|
| Level of Service (LOS) | A |
| Volume to capacity ratio (v/c) | 0.043 |
| Peak 15-min vehicle miles of travel (VMT15) (veh-mi) | 26 |
| Peak-hour vehicle-miles of travel (VMT60) (veh-mi) | 104 |
| Peak 15-min total travel time (TT15) (veh-h) | 0.84 |

| **Average Travel Speed** | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.71 |
| Passenger-car equivalents for trucks (ET) | 2.5 |
| Passenger-car equivalents for RVs (ER) | 1.1 |
| Heavy vehicle adjustment factor (FHV) | 0.971 |
| Two way flow rate (vp) (pc/h) | 150.9 |
| vp*highest directional proportion (pc/h) | 75.4 |
| Base free flow speed (BFFS) | 40 |
| Adjustment for lane and shoulder width (fLS) | 4.2 |
| Adjustment for access points (fA) | 0 |
| Free flow speed (FFS) | 35.8 |
| Adjustment for no-passing zones (fnp) (mi/h) | 3.5 |
| Average Travel Speed (ATS) (mi/h) | 31.1 |

| **Percent Time Spent Following** | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.77 |
| Passenger-car equivalents for trucks (ET) | 1.8 |
| Passenger-car equivalents for RVs (ER) | 1 |
| Heavy vehicle adjustment factor (FHV) | 0.984 |
| Two way flow rate (vp) (pc/h) | 137.2 |
| vp*highest directional proportion (pc/h) | 68.6 |
| Base percent time spent following (BPTSF) | 11.36 |
| Adjustment for directional distribution and no passing zones (fd/np) | 21.8 |
| Percent Time Spent Following (PTSF) | 33.16 |

*Worksheet based on worksheet provided in the Highway Capacity Manual 2000

**Two-Way Two Lane Highway Segment Worksheet***

| | |
|---|---|
| Section | 2 |
| Time Period | Summer 2010 |
| Projected Growth Rate | NA |

| Level of Service Criteria | |
|---|---|
| **LOS** | **PTSF** |
| A | ≤40 |
| B | >40-55 |
| C | >55-70 |
| D | >70-85 |
| E | >85 |

| Input Data | |
|---|---|
| Highway Class | II |
| Terrain | Rolling |
| Two way hourly volume (veh/hour) (V) | 104 |
| Highest Directional Split Proportion | 0.5 |
| Peak hour factor (PHF) | 1 |
| % Trucks and Buses ($P_{t)}$ | 2% |
| % Recreational Vehicles ($P_{R)}$ | 0% |
| % No passing zone | 100% |
| Access points/mile | 0 |
| Shoulder width (ft) | 3 |
| Lane width (ft) | 12 |
| Lane width (ft) | 12 |
| Shoulder width (ft) | 1 |
| Segment Length (Lt) | 0.4 |

| Level of Service and Other Performance Measures | |
|---|---|
| Level of Service (LOS) | A |
| Volume to capacity ratio (v/c) | 0.043 |
| Peak 15-min vehicle miles of travel (VMT15) (veh-mi) | 10.4 |
| Peak-hour vehicle-miles of travel (VMT60) (veh-mi) | 41.6 |
| Peak 15-min total travel time (TT15) (veh-h) | 0.33 |

| Average Travel Speed | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.71 |
| Passenger-car equivalents for trucks (ET) | 2.5 |
| Passenger-car equivalents for RVs (ER) | 1.1 |
| Heavy vehicle adjustment factor (FHV) | 0.971 |
| Two way flow rate (vp) (pc/h) | 150.9 |
| vp*highest directional proportion (pc/h) | 75.4 |
| Base free flow speed (BFFS) | 40 |
| Adjustment for lane and shoulder width (fLS) | 4.2 |
| Adjustment for access points (fA) | 0 |
| Free flow speed (FFS) | 35.8 |
| Adjustment for no-passing zones (fnp) (mi/h) | 3.5 |
| Average Travel Speed (ATS) (mi/h) | 31.1 |

| Percent Time Spent Following | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.77 |
| Passenger-car equivalents for trucks (ET) | 1.8 |
| Passenger-car equivalents for RVs (ER) | 1 |
| Heavy vehicle adjustment factor (FHV) | 0.984 |
| Two way flow rate (vp) (pc/h) | 137.2 |
| vp*highest directional proportion (pc/h) | 68.6 |
| Base percent time spent following (BPTSF) | 11.36 |
| Adjustment for directional distribution and no passing zones (fd/np) | 21.8 |
| Percent Time Spent Following (PTSF) | 33.16 |

*Worksheet based on worksheet provided in the Highway Capacity Manual 2000

**Two-Way Two Lane Highway Segment Worksheet***

| | |
|---|---|
| Section | 3 |
| Time Period | Summer 2010 |
| Projected Growth Rate | NA |

| Level of Service Criteria | |
|---|---|
| **LOS** | **PTSF** |
| A | ≤40 |
| B | >40-55 |
| C | >55-70 |
| D | >70-85 |
| E | >85 |

| Input Data | |
|---|---|
| Highway Class | II |
| Terrain | Rolling |
| Two way hourly volume (veh/hour) (V) | 104 |
| Highest Directional Split Proportion | 0.5 |
| Peak hour factor (PHF) | 1 |
| % Trucks and Buses ($P_{t)}$) | 2% |
| % Recreational Vehicles ($P_{R)}$) | 0% |
| % No passing zone | 100% |
| Access points/mile | 0 |
| Shoulder width (ft) | 0 |
| Lane width (ft) | 10 |
| Lane width (ft) | 10 |
| Shoulder width (ft) | 1 |
| Segment Length (Lt) | 2 |

| Level of Service and Other Performance Measures | |
|---|---|
| Level of Service (LOS) | A |
| Volume to capacity ratio (v/c) | 0.043 |
| Peak 15-min vehicle miles of travel (VMT15) (veh-mi) | 52 |
| Peak-hour vehicle-miles of travel (VMT60) (veh-mi) | 208 |
| Peak 15-min total travel time (TT15) (veh-h) | 2.60 |

| Average Travel Speed | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.71 |
| Passenger-car equivalents for trucks (ET) | 2.5 |
| Passenger-car equivalents for RVs (ER) | 1.1 |
| Heavy vehicle adjustment factor (FHV) | 0.971 |
| Two way flow rate (vp) (pc/h) | 150.9 |
| vp*highest directional proportion (pc/h) | 75.4 |
| Base free flow speed (BFFS) | 30 |
| Adjustment for lane and shoulder width (fLS) | 5.3 |
| Adjustment for access points (fA) | 0 |
| Free flow speed (FFS) | 24.7 |
| Adjustment for no-passing zones (fnp) (mi/h) | 3.5 |
| Average Travel Speed (ATS) (mi/h) | 20.0 |

| Percent Time Spent Following | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.77 |
| Passenger-car equivalents for trucks (ET) | 1.8 |
| Passenger-car equivalents for RVs (ER) | 1 |
| Heavy vehicle adjustment factor (FHV) | 0.984 |
| Two way flow rate (vp) (pc/h) | 137.2 |
| vp*highest directional proportion (pc/h) | 68.6 |
| Base percent time spent following (BPTSF) | 11.36 |
| Adjustment for directional distribution and no passing zones (fd/np) | 21.8 |
| Percent Time Spent Following (PTSF) | 33.16 |

*Worksheet based on worksheet provided in the Highway Capacity Manual 2000

## Two-Way Two Lane Highway Segment Worksheet*

| | |
|---|---|
| Section | 4 |
| Time Period | Summer 2010 |
| Projected Growth Rate | NA |

| Level of Service Criteria | |
|---|---|
| **LOS** | **PTSF** |
| A | ≤40 |
| B | >40-55 |
| C | >55-70 |
| D | >70-85 |
| E | >85 |

| Input Data | |
|---|---|
| Highway Class | II |
| Terrain | Rolling |
| Two way hourly volume (veh/hour) (V) | 104 |
| Highest Directional Split Proportion | 0.5 |
| Peak hour factor (PHF) | 1 |
| % Trucks and Buses ($P_t$) | 2% |
| % Recreational Vehicles ($P_R$) | 0% |
| % No passing zone | 100% |
| Access points/mile | 0 |
| Shoulder width (ft) | 1 |
| Lane width (ft) | 9 |
| Lane width (ft) | 9 |
| Shoulder width (ft) | 1 |
| Segment Length (Lt) | 0.2 |

| Level of Service and Other Performance Measures | |
|---|---|
| Level of Service (LOS) | A |
| Volume to capacity ratio (v/c) | 0.043 |
| Peak 15-min vehicle miles of travel (VMT15) (veh-mi) | 5.2 |
| Peak-hour vehicle-miles of travel (VMT60) (veh-mi) | 20.8 |
| Peak 15-min total travel time (TT15) (veh-h) | 0.27 |

| Average Travel Speed | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.71 |
| Passenger-car equivalents for trucks (ET) | 2.5 |
| Passenger-car equivalents for RVs (ER) | 1.1 |
| Heavy vehicle adjustment factor (FHV) | 0.971 |
| Two way flow rate (vp) (pc/h) | 150.9 |
| vp*highest directional proportion (pc/h) | 75.4 |
| Base free flow speed (BFFS) | 30 |
| Adjustment for lane and shoulder width (fLS) | 6.4 |
| Adjustment for access points (fA) | 0 |
| Free flow speed (FFS) | 23.6 |
| Adjustment for no-passing zones (fnp) (mi/h) | 3.5 |
| Average Travel Speed (ATS) (mi/h) | 18.9 |

| Percent Time Spent Following | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.77 |
| Passenger-car equivalents for trucks (ET) | 1.8 |
| Passenger-car equivalents for RVs (ER) | 1 |
| Heavy vehicle adjustment factor (FHV) | 0.984 |
| Two way flow rate (vp) (pc/h) | 137.2 |
| vp*highest directional proportion (pc/h) | 68.6 |
| Base percent time spent following (BPTSF) | 11.36 |
| Adjustment for directional distribution and no passing zones (fd/np) | 21.8 |
| Percent Time Spent Following (PTSF) | 33.16 |

*Worksheet based on worksheet provided in the Highway Capacity Manual 2000

**Two-Way Two Lane Highway Segment Worksheet***

| | |
|---|---|
| Section | 5 |
| Time Period | Summer 2010 |
| Projected Growth Rate | NA |

| Level of Service Criteria | |
|---|---|
| **LOS** | **PTSF** |
| A | ≤40 |
| B | >40-55 |
| C | >55-70 |
| D | >70-85 |
| E | >85 |

| Input Data | |
|---|---|
| Highway Class | II |
| Terrain | Rolling |
| Two way hourly volume (veh/hour) (V) | 104 |
| Highest Directional Split Proportion | 0.5 |
| Peak hour factor (PHF) | 1 |
| % Trucks and Buses ($P_{t)}$) | 2% |
| % Recreational Vehicles ($P_{R)}$) | 0% |
| % No passing zone | 100% |
| Access points/mile | 0 |
| Shoulder width (ft) | 3 |
| Lane width (ft) | 10 |
| Lane width (ft) | 10 |
| Shoulder width (ft) | 1 |
| Segment Length (Lt) | 0.6 |

| Level of Service and Other Performance Measures | |
|---|---|
| Level of Service (LOS) | A |
| Volume to capacity ratio (v/c) | 0.043 |
| Peak 15-min vehicle miles of travel (VMT15) (veh-mi) | 15.6 |
| Peak-hour vehicle-miles of travel (VMT60) (veh-mi) | 62.4 |
| Peak 15-min total travel time (TT15) (veh-h) | 0.78 |

| Average Travel Speed | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.71 |
| Passenger-car equivalents for trucks (ET) | 2.5 |
| Passenger-car equivalents for RVs (ER) | 1.1 |
| Heavy vehicle adjustment factor (FHV) | 0.971 |
| Two way flow rate (vp) (pc/h) | 150.9 |
| vp*highest directional proportion (pc/h) | 75.4 |
| Base free flow speed (BFFS) | 30 |
| Adjustment for lane and shoulder width (fLS) | 5.3 |
| Adjustment for access points (fA) | 0 |
| Free flow speed (FFS) | 24.7 |
| Adjustment for no-passing zones (fnp) (mi/h) | 3.5 |
| Average Travel Speed (ATS) (mi/h) | 20.0 |

| Percent Time Spent Following | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.77 |
| Passenger-car equivalents for trucks (ET) | 1.8 |
| Passenger-car equivalents for RVs (ER) | 1 |
| Heavy vehicle adjustment factor (FHV) | 0.984 |
| Two way flow rate (vp) (pc/h) | 137.2 |
| vp*highest directional proportion (pc/h) | 68.6 |
| Base percent time spent following (BPTSF) | 11.36 |
| Adjustment for directional distribution and no passing zones (fd/np) | 21.8 |
| Percent Time Spent Following (PTSF) | 33.16 |

*Worksheet based on worksheet provided in the Highway Capacity Manual 2000

**Two-Way Two Lane Highway Segment Worksheet***

| | |
|---|---|
| Section | 6 |
| Time Period | Summer 2010 |
| Projected Growth Rate | NA |

| Level of Service Criteria | |
|---|---|
| **LOS** | **PTSF** |
| A | ≤40 |
| B | >40-55 |
| C | >55-70 |
| D | >70-85 |
| E | >85 |

| Input Data | |
|---|---|
| Highway Class | II |
| Terrain | Rolling |
| Two way hourly volume (veh/hour) (V) | 104 |
| Highest Directional Split Proportion | 0.5 |
| Peak hour factor (PHF) | 1 |
| % Trucks and Buses ($P_{t)}$ | 2% |
| % Recreational Vehicles ($P_{R)}$ | 0% |
| % No passing zone | 100% |
| Access points/mile | 0 |
| Shoulder width (ft) | 1 |
| Lane width (ft) | 10 |
| Lane width (ft) | 10 |
| Shoulder width (ft) | 1 |
| Segment Length (Lt) | 0.4 |

| Level of Service and Other Performance Measures | |
|---|---|
| Level of Service (LOS) | A |
| Volume to capacity ratio (v/c) | 0.043 |
| Peak 15-min vehicle miles of travel (VMT15) (veh-mi) | 10.4 |
| Peak-hour vehicle-miles of travel (VMT60) (veh-mi) | 41.6 |
| Peak 15-min total travel time (TT15) (veh-h) | 0.52 |

| Average Travel Speed | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.71 |
| Passenger-car equivalents for trucks (ET) | 2.5 |
| Passenger-car equivalents for RVs (ER) | 1.1 |
| Heavy vehicle adjustment factor (FHV) | 0.971 |
| Two way flow rate (vp) (pc/h) | 150.9 |
| vp*highest directional proportion (pc/h) | 75.4 |
| Base free flow speed (BFFS) | 30 |
| Adjustment for lane and shoulder width (fLS) | 5.3 |
| Adjustment for access points (fA) | 0 |
| Free flow speed (FFS) | 24.7 |
| Adjustment for no-passing zones (fnp) (mi/h) | 3.5 |
| Average Travel Speed (ATS) (mi/h) | 20.0 |

| Percent Time Spent Following | |
|---|---|
| Grade Adjustment Factor ($f_G$) | 0.77 |
| Passenger-car equivalents for trucks (ET) | 1.8 |
| Passenger-car equivalents for RVs (ER) | 1 |
| Heavy vehicle adjustment factor (FHV) | 0.984 |
| Two way flow rate (vp) (pc/h) | 137.2 |
| vp*highest directional proportion (pc/h) | 68.6 |
| Base percent time spent following (BPTSF) | 11.36 |
| Adjustment for directional distribution and no passing zones (fd/np) | 21.8 |
| Percent Time Spent Following (PTSF) | 33.16 |

*Worksheet based on worksheet provided in the Highway Capacity Manual 2000

Attachment B1

SHN CONSULTING ENGINEERS & GEOLOGISTS, INC.
812 W. Wabash • Eureka, CA 95501-2138 • 707/441-8855 • FAX: 707/441-8877 •shninfo@shn-engr.com

# Technical Memorandum

Reference: 509051.200
Date: **August 10, 2011**
To: **Mark Chaney**
From: **Rosalind Litzky**
**Subject: REVISED Sound Analysis Results for JH Ranch, Siskiyou County, California**

Revisions to the original Sound Analysis (dated August 23, 2010) have been made to clarify definitions used in the report as they relate to operations at JH Ranch, to reflect more accurately the numbers of staff and guests at the Ranch during the study and to provide additional explanation on results. The term "baseline" in the report has been changed to "existing" where the report intended to reflect what was occurring at the time the study was undertaken. In other areas, the term "baseline" was used to reflect winter or lighter use periods and was confusing in describing the overall measurements as the related to the programs. In these instances "baseline" has been replaced with the term "winter" to better reflect the seasonality of the measurements.

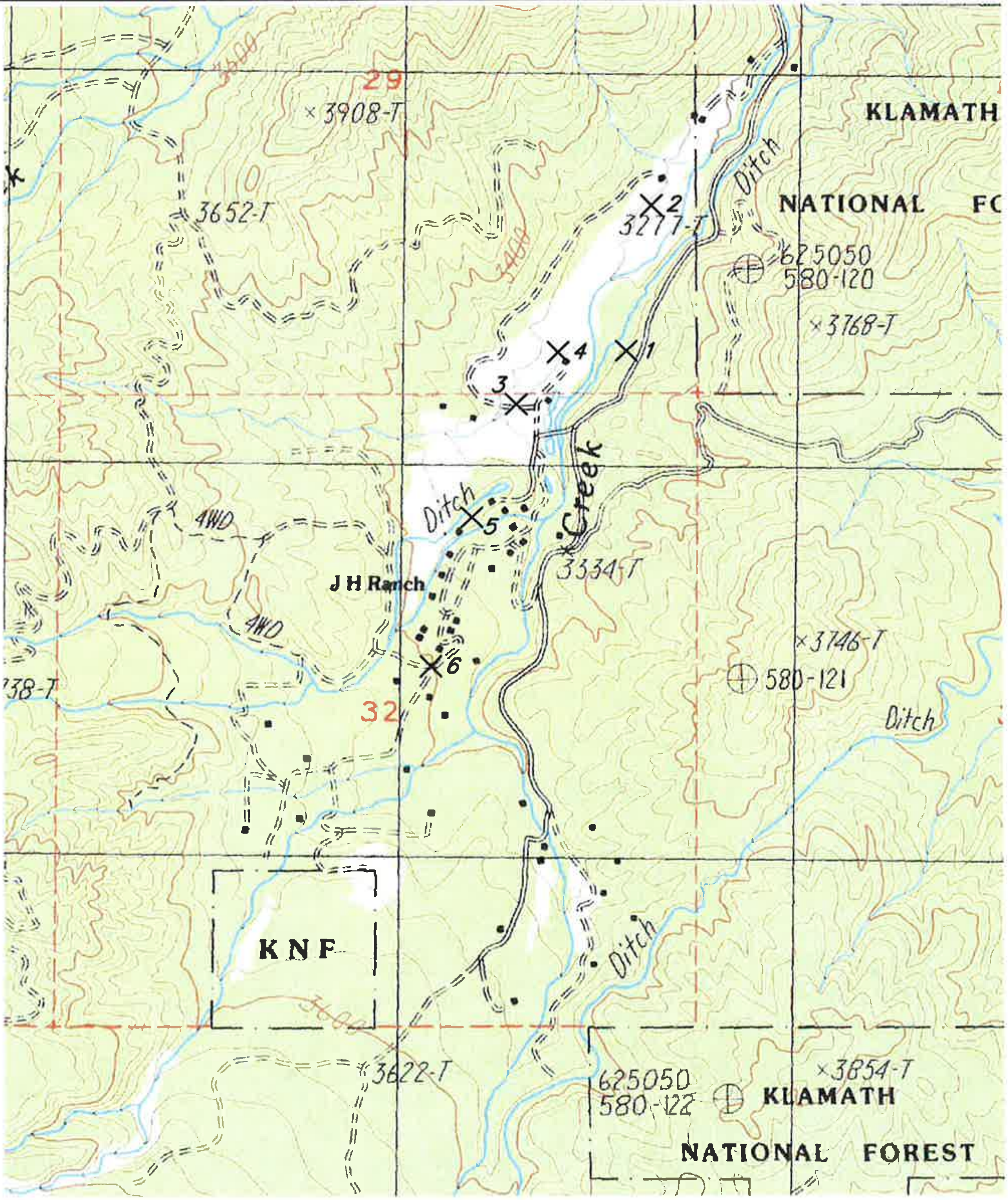
Additional modifications to the Sound Analysis include clarifications to the numbers of staff and guests present at the Ranch during our measurements. Staff and guest numbers in this revised study reflect attendance data from the 2010 use period when the study was conducted rather than estimates. As a result, the actual numbers of people at JH Ranch during our investigations were larger than previously reported. These revisions did not affect the report's conclusions.

Additional edits to the text were made to provide better definition and descriptions. Sound measurement results and conclusions were unchanged.

## Purpose of Sound Analysis

SHN Consulting Engineers & Geologists, Inc. conducted sound measurements at JH Ranch for the purpose of establishing existing conditions and sounds associated with guest ranch activities. Sound measurements were conducted on May 18, 2010, for the purpose of establishing winter measurements prior to typical summer activities when full guest ranch programs were underway.

Guest ranch related sound measurements were again conducted on June 23, 2010 to measure sounds generated by program activities during the Ranch's high school student programs. Sound measurements were conducted during this period as the Ranch considers this session to have the highest potential for sound generation. Measurements conducted during this program period allowed for a comparison of the Ranch's contribution to ambient noise and contributions from the summer seasons highest use program. These measurements are described as "Winter" and "Summer" in this memorandum.




## EXPLANATION

×5 MEASUREMENT LOCATION

NTS

Consulting Engineers & Geologists, Inc.

| | | |
|---|---|---|
| JH Ranch<br>Siskiyou County, California | | Sound Measurement Locations<br>509051.300 |
| July 2010 | 509051-300-GPS | Figure 1 |

\\Eureka\Projects\CAD-FILES\Redding\2009\509051\300 , SAVED: 7/12/2010 3:08 PM NDOWNEY, PLOTTED: 7/14/2010 1:25 PM, NATHAN DOWNEY

Sound measurements were only conducted on property owned by JH Ranch, and no measurements on adjacent private property were taken. Sound measurements at JH Ranch and associated private property line were taken. Because of its proximity to neighboring residences, sound measurements specifically targeted activities associated with the use of the "Big Top" tent where an amplified system is used.

## Site Description

JH Ranch owns several parcels along French Creek Road. Most of the guest ranch events occur at the developed areas west of French Creek Road. This area constitutes the study area (Figure 1). The study area can be generally characterized as having a variable topography with a few areas at higher elevations that overlook the low lying areas.

JH Ranch is a developed site with permanent and temporary structures and various access roads (paved and gravel). A paved access road from French Creek Road leads to the JH Ranch lodge, administrative offices, dining pavilion and kitchen area, and developed recreation sites; these facilities are at a location which is a geographically high spot that overlooks a small valley below. The existing dining pavilion, which sits adjacent to the lodge, was in the process of renovation and construction during site visits. Toward the southwest of the dining facility, there is a large recreation pond, basketball/tennis courts and a well maintained grass covered sports field and a separate area that is used for program activities.

A drainage located northwest of the recreation pond flows southwest into a series of ponds perpendicular to the renovated dining facility. Upslope of the drainage ditch is a forested area developed with a ropes course. From this vantage point the valley can be observed. At a break in slope from the recreation pond and grassy area, Paynes Lake Creek, a tributary to French Creek, was observed flowing northeast.

Down slope of the dining pavilion (to the south) are the primary guest accommodations. A series of gravel roads leads to guest cabins scattered throughout this area. This area is situated between French Creek and Paynes Lake Creek. North of the dining pavilion and along a paved access road is the "Big Top" tent, a large canvas tent with doors. A barn and horse corral are also located adjacent to the "Big Top" tent. The Ranch's bio-reactor (wastewater treatment) is located on the western edge of a pasture between the Big Top and the northern property line. A series of fenced pastures is located between the main lodge and northern property boundary. Some of the pastures are irrigated with horses and livestock keeping the grass low. The slope gradually steepens toward the west. French Creek is parallel to French Creek Road generally runs north to south.

## Sound Measurements

### General Sound Measurement Device Setup

Both the Winter and Summer sound levels were measured with a Quest Model 1900 Type 1 (Precision) Integrating and Logging Sound Level Meter, Serial # CC0090008 using a Bruel & Kjaer 4936 microphone (Prepolarized Free Field Electret), Serial #2128867 and calibrated with a QC-20 calibrator, Serial #QO0080023. Pre-survey calibration readings were 94 decibels (dB) on the Quest 1900 at a calibrator setting of 94 dB at 1,000 Hertz (Hz) and 114 dB on the Quest 1900 at a calibrator setting of 114 dB at 1,000 Hz. Post-survey calibration readings were exactly the same.

The settings on the sound level meter were A-weighted; fast response; 3-dB exchange rate; threshold level "off," no filter, and manual start. A windscreen was used to protect the microphone. The Quest 1900 was mounted on a tripod approximately 3 feet above the ground.

## Winter Measurements

Meteorological conditions were colder than expected for the time of year due to late rain and snow storms: wind ranged from about 0 to 10 miles per hour, temperatures ranged from 62 to 67° Fahrenheit, and skies were clear to partly overcast throughout the studies. Sound measurements were taken from approximately 8:30 a.m. to 12 p.m. and for approximately 15 minutes at each location.

Winter sound measurements were taken prior to the arrival of summer staff and summer guest programs beginning. Activities at the ranch consisted of final setup of the Big Top tent's internal structures (stage, sound system, lighting), ranch related maintenance activities, pre-season grading of the gravel road in the cabin area, and final construction at the dining pavilion (electrical, rock facing, final grading). Ranch staff consisted of approximately 35 people and there were approximately 10 dining pavilion construction workers.

The results of the field measurements are summarized below in Table 1, with the measurement locations displayed on Figure 1.

**Table 1**
**JH Ranch Recorded Sound Measurements for Winter[1] and Summer Conditions[1]**

| Measurements[2] | Location 1[3] | | Location 2[4] | | Location 3[5] | | Location 4[6] | | Location 5[7] | | Location 6[8] | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Winter (dBA) | Summer (dBA) | Winter (dBA) | Summer (dBA) | Winter (dBA) | Summer[8] (dBA) | Winter (dBA) | Summer (dBA) | Winter (dBA) | Summer (dBA) | Winter (dBA) | Summer (dBA) |
| **Average ($L_{eq}$)** | 55.0/ 52.8 | 52.3/55.9 | 47.7 | 48.6/60.2 | 61.2 | 49.9 | 46.9 | 44.4/48.9/ 45.6/46.0 | 50.5 | 55.1 | 60.6 | 44.2 |
| **Peak** | 84.7/ 74.1 | 82.7/ 84.1 | 77.7 | 48.6/ 99.4 | 99.0 | 87.9 | 85.0 | 83.2/ 82.7/ 87.0/82.8 | 88.1 | 98.7 | 90.6 | 84.9 |
| **L Maximum** | 60.4/ 58.3 | 57.0/ 60.5 | 63.4 | 70.0 | 87.9 | 70.0 | 68.1 | 56.9/60.9/ 59.1 59.4 | 66.4 | 78.1 | 77.8 | 61.3 |
| **L Minimum** | 53.9/ 51.8 | 51.3/ 55.0 | 43.7 | 43.9 | 43.4 | 44.0 | 43.3 | 41.6/ 45.3/ 42.6/43.5 | 45.8 | 47.1 | 42.1 | 42.3 |
| **LN 5** | 55.5/ 53.2 | 52.7/ 56.3 | 49.2 | 52.5 | 59.1 | 51.8 | 48.7 | 47.6/ 51.6/ 48.4/47.7 | 54.4 | 59.4 | 68.1 | 45.1 |
| **LN 10** | 55.3/ 53.1 | 52.6/ 56.2 | 49.2 | 48.5 | 53.9 | 49.8 | 47.8 | 46.4/ 50.5/ 46.9/ 47.2 | 53.0 | 57.6 | 64.5 | 44.3 |
| **LN 50** | 55.0/ 52.8 | 52.2/ 55.9 | 45.3 | 45.3 | 47.4 | 47.1 | 45.5 | 43.4/ 48.3/ 44.6/45.8 | 49.4 | 51.6 | 51.9 | 43.3 |
| **LN 90** | 54.7/ 52.4 | 51.9/ 55.6 | 44.5 | 44.7 | 44.7 | 45.2 | 44.4 | 42.5/ 47.0/ 43.5/ 44.8 | 47.1 | 48.7 | 43.1 | 42.9 |

1. Winter conditions measure noise prior to guests arriving in summer; Summer conditions measure noise during ranch operations with guest activities occurring.
2. Measurements taken include:
   - A-Weighted Sound Level (dBA). The sound pressure level in decibels as measured on a sound level meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to sound. All sound levels in this report are A-weighted, unless reported otherwise.
   - Equivalent Noise Level ($L_{eq}$). The average A-weighted sound level during the measurement period.
   - PEAK. Maximum instantaneous A-weighted sound level during the measurement period.
   - Lmax, Lmin. The maximum and minimum A-weighted sound level during the measurement period.
   - L01, L10, L50, L90. The A-weighted sound levels that are exceeded 1%, 10%, 50%, and 90% of the time during the measurement period.
3. Measurement was taken at girls volunteer summer staff housing along French Creek Road. The first Winter measurement was taken within a direct line of sight of the "Big Top" tent and the second was not within a direct line of sight. The second Summer measurement was taken during evening activities. Amplified music was faintly heard. Doors facing the dining facilities were open.
4. Measurement was taken at the northern property boundary. During the Winter measurement, several geese and one emu were in the vicinity. During the Summer measurement, a Meadow lark was heard and observed within the field. There was also the sound of vehicles from the road during the study. The second Summer measurement was taken during evening activities from the pasture, at the property line, near the house. The "Big Top" tent was visible in the distance. Two dogs from a neighbor's property were barking, and likely increased the sound measurement. SHN began the evening measurement at the northern property line in the pasture; sound activity associated with the "Big Top" tent was noted.

**Table 1**
**JH Ranch Recorded Sound Measurements for Winter[1] and Summer Conditions[1]**

| Measurements[2] | Location 1[3] | | Location 2[4] | | Location 3[5] | | Location 4[6] | | Location 5[7] | | Location 6[8] | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Winter (dBA) | Summer (dBA) | Winter (dBA) | Summer (dBA) | Winter (dBA) | Summer[8] (dBA) | Winter (dBA) | Summer (dBA) | Winter (dBA) | Summer (dBA) | Winter (dBA) | Summer (dBA) |

5. Measurement was taken along the access road between the pastures. During the Winter measurements, a truck, quad, and construction equipment drove by the noise meter.
6. Measurement was taken at the "Big Top" tent. Sprinklers were operating in the vicinity when measurement started, but stopped during the study. During the daytime Summer measurement, some campers walked by and construction noise could be heard.
7. Measurement was taken near the new dining pavilion that was under construction. Some construction noise could be heard. During the daytime Summer measurement, two cars drove by the sound level meter.
8. Measurement was taken near the Ranch housing. During the Winter measurement, road grading using a construction loader and large trucks was occurring in the area.
9. The first measurement was taken during the day; the second measurement was taken in the southeast corner during evening activities; the third measurement was taken in the southeast corner during evening activities.

### Summer Measurements

Meteorological conditions were considered pleasant with regard to time of year: wind ranged from about 0 to 10 miles per hour, temperatures ranged from 78 to 85° Fahrenheit, and skies were clear to partly cloudy throughout the studies. Sound measurements were taken from 12 p.m. to 8:30 p.m. and for approximately 15 minutes at each location.

Summer measurements were taken during the Ranch's high school student programs, with all summer Ranch staff present and full guest program activities underway. Activities observed consisted of staff and guests walking to program activities and meals, equestrian activities, ropes course activities, and other daily Ranch maintenance (vehicles and tractors, deliveries, etc.). Approximately 165 staff and 280 guests were present on the property during the measurement period. JH Ranch indicated to SHN that the high school program and the associated evening program activities reflected the highest potential sound generation event during the summer program schedule.

Night measurements were taken during the same period to determine sound levels from activities that may vary in the evening, specifically those programs that occur at the Big Top where amplified music and sound systems are used. Measurements were taken at the Big Top to measure sound levels from the approximately 425 guests and staff who participated in activities that included amplified music. The results of the field measurements are summarized in Table 1.

## Discussion

The results from the sound level measurements are shown in Table 1 and the equivalent noise level ($L_{eq}$) measurements are summarized in Table 2.

**Table 2**
**Equivalent Noise Level ($L_{eq}$)[1] Measurement Comparison**

| Measurement Locations[2] | Winter[3] (dBA)[4] | Summer[3] (Daytime Activities) (dbA) | Summer[3] (Evening Activities) (dbA) |
|---|---|---|---|
| 1 | 55.0 | 52.3 | 55.9 |
| 2 | 47.7 | 48.6 | 60.2 |
| 3 | 61.2 | 49.9 | NM[5] |
| 4 | 46.9 | 44.4 | 48.9[6]/45.6[7]/46.0[6] |
| 5 | 50.5 | 55.1 | NM |
| 6 | 60.6 | 44.1 | NM |

1. $L_{eq}$: The average A-weighted sound level during the measurement period.
2. Refer to Figure 1 for locations.
3. Winter measurements are for noise prior to guests arriving in summer; Summer measurements show noise during ranch operations with guest activities occurring.
4. dBA: decibel, A-weighted
5. NM: No measurement taken because evening measurements focused on the activities around the "Big Top" tent.
6. Measurement taken within southeast corner.
7. Measurement taken within northeast corner.

The $L_{eq}$ is the average A-weighted sound level during the measurement period and specifies maximum allowable average sound levels. The $L_{eq}$ is commonly used in county and city general plans as a tool for regulating noise disturbances. According to "Table A-6: Summary of Noise Levels Identified as Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety" of the *Siskiyou County General Plan Noise Element*, sound level measurements should be below 55dBA for outdoor activity in residential areas and farms and other outdoor areas where people spend widely varying amounts of time and other places in which quiet is a basis for use (Siskiyou County General Plan Noise Element, 1978). It should be noted that Table A-6 is based upon an $L_{eq}$ measurement of 24 hours, but no other comparisons of data were available from the General Plan.

The sound level measurements for the Summer measurement period are at or below the 55 dBA level. Measurements also show that Winter sound levels are within the General Plan guidelines, with the temporary exceptions noted below.

During the sound measurement sessions, no unusually loud sounds occurred beyond those in the natural environment, with the exception of construction equipment at the JH Ranch dining pavilion and road grading in the housing area during the Winter measurement period, as well as a neighbor's dogs barking during the Summer measurement period. Some of the measurements were collected close to French Creek Road, but only a few vehicles passed by within the measurement period and did not adversely affect the study. French Creek and its tributaries were loud enough to be heard at some locations, and localized wind, although present, did not produce enough sound to distort measurements and obscure other noise producing sources. Localized point sources of sound increased sound level measurements, specifically birds calling and singing and dogs barking (owned by residents beyond the study area).

The A-weighted sound level measurements (Table 2) show similar sound measurements between the Winter and Summer periods. This means that the sound level measurements taken during the Ranch's high school program (indicated by JH Ranch to have the highest noise potential) are not significantly different from the Winter sound level measurements. However, there were two exceptions.

First, the Winter measurements taken within the housing area without guests (measurement location 6) was louder than the measurements taken during the Summer period. This higher sound measurement was strongly influenced by heavy equipment that was performing pre-season grading of interior roads and placing a gravel surface. This activity temporarily inflated the noise conditions at this site (60.6 dBA) for the Winter period, as compared to 44.1 dBA during the Summer season.

Second, the sound levels recorded during Summer Evening Activities (measurement location 2 shown in Table 2) at the northern property line in the pasture was louder than daytime activities (60.2 dBA as compared to 48.6 dBA). A dog (owned by the neighbor) was able to access the pasture at Location 2 through a hole in the fence and was barking in close proximity to the sound recorder for a significant period of the sound measurements at this site. This disturbance at the site caused higher sound levels than typically would be expected. Additionally, no amplified sound was observed during the evening activities at this location. In fact, when evening measurements began at this location, it was unclear if activities were occurring at the Big Top tent as sound levels were essentially unchanged from Winter conditions established before the dog began barking.

This assumption that the dog barking at measurement location 2 caused a distortion in the measurements was later confirmed when review of the data collected adjacent to the Big Top during the same evening period (measurement location 4) showed that sound levels were considerably lower immediately adjacent to the Big Top (Table 2) than at location 2 which is approximately 2,000 feet distant. Based on this review, the sound measurements for location 2 during the evening activities is an anomaly, and is not used in the overall assessment of impacts.

Evening activities at the "Big Top" have been identified as having the potential to generate the most sound within the JH Ranch and as a potential source of noise to nearby residents. This is primarily due to periods of amplified music and concentration of guests and staff for evening activities. Other Ranch activities are located farther away than the Big Top. Based on these concerns, additional sound measurements during evening activities were conducted (Table 2). Results showed that sound coming from the Big Top was below 50 dBA for measurements immediately adjacent to the structure.

Sound measurements were taken at the JH Ranch property line at measurement locations 1 (55.0 dBA Winter; 52.3 dBA Summer Daytime; 55.9 dBA Summer Evening) and 2 (47.7 dBA Winter; 48.6 dBA Summer Daytime; 60.2 dBA Summer Evening[1]) near off-site private residence. Because sound pressure levels do not persist with distance (because as the distance from the source expands, the sound attenuation decreases), and the sound measurements taken at the property lines do not suggest enough sound pressure is generated that would result in inadequate noise levels, nearby residences are not subjected to sound pressure levels in excess of the *Siskiyou County General Plan Noise Element*.

## Conclusions

Winter and Summer sound level measurements taken at JH Ranch are typical for rural areas with decibel levels ranging from 44.1 dBA to 60.6 dBA. Based on the measurements collected for this study, Summer measurements do not differ significantly from Winter measurements. Data analysis revealed that sound levels are within the ranges outlined by Table A-6 of the *Siskiyou County General Plan Noise Element*. The data collected does not suggest noise is being produced from JH Ranch activities at levels that would be considered significant and further study does not appear warranted.

## References

Siskiyou County, 1978. *Siskiyou County General Plan Noise Element*. Yreka: Siskiyou County.

[1] As noted earlier in this report, Summer Evening measurements at location 2 exceed the 55 dBA measurement standards due to influence from a barking dog, are considered an anomaly and are not used in this report as a measurement of program activities on JH Ranch.

Attachment B2

**DOWNEY | BRAND**
ATTORNEYS LLP

Garrett J. Colli
gcolli@downeybrand.com
916/520-5289 Direct
916/520-5689 Fax

621 Capitol Mall, 18th Floor
Sacramento, CA 95814
916/444-1000 Main
916/444-2100 Fax
downeybrand.com

April 2, 2012

JH Ranch
Rob Hayes-St.Clair
402 Office Park Dr.
Suite 310
Birmingham, AL 35223

**Re: SB 610 Water Supply Assessment**

Dear Mr. Hayes-St.Clair:

You asked us to address whether the California Water Code requires a water supply assessment ("WSA") for JH Ranch's Planned Development Plan Amendment.

Brief Answer

No. WSA applicability is limited to "projects," which are defined in reference to a discrete list of specific types of developments. JH Ranch does not fall within any of these enumerated categories.

Factual Background

JH Ranch owns and operates a camp facility in Siskiyou County ("County"). JH Ranch has submitted an amendment that would modify the planned development zoning under which the property is currently designated (the "PDPA"). The County has asked JH Ranch to evaluate whether a water supply assessment is needed for the PDPA.

Discussion

SB 610, codified in California Water Code Sections 10910 through 10915, requires cities and counties to prepare a water supply assessment ("WSA") for "projects" that are subject to the California Environmental Quality Act ("CEQA") AND that meet the statutory definition of "project" in Water Code Section 10912. Under these sections, "project" is a statutorily defined term that encompasses only a few enumerated categories of development. Specifically, such projects only include:

- Proposed residential developments of more than 500 dwelling units.

- Proposed shopping centers or business establishments employing more than 1,000 persons or having more than 500,000 square feet of floor space.
- Proposed commercial office buildings employing more than 1,000 persons or having more than 250,000 square feet of floor space.
- Proposed hotels or motels, or both, having more than 500 rooms.
- Proposed industrial, manufacturing, or processing plants, or industrial parks planned to house more than 1,000 persons, occupying more than 40 acres of land, or having more than 650,000 square feet of floor area. (This does not include wind or solar facilities that demand no more than 75 acre feet of water annually.)
- Mixed-use projects that include one or more of the projects specified in this subdivision.
- Projects that would demand an amount of water equivalent to, or greater than, the amount of water required by a 500 dwelling unit project.

Cal. Water Code § 10912(a). Few courts have had occasion to interpret this section, and none have examined the project definitions in the context of a camp or recreational facility such as JH Ranch. Therefore, a plain reading of the statute offers the best insight regarding whether a WSA is required for JH Ranch's PDPA.

None of the categories above would apply to JH Ranch. For example, JH Ranch is not a "business establishment employing more than 1,000 persons or having more than 500,000 square feet of floor space." First, in this subsection, "business establishment" is paired with "shopping center," suggesting that the former term was intended to apply to large store fronts and is not so broad as would encompass a camp.[1] Second, the reference to "floor space" lends further weight to an interpretation that would exclude an outdoor recreation and educational facility like a camp.

Even the catch-all definition, referring to projects that demand an amount of water equal to or greater than that demanded by a 500 dwelling unit project, does not apply to JH Ranch. However, according to the California Department of Water Resources *Guidebook for Implementation of Senate Bill 610 and Senate Bill 221 of 2001* (Oct. 8, 2003) (http://www.water.ca.gov/pubs/use/sb_610_sb_221_guidebook/guidebook.pdf), a 500 dwelling unit project would consume 150 to 250 acre-feet of water per year. JH Ranch's water use is not even close to this level, placing it well outside of this catch-all category.

Similary, the remaining definitions of "project" under California Water Code Section 10912(a) clearly would not include a facility like JH Ranch. JH Ranch is not a residential development, commercial office building, hotel/motel with more than 500 rooms, or industrial facility.

---

[1] The *ejusdem generis* canon of statutory interpretation dictates that "where general words follow an enumeration of specific items, the general words are read as applying only to other items akin to those specifically enumerated." *Harrison v. PPG Industries, Inc.*, 446 U.S. 578, 588 (1980); *see also Khan v. Los Angeles City Employees' Retirement System*, (2010) 187 Cal. App. 4th 98, 106 (applying *noscitur a sociis*: "words grouped in a list should be given similar meaning"); *Ass'n of Irritated Residents v. San Joaquin Valley Unified Air Pollution Control District*, (2008) 168 Cal. App. 4th 535, 551 (applying both *ejusdem generis* and *noscitur a sociis*).

Accordingly, it does not qualify as a "project" under Water Code section 10912(a), relieving Siskiyou County of any potential obligation to prepare a WSA.

Very truly yours,

DOWNEY BRAND LLP

Garrett J. Colli

GJC

Attachment B3

**_EMKO Environmental, Inc._**
**551 Lakecrest Dr.**
**El Dorado Hills, CA 95762-3772**
**(916)718-5511**
**akopania@sbcglobal.net**

November 3, 2015

Mitchell Chadwick
3001 Lava Ridge Court, Suite 120
Roseville, California 95661

Attn.: Braiden Chadwick

Subject: Technical Evaluation of Groundwater and Surface Water Interaction
JH Ranch
Siskiyou County, California

Dear Mr. Chadwick:

This letter report presents my Technical Evaluation of the potential for interaction between the groundwater extracted by the wells at JH Ranch and the surface water flows in Paynes Lake Creek and French Creek. This evaluation is based on the following information:

1. Well Completion Reports for the JH Ranch wells;
2. Maps showing the location of the wells compared to the creeks and JH Ranch roads and facilities;
3. Photographs of the creeks at various locations, taken on June 3, 2015 and provided by Rob Hayes-St. Clair;
4. Groundwater pumping and water usage information provided by Carl Jones of JH Ranch on July 15, 2015; and
5. Water level data measured in two wells at JH Ranch on July 22, 2015.

According to Carl Jones and Rob Hayes-St. Clair of JH Ranch, during the 10-week peak season, the peak occupancy at JH Ranch can be up to 482 persons, with a water use of 80 gallons per person per day[1], or approximately 40,000 gallons per day. This water usage is equivalent to an average pumping rate of 28 gallons per minute (gpm). For an additional 14 weeks of the year, referred to as the shoulder season, the occupancy is typically half of the peak season, with an equivalent water use of approximately 20,000 gallons per day, equivalent to a pumping rate of 14 gpm. Very little potable water demand is reported to occur during the remaining 28 weeks of the year.

1 The California State Water Resources Control Board Drinking Water Program mandates use of 80 gallons per person per day for water use estimates for JH Ranch. Actual water usage may be less.

There are six groundwater supply wells that have been drilled at JH Ranch. The well locations are shown on Figure 1. According to Carl Jones, only two of the wells, Well 4 and Well 5, are currently connected to the JH Ranch water system and pumped for potable supply. These two wells are capable of pumping at between 40 gallons per minute (gpm) and 50 gpm each. Therefore, these wells pump intermittently based on demand, as the total pumping capacity is more than three times greater than the peak daily demand.

A wastewater treatment plant capable of treating up to 45,000 gallons per day is present at JH Ranch. Treated potable water is returned to the ground through a series of leach fields and pasture irrigation.

It is our understanding that proposed changes in site use would result in a redistribution of the current baseline peak occupancy of 482 persons but would not result in any change in water use.

Table 1 provides a summary of the well construction details, geology, and hydrologic information for Wells 4 and 5. Well 4 was drilled in August 2001 to a depth of 310 feet. It was completed with 10 feet of screen from 52 feet below the top of the well casing (ft btc) to 62 ft btc and as an open hole from 62 ft btc to 310 ft btc. The screened and open hole interval is completed primarily within decomposed granite. The static water level measured in Well 4 at the time it was drilled was 39 ft btc.

Well 5 was drilled in June 2008 to a depth of 140 feet. It was completed with 80 feet of screen from 60 ft btc to 140 ft btc. The screened interval is completely within gray and white granite bedrock. The static water level measured in Well 5 at the time it was drilled was 10 ft btc.

Both wells contain a cement-bentonite sanitary seal to a depth of 50 feet.

On July 22, 2015, water levels were measured in Wells 4 and 5. Well 4 had been pumping prior to taking measurements in that well. Well 4 was turned off at 11:54 and measurements were taken until 13:19, as indicated in Figure 2. Thus, the data shown on Figure 2 represent the recovery of the water level in Well 4 after pumping had occurred. The water level in Well 4 when the pump was turned off was 92 feet below the top of the well casing (ft btc). Over the next hour and 25 minutes, the water level increased 47.4 feet to a depth of 44.6 ft btc, which is similar to the depth of 39 feet measured when the well was installed in 2001[2].

When the initial measurement was taken in Well 5, pumping was not occurring and the depth to water was 11 ft btc, almost identical to the measurement taken when the well was installed in 2008. The pump was subsequently turned on for approximately 30 to 35 minutes and then turned off. Figure 3 shows the water levels measured in Well 5 prior to, during, and after pumping had occurred. The maximum depth to water measured in Well

2 Note that the water level in Well 4 was still rising when the final measurement was taken.

5 was 66 ft btc at the end of the pumping period. Water levels then recovered almost 50 feet, to a depth of 16.5 ft btc, within 15 minutes and were still rising at that time.

Although the static water levels in Wells 4 and 5 range from approximately 40 ft btc to as shallow as 10 ft btc, the intervals from which the wells produce water is much deeper. As described above, and shown in Table 1, both wells also include a sanitary seal extending from the ground surface to a depth of 50 feet that prevents water from shallower intervals from moving down the well bore and entering the well screens. Therefore, the water producing interval for Well 4 extends from 52 ft btc to 310 ft btc, within decomposed granite. For Well 5, the water producing interval extends from 60 ft btc to 140 ft btc, within granitic bedrock.

The depth of the sanitary seals and water producing intervals, along with the water levels recently measured in the wells, indicate that the groundwater currently produced for the JH Ranch comes from deeper intervals. More specifically, there is no evidence to suggest that pumping of Wells 4 and 5 draws water from shallow, near-surface zones or from the local creeks. Therefore, continued use of Wells 4 and 5 will not have an impact on the flows in Paynes Lake Creek and French Creek, based on the data and information discussed above.

Please do not hesitate to contact me if you have any questions regarding the information presented in this Technical Evaluation.

Sincerely,

***EMKO Environmental, Inc.***

A. Kopania

Andrew A. Kopania
President & Principal Hydrogeologist
California Professional Geologist #4711
California Certified Hydrogeologist #CH31

**TABLE 1**

Summary Information for Wells 4 and 5

| Well 4 | | | Well5 | | |
|---|---|---|---|---|---|
| Date Drilled | 8/31/2001 | | Date Drilled | 6/25/2008 | |
| Ground Surface Elevation (ft msl) | 3410 | | Ground Surface Elevation (ft msl) | 3280 | |
| **Well Construction** | | | | | |
| | ft btc | ft msl | | ft btc | ft msl |
| Total Depth | 310 | 3100 | Total Depth | 140 | 3140 |
| Sanitary Seal Bottom Depth | 50 | 3360 | | 50 | 3230 |
| Top of Screen | 52 | 3358 | Top of Screen | 60 | 3220 |
| Bottom of Screen | 62 | 3348 | Bottom of Screen | 140 | 3140 |
| Botton of Open Hole Interval | 310 | 3100 | Botton of Open Hole Interval | NA | NA |
| **Geology** | | | | | |
| Boulders | 0-23 | 3410-3387 | Soil and Clay | 0-15 | 3280-3265 |
| Brown rock with boulders | 23-59 | 3387-3351 | Decomposed granite | 15-40 | 3265-3240 |
| Decomposed granite | 59-310 | 3351-3100 | Gray and white granite | 40-140 | 3240-3140 |
| **Hydrologic Conditions** | | | | | |
| Depth to Groundwater | 39 | 3371 | Depth to Groundwater | 10 | 3270 |

ft msl = feet above mean sea level

ft btc = feet below top of well casing

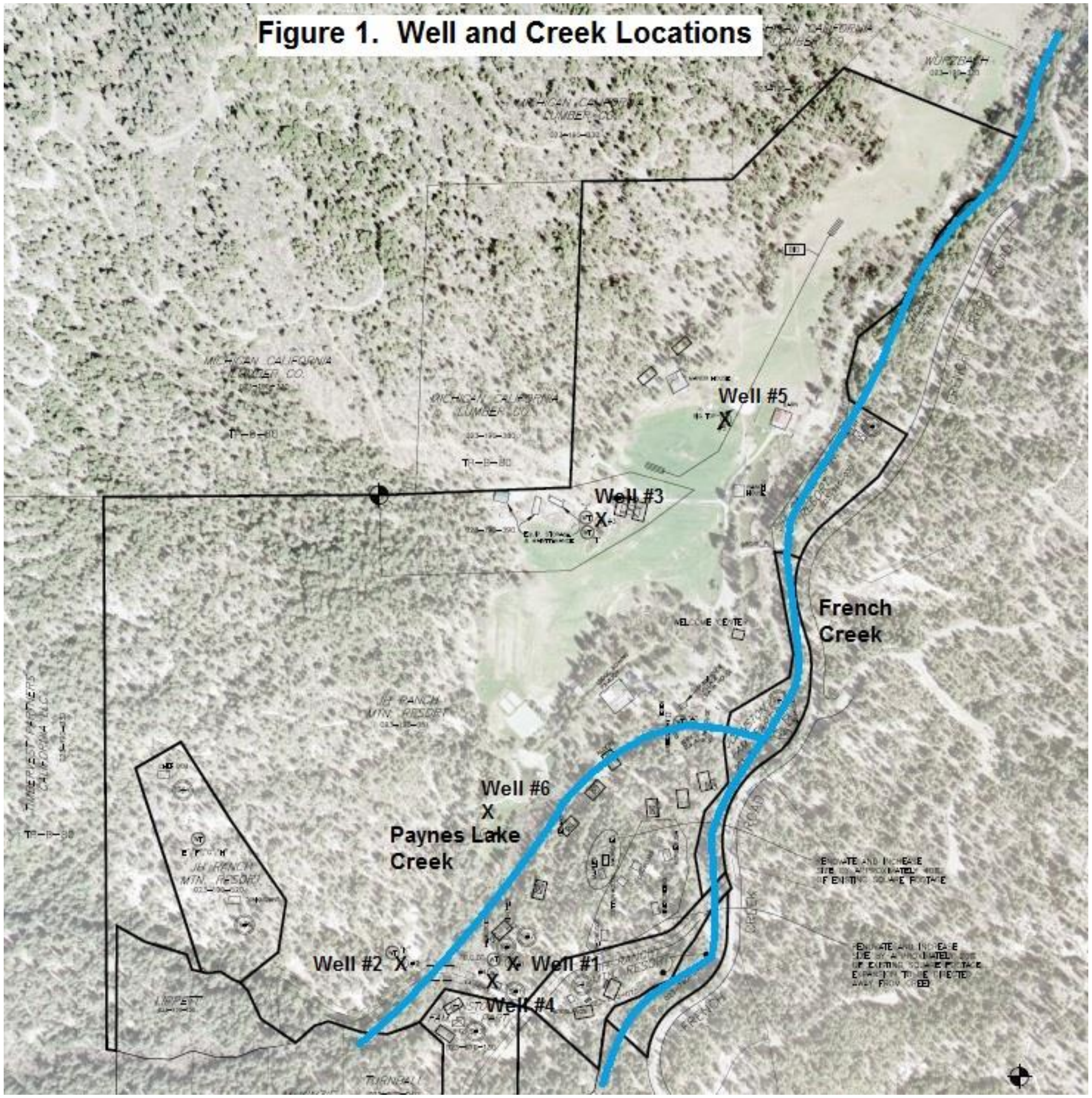


Figure 1. Well and Creek Locations
Well #5
Well #3
French
Creek
Well #6
Paynes Lake
Creek
Well #2
Well #1
Well #4
MICHIGAN CALIFORNIA
LUMBER CO.
JH RANCH
MTN. RESORT

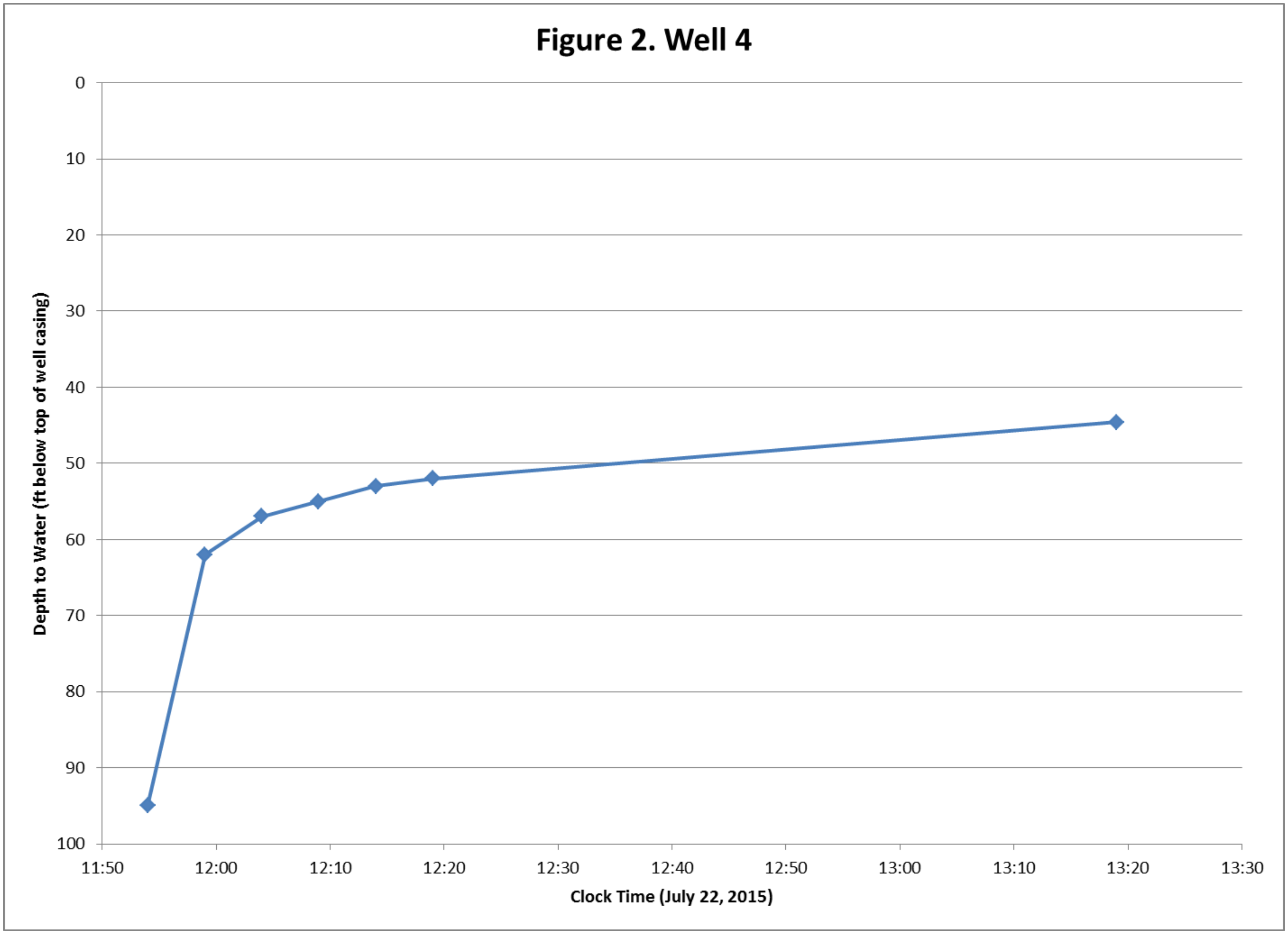


Figure 2. Well 4
Depth to Water (ft below top of well casing)
0
10
20
30
40
50
60
70
80
90
100
11:50
12:00
12:10
12:20
12:30
12:40
12:50
13:00
13:10
13:20
13:30
Clock Time (July 22, 2015)

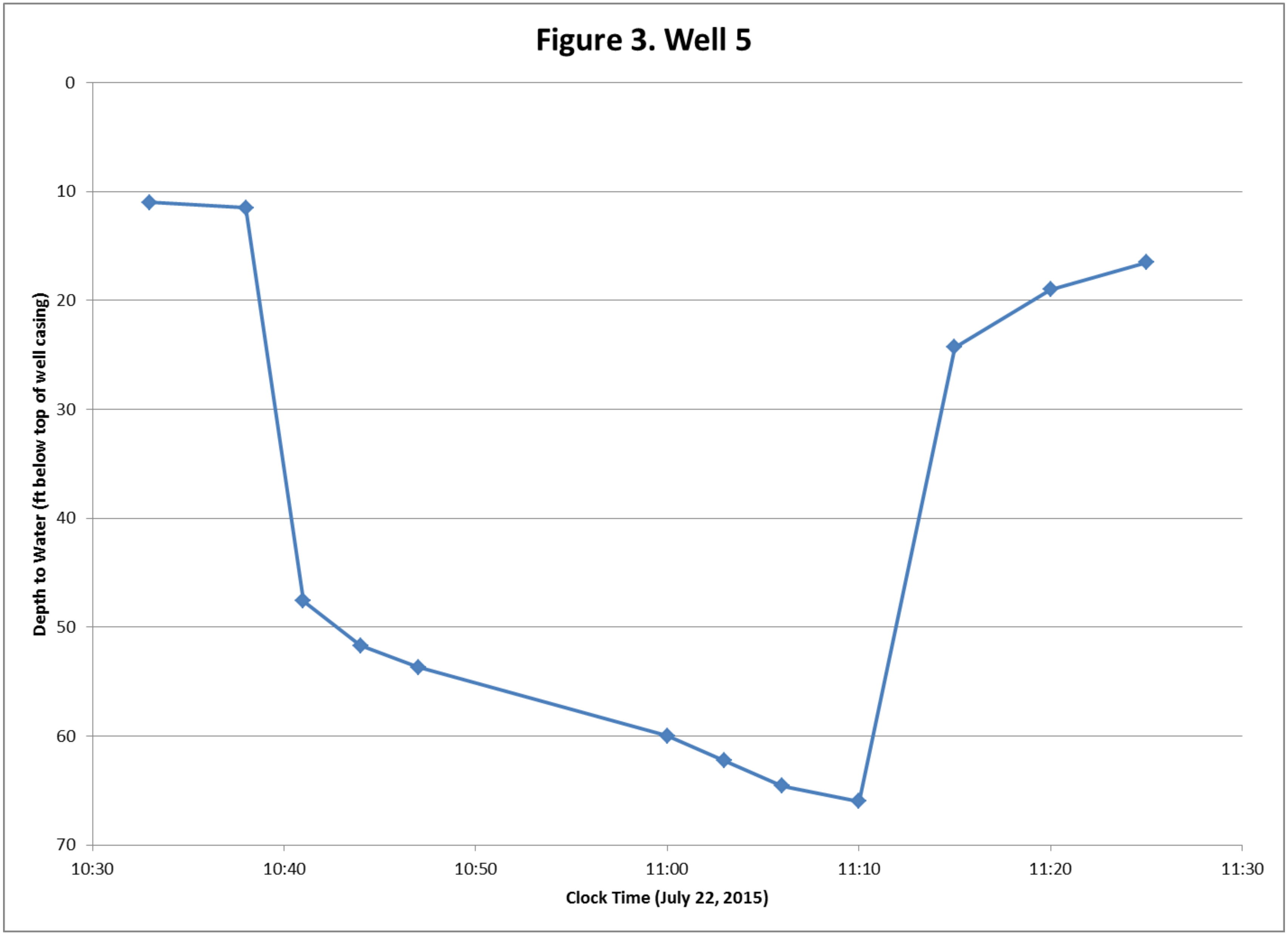


Figure 3. Well 5
Depth to Water (ft below top of well casing)
0
10
20
30
40
50
60
70
10:30
10:40
10:50
11:00
11:10
11:20
11:30
Clock Time (July 22, 2015)

Attachment B4

# Natural Resources Assessment Report

## JH Ranch

## Siskiyou County, California

Prepared for:

JH Ranch

SHN Consulting Engineers & Geologists, Inc.

350 Hartnell Ave., Suite B
Redding, CA 96002
530-221-5424

August 2010
509051.300

CONSULTING ENGINEERS & GEOLOGISTS, INC.
350 Hartnell Ave., Suite B • Redding, CA 96002• 530/221-5424 • FAX: 530/221-0135 •shninfo@shn-ngr.com

Reference: 509051.300

August 25, 2010

Rob Hayes-St. Clair
JH Ranch
8525 Homestead Lane
Etna, CA 96027

**Subject: Natural Resources Assessment Report, JH Ranch, Siskiyou County, California**

Dear Mr. Hayes-St. Clair:

Attached is the Natural Resources Assessment for JH Ranch in Siskiyou County, California. The purpose of this report is to assess potential impacts to any special status species and their habitat within the vicinity of JH Ranch from on-going activities associated with the JH Ranch activities. A habitat analysis has been conducted in order to determine the potential presence of natural resources occurring within the survey area. This report documents the methods, results, and conclusions for the natural assessment and analysis conducted.

If you have any questions about this report, please contact Mark Chaney, Project Manager, at our Redding office at (530) 221-5424.

Sincerely,

**SHN Consulting Engineers & Geologists, Inc.**

R. Litzky

Rosalind Litzky
Environmental Scientist

Hilary Sundeen

Hilary Sundeen
Botanist

RL:MSC:jlr
Enclosure: Natural Resources Assessment Report

Reference: 509051.300

# Natural Resources Assessment Report

## JH Ranch
## Siskiyou County, California

Prepared for:

**JH Ranch**

Prepared by:

Consulting Engineers & Geologists, Inc.
350 Hartnell Ave., Suite B
Redding, CA 96002
530-221-5424

August 2010

QA / QC: MSC

# Table of Contents

**Page**

# Table of Contents, Continued



**Appendices**



# List of Illustrations

**Figures** **Follows Page**



**Tables** **Page**

# Acronyms and Abbreviations

| | |
|---|---|
| ACOE | Army Corps of Engineers |
| BIOS | Biogeographical Information and Observation System |
| CCR | California Code of Regulations |
| CDFG | California Department of Fish and Game |
| CEQA | California Environmental Quality Act |
| CERES | California Environmental Resources Evaluation System |
| CESA | California Endangered Species Act |
| CFR | Code of Federal Regulations |
| CFGC | California Fish and Game Code |
| CH | Critical Habitat |
| CNDDB | California Natural Diversity Database |
| CNPS | California Native Plant Society |
| CWA | Clean Water Act |
| DG | Disintegrated Granite |
| DPS | Distinct Population Segment |
| ESU | Evolutionarily Significant Unit |
| FC | Federal Candidate |
| FE | Federally Endangered |
| FESA | Federal Endangered Species Act |
| FT | Federally Threatened |
| HA | Hydrologic Area |
| HR | Hydrologic Region |
| HSA | Hydrologic Sub-Area |
| HU | Hydrologic Unit |
| MBTA | Migratory Bird Treaty Act |
| MSL | Mean Sea Level |
| NA | Not Applicable |
| NR | Not Referenced |
| NCCP | Natural Community Conservation Planning Act |
| NEPA | National Environmental Policy Act |
| NMFS | National Marine Fisheries Service |
| NPPA | Native Plant Protection Act |
| NRCS | Natural Resources Conservation Service |
| NWI | National Wetland Inventory |
| OHWM | Ordinary High Water Mark |
| PSSC | Palustrine Scrub-Shrub Seasonally Flooded |
| PUBH | Palustrine Unconsolidated Bottom Permanently Flooded |
| PWS | Planning Watershed |
| RWQCB | Regional Water Quality Control Board |
| SAA | Streambed Alteration Agreement |
| SFP | State Fully Protected |
| SE | State Endangered |
| SHN | SHN Consulting Engineers & Geologists, Inc. |
| SONCC | Southern Oregon Northern California Coast |

# Acronyms and Abbreviations, Continued

| | |
|---|---|
| SPWS | Super Planning Watershed |
| SR | State listed Rare |
| SSC | Species of Special Concern |
| ST | State Threatened |
| SWRCB | State Water Resources Control Board |
| U.S. EPA | U.S. Environmental Protection Agency |
| USC | U.S. Code |
| USFWS | U.S. Fish and Wildlife Services |
| USGS | United States Geological Survey |
| WDR | Waste Discharge Requirement |

# 1.0 Introduction

SHN Consulting Engineers & Geologists, Inc. (SHN) has conducted site investigations, literature reviews, and an assessment to determine biological resources present at the JH Ranch in Siskiyou County, California. The findings in this report shall be used to facilitate ongoing discussion with Siskiyou County in regards to the existing Use Permit.

## 1.1 Project Location

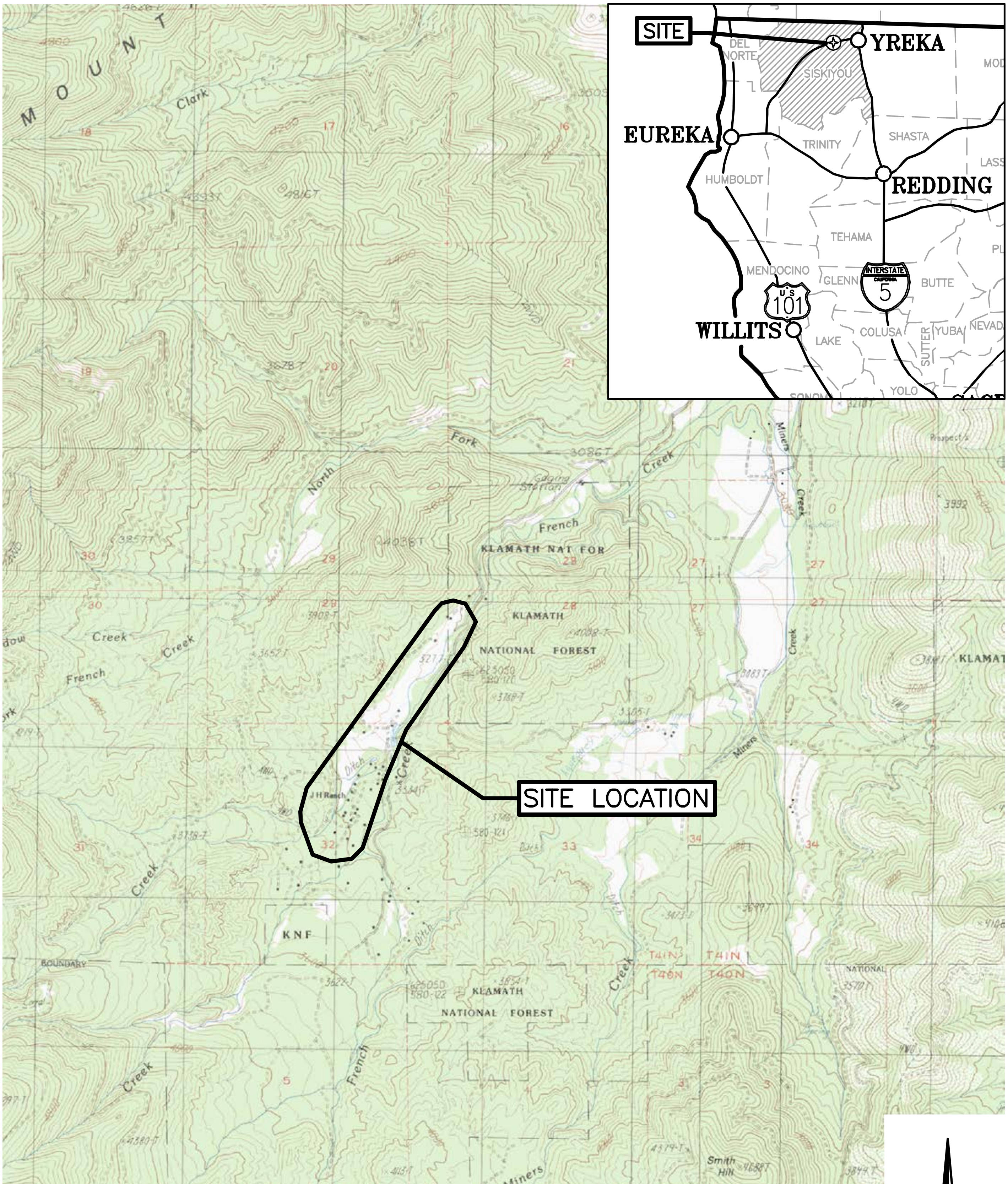
JH Ranch is located in the East ½ of Section 32, Township 41 North, Range 9 West, Mount Diablo Meridian (Figure 1). JH Ranch is located in a rural mountainous area of Siskiyou County, approximately 30 miles southwest of Yreka. Access to the JH Ranch site is from French Creek Road.

## 1.2 Site Description

JH Ranch owns several parcels along French Creek Road. Most of the guest ranch events occur at the developed areas west of French Creek Road, which constitutes the study area for this report (Figure 1). The study area can be generally characterized as having a range in topography with a few areas at higher elevations that overlook the low lying areas.

JH Ranch is a developed site with permanent and temporary structures onsite and various access roads (paved and gravel). A paved access road from French Creek Road leads up to a dining and kitchen area (at a geographically high spot). The existing dining pavilion, which sits adjacent to the lodge, was in the process of renovation and construction during site visits. Towards the southwest of the dining facility is a large recreation pond that appears to be used for swimming since several structures and lifeguard towers are found along the perimeter (Appendix A; Photo 1). A maintained grassy area is beyond the concrete pond. A drainage located northwest of the recreation pond flows southwest (Appendix A; Photo 2). It appears this drainage is diverted under an existing road and released into a series of ponds perpendicular to the dining facility (Appendix A; Photo 3). Upslope of the drainage ditch is a forested area developed with a ropes course (Appendix A; Photo 4). From this vantage point, the valley can be observed (Appendix A; Photo 5). At a break in slope from the recreation pond and grassy area, Paynes Lake Creek to French Creek was observed flowing northeast (Appendix A; Photo 6).

Downslope of the dining pavilion is primary ranch guest housing. A series of gravel roads leads to cabins found throughout this area (Appendix A; Photo 7). This area is situated between French Creek and Paynes Lake Creek. North of the ranch housing along a paved access road is the “Big Top” tent, a large canvas tent with doors (Appendix A; Photo 8). A barn and horse corral are within this area. A series of fenced pastures are located between the dining facility and northern property boundary (Appendix A; Photo 9). Some of the pastures are irrigated with horses and livestock mowing down the grass and the slope gradually increases towards the west. French Creek is parallel to French Creek Road where a wire fence is located approximately 100 feet from the edge of the water (Appendix A; Photo 9-11). Two ponds are located near paved access roads (Appendix A; Photo 12).




SOURCE: ETNA, CALLAHAN,
EATON PEAK, MCCONAUGHY RIDGE
USGS 7.5 MINUTE QUADRANGLE

1"=3000'±

| | | |
|---|---|---|
| SHN Consulting Engineers & Geologists, Inc. | JH Ranch<br>Siskiyou County, California | Site Location Map<br>SHN 509051.300 |
| | July 2010 / 509051-300-LOCATION | Figure 1 |

# 2.0 Methods

## 2.1 Literature Review

This natural resources assessment includes a review of pertinent literature on habitat characteristics of the site, and a review of information related to species of plants and animals that could potentially utilize the described habitats.

The findings for this report are a result of several sources, including a review of existing literature regarding sensitive resources that have the potential to occur within the site. Resources for this determination included:

1. California Natural Diversity Database (CNDDB) query for the Etna and the surrounding[1] U.S. Geological Survey (USGS) 7.5 minute topographic quadrangles (California Department of Fish and Game [CDFG}, 2010a).
2. Electronic Inventory of Rare and Endangered Vascular Plants of California (California Native Plant Society ([CNPS], 2010) was queried for a list of all plant species reported for the USGS 7.5 minute topographic quadrangles.
3. U.S. Fish and Wildlife Service (USFWS) Listed / Proposed Threatened and Endangered Species for Siskiyou County (Candidates Included) (USFWS, 2010).
4. Special Animals (CDFG, 2010b).
5. State and Federally Listed Endangered, Threatened, and Rare Plants of California (CDFG, 2010c).
6. State and Federally Listed Endangered, Threatened, and Animals of California (CDFG, 2010d).
7. Biogeographical Information and Observation System (BIOS; CDFG, 2010f).

Nomenclature for special-status animals conforms to CDFG (2010a, 2010b, and 2010d), respectively. Plant community names conform to *A Manual of California Vegetation, Second Edition* (Sawyer, Keeler-Wolf, and Evans, 2009). Botanical nomenclature in this assessment follows the *Jepson Manual (*Hickman, 1993; UC, 2009). A list of species observed is included in Appendix A.

## 2.2 Field Observations and Studies

Two site visits were conducted, one in late May and the other in late June. The purpose of the site visits was to observe and inventory biological resources during floristically appropriate times for botanical species. Although no focused botanical surveys were conducted, a list of all species observed can be found in Appendix B. Areas surveyed by foot include the pastures, camp housing, the western side of French Creek and part of the eastern side. Due to difficult access and the steep slope, the east side of French Creek was not surveyed, except for a small section near the second access along French Creek Road.

[1] The surrounding USGS 7.5 minute topographic quadrangles include: Yellow Dog Peak, Etna, McConaughy Gulch, Tanners Peak, Eaton Peak, Callahan, Grasshopper Ridge, Deadman Peak, Billy's Peak.

During the site visits, SHN also conducted a reconnaissance-level field survey to evaluate the presence or absence of habitat necessary for the special status wildlife species listed on species database searches. The assessment at the study area included an on-site inspection, by foot. The reconnaissance level field survey was adequate to provide a thorough inspection of the study area. Focused wildlife and nesting bird survey(s) were not conducted. The lack of species present during investigations may have been due to multiple factors, such as the season, time of day, lack of surface water, lack of seed and berry sources (these occur in late summer/early fall months when tree cones become ripe and flowering plants set fruit).

# 3.0 Environmental Setting

The environmental setting within the project area is predominately affected by fluvial and glacial outwash plains. JH Ranch is situated within the western portion of Scott Valley in the foothills of the Salmon Mountains. Temperatures are moderated by the altitude of the site, along with affects of geographic features that influence local winds and precipitation events. The majority of precipitation and snowfall occur between October through May; rainfall averages 20.91 inches per year and snowfall 12.9 inches per year (Western Regional Climate Center, 2010). The summers are hot during the day, but cool off during the evenings. Influence from these factors is evident in the generally similar habitat found throughout the study area. JH Ranch is located within a mixed conifer forest environment comprised of vegetation consistent with mixed conifer forests typically found in the Klamath Mountains. Appendix A contains site photographs which depict the existing conditions at the site.

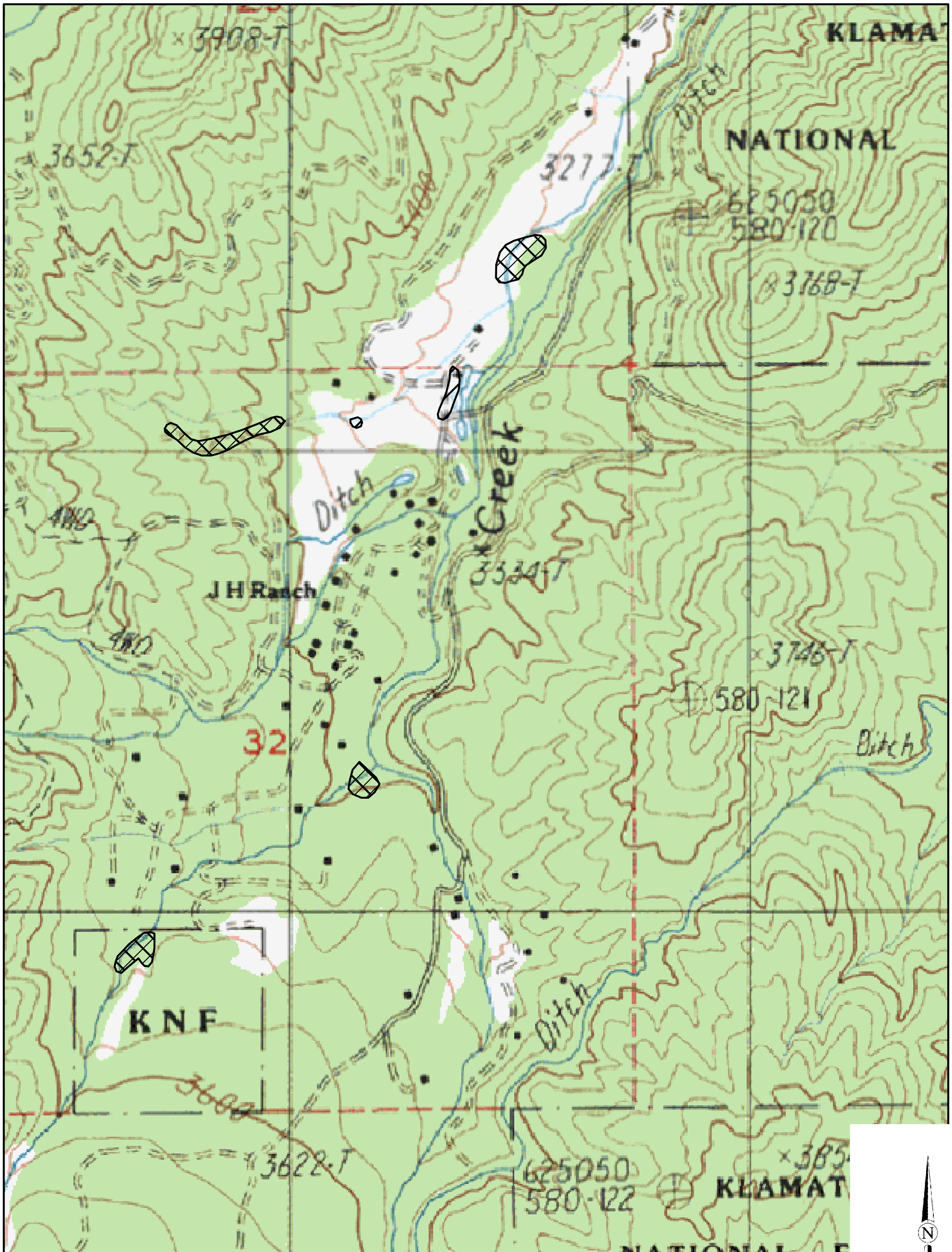
JH Ranch is located within the Scott Valley which is comprised of numerous rural ranch and timberlands that are used for a variety of ranching, timber production and residential purposes. The project area is surrounded by undeveloped private industrial forest lands and private land developed for rural residential uses. Public forest lands administered by the Klamath National Forest are located about 1 mile to the west.

## 3.1 Hydrology

The site is located within the North Coast Hydrologic Region (HR), Klamath River Hydrologic Unit (HU), Scott River Hydrologic Area (HA), Scott Valley Hydrologic Sub-Area (HSA), French Creek Super Planning Watershed (SPWS), and the Payne Lake Creek Planning Watershed (PWS) (California Environmental Resources Evaluation System [CERES] GeoFinder, 2009).

French Creek, a perennial stream, flows through the study area and eventually into the Scott River. The eastern side of the stream channel displays decomposed granite (DG) soils that are interspersed with minor amounts of cobbles and boulders at the stream margin. The western side of French Creek shows more evidence of recurrent flooding; cobbles, boulders and vegetative debris can be found along the stream margins. The French Creek Basin is predominately underlain by deeply weathered granitic soils that produce sandy sediments (Lisle and Hilton, 1999).

The USFWS is the federal agency responsible for tracking wetland trends as well as maintaining a reliable inventory through its National Wetland Inventory (NWI) (USDI, 1987). The NWI can be




**EXPLANATION**

***Freshwater Forested/Shrub Wetland***

***Freshwater Pond***

***1 "=1,000'***

| | | |
|---|---|---|
| SHN Consulting Engineers & Geologists, Inc. | JH Ranch<br>Siskiyou County, California | National Wetlands Inventory<br>SHN 509051.300 |
| July 2010 | 509041-300-NWI.mxd | Figure 2 |

queried for specific locations throughout the U.S. to aid federal, state, and local agencies in making informed decisions concerning wetlands. According to the NWI, wetland types found in the project area include those shown below (Figure 2).

- **Palustrine Unconsolidated Bottom Permanently Flooded (PUBH)**: The Palustrine System includes all nontidal wetlands dominated by trees, shrubs, emergents, and mosses or lichens. It includes all wetlands and deepwater habitats with at least 25% cover of particles smaller than stones less than 6-7 cm (2.3-2.4 inches), and a vegetative cover less than 30%. Water covers the land surface throughout the year in all years (Cowardin, 1979).

- **Palustrine Scrub-Shrub Seasonally Flooded (PSSC):** The Palustrine System includes all nontidal wetlands dominated by woody vegetation less than 6 m (20 feet) tall. The species include true shrubs, young trees (saplings), and trees or shrubs that are small or stunted because of environmental conditions. Surface water is present for extended periods, especially early in the growing season (April/May), but is absent by the end of the growing season in most years (October) (Cowardin, 1979).

It should be noted that Figure 2 is included as reference and should not be considered a wetland boundary line delineated. Although NWI maps are excellent references for determining the presence or absence of wetlands, the resolution of the NWI tends to be on a macro scale, with no field verification. Site-specific wetland delineations are necessary to determine an accurate distribution of wetlands within a proposed study area. For the purpose of this study, no further analysis regarding wetlands was warranted.

## 3.2 Soils

Soils at the study area have been mapped by the USDA Natural Resources Conservation Service (NRCS). The NRCS Web Soil Survey 2.1 was queried to identify mapping for the site (NRCS, 2010a). This includes the following soil types:

- 106 - Atter Very Bouldary Loamy Fine Sand, 5 to 30 percent slopes, found in alluvial fans, somewhat excessively drained;
- 120 – Chaix-Chawanakee Gravelly Coarse Sandy Loam, 30 to 50 percent slopes, found in mountains, well drained;
- 163 - Jilson-Duzel Gravelly Loams, 5 to 50 percent slopes, found in mountains, well drained;
- 184- Marpa-Kinkel-Boomer, Cool Complex, gravelly loam, 15 to 50 percent slopes, found in mountains, well drained;
- 198 - Odas Sandy Loam, slope 0 to 2 percent, found in floodplains, poorly drained and;
- 212 – Riverwash, stratified extremely gravelly coarse sand to gravelly sand, found in drainageways and floodplains.

Atter and Riverwash are the only soils in the project area designated as hydric soils on the *National Hydric Soils List* (NRCS, 2010b). No serpentine soils are located within the study area. However, serpentine rock rip-rap was observed along French Creek Road cut banks at several locations adjacent to the study area. It is assumed that this material was introduced to the area by Siskiyou County Public Works as stabilization material during roadway maintenance. Serpentine is not a native material at the study area.

## 3.3 Vegetation Communities

JH Ranch is located within a mixed conifer forest environment comprised of vegetation consistent with *Pinus ponderosa* alliance / ponderosa pine forest (hillsides) and *Pinus ponderosa - Calocedrus decurrens* alliance / mixed conifer forest (near creeks and lowland areas) (Sawyer, Wolfe, and Evans, 2009). Appendix A contains site photographs which depict the existing conditions at the site.

Approximately one third of the study area is grassland habitat dominated by a variety of grasses and herbaceous species. A series of fenced pastures exist between French Creek and the hillside. Some of these pastures were moderately grazed and / or irrigated. Flat, open areas with sparse tree and shrub stratum were observed along the outer edges of the grasslands. Dominant species found within the grassland habitat included shepherd's purse (*Capsella bursa-pastoris*), barley (*Hordem* sp.), bentgrass (*Agrostis*), orchard grass (*Dactylis glomerata*), wild rye (*Elymus* sp.), fescue (*Festuca* sp.), velvet grass (*Holcus lanatus*) and common sheep sorrel (*Rumex acetosella*).

Forested hillside areas exist on dry, moderately steep slopes along the east and west outer edges of the study area. This habitat was found east of French Creek above the paved road running through the property and along the western boundary above the pastures. Canopy coverage and tree stratum was moderate and included dominant tree species; ponderosa pine (*Pinus ponderosa*) and Douglas fir (*Pseutotsuga menziesii*). Shrub stratum was low and included dominant species; gooseberry (*Ribes* sp.), silver leaf lupine (*Lupinus albifrons*) and Himalaya berry (*Rubus discolor*). Herbaceous stratum was sparse in the drier sites along the ridge line and moderate within seasonal drainages. Dominant species include American vetch (*Vicia Americana* var. *americana*) and bracken fern (*Pteridium aquilinum* var. *pubescens*). Several saprophytic species were found in this area including snow plant (*Sarcodes sanguinea*), striped coralroot (*Corallorhiza striata),* and pine drops (*Pterospora andromedea*).

Forested lowland areas were found near housing between the dining area and French Creek. These areas had a low to moderate canopy coverage with small undulating hills throughout this gently sloping habitat. Sandy soils with rocks and boulders were found throughout, providing microhabitats for several unique species including Tolmie's star tulip (*Calochortis tolmiei*) and bell catchfly (*Silene campanulata* ssp. *glandulosa*). Tree stratum was moderate and included dominant species; ponderosa pine, incense cedar (*Calocedrus decurrens*) and Oregon white oak (*Quercus garryana*). The shrub stratum was sparse and included dominant species; silverleaf lupine and young Oregon white oak. Herbaceous stratum was sparse and included various grasses.

The upper reach of Paynes Lake Creek in the study area is found near the southwestern property boundary. This area contains a closed canopy riparian habitat which exists on moderate to steep slopes. The tree stratum within these areas was dense and included dominant species; white alder (*Alnus rhombifolia*) and incense cedar. The shrub stratum within these areas was sparse and included dominant species; Himalaya berry and currant (*Ribes* sp.) The herbaceous stratum was moderate to dense and included dominant species; miner's lettuce (*Claytonia perfoliata* ssp. *perfoliata*), small fruited bull rush (*Scirpus microcarpus*) and small flowered nemophila (*Nemophila parvilflora*).

Riparian areas found along the central portion of the property were gently sloping with rocky/sandy soils and had a moderate canopy cover. This habitat is found where French Creek and Paynes Lake Creek join and continues north to the property boundary. The tree stratum within this area was moderate and included dominant species; white alder, incense cedar and Fremont cottonwood (*Populus fremontii*). The shrub stratum within these areas was moderate and included dominant species; meadow lupine (*Lupinus polyphyllus* var. *polyphyllus*), snowberry (*Symphoricarpos albus* var. *laevigatus*) and willows (*Salix* sp.). The herbaceous stratum within this habitat was moderate and included dominant species; orchard grass, miner's lettuce, small flowered nemophila and bracken fern.

Several ponds have been developed by JH Ranch in the project area. The two ponds in the upper reaches of the property next to the dining facility, used as recreational swimming ponds, have been developed with recreational equipment and are surrounded by regularly mowed grasses. This area is within close proximity to the high traffic dining area and is regularly used by camp patrons. The larger of the two ponds is a permanent structure with a rock/cement basin. This pond is surrounded by unvegetated gravel. The second pond in this area is found along the edge of the dining facility. This pond is believed to be fed by water draining from the larger pond. This pond is lined by ornamental grasses which are mowed regularly, and has a moderate tree stratum that includes dominant species; ponderosa pine, white alder, and incense cedar. The shrub stratum around the second pond was sparse and limited to patches of Himalaya berry. Herbaceous species found along the banks of the second pond is moderate and include the dominant species small fruited bulrush and American vetch.

The two remaining ponds were found adjacent to French Creek within the riparian zone. Discussions with JH Ranch staff revealed that these ponds had been constructed many years ago to act as sedimentation basins, when significant surface erosion and sedimentation from private timber harvesting in the watershed caused frequent sediment loads to be deposited in French Creek. Both ponds had a moderate tree stratum and included dominant species; ponderosa pine, white alder and incense cedar. Shrub stratum along the ponds was dense and dominated by willows. Herbaceous stratum along these ponds was moderate and included dominant species; bedstraw (*Gallium* sp.), velvet grass and American speedwell (*Veronica americana*).

Both paved and unpaved roads were seen throughout JH Ranch. The main paved road travelled from the north end to the south end of the property boundary. Numerous paved and unpaved roads branched off from the main road, travelling though the grasslands and forested lowland areas.

## 3.4 Wildlife Habitats

Common wildlife species expected on the site are those typically associated coniferous forests. Wildlife species and/or wildlife signs observed at the site included Columbia black-tailed deer *(Odoicoileus hemionus columbiana*), chipmunk (*Eutamias* sp.), gopher (*Thomomys* sp.) (mounds only), and little brown bat (*Myotis lucifugus*). Several bird species were seen or heard within JH Ranch and includes ruffed grouse (*Bonasa umbellus)*, common raven (*Corvus corax*), horned lark (*Ereophila alpestris*), barn swallow (*Hirundo rustica*) and Bullock's oriole (*Icterus bullockii*).

The study area is generally a moderate value habitat for wildlife because the majority of human impacts are found in a centralized location within the property boundary. Several common opportunistic wildlife species could utilize this habitat and associated forested edges for hunting prey and gathering seeds and other vegetative food matter. Mammalian species that could utilize this habitat include gray fox (*Urocyon cinereoargenteus*), coyote (*Canis latrans*), and various species of mice. Birds may also be attracted to the site, such as red tailed hawk (*Buteo jamaicensis*), Stellar's jay (*Cyanocitta stellari*), and Clark's nutcracker (*Nucifraga columbiana*).

Prairie falcons (*Falco mexicanus*) are known to occur in Scott Valley and vicinity (BIOS 2010), although none were observed during the assessment, it is believed that potential foraging habitat exists for this species in the grassland habitat. Numerous horned larks (*Eremophila alpestris*) were seen in the grassland habitats within JH Ranch; this species is known as a primary winter food source for prairie falcons (Steenhof, 1998). Grassland habitats in JH Ranch could serve as a potential winter foraging site for this species. No nesting habitat or nests were observed.

Marginal habitat for Northern Spotted Owls (*Strix occidentalis caurina)* exists adjacent to the study area; there are no known occurrences within a mile (Sam Cuenca, personal communication, 2010).

The common wildlife species typically found in coniferous forest habitat surrounded by, or adjacent to, the study area in addition to those above include pine marten (*Martes americana*), silver-haired bat (*Lasionycteris noctivagans*), long-eared myotis (*Myotis evotis*), red-tailed hawk, northern goshawk (*Accipiter gentilis*), and song birds that come seasonally for tree seeds (pine and fir cones).

## 3.5 Wildlife Movement Corridors

Wildlife movement includes migration (i.e., usually one-way per season), inter-population movement (i.e., long-term genetic flow) and small travel pathways (i.e., daily movement corridors within an animal's territory). While small travel pathways usually facilitate movement for daily home range activities, such as foraging or escape from predators, they also provide connection between outlying populations and the main corridor, permitting an increase in gene flow among populations.

These linkages among habitat types can extend for miles from primary habitat areas and occur on a large scale throughout California. Habitat linkages facilitate movement between populations located in discrete areas and populations located within larger habitat areas. The mosaic of habitats found within a large-scale landscape results in wildlife populations that consist of discrete sub-populations constituting a large single population, which is often referred to as a meta-population. Even where patches of pristine habitat are fragmented, such as occurs with coastal scrub, the movement between wildlife populations is facilitated through habitat linkages, migration corridors and movement corridors. Depending on the condition of the corridor, genetic flow between populations may be high in frequency, thus allowing high genetic diversity within the population, or may be low in frequency. Low-frequency genetic flow may potentially lead to complete isolation and, if pressures are strong, potential extinction (McCullough, 1996 and Whittaker, 1998).

No identified wildlife movement corridors are known to exist in the area. Based on the significant amount of undeveloped forests on both public and private lands adjacent to the mine site, and the ability of wildlife to readily access sites in the vicinity, wildlife movement corridors will not be affected by this project.

# 4.0 Regulatory Setting

Regulatory authority over biological resources is shared by federal, state, and local authorities under a variety of legislative acts. The following section summarizes the federal, state, and local regulations for special status species, jurisdiction waters of the United States (U.S.) and State of California (State), and other sensitive biological resources. Only select regulations will be applicable to this project.

## 4.1 Federal Laws

### 4.1.1 Clean Water Act Sections 404 and 401

Under Section 404 (33 U.S. Code (USC) 1344) of the Clean Water Act (CWA), as amended, the Army Corps of Engineers (ACOE) retains primary responsibility for permits to discharge dredged or fill material into waters of the U.S. All discharges of dredged or fill material into jurisdictional waters of the U.S. that result in permanent or temporary losses of waters of the U.S. are regulated by the ACOE, and a permit from the ACOE must be obtained before placing fill or grading in wetlands or other waters of the U.S., unless the activity is exempt from CWA Section 404 regulation (for example, certain farming and forestry activities).

The ACOE defines wetlands as “those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions (Environmental Laboratory, 1987).” In other words, the ACOE defines wetlands by the presence of all three wetland indicators: hydrophytic vegetation, hydric soils, and wetlands hydrology.

Waters of the U.S. are defined at 33 Code of Federal Regulations (CFR) Part 328, and include traditional navigable waters; relatively permanent, non-navigable tributaries of traditional navigable waters; and certain wetlands. Following recent court cases, the U.S. Environmental Protection Agency (U.S. EPA) and ACOE published a memorandum entitled Clean Water Act Jurisdiction (U.S. EPA / U.S. ACOE, 2008) to guide the determination of jurisdiction over waters of the U.S, especially for wetlands. The applicability of Section 404 permitting over discharges to wetlands is therefore a two-step process: (1) Determining the areas which are wetlands, and (2) where wetlands are present, assessing the wetlands’ connection to traditional navigable waters and non-navigable tributaries to determine whether the wetlands are jurisdictional under the CWA. A wetland is considered jurisdictional if it meets certain specified criteria.

The ACOE is required to consult with the USFWS and/or National Marine Fisheries Service (NMFS) under Section 7 of the Federal Endangered Species Act (FESA) if the action subject to CWA permitting could result in “Take” of federally listed species or an adverse affect to designated critical habitat.

Section 401 of the CWA (33 USC 1341) requires any applicant for a federal license or permit to conduct any activity that may result in a discharge of a pollutant into waters of the U.S. to obtain a certification from the state in which the discharge originates or would originate, or, if appropriate, from the interstate water pollution control agency having jurisdiction over the affected waters at the point where the discharge originates or would originate, that the discharge will comply with the applicable effluent limitations and water quality standards. A certification obtained for the construction of any facility must also pertain to the subsequent operation of the facility. The responsibility for the protection of water quality in California rests with the State Water Resources Control Board (SWRCB) and its nine (9) Regional Water Quality Control Boards (RWQCB). The project is within the jurisdiction of the North Coast RWQCB.

### 4.1.2 Rivers and Harbors Appropriation Act of 1899

The Rivers and Harbors Appropriation Act of 1899 addresses activities that involve the construction of dams, bridges, dikes, and other structures across any navigable water. Placing obstructions to navigation outside established federal lines and excavating from or depositing material in such waters require permits from the ACOE pursuant to Section 10 (33 USC 403) of the Rivers and Harbors Appropriation Act, which prohibits the unauthorized obstruction or alteration of any navigable water of the U.S. This section provides that the construction of any structure in or over any navigable water of the U.S., or the accomplishment of any other work affecting the course, location, condition, or physical capacity of such waters, is unlawful unless the work has been recommended and authorized by the ACOE, Chief of Engineers.

### 4.1.3 Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act (16 USC Sections 661-667e, March 10, 1994, as amended 1946, 1958, 1978, and 1995) requires that whenever waters or channel of a stream or other body of water are proposed or authorized to be modified by a public or private agency under a federal license or permit, the federal agency must first consult with the USFWS and/or NMFS and with the head of the agency exercising administration over the wildlife resources of the state where construction will occur (in this case the CDFG), with a view to conservation of birds, fish, mammals and all other classes of wild animals and all types of aquatic and land vegetation upon which wildlife is dependent.

If direct permanent impacts occur to waters of the U.S. from a proposed project, then a permit from ACOE under the CWA Section 404 is required for the construction of the proposed project. ACOE is required to consult with USFWS and/or NMFS as appropriate regarding potential impacts to federally listed species under FESA. Such action may prompt consultation with CDFG which would review the project pursuant to California Endangered Species Act (CESA) and issue a consistency letter with USFWS and/or NMFS, if required.

### 4.1.4 Federal Endangered Species Act

The United States Congress passed the FESA in 1973 to protect species that are endangered or threatened with extinction. The FESA is intended to operate in conjunction with the National Environmental Policy Act (NEPA) to help protect the ecosystems upon which endangered and threatened species depend and within which they live. The USFWS and the NMFS are the designated federal agencies responsible for administering the FESA.

The FESA prohibits the "Take" of endangered or threatened wildlife species. A "Take" is defined as harassing, harming (including significantly modifying or degrading habitat), pursuing, hunting, shooting, wounding, killing, trapping, capturing, or collecting wildlife species, or any attempt to engage in such conduct (16 USC 1532, 50 CFR 17.3). An activity can be defined as a "Take" even if it is unintentional or accidental. Taking can result in civil or criminal penalties. Activities that could result in "Take" of a federally listed species require an incidental "Take" authorization resulting from FESA Section 7 consultation or FESA Section 10 consultation. Plants are legally protected under the FESA only if "Take" occurs on federal land or from federal actions, such as issuing a wetland fill permit.

A federal endangered species is one that is considered in danger of becoming extinct throughout all, or a significant portion, of its range. A federal threatened species is one that is likely to become endangered in the foreseeable future. The USFWS also maintains a list of species proposed for listing as threatened or endangered. Proposed species are those for which a proposed rule to list as endangered or threatened has been published in the Federal Register. In addition to endangered, threatened, and proposed species, the USFWS maintains a list of candidate species. Candidate (formerly category 1 candidate) species are those for which the USFWS has on file sufficient information to support issuance of a proposed listing rule.

Pursuant to the requirements of the FESA, an agency reviewing a proposed project within its jurisdiction must determine whether any federally-listed endangered or threatened species may be present in the project area and determine whether the proposed project will have a potentially significant impact on such a species. In addition, the agency is required to determine whether the project is likely to jeopardize the continued existence of any species proposed to be listed under the FESA or result in the destruction or adverse modification of critical habitat designated or proposed to be designated for such species (16 USC 1536[3], [4]). Project-related impacts to species on the FESA endangered or threatened list would be considered significant and would require mitigation.

### 4.1.5 Migratory Bird Treaty Act

The federal Migratory Bird Treaty Act (MBTA) of 1918 makes it unlawful to take, possess, buy, sell, purchase, or barter any migratory bird listed in CFR Part 10, including feather or other parts, nests, eggs, or products, except as allowed by implementing regulations (50 CFR 21). The MBTA also prohibits disturbance and harassment of nesting migratory birds at any time during their breeding season. The USFWS is responsible for enforcing the MBTA (16 USC 703).

## 4.2 State Laws

### 4.2.1 Porter-Cologne Water Quality Act

The state and RWQCB also maintain independent regulatory authority over the placement of waste, including fill, into waters of the State under the Porter-Cologne Act. Waters of the State are defined by the Porter-Cologne Act as “any surface water or groundwater, including saline waters, within the boundaries of the state.” The SWRCB protects all waters in its regulatory scope, but has special responsibility for isolated wetlands and headwaters. These water bodies might not be regulated by other programs, such as Section 404 of the CWA. Waters of the State are regulated by the RWQCBs under the State Water Quality Certification Program, which regulates discharges of dredged and fill material under Section 401 of the CWA and the Porter-Cologne Water Quality Control Act. Projects that require an ACOE permit, or fall under other federal jurisdiction, and have the potential to impact waters of the State are required to comply with the terms of the Water Quality Certification Program. If a proposed project does not require a federal license or permit, but does involve activities that may result in a discharge of harmful substances to waters of the State, the RWQCBs have the option to regulate such activities under its state authority in the form of Waste Discharge Requirements (WDRs) or Certification of WDRs. Water Quality Order No. 2004-0004-DWQ specifies general WDRs for dredged or fill discharges to waters deemed by the ACOE to be outside of federal jurisdiction under Section 404 of the CWA.

### 4.2.2 California Endangered Species Act

The State of California enacted the CESA in 1984. The CESA is similar to the FESA but pertains to state-listed endangered and threatened species. Under the CESA, the CDFG has the responsibility for maintaining a list of threatened and endangered species designated under state law (California Fish and Game Code [CFGC] 2070). Section 2080 of the CFGC prohibits “Take” of any species that the commission determines to be an endangered or threatened species. “Take” is defined in Section 86 of the CFGC as “to hunt, purse, catch, capture, or kill, or attempt to hunt, purse, catch, capture, or kill.”

The state and federal lists of threatened and endangered species are generally similar; however, a species present on one list may be absent from the other. CESA regulations are also somewhat different from the FESA in that the State regulations included threatened, endangered, and candidate plants on non-federal lands within the definition of “Take.” CESA allows for “Take” incidental to otherwise lawful development projects.

Pursuant to the requirements of the CESA, an agency reviewing a proposed project within its jurisdiction must determine whether any state-listed endangered or threatened species may be present in the project area and determine whether the proposed project will have a potentially significant impact on such species. Project-related impacts to species on the CESA endangered or threatened list (or, in addition, designated by the CDFG as a “Species of Special Concern,” which is a level below threatened or endangered status) would be considered significant and would require mitigation.

As a trustee agency under CEQA, CDFG reviews potential project impacts to biological resources, including wetlands. In accordance with the California Environmental Quality Act (CEQA) thresholds of significance for biological resources, areas that meet the state criteria of wetlands and could be impacted by a project must be analyzed. Pursuant to CFGC Section 2785, CDFG defines wet areas as "lands which may be covered periodically or permanently with shallow water and which include saltwater marshes, freshwater marshes, open or closed brackish water marshes, swamps, mudflats, fens, and vernal pools." Wet areas are determined by CDFG by the presence of one of the three-wetland indicators (hydrophytic vegetation, hydric soils, or wetland hydrology).

### 4.2.3 California Environmental Quality Act Guidelines Sections 15380 and 15370

CEQA Guidelines Section 15380(b) provides that a species not listed on the federal or state list of protected species may be considered rare or endangered if the species can be shown to meet certain specified criteria. Thus, CEQA provides the ability to protect a species from potential project impacts until the respective government agencies have an opportunity to designate the species as protected, if warranted.

CEQA also calls for the protection of other locally or regionally significant resources, including natural communities. Although natural communities do not at present have legal protection of any kind, CEQA calls for an assessment of whether any such resources would be affected, and requires a finding of significance if there will be substantial losses. Natural communities listed by CNDDB as sensitive are considered by CDFG to be significant resources and fall under the CEQA Guidelines for addressing impacts. Local planning documents such as general plans often identify these resources as well.

Proposed projects that may result in an impact pursuant to Section 15380(b) must meet the requirements of CEQA Section 15370. Section 15370 specifies that a project must avoid, minimize, or mitigate the impact to a less than significant level as determined by the lead agency, resource agency(s), and trustee agency(s).

### 4.2.4 California Fish and Game Code Section 1600

Streams, lakes, and riparian vegetation as habitat for fish and other wildlife species, are subject to jurisdiction by the CDFG under Sections 1600-1616 of the CFGC. Any activity that will do one or more of the following: (1) substantially obstruct or divert the natural flow of a river, stream, or lake; (2) substantially change or use any material from the bed, channel, or bank of a river, stream, or lake; or (3) deposit or dispose of debris, waste, or other material containing crumbled, flaked, or ground pavement where it can pass into a river, stream, or lake generally require a Streambed Alteration Agreement (SAA).

The term "stream," which includes creeks and rivers, is defined in the California Code of Regulations (CCR) as follows: "a body of water that flows at least periodically or intermittently through a bed or channel having banks and supports fish or other aquatic life." This includes watercourses having a surface or subsurface flow that supports or has supported riparian vegetation (14 CCR 1.72).

In addition, the term stream can include ephemeral streams, dry washes, watercourses with subsurface flows, canals, aqueducts, irrigation ditches, and other means of water conveyance if they support aquatic life, riparian vegetation, or stream-dependent terrestrial wildlife (CDFG, 1994a).

Riparian is defined as "on, or pertaining to, the banks of a stream"; therefore, riparian vegetation is defined as, "vegetation which occurs in and/or adjacent to a stream and is dependent on, and occurs because of, the stream itself" (CDFG, 1994a). Removal of riparian vegetation also requires an SAA from the CDFG.

### 4.2.5 California Fish and Game Code Sections 3503 and 3513

According to Section 3503 of the CFGC it is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird (except English sparrows [*Passer domesticus*] and European starlings [*Sturnus vulgaris*]). Section 3503.5 specifically protects birds in the orders Falconiformes and Strigiformes (birds-of-prey). Section 3513 essentially overlaps with the MBTA, prohibiting the "Take" or possession of any migratory non-game bird. Disturbance that causes nest abandonment and/or loss of reproductive effort is considered "Take" by the CDFG.

### 4.2.6 Fully Protected Species and Species of Special Concern

The classification of "fully protected" was the CDFG's initial effort to identify and provide additional protection to those animals that were rare or faced with possible extinction. Lists were created for fish, amphibian and reptiles, birds, and mammals. Most of the species on these lists have subsequently been listed under CESA and/or FESA. The CFGC sections (fish at Sec. 5515, amphibian and reptiles at Sec. 5050, birds at Sec. 3511, and mammals at Sec. 4700) dealing with "fully protected" species states that these species "…may not be taken or possessed at any time and no provision of this code or any other law shall be construed to authorize the issuance of permits or licenses to take any fully protected species," (CDFG, 1998) although "Take" may be authorized for necessary scientific research. This language makes the "fully protected" designation the strongest and most restrictive regarding the "Take" of these species. In 2003, the code sections dealing with fully protected species were amended to allow the CDFG to authorize "Take" resulting from recovery activities for state-listed species.

Species of Special Concern (SSC) are broadly defined as animals not listed under the CESA, but which are nonetheless of concern to the CDFG because they are declining at a rate that could result in listing or historically occurred in low numbers and known threats to their persistence currently exist. This designation is intended to result in special consideration for these animals by the CDFG, land managers, consulting biologists, and others, and is intended to focus attention on the species to help avert the need for costly listing under CESA and cumbersome recovery efforts that might ultimately be required. This designation also is intended to stimulate collection of additional information on the biology, distribution, and status of poorly known at-risk species, and focus research and management attention on them. Although these species generally have no special legal status, they are given special consideration under CEQA during project review.

Table 2 (Section 5 [Special Status Biological Resources]) includes potentially occurring federal and state listed species and SSC animals from the project area.

### 4.2.7 Native Plant Protection Act of 1973

The Native Plant Protection Act (NPPA) of 1973 (Sec.1900-1913 of the CFGC) includes provisions that prohibit the taking of endangered or rare native plants from the wild and a salvage requirement for landowners. The CDFG administers the NPPA and generally regards as "rare" many plant species included on Lists 1B, 2, 3, and 4 of the CNPS Inventory of Rare and Endangered Vascular Plants of California (Tibor, 2001; CNPS, 2008).

Table 1 (Section 5 [Special Status Biological Resources]) includes potentially occurring endangered or rare native plants from the project area (including CNPS Lists 1B through 3).

### 4.2.8 Natural Community Conservation Planning Act

The Natural Community Conservation Planning Act (NCCP) of 1991 is an effort by the State of California, and numerous private and public partners that is broader in its orientation and objectives than the CESA and FESA (refer to discussions above). The primary objective of the NCCP Act is to conserve natural communities at the ecosystem scale while accommodating compatible land use. The NCCP seeks to anticipate and prevent the controversies and gridlock caused by species' listings by focusing on the long-term stability of wildlife and plant communities and including key interests in the process.

No regionally occurring natural communities are listed by the State in the project area.

### 4.2.9 Sensitive Vegetation Communities

Sensitive vegetation communities are natural communities and habitats that are either unique, of relatively limited distribution in the region, or of particularly high wildlife value. However, these communities may or may not necessarily contain special-status species. Sensitive natural communities are usually identified in local or regional plans, policies or regulations, or by the CDFG (i.e., CNDDB) or the USFWS. Impacts to sensitive natural communities and habitats must be considered and evaluated under the CEQA (CCR: Title 14, Div. 6, Chap. 3, Appendix G).

The study area is not considered a sensitive vegetation community.

## 4.3 Other Statutes, Codes, and Policies Affording Limited Species Protection

**California Native Plant Society.** CNPS maintains a list of plant species native to California whose members exist in significantly reduced populations from historical levels, occur in limited distribution, or are otherwise threatened with extinction. This information is published in the Inventory of Rare and Endangered Plants of California (Tibor, 2001; CNPS, 2008). CDFG recognizes that Lists 1A, 1B, 2, 3, and 4 of the CNPS Inventory consist of plants that may qualify for listing, and the CDFG recommends they be addressed in projects pursuant to CEQA.

Table 1 (see Section 6 [Special Status Biological Resources]) includes CNPS Lists 1B through 3 from the project area.

## 4.4 Local Regulations and Ordinances

### 4.4.1 Siskiyou County General Plan

The Siskiyou County General Plan sets forth overall goals and objectives for development and land use in the County. Comprised of various "elements," the General Plan outlines guidance of development that is geared towards the appropriate use of the land based on site specific factors. For this study area, the Conservation Element (approved in 1973) and the Land Use and Circulation Element (approved 1980) provide overall guidance. Review of these elements found no specific information relating to the continued use and development of mining resources at this site, and no specific limitations or restrictions for continued project development.

# 5.0 Special Status Biological Resources

An evaluation was conducted for the potential presence or absence of habitat for special status plant and animal species. CNDDB RareFind (CDFG, 2010a), BIOS (CDFG, 2010f), and CNPS (CNPS, 2010) searches were completed for the 7.5-minute USGS Eaton Peak Quad quadrangle and all adjacent quadrangles. The aforementioned databases were queried for historical and existing occurrences of state and federally listed threatened, endangered, and candidate plant and animal species; species proposed for listing; and all plant species listed by the CNPS (On-line 2010 inventory and Tibor, 2001). In addition to querying the CNDDB, a list of all federally listed species that are known to occur or may occur in the Eaton Peak Quad quadrangle was obtained from the Yreka USFWS website (USFWS, 2010).

Table 1 includes all plant species reported from the queries, their preferred habitat, and whether there is suitable habitat present within the study area for the species. Table 2 includes all animal species reported from the queries, their preferred habitat, and whether there is suitable habitat present within the study area for the species. The potential for occurrence of those species included on the list were then evaluated based on the habitat requirements of each species relative to the conditions observed during the field surveys.

Each species was evaluated for its potential to occur on the study area according to the following criteria:

1. **None**. Species listed as having "none" are those species for which:
   - there is no suitable habitat present in the study area (that is, habitats on the study area are unsuitable for the species requirements [for example, elevation, hydrology, plant community, disturbance regime, etc.]).
2. **Low**. Species listed as having a "low" potential to occur in the study area are those species for which:
   - there is no known record of occurrence in the vicinity; and
   - there is marginal or very limited suitable habitat present within the study area.

3. **Moderate**. Species listed as having a “moderate” potential to occur in the study area are those species for which:
   - there are known records of occurrence in the vicinity; and
   - there is suitable habitat present in the study area.
4. **High**. Species listed as having a “high” potential to occur on the study area are those species for which:
   - there are known records of occurrence in the vicinity (there are many records and/or records in close proximity); and
   - there is highly suitable habitat present in the study area.
5. **Present**. Species listed as “present” in the study area are those species for which:
   - the species was observed in the study area.

**Table 1**
**Potential Regionally Occurring Sensitive Botanical Species from JH Ranch, California**

| Species Latin Name | Common Name | Status (Federal/ State/CNPS)[1] | Life Form/General Habitat Requirements[2] | Blooming Period | Potential for Occurrence |
|---|---|---|---|---|---|
| *Abies lasiocarpa* var. *lasiocarpa* | subalpine fir | -/-/2.3 | Evergreen tree. Subalpine forest, meadows; between approximately 945-2225 meters (m) above MSL. | N/A | None |
| *Astragalus applegatei* | Applegates's milk vetch | E/E/- | Perennial herb. Flat open seasonally moist remnants of floodplain alkaline grasslands of the Klamath Basin. Habitat was historically characterized by sparse, native bunchgrass and patches of bare soil. 1250 m above MSL. | Jun-Aug | Low |
| *Balsamorhiza lanata* | wooly balsamroot | -/-/1B.2 | Perennial from taproot. Cismontane woodland/rocky, volcanic; between approximately 800-1895 m above MSL. | Apr-Jun | None |
| *Balsamorhiza sericea* | silky balsamroot | -/-/1B.3 | Perennial from fleshy taproot. Yellow pine forest/serpentinite; between approximately 916-1740 m above MSL. | Apr-May | Low |
| *Botrychium pinnatum* | northwestern moonroot | -/-/2.3 | Rhizomatous herb. Lower montane coniferous forest meadows and seeps, upper montane coniferous forest; between approximately 1770-2040 m above MSL. | Jun-Aug | Low |
| *Botrychium virginianum* | Rattlesnake fern | -/-/2.2 | Perennial herb. Bogs and fens. Lower montane coniferous forest, meadows and seeps, riparian forest; between approximately 728-1300 m above MSL. | Jun-Sep | Moderate |
| *Calochortus persistens* | Siskiyou mariposa lily | C/Rare/1B.2 | Bulbiferous herb. Lower montane coniferous forest, North Coast coniferous forest/rocky, acidic; between approximately 1000-1860 m above MSL. | Jun-Jul | Moderate |
| *Chaenactis suffrutescens* | Shasta chaenactis | -/-/1B.3 | Perennial herb. Dry open areas, lower montane coniferous forest, upper montane coniferous forest/ sandy, serpentinite; between approximately 760-2800 m above MSL. | May-Sep | Low |
| *Epilobium siskiyouense* | Siskiyou fireweed | -/-/1B.3 | Perennial herb. Alpine boulder and rock fields, subalpine coniferous forest, upper montane coniferous forest/rocky, serpentinite; between approximately 1700-2500 m above MSL. | Jul-Sep | None |
| *Erigeronum bloomer* var. *nudatus* | Waldo daisy | -/-/2.3 | Perennial herb. Lower montane coniferous forest, upper montane coniferous forest/serpentinite; between approximately 600-2300 m above MSL. | Jun-Jul | Low |

| **Table 1**<br>**Potential Regionally Occurring Sensitive Botanical Species from JH Ranch, California** | | | | | |
|---|---|---|---|---|---|
| **Species Latin Name** | **Common Name** | **Status (Federal/ State/CNPS)[1]** | **Life Form/General Habitat Requirements[2]** | **Blooming Period** | **Potential for Occurrence** |
| *Eriogonum umbellatum* var. *lautum* | Scott Valley buckwheat | -/-/1B.1 | Perennial herb. Cismontane woodland, lower montane coniferous forest. Known only in Scott Valley; between approximately 800-900 m above MSL. | Jul-Sep not blooming, but vegetative present in Jun | Low |
| *Erythronium hendersonii* | Henderson's fawn lily | -/-/2.3 | Bulbiferous herb. Lower montane coniferous forest, dry woodlands, openings, strong affinity for serpentine soils; between approximately 300-1600 m above MSL. | Apr-Jul | Low |
| *Fissidens aphelotaxifolius* | Brook pocket moss | -/-/2.2 | Moss. Lower montane coniferous forest, upper montane coniferous forest/rock, stream channels, waterfalls; between approximately 2000-2200 m above MSL. | N/A | Low |
| *Galium serpenticum* ssp. *scotticum* | Scott mountain bedstraw | -/-/1B.2 | Perennial herb. Lower montane coniferous forest/ serpentinite; between approximately 1000-2075 m above MSL. | May-Aug | Low |
| *Ivesia pickeringii* | Pickering's ivesia | -/-/1B.2 | Perennial herb. Lower montane coniferous forest, meadows and seeps, mesic, clay, usually serpentinite seeps; between approximately 800-1510 m above MSL. | Jun-Aug | Low |
| *Lewisia cotyledon* var. *howellii* | Howell's lewisia | -/-/3.2 | Perennial herb. Broadleafed upland forest, chaparral, cismontane woodland, lower montane coniferous forest/rocky; between approximately 150-2010 m above MSL. | Apr-Jul | Moderate |
| *Lupinus elmeri* | South Fork Mtn. lupine | -/-/1B.2 | Perennial herb. Lower montane coniferous forest. Known only from South Fork Mtn. area; between approximately 1218-2000 m above MSL. | Jun-Jul | Low |
| *Mitella caulescens* | leafy stemmed mitrewort | -/-/4.2 | Rhizomatous herb. Broadleafed upland forest, lower montane coniferous forest, meadows and seeps, North Coast coniferous forest; between approximately 5-1700 m above MSL. | Apr-Oct | Moderate |
| *Orcuttia tenuis* | Slender Orcutt grass | T/E/1B.1 | Annual herb. Vernal pools; between approximately 35-1760 m above MSL. | May-Sep | None |

| **Table 1<br>Potential Regionally Occurring Sensitive Botanical Species from JH Ranch, California** | | | | | |
|---|---|---|---|---|---|
| **Species Latin Name** | **Common Name** | **Status (Federal/ State/CNPS)[1]** | **Life Form/General Habitat Requirements[2]** | **Blooming Period** | **Potential for Occurrence** |
| *Phacelia greenei* | Scott Valley phacelia | -/-/1B.2 | Annual herb. Closed-cone coniferous forest, lower montane coniferous forest, subalpine coniferous forest, upper montane coniferous forest/serpentinite. Known only in the vicinity of Scott Valley; between approximately 800-2440 m above MSL. | Apr-Jun | Low |
| *Phacelia leonis* | Siskiyou phacelia | -/-/1B.3 | Annual herb. Meadows and seeps, upper montane coniferous forest/openings, often on serpentinite; between approximately 1200-2000 m above MSL. | Jun-Aug | None |
| *Phlox hirsuta* | Yreka phlox | E/E/1B.2 | Perennial herb. Lower montane coniferous forest, upper montane coniferous forest/serpentinite. Known from only four occurrences near Yreka. Between approximately 820-1500 m above MSL. | Apr-Jun | None |
| *Picea engelmannii* | Engelmann spruce | -/-/2.2 | Evergreen tree. Upper montane coniferous forest, cool moist mixed-conifer subalpine forest; between approximately 1065-2135 m above MSL. | N/A | Low |
| *Pohlia tundrae* | Tundra thread moss | -/-/2.3 | Moss. Alpine boulder and rock field/gravelly, damp soil; between approximately 2700-3000 m above MSL. | N/A | None |
| *Raillardella pringlei* | Showy raillardella | -/-/1B.2 | Rizomatous herb. Bogs and fens, meadows and seeps, upper montane coniferous forest/mesic, serpentinite; between approximately 1200-2290 m above MSL. | Jul-Sep | Low |
| *Sidalcea oregana* ssp. *eximia* | coast checkerbloom | -/-/1B.2 | Perennial herb. Openings in lower montane and North Coast coniferous forests, meadows and seeps, and coastal prairie from 5-1,340 m above MSL. | June-August | None |
| *Smilax jamesii* | English Peak greenbriar | -/-/1B.3 | Rhizomatous herb. Broadleafed upland forest, lower montane coniferous forest, marshes and swamps, North Coast coniferous forest/streambanks and lake margins; between approximately 580-2500 m above MSL. | May-Jul | Moderate |
| *Vaccinium coccineum (not on list)* | Siskiou Mountains huckleberry | -/-/3.3 | Deciduous shrub. Lower montane coniferous forest, upper montaine coniferous forest/often serpentinite; between approximately 1095-2135 m above MSL. | Jun-Aug | Low |
| *Vaccinium scoparium* | Little-leaved huckleberry | -/-/2.2 | Deciduous shrub. Subalpine coniferous forest/rocky; between approximately 1036-2200 m above MSL. | Jun-Aug | None |

| Table 1<br>Potential Regionally Occurring Sensitive Botanical Species from JH Ranch, California | | | | | |
|---|---|---|---|---|---|
| **Species Latin Name** | **Common Name** | **Status (Federal/ State/CNPS)[1]** | **Life Form/General Habitat Requirements[2]** | **Blooming Period** | **Potential for Occurrence** |

1. CNPS List 1B includes plants that are rare, threatened, or endangered in CA and elsewhere.
   CNPS List 2 includes plants that are rare, threatened, or endangered in California but more common elsewhere.
   CNPS List 3 includes plants for which more information is needed–a review list.
   CNPS List 4 includes plants of limited distribution and should be documented as they are watch list species
   FE: Federally listed Endangered, pursuant to the Federal Endangered Species Act (FESA), as amended. This designation includes taxa that are in danger of extinction throughout all or a significant portion of their range.
   FT: Federally listed Threatened, pursuant to the FESA, as amended. This designation refers to species that are not presently threatened with extinction but are likely to become endangered throughout all or a significant portion of their range in the foreseeable future if special protection and management efforts are not undertaken.
   MSL: Mean Sea Level
   SE: State listed Endangered, pursuant to California Endangered Species Act (CESA). SE designation includes taxa that are in danger of extinction throughout all or a significant portion of their range.
   SR: State listed Rare, pursuant to CESA. SR designation refers to species that although not presently threatened with extinction, occur in such small numbers throughout their range that they may become endangered if their present environment worsens.
   ST: State listed Threatened, pursuant to CESA. ST designation includes taxa that are likely to become endangered throughout a significant portion of their range.
   N/A: Not Applicable
   "-": no status/listing.
2. Plant habitat descriptions are from CNDDB (2010), CNPS (2010), Tibor (2001), Hickman (1993), and Center for Plant Conservation (2010).

**Table 2**
**Potential Regionally Occurring Sensitive Wildlife Species from JH Ranch, California**

| Species Latin Name | Common Name | Status (Federal/State)[1] | General Habitat Requirements | Potential for Occurrence |
|---|---|---|---|---|
| **Invertebrates** | | | | |
| *Brachinecta lynchi* | vernal pool fairy shrimp | FT / - | A freshwater fairy shrimp. Found in palustrine habitats of herbaceous wetland, scrub-shrub wetland and temporary pools. This species inhabits vernal pools or basalt flow depression pools in unplowed grasslands. | None |
| *Monadenia infumata ochromphalus* | yellow-based sideband | - / ST | A terrestrial snail. This sub-species is an old growth and riparian associate found on leaves, sticks, concrete wall of irrigation ditches and mossy boulders and stones. Species has not been found since 1960s and possibly extirpated from the region. | Low |
| *Pacifastacus fortis* | Shasta crayfish | FE / - | A freshwater crayfish. Prefers rocky, gravelly bottoms, usually volcanic rubble. The most important habitat requirement appears to be the presence of adequate volcanic rock rubble to provide escape cover from predators. Range of this species is limited to the Fall River region of eastern Shasta County. | None |
| *Polites mardon* | mardon skipper | FC / - | A dull yellowish and brown skipper. Found in terrestrial habitat including: Alpine, Grassland / herbaceous, Woodland-Conifer. In California, the species is usually found in serpentine outcrops, generally grassy openings in subalpine coniferous forests. In California, two isolated populations are known, located about 10 miles apart in serpentine-soil grasslands in Del Norte County. | None |

**Table 2**
**Potential Regionally Occurring Sensitive Wildlife Species from JH Ranch, California**

| Species Latin Name | Common Name | Status (Federal/State)[1] | General Habitat Requirements | Potential for Occurrence |
|---|---|---|---|---|
| **Fish** | | | | |
| *Chasmistes brevirostris* | shortnose sucker | FE/- | A sucker (fish) with a hump on the snout; up to 64 cm long. Adults and juveniles prefer shallow, turbid, and highly productive lakes that are cool, but not cold, in summer. Habitat for this species is found in the Upper Klamath Basin, with young utilizing the mouths of streams along the Klamath River during outmigration. Spawning occurs in lake tributaries, in riffles or runs with gravel or cobble substrate, moderate flows, and depths or 11-130 cm. Fry move into lakes soon after hatching. Shoreline river and lake habitats are important for larvae and young. | None |
| *Deltistes luxatus* | Lost River sucker | FE/- | A sucker (fish) with a distinct hump on the snout; to 86 cm long. Found in the upper Klamath River Basin. Habitat includes deep-water lakes and impoundments, and swift water and deep pools of small to medium rivers. Suckers can be found throughout the reservoirs they inhabit but they appear to prefer shorelines with emergent vegetation that can provide cover from predators and invertebrate food. Suckers move from lakes into tributary streams to spawn in riffles or runs with gravel or cobble substrate, moderate flows, and depths of 21-128 cm. Spawning also occurs along shore of Upper Klamath Lake (e.g., at spring inflows). Juveniles move downstream into lakes soon after hatching. Larval suckers prefer shallow, near shore, and emergent vegetated habitat in both the lakes and rivers. | None |
| *Hypomesus transpacificus* | delta smelt | FT/- | Restricted to the Delta region and Suisun Bay in central California. Euryhaline species that inhabits open waters of bays, tidal rivers, channels, and sloughs. | None |

| Table 2<br>Potential Regionally Occurring Sensitive Wildlife Species from JH Ranch, California | | | | |
|---|---|---|---|---|
| **Species Latin Name** | **Common Name** | **Status (Federal/State)[1]** | **General Habitat Requirements** | **Potential for Occurrence** |
| *Oncorhynchus kisutch* | Southern Oregon/northern California (SONCC) coho salmon (ESU) | FT/- | Freshwater, near shore and offshore environments throughout their lifecycles. Coho prefer low stream velocity, shallow water and small gravel. Spawning and rearing habitat mainly in low gradient tributaries and side channels of river systems. Require beds of loose, silt-free, coarse gravel for spawning. Also need cover, cool water, and sufficient dissolved oxygen. | Moderate |
| *Oncorhynchus mykiss* | Central Valley steelhead (ESU) | FT/ - | Optimal habitats for steelhead throughout its range in the Sacramento River system and on the Pacific Coast can generally be characterized by clear, cool water with abundant in stream cover, well vegetated stream banks, relatively stable water flow and a 50:50 pool-to-riffle ratio. | None; not located within the habitat range |
| *Oncorhynchus mykiss irideus* | summer-run steelhead trout | -/SC | A trout of variable appearance. In California, adult migrants of summer-run steelhead enter freshwater streams April-June (sometimes extending into July), during or shortly after final high spring flows. Spawns in gravelly substrate in cool, clear, well-oxygenated streams (natal stream), in water flowing 23-155 cm/sec and 10-150 cm deep, usually at the tail of a pool or at the riffle at the head of a pool; favors areas with well-vegetated banks and abundant in stream cover such as boulders, logs, and undercut banks | Moderate |
| *Onchrhynchus tshawytscha* | Central Valley fall/late-fall Chinook salmon (ESU) | FC/- | Spawns in streams of the Sacramento and Joaquin river systems in California; more than 190,000 naturally spawning individuals | None; not located within the habitat range |
| *Oncorhynchus tshawytscha* | Central Valley spring-run Chinook salmon | FT/ - | Few wild spawning populations remain in the Sacramento River system, California; extirpated in San Joaquin River drainage. | None; not located within the habitat range |
| *Oncorhynchus tshawytscha* | winter-run Chinook salmon | FE/- | The Sacramento River winter-run Chinook salmon historically spawned in cold spring-fed tributaries of the Upper Sacramento River Basin. The run is now restricted to the main stem Sacramento River downstream of Keswick Dam. | None; not located within the habitat range |

**Table 2**
**Potential Regionally Occurring Sensitive Wildlife Species from JH Ranch, California**

| Species Latin Name | Common Name | Status (Federal/State)[1] | General Habitat Requirements | Potential for Occurrence |
|---|---|---|---|---|
| **Amphibians** | | | | |
| *Ascaphus truei* | Pacific tailed frog | - / SC | A small frog with a tail-like appendage in males. Found in clear, cold swift-moving mountain streams with coarse substrates. Primarily in older forest sites. May be found on land during wet weather near water in humid forests or in more open habitat. During dry weather stays on moist stream-banks. | Moderate |
| *Rana cascadae* | Cascades frog | / SC | A medium sized frog. Found in wet mountain meadows, sphagnum bogs, ponds, lakes, and streams, in open coniferous forest. Prefers quiet pond with shallow open water for breeding and egg laying. | Moderate |
| *Rana aurora draytonii* | California red-legged frog | FT / - | A frog with dorsolateral ridges. This species usually occurs in or near quiet permanent water of streams, marshes, ponds, lakes, and other quiet bodies of water. In summer, frogs estivate in small mammal burrows, leaf litter, or other moist sites in or near (within a few hundred feet of) riparian areas. Individuals may range far from water along riparian corridors and in damp thickets and forests. | Moderate |
| *Rana pretiosa* | Oregon spotted frog | FC / - | A medium sized frog. Highly aquatic, avoids dry uplands; rarely found far from permanent quiet water; usually occurs at the grassy margins of streams, lakes, ponds, springs, and marshes. | Moderate |

| Table 2<br>Potential Regionally Occurring Sensitive Wildlife Species from JH Ranch, California | | | | |
|---|---|---|---|---|
| **Species Latin Name** | **Common Name** | **Status (Federal/State)[1]** | **General Habitat Requirements** | **Potential for Occurrence** |
| **Birds** | | | | |
| *Brachyramphus marmoratus* | marbled murrelet | FT/- | Coastal areas, mainly in salt water within 2 km of shore, including bays and sounds; not uncommon up to 5 km offshore; occasionally also on rivers and lakes usually within 20 km of ocean. In California, most inland activity takes place in or to the west of old-growth stands of 250 ha or more. | None |
| *Coccyzus americanus* | Western yellow-billed cuckoo | Nesting FC/- | Nests in tall cottonwood and willow riparian woodland. Requires patches of at least 10 hectares (25 acres) of dense riparian forest with a canopy cover of at least 50 percent in both the understory and overstory; nests typically in mature willows. | None; not located within the habitat range |
| *Falco mexicanus* | prairie falcon | Nesting N/A | A brown falcon. Primarily open situations, especially in mountainous areas, steppe, plains or prairies. Typically nests in pot hole or well-sheltered ledge on rocky cliff or steep earth embankment. Vertical cliffs with rock structure overhanging the site are preferred. May use old nest of raven, hawk, eagle, etc. Winter foraging habitat includes wheat and other irrigated croplands. In all cases, large patches with low vegetation stature characterize the habitats used. Early sucessional stages, low vegetation height and large percentage of bare ground are an inferred requirement. | Low |
| *Riparia riparia* | bank swallow | Nesting -/ST | Habitat includes open and partly open situations, frequently near flowing water. Nests are in steep sand, dirt, or gravel banks, in burrows dug near the tip of the bank. They can also be found along the edge of inland water, or along the coast. Occasionally they are seen in gravel pits or road embankments. Individuals tend to return to the same nesting area in successive years. | None |
| *Strix occidentalis caurina* | northern spotted owl | FT/- | Northern spotted owl (*Strix occidentalis caurina*) is in the Family Strigidae and is generally found in coastal to mountainous mature coniferous forests. This species nests in cavities or on natural platforms. | Low |

**Table 2**
**Potential Regionally Occurring Sensitive Wildlife Species from JH Ranch, California**

| Species Latin Name | Common Name | Status (Federal/State)[1] | General Habitat Requirements | Potential for Occurrence |
|---|---|---|---|---|
| **Mammals** | | | | |
| *Gulo gulo* | California wolverine | - / ST | A large mustelid. Found in Alpine and arctic tundra, boreal and mountain forests (primarily coniferous). Usually found in areas with snow on the ground in winter. Riparian areas may be important winter habitat. May disperse through atypical habitat. When inactive, occupies den in cave, rock crevice, under fallen tree in thicket, or similar site. Terrestrial and may climb trees. | None; not located within the habitat range |
| *Martes americana* | American (pine) marten | N / A | A medium-sized mustelid. Found in dense deciduous, mixed, or (especially) coniferous upland and lowland forest. May use rocky alpine areas. When inactive, occupies hole in dead or live tree or stump, abandoned squirrel nest, conifer crown, rock pile, burrow, or snow cavity. Often associated with coarse woody debris. | Moderate |
| *Martes americana humboldtensis* | Humboldt marten | - / SC | A medium-sized mustelid. This sub-species is found almost exclusively in old-growth forests along the coast from present-day Del Norte to Sonoma counties. | None; not located within the habitat range |
| *Martes pennanti (pacifica) DPS* | fisher, West Coast DPS | FC / SC | The key aspects of fisher habitat are best expressed in forest stands with late-sucessional characteristics. Fishers use habitat with high canopy closure, large trees and snags, large woody debris, large hardwoods, multiple canopy layers, and avoidance of areas lacking overhead canopy cover. Fishers also occupy and reproduce in some managed forest landscapes and forest stands not classified as late-successional that provide some of the habitat elements important to fisher, such as relatively large trees, high canopy closure, large legacy trees, and large woody debris, in second-growth forest stands. | Moderate |

**Table 2**
**Potential Regionally Occurring Sensitive Wildlife Species from JH Ranch, California**

| Species Latin Name | Common Name | Status (Federal/State)[1] | General Habitat Requirements | Potential for Occurrence |
|---|---|---|---|---|

1. Abbreviations:
   - CH: Critical Habitat
   - DPS: Distinct Population Segment
   - ESU: Evolutionarily Significant Unit
   - FC: Federal Candidate. This designation includes taxa that require additional information to propose for listing pursuant to the Federal Endangered Species Act (FESA), as amended.
   - FE: Federally-listed Endangered, pursuant to the FESA, as amended. This designation includes taxa that are in danger of extinction throughout all or a significant portion of their range.
   - FT: Federally-listed Threatened, pursuant to the FESA, as amended. This designation refers to species that are not presently threatened with extinction but are likely to become endangered throughout all or a significant portion of their range in the foreseeable future if special protection and management efforts are not undertaken.
   - NA: Not Applicable
   - SE: State-listed Endangered, pursuant to California Endangered Species Act (CESA). SE designation includes taxa that are in danger of extinction throughout all or a significant portion of their range.
   - SONCC: Southern Oregon Northern California Coast
   - ST: State-listed Threatened, pursuant to CESA. ST designation includes taxa that are likely to become endangered throughout a significant portion of their range.
   - SC: Species of Special Concern are species that the CDFG consider of conservation concern. These species must be considered pursuant to CEQA.
   - "- ": No Status/Listing

## 5.1 Special Status Natural Communities

Natural communities are habitats that are generally defined by vegetation type and geographical location and are increasingly restricted in abundance and distribution. CNDDB natural communities are habitat for numerous special status plant and animal species. The natural communities that are included in the CNDDB are based on the state and global ranking status, which provides an estimate of the number of acres that remains of a particular community and threat level designation. Recognition of natural communities is an ecosystem-based approach to maintaining biodiversity in California.

No potential regionally occurring natural communities are listed by the CNDDB for the project area.

## 5.2 Special Status Plant Species

Based on a review for special-status plant species (CDFG, 2010a; CNPS ,2010; USFWS, 2010), a total of 29 special-status plant species have been reported from the region consisting of the site's quadrangle and the surrounding quadrangles. Of the 29 special status plant species reported for the region, five plants are considered to have a moderate potential to occur. These include:

- English peak greenbrier (*Smilax jamesii*)
- Engelmann spruce *(Picea engelmannii)*
- Howell's lewisia (*Lewisia cotyledon* var. *howellii*)
- Leafy stemmed miterwort *(Mitella caulescens)*
- Rattlesnake fern (*Botrychium virginianum*)
- Siskiyou mariposa lily (*Calochortus persistens*)

Only those plant species included in Table 1 with moderate to high (or present) potential to occur are described in more detail below. Engelmann's spruce has been included in the discussion below because CNDDB occurrence data has reported in the vicinity of the study area. None of the 29 special status plant species reported in Table 1 were observed during the 2010 site visits.

**English peak greenbrier** (*Smilax jamesii*) is a monocot, perennial herb (rhizomatous) endemic to California (Calflora, 2010). This species occurs in marshes, swamps, stream banks, and lake margins in broadleafed upland forest and in lower and upper montane coniferous forests (CNPS, 2010). The only occurrence is reported near the head of the north fork Salmon River at Finley's upper camp within the Klamath National Forest. Habitat is identified along the banks of French Creek and the Paynes Lake Creek. These areas were surveyed and no English peak greenbrier was observed.

**Engelmann spruce** *(Picea engelmannii)* is an evergreen tree found in upper montane coniferous forests and cool moist mixed-conifer subalpine forest. This species is found in Northern California and in other areas in North America (CNPS, 2010). Limited habitat for this species exists and is restricted to riparian areas along French Creek and Paynes Lake Creek. CNDDB occurrence data identified this species within the vicinity of the study area on private property, but the mapping precision is unclear. The study area is within the upper range for elevation requirements and not optimal habitat. Engelmann spruce was not observed in the study area.

**Howell's lewisia** *(Lewisia cotyledon var. howellii)* is a perennial herb native to California and found outside of California, but confined to Western North America (Calflora, 2010). This species is found in broadleafed upland forest, chaparral, cismontane woodland, and rocky lower montane coniferous forest (CNPS, 2010). Habitat for this species was identified within the forested lowland and riparian habitats along French Creek and Paynes Lake Creek.

**Leafy stemmed miterwort** *(Mitella caulescens)* is a perennial herb native to California and also found outside California, but confined to Western North America (Calflora, 2010). This species is a rhizomatous found in broadleafed upland forest, lower montane coniferous forest, meadows and seeps and North Coast coniferous forest (CNPS, 2010). Habitat for this species was identified within the riparian habitats along French Creek and Paynes Lake Creek within JH Ranch. The closest occurrence is at headwaters of Etna Creek in the Klamath National Forest. Leafy stemmed miterwort was not observed.

**Rattlesnake fern** (*Botrychium virginianum*), a pteridophyte is a perennial herbaceous species known throughout the Western United States. However, in California it is only documented from Mendocino, Shasta, and Siskiyou Counties (Calflora, 2010). This species grows in bogs and fens, meadows and seeps, riparian forest, and in mesic micro-habitats in lower montane coniferous forest (CNPS 2010). Habitat for this species was identified within the riparian habitats along French Creek and unnamed Paynes Lake Creek within JH Ranch. The closest occurrence is approximately two miles from the study area. Rattlesnake fern was not observed.

**Siskiyou mariposa lily** (*Calochortus persistens*), a monocot, is a perennial herb (bulb) that is endemic to Siskiyou County (Calflora, 2010). Siskiyou mariposa lily grows in rocky soils in lower montane and North Coast coniferous forest types (CNPS ,2010). Habitat for Siskiyou mariposa lily was seen in the forested lowland habitat and along French Creek and Paynes Lake Creek in JH Ranch. Siskiyou mariposa lily was not observed.

## 5.3 Special Status Animal Species

Based on a review of special status animal species (CDFG, 2010a; USFWS, 2010), 26 special status animal species have been reported, but 21 have potential to occur in the project region. Of the 21 animal species potentially occurring in the region, the habitat present in the study area, and the geographical range of the various special status animal species, six animal species included in the tables are considered to have a moderate to high potential to occur within the site:

- California red-legged frog (*Rana aurora draytonii*)
- Cascades frog (*Rana cascadae*)
- Oregon spotted frog (*Rana pretiosa*)
- Pacific tailed frog (*Ascaphus truei*)
- Coho salmon *(Oncorhynchus kisutch)*
- Steelhead (*Oncorhynchus mykiss irideus*)
- American (pine) marten *(Martes americana)*
- Fisher, West Coast DPS (*Martes pennanti*)

Only those animal species included in Table 2 with moderate to high (or present) potential to occur are described in more detail below.

Information presented in this section was gathered during the site visits, from published habitat requirements of each species, and through professional knowledge and experience with several of the species and their habitat requirements, disturbance issues, and distribution in northwestern California.

**California red-legged frog** (*Rana aurora draytonii*) is a frog with dorsolateral ridges. This species usually occurs in or near quiet permanent water of streams, marshes, ponds, lakes, and other quiet bodies of water. In summer, frogs estivate in small mammal burrows, leaf litter, or other moist sites in or near (within a few hundred feet of) riparian areas (USFWS 1996). Individuals may range far from water along riparian corridors and in damp thickets and forests. Breeding occurs in permanent or seasonal water of ponds, marshes, or quiet stream pools, sometimes in lakes (Jones et al. 2005). Moderate habitat for California red-legged frog was identified within the riparian habitats and ponds found along French Creek and Paynes Lake Creek. No California red-legged frogs were observed.

**Cascades frog** (*Rana cascadae*) is a medium sized frog found in wet mountain meadows, sphagnum bogs, ponds, lakes, and streams, in open coniferous forest (Briggs 1987). This species prefers quiet pond with shallow open water for breeding and egg laying (Briggs 1987). Moderate habitat for Cascades frog was identified within the riparian habitats and ponds found near French Creek and Paynes Lake Creek. No Cascades frogs were observed.

**Oregon spotted frog** (*Rana pretiosa*) is a medium sized frog. This species is highly aquatic, avoids dry uplands and is rarely found far from permanent quiet water. Oregon spotted frogs usually occur at the grassy margins of streams, lakes, ponds, springs, and marshes (Licht, 1986). Moderate habitat for Oregon spotted frog was identified within the riparian habitats and ponds near French Creek and Paynes Lake Creek. No Oregon spotted frogs were observed.

**Pacific tailed frog** *(Ascaphus truei)* is a small frog with a tail-like appendage in males. Found in clear, cold swift-moving mountain streams with coarse substrates. This species is found to occur in primarily in older forest sites (Welsh, 1990). This species may be found on land during wet weather, near water in humid forests or in more open habitat; during dry weather this species stays on moist stream-banks (Diller and Wallace, 1999). Moderate habitat for this species was identified within the riparian habitats and ponds along French Creek and Paynes Lake Creek. No Pacific tailed frogs were observed.

**Coho salmon** *(Oncorhynchus kisutch)* in the Klamath River watershed are part of the federally-designated Southern Oregon / Northern California Coast (SONCC) Evolutionarily Significant Unit (ESU), which includes all coho salmon stocks between Cape Blanco in southern Oregon and Punta Gorda in northern California (NMFS, 1995). Coho salmon exist in freshwater, nearshore and offshore environments throughout their lifecycles. Coho prefer low stream velocity, shallow water and small gravel. Spawning and rearing habitat mainly in low gradient tributaries and side channels of river systems. This species requires beds of loose, silt-free, coarse gravel for spawning and also needs cover, cool water, and sufficient dissolved oxygen (USFWS, 1986). French Creek and Paynes Lake Creek are within the coho range (CDFG, 2010a). Field observations confirmed habitat is available within the study area. No Coho salmon were observed.

**Steelhead** (*Oncorhynchus mykiss irideus*) within the Scott River basin are part of the federally-designated Klamath Mountains Province Distinct Population Segment (DPS). Optimal habitats for steelhead throughout its range on the Pacific Coast can generally be characterized by clear, cool water with abundant in-stream cover, well vegetated stream banks, relatively stable water flow and a 50:50 pool-to-riffle ratio (Moyle, 2002). Habitat for this species was identified within the riparian habitats along French Creek and unnamed tributary within JH Ranch. No steelhead were observed.

**American (pine) marten** *(Martes americana)* is a medium-sized mustelid. Found in dense deciduous, mixed, or (especially) coniferous upland and lowland forest. This species may use rocky alpine areas.

When inactive, the American martin occupies a hole in dead or live tree or stump, abandoned squirrel nest, conifer crown, rock pile, burrow, or snow cavity; this species is often associated with coarse woody debris (Nowak, 1991). Requires large stands of mature coniferous forest with snags and large-woody debris and greater than 50% canopy closure. Habitat for this species was observed in the forested hillside and riparian areas within JH Ranch. American (pine) marten are sensitive to human activities and likely avoid the area. None were observed.

**Fisher, West Coast DPS** (*Martes pennanti*) use habitat with high canopy closure, large trees and snags, large woody debris, large hardwoods, multiple canopy layers, and avoidance of areas lacking overhead canopy cover. Fishers also occupy and reproduce in some managed forest landscapes and forest stands not classified as late-successional that provide some of the habitat elements important to fisher, such as relatively large trees, high canopy closure, large legacy trees, and large woody debris, in second-growth forest stands (USFWS, 2004). Moderate habitat for this species was observed in the forested hillside and riparian areas within the study area. No fishers were observed.

# 6.0 Conclusions

The purpose of this report was to assess the biological resources and habitat available within the study area, not to evaluate impacts of a specific development. The habitat value and availability was assessed for special status species that occur within the study area. Recommendations for avoiding impacts for continuing operations and future projects are addressed Section 7.0.

## 6.1 Special Plant Status Species

The majority of vegetation within the study area has been altered and modified by past and current land use activities. Some activities have altered the environmental conditions at the site so that common, non-native plant species dominate the site. In some locations, the ongoing disturbed nature of the site and regular impacts from human intrusion are factors that likely contribute to the absence of rare plants or their ability to colonize the site over time, with the exception of species that can tolerate a high disturbance regime.

Of the 29 special status plant species potentially occurring in the area, five plant species are considered to have a moderate potential to occur within the site (CDFG, 2010a; CNPS, 2010). Habitat was identified for the five special status plant species with the potential to occur within the forested lowland and riparian habitats along French Creek and Paynes Lake Creek. Focused botanical surveys were conducted in areas suspected of having habitat for special status species, and none were detected. The likelihood of these species in the study area is low since they were not observed and no nearby occurrences suggest they would be able to colonize the project area.

Future projects developed in riparian habitats may be subject to additional rare plant surveys in the future to assess the potential impacts of site-specific development to listed species.

## 6.2 Special Wildlife Status Species

Of the 22 special status wildlife species potentially occurring in the area, six wildlife species are considered to have a moderate potential to occur within the site (CDFG, 2010a; CNPS, 2010). The avian or mammalian species were not observed at the site, but have the potential to utilize the site. Species, such as the American (pine) marten or fisher could be become habituated to the human activity and may create dens or travel through the property. These species were not located during field investigations. With respect to fish and frog species, they may be present within French Creek, Paynes Lake Creek, and ponds, but activities do not occur regularly in these areas and impacts to these species are not considered likely.

Future projects that may be developed in riparian habitats or within stream channels (and are outside the scope of this study) may be subject to permitting by the ACOE, CDFG, and RQWQCB. These agencies will address aquatic species, required studies or specific mitigations as needed during those future projects.

## 6.3 Nesting Birds

Bird species may potentially nest within the area, but no nests were observed during the study. Due to ongoing projects and noise generated by camp activities, birds may either avoid the area or nest if they are tolerant to noise disturbance. Nesting birds are protected by the MBTA and nests of native birds protected under CFGC (Section 3503). JH Ranch is responsible for compliance with these laws and policies.

## 6.4 Sensitive Natural Communities

There is no sensitive natural community within the study area.

## 6.5 Impacts on Wildlife Movement

JH Ranch is located in a rural setting surrounded by private industrial forest lands and a few residences. National Forest lands are located about one mile from the project site. The study area may facilitate home range and dispersal movement of resident wildlife species, but does not serve as wildlife movement corridor. Existing development does not restrict regional wildlife movement or wildlife migration patterns because there are available alternatives within the area.

## 6.6 Conflicts with Adopted Habitat Conservation Plan

No Habitat Conservation Plans, Natural Community Conservation Plans, or other local or regional plans have been adopted within the area that encompasses the site; therefore, no impacts are anticipated and no mitigation is considered necessary.

## 6.7 Conflicts with Local Policies or Ordinances Protecting Biological Resources

Siskiyou County does not have any local regulations and/or ordinances for the protection of biological resources; therefore the JH Ranch does not conflict with local polices or ordinances protecting these resources.

# 7.0 Recommendations

SHN recommends that the following mitigation measures be implemented for on-going operations at JH Ranch to minimize the potential impacts to nesting birds and to keep operations at the JH Ranch in compliance with the MBTA:

1. To avoid impacts to nesting birds and/or raptors, one of the following should be implemented. Either:

    A. conduct vegetation removal and other ground disturbance activities associated with any construction activities during mid-August through January, when birds are not nesting; or

    B. if vegetation removal or ground-disturbing activity is to take place during the nesting season (February 1 to August 31 for most birds), a qualified biologist shall conduct a pre-construction nesting bird survey. Preconstruction surveys for nesting pairs, nests, and eggs shall occur within the construction limits and within 100 feet (200 feet for raptors) of the construction limits. If active nests are encountered, species-specific measures shall be prepared by a qualified biologist in consultation with the USFWS and CDFG, and implemented to prevent abandonment of the active nest.

No special status plant species or high quality habitat was observed within the study area. If new parcels are acquired and/or development is proposed that is not included in the use permit, the following should be implemented to minimize potential impacts to special status plant species:

2. To avoid impacts to special status plant species, focused botanical surveys for species identified in Table 1 with a moderate to high potential for occurrence should be conducted. This should also include any special status plant species that may become listed in the future and have a moderate to high potential to occur.

By implementing the recommendations above, potential impacts to special status species would be avoided and minimized.

# 8.0 References Cited

Army Corps of Engineers. (2008). *Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region*. J. S. Wakeley, R. W. Lichvar, and C. V. Noble, eds., ERDC/EL TR-08-13, U. S. NR:ACOE.

Briggs, J.L., Sr. (1987). *Breeding Biology of the Cascade Frog, Rana cascadae, with Comparisons to R. aurora and R. pretiosa.* Copeia 1987:241-245. NR:NR.

Burke, T.E., J.S. Applegarth, and T.R. Weasma. (October, 1999). *Management Recommendations for Survey and Manage Terrestrial Mollusks.* Ver. 2.0. Report submitted to USDI Bureau of Land Management, Salem, Oregon. NR:NR.

Calflora. (Accessed July 2010). Information on California plants for education, research and conservation, based on data contributed by the Consortium of Calif. Herbaria and dozens of other public and private institutions and individuals. 2010. Berkeley, California: The Calflora Database. Accessed at: http://www.calflora.org/

California Department of Fish and Game. (1994). *A Field Guide to Lake and Streambed Alteration Agreements, Sections 1600-1607, California Fish and Game Code.* Sacramento:CDFG.

---. (January 1, 1998). *Fish and Game Code.* Sacramento:CDFG.

---. (2010a). California Natural Diversity Database (CNDDB). Accessed at: http://www.dfg.ca.gov/biogeodata/cnddb/. (Database version: May 2010).

---. (2010b). *Special Animals*. Biogeographic Data Branch, California Natural Diversity Database, Sacramento:CDFG.

---. (2010c). *State and Federally Listed Endangered and Threatened Animals of California*, Sacramento:CDFG.

---. (2010d). *State and Federally Listed Endangered, Threatened, and Rare Plants of California.* Sacramento:CDFG.

---. (2010f). Biogeographic Information and Observation System (BIOS). Accessed at <http://bios.dfg.ca.gov/>. Sacramento:CDFG.

California Native Plant Society. CNPS On-line Inventory of Rare and Endangered Plants. Accessed May 2010 at: <http://northcoastcnps.org/cgi-bin/inv/inventory.cgi >

Cowardin, L. M., V. Carter, F. C. Golet, E. T. LaRoe. (1979). "Classification of Wetlands and Deepwater Habitats of the United States. U.S. Department of the Interior, Fish and Wildlife Service, Washington, D. C." Jamestown: Northern Prairie Wildlife Research Center Online. Accessed at: <http://www.npwrc.usgs.gov/resource/1998/classwet/ classwet.htm) (Version 04DEC98).

Diller, L.V., and R.L. Wallace. (1999). "Distribution and Habitat of *Ascaphus truei* in Streams in Managed, Young Growth Forests in North Coastal California. *Journal of Herpetology* 33:71-79.

Hickman, J. C., ed. (1993). *The Jepson Manual: Higher Plants of California*. Berkeley:University of California Press Berkeley.

Jones, L.L.C., W.P. Leonard, and D.H. Olson, editors. (2005). *Amphibians of the Pacific Northwest*, xii + 227 pp. Seattle:Seattle Audubon Society.

Lisle and Hilton. (April 1999). "Fine Bed Material in Gravel Bed Channels," *Water Resources Research, Vol 35,* No 4 pages 1291-1304. NR:NR.

McCullough, D. (1996). *Met Populations and Wildlife Conservation*. NR: Island Press. 429 pp.

Moyle, P.B. (2002). *Inland Fishes of California.* Revised and expanded. Berkeley:University of California Press. xv + 502 pp.

NatureServe. (2009). "NatureServe Explorer: An Online Encyclopedia of Life. Verson 7.1." Arlington: NatureServe. Accessed on Apr. 28, 2010 at http://www.natureserve.org

Nowak, R. M. (1991). *Walker's Mammals of the world. Fifth edition. Vols. I and II.* Baltimore:John Hopkins Univ. Press. 1629 pp.

Sawyer, J.O., T. Keeler-Wolf, amd J Evans. (2009). *A Manual of California Vegetation Second Edition*. Sacramento:California Native Plant Society Press.

Steenhof, Karen. (1998). "Prairie Falcon *(Falco mexicanus)*," *The Birds of North America Online* (A Poole, Ed.). Ithica: Cornell Lab of Ornithology. Accessed at: http://bna.birds.corness.edu/species/346.

Tibor, David, P., ed. (2001). *Inventory of Rare and Endangered Plants of California, 6th Edition; Special Publication No. 1*. Sacramento: California Native Plant Society.

U.S. Department of Agriculture, Natural Resources Conservation Service. (2010a). Web Soil Surveys (2.1). Accessed at: http://websoilsurvey.nrcs.usda.gov/app/.

---. (2010b). “List of Hydric Soils by State.” Accessed at http://soils.usda.gov/use/hydric/lists/state.html.

U.S. Department of the Interior. (1987). “National Wetland Inventory Map,: Eaton Peak California Quadrangle. U.S. Department of the Interior Fish and Wildlife Service.” Accessed at: http://www.fws.gov/nwi/.

U.S. Fish and Wildlife Service. (1918). *Migratory Bird Treaty Act of 1918, as amended. 16 USC (703-711), 50 CFR Part 21, and 50 CFR Part 10*. Washington, D.C.:USFWS

---. (1996). “Determination of Threatened Status for the California Red-Legged Frog.” *Federal Register 61 (101)*:25813-25833. Washington D.C.:Federal Register

---. (2004). “12-month Finding for a Petition to List the West Coast Distinct Population Segment of the Fisher *(Martes pennanti);* Proposed Rule. *Federal Register 69(68):*18769-18792. Washington D.C.:Federal Register

---. (2009). “Listed/Proposed Threatened and Endangered Species (Candidates Included) for the Eaton Peak USGS 7.5 minute Topographic Quadrangle.” Washington, D.C.:USFWS.

U.S. Fish and Wildlife Service. Yreka Field Office. (2010). On-line database. Yreka:USFWS. Accessed May 2010, <http://www.fws.gov/arcata/specieslist/speciesreport.asp>.

U.S. Geological Survey. (1972). “7.5-minute USGS Quadrangle Map: Eaton, California.” NR:USGS.

Welsh, H.H., Jr. (1990). “Relictual Amphibians and Old-growth Forests. “ *Conservation Biology 4:309-19*

Western Regional Climatic Center. (2010). Online weather data. Accessed at <http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca6498>.

Whittaker, R. (1998). *Island Biogeography: Ecology, Evolution, and Conservation.* NR:Oxford University Press. 285 pp.

## Personal Communication

Sam Cuenca, Wildlife Biologist, Scott River and Salmon River Ranger District, Klamath National Forest, (May 2010). Conversation regarding Northern Spotted Owl locations.

Appendix A

# Site Photographs

Photo 1: Concrete pond. Photo taken by SHN on June 23, 2010.

Photo 2: Taken from top unnamed drainage, flowing towards camp. Photo taken by SHN on June 23, 2010.

Photo 3: Taken of ponds going towards dining facilities. Photo taken by SHN on May 18, 2010.

Photo 4: Area uphill of unnamed drainage with the rope's course found throughout area. Photo taken by SHN on June 23, 2010.

Photo 5: Taken from top of hill looking south towards the "Big Top" tent and pastures. Photo taken by SHN on May 18, 2010.

Photo 6: Taken of Paynes Lake Creek near the confluence with French Creek. Orientation is southwest. Photo taken by SHN on May 18, 2010.

Photo 7: Taken in camp housing Photo taken by SHN on June 23, 2010.

Photo 8: Taken of pastures and "Big Top" tent. Orientation is southeast. Photo taken by SHN on May 18, 2010.

Photo 9: Taken in pastures with south of the "Big Top" tent. Orientation northeast. Photo taken by SHN on May 18, 2010.

Photo 10: Photo 9: Taken in pastures north of the "Big Top" tent. Orientation northeast. Photo taken by SHN on May 18, 2010.

Photo 11: Taken in pastures with north of the "Big Top" tent facing the dining facilities. Orientation southeast. Photo taken by SHN on May 18, 2010.

Photo 12: Taken of French Creek. Photo taken by SHN on May 18, 2010.

Photo 13: Taken of French Creek. Photo taken by SHN on June 23, 2010.

Photo 14: Taken of pond near confluence of French Creek and Paynes Lake Creek. Photo taken by SHN on June 23, 2010.

# Appendix B

# Species List

| JH Ranch Plant Species List | | |
|---|---|---|
| **Latin Name** | **Common Name** | **Presence (1=tree, 2=shrub, 3=herb)** |
| *Abies concolor* | white fir | 1 |
| *Acer macrophylum* | big leaf maple | 1 |
| *Alnus rhombifolia* | white alder | 1 |
| *Calocedrus decurrens* | incense cedar | 1 |
| *Pinus jeffreyi* | Jeffrey pine | 1 |
| *Pinus ponderosa* | ponderosa pine | 1 |
| *Populus balsamifera ssp. trichocarpa* | black cottonwood | 1 |
| *Populus fremontii* | Fremont cottonwood | 1 |
| *Populus tremuloides* | quaking aspen | 1 |
| *Pseudotsuga menziesii* var. *menziesii* | Douglas-fir | 1 |
| *Quercus garryana var. garryana* | Oregon white oak | 1 |
| *Queucus kelloggii* | black oak | 1 |
| *Salix lucida* ssp. *lasiandra* | yellow willow | 1 |
| *Arctostaphylos glandulosa* ssp. *glandulosa* | eastwood manzanita | 2 |
| *Berberis nervosa* | Oregon grape | 2 |
| *Ceanothus integerrimus* | deerbrush | 2 |
| *Cornus nuttallii* | Pacific dogwood | 2 |
| *Corylus cornuta* var. *californica* | California hazel | 2 |
| *Lonicera ciliosa* | orange honeysuckle | 2 |
| *Physocarpus capitatus* | pacific ninebark | 2 |
| *Prunus emarginata* | bitter cherry | 2 |
| *Prunus virginiana* var. *demissa* | Western chokecherry | 2 |
| *Rhododendron occidentale* | Western azalea | 2 |
| *Ribes* sp. | gooseberry | 2 |
| *Rosa californica* | California wildrose | 2 |
| *Rosa gymnocarpa* | Sweet briar | 2 |
| *Rubus discolor* | Himalaya berry | 2 |
| *Rubus glaucifolius* | raspberry | 2 |
| *Salix* sp. | willow | 2 |
| *Spiraea douglasii* | Douglas's spirea | 2 |
| *Symphoricarpos albus* var *laevigatus* | snowberry | 2 |
| *Symphoricarpos mollis* | creeping snowberry | 2 |
| *Vitis californica* | California grape | 2 |
| *Achillea millefolium* | common yarrow | 3 |
| *Adenocaulon bicolor* | American trailplant | 3 |
| *Agrostis* sp. | bentgrass | 3 |
| *Aira caryophyllea* | silver hairgrass | 3 |
| *Antennaria* sp. | pussytoes | 3 |
| *Anthoxanthum odoratum* | sweet vernal grass | 3 |
| *Avena fatua* | wild oats | 3 |
| *Avena sativa* | cultivated oats | 3 |
| *Brassica* sp. | mustard | 3 |
| *Brassica rapa* | field mustard | 3 |
| *Bromus* sp. | brome grass | 3 |

| JH Ranch Plant Species List | | |
|---|---|---|
| **Latin Name** | **Common Name** | **Presence (1=tree, 2=shrub, 3=herb)** |
| *Calochortus tolmiei* | Tolmie's star tulip | 3 |
| *Calypso bulbosa* | fairy slipper | 3 |
| *Capeslla bursa-pastoris* | shepherd's purse | 3 |
| *Cardamine californica* var. *californica* | California toothwort | 3 |
| *Carex* sp. | sedge | 3 |
| *Carex obnupta* | slough sedge | 3 |
| *Cerastium arvense* | field chickweed | 3 |
| *Corallorhiza striata* | striped coralroot | 3 |
| *Cirsium arvense* | Canada thistle | 3 |
| *Cirsium vulgare* | bull thistle | 3 |
| *Claytonia perfoliata ssp. perfoliata* | miner's lettuce | 3 |
| *Cynoglossum grande* | Western houndstongue | 3 |
| *Dactylis glomerata* | orchard grass | 3 |
| *Deschampsia* sp. | deschampsia grass | 3 |
| *Dichelostemma ida-maia* | firecracker flower | 3 |
| *Elymus* sp. | rye grass | 3 |
| *Epilobium ciliatum* ssp. *ciliatum* | fringed willowherb | 3 |
| *Equisetum* sp. | horsetail | 3 |
| *Escschoizia californica* | California poppy | 3 |
| *Festuca* sp. | fescue grass | 3 |
| *Galium aparine* | common bedstraw | 3 |
| *Galium triflorum* | bedstraw | 3 |
| *Geranium oreganum* | Oregon geranium | 3 |
| *Heracleum lanatum* | cow parsnip | 3 |
| *Holcus lanatus* | velvet grass | 3 |
| *Hordeum* sp. | barley grass | 3 |
| *Juncus bufonius* var. *bufonius* | toad rush | 3 |
| *Juncus effuses* var. *pacificus* | Pacific rush | 3 |
| *Juncus patens* | common rush | 3 |
| *Lathyrus nevadensis* var. *nevademsos* | Sierra pea | 3 |
| *Leucanthemum vulgare* | oxeye daisy | 3 |
| *Lilium paardalinum* ssp. *wigginsii* | leopard lily | 3 |
| *Lolium multiflorum* | Italian rye grass | 3 |
| *Lolium perenne* | perennial ryegrass | 3 |
| *Lotus purshianus* var. *purshianus* | Spanish clover | 3 |
| *Lupinus albifrons* | Silverleaf lupine | 3 |
| *Lupinus polyphyllus* var. *polyphyllus* | meadow lupine | 3 |
| *Madia* sp. | tarweed | 3 |
| *Medicago lupulina* | black medick | 3 |
| *Melica californica* | oniongrass | 3 |
| *Mentha arvensis* | field mint | 3 |
| *Nemophila parviflora* | small flowered nemophila | 3 |
| *Osmorhiza chilensis* | sweet cicely | 3 |
| *Phacelia egena* | rock phacelia | 3 |

| JH Ranch Plant Species List | | |
|---|---|---|
| **Latin Name** | **Common Name** | **Presence (1=tree, 2=shrub, 3=herb)** |
| *Poa* sp. | blue grass | 3 |
| *Potamogeton* sp. | pondweed | 3 |
| *Prunella vulgaris* | self-heal | 3 |
| *Pteridium aquilinum* var. *pubescens* | hairy brackenfern | 3 |
| *Pterospora andromedea* | pine drops | 3 |
| *Pyrola picta* | white veined wintergreen | 3 |
| *Ranunculus californicus* | california buttercup | 3 |
| *Rumex acetosella* | common sheep sorrel | 3 |
| *Rumex crispus* | curly dock | 3 |
| *Sanicua* sp. | sanicle | 3 |
| *Sarcodes sanguinea* | snow plant | 3 |
| *Scirpus microcarpus* | small fruited bullrush | 3 |
| *Silene campanulata* ssp. *glandulosa* | bell catchfly | 3 |
| *Smilacina racemosa* | Western Solomon's seal | 3 |
| *Smilacina stellata* | false Solomon seal | 3 |
| *Stachys ajugoides* var. *ajugoides* | hedge nettle | 3 |
| *Stellaria media* | common chickweed | 3 |
| *Tetaxacum officinale* | dandelion | 3 |
| *Tiarella trifoliate* var. *unifoliata* | foamflower | 3 |
| *Trifolium pratense* | red clover | 3 |
| *Trifolium repens* | white clover | 3 |
| *Trifolium wormskioldii* | cows clover | 3 |
| *Verbascum thapsus* | common mullein | 3 |
| *Veronica americana* | American speedwell | 3 |
| *Vicia americana var. americana* | American vetch | 3 |
| *Viola glabella* | pioneer violet | 3 |

| Table B-2. JH Ranch Animal Species List | |
|---|---|
| **Latin Name** | **Common Name** |
| *Bonasa umbellus* | Ruffed Grouse |
| *Corvus corax* | Common Raven |
| *Eremophila alpestris* | Horned Lark |
| *Hirundo rustica* | Barn Swallow |
| *Icterus bullockii* | Bullock's Oriole |
| *Myotis lucifugus* | Little Brown Bat |
| *Odocoileus hemionus* | Black-tailed Deer |
| *Thomomys mazama* | Western Pocket Gopher |

Attachment B5

SHN CONSULTING ENGINEERS & GEOLOGISTS, INC.
350 Hartnell Avenue, Suite B • Redding, CA 96002 • 530-221-5424 • FAX 530-221-0135

Reference: 509051.300

August 28, 2014

Rob Hayes-St. Clair
JH Ranch
8525 Homestead Lane
Etna, CA 96027

**Subject: Natural Resource Assessment Report, Addendum #1
Engelmann Spruce Survey
JH Ranch, Siskiyou County, California**

Dear Mr. Hayes-St. Clair:

This Addendum #1 is to our Natural Resource Assessment Report (NRA) of August 25, 2010. The NRA report was developed to assess potential impacts to special status species and their habitat within the JH Ranch vicinity that might be impacted by on-going operations. Addendum #1 has been prepared to provide additional information on Engelmann spruce (*Picea engelmannii*) surveys that were conducted as part of the NRA report.

## 1.0 Project Location

JH Ranch is located in the East ½ of Section 32, Township 41 North, Range 9 West, Mount Diablo Meridian (Figure 1). JH Ranch is located in a rural mountainous area of Siskiyou County, approximately 30 miles southwest of Yreka. Access to the JH Ranch site is from French Creek Road. Elevation of the JH Ranch ranges from approximately 3,200 to 3,480 feet above sea level.

Existing development at JH Ranch consists of improvements for "guest camp" activities that generally consist of sleeping cabins, a dining facility, swimming pool and pond, activity fields (football, soccer, etc.), horse barn and corral facilities, a large tent used for assemblies, ropes courses and other outdoor activity areas. Administrative and operational facilities include offices, laundry, storage facilities, and staff housing. Roadways (both paved and unpaved) and trails provide access to the various parts of the facility. Roadway bridges provide access over French Creek and Paynes Lake Creek.

The facility is adjacent to French Creek, a perennial stream on the eastern side of the property that runs along French Creek Road, a Siskiyou County paved roadway. The property is also bisected by Paynes Lake Creek, a tributary of French Creek.

## 2.0 Engelmann Spruce

### 2.1 Species Account

Engelmann spruce (*Picea engelmannii*) is an evergreen tree that can grow to a height of 120 feet and have diameters of 36-inches DBH (diameter at breast height). It has a compact form with spreading branches and its bark is comprised of small flaky scales that emerge after about 4 years of growth;

young trees have generally smooth bark. Needles are soft, flexible and dark green at maturity, approximately 1-1 ¼ inch in length. Cones are oblong-cylindrical to ellipsoidal and are approximately 2-inches in length, and are either sessile or very short stalked. Produced in great numbers in the upper branches of the tree, they are green when formed and turn pale brown at maturity with flexible and somewhat soft scales (Sargent, 1965; Hickman, 1993). The Engelmann spruce prefers cool, moist habitats of the mixed-conifer and sub-alpine forests, with an elevation range of approximately 3,900 feet to 6,900 feet in elevation (Hickman, 1993). In northern California it is generally considered a species of interior mountains.

## 2.2 Species Status

The Engelmann spruce has a California Native Plant Society (CNPS) 2B.2 Rare Plant Ranking. It is not listed by the State of California or the federal government as a Threatened, Endangered or Candidate species. During development of the NRA report (2010) the Rare Plant Ranking was called the "CNPS List". In 2011, the CNPS List was officially changed to the California Rare Plant Rank, but still uses the same categorizations and degrees of concern. For this Addendum #1, the Rare Plant Ranking will be used.

With a ranking of 2B.2, the Engelmann spruce is considered rare in California, though it may be more common in other states. While not officially listed under the California Endangered Species Act, it meets the definition of eligible for state listing. The ranking system designation means:

- **List 2B**: Plants Rare, Threatened, or Endangered in California, but more Common Elsewhere
- **Threat Rank 0.2**: Fairly Threatened in California

## 2.3 Habitat in the Project Area

Review of the habitat considerations for this species find that its preferred habitat is upper elevations (3,900 feet +) and in cool, moist mixed-conifer or sub-alpine conditions. Habitat in the project site does not generally fit these criteria, as elevations at JH Ranch are several hundred feet below the preferred habitat range (3,200 to 3,480 feet). However, French Creek does provide generally cooler and moister habitat conditions that this species may be able to disperse into through seed production.

Known populations of Engelmann spruce are found in the upper tributaries of the French Creek/Paynes Lake Creek drainages in the Russian Wilderness, especially within the Eaton Peak, US Geological Survey (USGS) quadrangle.

Review of the California Natural Diversity Data Base (CNDDB) RareFind program (managed by the California Department of Fish and Wildlife) found that the Engelmann spruce has been identified as individuals and groups at eight locations in the Eaton Peak Quad, from 1930 to 1983. One record from 1930 (Goldsmith, GOL30S0001) documents one individual Engelmann spruce on the banks of French Creek where French Creek is crossed by French Creek Road. No additional follow-up surveys were conducted (as of 2010) to determine if the tree was still present. The balance of the documented locations in RareFind are significantly higher in the watershed and within the wilderness.

## 3.0 Survey Methods

Using the data collected from the CNDDB, pedestrian field surveys were conducted in May 2010 to determine if the Engelmann spruce occurrence made by Goldsmith in 1930 could be found. While the age of the tree was not noted in the RareFind records, it is assumed that the tree was of a young to mature age, giving distinctive markings for identification, such as bark and possibly cones. Assuming a tree of 10 years of age, the current tree would be approximately 90 years of age; a mature and large tree.

Mark Chaney, Principal Environmental Scientist from SHN evaluated the banks of French Creek from the bridge over French Creek upstream for approximately 100 feet and immediately downstream of the bridge. Due to private property limits, no additional investigations were able to be made at this location. Investigations included viewing the area canopy, tree trunks and saplings to determine if the spruce could be located.

Additional transects were installed on JH Ranch property from their southern property boundary on French Creek through the JH Ranch property to the north. The banks of the creek were again viewed both in the understory and overstory in an attempt to find Engelmann spruce.

Using the RareFind 5 and Bios Viewer (version 5.20.18a) software from the CNDDB, previously mapped locations and reviews of records were made in August 2014 to determine if any new locations had been identified. Review of the data found that the same eight occurrence documents as noted in the 2010 NRA report. Additional review of the Bios Viewer mapping system also found that the lower reaches of the population, identified by Goldsmith, was within the survey area completed in 2010. Based on the survey coverage from 2010 being consistent with current mapped data, no additional survey was conducted.

## 4.0 Results

Surveys conducted in 2010 along French Creek were unable to locate the single Engelmann spruce found in 1930 by Goldsmith. Mapping for this individual was descriptive only, and placed it near the current bridge crossing of French Creek Road. Additional survey along French Creek through JH Ranch property also failed to locate this species within the confines of the property.

## 5.0 References

California Department of Fish and Game. (2010a). California Natural Diversity Database (CNDDB). Accessed at: http://www.dfg.ca.gov/biogeodata/cnddb/. (Database version: May 2010).

---. (2010b). *State and Federally Listed Endangered, Threatened, and Rare Plants of California.* Sacramento:CDFG.

California Department of Fish and Wildlife. (2014). RareFind 5 database, part of the California Natural Diversity Database. Accessed August 28, 2014 at https://www.dfg.ca.gov/biogeodata/cnddb/mapsanddata.asp

California Native Plant Society. CNPS On-line Inventory of Rare and Endangered Plants. Accessed May 2010 at: <http://northcoastcnps.org/cgi-bin/inv/inventory.cgi

Calflora. (2010). The Calflora Database. Accessed at: http://www.calflora.org/

Hickman, J. C., ed. (1993). *The Jepson Manual: Higher Plants of California*. Berkeley:University of California Press Berkeley.

Sargent, Charles Sprague. (1965). *Manual of the Trees of North America. Volume One*. Toronto: Canada, General Publishing Company, Ltd.

Sawyer, J.O., T. Keeler-Wolf, and J Evans. (2009). *A Manual of California Vegetation Second Edition*. Sacramento:Native Plant Society Press.

## Conclusion

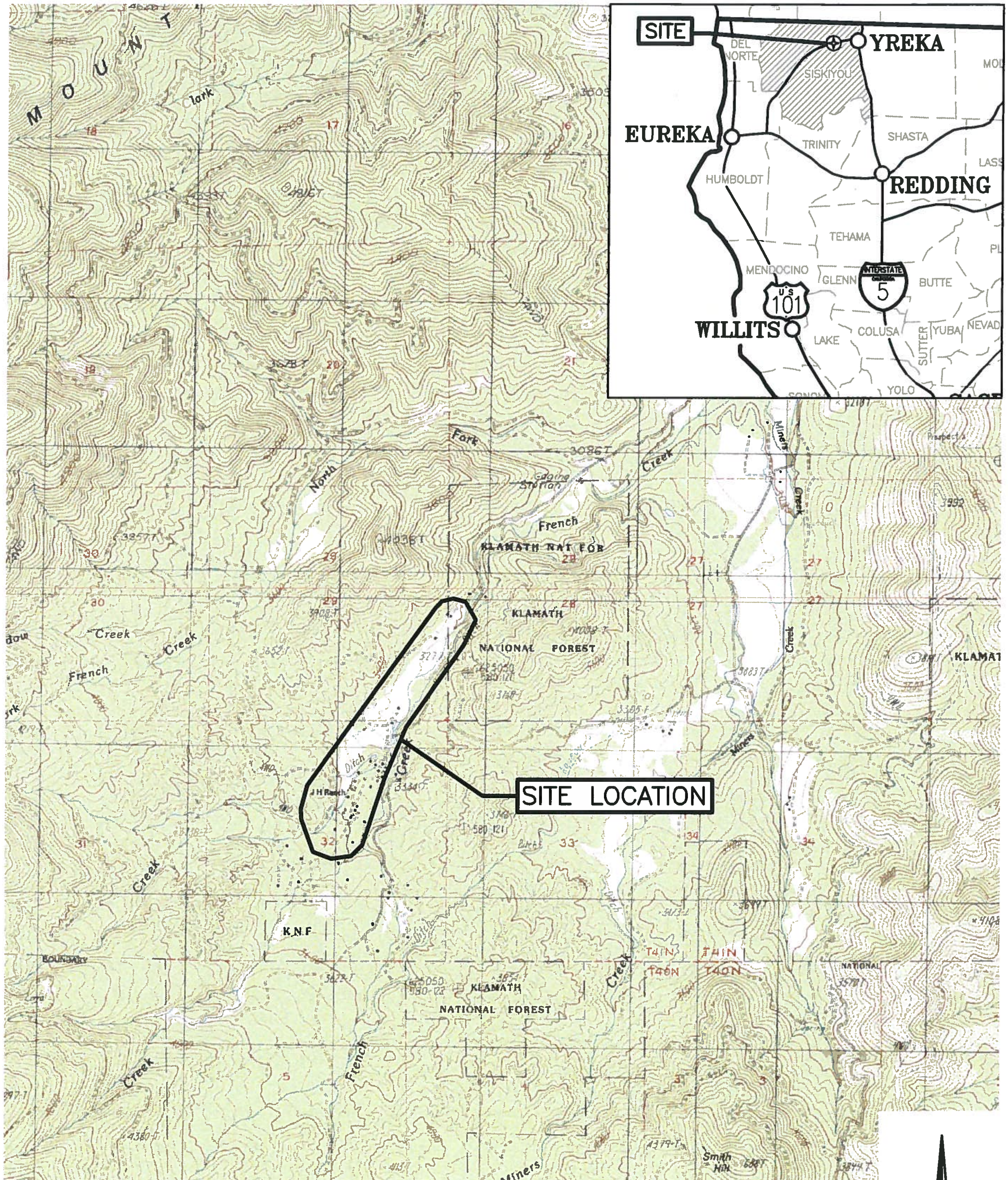
Based on the 2010 surveys conducted for the 2010 NRA report for JH Ranch, and the follow-up literature and document review in 2014, it is our opinion that Engelmann spruce does not occur at the JH Ranch.

Sincerely,

**SHN Consulting Engineers & Geologists, Inc.**

Mark S. Chaney
Principal Scientist

MSC: llc
Enclosures: Figure 1
c. s/encl: Curt Babcock, DFW-Region 1




SOURCE: ETNA, CALLAHAN,
EATON PEAK, MCCONAUGHY RIDGE
USGS 7.5 MINUTE QUADRANGLE

N

1"=3000'±

\\Eureka\projects\CAD-FILES\Redding\2009\509051\300 , SAVED: 7/14/2010 2:38 PM NDOWNEY, PLOTTED: 8/26/2010 12:53 PM, NATHAN DOWNEY

| | | | |
|---|---|---|---|
| SHN Consulting Engineers & Geologists, Inc. | JH Ranch<br>Siskiyou County, California | | Site Location Map<br>SHN 509051.300 |
| | July 2010 | 509051-300-LOCATION | Figure 1 |

Attachment B6

SHN
CONSULTING ENGINEERS & GEOLOGISTS, INC.
350 Hartnell Avenue, Suite B • Redding, CA 96002 • 530-221-5424 • FAX 530-221-0135

Reference: 509051.300

July 21, 2015

Rob Hayes-St. Clair
JH Ranch
8525 Homestead Lane
Etna, CA 96027

**Subject: Natural Resource Assessment Report, Addendum #2
Sensitive Species Surveys Clarification
JH Ranch, Siskiyou County, California**

Dear Mr. Hayes-St. Clair:

This Addendum #2 is to our Natural Resource Assessment Report (NRA) of August 25, 2010. The NRA report was developed to assess potential impacts to special status species and their habitat within the JH Ranch vicinity that might be impacted by on-going operations. Addendum #2 has been prepared to provide clarification for local and state reviewers regarding the level of surveys that were conducted for special status species as part of the NRA report.

## Special Status Species

### Pre-Field Research

SHN's biologist, botanist and wetland scientist undertook pre-field research in order to identify potential species of special concern and special status natural communities within the project area. As noted in the NRA at Section 2.1 Literature Review, SHN consulted with multiple database and species lists to determine the number and types of potentially present special status species. Please refer to Section 2.1 of the NRA for details. From these reviews, SHN assembled a species list that identified 29 special status plant species and 26 special status animal species. That list can be found as Table 1 and Table 2 within Section 5.0 Special Status Biological Resources of the NRA.

### Reconnaissance Level Field Surveys

Using the information collected in our Pre-Field Research, SHN undertook reconnaissance level field surveys for the areas of JH Ranch where operations had been historically conducted and areas that had the potential to be developed within other developed areas. Refer to the NRA at Section 2.2 Field Observations and Studies. Reconnaissance level surveys evaluated site conditions to determine if suitable habitats, or assemblages of habitats, were present that could support the identified special status species, as well as an attempt to locate individuals or groups of special status species, or special status natural communities that may be within the project area.

## Protocol Level Surveys

Based on the findings of the reconnaissance level field surveys, it was determined that no protocol level surveys (referred to as 'focused botanical surveys' in the NRA) were required, because either the habitat conditions were not conducive for the individual species to be present, no special status individuals were detected and no natural communities were identified within the project area. It was also determined that nesting bird surveys would not need to be conducted as this survey was too detailed for the planning level analysis, though reconnaissance of the project site and surrounding areas were undertaken prior to making this determination in order to locate raptor nests.

Additionally, due to the human disturbance and development at JH Ranch, it was determined that the essential habitat elements for the American marten (*Martes americana*) and Fisher (*Martes pennanti*) were not present at the site and no additional surveys were required.

We hope this provides the clarification regarding our surveys. Should you have any additional questions please contact me at (530) 221-5424.

Sincerely,

**SHN Consulting Engineers & Geologists, Inc.**

Mark S. Chaney
Principal Scientist

MSC: llc

Attachment B7

# JH Ranch Emergency Action Plan – Fire

# Prepared: May 27, 2015

**TABLE OF CONTENTS:**

**STANDARD FIRE PREPARATION (Jim Free)**

As part of our Standard Fire Preparation, JH Ranch complies with all regulations written by Cal-Fire as they apply to a Class-??? Camp.

While all regulations consider certain authority, we want to call close attention to the following regulations:

These regulations include:

- Fire Extinguishers located inside of every structure
  - Clearly labeled
  - Easily accessible
  - Inspected monthly
- Smoke Alarms located inside of every structure
  - Inspected monthly
- Safe Zones created around all structures
  - Pine needles, leaves, etc. swept away from all structures in 30 foot radius
- Fire Drills conducted regularly
  - Within 24 hours of registered guests or staff arriving on-property
  - Night-time drill conducted if program lasts longer than 6 days
  - Log maintained of all Fire Drills
- Hazardous Materials labeled and stored properly
  - Propane
  - Gasoline
  - Other
- Exit Signs Posted Above Emergency Exits

**DIRECTOR ON DUTY (Carl and Jonathan)**

The Director On Duty is the ultimate authority on property and is responsible for the …. responsible for all guests, staff, families, visitors, livestock and facilities.

- The Director On Duty will be announced at every meal to the staff and posted in a visible manner behind the Hospitality Hut for guests to see
- The Director On Duty log will be kept at the Hospitality Hut

**Roster**
The Director On Duty will be determined according to the following roster:

[Switch position and names]
- Jonathan LeDuc – Executive Director
- Carl Jones – Operations Director
- Eric Nickoli – Program Director
- Rob Hayes St. Clair – Land Development Director
- David Curran – Advancement Director
- Jim Free – Facilities Manager
- Tyler Williamson – Logistics Director
- Mack Ogren – Chief Generosity Officer
- Tyler Higginbotham – Controller
- Payne Kellum – Assistant Program Director

**Communication**
To ensure preparedness in the event of an emergency, each individual listed in the Director On Duty Roster shall always record his or her movement off-property with the Front Desk.

Whenever the current Director On Duty leaves property, it is his or her responsibility to notify and confirm with the subsequent Director On Duty that he or she is now the Director On Duty. This can be done via text and email.

**DECISION MAKING FACTORS (Carl and Jonathan)**

To determine the best fire emergency response, the Leadership of JH Ranch will consider the following factors:

**Location of Fire Threat**
- On-property Fire
- Off-property Fire (“Wildfire”)

**Time of Day**
- Daytime (0500 – 2200)
- Nighttime (2200 – 0500)

**Program In Session**
- Off-Season
- Shoulder-Season
- Staff Orientation
- Parent & Son/Daughter
- Student Leadership

**Type of Day**
- Arrival Day
- Standard Day
- Departure Day

**Evacuation Notices**
- No Evacuation Notice
- Preliminary Notice
- Optional Notice
- Mandatory Notice

**ON-PROPERTY FIRE**

**<u>Discovery</u>**

**Discovery By A Guest or Visitor**
In all situations, should a Guest or Visitor discover a fire, they should seek to inform a staff member immediately rather than fight the fire on their own.

**Discovery By A Staff Member**
Upon discovering or being informed of an on-property fire, a Staff Member shall assess quickly whether the fire can be extinguished immediately. If the Staff Member believes the localized fire is able to be extinguished immediately (e.g., a fire in a toaster oven), staff members shall make every effort to do so while seeking to raise awareness of the fire among other staff members.

If the fire is successfully put out, the Director On Duty shall be informed and perform a personal inspection of the fire scene. The Director On Duty will review with the Full Time Staff Member responsible for the area of operation in which the fire occurred, along with all staff members assigned to that area, to ascertain the cause of the fire and determine what practices need to be enforced, fixed, or added to prevent any future fires. <u>The Director on Duty will also take the opportunity to review with the staff members involved the protocol for on-property fires in entirety.</u>

If the fire is too large to be quickly eliminated, the Staff Member should seek to contain the fire, while warning guests to seek safety. He or she should designate someone with them or in their vicinity to specifically inform Ranch Leadership of the fire.

**On-Scene Commander**
It is critical that an On-Scene Commander be identified immediately. The staff member who first discovers or is informed of the fire shall act as the on-scene commander until such time as a staff member with greater seniority appears on scene. The arriving senior staff member shall identify whom the current On-Scene Commander is and verbally assume control of the situation by announcing themselves as the new On-Scene Commander.

**<u>Awareness</u>**
**Communication of a Fire's Discovery**
Upon learning of a fire, staff members not involved directly in combating it shall seek to inform Ranch Leadership, the Hospitality Hut, and the Logistics Team.

Upon learning of a fire, Ranch Leadership, the Hospitality Hut, and the Logistics Team shall seek to inform the Summer Core Leadership Team through email, text, and radio.

**Director On Duty's Awareness**
Assuming the fire has not already been extinguished, the Director On Duty upon learning of the fire shall seek to determine the location of the fire and its threat level to guests, staff, and facilities. If the fire is determined to not be an immediate danger to guests (e.g., a fire in the barn at night – over 1000 feet from the nearest guest location) the Director On Duty will direct all available resources and personnel to battle the fire directly. If the fire is a threat to guest or staff safety, the Director shall implement the Fire Response Protocol at his discretion.

***add in On-Scene Commander communication (maybe put in communication tab at beginning)

## <u>Response</u>

### Fire Response Protocol

*Fire Siren*
The Director On Duty will designate a Staff Member to sound the Fire Siren, located in the Dining Pavilion. The Fire Siren will sound for a minimum of three minutes.

*Response to Fire Siren*
Upon hearing the Fire Siren:

- All Visitors and Guests shall head to the Upper Pasture
- All Coaches shall head to the Upper Pasture
- <u>All Summer Staff with Guests currently in their care shall escort those guests to the Upper Pasture and shall then continue on to the Orchard Pasture</u>
- All Summer Staff without Guests in their care shall head to the Orchard Pasture
    - Maintenance Summer Staff shall head directly to the Fire's Location
- All Seasonal Staff shall make a sweep of their immediate vicinity to ensure that all Guests are heading to the Upper Pasture and all Summer Staff to the Orchard Pasture
- All Full Time Staff make a sweep of their immediate vicinity to ensure that all Guests are heading to the Upper Pasture and all Summer Staff to the Orchard Pasture
    - The Vehicle Manager and/or Maintenance Manager shall head directly to the Water Truck and then to the Fire's Location
    - If the fire is within an Area of Concern, the Maintenance Manager shall turn off all Propane and Gas lines, but leave all Power lines on
    - All Maintenance Staff shall head directly to the Fire's Location
    - The Logistics Team shall immediately implement their appropriate protocols
    - The Medical Staff shall gather all necessary items and establish a first-aid center at the Ranch House

- The Wrangler Staff shall immediately gather the Travelers and begin soaking the areas around the Safe Zones

*Safe Zone*

- The standard Safe Zone for all Guests is the Upper Pasture.
- The standard Safe Zone for all Staff is the Orchard Pasture.
- Should the Director On Duty determine that either Safe Zone is threatened by the fire's original location, the back-up safe zones are:
    - The Sports Field
    - Woodlands Circle

*Logistics Team Fire Protocols*

The Logistics Team is responsible for the accurate roll call of all persons known to be on property.

The Logistics Team will:

- Assess which staff are known to be on-property and off-property
    - Check with the Hospitality Hut to determine staff off property for off-days
- Designate staff members to create rally points for all housing areas in the Upper Pasture and Orchard Pasture
    - Staff will use orange safety cones with signs painted for each housing area
    - Cones and signs will be stored in the Pump House on the Upper Pasture
    - If needed, use halogen flood lights to light gathering areas
- Designate staff members to ensure Emergency Action Kit is complete and equip the Program Champion and Program Director with needed items
    - See Appendix for all items included in Emergency Action Kit
- After determining expected attendance lists, gather printed lists for Staff and Guests
    - Master Guest List Alphabetical
    - Master Guest List Housing
    - Team Lists
    - Master Staff List Alphabetical
    - Master Staff List Housing
    - List of Coaches
- Present all Guests Lists and List of Coaches to Program Champion
- Present all Staff Lists and List of Coaches to Program Director
- Establish a headquarters in front of the Windmill

*Guest Response At Safe Zone*

Once at the designated safe zones:

- The Program Champion will assume responsibility for all Guest Safety (& Coaches)
- The Program Champion will address all guests to share known information regarding the fire and inform them that a roll call will be taken presently

- During Parent & Son/Daughter Weeks, Guests will be asked to gather in double column lines in Parent/Child pairs according to their housing unit behind the appropriately marked cone
    - During Second Wind Weeks, guests will be asked to arrange in single file lines according to their housing unit behind appropriately marked cone
- All coaches will gather by the Red Wagon to receive printed team lists and markers
- Coaches will then return to their teams and do an initial roll call
    - After finishing the roll call, coaches will stand in front of their cones signifying that they are finished
- The Logistics Team will then perform an initial check with all the coaches to determine which guests are missing and their last known location
- The Logistics Team will confirm that the guests believed to be missing are indeed missing from their housing area rally point
- The Logistics Team will then pass this information along to the Program Champion, who will announce the names of the missing guests to ensure that they are not elsewhere in the Upper Pasture
- If the guests are determined to be missing, the Program Champion will designate staff members in pairs to search for the missing guests at their last known location
    - Staff members will check back in verbally every thirty minutes or in person every hour
    - If guests have no last known location, or are not immediately found, staff will search in the following order:
        - Housing assignment
        - Lodge
        - Ropes Courses (High Ropes, Low Ropes, Alpine Tower, Odyssey)
        - Cabin Areas
        - General Property
- All guests shall remain in the safe zone until an All-Clear Signal is given or an Evacuation Order is issued
    - If an all-clear signal is given by the Director on Duty or by the ringing of the Dinner Bell 5 times, all persons shall gather in the Big Top for an address from the Director On Duty
    - If an Evacuation Order is given, staff and guests will follow the Evacuation Protocol

*Staff Response At Safe Zone*

- The Program Director will assume responsibility for all Volunteer Staff Safety
    - Except for Maintenance Staff, Logistics Staff and Coaches
- All staff will organize in the Orchard Pasture according to Housing Unit
- Men's Staff Dean will perform a roll-call for all male summer staff members
- Women's Staff Dean will perform a roll-call for all female summer staff members
- If a Volunteer Summer Staff Member is found to be missing, the Program Director will designate staff members in pairs to search for the missing staff member at his or her last known location

    - Staff members will check back in verbally every thirty minutes or in person every hour
    - If missing staff have no last known location, or are not immediately found, staff will search in the following order:
        - Housing assignment
        - Lodge
        - Ropes Courses (High Ropes, Low Ropes, Alpine Tower, Odyssey)
        - Cabin Areas
        - General Property
- Once all staff are accounted for, the Program Director may at his discretion designate some Area Leads to assist the Logistics Team, the Operations Director, or the Program Champion in their efforts
    - All other staff are to remain at the Orchard Pasture
- Staff shall remain in the safe zone until an All-Clear Signal is given or an Evacuation Order is issued
    - If an All-Clear Signal is given by the Director on Duty or by the ringing of the Dinner Bell 5 times, all persons shall gather in the Big Top for an address from the Director On Duty
    - If an Evacuation Order is given, staff and guests will follow the Evacuation Protocol

*Staff Response At The Fire*
The staff at the scene of the fire shall continue to pursue extinguishing the blaze until the On-Scene Commander determines that it is outside of the capacity of Ranch Staff to handle. At this point, he or she will notify the Director On Duty, who will then authorize a Staff Member to call local Emergency Services. At this point, the staff members will switch their focus from extinguishing the blaze to containing the fire.

Upon calling the local Emergency Services, the Director On Duty will designate a Staff Member to greet the Emergency Response Crews at the main entrance to the Ranch and guide them directly to the fire.

All Emergency Contact numbers will be posted at every Ranch phone.

**Arrival & Departure Day Considerations**
Arrival and Departure Days are defined as days when Registered Guests are arriving formally for the first time or departing formally for the last time from JH Ranch property.

If Guests have yet to formally arrive for the start of a program:

- The Program Champion will designate several staff members to be posted at the entrance to the Ranch, to greet guests and explain the situation to them along with their next steps
- The Logistics Team will establish an official check-in station at Ranch House.
    - During Parent & Son/Daughter programs, guests will be directed to park their cars in the Barn parking lot and pasture

- All guests will receive a check-in bracelet and their housing assignment and then be directed to the Upper Pasture to join their Housing group

If Guests will be formally departing that day:

- During Parent & Son/Daughter weeks, the Logistics Team will establish a check-out station to accurately record Guests as they leave the Ranch AFTER Emergency Response Crews have arrived

**Consideration Of Guests With Special Needs**
If any Guests are determined to have any special needs, they will be allowed to gather and wait at the Ranch House, next to the Upper Pasture at the discretion of the Program Champion. The Program Champion will also designate a Staff Member to stay with these guests throughout the time needed.

**Consideration of Special Circumstances**
At all times, the Director On Duty shall have the authority to adjust the Fire Response Protocol should he or she deem it necessary.

**OFF-PROPERTY FIRE**

**Discovery**

**Discovery By A Guest Or Visitor**
If a fire is discovered off-property by a guest or visitor, they shall immediately return to JH Ranch and inform a Staff Member.

**Discovery By A Staff Member**
If a fire is discovered off-property by a staff member alone, he or she shall immediately return to JH and inform Ranch Leadership. If there are multiple staff members, a pair of staff members shall remain at a safe distance to monitor the fire's growth while other staff members seek to inform Ranch Leadership.

**On-Scene Commander**
It is critical that an On-Scene Commander be identified immediately. The staff member who first discovers or is informed of the fire shall act as the on-scene commander until such time as a staff member with greater seniority appears on scene. The arriving senior staff member shall identify whom the current On-Scene Commander is and verbally assume control of the situation by announcing themselves as the new On-Scene Commander.

**Awareness**
**Communication of a Fire's Discovery**
Upon learning of an off-property fire, staff members not involved directly in combating it shall seek to inform Ranch Leadership, the Hospitality Hut, and the Logistics Team.

Upon learning of a off-property fire, Ranch Leadership, the Hospitality Hut, and the Logistics Team shall seek to inform the Summer Core Leadership Team through email, text, and radio. They shall clearly communicate that it is currently OFF-PROPERTY.

**Director On Duty's Awareness**
Assuming the fire has not already been extinguished, the Director On Duty upon learning of the fire shall seek to determine the location of the fire and its threat level to guests, staff, and facilities. If the fire is determined to not be an immediate danger to guests (e.g., a fire in the barn at night – over 1000 feet from the nearest guest location) the Director On Duty will direct all available resources and personnel to battle the fire directly without sounding

the Fire Siren and implementing the Fire Response Protocol. If the fire is a threat to guest or staff safety, the Director shall implement the Fire Response Protocol at his discretion.

## Response

Upon learning of the fire, the Director On Duty shall head to the South Office, where he will meet with Logistics Team and other Ranch Leaders to start reviewing the Emergency Evacuation Protocols should they prove necessary.

*Communication Channels*
The Director On Duty shall designate a Senior Staff Member to be the primary point person for all communication between JH Ranch and local authorities regarding the fire.

**All radios shall be set to Channel 14:1.**

## Evacuation Protocols

### Preliminary Evacuation Protocol

The Preliminary Evacuation Protocol is a level of readiness and preparation that the Ranch may adopt when a wildfire is burning off-property and nearby, but not directly threatening the Ranch. The Director on Duty may order the Preliminary Evacuation Protocol at his or her discretion.

The preparation steps include

- Vehicles
  - The Vehicle Manager will seek to arrange all vans in an accessible manner, facing out of their parking spots, with keys in the vehicle, full gas tanks, and spare tires in every van.
  - The Vehicle Manager shall ensure that every van has a list of all emergency contact numbers as well as maps of all evacuation routes
  - The Water Truck will be inspected and readied for use
- Logistics
  - The Logistics Team will review attendance records and brief the Director On Duty on the expected movements of all persons on property
  - The Logistics Team will inspect the Emergency Action Kit
  - The Logistics Team will place Dole Transportation on notice
- Guests
  - The Director On Duty will establish a communication plan with the Program Champion for informing the guests, if necessary, of the wildfire and prep them for the Imminent Evacuation Protocol
- Staff
  - The Director On Duty will designate a staff member to send an email with all relevant information concerning the possible threat and the protocols being followed to the ALLSUMMER@JHRANCH.COM email listserv.
- Facilities

    - The Facilities manager shall review the hazardous materials on property and ensure that all propane tanks and gasoline containers are in their appropriate, marked areas.
- Livestock
    - The Livestock manager shall prep for transporting the livestock off-property to a designated safe zone should it prove necessary
- Route
    - The Director On Duty shall determine the best evacuation route based upon current and future understandings of the wildfire threat

**Imminent Evacuation Protocol**
The Imminent Evacuation Protocol will be implemented at the discretion of the Director On Duty should authorities issue a Pre-Evacuation or Optional Evacuation Notice.

The protocol steps include:

- Vehicles
    - The Vehicle Manager will line all vans in single column line leading from the Barn towards the entrance to the Ranch, facing in the same direction, with full gas tanks, spare tires, evacuation route maps, attendance logs, and keys in the vehicles
- Logistics
    - The Logistics Team will confirm the Evacuation Route and Safe Zone with the Director on Duty
    - The Logistics Team will dispatch a Staff Member to inspect the Route and the Safe Zone in case an evacuation is ordered
    - The Logistics Team will ensure the Director On Duty has an accurate report on all people on property, their current locations, and their planned movements.
    - The Director On Duty will at his discretion alter Guests and Staff Members' planned movements in the interest of safety and preparation (for example, canceling off-property excursions)
    - The Logistics Team will prep the Safe Zone for possible Evacuation Protocols by
        - Setting up rally points for each housing unit for Guests and Staff with cones and signs and ribbons
        - Setting up halogen flood lights should a night-time evacuation be necessary
    - The Logistics Team will be sure that each Van and/or Bus has a laminated number placed in its driver window
    - The Logistics Team will prepare a truck and trailer with all needed supplies to establish a Safe Zone off-property for Guests comfort and safety
        - See Appendix G for Evacuation Trailer List
- Guests
    - The Program Champion will receive from the Logistics Team an accurate list of all guests and coaches.

- All coaches will gather in the Chapel for a briefing by the Program Champion on the situation and the protocol for evacuation should one be needed
- At the next already scheduled gathering (meal time, lakeside chat, or Big Top session) the Program Champion will brief all guests about the situation
  - During Parent Son & Daughter programs:
    - Guests will be instructed to return to their cabins and gather their personal effects into order and place them into their personal vehicles
    - Guests will be instructed to orient their cars in an outward facing manner, to allow for a quicker egress should it be needed
    - Guests will be briefed on the evacuation protocols for attendance, route, and safe-zone
    - Guests will receive a printed map of the evacuation route, along with written instructions
    - Guests will receive a printed list of all relevant phone numbers and be encouraged to save them in their phones' memory
  - During Second Wind Programs
    - Guests will be instructed to return to their cabins and gather their personal effects into small bags placed on their cabin porches
    - Guests will be briefed on the evacuation protocols for attendance, route, and safe-zone
    - Guests will receive a printed list of all relevant phone numbers
    - Coaches will be given an assigned bus for their teams' possible evacuation
- The Program Champion will work with the Director On Duty to send out relevant updates to guests' families and the general public

- Staff
  - The Program Director is responsible for the safety of all volunteer summer staff except Coaches
  - The Program Director will hold an all-staff meeting in the dining pavilion following dinner while the guests are in the Big Top
    - The Program Director will go over the evacuation protocols with all of the staff
    - All staff will be instructed to return to their cabins at the first possible moment and gather all personal effect and place them in backpacks on the front of their cabins
    - All staff will be given copies of the evacuation route, the designated safe zone, and a list of all relevant phone numbers
    - Staff will continue to work in their assigned areas per their schedule
  - Staff will be given an assigned evacuation vehicle by the Logistics Team
  - Department and Area leaders will prepare their areas of work for a quick shutdown if needed as determined by Department
- Facilities

- The Facilities Manager shall review the hazardous materials on property and ensure that all propane tanks and gasoline containers are in their appropriate, marked areas.
    - The Facilities Manager, time permitting, shall work with Staff to widen the defensible perimeter around structures by clearing away possible fuel elements such as sticks and pine needles
    - The Facilities Manager shall work with the Logistics Team to determine what items need to be moved inside to protect them from possible smoke damage
    - The Facilities Manager will ensure that the Water Truck is used to start soaking the Upper Pasture where Guests and Staff may stage
- Livestock
    - The Livestock Manager shall prep for transporting the livestock off-property to a designated safe zone should it prove necessary
    - The Livestock Manager shall confirm safe zone is prepared to receive the animals
- Route
    - The Director On Duty shall confirm the best evacuation route based upon current and future understandings of the wildfire threat with local authorities

**Evacuation Protocol**
The Evacuation Protocol will be initiated at the discretion of the Director On Duty.

- The Director On Duty shall designate a Staff Member to sound the Fire Siren continuously for a minimum of 5 minutes
- Upon hearing the Fire Siren, staff shall follow the Fire Response Procedures
- After all staff and guests are accounted for, the Director On Duty shall initiate the Evacuation Protocol

The protocol steps include:

- Logistics
    - The Logistics Team will designate staff members to be posted at the rear entrance to the Ranch, where they will take an accurate list of everyone leaving the Ranch, confirming their exit
    - The Logistics Team will dispatch a pair of staff members to the safe site to prepare to receive the guests and staff
    - The Logistics Team will safely power down and remove the networked drives and critical IT elements
- Staff
    - The Program Director will direct all Summer Staff to grab their personal effects and proceed to their assigned vehicle
    - The Program Director may direct a pair of Staff to perform a final visual inspection on all ropes courses to ensure they are shut down appropriately

- An Area Lead will be designated to serve as a Captain for every vehicle, often it will be the Driver of the vehicle
- Guests
  - The Program Champion will communicate to all Guests gathered on the Upper Pasture that an evacuation order has been issued
  - Guests will be dismissed to their cars by the Program Champion by housing assignment
  - Their coach will go with them to their cabin and stand by the road once all guests have been accounted for in vehicles
  - The Program Champion will designate a senior staff member to dismiss each housing area once all guests are loaded into vehicles and ready to depart
    - Housing areas will dismiss from farthest from the exit point to nearest
    - Guests will be instructed to drive with their emergency lights flashing
  - Staff taking attendance at the exit point will have extra copies of the route and emergency numbers for guests
- Livestock
  - The Livestock Manager will, with the help of designated staff (known to the Program Director and Logistics Manager), be responsible for the safe evacuation of all Livestock
- Facilities
  - The Facilities Manager will coordinate with all Building and Area Managers to ensure that each is shut down properly
  - The Facilities Manager will ensure that the Propane and Gas lines are turned off and all propane tanks returned to a unified location
- Communication
  - The Director On Duty will ensure that a clear message is communicated to all Guests' families regarding the evacuation

All guests and staff will depart via the chosen Evacuation Route and arrive at the chosen Safe Zone. Once there the Logistics Team will establish a Headquarters and a Check-In Station to confirm that all persons have arrived at the Safe Zone.

**Final Evacuation Protocol**
After ensuring that all Guests and Volunteer Summer Staff have left, the Logistics Team will provide the Director On Duty a complete and verified account of all people left on property at JH Ranch.

The Director On Duty will establish a three-man crew to remain property until Emergency Response Crews arrive. This crew will travel from structure to structure in a clock-wise manner, inspecting every structure to ensure that all persons have evacuated, and that all areas were shut down appropriately. Having done so, they will mark the entrance to those facilities with a large "X" in chalk to indicate to Emergency Response Crews that the buildings have been officially cleared by JH Ranch Staff.

**Evacuation Safe Zone Protocol**

Upon arriving at the Safe Zone, the On-Scene Commander, dispatched by the Logistics Director, will connect with the local leader.

The On-Scene Commander will then prepare for the arrival of staff and guests by:

- Establishing a Logistics Headquarters
- Establishing a Check-In Station
    - As Guests and Staff arrive, they will be issued a bracelet and checked-in off a Master Attendance list
- Determining where guests and staff may park
- Determining where guests and staff may congregate
- Determining where restroom facilities are
- As staff arrive, they will be assigned roles at the discretion of the Commander

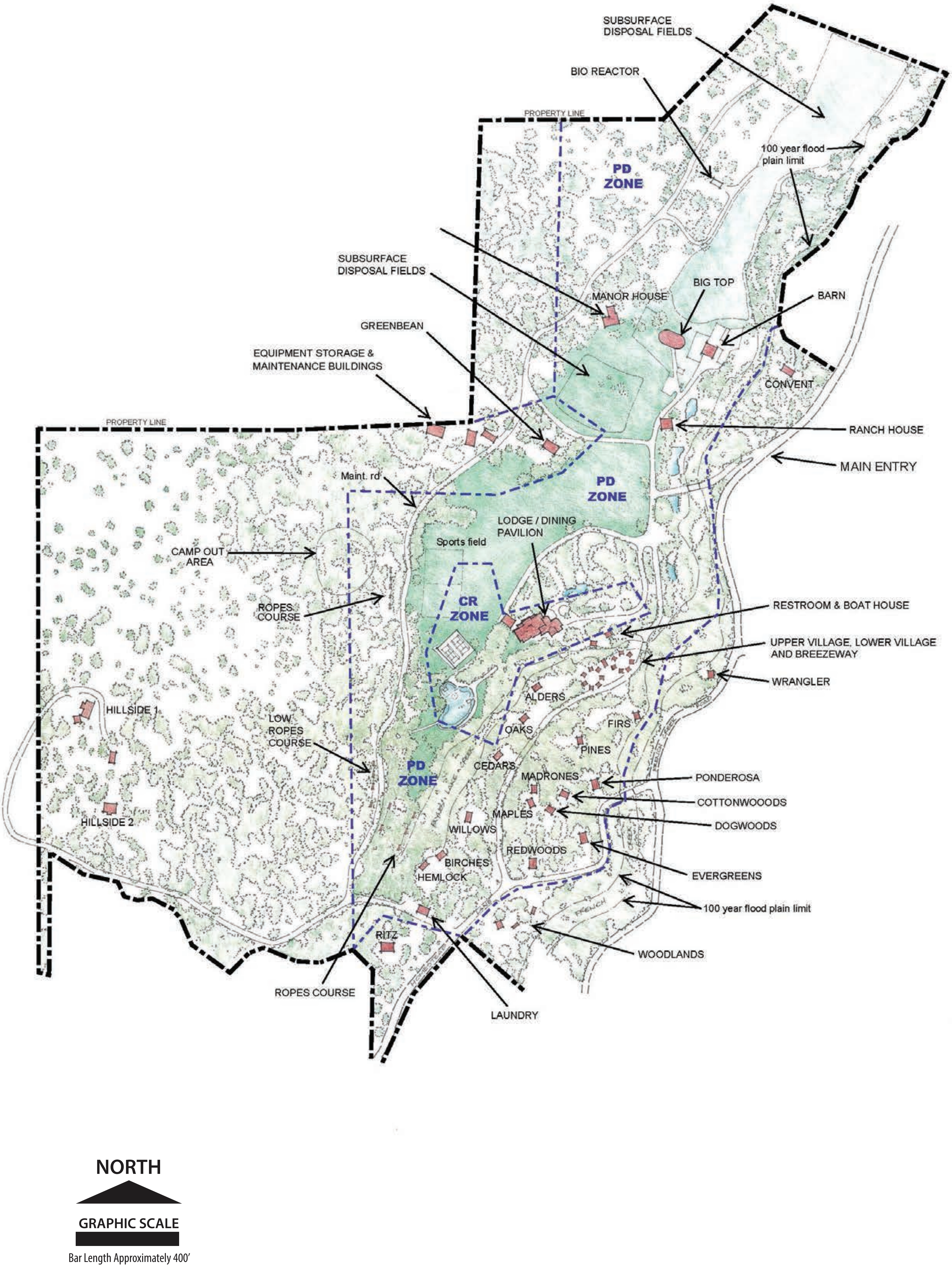
**Emergency Kits**

- Flashlights and un-opened new batteries
- Halogen flood lamps
- Extension cords
- Plastic folding tables
- Clip boards
- Speaker boxes
- Reflective vests
- Fire extinguishers
- Fire extinguishers' map
- Hazardous materials' map
- Weekly Updated Attendance Rosters
- Director On Duty Log
- Step Ladder
- Pens & Highlighters
- Radios and un-opened new batteries
- Check-In Bracelets
- Ribbons

**Emergency Trailer Manifesto**

- Generator
- River Mats
- Sleeping Bags
- Pillows
- Off-Site Food
  - Granola
  - Camping food
  - Paper Sacks
- Water Jugs
- Mini-fridge for medicine
- First-aid supplies
- Trash cans
- Trash bags
- Propane tanks
- Propane stoves
- Pots
- Pans
- Cleaning materials
- Rope
- Blue folding chairs
- Coffee & Supplies
- Coffee carafes
- Tarps
- Camp Shovel

Attachment C1




EXISTING CONDITIONS

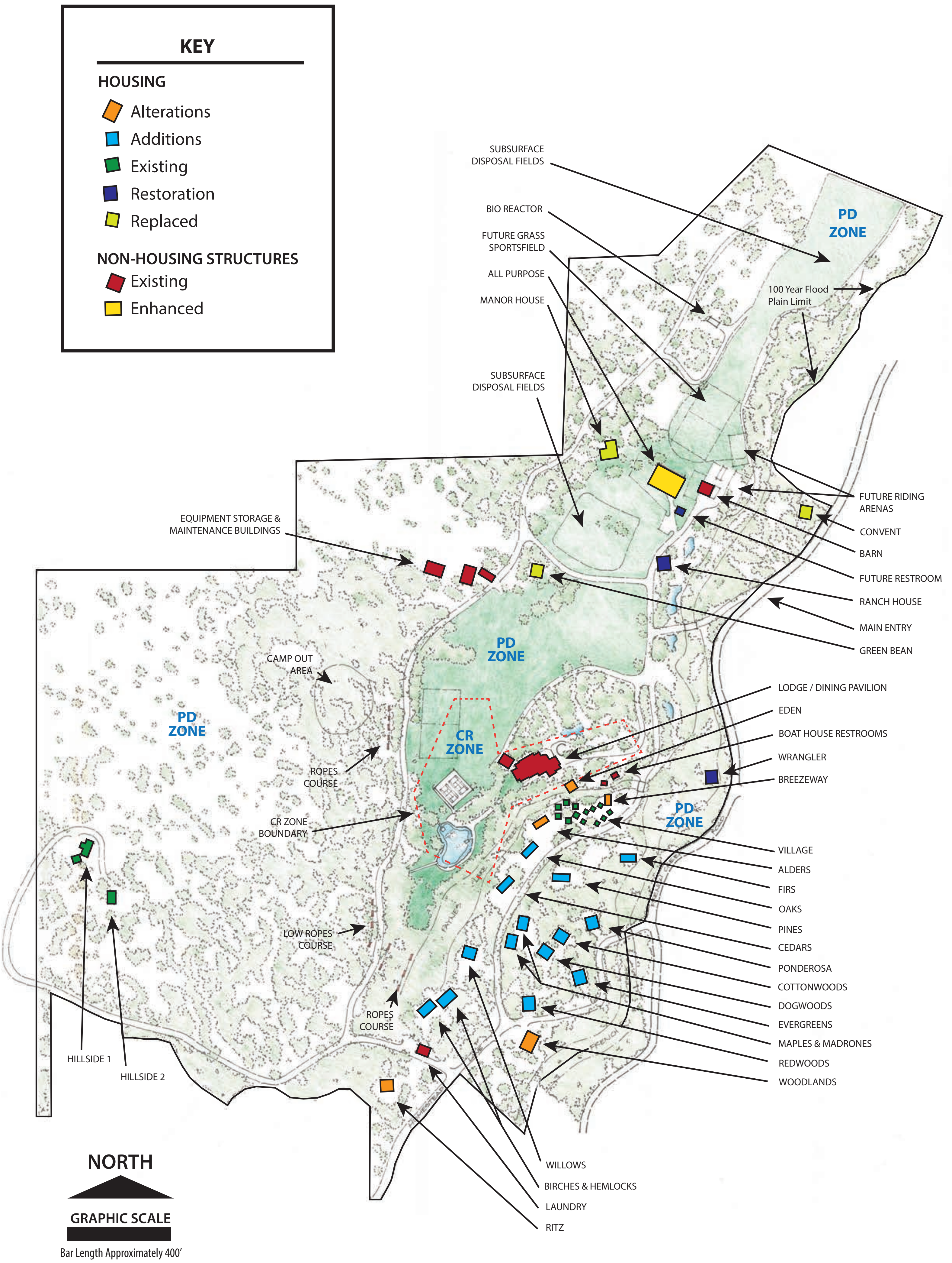
Master Plan Exhibit

**JH RANCH MOUNTAIN RESORT**

ETNA, CALIFORNIA

**MARCH 2016**

Attachment C2




PROPOSED CHANGES

Master Plan Exhibit

**JH RANCH MOUNTAIN RESORT**

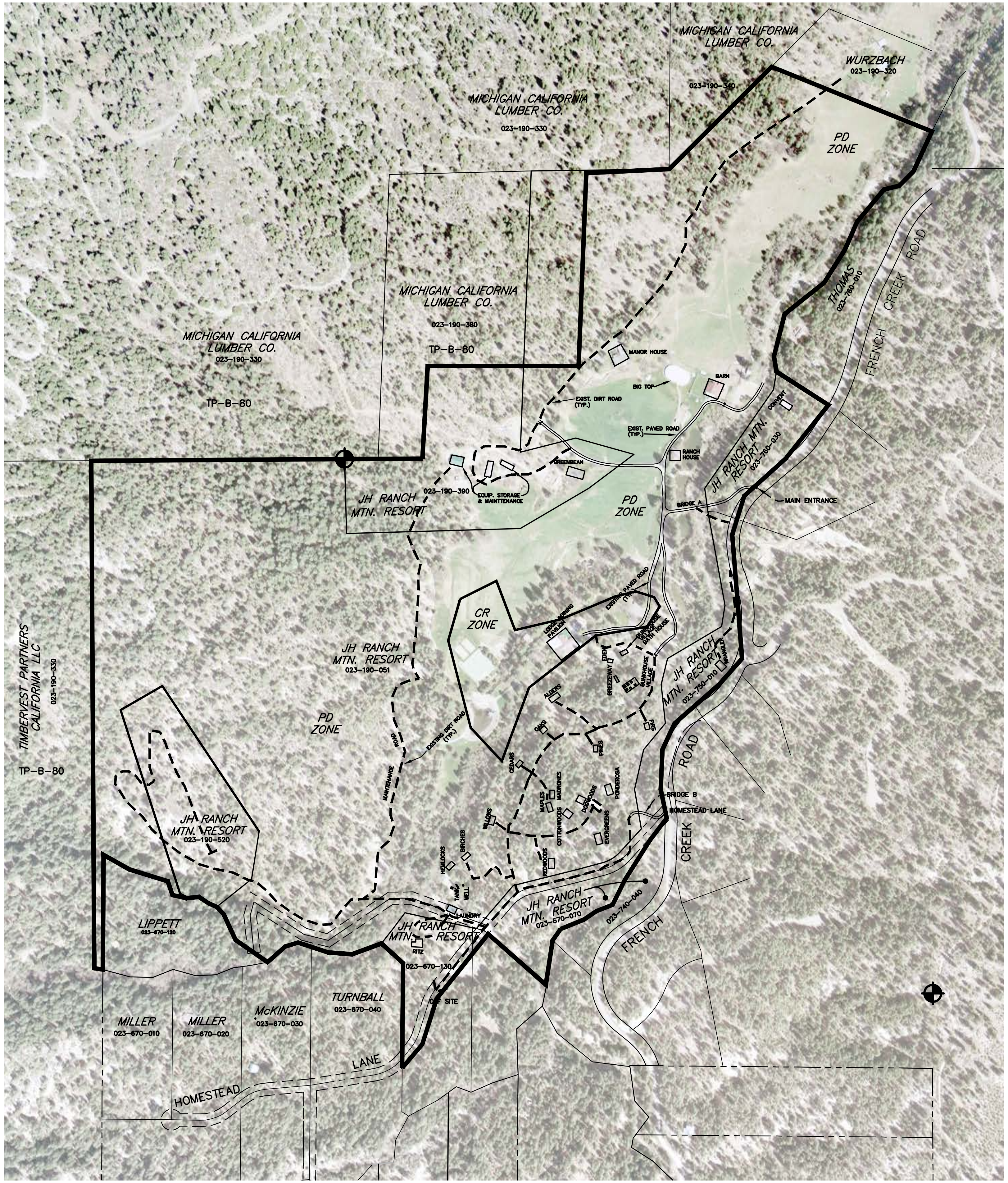
ETNA, CALIFORNIA

**MARCH 2016**

Attachment C3

| Exemption | Status | Structure Name | Existing Size | Existing SF | New SF | Percentage Char | Current Baseline | Contiguous Parc | 2015 PDPA | |
|---|---|---|---|---|---|---|---|---|---|---|
| Class 1 | Restoration | Upper Village 1 | 19'x19' | 361 | 361 | N/A | 8 | 0 | 8 | |
| Class 1 | Restoration | Upper Village 2 | 19'x19' | 361 | 361 | N/A | 8 | 0 | 8 | |
| Class 1 | Restoration | Upper Village 3 | 19'x19' | 361 | 361 | N/A | 8 | 0 | 8 | |
| Class 1 | Restoration | Upper Village 4 | 19'x19' | 361 | 361 | N/A | 8 | 0 | 8 | |
| Class 1 | Restoration | Upper Village 5 | 19'x19' | 361 | 361 | N/A | 8 | 0 | 8 | |
| Class 1 | Restoration | Upper Village 6 | 19'x19' | 361 | 361 | N/A | 8 | 0 | 8 | |
| Class 1 | Restoration | Upper Village 7 | 19'x19' | 361 | 361 | N/A | 8 | 0 | 8 | |
| Class 1 | Restoration | Lower Village 1 | 13'x15' | 195 | 195 | N/A | 8 | 0 | 8 | |
| Class 1 | Restoration | Lower Village 2 | 13'x15' | 195 | 195 | N/A | 8 | 0 | 8 | |
| Class 1 | Restoration | Lower Village 3 | 13'x15' | 195 | 195 | N/A | 8 | 0 | 8 | |
| Class 1 | Restoration | Lower Village 4 | 13'x15' | 195 | 195 | N/A | 8 | 0 | 8 | |
| Class 1 | Restoration | Lower Village 5 | 13'x15' | 195 | 195 | N/A | 8 | 0 | 8 | |
| Class 1 | Restoration | Lower Village 6 | 13'x15' | 195 | 195 | N/A | 8 | 0 | 8 | |
| Class 1 | Restoration | Lower Village 7 | 13'x15' | 195 | 195 | N/A | 8 | 0 | 8 | |
| N/A | No change | Eden | Varies | 412 | 412 | N/A | 8 | 0 | 4 | |
| Class 1 | No change | Breezeway | Varies | 363 | 363 | N/A | 8 | 0 | 8 | |
| Class 1 | Addition | Pines | 23'x31' | 707 | 797 | 13% | 8 | 0 | 8 | |
| N/A | No change | Hillside 1 | Varies | 1800 | 1800 | 0% | 0 | 6 | 6 | |
| N/A | No change | Hillside 2 | Varies | 1800 | 1800 | 0% | 0 | 6 | 6 | |
| Class 1 | Restoration | Wrangler | Varies | 1850 | 1850 | N/A | 0 | 6 | 6 | |
| Class 2 | Replaced | Convent | Varies | 1850 | 1850 | 0% | 0 | 6 | 6 | |
| Class 1 | Restoration | Ranch House | Varies | 1600 | 1600 | 0% | 6 | 0 | 6 | |
| Class 1 | Addition | Cottonwoods | Varies | 2092 | 2690 | 29% | 32 | 0 | 32 | |
| Class 1 | Addition | Dogwoods | Varies | 2092 | 2690 | 29% | 32 | 0 | 32 | |
| Class 1 | Addition | Ponderosa | Varies | 1664 | 1872 | 13% | 28 | 0 | 28 | |
| Class 1 | Addition | Evergreens | Varies | 1664 | 1872 | 13% | 28 | 0 | 28 | |
| Class 1 | Addition | Redwoods | Varies | 1664 | 1872 | 13% | 28 | 0 | 28 | |
| Class 2 | Replaced | Manor House | Varies | 4205 | 3580 | -15% | 24 | 0 | 24 | |
| Class 1 | Addition | Hemlocks | 20'x40' | 800 | 1030 | 29% | 20 | 0 | 16 | |
| Class 1 | Addition | Birches | 20'x40' | 800 | 1030 | 29% | 20 | 0 | 16 | |
| Class 1 | Addition | Maples | 20'x40' | 800 | 1030 | 29% | 20 | 0 | 16 | |
| Class 1 | Addition | Madrones | 20'x40' | 800 | 1030 | 29% | 20 | 0 | 16 | |
| Class 1 | Addition | Willows | 20'x40' | 800 | 1030 | 29% | 20 | 0 | 16 | |
| Class 1 | Restoration | Alders | 23'x31' | 707 | 707 | 0% | 8 | 0 | 8 | |
| Class 1 | Addition | Firs | 23'x31' | 707 | 797 | 13% | 8 | 0 | 4 | |
| Class 1 | Addition | Oaks | 23'x31' | 707 | 797 | 13% | 8 | 0 | 8 | |
| Class 1 | Addition | Cedars | 23'x31' | 707 | 797 | 13% | 8 | 0 | 8 | |
| Class 1 | Replaced | Woodlands | Varies | 2302 | 2302 | 0% | 0 | 6 | 6 | |
| Class 2 | Replaced | Ritz | Varies | 2456 | 2456 | 0% | 0 | 6 | 28 | |
| Class 2 | Replaced | Green Bean | Varies | 2593 | 2400 | -7% | 0 | 6 | 6 | |
| | | TOTALS | | 41834 | 44346 | | 446 | 42 | 482 | |
| | | PERCENTAGE INCREASE | | | 6% | | | | | |

Attachment C4




N

SCALE: 1"=200'

LEGEND

PAVED ROAD

GRAVEL ROAD

PEDESTRIAN ACCESS

SAVED: 10/16/2015 3:27 PM WBOND, PLOTTED: 10/16/2015 3:29 PM WILLIAM BOND
\\REDDING\PROJECTS\2009\509051-JHRANCH\PLANNING\DWGS\509051-DEVELOPMENTPLAN.DWG

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

SHN CONSULTING ENGINEERS & GEOLOGISTS, INC.
812 W. Wabash Ave. Eureka, CA 95501
(707)441-8855 FAX (707)441-8877

| NO. | DATE | REVISION | BY |
|---|---|---|---|
| 1 | 2/24/15 | | MSC |

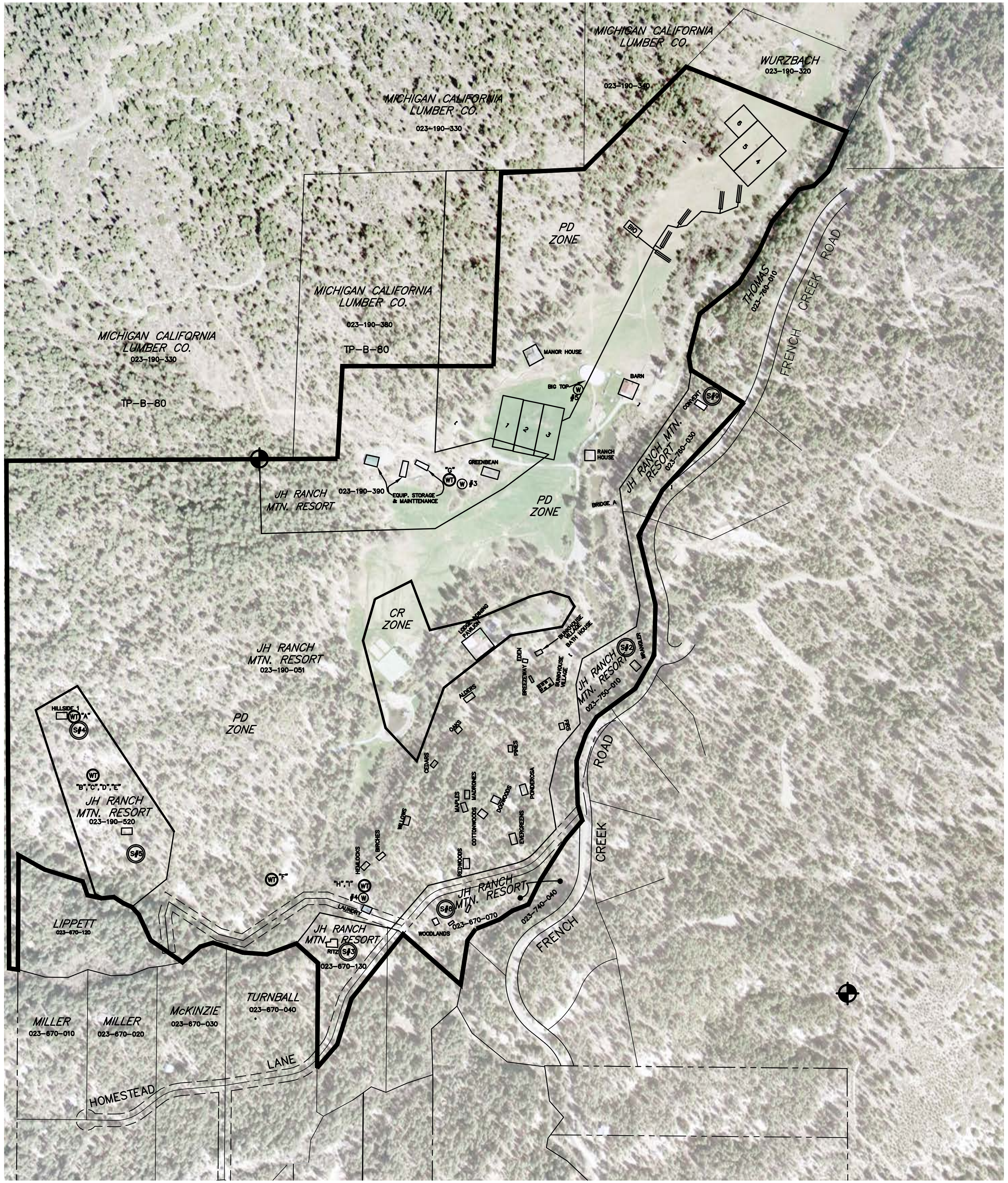
DSGN DAR
DR DAR
CHK MSC
APVD

JH RANCH MOUNTAIN RESORT
ETNA, CALIFORNIA

# JH RANCH CIRCULATION PLAN

DRAWING C-4
SHT 4 OF 4
DATE 1/2011
PROJ. NO. 509051

Attachment C5




## LEGEND

SCALE: 1"=200'

| | |
|---|---|
| W #_ | WELL |
| WT "A" | WATER TANK |
| BIO | BIO-REACTOR |
| | LEACH FIELD |
| S#_ | SEPTIC SYSTEM (SEPTIC TANK & LEACHFIELD) |

## EXISTING POTABLE WATER SYSTEM

**WELL LOCATION AND CAPACITY**

| | | |
|---|---|---|
| #3 | GREEN BEAN | 20 GPM |
| #4 | NEAR LAUNDRY | 45 GPM (PRIMARY WELL) |
| #5 | BIG TOP | 45 GPM |

**WATER TANK DESIGNATION, STORAGE CAPACITY & TYPE**

"A" – 12,000 GAL. (ABOVE GROUND)
"B" – 5,000 GAL. (ABOVE GROUND)
"C" – 5,000 GAL. (ABOVE GROUND)
"D" – 5,000 GAL. (ABOVE GROUND)
"E" – 5,000 GAL. (ABOVE GROUND)
"F" – 5,000 GAL. (ABOVE GROUND)
"G" – 5,000 GAL. (ABOVE GROUND)
"H" – 1,100 GAL. (UNDERGROUND)
"I" – 1,100 GAL. (UNDERGROUND)

## EXISTING SEWAGE DISPOSAL SYSTEM

**BIO-REACTOR DESCRIPTION**

THE EXISTING BIO-REACTOR ACCEPTS SEWAGE FROM ALL FACILITIES ON THE JH RANCH, EXCEPT THOSE INDICATED BELOW THAT ARE ON INDIVIDUAL SEPTIC DISPOSAL SYSTEMS. (SEPTIC TANK WITH LEACHFIELD)

EFFLUENT FROM THE BIO-REACTOR IS DISPOSED OF THROUGH THE LEACH FIELDS INDICATED HEREON.

**SEPTIC SYSTEMS**

THE FOLLOWING STRUCTURES ARE SERVED BY SEPTIC SYSTEMS AND ARE NOT CONNECTED TO THE BIO-REACTOR TREATMENT SYSTEM.

- WRANGLER (SEPTIC SYSTEM S# 2)
- RITZ (SEPTIC SYSTEM S# 3)
- HILLSIDE 1 & 2 (SEPTIC SYSTEM S# 4 & 5)
- WOODLANDS (SEPTIC SYSTEM S# 8)
- CONVENT (SEPTIC SYSTEM S# 9)

## NOTES

1. THE LOCATIONS AND CAPACITIES OF EXISTING WATER AND SEWER FACILITIES INDICATED HEREON IS BASED UPON INFORMATION PROVIDED BY JH RANCH.
2. THE LOCATION AND SIZES OF THE EXISTING WATER DISTRIBUTION AND SEWAGE COLLECTION SYSTEMS ARE UNKNOWN.

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

SHN CONSULTING ENGINEERS & GEOLOGISTS, INC.
812 W. Wabash Ave. Eureka, CA 95501 (707)441-8855 FAX (707)441-8877

| NO. | DATE | REVISION | BY |
|---|---|---|---|
| 1 | 2/24/15 | | MSC |

DSGN DAR
DR DAR
CHK MSC
APVD

JH RANCH MOUNTAIN RESORT
ETNA, CALIFORNIA
**JH RANCH**
**EXISTING UTILITIES PLAN**

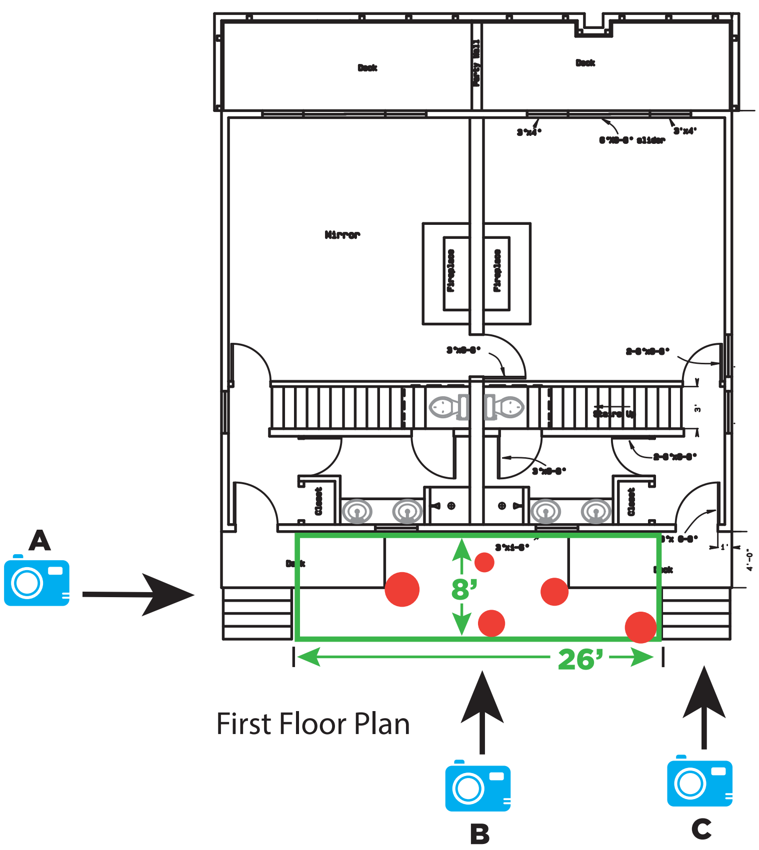
DRAWING C-5
SHT 5 OF 5
DATE 7/2011
PROJ. NO. 509051

SAVED: 10/20/2015 11:01 AM ESCHNEIDER, PLOTTED: 10/20/2015 11:15 AM ERIC SCHNEIDER
\\REDDING\PROJECTS\2009\509051-JHRANCH\PLANNING\DWGS\509051-UTILITY PLAN - COPY.DWG

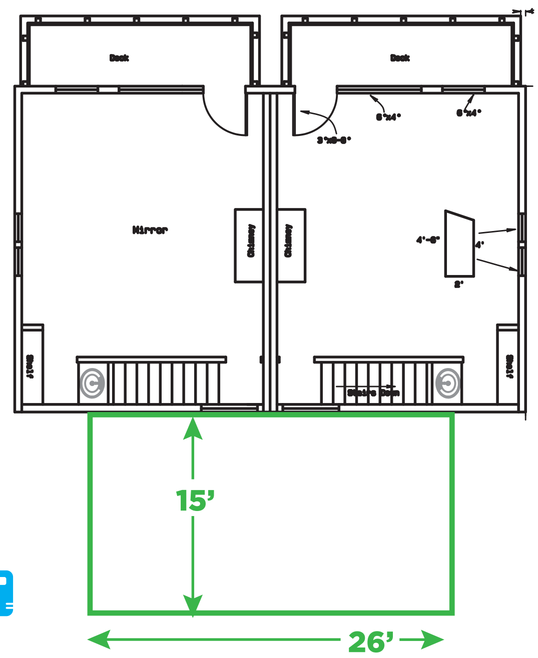
Attachment D1

# SHEET D-1
# COTTONWOODS

Existing Sq Ft: 2092
Proposed Renovation Sq Ft: 2690
Increase Sq Ft: 598
Potential tree removal: 5




First Floor Plan




Second Floor Plan

A

B

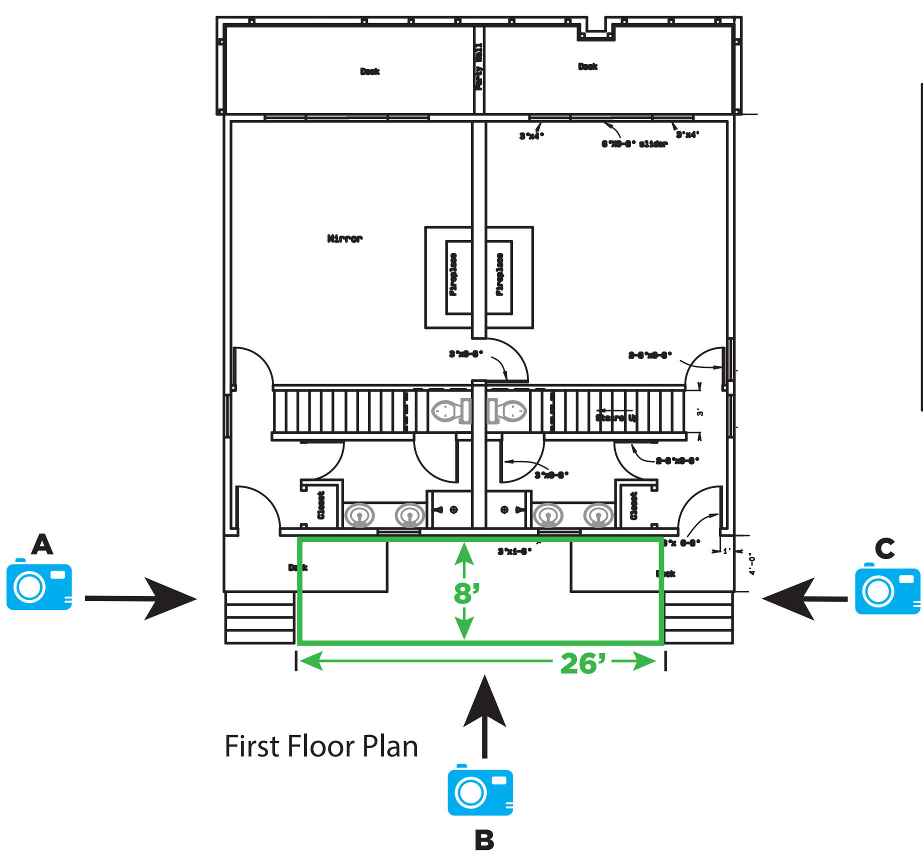
C

D

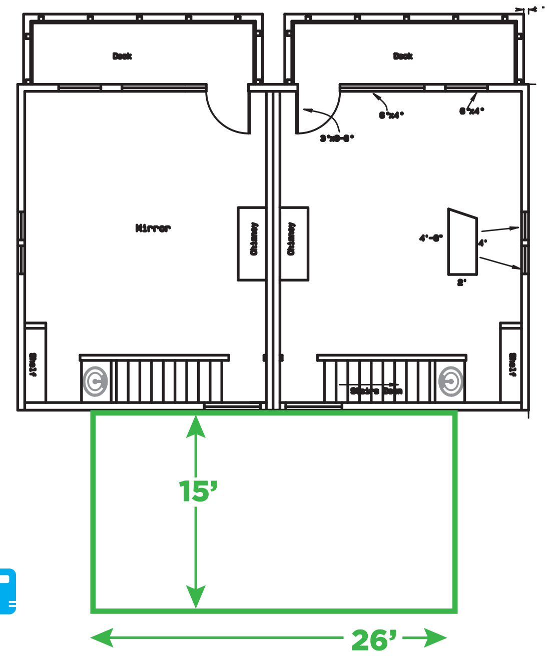
Attachment D2

# SHEET D-2
# DOGWOODS

Existing Sq Ft: 2092
Proposed Renovation Sq Ft: 2690
Increase Sq Ft: 598
Potential tree removal: 0




First Floor Plan




Second Floor Plan

A

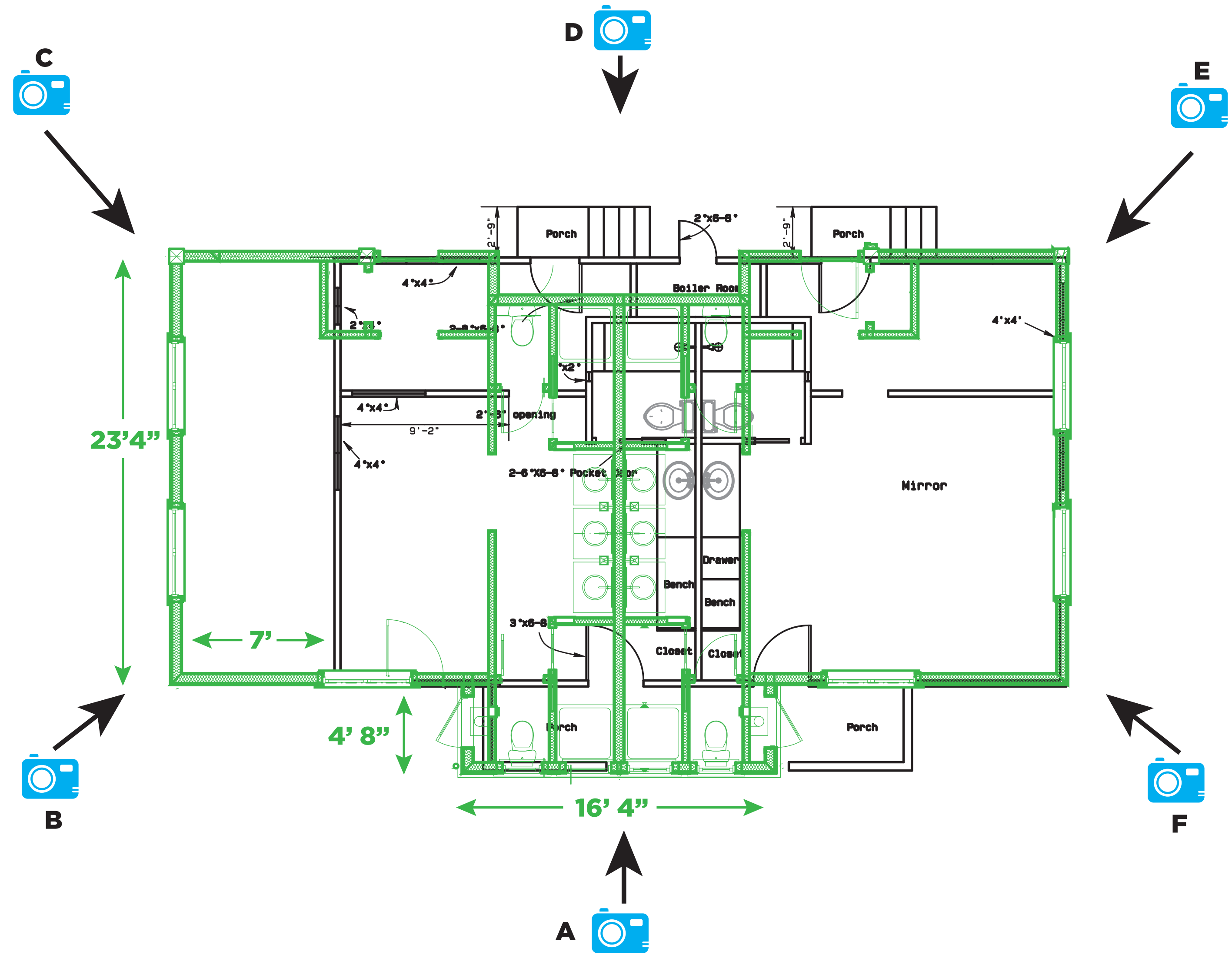
B

C

Attachment D3

# SHEET D-3
# MADRONES

Existing Sq Ft: 800
Proposed Renovation Sq Ft: 1030
Increase Sq Ft: 230
Potential tree removal: 0



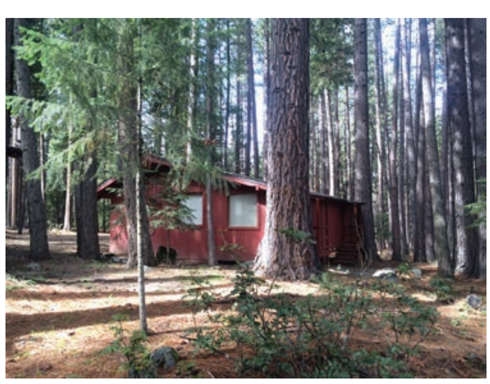


A


B


C


D

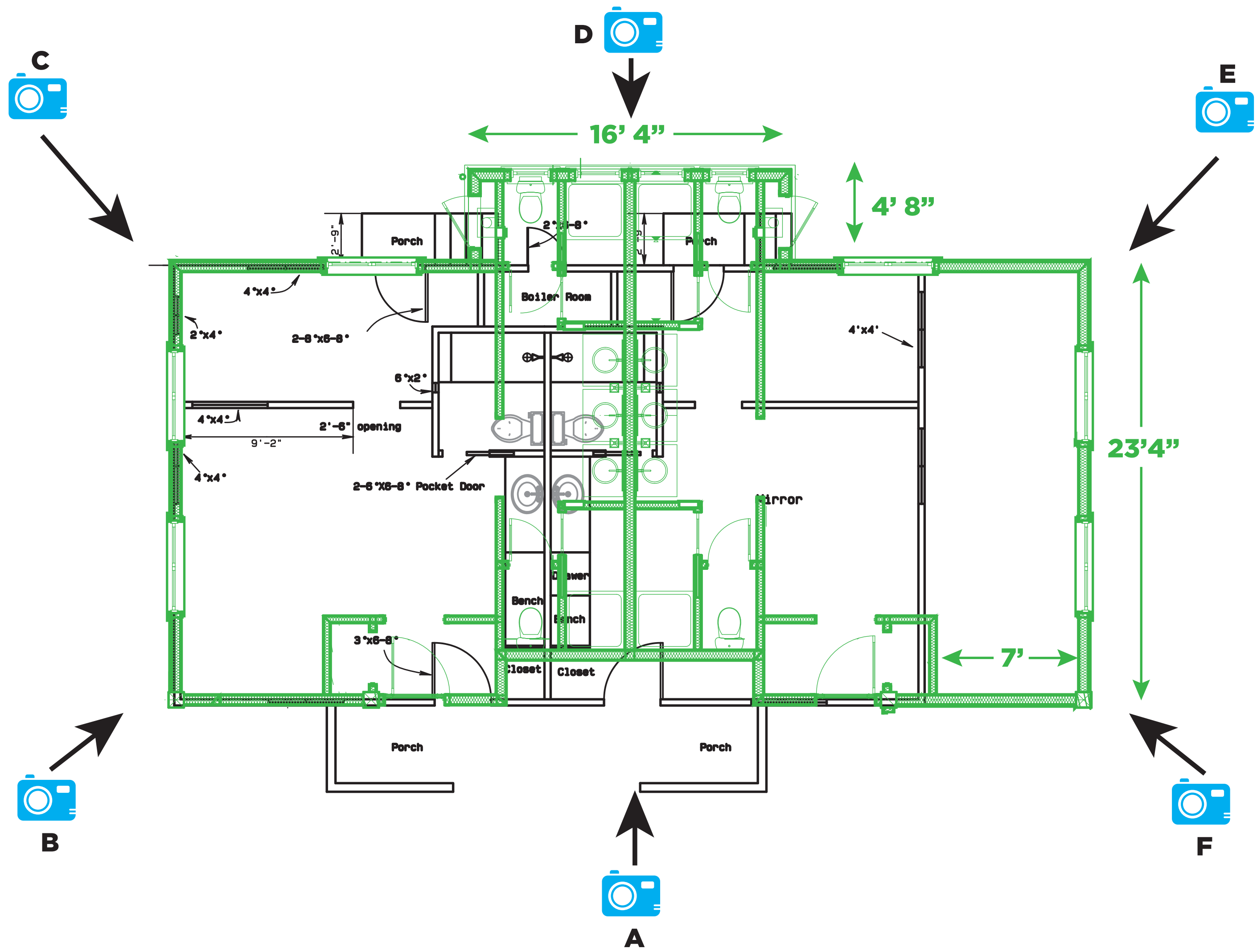

E


F

Attachment D4

# SHEET D-4
# MAPLES

Existing Sq Ft: 800
Proposed Renovation Sq Ft: 1030
Increase Sq Ft: 230
Potential tree removal: 0





A


B


C


D

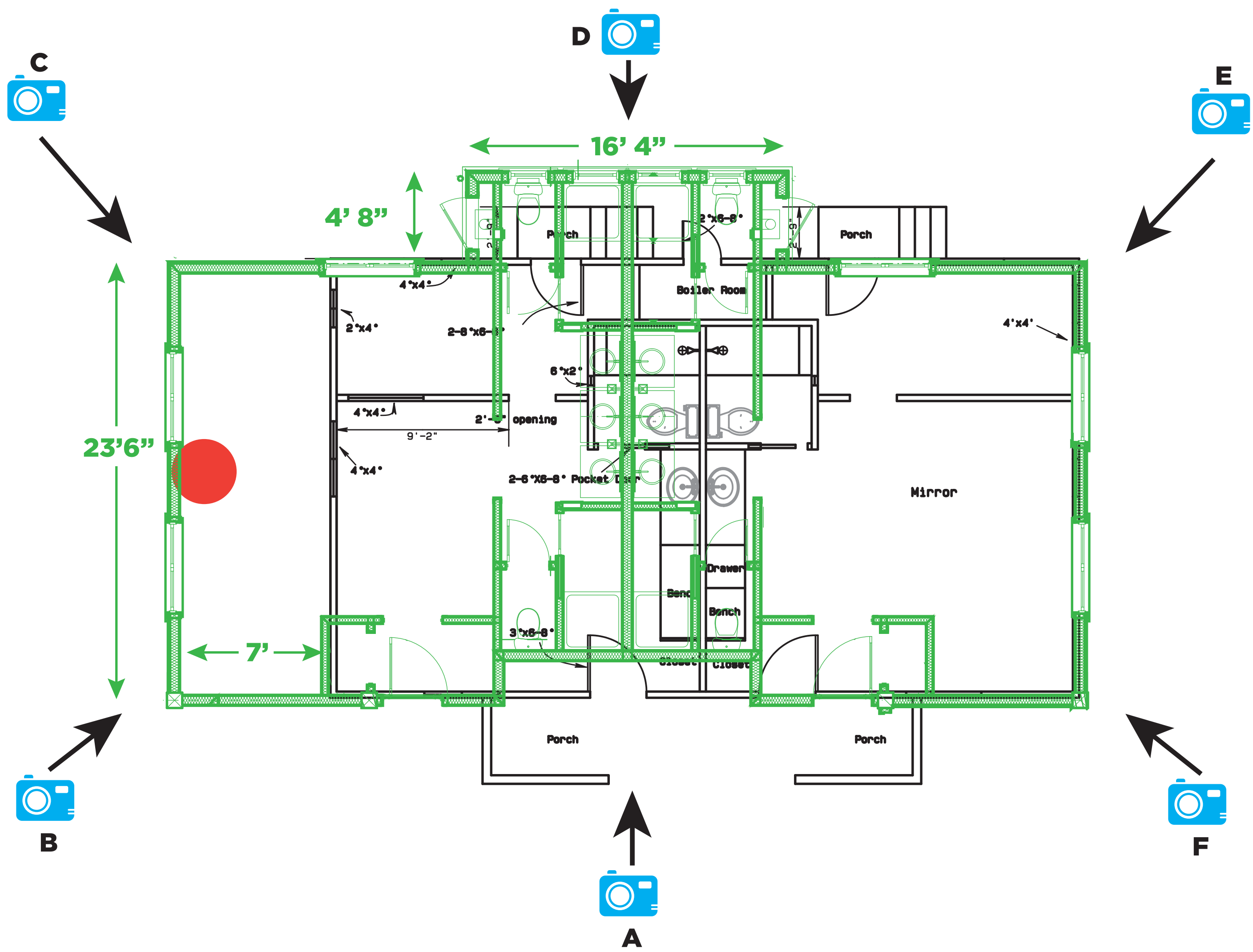

E


F

Attachment D5

# SHEET D-5
# HEMLOCKS

Existing Sq Ft: 800
Proposed Renovation Sq Ft: 1030
Increase Sq Ft: 230
● Potential tree removal: 1




A

B

C

D

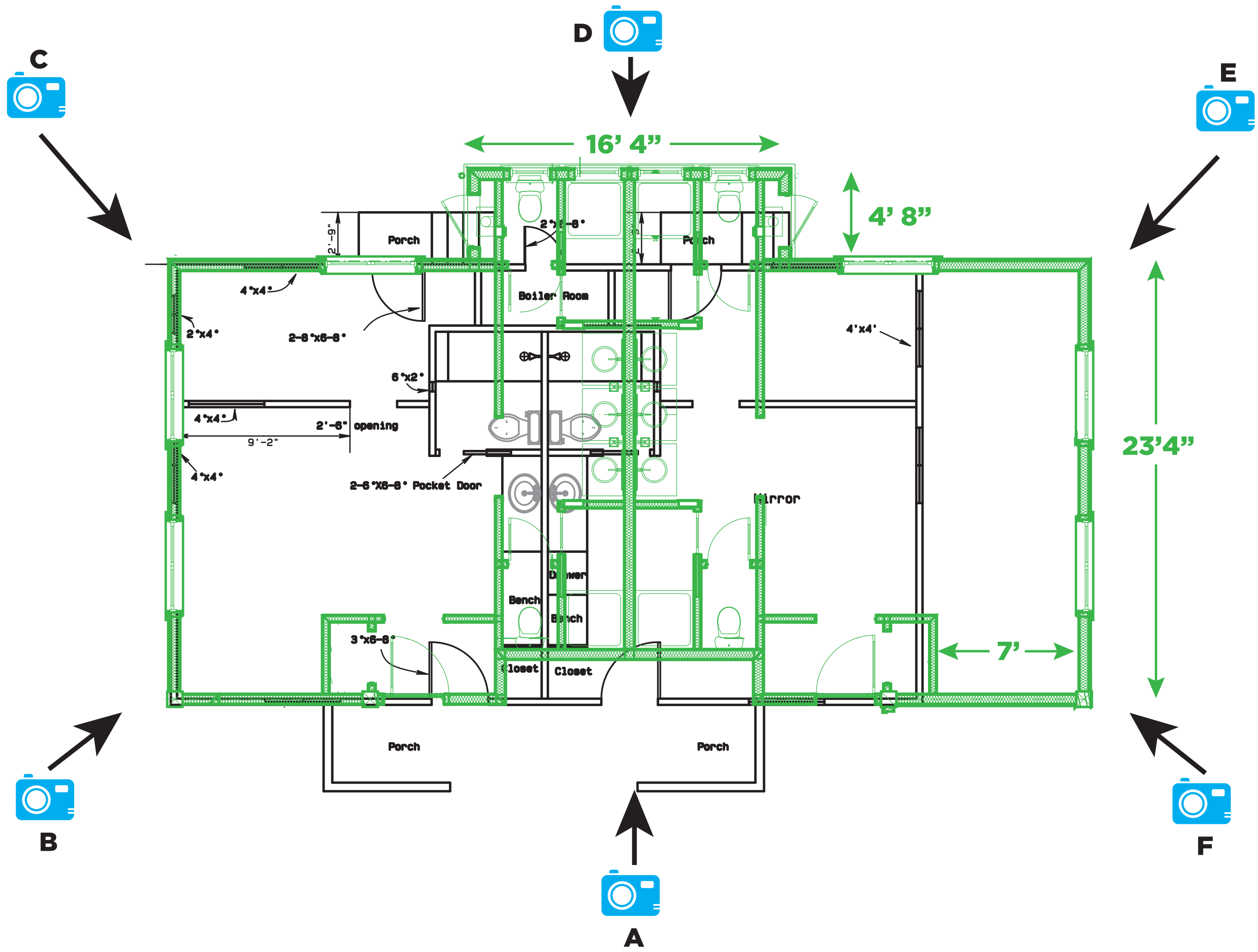
E

F

Attachment D6

# SHEET D-6
# BIRCHES

Existing Sq Ft: 800
Proposed Renovation Sq Ft: 1030
Increase Sq Ft: 230
Potential tree removal: 0





A


B


C


D

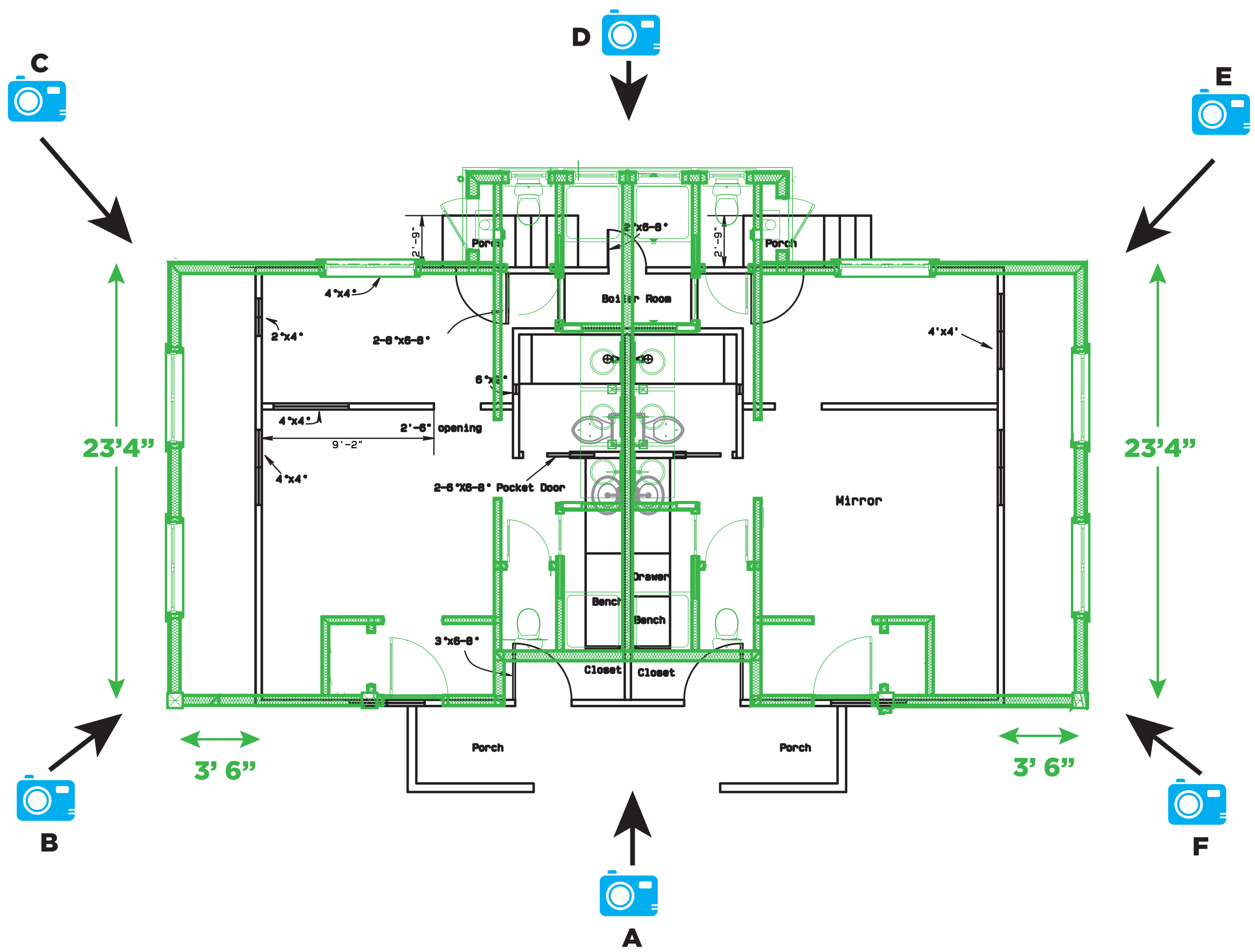

E


F

Attachment D7

# SHEET D-7
# WILLOWS

Existing Sq Ft: 800
Proposed Renovation Sq Ft: 1030
Increase Sq Ft: 230
Potential tree removal: 0




**Rear view not attainable due to terrain**

A

B

C

D

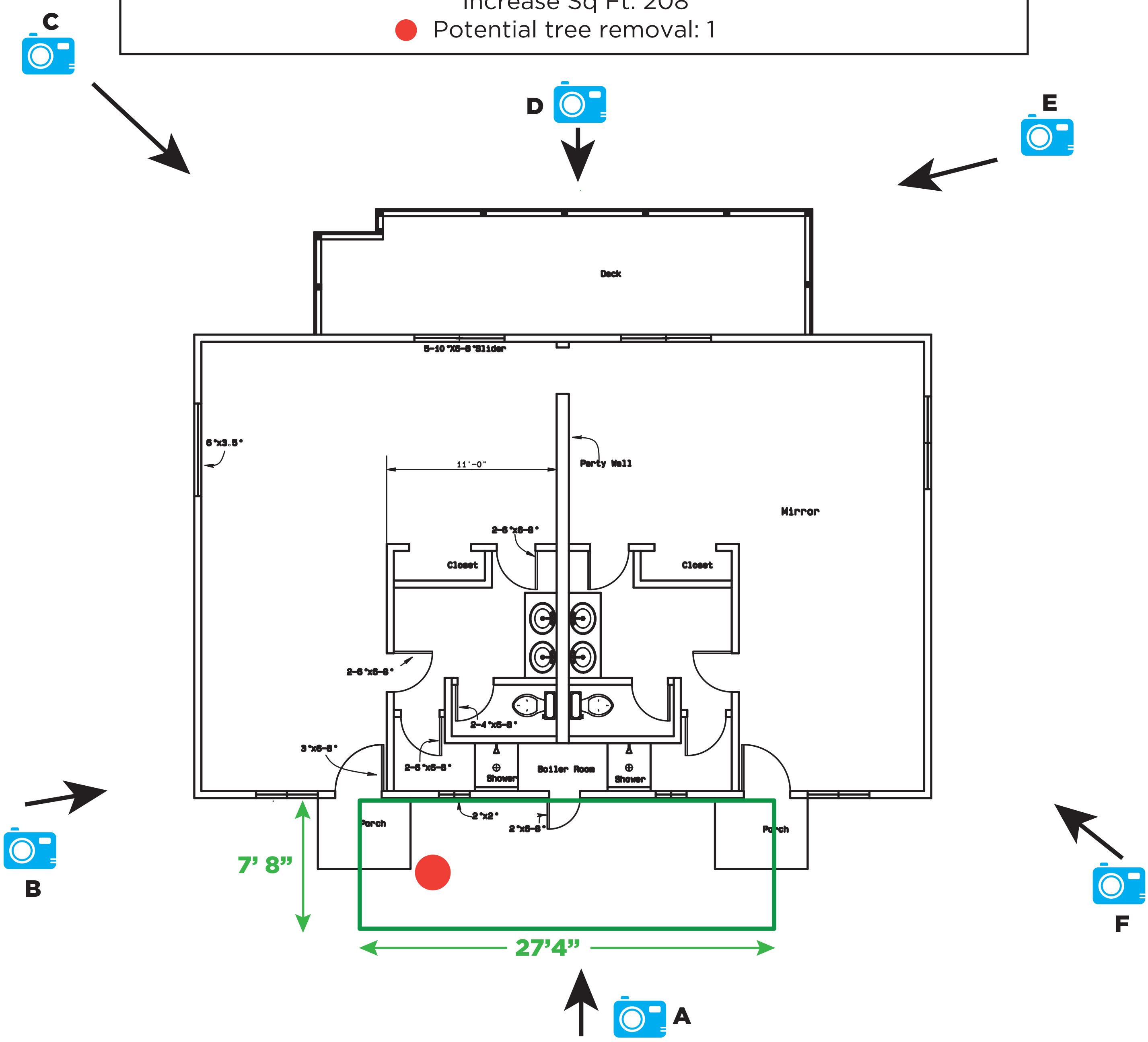
E

F

Attachment D8

# SHEET D-8
# PONDEROSA

Existing Sq Ft: 1664
Proposed Renovation Sq Ft: 1872
Increase Sq Ft: 208
Potential tree removal: 1





A


B


C


D

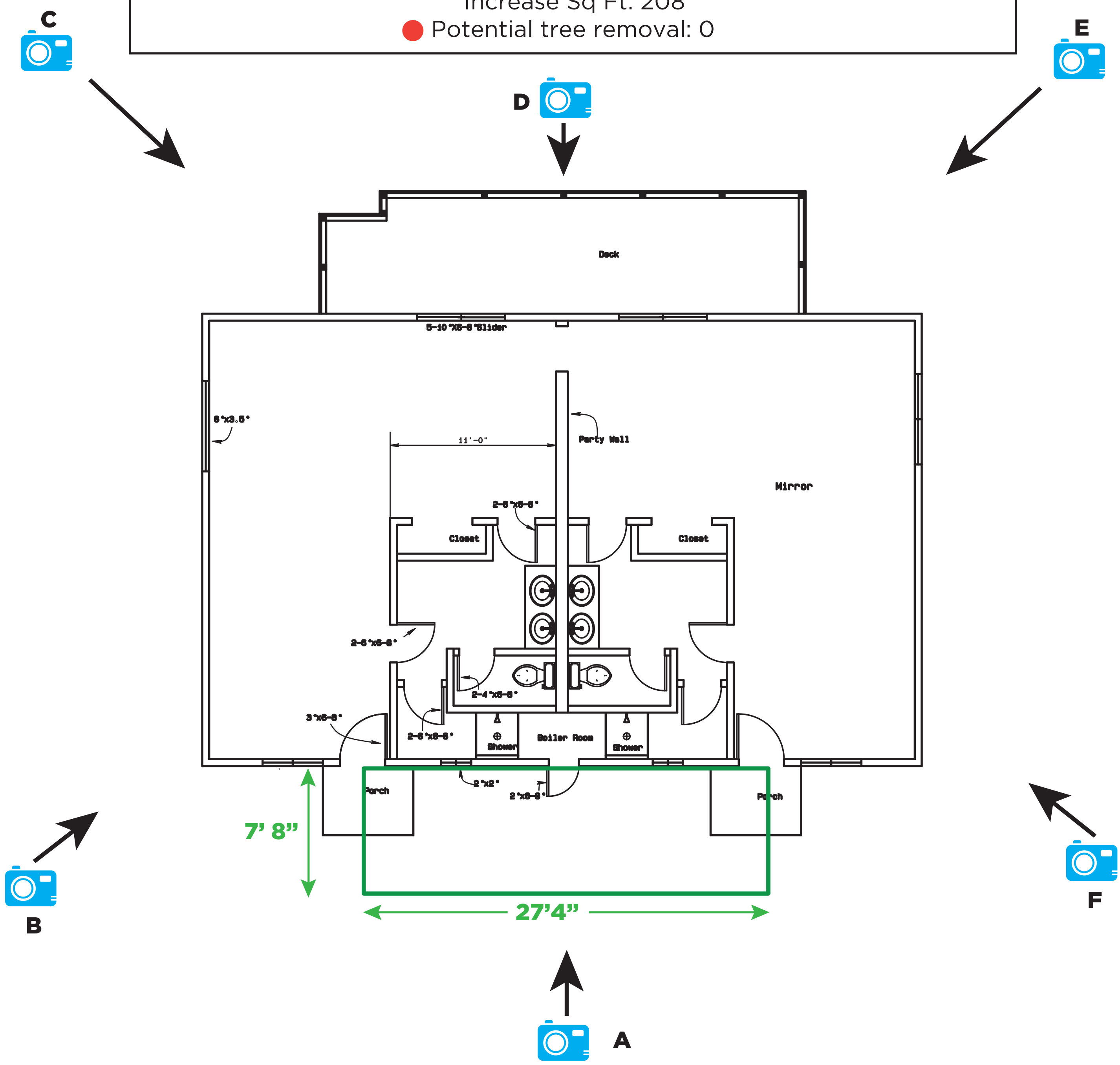

E


F

Attachment D9

# SHEET D-9
# REDWOODS

Existing Sq Ft: 1664
Proposed Renovation Sq Ft: 1872
Increase Sq Ft: 208
Potential tree removal: 0




A

B

C

D

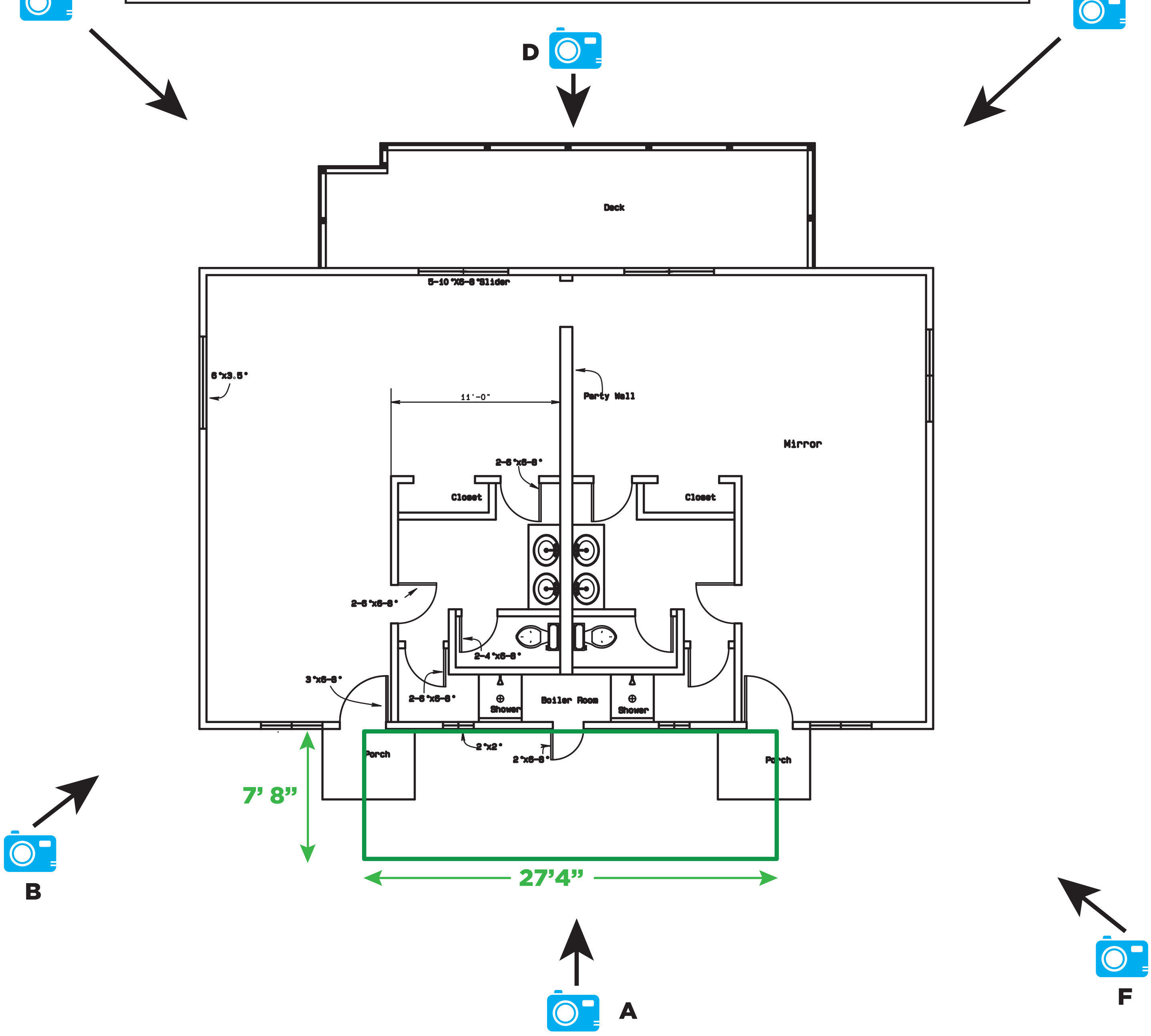
E

F

Attachment D10

# SHEET D-10
# EVERGREENS

Existing Sq Ft: 1664
Proposed Renovation Sq Ft: 1872
Increase Sq Ft: 208
Potential tree removal: 0




A

B

C

**Rear view not attainable due to terrain**

D

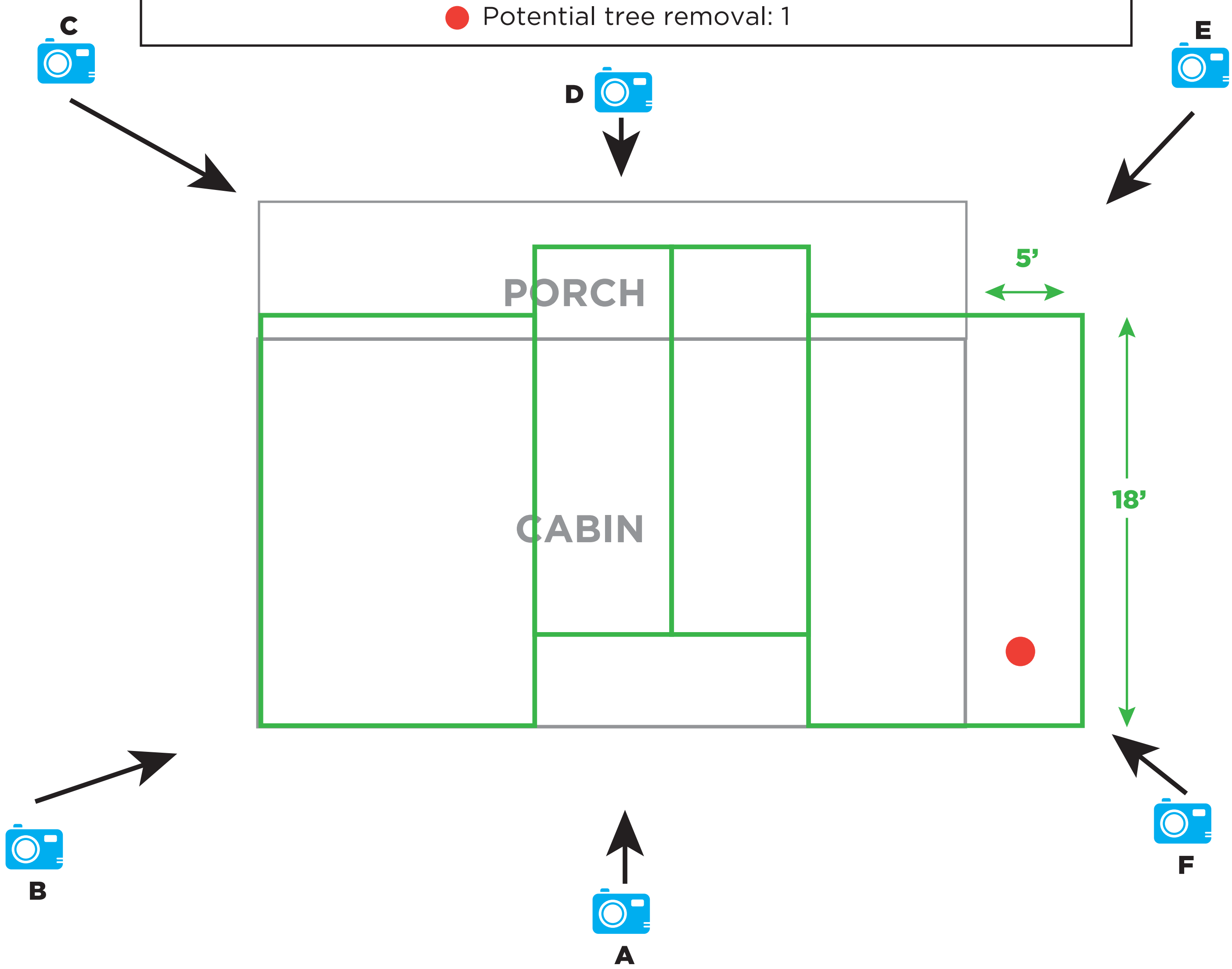
E

F

Attachment D11

# SHEET D-11
# CEDARS

Existing Sq Ft: 707
Proposed Renovation Sq Ft: 797
Increase Sq Ft: 90
● Potential tree removal: 1




A

B

C

D

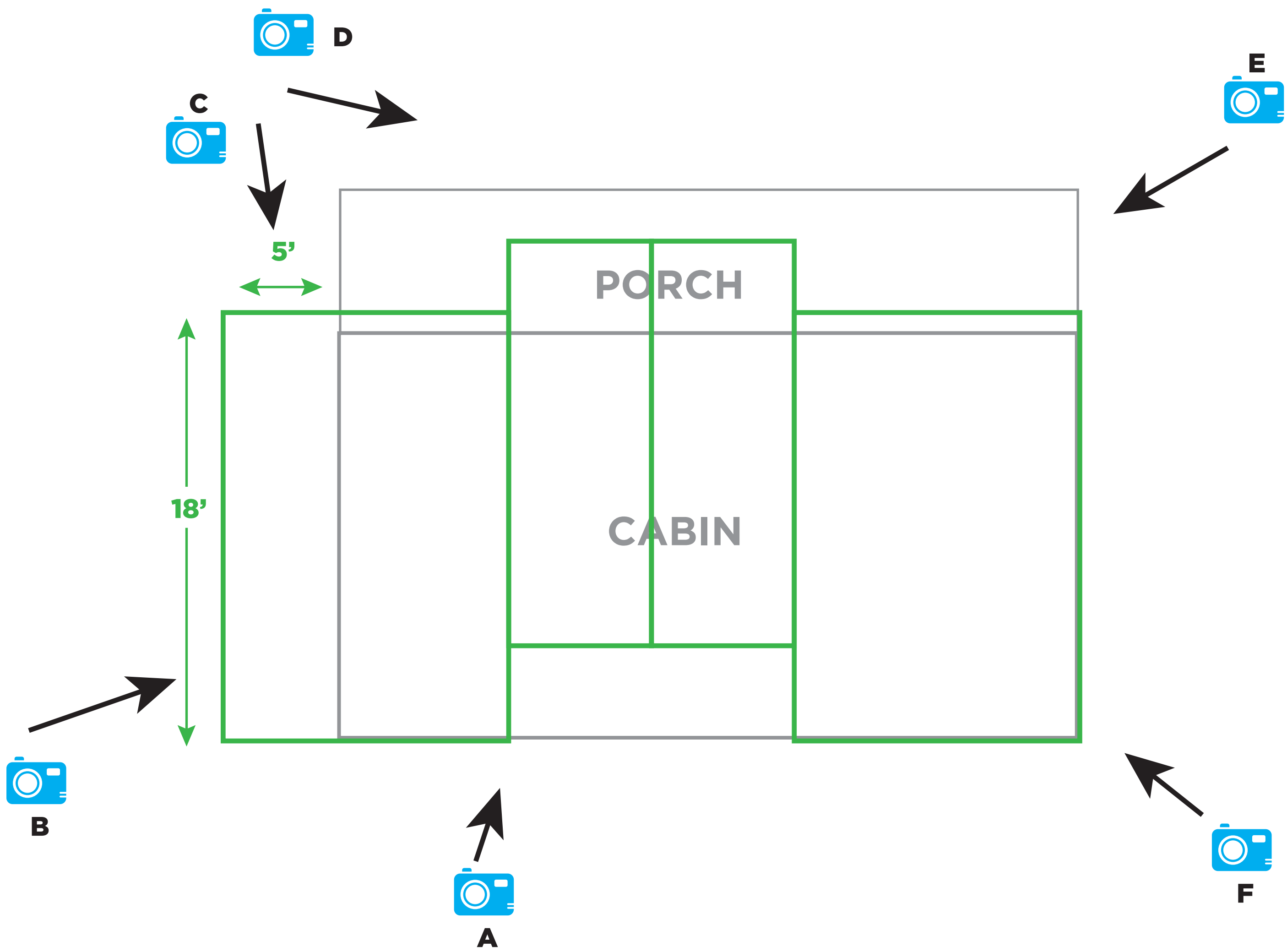
E

F

Attachment D12

# SHEET D-12
# OAKS

Existing Sq Ft: 707
Proposed Renovation Sq Ft: 797
Increase Sq Ft: 90
Potential tree removal: 0




A

B

C

D

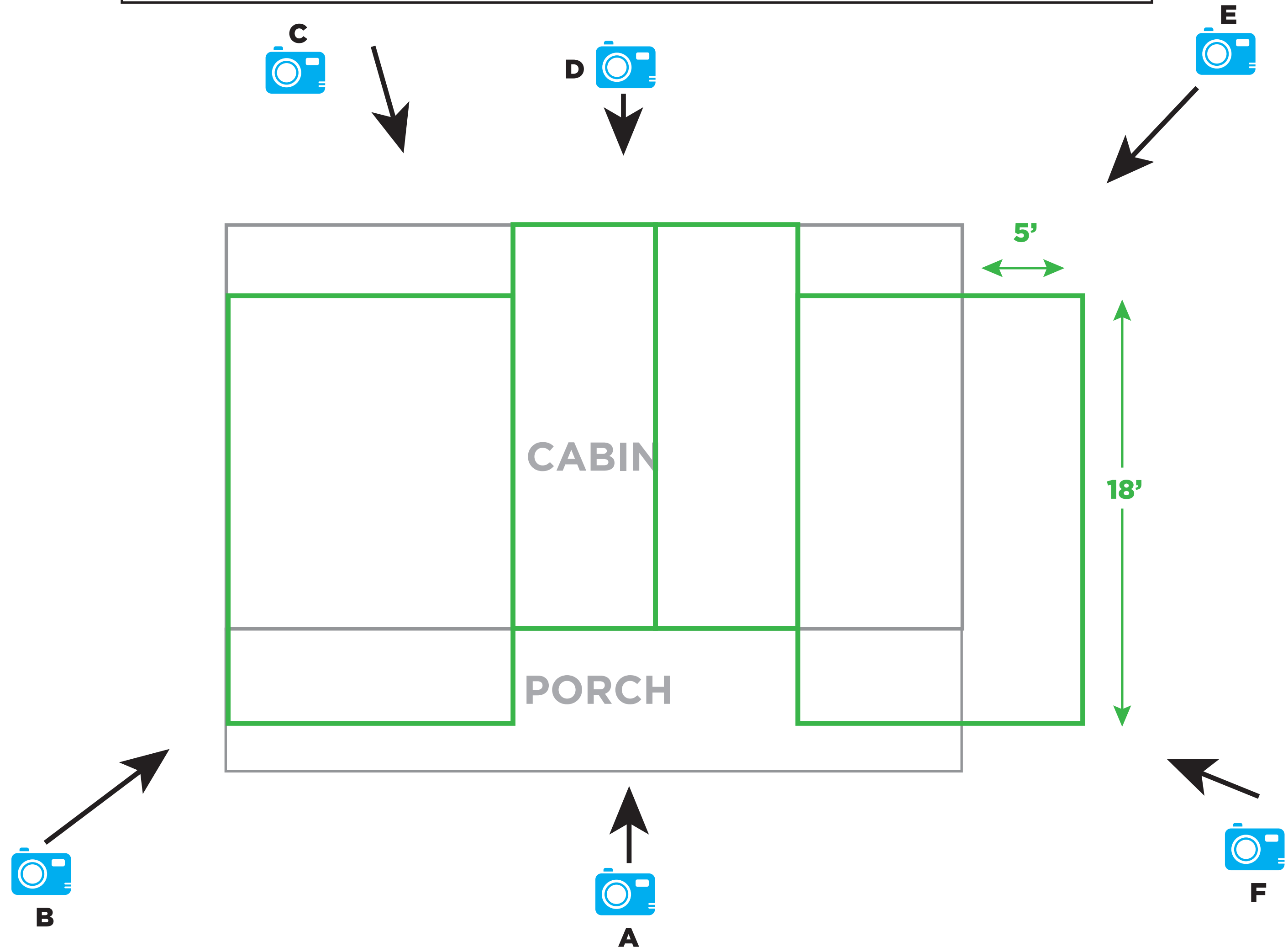
E

F

Attachment D13

# SHEET D-13
# FIRS

Existing Sq Ft: 707
Proposed Renovation Sq Ft: 797
Increase Sq Ft: 90
Potential tree removal: 0




A

B

C

D

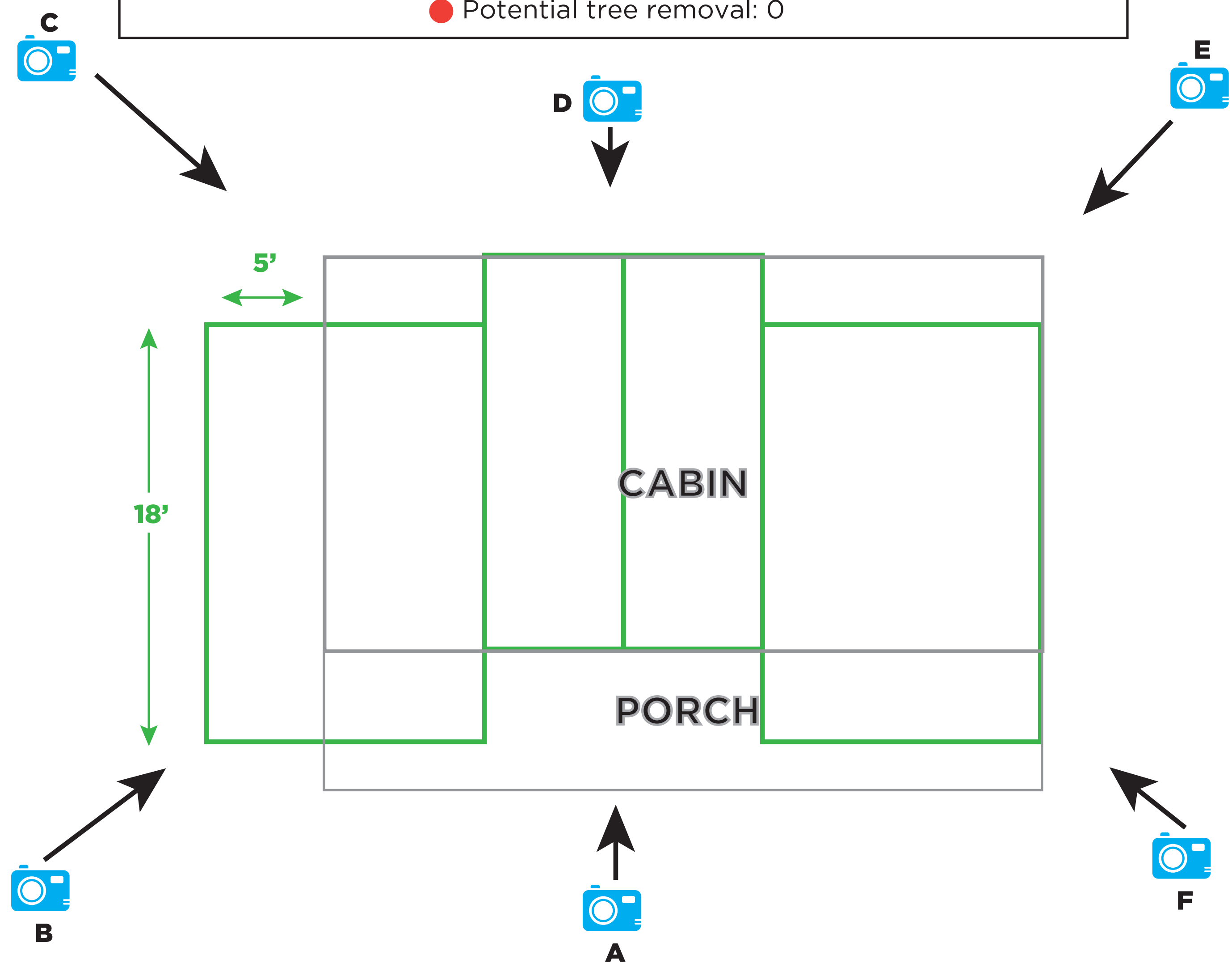
E

F

Attachment D14

# SHEET D-14
# PINES

Existing Sq Ft: 707
Proposed Renovation Sq Ft: 797
Increase Sq Ft: 90
Potential tree removal: 0




A

B

C

D

E

F