Appendix A

Air Quality & Greenhouse Gas Impact Assessment

AIR QUALITY & GREENHOUSE GAS IMPACT ANALYSIS

FOR

OAKHURST COMMUNITY COLLEGE CENTER PROJECT

STATE CENTER COMMUNITY COLLEGE DISTRICT

OAKHURST, CA

MARCH 2020

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LIST OF COMMON TERMS & ACRONYMS

AAM	Annual Arithmetic Mean
AHERA	Asbestos Hazard Emergency Response Act
ASHAA	Asbestos School Hazard Abatement Act
ASHARA	Asbestos School Hazard Abatement and Reauthorization Act
ATCM	Airborne Toxic Control Measure
CAAQS	California Ambient Air Quality Standards
ARB	California Air Resources Board
CCAA	California Clean Air Act
CCAR	California Climate Action Registry
CEQA	California Environmental Quality Act
CH_4	Methane
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CO_2e	Carbon Dioxide Equivalent
DPM	Diesel-Exhaust Particulate Matter or Diesel-Exhaust PM
DRRP	Diesel Risk Reduction Plan
FCAA	Federal Clean Air Act
GHG	Greenhouse Gases
HAP	Hazardous Air Pollutant
IPCC	Intergovernmental Panel on Climate Change
LOS	Level of Service
N_2O	Nitrous Oxide
NAAQS	National Ambient Air Quality Standards
NESHAPs	National Emission Standards for HAPs
NO_x	Oxides of Nitrogen
O_3	Ozone
Pb	Lead
PM	Particulate Matter
PM_{10}	Particulate Matter (less than 10 µm)
$PM_{2.5}$	Particulate Matter (less than 2.5 µm)
ppb	Parts per Billion
ppm	Parts per Million
ROG	Reactive Organic Gases
SIP	State Implementation Plan
SJVAB	San Joaquin Valley Air Basin
SJVAPCD	San Joaquin Valley Air Pollution Control District
SO_2	Sulfur Dioxide
SRTS	Safe Routes to School
TAC	Toxic Air Contaminant
TSCA	Toxic Substances Control Act
µg/m^3	Micrograms per cubic meter
U.S. EPA	United State Environmental Protection Agency

INTRODUCTION

This report describes the existing environment in the project vicinity and identifies potential air quality and greenhouse gas impacts associated with the proposed project. Project impacts are evaluated relative to applicable thresholds of significance. Mitigation measures have been identified for significant impacts.

PROPOSED PROJECT

The proposed State Center Community College District's Oakhurst Community College Center (project) will occupy a site in Liberty Village. Liberty Village development anticipates a range of land uses that are already permitted under the current Madera County CUM, IL, and RUM zoning designations. The proposed project site is on 30 acres located off of Westlake Drive roughly one-quarter mile north of State Route 49 (SR 49). The proposed project regional location site boundaries are depicted in Figure 1 and Figure 2, respectively.

The proposed project includes approximately 28,500 sf feet of building area at completion. The current enrollment of the existing facility located off of Civic Center Drive is 1,030 students, and these students would theoretically be relocated to the new site. The project envisions a maximum enrollment of 1,530 students. Proposed facilities are depicted in Figure 3. Construction of the project is anticipated to begin in 2020 and be completed by spring 2022.

AIR QUALITY

EXISTING SETTING

The project is located within the San Joaquin Valley Air Basin (SJVAB). The SJVAB is within the jurisdiction of the San Joaquin Valley Air Pollution Control District (SJVAPCD). Air quality in the SJVAB is influenced by a variety of factors, including topography, local and regional meteorology. Factors affecting regional and local air quality are discussed below.

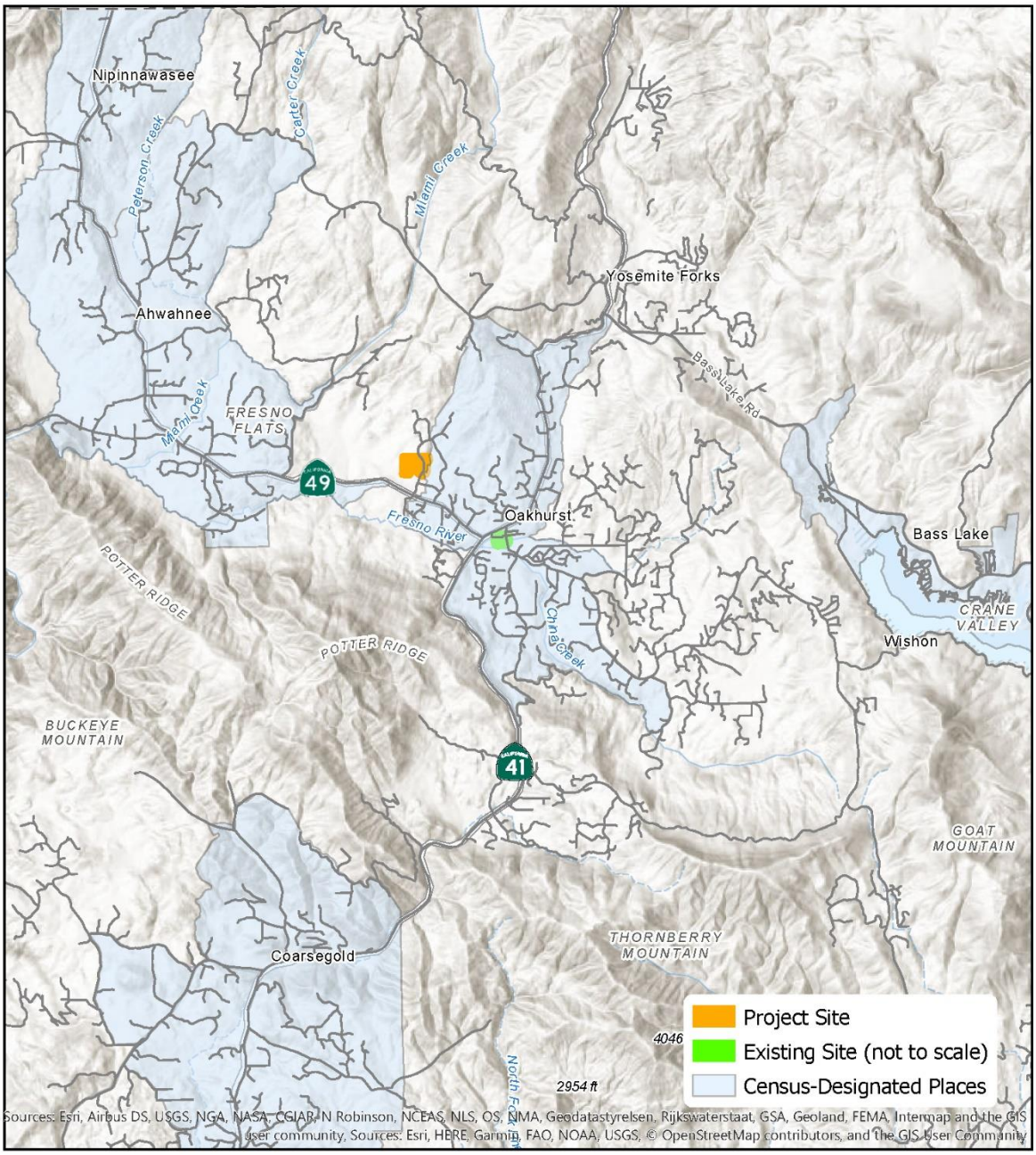
TOPOGRAPHY, METEOROLOGY, AND POLLUTANT DISPERSION

The dispersion of air pollution in an area is determined by such natural factors as topography, meteorology, and climate, coupled with atmospheric stability conditions and the presence of inversions. The factors affecting the dispersion of air pollution with respect to the SJVAB are discussed below.

Topography

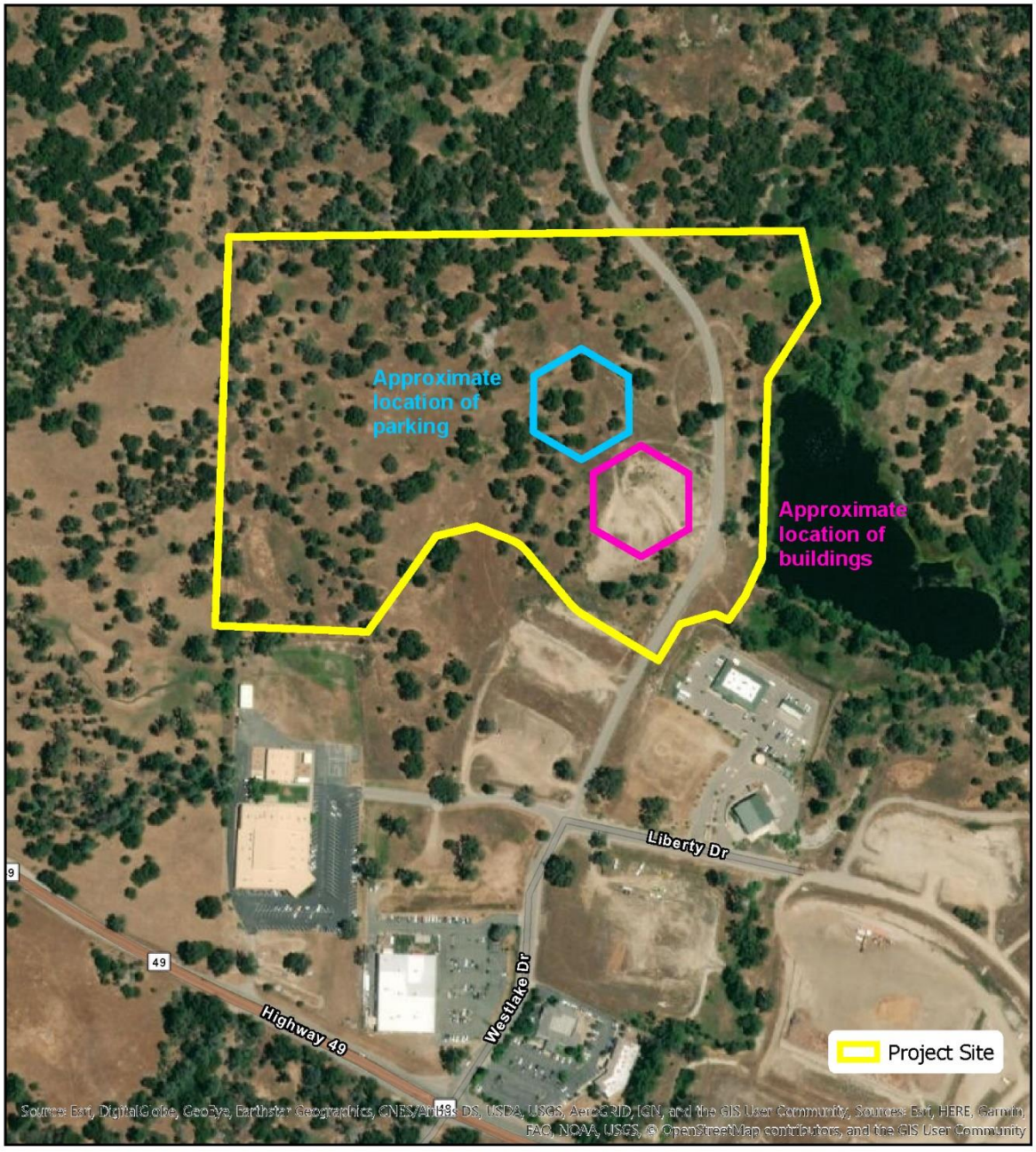
The SJVAB occupies the southern half of the Central Valley. The SJVAB is open to the north, and is surrounded by mountain ranges on all other sides. The Coast Ranges, which have an average elevation of 3,000 feet, are along on the western boundary of the SJVAB, while the Sierra Nevada Mountains (8,000 to 14,000 feet in elevation) are along the eastern border. The San Emigdio Mountains, which are part of the Coast Ranges, and the Tehachapi Mountains, which are part of the Sierra Nevada, form the southern boundary, and have an elevation of 6,000 to 8,000 feet. The SJVAB is mostly flat with a downward gradient in terrain to the northwest.

Figure 1
Proposed Project Regional Location



Source: OPR 2019

Figure 2
Proposed Project Site Boundaries



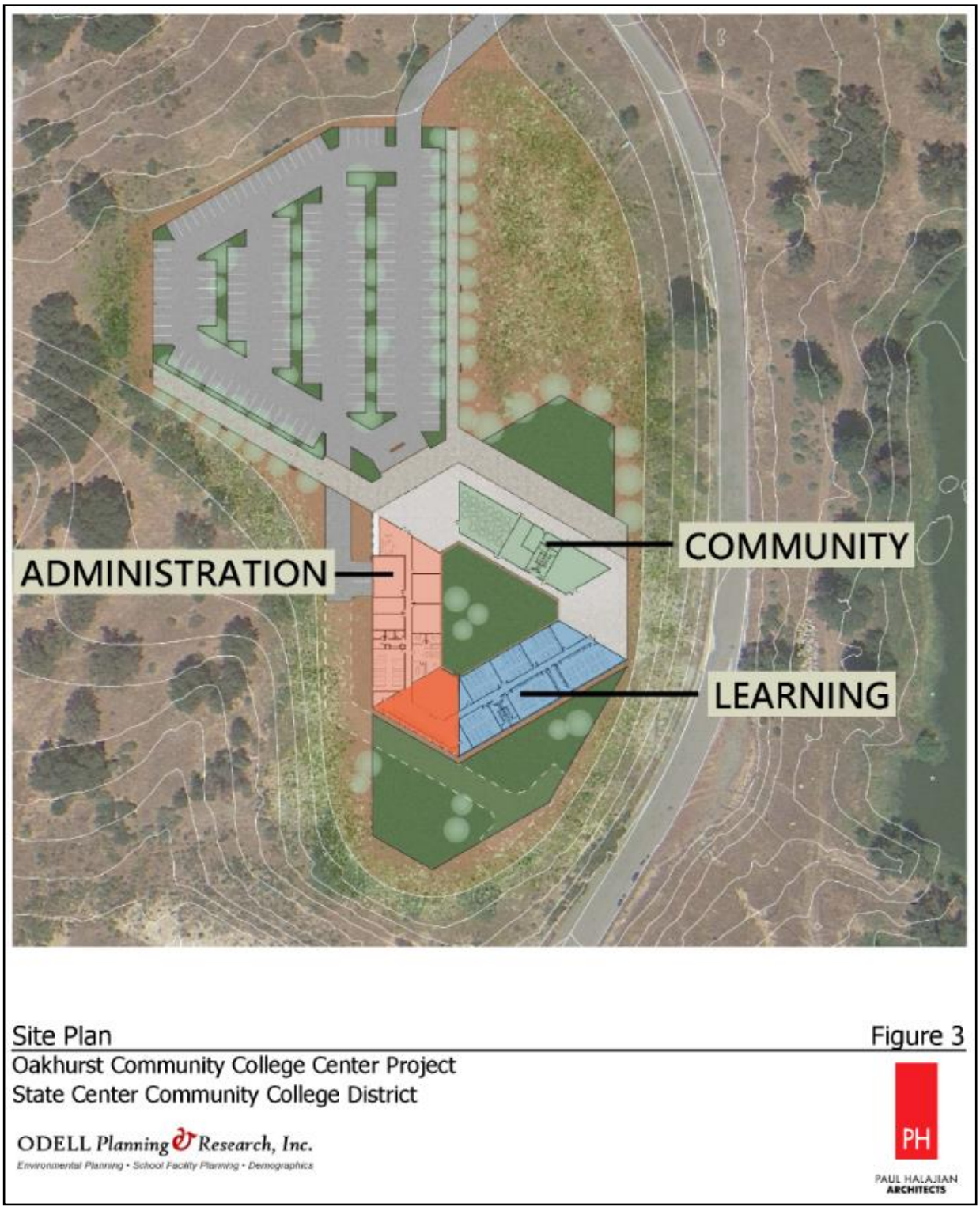
Project Site — Figure 2
Oakhurst Community College Center Project
State Center Community College District

ODELL Planning & Research, Inc.
Environmental Planning • School Facility Planning • Demographics

0 125 250 500 Feet
N

Source: OPR 2019

Figure 3
Proposed Project Site Plan



Source: OPR 2019

Meteorology and Climate

The SJVAB has an inland Mediterranean climate that is strongly influenced by the presence of mountain ranges. The mountain ranges to the west and south induce winter storms from the Pacific Ocean to release precipitation on the western slopes producing a partial rain shadow over the valley. In addition, the mountain ranges block the free circulation of air to the east, trapping stable air in the valley for extended periods during the cooler half of the year.

Winter in the SJVAB is characterized as mild and fairly humid, while the summer is typically hot, dry, and cloudless. The climate is a result of the topography and the strength and location of a semi permanent, subtropical high-pressure cell. During the summer months, the Pacific high-pressure cell is centered over the northeastern Pacific Ocean, resulting in stable meteorological conditions and a steady northwesterly wind flow. Upwelling of cold ocean water from below to the surface as a result of the northwesterly flow produces a band of cold water off the California coast. In winter, the Pacific high-pressure cell weakens and shifts southward, resulting in wind flow offshore, the absence of upwelling, and the occurrence of storms.

The annual temperature, humidity, precipitation, and wind patterns reflect the topography of the SJVAB and the strength and location of the semi permanent, subtropical high-pressure cell. Summer temperatures that often exceed 100 degrees Fahrenheit (°F) and clear sky conditions are favorable to ozone formation. Most of the precipitation in the valley occurs as rainfall during winter storms. The winds and unstable atmospheric conditions associated with the passage of winter storms result in periods of low air pollution and excellent visibility. However, between winter storms, high pressure and light winds lead to the creation of low-level temperature inversions and stable atmospheric conditions, which can result in higher pollutant concentrations. The orientation of the wind flow pattern in the SJVAB is parallel to the valley and mountain ranges. Summer wind conditions promote the transport of ozone and precursors from the San Francisco Bay Area through the Carquinez Strait, a gap in the Coast Ranges, and low-mountain passes such as Altamont Pass and Pacheco Pass. During the summer, predominant wind direction is from the northwest. During the winter, the predominant wind direction is from the southeast. Calm conditions are also predominant during the winter (ARB 1992).

The climate is semi-arid, with an annual normal precipitation of approximately 11 inches. Temperatures in the project area range from an average minimum of approximately 38°F, in January, to an average maximum of 98°F, in July (WRCC 2018).

Atmospheric Stability and Inversions

Stability describes the resistance of the atmosphere to vertical motion. The stability of the atmosphere is dependent on the vertical distribution of temperature with height. Stability categories range from "Extremely Unstable" (Class A), through Neutral (Class D), to "Stable" (Class F). Unstable conditions often occur during daytime hours when solar heating warms the lower atmospheric layers sufficiently. Under Class A stability conditions, large fluctuations in horizontal wind direction occur coupled with large vertical mixing depths. Under Class B stability conditions, wind direction fluctuations and the vertical mixing depth are less pronounced because of a decrease in the amount of solar heating. Under Class C stability conditions, solar heating is weak along with horizontal and vertical fluctuations because of a combination of thermal and mechanical turbulence. Under Class D stability conditions, vertical motions are primarily generated by mechanical turbulence. Under Class E and Class F stability conditions, air pollution emitted into the atmosphere travels downwind with poor dispersion. The dispersive power of the atmosphere decreases with progression through the categories from A to F.

With respect to the SJVAB, Classes D through F are predominant during the late fall and winter because of cool temperatures and entrapment of cold air near the surface. March and August are transition months with equally occurring percentages of Class F and Class A. During the spring months of April and May and the summer months of June and July, Class A is predominant. The fall months of September, October, and November have comparable percentages of Class A and Class F.

An inversion is a layer of warmer air over a layer of cooler air. Inversions influence the mixing depth of the atmosphere, which is the vertical depth available for diluting air pollution near the ground, thus significantly affecting air quality conditions. The SJVAB experiences both surface-based and elevated inversions. The

shallow surface-based inversions are present in the morning but are often broken by daytime heating of the air layers near the ground. The deep elevated inversions occur less frequently than the surface-based inversions but generally result in more severe stagnation. The surface-based inversions occur more frequently in the fall, and the stronger elevated inversions usually occur during December and January.

AIR POLLUTANTS OF CONCERN

Criteria Air Pollutants

For the protection of public health and welfare, the Federal Clean Air Act (FCAA) required that the United States Environmental Protection Agency (U.S. EPA) establish National Ambient Air Quality Standards (NAAQS) for various pollutants. These pollutants are referred to as "criteria" pollutants because the U.S. EPA publishes criteria documents to justify the choice of standards. These standards define the maximum amount of an air pollutant that can be present in ambient air. An ambient air quality standard is generally specified as a concentration averaged over a specific time period, such as one hour, eight hours, 24 hours, or one year. The different averaging times and concentrations are meant to protect against different exposure effects. Standards established for the protection of human health are referred to as primary standards; whereas, standards established for the prevention of environmental and property damage are called secondary standards. The FCAA allows states to adopt additional or more health-protective standards. The air quality regulatory framework and ambient air quality standards are discussed in greater detail later in this report.

The following provides a summary discussion of the primary and secondary criteria air pollutants of primary concern. In general, primary pollutants are directly emitted into the atmosphere, and secondary pollutants are formed by chemical reactions in the atmosphere.

Ozone (O_3) is a reactive gas consisting of three atoms of oxygen. In the troposphere, it is a product of the photochemical process involving the sun's energy. It is a secondary pollutant that is formed when NO_X and volatile organic compounds (VOC) react in the presence of sunlight. Ozone at the earth's surface causes numerous adverse health effects and is a criteria pollutant. It is a major component of smog. In the stratosphere, ozone exists naturally and shields Earth from harmful incoming ultraviolet radiation.

High concentrations of ground level ozone can adversely affect the human respiratory system and aggravate cardiovascular disease and many respiratory ailments. Ozone also damages natural ecosystems such as forests and foothill communities, agricultural crops, and some man-made materials, such as rubber, paint, and plastics.

Reactive Organic Gas (ROG) is a reactive chemical gas, composed of hydrocarbon compounds that may contribute to the formation of smog by their involvement in atmospheric chemical reactions. No separate health standards exist for ROG as a group. Because some compounds that make up ROG are also toxic, like the carcinogen benzene, they are often evaluated as part of a toxic risk assessment. Total Organic Gases (TOGs) includes all of the ROGs, in addition to low reactivity organic compounds like methane and acetone. ROGs and VOC are subsets of TOG.

Volatile Organic Compounds (VOC) are hydrocarbon compounds that exist in the ambient air. VOCs contribute to the formation of smog and may also be toxic. VOC emissions are a major precursor to the formation of ozone. VOCs often have an odor, and some examples include gasoline, alcohol, and the solvents used in paints.

Oxides of Nitrogen (NO_X) are a family of gaseous nitrogen compounds and is a precursor to the formation of ozone and particulate matter. The major component of NO_X, nitrogen dioxide (NO_2), is a reddish-brown gas that is toxic at high concentrations. NO_X results primarily from the combustion of fossil fuels under high temperature and pressure. On-road and off-road motor vehicles and fuel combustion are the major sources of this air pollutant.

Particulate Matter (PM), also known as particle pollution, is a complex mixture of extremely small particles and liquid droplets. Particle pollution is made up of a number of components, including acids (such as nitrates and sulfates), organic chemicals, metals, and soil or dust particles. The size of particles is directly linked to their potential for causing health problems. U.S. EPA is concerned about particles that are 10 micrometers in

diameter or smaller because those are the particles that generally pass through the throat and nose and enter the lungs. Once inhaled, these particles can affect the heart and lungs and cause serious health effects. U.S. EPA groups particle pollution into three categories based on their size and where they are deposited:

- "Inhalable coarse particles ($PM_{2.5}$- PM_{10})," such as those found near roadways and dusty industries, are between 2.5 and 10 micrometers in diameter. $PM_{2.5-10}$ is deposited in the thoracic region of the lungs.
- "Fine particles ($PM_{2.5}$)," such as those found in smoke and haze, are 2.5 micrometers in diameter and smaller. These particles can be directly emitted from sources such as forest fires, or they can form when gases emitted from power plants, industries and automobiles react in the air. They penetrate deeply into the thoracic and alveolar regions of the lungs.
- "Ultrafine particles (UFP)," are very small particles less than 0.1 micrometers in diameter largely resulting from the combustion of fossils fuels, meat, wood and other hydrocarbons. While UFP mass is a small portion of $PM_{2.5}$, its high surface area, deep lung penetration, and transfer into the bloodstream can result in disproportionate health impacts relative to their mass.

PM_{10}, $PM_{2.5}$, and UFP include primary pollutants (emitted directly to the atmosphere) as well as secondary pollutants (formed in the atmosphere by chemical reactions among precursors). Generally speaking, $PM_{2.5}$ and UFP are emitted by combustion sources like vehicles, power generation, industrial processes, and wood burning, while PM_{10} sources include these same sources plus roads and farming activities. Fugitive windblown dust and other area sources also represent a source of airborne dust.

Numerous scientific studies have linked both long- and short-term particle pollution exposure to a variety of health problems. Long-term exposures, such as those experienced by people living for many years in areas with high particle levels, have been associated with problems such as reduced lung function and the development of chronic bronchitis and even premature death. Short-term exposures to particles (hours or days) can aggravate lung disease, causing asthma attacks and also acute (short-term) bronchitis, and may also increase susceptibility to respiratory infections. In people with heart disease, short-term exposures have been linked to heart attacks and arrhythmias. Healthy children and adults have not been reported to suffer serious effects from short term exposures, although they may experience temporary minor irritation when particle levels are elevated.

Carbon Monoxide (CO) is an odorless, colorless gas that is highly toxic. It is formed by the incomplete combustion of fuels and is emitted directly into the air (unlike ozone). The main source of CO is on-road motor vehicles. Other CO sources include other mobile sources, miscellaneous processes, and fuel combustion from stationary sources. Because of the local nature of CO problems, the California Air Resources Board (ARB) and U.S. EPA designate urban areas as CO nonattainment areas instead of the entire basin as with ozone and PM_{10}. Motor vehicles are by far the largest source of CO emissions. Emissions from motor vehicles have been declining since 1985, despite increases in vehicle miles traveled, with the introduction of new automotive emission controls and fleet turnover.

Sulfur Dioxide (SO_2) is a colorless, irritating gas with a "rotten egg" smell formed primarily by the combustion of sulfur-containing fossil fuels. However, like airborne NO_X, suspended SO_X particles contribute to the poor visibility. These SO_X particles can also combine with other pollutants to form $PM_{2.5}$. The prevalence of low-sulfur fuel use has minimized problems from this pollutant.

Lead (Pb) is a metal that is a natural constituent of air, water, and the biosphere. Lead is neither created nor destroyed in the environment, so it essentially persists forever. The health effects of lead poisoning include loss of appetite, weakness, apathy, and miscarriage. Lead can also cause lesions of the neuromuscular system, circulatory system, brain, and gastrointestinal tract. Gasoline-powered automobile engines were a major source of airborne lead through the use of leaded fuels. The use of leaded fuel has been mostly phased out, with the result that ambient concentrations of lead have dropped dramatically.

Hydrogen Sulfide (H_2S) is associated with geothermal activity, oil and gas production, refining, sewage treatment plants, and confined animal feeding operations. Hydrogen sulfide is extremely hazardous in high concentrations; especially in enclosed spaces (800 ppm can cause death). OSHA regulates workplace exposure to H_2S.

Other Pollutants

The State of California has established air quality standards for some pollutants not addressed by Federal standards. The ARB has established State standards for hydrogen sulfide, sulfates, vinyl chloride, and visibility reducing particles. The following section summarizes these pollutants and provides a description of the pollutants' physical properties, health and other effects, sources, and the extent of the problems.

Sulfates (SO_4^{2-}) are the fully oxidized ionic form of sulfur. Sulfates occur in combination with metal and/or hydrogen ions. In California, emissions of sulfur compounds occur primarily from the combustion of petroleum-derived fuels (e.g., gasoline and diesel fuel) that contain sulfur. This sulfur is oxidized to SO_2 during the combustion process and subsequently converted to sulfate compounds in the atmosphere. The conversion of SO_2 to sulfates takes place comparatively rapidly and completely in urban areas of California due to regional meteorological features.

The ARB sulfates standard is designed to prevent aggravation of respiratory symptoms. Effects of sulfate exposure at levels above the standard include a decrease in ventilator function, aggravation of asthmatic symptoms, and an increased risk of cardio-pulmonary disease. Sulfates are particularly effective in degrading visibility, and, due to the fact that they are usually acidic, can harm ecosystems and damage materials and property.

Visibility Reducing Particles: Are a mixture of suspended particulate matter consisting of dry solid fragments, solid cores with liquid coatings, and small droplets of liquid. The standard is intended to limit the frequency and severity of visibility impairment due to regional haze and is equivalent to a 10-mile nominal visual range.

Vinyl Chloride (C_2H_3Cl or **VCM)** is a colorless gas that does not occur naturally. It is formed when other substances such as trichloroethane, trichloroethylene, and tetrachloro-ethylene are broken down. Vinyl chloride is used to make polyvinyl chloride (PVC) which is used to make a variety of plastic products, including pipes, wire and cable coatings, and packaging materials.

Odors

Typically odors are generally regarded as an annoyance rather than a health hazard. However, manifestations of a person's reaction to foul odors can range from the psychological (i.e. irritation, anger, or anxiety) to the physiological, including circulatory and respiratory effects, nausea, vomiting, and headache.

The ability to detect odors varies considerably among the population and overall is quite subjective. Some individuals have the ability to smell very minute quantities of specific substances; others may not have the same sensitivity but may have sensitivities to odors of other substances. In addition, people may have different reactions to the same odor and in fact an odor that is offensive to one person may be perfectly acceptable to another (e.g., fast food restaurant). It is important to also note that an unfamiliar odor is more easily detected and is more likely to cause complaints than a familiar one. This is because of the phenomenon known as odor fatigue, in which a person can become desensitized to almost any odor and recognition only occurs with an alteration in the intensity.

Quality and intensity are two properties present in any odor. The quality of an odor indicates the nature of the smell experience. For instance, if a person describes an odor as flowery or sweet, then the person is describing the quality of the odor. Intensity refers to the strength of the odor. For example, a person may use the word strong to describe the intensity of an odor. Odor intensity depends on the odorant concentration in the air. When an odorous sample is progressively diluted, the odorant concentration decreases. As this occurs, the odor intensity weakens and eventually becomes so low that the detection or recognition of the odor is quite difficult. At some point during dilution, the concentration of the odorant reaches a detection threshold. An odorant concentration below the detection threshold means that the concentration in the air is not detectable by the average human.

Neither the state nor the federal governments have adopted rules or regulations for the control of odor sources. The SJVAPCD does not have an individual rule or regulation that specifically addresses odors;

however, odors would be subject to SJVAPCD *Rule 4102, Nuisance*. Any actions related to odors would be based on citizen complaints to local governments and the SJVAPCD.

Toxic Air Contaminants

Toxic air contaminants (TACs) are air pollutants that may cause or contribute to an increase in mortality or serious illness, or which may pose a hazard to human health. TACs are usually present in minute quantities in the ambient air, but due to their high toxicity, they may pose a threat to public health even at very low concentrations. Because there is no threshold level below which adverse health impacts are not expected to occur, TACs differ from criteria pollutants for which acceptable levels of exposure can be determined and for which state and federal governments have set ambient air quality standards. TACs, therefore, are not considered "criteria pollutants" under either the FCAA or the California Clean Air Act (CCAA), and are thus not subject to National or California ambient air quality standards (NAAQS and CAAQS, respectively). Instead, the U.S. EPA and the ARB regulate Hazardous Air Pollutants (HAPs) and TACs, respectively, through statutes and regulations that generally require the use of the maximum or best available control technology to limit emissions. In conjunction with SJVAPCD rules, these federal and state statutes and regulations establish the regulatory framework for TACs. At the national levels, the U.S. EPA has established National Emission Standards for HAPs (NESHAPs), in accordance with the requirements of the FCAA and subsequent amendments. These are technology-based source-specific regulations that limit allowable emissions of HAPs.

Within California, TACs are regulated primarily through the Tanner Air Toxics Act (AB 1807) and the Air Toxics Hot Spots Information and Assessment Act of 1987 (AB 2588). The Tanner Act sets forth a formal procedure for ARB to designate substances as TACs. The following provides a summary of the primary TACs of concern within the State of California and related health effects:

Diesel Particulate Matter (DPM) was identified as a TAC by the ARB in August 1998. DPM is emitted from both mobile and stationary sources. In California, on-road diesel-fueled vehicles contribute approximately 40% of the statewide total, with an additional 57 percent attributed to other mobile sources such as construction and mining equipment, agricultural equipment, and transport refrigeration units. Stationary sources, contributing about 3 percent of emissions, include shipyards, warehouses, heavy equipment repair yards, and oil and gas production operations. Emissions from these sources are from diesel-fueled internal combustion engines. Stationary sources that report DPM emissions also include heavy construction, manufacturers of asphalt paving materials and blocks, and diesel-fueled electrical generation facilities (ARB 2013).

In October 2000, the ARB issued a report entitled: "Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles", which is commonly referred to as the Diesel Risk Reduction Plan (DRRP). The DRRP provides a mechanism for combating the DPM problem. The goal of the DRRP is to reduce concentrations of DPM by 85 percent by the year 2020, in comparison to year 2000 baseline emissions. The key elements of the DRRP are to clean up existing engines through engine retrofit emission control devices, to adopt stringent standards for new diesel engines, and to lower the sulfur content of diesel fuel to protect new, and very effective, advanced technology emission control devices on diesel engines. When fully implemented, the DRPP will significantly reduce emissions from both old and new diesel fueled motor vehicles and from stationary sources that burn diesel fuel. In addition to these strategies, the ARB continues to promote the use of alternative fuels and electrification. As a result of these actions, DPM concentrations and associated health risks in future years are projected to decline (ARB 2013, ARB 2000).

Exposure to DPM can have immediate health effects. DPM can irritate the eyes, nose, throat, and lungs, and it can cause coughs, headaches, lightheadedness, and nausea. In studies with human volunteers, Exposure to DPM also causes inflammation in the lungs, which may aggravate chronic respiratory symptoms and increase the frequency or intensity of asthma attacks. The elderly and people with emphysema, asthma, and chronic heart and lung disease are especially sensitive to fine-particle pollution. Because children's lungs and respiratory systems are still developing, they are also more susceptible than healthy adults to fine particles. Exposure to fine particles is associated with increased frequency of childhood illnesses and can also reduce lung function in children. In California, DPM has been identified as a carcinogen.

Acetaldehyde is a federal hazardous air pollutant. The ARB identified acetaldehyde as a TAC in April 1993. Acetaldehyde is both directly emitted into the atmosphere and formed in the atmosphere as a result of

photochemical oxidation. Sources of acetaldehyde include emissions from combustion processes such as exhaust from mobile sources and fuel combustion from stationary internal combustion engines, boilers, and process heaters. A majority of the statewide acetaldehyde emissions can be attributed to mobile sources, including on-road motor vehicles, construction and mining equipment, aircraft, recreational boats, and agricultural equipment. Area sources of emissions include the burning of wood in residential fireplaces and wood stoves. The primary stationary sources of acetaldehyde are from fuel combustion from the petroleum industry (ARB 2013).

Acute exposure to acetaldehyde results in effects including irritation of the eyes, skin, and respiratory tract. Symptoms of chronic intoxication of acetaldehyde resemble those of alcoholism. The U.S. EPA has classified acetaldehyde as a probable human carcinogen. In California, acetaldehyde was classified on April 1, 1988, as a chemical known to the state to cause cancer (U.S. EPA 2014; ARB 2013).

Benzene is highly carcinogenic and occurs throughout California. The ARB identified benzene as a TAC in January 1985. A majority of benzene emitted in California (roughly 88 percent) comes from motor vehicles, including evaporative leakage and unburned fuel exhaust. These sources include on-road motor vehicles, recreational boats, off-road recreational vehicles, and lawn and garden equipment. Benzene is also formed as a partial combustion product of larger aromatic fuel components. To a lesser extent, industry-related stationary sources are also sources of benzene emissions. The primary stationary sources of reported benzene emissions are crude petroleum and natural gas mining, petroleum refining, and electric generation that involves the use of petroleum products. The primary area sources include residential combustion of various types such as cooking and water heating (ARB 2013).

Acute inhalation exposure of humans to benzene may cause drowsiness, dizziness, headaches, as well as eye, skin, and respiratory tract irritation, and, at high levels, unconsciousness. Chronic inhalation exposure has caused various disorders in the blood, including reduced numbers of red blood cells and aplastic anemia, in occupational settings. Reproductive effects have been reported for women exposed by inhalation to high levels, and adverse effects on the developing fetus have been observed in animal tests. Increased incidences of leukemia (cancer of the tissues that form white blood cells) have been observed in humans occupationally exposed to benzene. The U.S. EPA has classified benzene as known human carcinogen for all routes of exposure (U.S. EPA 2014).

1,3-butadiene was identified by the ARB as a TAC in 1992. Most of the emissions of 1,3-butadiene are from incomplete combustion of gasoline and diesel fuels. Mobile sources account for a majority of the total statewide emissions. Additional sources include agricultural waste burning, open burning associated with forest management, petroleum refining, manufacturing of synthetics and man-made materials, and oil and gas extraction. The primary natural sources of 1,3-butadiene emissions are wildfires (ARB 2013).

Acute exposure to 1,3-butadiene by inhalation in humans results in irritation of the eyes, nasal passages, throat, and lungs. Epidemiological studies have reported a possible association between 1,3-butadiene exposure and cardiovascular diseases. Epidemiological studies of workers in rubber plants have shown an association between 1,3-butadiene exposure and increased incidence of leukemia. Animal studies have reported tumors at various sites from 1,3-butadiene exposure. In California, 1,3-butadiene has been identified as a carcinogen.

Carbon Tetrachloride was identified by the ARB as a TAC in 1987 under California's TAC program (ARB 2013). The primary stationary sources reporting emissions of carbon tetrachloride include chemical and allied product manufacturers and petroleum refineries. In the past, carbon tetrachloride was used for dry cleaning and as a grain-fumigant. Usage for these purposes is no longer allowed in the United States. Carbon tetrachloride has not been registered for pesticidal use in California since 1987. Also, the use of carbon tetrachloride in products to be used indoors has been discontinued in the United States. The statewide emissions of carbon tetrachloride are small (about 1.96 tons per year), and background concentrations account for most of the health risk (ARB 2013).

The primary effects of carbon tetrachloride in humans are on the liver, kidneys, and central nervous system. Human symptoms of acute inhalation and oral exposures to carbon tetrachloride include headache, weakness, lethargy, nausea, and vomiting. Acute exposures to higher levels and chronic (long-term)

inhalation or oral exposure to carbon tetrachloride produces liver and kidney damage in humans. Human data on the carcinogenic effects of carbon tetrachloride are limited. Studies in animals have shown that ingestion of carbon tetrachloride increases the risk of liver cancer. In California, carbon tetrachloride has been identified as a carcinogen.

Hexavalent chromium was identified as a TAC in 1986. Sources of Hexavalent chromium include industrial metal finishing processes, such as chrome plating and chromic acid anodizing, and firebrick lining of glass furnaces. Other sources include mobile sources, including gasoline motor vehicles, trains, and ships (ARB 2013).

The respiratory tract is the major target organ for hexavalent chromium toxicity, for acute and chronic inhalation exposures. Shortness of breath, coughing, and wheezing were reported from a case of acute exposure to hexavalent chromium, while perforations and ulcerations of the septum, bronchitis, decreased pulmonary function, pneumonia, and other respiratory effects have been noted from chronic exposure. Human studies have clearly established that inhaled hexavalent chromium is a human carcinogen, resulting in an increased risk of lung cancer. In California, hexavalent chromium has been identified as a carcinogen.

Para-Dichlorobenzene was identified by the ARB as a TAC in April 1993. The primary area-wide sources that have reported emissions of para-dichlorobenzene include consumer products such as non-aerosol insect repellants and solid/gel air fresheners. These sources contribute nearly all of the statewide para-dichlorobenzene emissions (ARB 2013).

Acute exposure to paradichlorobenzene via inhalation results in irritation to the eyes, skin, and throat in humans. In addition, long-term inhalation exposure may affect the liver, skin, and central nervous system in humans. The U.S. EPA has classified para-dichlorobenzene as a possible human carcinogen.

Formaldehyde was identified by the ARB as a TAC in 1992. Formaldehyde is both directly emitted into the atmosphere and formed in the atmosphere as a result of photochemical oxidation. Photochemical oxidation is the largest source of formaldehyde concentrations in California ambient air. Directly emitted formaldehyde is a product of incomplete combustion. One of the primary sources of directly-emitted formaldehyde is vehicular exhaust. Formaldehyde is also used in resins, can be found in many consumer products as an antimicrobial agent, and is also used in fumigants and soil disinfectants. The primary area sources of formaldehyde emissions include wood burning in residential fireplaces and wood stoves (ARB 2013).

Exposure to formaldehyde may occur by breathing contaminated indoor air, tobacco smoke, or ambient urban air. Acute and chronic inhalation exposure to formaldehyde in humans can result in respiratory symptoms, and eye, nose, and throat irritation. Limited human studies have reported an association between formaldehyde exposure and lung and nasopharyngeal cancer. Animal inhalation studies have reported an increased incidence of nasal squamous cell cancer. Formaldehyde is classified as a probable human carcinogen.

Methylene Chloride was identified by the ARB as a TAC in 1987. Methylene chloride is used as a solvent, a blowing and cleaning agent in the manufacture of polyurethane foam and plastic fabrication, and as a solvent in paint stripping operations. Paint removers account for the largest use of methylene chloride in California, where methylene chloride is the main ingredient in many paint stripping formulations. Plastic product manufacturers, manufacturers of synthetics, and aircraft and parts manufacturers are stationary sources reporting emissions of methylene chloride (ARB 2013).
The acute effects of methylene chloride inhalation in humans consist mainly of nervous system effects including decreased visual, auditory, and motor functions, but these effects are reversible once exposure ceases. The effects of chronic exposure to methylene chloride suggest that the central nervous system is a potential target in humans and animals. Human data are inconclusive regarding methylene chloride and cancer. Animal studies have shown increases in liver and lung cancer and benign mammary gland tumors following the inhalation of methylene chloride. In California, methylene chloride has been identified as a carcinogen.

Perchloroethylene was identified by the ARB as a TAC in 1991. Perchloroethylene is used as a solvent, primarily in dry cleaning operations. Perchloroethylene is also used in degreasing operations, paints and coatings,

adhesives, aerosols, specialty chemical production, printing inks, silicones, rug shampoos, and laboratory solvents. In California, the stationary sources that have reported emissions of perchloroethylene are dry cleaning plants, aircraft part and equipment manufacturers, and fabricated metal product manufacturers. The primary area sources include consumer products such as automotive brake cleaners and tire sealants and inflators (ARB 2013).

Acute inhalation exposure to perchloroethylene vapors can result in irritation of the upper respiratory tract and eyes, kidney dysfunction, and at lower concentrations, neurological effects, such as reversible mood and behavioral changes, impairment of coordination, dizziness, headaches sleepiness, and unconsciousness. Chronic inhalation exposure can result in neurological effects, including sensory symptoms such as headaches, impairments in cognitive and motor neurobehavioral functioning, and color vision decrements. Cardiac arrhythmia, liver damage, and possible kidney damage may also occur. In California, perchloroethylene has been identified as a carcinogen.

ASBESTOS

Asbestos is a term used for several types of naturally-occurring fibrous minerals found in many parts of California. The most common type of asbestos is chrysotile, but other types are also found in California. Serpentine rock often contains chrysotile asbestos. Serpentine rock, and its parent material, ultramafic rock, is abundant in the Sierra foothills, the Klamath Mountains, and Coast Ranges. The project site, however, is not located in an area of known ultramafic rock.

Asbestos is commonly found in ultramafic rock, including serpentine, and near fault zones. The amount of asbestos that is typically present in these rocks range from less than 1 percent up to about 25 percent, and sometimes more. Asbestos is released from ultramafic and serpentine rock when it is broken or crushed. This can happen when cars drive over unpaved roads or driveways which are surfaced with these rocks, when land is graded for building purposes, or at quarrying operations. It is also released naturally through weathering and erosion. Once released from the rock, asbestos can become airborne and may stay in the air for long periods of time.

Additional sources of asbestos include building materials and other manmade materials. The most common sources are heat-resistant insulators, cement, furnace or pipe coverings, inert filler material, fireproof gloves and clothing, and brake linings. Asbestos has been used in the United States since the early 1900's; however, asbestos is no longer allowed as a constituent in most home products and materials. Many older buildings, schools, and homes still have asbestos containing products.

Naturally-occurring asbestos was identified by ARB as a TAC in 1986. The ARB has adopted two statewide control measures which prohibits the use of serpentine or ultramafic rock for unpaved surfacing and controls dust emissions from construction, grading, and surface mining in areas with these rocks. Various other laws have also been adopted, including laws related to the control of asbestos-containing materials during the renovation and demolition of buildings.

All types of asbestos are hazardous and may cause lung disease and cancer. Health risks to people are dependent upon their exposure to asbestos. The longer a person is exposed to asbestos and the greater the intensity of the exposure, the greater the chances for a health problem. Asbestos-related disease, such as lung cancer, may not occur for decades after breathing asbestos fibers. Cigarette smoking increases the risk of lung cancer from asbestos exposure.

VALLEY FEVER

Valley fever is an infection caused by the fungus Coccidioides. The scientific name for valley fever is "coccidioidomycosis," and it's also sometimes called "desert rheumatism." The term "valley fever" usually refers to Coccidioides infection in the lungs, but the infection can spread to other parts of the body in severe cases.

Coccidioides spores circulate in the air after contaminated soil and dust are disturbed by humans, animals, or the weather. The spores are too small to see without a microscope. When people breathe in the spores, they are at risk for developing valley fever. After the spores enter the lungs, the person's body temperature

allows the spores to change shape and grow into spherules. When the spherules get large enough, they break open and release smaller pieces (called endospores) which can then potentially spread within the lungs or to other organs and grow into new spherules. In extremely rare cases, the fungal spores can enter the skin through a cut, wound, or splinter and cause a skin infection.

Symptoms of valley fever may appear between 1 and 3 weeks after exposure. Symptoms commonly include fatigue, coughing, fever, shortness of breath, headaches, night sweats, muscle aches and joint pain, and rashes on the upper body or legs.

Approximately 5 to 10 percent of people who get valley fever will develop serious or long-term problems in their lungs. In an even smaller percent of people (about 1 percent), the infection spreads from the lungs to other parts of the body, such as the central nervous system (brain and spinal cord), skin, or bones and joints. Certain groups of people may be at higher risk for developing the severe forms of valley fever, such as people who have weakened immune systems. The fungus that causes valley fever, Coccidioides, can't spread from the lungs between people or between people and animals. However, in extremely rare instances, a wound infection with Coccidioides can spread valley fever to someone else, or the infection can be spread through an organ transplant with an infected organ.

For many people, the symptoms of valley fever will go away within a few months without any treatment. Healthcare providers choose to prescribe antifungal medication for some people to try to reduce the severity of symptoms or prevent the infection from getting worse. Antifungal medication is typically given to people who are at higher risk for developing severe valley fever. The treatment typically occurs over a period of roughly 3 to 6 months. In some instances, longer treatment may be required. If valley fever develops into meningitis life-long antifungal treatment is typically necessary.

Scientists continue to study how weather and climate patterns affect the habitat of the fungus that causes valley fever. Coccidioides is thought to grow best in soil after heavy rainfall and then disperse into the air most effectively during hot, dry conditions. For example, hot and dry weather conditions have been shown to correlate with an increase in the number of valley fever cases in Arizona and in California. The ways in which climate change may be affecting the number of valley fever infections, as well as the geographic range of Coccidioides, isn't known yet, but is a subject for further research (CDC 2016).

REGULATORY FRAMEWORK

Air quality within the SJVAB is regulated by several jurisdictions including the U.S. EPA, ARB, and the SJVAPCD. Each of these jurisdictions develops rules, regulations, and policies to attain the goals or directives imposed upon them through legislation. Although U.S. EPA regulations may not be superseded, both state and local regulations may be more stringent.

FEDERAL

U.S. Environmental Protection Agency

At the federal level, the U.S. EPA has been charged with implementing national air quality programs. The U.S. EPA's air quality mandates are drawn primarily from the FCAA, which was signed into law in 1970. Congress substantially amended the FCAA in 1977 and again in 1990.

Federal Clean Air Act

The FCAA required the U.S. EPA to establish National Ambient Air Quality Standards (NAAQS), and also set deadlines for their attainment. Two types of NAAQS have been established: primary standards, which protect public health, and secondary standards, which protect public welfare from non-health-related adverse effects, such as visibility restrictions. NAAQS are summarized in Table 1.

The FCAA also required each state to prepare an air quality control plan referred to as a State Implementation Plan (SIP). The FCAA Amendments of 1990 added requirements for states with nonattainment areas to revise their SIPs to incorporate additional control measures to reduce air pollution.

The SIP is periodically modified to reflect the latest emissions inventories, planning documents, and rules and regulations of the air basins as reported by their jurisdictional agencies. The U.S. EPA has responsibility to review all state SIPs to determine conformance with the mandates of the FCAA, and the amendments thereof, and determine if implementation will achieve air quality goals. If the U.S. EPA determines a SIP to be inadequate, a Federal Implementation Plan (FIP) may be prepared for the nonattainment area that imposes additional control measures.

Toxic Substances Control Act

The Toxic Substances Control Act (TSCA) first authorized the U.S. EPA to regulate asbestos in schools and Public and Commercial buildings under Title II of the law, which is also known as the Asbestos Hazard Emergency Response Act (AHERA). AHERA requires Local Education Agencies (LEAs) to inspect their schools for ACBM and prepare management plans to reduce the asbestos hazard. The Act also established a program for the training and accreditation of individuals performing certain types of asbestos work.

National Emission Standards for Hazardous Air Pollutants

Pursuant to the FCAA of 1970, the U.S. EPA established the National Emission Standards for Hazardous Air Pollutants. These are technology-based source-specific regulations that limit allowable emissions of HAPs.

STATE

California Air Resources Board

The ARB is the agency responsible for coordination and oversight of state and local air pollution control programs in California and for implementing the California Clean Air Act of 1988. Other ARB duties include monitoring air quality (in conjunction with air monitoring networks maintained by air pollution control districts and air quality management districts, establishing California Ambient Air Quality Standards (CAAQS), which in many cases are more stringent than the NAAQS, and setting emissions standards for new motor vehicles. The CAAQS are summarized in Table 1. The emission standards established for motor vehicles differ depending on various factors including the model year, and the type of vehicle, fuel and engine used.

California Clean Air Act

The CCAA requires that all air districts in the state endeavor to achieve and maintain CAAQS for Ozone, CO, SO_2, and NO_2 by the earliest practical date. The CCAA specifies that districts focus particular attention on reducing the emissions from transportation and area-wide emission sources, and the act provides districts with authority to regulate indirect sources. Each district plan is required to either (1) achieve a five percent annual reduction, averaged over consecutive 3-year periods, in district-wide emissions of each non-attainment pollutant or its precursors, or (2) to provide for implementation of all feasible measures to reduce emissions. Any planning effort for air quality attainment would thus need to consider both state and federal planning requirements.

California Assembly Bill 170

Assembly Bill 170, Reyes (AB 170), was adopted by state lawmakers in 2003 creating Government Code Section 65302.1 which requires cities and counties in the San Joaquin Valley to amend their general plans to include data and analysis, comprehensive goals, policies and feasible implementation strategies designed to improve air quality.

Assembly Bills 1807 & 2588 - Toxic Air Contaminants

Within California, TACs are regulated primarily through AB 1807 (Tanner Air Toxics Act) and AB 2588 (Air Toxics Hot Spots Information and Assessment Act of 1987). The Tanner Air Toxics Act sets forth a formal procedure for ARB to designate substances as TACs. This includes research, public participation, and scientific peer review before ARB designates a substance as a TAC. Existing sources of TACs that are subject to the Air Toxics Hot Spots Information and Assessment Act are required to: (1) prepare a toxic emissions inventory; (2) prepare a risk assessment if emissions are significant; (3) notify the public of significant risk levels; and (4) prepare and implement risk reduction measures.

Table 1
Summary of Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards	National Standards (Primary)
Ozone (O_3)	1-hour	0.09 ppm	–
	8-hour	0.070 ppm	0.070 ppm
Particulate Matter (PM_{10})	AAM	20 µg/m^3	–
	24-hour	50 µg/m^3	150 µg/m^3
Fine Particulate Matter ($PM_{2.5}$)	AAM	12 µg/m^3	12 µg/m^3
	24-hour	No Standard	35 µg/m^3
Carbon Monoxide (CO)	1-hour	20 ppm	35 ppm
	8-hour	9 ppm	9 ppm
	8-hour (Lake Tahoe)	6 ppm	–
Nitrogen Dioxide (NO_2)	AAM	0.030 ppm	53 ppb
	1-hour	0.18 ppm	100 ppb
Sulfur Dioxide (SO_2)	AAM	–	0.03 ppm
	24-hour	0.04 ppm	0.14 ppm
	3-hour	–	–
	1-hour	0.25 ppm	75 ppb
Lead	30-day Average	1.5 µg/m^3	–
	Calendar Quarter	–	1.5 µg/m^3
	Rolling 3-Month Average	–	0.15 µg/m^3
Sulfates	24-hour	25 µg/m^3	No Federal Standards
Hydrogen Sulfide	1-hour	0.03 ppm (42 µg/m^3)	
Vinyl Chloride	24-hour	0.01 ppm (26 µg/m^3)	
Visibility-Reducing Particle Matter	8-hour	Extinction coefficient: 0.23/kilometer-visibility of 10 miles or more (0.07-30 miles or more for Lake Tahoe) due to particles when the relative humidity is less than 70%.	

** For more information on standards visit : https://ww3.arb.ca.gov/research/aaqs/aaqs2.pdf*
Source: ARB 2019a

California Air Resources Board's Truck and Bus Regulation

This regulation requires fleets that operate in California to reduce diesel truck and bus emissions by retrofitting or replacing existing engines. Amendments were adopted in December 2010 to provide more time for fleets to comply. The amended regulation required installation of PM retrofits beginning January 1, 2012 and replacement of older trucks starting January 1, 2015. By January 1, 2023, nearly all vehicles would need to have 2010 model year engines or equivalent.

The regulation applies to nearly all privately and federally owned diesel fueled trucks and buses and privately and publicly owned school buses with a gross vehicle weight rating greater than 14,000 pounds. The

regulation has provisions to provide extra credit for PM filters installed prior to July 2011, has delayed requirements for fleets with 3 or fewer vehicles, provisions for agricultural vehicles and other situations.

Airborne Toxic Control Measure to Limit School Bus Idling at Schools

ARB has approved an airborne toxic control measure (ATCM) that limits school bus idling and idling at or near schools to only when necessary for safety or operational concerns. The ATCM requires a driver of a school bus or vehicle, transit bus, or other commercial motor vehicle to manually turn off the bus or vehicle engine upon arriving at a school and to restart no more than 30 seconds before departing. A driver of a school bus or vehicle is subject to the same requirement when operating within 100 feet of a school and is prohibited from idling more than five minutes at each stop beyond schools, such as parking or maintenance facilities, school bus stops, or school activity destinations. A driver of a transit bus or other commercial motor vehicle is prohibited from idling more than five minutes at each stop within 100 feet of a school. Idling necessary for health, safety, or operational concerns is exempt from these restrictions. In addition, the ATCM requires a motor carrier of an affected bus or vehicle to ensure that drivers are informed of the idling requirements, track complaints and enforcement actions, and keep records of these driver education and tracking activities. This ATCM became effective in July 2003.

SAN JOAQUIN VALLEY AIR POLLUTION CONTROL DISTRICT

The SJVAPCD is the agency primarily responsible for ensuring that NAAQS and CAAQS are not exceeded and that air quality conditions are maintained in the SJVAB, within which the proposed project is located. Responsibilities of the SJVAPCD include, but are not limited to, preparing plans for the attainment of ambient air quality standards, adopting and enforcing rules and regulations concerning sources of air pollution, issuing permits for stationary sources of air pollution, inspecting stationary sources of air pollution and responding to citizen complaints, monitoring ambient air quality and meteorological conditions, and implementing programs and regulations required by the FCAA and the CCAA. The SJVAPCD Rules and Regulations that are applicable to the proposed project include, but are not limited to, the following:

- *Regulation VIII (Fugitive PM_{10} Prohibitions)*. *Regulation VIII (Rules 8011-8081)*. This regulation is a series of rules designed to reduce particulate emissions generated by human activity, including construction and demolition activities, carryout and trackout, paved and unpaved roads, bulk material handling and storage, unpaved vehicle/traffic areas, open space areas, etc.
- *Rule 4002 (National Emissions Standards for Hazardous Air Pollutants)*. This rule may apply to projects in which portions of an existing building would be renovated, partially demolished or removed. With regard to asbestos, the NESHAP specifies work practices to be followed during renovation, demolition or other abatement activities when friable asbestos is involved. Prior to demolition activity, an asbestos survey of the existing structure may be required to identify the presence of any asbestos containing building materials (ACBM). Removal of identified ACBM must be removed by a certified asbestos contractor in accordance with CAL-OSHA requirements.
- *Rule 4102 (Nuisance)*. Applies to any source operation that emits or may emit air contaminants or other materials.
- *Rule 4103 (Open Burning)*. This rule regulates the use of open burning and specifies the types of materials that may be open burned. Section 5.1 of this rule prohibits the burning of trees and other vegetative (non-agricultural) material whenever the land is being developed for non-agricultural purposes.
- *Rule 4601 (Architectural Coatings)*. Limits volatile organic compounds from architectural coatings.
- *Rule 4641 (Cutback, Slow Cure, and Emulsified Asphalt, Paving and Maintenance Operations)*. This rule applies to the manufacture and use of cutback, slow cure, and emulsified asphalt during paving and maintenance operations.
- *Rule 9510 (Indirect Source Review - ISR)*. Requires developers of larger residential, commercial, recreational, and industrial projects to reduce smog-forming and particulate emissions from their projects' baselines. If project emissions still exceed the minimum baseline reductions, a project's

developer will be required to mitigate the difference by paying an off-site fee to the District, which would then be used to fund clean-air projects. For projects subject to this rule, the ISR rule requires developers to mitigate and/or offset emissions sufficient to achieve: (1) 20-percent reduction of construction equipment exhaust NOx; (2) 45-percent reduction of construction equipment exhaust PM_{10}; (3) 33-percent reduction of operational NOx over 10 years; and (4) 50-percent reduction of operational PM_{10} over 10 years. SJVAPCD ISR applications must be filed "no later than applying for a final discretionary approval with a public agency."

REGULATORY ATTAINMENT DESIGNATIONS

Under the CCAA, ARB is required to designate areas of the state as attainment, nonattainment, or unclassified with respect to applicable standards. An "attainment" designation for an area signifies that pollutant concentrations did not violate the applicable standard in that area. A "nonattainment" designation indicates that a pollutant concentration violated the applicable standard at least once, excluding those occasions when a violation was caused by an exceptional event, as defined in the criteria. Depending on the frequency and severity of pollutants exceeding applicable standards, the nonattainment designation can be further classified as serious nonattainment, severe nonattainment, or extreme nonattainment, with extreme nonattainment being the most severe of the classifications. An "unclassified" designation signifies that the data does not support either an attainment or nonattainment designation. The CCAA divides districts into moderate, serious, and severe air pollution categories, with increasingly stringent control requirements mandated for each category.

The U.S. EPA designates areas for ozone, CO, and NO_2 as "does not meet the primary standards," "cannot be classified," or "better than national standards." For SO_2, areas are designated as "does not meet the primary standards," "does not meet the secondary standards," "cannot be classified," or "better than national standards." However, ARB terminology of attainment, nonattainment, and unclassified is more frequently used. The U.S. EPA uses the same sub-categories for nonattainment status: serious, severe, and extreme. In 1991, U.S. EPA assigned new nonattainment designations to areas that had previously been classified as Group I, II, or III for PM_{10} based on the likelihood that they would violate national PM_{10} standards. All other areas are designated "unclassified."

The state and national attainment status designations pertaining to the SJVAB are summarized in Table 2. The SJVAB is currently designated as a nonattainment area with respect to the state PM_{10} standard, ozone, and $PM_{2.5}$ standards. The SJVAB is designated nonattainment for the national 8-hour ozone and $PM_{2.5}$ standards. On September 25, 2008, the U.S. EPA redesignated the San Joaquin Valley to attainment for the PM_{10} NAAQS and approved the PM_{10} Maintenance Plan (SJVAPCD 2019).

AMBIENT AIR QUALITY

Air pollutant concentrations are measured at two monitoring stations in Madera County. The Madera-28261 Avenue 14 Monitoring Station is the closest representative monitoring site to the proposed project site with sufficient data to meet U.S. EPA and/or ARB criteria for quality assurance. This monitoring station monitors ambient concentrations of ozone, $PM_{2.5}$ and PM_{10}. Ambient NO_2 monitoring data was obtained from the Madera-Pump Yard Monitoring Station. Ambient monitoring data was obtained for the last three years of available measurement data (i.e., 2016 through 2018) and are summarized in Table 3. As depicted, the state and national ozone and national $PM_{2.5}$ standards were exceeded on numerous occasions during the past 3 years.

Table 2
SJVAB Attainment Status Designations

Pollutant	National Designation	State Designation
Ozone, 1 hour	No Standard	Nonattainment/Severe
Ozone, 8 hour	Nonattainment/Extreme	Nonattainment
PM_{10}	Attainment	Nonattainment
$PM_{2.5}$	Nonattainment	Nonattainment
Carbon Monoxide	Attainment/Unclassified	Attainment/Unclassified
Nitrogen dioxide	Attainment/Unclassified	Attainment
Sulfur dioxide	Attainment/Unclassified	Attainment
Lead (particulate)	No Designation/Classification	Attainment
Hydrogen sulfide	No Federal Standard	Unclassified
Sulfates	No Federal Standard	Attainment
Visibility-reducing particulates	No Federal Standard	Unclassified
Vinyl Chloride	No Federal Standard	Attainment

For more information visit website url: https://www.valleyair.org/aqinfo/attainment.htm.
Source: SJVAPCD 2019

Table 3
Summary of Ambient Air Quality Monitoring Data[1]

	2016	2017	2018
Ozone			
Maximum concentration (1-hour/8-hour average)	0.097/0.089	0.101/0.092	0.097/0.083
Number of days state/national 1-hour standard exceeded	2/0	3/0	2/0
Number of days state/national 8-hour standard exceeded	43/40	29/27	17/14
Nitrogen Dioxide (NO_2)			
Maximum concentration (1-hour average)	34.5	46.0	46.5
Annual average	5	6	6
Number of days state/federal standard exceeded	0/0	0/0	0/0
Suspended Particulate Matter (PM_{10})			
Maximum concentration (state/national)	NA/122.7	NA/149.5	NA/NA
Number of days state standard exceeded (measured/calculated[2])	NA/NA	NA/NA	0/NA
Number of days national standard exceeded (measured/calculated[2])	0/0	0/0	0/NA
Suspended Particulate Matter ($PM_{2.5}$)			
Maximum concentration (state/national)	47.7/47.7	70.6/70.6	81.7/80.0
Annual Average (state/national)	12.1/12.0	NA/12.4	NA/13.9
Number of days national standard exceeded	9	16	23

ppm = parts per million by volume, µg/m³ = micrograms per cubic meter, NA=Not Available

1 *Ambient NO_2, data was obtained from the Madera-Pump Yard Monitoring Station.*

2 *Measured days are those days that an actual measurement was greater than the standard. Calculated days are the estimated number of days that a measurement would have been greater than the level of the standard had measurements been collected every day.*

Source: ARB 2020b

SENSITIVE RECEPTORS

One of the most important reasons for air quality standards is the protection of those members of the population who are most sensitive to the adverse health effects of air pollution, termed "sensitive receptors." The term sensitive receptors refer to specific population groups, as well as the land uses where individuals would reside for long periods. Commonly identified sensitive population groups are children, the elderly, the acutely ill, and the chronically ill. Commonly identified sensitive land uses would include facilities that house or attract children, the elderly, people with illnesses, or others who are especially sensitive to the effects of air pollutants. Residential dwellings, schools, parks, playgrounds, day care centers, convalescent homes, and hospitals are examples of sensitive land uses.

Nearby existing land uses consist predominantly of a mix of commercial and office land uses. The nearest sensitive land uses located in the vicinity of the proposed project site include a childcare center, which is located approximately 300 feet south of the project site at the terminus of Liberty Drive, west of Westlake Drive. Residential land uses are also approved for future construction approximately 800 feet south of the project site, adjacent to and south of Liberty Drive.

IMPACTS & MITIGATION MEASURES

METHODOLOGY

Short-term Impacts

Short-term construction emissions associated with the proposed project were calculated using the CalEEMod computer program. Emissions were quantified for site preparation/grading, asphalt paving, facility construction, and application of architectural coatings. Construction is anticipated to start in 2020. Detailed construction information, including construction schedules and equipment requirements, have not been identified for the proposed project. Default construction phases and equipment assumptions contained in the CalEEMod model were, therefore, relied upon for the calculation of construction-generated emissions. Due to anticipated reductions in future fleet-average emission rates, emissions for post-year 2020 conditions would likely be less. Modeling assumptions and output files are included in Appendix A.

Localized air quality impacts associated with fugitive dust emitted during project construction and long-term operational activities were qualitatively assessed. Localized air quality impacts associated short-term construction-generated emissions of diesel-exhaust particulate matter were quantitatively assessed using the SJVAPCD's *Prioritization Calculator*. Estimated exhaust $PM_{2.5}$ emissions were derived from the CalEEMod emissions modeling conducted for this project. The analysis was based on distances from the source center to the nearest sensitive land uses. Nearby sensitive land uses evaluated in this analysis included the nearby existing childcare center, as well as, the planned future residential land uses located approximately 800 feet south of the project site, adjacent to and south of Liberty Drive. Health-risk calculation worksheets are included in Appendix B.

Long-term Impacts

Long-term operational emissions of criteria air pollutants associated with the proposed project were calculated using the CalEEMod computer program. Modeling was conducted based on traffic data derived, in part, from the *Traffic Impact Analysis* prepared for the proposed project (KDA 2020). Mobile-source emissions were conservatively based on the default fleet distribution assumptions contained in the model. To be conservative, all vehicle trips were assumed to be new trips and do not take into account existing trips associated with the existing facility. All other modeling assumptions were based on the default parameters contained in the CalEEMod computer model. Initial operation of the project is anticipated to begin in 2022. Due to anticipated reductions in future fleet-average mobile-source and energy emission rates, emissions for post-year 2022 operational conditions would be less. Exposure to localized pollutant concentrations, including fugitive dust, mobile-source CO, and odors were qualitatively assessed. Modeling assumptions and output files are included in Appendix A of this report.

THRESHOLDS OF SIGNIFICANCE

In accordance with Appendix G of the CEQA Guidelines Initial Study Checklist, a project would be considered to have a significant impact to climate change if it would:

a) Conflict with or obstruct implementation of the applicable air quality plan.

b) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard.

c) Expose sensitive receptors to substantial pollutant concentrations.

d) Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people.

To assist local jurisdictions in the evaluation of air quality impacts, the SJVAPCD has published the Guide for Assessing and Mitigating Air Quality Impacts (SJVAPCD 2015). This guidance document includes recommended thresholds of significance to be used for the evaluation of short-term construction, long-term operational, odor, toxic air contaminant, and cumulative air quality impacts. Accordingly, the SJVAPCD-recommended thresholds of significance are used to determine whether implementation of the proposed project would result in a significant air quality impact. The thresholds of significance are summarized below.

- Short-term Emissions—Construction impacts associated with the proposed project would be considered significant if project-generated emissions would exceed 100 tons per year (TPY) of CO, 10 TPY of ROG or NO_X, 27 TPY of SO_X, or 15 TPY of PM_{10} or $PM_{2.5}$.
- Long-term Emissions—Operational impacts associated with the proposed project would be considered significant if project generated emissions would exceed 100 TPY of CO, 10 TPY of ROG or NO_X, 27 TPY of SO_X, or 15 TPY of PM_{10} or $PM_{2.5}$.
- Conflict with or Obstruct Implementation of Applicable Air Quality Plan—Due to the region's non-attainment status for ozone, $PM_{2.5}$, and PM_{10}, if project-generated emissions of ozone precursor pollutants (i.e., ROG and NO_x) or PM would exceed the SJVAPCD's significance thresholds, then the project would be considered to conflict with the attainment plans.
- Local Mobile-Source CO Concentrations—Local mobile source impacts associated with the proposed project would be considered significant if the project contributes to CO concentrations at receptor locations in excess of the CAAQS (i.e., 9.0 ppm for 8 hours or 20 ppm for 1 hour).
- Exposure to toxic air contaminants (TAC) would be considered significant if the probability of contracting cancer for the Maximally Exposed Individual (i.e., maximum individual risk) would exceed 20 in one million or would result in a Hazard Index equal or greater than 1.
- Odor impacts associated with the proposed project would be considered significant if the project has the potential to frequently expose members of the public to objectionable odors.

In addition to the above thresholds, the SJVAPCD also recommends the use of daily emissions thresholds for the evaluation of project impacts on localized ambient air quality conditions. Accordingly, the proposed project would also be considered to result in a significant contribution to localized ambient air quality if on-site emissions or ROG, NO_X, PM_{10}, $PM_{2.5}$, CO, or SO_2 associated with either short-term construction or long-term operational activities would exceed a daily average of 100 pounds per day (lbs/day) for each of the pollutants evaluated (SJVAPCD 2015).

PROJECT IMPACTS

Impact AQ-A. Would the project conflict with or obstruct implementation of the applicable air quality plan?

In accordance with SJVAPCD-recommended methodology for the assessment of air quality impacts, projects that result in significant air quality impacts at the project level are also considered to have a significant cumulative air quality impact. As noted in Impact AQ-B, short-term construction and long-term operational emissions would not exceed applicable thresholds. In addition, the proposed project's contribution to localized concentrations of emissions, including emissions of CO, TACs, and odors, are considered less than significant. However, as noted in Impact AQ-C, the proposed project could result in a significant contribution to localized PM concentrations for which the SJVAB is currently designated non-attainment. For this reason, implementation of the proposed project could conflict with air quality attainment or maintenance planning efforts. This impact would be considered ***potentially significant***.

Mitigation Measure: Implement Mitigation Measure AQ-1 (refer to Impact AQ-C).

Significance after Mitigation: With implementation of Mitigation Measure AQ-1 this impact would be considered less than significant.

Impact AQ-B. Would the project result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard?

The proposed project is located in the City of Oakhurst, which is within the SJVAB. The SJVAB is designated nonattainment for the national 8-hour ozone and $PM_{2.5}$ standards. On September 25, 2008, the U.S. EPA redesignated the San Joaquin Valley to attainment for the PM_{10} NAAQS and approved the PM_{10} Maintenance Plan (SJVAPCD 2019). Potential air quality impacts associated with the proposed project could potentially occur during project construction or operational phases. Short-term construction and long-term air quality impacts associated with the proposed project are discussed, as follows:

Short-term Construction Emissions

Short-term increases in emissions would occur during the construction process. Construction-generated emissions are of temporary duration, lasting only as long as construction activities occur, but have the potential to represent a significant air quality impact. The construction of the proposed project would result in the temporary generation of emissions associated with site grading and excavation, paving, motor vehicle exhaust associated with construction equipment, and worker trips; as well as, the movement of construction equipment on unpaved surfaces. Short-term construction emissions would result in increased emissions of ozone-precursor pollutants (i.e., ROG and NO_X) and emissions of PM. Emissions of ozone-precursors would result from the operation of on-road and off-road motorized vehicles and equipment. Emissions of airborne PM are largely dependent on the amount of ground disturbance associated with site grading and excavation activities and can result in increased concentrations of PM that can adversely affect nearby sensitive land uses.

Estimated annual construction-generated emissions are summarized in Table 4. As noted in Table 4, construction of the proposed project would generate maximum annual emissions of approximately 0.34 tons/year of ROG, 2.28 tons/year of NO_x, 1.95 tons/year of CO, 0.00 tons/year of SO_2, 0.18 tons/year of PM_{10}, and 0.13 tons/year of $PM_{2.5}$. Estimated construction-generated emissions would not exceed the SJVAPCD's significance thresholds of 10 tons/year of ROG, 10 tons/year of NO_x, 100 tons/year of CO, 27 tons/year of SO_x,15 tons/year PM_{10}, or 15 tons/year $PM_{2.5}$.

Table 4
Annual Construction Emissions (Uncontrolled)

Construction Phase	Uncontrolled Maximum Annual Emissions (TPY) [1]					
	ROG	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$
Construction Year 1						
Site Preparation	0.00	0.03	0.02	0.00	0.00	0.00
Grading	0.01	0.06	0.03	0.00	0.02	0.01
Building Construction	0.28	2.13	1.83	0.00	0.15	0.11
Paving	0.01	0.06	0.06	0.00	0.00	0.00
Architectural Coating	0.05	0.00	0.00	0.00	0.00	0.00
Total:	0.34	2.28	1.95	0.00	0.18	0.13
Construction Year 2						
Architectural Coating	0.11	0.01	0.01	0.00	0.00	0.00
Total:	0.11	0.01	0.01	0.00	0.00	0.00
Maximum Annual Emissions:	0.34	2.28	1.95	0.00	0.18	0.13
Significance Thresholds:	*10*	*10*	*100*	*27*	*15*	*15*
Exceeds Thresholds/Significant Impact?:	*No*	*No*	*No*	*No*	*No*	*No*

1. Based on CalEEMod computer modeling. Totals may not sum due to rounding. Does not include emission control measures. Construction start date has not yet been identified. Construction is anticipated to begin in 2020. Future year emissions would be less.
Refer to Appendix A for modeling results and assumptions.

Estimated average-daily on-site construction emissions are summarized in Table 5. As noted in Table 5, construction of the proposed project would generate maximum on-site emissions of approximately 36.57 lbs/day of ROG, 30.59 lbs/day of NO_x, 28.52 lbs/day of CO, 0.05 lbs/day of SO_2, 1.70 lbs/day of PM_{10}, and 1.62 lbs/day of $PM_{2.5}$. Emissions of SO_2 would be negligible (e.g., less than 1 pound/day). Average-daily on-site construction emissions would not exceed the SJVAPCD's recommended localized ambient air quality significance thresholds of 100 lbs/day for each of the criteria air pollutants evaluated.

Table 5
Average-Daily On-Site Construction Emissions (Uncontrolled)

Construction Phase	Uncontrolled Daily Emissions (lbs/day) [1,2]					
	ROG	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$
Site Preparation	1.65	19.93	11.27	0.03	2.37	0.89
Grading	1.92	21.33	9.93	0.02	7.53	4.27
Building Construction	2.29	17.43	14.90	0.03	0.95	0.91
Paving	1.59	11.58	11.80	0.02	0.66	0.61
Architectural Coating	32.70	1.57	1.82	0.00	0.10	0.10
Highest Average-Daily On-site Emissions[3]:	36.57	30.59	28.52	0.05	1.70	1.62
Significance Thresholds:	*100*	*100*	*100*	*100*	*100*	*100*
Exceeds Thresholds/Significant Impact?:	*No*	*No*	*No*	*No*	*No*	*No*

1. Based on CalEEMod computer modeling. Totals may not sum due to rounding. Does not include emission control measures, such as dust control per Regulation VIII.
2. Average daily on-site emissions are based on total on-site emissions divided by the total number of construction days.
3. Maximum daily on-site emissions assumes building construction, paving, and architectural coating application could potentially occur simultaneously.
Refer to Appendix A for modeling results and assumptions.

Short-term construction of the proposed project would not result in a significant impact to regional or local air quality conditions. Furthermore, it is important to note that project construction, including excavation and grading activities, would be required to comply with SJVPACD Regulation VIII (Fugitive PM_{10} Prohibitions). Mandatory compliance with SJVAPCD Regulation VIII would further reduce emissions of fugitive dust from the project site. With compliance with SJVAPCD Regulation VIII, emissions of PM would be further reduced by approximately 50 percent, or more. Given that project-generated emissions would not exceed applicable SJVAPCD significance thresholds, this impact would be considered ***less than significant***.

Long-term Operational Emissions

Estimated annual operational emissions for the anticipated opening year of the proposed project are summarized in Table 6. As depicted, the proposed project would result in total operational emissions of approximately 0.26 tons/year of ROG, 1.44 tons/year of NO_X, 1.59 tons/year of CO, 0.01 tons/year of SO_2, 0.42 tons/year of PM_{10}, and 0.12 tons/year of $PM_{2.5}$ during the initial year of operation. Emissions of SO_2 would be negligible (i.e., less than 0.1 tons/year). Operational emissions would be projected to decline in future years, with improvements in fuel-consumption emissions standards. Operational emissions would not exceed SJVAPCD's mass-emissions significance thresholds.

Estimated average-daily on-site operational emissions are also summarized in Table 6. Average-daily on-site emissions would total approximately 1.38 lbs/day of ROG. 0.02 lbs/day of CO, and less than 0.01 lbs/day of NO_X, SO_2, PM_{10}, and $PM_{2.5}$. Average-daily on-site emissions would not exceed the SJVAPCD's recommended localized ambient air quality significance thresholds of 100 lbs/day for each of the criteria air pollutants evaluated.

Table 6
Operational Emissions (Unmitigated) Year 2022

Sources	Uncontrolled Annual Emissions (tons/year)[1]					
	ROG	NO_x	CO	SO_2	PM_{10}	$PM_{2.5}$
Area Source	0.10	0.00	0.00	0.00	0.00	0.00
Energy Use	0.00	0.02	0.02	0.00	0.00	0.00
Mobile Source[2]	0.16	1.42	1.57	0.01	0.42	0.12
Total:	0.26	1.44	1.59	0.01	0.42	0.12
Significance Thresholds (tons):	*10*	*10*	*100*	*27*	*15*	*15*
Exceeds Thresholds/Significant Impact?:	*No*	*No*	*No*	*No*	*No*	*No*
Average-Daily On-site Emissions (lbs)[3]:	*1.38*	*<0.01*	*0.02*	*<0.01*	*<0.01*	*<0.01*
Significance Thresholds (lbs):	*100*	*100*	*100*	*100*	*100*	*100*
Exceeds Thresholds/Significant Impact?:	*No*	*No*	*No*	*No*	*No*	*No*

1. Emissions were calculated using the CalEEMod computer program. Does not include implementation of emissions control measures.
2. Fleet distribution data for the project is not available. Mobile-source emissions are conservatively based on default vehicle fleet distribution for Madera County, which includes all vehicle types/classifications, including medium and heavy-duty vehicles. Actual emissions would likely be lower.
3. Based on calculated annual operational emissions from area sources and an average of 150 operational days annually. Totals may not sum due to rounding.
Refer to Appendix A for modeling assumptions and results.

Long-term operation of the proposed project would not result in a significant impact to regional or local air quality conditions. It is important to note that estimated operational emissions are conservatively based on the default vehicle fleet distribution assumptions contained in the model, which include contributions from medium and heavy-duty trucks. Mobile sources associated with the proposed land uses would consist predominantly of light-duty vehicles. As a result, actual mobile source emissions would likely be less than estimated. In addition, it is also important to note that a large majority of the mobile-source emissions identified for the proposed project already occur associated with the estimated 1,030 students that attend the existing facility. The proposed project would provide increased capacity to serve an estimated future student population of approximately 1,582 students. Providing services to serve an increased future student population may help to reduce future trips to colleges located in other nearby communities, thereby resulting in potential overall decreases in regional VMT and associated emissions. For these reasons, this impact is considered ***less than significant***.

Impact AQ-C. Would the project expose sensitive receptors to substantial pollutant concentrations?

Sensitive land uses located in the vicinity of the proposed project site consist predominantly of a day care center and residential dwellings. The nearest day care center is located approximately 1,168 feet southwest of the project site. The nearest residential land use is located approximately 965 south of the project site.

Long-term operational and short-term construction activities and emission sources that could adversely impact these nearest sensitive receptors are discussed, as follows:

Long-term Operation

Localized Mobile-Source CO Emissions

Carbon monoxide is the primary criteria air pollutant of local concern associated with the proposed project. Under specific meteorological and operational conditions, such as near areas of heavily congested vehicle traffic, CO concentrations may reach unhealthy levels. If inhaled, CO can be adsorbed easily by the blood stream and can inhibit oxygen delivery to the body, which can cause significant health effects ranging from slight headaches to death. The most serious effects are felt by individuals susceptible to oxygen deficiencies, including people with anemia and those suffering from chronic lung or heart disease.

Mobile-source emissions of CO are a direct function of traffic volume, speed, and delay. Transport of CO is extremely limited because it disperses rapidly with distance from the source under normal meteorological conditions. For this reason, modeling of mobile-source CO concentrations is typically recommended for sensitive land uses located near signalized roadway intersections that are projected to operate at unacceptable levels of service (i.e., LOS E or F). Localized CO concentrations associated with the proposed project would be considered less-than-significant impact if: (1) traffic generated by the proposed project would not result in deterioration of a signalized intersection to a LOS of E or F; or (2) the project would not contribute additional traffic to a signalized intersection that already operates at LOS of E or F.

Signalized intersections in the project area include the intersections of SR-49/Junction Avenue and SR-49/SR-41. With project implementation, these intersections are projected to operate at LOS C, or better, for existing-plus-project and future cumulative-plus-project conditions (KDA 2020). In comparison to the CO screening criteria, implementation of the proposed project would not result in or contribute to unacceptable levels of service (i.e., LOS E, or worse) at nearby signalized intersections. As a result, the proposed project would not be anticipated to contribute substantially to localized CO concentrations that would exceed applicable standards. For this reason, this impact would be considered ***less than significant***.

Toxic Air Contaminants

Implementation of the proposed project would not result in the long-term operation of any major onsite stationary sources of TACs, nor would project implementation result in a significant increase in diesel-fueled vehicles traveling along area roadways. No major stationary sources of TACs were identified in the project vicinity that would result in increased exposure of students or staff to TACs. For these reasons, long-term increases in exposure to TACs would be considered ***less than significant***.

Short-term Construction

Naturally Occurring Asbestos

Naturally-occurring asbestos, which was identified by ARB as a TAC in 1986, is located in many parts of California and is commonly associated with ultramafic rock. The project site is not located near any areas that are likely to contain ultramafic rock (DOC 2000). As a result, risk of exposure to asbestos during the construction process would be considered ***less than significant***.

Asbestos-Containing Materials

Demolition activities can have potential negative air quality impacts, including issues surrounding proper handling, demolition, and disposal of asbestos containing material (ACM). Asbestos containing materials could be encountered during demolition of existing buildings, particularly older structures constructed prior to 1970. Asbestos can also be found in various building products, including (but not limited to) utility pipes/pipelines (transite pipes or insulation on pipes). If a project will involve the disturbance or potential disturbance of ACM, various regulatory requirements may apply, including the requirements stipulated in the National Emission Standard for Hazardous Air Pollutants (40CFR61, Subpart M-Asbestos NESHAP). These

requirements include but are not limited to: 1) notification, within at least 10 business days of activities commencing, to the APCD, 2) an asbestos survey conducted by a Certified Asbestos Consultant, and, 3) applicable removal and disposal requirements of identified ACM.

The proposed project would not include the demolition of existing structures. This impact is considered ***less than significant***.

Lead-Coated Materials

Demolition of structures coated with lead based paint can have potential negative air quality impacts and may adversely affect the health of nearby individuals. Lead-based paints could be encountered during demolition of existing buildings, particularly older structures constructed prior to 1978. Improper demolition can result in the release of lead containing particles from the site. Sandblasting or removal of paint by heating with a heat gun can result in significant emissions of lead. In such instances, proper abatement of lead before demolition of these structures must be performed in order to prevent the release of lead from the site. Federal and State lead regulations, including the Lead in Construction Standard (29CFR1926.62) and California Code of Regulations (CCR Title 8, Section 1532.1, Lead) regulate disturbance of lead containing materials during construction, demolition, and maintenance-related activities. Depending on removal method, a SJVAPCD permit may be required.

The proposed project would not include the demolition of existing structures. This impact is considered ***less than significant***.

Toxic Air Contaminants (Diesel-Exhaust Emissions)

Implementation of the proposed project would result in the generation of DPM emissions during construction associated with the use of off-road diesel equipment for site grading and excavation, paving and other construction activities. Construction activities would take place approximately 1,168 feet and 965 feet away from the nearest offsite sensitive receptors (i.e. day care center and residential land use). Therefore, given the dispersive properties of diesel PM, concentrations would be minimal at this distance.

A screening-level health risk analysis was conducted using the SJVAPCD's *Prioritization Calculator* to estimate the maximum prioritization score associated with construction-generated $PM_{2.5}$ emissions. More than 90% of DPM is less than 1 µm in diameter (about 1/70th the diameter of a human hair), and thus is a subset of $PM_{2.5}$ (ARB 2020b).

As previously noted, sensitive land uses located in the vicinity of the proposed project site consist of a child care center and planned future residential land uses. Construction of the proposed facilities would be largely limited to the eastern portion of the project site. However, to be conservative the entire project site was assumed to involve site preparation and grading activities. Distances to the nearest existing and future planned sensitive land uses were, therefore, calculated from the center of the project site. Based on the analysis conducted, the maximum cancer-risk prioritization score at the nearby existing child care center and the planned future residential land uses would be 24. Non-cancer acute and chronic hazard indices would be less than one. The predicted cancer-risk prioritization score would exceed the SJVAPCD's prioritization score of 10. For this reason, this impact would be considered ***potentially significant***.

Localized PM Concentrations

Fugitive dust emissions would be primarily associated with site preparation and grading, and vehicle travel on unpaved and paved surfaces. On-site off-road equipment and trucks would also result in short-term emissions of diesel-exhaust PM, which could contribute to elevated localized concentration at nearby receptors. Uncontrolled emissions of fugitive dust may also contribute to increased occurrences of Valley Fever and potential increases in nuisance impacts to nearby receptors. For these reasons, localized uncontrolled concentrations of construction-generated PM would be considered to have a ***potentially-significant*** impact.

Mitigation Measure AQ-1: The following measures shall be implemented to reduce potential expose of nearby sensitive receptors to localized pollutant concentrations of DPM and fugitive dust associated with project construction:

1. On-road diesel vehicles shall comply with Section 2485 of Title 13 of the California Code of Regulations. This regulation limits idling from diesel-fueled commercial motor vehicles with gross vehicular weight ratings of more than 10,000 pounds and licensed for operation on highways. It applies to California and non-California based vehicles. In general, the regulation specifies that drivers of said vehicles:
    a. Shall not idle the vehicle's primary diesel engine for greater than 5 minutes at any location, except as noted in Subsection (d) of the regulation; and,
    b. Shall not operate a diesel-fueled auxiliary power system to power a heater, air conditioner, or any ancillary equipment on that vehicle during sleeping or resting in a sleeper berth for greater than 5.0 minutes at any location when within 1,000 feet of a restricted area, except as noted in Subsection (d) of the regulation.
2. Heavy-duty, off-road diesel-fueled equipment (50 horsepower, or greater) shall comply with the 5-minute idling restriction identified in Section 2449(d)(2) of the California Air Resources Board's In-Use Off-Road Diesel regulation. The specific requirements and exceptions in the regulations can be reviewed at the following web sites: www.arb.ca.gov/msprog/truck-idling/2485.pdf and ww.arb.ca.gov/regact/2007/ordiesl07/frooal.pdf.
3. Heavy-duty, off-road diesel-fueled equipment (50 horsepower, or greater) shall be fitted with diesel-particulate filters, per manufacturer's recommendations, or shall meet Tier 4 emissions standards.
4. Signs shall be posted at the project site construction entrance to remind drivers and operators of the state's 5-minute idling limit.
5. To the extent available, replace fossil-fueled equipment with alternatively-fueled (e.g., natural gas) or electrically-driven equivalents.
6. Construction truck trips shall be scheduled, to the extent feasible, to occur during non-peak hours.
7. The burning of vegetative material shall be prohibited.
8. The proposed project shall comply with SJVAPCD Regulation VIII for the control of fugitive dust emissions. Regulation VIII can be obtained on the SJVAPCD's website at website URL: https://www.valleyair.org/rules/1ruleslist.htm. At a minimum, the following measures shall be implemented:
    a. All disturbed areas, including storage piles, which are not being actively utilized for construction purposes, shall be effectively stabilized of dust emissions using water, chemical stabilizer/suppressant, covered with a tarp or other suitable cover or vegetative ground cover.
    b. All on-site unpaved roads and off-site unpaved access roads shall be effectively stabilized of dust emissions using water or chemical stabilizer/suppressant.
    c. All land clearing, grubbing, scraping, excavation, land leveling, grading, cut & fill, and demolition activities shall be effectively controlled of fugitive dust emissions utilizing application of water or by presoaking.
    d. With the demolition of buildings up to six stories in height, all exterior surfaces of the building shall be wetted during demolition.
    e. When materials are transported off-site, all material shall be covered, or effectively wetted to limit visible dust emissions, and at least six inches of freeboard space from the top of the container shall be maintained.
    f. All operations shall limit or expeditiously remove the accumulation of mud or dirt from adjacent public streets at the end of each workday. (The use of dry rotary brushes is expressly prohibited except where preceded or accompanied by sufficient wetting to limit the visible dust emissions.) (Use of blower devices is expressly forbidden.)

g. Following the addition of materials to, or the removal of materials from, the surface of outdoor storage piles, said piles shall be effectively stabilized of fugitive dust emissions utilizing sufficient water or chemical stabilizer/suppressant.

h. On-road vehicle speeds on unpaved surfaces of the project site shall be limited to 15 mph.

i. Sandbags or other erosion control measures shall be installed sufficient to prevent silt runoff to public roadways from sites with a slope greater than one percent.

j. Excavation and grading activities shall be suspended when winds exceed 20 mph (Regardless of wind speed, an owner/operator must comply with Regulation VIII's 20 percent opacity limitation).

9. The above measures for the control of construction-generated emissions shall be included on site grading and construction plans.

Significance After Mitigation

Implementation of Mitigation Measure AQ-1would include measures to ensure compliance with applicable regulatory requirements. Additional measures have also been included to reduce construction-generated emissions that could contribute to increases in localized pollutant concentrations at nearby sensitive receptors. Such measures include requirements that heavy-duty off-road equipment be fitted with diesel-particulate filters or meet Tier 4 emissions standards. With mitigation, the predicted cancer-risk prioritization score at the nearby existing child care center and future planned residential land uses would be 5.54, or less. With mitigation, the predicted cancer-risk prioritization score would not exceed the SJVAPCD's prioritization score of 10. Predicted chronic and acute hazard indices at nearby existing and planned sensitive land uses would be less than one. As a result, exposure to construction-generated DPM at nearby sensitive land uses would not be anticipated to exceed applicable thresholds (i.e., incremental increase in cancer risk of 20 in one million or a Hazard Index equal or greater than 1). For these reasons, this impact would be considered ***less than significant***.

Impact AQ-D. Would the project result in other emissions (such as those leading to odors) affecting a substantial number of people?

Other emissions potentially associated with the proposed project would be predominantly associated with the generation of odors during project construction. The occurrence and severity of odor impacts depend on numerous factors, including: the nature, frequency, and intensity of the source; wind speed and direction; and the sensitivity of the receptors. While offensive odors rarely cause any physical harm, they still can be very unpleasant, leading to considerable distress among the public and often generating citizen complaints to local governments and regulatory agencies.

Construction of the proposed project would involve the use of a variety of gasoline or diesel-powered equipment that would emit exhaust fumes. Exhaust fumes, particularly diesel-exhaust, may be considered objectionable by some people. In addition, pavement coatings and architectural coatings used during project construction would also emit temporary odors. However, construction-generated emissions would occur intermittently throughout the workday and would dissipate rapidly within increasing distance from the source. As a result, short-term construction activities would not expose a substantial number of people to frequent odorous emissions. In addition, no major sources of odors have been identified in the project area. This impact would be considered ***less than significant***.

GREENHOUSE GASES AND CLIMATE CHANGE

EXISTING SETTING

To fully understand global climate change, it is important to recognize the naturally occurring "greenhouse effect" and to define the greenhouse gases (GHGs) that contribute to this phenomenon. Various gases in the earth's atmosphere, classified as atmospheric GHGs, play a critical role in determining the earth's surface temperature. Solar radiation enters the earth's atmosphere from space and a portion of the radiation is absorbed by the earth's surface. The earth emits this radiation back toward space, but the properties of the radiation change from high-frequency solar radiation to lower-frequency infrared radiation. Greenhouse gases, which are transparent to solar radiation, are effective in absorbing infrared radiation. As a result, this radiation that otherwise would have escaped back into space is now retained, resulting in a warming of the atmosphere. This phenomenon is known as the greenhouse effect. Among the prominent GHGs contributing to the greenhouse effect are carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. Primary GHGs attributed to global climate change, are discussed, as follows:

- **Carbon Dioxide**. Carbon dioxide (CO_2) is a colorless, odorless gas. CO_2 is emitted in a number of ways, both naturally and through human activities. The largest source of CO_2 emissions globally is the combustion of fossil fuels such as coal, oil, and gas in power plants, automobiles, industrial facilities, and other sources. A number of specialized industrial production processes and product uses such as mineral production, metal production, and the use of petroleum-based products can also lead to CO_2 emissions. The atmospheric lifetime of CO_2 is variable because it is so readily exchanged in the atmosphere (U.S. EPA 2018).

- **Methane**. Methane (CH_4) is a colorless, odorless gas that is not flammable under most circumstances. CH_4 is the major component of natural gas, about 87 percent by volume. It is also formed and released to the atmosphere by biological processes occurring in anaerobic environments. Methane is emitted from a variety of both human-related and natural sources. Human-related sources include fossil fuel production, animal husbandry (enteric fermentation in livestock and manure management), rice cultivation, biomass burning, and waste management. These activities release significant quantities of methane to the atmosphere. Natural sources of methane include wetlands, gas hydrates, permafrost, termites, oceans, freshwater bodies, non-wetland soils, and other sources such as wildfires. Methane's atmospheric lifetime is about 12 years (U.S. EPA 2018).

- **Nitrous Oxide**. Nitrous oxide (N_2O) is a clear, colorless gas with a slightly sweet odor. N_2O is produced by both natural and human-related sources. Primary human-related sources of N_2O are agricultural soil management, animal manure management, sewage treatment, mobile and stationary combustion of fossil fuels, acid production, and nitric acid production. N_2O is also produced naturally from a wide variety of biological sources in soil and water, particularly microbial action in wet tropical forests. The atmospheric lifetime of N_2O is approximately 114 years (U.S. EPA 2018).

- **Hydrofluorocarbons.** Hydrofluorocarbons (HFCs) are man-made chemicals, many of which have been developed as alternatives to ozone-depleting substances for industrial, commercial, and consumer products. The only significant emissions of HFCs before 1990 were of the chemical HFC-23, which is generated as a byproduct of the production of HCFC-22 (or Freon 22, used in air conditioning applications). The atmospheric lifetime for HFCs varies from just over a year for HFC-152a to 270 years for HFC-23. Most of the commercially used HFCs have atmospheric lifetimes of less than 15 years (e.g., HFC-134a, which is used in automobile air conditioning and refrigeration, has an atmospheric life of 14 years) (U.S. EPA 2018).

- **Perfluorocarbons.** Perfluorocarbons (PFCs) are colorless, highly dense, chemically inert, and nontoxic. There are seven PFC gases: perfluoromethane (CF_4), perfluoroethane (C_2F_6), perfluoropropane (C_3F_8), perfluorobutane (C_4F_{10}), perfluorocyclobutane (C_4F_8), perfluoropentane (C_5F_{12}), and perfluorohexane (C_6F1_4). Natural geological emissions have been responsible for the PFCs that have accumulated in the atmosphere in the past; however, the largest current source is aluminum production, which releases CF_4 and C_2F_6 as byproducts. The estimated atmospheric lifetimes for PFCs ranges from 2,600 to 50,000 years (U.S. EPA 2018).

- **Nitrogen Trifluoride**. Nitrogen trifluoride (NF_3) is an inorganic, colorless, odorless, toxic, nonflammable gas used as an etchant in microelectronics. Nitrogen trifluoride is predominantly employed in the cleaning of the plasma-enhanced chemical vapor deposition chambers in the production of liquid crystal displays and silicon-based thin film solar cells. It has a global warming potential of 16,100 carbon dioxide equivalents (CO_2e). While NF_3 may have a lower global warming potential than other chemical etchants, it is still a potent GHG. In 2009, NF_3 was listed by California as a high global warming potential GHG to be listed and regulated under Assembly Bill (AB) 32 (Section 38505 Health and Safety Code).

- **Sulfur Hexafluoride**. Sulfur hexafluoride (SF_6) is an inorganic compound that is colorless, odorless, nontoxic, and generally nonflammable. SF_6 is primarily used as an electrical insulator in high voltage equipment. The electric power industry uses roughly 80 percent of all SF_6 produced worldwide. Leaks of SF_6 occur from aging equipment and during equipment maintenance and servicing. SF_6 has an atmospheric life of 3,200 years (U.S. EPA 2018).

- **Black Carbon**. Black carbon is the strongest light-absorbing component of particulate matter (PM) emitted from burning fuels such as coal, diesel, and biomass. Black carbon contributes to climate change both directly by absorbing sunlight and indirectly by depositing on snow and by interacting with clouds and affecting cloud formation. Black carbon is considered a short-lived species, which can vary spatially and, consequently, it is very difficult to quantify associated global-warming potentials. The main sources of black carbon in California are wildfires, off-road vehicles (locomotives, marine vessels, tractors, excavators, dozers, etc.), on-road vehicles (cars, trucks, and buses), fireplaces, agricultural waste burning, and prescribed burning (planned burns of forest or wildlands) (CCAC 2018, U.S. EPA 2018).

Each GHG differs in its ability to absorb heat in the atmosphere based on the lifetime, or persistence, of the gas molecule in the atmosphere. Often, estimates of GHG emissions are presented in CO_2e, which weight each gas by its global warming potential (GWP). Expressing GHG emissions in CO_2e takes the contribution of all GHG emissions to the greenhouse effect and converts them to a single unit equivalent to the effect that would occur if only CO_2 were being emitted. Table 7 provides a summary of the GWP for GHG emissions of typical concern with regard to community development projects, based on a 100-year time horizon. As indicated, Methane traps over 25 times more heat per molecule than CO_2, and N_2O absorbs roughly 298 times more heat per molecule than CO_2. Additional GHG with high GWP include Nitrogen trifluoride, Sulfur hexafluoride, Perfluorocarbons, and black carbon.

Table 7
Global Warming Potential for Greenhouse Gases

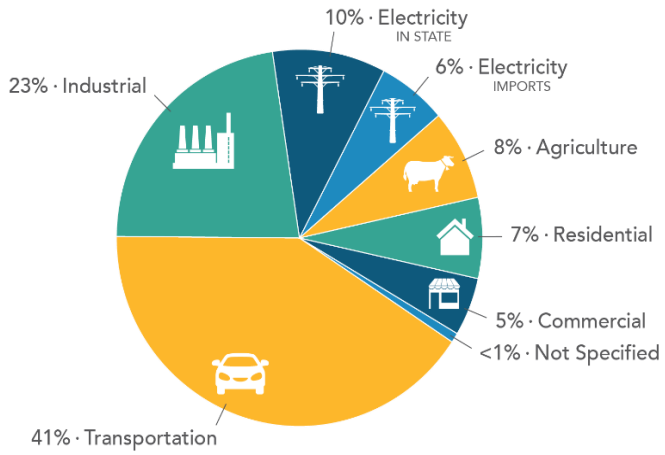
Greenhouse Gas	Global Warming Potential (100-year)
Carbon Dioxide (CO_2)	1
Methane (CH_4)	25
Nitrous Dioxide (N_2O)	298
**Based on IPCC GWP values for 100-year time horizon* *Source: IPCC 2007*	

SOURCES OF GHG EMISSIONS

On a global scale, GHG emissions are predominantly associated with activities related to energy production; changes in land use, such as deforestation and land clearing; industrial sources; agricultural activities; transportation; waste and wastewater generation; and commercial and residential land uses. World-wide, energy production including the burning of coal, natural gas, and oil for electricity and heat are typically considered the largest single sources of global GHG emissions.

In 2016, GHG emissions within California totaled 429.4 million metric tons of carbon dioxide equivalents ($MMTCO_2e$). Within California, the transportation sector is the largest contributor, accounting for roughly 41 percent of the total state-wide GHG emissions. Emissions associated with the industrial sector are the second largest contributor, totaling approximately 23 percent. Emissions from in-state electricity generation, imported electricity, agriculture, residential, and commercial uses constitute the remaining major sources on GHG emissions. In comparison to the year 2014 emissions inventory, overall GHG emissions in California decreased by 12 MMTCO2e. The State of California GHG emissions inventory for year 2016, by main economic sector, is depicted in Figure 4 (ARB 2019c).

Figure 4
State of California Greenhouse Gases Emissions Inventory by Main Economic Sector



Emissions inventory is categorized based on main economic sector. "Not Specified" includes sources that could not be attributed to an individual sector, such as evaporative losses and emissions from use of ozone-depleting substances.
Source: ARB 2019c

Short-Lived Climate Pollutants

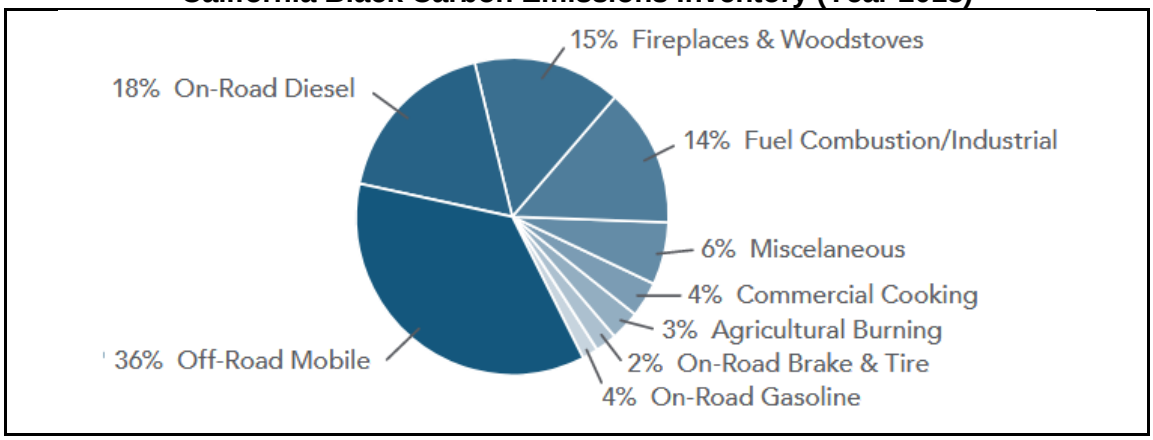
Short-lived climate pollutants (SLCPs), such as black carbon, fluorinated gases, and methane also have a dramatic effect on climate change. Though short lived, these pollutants create a warming influence on the climate that is many times more potent than that of carbon dioxide.

As part of the ARB's efforts to address SLCPs, the ARB has developed a statewide emission inventory for black carbon. The black carbon inventory will help support implementation of the SLCP Strategy, but it is not part of the State's GHG Inventory that tracks progress towards the State's climate targets. The most recent inventory for year 2013 conditions is depicted in Figure 5. As depicted, off-road mobile sources account for a majority of black carbon emissions totaling roughly 36 percent of the inventory. Other major anthropogenic sources of black carbon include on-road transportation, residential wood burning, fuel combustion, and industrial processes (ARB 2017).

EFFECTS OF GLOBAL CLIMATE CHANGE

There are uncertainties as to exactly what the climate changes will be in various local areas of the earth. There are also uncertainties associated with the magnitude and timing of other consequences of a warmer planet: sea level rise, spread of certain diseases out of their usual geographic range, the effect on agricultural production, water supply, sustainability of ecosystems, increased strength and frequency of storms, extreme heat events, increased air pollution episodes, and the consequence of these effects on the economy.

Figure 5
California Black Carbon Emissions Inventory (Year 2013)



Source: ARB 2017

Within California, climate changes would likely alter the ecological characteristics of many ecosystems throughout the state. Such alterations would likely include increases in surface temperatures and changes in the form, timing, and intensity of precipitation. For instance, historical records are depicting an increasing trend toward earlier snowmelt in the Sierra Nevada. This snowpack is a principal supply of water for the state, providing roughly 50 percent of state's annual runoff. If this trend continues, some areas of the state may experience an increased danger of floods during the winter months and possible exhaustion of the snowpack during spring and summer months. An earlier snowmelt would also impact the State's energy resources. Currently, approximately 20 percent of California's electricity comes from hydropower. An early exhaustion of the Sierra snowpack, may force electricity producers to switch to more costly or non-renewable forms of electricity generation during spring and summer months. A changing climate may also impact agricultural crop yields, coastal structures, and biodiversity. As a result, resultant changes in climate will likely have detrimental effects on some of California's largest industries, including agriculture, wine, tourism, skiing, recreational and commercial fishing, and forestry (ARB 2017).

REGULATORY FRAMEWORK

FEDERAL

Executive Order 13514

Executive Order 13514 is focused on reducing GHGs internally in federal agency missions, programs, and operations. In addition, the executive order directs federal agencies to participate in the Interagency Climate Change Adaptation Task Force, which is engaged in developing a national strategy for adaptation to climate change.

On April 2, 2007, in Massachusetts v. U.S. EPA, 549 U.S. 497 (2007), the Supreme Court found that GHGs are air pollutants covered by the FCAA and that the U.S. EPA has the authority to regulate GHG. The Court held that the U.S. EPA Administrator must determine whether or not emissions of GHGs from new motor vehicles cause

or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare, or whether the science is too uncertain to make a reasoned decision.

On December 7, 2009, the U.S. EPA Administrator signed two distinct findings regarding GHGs under section 202(a) of the Clean Air Act:

- Endangerment Finding: The Administrator found that the current and projected concentrations of the six key well-mixed GHGs (CO_2, CH_4, N_2O, HFCs, PFCs, and SF_6) in the atmosphere threaten the public health and welfare of current and future generations.
- Cause or Contribute Finding: The Administrator found that the combined emissions of these well-mixed GHGs from new motor vehicles and new motor vehicle engines contribute to the GHG pollution which threatens public health and welfare.

Although these findings did not themselves impose any requirements on industry or other entities, this action was a prerequisite to finalizing the U.S. EPA's Proposed Greenhouse Gas Emission Standards for Light-Duty Vehicles, which was published on September 15, 2009. On May 7, 2010 the final Light-Duty Vehicle Greenhouse Gas Emissions Standards and Corporate Average Fuel Economy Standards was published in the Federal Register.

U.S. EPA and the National Highway Traffic Safety Administration (NHTSA) are taking coordinated steps to enable the production of a new generation of clean vehicles with reduced GHG emissions and improved fuel efficiency from on-road vehicles and engines. These next steps include developing the first-ever GHG regulations for heavy-duty engines and vehicles, as well as additional light-duty vehicle GHG regulations. These steps were outlined by President Obama in a Presidential Memorandum on May 21, 2010.

The final combined U.S. EPA and NHTSA standards that make up the first phase of this national program apply to passenger cars, light-duty trucks, and medium-duty passenger vehicles, covering model years 2012 through 2016. The standards require these vehicles to meet an estimated combined average emissions level of 250 grams of CO_2 per mile (the equivalent to 35.5 miles per gallon if the automobile industry were to meet this CO_2 level solely through fuel economy improvements). Together, these standards will cut GHG emissions by an estimated 960 MMT and 1.8 billion barrels of oil over the lifetime of the vehicles sold under the program (model years 2012-2016). On August 28, 2012, U.S. EPA and NHTSA issued their joint rule to extend this national program of coordinated GHG and fuel economy standards to model years 2017 through 2025 passenger vehicles.

STATE

Assembly Bill 1493

AB 1493 (Pavley) of 2002 (Health and Safety Code Sections 42823 and 43018.5) requires the ARB to develop and adopt the nation's first GHG emission standards for automobiles. These standards are also known as Pavley I. The California Legislature declared in AB 1493 that global warming is a matter of increasing concern for public health and the environment. It cites several risks that California faces from climate change, including a reduction in the state's water supply; an increase in air pollution caused by higher temperatures; harm to agriculture; an increase in wildfires; damage to the coastline; and economic losses caused by higher food, water, energy, and insurance prices. The bill also states that technological solutions to reduce GHG emissions would stimulate California's economy and provide jobs. In 2004, the State of California submitted a request for a waiver from federal clean air regulations, as the State is authorized to do under the FCAA, to allow the State to require reduced tailpipe emissions of CO_2. In late 2007, the U.S. EPA denied California's waiver request and declined to promulgate adequate federal regulations limiting GHG emissions. In early 2008, the State brought suit against the U.S. EPA related to this denial.

In January 2009, President Obama instructed the U.S. EPA to reconsider the Bush Administration's denial of California's and 13 other states' requests to implement global warming pollution standards for cars and trucks. In June 2009, the U.S. EPA granted California's waiver request, enabling the State to enforce its GHG emissions standards for new motor vehicles beginning with the current model year.

In 2009, President Obama announced a national policy aimed at both increasing fuel economy and reducing GHG pollution for all new cars and trucks sold in the US. The new standards would cover model

years 2012 to 2016 and would raise passenger vehicle fuel economy to a fleet average of 35.5 miles per gallon by 2016. When the national program takes effect, California has committed to allowing automakers who show compliance with the national program to also be deemed in compliance with state requirements. California is committed to further strengthening these standards beginning in 2017 to obtain a 45 percent GHG reduction from the 2020 model year vehicles.

Executive Order No. S-3-05

Executive Order S-3-05 (State of California) proclaims that California is vulnerable to the impacts of climate change. It declares that increased temperatures could reduce the Sierra's snowpack, further exacerbate California's air quality problems, and potentially cause a rise in sea levels. To combat those concerns, the Executive Order established total GHG emission targets. Specifically, emissions are to be reduced to the 2000 level by 2010, to the 1990 level by 2020, and to 80 percent below the 1990 level by 2050.

The Executive Order directed the secretary of the California Environmental Protection Agency (CalEPA) to coordinate a multi-agency effort to reduce GHG emissions to the target levels. The secretary will also submit biannual reports to the governor and state legislature describing (1) progress made toward reaching the emission targets, (2) impacts of global warming on California's resources, and (3) mitigation and adaptation plans to combat these impacts. To comply with the Executive Order, the secretary of CalEPA created a Climate Action Team made up of members from various state agencies and commissions. The Climate Action Team released its first report in March 2006 and continues to release periodic reports on progress. The report proposed to achieve the targets by building on voluntary actions of California businesses, local government and community actions, as well as through state incentive and regulatory programs.

Assembly Bill 32 - California Global Warming Solutions Act of 2006

AB 32 (Health and Safety Code Sections 38500, 38501, 28510, 38530, 38550, 38560, 38561–38565, 38570, 38571, 38574, 38580, 38590, 38592–38599) requires that statewide GHG emissions be reduced to 1990 levels by the year 2020. The gases that are regulated by AB 32 include CO_2, CH_4, N_2O, HFCs, PFCs, NF_3, and SF_6. The reduction to 1990 levels will be accomplished through an enforceable statewide cap on GHG emissions that will be phased in starting in 2012. To effectively implement the cap, AB 32 directs ARB to develop and implement regulations to reduce statewide GHG emissions from stationary sources. AB 32 specifies that regulations adopted in response to AB 1493 should be used to address GHG emissions from vehicles. However, AB 32 also includes language stating that if the AB 1493 regulations cannot be implemented, then ARB should develop new regulations to control vehicle GHG emissions under the authorization of AB 32.

AB 32 requires that ARB adopt a quantified cap on GHG emissions representing 1990 emissions levels and disclose how it arrives at the cap, institute a schedule to meet the emissions cap, and develop tracking, reporting, and enforcement mechanisms to ensure that the state achieves reductions in GHG emissions necessary to meet the cap. AB 32 also includes guidance to institute emissions reductions in an economically efficient manner and conditions to ensure that businesses and consumers are not unfairly affected by the reductions.

Climate Change Scoping Plan

In October 2008, ARB published its *Climate Change Proposed Scoping Plan*, which is the State's plan to achieve GHG reductions in California required by AB 32. This initial Scoping Plan contained the main strategies to be implemented in order to achieve the target emission levels identified in AB 32. The Scoping Plan included ARB-recommended GHG reductions for each emissions sector of the state's GHG inventory. The largest proposed GHG reduction recommendations were associated with improving emissions standards for light-duty vehicles, implementing the Low Carbon Fuel Standard program, implementation of energy efficiency measures in buildings and appliances, and the widespread development of combined heat and power systems, and developing a renewable portfolio standard for electricity production.

The Scoping Plan states that land use planning and urban growth decisions will play important roles in the state's GHG reductions because local governments have primary authority to plan, zone, approve, and permit how land is developed to accommodate population growth and the changing needs of their jurisdictions. ARB further acknowledges that decisions on how land is used will have large impacts on the

GHG emissions that will result from the transportation, housing, industry, forestry, water, agriculture, electricity, and natural gas emissions sectors. With regard to land use planning, the Scoping Plan expects approximately 5.0 MMT CO_2e will be achieved associated with implementation of Senate Bill 375, which is discussed further below.

The initial Scoping Plan was first approved by ARB on December 11, 2008 and is updated every five years. The first update of the Scoping Plan was approved by the ARB on May 22, 2014, which looked past 2020 to set mid-term goals (2030-2035) on the road to reaching the 2050 goals., The most recent update released by ARB is the *2017 Climate Change Scoping Plan*, which was released In November 2017. The *2017 Climate Change Scoping Plan* incorporates strategies for achieving the 2030 GHG-reduction target established in SB 32 and EO B-30-15.

Senate Bill 1078 and Governor's Order S-14-08 (California Renewables Portfolio Standards)

Senate Bill 1078 (Public Utilities Code Sections 387, 390.1, 399.25 and Article 16) addresses electricity supply and requires that retail sellers of electricity, including investor-owned utilities and community choice aggregators, provide a minimum 20 percent of their supply from renewable sources by 2017. This Senate Bill will affect statewide GHG emissions associated with electricity generation. In 2008, Governor Schwarzenegger signed Executive Order S-14-08, which set the Renewables Portfolio Standard target to 33 percent by 2020. It directed state government agencies and retail sellers of electricity to take all appropriate actions to implement this target. Executive Order S-14-08 was later superseded by Executive Order S-21-09 on September 15, 2009. Executive Order S-21-09 directed the ARB to adopt regulations requiring 33 percent of electricity sold in the State come from renewable energy by 2020. Statute SB X1-2 superceded this Executive Order in 2011, which obligated all California electricity providers, including investor-owned utilities and publicly owned utilities, to obtain at least 33 percent of their energy from renewable electrical generation facilities by 2020.

ARB is required by current law, AB 32 of 2006, to regulate sources of GHGs to meet a state goal of reducing GHG emissions to 1990 levels by 2020 and an 80 percent reduction of 1990 levels by 2050. The California Energy Commissions and California Public Utilities Commission serve in advisory roles to help ARB develop the regulations to administer the 33 percent by 2020 requirement. ARB is also authorized to increase the target and accelerate and expand the time frame.

Mandatory Reporting of GHG Emissions

The California Global Warming Solutions Act (AB 32, 2006) requires the reporting of GHGs by major sources to the ARB. Major sources required to report GHG emissions include industrial facilities, suppliers of transportation fuels, natural gas, natural gas liquids, liquefied petroleum gas, and carbon dioxide, operators of petroleum and natural gas systems, and electricity retail providers and marketers.

Cap-and-Trade Regulation

The cap-and-trade regulation is a key element in California's climate plan. It sets a statewide limit on sources responsible for 85 percent of California's GHG emissions and establishes a price signal needed to drive long-term investment in cleaner fuels and more efficient use of energy. The cap-and-trade rules came into effect on January 1, 2013, and apply to large electric power plants and large industrial plants. In 2015, fuel distributors, including distributors of heating and transportation fuels, also became subject to the cap-and-trade rules. At that stage, the program will encompass around 360 businesses throughout California and nearly 85 percent of the state's total GHG emissions.

Under the cap-and-trade regulation, companies must hold enough emission allowances to cover their emissions and are free to buy and sell allowances on the open market. California held its first auction of GHG allowances on November 14, 2012. California's GHG cap-and-trade system is projected to reduce GHG emissions to 1990 levels by the year 2020 and would achieve an approximate 80 percent reduction from 1990 levels by 2050.

Senate Bill 32

SB 32 was signed by Governor Brown on September 8, 2016. SB 32 effectively extends California's GHG emission-reduction goals from year 2020 to year 2030. This new emission-reduction target of 40 percent below 1990 levels by 2030 is intended to promote further GHG-reductions in support of the State's ultimate goal of reducing GHG emissions by 80 percent below 1990 levels by 2050. SB 32 also directs the ARB to update the Climate Change Scoping Plan to address this interim 2030 emission-reduction target.

Senate Bill 375

SB 375 requires Metropolitan Planning Organizations (MPOs) to adopt a sustainable communities strategy (SCS) or alternative planning strategy (APS) that will address land use allocation in that MPOs regional transportation plan. ARB, in consultation with MPOs, establishes regional reduction targets for GHGs emitted by passenger cars and light trucks for the years 2020 and 2035. These reduction targets will be updated every eight years but can be updated every four years if advancements in emissions technologies affect the reduction strategies to achieve the targets. ARB is also charged with reviewing each MPO's SCS or APS for consistency with its assigned targets. If MPOs do not meet the GHG reduction targets, funding for transportation projects may be withheld.

California Building Code

The California Building Code (CBC) contains standards that regulate the method of use, properties, performance, or types of materials used in the construction, alteration, improvement, repair, or rehabilitation of a building or other improvement to real property. The California Building Code is adopted every three years by the Building Standards Commission (BSC). In the interim, the BSC also adopts annual updates to make necessary mid-term corrections. The CBC standards apply statewide; however, a local jurisdiction may amend a CBC standard if it makes a finding that the amendment is reasonably necessary due to local climatic, geological, or topographical conditions.

Green Building Standards

In essence, green buildings standards are indistinguishable from any other building standards. Both standards are contained in the California Building Code and regulate the construction of new buildings and improvements. The only practical distinction between the two is that whereas the focus of traditional building standards has been protecting public health and safety, the focus of green building standards is to improve environmental performance.

AB 32, which mandates the reduction of GHG emissions in California to 1990 levels by 2020, increased the urgency around the adoption of green building standards. In its scoping plan for the implementation of AB 32, ARB identified energy use as the second largest contributor to California's GHG emissions, constituting roughly 25 percent of all such emissions. In recommending a green building strategy as one element of the scoping plan, ARB estimated that green building standards would reduce GHG emissions by approximately 26 MMT of CO_2e by 2020. The green buildings standards were most recently updated in 2016.

Senate Bill 97

Senate Bill 97 (SB 97) was enacted in 2007. SB 97 required OPR to develop, and the Natural Resources Agency to adopt, amendments to the CEQA Guidelines addressing the analysis and mitigation of GHG emissions. Those CEQA Guidelines amendments clarified several points, including the following:

- Lead agencies must analyze the GHG emissions of proposed projects and must reach a conclusion regarding the significance of those emissions.
- When a project's GHG emissions may be significant, lead agencies must consider a range of potential mitigation measures to reduce those emissions.
- Lead agencies must analyze potentially significant impacts associated with placing projects in hazardous locations, including locations potentially affected by climate change.
- Lead agencies may significantly streamline the analysis of GHGs on a project level by using a programmatic GHG emissions reduction plan meeting certain criteria.

- CEQA mandates analysis of a proposed project's potential energy use (including transportation-related energy), sources of energy supply and ways to reduce energy demand, including through the use of efficient transportation alternatives.

Short-Lived Climate Pollutant Reduction Strategy

In March 2017, the ARB adopted the *Short-Lived Climate Pollutant Reduction Strategy* (*SLCP Strategy*) establishing a path to decrease GHG emissions and displace fossil-based natural gas use. Strategies include avoiding landfill methane emissions by reducing the disposal of organics through edible food recovery, composting, in-vessel digestion, and other processes; and recovering methane from wastewater treatment facilities, and manure methane at dairies, and using the methane as a renewable source of natural gas to fuel vehicles or generate electricity. The *SLCP Strategy* also identifies steps to reduce natural gas leaks from oil and gas wells, pipelines, valves, and pumps to improve safety, avoid energy losses, and reduce methane emissions associated with natural gas use. Lastly, the *SLCP Strategy* also identifies measures that can reduce hydrofluorocarbon (HFC) emissions at national and international levels, in addition to State-level action that includes an incentive program to encourage the use of low-Global Warming Potential (GWP) refrigerants, and limitations on the use of high-GWP refrigerants in new refrigeration and air-conditioning equipment (ARB 2017).

SAN JOAQUIN VALLEY AIR POLLUTION CONTROL DISTRICT

SJVAPCD Climate Change Action Plan

On August 21, 2008, the SJVAPCD Governing Board approved the SJVAPCD's *Climate Change Action Plan* with the following goals and actions:

Goals:

- Assist local land-use agencies with California Environmental Quality Act (CEQA) issues relative to projects with GHG emissions increases.
- Assist Valley businesses in complying with mandates of AB 32.
- Ensure that climate protection measures do not cause increase in toxic or criteria pollutants that adversely impact public health or environmental justice communities.

Actions:

- Authorize the Air Pollution Control Officer to develop GHG significance threshold(s) or other mechanisms to address CEQA projects with GHG emissions increases. Begin the requisite public process, including public workshops, and develop recommendations for Governing Board consideration in the spring of 2009.
- Authorize the Air Pollution Control Officer to develop necessary regulations and instruments for establishment and administration of the San Joaquin Valley Carbon Exchange Bank for voluntary GHG reductions created in the Valley. Begin the requisite public process, including public workshops, and develop recommendations for Governing Board consideration in spring 2009.
- Authorize the Air Pollution Control Officer to enhance the SJVAPCD's existing criteria pollutant emissions inventory reporting system to allow businesses subject to AB32 emission reporting requirements to submit simultaneous streamlined reports to the SJVAPCD and the state of California with minimal duplication.
- Authorize the Air Pollution Control Officer to develop and administer voluntary GHG emission reduction agreements to mitigate proposed GHG increases from new projects.
- Direct the Air Pollution Control Officer to support climate protection measures that reduce GHG emissions as well as toxic and criteria pollutants. Oppose measures that result in a significant increase in toxic or criteria pollutant emissions in already impacted area.

SJVAPCD CEQA Greenhouse Gas Guidance.

On December 17, 2009, the SJVAPCD Governing Board adopted "Guidance for Valley Land-use Agencies in Addressing GHG Emission Impacts for New Projects under CEQA" and the policy, "District Policy—Addressing GHG Emission Impacts for Stationary Source Projects Under CEQA When Serving as the Lead Agency." The SJVAPCD concluded that the existing science is inadequate to support quantification of the impacts that project specific greenhouse gas emissions have on global climatic change. The SJVAPCD found

the effects of project-specific emissions to be cumulative, and without mitigation, that their incremental contribution to global climatic change could be considered cumulatively considerable. The SJVAPCD found that this cumulative impact is best addressed by requiring all projects to reduce their greenhouse gas emissions, whether through project design elements or mitigation.

The SJVAPCD's approach is intended to streamline the process of determining if project-specific greenhouse gas emissions would have a significant effect. Projects exempt from the requirements of CEQA, and projects complying with an approved plan or mitigation program would be determined to have a less than significant cumulative impact. Such plans or programs must be specified in law or adopted by the public agency with jurisdiction over the affected resources and have a certified final CEQA document.

Best performance standards (BPS) would be established according to performance-based determinations. Projects complying with BPS would not require specific quantification of greenhouse gas emissions and would be determined to have a less than significant cumulative impact for greenhouse gas emissions. Projects not complying with BPS would require quantification of greenhouse gas emissions and demonstration that greenhouse gas emissions have been reduced or mitigated by 29 percent, as targeted by ARB's AB 32 Scoping Plan. Furthermore, quantification of greenhouse gas emissions would be required for all projects for which the lead agency has determined that an Environmental Impact Report is required, regardless of whether the project incorporates Best Performance Standards.

For stationary source permitting projects, best performance standards are "the most stringent of the identified alternatives for control of greenhouse gas emissions, including type of equipment, design of equipment and operational and maintenance practices, which are achieved-in-practice for the identified service, operation, or emissions unit class." For development projects, best performance standards are "any combination of identified greenhouse gas emission reduction measures, including project design elements and land use decisions that reduce project specific greenhouse gas emission reductions by at least 29 percent compared with business as usual." The SJVAPCD proposes to create a list of all approved Best Performance Standards to help in the determination as to whether a proposed project has reduced its GHG emissions by 29 percent.

IMPACTS & MITIGATION MEASURES

METHODOLOGY

Short-term Impacts

Short-term construction emissions associated with the proposed project were calculated using the CalEEMod computer program. Modeling includes emissions generated during site preparation/grading, asphalt paving, facility construction, and application of architectural coatings. Detailed construction information, including construction schedules and equipment requirements, has not been identified for the proposed project. Default construction phases and equipment assumptions contained in the CalEEMod model were, therefore, relied upon for the calculation of construction-generated emissions. Construction is anticipated to begin in 2020. As previously noted, an estimated date of project construction has not yet been identified. Due to anticipated reductions in future fleet-average emission rates, emissions for post-year 2020 conditions would be less. Modeling assumptions and output files are included in Appendix A of this report.

Long-term Impacts

Long-term operational GHG emissions associated with the proposed project were calculated using the CalEEMod computer program. Modeling was conducted based on traffic data derived, in part, from the traffic analysis prepared for the proposed project (KDA 2020). Mobile-source emissions were conservatively based on the default fleet distribution assumptions contained in the model. To be conservative, all vehicle trips were assumed to be new trips and do not take into account existing trips associated with the existing facility. All other modeling assumptions were based on the default parameters contained in the CalEEMod computer model. As previously noted, an estimated date of project construction and opening have not yet been identified. Initial operation of the project is anticipated to begin in 2022. Due to anticipated reductions in future fleet-

average mobile-source and energy emission rates, emissions for post-year 2022 operational conditions would be less. Modeling assumptions and output files are included in Appendix A of this report.

THRESHOLDS OF SIGNIFICANCE

In accordance with Appendix G of the CEQA Guidelines Initial Study Checklist, a project would be considered to have a significant impact to climate change if it would:

a) Generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment; or,

b) Conflict with any applicable plan, policy or regulation of an agency adopted for the purpose of reducing the emissions of GHGs.

San Joaquin Valley Air Pollution Control District

In accordance with the SJVAPCD's *Guidance for Valley Land-use Agencies in Addressing GHG Emission Impacts for New Projects Under CEQA* (SJVAPCD 2009), a project would be considered to have a less than significant impact on climate change if it would comply with at least one of the following criteria:

- Comply with an approved GHG emission reduction plan or GHG mitigation program which avoids or substantially reduces GHG emissions within the geographic area in which the project is located. Such plans or programs must be specified in law or approved by the lead agency with jurisdiction over the affected resource and supported by a CEQA compliant environmental review document adopted by the lead agency, or
- Implement approved best performance standards, or
- Quantify project GHG emissions and reduce those emissions by at least 29 percent compared to "business as usual" (BAU).

The SJVAPCD has not yet adopted best performance standards for development projects. The quantification of project-generated GHG emissions in comparison to BAU conditions to determine consistency with AB 32's reduction goals is considered appropriate in some instances. However, based on the California Supreme Court's decision in *Center for Biological Diversity v. California Department of Fish and Wildlife and Newhall Land and Farming (2015) 224 Cal.App.4th 1105 (CBD vs. CDFW;* also known as the *"Newhall Ranch case")*, substantial evidence would need to be provided to document that project-level reductions in comparison to a BAU approach would be consistent with achieving AB 32's overall statewide reduction goal. Given that AB 32's statewide goal includes reductions that are not necessarily related to an individual development project, the use of this approach may be difficult to support given the lack of substantial evidence to adequately demonstrate a link between the data contained in the AB 32 Scoping Plan and individual development projects. Alternatively, the Court identified potential options for evaluating GHG impacts for individual development projects, which included the use of GHG efficiency metrics. In general, GHG efficiency metrics can be used to assess the GHG efficiency of an individual project based on a per capita basis or on a service population basis.

A GHG-efficiency threshold based on service population can be calculated by dividing the GHG emissions inventory goal (allowable emissions), by the estimated service population of the individual project. For most development projects, service population is traditionally defined as the sum of the number of employees and/or the number of residents provided by a project. However, this traditional definition of service population may not be applicable to all projects, depending on the end use. For instance, with regard to schools, the student and employee population is the primary generator of GHG emissions with a majority of the school's emissions being associated with student vehicle trips. Therefore, the calculated GHG efficiency of the proposed project was expanded to include the proposed student and employee population. GHG efficiency for the proposed project was calculated for initial opening year 2022, as well as, year 2030 to be consistent with the state's scoping plan GHG-reduction target year. In addition, GHG efficiency for the project was also calculated for the project's ultimate buildout year 2040. The methodology used for quantification of the GHG-efficiency threshold applied to the proposed project is summarized in Table 8. Project-generated GHG emissions that would exceed the efficiency threshold of 4.2 $MTCO_2e$ per service population ($MTCO_2e$/SP/year) in year 2022, 2.5 $MTCO_2e$/SP/year in year 2030, or 1.6 $MTCO_2e$/SP/year in year

2040 would be considered to have a potentially significant impact on the environment that could conflict with GHG-reduction planning efforts. To be conservative, construction-generated GHG emissions were amortized based on an estimated 30-year project life and included in annual operational GHG emissions estimates for comparison to these thresholds.

Table 8
Project-Level GHG Efficiency Threshold Calculation

	2022	2030	2040
Land Use Sectors GHG Emissions Target[1]	251,080,000	163,710,000	109,140,000
Population[2]	41,110,032	43,631,295	46,484,933
Employment[3]	19,249,460	20,795,940	22,729,040
Service Population	60,359,492	64,427,235	69,213,973
GHG Efficiency Threshold ($MTCO_2e$/SP/yr)	4.2	2.5	1.6

Based on AB 32 Scoping Plan's land use inventory sectors for years 2030 and 2040; Includes transportation sources. Takes into account the state's year 2030 and year 2050 GHG-reduction goals.

Employment data for interim years is estimated based on proportionality with population trends based on historical data.

1. *California Air Resources Board. 2007 (CARB). California 1990 Greenhouse Gas Emissions Level and 2020 Limit — by Sector and Activity (Land Use-driven sectors only) MMT CO2e - (based upon IPCC Fourth Assessment Report Global Warming Potentials).*
2. *California Department of Finance, Demographic Research Unit. 2019. Report P-1 "State Population Projections (2010 - 2060), Total Population by County".*
3. *California Employment Development Department. 2019. Employment Projections Labor Market Information Resources and Data, "CA Long-Term. 2016-2026 Statewide Employment Projections".*

PROJECT IMPACTS

Impact GHG-A. Would the project generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?

Implementation of the proposed project would contribute to increases of GHG emissions that are associated with global climate change. Short-term and long-term GHG emissions associated with the development of the proposed project are discussed in greater detail, as follows:

Short-term Greenhouse Gas Emissions

Short-term annual GHG emissions are summarized in Table 9. Based on the modeling conducted, annual emissions of GHGs associated with construction of the proposed project would total approximately 325 $MTCO_2e$. There would also be a small amount of GHG emissions from waste generated during construction; however, this amount is speculative. Actual emissions would vary, depending on various factors including construction schedules, equipment required, and activities conducted. Assuming an average project life of 30 years, amortized construction-generated GHG emissions would total approximately 11 $MTCO_2e$/yr. Amortized construction-generated GHG emissions were included in the operational GHG emissions inventory for the evaluation of project-generated GHG emissions (refer to Table 10).

Table 9
Short-Term Construction GHG Emissions

Construction Year	Total GHG Emissions ($MTCO_2e$)
Year 1	325.1
Year 2	1.1
Total:	325.1
Amortized Construction Emissions:	10.8

Based on CalEEMod computer modeling. Assumes a 30-year project life. Refer to Appendix A for modeling results and assumptions.

Long-term Greenhouse Gas Emissions

Estimated long-term increases in GHG emissions associated with the proposed project are summarized in Table 10. Based on the modeling conducted, operational GHG emissions would total approximately 718 $MTCO_2e$/year in 2022, 594 $MTCO_2e$/year in 2030, and 524 $MTCO_2e$/year in 2040. The calculated GHG efficiency for the proposed project would be 0.6 $MTCO_2e$/SP/yr in 2022, 0.4 $MTCO_2e$/SP/yr in 2030, and 0.3 $MTCO_2e$/SP/yr in 2040. The GHG efficiency for the proposed project would not exceed the thresholds of 4.2 $MTCO_2e$/SP/yr in 2022, 2.5 $MTCO_2e$/SP/yr in 2030, and 1.6 $MTCO_2e$/SP/yr in 2040.

Table 10
Long-term Operational GHG Emissions

Emissions Source	GHG Emissions ($MTCO_2e$ per year)[1]		
	Year 2022	Year 2030	Year 2040
Energy Use	80.2	60.9	37.0
Mobile Sources[2]	620.3	516.6	471.1
Waste Generation	13.8	13.8	13.8
Water Use[3]	3.3	2.6	1.6
Total Operational Emissions:	717.6	593.9	523.5
Amortized Construction Emissions:	10.8	10.8	10.8
Total Operational Emissions with Amortized Construction Emissions:	728.4	604.7	534.3
Service Population[4]:	1,110	1,333	1,612
Project GHG Efficiency ($MTCO_2e$/SP/yr)[4]:	0.7	0.5	0.3
GHG Efficiency Threshold ($MTCO_2e$/SP/yr):	4.2	2.5	1.6
Exceeds Threshold/Significant Impact?	No	No	No

1. Project-generated emissions were quantified using the CalEEMod computer program.
2. Fleet distribution data for the project is not available. Mobile-source emissions are conservatively based on default vehicle fleet distribution for Madera County, which includes all vehicle types/classifications, including medium and heavy-duty vehicles. Actual emissions would likely be lower.
3. Includes installation of low-flow water fixtures and water-efficient irrigation systems, per California's 2015 water-efficiency standards.
4. Based on combined student and employee populations for near-term and build-out conditions. Interim year 2030 conditions based on projected student population assuming an average annual service population increase of 28 individuals.
Refer to Appendix A for modeling results and assumptions.

As depicted in Table 10, operational GHG emissions associated with the proposed project would be predominantly associated with mobile sources. It is important to note that mobile-source emissions were conservatively calculated, based on the default fleet-distribution assumptions contained in the model, which includes medium and heavy-duty vehicles. Mobile sources associated with the proposed project would consist largely to light-duty vehicles. As a result, actual mobile-source emissions would be less. Nonetheless, because the GHG efficiency for the proposed project would not exceed the efficiency threshold of 4.2 $MTCO_2e$/SP/yr in 2022, 2.5 $MTCO_2e$/SP/yr in 2030, and 1.6 $MTCO_2e$/SP/yr in 2040. As a result, implementation of the proposed project would not result in an increase in GHG emissions that would have a significant impact on the environment or conflict with the State's future GHG-reduction goals. This impact would be considered ***less than significant***.

Impact GHG-B. Would the project conflict with any applicable plan, policy or regulation of an agency adopted for the purpose of reducing the emissions of greenhouse gases?

As noted in Impact GHG-A, the proposed project would not result in increased GHG emissions that would conflict with the State's GHG-reduction target goals. The proposed project would be designed to meet current building energy-efficiency standards, which includes measures to reduce overall energy use, water use, and waste generation. In comparison to existing operations, these improvements would help to further reduce the project's operational GHG emissions and would also help to reduce community-wide GHG emissions. It is also important to note that a large majority of the mobile-source emissions identified for the

proposed project already occur associated with the estimated 1,030 students that attend the existing facility. The proposed project would provide increased capacity to serve an estimated future student population of approximately 1,582 students. Providing services to serve an increased future student population may help to reduce future trips to colleges located in other nearby communities, thereby resulting in potential decreases in regional VMT and associated emissions. For these reasons, the proposed project would not conflict with local, regional, or state GHG-reduction planning efforts. This impact would be considered ***less than significant***.

REFERENCES

Air Quality

California Air Resources Board (ARB). Aerometric Data Division. January 1992. *California Surface Wind Climatology*.

———. 2000. *Diesel Risk Reduction Plan*. *Website URL*: http://www.arb.ca.gov/diesel/documents/rrpapp.htm.

———. *2013. California Almanac of Emissions & Air Quality*.

———. 2019(a). *Ambient Air Quality Standards*. *Website URL*: https://ww3.arb.ca.gov/research/aaqs/aaqs2.pdf.

———. 2020(a). Accessed September 3, 2010. *Air Quality Data*. *Website URL*: http://www.arb.ca.gov/adam/index.html

———. 2020(b).Accessed: March 10, 2020. *Inhalable Particulate Matter and Health (PM2.5 and PM10)*. Website URL: *https://ww2.arb.ca.gov/resources/inhalable-particulate-matter-and-health*

California Building Standards Commission (BSC). April 2016. CalGreen. *Website URL*: http://www.bsc.ca.gov.

California Department of Transportation (Caltrans). 1996. *Transportation Project-Level Carbon Monoxide Protocol. University of California Davis, Institute of Transportation Studies, UCD-ITS-RR-96-1*.

California Department of Conservation (DOC). Division of Mines and Geology. August 2000. *A General Location Guide for Ultramafic Rocks in California-Areas More Likely to Contain Naturally Occurring Asbestos. Open File Report 2000-19.*

California Energy Commission (CEC). Accessed: April 2016. Energy Commission Approves More Efficient Buildings for California's Future. *Website URL*: http://www.energy.ca.gov/releases/2012_releases/2012-05-31_energy_commission_approves_more_efficient_buildings_nr.html.

Centers for Disease Control and Prevention (CDC). Accessed: April 2016. *Valley Fever: Awareness is Key*. *Website URL*: http://www.cdc.gov/features/valleyfever/.

KD Anderson & Associates, Inc. (KDA). 2020. *Traffic Impact Analysis for State Center Community College District Oakhurst Center Relocation & Master Plan.*

Odell Planning & Research (OPR). 2019. Request for Preliminary Comment, *State Center Community College District Oakhurst Community College Center Project.*

San Joaquin Valley Air Pollution Control District (SJVAPCD). March 19, 2015. *Guidance for Assessing and Mitigating Air Quality Impacts.*

San Joaquin Valley Air Pollution Control District (SJVAPCD). Accessed: 2019. *Ambient Air Quality Standards and Valley Attainment Status*. *Website URL*: http://www.valleyair.org/aqinfo/attainment.htm.

U.S. Environmental Protection Agency (U.S. EPA). Accessed: November 12, 2014. *Technology Transfer Network – Pollutants and Sources. Website URL*: http://www.epa.gov/ttn/atw/pollsour.html.

Western Regional Climate Center. Accessed: May 27, 2018. Historical Period of Record Monthly Climate Summary. Fresno Yosemite International Airport, California. Website url: https://wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca3257.

Greenhouse Gas

California Air Resources Board (ARB). *Assembly Bill 32 Overview.* Accessed: April 2016. Website url: http://www.arb.ca.gov/cc/ab32/ab32.htm.

———. 2019(c). *California Greenhouse Gas Emissions Inventory: 2000-2016. Website URL:* https://ww3.arb.ca.gov/cc/inventory/inventory.htm.

———. May 22, 2014. *First Update to the Climate Change Scoping Plan.*

———. 2017. *Short-Lived Climate Pollutant Reduction Strategy. Website URL*: https://ww3.arb.ca.gov/cc/shortlived/meetings/03142017/final_slcp_report.pdf.

———. 2007. *California 1990 Greenhouse Gas Emissions Level and 2020 Limit — by Sector and Activity (Land Use-driven sectors only) MMT CO2e - (based upon IPCC Fourth Assessment Report Global Warming Potentials). Website URL:* https://ww3.arb.ca.gov/cc/inventory/pubs/reports/staff_report_1990_level.pdf.

California Building Standards Commission (BSC). April 2016. *CalGreen. Website URL*: http://www.documents.dgs.ca.gov/bsc/CALGreen/2010_CA_Green_Bldg.pdf.

California Department of Finance, Demographic Research Unit. 2019. *Report P-1 "State Population Projections (2010 - 2060), Total Population by County". Website URL:* http://www.dof.ca.gov/Forecasting/Demographics/Projections/.

California Department of Transportation (Caltrans). Accessed: April 2016. *Website URL*: http://www.dot.ca.gov/ser/forms.htm.

California Employment Development Department. 2019. *Employment Projections Labor Market Information Resources and Data, "CA Long-Term. 2016-2026 Statewide Employment Projections". Website URL:* https://www.labormarketinfo.edd.ca.gov/data/employment-projections.html.

International Panel on Climate Change (IPCC). 2007. *Fourth Assessment Report: Climate Change 2007*.

KD Anderson & Associates, Inc. (KDA). 2020. *Traffic Impact Analysis for State Center Community College District Oakhurst Center Relocation & Master Plan.*

Odell Planning & Research (OPR). 2019. Request for Preliminary Comment, *State Center Community College District Oakhurst Community College Center Project.*

United States Environmental Protection Agency (U.S. EPA). 2016. *Overview of Greenhouse Gas Emissions. Website URL*: https://www3.epa.gov/climatechange/ghgemissions/gases.html

———. June 4, 2012. *SF_6 Emission Reduction Partnership for Electric Power Systems: Basic Information. Website URL*: http://www.c2es.org/docUploads/mrv-workshop-rand.pdf.

———. 2010. *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2008.*

San Joaquin Valley Air Pollution Control District (SJVAPCD). December 2009. *Guidance for Valley Land-use Agencies in Addressing GHG Emission Impacts for New Projects under CEQA*.

APPENDIX A

EMISSIONS MODELING & DOCUMENTATION

Oakhurst Community College Center Project

Madera County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Junior College (2Yr)	21.15	1000sqft	0.49	21,148.00	0
Other Asphalt Surfaces	9.65	1000sqft	0.22	9,654.00	0
Parking Lot	159.00	Space	1.43	63,600.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.9	**Precipitation Freq (Days)**	51
Climate Zone	3			**Operational Year**	2022
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	458.64	**CH4 Intensity (lb/MWhr)**	0.021	**N2O Intensity (lb/MWhr)**	0.004

1.3 User Entered Comments & Non-Default Data

Oakhurst Community College Center Project - Madera County, Annual

Project Characteristics - Intensity factors are adjusted to opening year 2022 renewable portfolio standards.

Land Use - Project includes: 21,148 square feet of enclosed building area, 9,654 square feet of open covered area, and 159-stall parking lot. Population of 1,030 students and 24 faculty and staff.

Construction Phase -

Vehicle Trips - Trip generation rates provided by the project traffic engineer.

Energy Use -

Construction Off-road Equipment Mitigation - Includes the use of tier 3 diesel engines.

Area Mitigation -

Energy Mitigation - California energy commission's 2019 building energy efficiency standards.

Water Mitigation -

Table Name	Column Name	Default Value	New Value
tblAreaMitigation	UseLowVOCPaintParkingCheck	False	True
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	0	15
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	5.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	3.00
tblConstEquipMitigation	Tier	No Change	Tier 3

tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblLandUse	LandUseSquareFeet	21,150.00	21,148.00
tblLandUse	LandUseSquareFeet	9,650.00	9,654.00
tblProjectCharacteristics	CH4IntensityFactor	0.029	0.021
tblProjectCharacteristics	CO2IntensityFactor	641.35	458.64
tblProjectCharacteristics	N2OIntensityFactor	0.006	0.004
tblVehicleTrips	ST_TR	11.23	20.25
tblVehicleTrips	SU_TR	1.21	20.25
tblVehicleTrips	WD_TR	27.49	20.25

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2020	0.3447	2.2824	1.9455	3.7900e-003		0.1133	0.1823		0.1083	0.1314						325.1293
2021	0.1145	5.4200e-003	7.1900e-003	1.0000e-005		3.3000e-004	5.5000e-004		3.3000e-004	3.9000e-004						1.0944
Maximum	**0.3447**	**2.2824**	**1.9455**	**3.7900e-003**		**0.1133**	**0.1823**		**0.1083**	**0.1314**						**325.1293**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2020	0.1618	1.8035	2.0177	3.7900e-003		0.0963	0.1519		0.0962	0.1130						325.1290
2021	0.1139	4.8200e-003	7.2400e-003	1.0000e-005		3.3000e-004	5.6000e-004		3.3000e-004	3.9000e-004						1.0944
Maximum	**0.1618**	**1.8035**	**2.0177**	**3.7900e-003**		**0.0963**	**0.1519**		**0.0962**	**0.1130**						**325.1290**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**39.95**	**20.96**	**-3.70**	**0.00**	**0.00**	**14.91**	**16.61**	**0.00**	**11.08**	**13.93**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	1-1-2020	3-31-2020	0.4976	0.3469
2	4-1-2020	6-30-2020	0.7107	0.5356
3	7-1-2020	9-30-2020	0.7185	0.5415
4	10-1-2020	12-31-2020	0.6900	0.5279
5	1-1-2021	3-31-2021	0.1346	0.1333
		Highest	0.7185	0.5415

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.1037	2.0000e-005	1.7500e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005						3.6200e-003
Energy	2.5200e-003	0.0229	0.0192	1.4000e-004		1.7400e-003	1.7400e-003		1.7400e-003	1.7400e-003						80.1566
Mobile	0.1577	1.4215	1.5732	6.6800e-003		5.9600e-003	0.4181		5.6200e-003	0.1164						620.2631
Waste						0.0000	0.0000		0.0000	0.0000						13.8248
Water						0.0000	0.0000		0.0000	0.0000						3.7701
Total	**0.2639**	**1.4444**	**1.5942**	**6.8200e-003**		**7.7100e-003**	**0.4198**		**7.3700e-003**	**0.1181**						**718.0181**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.1037	2.0000e-005	1.7500e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005						3.6200e-003
Energy	1.8100e-003	0.0165	0.0138	1.0000e-004		1.2500e-003	1.2500e-003		1.2500e-003	1.2500e-003						60.0502
Mobile	0.1577	1.4215	1.5732	6.6800e-003		5.9600e-003	0.4181		5.6200e-003	0.1164						620.2631
Waste						0.0000	0.0000		0.0000	0.0000						13.8248
Water						0.0000	0.0000		0.0000	0.0000						3.2946
Total	**0.2632**	**1.4379**	**1.5888**	**6.7800e-003**		**7.2200e-003**	**0.4194**		**6.8800e-003**	**0.1176**						**697.4362**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.27**	**0.45**	**0.34**	**0.59**	**0.00**	**6.36**	**0.12**	**0.00**	**6.65**	**0.41**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**2.87**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Preparation	Site Preparation	1/29/2020	1/31/2020	5	3	
2	Grading	Grading	2/1/2020	2/10/2020	5	6	
3	Building Construction	Building Construction	2/11/2020	12/14/2020	5	220	
4	Paving	Paving	12/15/2020	12/28/2020	5	10	
5	Architectural Coating	Architectural Coating	12/29/2020	1/11/2021	5	10	

Acres of Grading (Site Preparation Phase): 4.5

Acres of Grading (Grading Phase): 3

Acres of Paving: 1.65

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 31,722; Non-Residential Outdoor: 10,574; Striped Parking Area: 4,395 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Site Preparation	Graders	1	8.00	187	0.41
Site Preparation	Scrapers	1	8.00	367	0.48
Site Preparation	Tractors/Loaders/Backhoes	1	7.00	97	0.37
Grading	Graders	1	8.00	187	0.41
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Tractors/Loaders/Backhoes	2	7.00	97	0.37
Building Construction	Cranes	1	8.00	231	0.29
Building Construction	Forklifts	2	7.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	1	6.00	97	0.37
Building Construction	Welders	3	8.00	46	0.45
Paving	Cement and Mortar Mixers	1	8.00	9	0.56
Paving	Pavers	1	8.00	130	0.42
Paving	Paving Equipment	1	8.00	132	0.36
Paving	Rollers	2	8.00	80	0.38
Paving	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Architectural Coating	Air Compressors	1	6.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Site Preparation	3	8.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	4	10.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	8	40.00	15.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	8.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Cleaner Engines for Construction Equipment

Use Soil Stabilizer

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

3.2 Site Preparation - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust						0.0000	2.3900e-003		0.0000	2.6000e-004						0.0000
Off-Road	2.4800e-003	0.0299	0.0169	4.0000e-005		1.1700e-003	1.1700e-003		1.0700e-003	1.0700e-003						3.2551
Total	**2.4800e-003**	**0.0299**	**0.0169**	**4.0000e-005**		**1.1700e-003**	**3.5600e-003**		**1.0700e-003**	**1.3300e-003**						**3.2551**

3.2 Site Preparation - 2020

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Vendor	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Worker	5.0000e-005	4.0000e-005	4.0000e-004	0.0000		0.0000	1.0000e-004		0.0000	3.0000e-005						0.0896
Total	**5.0000e-005**	**4.0000e-005**	**4.0000e-004**	**0.0000**		**0.0000**	**1.0000e-004**		**0.0000**	**3.0000e-005**						**0.0896**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust						0.0000	9.3000e-004		0.0000	1.0000e-004						0.0000
Off-Road	9.0000e-004	0.0178	0.0205	4.0000e-005		7.5000e-004	7.5000e-004		7.5000e-004	7.5000e-004						3.2551
Total	**9.0000e-004**	**0.0178**	**0.0205**	**4.0000e-005**		**7.5000e-004**	**1.6800e-003**		**7.5000e-004**	**8.5000e-004**						**3.2551**

3.2 Site Preparation - 2020

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Vendor	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Worker	5.0000e-005	4.0000e-005	4.0000e-004	0.0000		0.0000	1.0000e-004		0.0000	3.0000e-005						0.0896
Total	**5.0000e-005**	**4.0000e-005**	**4.0000e-004**	**0.0000**		**0.0000**	**1.0000e-004**		**0.0000**	**3.0000e-005**						**0.0896**

3.3 Grading - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust						0.0000	0.0197		0.0000	0.0101						0.0000
Off-Road	5.7700e-003	0.0640	0.0298	6.0000e-005		2.9700e-003	2.9700e-003		2.7300e-003	2.7300e-003						5.4773
Total	**5.7700e-003**	**0.0640**	**0.0298**	**6.0000e-005**		**2.9700e-003**	**0.0226**		**2.7300e-003**	**0.0128**						**5.4773**

3.3 Grading - 2020

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Vendor	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Worker	1.4000e-004	9.0000e-005	9.9000e-004	0.0000		0.0000	2.4000e-004		0.0000	7.0000e-005						0.2240
Total	**1.4000e-004**	**9.0000e-005**	**9.9000e-004**	**0.0000**		**0.0000**	**2.4000e-004**		**0.0000**	**7.0000e-005**						**0.2240**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust						0.0000	7.6700e-003		0.0000	3.9400e-003						0.0000
Off-Road	1.5100e-003	0.0307	0.0364	6.0000e-005		1.4600e-003	1.4600e-003		1.4600e-003	1.4600e-003						5.4773
Total	**1.5100e-003**	**0.0307**	**0.0364**	**6.0000e-005**		**1.4600e-003**	**9.1300e-003**		**1.4600e-003**	**5.4000e-003**						**5.4773**

3.3 Grading - 2020

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Vendor	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Worker	1.4000e-004	9.0000e-005	9.9000e-004	0.0000		0.0000	2.4000e-004		0.0000	7.0000e-005						0.2240
Total	**1.4000e-004**	**9.0000e-005**	**9.9000e-004**	**0.0000**		**0.0000**	**2.4000e-004**		**0.0000**	**7.0000e-005**						**0.2240**

3.4 Building Construction - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.2517	1.9177	1.6387	2.7500e-003		0.1043	0.1043		0.1000	0.1000						229.5678
Total	**0.2517**	**1.9177**	**1.6387**	**2.7500e-003**		**0.1043**	**0.1043**		**0.1000**	**0.1000**						**229.5678**

3.4 Building Construction - 2020

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Vendor	7.2100e-003	0.1967	0.0490	4.7000e-004		1.0700e-003	0.0120		1.0200e-003	4.1800e-003						44.8175
Worker	0.0200	0.0132	0.1450	3.6000e-004		2.9000e-004	0.0353		2.7000e-004	9.5800e-003						32.8504
Total	**0.0272**	**0.2100**	**0.1941**	**8.3000e-004**		**1.3600e-003**	**0.0473**		**1.2900e-003**	**0.0138**						**77.6680**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0785	1.4984	1.6949	2.7500e-003		0.0900	0.0900		0.0900	0.0900						229.5675
Total	**0.0785**	**1.4984**	**1.6949**	**2.7500e-003**		**0.0900**	**0.0900**		**0.0900**	**0.0900**						**229.5675**

3.4 Building Construction - 2020

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Vendor	7.2100e-003	0.1967	0.0490	4.7000e-004		1.0700e-003	0.0120		1.0200e-003	4.1800e-003						44.8175
Worker	0.0200	0.0132	0.1450	3.6000e-004		2.9000e-004	0.0353		2.7000e-004	9.5800e-003						32.8504
Total	**0.0272**	**0.2100**	**0.1941**	**8.3000e-004**		**1.3600e-003**	**0.0473**		**1.2900e-003**	**0.0138**						**77.6680**

3.5 Paving - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	5.7700e-003	0.0579	0.0590	9.0000e-005		3.2800e-003	3.2800e-003		3.0300e-003	3.0300e-003						7.8143
Paving	2.1600e-003					0.0000	0.0000		0.0000	0.0000						0.0000
Total	**7.9300e-003**	**0.0579**	**0.0590**	**9.0000e-005**		**3.2800e-003**	**3.2800e-003**		**3.0300e-003**	**3.0300e-003**						**7.8143**

3.5 Paving - 2020

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Vendor	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Worker	3.4000e-004	2.3000e-004	2.4700e-003	1.0000e-005		0.0000	6.0000e-004		0.0000	1.6000e-004						0.5600
Total	**3.4000e-004**	**2.3000e-004**	**2.4700e-003**	**1.0000e-005**		**0.0000**	**6.0000e-004**		**0.0000**	**1.6000e-004**						**0.5600**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	2.1000e-003	0.0443	0.0649	9.0000e-005		2.6500e-003	2.6500e-003		2.6500e-003	2.6500e-003						7.8143
Paving	2.1600e-003					0.0000	0.0000		0.0000	0.0000						0.0000
Total	**4.2600e-003**	**0.0443**	**0.0649**	**9.0000e-005**		**2.6500e-003**	**2.6500e-003**		**2.6500e-003**	**2.6500e-003**						**7.8143**

3.5 Paving - 2020

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Vendor	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Worker	3.4000e-004	2.3000e-004	2.4700e-003	1.0000e-005		0.0000	6.0000e-004		0.0000	1.6000e-004						0.5600
Total	**3.4000e-004**	**2.3000e-004**	**2.4700e-003**	**1.0000e-005**		**0.0000**	**6.0000e-004**		**0.0000**	**1.6000e-004**						**0.5600**

3.6 Architectural Coating - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.0487					0.0000	0.0000		0.0000	0.0000						0.0000
Off-Road	3.6000e-004	2.5300e-003	2.7500e-003	0.0000		1.7000e-004	1.7000e-004		1.7000e-004	1.7000e-004						0.3837
Total	**0.0491**	**2.5300e-003**	**2.7500e-003**	**0.0000**		**1.7000e-004**	**1.7000e-004**		**1.7000e-004**	**1.7000e-004**						**0.3837**

3.6 Architectural Coating - 2020

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Vendor	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Worker	5.0000e-005	4.0000e-005	4.0000e-004	0.0000		0.0000	1.0000e-004		0.0000	3.0000e-005						0.0896
Total	**5.0000e-005**	**4.0000e-005**	**4.0000e-004**	**0.0000**		**0.0000**	**1.0000e-004**		**0.0000**	**3.0000e-005**						**0.0896**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.0487					0.0000	0.0000		0.0000	0.0000						0.0000
Off-Road	9.0000e-005	2.0400e-003	2.7500e-003	0.0000		1.4000e-004	1.4000e-004		1.4000e-004	1.4000e-004						0.3837
Total	**0.0488**	**2.0400e-003**	**2.7500e-003**	**0.0000**		**1.4000e-004**	**1.4000e-004**		**1.4000e-004**	**1.4000e-004**						**0.3837**

3.6 Architectural Coating - 2020

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Vendor	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Worker	5.0000e-005	4.0000e-005	4.0000e-004	0.0000		0.0000	1.0000e-004		0.0000	3.0000e-005						0.0896
Total	**5.0000e-005**	**4.0000e-005**	**4.0000e-004**	**0.0000**		**0.0000**	**1.0000e-004**		**0.0000**	**3.0000e-005**						**0.0896**

3.6 Architectural Coating - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.1136					0.0000	0.0000		0.0000	0.0000						0.0000
Off-Road	7.7000e-004	5.3400e-003	6.3600e-003	1.0000e-005		3.3000e-004	3.3000e-004		3.3000e-004	3.3000e-004						0.8952
Total	**0.1144**	**5.3400e-003**	**6.3600e-003**	**1.0000e-005**		**3.3000e-004**	**3.3000e-004**		**3.3000e-004**	**3.3000e-004**						**0.8952**

3.6 Architectural Coating - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Vendor	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Worker	1.2000e-004	7.0000e-005	8.3000e-004	0.0000		0.0000	2.2000e-004		0.0000	6.0000e-005						0.1992
Total	**1.2000e-004**	**7.0000e-005**	**8.3000e-004**	**0.0000**		**0.0000**	**2.2000e-004**		**0.0000**	**6.0000e-005**						**0.1992**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.1136					0.0000	0.0000		0.0000	0.0000						0.0000
Off-Road	2.1000e-004	4.7500e-003	6.4100e-003	1.0000e-005		3.3000e-004	3.3000e-004		3.3000e-004	3.3000e-004						0.8952
Total	**0.1138**	**4.7500e-003**	**6.4100e-003**	**1.0000e-005**		**3.3000e-004**	**3.3000e-004**		**3.3000e-004**	**3.3000e-004**						**0.8952**

3.6 Architectural Coating - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Vendor	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Worker	1.2000e-004	7.0000e-005	8.3000e-004	0.0000		0.0000	2.2000e-004		0.0000	6.0000e-005						0.1992
Total	**1.2000e-004**	**7.0000e-005**	**8.3000e-004**	**0.0000**		**0.0000**	**2.2000e-004**		**0.0000**	**6.0000e-005**						**0.1992**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.1577	1.4215	1.5732	6.6800e-003		5.9600e-003	0.4181		5.6200e-003	0.1164						620.2631
Unmitigated	0.1577	1.4215	1.5732	6.6800e-003		5.9600e-003	0.4181		5.6200e-003	0.1164						620.2631

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Junior College (2Yr)	428.29	428.29	428.29	1,087,652	1,087,652
Other Asphalt Surfaces	0.00	0.00	0.00		
Parking Lot	0.00	0.00	0.00		
Total	428.29	428.29	428.29	1,087,652	1,087,652

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Junior College (2Yr)	9.50	7.30	7.30	6.40	88.60	5.00	92	7	1
Other Asphalt Surfaces	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0
Parking Lot	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Junior College (2Yr)	0.530844	0.031753	0.165023	0.117863	0.020860	0.005456	0.014179	0.100253	0.002735	0.001704	0.007139	0.001243	0.000949
Other Asphalt Surfaces	0.530844	0.031753	0.165023	0.117863	0.020860	0.005456	0.014179	0.100253	0.002735	0.001704	0.007139	0.001243	0.000949
Parking Lot	0.530844	0.031753	0.165023	0.117863	0.020860	0.005456	0.014179	0.100253	0.002735	0.001704	0.007139	0.001243	0.000949

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

Exceed Title 24

Install High Efficiency Lighting

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000						42.0395
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000						55.0790
NaturalGas Mitigated	1.8100e-003	0.0165	0.0138	1.0000e-004		1.2500e-003	1.2500e-003		1.2500e-003	1.2500e-003						18.0107
NaturalGas Unmitigated	2.5200e-003	0.0229	0.0192	1.4000e-004		1.7400e-003	1.7400e-003		1.7400e-003	1.7400e-003						25.0775

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Junior College (2Yr)	467159	2.5200e-003	0.0229	0.0192	1.4000e-004		1.7400e-003	1.7400e-003		1.7400e-003	1.7400e-003						25.0775
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Total		**2.5200e-003**	**0.0229**	**0.0192**	**1.4000e-004**		**1.7400e-003**	**1.7400e-003**		**1.7400e-003**	**1.7400e-003**						**25.0775**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Junior College (2Yr)	335513	1.8100e-003	0.0165	0.0138	1.0000e-004		1.2500e-003	1.2500e-003		1.2500e-003	1.2500e-003						18.0107
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Total		**1.8100e-003**	**0.0165**	**0.0138**	**1.0000e-004**		**1.2500e-003**	**1.2500e-003**		**1.2500e-003**	**1.2500e-003**						**18.0107**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Junior College (2Yr)	241510				50.4308
Other Asphalt Surfaces	0				0.0000
Parking Lot	22260				4.6482
Total					**55.0790**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Junior College (2Yr)	185743				38.7858
Other Asphalt Surfaces	0				0.0000
Parking Lot	15582				3.2538
Total					**42.0395**

6.0 Area Detail

6.1 Mitigation Measures Area

Use Low VOC Paint - Non-Residential Interior

Use Low VOC Paint - Non-Residential Exterior

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.1037	2.0000e-005	1.7500e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005						3.6200e-003
Unmitigated	0.1037	2.0000e-005	1.7500e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005						3.6200e-003

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0162					0.0000	0.0000		0.0000	0.0000						0.0000
Consumer Products	0.0873					0.0000	0.0000		0.0000	0.0000						0.0000
Landscaping	1.6000e-004	2.0000e-005	1.7500e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005						3.6200e-003
Total	**0.1037**	**2.0000e-005**	**1.7500e-003**	**0.0000**		**1.0000e-005**	**1.0000e-005**		**1.0000e-005**	**1.0000e-005**						**3.6200e-003**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0162					0.0000	0.0000		0.0000	0.0000						0.0000
Consumer Products	0.0873					0.0000	0.0000		0.0000	0.0000						0.0000
Landscaping	1.6000e-004	2.0000e-005	1.7500e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005						3.6200e-003
Total	**0.1037**	**2.0000e-005**	**1.7500e-003**	**0.0000**		**1.0000e-005**	**1.0000e-005**		**1.0000e-005**	**1.0000e-005**						**3.6200e-003**

7.0 Water Detail

7.1 Mitigation Measures Water

Install Low Flow Bathroom Faucet

Install Low Flow Kitchen Faucet

Install Low Flow Toilet

Use Water Efficient Irrigation System

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated				3.2946
Unmitigated				3.7701

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Junior College (2Yr)	1.03739 / 1.62258				3.7701
Other Asphalt Surfaces	0 / 0				0.0000
Parking Lot	0 / 0				0.0000
Total					**3.7701**

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Junior College (2Yr)	0.875555 / 1.5236				3.2946
Other Asphalt Surfaces	0 / 0				0.0000
Parking Lot	0 / 0				0.0000
Total					**3.2946**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated				13.8248
Unmitigated				13.8248

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Junior College (2Yr)	27.49				13.8248
Other Asphalt Surfaces	0				0.0000
Parking Lot	0				0.0000
Total					**13.8248**

8.2 Waste by Land Use

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Junior College (2Yr)	27.49				13.8248
Other Asphalt Surfaces	0				0.0000
Parking Lot	0				0.0000
Total					**13.8248**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Oakhurst Community College Center Project

Madera County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Junior College (2Yr)	21.15	1000sqft	0.49	21,148.00	0
Other Asphalt Surfaces	9.65	1000sqft	0.22	9,654.00	0
Parking Lot	159.00	Space	1.43	63,600.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.9	**Precipitation Freq (Days)**	51
Climate Zone	3			**Operational Year**	2022
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	458.64	**CH4 Intensity (lb/MWhr)**	0.021	**N2O Intensity (lb/MWhr)**	0.004

1.3 User Entered Comments & Non-Default Data

Oakhurst Community College Center Project - Madera County, Annual

Project Characteristics - Intensity factors are adjusted to opening year 2022 renewable portfolio standards.

Land Use - Project includes: 21,148 square feet of enclosed building area, 9,654 square feet of open covered area, and 159-stall parking lot. Population of 1,030 students and 24 faculty and staff.

Construction Phase -

Vehicle Trips - Trip generation rates provided by the project traffic engineer.

Energy Use -

Construction Off-road Equipment Mitigation - Includes the use of tier 3 diesel engines and level 3 diesel particulate filters.

Area Mitigation -

Energy Mitigation - California energy commission's 2019 building energy efficiency standards.

Water Mitigation -

Table Name	Column Name	Default Value	New Value
tblAreaMitigation	UseLowVOCPaintParkingCheck	False	True
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	0	15
tblConstEquipMitigation	DPF	No Change	Level 3
tblConstEquipMitigation	DPF	No Change	Level 3
tblConstEquipMitigation	DPF	No Change	Level 3
tblConstEquipMitigation	DPF	No Change	Level 3
tblConstEquipMitigation	DPF	No Change	Level 3
tblConstEquipMitigation	DPF	No Change	Level 3
tblConstEquipMitigation	DPF	No Change	Level 3
tblConstEquipMitigation	DPF	No Change	Level 3
tblConstEquipMitigation	DPF	No Change	Level 3
tblConstEquipMitigation	DPF	No Change	Level 3
tblConstEquipMitigation	DPF	No Change	Level 3
tblConstEquipMitigation	DPF	No Change	Level 3
tblConstEquipMitigation	DPF	No Change	Level 3
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00

tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	5.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	3.00
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblLandUse	LandUseSquareFeet	21,150.00	21,148.00
tblLandUse	LandUseSquareFeet	9,650.00	9,654.00

tblProjectCharacteristics	CH4IntensityFactor	0.029	0.021
tblProjectCharacteristics	CO2IntensityFactor	641.35	458.64
tblProjectCharacteristics	N2OIntensityFactor	0.006	0.004
tblVehicleTrips	ST_TR	11.23	20.25
tblVehicleTrips	SU_TR	1.21	20.25
tblVehicleTrips	WD_TR	27.49	20.25

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2020	0.3447	2.2824	1.9455	3.7900e-003		0.1133	0.1823		0.1083	0.1314						325.1293
2021	0.1145	5.4200e-003	7.1900e-003	1.0000e-005		3.3000e-004	5.5000e-004		3.3000e-004	3.9000e-004						1.0944
Maximum	**0.3447**	**2.2824**	**1.9455**	**3.7900e-003**		**0.1133**	**0.1823**		**0.1083**	**0.1314**						**325.1293**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2020	0.1618	1.8035	2.0177	3.7900e-003		0.0156	0.0712		0.0155	0.0323						325.1290
2021	0.1139	4.8200e-003	7.2400e-003	1.0000e-005		5.0000e-005	2.7000e-004		5.0000e-005	1.1000e-004						1.0944
Maximum	**0.1618**	**1.8035**	**2.0177**	**3.7900e-003**		**0.0156**	**0.0712**		**0.0155**	**0.0323**						**325.1290**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**39.95**	**20.96**	**-3.70**	**0.00**	**0.00**	**86.21**	**60.91**	**0.00**	**85.64**	**75.38**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	1-1-2020	3-31-2020	0.4976	0.3469
2	4-1-2020	6-30-2020	0.7107	0.5356
3	7-1-2020	9-30-2020	0.7185	0.5415
4	10-1-2020	12-31-2020	0.6900	0.5279
5	1-1-2021	3-31-2021	0.1346	0.1333
		Highest	0.7185	0.5415

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.1037	2.0000e-005	1.7500e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005						3.6200e-003
Energy	2.5200e-003	0.0229	0.0192	1.4000e-004		1.7400e-003	1.7400e-003		1.7400e-003	1.7400e-003						80.1566
Mobile	0.1577	1.4215	1.5732	6.6800e-003		5.9600e-003	0.4181		5.6200e-003	0.1164						620.2631
Waste						0.0000	0.0000		0.0000	0.0000						13.8248
Water						0.0000	0.0000		0.0000	0.0000						3.7701
Total	**0.2639**	**1.4444**	**1.5942**	**6.8200e-003**		**7.7100e-003**	**0.4198**		**7.3700e-003**	**0.1181**						**718.0181**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.1037	2.0000e-005	1.7500e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005						3.6200e-003
Energy	1.8100e-003	0.0165	0.0138	1.0000e-004		1.2500e-003	1.2500e-003		1.2500e-003	1.2500e-003						60.0502
Mobile	0.1577	1.4215	1.5732	6.6800e-003		5.9600e-003	0.4181		5.6200e-003	0.1164						620.2631
Waste						0.0000	0.0000		0.0000	0.0000						13.8248
Water						0.0000	0.0000		0.0000	0.0000						3.2946
Total	**0.2632**	**1.4379**	**1.5888**	**6.7800e-003**		**7.2200e-003**	**0.4194**		**6.8800e-003**	**0.1176**						**697.4362**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.27**	**0.45**	**0.34**	**0.59**	**0.00**	**6.36**	**0.12**	**0.00**	**6.65**	**0.41**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**2.87**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Preparation	Site Preparation	1/29/2020	1/31/2020	5	3	
2	Grading	Grading	2/1/2020	2/10/2020	5	6	
3	Building Construction	Building Construction	2/11/2020	12/14/2020	5	220	
4	Paving	Paving	12/15/2020	12/28/2020	5	10	
5	Architectural Coating	Architectural Coating	12/29/2020	1/11/2021	5	10	

Acres of Grading (Site Preparation Phase): 4.5

Acres of Grading (Grading Phase): 3

Acres of Paving: 1.65

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 31,722; Non-Residential Outdoor: 10,574; Striped Parking Area: 4,395 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Site Preparation	Graders	1	8.00	187	0.41
Site Preparation	Scrapers	1	8.00	367	0.48
Site Preparation	Tractors/Loaders/Backhoes	1	7.00	97	0.37
Grading	Graders	1	8.00	187	0.41
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Tractors/Loaders/Backhoes	2	7.00	97	0.37
Building Construction	Cranes	1	8.00	231	0.29
Building Construction	Forklifts	2	7.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	1	6.00	97	0.37
Building Construction	Welders	3	8.00	46	0.45
Paving	Cement and Mortar Mixers	1	8.00	9	0.56
Paving	Pavers	1	8.00	130	0.42
Paving	Paving Equipment	1	8.00	132	0.36
Paving	Rollers	2	8.00	80	0.38
Paving	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Architectural Coating	Air Compressors	1	6.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Site Preparation	3	8.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	4	10.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	8	40.00	15.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	8.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Cleaner Engines for Construction Equipment

Use DPF for Construction Equipment

Use Soil Stabilizer

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

3.2 Site Preparation - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust						0.0000	2.3900e-003		0.0000	2.6000e-004						0.0000
Off-Road	2.4800e-003	0.0299	0.0169	4.0000e-005		1.1700e-003	1.1700e-003		1.0700e-003	1.0700e-003						3.2551
Total	**2.4800e-003**	**0.0299**	**0.0169**	**4.0000e-005**		**1.1700e-003**	**3.5600e-003**		**1.0700e-003**	**1.3300e-003**						**3.2551**

3.2 Site Preparation - 2020

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Vendor	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Worker	5.0000e-005	4.0000e-005	4.0000e-004	0.0000		0.0000	1.0000e-004		0.0000	3.0000e-005						0.0896
Total	**5.0000e-005**	**4.0000e-005**	**4.0000e-004**	**0.0000**		**0.0000**	**1.0000e-004**		**0.0000**	**3.0000e-005**						**0.0896**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust						0.0000	9.3000e-004		0.0000	1.0000e-004						0.0000
Off-Road	9.0000e-004	0.0178	0.0205	4.0000e-005		1.1000e-004	1.1000e-004		1.1000e-004	1.1000e-004						3.2551
Total	**9.0000e-004**	**0.0178**	**0.0205**	**4.0000e-005**		**1.1000e-004**	**1.0400e-003**		**1.1000e-004**	**2.1000e-004**						**3.2551**

3.2 Site Preparation - 2020

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Vendor	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Worker	5.0000e-005	4.0000e-005	4.0000e-004	0.0000		0.0000	1.0000e-004		0.0000	3.0000e-005						0.0896
Total	**5.0000e-005**	**4.0000e-005**	**4.0000e-004**	**0.0000**		**0.0000**	**1.0000e-004**		**0.0000**	**3.0000e-005**						**0.0896**

3.3 Grading - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust						0.0000	0.0197		0.0000	0.0101						0.0000
Off-Road	5.7700e-003	0.0640	0.0298	6.0000e-005		2.9700e-003	2.9700e-003		2.7300e-003	2.7300e-003						5.4773
Total	**5.7700e-003**	**0.0640**	**0.0298**	**6.0000e-005**		**2.9700e-003**	**0.0226**		**2.7300e-003**	**0.0128**						**5.4773**

3.3 Grading - 2020

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Vendor	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Worker	1.4000e-004	9.0000e-005	9.9000e-004	0.0000		0.0000	2.4000e-004		0.0000	7.0000e-005						0.2240
Total	**1.4000e-004**	**9.0000e-005**	**9.9000e-004**	**0.0000**		**0.0000**	**2.4000e-004**		**0.0000**	**7.0000e-005**						**0.2240**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust						0.0000	7.6700e-003		0.0000	3.9400e-003						0.0000
Off-Road	1.5100e-003	0.0307	0.0364	6.0000e-005		2.2000e-004	2.2000e-004		2.2000e-004	2.2000e-004						5.4773
Total	**1.5100e-003**	**0.0307**	**0.0364**	**6.0000e-005**		**2.2000e-004**	**7.8900e-003**		**2.2000e-004**	**4.1600e-003**						**5.4773**

3.3 Grading - 2020

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Vendor	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Worker	1.4000e-004	9.0000e-005	9.9000e-004	0.0000		0.0000	2.4000e-004		0.0000	7.0000e-005						0.2240
Total	**1.4000e-004**	**9.0000e-005**	**9.9000e-004**	**0.0000**		**0.0000**	**2.4000e-004**		**0.0000**	**7.0000e-005**						**0.2240**

3.4 Building Construction - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.2517	1.9177	1.6387	2.7500e-003		0.1043	0.1043		0.1000	0.1000						229.5678
Total	**0.2517**	**1.9177**	**1.6387**	**2.7500e-003**		**0.1043**	**0.1043**		**0.1000**	**0.1000**						**229.5678**

3.4 Building Construction - 2020

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Vendor	7.2100e-003	0.1967	0.0490	4.7000e-004		1.0700e-003	0.0120		1.0200e-003	4.1800e-003						44.8175
Worker	0.0200	0.0132	0.1450	3.6000e-004		2.9000e-004	0.0353		2.7000e-004	9.5800e-003						32.8504
Total	**0.0272**	**0.2100**	**0.1941**	**8.3000e-004**		**1.3600e-003**	**0.0473**		**1.2900e-003**	**0.0138**						**77.6680**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0785	1.4984	1.6949	2.7500e-003		0.0135	0.0135		0.0135	0.0135						229.5675
Total	**0.0785**	**1.4984**	**1.6949**	**2.7500e-003**		**0.0135**	**0.0135**		**0.0135**	**0.0135**						**229.5675**

3.4 Building Construction - 2020

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Vendor	7.2100e-003	0.1967	0.0490	4.7000e-004		1.0700e-003	0.0120		1.0200e-003	4.1800e-003						44.8175
Worker	0.0200	0.0132	0.1450	3.6000e-004		2.9000e-004	0.0353		2.7000e-004	9.5800e-003						32.8504
Total	**0.0272**	**0.2100**	**0.1941**	**8.3000e-004**		**1.3600e-003**	**0.0473**		**1.2900e-003**	**0.0138**						**77.6680**

3.5 Paving - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	5.7700e-003	0.0579	0.0590	9.0000e-005		3.2800e-003	3.2800e-003		3.0300e-003	3.0300e-003						7.8143
Paving	2.1600e-003					0.0000	0.0000		0.0000	0.0000						0.0000
Total	**7.9300e-003**	**0.0579**	**0.0590**	**9.0000e-005**		**3.2800e-003**	**3.2800e-003**		**3.0300e-003**	**3.0300e-003**						**7.8143**

3.5 Paving - 2020

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Vendor	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Worker	3.4000e-004	2.3000e-004	2.4700e-003	1.0000e-005		0.0000	6.0000e-004		0.0000	1.6000e-004						0.5600
Total	**3.4000e-004**	**2.3000e-004**	**2.4700e-003**	**1.0000e-005**		**0.0000**	**6.0000e-004**		**0.0000**	**1.6000e-004**						**0.5600**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	2.1000e-003	0.0443	0.0649	9.0000e-005		4.0000e-004	4.0000e-004		4.0000e-004	4.0000e-004						7.8143
Paving	2.1600e-003					0.0000	0.0000		0.0000	0.0000						0.0000
Total	**4.2600e-003**	**0.0443**	**0.0649**	**9.0000e-005**		**4.0000e-004**	**4.0000e-004**		**4.0000e-004**	**4.0000e-004**						**7.8143**

3.5 Paving - 2020

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Vendor	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Worker	3.4000e-004	2.3000e-004	2.4700e-003	1.0000e-005		0.0000	6.0000e-004		0.0000	1.6000e-004						0.5600
Total	**3.4000e-004**	**2.3000e-004**	**2.4700e-003**	**1.0000e-005**		**0.0000**	**6.0000e-004**		**0.0000**	**1.6000e-004**						**0.5600**

3.6 Architectural Coating - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.0487					0.0000	0.0000		0.0000	0.0000						0.0000
Off-Road	3.6000e-004	2.5300e-003	2.7500e-003	0.0000		1.7000e-004	1.7000e-004		1.7000e-004	1.7000e-004						0.3837
Total	**0.0491**	**2.5300e-003**	**2.7500e-003**	**0.0000**		**1.7000e-004**	**1.7000e-004**		**1.7000e-004**	**1.7000e-004**						**0.3837**

3.6 Architectural Coating - 2020

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Vendor	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Worker	5.0000e-005	4.0000e-005	4.0000e-004	0.0000		0.0000	1.0000e-004		0.0000	3.0000e-005						0.0896
Total	**5.0000e-005**	**4.0000e-005**	**4.0000e-004**	**0.0000**		**0.0000**	**1.0000e-004**		**0.0000**	**3.0000e-005**						**0.0896**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.0487					0.0000	0.0000		0.0000	0.0000						0.0000
Off-Road	9.0000e-005	2.0400e-003	2.7500e-003	0.0000		2.0000e-005	2.0000e-005		2.0000e-005	2.0000e-005						0.3837
Total	**0.0488**	**2.0400e-003**	**2.7500e-003**	**0.0000**		**2.0000e-005**	**2.0000e-005**		**2.0000e-005**	**2.0000e-005**						**0.3837**

3.6 Architectural Coating - 2020

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Vendor	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Worker	5.0000e-005	4.0000e-005	4.0000e-004	0.0000		0.0000	1.0000e-004		0.0000	3.0000e-005						0.0896
Total	**5.0000e-005**	**4.0000e-005**	**4.0000e-004**	**0.0000**		**0.0000**	**1.0000e-004**		**0.0000**	**3.0000e-005**						**0.0896**

3.6 Architectural Coating - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.1136					0.0000	0.0000		0.0000	0.0000						0.0000
Off-Road	7.7000e-004	5.3400e-003	6.3600e-003	1.0000e-005		3.3000e-004	3.3000e-004		3.3000e-004	3.3000e-004						0.8952
Total	**0.1144**	**5.3400e-003**	**6.3600e-003**	**1.0000e-005**		**3.3000e-004**	**3.3000e-004**		**3.3000e-004**	**3.3000e-004**						**0.8952**

3.6 Architectural Coating - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Vendor	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Worker	1.2000e-004	7.0000e-005	8.3000e-004	0.0000		0.0000	2.2000e-004		0.0000	6.0000e-005						0.1992
Total	**1.2000e-004**	**7.0000e-005**	**8.3000e-004**	**0.0000**		**0.0000**	**2.2000e-004**		**0.0000**	**6.0000e-005**						**0.1992**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.1136					0.0000	0.0000		0.0000	0.0000						0.0000
Off-Road	2.1000e-004	4.7500e-003	6.4100e-003	1.0000e-005		5.0000e-005	5.0000e-005		5.0000e-005	5.0000e-005						0.8952
Total	**0.1138**	**4.7500e-003**	**6.4100e-003**	**1.0000e-005**		**5.0000e-005**	**5.0000e-005**		**5.0000e-005**	**5.0000e-005**						**0.8952**

3.6 Architectural Coating - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Vendor	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Worker	1.2000e-004	7.0000e-005	8.3000e-004	0.0000		0.0000	2.2000e-004		0.0000	6.0000e-005						0.1992
Total	**1.2000e-004**	**7.0000e-005**	**8.3000e-004**	**0.0000**		**0.0000**	**2.2000e-004**		**0.0000**	**6.0000e-005**						**0.1992**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.1577	1.4215	1.5732	6.6800e-003		5.9600e-003	0.4181		5.6200e-003	0.1164						620.2631
Unmitigated	0.1577	1.4215	1.5732	6.6800e-003		5.9600e-003	0.4181		5.6200e-003	0.1164						620.2631

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Junior College (2Yr)	428.29	428.29	428.29	1,087,652	1,087,652
Other Asphalt Surfaces	0.00	0.00	0.00		
Parking Lot	0.00	0.00	0.00		
Total	428.29	428.29	428.29	1,087,652	1,087,652

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Junior College (2Yr)	9.50	7.30	7.30	6.40	88.60	5.00	92	7	1
Other Asphalt Surfaces	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0
Parking Lot	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Junior College (2Yr)	0.530844	0.031753	0.165023	0.117863	0.020860	0.005456	0.014179	0.100253	0.002735	0.001704	0.007139	0.001243	0.000949
Other Asphalt Surfaces	0.530844	0.031753	0.165023	0.117863	0.020860	0.005456	0.014179	0.100253	0.002735	0.001704	0.007139	0.001243	0.000949
Parking Lot	0.530844	0.031753	0.165023	0.117863	0.020860	0.005456	0.014179	0.100253	0.002735	0.001704	0.007139	0.001243	0.000949

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

Exceed Title 24

Install High Efficiency Lighting

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000						42.0395
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000						55.0790
NaturalGas Mitigated	1.8100e-003	0.0165	0.0138	1.0000e-004		1.2500e-003	1.2500e-003		1.2500e-003	1.2500e-003						18.0107
NaturalGas Unmitigated	2.5200e-003	0.0229	0.0192	1.4000e-004		1.7400e-003	1.7400e-003		1.7400e-003	1.7400e-003						25.0775

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Junior College (2Yr)	467159	2.5200e-003	0.0229	0.0192	1.4000e-004		1.7400e-003	1.7400e-003		1.7400e-003	1.7400e-003						25.0775
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Total		**2.5200e-003**	**0.0229**	**0.0192**	**1.4000e-004**		**1.7400e-003**	**1.7400e-003**		**1.7400e-003**	**1.7400e-003**						**25.0775**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Junior College (2Yr)	335513	1.8100e-003	0.0165	0.0138	1.0000e-004		1.2500e-003	1.2500e-003		1.2500e-003	1.2500e-003						18.0107
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Total		**1.8100e-003**	**0.0165**	**0.0138**	**1.0000e-004**		**1.2500e-003**	**1.2500e-003**		**1.2500e-003**	**1.2500e-003**						**18.0107**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Junior College (2Yr)	241510				50.4308
Other Asphalt Surfaces	0				0.0000
Parking Lot	22260				4.6482
Total					**55.0790**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Junior College (2Yr)	185743				38.7858
Other Asphalt Surfaces	0				0.0000
Parking Lot	15582				3.2538
Total					**42.0395**

6.0 Area Detail

6.1 Mitigation Measures Area

Use Low VOC Paint - Non-Residential Interior

Use Low VOC Paint - Non-Residential Exterior

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.1037	2.0000e-005	1.7500e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005						3.6200e-003
Unmitigated	0.1037	2.0000e-005	1.7500e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005						3.6200e-003

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0162					0.0000	0.0000		0.0000	0.0000						0.0000
Consumer Products	0.0873					0.0000	0.0000		0.0000	0.0000						0.0000
Landscaping	1.6000e-004	2.0000e-005	1.7500e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005						3.6200e-003
Total	**0.1037**	**2.0000e-005**	**1.7500e-003**	**0.0000**		**1.0000e-005**	**1.0000e-005**		**1.0000e-005**	**1.0000e-005**						**3.6200e-003**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0162					0.0000	0.0000		0.0000	0.0000						0.0000
Consumer Products	0.0873					0.0000	0.0000		0.0000	0.0000						0.0000
Landscaping	1.6000e-004	2.0000e-005	1.7500e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005						3.6200e-003
Total	**0.1037**	**2.0000e-005**	**1.7500e-003**	**0.0000**		**1.0000e-005**	**1.0000e-005**		**1.0000e-005**	**1.0000e-005**						**3.6200e-003**

7.0 Water Detail

7.1 Mitigation Measures Water

Install Low Flow Bathroom Faucet

Install Low Flow Kitchen Faucet

Install Low Flow Toilet

Use Water Efficient Irrigation System

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated				3.2946
Unmitigated				3.7701

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Junior College (2Yr)	1.03739 / 1.62258				3.7701
Other Asphalt Surfaces	0 / 0				0.0000
Parking Lot	0 / 0				0.0000
Total					**3.7701**

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Junior College (2Yr)	0.875555 / 1.5236				3.2946
Other Asphalt Surfaces	0 / 0				0.0000
Parking Lot	0 / 0				0.0000
Total					**3.2946**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated				13.8248
Unmitigated				13.8248

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Junior College (2Yr)	27.49				13.8248
Other Asphalt Surfaces	0				0.0000
Parking Lot	0				0.0000
Total					**13.8248**

8.2 Waste by Land Use

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Junior College (2Yr)	27.49				13.8248
Other Asphalt Surfaces	0				0.0000
Parking Lot	0				0.0000
Total					**13.8248**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Oakhurst Community College Center Project

Madera County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Junior College (2Yr)	21.15	1000sqft	0.49	21,148.00	0
Other Asphalt Surfaces	9.65	1000sqft	0.22	9,654.00	0
Parking Lot	159.00	Space	1.43	63,600.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.9	**Precipitation Freq (Days)**	51
Climate Zone	3			**Operational Year**	2030
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	298.3	**CH4 Intensity (lb/MWhr)**	0.013	**N2O Intensity (lb/MWhr)**	0.003

1.3 User Entered Comments & Non-Default Data

Oakhurst Community College Center Project - Madera County, Annual

Project Characteristics - Intensity factors are adjusted to operational year 2030 renewable portfolio standards.

Land Use - Project includes: 21,148 square feet of enclosed building area, 9,654 square feet of open covered area, and 159-stall parking lot. Population of 1,582 students and 30 faculty and staff.

Construction Phase -

Vehicle Trips - Trip generation rates provided by the project traffic engineer.

Energy Use -

Construction Off-road Equipment Mitigation - Includes the use of tier 3 diesel engines.

Area Mitigation -

Energy Mitigation - California energy commission's 2019 building energy efficiency standards.

Water Mitigation -

Vehicle Emission Factors -

Vehicle Emission Factors -

Vehicle Emission Factors -

Waste Mitigation -

Table Name	Column Name	Default Value	New Value
tblAreaMitigation	UseLowVOCPaintParkingCheck	False	True
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	0	15
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00

tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	5.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	3.00
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblLandUse	LandUseSquareFeet	21,150.00	21,148.00
tblLandUse	LandUseSquareFeet	9,650.00	9,654.00
tblProjectCharacteristics	CH4IntensityFactor	0.029	0.013
tblProjectCharacteristics	CO2IntensityFactor	641.35	298.3
tblProjectCharacteristics	N2OIntensityFactor	0.006	0.003
tblVehicleTrips	ST_TR	11.23	20.25
tblVehicleTrips	SU_TR	1.21	20.25
tblVehicleTrips	WD_TR	27.49	20.25

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2020	0.3447	2.2824	1.9455	3.7900e-003		0.1133	0.1823		0.1083	0.1314						325.1293
2021	0.1145	5.4200e-003	7.1900e-003	1.0000e-005		3.3000e-004	5.5000e-004		3.3000e-004	3.9000e-004						1.0944
Maximum	**0.3447**	**2.2824**	**1.9455**	**3.7900e-003**		**0.1133**	**0.1823**		**0.1083**	**0.1314**						**325.1293**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2020	0.1618	1.8035	2.0177	3.7900e-003		0.0963	0.1519		0.0962	0.1130						325.1290
2021	0.1139	4.8200e-003	7.2400e-003	1.0000e-005		3.3000e-004	5.6000e-004		3.3000e-004	3.9000e-004						1.0944
Maximum	**0.1618**	**1.8035**	**2.0177**	**3.7900e-003**		**0.0963**	**0.1519**		**0.0962**	**0.1130**						**325.1290**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**39.95**	**20.96**	**-3.70**	**0.00**	**0.00**	**14.91**	**16.61**	**0.00**	**11.08**	**13.93**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	1-1-2020	3-31-2020	0.4976	0.3469
2	4-1-2020	6-30-2020	0.7107	0.5356
3	7-1-2020	9-30-2020	0.7185	0.5415
4	10-1-2020	12-31-2020	0.6900	0.5279
5	1-1-2021	3-31-2021	0.1346	0.1333
		Highest	0.7185	0.5415

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.1037	2.0000e-005	1.7400e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005						3.6100e-003
Energy	2.5200e-003	0.0229	0.0192	1.4000e-004		1.7400e-003	1.7400e-003		1.7400e-003	1.7400e-003						60.9132
Mobile	0.0966	0.9236	0.9602	5.5500e-003		3.1000e-003	0.4142		2.8900e-003	0.1132						516.6408
Waste						0.0000	0.0000		0.0000	0.0000						13.8248
Water						0.0000	0.0000		0.0000	0.0000						2.9462
Total	**0.2028**	**0.9465**	**0.9812**	**5.6900e-003**		**4.8500e-003**	**0.4159**		**4.6400e-003**	**0.1150**						**594.3287**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.1037	2.0000e-005	1.7400e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005						3.6100e-003
Energy	1.8100e-003	0.0165	0.0138	1.0000e-004		1.2500e-003	1.2500e-003		1.2500e-003	1.2500e-003						45.3626
Mobile	0.0966	0.9236	0.9602	5.5500e-003		3.1000e-003	0.4142		2.8900e-003	0.1132						516.6408
Waste						0.0000	0.0000		0.0000	0.0000						3.4562
Water						0.0000	0.0000		0.0000	0.0000						2.5599
Total	**0.2021**	**0.9401**	**0.9758**	**5.6500e-003**		**4.3600e-003**	**0.4154**		**4.1500e-003**	**0.1145**						**568.0231**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.35**	**0.68**	**0.55**	**0.70**	**0.00**	**10.10**	**0.12**	**0.00**	**10.56**	**0.43**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**4.43**

3.0 Construction Detail

Construction Phase

Oakhurst Community College Center Project - Madera County, Annual

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Preparation	Site Preparation	1/29/2020	1/31/2020	5	3	
2	Grading	Grading	2/1/2020	2/10/2020	5	6	
3	Building Construction	Building Construction	2/11/2020	12/14/2020	5	220	
4	Paving	Paving	12/15/2020	12/28/2020	5	10	
5	Architectural Coating	Architectural Coating	12/29/2020	1/11/2021	5	10	

Acres of Grading (Site Preparation Phase): 4.5

Acres of Grading (Grading Phase): 3

Acres of Paving: 1.65

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 31,722; Non-Residential Outdoor: 10,574; Striped Parking Area: 4,395 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Site Preparation	Graders	1	8.00	187	0.41
Site Preparation	Scrapers	1	8.00	367	0.48
Site Preparation	Tractors/Loaders/Backhoes	1	7.00	97	0.37
Grading	Graders	1	8.00	187	0.41
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Tractors/Loaders/Backhoes	2	7.00	97	0.37
Building Construction	Cranes	1	8.00	231	0.29
Building Construction	Forklifts	2	7.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	1	6.00	97	0.37
Building Construction	Welders	3	8.00	46	0.45
Paving	Cement and Mortar Mixers	1	8.00	9	0.56
Paving	Pavers	1	8.00	130	0.42
Paving	Paving Equipment	1	8.00	132	0.36
Paving	Rollers	2	8.00	80	0.38
Paving	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Architectural Coating	Air Compressors	1	6.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Site Preparation	3	8.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	4	10.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	8	40.00	15.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	8.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Cleaner Engines for Construction Equipment

Use Soil Stabilizer

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

3.2 Site Preparation - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust						0.0000	2.3900e-003		0.0000	2.6000e-004						0.0000
Off-Road	2.4800e-003	0.0299	0.0169	4.0000e-005		1.1700e-003	1.1700e-003		1.0700e-003	1.0700e-003						3.2551
Total	**2.4800e-003**	**0.0299**	**0.0169**	**4.0000e-005**		**1.1700e-003**	**3.5600e-003**		**1.0700e-003**	**1.3300e-003**						**3.2551**

3.2 Site Preparation - 2020

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Vendor	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Worker	5.0000e-005	4.0000e-005	4.0000e-004	0.0000		0.0000	1.0000e-004		0.0000	3.0000e-005						0.0896
Total	**5.0000e-005**	**4.0000e-005**	**4.0000e-004**	**0.0000**		**0.0000**	**1.0000e-004**		**0.0000**	**3.0000e-005**						**0.0896**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust						0.0000	9.3000e-004		0.0000	1.0000e-004						0.0000
Off-Road	9.0000e-004	0.0178	0.0205	4.0000e-005		7.5000e-004	7.5000e-004		7.5000e-004	7.5000e-004						3.2551
Total	**9.0000e-004**	**0.0178**	**0.0205**	**4.0000e-005**		**7.5000e-004**	**1.6800e-003**		**7.5000e-004**	**8.5000e-004**						**3.2551**

3.2 Site Preparation - 2020

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Vendor	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Worker	5.0000e-005	4.0000e-005	4.0000e-004	0.0000		0.0000	1.0000e-004		0.0000	3.0000e-005						0.0896
Total	**5.0000e-005**	**4.0000e-005**	**4.0000e-004**	**0.0000**		**0.0000**	**1.0000e-004**		**0.0000**	**3.0000e-005**						**0.0896**

3.3 Grading - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust						0.0000	0.0197		0.0000	0.0101						0.0000
Off-Road	5.7700e-003	0.0640	0.0298	6.0000e-005		2.9700e-003	2.9700e-003		2.7300e-003	2.7300e-003						5.4773
Total	**5.7700e-003**	**0.0640**	**0.0298**	**6.0000e-005**		**2.9700e-003**	**0.0226**		**2.7300e-003**	**0.0128**						**5.4773**

3.3 Grading - 2020

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Vendor	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Worker	1.4000e-004	9.0000e-005	9.9000e-004	0.0000		0.0000	2.4000e-004		0.0000	7.0000e-005						0.2240
Total	**1.4000e-004**	**9.0000e-005**	**9.9000e-004**	**0.0000**		**0.0000**	**2.4000e-004**		**0.0000**	**7.0000e-005**						**0.2240**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust						0.0000	7.6700e-003		0.0000	3.9400e-003						0.0000
Off-Road	1.5100e-003	0.0307	0.0364	6.0000e-005		1.4600e-003	1.4600e-003		1.4600e-003	1.4600e-003						5.4773
Total	**1.5100e-003**	**0.0307**	**0.0364**	**6.0000e-005**		**1.4600e-003**	**9.1300e-003**		**1.4600e-003**	**5.4000e-003**						**5.4773**

3.3 Grading - 2020

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Vendor	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Worker	1.4000e-004	9.0000e-005	9.9000e-004	0.0000		0.0000	2.4000e-004		0.0000	7.0000e-005						0.2240
Total	**1.4000e-004**	**9.0000e-005**	**9.9000e-004**	**0.0000**		**0.0000**	**2.4000e-004**		**0.0000**	**7.0000e-005**						**0.2240**

3.4 Building Construction - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.2517	1.9177	1.6387	2.7500e-003		0.1043	0.1043		0.1000	0.1000						229.5678
Total	**0.2517**	**1.9177**	**1.6387**	**2.7500e-003**		**0.1043**	**0.1043**		**0.1000**	**0.1000**						**229.5678**

3.4 Building Construction - 2020

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Vendor	7.2100e-003	0.1967	0.0490	4.7000e-004		1.0700e-003	0.0120		1.0200e-003	4.1800e-003						44.8175
Worker	0.0200	0.0132	0.1450	3.6000e-004		2.9000e-004	0.0353		2.7000e-004	9.5800e-003						32.8504
Total	**0.0272**	**0.2100**	**0.1941**	**8.3000e-004**		**1.3600e-003**	**0.0473**		**1.2900e-003**	**0.0138**						**77.6680**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0785	1.4984	1.6949	2.7500e-003		0.0900	0.0900		0.0900	0.0900						229.5675
Total	**0.0785**	**1.4984**	**1.6949**	**2.7500e-003**		**0.0900**	**0.0900**		**0.0900**	**0.0900**						**229.5675**

3.4 Building Construction - 2020

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Vendor	7.2100e-003	0.1967	0.0490	4.7000e-004		1.0700e-003	0.0120		1.0200e-003	4.1800e-003						44.8175
Worker	0.0200	0.0132	0.1450	3.6000e-004		2.9000e-004	0.0353		2.7000e-004	9.5800e-003						32.8504
Total	**0.0272**	**0.2100**	**0.1941**	**8.3000e-004**		**1.3600e-003**	**0.0473**		**1.2900e-003**	**0.0138**						**77.6680**

3.5 Paving - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	5.7700e-003	0.0579	0.0590	9.0000e-005		3.2800e-003	3.2800e-003		3.0300e-003	3.0300e-003						7.8143
Paving	2.1600e-003					0.0000	0.0000		0.0000	0.0000						0.0000
Total	**7.9300e-003**	**0.0579**	**0.0590**	**9.0000e-005**		**3.2800e-003**	**3.2800e-003**		**3.0300e-003**	**3.0300e-003**						**7.8143**

3.5 Paving - 2020

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Vendor	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Worker	3.4000e-004	2.3000e-004	2.4700e-003	1.0000e-005		0.0000	6.0000e-004		0.0000	1.6000e-004						0.5600
Total	**3.4000e-004**	**2.3000e-004**	**2.4700e-003**	**1.0000e-005**		**0.0000**	**6.0000e-004**		**0.0000**	**1.6000e-004**						**0.5600**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	2.1000e-003	0.0443	0.0649	9.0000e-005		2.6500e-003	2.6500e-003		2.6500e-003	2.6500e-003						7.8143
Paving	2.1600e-003					0.0000	0.0000		0.0000	0.0000						0.0000
Total	**4.2600e-003**	**0.0443**	**0.0649**	**9.0000e-005**		**2.6500e-003**	**2.6500e-003**		**2.6500e-003**	**2.6500e-003**						**7.8143**

3.5 Paving - 2020

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Vendor	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Worker	3.4000e-004	2.3000e-004	2.4700e-003	1.0000e-005		0.0000	6.0000e-004		0.0000	1.6000e-004						0.5600
Total	**3.4000e-004**	**2.3000e-004**	**2.4700e-003**	**1.0000e-005**		**0.0000**	**6.0000e-004**		**0.0000**	**1.6000e-004**						**0.5600**

3.6 Architectural Coating - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.0487					0.0000	0.0000		0.0000	0.0000						0.0000
Off-Road	3.6000e-004	2.5300e-003	2.7500e-003	0.0000		1.7000e-004	1.7000e-004		1.7000e-004	1.7000e-004						0.3837
Total	**0.0491**	**2.5300e-003**	**2.7500e-003**	**0.0000**		**1.7000e-004**	**1.7000e-004**		**1.7000e-004**	**1.7000e-004**						**0.3837**

3.6 Architectural Coating - 2020

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Vendor	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Worker	5.0000e-005	4.0000e-005	4.0000e-004	0.0000		0.0000	1.0000e-004		0.0000	3.0000e-005						0.0896
Total	**5.0000e-005**	**4.0000e-005**	**4.0000e-004**	**0.0000**		**0.0000**	**1.0000e-004**		**0.0000**	**3.0000e-005**						**0.0896**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.0487					0.0000	0.0000		0.0000	0.0000						0.0000
Off-Road	9.0000e-005	2.0400e-003	2.7500e-003	0.0000		1.4000e-004	1.4000e-004		1.4000e-004	1.4000e-004						0.3837
Total	**0.0488**	**2.0400e-003**	**2.7500e-003**	**0.0000**		**1.4000e-004**	**1.4000e-004**		**1.4000e-004**	**1.4000e-004**						**0.3837**

3.6 Architectural Coating - 2020

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Vendor	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Worker	5.0000e-005	4.0000e-005	4.0000e-004	0.0000		0.0000	1.0000e-004		0.0000	3.0000e-005						0.0896
Total	**5.0000e-005**	**4.0000e-005**	**4.0000e-004**	**0.0000**		**0.0000**	**1.0000e-004**		**0.0000**	**3.0000e-005**						**0.0896**

3.6 Architectural Coating - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.1136					0.0000	0.0000		0.0000	0.0000						0.0000
Off-Road	7.7000e-004	5.3400e-003	6.3600e-003	1.0000e-005		3.3000e-004	3.3000e-004		3.3000e-004	3.3000e-004						0.8952
Total	**0.1144**	**5.3400e-003**	**6.3600e-003**	**1.0000e-005**		**3.3000e-004**	**3.3000e-004**		**3.3000e-004**	**3.3000e-004**						**0.8952**

3.6 Architectural Coating - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Vendor	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Worker	1.2000e-004	7.0000e-005	8.3000e-004	0.0000		0.0000	2.2000e-004		0.0000	6.0000e-005						0.1992
Total	**1.2000e-004**	**7.0000e-005**	**8.3000e-004**	**0.0000**		**0.0000**	**2.2000e-004**		**0.0000**	**6.0000e-005**						**0.1992**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.1136					0.0000	0.0000		0.0000	0.0000						0.0000
Off-Road	2.1000e-004	4.7500e-003	6.4100e-003	1.0000e-005		3.3000e-004	3.3000e-004		3.3000e-004	3.3000e-004						0.8952
Total	**0.1138**	**4.7500e-003**	**6.4100e-003**	**1.0000e-005**		**3.3000e-004**	**3.3000e-004**		**3.3000e-004**	**3.3000e-004**						**0.8952**

3.6 Architectural Coating - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Vendor	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Worker	1.2000e-004	7.0000e-005	8.3000e-004	0.0000		0.0000	2.2000e-004		0.0000	6.0000e-005						0.1992
Total	**1.2000e-004**	**7.0000e-005**	**8.3000e-004**	**0.0000**		**0.0000**	**2.2000e-004**		**0.0000**	**6.0000e-005**						**0.1992**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0966	0.9236	0.9602	5.5500e-003		3.1000e-003	0.4142		2.8900e-003	0.1132						516.6408
Unmitigated	0.0966	0.9236	0.9602	5.5500e-003		3.1000e-003	0.4142		2.8900e-003	0.1132						516.6408

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Junior College (2Yr)	428.29	428.29	428.29	1,087,652	1,087,652
Other Asphalt Surfaces	0.00	0.00	0.00		
Parking Lot	0.00	0.00	0.00		
Total	428.29	428.29	428.29	1,087,652	1,087,652

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Junior College (2Yr)	9.50	7.30	7.30	6.40	88.60	5.00	92	7	1
Other Asphalt Surfaces	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0
Parking Lot	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Junior College (2Yr)	0.570188	0.028691	0.167603	0.094255	0.011593	0.003852	0.013136	0.098790	0.002559	0.001500	0.006160	0.001107	0.000564
Other Asphalt Surfaces	0.570188	0.028691	0.167603	0.094255	0.011593	0.003852	0.013136	0.098790	0.002559	0.001500	0.006160	0.001107	0.000564
Parking Lot	0.570188	0.028691	0.167603	0.094255	0.011593	0.003852	0.013136	0.098790	0.002559	0.001500	0.006160	0.001107	0.000564

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

Exceed Title 24

Install High Efficiency Lighting

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000						27.3519
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000						35.8357
NaturalGas Mitigated	1.8100e-003	0.0165	0.0138	1.0000e-004		1.2500e-003	1.2500e-003		1.2500e-003	1.2500e-003						18.0107
NaturalGas Unmitigated	2.5200e-003	0.0229	0.0192	1.4000e-004		1.7400e-003	1.7400e-003		1.7400e-003	1.7400e-003						25.0775

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Junior College (2Yr)	467159	2.5200e-003	0.0229	0.0192	1.4000e-004		1.7400e-003	1.7400e-003		1.7400e-003	1.7400e-003						25.0775
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Total		**2.5200e-003**	**0.0229**	**0.0192**	**1.4000e-004**		**1.7400e-003**	**1.7400e-003**		**1.7400e-003**	**1.7400e-003**						**25.0775**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Junior College (2Yr)	335513	1.8100e-003	0.0165	0.0138	1.0000e-004		1.2500e-003	1.2500e-003		1.2500e-003	1.2500e-003						18.0107
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Total		**1.8100e-003**	**0.0165**	**0.0138**	**1.0000e-004**		**1.2500e-003**	**1.2500e-003**		**1.2500e-003**	**1.2500e-003**						**18.0107**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Junior College (2Yr)	241510				32.8115
Other Asphalt Surfaces	0				0.0000
Parking Lot	22260				3.0242
Total					**35.8357**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Junior College (2Yr)	185743				25.2349
Other Asphalt Surfaces	0				0.0000
Parking Lot	15582				2.1170
Total					**27.3519**

6.0 Area Detail

6.1 Mitigation Measures Area

Use Low VOC Paint - Non-Residential Interior

Use Low VOC Paint - Non-Residential Exterior

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.1037	2.0000e-005	1.7400e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005						3.6100e-003
Unmitigated	0.1037	2.0000e-005	1.7400e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005						3.6100e-003

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0162					0.0000	0.0000		0.0000	0.0000						0.0000
Consumer Products	0.0873					0.0000	0.0000		0.0000	0.0000						0.0000
Landscaping	1.6000e-004	2.0000e-005	1.7400e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005						3.6100e-003
Total	**0.1037**	**2.0000e-005**	**1.7400e-003**	**0.0000**		**1.0000e-005**	**1.0000e-005**		**1.0000e-005**	**1.0000e-005**						**3.6100e-003**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0162					0.0000	0.0000		0.0000	0.0000						0.0000
Consumer Products	0.0873					0.0000	0.0000		0.0000	0.0000						0.0000
Landscaping	1.6000e-004	2.0000e-005	1.7400e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005						3.6100e-003
Total	**0.1037**	**2.0000e-005**	**1.7400e-003**	**0.0000**		**1.0000e-005**	**1.0000e-005**		**1.0000e-005**	**1.0000e-005**						**3.6100e-003**

7.0 Water Detail

7.1 Mitigation Measures Water

Install Low Flow Bathroom Faucet

Install Low Flow Kitchen Faucet

Install Low Flow Toilet

Use Water Efficient Irrigation System

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated				2.5599
Unmitigated				2.9462

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Junior College (2Yr)	1.03739 / 1.62258				2.9462
Other Asphalt Surfaces	0 / 0				0.0000
Parking Lot	0 / 0				0.0000
Total					**2.9462**

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Junior College (2Yr)	0.875555 / 1.5236				2.5599
Other Asphalt Surfaces	0 / 0				0.0000
Parking Lot	0 / 0				0.0000
Total					**2.5599**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Institute Recycling and Composting Services

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated				3.4562
Unmitigated				13.8248

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Junior College (2Yr)	27.49				13.8248
Other Asphalt Surfaces	0				0.0000
Parking Lot	0				0.0000
Total					**13.8248**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Junior College (2Yr)	6.8725				3.4562
Other Asphalt Surfaces	0				0.0000
Parking Lot	0				0.0000
Total					**3.4562**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Oakhurst Community College Center Project

Madera County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Junior College (2Yr)	21.15	1000sqft	0.49	21,148.00	0
Other Asphalt Surfaces	9.65	1000sqft	0.22	9,654.00	0
Parking Lot	159.00	Space	1.43	63,600.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.9	**Precipitation Freq (Days)**	51
Climate Zone	3			**Operational Year**	2040
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	99.43	**CH4 Intensity (lb/MWhr)**	0.004	**N2O Intensity (lb/MWhr)**	0.001

1.3 User Entered Comments & Non-Default Data

Oakhurst Community College Center Project - Madera County, Annual

Project Characteristics - Intensity factors are adjusted to build out year 2040 renewable portfolio standards.

Land Use - Project includes: 21,148 square feet of enclosed building area, 9,654 square feet of open covered area, and 159-stall parking lot. Population of 1,582 students and 30 faculty and staff.

Construction Phase -

Vehicle Trips - Trip generation rates provided by the project traffic engineer.

Energy Use -

Construction Off-road Equipment Mitigation - Includes the use of tier 3 diesel engines.

Area Mitigation -

Energy Mitigation - California energy commission's 2019 building energy efficiency standards.

Water Mitigation -

Table Name	Column Name	Default Value	New Value
tblAreaMitigation	UseLowVOCPaintParkingCheck	False	True
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	0	15
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	5.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	3.00
tblConstEquipMitigation	Tier	No Change	Tier 3

tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblLandUse	LandUseSquareFeet	21,150.00	21,148.00
tblLandUse	LandUseSquareFeet	9,650.00	9,654.00
tblProjectCharacteristics	CH4IntensityFactor	0.029	0.004
tblProjectCharacteristics	CO2IntensityFactor	641.35	99.43
tblProjectCharacteristics	N2OIntensityFactor	0.006	0.001
tblVehicleTrips	ST_TR	11.23	20.25
tblVehicleTrips	SU_TR	1.21	20.25
tblVehicleTrips	WD_TR	27.49	20.25

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2020	0.3447	2.2824	1.9455	3.7900e-003		0.1133	0.1823		0.1083	0.1314						325.1293
2021	0.1145	5.4200e-003	7.1900e-003	1.0000e-005		3.3000e-004	5.5000e-004		3.3000e-004	3.9000e-004						1.0944
Maximum	**0.3447**	**2.2824**	**1.9455**	**3.7900e-003**		**0.1133**	**0.1823**		**0.1083**	**0.1314**						**325.1293**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2020	0.1618	1.8035	2.0177	3.7900e-003		0.0963	0.1519		0.0962	0.1130						325.1290
2021	0.1139	4.8200e-003	7.2400e-003	1.0000e-005		3.3000e-004	5.6000e-004		3.3000e-004	3.9000e-004						1.0944
Maximum	**0.1618**	**1.8035**	**2.0177**	**3.7900e-003**		**0.0963**	**0.1519**		**0.0962**	**0.1130**						**325.1290**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**39.95**	**20.96**	**-3.70**	**0.00**	**0.00**	**14.91**	**16.61**	**0.00**	**11.08**	**13.93**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	1-1-2020	3-31-2020	0.4976	0.3469
2	4-1-2020	6-30-2020	0.7107	0.5356
3	7-1-2020	9-30-2020	0.7185	0.5415
4	10-1-2020	12-31-2020	0.6900	0.5279
5	1-1-2021	3-31-2021	0.1346	0.1333
		Highest	0.7185	0.5415

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.1037	2.0000e-005	1.7300e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005						3.6100e-003
Energy	2.5200e-003	0.0229	0.0192	1.4000e-004		1.7400e-003	1.7400e-003		1.7400e-003	1.7400e-003						37.0214
Mobile	0.0687	0.8252	0.7047	5.0500e-003		1.9200e-003	0.4123		1.7900e-003	0.1119						471.0905
Waste						0.0000	0.0000		0.0000	0.0000						13.8248
Water						0.0000	0.0000		0.0000	0.0000						1.9234
Total	**0.1749**	**0.8481**	**0.7257**	**5.1900e-003**		**3.6700e-003**	**0.4141**		**3.5400e-003**	**0.1136**						**523.8637**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.1037	2.0000e-005	1.7300e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005						3.6100e-003
Energy	1.8100e-003	0.0165	0.0138	1.0000e-004		1.2500e-003	1.2500e-003		1.2500e-003	1.2500e-003						27.1269
Mobile	0.0687	0.8252	0.7047	5.0500e-003		1.9200e-003	0.4123		1.7900e-003	0.1119						471.0905
Waste						0.0000	0.0000		0.0000	0.0000						13.8248
Water						0.0000	0.0000		0.0000	0.0000						1.6478
Total	**0.1742**	**0.8417**	**0.7202**	**5.1500e-003**		**3.1800e-003**	**0.4136**		**3.0500e-003**	**0.1131**						**513.6936**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.41**	**0.76**	**0.75**	**0.77**	**0.00**	**13.35**	**0.12**	**0.00**	**13.84**	**0.43**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1.94**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Preparation	Site Preparation	1/29/2020	1/31/2020	5	3	
2	Grading	Grading	2/1/2020	2/10/2020	5	6	
3	Building Construction	Building Construction	2/11/2020	12/14/2020	5	220	
4	Paving	Paving	12/15/2020	12/28/2020	5	10	
5	Architectural Coating	Architectural Coating	12/29/2020	1/11/2021	5	10	

Acres of Grading (Site Preparation Phase): 4.5

Acres of Grading (Grading Phase): 3

Acres of Paving: 1.65

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 31,722; Non-Residential Outdoor: 10,574; Striped Parking Area: 4,395 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Site Preparation	Graders	1	8.00	187	0.41
Site Preparation	Scrapers	1	8.00	367	0.48
Site Preparation	Tractors/Loaders/Backhoes	1	7.00	97	0.37
Grading	Graders	1	8.00	187	0.41
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Tractors/Loaders/Backhoes	2	7.00	97	0.37
Building Construction	Cranes	1	8.00	231	0.29
Building Construction	Forklifts	2	7.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	1	6.00	97	0.37
Building Construction	Welders	3	8.00	46	0.45
Paving	Cement and Mortar Mixers	1	8.00	9	0.56
Paving	Pavers	1	8.00	130	0.42
Paving	Paving Equipment	1	8.00	132	0.36
Paving	Rollers	2	8.00	80	0.38
Paving	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Architectural Coating	Air Compressors	1	6.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Site Preparation	3	8.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	4	10.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	8	40.00	15.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	8.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Cleaner Engines for Construction Equipment

Use Soil Stabilizer

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

3.2 Site Preparation - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust						0.0000	2.3900e-003		0.0000	2.6000e-004						0.0000
Off-Road	2.4800e-003	0.0299	0.0169	4.0000e-005		1.1700e-003	1.1700e-003		1.0700e-003	1.0700e-003						3.2551
Total	**2.4800e-003**	**0.0299**	**0.0169**	**4.0000e-005**		**1.1700e-003**	**3.5600e-003**		**1.0700e-003**	**1.3300e-003**						**3.2551**

3.2 Site Preparation - 2020

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Vendor	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Worker	5.0000e-005	4.0000e-005	4.0000e-004	0.0000		0.0000	1.0000e-004		0.0000	3.0000e-005						0.0896
Total	**5.0000e-005**	**4.0000e-005**	**4.0000e-004**	**0.0000**		**0.0000**	**1.0000e-004**		**0.0000**	**3.0000e-005**						**0.0896**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust						0.0000	9.3000e-004		0.0000	1.0000e-004						0.0000
Off-Road	9.0000e-004	0.0178	0.0205	4.0000e-005		7.5000e-004	7.5000e-004		7.5000e-004	7.5000e-004						3.2551
Total	**9.0000e-004**	**0.0178**	**0.0205**	**4.0000e-005**		**7.5000e-004**	**1.6800e-003**		**7.5000e-004**	**8.5000e-004**						**3.2551**

3.2 Site Preparation - 2020

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Vendor	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Worker	5.0000e-005	4.0000e-005	4.0000e-004	0.0000		0.0000	1.0000e-004		0.0000	3.0000e-005						0.0896
Total	**5.0000e-005**	**4.0000e-005**	**4.0000e-004**	**0.0000**		**0.0000**	**1.0000e-004**		**0.0000**	**3.0000e-005**						**0.0896**

3.3 Grading - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust						0.0000	0.0197		0.0000	0.0101						0.0000
Off-Road	5.7700e-003	0.0640	0.0298	6.0000e-005		2.9700e-003	2.9700e-003		2.7300e-003	2.7300e-003						5.4773
Total	**5.7700e-003**	**0.0640**	**0.0298**	**6.0000e-005**		**2.9700e-003**	**0.0226**		**2.7300e-003**	**0.0128**						**5.4773**

3.3 Grading - 2020

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Vendor	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Worker	1.4000e-004	9.0000e-005	9.9000e-004	0.0000		0.0000	2.4000e-004		0.0000	7.0000e-005						0.2240
Total	**1.4000e-004**	**9.0000e-005**	**9.9000e-004**	**0.0000**		**0.0000**	**2.4000e-004**		**0.0000**	**7.0000e-005**						**0.2240**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust						0.0000	7.6700e-003		0.0000	3.9400e-003						0.0000
Off-Road	1.5100e-003	0.0307	0.0364	6.0000e-005		1.4600e-003	1.4600e-003		1.4600e-003	1.4600e-003						5.4773
Total	**1.5100e-003**	**0.0307**	**0.0364**	**6.0000e-005**		**1.4600e-003**	**9.1300e-003**		**1.4600e-003**	**5.4000e-003**						**5.4773**

3.3 Grading - 2020

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Vendor	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Worker	1.4000e-004	9.0000e-005	9.9000e-004	0.0000		0.0000	2.4000e-004		0.0000	7.0000e-005						0.2240
Total	**1.4000e-004**	**9.0000e-005**	**9.9000e-004**	**0.0000**		**0.0000**	**2.4000e-004**		**0.0000**	**7.0000e-005**						**0.2240**

3.4 Building Construction - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.2517	1.9177	1.6387	2.7500e-003		0.1043	0.1043		0.1000	0.1000						229.5678
Total	**0.2517**	**1.9177**	**1.6387**	**2.7500e-003**		**0.1043**	**0.1043**		**0.1000**	**0.1000**						**229.5678**

3.4 Building Construction - 2020

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Vendor	7.2100e-003	0.1967	0.0490	4.7000e-004		1.0700e-003	0.0120		1.0200e-003	4.1800e-003						44.8175
Worker	0.0200	0.0132	0.1450	3.6000e-004		2.9000e-004	0.0353		2.7000e-004	9.5800e-003						32.8504
Total	**0.0272**	**0.2100**	**0.1941**	**8.3000e-004**		**1.3600e-003**	**0.0473**		**1.2900e-003**	**0.0138**						**77.6680**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0785	1.4984	1.6949	2.7500e-003		0.0900	0.0900		0.0900	0.0900						229.5675
Total	**0.0785**	**1.4984**	**1.6949**	**2.7500e-003**		**0.0900**	**0.0900**		**0.0900**	**0.0900**						**229.5675**

3.4 Building Construction - 2020

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Vendor	7.2100e-003	0.1967	0.0490	4.7000e-004		1.0700e-003	0.0120		1.0200e-003	4.1800e-003						44.8175
Worker	0.0200	0.0132	0.1450	3.6000e-004		2.9000e-004	0.0353		2.7000e-004	9.5800e-003						32.8504
Total	**0.0272**	**0.2100**	**0.1941**	**8.3000e-004**		**1.3600e-003**	**0.0473**		**1.2900e-003**	**0.0138**						**77.6680**

3.5 Paving - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	5.7700e-003	0.0579	0.0590	9.0000e-005		3.2800e-003	3.2800e-003		3.0300e-003	3.0300e-003						7.8143
Paving	2.1600e-003					0.0000	0.0000		0.0000	0.0000						0.0000
Total	**7.9300e-003**	**0.0579**	**0.0590**	**9.0000e-005**		**3.2800e-003**	**3.2800e-003**		**3.0300e-003**	**3.0300e-003**						**7.8143**

3.5 Paving - 2020

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Vendor	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Worker	3.4000e-004	2.3000e-004	2.4700e-003	1.0000e-005		0.0000	6.0000e-004		0.0000	1.6000e-004						0.5600
Total	**3.4000e-004**	**2.3000e-004**	**2.4700e-003**	**1.0000e-005**		**0.0000**	**6.0000e-004**		**0.0000**	**1.6000e-004**						**0.5600**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	2.1000e-003	0.0443	0.0649	9.0000e-005		2.6500e-003	2.6500e-003		2.6500e-003	2.6500e-003						7.8143
Paving	2.1600e-003					0.0000	0.0000		0.0000	0.0000						0.0000
Total	**4.2600e-003**	**0.0443**	**0.0649**	**9.0000e-005**		**2.6500e-003**	**2.6500e-003**		**2.6500e-003**	**2.6500e-003**						**7.8143**

3.5 Paving - 2020

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Vendor	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Worker	3.4000e-004	2.3000e-004	2.4700e-003	1.0000e-005		0.0000	6.0000e-004		0.0000	1.6000e-004						0.5600
Total	**3.4000e-004**	**2.3000e-004**	**2.4700e-003**	**1.0000e-005**		**0.0000**	**6.0000e-004**		**0.0000**	**1.6000e-004**						**0.5600**

3.6 Architectural Coating - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.0487					0.0000	0.0000		0.0000	0.0000						0.0000
Off-Road	3.6000e-004	2.5300e-003	2.7500e-003	0.0000		1.7000e-004	1.7000e-004		1.7000e-004	1.7000e-004						0.3837
Total	**0.0491**	**2.5300e-003**	**2.7500e-003**	**0.0000**		**1.7000e-004**	**1.7000e-004**		**1.7000e-004**	**1.7000e-004**						**0.3837**

3.6 Architectural Coating - 2020

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Vendor	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Worker	5.0000e-005	4.0000e-005	4.0000e-004	0.0000		0.0000	1.0000e-004		0.0000	3.0000e-005						0.0896
Total	**5.0000e-005**	**4.0000e-005**	**4.0000e-004**	**0.0000**		**0.0000**	**1.0000e-004**		**0.0000**	**3.0000e-005**						**0.0896**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.0487					0.0000	0.0000		0.0000	0.0000						0.0000
Off-Road	9.0000e-005	2.0400e-003	2.7500e-003	0.0000		1.4000e-004	1.4000e-004		1.4000e-004	1.4000e-004						0.3837
Total	**0.0488**	**2.0400e-003**	**2.7500e-003**	**0.0000**		**1.4000e-004**	**1.4000e-004**		**1.4000e-004**	**1.4000e-004**						**0.3837**

3.6 Architectural Coating - 2020

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Vendor	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Worker	5.0000e-005	4.0000e-005	4.0000e-004	0.0000		0.0000	1.0000e-004		0.0000	3.0000e-005						0.0896
Total	**5.0000e-005**	**4.0000e-005**	**4.0000e-004**	**0.0000**		**0.0000**	**1.0000e-004**		**0.0000**	**3.0000e-005**						**0.0896**

3.6 Architectural Coating - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.1136					0.0000	0.0000		0.0000	0.0000						0.0000
Off-Road	7.7000e-004	5.3400e-003	6.3600e-003	1.0000e-005		3.3000e-004	3.3000e-004		3.3000e-004	3.3000e-004						0.8952
Total	**0.1144**	**5.3400e-003**	**6.3600e-003**	**1.0000e-005**		**3.3000e-004**	**3.3000e-004**		**3.3000e-004**	**3.3000e-004**						**0.8952**

3.6 Architectural Coating - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Vendor	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Worker	1.2000e-004	7.0000e-005	8.3000e-004	0.0000		0.0000	2.2000e-004		0.0000	6.0000e-005						0.1992
Total	**1.2000e-004**	**7.0000e-005**	**8.3000e-004**	**0.0000**		**0.0000**	**2.2000e-004**		**0.0000**	**6.0000e-005**						**0.1992**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.1136					0.0000	0.0000		0.0000	0.0000						0.0000
Off-Road	2.1000e-004	4.7500e-003	6.4100e-003	1.0000e-005		3.3000e-004	3.3000e-004		3.3000e-004	3.3000e-004						0.8952
Total	**0.1138**	**4.7500e-003**	**6.4100e-003**	**1.0000e-005**		**3.3000e-004**	**3.3000e-004**		**3.3000e-004**	**3.3000e-004**						**0.8952**

3.6 Architectural Coating - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Vendor	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Worker	1.2000e-004	7.0000e-005	8.3000e-004	0.0000		0.0000	2.2000e-004		0.0000	6.0000e-005						0.1992
Total	**1.2000e-004**	**7.0000e-005**	**8.3000e-004**	**0.0000**		**0.0000**	**2.2000e-004**		**0.0000**	**6.0000e-005**						**0.1992**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0687	0.8252	0.7047	5.0500e-003		1.9200e-003	0.4123		1.7900e-003	0.1119						471.0905
Unmitigated	0.0687	0.8252	0.7047	5.0500e-003		1.9200e-003	0.4123		1.7900e-003	0.1119						471.0905

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Junior College (2Yr)	428.29	428.29	428.29	1,087,652	1,087,652
Other Asphalt Surfaces	0.00	0.00	0.00		
Parking Lot	0.00	0.00	0.00		
Total	428.29	428.29	428.29	1,087,652	1,087,652

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Junior College (2Yr)	9.50	7.30	7.30	6.40	88.60	5.00	92	7	1
Other Asphalt Surfaces	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0
Parking Lot	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Junior College (2Yr)	0.583441	0.028047	0.168882	0.089637	0.008318	0.003459	0.012571	0.094450	0.002456	0.001408	0.005913	0.000973	0.000446
Other Asphalt Surfaces	0.583441	0.028047	0.168882	0.089637	0.008318	0.003459	0.012571	0.094450	0.002456	0.001408	0.005913	0.000973	0.000446
Parking Lot	0.583441	0.028047	0.168882	0.089637	0.008318	0.003459	0.012571	0.094450	0.002456	0.001408	0.005913	0.000973	0.000446

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

Exceed Title 24

Install High Efficiency Lighting

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000						9.1162
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000						11.9438
NaturalGas Mitigated	1.8100e-003	0.0165	0.0138	1.0000e-004		1.2500e-003	1.2500e-003		1.2500e-003	1.2500e-003						18.0107
NaturalGas Unmitigated	2.5200e-003	0.0229	0.0192	1.4000e-004		1.7400e-003	1.7400e-003		1.7400e-003	1.7400e-003						25.0775

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Junior College (2Yr)	467159	2.5200e-003	0.0229	0.0192	1.4000e-004		1.7400e-003	1.7400e-003		1.7400e-003	1.7400e-003						25.0775
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Total		**2.5200e-003**	**0.0229**	**0.0192**	**1.4000e-004**		**1.7400e-003**	**1.7400e-003**		**1.7400e-003**	**1.7400e-003**						**25.0775**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Junior College (2Yr)	335513	1.8100e-003	0.0165	0.0138	1.0000e-004		1.2500e-003	1.2500e-003		1.2500e-003	1.2500e-003						18.0107
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000						0.0000
Total		**1.8100e-003**	**0.0165**	**0.0138**	**1.0000e-004**		**1.2500e-003**	**1.2500e-003**		**1.2500e-003**	**1.2500e-003**						**18.0107**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Junior College (2Yr)	241510				10.9359
Other Asphalt Surfaces	0				0.0000
Parking Lot	22260				1.0080
Total					**11.9438**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Junior College (2Yr)	185743				8.4107
Other Asphalt Surfaces	0				0.0000
Parking Lot	15582				0.7056
Total					**9.1162**

6.0 Area Detail

6.1 Mitigation Measures Area

Use Low VOC Paint - Non-Residential Interior

Use Low VOC Paint - Non-Residential Exterior

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.1037	2.0000e-005	1.7300e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005						3.6100e-003
Unmitigated	0.1037	2.0000e-005	1.7300e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005						3.6100e-003

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0162					0.0000	0.0000		0.0000	0.0000						0.0000
Consumer Products	0.0873					0.0000	0.0000		0.0000	0.0000						0.0000
Landscaping	1.6000e-004	2.0000e-005	1.7300e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005						3.6100e-003
Total	**0.1037**	**2.0000e-005**	**1.7300e-003**	**0.0000**		**1.0000e-005**	**1.0000e-005**		**1.0000e-005**	**1.0000e-005**						**3.6100e-003**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0162					0.0000	0.0000		0.0000	0.0000						0.0000
Consumer Products	0.0873					0.0000	0.0000		0.0000	0.0000						0.0000
Landscaping	1.6000e-004	2.0000e-005	1.7300e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005						3.6100e-003
Total	**0.1037**	**2.0000e-005**	**1.7300e-003**	**0.0000**		**1.0000e-005**	**1.0000e-005**		**1.0000e-005**	**1.0000e-005**						**3.6100e-003**

7.0 Water Detail

7.1 Mitigation Measures Water

Install Low Flow Bathroom Faucet

Install Low Flow Kitchen Faucet

Install Low Flow Toilet

Use Water Efficient Irrigation System

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated				1.6478
Unmitigated				1.9234

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Junior College (2Yr)	1.03739 / 1.62258				1.9234
Other Asphalt Surfaces	0 / 0				0.0000
Parking Lot	0 / 0				0.0000
Total					**1.9234**

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Junior College (2Yr)	0.875555 / 1.5236				1.6478
Other Asphalt Surfaces	0 / 0				0.0000
Parking Lot	0 / 0				0.0000
Total					**1.6478**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated				13.8248
Unmitigated				13.8248

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Junior College (2Yr)	27.49				13.8248
Other Asphalt Surfaces	0				0.0000
Parking Lot	0				0.0000
Total					**13.8248**

8.2 Waste by Land Use

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Junior College (2Yr)	27.49				13.8248
Other Asphalt Surfaces	0				0.0000
Parking Lot	0				0.0000
Total					**13.8248**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

APPENDIX B

SJVAPCD PRIORITIZATION CALCULATOR

Name	Prioritization Calculator (Unmitigated Emissions)				
Applicability	Use to provide a Prioritization score based on the emission potency method. Entries required in yellow areas, output in grey areas.				
Author or updater	Danny Luu	*Last Update*	March 25, 2020		
Facility:	Oakhurst Community College Center Project				
ID#:					
Project #:					
Unit and Process#	1-0 p1				
Operating Hours hr/yr	1,992.00				

Receptor Proximity and Proximity Factors	Cancer Score	Chronic Score	Acute Score	Max Score
0< R<100 1.000	6.01E+02	3.92E+00	0.00E+00	6.01E+02
100≤R<250 0.250	1.50E+02	9.79E-01	0.00E+00	1.50E+02
250≤R<500 0.040	2.40E+01	1.57E-01	0.00E+00	2.40E+01
500≤R<1000 0.011	6.61E+00	4.31E-02	0.00E+00	6.61E+00
1000≤R<1500 0.003	1.80E+00	1.17E-02	0.00E+00	1.80E+00
1500≤R<2000 0.002	1.20E+00	7.83E-03	0.00E+00	1.20E+00
2000<R 0.001	6.01E-01	3.92E-03	0.00E+00	6.01E-01

Receptor proximity is in meters. Priortization scores are calculated by multiplying the total scores summed below by the proximity factors. Record the Max score for your receptor distance. If the substance list for the unit is longer than the number of rows here or if there are multiple processes use additional worksheets and sum the totals of the Max Scores.

1-0 p1

Enter the unit's CAS# of the substances emitted and their amounts.

Prioritzation score for each substance generated below. Totals on last row.

Substance	CAS#	Annual Emissions (lbs/yr)	Maximum Hourly (lbs/hr)	Average Hourly (lbs/hr)	Cancer	Chronic	Acute
Diesel engine exhaust, particulate matter (Diesel PM)	**9901**	2.60E+02	2.03E-01	1.31E-01	6.01E+02	3.92E+00	0.00E+00
				0.00E+00	0.00E+00	0.00E+00	0.00E+00
				0.00E+00	0.00E+00	0.00E+00	0.00E+00
				0.00E+00	0.00E+00	0.00E+00	0.00E+00
				0.00E+00	0.00E+00	0.00E+00	0.00E+00
				0.00E+00	0.00E+00	0.00E+00	0.00E+00
				0.00E+00	0.00E+00	0.00E+00	0.00E+00
				0.00E+00	0.00E+00	0.00E+00	0.00E+00
				0.00E+00	0.00E+00	0.00E+00	0.00E+00
				0.00E+00	0.00E+00	0.00E+00	0.00E+00
				0.00E+00	0.00E+00	0.00E+00	0.00E+00
				0.00E+00	0.00E+00	0.00E+00	0.00E+00
				0.00E+00	0.00E+00	0.00E+00	0.00E+00
				0.00E+00	0.00E+00	0.00E+00	0.00E+00
				0.00E+00	0.00E+00	0.00E+00	0.00E+00
				0.00E+00	0.00E+00	0.00E+00	0.00E+00
				0.00E+00	0.00E+00	0.00E+00	0.00E+00
				0.00E+00	0.00E+00	0.00E+00	0.00E+00
				0.00E+00	0.00E+00	0.00E+00	0.00E+00
				0.00E+00	0.00E+00	0.00E+00	0.00E+00
				0.00E+00	0.00E+00	0.00E+00	0.00E+00
				0.00E+00	0.00E+00	0.00E+00	0.00E+00
				Totals	**6.01E+02**	**3.92E+00**	**0.00E+00**

Sensitive Receptor Proximity

Sensitive Receptors	Distance from Project Site	
	feet	meters
Day Care Center (Playground)	1168	356
Proposed Residential Dwellings	965	294
Existing Residential Dwellings	2001	610

Name	Prioritization Calculator (Mitigated Emissions)				
Applicability	Use to provide a Prioritization score based on the emission potency method. Entries required in yellow areas, output in grey areas.				
Author or updater	Danny Luu	*Last Update*	March 25, 2020		
Facility:	Oakhurst Community College Center Project				
ID#:					
Project #:					
Unit and Process#	1-0 p1				
Operating Hours hr/yr	1,992.00				

Receptor Proximity and Proximity Factors	Cancer Score	Chronic Score	Acute Score	Max Score
0< R<100 1.000	1.39E+02	9.04E-01	0.00E+00	1.39E+02
100≤R<250 0.250	3.47E+01	2.26E-01	0.00E+00	3.47E+01
250≤R<500 0.040	5.54E+00	3.61E-02	0.00E+00	5.54E+00
500≤R<1000 0.011	1.52E+00	9.94E-03	0.00E+00	1.52E+00
1000≤R<1500 0.003	4.16E-01	2.71E-03	0.00E+00	4.16E-01
1500≤R<2000 0.002	2.77E-01	1.81E-03	0.00E+00	2.77E-01
2000<R 0.001	1.39E-01	9.04E-04	0.00E+00	1.39E-01

Receptor proximity is in meters. Priortization scores are calculated by multiplying the total scores summed below by the proximity factors. Record the Max score for your receptor distance. If the substance list for the unit is longer than the number of rows here or if there are multiple processes use additional worksheets and sum the totals of the Max Scores.

1-0 p1

Enter the unit's CAS# of the substances emitted and their amounts.

Prioritzation score for each substance generated below. Totals on last row.

Substance	CAS#	Annual Emissions (lbs/yr)	Maximum Hourly (lbs/hr)	Average Hourly (lbs/hr)	Cancer	Chronic	Acute
Diesel engine exhaust, particulate matter (Diesel PM)	**9901**	6.00E+01	2.75E-02	3.01E-02	1.39E+02	9.04E-01	0.00E+00
				0.00E+00	0.00E+00	0.00E+00	0.00E+00
				0.00E+00	0.00E+00	0.00E+00	0.00E+00
				0.00E+00	0.00E+00	0.00E+00	0.00E+00
				0.00E+00	0.00E+00	0.00E+00	0.00E+00
				0.00E+00	0.00E+00	0.00E+00	0.00E+00
				0.00E+00	0.00E+00	0.00E+00	0.00E+00
				0.00E+00	0.00E+00	0.00E+00	0.00E+00
				0.00E+00	0.00E+00	0.00E+00	0.00E+00
				0.00E+00	0.00E+00	0.00E+00	0.00E+00
				0.00E+00	0.00E+00	0.00E+00	0.00E+00
				0.00E+00	0.00E+00	0.00E+00	0.00E+00
				0.00E+00	0.00E+00	0.00E+00	0.00E+00
				0.00E+00	0.00E+00	0.00E+00	0.00E+00
				0.00E+00	0.00E+00	0.00E+00	0.00E+00
				0.00E+00	0.00E+00	0.00E+00	0.00E+00
				0.00E+00	0.00E+00	0.00E+00	0.00E+00
				0.00E+00	0.00E+00	0.00E+00	0.00E+00
				0.00E+00	0.00E+00	0.00E+00	0.00E+00
				0.00E+00	0.00E+00	0.00E+00	0.00E+00
				0.00E+00	0.00E+00	0.00E+00	0.00E+00
				Totals	**1.39E+02**	**9.04E-01**	**0.00E+00**

Sensitive Receptor Proximity

Sensitive Receptors	Distance from Project Site	
	feet	meters
Day Care Center (Playground)	1168	356
Proposed Residential Dwellings	965	294
Existing Residential Dwellings	2001	610

Appendix B-1

Biological Resources Assessment

Appendix B-2

Special Status Plant Survey

Biological Resources Assessment

Oakhurst Community College Center Project

State Center Community College District

Prepared by

ODELL *Planning & Research, Inc.*

Environmental Planning • School Facility Planning • Demographics

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December 16, 2019

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Executive Summary

The State Center Community College District is proposing construction of the Oakhurst Community College Center Project (project), which consists of the construction and operation of a community college center campus on an approximately 30-acre site (Project Area), located on Westlake Drive, north of Liberty Drive, in the unincorporated community of Oakhurst, in Madera County. This new campus will replace the existing 2.5-acre site, which houses eight portable buildings, located at Highway 41 and Road 426 in Oakhurst. The Project Footprint is approximately 5.7-acres, and encompasses the proposed location of the new facilities as well as the access and staging areas needed for construction. Approximately 3.5 acres of the Project Footprint is composed of cismontane woodland (oak woodland) and the remainder 2.2 acres are disturbed land. However, the Project Footprint is adjacent to an existing riparian area and pond.

The proposed project will not result in significant impacts to any sensitive biological resources or sensitive communities with the incorporation of mitigation measures which avoid and minimize impacts, including but not limited to, replanting of any oak trees that are required to be removed for construction. No wetlands, waters, or migratory corridors exist in the Project Footprint. One special status mammal (pallid bat) and one special status reptile (western pond turtle) have the potential to utilize habitat features (such as oak snags/cavities (bats) and sunny hillsides or downed logs (turtles)) within the Project Area. Mortality due to project construction is a potentially significant impact; therefore, measures have been identified to reduce these impacts to a less than significant level. Seven special status avian species (oak titmouse, Lawrence's goldfinch, wrentit, yellow warbler, loggerhead shrike, fox sparrow, and Nuttall's woodpecker) have the potential to nest and/or forage within the vicinity of the project. Construction related disturbance within the project area could result in nest abandonment or direct mortality of eggs, chicks, and/or fledglings. This type of impact to migratory birds, including special status bird species, would be considered take under the MBTA, and therefore, is a potentially significant impact. In order to avoid impacts to avian species, nests and nesting habitat should not be disturbed or destroyed. Implementation of the measures identified will avoid and reduce any potential impacts to avian species protected under the MBTA to a less than significant level. There are 15 special status plant species with the potential to occur in the vicinity of the project. In order to fully assess impacts to plants, and determine presence on the site, focused botanical surveys must occur during the peak blooming season of the species, prior to construction of the project.

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Purpose of the Study

The purpose of this assessment is to determine if the project may have a significant impact on the biological resources in the vicinity and to identify design, operational, or other measures that may be available to reduce or avoid the impacts. The following biological resources report consists of a description of the results of the assessment, including habitat types present, species descriptions for special status species that have the potential to occur, potential significant impacts the project could have on these species and their habitats, recommendations for further focused species surveys, if necessary, and avoidance or minimization measures that would reduce or eliminate any project impacts on these species.

Project Description and Background

Project Description & Location

The Oakhurst Community College Center Project (project) involves the construction and operation of a community college center campus on an approximately 30-acre site, located on Westlake Drive, north of Liberty Drive, in the unincorporated community of Oakhurst, in Madera County (see Figures 1 and 2). This new campus will replace the existing 2.5-acre site, which houses eight portable buildings, located at Highway 41 and Road 426 in Oakhurst.

The project includes two buildings totaling approximately 28,500 square feet (see Figure 3). The southern building will house administration, student support services, classrooms, and labs. The northern building will house a museum, café, and multi-purpose room. The museum will preserve and showcase the school's taxidermy collection and will be used for instructional purposes, and as well as being available by appointment for public entities such as K-12 field trips or approved group visits. The project also includes a 200-stall parking lot, pathways, and landscaping. The campus, as initially constructed, will serve the existing approximately 1,030 students and 24 faculty and staff. The campus will expand as needed to accommodate future growth, serving an estimated 1,582 students and 30 faculty and staff by 2040.

Construction of the project is anticipated to begin in 2020 and be completed by spring 2022.

Project Area

The over 30-acre Project Area consists of two parcels of land (Madera County APNs 064-142-039 & -040) and includes the proposed project footprint (where actual work will take place – construction areas, staging and construction equipment access route) and the remaining portions of the parcels which are proposed to persist as open space. The Project Area is partially fenced (4-5 strand barbed wire) and bounded to the west, north and east by private lands that are generally open and natural, and to the south by disturbed lots, government facilities (Sheriff Substation and Fire Station), commercial development, and a large church (Figure 2). The Project Area is generally hilly and rolling in topography, growing steeper to the north and northeast. The Project Area is primarily open oak woodland, with a paved road dissecting the property, a flat disturbed area at the south-eastern area (with a dirt access road), and a large, man-made perennial pond along the eastern boundary, which is fed by a seasonal stream coming in from the north side of the Project Area. The seasonal stream is unnamed, but drains into the Fresno River to the south. The approximate elevation of the Project Area ranges from 2,350 to 2,470 feet above mean sea level. The project is located in a portion of Section 10, Township 7 South, Range 21 East, M.D.B. & M., as shown on the Ahwahnee, California Quadrangle 7.5 Minute Series USGS Map (Topographic).

Assessment Methods

A background search and literature review of all existing data pertaining to biological resources within the area was conducted. This included searching *California Natural Diversity Data Base* (CDFW 2019), the *Inventory of Rare and Endangered Vascular Plants of California* (CNPS 2018), the U.S. Fish and Wildlife Service *IPac Trust Resource List* (see Appendices), other available CEQA/NEPA documents, herbaria records, maps, and photographs. To ensure completeness of the search, a nine-quad radius was used for database queries, centered on the Ahwahnee 7.5" USGS Quadrangle (Figure 4). From this review, a list of potentially occurring special status species was compiled for the project (see Appendices). Special status biological resources include special-status plant and wildlife species (including State or Federally designated, rare, threatened, endangered, Migratory Bird Treaty Act species, species of concern, or unique species); potential wetland/riparian habitats; sensitive plant communities; and other environmentally sensitive habitat areas.

On June 21 and December 22, 2018, reconnaissance-level site visits were conducted within the Project Area and a 200-foot radius buffer (study area), where accessible, to assess potential special status biological resources. The study area was surveyed on foot and evaluated to determine its ability to support the special status species under consideration. Wildlife observations, plant species, and habitat types encountered were documented. Focus was placed on searching for large burrows or burrow complexes and any potential wetland features, as well as potential wildlife corridors.

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.

Federal Endangered Species Act

The U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) implement the Federal Endangered Species Act (FESA) of 1973 (16 USC Section 1531 et seq.). Under the FESA, threatened and endangered species on the federal list and their habitats (50 CFR Subsection 17.11, 17.12) are protected from "take" (i.e., activities that harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect) as well as any attempt to engage in any such conduct, unless a Section 10 Permit is granted to an individual or a Section 7 consultation and a Biological Opinion with incidental take provisions are rendered from the lead federal agency. Pursuant to the requirements of FESA, an agency reviewing a Proposed Project within its jurisdiction must determine whether any federally listed species may be present within the project site and vicinity and determine whether the Proposed Project will have a potentially significant impact upon such species. Under the FESA, habitat loss is considered to be an impact to the 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 proposed to be designated for such species (16 USC Section 1536[3], [4]). Therefore, project-related impacts to these species, or their habitats, would be considered significant and require mitigation.

Under the FESA, critical habitat may be designated by the Secretary of the Interior for any listed species. The term "critical habitat" for a threatened or endangered species refers to the following: specific areas within the geographical range of the species at the time it is listed that contain suitable habitat for the species, which may require special management considerations or protection; and specific areas outside the geographical range of the species at the time it is listed that contain suitable habitat for the species and is determined to be essential for the conservation of the species. Under Section 7 of the FESA, all federal

agencies (including the USFWS and the NMFS) are required to ensure that any action they authorize, fund, or carry out will not likely jeopardize the continued existence of a listed species or modify their critical habitat.

Migratory Bird Treaty Act

Most bird species, (especially those that are breeding, migrating, or of limited distribution) are protected under federal and/or state regulations. Under the Migratory Bird Treaty Act of 1918 (MBTA) (16 USC Subsection 703-712), migratory bird species, their nests, and their eggs are protected from injury or death, as well as any project-related disturbances during the nesting cycle. The MBTA of 1918 prohibits killing, possessing, or trading migratory birds except in accordance with regulation prescribed by the Secretary of the Interior. Most actions that result in taking or in permanent or temporary possession of a protected species constitute violations of the MBTA. The USFWS is responsible for overseeing compliance with the MBTA and implements Conventions (treaties) between the United States and four countries for the protection of migratory birds – Canada, Mexico, Japan, and Russia. The USFWS maintains a list of migratory bird species that are protected under the MBTA.

Bald and Golden Eagle Protection Act

The Bald Eagle Protection Act was originally enacted in 1940 to protect bald eagles and was later amended to include golden eagles (16 USC Subsection 668-668). This Bald Eagle Protection Act prohibits the taking or possession of, and commerce in, bald and golden eagles, parts, feathers, nests, or eggs with limited exceptions. The definition of take includes pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb. Bald eagles may not be taken for any purpose unless a permit is issued prior to the taking. Activities which can be authorized by permit are: scientific collecting/research, exhibition, tribal religious, depredation, falconry, and the taking of inactive golden eagle nests, which interfere with resource development or recovery operations. The statute imposes criminal and civil sanctions as well as an enhanced penalty provision for subsequent offenses.

Wetlands and Waters of the U.S.

The U.S. Army Corps of Engineers (USACE) has primary federal responsibility for administering regulations that concern Waters of the U.S. (including wetlands), under Section 404 of the Clean Water Act (CWA). Section 404 of the CWA regulates the discharge of dredged or fill material into waters of the U.S. The USACE requires that a permit be obtained if a project proposes the placement of structures within, over, or under navigable waters and/or discharging dredged or fill material into waters below the ordinary high water mark (OHWM). The USACE has established a series of nationwide permits (NWP) that authorize certain activities in waters of the U.S.

Waters of the U.S. are defined as: *All waters used in interstate or foreign commerce; all interstate waters including interstate wetlands; all other waters such as intrastate lakes, rivers, streams (including intermittent and ephemeral streams), mudflats, sand flats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes or natural ponds, where the use, degradation, or destruction of which could affect interstate commerce; and impoundments of these waters, tributaries of these waters, or wetlands adjacent to these waters* (Section 404 of the CWA; 33 CFR Part 328). The limit of USACE jurisdiction for non-tidal waters (including non-tidal perennial and intermittent watercourses and tributaries to such watercourses) in the absence of adjacent wetlands is defined by the OHWM.

The OHWM is defined as: *The line on the shore established by the fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas* (Section 404 of the CWA; 33 CFR Part 328).

Wetlands are defined 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* (Section 404 of the CWA; 33 CFR Part 328).

In addition, a Section 401 Water Quality Certification Permit was established to comply with CWA Sections 301, 302, 303, 306, and 307 and is regulated by the Regional Water Quality Control Board (RWQCB). Anyone that proposes to conduct a project that may result in a discharge to U.S. surface waters and/or "waters of the state" including wetlands (all types), year round and seasonal streams, lakes and all other surface waters would require a federal permit. At a minimum, any beneficial uses lost must be replaced by a mitigation project of at least equal function, value, and area. Waste Discharge Requirements Permits are required pursuant to California Water Code Section 13260 for any persons discharging or proposing to discharge waste, including dredge/fill, that could affect the quality of the waters of the state.

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 CDFW 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 CDFW 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, CDFW reviews potential project impacts to biological resources, including wetlands. In accordance with the 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, CDFW 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 CDFW by the presence of one of the three-wetland indicators (hydrophytic vegetation, hydric soils, or wetland hydrology).

Fully Protected Species and Species of Special Concern

The classification of "fully protected" was the CDFW'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," 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 CDFW 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 CDFW 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 CDFW, 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.

CEQA Guidelines Section 15380

Several federal and state statutes protect rare, threatened, and endangered species. The CEQA *Guidelines* Article 20, Section 15380 provides that a species not listed on the federal or state list of protected species may be considered rare, threatened, or endangered if the species can be shown to meet certain specified criteria. These criteria have been modeled after the definitions of endangered, rare, or threatened provided in the FESA and the CESA. This section of the *Guidelines* provides public agencies with the ability to protect a species from any potential impacts of proposed projects until the respective government agency has the opportunity to designate (list) that species as protected, if warranted.

California Fish and Game Code Sections 1600-1616

Under Sections 1600-1616, the CDFW regulates activities that would alter the flow, bed, channel, or bank of streams and lakes. It derives this jurisdiction under the CESA because the CDFW is responsible for the protection of fish or wildlife resources and their habitats (including wetlands). The CDFW provides comments on USACE Section 404 and 401 permits under the Fish and Wildlife Coordination Act, last amended in 1995. The CDFW is authorized under the California Fish and Game Code Sections 1600- 1616 to develop mitigation measures and enter into Streambed Alteration Agreements with applicants whose proposed projects would obstruct the flow of, or alter the bed, channel, or bank of a river or stream in which there is a fish or wildlife resource, including intermittent and ephemeral streams and wetlands. Biological components of rivers, streams, or lakes may include aquatic and riparian vegetation, aquatic animals and fish, amphibians, reptiles, invertebrates, and terrestrial species that derive benefits from the stream system.

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 house sparrows (*Passer domesticus*) and European starlings [*Sturnus vulgaris*], and other non-native species). 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 CDFW.

California Native Plant Society

The California Native Plant Society (CNPS) maintains an extensive 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. several of which have no designated status or protection under federal or state endangered species legislation. This information is published in the Inventory of Rare and Endangered Plants of California (CNPS 2019). Impacts to CNPS listed species (e.g., CNPS list 1B and 2) are considered during CEQA environmental review.

Madera County General Plan Policies

The Madera County General Plan - Policy Document (1995) defines certain goals, objectives, and policies protecting natural resources. The General Plan addresses the following areas that relate to biological resources: wetland and riparian areas, fish and wildlife habitat and vegetation. The goals and polices applicable to this Biological Resources Assessment are as follows:

Wetland and Riparian Areas

Goal 5.D: To protect wetland communities and related riparian areas throughout Madera County as valuable resources.

Policies

5.D.1. The County shall comply with the wetlands policies of the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service, and the California Department of Fish and Game. Coordination with these agencies at all levels of project review shall continue to ensure that appropriate mitigation measures and the concerns of these agencies are adequately addressed.

5.D.2. The County shall require new development to mitigate wetland loss in both regulated and non-regulated wetlands through any combination of avoidance, minimization, or compensation. The County shall support mitigation banking programs that can provide the opportunity to mitigate impacts to rare, threatened, and endangered species and/or the habitat which supports these species in wetland and riparian areas.

5.D.3. Development should be designed in such a manner that pollutants and siltation will not significantly adversely affect the value or function of wetlands.

5.D.4. The County shall require riparian protection zones around natural watercourses. Riparian protection zones shall include the bed and bank of both low and high flow channels and associated riparian vegetation, the band of riparian vegetation outside the high flow channel, and buffers of 100 feet in width as measured from the top of bank of unvegetated channels and 50 feet in width as measured from the outer edge for the canopy of riparian vegetation. Exceptions may be made in existing developed areas where existing development and lots are located within the setback areas.

5.D.5. The County shall strive to identify and conserve remaining upland habitat areas adjacent to wetlands and riparian areas that are critical to the feeding or nesting of wildlife species associated with these wetland and riparian areas.

5.D.6. The County shall require new private or public developments to preserve and enhance existing native riparian habitat unless public safety concerns require removal of habitat for flood control or other public purposes. In cases where new private or public development results in modification or destruction of riparian habitat for purposes of flood control, the developers shall be responsible for creating new riparian habitats within or near the project area at a ratio of three acres of new habitat for every acre destroyed.

5.D.7. The County shall support the management of wetland and riparian plant communities for passive recreation, groundwater recharge, nutrient catchment, and wildlife habitats. Such communities shall be restored, where possible.

Fish and Wildlife Habitat

Goal 5.E: To protect, restore, and enhance habitats that support fish and wildlife species so as to maintain populations at viable levels.

Policies

5.E.1. The County shall identify and protect critical nesting and foraging areas, important spawning grounds, migratory routes, waterfowl resting areas, oak woodlands, wildlife movement corridors, and other unique wildlife habitats critical to protecting and sustaining wildlife populations.

5.E.2. The County shall require development in areas known to have particular value for wildlife to be carefully planned and, where possible, located so that the reasonable value of the habitat for wildlife is maintained.

5.E.3. The County shall encourage private landowners to adopt sound wildlife habitat management practices, as recommended by the California Department of Fish and Game officials and the U.S. Fish and Wildlife Service.

5.E.4. The County shall support preservation of the habitats of rare, threatened, endangered, and/or other special status species. The County shall consider developing a formal habitat conservation plan in consultation with federal and state agencies, as well as other resource conservation organizations. Such a plan would provide a mechanism for the acquisition and management of lands supported by threatened and endangered species.

5.E.5. The County shall support the maintenance of suitable habitats for all indigenous species of wildlife through maintenance of habitat diversity.

5.E.6. The County shall ensure the conservation of sufficiently large, continuous expanses of native vegetation to provide suitable habitat for maintaining abundant and diverse wildlife, if this preservation does not threaten the economic well-being of the county.

5.E.7. The County shall support the preservation or reestablishment of fisheries in the rivers and streams within the county, whenever possible.

5.E.8. The County shall ensure close monitoring of pesticide use in areas adjacent to habitats of special status plants and animals.

5.E.9. The County shall promote effective methods of ground squirrel control on croplands bordering sensitive habitat that do not place kit foxes and other special-status species at risk.

5.E.10. Prior to approval of discretionary development permits involving parcels within a significant ecological resource area, the County shall require, as part of the environmental review process, a biotic resources evaluation of the sites by a qualified biologist. The evaluation shall be based upon field reconnaissance performed at the appropriate time of year to determine the presence or absence of rare, threatened, or endangered species of plants or animals. Such evaluation will consider the potential for significant impact on these resources and will either identify feasible measures to mitigate such impacts or indicate why mitigation is not feasible.

Vegetation

Goal 5.F: To preserve and protect the valuable vegetation resources of Madera County.

Policies

5.F.1. The County shall encourage landowners and developers to preserve the integrity of existing terrain and natural vegetation in visually-sensitive areas such as hillsides, ridges, and along important transportation corridors.

5.F.2. The County shall require developers to use native and compatible non-native species, especially drought-resistant species, to the extent possible in fulfilling landscaping requirements imposed as conditions of discretionary permit approval or for project mitigation.

5.F.3. The County shall support the preservation of outstanding areas of natural vegetation, including, but not limited to, oak woodlands, riparian areas, and vernal pools.

5.F.4. The County shall ensure that landmark trees are preserved and protected.

5.F.5. The County shall establish procedures for identifying and preserving rare, threatened, and endangered plant species that may be adversely affected. by public or private development projects. The County shall consider developing a formal habitat conservation plan in consultation with federal and state agencies, as well as other resources conservation organizations. Such a plan would provide a mechanism for the acquisition and management of land supporting threatened and endangered species.

5.F.6. The County shall require that new development preserve natural woodlands to the maximum extent possible.

5.F.7. The County shall require that development on hillsides be limited to maintain valuable natural vegetation, especially forests and open grasslands, and to control erosion.

5.F.8. The County shall support the continued use of prescribed burning to mimic the effects of natural fires to reduce fuel volumes and associated fire hazard to human residents and to enhance the health of biotic communities.

Environmental Setting

Existing Conditions

The Project Area and study area are located within the Central Sierra Nevada Foothills District of the Sierra Nevada Foothills Subregion of the California Floristic Province (Baldwin et al. 2012). The Sierra Nevada Foothills Subregion is a lower, mostly narrow, north-south strip in the westernmost one-third of the Sierra Nevada, bounded to the west by the Great Valley and the High Sierra Nevada to the east. The upper elevational limit of the Sierra Nevada Foothills Subregion ranges from 1000 meters to 1500 meters. This subregion is typically characterized by blue-oak/foothill-pine woodlands and chaparral, with some serpentine soils.

The Project Area is within the Fresno River Watershed. The Fresno River runs west from the higher Sierra Nevada through Oakhurst, Coarsegold and Raymond, where it flows into Hensley Lake, a U.S. Army Corps of Engineers reservoir. From Hensley Lake, the Fresno River drains to the San Joaquin River which eventually reaches the Sacramento-San Joaquin Delta and the Pacific Ocean.

The Central Sierra Nevada Foothills have dry, hot summers and cold, wet winters. The Oakhurst/North Fork area has a mean annual rainfall of 32 inches and average temperatures range from 42-72 ºF) (Western Regional Climate Center 2019).

Topography of the vicinity is ranges from hilly to very steep mountains. In the Project Area, topography is hilly, gaining elevation to the north and northeast. There are only two soil types within the Project Area, Ahwahnee and Auberry coarse sandy loams, 8 to 15 percent slopes and Ahwahnee and Auberry coarse sandy loams, 15 to 30 percent slope (NRCS 2019). Both soil types are typically on mountains, mountain slopes and with parent material consisting of residuum weathered from granite. These soil types are well drained and not hydric and not ponded.

In general, this area of Oakhurst is growing, as the needs for the town have expanded. The Project Area is on the edge of the growing area, which is evident from the developed nature of the properties to the south and the open, rural character of the properties to the north, east and west. With the development of the area, more urban influences also are prevalent, including frequent human disturbance, feral animals, rodent poisoning, and debris. Adjacent land uses include a ranch with rural residences to the west, a large church, vacant lot, hardware store, medical offices, sheriff's substation, and a fire station to the south, a large pond, open land and rural residences to the east, and open land and rural residences to the north. An unnamed stream and its associated riparian corridor, which drains to the Fresno River, runs along the east side of the Project and study area. This stream feeds the man-made pond also on the eastern edge of the Project Area.

Vegetation/Habitats

The approximately 32.4-acre Project Area consisted of primarily Cismontane Woodland (oak woodland), Disturbed-Ruderal areas, and very small portions of Valley Foothill Riparian and Open Water (Table 1). The existing paved road through the property is the access to the proposed project. Habitat present within the Project Area is described below.

Table 1. Approximate acreages of habitat types present in the Project Area and Study Area

HABITAT TYPE	PROJECT AREA (ACRES)	STUDY AREA (ACRES)
Cismontane Woodland	28.1	46.2
Disturbed-Ruderal	3.6	7.7
Open Water	0.005	2.059
Seasonal Wetland	0.000	0.380
Valley Foothill Riparian	0.7	3.1
Total Acres	32.4	59.5

Cismontane Woodland

Cismontane woodland, as defined by the California Native Plant Society, is a woodland with trees that are deciduous, evergreen, or both, with open canopies. Broadleaved trees, especially oaks, dominate, although conifers may be present in or emergent through the canopy. Understories may be open and herbaceous or closed and shrubby. This type occurs on a variety of sites below the conifer forests in Mediterranean California (CNPS 2019). Cismontane woodland is the predominant habitat occurring in the Project Area, occurring on approximately 28 acres and appears to be healthy with various age classes and diversity. Blue oak (*Quercus douglasii*), valley oak (*Quercus lobata*), and interior live oak (*Quercus wislizeni*) comprise the majority of the woodland canopy; however, California black oak (*Quercus kelloggii*), Foothill pine (*Pinus sabiniana*), and Ponderosa pine (*Pinus ponderosa*) trees were also observed in this habitat in the Project Area. The understory supports numerous herbaceous and woody species commonly occurring in foothill oak woodlands including hoary coffeeberry (*Frangula californica*), hollyleaf redberry (*Rhamnus ilicifolia*), deer brush (*Ceanothus integerrimus*), buck brush (*Ceanothus cuneatus*), whiteleaf manzanita (*Arctostaphylos viscida*), and poison-oak (*Toxicodendron diversilobum*). Additional species observed in the understory include wild oat (*Avena fatua*), erodium (*Erodium* spp.), ripgut brome (*Bromus diandrus*), soft chess (*Bromus hordeaceus*), foxtail barley (*Hordeum murinum* ssp. *leporinum*), rose clover (*Trifolium hirtum*), vinegar weed (*Trichostema lanceolatum*), dove weed (*Croton setiger*), and fiddleneck (*Amsinckia* sp.), in part. Several elderberry (*Sambucus* sp.) shrubs were found throughout the woodland habitat in the Project Area. Within this habitat type in the Project Area, there was also a large granite slab outcropping upon which grew a *Selaginella* sp., a moss-like fern (see photos). Other mosses were also present on the same rock.

Disturbed-Ruderal

Disturbed-Ruderal habitat was observed within the Project Area and study area (Table 1). Disturbed-Ruderal areas are those areas which have been developed or have been subject to historic and ongoing disturbance by human activities (e.g., existing roads, graded areas, or agricultural areas) and are devoid of vegetation or impacted by non-native and/or invasive weed species. This habitat type is considered to have low biological value, as it is dominated generally by non-native plant species and consists of relatively low-quality habitat from a wildlife perspective. Approximately 3.6 acres falls into this category, and consists of a disturbed, graded area in the southeast corner of the Project Area, as well as existing paved and dirt roads and graveled shoulders. Plant species observed included burclover (*Medicago polymorpha*), rose clover, Bermuda grass (*Cynodon dactylon*), prostrate knotweed, (*Polygonum aviculare*), common mullein (*Verbascum thapsus*), prickly lettuce (*Lactuca serriola*), dove weed, foxtail barley, and filaree, in part.

Open Water

Open water habitats include permanently flooded lakes and reservoirs, intermittent lakes, and ponds. Vegetation typically occurring in the deeper water of this habitat includes suspended photoplankton such as diatoms, desmids, and filamentous green algae. Depending upon the fluctuation of water levels throughout the year, submergent vegetation such as algae and pondweed may occur near the shoreline of open water habitats. In the Project Area, open water habitat occurs on the eastern edge of the Project Area In general, ponds in this region were created by impoundment of waters of the local streams to provide water to livestock that were previously grazing in the area. However, the original purpose of this particular pond is unknown at the time of this report. Vegetation occurring in the open water habitat on the Project site is poorly developed, likely due to the summertime drops of the water level; however, emergent vegetation comprised of willows (*Salix* sp.), rushes (*Juncus* sp.), sedges (*Carex* sp.), and cattails (*Typha* sp.) were observed along portions of the shoreline.

Valley Foothill Riparian

Valley foothill riparian habitats occur in association with open water and streams in elevations ranging from sea level to approximately 3,000 feet above MSL throughout California. Three vegetation layers including tree, shrub, and herb, typically encompass this habitat. Vegetation expected to occur within valley foothill riparian habitat include trees such as arroyo willow (*Salix lasiolepis*), California sycamore (*Platanus racemosa*), Fremont's cottonwood (*Populus fremontii*), and red willow (*Salix laevigata*); shrubs such as California blackberry (*Rubus ursinus*), California rose (*Rosa californica*), California wild grape (*Vitis californica*), and poison-oak; and herbs such as miner's lettuce (*Montia perfoliata*), mugwort (*Artemisia douglasiana*), and stinging nettle (*Urtica dioica*).

On the Project site, valley foothill riparian habitat occurs adjacent to both the open water habitat and the small unnamed stream just outside the Project Area. Vegetation observed in this habitat includes valley oak, willows, tule (*Schoenoplectus acutus*), Himalayan blackberry (*Rubus armeniacus*), Klamath weed (*Hypericum perforatum*), common mullein, elderberry, dock (*Rumex* sp.), California brome (*Bromus carinatus*), rushes, sedges, in part. No formal wetland delineation was performed, but there was evidence of wetland features (hydrophytic vegetation, etc.) under the areas mapped as valley foothill riparian along the unnamed stream within the Project Area (Figure 5).

Wildlife

The immediate site vicinity, especially to the south, is visited frequently by humans (people, vehicles, residents, etc). Therefore, wildlife species that are sensitive to human disturbance are less likely to use the project site. A several common wildlife species or their sign were observed during the surveys (Table 2). Busy roadways, commercial areas, landscaped areas, and residential areas ordinarily provide low to marginal habitat for some terrestrial wildlife, primarily due to the amount of regular ground disturbance, pesticide/herbicide use, heavy foot and vehicle traffic, and feral or domestic animal presence. On the other hand, the Project Area, being on the edge of existing development and encompassing primarily cismontane/oak woodland, with a large water source and mature trees, likely provides beneficial habitat for many wildlife species. Wildlife species and sign (tracks and scat) observed on or near the project site during the visit included species from various taxa (Table 2).

Cismontane woodland habitat is important to common wildlife as a food resource (i.e., acorns and browse), as well as for breeding and cover habitat. Wildlife expected to occur in this habitat include birds such as American crow (*Corvus brachyrhynchos*), American kestrel (*Falco sparverius*), great horned owl (*Bubo virginianus*), California quail (*Callipepla californicus*), acorn woodpecker (*Melanerpes formicivorus*), and oak titmouse (*Baeolophus inornatus*); and mammals such as black-tailed jackrabbit (*Lepus californicus*), bobcat (*Lynx rufus*), mule deer (*Odocoileus hemionus*), and western gray squirrel (*Sciurus griseus*).

Common wildlife species that do well in disturbed areas that may occur within the study area include California ground squirrel (*Spermophilus beecheyi*), raccoon (*Procyon lotor*), skunk (*Mephitis mephitis*), American crow, scrub jay (*Aphelocoma californica*), European starling (*Sturnus vulgaris*), northern mockingbird (*Mimus polyglottos*), fence lizard (*Sceloporus occidentalis*), and rock dove (*Columba livia*).

Open water habitats are used by a variety of wildlife for breeding, foraging, and cover. Wildlife expected to occur in this habitat includes fish such as bluegill (*Lepomis macrochirus*), catfish (*Ictalurus* sp.), large mouth bass (*Micropterus salmoides*), and trout (*Salmo* sp.); amphibians such as Sierran treefrog (*Pseudocris sierra*), American bullfrog (*Rana catesbeiana*) and western toad (*Bufo boreas*); reptiles such as western pond turtle (*Actinemys marmorata*); birds such as black phoebe (*Sayornis nigricans*), great blue heron (*Ardea herodias*), great egret (*Casmerodius albus*), and mallard (*Anas platyrhynchos*); and mammals such as various bats, coyote (*Canis latrans*), opossum (*Didelphis marsupialis*), and raccoon.

Valley foothill riparian habitat provides substantial breeding, cover, and foraging habitat for a wide variety of wildlife. Additionally, this habitat provides a sheltered corridor for wildlife movement. Wildlife expected to occur in this habitat include birds such as Anna's hummingbird (*Calypte anna*), belted kingfisher (*Ceryle alcyon*), lesser goldfinch (*Carduelis psaltria*), scrub jay, song sparrow (*Melospiza melodia*), spotted towhee (*Pipilo maculates*); and mammals such as mule deer, raccoon, and striped skunk.

Table 2. Wildlife species observed during surveys conducted on June 21 & December 22, 2018.

SPECIES NAME	COMMON NAME
BIRDS (ALL PROTECTED BY THE MIGRATORY BIRD TREATY ACT*)	
Agelaius phoeniceus	Red-winged blackbird
Anas platyrhynchos	Mallard
Aphelocoma californica	California scrub-jay
Ardea alba	Great egret
Ardea herodias	Great blue heron
Baeolophus inornatus	Oak titmouse
Buteo jamaicensis	Red-tailed hawk
Callipepla californica	California quail
Chamaea fasciata	Wrentit
Colaptes auratus	Northern flicker
Fulica americana	American coot
Haemorhous mexicanus	House finch
Junco hyemalis	Dark-eyed junco
Lophodytes cucullatus	Hooded merganser
Melanerpes formicivorus	Acorn woodpecker
Melozone crissalis	California towhee
Mergus merganser	Common merganser
Myiarchus cinerascens	Ash-throated flycatcher
Petrochelidon pyrrhonota	Cliff swallow
Picoides pubescens	Downy woodpecker
Pipilo maculatus	Spotted towhee

SPECIES NAME	COMMON NAME
Piranga ludoviciana	Western tanager
Phainopepla nitens	Phainopepla
Psaltriparus minimus	Bushtit
Regulus calendula	Ruby-crowned kinglet
Sialia mexicana	Western bluebird
Sitta carolinensis	White-breasted nuthatch
Sturnus vulgaris	European starling*
Tyrannus verticalis	Western kingbird
Zenaida macroura	Mourning dove
Zonotrichia atricapilla	Golden-crowned sparrow
MAMMALS	
Canis latrans	Coyote (scat)
Felis catus	Domestic cat
Spermophilus beecheyi	Ground squirrel
Thomomys sp.	Gopher (mounds/holes)
REPTILES & AMPHIBIANS	
Pseudacris sierra	Sierran treefrog
Lithobates catesbeianus	American bullfrog*
Lampropeltis californiae	California kingsnake

*denotes a non-native species, not protected by MBTA or other laws

Potential Direct and Indirect Project Impacts

The direct impact of the proposed project will be disturbance of approximately 5.7 acres, and possible direct mortality for any special status species in the path of construction equipment or disturbed by construction activities. Direct mortality could also occur to common fossorial or slow-moving mammals and reptiles within the Project Area. Table 3 and Figure 5 details the habitat types potentially impacted by the project.

Direct take is also possible for bird eggs and nestlings within the Project Area if vegetation removal or heavy disturbance occur during the nesting season, which in this region generally runs between February 1 through August 31. In addition to Migratory Bird Treaty Act (MBTA)-covered bird species, other special status bird species that could nest in the area include oak titmouse, Lawrence's goldfinch (*Carduelis lawrencei*), wrentit (*Chamaea fasciata*), yellow warbler (*Setophaga petechia*), loggerhead shrike (*Lanius ludovicianus*), fox sparrow (*Passerella iliaca*), and Nuttall's woodpecker (*Picoides nuttallii*) (Appendix A). Other potential special status species that my use the Project Area and vicinity, and therefore have potential to be impacted by the project are the pallid bat (*Antrozous pallidus*) and the western pond turtle (*Actinemys marmorata*).

Indirect impacts to species in the Project Area are those typical of habitat modification. They include temporary/permanent habitat fragmentation, decreased potential for dispersal and increased debris that through ingestion or physical contact can be harmful to wildlife. The increase in human presence, and presence and noise from construction equipment will likely deter some birds, bats and other wildlife species from foraging, resting, or nesting in the Project Area and vicinity during construction. Any new lighting (street/parking lights, etc.), if not directed downward, and shielded on the sides and top, can affect bird and bat migration. This can result in an effective reduction of suitable habitat for these individuals, at least those which did not already avoid the area due human presence and typical traffic. The project is not expected to result in direct take of any special status plant species (Appendix B) with the incorporation of

avoidance and minimization measures. All these impacts are caused by the increase in human disturbance (fences, vehicles, people, and pets). However, impacts to special status species can be minimized to a less than significant impact with the incorporation of avoidance and minimization measures. (CEQA-Less than significant with Mitigation incorporation)

Table 3. Habitat types potentially impacted within the Project Footprint.

HABITAT TYPE	ACRES/LINEAR FEET
Cismontane Woodland	3.5 ac
Disturbed-Ruderal	2.2 ac
Total	5.7 ac

General Avoidance Measures

1. Due to the Project's location within, and proximity to, quality habitats for wildlife, the following typical avoidance and minimization measures for during construction are recommended for the Project. These measures will help ensure that impacts to all habitats, plant, and wildlife species are reduced to a less-than-significant level.

    a. All workers onsite will receive environmental training on the project's sensitive biological resources and species potentially present, the project avoidance and minimization measures, and any permit-specified (if applicable) project requirements.

    b. Before they are filled, all holes or trenches will be thoroughly inspected (to prevent wildlife mortality). All excavated, steep-walled holes or trenches should be covered with plywood or similar materials at the end of each workday to prevent trapping animals. Biologist-approved escape ramps should be established in a hole or trench, if covering it is not possible.

    c. Any pipes greater than 4 inches in diameter that are stored onsite must be sealed on both ends at all times.

    d. Project design, BMPs, and grading and stormwater permits required for project construction are all ways to avoid and minimize sediment influx into the creek and pond.

    e. Construct biologist-approved wildlife barriers to keep wildlife out of the construction site and minimize construction-related wildlife mortality. Where practicable, directional fencing should be actively maintained and/or modified during construction to allow any onsite turtles or other wildlife to exit the Project Footprint, and to prevent wildlife from entering the Project Footprint during construction. This directional fencing will be no less than 36 inches high, buried 6 inches deep and backfilled, and made of silt fence or similar material. This fencing shall be installed and maintained under the direction of a qualified biologist. Please note that this fence may be located so that it doubles as the Project's silt fencing, which will likely be required by any grading permits.

Special Status Species Impacts and Avoidance Measures

Database queries indicated 27 animals and 25 plant species with special status occur or have historically occurred within the 9-quad search area (Appendices A and B). Many of the species from the generated list either were historic, extirpated occurrences, or were species with very specialized habitat requirements that

were not present on the site or within the vicinity. Therefore, the majority of the species were "ruled out". Based on the habitat types present within the study area, 9 special status wildlife species and 15 special status plant species have the potential to occur on the site.

Special Status Mammals

The pallid bat (*Antrozous pallidus*) inhabits deserts, grasslands, scrublands, woodlands and open forests. They are most common in open, dry habitats with rocky areas for roosting. Bridges, buildings, and exfoliating tree bark or hollows are frequently used by this species for roost sites (H.T. Harvey 2004). Pallid bats will roost alone or in both large and small groups. Breeding occurs from October to February. Pups are born from late April to July and are volant at 4 to 6 weeks of age. Breeding colonies disperse between August and October. Therefore, exfoliating bark and hollows of the trees within and in the vicinity of the Project Area are suitable roosting habitat. The adjacent buildings south of the project footprint, may provide roosting habitat. Open water of the large pond provides a water source and foraging opportunities for bats.

Impact

No evidence of bats (bats, sign, etc.) was detected during the project site survey; however, there were large oak trees and a few snags trees (dead standing trees or trees with large cavities) throughout the Project Area, many of which could provide potential roosting habitat. The pallid bat and other common bats may roost and breed in or under the bark of trees, in tree or rock crevices, and in man-made structures (buildings, bridge, etc.) within the Project Area and the adjacent land. If nursery or hibernation sites are present within the Project Area, disturbance caused by project construction may be significant. Direct mortality to bats could occur if an occupied roost site is demolished. Vibration, noise, and light caused by construction equipment and personnel could result in roost abandonment, mortality of juvenile bats, or both. Bats are susceptible to both day and night roost disturbances. These types of threats reduce metabolic economy and can impact species survival (Orr 1954, Zeiner et al. 1990*b*), and should be minimized if any bats roost in the Project Area. However, the incorporation of the following measures could minimize the impacts to less than significant.

Avoidance and Minimization Measures

1. Pre-construction Surveys: Prior to the onset of construction activity, a CDFW-approved biologist will conduct pre-construction surveys for active roosting, breeding, or hibernacula sites (roosts) in large trees within the Project Area. Construction will not take place as long as a roost site is occupied. Therefore, depending on when construction begins, bat surveys should be timed to be prior to the change in season (maternity vs. hibernation) so that special status bats can be correctly excluded without take (see seasons below). If no active bat roosts, breeding, or hibernacula sites are detected, no further action is required.

2. Avoidance & Minimization:

    a. If any active bat sites are discovered or if evidence of recent occupation is established, the following measures will be implemented in order to minimize impacts on special status bats:

        i. Construction will be scheduled to minimize impacts upon pallid bats. Type and status of active roosts shall be determined, and bat eviction shall be undertaken in a manner that does not exclude bats during times of inclement weather, or exclude females from young still in a roost.

        ii. Hibernation sites with evidence of prior occupation will be sealed before the hibernation season (November–March), and nursery sites will be sealed before the nursery season (April–August).

iii. If the site is occupied by the bats, then construction will occur outside the hibernation season (for hibernacula), and after August 15 (for nursery colonies). Construction/building demolition will not take place as long as the roost site is occupied.

iv. If exclusion devices are used, they will be employed based on current best practices and will be regularly monitored by a qualified biologist.

b. All new lighting shall be down-cast to reduce disturbance impacts to bat species.

Special Status Birds

Seven special status avian species (oak titmouse, Lawrence's goldfinch, wrentit, yellow warbler, loggerhead shrike, fox sparrow, and Nuttall's woodpecker) have the potential to nest and/or forage within the study area. Greater detail regarding life history requirements of these birds is provided in Appendix A. Nuttall's woodpecker, oak titmouse, Lawrence's goldfinch, and yellow warbler could nest in the large trees within and adjacent to the study area and forage throughout the study area. Loggerhead shrike could nest in shrubs or trees within and adjacent to the study area and forage in the open areas. Wrentit and fox sparrow prefer shrubs for their nests and typically forage near shrub patches.

Impact

Noise and human disturbance during project activities could directly impact nesting bird species. Since CDFW/USFWS usually requires a various sized "no disturbance" buffers around nesting sites for these species, construction-related disturbance could be considered take of protected avian species under CESA and MBTA. In addition, other migratory birds will likely be nesting in the study area and vicinity, most of which are protected by the Migratory Bird Treaty Act (USCA 1918). Construction-related disturbance within the Project Area could result in nest abandonment or direct mortality of eggs, chicks, and/or fledglings. This type of impact to migratory birds, including special status bird species, would be considered take under the MBTA and CESA, and therefore, is a potentially significant impact. In order to avoid impacts to avian species, nests and nesting habitat should not be disturbed or destroyed. The following measures will reduce potential impacts to a less than significant level.

Avoidance and Minimization Measures

1. Avoidance. If feasible, any vegetation removal or ground disturbance will take place between September 1 and February 1 to avoid impacts to nesting birds in compliance with the Migratory Bird Treaty Act. If vegetation removal must occur during the nesting season, project construction is at risk of being delayed due to actively nesting birds and their required protective buffers.
2. Pre-construction Surveys.
    1. If vegetation removal or ground disturbance will commence between February 1 and August 31, a qualified biologist will conduct a pre-construction survey for nesting birds within 14 days prior to the initiation of disturbance activities. This survey will cover:
        i. Potential nest sites in trees, bushes, or grass within species-specific buffers of the Project Area (raptor species such as red-tailed hawk, great horned owl, etc. – 500 ft, non-raptor species (loggerhead shrike, yellow warbler, etc.) – 250 ft).
    2. If no active nests are detected during the pre-construction survey, then no further action is required. If an active nest is detected, then the following minimization measures will be implemented.

3. Minimization/Establish Buffers.

    1. Special status bird species and MBTA-protected species: If any active nests are discovered (and if construction will occur during bird breeding season), the USFWS and/or CDFW will be contacted to determine protective measures required to avoid take. These measures could include fencing off an area where a nest occurs, or shifting construction work temporally or spatially away from the nesting birds. Biologists are required on site to monitor construction while protected migratory birds are nesting in the Project Area to ensure that the buffer is adequate and that the nest is not stressed and/or abandoned. If an active nest is found after the completion of the pre-construction surveys and after construction begins, all construction activities will stop until a qualified biologist has evaluated the nest and erected the appropriate buffer around the nest.

Special Status Reptiles

The western pond turtle (*Actinemys marmorata*), a California Species of Special Concern, has the potential to breed, forage and/or move within the Project Area. This species has a high likelihood of inhabiting the large pond to the east of the project footprint and is locally abundant in in the region, usually in stock ponds and other man-made ponds nearby. It is a diurnal, aquatic turtle that inhabits ponds, lakes, marshes, rivers, streams, and irrigation ditches that typically have rocky or muddy bottom and aquatic vegetation. In streams and rivers, this turtle prefers pools and shallower areas. Basking areas such as logs, rocks, or exposed banks are an important habitat element. This species nests in uplands associated with wetland habitat. Upland habitat is used by this species for dispersal, basking, nest building, aestivation, and other purposes (Holland 1994). When associated with ephemeral water sources, this species general stays within 187 meters of the drying aquatic habitat (Zaragoza et al. 2015). However, when water is perennial, there is not such a need to seek out refuge at such great distances. They will often nest along the margins of the stream or pond. The nesting season is typically from April – August. This species will hibernate underwater, in the muddy bottom of a pool, but they can still be active during warm periods in the winter months (November – February) (Nafis 2019).

Impact

Due to the small size of the direct impact area, temporary loss of the any upland habitat within the Project Footprint (Figure 5) would not substantially reduce regionally available habitat for the species. However, direct mortality of individuals may occur during construction through the digging, grading, and movement of fill on the site. Indirect impacts from the Project may include increased exposure to humans (construction crews, students and staff), possibly rendering the area in and around the Project as unsuitable for occasional upland habitat/dispersal.

The following measures will reduce potential impacts to turtles to a less-than-significant level.

Avoidance and Minimization Measures

1. Avoidance. Any western pond turtle discovered at the site immediately prior to or during Project activities shall be allowed to move out of the area on their own volition. If this is not feasible, they shall be captured by a qualified biologist who holds a CDFW Scientific Collecting Permit for the species, and relocated out of harm's way to the nearest suitable habitat from the Project Area.

Special Status Plants

Of the 25 potentially occurring special status plant species, none were found within the Project Area during reconnaissance-level surveys. Although the site survey was not conducted at the peak blooming period for some potentially occurring special status plants, several plants could be ruled out because their elevation range, required habitat, and/or soil type differed from the site conditions. However, 15 special status plants were determined to have the potential to occur on site (Table 4). Since the site survey was not conducted at the typical blooming period for these species, it is unknown if they are present.

Table 4. Special Status Plant Species with Potential to Occur in the Project Area.

SPECIES NAME	COMMON NAME	STATUS	BLOOMING PERIOD
Balsamorhiza macrolepis	big-scale balsamroot	1B.2	Mar-Jun
Calyptridium pulchellum	Mariposa pussypaws	FT; 1B.1	Apr-Aug
Camissonia sierrae ssp. *sierrae*	Yosemite evening-primrose	4.3	Apr-Jun
Clarkia rostrata	beaked clarkia	1B.3	Apr-May
Claytonia parviflora ssp. *grandiflora*	streambank spring beauty	4.2	Feb-May
Collomia rawsoniana	Rawson's flaming trumpet	1B.2	Jul-Aug
Cordylanthus rigidus ssp. brevibracteatus	short-bracted bird's-beak	4.3	Jul-Aug
Cypripedium montanum	mountain lady's-slipper	4.2	Mar-Aug
Delphinium hansenii ssp. *ewanianum*	Ewan's larkspur	4.2	Mar-May
Diplacus pulchellus	yellow-lip pansy monkeyflower	1B.2	Apr-Jul
Erythranthe acutidens	Kings River monkeyflower	3	Apr-Jul
Erythranthe gracilipes	slender-stalked monkeyflower	1B.2	Apr-Jun
Gratiola heterosepala	Boggs Lake hedge-hyssop	SE, 1B.2	Apr-Aug
Leptosiphon serrulatus	Madera leptosiphon	1B.2	Apr-May
Lupinus citrinus var. *citrinus*	orange lupine	1B.2	Apr-Jul

Impact

If any special status plant species populations are present, the project construction may result in direct mortality of individual plants, loss of portions of the population, and reduction of the seed bank. In addition, ground disturbance can facilitate non-native plant species invasions, giving them a competitive advantage over native species on the site. In order to avoid impacts to special status plant species, plants should not be disturbed or destroyed. Therefore, special status plant species have the potential to be significantly impacted by the project, without the implementation of the avoidance and minimization measures. The following measures will reduce potential impacts to a less than significant level.

Avoidance and Minimization Measures

1. Focused Surveys. In order to fully assess impacts to potentially occurring special status plant species, focused botanical surveys for the 15 species which may occur on site shall be conducted prior to project construction, during each species' blooming period. Primary focus should be upon the two species which are state or federally listed – Mariposa pussypaws and Boggs Lake hedge-hyssop. See Table 2 for appropriate blooming periods for each species.
2. Avoidance. If special status plant species are detected, populations shall be avoided on the site by installing Environmentally Sensitive Area (ESA) fencing around the portion of the population within the Project Footprint. ESA fence configuration will be determined by a qualified biologist in concert with CDFW. Any other measures recommended by CDFW to avoid take will be implemented.
3. Plant Salvage. If avoidance is not feasible, impacts will be mitigated (by salvaging seed, viable plants, or both) according to methods specified through consultation with the CDFW. A qualified

botanist could collect viable plants, or mature seeds from individual plants, that could not be avoided, and those seeds and plants could be replanted and distributed in suitable habitat preserves, to establish new populations.

Effects on Riparian Habitats and Other Sensitive Natural Communities

Riparian Habitats

There are no riparian habitats within the Project Footprint. Within the Project Area there are approximately 0.07 acres of Valley Foothill Riparian Habitat, specifically the area associated with an unnamed stream which enters at the north end of the Open Water (0.005 ac) habitat also within the Project Area. However, due to the current configuration of the Project Footprint, and with the incorporation of the avoidance measures below, impacts are expected to be less than significant. However, if the project configuration were to change or if any work, impact of actions were to take place across the existing paved road, Measures 1.b.i and 1.b.ii., detailed below would apply to the Project.

Other Sensitive Natural Communities: Cismontane Woodland

The Project Footprint will impact 3.5 acres of Cismontane Woodland (oak woodland) (Table 3; Figure 5). Oak woodlands are extremely important habitat for over 300 species of wildlife in California. Oak trees are slow-growing and often have a difficult time surviving in developed areas or yards due to their unique water requirements and sensitive root systems. Therefore, impacts from construction are expected to be compaction of root systems of adjacent trees, altered hydrology for the existing oaks, and removal of oak trees themselves. Therefore, the project would be considered an impact on a sensitive natural community, as oak woodlands are identified by Madera County in several instances as habitats in need of preservation. In fact, according to Madera County Policy 5.F.6., new development must preserve natural woodlands to the maximum extent possible and shall ensure that landmark trees are preserved and protected (Policy 5.F.4). At the time of this report, exact project plans were not available. Therefore, it is unknown which oak trees, if any, will need to be removed for the construction of the project and which trees' root systems may be impacted by construction. A "Legacy" oak tree is any tree at or above 24 inches diameter at breast height (dbh), whereas other oaks are considered to be a "tree" (as opposed to a sapling, etc.) when it has reached 4 inches dbh. These different sized trees, if required to be impacted by the project, will require different mitigation ratios. Therefore, the avoidance and minimization measures below were incorporated to ensure that the project does not significantly impact oak woodland.

(CEQA – Less than significant with Mitigation Incorporation)

Avoidance and Minimization Measures

1. <u>Valley Foothill Riparian Habitat</u>

    a. To ensure impacts to Valley Foothill Riparian habitat is minimized,
        i. During grading plan review by Madera County, the County shall ensure that the buffer around riparian habitats is widened to encompass the entire riparian corridor and provides a 50-foot buffer from the canopy edge as per Madera County General Plan - Policy 5.D.4.
        ii. During construction activities within 100 feet of riparian habitats, such as the construction of road crossings, valley foothill riparian habitat that is not proposed for removal shall be protectively fenced in the areas where construction activity will directly impact the habitat. This fence shall be maintained until all construction activities are completed.
    b. If the Project configuration were to change and encompass any area to the east of the existing paved road:

i. Prior to issuance of a grading permit, a Wetland Delineation would be required and a Streambed Alteration Agreement shall be obtained from CDFW, pursuant to Section 1600 of the California Fish and Game Code, for any stream impacts and any other activities affecting the bed, bank, or associated riparian vegetation of the stream or existing pond.
ii. Any riparian vegetation removed as part of construction activities shall be replaced at a 3:1 (3 new acres per one lost acre) mitigation ratio, per Madera County General Plan - Policy 5.D.6.

2. Cismontane Woodland (oak woodland) Habitat

a. To ensure impacts to Cismontane Woodland habitat, specifically oak trees, is minimized,
i. Prior to the onset of construction activities, the District shall contract with an Arborist to complete a tree survey in the Project Footprint focused on landmark/legacy trees, but documenting any oak trees (Tree is >4 inch dbh; Landmark/Legacy tree is >/= 24 inches dbh). Upon completion of the survey, the Arborist will submit a tree survey map of trees that may be disturbed during development.
ii. Disturbance to all native oak trees and their canopy drip lines (branches and soils beneath) shall be avoided to the largest extent feasible during construction. This includes installing a fence 20 ft from the dripline of any trees to be retained within the Project Footprint to avoid any unplanned, accidental, or construction related impacts.
iii. If oak trees are found during the tree survey that must be removed during construction activities, then an oak tree mitigation and monitoring plan shall be prepared by an Arborist or Biologist and subject to the review and approval by Madera County. Typical mitigation ratios recently accepted by CDFW, for example are:
- oak trees between 4 inches and 24 inches dbh - 3:1 replacement ratio;
- landmark/legacy oak trees (>24 inches dbh) - 10:1 replacement ratio.

3. If avoidance and minimization of special habitats is not feasible, a qualified biologist will develop appropriate mitigations that will reduce project impacts to sensitive biological resources to a less than significant level. The type and amount of mitigation will depend on the resources impacted, the extent of the impacts, and the quality of habitats to be impacted. Mitigations may include but are not limited to: 1) Compensation for lost habitat in the form of preservation or creation of in-kind habitat protected by conservation easement; 2) Purchase of appropriate credits from an approved mitigation bank or land trust servicing the Madera County Area; 3) Payment of in-lieu fees.

Effects on State or Federally Protected Wetlands

There are no federally protected wetlands within the Project Footprint. Although there is an existing man-made pond and an unnamed stream adjacent to the project, implementation of typical ground disturbance and erosion control Best Management Practices (BMPs) and compliance with grading permits will ensure that there is no impact to these wetlands. If proposed plans were to change, then impacts would need to be reassessed. No wetland delineation was conducted due to the proposed plans encompassing only the west side of the existing paved road, thus avoiding any wetland impacts. BMPs will include actions such as:

- Installing silt fence downslope of all ground disturbance for the life of the construction period.
- No work shall occur during heavy rain events.
- Protect spoils piles and slopes with straw waddles and erosion control devices during rain events.
- Revegetation of slopes and installation of erosion control devices after earth work is complete.
- Vehicle staging shall occur within the Project Footprint and existing disturbed roads.
- Chemicals, lubricants, and petroleum products must be closely monitored, and precautions would be used. If any spills occur, cleanup would take place immediately.

Movement Corridors and Nursery Sites for Resident or Migratory Fish or Wildlife Species

The Project Footprint does not appear to constitute a "movement corridor" for native wildlife (USFWS 1998) that would attract wildlife to move through the site any more than the surrounding developed and agricultural (grazing) lands. The Project Area is bordered by residential, government, and commercial development, and in the vicinity of Highway 49, which restricts access for wildlife. The majority of the Project Area consists of open cismontane woodland and disturbed habitats, which are not particularly attractive as a migration corridor over other similar lands in the vicinity. However, the valley foothill riparian habitat associated with the stream and open water features adjacent to the Project Area likely functions as a common wildlife movement corridor. The pond will draw wildlife for a food and water source and the valley foothill riparian is attractive for cover and food sources. Yet, all valley foothill riparian habitat is at least 100 feet from the Project Footprint, which is the double the distance of the 50 foot setback required by Madera County (Policy 5.D.4 Riparian Protection Zone). Wildlife expected to use these habitats in the Project Area for movement within their home range includes bobcat, coyote, raccoon, and various small mammals. Given the setback from the riparian area and the avoidance and minimization measures required to protect sensitive habitats and waterways already listed, the project will have a less than significant effect on regional wildlife movements. (CEQA – Less than Significant)

Conflicting Local Policies or Ordinances Protection Biological Resources

With the incorporation of the measures previously listed, particularly those listed in the Riparian and Other Sensitive Natural Communities section and the Federally Protected Wetlands section, the project appears to be consistent with relevant biological resources policies of the County of Madera (in particular see Regulatory Authority section), and would not conflict with local policies or ordinances protecting biological resources (Madera County 1995). These local ordinances and policies encourage tree management and conservation of other natural vegetation. The District will also enforce grading regulations and Best Management Practices to control and minimize impact of vegetation removal, terrain alterations, and resultant erosion/sedimentation. (CEQA – Less than Significant with the Incorporation of Mitigation Measures)

Avoidance and Minimization Measures

1. In addition to the measures listed for avoidance and minimization of Sensitive Natural Communities (above), the project shall, where feasible, follow the Voluntary Oak Woodland Management Guidelines (Coarsegold Resource Conservation District 1995), specifically those designed for "Building within Oak Woodland." These include, but are not limited to:
    a. Cluster improvements to preserve wildlife corridors.
    b. Protect existing oaks during construction, replace trees with seedlings if removal is unavoidable.
    c. Avoid root compaction by limiting heavy equipment in the root zone.
    d. Minimize root cutting during road construction, building foundations or septic systems.
    e. Avoid grade changes in dripline zones of trees.
    f. Avoid landscaping which requires or allows irrigation within the dripline of a crown of a tree.

Conflicting Habitat Conservation Plans, Natural Conservation Community Plans, or other Approved Plans

There are no HCPs or NCCPs that cover the Project Area location within Madera County, so the project would not conflict any provisions of any local, regional or state habitat conservation plan (MO, USFWS 1998, 2005). All existing HCPs in Madera County are project-specific HCPs and not overarching for the County (USFWS 2018b). (CEQA – No Impact)

SOURCES CONSULTED

Baldwin, B.G., D.H. Goldman, D. J. Keil, R. Patterson, T.J. Rosatti, and D.H. Wilken, editors. 2012. The Jepson manual: vascular plants of California, second edition. University of California Press, Berkeley.

Barry, S.J. and G.M. Fellers. 2013. History and Status of the California Red-legged Frog (*Rana draytonii*) in the Sierra Nevada, California, USA Herpetological Conservation and Biology 8(2):456-502.

California Department of Fish and Wildlife (CDFW). 2019. California Natural Diversity Database. The Resources Agency, Sacramento, CA Accessed August 2019.

California Native Plant Society (CNPS). 2019. Inventory of Rare and Endangered Plants (online edition, v8-02). California Native Plant Society. Sacramento, CA. Accessed August 2019 from http://www.cnps.org/inventory

Coarsegold Resource Conservation District. 1995. Voluntary Oak Woodland Management Guidelines. Eastern Madera County.

County of Madera. 1995. Madera County General Plan – Policy Document. Adopted October 24, 1995.

Holland, D.C. 1994. The western pond turtle: habitat and history. Prepared for: U. S. Department of Energy Bonneville Power Administration Environment, Fish and Wildlife, Portland, OR.

H.T. Harvey & Associates. 2004. California bat mitigation, techniques, solutions, and effectiveness. Prepared for California Department of Transportation (Caltrans), Office of Biological Studies and Technical Assistance, Sacramento, CA. Project Number 2394-01. 163 pgs.

Laughrin, L. 1970. San Joaquin kit fox, its distribution and abundance. Calif. Dept. of Fish and Game, Sacramento. Wildl. Manage. Br. Admin. Rep. No. 70-2. 20pp.

Moyle, P.B. 2002. Inland Fishes of California. University of California Press. Berkeley, CA

Nafis, G. 2019. California Herps - A Guide to the Amphibians and Reptiles of California. Available at: http://www.californiaherps.com/ (accessed February 2019).

Odell, Melissa (MO), Senior Biologist/Planner. Odell Planning and Research, Inc. Project Site Biological Reconnaissance Surveys. June 21 & December 22, 2018.

Orloff, S., F. Hall, and L. Spiegel. 1986. Distribution and habitat requirements of the San Joaquin kit fox in the northern extreme of their range. Trans. West. Sect. Wildl. Soc. 22-60-70.

Shuford, W. D., and Gardali, T., editors. 2008. California Bird Species of Special Concern: A ranked assessment of species, subspecies, and distinct populations of birds of immediate conservation concern in California. Studies of Western Birds 1. Western Field Ornithologists, Camarillo, California, and California Department of Fish and Game, Sacramento.

USDA Natural Resources Conservation Service (NRCS). 2019. Web Soil Survey. Accessed September 2019 from http://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx

U. S. Code Annotated (USCA). 1918. Migratory bird treaty act of 1918. U.S. Code, Section Title 16, Parts 703-712.

U.S. Fish and Wildlife Service (USFWS). 1998. Recovery plan for upland species of the San Joaquin Valley, California. Region 1, Portland, OR. 319 pp.

U.S. Fish and Wildlife Service. 2005. Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon. Portland, Oregon. xxvi + 606 pp.

U.S. Fish and Wildlife Service. 2018a. Information for Planning and Conservation (IPac) Trust Resource List. Accessed February 2018. https://ecos.fws.gov/ipac/

U.S. Fish and Wildlife Service. 2018b. Habitat Conservation Plans, ECOS,-Environmental Conservation Online System. Accessed November 2018. https://ecos.fws.gov/ecp0/conservationPlan/region/summary?region=8&type=HCP

Western Regional Climate Center. Historical Climate Center. www.wrcc.dri.edu. Accessed October 8, 2019.

Zaragoza, G., J.P. Rose, K. Purcell, and B.D. Todd. 2015. Terrestrial Habitat use by Western Pond Turtles (*Actinemys marmorata*) in the Sierra Foothills. Journal of Herpetology 49 (3): 437-441.

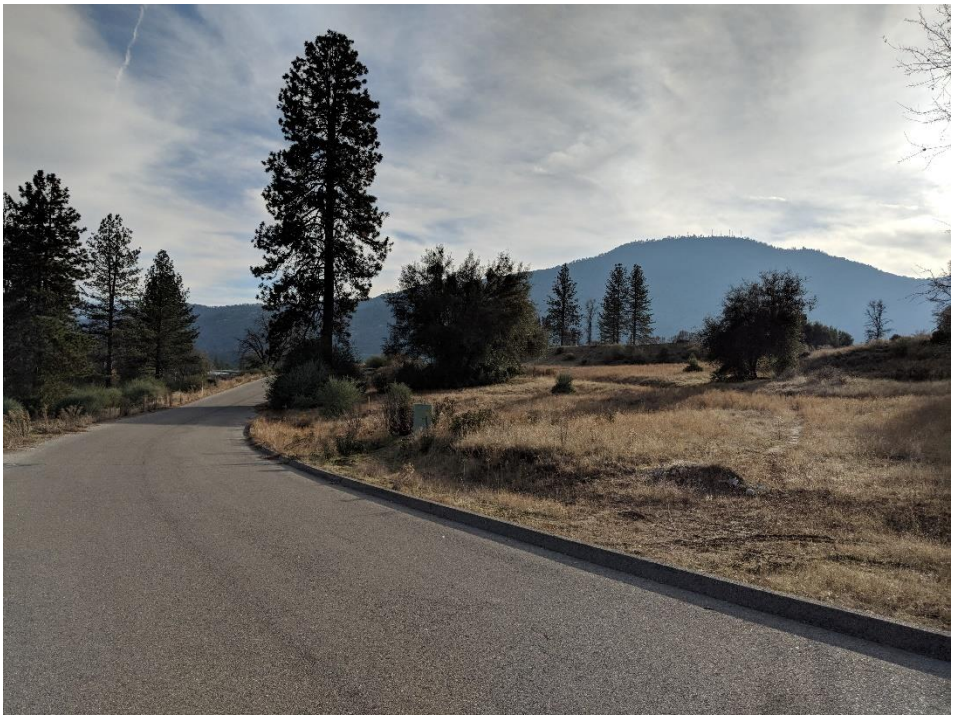
Zeiner, D. C., W. F. Laudenslayer, Jr., and K. E. Mayer, editors. 1988. California's Wildlife. Volume I: Amphibians and Reptiles. California Statewide Wildlife Habitat Relationships System, California Department of Fish and Game, Sacramento, USA.

Zeiner, D. C., W. F. Laudenslayer, Jr., K. E. Mayer, and M. White, editors. 1990a. California's Wildlife. Volume II: Birds. California Statewide Wildlife Habitat Relationships System, California Department of Fish and Game, Sacramento, USA.

Zeiner, D. C., W. F. Laudenslayer, Jr., K. E. Mayer, and M. White, editors. 1990b. California's Wildlife. Volume III: Mammals. California Statewide Wildlife Habitat Relationships System, California Department of Fish and Game, Sacramento, USA.

Site Photos – June 21 & December 22, 2018

Portion of proposed Project Footprint within existing disturbed area and showing paved road that bisects Project Area. Looking northwest. June 21, 2018



Portion of proposed Project Footprint within existing disturbed area and showing paved road that bisects Project Area. Looking southwest. December 22, 2018

Portion of Proposed Project Footprint looking southwest towards existing disturbed habitat (graded pad) of Project Area. December 22, 2018.

Portion of Proposed Project Footprint looking southeast towards existing disturbed habitat of Project Area, existing paved road in background. December 22, 2018.

Portion of Proposed Project Footprint looking northwest showing typical dirt access road within Project Area. December 22, 2018.

Existing dirt mound (disturbed habitat) within the Project Area. Looking west. December 22, 2018.

Open water habitat of Project Area and outside of Project Area, taken from existing paved road within the Project Area. Looking southeast. June 21, 2018.

Valley Foothill Riparian habitat and associated wetland vegetation within the Project Area, along the northeast corner of the Project Area, just north of the pond. Looking southeast. December 22, 2018.

Cismontane Woodland habitat of Project Area, including elderberry shrubs in the foreground. Looking north. December 22, 2018.

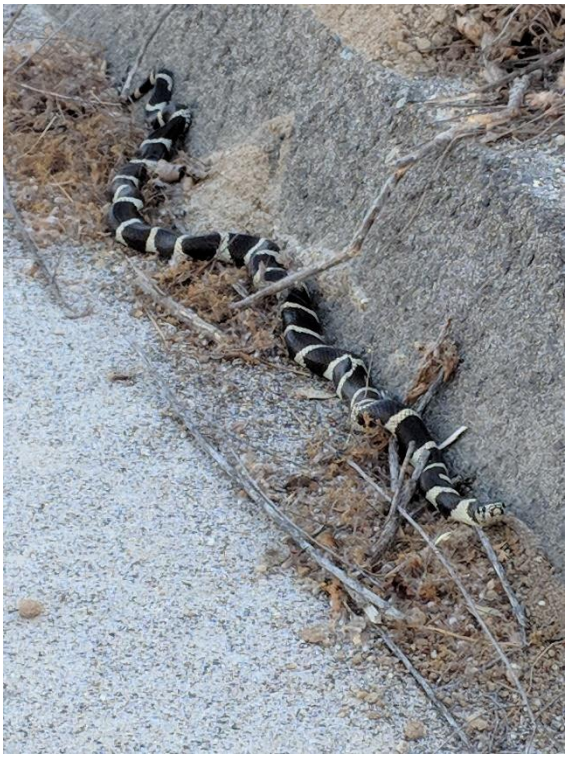
Granite rock slab/outcrop within cismontane woodland habitat of the Project Area. Looking northwest. December 22, 2018.

Sellaginella sp. growing on granite outcrop in cismontane woodland habitat of Project Area. December 22, 2018.

Example of one of several partially dead oak trees (snag) present, providing high quality wildlife habitat and potential bat roosting locations within the Project Area. December 22, 2018.

Typical cismontane woodland in the Project Area, showing the mix of various oak species and shrub species. Pink parcel line marker right of center. Looking east. December 22, 2018.

Typical cismontane woodland on the north west side of the Project Area, showing the mix of various oak species and shrub species of diverse age classes, amongst annual grasses. Looking north. December 22, 2018.



California kingsnake observed on paved road in Project Area. June 21, 2018.

Fire house and sheriff's substation adjacent (south) of the Project Area. Photo taken from existing paved road in Project Area, looking south-southeast December 22, 2018.

Adjacent developed area (Mountain Christian Center); photo taken from corner of Project Area. Looking southwest. December 22, 2018.

Portion of Project Area looking southeast towards existing development of Oakhurst in background (True Value Hardware, Kaiser Medical Offices, Highway 49), and a graded pad at center. Looking south-southwest. December 22, 2018.

Appendices and Maps

Appendix A. Special status animal species known from the vicinity of the Oakhurst Community College Center Project.

Name	Status* State	Status* Federal	Description of Habitat Required [c, e, f]	Historic 9 Quad Presence[a]	Potential to Occur in Study Area [a,b,d]
MAMMALS					
Pallid bat (*Antrozous pallidus*)	SSC	FSC	Deserts, grasslands, scrublands, woodlands and open forests. Most common in open, dry habitats with rocky areas for roosting. Bridges, buildings, and exfoliating tree bark or hollows are frequently used for roost sites (H.T. Harvey 2004). Extremely sensitive to roost disturbances.	Knowles	Possible, but low likelihood. Exfoliating bark and hollows of the trees within and in the vicinity of the project area are suitable roosting habitat. Open water of pond nearby provides a water source for bats.
California wolverine (*Gulo gulo*)	ST, FP	Proposed T	Found in the north coast mountains and the Sierra Nevada. Found in a wide variety of high elevation habitats. Needs water source. Uses caves, logs, burrows for cover and den area. Hunts in more open areas. Can travel long distances.	White Chief Mtn.	None. No suitable habitat present. Has not been observed in the 9 quad area since 1921.
fisher - West Coast DPS (*Pekania pennant)*	ST, SSC	none	Intermediate to large-tree stages of coniferous forests and deciduous-riparian areas with high percent canopy closure. Uses cavities, snags, logs and rocky areas for cover and denning. Needs large areas of mature, dense forest.	White Chief Mtn., Fish Camp	None. No suitable habitat present.
American badger (*Taxidea taxus*)	SSC	None	Herbaceous, shrub, and open stages of most habitats with dry, friable soils.	O'Neals, Knowles	Unlikely. The project area could be used for dispersal, however the proximity to humans (church, commercial and Sherriff's station) and frequent disturbance make the project area unlikely to be used for denning.
Sierra Nevada red fox (*Vulpes vulpes necator*)	ST	Candidate	Historically found from the Cascades down to the Sierra Nevada. Found in a variety of habitats from wet meadows to forested areas. Use dense vegetation and rocky areas for cover and den sites. Prefer forests interspersed with meadows or alpine fell-fields. Currently only 2 populations of this species exist: near Lassen Peak and near Sonora Pass.	Bass Lake, Ahwahnee, Fish Camp, White Chief Mtn.	None. Not within typical elevational range or habitat type. Also, species is only currently known to exist in 2 distinct areas. Historic occurrences in the vicinity need further research; believed to possibly be "suspect".
BIRDS					
Golden eagle (*Aquila chrysaetos*)	None	BGEPA	Inhabits mountainous or hilly terrain, hunting over open country. Also found in valleys and western plains, especially in migration and winter. Nests on cliffs or in trees. Breeds Jan 1 to Aug 31	None	Unlikely. Project area and developed vicinity are not suitable nesting habitat. Very unlikely foraging habitat due to developed nature and human presence.

Name	Status* State	Status* Federal	Description of Habitat Required [c, e, f]	Historic 9 Quad Presence[a]	Potential to Occur in Study Area [a,b,d]
Oak titmouse (*Baeolophus inornatus*)	None	FSC	Usually found in warm, open, dry oak or oak-pine woodlands. Will also use scrub oaks or other brush as long as woodlands are nearby. They live in a restricted range, from southwest Oregon to northwest Baja California, with another population in the Cape District of south Baja California. Breeds Mar 15 to Jul 15.	Not followed in CNDDB	Present. Observed during site visit. Project area and adjacent trees are suitable habitat for this species year-round.
Lawrence's goldfinch (*Carduelis lawrencei*)	None	FSC	Open woodlands, chaparral, and weedy fields. Nests mid-height in trees with a cup nest made of leaves, grass stems and lichen. Breeds Mar 20 to Sep 20.	Not followed in CNDDB	Possible. Project area and study area provides potential nesting habitat.
Cassin's Finch (*Carpodacus cassinii*)	None	FSC	A common montane resident; breeds in most higher mountain ranges in California. Prefers tall, open coniferous forests, in lodgepole pine, red fir, and subalpine conifer habitats, particularly in breeding season. Most numerous near wet meadows and grassy openings; also frequents semi-arid forests, unlike purple finch. Breeds May 15 to Jul 15.	Not followed in CNDDB	Unlikely. No breeding habitat present. May migrate through the area.
Wrentit (*Chamaea fasciata*)	None	FSC	Year-round resident in coastal scrub, chaparral, oak woodland, evergreen forests, and dense shrublands with coyotebush, manzanita, California lilac, and blackberry thickets in foothills, coastal, and desert regions of California and Oregon. Tend to avoid areas with non-native plants such as eucalyptus and broom. Breeds Mar 15 to Aug 10, in shrubs and trees; creates a cup nest 1 – 9 feet high.	Not followed in CNDDB	Present. Observed during site visit.
Black Swift (*Cypseloides niger*)	SSC	FSC	Open sky over mountains, coastal cliffs. Forages widely over any kind of terrain but is still very local in its occurrence, probably limited to regions with suitable nesting sites. Nests on ledges or in crevices in steep cliffs, either along coast or near streams or waterfalls in mountains. Breeds Jun 15 to Sep 10.	None	None, no habitat present.

Name	Status* State	Status* Federal	Description of Habitat Required [c, e, f]	Historic 9 Quad Presence[a]	Potential to Occur in Study Area [a,b,d]
Yellow warbler (*Dendroica petechia brewsteri*)	SSC	None	Favors riparian and wetland habitats with thick cover; especially willows and alders. Also associated with open woodlands, gardens, orchards.	None	Possible. Suitable habitat present and project area is within historic breeding range. While the habitat is suitable the pond and adjacent, likelihood of nesting is low.
Willow Flycatcher (*Empidonax traillii*)	SE	FSC	Summer resident in wet meadow and montane riparian habitats at 600-2500 m (2000-8000 ft) in the Sierra Nevada and Cascade Range. Most often occurs in broad, open river valleys or large mountain meadows with lush growth of shrubby willows. Common spring (mid-May to early June) and fall (mid-August to early September) migrant at lower elevations, primarily in riparian habitats.	None	Unlikely. No nesting habitat present, however could forage during migration, especially from shrubs and willows at property edges near neighboring pond. Known to nest at Beasore Meadows in Sierra National Forest (Little Shuteye Peak Quad).
Bald eagle (*Haliaeetus leucocephalus*) (wintering)	SE; FP	BGEPA; FSC; delisted	Inhabits lower montane coniferous forests and areas with old growth trees. Prefers ocean shore, lake margins, & rivers for both nesting & wintering. Most nests are found within 1 mi of water. Nests in large, old-growth, or dominant live tree w/open branches, especially ponderosa pine. Roosts communally in winter.	Knowles, Bass Lake	Unlikely. Could forage in the pond, however, oak woodland habitat type, frequent human disturbance and developed surrounding make nesting highly unlikely. Known to nest at Bass Lake and Eastman Lake in Madera County.
Loggerhead shrike (*Lanius ludovicianus*)	SSC	FSC	Hunts in open or brushy areas, diving from low perch. Nests in dense shrubs or trees associated with foraging areas.	None	Possible. Could nest in shrubs within the study area and forage over open areas adjacent to the project.
Fox sparrow (*Passerella iliaca*) (wintering)	None	FSC	During the breeding season, occur in higher elevation Sierra foothills, where they nest in chaparral or montane coniferous forest under dense, shrubby vegetation. Winters throughout California, in dense brushy patches and thickets within woodlands.	Not followed in CNDDB	Possible. Could nest in shrubs within the study area and/or winter in the area.
Nuttall's woodpecker (*Picoides nuttallii*)	None	FSC	Oak forest and woodlands, including riparian zones. Requires standing snag or hollow tree for nest cavity. Breeds Apr 1 to Jul 20.	Not followed in CNDDB	Possible. Project area and adjacent trees are suitable habitat for this species year-round.
Rufous hummingbird (*Selasphorus rufus*)	None	FSC	Forest edges, streamsides, mountain meadows. Breeding habitat includes forest edges and clearings, and brushy second growth within the region of northern coast and mountains. Winters mostly in pine-oak woods in Mexico. Migrants occur at all elevations but more commonly in lowlands during spring, in mountain meadows during late summer and fall. Breeds elsewhere.	Not followed in CNDDB	Unlikely. May use the project area and adjacent areas to forage during spring migration. Otherwise, outside of known breeding range.
REPTILES					

Name	Status* State	Federal	Description of Habitat Required [c, e, f]	Historic 9 Quad Presence[a]	Potential to Occur in Study Area [a,b,d]
Western pond turtle (*Emys marmorata* aka *Actinemys marmorata*)	SSC	None	Aquatic turtle of ponds, lakes, marshes, rivers, streams, and irrigation ditches that typically have rocky or muddy bottom, with aquatic vegetation. Nests in uplands associated with wetland habitat.	Ahwahnee, Stumpfield Mtn., Horsecamp Mtn, Bass Lake, North Fork, O'Neals, Knowles	Possible. This species may inhabit the pond and use the project area (sunny slope) for nesting.
AMPHIBIANS					
California tiger salamander (*Ambystoma californiense*)	ST, SSC	FT	Quiet water of ponds, reservoirs, lakes, vernal pools, streams, and stock ponds within annual grasslands, oak savannah, oak woodland and open chaparral.	O'Neals, Knowles	Unlikely. No habitat present in the project area. Outside of typical elevational range.
Yosemite toad (*Anaxyrus canorus*)	SSC	FT	Primarily montane wet meadows; also in seasonal ponds associated with lodgepole pine and subalpine conifer forest. Vicinity of wet meadows in central High Sierra, 6,400 to 11,300 feet in elevation.	White Chief Mtn.	None. Outside of species elevational range and habitat type.
California red-legged frog (*Rana draytonii*)	SSC	FT	Chiefly lakes, ponds, and streams in coastal forest, inland woodlands, and valley grasslands where cattails, bulrush, or other plants provide dense cover. Aquatic sites need not be permanent.	None	None. This species historically occurred in the foothills. However, there are currently less than 20 known populations in the Sierra, all north of Mariposa County[g]. Therefore, this species is not expected to occur in project area or vicinity. No known occurrences in the 9 quad area.
foothill yellow-legged frog (*Rana boylii*)	CT, SSC	none	Closely associated with partly shaded, permanent water courses including streams or rivers in woodland, chaparral, and forest. Often found in riffles with rocks and sunny banks. Shallow streams and riffles with a rocky substrate are preferred. Needs at least some cobble-sized substrate for egg-laying. Needs at least 15 weeks to attain metamorphosis.	All	None. No suitable habitat present in the study area. Also, has not been detected in the vicinity since 1994. Species in decline.
Sierra Nevada yellow-legged frog (*Rana sierrae*)	ST	FE	Typical habitat includes lakes, ponds, marshes, meadows, and streams at high elevations— typically ranging from about 4,500 to 12,000 feet, but can occur as low as about 3,500 feet in the northern portions of their range. Highly aquatic and adults can be found sitting on rocks along the shoreline, where there was little or no vegetation. Always encountered	White Chief Mtn.	None. No suitable habitat present. Outside of elevational range.

Name	Status* State	Status* Federal	Description of Habitat Required [c, e, f]	Historic 9 Quad Presence[a]	Potential to Occur in Study Area [a,b,d]
			within a few feet of water. Tadpoles may require 2 - 4 yrs to complete their aquatic development.		
Western spadefoot (*Spea hammondii*)	SSC	None	Primarily a species of the lowlands, frequenting washes, river floodplains, alluvial fans, playas, alkali flats, but also foothills and mountains. Open vegetation and short grasses preferred, with sandy or gravelly soil. Valley and foothill grasslands, open chaparral, pine-oak woodlands. Vernal pools are essential for breeding and egg-laying.	O'Neals, Knowles	Unlikely. No potential breeding habitat present in the project or study area.
FISH					
Delta smelt (*Hypomesus tranpacificus*)	SE	FT	Found only from the Suisun Bay upstream through the Delta in Contra Costa, Sacramento, San Joaquin, Solano and Yolo counties. Typically found in estuarine waters-along the freshwater edge of the mixing zone (saltwater-freshwater interface), and upstream into river channels and tidally-influenced backwater sloughs. Most spawning happens in tidally-influenced backwater sloughs and channel edgewaters.	None	None. No habitat present.
INVERTEBRATES					
Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*)	None	FT	Nearly always found on or close to its host plant, elderberry (*Sambucus* sp.). Inhabited shrubs typically have stems that are 1.0 inch or greater in diameter at ground level. Distribution is patchy throughout the remaining riparian forests of the Central Valley from Redding to Madera County at elevations below 1000 ft.	O'Neals, Ahwahnee, North Fork	None. Outside of updated species elevation range as of October 2015. However, a few elderberry shrubs are present.

* None = no special status granted or recognized by named party
BGEPA = Bald and Golden Eagle Protection Act; USFWS prohibits the taking, possession and commerce of such birds.
FC = Federal Candidate; USFWS/NOAA FISHERIES has enough information on biological vulnerability and threats to support a proposal to list as endangered or threatened.
FE = Federally Endangered; listed by USFWS as in danger of extinction throughout all or a significant portion of its range.
FT = Federally Threatened; listed by USFWS as likely to become endangered within the foreseeable future throughout all or a significant portion of its range.
FSC = Federal Species of Concern; provides no protection, but allows for awareness and research efforts that may keep species from being listed.
SCE = California Candidate for Endangered Status under the CESA.
SCT = California Candidate for Threatened Status under the CESA.
SE = California Endangered under the CESA.
ST = California Threatened under the CESA.
FP = Fully Protected under California Fish and Game Code (Sections 3511, 4700, 5050, and 5515)

SSC = California Species of Special Concern.
a = Based upon quad lists from query of California Natural Diversity Database (CNDDB) search, accessed August 2019.
b = Based upon planning survey conducted by Odell P&R on project site during June and December 2018.
c = USFWS Sacramento Fish and Wildlife Office's Endangered Species Program; http://www.fws.gov/sacramento/es/
d= Moyle, P.B. 2002. Inland fishes of California. University of California Press. Berkeley, CA
e= Zeiner, D.C., W.F.Laudenslayer, Jr., K.E. Mayer, and M. White, eds. 1988-1990. California's Wildlife. Vol. I-III. California Department of Fish and Game, Sacramento, California.
f = Shuford, W. D., and Gardali, T., editors. 2008. California Bird Species of Special Concern: A ranked assessment of species, subspecies, and distinct populations of birds of immediate conservation concern in California. Studies of Western Birds 1. Western Field Ornithologists, Camarillo, California, and California Department of Fish and Game, Sacramento.
g= Sean J. Barry and Gary M. Fellers. History and Status of the California Red-legged Frog (*Rana draytonii*) in the Sierra Nevada, California, USA Herpetological Conservation and Biology 8(2):456-502. Published: 15 September 2013.

Appendix B. Special status plant species known from the vicinity of the Oakhurst Community College Center Project.

Name	Status[a]		Description of Habitat Required[b]	Blooming Period	Historic 9 Quad Presence[c]	Potential to Occur in Study Area[d]
	State	Federal				
Abrams' onion (*Allium abramsii*)	1B.2	None	Lower montane coniferous forest, upper montane coniferous forest. On sandy soils, derived from disintegrated granite. 975-3050 m.	Apr-Jul	Bass Lake	Unlikely. Project Area is below typical elevational range and habitat type.
big-scale balsamroot (*Balsamorhiza macrolepis*)	1B.2	None	Chaparral, valley and foothill grassland, cismontane woodland. Sometimes on serpentine. 35-1465 m.	Mar-Jun	Stumpfield Mtn.	Possible. Potential habitat present within the project area.
Mariposa pussypaws (*Calyptridium pulchellum*)	1B.1	FT	Cismontane woodland, chaparral. On granite domes, restricted to exposed sites. 440-1040 m.	Apr-Aug	Ahwahnee, O'Neals	Possible. Potential habitat present within the project area.
Yosemite evening-primrose (*Camissonia sierrae* ssp. *sierrae*)	4.3	None	Cismontane woodland, lower montane coniferous forest. 500-1645 meters elevation.	Apr-Jun	Bass Lake, Ahwahnee	Possible. Potential habitat present within the project area.
tree-anemone (*Carpenteria californica*)	ST, 1B.2	None	Cismontane woodland, chaparral. A very localized endemic found on well-drained granitic soils, mostly in north-facing ravines and drainages. 335-1345 m.	May-Jul	North Fork	None. Species not observed during surveys.
Fresno ceanothus (*Ceanothus fresnensis*)	4.3	None	Cismontane woodland (openings), lower montane coniferous forest. 900-2103 m	May-Jul	White Chief Mtn.	None. Species not observed during surveys and outside typical elevational range.
Bolander's woodreed (*Cinna bolanderi*)	1B.2	None	Mesic, streamside areas in meadows and seeps, upper montane coniferous forest. 1670 - 2440 meters	Jul-Sep	White Chief Mtn.	None. No habitat present and outside of elevational range.
Small's southern clarkia (*Clarkia australis*)	1B.2	None	Cismontane woodland, lower montane coniferous forest. Open, rocky sites in conifer forest or oak woodland. 910-2075 m.	May-Aug	Fish Camp	Unlikely. Project Area is below typical elevational range.
beaked clarkia (*Clarkia rostrata*)	1B.3	None	Cismontane woodland, valley and foothill grassland. North-facing slopes; sometimes on sandstone. 60-915 m.	Apr-May	Stumpfield Mtn.	Possible. Potential habitat present within the project area.
streambank spring beauty (*Claytonia parviflora* ssp. *grandiflora*)	4.2	None	Rocky areas in cismontane woodland.	Feb-May	North Fork	Possible. Potential habitat present within the project area.
Rawson's flaming trumpet (*Collomia rawsoniana*)	1B.2	None	Riparian forest, lower montane coniferous forest, meadows and seeps. On stabilized alluvium in riparian zones. 780-2075 m.	Jul-Aug	Bass Lake, White Chief Mtn.	Possible. Potential habitat present within the project area.
short-bracted bird's-beak (*Cordylanthus rigidus* ssp. *brevibracteatus*)	4.3	None	Openings, granitic soils in chaparral, lower montane coniferous forest, pinyon and juniper woodland, upper montane coniferous forest.	Jul-Aug	Bass Lake	Possible. Potential habitat present within the project area.
Hoover's cryptantha (*Cryptantha hooveri*)	1A	None	Valley and foothill grassland, inland dunes. In coarse sand. 50-365 m.	Apr-May	Knowles, O'Neals	Presumed Extirpated. All occurrences historical. Last seen in 1939. No habitat present.

Name	Status[a]		Description of Habitat Required[b]	Blooming Period	Historic 9 Quad Presence[c]	Potential to Occur in Study Area[d]
	State	Federal				
Mountain lady's-slipper (*Cypripedium montanum*)	4.2	None	Broadleafed upland forest, cismontane woodland, lower montane coniferous forest, North Coast coniferous forest.	Mar-Aug	White Chief Mtn., Fish Camp	Possible. Potential habitat present within the project area.
Ewan's Larkspur (*Delphinium hansenii* ssp. *ewanianum*)	4.2	None	Rocky areas in cismontane woodland and valley and foothill grassland. 60 - 600 meters	Mar-May	Knowles, O'Neals, Ahwahnee	Possible. Potential habitat present within the project area.
yellow-lip pansy monkeyflower (*Diplacus pulchellus*)	1B.2	None	Lower montane coniferous forest, meadows and seeps. Vernally wet sites. Soils can be clay, volcanic, or granitic. 670-1950 m.	Apr-Jul	Stumpfield Mtn.	Possible. Potential habitat present within the project area along pond and adjacent wet areas.
Kings River monkeyflower (*Erythranthe acutidens*)	3	None	Cismontane woodland, lower montane coniferous forest.	Apr-Jul	White Chief Mtn.	Possible. Potential habitat present within the project area.
slender-stalked monkeyflower (*Erythranthe gracilipes*)	1B.2	None	Chaparral, cismontane woodland, lower montane coniferous forest. Disturbed places such as burns and RR grades; also on thin granitic soil in cracks in large granite rocks. 500-1300 m.	Apr-Jun	Stumpfield Mtn., Ahwahnee	Possible. Potential habitat present within the project area.
Boggs Lake hedge-hyssop (*Gratiola heterosepala*)	SE, 1B.2	None	Marshes and swamps (lake margins), vernal pools. 10 - 2375 meters	Apr-Aug	North Fork	Possible. Potential habitat present within the project area.
short-leaved hulsea (*Hulsea brevifolia*)	1B.2	None	Lower montane coniferous forest, upper montane coniferous forest. Granitic or volcanic soil of forest openings and road cuts. 1500-3200 m.	May-Aug	White Chief Mtn.	None. No habitat present and outside of elevational range.
Madera leptosiphon (*Leptosiphon serrulatus*)	1B.2	None	Cismontane woodland, lower montane coniferous forest. Dry slopes; often on decomposed granite in woodland. 300-1300 m.	Apr-May	O'Neals, Ahwahnee, North Fork	Possible. Potential habitat present within the project area.
Orange lupine (*Lupinus citrinus* var. *citrinus*)	1B.2	None	Chaparral, cismontane woodland, lower montane coniferous forest. Rocky, decomposed granitic outcrops, usually open areas, on flat to rolling terrain. 380-1770 m.	Apr-Jul	O'Neals, Ahwahnee	Possible. Potential habitat present within the project area.
three-ranked hump moss (*Meesia triquetra*)	4.2	None	Bogs and fens, meadows and seeps,in subalpine coniferous forest and upper montane coniferous forest (mesic). 1300 - 2953 meters.	Jul	White Chief Mtn.	None. No habitat present and outside of elevational range.
western waterfan lichen (*Peltigera gowardii*)	4.2	None	Occurs in riparian forest, on rocks in cold water creeks with little or no sediment or disturbance. Often associated with rich bryophyte flora. 1065-2375 m.	NA	White Chief Mtn.	Unlikely. No habitat present and outside of elevational range.
Bolander's clover (*Trifolium bolanderi*)	1B.2	None	Meadows and seeps, lower montane coniferous forest, upper montane coniferous forest. Moist mountain meadows. 2039-2600 m.	Jun-Aug	White Chief Mtn.	None. No habitat present and outside of elevational range.

a Status codes are as follows:
FC = Federal Candidate; USFWS/NOAA FISHERIES has enough information on biological vulnerability and threats to support a proposal to list as endangered or threatened.
FE = Federally Endangered; listed by USFWS as in danger of extinction throughout all or a significant portion of its range.
FT = Federally Threatened; listed by USFWS as likely to become endangered within the foreseeable future throughout all or a significant portion of its range.
FSC = Federal Species of Concern; provides no protection, but allows for awareness and research efforts that may keep species from being listed.
SCE = California Candidate for Endangered Status under the CESA.
SCT = California Candidate for Threatened Status under the CESA.
ST = California Threatened under the CESA.

FP = Fully Protected under California Fish and Game Code (Sections 3511, 4700, 5050, and 5515)
SSC = California Species of Special Concern.
Rare = State listed as Rare

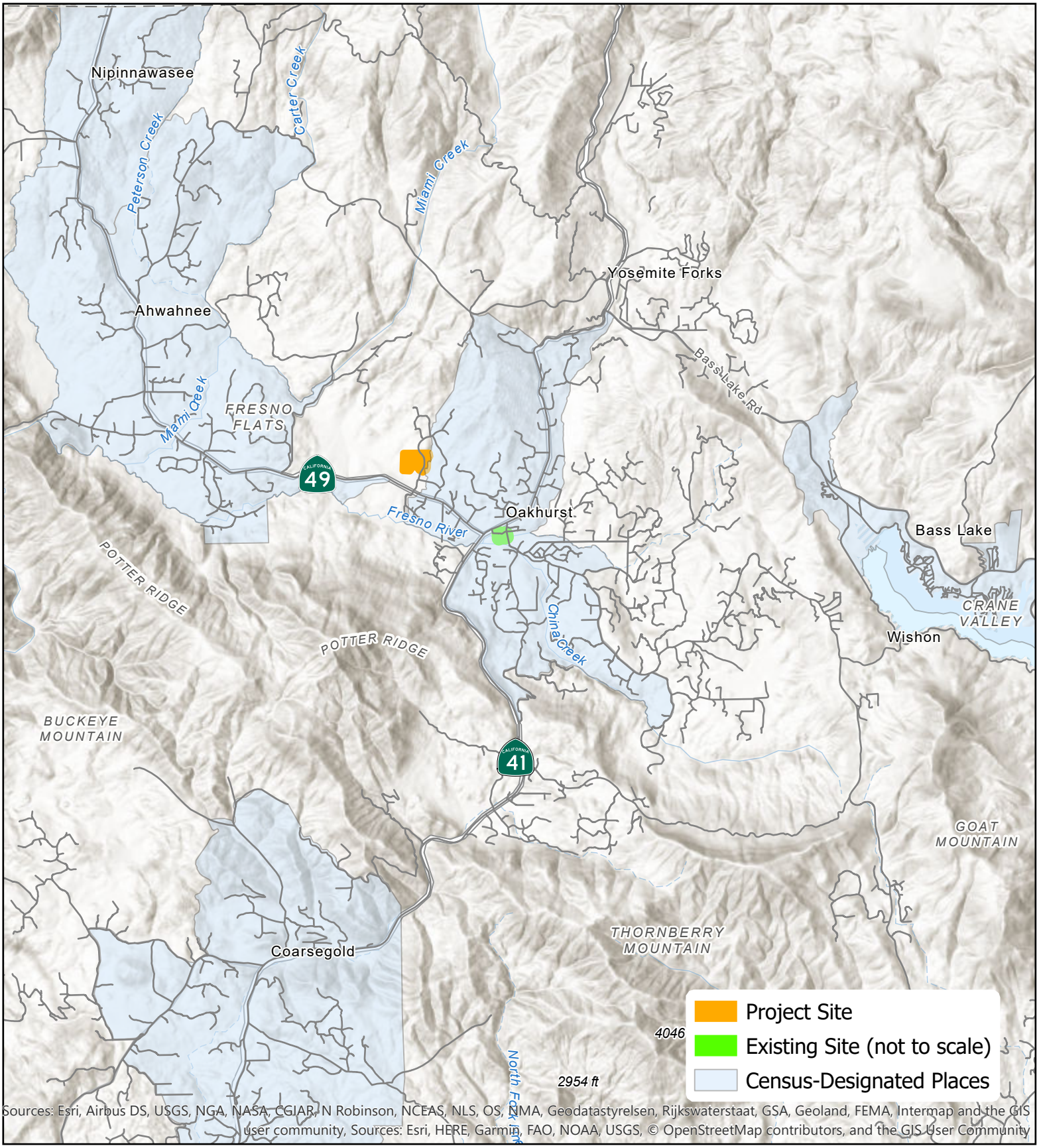
California Rare Plant Rank:

1A	Presumed extinct in California
1B	Rare or Endangered in California and elsewhere
2	Rare or Endangered in California, more common elsewhere
3	Plants for which we need more information - Review list
4	Plants of limited distribution - Watch list

California Native Plant Society Threat Codes:

.1	Seriously Endangered in California (over 80% of occurrences Threatened / high degree and immediacy of threat)
.2	Fairly Endangered in California (20-80% occurrences Threatened)
.3	Not very Endangered in California (<20% of occurrences Threatened or no current threats known)

b Habitat information sources and blooming times - CNPS Inventory of Rare & Endangered Plants website (http://cnps.web.aplus.net/cgi-bin/inv/inventory.cgi) used for all plant species.
c Quad lists for plant species from February 2019query of California Natural Diversity Database (CNDDB), supplemented for plants by the CNPS Inventory of Rare & Endangered Plants website, which notes quads species have been extirpated from (noted with an * in this table).
d Site survey from work conducted by Odell P& R on project site during June & December 2018.



Regional Location

Figure 1

Oakhurst Community College Center Project
State Center Community College District

ODELL *Planning & Research, Inc.*
Environmental Planning • School Facility Planning • Demographics

0 0.5 1 2 Miles

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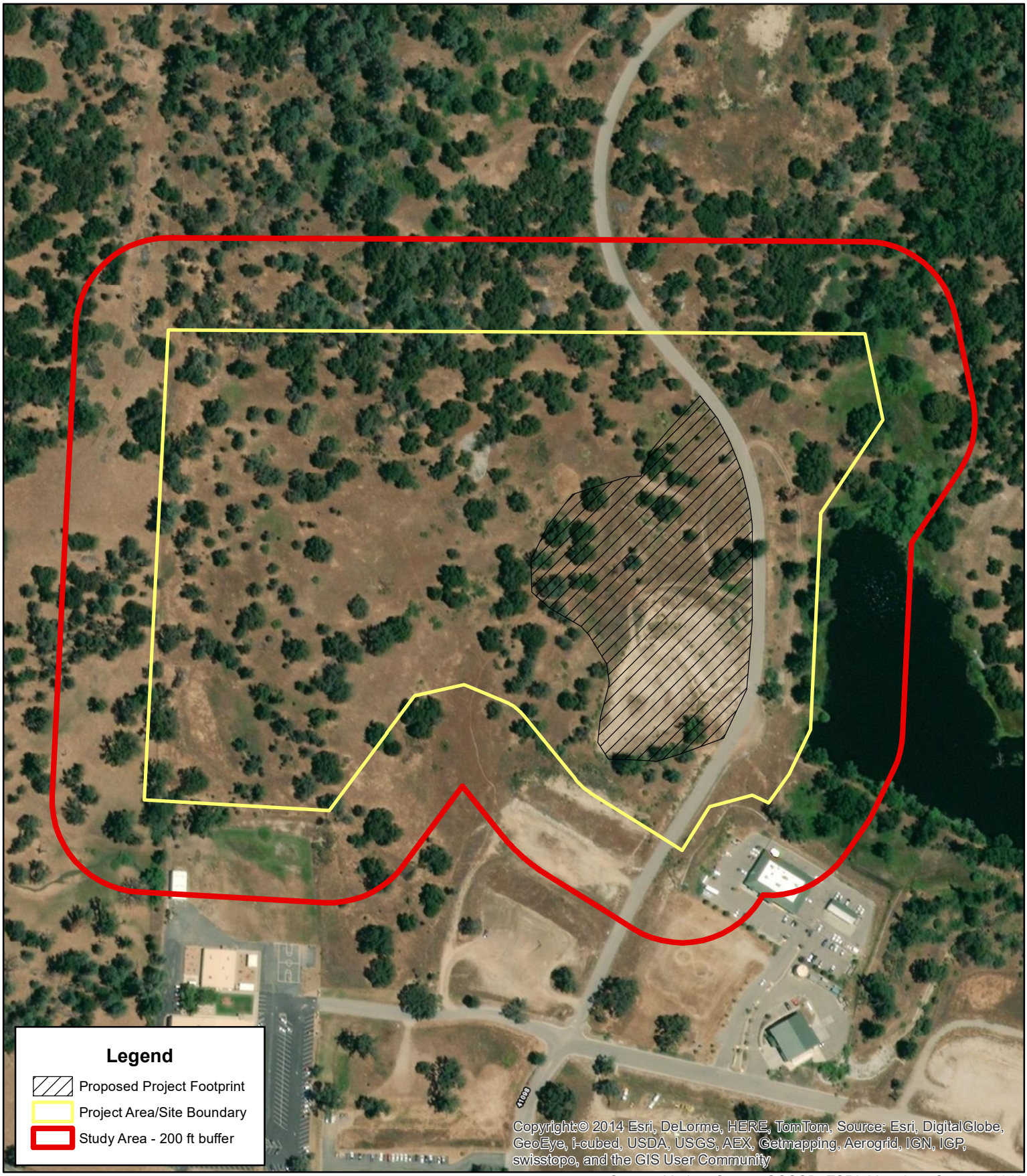


Source: Madera County, SCCCD, ESRI. Map date: Sept 15, 2019
Map Author: M. Odell

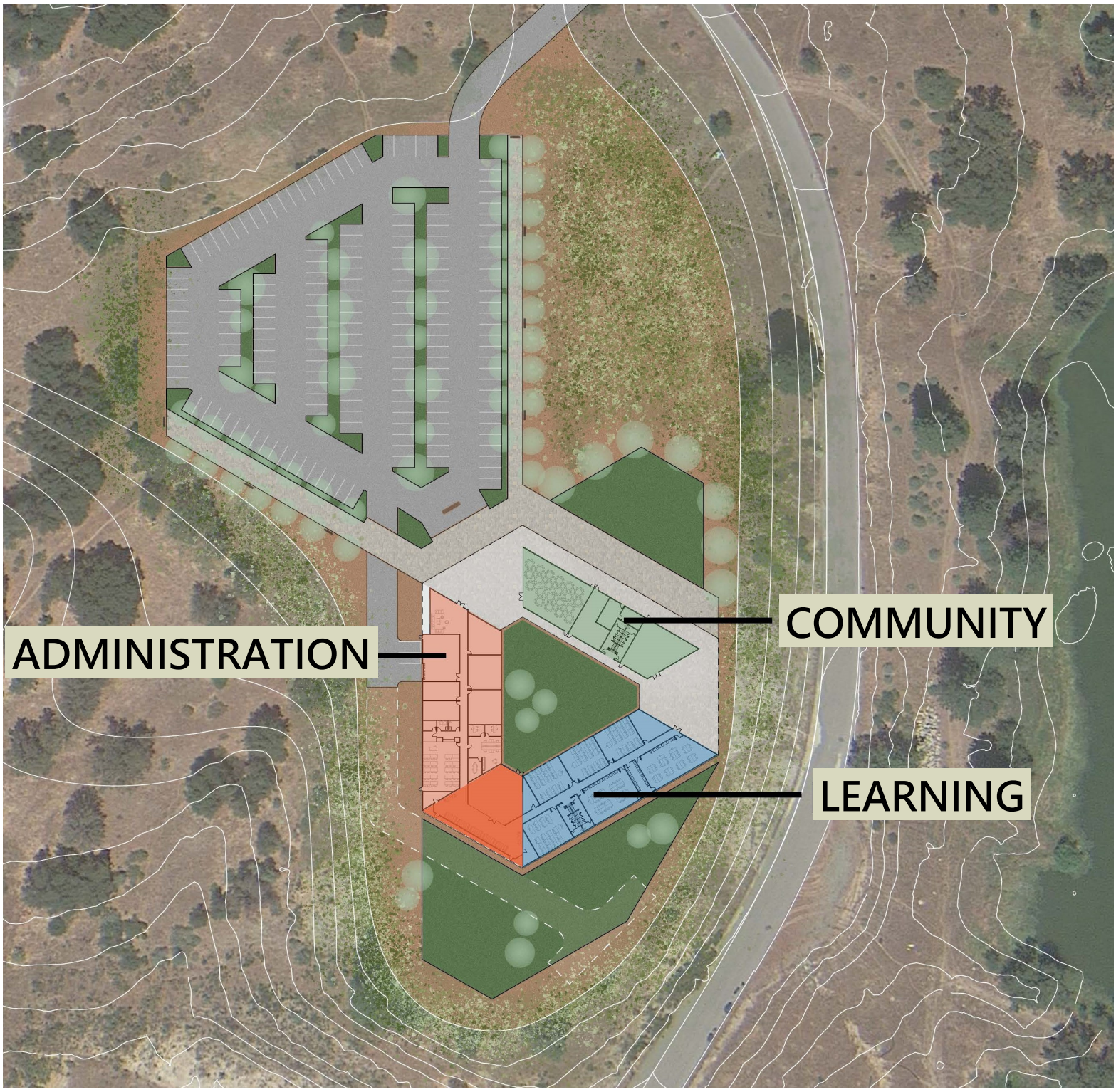
Project Area and Study Area Map

Figure 2

New Oakhurst Community College Center Project
State Center Community College District

ODELL *Planning & Research, Inc.*
School Facility Planning • Environmental Analysis • Demographics

0 70 140 280 420 560 Feet



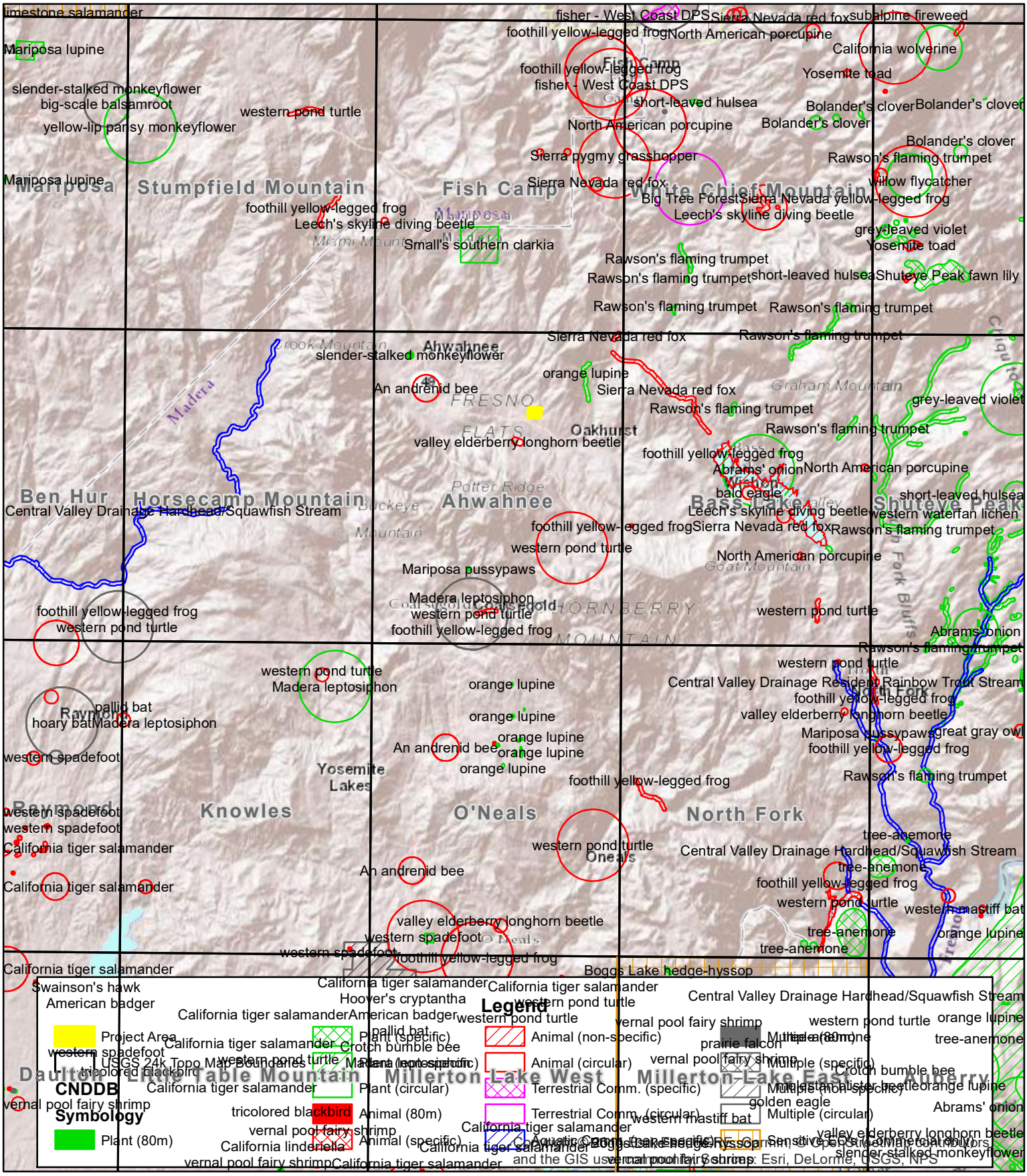
Site Plan

Figure 3

Oakhurst Community College Center Project
State Center Community College District

ODELL *Planning & Research, Inc.*
Environmental Planning • School Facility Planning • Demographics

PAUL HALAJIAN
ARCHITECTS



Source: CDFW, SCCCD, ESRI
Map Date: Sept 21, 2019 Map Author: M. Odell

California Natural Diversity Database (CNDDB) Map

Figure 4

Oakhurst Community College Center Project
State Center Community College District

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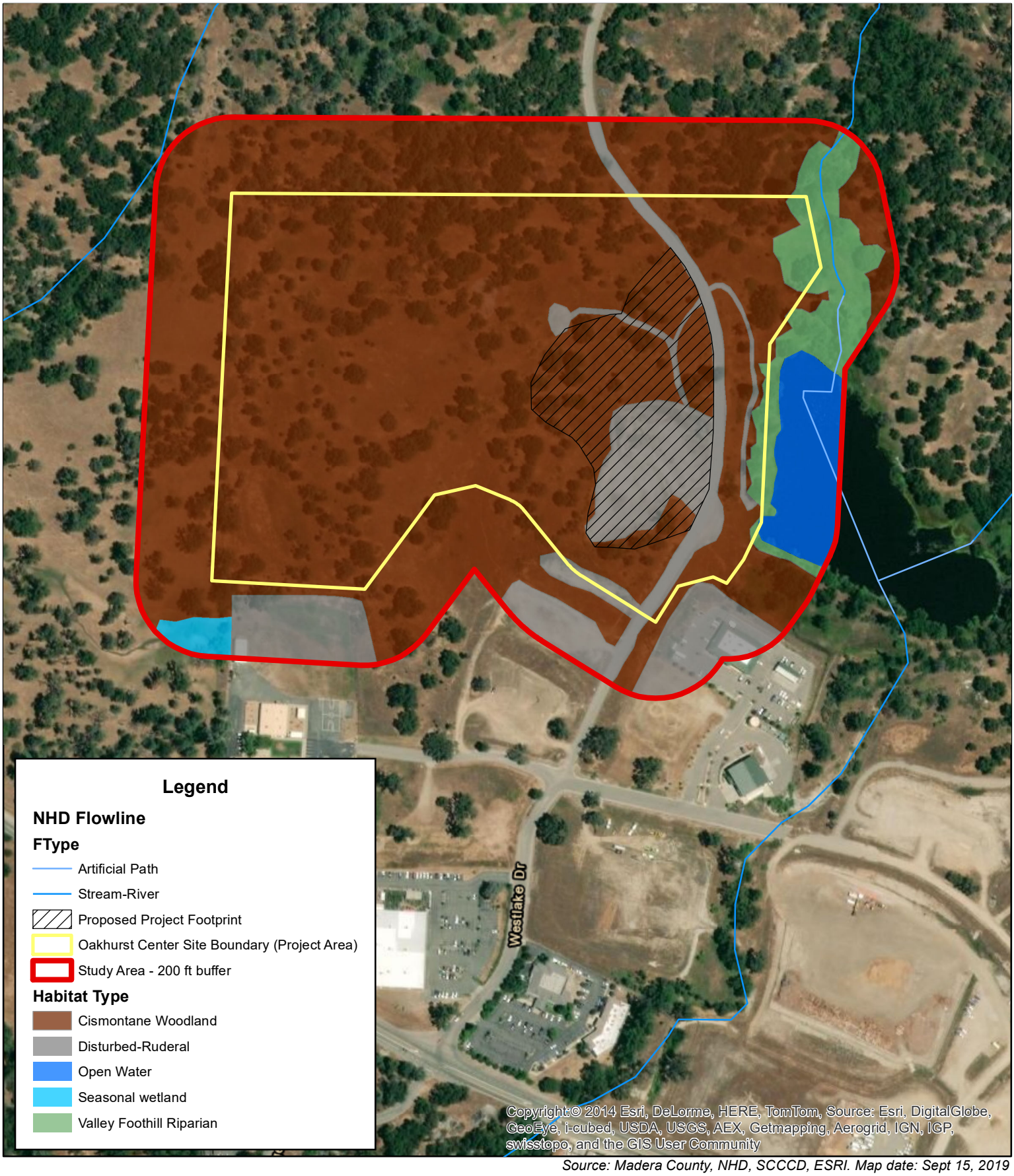

Source: Madera County, NHD, SCCCD, ESRI. Map date: Sept 15, 2019
Map Author: M. Odell

Habitat Map

Figure 5

New Oakhurst community College Center Project
State Center Community College District

ODELL *Planning & Research, Inc.*
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0 85 170 340 510 680
Feet

LIVE OAK ASSOCIATES, INC.
an Ecological Consulting Firm

July 7, 2020

George Cummings
Director of Facilities Planning
State Center Community College District
1171 Fulton Street
Fresno, CA 93721

RE: Results of the Special Status Plant Survey, Oakhurst Community College Project, Oakhurst, Madera County, California.

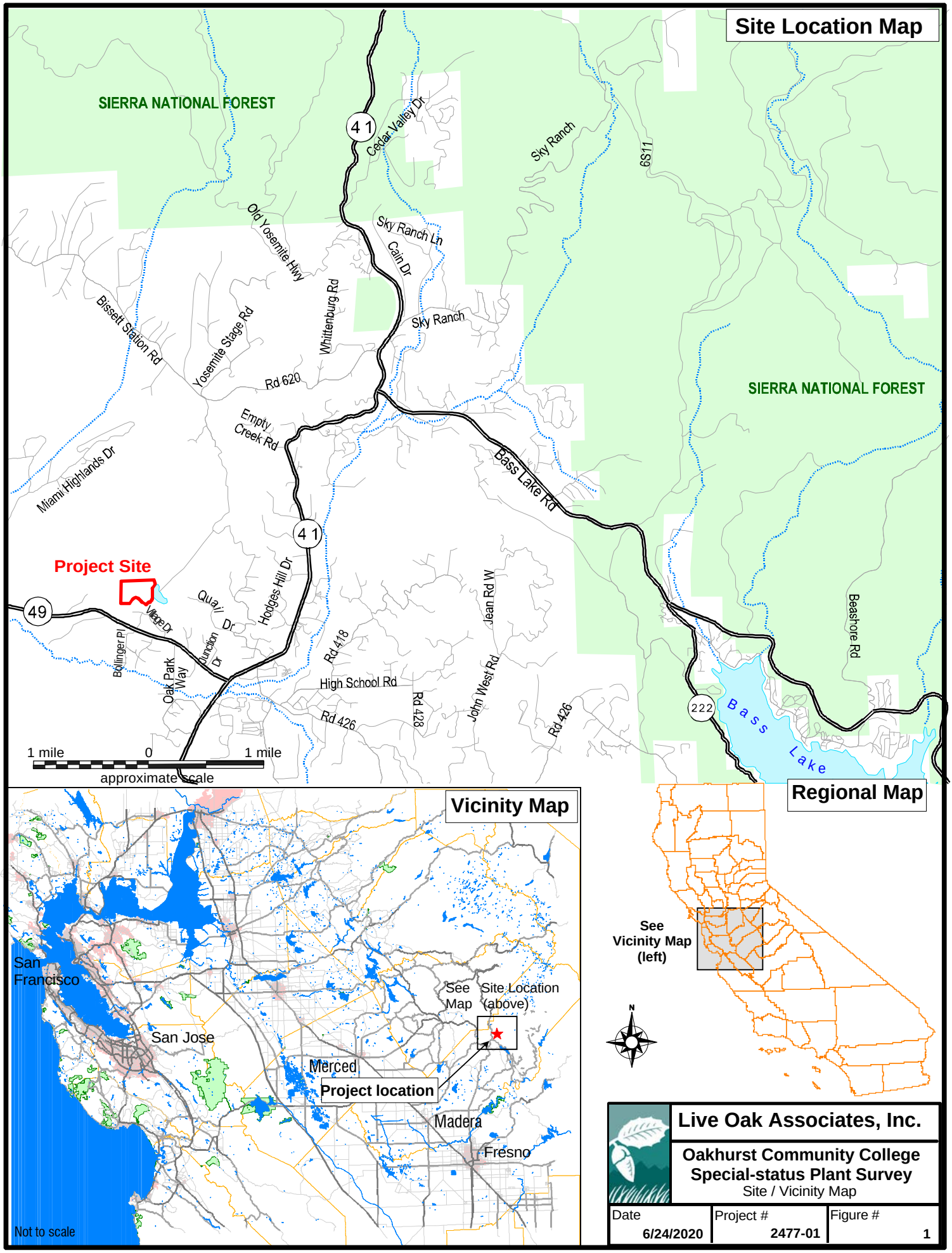
Dear Mr. Cummings:

In the spring of 2020, Live Oak Associates, Inc. (LOA) conducted surveys for 31 special status plant species on an approximately 5.7-acre property ("Project Site") bisected by Westlake Drive in the unincorporated community of Oakhurst, Madera County (Figure 1). Surveys for 15 of these species were a requirement of the project's Biological Resources Assessment (Odell Planning and Research, 2019); the remaining 16 species were included in the surveys because they have California Natural Diversity Database (CNDDB) occurrence records in the Project vicinity. This letter presents the results of these surveys.

The Project Site is generally hilly with an approximate elevation ranging from 2,350 to 2,470 feet (ft.) above mean sea level. The project is located in a portion of Section 10, Township 7 South, Range 21 East, Mount Diablo Base and Meridian, as shown on the *Ahwahnee*, California Quadrangle 7.5 Minute Series USGS Map (Figure 2).

Four land uses/biotic habitats, (cismontane woodland, disturbed-ruderal, valley foothill riparian, and seasonal wetland) were identified on the Project Site. Paved Westlake Drive bisects the property from north to south near its eastern boundary. A flat disturbed area with sparsely vegetated, compacted soils occurs in the southeastern portion of the site. A dirt road provides access to this previously disturbed area. A large, man-made perennial pond occurs immediately east of the site, and is fed by a seasonal stream through a montane meadow.

Soils within the Project Site include two soil mapping units from two soil series, 1) Ahwahnee and Auberry coarse sandy loams, 8 to 15 percent slopes and 2) Ahwahnee and Auberry coarse

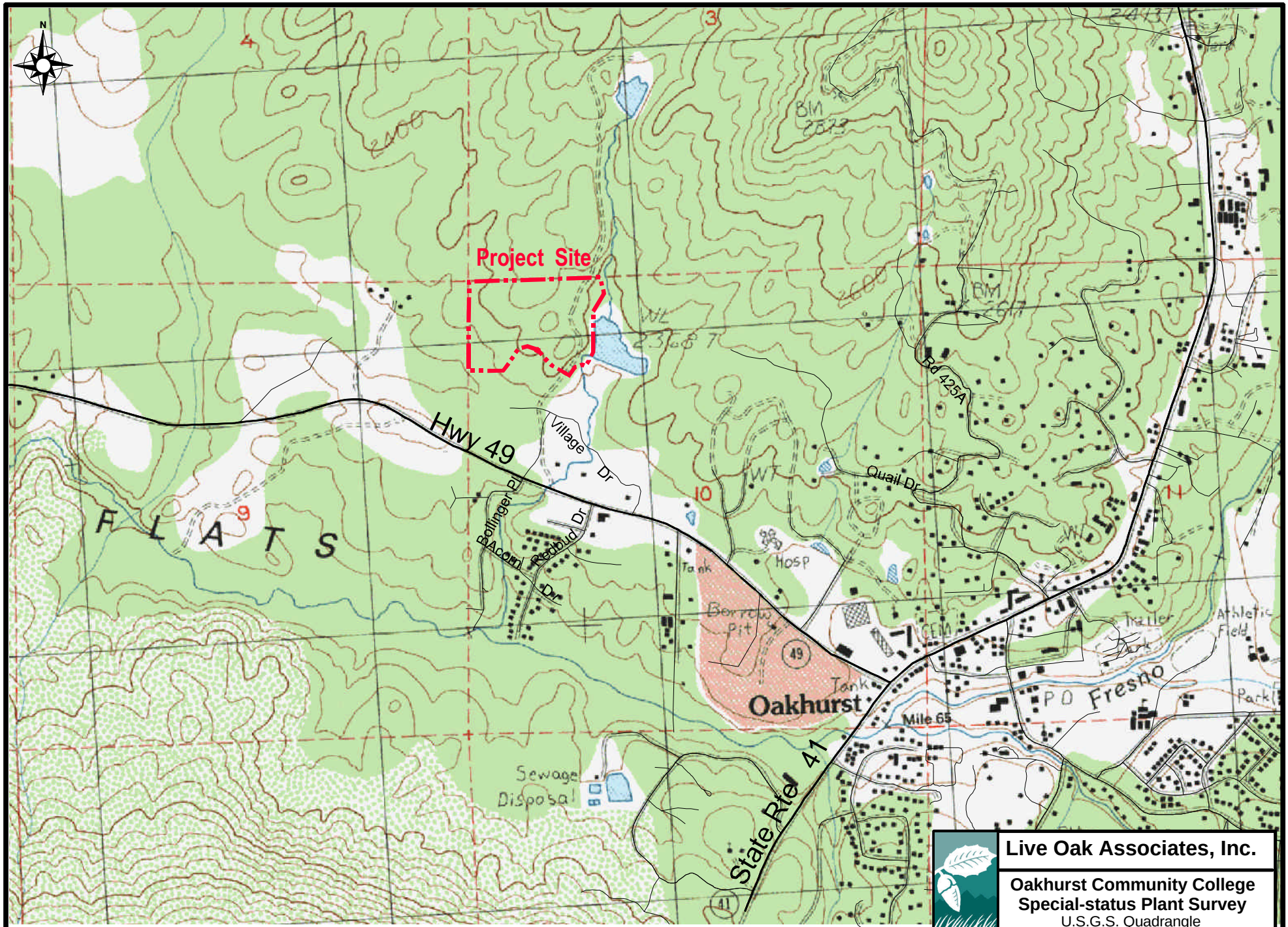


Live Oak Associates, Inc.

Oakhurst Community College Special-status Plant Survey

Site / Vicinity Map

Date	Project #	Figure #
6/24/2020	2477-01	1



From USGS Ahwahnee 7.5' Quadrangle 1990

Live Oak Associates, Inc.

Oakhurst Community College
Special-status Plant Survey
U.S.G.S. Quadrangle

Date	Project #	Figure #
6/24/2020	2477-01	2

sandy loams, 15 to 30 percent slope (NRCS 2020). Both soil types typically occur on foothill or mountain slopes with parent material of residuum weathered from granite. These sandy soils are well drained, not hydric and not ponded.

SURVEY METHODOLOGY

LOA conducted a focused survey for thirty-one (31) special status plants within the Project Site on May 19, 21, 22, and June 2, 2020. The special status plant species targeted during the field effort based on the Biological Resources Assessment (BRA) report included big-scale balsamroot (*Balsamorhiza macrolepis*), Mariposa pussypaws (*Calyptridium pulchellum*), Yosemite evening primrose (*Camissonia sierra* ssp. *sierra*), beaked clarkia (*Clarkia rostrata*), streambank spring beauty (*Claytonia parviflora* ssp.*grandiflora*), Rawson's flaming trumpet (*Collomia rawsoniana*), short-bracted bird's beak (*Cordylanthus rigidus* ssp. *brevibracteatus*), mountain lady's slipper (*Cypripedium montanum*), Ewan's larkspur (*Delphinium hansenii* ssp. *ewanianum*), yellow-lip pansy monkeyflower (*Diplacus pulchellus*), Kings River monkeyflower (*Erythranthe acutidens*), slender-stalked monkeyflower (*Erythranthe gracilipes*), Bogg's Lake hedge hyssop (*Gratiola heterosepala*), Madera leptosiphon (*Leptosiphon serrulatus*), and orange lupine (*Lupinus citrinus* ssp. *citrinus*). Additional species were included in the analysis based on a CNDDB query of the nine U.S. Geological Survey quadrangles containing and surrounding the Project Site (*Ahwahnee, Bass Lake, White Chief Mountain, Fish Camp, Stumpfield Mountain, Horsecamp Mountain, Knowles, O'Neals, and North Fork*). These species included Abrams onion (*Allium abramsii*), Yosemite onion (*Allium yosemitense*), mud sedge (*Carex limosa*), Bolander's woodreed (*Cinna bolanderi*), Small's southern clarkia (*Clarkia australis*), Jepson's dodder (*Cuscuta jepsonii*), recurved larkspur (*Delphinium recurvatum*) Congdon's woolly sunflower (*Eriophyllum congdonii*), Yosemite woolly sunflower (*Eriophyllum nubigenum*), slender-stemmed monkeyflower (*Erythranthe filicaulis*), short-leaved hulsea (*Hulsea brevifolia*), Congdon's lewisia (*Lewisia congdonii*), slender lupine (*Lupinus gracilentus*), Yosemite popcorn flower (*Plagiobothrys torreyi* var. *torreyi*), Bolander's clover (*Trifolium bolanderi*), and grey-leaved violet (*Viola pinetorum ssp. grisea*).

The surveys were completed in accordance with current protocols developed by the California Native Plant Society (CNPS) and California Department of Fish and Wildlife (CDFW). Prior to the survey, Ms. Fisher reviewed the relevant literature, focusing on habitat requirements and survey guidelines for the target plant species. Specifically, she reviewed the *CNPS Botanical Survey Guidelines*, the CDFW *Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities* (CDFW 2018) (Attachment 1), the on-line *Inventory of Rare and Endangered Plants* (CNPS 2020), the on-line *Jepson Interchange* (UCB 2020), and on-line *Calflora* (Calflora 2020). Local U.S. Forest Service and consulting botanists were contacted to verify local reference locations and blooming periods.

Having resided and worked as a plant ecologist in the Oakhurst area for over 25 years, Ms. Fisher was highly familiar with most of the target plant species. During the current spring and recent years, the botanist had visited seven reference populations of the target species, including Mariposa pussypaws, Rawson's flaming trumpet, mountain lady's slipper, Ewan's larkspur, Boggs lake hedge-hyssop, Madera leptosiphon, and orange lupine. Personal photographs and other documentation, photographs from *Calphotos* and species descriptions from *Calflora* and the *On-line Inventory* (CNPS 2020) were printed and carried in the field for reference. Field

equipment also included a hand lens and the current version of the Jepson Manual (Baldwin et al. 2012) for keying field specimens.

Field surveys were timed to coincide with species blooming periods. Meandering transects approximately 35 ft. in width were walked throughout the Project Site. All plant species observed over the course of the surveys were recorded in a field notebook. A complete list of vascular plant species observed in the survey area during the surveys in 2020 is presented in Attachment 2. Selected photographs of plants of interest within land uses/habitats of the Project Site can be found in Attachment 3.

RESULTS

Table 1 below discusses habitats, blooming periods, and occurrence information for each special status plant species targeted during the survey. Figure 3 shows all documented occurrences of special status plants within a 10-mile radius of the Project Site.

TABLE 1. LIST OF SPECIAL STATUS SPECIES THAT COULD OCCUR IN THE PROJECT VICINITY

PLANTS (adapted from CDFW 2020, CNPS 2020)

Species Listed as Threatened or Endangered under the State and/or Federal Endangered Species Act

Species	Status	Habitat	*Occurrence on the Project Site
Mariposa Pussypaws (*Calyptridium pulchellum*)	FT, CNPS 1B.1	Fewer than 10 populations in Mariposa, Madera and Fresno Counties between 1,320 and 4,000 ft. in elevation; primarily in coarse granitic sands of decomposing outcrops. Blooms April - August. There are four documented occurrences within a 10-mile radius. The nearest documented occurrence is approximately 3 miles south of the site.	**Absent.** Coarse granitic sands surrounding outcrops required by this species are present but limited. Furthermore, floristic surveys during this species' blooming period did not detect this species. No species of *Calandrinia* was observed on the site.
Boggs Lake Hedge Hyssop (*Gratiola heterosepala*)	CE, CNPS 1B.2	Occurs in vernal pools and seasonal wetland margins less than 5,300 ft in elevation. Blooms April-September.	**Absent.** While marginally suitable habitat occurs on the site, floristic surveys during this species' blooming period did not detect this species. No species of *Gratiola* was observed on the site.

CNPS Listed Species

Abrams' Onion (*Allium abramsii*)	CNPS 1B.2	Occurs in montane coniferous forest on sandy soils derived from disintegrated granite between 2,900-10,000 ft. in elevation. Blooms May-June. There is one documented occurrence within a 10-mile radius. The nearest documented occurrence is approximately 5 miles east of the site (CDFW 2020)(Figure 3).	**Absent.** Marginal habitat in the form of sandy soils in conifer forest openings is present on the Project Site. However, the site is just below the elevational range of this species. Furthermore, floristic surveys in 2020 during this species' blooming period did not detect this species. No species of *Allium* was observed on the site.
Yosemite Onion (*Allium yosemitense*)	CNPS 1B.3	Occurs in pockets of wet soil or in wet cracks of metamorphic rock; also on slopes and walls of broadleaved upland forest, chaparral, cismontane woodland, and lower montane and coniferous forests at 1,740-6,650 ft. in elevation. Blooms April-June	**Absent.** Suitable habitat is absent from the project site. Furthermore, floristic surveys LOA in 2020 during this species' blooming period did not detect this species. No species of *Allium* was observed on the site.
Big-scale Balsamroot (*Balsamorhiza macrolepis*)	CNPS 1B.2	This perennial occurs in chaparral, cismontane woodland, Valley and foothill grassland, sometimes serpentine soils, in Central California between 150 and 4,000 ft in elevation. Blooms March – June.	**Absent.** While potentially suitable habitat occurs on the site, floristic surveys during this species' blooming period did not detect this species. A similar species, *Balsamorhiza deltoidea*, was observed on the site.
Yosemite Evening-Primrose (*Camissonia sierra* ssp. *sierrae*)	CNPS 4.3	Occurs in foothill pine/blue oak and lower montane coniferous forest openings in sand or gravel, between 1,600 – 4.300 ft. in elevation. Blooms April-June.	**Absent.** While potentially suitable habitat occurs on the site, floristic surveys during this species' blooming period did not detect this species. A closely related species of *Camissonia* (*C. campestris* ssp. *campestris*) was observed (Attachment 2).

TABLE 1. LIST OF SPECIAL STATUS SPECIES THAT COULD OCCUR IN THE PROJECT VICINITY

PLANTS (adapted from CDFW 2020, CNPS 2020)

CNPS Listed Species

Species	Status	Habitat	*Occurrence on the Project Site
Mud Sedge (*Carex limosa*)	CNPS 2B.2	Bogs and fens in lower montane coniferous forest; meadows, seeps, marshes, and swamps in upper montane coniferous forest between 4,500 and 9,150 ft. in elevation. Blooms June - August.	**Absent.** The site is too low in elevation for this species. Floristic surveys during this species' blooming period did not detect this species. Two species of *Carex* (*C. praegracilis*) and *C. praticola*) were observed (Attachment 2).
Bolander's Woodreed (*Cinna bolanderi*)	CNPS 1B	Stream banks, wet meadows, moist sites in coniferous forest, central and southern Sierra between 5,479 and 8,005 ft. in elevation. Blooms July - August.	**Absent.** The site is too low in elevation for this species. Floristic surveys during this species' blooming period did not detect this species. No species of *Cinna* was observed on the site.
Small's Southern Clarkia (*Clarkia australis*)	CNPS 1B.2	This species occurs in open, rocky sites in conifer forest or oak woodland between 2,800 and 6,200 ft in elevation in Calaveras, Madera, Mariposa, and Tuolumne Counties. Blooms May – August. There is one documented occurrence within a 10-mile radius approximately 4 miles north of the site (CDFW 2020)(Figure 3).	**Absent.** While potentially suitable habitat occurs on the site, floristic surveys during this species' blooming period did not detect this species. Three common species of *Clarkia* (*C. dudleyana, C purpurea* ssp. *quadrvulnera, and C. speciosa* ssp. *polyantha*) were found on the site (Attachment 2).
Beaked Clarkia (*Clarkia rostrata*)	CNPS 1B.3	Occurs in cismontane woodland, and valley/foothill grassland in Merced, Mariposa, Stanislaus and Tuolumne Counties between 700 and 5,400 ft in elevation. Blooms April-May.	**Absent.** While potentially suitable habitat occurs on the site, floristic surveys during this species' blooming period did not detect this species. Three common species of *Clarkia* (*C. dudleyana, C purpurea* ssp. *quadrvulnera, and C. speciosa* ssp. *polyantha*) were found on the site (Attachment 2).
Streambank Spring Beauty (*Claytonia parviflora* ssp. *grandiflora*)	CNPS 4.2	Occurs in rocky cismontane woodland in Central California between 820 and 4,000 ft in elevation. Blooms February – May.	**Absent.** While potentially suitable habitat occurs on the site, floristic surveys during this species' blooming period did not detect this species. A common species of *Claytonia* (*C. perfoliata* ssp. *perfoliata*) was observed (Attachment 2).
Rawson's Flaming Trumpet (*Collomia rawsoniana*)	CNPS 1B.2	Occurs on stabilized alluvium in riparian zones between 2,500 and 6,600 ft in elevation. Endemic to Madera and Mariposa Counties. Blooms July – August. There are three documented occurrences within a 10-mile radius. The nearest documented occurrence is approximately 7 miles east of the site (CDFW 2020)(Figure 3).	**Absent.** While potentially suitable habitat occurs on the site, floristic surveys during this species' blooming period did not detect this species. No species of *Collomia* was observed on the site.
Short-bracted Bird's Beak (*Cordylanthus rigidus* ssp. *brevibracteatus*)	CNPS 4.3	Occurs in granitic openings of chaparral, oak/pine woodland, pinyon and juniper coniferous forest, lower and upper mixed conifer forest between 2,000 and 8500 ft in elevation. Blooms July-August.	**Absent.** While potentially suitable habitat occurs on the site, floristic surveys during this species' blooming period did not detect this species. No species of *Cordylanthus* was observed on the site.

TABLE 1. LIST OF SPECIAL STATUS SPECIES THAT COULD OCCUR IN THE PROJECT VICINITY

PLANTS (adapted from CDFW 2020, CNPS 2020)

CNPS Listed Species

Species	Status	Habitat	*Occurrence on the Project Site
Jepson's Dodder (*Cuscuta jepsonii*)	CNPS 1B.2	Occurs on dry, undisturbed slopes in lower montane coniferous forest, broadleaved upland forest, cismontane woodland, north coast coniferous forest between 600 and 7,300 ft. in elevation.	**Absent.** While potentially suitable habitat occurs on the site, floristic surveys during this species' blooming period did not detect this species. California dodder (*Cuscuta californica*) was observed (Attachment 2).
Mountain Lady's Slipper (*Cypripedium montanum*)	CNPS 4.2	This rhizomatous perennial orchid occurs in mixed evergreen and riparian habitats of northern and central California between 600 and 7,300 ft in elevation. Blooms March – August.	**Absent.** While potentially suitable habitat occurs on the site, floristic surveys during this species' blooming period did not detect this species. No species of orchid was observed on the site.
Ewan's Larkspur (*Delphinium hansenii* ssp. *ewanianum*)	CNPS 4.2	Occurs in valley and foothill grassland and cismontane woodland in Sierra foothills of Central California between 200 and 2,000 ft in elevation. Blooms March – May.	**Absent.** While potentially suitable habitat occurs on the site, floristic surveys during this species' blooming period did not detect this species. A closely related species, Hansen's larskspur (*Delphinium hansenii* ssp. *hansenii*), was observed (Attachment 2).
Recurved Larkspur (*Delphinium recurvatum*)	CNPS 1B.2	Occurs in alkaline soils of chenopod scrub, valley and foothill grassland and cismontane woodland of Central California between 10 and 2,600 ft. in elevation. Blooms March – June. There is one documented occurrence within a 10-mile radius, approximately 8 miles southwest of the site (CDFW 2020)(Figure 3).	**Absent.** Alkaline soils are not present. Furthermore, floristic surveys during this species' blooming period did not detect this species. A related species, Hansen's larskspur (*Delphinium hansenii* ssp. *hansenii*), was observed (Attachment 2).
Yellow-lip Pansy Monkeyflower (*Diplacus pulchellus*)	CNPS 1B.2	Moist meadows and vernally moist open sandy benches and depressions of central Sierra between 2,000 and 6,600 ft. in elevation. Blooms May – July.	**Absent.** While potentially suitable habitat occurs on the site, floristic surveys during this species' blooming period did not detect this species. Two species of *Diplacus were found on the site, D. bolanderi and D. compactus,* were observed (Attachment 2).
Congdon's Woolly Sunflower (*Eriophyllum congdonii*)	CNPS 1B.2	Occurs in cracks in rock outcroppings, and on talus; sometimes with *Quercus douglasii* and *Aesculus californica*. Chaparral, cismontane woodland, lower montane coniferous forest, valley and foothill grassland between 1,590 and 6,000 ft. in elevation. Blooms April – June.	**Absent.** While potentially suitable habitat occurs on the site, floristic surveys during this species' blooming period did not detect this species. A closely related species, golden yarrow (*Eriophyllum confertiflorum*) was observed (Attachment 2).
Yosemite Woolly Sunflower (*Eriophyllum nubigenum*)	CNPS 1B.3	Occurs on south-facing slopes on granitic slabs and domes; gravelly soils. Chaparral, lower montane coniferous forest, upper montane coniferous forest between 4,985 and 8,040 ft. in elevation. Blooms May – August.	**Absent.** The site is too low in elevation for this species. Floristic surveys during this species' blooming period did not detect this species. A closely related species, golden yarrow (*Eriophyllum confertiflorum*) was observed (Attachment 2).

TABLE 1. LIST OF SPECIAL STATUS SPECIES THAT COULD OCCUR IN THE PROJECT VICINITY

PLANTS (adapted from CDFW 2020, CNPS 2020)

CNPS Listed Species

Species	Status	Habitat	*Occurrence on the Project Site
Kings River Monkeyflower (*Erythranthe acutidens*)	CNPS 3	Occurs in cismontane woodland and lower montane coniferous forest in Fresno, Madera and Tulare Counties between 1,000 and 4,000 ft. in elevation. Blooms April - July.	**Absent.** While potentially suitable habitat occurs on the site, floristic surveys during this species' blooming period did not detect this species. One species of Erythranthe (*E. guttata*) was observed (Attachment 2).
Slender-stalked Monkeyflower (*Erythranthe gracilipes*)	CNPS 1B.2	Occurs within disturbed places such as burns and railroad grades; also on thin granitic soil in cracks in large granite rocks. Chaparral, cismontane woodland, and lower montane coniferous forest between 1,640 and 4,265 ft. Blooms April – June.	**Absent.** While potentially suitable habitat occurs on the site, floristic surveys during this species' blooming period did not detect this species. One species of Erythranthe (*E. guttata*) was observed (Attachment 2).
Short-leaved Hulsea (*Hulsea brevifolia*)	CNPS 1B.2	Occurs in granitic or volcanic soils in openings and under canopy in mixed coniferous and red fir forests between 5,000 and 9,000 ft. in elevation from Tulare County to Tuolumne County. Blooms May – August. There are three documented occurrences within a 10-mile radius. The nearest documented occurrence is approximately 9 miles north of the site (CDFW 2020)(Figure 3).	**Absent.** The site is too low in elevation for this species. Floristic surveys during this species' blooming period did not detect this species. No species of *Hulsea* was observed on the site.
Madera Leptosiphon (*Leptosiphon serrulatus*)	CNPS 1B.2	Occurs in cismontane woodlands and lower montane coniferous forests between 100 and 4,200 ft. in elevation. Prefers dry slopes often on decomposed granite in woodlands. Blooms April – May. There are two documented occurrences within a 10-mile radius. The nearest documented occurrence is approximately 7 miles south of the site (CDFW 2020)(Figure 3).	**Absent.** Suitable habitat occurs on the site in grasslands of the oak woodland. However, floristic surveys during this species' blooming period did not detect this species. No species of *Leptosiphon* was observed on the site.
Congdon's Lewisia (*Lewisia congdonii*)	CNPS 1B.3	Occurs in crevices in broken moss covered metamorphic rock of chaparral/oak woodland zone, canyons of the Merced and South Fork Merced Rivers between 656 and 9,186 ft. in elevation. Blooms May – June.	**Absent.** Soils on the site are not metamorphic. This species was not detected during the species' blooming period. No species of *Lewisia* was observed on the site.
Orange Lupine (*Lupinus citrinus* var. *citrinus*)	CNPS 1B.2	Populations are known from Madera and Fresno Counties in coarse granitic sands of decomposing outcrops with elevational range of 2,000 – 5,500 ft. Blooms July – August. There are three documented occurrences within a 10-mile radius. The nearest documented occurrence is approximately 2 miles northeast of the site.	**Absent.** While potentially suitable habitat occurs on the site, floristic surveys during this species' blooming period did not detect this species. Four species of lupine (*Lupinus bicolor, L. latifolia, L. nanus*, and *L. stiversii*) were found (Attachment 2).

TABLE 1. LIST OF SPECIAL STATUS SPECIES THAT COULD OCCUR IN THE PROJECT VICINITY

PLANTS (adapted from CDFW 2020, CNPS 2020)

CNPS Listed Species

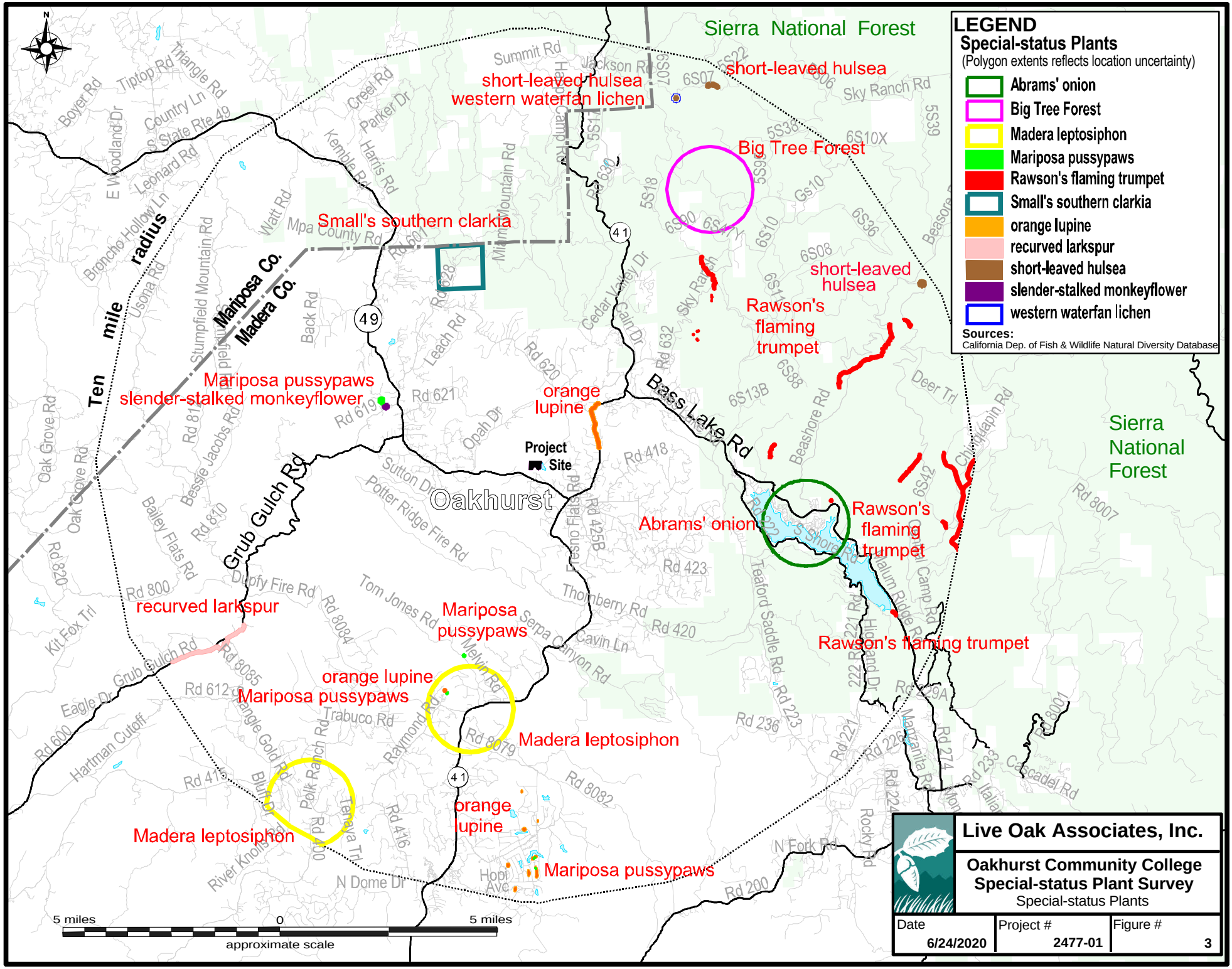
Species	Status	Habitat	*Occurrence on the Project Site
Slender Lupine (*Lupinus gracilentus*)	CNPS 1B.3	Occurs in semi-moist shaded areas of subalpine coniferous forest at elevations of 8,200 – 11,480 ft. Blooms April – July.	**Absent.** The site is too low in elevation for this species. Floristic surveys during this species' blooming period did not detect this species. Four species of lupine (*Lupinus bicolor, L. latifolia, L. nanus,* and *L. stiversii*) were found (Attachment 2).
Yosemite Popcornflower (*Plagiobothrys torreyi var. torreyi*)	CNPS 1B.2	Occurs in lower montane coniferous forest, meadows and seeps at elevations of 3,540 – 4,560 ft. Blooms April – June.	**Absent.** The site is too low in elevation for this species. Floristic surveys during this species' blooming period did not detect this species. Two species of popcornflower (*Plagiobothrys nothofulvus* and *P. canescens* ssp. *canescens*) were observed (Attachment 2).
Bolander's Clover (*Trifolium bolanderi*)	CNPS 1B.2	Occurs in lower montane coniferous forest, meadows and seeps between 6,800 and 7,550 ft. in elevation in Fresno, Madera, and Mariposa Counties. Blooms June – August.	**Absent.** The site is too low in elevation for this species. Floristic surveys during this species' blooming period did not detect this species. Five species of *Trifolium (T. Ciliolatum, T. depauperatum, T. dubium, T. hirtum, and T. variegatum*) were observed (Attachment 2).
Grey-leaved Violet (*Viola pinetorum* ssp. *grisea*)	CNPS 1B.3	Occurs on dry peaks and slopes in subalpine forest and upper montane coniferous forest between 5,000 and 11,050 ft. in elevation. Blooms all summer.	**Absent.** The site is too low in elevation for this species. Floristic surveys during this species' blooming period did not detect this species. One species of violet (*Viola purpurea*) was observed (Attachment 2).

FE: Federally Endangered
CE: California Endangered

CNPS California Native Plant Society Listing

1A Plants Presumed Extinct in California
1B Plants Rare, Threatened, or Endangered in California and elsewhere
2 Plants Rare, Threatened, or Endangered in California, but more common elsewhere
3 Plants about which we need more information – a review list
4 Plants of limited distribution – a watch list

0.1 Seriously endangered in California
0.2: Fairly Endangered in California


Sierra National Forest
short-leaved hulsea
western waterfan lichen
short-leaved hulsea
Big Tree Forest
Small's southern clarkia
short-leaved hulsea
Rawson's flaming trumpet
Mariposa pussypaws
slender-stalked monkeyflower
orange lupine
Project Site
Oakhurst
Abrams' onion
Rawson's flaming trumpet
Sierra National Forest
recurved larkspur
Mariposa pussypaws
orange lupine
Mariposa pussypaws
Madera leptosiphon
Rawson's flaming trumpet
orange lupine
Madera leptosiphon
Mariposa pussypaws
Ten mile radius
Mariposa Co.
Madera Co.
Bass Lake Rd
Grub Gulch Rd
5 miles
0
5 miles
approximate scale
LEGEND
Special-status Plants
(Polygon extents reflects location uncertainty)
Abrams' onion
Big Tree Forest
Madera leptosiphon
Mariposa pussypaws
Rawson's flaming trumpet
Small's southern clarkia
orange lupine
recurved larkspur
short-leaved hulsea
slender-stalked monkeyflower
western waterfan lichen
Sources:
California Dep. of Fish & Wildlife Natural Diversity Database
Live Oak Associates, Inc.
Oakhurst Community College
Special-status Plant Survey
Special-status Plants
Date
6/24/2020
Project #
2477-01
Figure #
3

DISCUSSION

All thirty-one (31) special status plant species that have been documented in the project vicinity are considered absent from the project site due to the absence of suitable habitat, the site's being situated outside the elevation or range of the species, and/or the absence of these species during protocol-level floristic surveys conducted by LOA in 2020 (see Table 1).

Because these species are not expected to occur on the site, the proposed project would have no effect on individuals or regional populations of these special status plant species.

If you have any questions, please do not hesitate to contact me.

Sincerely,

Wendy C. Fisher
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Senior Project Manager
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559-642-4880

REFERENCES OR LITERATURE CITED

Baldwin, B.G., D.H. Goldman, D.J. Keil, R. Patterson, T.J. Rosatti, and D. G. Wilken, editors, 2012. The *Jepson Manual: Vascular Plants of California, second edition*. University of California Press, Berkeley.

California Department of Fish and Wildlife (CDFW). 2018. *Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities.* Sacramento, California.

CDFW. 2020. Natural Heritage Division. Natural Diversity Database (CNDDB). U.S.G.S. 7.5' Quadrangles Searched included *Ahwahnee, Bass Lake, White Chief Mountain, Fish Camp. Stumpfield Mountain, Horsecamp Mountain, Knowles, O'Neals, and North Fork,* Rare Find 6.

Calflora: Information on California plants for education, research and conservation. [web application]. 2012. Berkeley, California: The Calflora Database [a non-profit organization]. Available: http://www.calflora.org/ Accessed March, April and May, 2020.

California Native Plant Society (CNPS). 2020. *Inventory of Rare and Endangered Plants* (online edition, v8-01a). California Native Plant Society. Sacramento, CA. Accessed March, April and May, 2020.

California Department of Fish and Wildlife (CDFW). 2020. California Natural Diversity Database. The Resources Agency, Sacramento, CA. Special Vascular Plants, Bryophytes, and Lichens List. The Resources Agency, Sacramento, CA.

Consortium of California Herbaria, U.C. Berkeley, Jepson Herbarium. *On-line data base. http://ucjeps.berkeley.edu/cgi-bin/get_consort.pl?taxon_name.org.* Accessed March, April and May, 2020.

Natural Resources Conservation Service, USDA. 2020. On-Line Soil Survey and Hydric Soils List. http://soils.usda.gov/use/hydric/ Accessed March, April and May, 2020.

O'Dell Planning and Research, Inc. 2019. Biological Resources Assessment, Oakhurst Community College Center Project. State Center Community College District.

University of California Berkeley, *Jepson Online Interchange for California floristics.* http://ucjeps.berkely.edu/interchange.html. Accessed March, April and May, 2020.

ATTACHMENT 1

PROTOCOLS FOR SURVEYING AND EVALUATING IMPACTS TO SPECIAL STATUS NATIVE PLANT POPULATIONS AND NATURAL COMMUNITIES, CDFW 2018

Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Sensitive Natural Communities

STATE OF CALIFORNIA
CALIFORNIA NATURAL RESOURCES AGENCY
DEPARTMENT OF FISH AND WILDLIFE

DATE: March 20, 2018

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1. INTRODUCTION AND PURPOSE

The conservation of special status native plants and their habitats, as well as sensitive natural communities, is integral to maintaining biological diversity. The purpose of these protocols is to facilitate a consistent and systematic approach to botanical field surveys and assessments of special status plants and sensitive natural communities so that reliable information is produced and the potential for locating special status plants and sensitive natural communities is maximized. These protocols may also help those who prepare and review environmental documents determine when botanical field surveys are needed, how botanical field surveys may be conducted, what information to include in a botanical survey report, and what qualifications to consider for botanical field surveyors. These protocols are meant to help people meet California Environmental Quality Act (CEQA)[1] requirements for adequate disclosure of potential impacts to plants and sensitive natural communities. These protocols may be used in conjunction with protocols formulated by other agencies, for example, those developed by the U.S. Army Corps of Engineers to delineate jurisdictional wetlands[2] or by the U.S. Fish and Wildlife Service to survey for the presence of special status plants[3].

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1 Available at: http://resources.ca.gov/ceqa

2 Available at: http://www.usace.army.mil/Missions/CivilWorks/RegulatoryProgramandPermits/techbio.aspx

3 U.S. Fish and Wildlife Service Survey Guidelines: https://www.fws.gov/sacramento/es/Survey-Protocols-Guidelines/

Department of Fish and Wildlife Trustee and Responsible Agency Mission

The mission of the California Department of Fish and Wildlife (CDFW) is to manage California's diverse wildlife and native plant resources, and the habitats upon which they depend, for their ecological values and for their use and enjoyment by the public. CDFW has jurisdiction over the conservation, protection, and management of wildlife, native plants, and habitat necessary to maintain biologically sustainable populations (Fish & G. Code, § 1802). CDFW, as trustee agency under CEQA Guidelines section 15386, provides expertise in reviewing and commenting on environmental documents and provides protocols regarding potential negative impacts to those resources held in trust for the people of California.

Certain species are in danger of extinction because their habitats have been severely reduced in acreage, are threatened with destruction or adverse modification, or because of a combination of these and other factors. The California Endangered Species Act (CESA) and Native Plant Protection Act (NPPA) provide additional protections for such species, including take prohibitions (Fish & G. Code, § 2050 *et seq.*; Fish & G. Code, § 1908). As a responsible agency, CDFW has the authority to issue permits for the take of species listed under CESA and NPPA if the take is incidental to an otherwise lawful activity; CDFW has determined that the impacts of the take have been minimized and fully mitigated; and the take would not jeopardize the continued existence of the species (Fish & G. Code, § 2081, subd. (b); Cal. Code Regs., tit. 14 § 786.9, subd. (b)). Botanical field surveys are one of the preliminary steps to detect special status plant species and sensitive natural communities that may be impacted by a project.

Definitions

Botanical field surveys provide information used to determine the potential environmental effects of proposed projects on special status plants and sensitive natural communities as required by law (e.g., CEQA, CESA, and federal Endangered Species Act (ESA)).

Special status plants, for the purposes of this document, include all plants that meet one or more of the following criteria:

- Listed or proposed for listing as threatened or endangered under the ESA or candidates for possible future listing as threatened or endangered under the ESA (50 C.F.R., § 17.12).
- Listed or candidates for listing by the State of California as threatened or endangered under CESA (Fish & G. Code, § 2050 et seq.)[4]. In CESA, "endangered species" means a native species or subspecies of plant which is in serious danger of becoming extinct throughout all, or a significant portion, of its range due to one or more causes, including loss of habitat, change in habitat, overexploitation, predation, competition, or disease (Fish & G. Code, § 2062). "Threatened species" means a native species or subspecies of plant that,

[4] Refer to current online published lists available at: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=109390&inline

although not presently threatened with extinction, is likely to become an endangered species in the foreseeable future in the absence of the special protection and management efforts required by CESA (Fish & G. Code, § 2067). "Candidate species" means a native species or subspecies of plant that the California Fish and Game Commission has formally noticed as being under review by CDFW for addition to either the list of endangered species or the list of threatened species, or a species for which the California Fish and Game Commission has published a notice of proposed regulation to add the species to either list (Fish & G. Code, § 2068).

- Listed as rare under the California Native Plant Protection Act (Fish & G. Code, § 1900 et seq.). A plant is rare when, although not presently threatened with extinction, the species, subspecies, or variety is found in such small numbers throughout its range that it may be endangered if its environment worsens (Fish & G. Code, § 1901).
- Meet the definition of rare or endangered under CEQA Guidelines section 15380, subdivisions (b) and (d), including:
    - Plants considered by CDFW to be "rare, threatened or endangered in California." This includes plants tracked by the California Natural Diversity Database (CNDDB) and the California Native Plant Society (CNPS) as California Rare Plant Rank (CRPR) 1 or 2[5];
    - Plants that may warrant consideration on the basis of declining trends, recent taxonomic information, or other factors. This may include plants tracked by the CNDDB and CNPS as CRPR 3 or 4[6].
- Considered locally significant plants, that is, plants that are not rare from a statewide perspective but are rare or uncommon in a local context such as within a county or region (CEQA Guidelines, § 15125, subd. (c)), or as designated in local or regional plans, policies, or ordinances (CEQA Guidelines, Appendix G). Examples include plants that are at the outer limits of their known geographic range or plants occurring on an atypical soil type.

Sensitive natural communities are communities that are of limited distribution statewide or within a county or region and are often vulnerable to environmental effects of projects. These communities may or may not contain special status plants or their

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5 See CNDDB's Special Vascular Plants, Bryophytes, and Lichens List for plant taxa with a CRPR of 1 or 2: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=109383&inline

6 CRPR 3 plants (plants about which more information is needed) and CRPR 4 plants (plants of limited distribution) may warrant consideration under CEQA Guidelines section 15380. Impacts to CRPR 3 plants may warrant consideration under CEQA if sufficient information is available to assess potential impacts to such plants. Impacts to CRPR 4 plants may warrant consideration under CEQA if cumulative impacts to such plants are significant enough to affect their overall rarity. Data on CRPR 3 and 4 plants should be submitted to CNDDB. Such data aids in determining and revising the CRPR of plants. See CNDDB's Special Vascular Plants, Bryophytes, and Lichens List for plant taxa with a CRPR of 3 or 4: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=109383&inline

habitat. CDFW's *List of California Terrestrial Natural Communities*[7] is based on the best available information, and indicates which natural communities are considered sensitive at the current stage of the California vegetation classification effort. See the Vegetation Classification and Mapping Program (VegCAMP) website for additional information on natural communities and vegetation classification[8].

2. BOTANICAL FIELD SURVEYS

Evaluate the need for botanical field surveys prior to the commencement of any activities that may modify vegetation, such as clearing, mowing, or ground-breaking activities. It is appropriate to conduct a botanical field survey when:

- Natural (or naturalized) vegetation occurs in an area that may be directly or indirectly affected by a project (project area), and it is unknown whether or not special status plants or sensitive natural communities occur in the project area;
- Special status plants or sensitive natural communities have historically been identified in a project area; or
- Special status plants or sensitive natural communities occur in areas with similar physical and biological properties as a project area.

Survey Objectives

Conduct botanical field surveys in a manner which maximizes the likelihood of locating special status plants and sensitive natural communities that may be present. Botanical field surveys should be floristic in nature, meaning that every plant taxon that occurs in the project area is identified to the taxonomic level necessary to determine rarity and listing status. "Focused surveys" that are limited to habitats known to support special status plants or that are restricted to lists of likely potential special status plants are not considered floristic in nature and are not adequate to identify all plants in a project area to the level necessary to determine if they are special status plants.

For each botanical field survey conducted, include a list of all plants and natural communities detected in the project area. More than one field visit is usually necessary to adequately capture the floristic diversity of a project area. An indication of the prevalence (estimated total numbers, percent cover, density, etc.) of the special status plants and sensitive natural communities in the project area is also useful to assess the significance of a particular plant population or natural community.

Survey Preparation

Before botanical field surveys are conducted, the botanical field surveyors should compile relevant botanical information in the general project area to provide a regional

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7 Available at: https://www.wildlife.ca.gov/Data/VegCAMP/Natural-Communities#natural%20communities%20lists

8 Available at: https://www.wildlife.ca.gov/Data/VegCAMP

context. Consult the CNDDB[9] and BIOS[10] for known occurrences of special status plants and sensitive natural communities in the project area prior to botanical field surveys. Generally, identify vegetation and habitat types potentially occurring in the project area based on biological and physical properties (e.g. soils) of the project area and surrounding ecoregion[11]. Then, develop a list of special status plants and sensitive natural communities with the potential to occur within the vegetation and habitat types identified. The list of special status plants with the potential to occur in the project area can be created with the help of the CNDDB QuickView Tool[12] which allows the user to generate lists of CNDDB-tracked elements that occur within a particular U.S. Geological Survey 7.5' topographic quad, surrounding quads, and counties within California. Resulting lists should only be used as a tool to facilitate the use of reference sites, with the understanding that special status plants and sensitive natural communities in a project area may not be limited to those on the list. Botanical field surveys and subsequent reporting should be comprehensive and floristic in nature and not restricted to or focused only on a list. Include in the botanical survey report the list of potential special status plants and sensitive natural communities that was created, and the list of references used to compile the background botanical information for the project area.

Survey Extent

Botanical field surveys should be comprehensive over the entire project area, including areas that will be directly or indirectly impacted by the project. Adjoining properties should also be surveyed where direct or indirect project effects could occur, such as those from fuel modification, herbicide application, invasive species, and altered hydrology. Surveys restricted to known locations of special status plants may not identify all special status plants and sensitive natural communities present, and therefore do not provide a sufficient level of information to determine potential impacts.

Field Survey Method

Conduct botanical field surveys using systematic field techniques in all habitats of the project area to ensure thorough coverage. The level of effort required per given area and habitat is dependent upon the vegetation and its overall diversity and structural complexity, which determines the distance at which plants can be identified. Conduct botanical field surveys by traversing the entire project area to ensure thorough coverage, documenting all plant taxa observed. Parallel survey transects may be necessary to ensure thorough survey coverage in some habitats. The level of effort should be sufficient to provide comprehensive reporting. Additional time should be allocated for plant identification in the field.

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9 Available at: https://www.wildlife.ca.gov/Data/CNDDB

10 Available at: https://www.wildlife.ca.gov/Data/BIOS

11 Ecological Subregions of the United States, available at: http://www.fs.fed.us/land/pubs/ecoregions/toc.html

12 Available at: https://www.wildlife.ca.gov/Data/CNDDB/Maps-and-Data. When creating a list of special status plants with the potential to occur in a project area, special care should be taken to search all quads with similar geology, habitats, and vegetation to those found in the project area.

Timing and Number of Visits

Conduct botanical field surveys in the field at the times of year when plants will be both evident and identifiable. Usually this is during flowering or fruiting. Space botanical field survey visits throughout the growing season to accurately determine what plants exist in the project area. This usually involves multiple visits to the project area (e.g. in early, mid, and late-season) to capture the floristic diversity at a level necessary to determine if special status plants are present[13]. The timing and number of visits necessary to determine if special status plants are present is determined by geographic location, the natural communities present, and the weather patterns of the year(s) in which botanical field surveys are conducted.

Reference Sites

When special status plants are known to occur in the type(s) of habitat present in a project area, observe reference sites (nearby accessible occurrences of the plants) to determine whether those special status plants are identifiable at the times of year the botanical field surveys take place and to obtain a visual image of the special status plants, associated habitat, and associated natural communities.

Use of Existing Surveys

For some project areas, floristic inventories or botanical survey reports may already exist. Additional botanical field surveys may be necessary for one or more of the following reasons:

- Botanical field surveys are not current[14];
- Botanical field surveys were conducted in natural systems that commonly experience year to year fluctuations such as periods of drought or flooding (e.g. vernal pool habitats or riverine systems);
- Botanical field surveys did not cover the entire project area;
- Botanical field surveys did not occur at the appropriate times of year;
- Botanical field surveys were not conducted for a sufficient number of years to detect plants that are not evident and identifiable every year (e.g. geophytes, annuals and some short-lived plants);

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[13] U.S. Fish and Wildlife Service Guidelines for Conducting and Reporting Botanical Inventories for Federally Listed, Proposed and Candidate Plants available at: https://www.fws.gov/sacramento/es/Survey-Protocols-Guidelines/

[14] Habitats, such as grasslands or desert plant communities that have annual and short-lived perennial plants as major floristic components may require yearly surveys to accurately document baseline conditions for purposes of impact assessment. In forested areas, however, surveys at intervals of five years may adequately represent current conditions. For forested areas, refer to "Guidelines for Conservation of Sensitive Plant Resources Within the Timber Harvest Review Process and During Timber Harvesting Operations", available at: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=116396&inline

- Botanical field surveys did not identify all plants in the project area to the taxonomic level necessary to determine rarity and listing status;
- Fire history, land use, or the physical or climatic conditions of the project area have changed since the last botanical field survey was conducted;
- Changes in vegetation or plant distribution have occurred since the last botanical field surveys were conducted, such as those related to habitat alteration, fluctuations in abundance, invasive species, seed bank dynamics, or other factors; or
- Recent taxonomic studies, status reviews or other scientific information has resulted in a revised understanding of the special status plants with potential to occur in the project area.

Negative Surveys

Adverse conditions from yearly weather patterns may prevent botanical field surveyor from determining the presence of, or accurately identifying, some special status plants in the project area. Disease, drought, predation, fire, herbivory or other disturbance may also preclude the presence or identification of special status plants in any given year. Discuss all adverse conditions in the botanical survey report[15].

The failure to locate a known special status plant occurrence during one field season does not constitute evidence that the plant occurrence no longer exists at a location, particularly if adverse conditions are present. For example, botanical field surveys over a number of years may be necessary if the special status plant is an annual or short-lived plant having a persistent, long-lived seed bank and populations of the plant are known to not germinate every year. Visiting the project area in more than one year increases the likelihood of detecting special status plants, particularly if conditions change. To further substantiate negative findings for a known occurrence, a visit to a nearby reference site may help ensure that the timing of botanical field surveys was appropriate.

3. REPORTING AND DATA COLLECTION

Adequate information about special status plants and sensitive natural communities present in a project area will enable reviewing agencies and the public to effectively assess potential impacts to special status plants and sensitive natural communities and will guide the development of avoidance, minimization, and mitigation measures. The information necessary to assess impacts to special status plants and sensitive natural communities is described below. For comprehensive, systematic botanical field surveys where no special status plants or sensitive natural communities were found, reporting

and data collection responsibilities for botanical field surveyor remain as described

[15] U.S. Fish and Wildlife Service Guidelines for Conducting and Reporting Botanical Inventories for Federally Listed, Proposed and Candidate Plants available at: https://www.fws.gov/sacramento/es/Survey-Protocols-Guidelines/

below, excluding specific occurrence information.

Special Status Plant and Sensitive Natural Community Observations

Record the following information for locations of each special status plant and sensitive natural community detected during a botanical field survey of a project area.

- The specific geographic locations where the special status plants and sensitive natural communities were found. Preferably this will be done by use of global positioning system (GPS) and include the datum[16] in which the spatial data was collected and any uncertainty or error associated with the data. If GPS is not available, a detailed map (1:24,000 or larger) showing locations and boundaries of each special status plant population and sensitive natural community in relation to the project area is acceptable. Mark occurrences and boundaries as accurately as possible;
- The site-specific characteristics of occurrences, such as associated species, habitat and microhabitat, structure of vegetation, topographic features, soil type, texture, and soil parent material. If a special status plant is associated with a wetland, provide a description of the direction of flow and integrity of surface or subsurface hydrology and adjacent off-site hydrological influences as appropriate;
- The number of individuals in each special status plant population as counted (if population is small) or estimated (if population is large);
- If applicable, information about the percentage of each special status plant in each life stage such as seedling, vegetative, flowering and fruiting;
- The density of special status plants, identifying areas of relatively high, medium and low density of each special status plant in the project area; and
- Digital images of special status plants and sensitive natural communities in the project area, with diagnostic features.

Special Status Plant and Sensitive Natural Community Documentation

When a special status plant is located, data must be submitted to the CNDDB. Data may be submitted in a variety of formats depending on the amount and type of data that is collected[17]. The most common way to submit data is the Online CNDDB Field Survey Form[18], or equivalent written report, accompanied by geographic locality information (GPS coordinates, GIS shapefiles, KML files, topographic map, etc.). Data submitted in digital form must include the datum[19] in which it was collected.

If a sensitive natural community is found in a project area, document it with a Combined

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16 NAD83, NAD27 or WGS84

17 See https://www.wildlife.ca.gov/Data/CNDDB/Submitting-Data for information on acceptable data submission formats.

18 Available at: https://www.wildlife.ca.gov/Data/CNDDB/Submitting-Data

19 NAD83, NAD27 or WGS84

ATTACHMENT 2

VASCULAR PLANTS IDENTIFIED ON THE OAKHURST COMMUNITY COLLEGE SITE

ATTACHMENT 2
VASCULAR PLANTS OF THE OAKHURST COMMUNITY COLLEGE SITE

The plants species listed below have been observed on the 37-acre Project Site during surveys conducted by Live Oak Associates, Inc. in May and June of 2020. The U.S. Fish and Wildlife Service wetland indicator status of each plant has been shown following its common name.

OBL - Obligate
FACW - Facultative Wetland
FAC - Facultative
FACU - Facultative Upland
UPL - Upland
+/- - Higher/lower end of category
NR - No review
NA - No agreement
NI - No investigation

ADOXACEAE – Elder Family		
Sambucus nigra	Blue Elderberry	FACU
AGAVACEAE – Agave Family		
Chlorogalum pomeridianum ssp. *pomeridianum*	Wavy-leaved Soap Plant	UPL
ANACARDIACEAE — Sumac Family		
Rhus trilobata	Skunkbush	UPL
Toxicodendron diversilobum	Poison Oak	UPL
APIACEAE – Umbel Family		
Anthriscus caucalis	Bur Chervil	UPL
Daucus pusillus	Wild Carrot	UPL
Lomatium utriculatum	Hog Fennel	UPL
Sanicula crassicaulis	Pacific Sanicle	UPL
Torilis arvensis	Field Hedge Parsley	UPL
ASCLEPIADACEAE – Milkweed Family		
Asclepias cordifolia	Purple Milkweed	UPL
ASTERACEAE - Sunflower Family		
Achyrachaena mollis	Blow Wives	UPL
Agoseris retrorsa ssp. *retrorsa*	Native Dandelion	UPL
Anaphalis margaritacea	Pearly Everlasting	UPL
Artemisia douglasiana	Mugwort	FAC
Balsamorhiza deltoidea	Balsam-root	UPL
Carduus picnocephalus	Italian Thistle	UPL
Centaurea melitensis	Tocalote	UPL
Centaurea solstitialis	Yellow Star Thistle	UPL
Cirsium californica	California Thistle	UPL
Cirsium vulgare	Bull Thistle	UPL
Conyza canadensis	Canada Horseweed	FAC
Eriophyllum confertiflorum	Golden Yarrow	UPL
Heterotheca grandiflora	Telegraph Weed	UPL
Holocarpha heermani	Heerman's Tarweed	UPL
Hypochaeris glabra	Smooth Cat's Ear	UPL
Lactuca serriola	Prickly Lettuce	FAC
Logfia filaginoides	California Cottonrose	UPL
Madia minima	Minute Tidy Tips	UPL
Micropus californicus	Slender Cottonweed	UPL
Pseudoghaphalium luteoalbum	Jersey Cudweed	FACW

Stephanomeria exigua ssp. *coronaria*	White Plume Wirelettuce	UPL
Taraxacum officinale ssp. *officinale*	Dandelion	FACU
Tragopogon dubius	Salsify	UPL
Wyethia angustifolia	Narrow-leaved Wyethia	FACU
BORAGINACEAE – Borage Family		
Amsinckia eastwoodiae	Eastwood's Fiddleneck	UPL
Cryptantha sp.	Cryptantha	UPL
Phacelia platyloba	Broad-lobed Phacelia	UPL
Plagiobothrys canescens ssp *canescens*	Popcorn Flower	UPL
Plagiobothrys nothofulvus	Popcorn Flower	UPL
BRASSICACEAE - Mustard Family		
Capsella bursa-pastoris	Shepherd's Purse	FAC-
Hirschfeldia incana	Summer Mustard	UPL
Thysanocarpus curvipes	Fringepod	UPL
CAPRIFOLIACEAE – Honeysuckle Family		
Lonicera interrupta	Chaparral Honeysuckle	UPL
CARYOPHYLLACEAE - Pink Family		
Minuartia douglasii	Douglas Sandwort	UPL
Silene gallica	Windmill Pink	UPL
Spergularia rubra	Red Sand Spurry	FAC
Stellaria media	Common Chickweed	FACU
CONVOLVULACEAE – Morning Glory		
Calystegia malacophylla	Sierra Morning Glory	UPL
CRASSULACEAE – Stonecrop Family		
Crassula connata	Stonecrop	UPL
CUCURBITACEAE – Cucumber Family		
Marah horrida	Manroot	UPL
CUSCUTACEAE – Dodder Family		
Cuscuta californica	California Dodder	UPL
CYPERACEAE – Sedge Family		
Carex praegracilis	Clustered Field Sedge	FACW
Carex praticola	Meadow Sedge	FACW
Schoenoplectus acutus	Hardstem Bulrush	OBL
ERICACEAE - Heath Family		
Arctostaphylos viscida ssp. *mariposa*	Mariposa Manzanita	UPL
EUPHORBIACEAE - Spurge Family		
Croton setiger	Turkey Mullein	UPL
FABACEAE - Pea Family		
Acmispon parviflorus	Hill Lotus	UPL
Acmispon purshianus	Spanish Clover	UPL
Acmispon nevadensis	Sierra Lotus	UPL
Lupinus bicolor	Annual Lupine	UPL
Lupinus latifolia	Broad-leaved Lupine	FAC
Lupinus nanus	Sky Lupine	UPL
Lupinus stiversii	Harlequin Lupine	UPL
Medilotus indica	Yellow Sweetclover	FAC
Trifolium ciliolatun	Clover	UPL
Trifolium depauperatum	Dwarf Sac Clover	FAC
Trifolium dubium	Shamrock	UPL
Trifolium hirtum	Rose Clover	UPL
Trifolium variegatum	Variegated Clover	FACU
FAGACEAE - Oak Family		
Quercus douglasii	Blue Oak	UPL
Quercus kelloggii	Black Oak	UPL
Quercus lobata	Valley Oak	FACU
Quercus x morehus	Oracle Oak	UPL

Quercus wislizenii	Interior Live Oak	UPL
GERANIACEAE - Geranium Family		
Erodium botrys	Broad-leaf Filaree	UPL
Erodium cicutarium	Red-stem Filaree	UPL
Geranium carolinianum	Carolina Geranium	UPL
GROSSULARIACEAE – Currant Family		
Ribes roezlii	Sierra Gooseberry	UPL
HYDROPHYLLACEAE – Waterleaf Family		
Eriodictyon californica	Yerba Santa	UPL
Nemophilla heterophylla	Nemophilla	UPL
Nemophilla menziesii	Baby Blue Eyes	UPL
HYPERICACEAE – St. John's Wort Family		
Hypericum perforatum	Klamathweed	UPL
JUNCACEAE – Rush Family		
Eleocharis macrostachya	Creeping Spikerush	FACW
Juncus bufonius	Toad Rush	FACW
Luzula comosa	Hairy Woodrush	FAC
LAMIACEAE - Mint Family		
Marrubium vulgare	Common Horehound	FAC
Mentha pelugium	Pennyroyal	OBL
Scutellaria bolanderi	Bolanders Skullcap	FACW
Scutellaria siphocampyloides	Grey-leaved Skullcap	FACU
Stachys albens	White Hedge Nettle	OBL
LAURACEAE – Laurel Family		
Umbellularia californica	California Bay Laurel	FAC
LILIACEAE – Lily Family		
Calochortus supurbus	Supurb Mariposa Lily	UPL
ONAGRACEAE – Fuschia Family		
Camissonia campestris ssp. *campestris*	Sierra Suncup	UPL
Clarkia dudleyana	Dudley's Clarkia	UPL
Clarkia purpurea ssp. *quadrivulnera*	Winecup Clarkia	UPL
Clarkia speciosa ssp. *polyantha*	Red Spot Clarkia	UPL
PHRYMACEAE – Monkey Flower Family		
Diplacus bolanderi	Bolander's Monkeyflower	UPL
Diplacus compactus	Small Viscid Monkeyflower	UPL
Erythranthe guttata	Common Monkeyflower	OBL
PINACEAE - Pine Family		
Pinus ponderosa	Ponderosa Pine	FACU
Pinus sabiniana	Foothill Pine	UPL
PLANTAGINACEAE – Plantain Family		
Collinsia heterophylla var. *heterophylly*	Chinese Houses	UPL
Collinsia tinctoria	Tincture Plant	FACU
Keckiella breviflora	Gaping Penstemon	UPL
Penstemon laetus var. *laetus*	Mountain Penstemon	UPL
Plantago erecta	California Plantain	UPL
Plantago lanceolata	English Plantain	FAC
POACEAE - Grass Family		
Aira caryophylla	Silver European Hairgrass	UPL
Avena fatua	Wild Oats	UPL
Briza minor	Little Quakinggrass	FAC
Bromus carinatus ssp.*carinatus*	California Brome	UPL
Bromus diandrus	Ripgut	UPL
Bromus hordeaceus	Soft Chess	FACU
Bromus tectorum	Cheat Grass	UPL
Cynosurus echinatus	Hedgehog Dogtail	UPL
Elymus glaucus	Blue Wildrye	FACU
Hordium brachyantherum	Meadow Barley	FACW

Hordeum marinum	Meditteranean Barley	FACU
Hordeum marinum	Barnyard Barley	FAC
Glyceria elata	Tall Mannagrass	FACW
Melica californica	California Medic Grass	UPL
Festuca perrene	Ryegrass	UPL
Poa annua ssp. *annua*	Annual Bluegrass	FAC
Poa bulbosa	Fruiting Bluegrass	FACU
Poa secunda ssp. *secunda*	One-sided Bluegrass	UPL
Polypogon monspeliensis	Rabbit's Foot Grass	FACW
Stipa occidentalis	Needlegrass	UPL
Vulpia bromoides	Slender Fescue	FACU
Vulpia myuros	Rat-tail Fescue	FACU
POLEMONIACEAE – Phlox Family		
Gilia capitata ssp. *abrotanifolia*	Blue Field Gilia	UPL
Gilia tricolor	Birds Eye Gilia	UPL
Linanthus ciliates	Whisker Brush	UPL
Navarretia leucocephala ssp. *minima*	White Navarretia	FACW
POLYGONACEAE - Buckwheat Family		
Rumex acetosella	Sheep Sorrel	FACU
Rumex crispus	Curly Dock	FAC
PORTULACACEAE – Purslane Family		
Calandrinia ciliata	Red Maids	UPL
PRIMULACEAE – Primrose Family		
Anagallis arvensis	Scarlet Pimpernel	UPL
PTERIDACEAE- Ferm Family		
Pentagramma triangularis	Golden Back Fern	UPL
RANUNCULACEAE – Buttercup family		
Ranunculus californicus	California Buttercup	FACU
Delphinium hansenii ssp. *hansenii*	Hansen's Larkspur	UPL
RHAMNACEAE - Buckthorn Family		
Ceonothus cuneatus	Wedgeleaf Ceonothus	UPL
Ceanothus leucodermis	Chapparal Whitethorn	UPL
Frangula californica	California Coffeeberry	UPL
Rhamnus ilicifolia	Evergreen Buckthorn	UPL
ROSACEAE – Rose Family		
Horkelia fusca ssp. *parviflora*	Horkelia	UPL
Potentilla glandulosa	Gland Cinquefoil	UPL
Prunus emarginata	Bitter Cherry	UPL
Rubus armeniacus	Himalayan Blackberry	FAC
RUBIACEAE – Madder Family		
Claytonia perfoliata ssp. *perfoliata*	Miner's Lettuce	FAC
Galium aparine	Catchweed Bedstraw	FACU
Galium parisiense	Wall Bedstraw	UPL
Galium porrigens	Climbing Bedstraw	UPL
SALICACEAE - Willow Family		
Salix laevigata	Red Willow	FACW
SCROPHULARIACEAE – Figwort Family		
Castilleja lineariloba	Thin-lobed Owl's Clover	UPL
Verbascum blattaria	Moth Mullein	UPL
SELAGINELLACEAE – Spike-moss Family		
Selaginella sp.	Spike Moss	UPL

SOLANACEAE – Potato Family		
Datura wrightii	Thorn Apple	UPL
Solanum eleagnifokium	Poison Nightshade	UPL
THEMIDACEAE – Lily Family		
Brodiaea elegans ssp. *elegans*	Elegant Brodiaea	UPL
Dichelostemma capitatum	Blue Dicks	UPL
Dichelostemma volubile	Twining Brodiaea	UPL
Tritileia ixioides ssp. *scabra*	Pretty Face	UPL
VISCACEAE - Mistletoe Family		
Phoradendron villosum	Oak Mistletoe	UPL
VIOLACEAE – Violet Family		
Viola purpurea	Goosefoot Violet	UPL

ATTACHMENT 3: SELECTED PHOTOGRAPHS OF THE OAKHURST COMMUNITY COLLEGE SITE, MAY AND JUNE, 2020 SPECIAL STATUS PLANT SURVEYS

Photographs 1 and 2. Ruderal (disturbed) areas of the site provide limited habitat for special status plant species.

Photograph 3 (above). A common species of evening primrose (*Camissonia campestris* ssp. *campestris*) resembles one of the target species (*Camissonia sierrae* ssp. *sierrae*). Photograph 4 (below). *Clarkia speciose* ssp. speciose was commonly observed during the May and June field surveys.

Photograph 5 (above). *Clarkia dudleyana* was a commonly observed species of farewell to spring. Photograph 6 (below). Hansen's larkspur (*Delphinium hansenii* ssp. *hansenii*) closely resembles the special status Ewan's larkspur.

Photography 7 (above). Compact monkey flower (*Diplacus compactus*) occurred in one location of the site. Photograph 8 (below). Riparian woodland with an understory of seasonal wetland understory was prevalent along the site's eastern boundary, and bordered a pond occurring just off-site.

Appendix C

Cultural Resources Assessment

CULTURAL RESOURCES ASSESSMENT FOR THE STATE CENTER COMMUNITY COLLEGE DISTRICT'S NEW OAKHURST CENTER SITE WESTLAKE DRIVE, OAKHURST MADERA COUNTY, CALIFORNIA

Prepared for:

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22 September 2018

USGS Topographic Quadrangle: Ahwahnee, Calif., 7.5' (1978)

Area: 30 acres

(Keywords: *Madera County, Township 7S, Range 21E, Oakhurst, Fresno River, Southern Sierra Miwok, Northfork Mono, Picayune Rancheria of the Chukchansi Indians, Wright Ranch)*

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SUMMARY OF FINDINGS

On March 8, 2018, a cultural resources survey was performed of a 30-acre parcel located north of State Route 49 along Westlake Drive, in the community of Oakhurst, Madera County, California. The surveyed area, which is depicted on the USGS Ahwahnee, Calif., 7.5' topographic quadrangle map, includes a portion of Section 10, Township 7S, Range 21E, MDB&M (see Maps 1-2).

The State Center Community College District is proposing to construct a new Oakhurst Community College Center using Measure C funding. The proposed campus construction project will replace the temporary classrooms and offices currently on 2.7 acres at the corner of Crane Valley Road (426) and Civic Circle Loop behind Rite Aid.

ODELL Planning & Research, Inc., is preparing environmental documents necessary under the California Environmental Quality Act (CEQA). Provisions and implementing guidelines of the CEQA, as amended March 18, 2010, state that identification and evaluation of historical resources is required for any action that may result in a potential adverse effect on the significance of such resources, which include archaeological resources.

No significant or important archaeological or other cultural resources were identified as a result of this study. Therefore, it is unlikely that the proposed campus development project will have an effect on important archaeological, historical, or other cultural resources. No further cultural resources investigation is therefore recommended. In the unlikely event that buried archaeological deposits are encountered within the project area, the finds must be evaluated by a qualified archaeologist. Should human remains be encountered, the County Coroner must be contacted immediately; if the remains are determined to be Native American, then the Native American Heritage Commission must be contacted as well.

INTRODUCTION

This report presents the findings of a pedestrian archaeological survey of a 30-acre parcel of land located north of State Route 49 along Westlake Drive, in the community of Oakhurst, Madera County, California. The surveyed area, which is depicted on the USGS Ahwahnee, Calif., 7.5' topographic quadrangle map, includes a portion of Section 10, Township 7S, Range 21E, MDB&M (see Maps 1-2).

The State Center Community College District is proposing to construct a new Oakhurst Community College Center using Measure C funding. ODELL Planning & Research, Inc., is preparing environmental documents necessary under the California Environmental Quality Act (CEQA). Provisions and implementing guidelines of the CEQA, as amended March 18, 2010, state that identification and evaluation of historical resources is required for any action that may result in a potential adverse effect on the significance of such resources, which include archaeological resources.

Sierra Valley Cultural Planning (SVCP) archaeologist Douglas S. McIntosh completed a systematic archaeological survey of the project Area of Potential Effect (APE). This report was completed by SVCP Principal Investigator C. Kristina Roper.

PROJECT LOCATION AND DESCRIPTION

The proposed 30-acre community college campus is located off State Route 49 along Westlake Drive, and just west of the Madera County Sheriff's sub-station in the community of Oakhurst, Madera County, California. The project study area (Assessor's Parcel No. 064-142-040) lies within Township 7S, Range 21E, Section 10, MDB&M (see Maps 1-2). The new campus will replace the temporary classrooms and offices currently on 2.7 acres at the corner of Crane Valley Road (426) and Civic Circle Loop behind Rite Aid. The project Area of Potential Effects (APE), which includes the entire 30-acre footprint, is depicted on Map 3.

The general setting of the project area is located within the rural residential community of Oakhurst in the foothills of Madera County, California. Twentieth century modifications within and adjacent to the project area include a WW II-era pond, an access road, and fencing. A sheriff's sub-station, community church, medical center, and hardware store are situated south of the project area along Westlake Drive and Highway 49. Photos 1 through 6 provide a pictorial overview of the project APE.

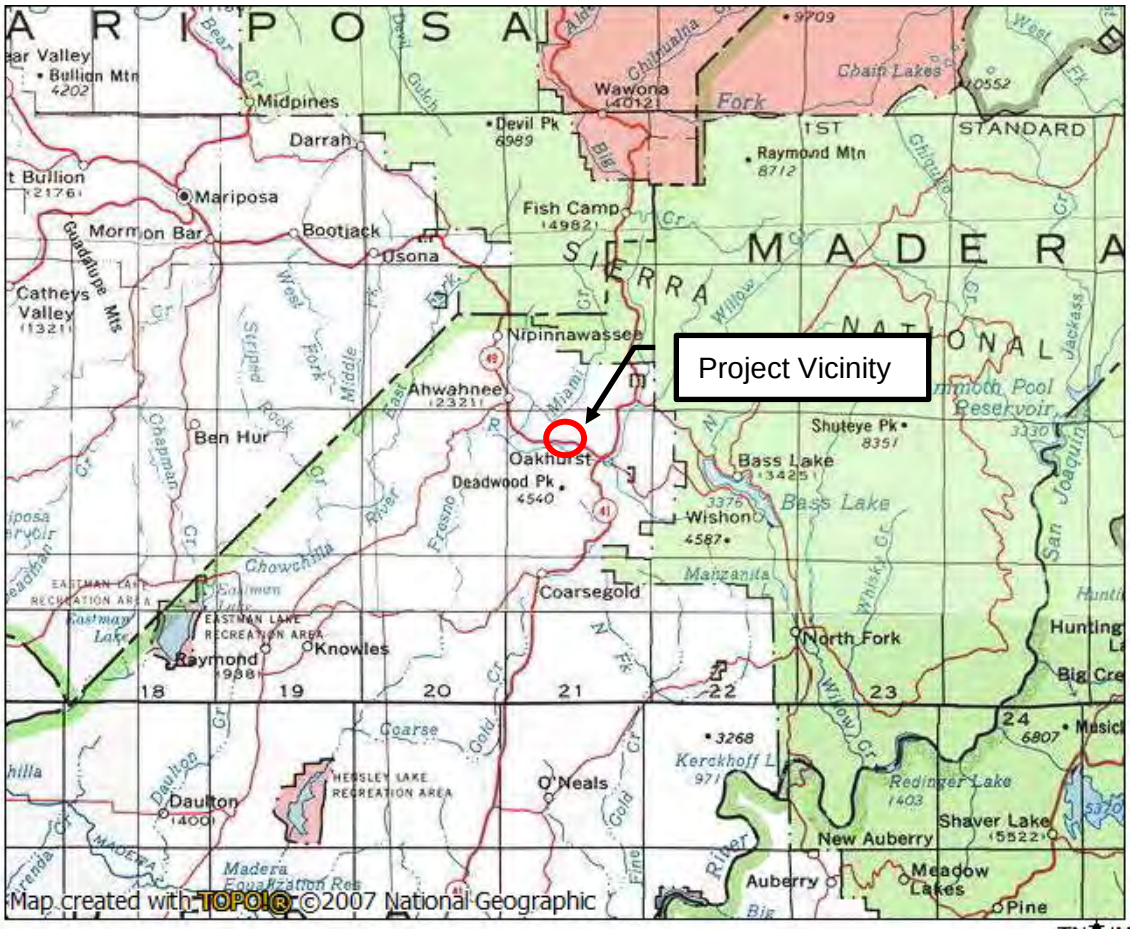
SOURCES CONSULTED

Prior to field inspection, an in-house records search was completed by Mr. McIntosh at the Southern San Joaquin Valley Information Center (SSJVIC) of the California Historical Resources Information System to identify areas previously investigated and to identify known cultural resources present within or in close proximity to the Project APE. According to the Information Center records there are no prehistoric or historic-period sites or structures identified within the project APE; seven resources have been documented within a ½-mile radius of the study area. There have been two previous investigations within the APE (Roper 2008, Thornton 1978), and five within a ½-mile radius of the parcel. No cultural resource sites listed on the National Register of Historic Places, the California Register of Historic Resources, California Points of Historical Interest, State Historic Landmarks, or the California Inventory of Historic Resources have been documented either in or within ½-mile radius of the project APE.

MAP 1. PROJECT VICINITY

State Center Community College District
New Oakhurst Center Site
Oakhurst, Madera County, California

N



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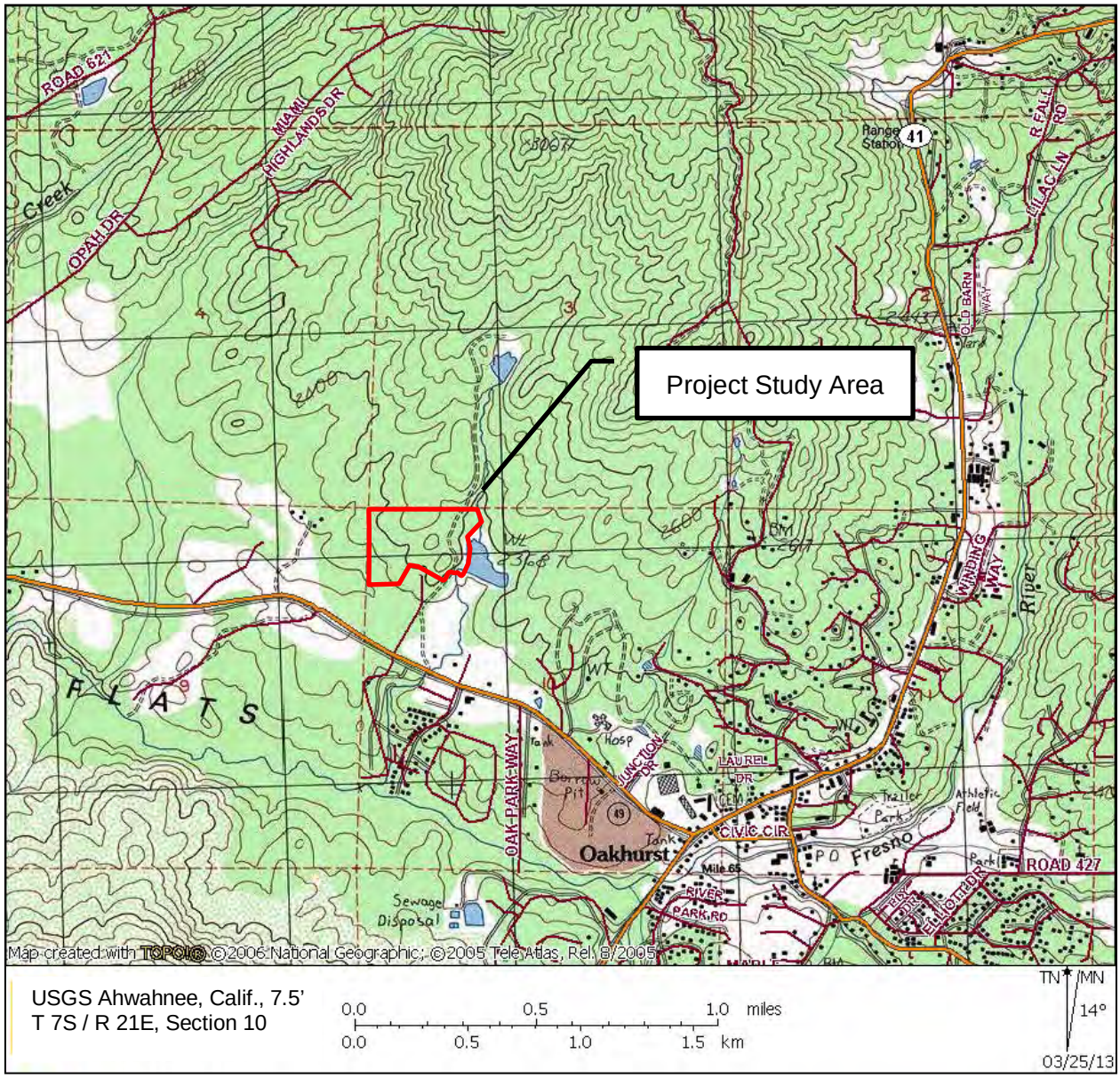


Map 2. Project Study Area, New Oakhurst Center Site, Oakhurst, Madera County, California.

Map 3. Project Area of Potential Effects (APE).

Photo 1. View SE from NW corner of APE.

Photo 2. Graded area at SW corner of APE, facing NW.

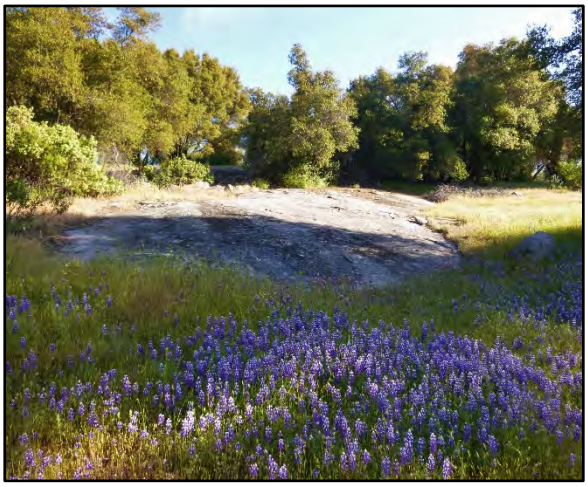


Photo 3. Granite outcrop near center of APE, facing N.

Photo 4. Graded area near SEW corner of APE, facing N.

Photo 5. View south from west edge of pond on APE border.

Photo 6. View NW from SE corner of APE.

BACKGROUND

The project area is located within the rural residential area surrounding the community of Oakhurst in the foothills of Madera County, California. Twentieth century modifications within and adjacent to the project area include a WW II-era pond, access roads, and fencing. A community church, sheriff's sub-station, medical center, and hardware store are situated south of the project area along Westlake Drive and Highway 49.

The project APE (study area) is located on the northern slopes above the Fresno River and north of Highway 49, in the central Sierra Nevada foothills in eastern Madera County, at an elevation ranging from 2340-2500 ft above mean sea level. Soils within the study area include well-drained rocky sandy clay loam. Current land use is largely undeveloped oak woodland with scatterings of mixed conifers and an understory of shrubs and grasses.

The mid-elevations of the central Sierran Foothills are dominated by grassy hills dotted with blue oak, interior live oak, and grey pine. Patches of annual grassland alternate with shrubs including manzanita, ceanothus, redbud, and numerous other species. Other tree species found within the project vicinity include California buckeye, black oak, cedar, and yellow pines. The variable forest canopy and understory vegetation provides habitat for numerous species of birds, animals, and reptiles.

Prior to EuroAmerican exploration and settlement in the region, the central San Joaquin Valley was extensive grassland covered with spring-flowering herbs. Stands of trees -- sycamore, cottonwoods, box elders and willows -- lined the stream and river courses with groves of valley oaks in well-watered localities with rich soil. Rivers yielded fish, mussels, and pond turtles; migratory waterfowl nested in the dense tules along the river sloughs downstream. When the Spanish first set foot in the area, they found the deer and tule elk trails to be so broad and extensive that they first supposed that the area was occupied by cattle. Grizzly bears occupied the open grassland and riparian corridors on the valley floor and adjacent foothills. Smaller mammals and birds, including jackrabbits, ground squirrels, and quail were abundant. Native Americans occupants of the region describe abundant sedge beds, along with rich areas of deer grass, plants that figure prominently in the construction of Native American basketry items.

Prehistoric Period Summary

The San Joaquin Valley and adjacent Sierran foothills and Coast Range have a long and complex cultural history with distinct regional patterns that extend back more than 11,000 years (McGuire 1995). The first generally agreed-upon evidence for the presence of prehistoric peoples in the region is represented by the distinctive basally-thinned and fluted projectile points, found on the margins of extinct lakes in the San Joaquin Valley. These projectiles, often compared to Clovis points, have been found at three localities in the San Joaquin Valley including along the Pleistocene shorelines of former Tulare Lake. Based on evidence from these sites and other well-dated contexts elsewhere, these Paleo-Indian hunters who used these spear points existed during a narrow time range of 11550 cal B.C. to 8550 cal B.C. (Rosenthal et al. 2007).

As a result of climate change at the end of the Pleistocene, a period of extensive deposition occurred throughout the lowlands of central California, burying many older landforms and providing a distinct break between Pleistocene and subsequent occupations during the Holocene. Another period of deposition, also a product of climate change, had similar results around 7550 cal B.C., burying some of the oldest archaeological deposits discovered in California (Rosenthal and Meyer 2004).

The Lower Archaic (8550-5550 cal B.C.) is characterized by an apparent contrast in economies, although it is possible they may be seasonal expressions of the same economy. Archaeological deposits which date to this period on the valley floor frequently include only large stemmed spear points, suggesting an emphasis on large game such as artiodactyls (Wallace 1991). Recent discoveries in the adjacent Sierra Nevada have yielded distinct milling assemblages which clearly indicate a reliance on plant foods. Investigations at Copperopolis (LaJeunesse and Pryor 1996) argue that nut crops were the primary target of seasonal plant exploitation. Assemblages at these foothill sites include dense accumulations of handstones, millingslabs, and various cobble-core tools, representing "frequently visited camps in a seasonally structured settlement system" (Rosenthal et al. 2007:152). During the Lower Archaic, regional interaction spheres were well established. Marine shell from the central California coast has been found in early Holocene contexts in the Great Basin east of the Sierra Nevada, and eastern Sierra obsidian comprises a large percentage of flaked stone debitage and tools recovered from sites on both sides of the Sierra (Rosenthal et al. 2007:152).

About 8,000 years ago, many California cultures shifted the main focus of their subsistence strategies from hunting to nut and seed gathering, as evidenced by the increase in food-grinding implements found in archeological sites dating to this period. This cultural pattern is best known for southern California, where it has been termed the Milling Stone Horizon (Wallace 1954, 1978a), but recent studies suggest that the horizon may be more widespread than originally described and is found throughout the central region during the Middle Archaic Period. Dates associated with this period vary between 9,000 and 2,000 cal BP, although most cluster in the 6,800 to 4,500 cal BP range (Basgall and True 1985).

On the valley floor, early Middle Archaic sites are relatively rare; this changes significantly toward the end of the Middle Archaic. In central California late Middle Archaic settlement focused on river courses on the valley floor. "Extended residential settlement at these sites is indicated by refined and specialized tool assemblages and features, a wide range of nonutilitarian artifacts, abundant trade objects, and plant and animal remains indicative of year-round occupation" (Rosenthal et al. 2007:154). Again, climate change apparently influence this shift, with warmer, drier conditions prevailing throughout California. The shorelines of many lakes, including Tulare Lake, contracted substantially, while at the same time rising sea levels favored the expansion of the San Joaquin/Sacramento Delta region, with newly formed wetlands extending eastward from the San Francisco Bay.

In contrast with rare early Middle Archaic sites on the valley floor, early Middle Archaic sites are relatively common in the Sierran foothills, and their recovered, mainly utilitarian assemblages show relatively little change from the preceding period with a continued emphasis on acorns and pine nuts. Few bone or shell artifacts, beads, or ornaments have been recovered from these localities. Projectile points from this period reflect a high degree of regional morphological variability, with an emphasis on local toolstone material supplemented with a small amount of obsidian from eastern sources. In contrast with the more elaborate mortuary assemblages and extended burial mode documented at Valley sites, burials sites documented at some foothill sites such as CA-FRE-61 on Wahtoke Creek are reminiscent of "re-burial" features reported from Milling Stone Horizon sites in southern California. These re-burials are characterized by re-interment of incomplete skeletons often capped with inverted millingstones (McGuire 1995:57).

A return to colder and wetter conditions marked the Upper Archaic in Central California (550 cal B.C. to cal A.D. 1100). Previously desiccated lakes returned to spill levels and increased freshwater flowed in the San Joaquin and Sacramento watershed. Cultural patterns as reflected in the archeological record, particularly specialized subsistence practices, emerged during this

period. The archeological record becomes more complex, as specialized adaptations to locally available resources were developed and valley populations expanded into the lower Sierran foothills. New and specialized technologies expanded and distinct shell bead types occurred across the region. The range of subsistence resources utilized and exchange systems expanded significantly from the previous period. In the Central Valley, archaeological evidence of social stratification and craft specialization is indicated by well-made artifacts such as charmstones and beads, often found as mortuary items.

The period between approximately cal A.D. 1000 and Euro-American contact is referred to as the Emergent Period. The Emergent Period is marked by the introduction of bow and arrow technology which replaced the dart and atlatl at about cal A.D. 1000 and 1300. In the San Joaquin region, villages and small residential sites developed along the many stream courses in the lower foothills and along the river channels and sloughs of the valley floor. A local form of pottery was developed in the southern Sierran foothills along the Kaweah River. Archaeological excavations at habitation sites in Merced and Fresno counties have revealed an artifact assemblage belonging to the Yokuts groups who inhabited the valley floor and adjacent foothills into historic times (Olsen and Payen 1968, 1969; Pritchard 1970).

Ethnographic Summary

The south-central Sierra Nevada foothills in the Oakhurst/Coarsegold vicinity are the traditional homelands of the Chukchansi, northernmost of the Foothill Yokuts. Chukchansi lands are bordered on the north by the Southern Sierra Miwok and to the east by the Northfork Mono. According the Gayton (1948), the Fresno River marked the boundary between the Chukchansi and the Miwok, but due to friendly relations and intermarriage between the two groups, the boundary was a lax one (Gayton 1948:175).

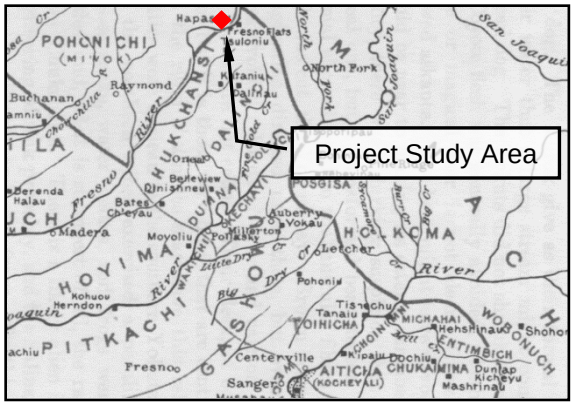


Figure 1. Northern Valley Yokuts Village Locations (from Kroeber 1925: Plate 47).

Due to the abundance and diversity of wildlife habitats and plant communities within the Sierran foothills and nearby San Joaquin Valley and higher elevations of the Sierra Nevada, Native American population densities in the region were quite high (Baumhoff 1963). While the acorn was the dietary staple, the diversity of accessible natural resources provided an omnivorous diet. The reader is referred to Gayton (1948), Kroeber (1925), Latta (1999), Levy (1978), and Spier (1978) for additional information on pre-contact Yokuts/Miwok subsistence and culture.

Historic Period Summary

The Coarsegold/Oakhurst region formed the southernmost extent of the California Gold Rush of 1849. By 1851 Coarsegold, located about seven miles southwest of Oakhurst, was one of California largest mining centers. The traditional lands of the Chukchansi and Miwok were overrun and overexploited by the miners and those who followed them. Clashes between American settlers and Native peoples led to formation of the Mariposa Battalion and the forced removal of Native tribes from the region.

Madera County was created on March 11, 1893 from a portion of Fresno County lying north of the San Joaquin River. Oakhurst, originally called Fresno Flats, was founded as a supply center for the southern mines and developed over the years as a small, rural settlement. Since the establishment of Yosemite National Park in the late 1800s, it has served as a gateway community for tourists. During the 1990s Oakhurst underwent a significant expansion with the development of numerous residential subdivisions and commercial establishments serving the growing foothill population.

In 1914 the project area was under the ownership of W. F. Wright (see Figure 3). The original ranch house stood where the Kaiser Medical Center is now located south of the study area. The modern residence, situated southeast of the project area at 40253 Highway 49, was built by Wright family descendants in the 1960s.

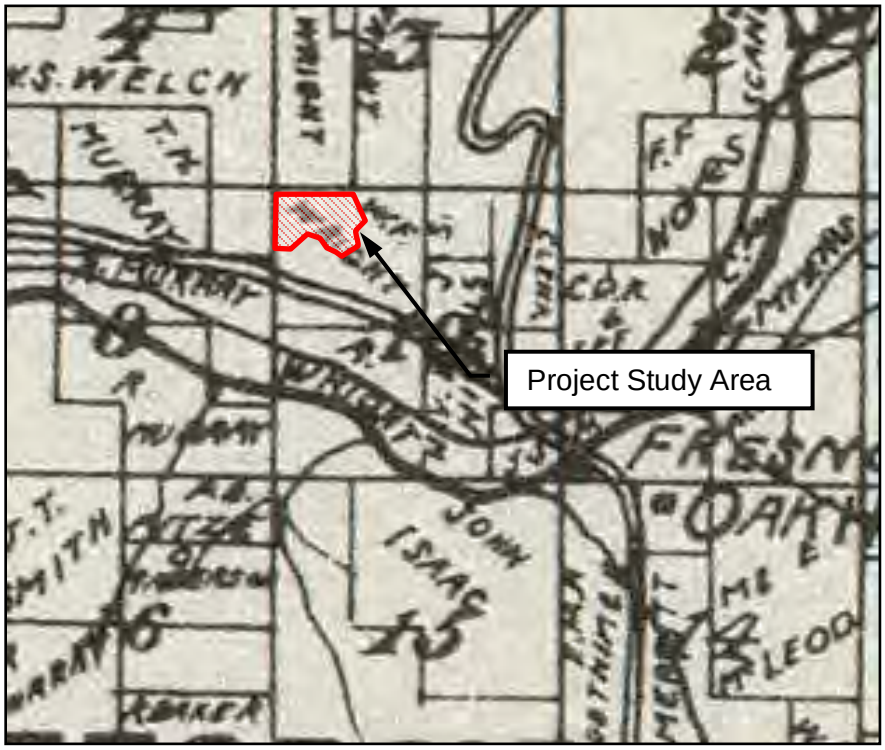


Figure 2. 1914 Map of Madera County. Project study area is within the northwest corner of Section 10, owned by W. F. Wright.

METHODS AND FINDINGS

On March 8, 2018, Sierra Valley Cultural Resources archaeologist Douglas S. McIntosh, under the direction of Project Manager C. Kristina Roper, conducted a systematic archaeological pedestrian survey of the 30-acre parcel. This survey was conducted to assess the potential effects on cultural resources of the proposed new Oakhurst Community College Center project.

The survey sought to identify any archaeological sites, features, and artifacts which might be present on the ground surface. Items such as chipped stone tools, grinding implements, hearths, and midden deposits are indicators of prehistoric activities. All exposed bedrock outcrops were inspected for any grinding features or rock art. In addition, the survey also sought to identify any historic structures, features, and artifacts over fifty years old. This pedestrian survey entailed

walking systematic north to south transects across the entire project area. These transects were space approximately 15 meters apart. A Panasonic DMC-TS20 digital camera was used to photo-document the project setting and any cultural resources. All photo information was recorded in the field on a photo-log. A hand held Magellan GPS unit was used to record UTM points.

The subject parcel is located in the community of Oakhurst, north of State Highway 49, along Westlake Drive, and just west of the Madera County Sheriff's sub-station. To the north and west of the site are undeveloped acreage, which are covered by oaks and chaparral. To the east of the parcel is a manmade reservoir/pond. Along the southern boundary is a church and day school, mechanically graded parcels, and sheriff's sub-station. Westlake Drive which trends north/south, bisects the eastern edge of the 30-acre parcel. The northern and western edges of the parcel are bounded by a barbed wire fence line. The southern and eastern boundaries have recently been staked by a survey crew. At the center of the parcel is a newly installed land survey control hub/point.

A majority of New Oakhurst Community College Center Site is situated on a rolling hillside landform. Oaks and moderate to dense chaparral are present across much of the property. At the southwest, central and southeast portions of the parcel there are visible signs of large scale mechanical earthmoving activities. At these locations, there are leveled pads, cut slopes and stockpiled soils. Along the eastern edge of Westlake Drive there appears to be an east-facing engineered slope, which includes a drainage culvert and erosion control wattles.

Ground surface visibility across a majority of the 30-acre parcel was poor, less than 10 percent. Both native and non-native spring grasses and vegetation 8 inches to 3 ½ feet tall greatly limited a full inspection of the ground surface area. Within the mechanically impacted portions of the site, all of the top soil had been removed. Project soils are a fine- to coarse-grained sandy loam with granitic gravels. Inspected soils have a Munsell color range of 10yr 4/3 to 10yr 4/4, brown to dark yellowish brown (wet). Soils within the study area are strongly developed alfisols classified as Ahwahnee and Auberry coarse sandy loams. These soils formed during the pre-Quaternary period on mountain slopes. There is a low sensitivity for buried cultural deposits within these soil components (Meyer et al. 2010).

Summary of Findings

No significant or important archaeological or other cultural resources were identified as a result of this study. Therefore, it is unlikely that the proposed action will have an effect on important archaeological, historical, or other cultural resources. No further cultural resources investigation is therefore recommended. In the unlikely event that buried archaeological deposits are encountered within the project area, the finds must be evaluated by a qualified archaeologist. Should human remains be encountered, the County Coroner must be contacted immediately; if the remains are determined to be Native American, then the Native American Heritage Commission must be contacted as well.

REFERENCES CITED

Basgall, M. E. and D. L. True.
1985 Archaeological Investigations in Crowder Canyon, 1973-1984: Excavations at Sites SBR-421B, SBR-421C, SBR-421D, and SBR-713. Report on file, Caltrans, Sacramento CA

Baumhoff, M. A.
1963 *Ecological Determinants of Aboriginal California Populations*. University of California Publications in American Archaeology and Ethnology 49(2).

F.E. Smith Survey Company
1914 Official Map of Madera County, California. Drawn by Irving Bacon.

Gayton, A. H.
1948 Yokuts and Western Mono Ethnography I: Tulare Lake, Southern Valley, and Central Foothill Yokuts. University of California Anthropological Records 10(1). Berkeley.

Kroeber, A. L.
1925 *Handbook of the Indians of California* (1976 Dover Edition). Bureau of American Ethnology Bulletin 76, Smithsonian Institution, Washington D.C.

LaJeunesse, Roger M., and John M. Pryor
1996 *Skyrocket Appendices*. Report on file, Department of Anthropology, California State University, Fresno.

Latta, Frank F.
1999 *Handbook of Yokuts Indians*. Brewer's Historical Press, Exeter, CA / Coyote Press, Salinas, CA.

Levy, Richard
1978 Eastern Miwok. In Handbook of North American Indians, vol. 8, California, edited by R. F. Heizer, pp. 398-413. Smithsonian Institution, Washington, D.C.

McGuire, Kelly R.
1995 Test Excavations at CA-FRE-61, Fresno County, California. Occasional Papers in Anthropology 5. Museum of Anthropology, California State University Bakersfield.

Meyer, Jack, D, Craig Young, and Jeffrey S. Rosenthal
2010 A Geoarchaeological Overview and Assessment of Caltrans Districts 6 and 9, Cultural Resources Inventory of Caltrans District 6/9 Rural Conventional Highways (Volumes I and 2). Far Western Anthropological Research Group, Inc. Davis, CA.

Olsen, William H., and Louis A. Payen
1968 *Archaeology of the Little Panoche Reservoir, Fresno County, Californi*a. California State Department of Parks and Recreation, Archaeological Resources Section Report 11. Sacramento.

1969 *Archaeology of the Grayson Site, Merced County, California.* California State Department of Parks and Recreation, Archaeological Resources Section Report 12.

Pritchard, William E.
1970 *Archeology of the Menjoulet Site, Merced County, California*. California State Department of Parks and Recreation, Archaeological Resources Section Report 13. Sacramento.

Roper, C. Kristina
2008 A Cultural Resources Survey of a ~40-Acre Parcel Located at Westlake Drive and Highway 49, Oakhurst, Madera County, California. Sierra Valley Cultural Planning. Submitted to Mr. Russ Shaw, Oakhurst, CA.

Rosenthal, Jeffrey S., and Jack Meyer
2004 Landscape Evolution and the Archaeological Record: A Geoarchaeological Study of the Southern Santa Clara Valley and Surrounding Region. Center for Archaeological Research at Davis, Publication No. 14, University of California, Davis.

Rosenthal, Jeffrey S., Gregory G. White and Mark Q. Sutton
2007 The Central Valley: A View from the Catbird's Seat. In *California Prehistory: Colonization, Culture, and Complexity*, pp. 147-164, edited by Terry L. Jones and Kathryn A. Klar, Alta Mira Press, New York.

Spier, Robert F.G.
1978 Foothill Yokuts. In Handbook of North American Indians, vol. 8, California, edited by R. F. Heizer, pp. 471-484. Smithsonian Institution, Washington, D.C.

Thornton, Michael T.
1978 Archaeological Survey of the West Oak Property, Oakhurst, Madera County. California State University, Fresno. Report on file, SSJVIC No. MA-00382.

Wallace, William J.
1954 The Little Sycamore Site and the Early Milling Stone Cultures of Southern California. *American Antiquity* 20(2):112-123.

1978a Post-Pleistocene Archeology, 9000 to 2000 B.C. In Handbook of North American Indians, vol. 8, *California*, edited by R. F. Heizer, pp. 25-36. Smithsonian Institution, Washington, D.C.

1991 Tulare Lake's Archaeological Past. In *Background to a Study of Tulare Lake's Archaeological Past*, pp. 23-33. Contributions to Tulare Lake Archaeology 1.

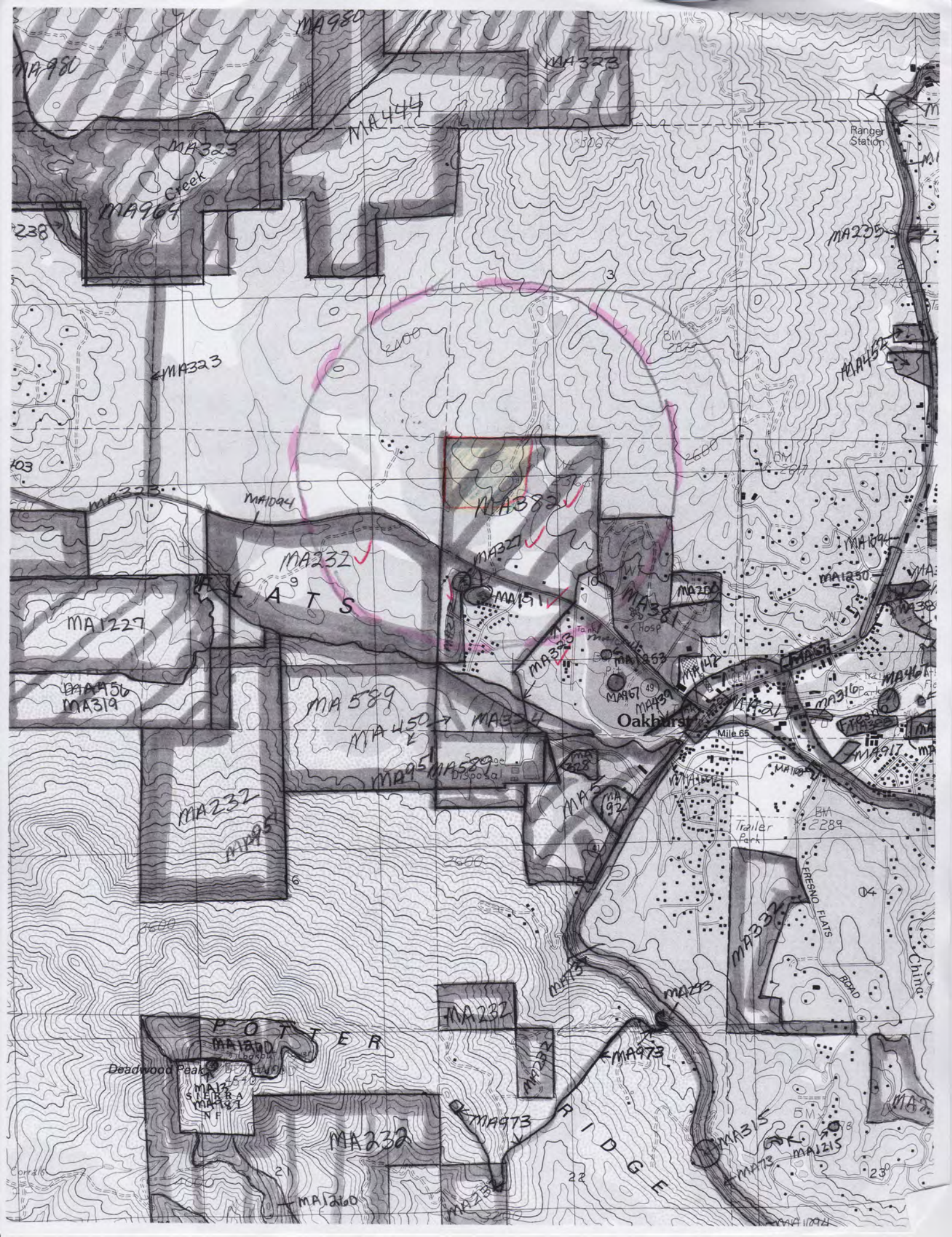
PREPARER'S QUALIFICATIONS

Douglas S. McIntosh completed the archaeological survey of the Project APE. Mr. McIntosh has over 26 years of experience in California archaeology and has served as field crew chief and lead field assistant for both historical and prehistoric resource investigations, including tasks of surveying, field mapping, excavation, field graphics, soils descriptions, photography, and general site documentation. He has served as an archaeological monitor for various aspects of earthmoving and grading activities for cultural resources, and as Laboratory assistant for both historical and prehistoric resources which includes processing soil samples, cleaning and cataloging historical and prehistoric artifacts and collections, and artifact illustration. Mr. McIntosh has conducted historical research which involves records, maps and archival searches, oral interviews, and documentation of historical photographic collections.

C. Kristina Roper meets the Secretary of the Interior's Guidelines for archaeology. Ms. Roper has a B.A. in Anthropology from the University of California, Berkeley, and a M.A. in Cultural Resources Management from Sonoma State University. She has over 36 years of archaeological survey and excavation experience, including both prehistoric and historic sites, in California, Nevada, Oregon, and Idaho, and has produced over 250 professional reports. For the past 21 years Ms. Roper has served as a Lecturer in Anthropology at California State University, Fresno. Ms. Roper is a Registered Professional Archaeologist in good standing. As sole proprietor of a cultural resources management firm established in 1995, her responsibilities include all aspects of project management, from marketing and development, to project completion, and include NEPA, CEQA, and NHPA (Section 106) compliance.

ATTACHMENT A

RECORDS SEARCH (#18-197)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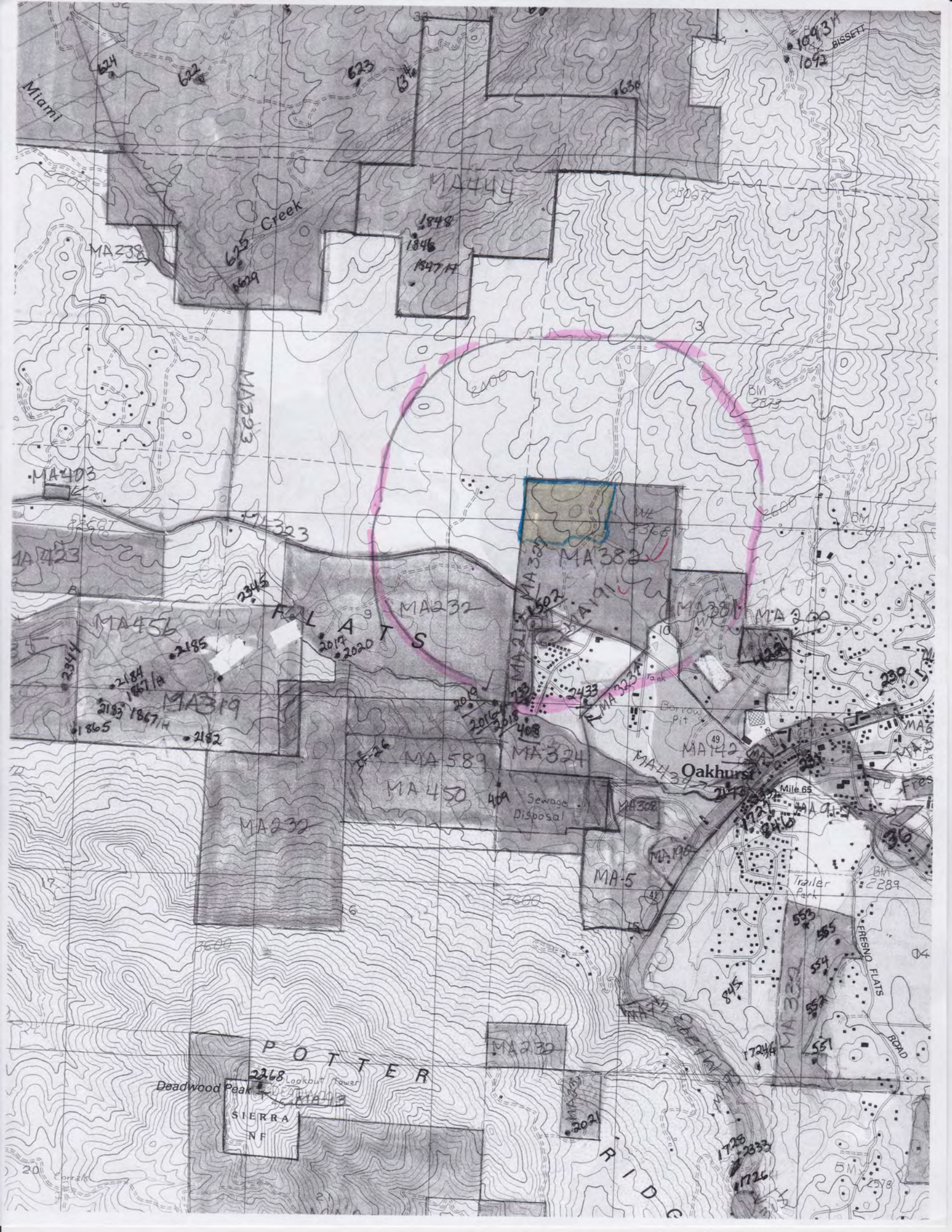
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Resource List

New Oakhurst Center Site

Primary No.	Trinomial	Other IDs	Type	Age	Attribute codes	Recorded by	Reports
P-20-000408	CA-MAD-000408	Resource Name - MP-OH-01	Site	Prehistoric	AP04 (Bedrock milling feature)	1977 (R. Gerry)	MA-00324
P-20-000733	CA-MAD-000733	Resource Name - Temporary Field No. B80-19-1	Site	Prehistoric	AP04 (Bedrock milling feature)	1981 (M. Crist)	MA-00212
P-20-001502	CA-MAD-001502	Resource Name - AC-1009-01	Site	Prehistoric	AP01 (Unknown)	1987 (Charles R. Smith, Archaeological Consulting)	
P-20-002016	CA-MAD-002016	Resource Name - Happy Campers BRM Site	Site	Prehistoric	AP04 (Bedrock milling feature)	1992 (John W. Foster and Robert I. Orlins, Cultural Heritage Section, CA Department of Parks and Recreation)	MA-00232
P-20-002018	CA-MAD-002018	Resource Name - Section Line Site	Site	Prehistoric	AP04 (Bedrock milling feature); AP16 (Other) - Midden deposit	1992 (John W. Foster and Robert I. Orlins, Cultural Heritage Section, CA Department of Parks and Recreation)	MA-00232
P-20-002019	CA-MAD-002019	Resource Name - Arthur BRM	Site	Prehistoric	AP04 (Bedrock milling feature)	1992 (Robert I. Orlins and John W. Foster, Cultural Heritage Section, CA Department of Parks and Recreation)	MA-00232
P-20-002433	CA-MAD-002336	Resource Name - Oakhurst HWY 41/49 Curran #1	Site	Prehistoric	AP02 (Lithic scatter); AP04 (Bedrock milling feature); AP15 (Habitation debris)	2001 (Maggie Trumbly, URS Corporation)	

Report List

New Oakhurst Center Site

Report No.	Other IDs	Year	Author(s)	Title	Affiliation	Resources
MA-00191		1987	Breschini, Gary and Smith, Charles	Preliminary Cultural Resources Reconnaissance of 3.1 Acres Near Redbud Drive and Lindsay Lane, Oakhurst, Madera County, California	Archaeological Consulting	
MA-00212		1981	Crist, Michael K.	Cultural Resource Inventory for Boulder Creek EIR, Madera County	Buada Associates	20-000733
MA-00232		1992	John Foster and Robert Orlins	An Archaeological Reconnaissance of Selected Parcels in Pneumonia Gulch, Fresno Flats and Deadwood Peak, Madera County, California	State of California, Department of Parks and Recreation	20-002014, 20-002015, 20-002016, 20-002017, 20-002018, 20-002019, 20-002020, 20-002021
MA-00327		1987	Gerry, Robert	Evaluation of Significance of Archaeological Site AC-1009-01 (CA-MAD-1502), Oakhurst, Madera County, California	Peak & Associates, Inc.	
MA-00381		1978	Thornton, Michael E.	Archaeological Survey of the Junction Property, Oakhurst, Madera County	California State University, Fresno	20-000422
MA-00382		1978	Thornton, Michael T.	Archaeological Survey of the West Oak Property, Oakhurst, Madera County	California State University, Fresno	

Appendix D

Geotechnical Engineering Investigation

with Geologic Hazards Evaluation

GEOTECHNICAL • ENVIRONMENTAL • GEOLOGY • MATERIALS TESTING & INSPECTION • FORENSIC • LABORATORY

SALEM
engineering group, inc.

GEOTECHNICAL ENGINEERING INVESTIGATION WITH GEOLOGIC HAZARDS EVALUATION

PROPOSED STATE CENTER COMMUNITY COLLEGE DISTRICT - CLASSROOM BUILDINGS AND PARKING LOT
WESTLAKE DRIVE
OAKHURST, CALIFORNIA

SALEM PROJECT NO. 1-219-1134
JANUARY 27, 2020

PREPARED FOR:

MR. GEORGE CUMMINGS
STATE CENTER COMMUNITY COLLEGE DISTRICT
1171 FULTON STREET
FRESNO, CA 93721

PREPARED BY:

SALEM ENGINEERING GROUP, INC.
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SALEM
engineering group, inc.

4729 W. Jacquelyn Avenue
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January 27, 2020 Project No. 1-219-1134

Mr. George Cummings
State Center Community College District
1171 Fulton Street
Fresno, CA 93722

Subject: Geotechnical Engineering Investigation with Geologic Seismic Hazards Evaluation
Proposed State Center Community College District – Classroom Buildings and Parking Lot
Westlake Drive
Oakhurst, California

Dear Mr. Cummings:

At your request and authorization, SALEM Engineering Group, Inc. (SALEM) has prepared this Geotechnical Engineering Investigation and Geologic Seismic Hazards Evaluation Report for the Proposed State Center Community College District - Classroom Buildings and Parking Lot located at Westlake Drive in Oakhurst, California.

The accompanying report presents our findings, conclusions, and recommendations regarding the geotechnical aspects of designing and constructing the project as presently proposed. In our opinion, the proposed project is feasible from a geotechnical viewpoint provided our recommendations are incorporated into the design and construction of the project.

We appreciate the opportunity to assist you with this project. Should you have questions regarding this report or need additional information, please contact the undersigned at (559) 271-9700.

Respectfully Submitted,

SALEM ENGINEERING GROUP, INC.

Joshua R. Marroquin, EIT
Geotechnical Staff Engineer
Central / Northern California

Dean B. Ledgerwood II, CEG
Northern California Geotechnical Manager
CEG 2613

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Expansion Index Test Result
Atterberg Limit Test Result
Resistivity Test Result
Corrosivity Test Results
R-Value Test Result

APPENDIX C – EARTHWORK AND PAVEMENT SPECIFICATIONS

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PROPOSED STATE CENTER COMMUNITY COLLEGE DISTRICT CLASSROOM BUILDINGS AND PARKING LOT WESTLAKE DRIVE OAKHURST, CALIFORNIA

1. PURPOSE AND SCOPE

This report presents the results of our Geotechnical Engineering Investigation and Geologic Seismic Hazards Evaluation for the Proposed State Center Community College District Classroom Buildings and Parking Lot located at Westlake Drive in Oakhurst, California (see Figure 1, Vicinity Map).

The purpose of our geotechnical engineering investigation was to conduct site observations, observe and sample the subsurface conditions encountered at the project site, and to provide conclusions and recommendations relative to the geotechnical aspects of constructing the project as presently proposed.

The recommendations presented herein are based on analysis of the data obtained and reviewed during the investigation and our experience with similar soil and geologic conditions.

If project details vary significantly from those described herein, SALEM should be contacted to determine the necessity for review and possible revision of this report. Earthwork and Pavement Specifications are presented in Appendix C. If text of the report conflict with the specifications in Appendix C, the recommendations in the text of the report have precedence.

2. SITE LOCATION AND DESCRIPTION

The proposed Classroom Buildings and Parking Lot are planned at Westlake Drive in Oakhurst, California (see Site Plan, Figure 2). At the time of field reconnaissance, the areas of the proposed improvements included vacant fields, and mature trees. Generally, the site was noted to be covered in seasonal native grassy vegetation. Based in Google Earth aerial imagery previous grading activities have taken place directly to the south of the project site.

Google Earth imagery indicates the site lies at a relative elevation range of 2,439 to 2,446 feet above mean sea level.

3. PROJECT DESCRIPTION

We understand that the project involves the construction a new classroom buildings and parking lot within the subject site located Westlake Drive in Oakhurst, California.

Based on the site plan provided to us by the client, the proposed campus development will include construction of three classroom buildings. It is anticipated the proposed buildings will be single story construction, and will include either wood framing, metal framing, or concrete masonry unit (CMU) wall. The buildings will be supported on conventional shallow spread foundations with concrete slabs on grade.

Maximum column and wall loads for the buildings are anticipated to be about 40 to 75 kips and 2 to 3 kips per linear foot, respectively. Maximum total and differential settlement is anticipated be 1 inch and ½ inch, respectively.

Appurtenant construction is anticipated to include new asphaltic concrete pavements, underground utilities, and isolated landscape areas.

A site grading plan shows that that cuts and fills during earthwork will be around 1 to 5 feet to provide level building pads and positive site drainage. In the event that changes occur in the nature or design of the project, the conclusions and recommendations contained in this report will not be considered valid unless the changes are reviewed and the conclusions of our report are modified. The site configuration and locations of proposed improvements are shown on the Site Plan, Figure 2.

4. FIELD EXPLORATION

Our field exploration consisted of site surface reconnaissance and subsurface exploration. The exploratory test borings (B-1 thru B-5) were drilled on December 26, 2019 in the area shown on the Site Plan, Figure 2. The test borings were advanced with 6-inch diameter solid-flight auger rotated by a truck-mounted CME-55 drill rig. The test borings were extended to depths ranging from 5 feet BSG (below site grade) to the maximum depth explored of approximately 36.5 feet BSG where practical refusal was encountered due to bedrock. The location of the soil borings are depicted on Figure 2, Site Plan. A detailed discussion of our field investigation and exploratory boring logs are presented in Appendix A

The materials encountered in the test borings were visually classified in the field, and logs were recorded by a field engineer and stratification lines were approximated on the basis of observations made at the time of drilling. Visual classification of the materials encountered in the test borings were generally made in accordance with the Unified Soil Classification System (ASTM D2487). A soil classification chart and key to sampling is presented on the Unified Soil Classification Chart, in Appendix "A." The test boring logs are presented in Appendix "A." The Boring Logs include the soil type, color, moisture content, dry density, and the applicable Unified Soil Classification System symbol. The location of the test borings were determined by measuring from features shown on the Site Plan, provided to us. Hence, accuracy can be implied only to the degree that this method warrants.

The actual boundaries between different soil types may be gradual and soil conditions may vary. For a more detailed description of the materials encountered, the Boring Logs in Appendix "A" should be consulted.

Soil samples were obtained from the test borings at the depths shown on the test boring logs. The samples recovered were capped at both ends to preserve the samples at their natural moisture content; bag samples were recovered and placed in a sealed bag to preserve their natural moisture content. The borings were backfilled with soil cuttings after completion of the drilling.

5. LABORATORY TESTING

Laboratory tests were performed on selected soil samples to evaluate their physical characteristics and engineering properties. The laboratory-testing program was formulated with emphasis on the evaluation of natural moisture, density, shear strength, consolidation potential, expansion index, Atterberg limit, resistivity, R-value, and gradation of the materials encountered.

In addition, chemical tests were performed to evaluate the corrosivity of the soils to buried concrete and metal. Details of the laboratory test program and the results of laboratory test are summarized in Appendix "B." This information, along with the field observations, was used to prepare the final boring logs in Appendix "A."

6. SOIL AND GROUNDWATER CONDITIONS

6.1 Subsurface Conditions

The subsurface soil conditions encountered appear typical of those found in the geologic region of the site. In general, the soils encountered in the test borings drilled consisted of silty sand, poorly-graded sand with silt, well-graded sand with silt, and poorly graded sand throughout the maximum depth explored of 36.5 feet BSG where refusal was encountered due to bedrock. Based on the relative density and appearance, the upper soils encountered appeared consistent with weathered igneous rock. It should be noted that areas of surficial soils with thicknesses less than 5 feet were noted over the weathered rock material.

A consolidation test was performed, the sample resulted in about 6.5 percent compressibility under a load of 8 kips per square foot. When wetted under a load of 2 kips per square foot, these samples exhibited about 1 percent collapse. A direct shear test resulted in an internal angle of friction of 51 degrees with a cohesion value of 103 pounds per square feet. An Atterberg limits test resulted in a plasticity index of 9 and liquid limits value of 33. An expansion index test performed on a near surface soil sample resulted in an expansion index of 10.

An R-value test performed on a near surface sample resulted in an R-value of 58.

Soil conditions described in the previous paragraphs are generalized. Therefore, the reader should consult exploratory boring logs included in Appendix A for soil type, color, moisture, consistency, and USCS classification of the materials encountered at specific locations and elevations.

6.2 Groundwater

The test boring locations were checked for the presence of groundwater during and after the drilling operations. Free Groundwater was not encountered within the depth of exploration, 36.5 feet below site grade (BSG). Based on review of the Department of Water Resources Water Data Library website (http://www.water.ca.gov/), no available groundwater data was noted within 15 miles of the project site. Based on the shallow depth to weathered rock, perched water conditions may occur during wet inclement periods of the year.

It should be recognized that water table elevations may fluctuate with time, being dependent upon seasonal precipitation, irrigation, land use, localized pumping, and climatic conditions as well as other factors. Therefore, water level observations at the time of the field investigation may vary from those encountered during the construction phase of the project. The evaluation of such factors is beyond the scope of this report.

6.3 Soil Corrosion Screening

Excessive sulfate in either the soil or native water may result in an adverse reaction between the cement in concrete and the soil. The 2014 Edition of ACI 318 (ACI 318) has established criteria for evaluation of sulfate and chloride levels and how they relate to cement reactivity with soil and/or water. A soil sample was obtained

from the project site and was tested for the evaluation of the potential for concrete deterioration or steel corrosion due to attack by soil-borne soluble salts and soluble chloride. The water-soluble sulfate concentration in the saturation extract from the soil samples were detected to be 110 mg/kg.

ACI 318 Tables 19.3.1.1 and 19.3.2.1 outline exposure categories, classes, and concrete requirements by exposure class. ACI 318 requirements for site concrete based upon soluble sulfate are summarized in Table 6.3 below.

TABLE 6.3
WATER SOLUBLE SULFATE EXPOSURE REQUIREMENTS

Location	Water Soluble Sulfate (SO_4) in Soil, Percentage by Weight	Exposure Severity	Exposure Class	Max w/cm Ratio	Minimum Concrete Compressive Strength	Cementations Materials Type
B-3	0.011	N/A	S0	N/A	2,500 psi	No Restriction

The water-soluble chloride concentration detected in saturation extract from the soil samples was 22 mg/kg. In addition, testing performed on a near surface soil resulted in a minimum resistivity value of 17,145 ohm-centimeters. Based on the results, these soils would be considered to have a "mildly corrosive" potential to buried metal objects (per National Association of Corrosion Engineers, Corrosion Severity Ratings).

It is recommended that a qualified corrosion engineer be consulted regarding protection of buried steel or ductile iron piping and conduit or, at a minimum, applicable manufacturer's recommendations for corrosion protection of buried metal pipe be closely followed. Additional corrosion testing for minimum resistivity may need to be performed if required by the pipe manufacturer.

7. GEOLOGIC AND SEISMIC HAZARD EVALUATIONS

7.1 Geologic Setting

The project site is located within the Sierra Nevada Geomorphic Province. The Sierra Nevada, a fault block dipping gently southwestward, are comprised of igneous and metamorphic rocks of pre-Tertiary age that form the basement complex beneath the San Joaquin Valley. The extensive uplift of the block on its eastern border created much steeper relief on the eastern side of the range compared to the western side. Consequently, drainages on the eastern flank tend to be steeper and narrower than those on the western flank. Altitudes along the west slope of the Sierra Nevada vary from the few hundreds of feet AMSL in the foothill areas of the Sacramento and San Joaquin Valleys to 14,496 feet AMSL at Mount Whitney. The mountain range varies in width from about 40 to 80 miles.

The subject site is mapped by the Geologic Map of the Bass Lake Quadrangle[1] as underlain by Bass Lake Tonalite (Early Cretaceous) [Kbl]. The materials encountered were generally consistent with the igneous bedrock (Tonalite) materials mapped in the region.

[1] Bateman, P.C., 1989, Geologic map of the Bass Lake quadrangle, west-central Sierra Nevada, California: U.S. Geological Survey, Geologic Quadrangle Map GQ-1656, scale 1:62,500

A regional geologic map is included as Figure No. 3 at the end of this report. Based on the largely mapped area of Kbl around the project site and uniform geologic conditions, site specific geologic cross sections are not determined necessary.

7.2 Tectonics and Seismicity

Numerous active and potentially active faults are located in the site region and contribute to design seismic ground motion estimates. An "active fault" is defined, for the purpose of this evaluation, as a fault that has had surface displacement within the Holocene age (about the last 11,700 years).

To determine the distance of known active faults within 100 miles of the site, we used the United States Geological Survey (USGS) web-based application *2008 National Seismic Hazard Maps - Fault Parameters*. Site latitude is 37.3430 North; site longitude is -119.6677 West. The ten closest active faults are summarized below in Table 7.2.

TABLE 7.2
REGIONAL FAULT SUMMARY

Fault Name	Distance to Site (miles)	Maximum Earthquake Magnitude, M_w
Hartley Springs	42.10	6.8
Hilton Creek	49.21	6.9
Mono Lake	51.16	6.8
Round Valley	52.99	7.1
Robinson Creek	62.56	6.7
Huntoon Valley fault system	69.60	6.9
Fish Slough	69.72	6.8
Great Valley 9	70.25	6.8
Great Valley 10	71.03	6.5
Birch Creek	71.65	6.6

The faults tabulated above and numerous other faults in the region are sources of potential ground motion. However, earthquakes that might occur on other faults throughout California are also potential generators of significant ground motion and could subject the site to intense ground shaking.

7.3 Geologic Hazards Evaluation

The potential geologic hazards of flooding, landslides, and volcanic activity are described in the following subsections

7.3.1 Flooding

Based on FEMA Flood Insurance Rate Map No. 06039C0483E dated September 26, 2008, the subject site area is labeled other flood areas Zone X, which designates an area determined to be outside the 0.2% annual chance floodplain (Figure 6).

7.3.2 Landslides

The site vicinity is gradually sloping and based on our field investigation exhibits dense to very dense conditions from the surface to the maximum depth of exploration of 36.5 feet BSG where refusal due to bedrock was encountered. There are no known landslides at the site, nor is the site in the path of any known or potential landslides. We do not consider the potential for a landslide to be a hazard to this project.

7.3.3 Volcanic Activity

California includes six regions with a history of late Pleistocene and Holocene volcanic eruptions that are subject to hazards from future eruptions (Miller, 1989). Of these six regions, the Mono Lake-Long Valley area is the closest. This area is located about 34 miles east of the site. Based on review of Plate 1, Miller 1989, the subject site is not located within any designated volcanic hazard zones.

Based on the distance of volcanic hazards from the site, the prospect for volcanic hazards to impact the site during the design life of the facility is considered low.

8. OTHER GEOLOGIC HAZARDS

8.1 Expansive Soils

One of the potential geotechnical hazards evaluated at this site is the expansion potential of the near surface soils. Expansive soils experience shrink and swell due to moisture content fluctuations throughout the dry and wet season. If not addressed, the potential for shrinkage and heave would have an impact on foundations and lightly loaded slabs. The potential for damage to slabs-on-grade and foundations supported on expansive soils can be reduced by placing non-expansive fill below the slabs-on-grade.

Based on the granular nature of the near surface soils encountered and our experience in the near site vicinity, the near surface soils are considered to have very low expansion potential (EI=10). Thus, the potential to damage due to heave of expansive soils is not a concern for the site.

8.2 Corrosion Protection

The risk of corrosion of construction materials relates to the potential for soil-induced chemical reaction. Corrosion is a naturally occurring process whereby the surface of a metallic structure is oxidized or reduced to a corrosion product such as iron oxide (i.e., rust).

Testing performed on a near surface soil resulted in a minimum resistivity value of 17,145 ohm-centimeters. Based on the results, these soils would be considered to have a “mildly corrosive” potential to buried metal objects (per National Association of Corrosion Engineers, Corrosion Severity Ratings).

8.3 Sulfate Attack of Concrete

Excessive sulfate in either the soil or native water may result in an adverse reaction between the cement in concrete and the soil. The 2014 Edition of ACI 318 (ACI 318) has established criteria for evaluation of sulfate levels and how they relate to cement reactivity with soil and/or water. A soil sample was obtained from the project site and was tested for the evaluation of the potential for concrete deterioration. ACI 318 Tables 19.3.1.1 and 19.3.2.1 outline exposure categories, classes, and concrete requirements by exposure class.

The water-soluble sulfate concentration in the saturation extract from the soil sample was detected to be 110 mg/kg (0.010 Percent by weight). Therefore, the potential for sulfate attack on concrete is considered negligible.

9. CONDITIONAL GEOLOGIC HAZARDS:

Conditional geologic hazards, as identified in section 31 of California Geological Survey Note 48, are discussed in the following subsections.

9.1 Tsunamis and Seiches

The site is not located within a coastal area. Therefore, tsunamis (seismic sea waves) are not considered a significant hazard at the site. Seiches are large waves generated in enclosed bodies of water in response to ground shaking. No major water-retaining structures are located immediately up gradient from the project site. Flooding from a seismically-induced seiche is considered unlikely.

9.2 Hazardous Materials

Hazardous materials such as methane gas, hydrogen-sulfide gas and tar seeps are not known to be present in the project area and are not considered to be a concern at the subject site.

9.3 Radon Gas

Based on review of the EPA Map of Radon Zones [2]the site and Fresno area is located in an area identified as having indoor radon screening levels ranging from 2 to 4 pCi/L. Given the site is expected to experience less than 4pCi/L, the site is less than the recommended EPA's recommended action level for radon exposure. Provided the buildings are constructed with adequate ventilation, radon exposure is not considered a concern.

9.4 Naturally Occurring Asbestos

Asbestos commonly occurs in soil and ultramafic rocks such as serpentinite throughout California. Ultramafic rocks are scattered throughout much of the Sierra Nevada Mountain and the Coast Range regions. Based on review of the Open-File Report 2000-19, titled A General Location Guide for Ultramafic Rocks in California - Areas More Likely to Contain Naturally Occurring Asbestos, prepared by the State of California Department of Conservation, Division of Mines and Geology, dated August, 2000, ultramafic rock is identified 16 miles northwest of the site. Based on the cited literature and our site observations, it is our opinion that the potential to encounter near surface naturally occurring asbestos containing rock at the site is very low.

9.5 Hydrocollapse

Collapsible soils typically consist of loose, dry, low-density soils that, when wetted, will experience settlement/consolidation. Based on the results of testing performed on a relatively undisturbed near surface soil sample, when wetted under a load of 2 kips per square foot these soils exhibited less than 2 percent collapse. Thus, laboratory testing indicates there is a "slight" potential for hydrocollapse of native soils. Based on the results of the testing performed, provided the recommendations to support foundations on a

[2] https://www.epa.gov/radon/find-information-about-local-radon-zones-and-state-contact-information#radonmap

uniform layer of engineered fill are followed, the potential for hydrocollapse is not a concern for the proposed construction.

9.6 Regional Subsidence

Based on our review of an online map published by California Water Science Center[3], the site is not located in an area of recorded subsidence.

10. SEISMIC HAZARDS

The potential for fault ground rupture, seismic groundshaking and seismic coefficients/earthquake spectral response acceleration design values, and liquefaction and seismic settlement are described in the following subsections.

10.1 Active Faulting and Surface Fault Rupture

Based on mapping and historical seismicity, the seismicity of the Oakhurst Area has been generally considered low by the scientific community. The site is not within a currently established State of California Earthquake Fault Zone for surface fault rupture hazards nor within an Alquist-Priolo Earthquake Fault (Special Studies) Zone, therefore, a site specific fault study investigation by an Engineering Geologist is not required. No active faults with the potential for surface fault rupture are known to pass directly beneath the site. Therefore, the potential for surface rupture due to faulting occurring beneath the site during the design life of the proposed development is considered low.

The nearest faults to the project site are associated with the Hartley Springs Fault system located approximately 42 miles from the site. There are no known active fault traces in the immediate project vicinity.

A map depicting the major active faults in the vicinity of the site is included on Figure No. 4 at the end of this report. Considering the distance to the nearest known active fault, the potential for surface fault rupture at the site due to a known active fault is considered low.

10.2 Historic Seismic Activity

The general area of the site has experienced recurring seismic activity. Based on historical earthquake data obtained from the U.S. Geological Survey's earthquake database system, approximately 249 historical earthquakes with magnitude 4.5 or greater have been recorded from 1920 through January 20, 2020 within about 100 miles of the site. A map showing the location of the project site with relation to the approximate historical earthquake epicenter locations and magnitude category is presented on Figure No. 5 at the end of this report.

The nearest earthquake event (estimated magnitude of 4.5) found during the search occurred southwest of Mammoth Lakes on May 25, 1980, with a reported location of approximately 35 miles northeast of the site. The nearest magnitude earthquake identified within a 100 mile search radius was the 6.4 magnitude earthquake, which occurred on May 27, 1980, approximately 49 miles east-northeast of the site (peak ground acceleration in the vicinity of the site of about 0.029g).

[3] https://ca.water.usgs.gov/land_subsidence/california-subsidence-areas.html

10.3 Design Seismic Ground Motion Parameters and Site Class

Seismic coefficients and spectral response acceleration values were developed based on the 2019 California Building Code (CBC). The CBC methodology for determining design ground motion values is based on the Office of Statewide Health Planning and Development (OSHPD) Seismic Design Maps, which incorporate both probabilistic and deterministic seismic ground motion.

Based on the 2019 CBC, a Site Class C represents the on-site soil conditions with standard penetration resistance, N-values, averaging greater than 50 blows per foot in the upper 100 feet below site grade. A table providing the recommended design acceleration parameters for the project site, based on a Site Class C designation, is included in section 11.6 of this report.

Based on Office of Statewide Health Planning and Development (OSHPD) Seismic Design Maps, the estimated design peak ground acceleration adjusted for site class effects (PGA_M) was determined to be 0.277 g (based on both probabilistic and deterministic seismic ground motion).

10.4 Liquefaction and Seismic Settlement

Soil liquefaction is a state of soil particles suspension caused by a complete loss of strength when the effective stress drops to zero. Liquefaction normally occurs under saturated conditions in soils such as sand in which the strength is purely frictional. Primary factors that trigger liquefaction are: moderate to strong ground shaking (seismic source), relatively clean, loose granular soils (primarily poorly graded sands and silty sands), and saturated soil conditions (shallow groundwater). Due to the increasing overburden pressure with depth, liquefaction of granular soils is generally limited to the upper 50 feet of a soil profile. However, liquefaction has occurred in soils other than clean sand.

In general, the soils encountered in the test borings drilled consisted of silty sand, poorly-graded sand with silt, well-graded sand with silt, and poorly graded sand throughout the maximum depth explored of 36.5 feet BSG where refusal was encountered due to bedrock. Based on the relative density and appearance, the upper soils encountered appeared consistent with weathered granitic rock. It should be noted that areas of surficial soils with thicknesses less than 5 feet were noted over the weathered rock material.

The test boring locations were checked for the presence of groundwater during and after the drilling operations. Free Groundwater was not encountered within the depth of exploration, 36.5 feet below site grade (BSG). Based on review of the Department of Water Resources Water Data Library website (http://www.water.ca.gov/), no available groundwater data was noted within 15 miles of the project site

A seismic hazard, which could cause damage to the proposed development during seismic shaking, is the post-liquefaction settlement of the liquefied sands. According to the State of California, Seismic Hazard Zonation Program, the site is NOT located within the potential liquefaction zone. Furthermore, the site is mapped in an area of Tonalite (Early Cretaceous) [Kbl]. Based on the relatively shallow depth to weathered igneous bedrock (Tonalite) liquefaction and/or seismic settlement is not a concern for the subject site.

10.5 Lateral Spreading

Lateral spreading is a phenomenon in which soils move laterally during seismic shaking and is often associated with liquefaction. The amount of movement depends on the soil strength, duration and intensity of

seismic shaking, topography, and free face geometry. Due to the lack of groundwater near the surface and relatively flat nature of the site, we judge the likelihood of lateral spreading to be low.

11. CONCLUSIONS AND RECOMMENDATIONS

11.1 General

11.1.1 Based upon the data collected during this investigation, and from a geotechnical engineering standpoint, it is our opinion that the site is suitable for the proposed construction of improvements at the site as planned, provided the recommendations contained in this report are incorporated into the project design and construction. Conclusions and recommendations provided in this report are based on our review of available literature, analysis of data obtained from our field exploration and laboratory testing program, and our understanding of the proposed development at this time.

11.1.2 In general, the soils encountered in the test borings drilled consisted of silty sand, poorly-graded sand with silt, well-graded sand with silt, and poorly graded sand throughout the maximum depth explored of 36.5 feet BSG where refusal was encountered due to bedrock. Based on the relative density and appearance, the upper soils encountered appeared consistent with weathered igneous rock. It should be noted that areas of surficial soils with thicknesses less than 5 feet were noted over the weathered rock material.

11.1.3 The near surface soils have low compressibility characteristics and slight collapse potential. Based on the granular nature of the soils encountered and laboratory testing of the upper soils have a very low expansive potential (EI=10). When compacted as engineered fill, the near surface soils have excellent pavement support characteristics.

11.1.4 Based on the subsurface conditions at the site and the anticipated structural loading, we anticipate that the proposed improvements may be supported using conventional shallow foundations provided that the recommendations presented herein are incorporated in the design and construction of the project.

11.1.5 Provided the site is graded in accordance with the recommendations of this report and foundations constructed as described herein, we estimate that total settlement due to static loads utilizing conventional shallow foundations of about 1-inch and corresponding differential static of ½ inch in 40 feet.

11.1.6 Based on the chemistry testing performed, the near surface soils have ‘negligible’ potential for sulfate attack on concrete and are considered to have a “mildly corrosive” potential to buried metal objects.

11.1.7 All references to relative compaction and optimum moisture content in this report are based on ASTM D 1557 (latest edition).

11.1.8 We should be retained to review the project plans as they develop further, provide engineering consultation as-needed, and perform geotechnical observation and testing services during construction.

11.2 Surface Drainage

11.2.1 Proper surface drainage is critical to the future performance of the project. Uncontrolled infiltration of irrigation excess and storm runoff into the soils can adversely affect the performance of the planned improvements. Saturation of a soil can cause it to lose internal shear strength and increase its compressibility, resulting in a change to important engineering properties. Proper drainage should be maintained at all times.

11.2.2 The ground immediately adjacent to foundations shall be sloped away from the building at a slope of not less than 5 percent for a minimum distance of 10 feet. Impervious surfaces within 10 feet of building foundations shall be sloped a minimum of 2 percent away from the building and drainage gradients maintained to carry all surface water to collection facilities and off site. These grades should be maintained for the life of the project. Ponding of water should not be allowed adjacent to the structures. Over-irrigation within landscaped areas adjacent to the structures should not be performed.

11.2.3 Roof drains should be installed with appropriate downspout extensions out-falling on splash blocks so as to direct water a minimum of 5 feet away from the structures or be connected to the storm drain system for the development.

11.3 Site Grading

11.3.1 A representative of our firm should be present during all site clearing and grading operations to test and/or observe earthwork construction. This testing and observation is an integral part of our service as acceptance of earthwork construction is dependent upon compaction of the material and the stability of the material. The Geotechnical Engineer may reject any material that does not meet compaction and stability requirements. Further recommendations of this report are predicated upon the assumption that earthwork construction will conform to recommendations set forth in this section as well as other portions of this report.

11.3.2 A preconstruction conference should be held at the site prior to the beginning of grading operations with the owner, contractor, civil engineer and geotechnical engineer in attendance.

11.3.3 Site demolition activities shall include removal of all surface obstructions not intended to be incorporated into final site design. In addition, undocumented fill, underground buried structures, and/or utility lines encountered during demolition and construction should be properly removed and the resulting excavations backfilled with Engineered Fill. After demolition activities, it is recommended that disturbed soils be removed and/or replaced with compacted engineered fill soils.

11.3.4 Site preparation should begin with removal of existing surface/subsurface structures, underground utilities (as required), disturbed soil, any existing uncertified/undocumented fill, and debris. Excavations or depressions resulting from site clearing operations, or other existing excavations or depressions, should be restored with Engineered Fill in accordance with the recommendations of this report. Any disturbed subgrade, undocumented fill materials or loose unsuitable materials encountered during grading should be removed and replaced as engineered fill. The actual depth of the over-excavation should be determined by our field representative during construction

11.3.5 Surface vegetation consisting of grasses and other similar vegetation should be removed by stripping to a sufficient depth to remove organic-rich topsoil. The upper 2 to 4 inches of the soils containing, vegetation, roots and other objectionable organic matter encountered at the time of grading should be stripped and removed from the surface. Deeper stripping may be required in localized areas. The stripped vegetation will not be suitable for use as Engineered Fill or within 5 feet of building pads. However, stripped topsoil may be stockpiled and reused in landscape or non-structural areas or exported from the site.

11.3.6 Cut and fill slopes be constructed to 2:1 (horizontal to vertical) or flatter.

11.3.7 For fill slope grading, a minimum 15 foot wide keyway should be excavated at the top of all proposed fill slopes. The limits of the keyway should extend a minimum of 5 feet horizontally beyond the toe of the slope in the downslope direction. Keyways should extend a minimum of 3 feet below preconstruction site grade, 3 feet below finished grade, or to the depth required to remove undocumented fills, whichever provides greater fill. The bottom of keyway should be sloped1 percent in the upslope direction. The bottom of keyway should be observed by SALEM prior to processing the bottom. Actual depths and limits may be greater based on actual keyway conditions. Upon approval, the bottom of keyway should be scarified 8 inches, moisture conditioned to slightly above optimum, and compacted as engineered fill.

11.3.8 Fill soils placed on ground surface steeper than 5H to 1V should be benched into firm native soils to at least 2 feet below preconstruction ground surface. Benches should be cut at a minimum interval of about five (5) feet vertically. Benches should be 10 feet in width, and bottom sloped 1 percent in upslope dimension. The bottom of each bench should be scarified 12 inches, moisture conditioned to slightly above optimum and compacted as engineered fill.

11.3.9 Structural building pad areas and over-build zone should be considered as areas extending a minimum of 5 feet horizontally beyond the outside dimensions of buildings, including footings and non-cantilevered overhangs carrying structural loads.

11.3.10 To provide uniform support for the proposed building, it is recommended that over-excavation extend to at least 24 inches below preconstruction site grade, 12 inches below foundations, or to the depth required to remove any undocumented fills, whichever provides greater fill. The resulting bottom of excavation shall be scarified to a minimum depth of at least 12 inches, worked until uniform and free from large clods, moisture-conditioned to slightly above optimum moisture, and compacted to 92 percent of the maximum density. The horizontal limits of the over-excavation should extend throughout the building over-build zone, laterally to a minimum of 5 feet beyond the outer edges of the proposed footings.

11.3.11 Interior slabs on grade should be supported on a minimum of 4 inches of Class 2 aggregate base compacted to 95 percent relative compaction, over the depth of engineered fill recommended below foundations.

11.3.12 Areas of proposed lightly loaded shallow spread foundations (i.e. retaining walls, screen walls, etc.) should be over-excavated to minimum depths of one (1) foot below existing grade, to the bottom of proposed footing bottom, or depth required to remove undocumented fills, whichever is deeper. The over-excavation should also extend laterally to a minimum of 5 feet beyond the outer edges

of the proposed footings. The resulting bottom of excavation shall be scarified to a minimum depth of at least 12 inches, worked until uniform and free from large clods, moisture-conditioned to slightly above optimum moisture, and compacted to a minimum of 92 percent of the maximum density.

11.3.13 Areas of exterior concrete slabs on grade located outside the building pad over-build zone, should be prepared by scarification of the upper 12 inches below existing grade or 12 inches below the bottom of the recommended aggregate base section, whichever is greater. The zone of subgrade preparation should extend a minimum of 3 feet beyond these improvements. These soils should be moisture conditioned to slightly above optimum and compacted as engineered fill.

Exterior slabs on grade should be supported on a minimum of 4 inches of Class 2 aggregate base compacted to 95 percent relative compaction over subgrade soils prepared as recommended above. As an alternative, if the Community College District is willing to accept additional risk for distress to exterior slabs, slabs on grade located outside the building pad may be supported directly over compacted subgrade soils as recommended above.

11.3.14 Areas of proposed Portland cement concrete and asphaltic concrete pavements should be over-excavated to a minimum of 1 foot below preconstruction site grade or 1 foot below the bottom of the recommended aggregate base section, whichever is greater. The zone of subgrade preparation should extend a minimum of 3 feet beyond these improvements. These soils should be moisture conditioned to slightly above optimum and compacted as engineered fill. The upper 12 inches of subgrade soils below pavements should be compacted to a minimum of 95 percent relative compaction.

11.3.15 Areas to receive engineered fill outside the building pad over-build zone, should be prepared by scarification of the upper 12 inches below existing grade or 12 inches below the recommended base section, whichever is greater. These soils should be moisture conditioned to slightly above optimum and compacted as engineered fill.

11.3.16 An integral part of satisfactory fill placement is the stability of the placed lift of soil. If placed materials exhibit excessive instability as determined by a SALEM field representative, the lift will be considered unacceptable and shall be remedied prior to placement of additional fill material. Additional lifts should not be placed if the previous lift did not meet the required dry density or if soil conditions are not stable.

11.3.17 The most effective site preparation alternatives will depend on site conditions prior to grading. We should evaluate site conditions and provide supplemental recommendations immediately prior to grading, if necessary.

11.3.18 We do not anticipate groundwater or seepage to adversely affect construction if conducted during the drier months of the year (typically summer and fall). However, groundwater and soil moisture conditions could be significantly different during the wet season (typically winter and spring) as surface soil becomes wet; perched groundwater conditions may develop. Grading during this time period will likely encounter wet materials resulting in possible excavation and fill placement difficulties. Project site winterization consisting of placement of aggregate base and protecting exposed soils during construction should be performed. If the construction schedule requires

grading operations during the wet season, we can provide additional recommendations as conditions warrant.

11.3.19 Typical remedial measures include: discing and aerating the soil during dry weather; mixing the soil with dryer materials; removing and replacing the soil with an approved fill material or placement of crushed rocks or aggregate base material; or mixing the soil with an approved lime or cement product.

The most common remedial measure of stabilizing the bottom of the excavation due to wet soil condition is to reduce the moisture of the soil to near the optimum moisture content by having the subgrade soils scarified and aerated or mixed with drier soils prior to compacting. However, the drying process may require an extended period of time and delay the construction operation. To expedite the stabilizing process, crushed rock may be utilized for stabilization provided this method is approved by the owner for the cost purpose.

If the use of crushed rock is considered, it is recommended that the upper soft and wet soils be replaced by 6 to 24 inches of ¾-inch to 1-inch crushed rocks. The thickness of the rock layer depends on the severity of the soil instability. The recommended 6 to 24 inches of crushed rock material will provide a stable platform. It is further recommended that lighter compaction equipment be utilized for compacting the crushed rock. All open graded crushed rock/gravel should be fully encapsulated with a geotextile fabric (such as Mirafi 140N) to minimize migration of soil particles into the voids of the crushed rock. Although it is not required, the use of geogrid (e.g. Tensar BX 1100, BX 1200 or TX 160) below the crushed rock will enhance stability and reduce the required thickness of crushed rock necessary for stabilization.

Our firm should be consulted prior to implementing remedial measures to provide appropriate recommendations.

11.4 Soil and Excavation Characteristics

11.4.1 Based on the soil conditions encountered in our borings, the onsite soils can be excavated with moderate excavation equipment, particularly for trenches. As noted, weathered rock material were encountered greater than about 1 foot BSG. The contractor should anticipate deeper excavations may require increased excavation effort. A rippabilty study was not included in this investigation. However, based on the materials encountered, the weathered rock material is anticipated to require moderate to strong excavation effort.

11.4.2 It is the responsibility of the contractor to ensure that all excavations and trenches are properly shored and maintained in accordance with applicable Occupational Safety and Health Administration (OSHA) rules and regulations to maintain safety and maintain the stability of adjacent existing improvements. Temporary excavations are further discussed in a later Section of this report.

11.4.3 The near surface soils identified as part of our investigation are, generally, damp to moist due to the absorption characteristics of the soil. Earthwork operations may encounter very moist unstable soils which may require removal to a stable bottom. Exposed native soils exposed as part of site grading operations shall not be allowed to dry out and should be kept continuously moist prior to placement of subsequent fill.

11.5 Materials for Fill

11.5.1 On-site soils are suitable for use as general Engineered Fill in structural areas, and below the aggregate base section recommended below concrete slabs on grade, provided they do not contain deleterious matter, organic material, or rock/cemented fragments material larger than 3 inches in maximum dimension. Rock fragments should be reduced to less than 3 inches, blended with on-site soils to a well graded mixture and placed to prevent nesting of large particles.

11.5.2 Imported Engineered Fill soil, should be well-graded, granular soils. This material should be approved by the Engineer prior to use and should typically possess the soil characteristics summarized below in Table 11.5.2.

TABLE 11.5.2
IMPORT FILL REQUIREMENTS

Percent Passing 3-inch Sieve	100
Percent Passing No.4 Sieve	75-100
Percent Passing No 200 Sieve	15-40
Maximum Plasticity Index	15
Maximum Organic Content	3% by Weight
Maximum Expansion Index (ASTM D4829)	20

Prior to importing fill, the Contractor shall submit test data that demonstrates that the proposed import complies with the recommended criteria for both geotechnical and environmental compliance. Also, prior to being transported to the site, the import material shall be certified by the Contractor and the supplier (to the satisfaction of the Community College District) that the soils do not contain any environmental contaminates regulated by local, state or federal agencies having jurisdiction. This certification shall consist of, as a minimum, analytical data specific to the source of the import material in accordance with the Department of Toxic Substances Control, "Informational Advisory, Clean Imported Fill Material," dated October 2001. The list of constituents to be tested for the fill source shall be submitted to SCCCD for review and approval prior to the Contractor testing the fill. Contractors should provide a minimum of 14 working days after sample collection to complete the DTSC and geotechnical testing.

11.5.3 All Engineered Fill (including scarified ground surfaces and backfill) should be placed in lifts no thicker than will allow for adequate bonding and compaction (typically 6 to 8 inches in loose thickness).

11.5.4 On-Site soils used as engineered fill soils should moisture conditioned to slightly above optimum moisture content, and compacted to at least 92 percent relative compaction.

11.5.5 Import Engineered Fill, if selected, should be placed, moisture conditioned to slightly above optimum moisture content, and compacted to at least 92 percent relative compaction.

11.5.6 The preferred materials specified for Engineered Fill are suitable for most applications with the exception of exposure to erosion. Project site winterization and protection of exposed soils during the construction phase should be the sole responsibility of the Contractor, since they have complete control of the project site.

11.5.7 Environmental characteristics and corrosion potential of import soil materials should also be considered.

11.5.8 Proposed import materials should be sampled, tested, and approved by SALEM prior to its transportation to the site.

11.5.9 Aggregate base material should meet the requirements of a Caltrans Class 2 Aggregate Base. The aggregate base material should conform to the requirements of Section 26 of the Standard Specifications for Class 2 material, ¾-inch or 1½-inches maximum size. The aggregate base material should be compacted to a minimum relative compaction of 95 percent based ASTM D1557. The aggregate base material should be spread in layers not exceeding 6 inches and each layer of aggregate material course should be tested and approved by the Soils Engineer prior to the placement of successive layers

11.6 Seismic Design Criteria

11.6.1 For seismic design of the structures, and in accordance with the seismic provisions of the 2019 CBC, our recommended parameters are shown below. These parameters were determined using California's Office of Statewide Health Planning and Development (OSHPD) (https://seismicmaps.org/) in accordance with the 2019 CBC. The Site Class was determined based on the soils encountered during our field exploration.

TABLE 11.6.1
2019 CBC SEISMIC DESIGN PARAMETERS

Seismic Item	Symbol	Value	2016 ASCE 7 or 2019 CBC Reference
Site Coordinates (Datum = NAD 83)		37.3430 Lat -119.6677 Lon	
Site Class	--	C	ASCE 7 Table 20.3
Soil Profile Name	--	Very Dense Soil and Soft Rock	ASCE 7 Table 20.3
Risk Category	--	III	CBC Table 1604.5
Site Coefficient for PGA	F_{PGA}	1.200	ASCE 7 Table 11.8-1
Peak Ground Acceleration (adjusted for Site Class effects)	PGA_M	0.277 g	ASCE 7 Equation 11.8-1
Seismic Design Category	SDC	D	ASCE 7 Table 11.6-1 & 2
Mapped Spectral Acceleration (Short period - 0.2 sec)	S_S	0.533 g	CBC Figure 1613.3.1(1-6)
Mapped Spectral Acceleration (1.0 sec. period)	S_1	0.204 g	CBC Figure 1613.3.1(1-6)

Seismic Item	Symbol	Value	2016 ASCE 7 or 2019 CBC Reference
Site Class Modified Site Coefficient	F_a	1.287	CBC Table 1613.3.3(1)
Site Class Modified Site Coefficient	F_v	1.500	CBC Table 1613.3.3(2)
MCE Spectral Response Acceleration (Short period - 0.2 sec) $S_{MS} = F_a S_S$	S_{MS}	0.686 g	CBC Equation 16-37
MCE Spectral Response Acceleration (1.0 sec. period) $S_{M1} = F_v S_1$	S_{M1}	0.306 g	CBC Equation 16-38
Design Spectral Response Acceleration $S_{DS}=⅔S_{MS}$ (short period - 0.2 sec)	S_{DS}	0.457 g	CBC Equation 16-39
Design Spectral Response Acceleration $S_{D1}=⅔S_{M1}$ (1.0 sec. period)	S_{D1}	0.204 g	CBC Equation 16-40

11.6.2 Conformance to the criteria in the above table for seismic design does not constitute any kind of guarantee or assurance that significant structural damage or ground failure will not occur if a large earthquake occurs. The primary goal of seismic design is to protect life, not to avoid all damage, since such design may be economically prohibitive.

11.7 Shallow Foundations

11.7.1 Structures should be setback from cut, fill, and native slopes to provide adequate foundation support and protection against erosion. The minimum setback from ascending slopes steeper than 3H to 1V is 15 feet or ½ the cut slope height, whichever is greater. From top of descending slopes, structures should be setback a minimum of 1/3 the height of the proposed slope or 15 feet, whichever is less.

11.7.2 The site is suitable for use of conventional shallow foundations consisting of continuous footings and isolated pad footings supported on engineered fill soils prepared in accordance with Section 11.3 of this report. Shallow foundations supported on engineered fill as recommended in this report may be designed based on total and differential static settlement of 1 inch and ½ inch in 40 feet, respectively.

11.7.3 The bearing wall footings considered for the buildings should be continuous with a minimum width of 12 inches and extend to minimum depths of 18 inches below the lowest adjacent grade. Isolated column footings should have a minimum width of 15 inches and extend a minimum depth of 18 inches below the lowest adjacent grade. In addition, where sloping conditions occur, foundations should be setback horizontally from the face of existing slopes a minimum of 1/3 the height of the slope or 40 feet, whichever is less.

11.7.4 Lightly loaded foundations for screen walls, retaining walls, etc., should have a minimum width of 12 inches and minimum depth of 12 inches below adjacent grade.

11.7.5 Footing concrete should be placed into neat excavation. The footing bottoms shall be maintained free of loose and disturbed soil.

11.7.6 Footings proportioned as recommended above may be designed for the maximum allowable soil bearing pressures shown in the table below.

Loading Condition	Allowable Bearing
Dead-Plus-Live Load	3,000 psf
Total Load, Including Wind or Seismic Loads	4,000 psf

11.7.7 Resistance to lateral footing displacement can be computed using an allowable coefficient of friction factor of 0.50 acting between the base of foundations and the supporting native subgrade.

11.7.8 Lateral resistance for footings can alternatively be developed using an allowable equivalent fluid passive pressure of 425 pounds per cubic foot acting against the appropriate vertical native footing faces. The frictional and passive resistance of the soil may be combined without reduction in determining the total lateral resistance. An increase of one-third is permitted when using the alternate load combination in Section 1605.3.2 of the 2019 CBC that includes wind or earthquake loads.

11.7.9 Underground utilities running parallel to footings should not be constructed in the zone of influence of footings. The zone of influence may be taken to be the area beneath the footing and within a 1:1 plane extending out and down from the bottom edge of the footing.

11.7.10 The foundation subgrade should be sprinkled as necessary to maintain a moist condition without significant shrinkage cracks as would be expected in any concrete placement. Prior to placing rebar reinforcement, foundation excavations should be evaluated by a representative of SALEM for appropriate support characteristics and moisture content. Moisture conditioning may be required for the materials exposed at footing bottom, particularly if foundation excavations are left open for an extended period.

11.8 Interior Concrete Slabs-on-Grade

11.8.1 Slab thickness and reinforcement should be determined by the structural engineer based on the anticipated loading. We recommend that non-structural slabs-on-grade be at least 5 inches thick and underlain by four (4) inches of class 2 aggregate base compacted to 95 percent relative compaction over engineered fill extending below foundations.

11.8.2 We recommend reinforcing slabs, at a minimum, welded wire or fiber mesh reinforcement. The type of reinforcement should be selected by the structural engineer.

11.8.3 The spacing of crack control joints should be designed by the project structural engineer. In order to regulate cracking of the slabs, we recommend that full depth construction joints or control joints be provided at a maximum spacing of 15 feet in each direction for 5-inch thick slabs.

11.8.4 Crack control joints should extend a minimum depth of one-fourth the slab thickness and should be constructed using saw-cuts or other methods as soon as practical after concrete placement. The exterior floors should be poured separately in order to act independently of the walls and foundation system.

11.8.5 It is recommended that the utility trenches within the structure be compacted, as specified in our report, to minimize the transmission of moisture through the utility trench backfill. Special attention to the immediate drainage and irrigation around the structures is recommended.

11.8.6 Moisture within the structure may be derived from water vapors, which were transformed from the moisture within the soils. This moisture vapor penetration can affect floor coverings and produce mold and mildew in the structure. To minimize moisture vapor intrusion, it is recommended that a vapor retarder be installed in accordance with manufacturer's recommendations and/or ASTM guidelines, whichever is more stringent. In addition, ventilation of the structure is recommended to reduce the accumulation of interior moisture.

11.8.7 In areas where it is desired to reduce floor dampness where moisture-sensitive coverings, coatings, underlayments, adhesives, moisture sensitive goods, humidity controlled environments, or climate cooled environments are anticipated, construction should have a suitable waterproof vapor retarder (a minimum of 15 mils thick, is recommended, polyethylene vapor retarder sheeting, Raven Industries "VaporBlock 15, Stego Industries 15 mil "StegoWrap" or W.R. Meadows Sealtight 15 mil "Perminator") incorporated into the floor slab design. The water vapor retarder should be a decay resistant material complying with ASTM E96 or ASTM E1249 not exceeding 0.01 perms, ASTM E154 and ASTM E1745 Class A. The vapor retarder should, maintain the recommended permeance **after** conditioning tests per ASTM E1745. The vapor barrier should be placed between the concrete slab and the compacted granular aggregate subbase material. The water vapor retarder (vapor barrier) should be installed in accordance with ASTM Specification E 1643-18.

11.8.8 The concrete maybe placed directly on vapor retarder. The vapor retarder should be inspected prior to concrete placement. Cut or punctured retarder should be repaired using vapor retarder material lapped 6 inches beyond damaged areas and taped. Extend vapor retarder over footings and seal to foundation wall or slab at an elevation consistent with the top of the slab or terminate at impediments such as water stops or dowels. Seal around penetrations such as utilities or columns in order to create a monolithic membrane between the surface of the slab and moisture sources below the slab as well as at the slab perimeter.

11.8.9 Avoid use of stakes driven through the vapor retarder.

11.8.10 The recommendations of this report are intended to reduce the potential for cracking of slabs due to soil movement. However, even with the incorporation of the recommendations presented herein, foundations, stucco walls, and slabs-on-grade may exhibit some cracking due to soil movement. This is common for project areas that contain expansive soils since designing to eliminate potential soil movement is cost prohibitive. The occurrence of concrete shrinkage cracks is independent of the supporting soil characteristics. Their occurrence may be reduced and/or controlled by limiting the slump of the concrete, proper concrete placement and curing, and by the placement of crack control joints at periodic intervals, in particular, where re-entrant slab corners occur.

11.8.11 Proper finishing and curing should be performed in accordance with the latest guidelines provided by the American Concrete Institute, Portland Cement Association, and ASTM.

11.9 Exterior Concrete Slabs on Grade

11.9.1 The following recommendations are intended for lightly loaded exterior slabs on grade not subject to vehicular traffic. Slab thickness and reinforcement should be determined by the structural engineer based on the anticipated loading. We recommend that non-structural slabs-on-grade be at least 4 inches thick and underlain by four (4) inches of class 2 aggregate base over subgrade soils prepared in accordance with the recommendations in section 11.3 of this report. As an alternative, if the Community College District is willing to accept additional risk for distress to exterior slabs, slabs on grade located outside the building pad may be supported directly over compacted subgrade soils as recommended above.

11.9.2 The spacing of crack control joints should be designed by the project structural engineer. In order to regulate cracking of the slabs, we recommend that full depth construction joints or control joints be provided at a maximum spacing of 15 feet in each direction for 5-inch thick slabs and 12 feet for 4-inch thick slabs.

11.9.3 Crack control joints should extend a minimum depth of one-fourth the slab thickness and should be constructed using saw-cuts or other methods as soon as practical after concrete placement.

11.9.4 Proper finishing and curing should be performed in accordance with the latest guidelines provided by the American Concrete Institute, Portland Cement Association, and ASTM.

11.10 Lateral Earth Pressures and Frictional Resistance

11.10.1 Active, at-rest and passive unit lateral earth pressures against footings and walls are summarized in the table below:

Lateral Pressure Conditions	Soil Equivalent Fluid Pressure
Active Pressure, Drained, pcf	29
At-Rest Pressure, Drained, pcf	48
Allowable Passive Pressure, pcf	425
Allowable Coefficient of Friction	0.50
Minimum Wet Unit Weight (lbs/ft^3) [γ_{min}]	105
Maximum Wet Unit Weight (lbs/ft^3) [γ_{max}]	135

11.10.2 Active pressure applies to walls, which are free to rotate. At-rest pressure applies to walls, which are restrained against rotation. The preceding lateral earth pressures assume sufficient drainage behind retaining walls to prevent the build-up of hydrostatic pressure. The top one-foot of adjacent subgrade should be deleted from the passive pressure computation.

11.10.3 The allowable parameters include a safety factor of 1.5 and can be used in design for direct comparison of resisting loads against lateral driving loads.

11.10.4 If combined passive and frictional resistance is used in design, a 50 percent reduction in frictional resistance is recommended.

11.10.5 For lateral stability against seismic loading conditions, we recommend a minimum safety factor of 1.1.

11.10.6 For dynamic seismic lateral loading the following equation shall be used:

Dynamic Seismic Lateral Loading Equation
Dynamic Seismic Lateral Load = $\frac{3}{8}\gamma K_h H^2$
Where: γ = Maximum In-Place Soil Density (Section 11.10.1 above)
K_h = Horizontal Acceleration = $\frac{2}{3}PGA_M$ (Section 11.6.1 above)
H = Wall Height

11.11 Retaining Walls

11.11.1 Retaining and/or below grade walls should be drained with either perforated pipe encased in free-draining gravel or a prefabricated drainage system. The gravel zone should have a minimum width of 12 inches wide and should extend upward to within 12 inches of the top of the wall. The upper 12 inches of backfill should consist of native soils, concrete, asphaltic-concrete or other suitable backfill to minimize surface drainage into the wall drain system. The gravel should conform to Class 2 permeable materials graded in accordance with the current Caltrans Standard Specifications.

11.11.2 Prefabricated drainage systems, such as Miradrain®, Enkadrain®, or an equivalent substitute, are acceptable alternatives in lieu of gravel provided they are installed in accordance with the manufacturer's recommendations. If a prefabricated drainage system is proposed, our firm should review the system for final acceptance prior to installation.

11.11.3 Drainage pipes should be placed with perforations down and should discharge in a non-erosive manner away from foundations and other improvements.

11.11.4 The top of the perforated pipe should be placed at or below the bottom of the adjacent floor slab or pavements. The pipe should be placed in the center line of the drainage blanket and should have a minimum diameter of 4 inches. Slots should be no wider than 1/8-inch in diameter, while perforations should be no more than ¼-inch in diameter.

11.11.5 If retaining walls are less than 5 feet in height, the perforated pipe may be omitted in lieu of weep holes on 4 feet maximum spacing. The weep holes should consist of 2-inch minimum diameter holes (concrete walls) or unmortared head joints (masonry walls) and placed no higher than 18 inches above the lowest adjacent grade. Two 8-inch square overlapping patches of geotextile fabric (conforming to the Caltrans Standard Specifications for "edge drains") should be affixed to the rear wall opening of each weep hole to retard soil piping.

11.11.6 During grading and backfilling operations adjacent to any walls, heavy equipment should not be allowed to operate within a lateral distance of 5 feet from the wall, or within a lateral distance equal to the wall height, whichever is greater, to avoid developing excessive lateral pressures. Within this zone, only hand operated equipment ("whackers," vibratory plates, or pneumatic compactors) should be used to compact the backfill soils.

11.12 Temporary Excavations

11.12.1 We anticipate that the majority of the dense site soils will be classified as Cal-OSHA "Type C" soil when encountered in excavations during site development and construction. Excavation sloping, benching, the use of trench shields, and the placement of trench spoils should conform to the latest applicable Cal-OSHA standards. The contractor should have a Cal-OSHA-approved "competent person" onsite during excavation to evaluate trench conditions and make appropriate recommendations where necessary.

11.12.2 It is the contractor's responsibility to provide sufficient and safe excavation support as well as protecting nearby utilities, structures, and other improvements which may be damaged by earth movements. All onsite excavations must be conducted in such a manner that potential surcharges from existing structures, construction equipment, and vehicle loads are resisted. The surcharge area may be defined by a 1:1 projection down and away from the bottom of an existing foundation or vehicle load.

11.12.3 Temporary excavations and slope faces should be protected from rainfall and erosion. Surface runoff should be directed away from excavations and slopes.

11.12.4 Open, unbraced excavations in undisturbed soils should be made according to the slopes presented in the following table:

RECOMMENDED EXCAVATION SLOPES

Depth of Excavation (ft)	Slope (Horizontal : Vertical)
0-5	1:1
5-10	1½:1
10-15	2:1

11.12.5 If, due to space limitation, excavations near existing structures are performed in a vertical position, braced shorings or shields may be used for supporting vertical excavations. Therefore, in order to comply with the local and state safety regulations, a properly designed and installed shoring system would be required to accomplish planned excavations and installation. A Specialty Shoring Contractor should be responsible for the design and installation of such a shoring system during construction.

11.12.6 Braced shorings should be designed for a maximum pressure distribution of 10H, (where H is the depth of the excavation in feet). The foregoing does not include excess hydrostatic pressure or surcharge loading. Fifty percent of any surcharge load, such as construction equipment weight,

should be added to the lateral load given herein. Equipment traffic should concurrently be limited to an area at least 3 feet from the shoring face or edge of the slope.

11.12.7 The excavation and shoring recommendations provided herein are based on soil characteristics derived from the borings within the area. Variations in soil conditions will likely be encountered during the excavations. SALEM Engineering Group, Inc. should be afforded the opportunity to provide field review to evaluate the actual conditions and account for field condition variations not otherwise anticipated in the preparation of this recommendation. Slope height, slope inclination, or excavation depth should in no case exceed those specified in local, state, or federal safety regulation, (e.g. OSHA) standards for excavations, 29 CFR part 1926, or Assessor's regulations.

11.13 Underground Utilities

11.13.1 Underground utility trenches should be backfilled with properly compacted material. The material excavated from the trenches should be adequate for use as backfill provided it does not contain deleterious matter, vegetation or rock larger than 3 inches in maximum dimension. Trench backfill should be placed in loose lifts not exceeding 8 inches and compacted to at least 92 percent relative compaction at or above optimum moisture content. The upper 12 inches of trench backfill within asphalt or concrete paved areas shall be moisture conditioned to at or above optimum moisture content and compacted to at least 95 percent relative compaction.

11.13.2 Bedding and pipe zone backfill typically extends from the bottom of the trench excavations to approximately 12 inches above the crown of the pipe. Pipe bedding, haunches and initial fill extending to 1 foot above the pipe should consist of a clean well graded sand with 100 percent passing the #4 sieve, a maximum of 15 percent passing the #200 sieve, and a minimum sand equivalent of 20.

11.13.3 It is suggested that underground utilities crossing beneath new or existing structures be plugged at entry and exit locations to the building or structure to prevent water migration. Trench plugs can consist of on-site clay soils, if available, or sand cement slurry. The trench plugs should extend 2 feet beyond each side of individual perimeter foundations.

11.13.4 The contractor is responsible for removing all water-sensitive soils from the trench regardless of the backfill location and compaction requirements. The contractor should use appropriate equipment and methods to avoid damage to the utilities and/or structures during fill placement and compaction.

11.14 Pavement Design

11.14.1 R-Value testing was performed on a sample obtained from the site at the location shown on the attached site plan (Boring B-5). The sample was tested in accordance with the State of California Materials Manual Test Designation 301. R-Value testing on a near surface sample resulted in an R-value of 58. Therefore, based on requirements of Caltrans Highway Design Manual, an R-value of 50 was selected for design.

11.14.2 The pavement design recommendations provided herein are based on the State of California Department of Transportation (CALTRANS) design manual. The asphaltic concrete (flexible

pavement) is based on a 20-year pavement life. The following table shows the recommended pavement sections for traffic indices between 5.0 and 8.0.

TABLE 11.14.2
ASPHALT CONCRETE PAVEMENT THICKNESSES

Traffic Index	Asphaltic Concrete, (inches)	Class 2 Aggregate Base, (inches)*	Compacted Subgrade, (inches)*
5.0	2.5	4.0	12.0
6.0	3.0	4.0	12.0
7.0	4.0	4.5	12.0
8.0	4.5	6.0	12.0

**** 95% compaction based on ASTM D1557-07 Test Method***

11.14.3 The following recommended Portland Cement Concrete pavement sections for traffic indexes ranging from 5.0 to 8.0.

TABLE 11.14.3
PORTLAND CEMENT CONCRETE PAVEMENT THICKNESSES

Traffic Index	Portland Cement Concrete, (inches)*	Class 2 Aggregate Base, (inches)**	Compacted Subgrade. (inches)**
5.0	5.0	4.0	12.0
6.0	5.0	4.0	12.0
7.0	6.0	4.0	12.0
8.0	7.0	4.0	12.0

**** Minimum Compressive Strength of 4,000 psi***
***** 95% compaction based on ASTM D1557-07 Test Method***

11.14.4 Asphalt concrete should conform to Section 39 of Caltrans' latest Standard Specifications for ½ inch Hot Mix Asphalt (HMA) Type A or B.

11.14.5 Excavations, depressions, or soft and pliant areas extending below planned finished subgrade levels should be cleaned to firm, undisturbed soil and backfilled with Engineered Fill. Any buried structures encountered during construction should be properly removed and backfilled.

11.14.6 Buried structures encountered during construction should be properly removed/rerouted and the resulting excavations backfilled. It is suspected that demolition activities of the existing pavement will disturb the upper soils. After demolition activities, it is recommended that disturbed soils within pavement areas be removed and/or compacted as engineered fill.

11.14.7 An integral part of satisfactory fill placement is the stability of the placed lift of soil. Prior to placement of aggregate base, the subgrade soils should be proof-rolled by a loaded water truck (or

equivalent) to verify no deflections of greater than ½ inch occur. If placed materials exhibit excessive instability as determined by a SALEM field representative, the lift will be considered unacceptable and shall be remedied prior to placement of additional fill material. Additional lifts should not be placed if the previous lift did not meet the required dry density or if soil conditions are not stable.

11.14.8 A representative of our firm should be present during all site clearing and grading operations to test and observe earthwork construction. This testing and observation is an integral part of our service as acceptance of earthwork construction is dependent upon compaction of the material and the stability of the material.

12. PLAN REVIEW, CONSTRUCTION OBSERVATION AND TESTING

12.1 Plan and Specification Review

12.1.1 SALEM should review the project plans and specifications prior to final design submittal to assess whether our recommendations have been properly implemented and evaluate if additional analysis and/or recommendations are required.

12.2 Construction Observation and Testing Services

12.2.1 The recommendations provided in this report are based on the assumption that we will continue as Geotechnical Engineer of Record throughout the construction phase. It is important to maintain continuity of geotechnical interpretation and confirm that field conditions encountered are similar to those anticipated during design. If we are not retained for these services, we cannot assume any responsibility for others interpretation of our recommendations, and therefore the future performance of the project.

12.2.2 SALEM should be present at the site during site preparation to observe site clearing, preparation of exposed surfaces after clearing, and placement, treatment and compaction of fill material.

12.2.3 SALEM's observations should be supplemented with periodic compaction tests to establish substantial conformance with these recommendations. Moisture content of footings and slab subgrade should be tested immediately prior to concrete placement. SALEM should observe foundation excavations prior to placement of reinforcing steel or concrete to assess whether the actual bearing conditions are compatible with the conditions anticipated during the preparation of this report.

13. LIMITATIONS AND CHANGED CONDITIONS

The analyses and recommendations submitted in this report are based upon the data obtained from the test borings drilled at the approximate locations shown on the Site Plan, Figure 2. The report does not reflect variations which may occur between borings. The nature and extent of such variations may not become evident until construction is initiated.

If variations then appear, a re-evaluation of the recommendations of this report will be necessary after performing on-site observations during the excavation period and noting the characteristics of such variations.

The findings and recommendations presented in this report are valid as of the present and for the proposed construction.

If site conditions change due to natural processes or human intervention on the property or adjacent to the site, or changes occur in the nature or design of the project, or if there is a substantial time lapse between the submission of this report and the start of the work at the site, the conclusions and recommendations contained in our report will not be considered valid unless the changes are reviewed by SALEM and the conclusions of our report are modified or verified in writing. The validity of the recommendations contained in this report is also dependent upon an adequate testing and observations program during the construction phase. Our firm assumes no responsibility for construction compliance with the design concepts or recommendations unless we have been retained to perform the on-site testing and review during construction. SALEM has prepared this report for the exclusive use of the owner and project design consultants

SALEM does not practice in the field of corrosion engineering. It is recommended that a qualified corrosion engineer be consulted regarding protection of buried steel or ductile iron piping and conduit or, at a minimum, that manufacturer's recommendations for corrosion protection be closely followed. Further, a corrosion engineer may be needed to incorporate the necessary precautions to avoid premature corrosion of concrete slabs and foundations in direct contact with native soil. The importation of soil and or aggregate materials to the site should be screened to determine the potential for corrosion to concrete and buried metal piping. The report has been prepared in accordance with generally accepted geotechnical engineering practices in the area. No other warranties, either express or implied, are made as to the professional advice provided under the terms of our agreement and included in this report.

If you have any questions, or if we may be of further assistance, please do not hesitate to contact our office at (559) 271-9700.

Respectfully Submitted,

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REFERENCES

Allen, C. R. 1968, The Tectonic Environments of Seismically Active and Inactive Areas Along the San Andreas Fault System, in Proceedings Conference on Geologic Problems of San Andreas Fault System, edited by W. R. Dickenson and A. Grantz, pp. 1982

Bateman, P.C., 1989, Geologic map of the Bass Lake quadrangle, west-central Sierra Nevada, California: U.S. Geological Survey, Geologic Quadrangle Map GQ-1656, scale 1:62,500

California Geologic Survey, Open-File Report 2000-19, August 2000, A General Location Guide for Ultramafic Rocks in California - Areas More Likely to Contain Naturally Occurring Asbestos

Cao, T., Bryant, W.A., Rowshandel, B., Branum, D. And Wills, C. J. (June 2003), The Revised California Probabilistic Seismic Hazard Maps, June 2003, prepared by the California Geological Survey

California Division of Oil, Gas, and Geothermal Resources, Map S-1, 2000, Oil, Gas, and Geothermal Fields in California

Federal Emergency Management Agency, Flood Insurance Rate Maps, Community Panel number 06039C0483E dated September 26, 2008

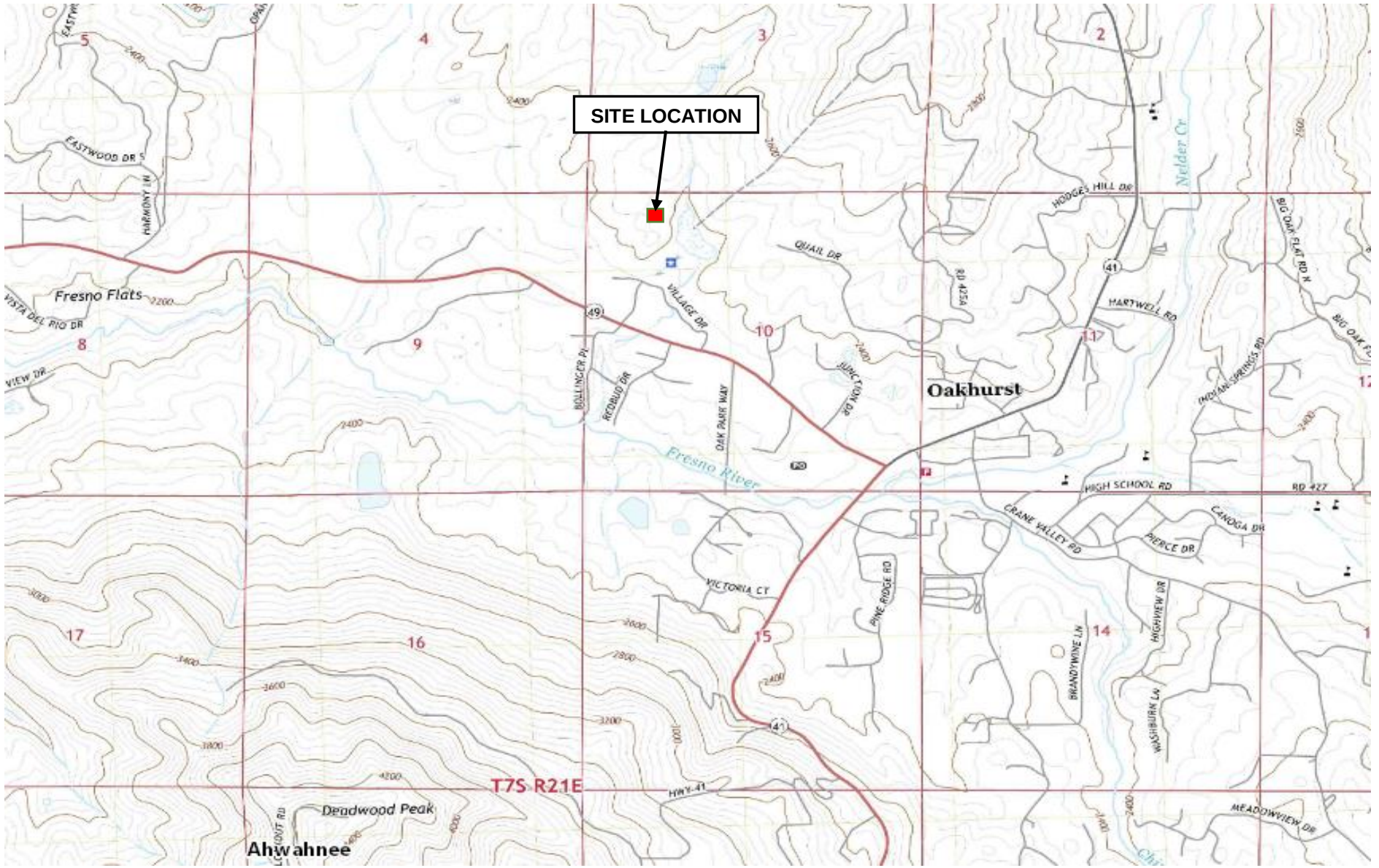
Jennings, C.W., and Bryant, W.A., 2010 Fault Activity Map of California: California Geological Survey, Geologic Data Map No. 6, http://www.quake.ca.gov/gmaps/GMC/stategeologicmap.html.

Miller, C. D., 1989, Potential Hazards from Future Volcanic Eruptions in California, U. S. Geologic Survey Bulletin 1847.

OSHPD California's Office of Statewide Health Planning and Development (OSHPD) Seismic Design Maps (https://seismicmaps.org/)

Bateman, P.C., 1989, Geologic map of the Bass Lake quadrangle, west-central Sierra Nevada, California: U.S. Geological Survey, Geologic Quadrangle Map GQ-1656, scale 1:62,500

United States Geological Survey, Circular Area Earthquake
Search" (http:// earthquake.usgs.gov/earthquakes/eqarchives/epic/epic_circ.php)



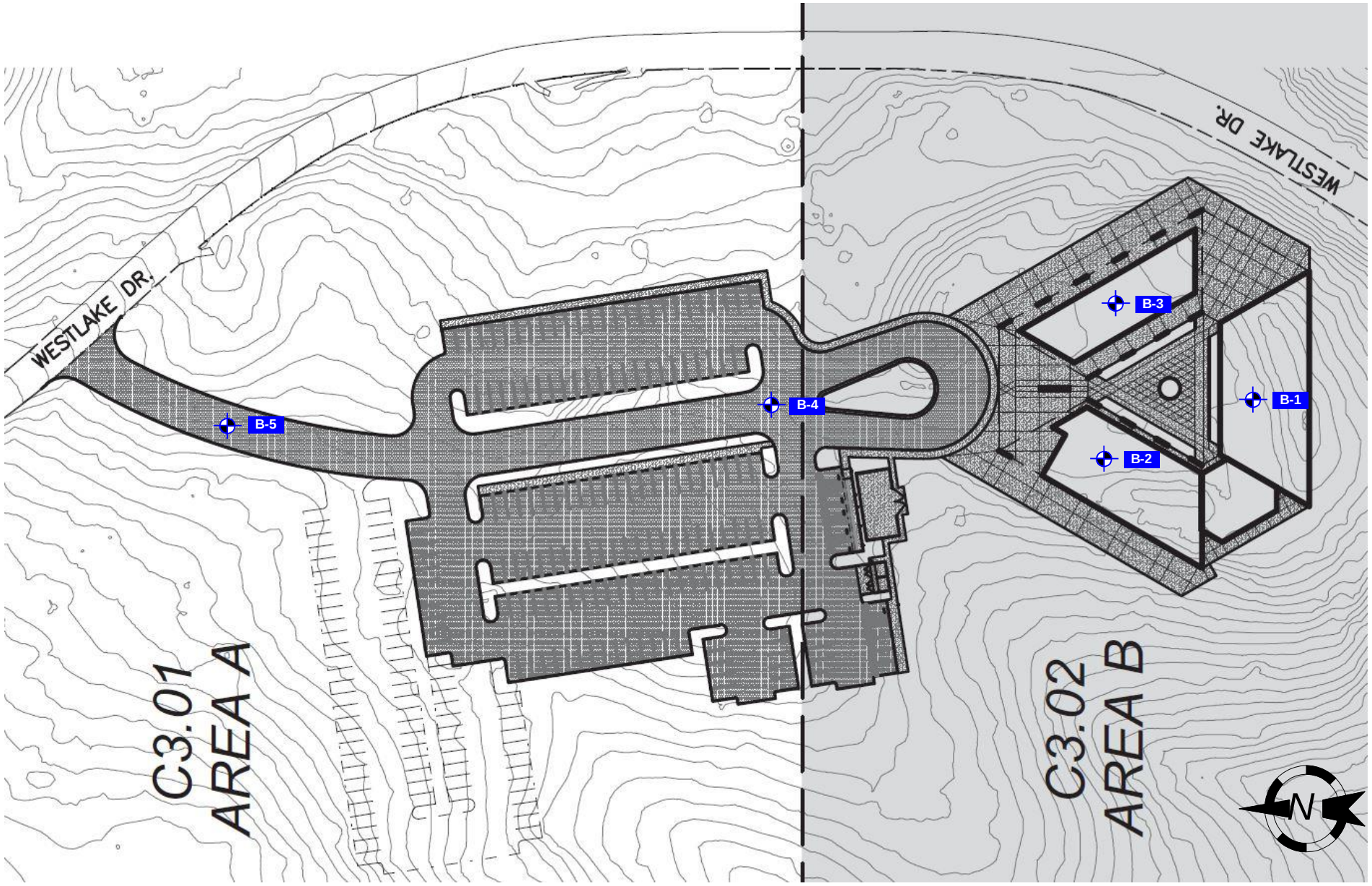
Source Image: U.S. Geological Survey, Ahwahnee, Calif. 7.5' Quadrangle, 2018 (US Topo)

VICINITY MAP

GEOTECHNICAL ENGINEERING INVESTIGATION
Proposed Classroom Bldgs. & Parking Lot at Oakhurst Community College
Westlake Drive
Oakhurst, California

SCALE:	DATE:
NOT TO SCALE	1/15/2020
DRAWN BY:	APPROVED BY:
VT	JRM
PROJECT NO.	FIGURE NO.
1-219-1134	1

SALEM engineering group, inc.



SITE PLAN

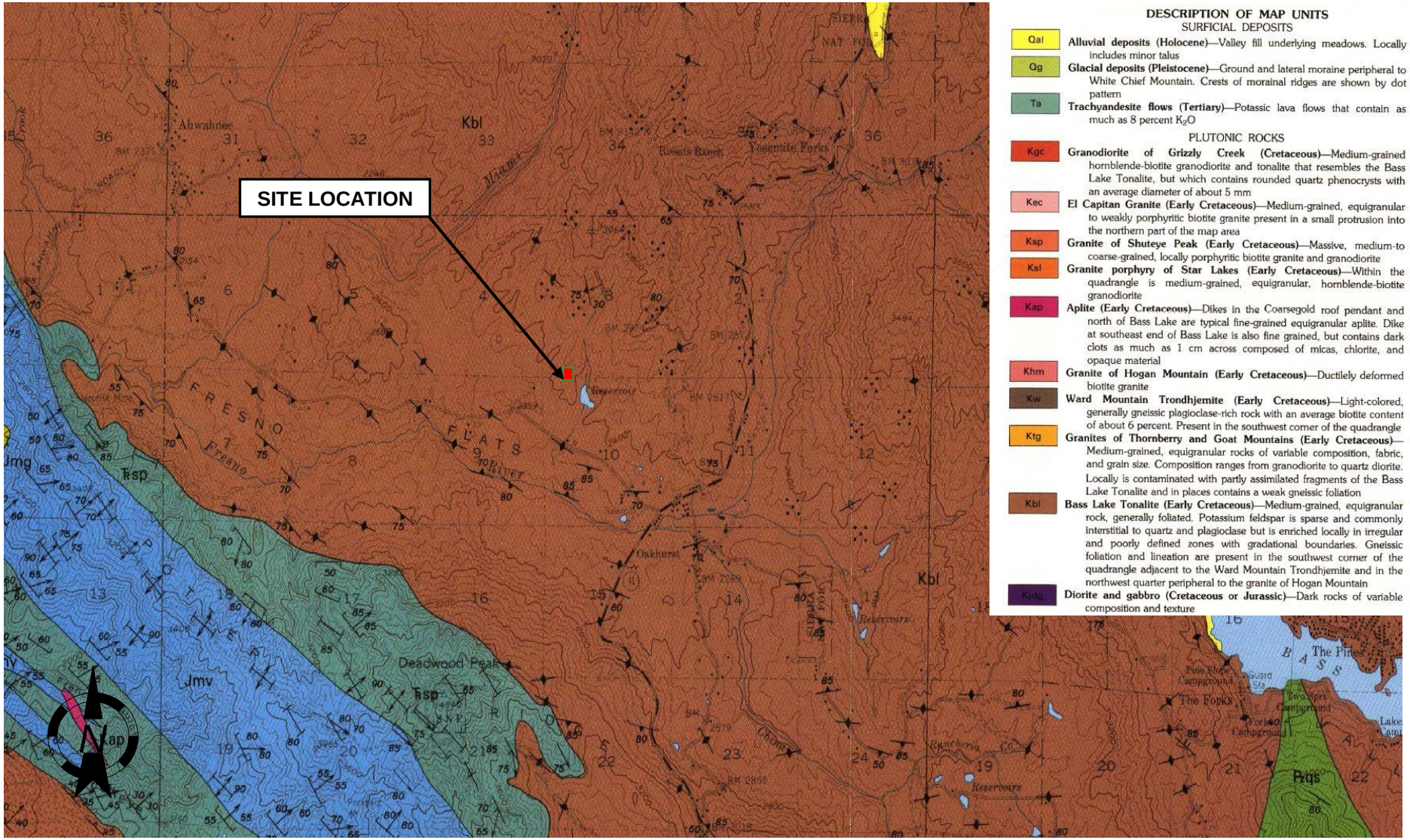
GEOTECHNICAL ENGINEERING INVESTIGATION
Proposed Classroom Bldgs. & Parking Lot at Oakhurst Community College
Westlake Drive
Oakhurst, California

SCALE: NOT TO SCALE	DATE: 1/14/2020
DRAWN BY: VT	APPROVED BY: JRM
PROJECT NO. 1-219-1034	FIGURE NO. 2

LEGEND:
B-1 Soil Boring Location

All Locations Approximate

SALEM engineering group, inc.



GEOLOGIC MAP OF THE BASS LAKE QUADRANGLE, WEST–CENTRAL SIERRA NEVADA, CALIFORNIA

By

Paul C. Bateman

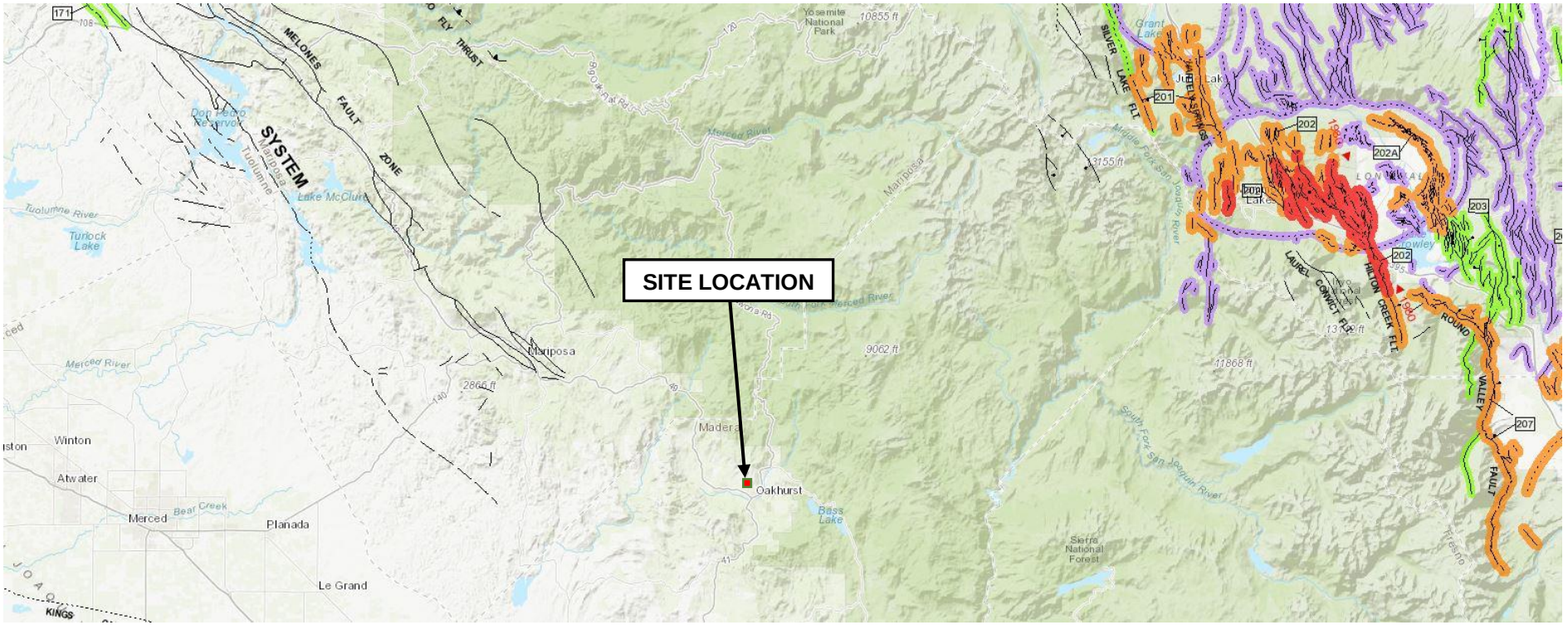
1989

REGIONAL GEOLOGIC MAP

GEOTECHNICAL ENGINEERING INVESTIGATION
Proposed Classroom Bldgs. and Parking Lot at Oakhurst Community College
Westlake Drive
Oakhurst, California

SCALE:	DATE:
Not to Scale	1/15/2020
DRAWN BY:	APPROVED BY:
JRM	JRM
PROJECT NO.	FIGURE NO.
1-219-1134	3

SALEM engineering group, inc.



FAULT CLASSIFICATION COLOR CODE
(Indicating Recency of Movement)

Fault along which historic (last 200 years) displacement has occurred.

A triangle to the right or left of the date indicates termination point of observed surface displacement. Solid red triangle indicates known location of rupture termination point. Open black triangle indicates uncertain or estimated location of rupture termination point.

Date bracketed by triangles indicates local fault break.

No triangle by date indicates an intermediate point along faultbreak.

Fault that exhibits fault creep slippage. Hachures indicate linear extent of fault creep. Annotation (creep with leader) indicates representative locations where fault creep has been observed and recorded.

Square on fault indicates where fault creep slippage has occured that has been triggered by an earthquake on some other fault. Date of causative earthquake indicated. Squares to right and left of date indicate terminal points between which triggered creep slippage has occurred (creep either continuous or intermittent between these end points).

Holocene fault displacement (during past 11,700 years) without historic record.

Late Quaternary fault displacement (during past 700,000 years).

Quaternary fault (age undifferentiated).

Pre-Quaternary fault (older that 1.6 million years) or fault without recognized Quaternary displacement.

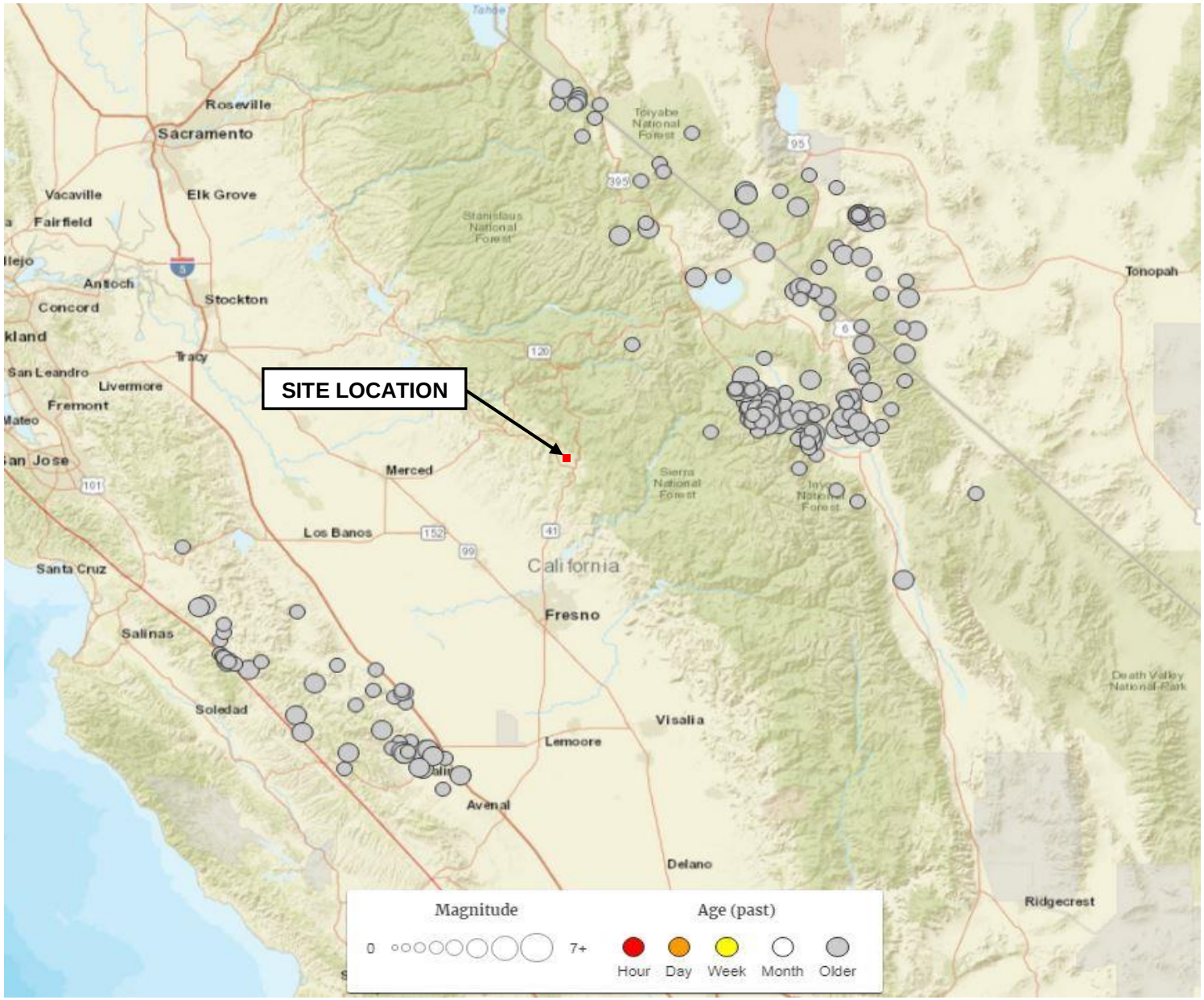
N

REGIONAL FAULT MAP

GEOTECHNICAL ENGINEERING INVESTIGATION
Proposed Classroom Bldgs. and Parking Lot at Oakhurst Community College
Westlake Drive
Oakhurst, California

SCALE:	DATE:
Not to Scale	1/15/2020
DRAWN BY:	APPROVED BY:
JRM	JRM
PROJECT NO.	FIGURE NO.
1-219-1134	4

SALEM engineering group, inc.

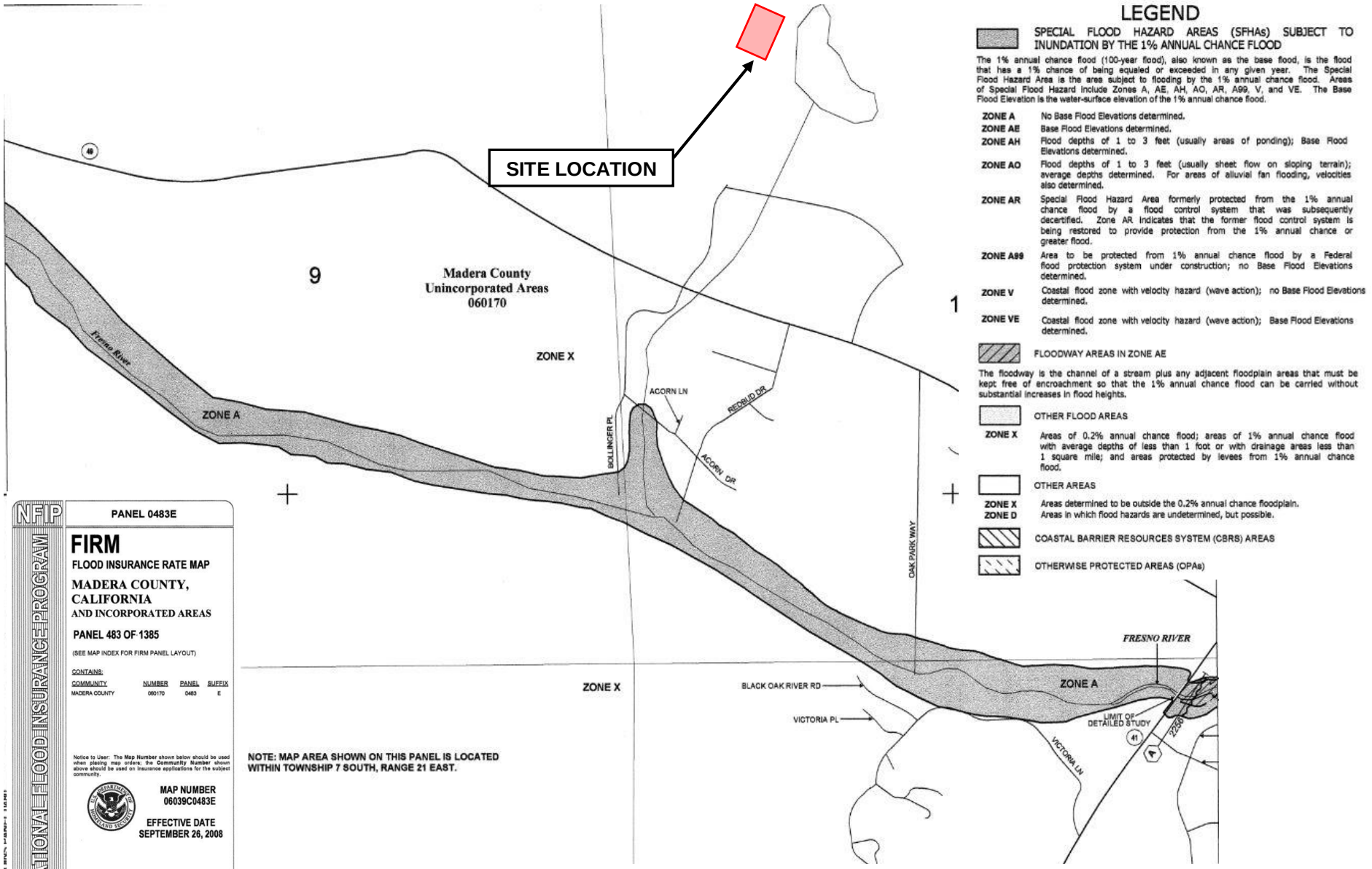


EARTHQUAKE EPICENTER LOCATION MAP

GEOTECHNICAL ENGINEERING INVESTIGATION
Proposed Classroom Bldgs. and Parking Lot at Oakhurst Community College
Westlake Drive
Oakhurst, California

SCALE:	DATE:
NOT TO SCALE	1/15/2020
DRAWN BY:	APPROVED BY:
JRM	JRM
PROJECT NO.	FIGURE NO.
1-219-1134	5

SALEM engineering group, inc.



Source Image: U.S. Dept. Homeland Security; FEMA Flood Hazard Mapping; https://msc.fema.gov/portal

FLOOD ZONE MAP

GEOTECHNICAL ENGINEERING INVESTIGATION
Proposed Classroom Bldgs. and Parking Lot at Oakhurst Community College
Westlake Drive
Oakhurst, California

SCALE:	DATE:
NOT TO SCALE	1/15/2020
DRAWN BY:	APPROVED BY:
JRM	JRM
PROJECT NO.	FIGURE NO.
1-219-1134	6

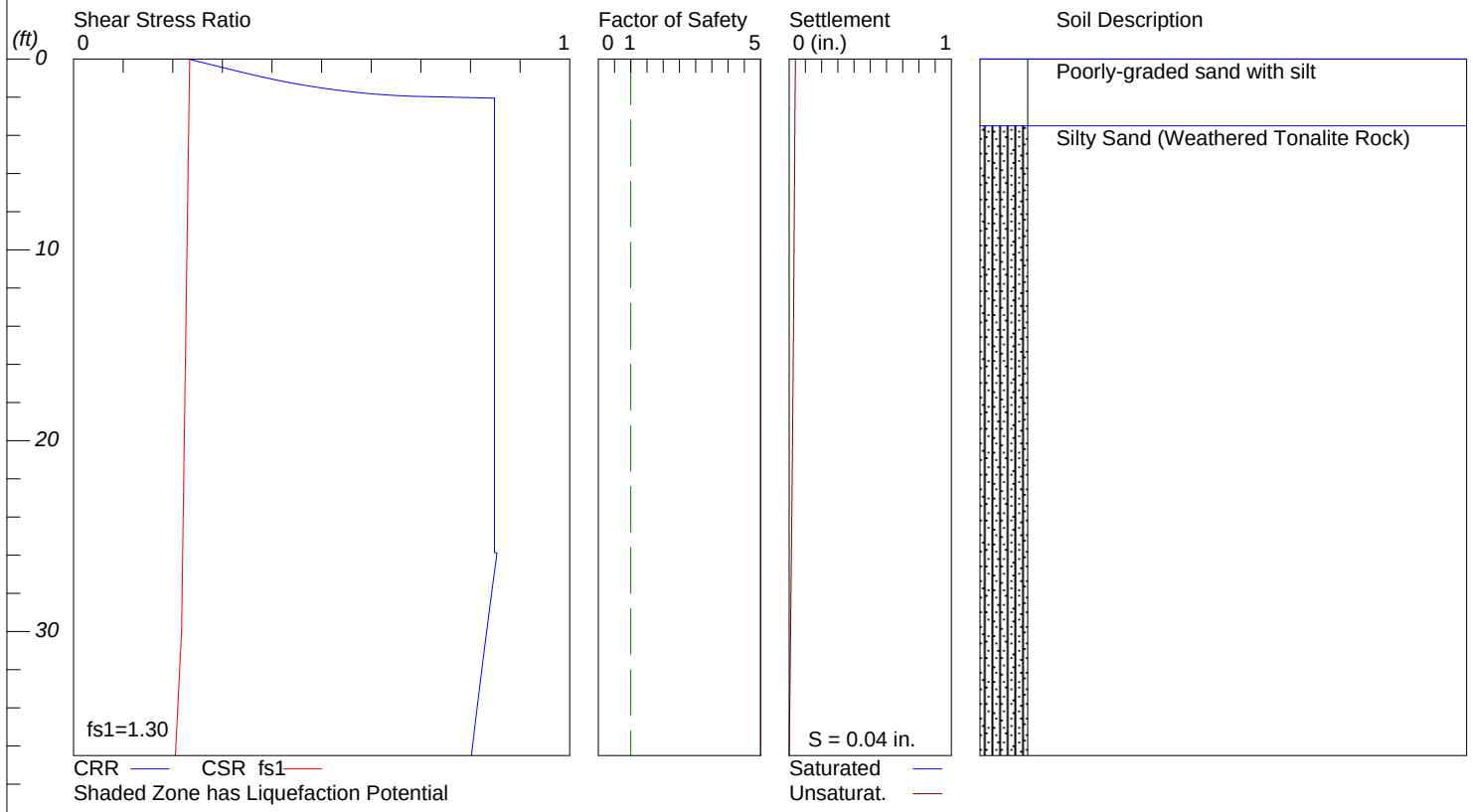
SALEM engineering group, inc.

LIQUEFACTION ANALYSIS

SCCCD-Oakhurst

Hole No.=B3 Water Depth=100 ft Surface Elev.=2,436

Magnitude=6.1
Acceleration=0.277g



LiquefyPro CivilTech Software USA www.civiltech.com

****

LIQUEFACTION ANALYSIS SUMMARY

Copyright by CivilTech Software

www.civiltech.com

****

Title: SCCCD-Oakhurst
Subtitle: 1-219-1134

Surface Elev.=2,436
Hole No.=B3
Depth of Hole= 36.50 ft
Water Table during Earthquake= 100.00 ft
Water Table during In-Situ Testing= 100.00 ft
Max. Acceleration= 0.28 g
Earthquake Magnitude= 6.10

Input Data:

Surface Elev.=2,436
Hole No.=B3
Depth of Hole=36.50 ft
Water Table during Earthquake= 100.00 ft
Water Table during In-Situ Testing= 100.00 ft
Max. Acceleration=0.28 g
Earthquake Magnitude=6.10
No-Liquefiable Soils: Based on Analysis

1. SPT or BPT Calculation.
2. Settlement Analysis Method: Ishihara / Yoshimine
3. Fines Correction for Liquefaction: Idriss/Seed
4. Fine Correction for Settlement: During Liquefaction*
5. Settlement Calculation in: All zones*
6. Hammer Energy Ratio, Ce = 1.25
7. Borehole Diameter, Cb= 1.0
8. Sampling Method, Cs= 1.200
9. User request factor of safety (apply to CSR) , User= 1.3
   Plot one CSR curve (fs1=User)
10. Use Curve Smoothing: Yes*

* Recommended Options

In-Situ Test Data:

Depth ft	SPT	gamma pcf	Fines %
0.00	6.00	125.00	10.00
3.50	19.00	130.00	21.00
8.50	35.00	125.00	21.00
15.00	50.00	125.00	21.00
20.00	50.00	125.00	21.00
25.00	50.00	125.00	21.00
30.00	66.00	125.00	21.00
35.00	57.00	125.00	21.00

Output Results:

Settlement of Saturated Sands=0.00 in.
Settlement of Unsaturated Sands=0.04 in.
Total Settlement of Saturated and Unsaturated Sands=0.04 in.

Depth ft	CRRm	CSRfs	F.S.	S_sat. in.	S_dry in.	S_all in.
0.00	0.23	0.23	5.00	0.00	0.04	0.04
1.00	0.39	0.23	5.00	0.00	0.04	0.04
2.00	0.76	0.23	5.00	0.00	0.04	0.04
3.00	0.85	0.23	5.00	0.00	0.04	0.04
4.00	0.85	0.23	5.00	0.00	0.03	0.03
5.00	0.85	0.23	5.00	0.00	0.03	0.03
6.00	0.85	0.23	5.00	0.00	0.03	0.03
7.00	0.85	0.23	5.00	0.00	0.03	0.03
8.00	0.85	0.23	5.00	0.00	0.03	0.03
9.00	0.85	0.23	5.00	0.00	0.03	0.03
10.00	0.85	0.23	5.00	0.00	0.03	0.03
11.00	0.85	0.23	5.00	0.00	0.03	0.03
12.00	0.85	0.23	5.00	0.00	0.03	0.03
13.00	0.85	0.23	5.00	0.00	0.03	0.03
14.00	0.85	0.23	5.00	0.00	0.03	0.03
15.00	0.85	0.23	5.00	0.00	0.03	0.03
16.00	0.85	0.23	5.00	0.00	0.02	0.02
17.00	0.85	0.22	5.00	0.00	0.02	0.02
18.00	0.85	0.22	5.00	0.00	0.02	0.02
19.00	0.85	0.22	5.00	0.00	0.02	0.02
20.00	0.85	0.22	5.00	0.00	0.02	0.02
21.00	0.85	0.22	5.00	0.00	0.02	0.02
22.00	0.85	0.22	5.00	0.00	0.02	0.02
23.00	0.85	0.22	5.00	0.00	0.02	0.02
24.00	0.85	0.22	5.00	0.00	0.02	0.02
25.00	0.85	0.22	5.00	0.00	0.01	0.01
26.00	0.85	0.22	5.00	0.00	0.01	0.01
27.00	0.85	0.22	5.00	0.00	0.01	0.01
28.00	0.84	0.22	5.00	0.00	0.01	0.01
29.00	0.84	0.22	5.00	0.00	0.01	0.01
30.00	0.83	0.22	5.00	0.00	0.01	0.01
31.00	0.83	0.22	5.00	0.00	0.01	0.01
32.00	0.82	0.21	5.00	0.00	0.01	0.01
33.00	0.82	0.21	5.00	0.00	0.00	0.00
34.00	0.81	0.21	5.00	0.00	0.00	0.00
35.00	0.81	0.21	5.00	0.00	0.00	0.00
36.00	0.80	0.21	5.00	0.00	0.00	0.00

* F.S.<1, Liquefaction Potential Zone
(F.S. is limited to 5,CRR is limited to 2, CSR is limited to 2)

Units: Unit: qc, fs, Stress or Pressure = atm (1.0581tsf); Unit Weight = pcf; Depth = ft; Settlement = in.

1 atm (atmosphere) = 1 tsf (ton/ft2)

CRRm	Cyclic resistance ratio from soils
CSRsf	Cyclic stress ratio induced by a given earthquake (with user request factor of safety)
F.S.	Factor of Safety against liquefaction, F.S.=CRRm/CSRsf
S_sat	Settlement from saturated sands
S_dry	Settlement from Unsaturated Sands
S_all	Total Settlement from Saturated and Unsaturated Sands
NoLiq	No-Liquefy Soils

APPENDIX

A

APPENDIX A
FIELD EXPLORATION

Fieldwork for our investigation (drilling) was conducted on December 26, 2019 and included a site visit, subsurface exploration, and soil sampling. The locations of the exploratory borings are shown on the Site Plan, Figure 2. Boring logs for our exploration are presented in figures following the text in this appendix. Borings were located in the field using existing reference points. Therefore, actual boring locations may deviate slightly.

In general, our borings were performed using a truck-mounted CME-55 drill rig equipped with 6-inch diameter solid-flight. Sampling in the borings was accomplished using a hydraulic 140-pound hammer with a 30-inch drop. Samples were obtained with a 3-inch outside-diameter (OD), split spoon (California Modified) sampler, and a 2-inch OD, Standard Penetration Test (SPT) sampler. The number of blows required to drive the sampler the last 12 inches (or fraction thereof) of the 18-inch sampling interval were recorded on the boring logs. The blow counts shown on the boring logs should not be interpreted as standard SPT "N" values; corrections have not been applied. Upon completion, the borings were backfilled with drill cuttings.

Subsurface conditions encountered in the exploratory borings were visually examined, classified and logged in general accordance with the American Society for Testing and Materials (ASTM) Practice for Description and Identification of Soils (Visual-Manual Procedure D2488). This system uses the Unified Soil Classification System (USCS) for soil designations. The logs depict soil and geologic conditions encountered and depths at which samples were obtained. The logs also include our interpretation of the conditions between sampling intervals. Therefore, the logs contain both observed and interpreted data. We determined the lines designating the interface between soil materials on the logs using visual observations, drill rig penetration rates, excavation characteristics and other factors. The transition between materials may be abrupt or gradual. Where applicable, the field logs were revised based on subsequent laboratory testing.

SALEM
engineering group, inc.

Test Boring: B-1 **Page** 1 **Of:** 1

Project Number: 1-219-1134

Date: 12/26/2019

Client: SCCCD

Project: Proposed Classroom Building & Parking Oakhurst Community College

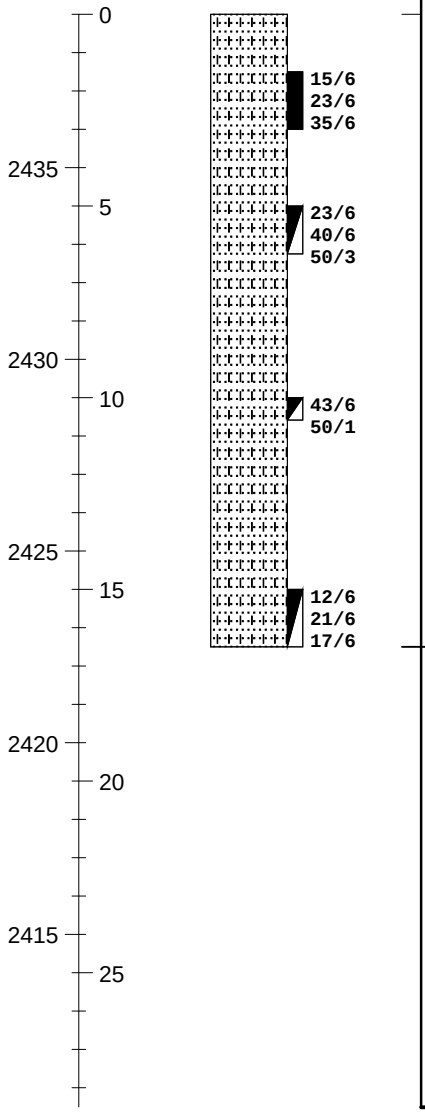
Location: WestLake Drive, Oakhurst, CA.

Drilled By: Salem Engineering Group, Inc. **Logged By:** AG

Drill Type: CME 55 **Elevation:** 2,439 ft. AMSL

Auger Type: 6in. Solid Flight Auger **Initial Depth to Groundwater:** N/A

Hammer Type: Automatic Trip - 140lbs/30in. **Final Depth to Groundwater:** N/A



ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	N-Values blows/ft.	Moisture Content %	Dry Density, PCF	Remarks
0		SW-SM	Well-graded sand with silt; dense, light tan, medium grained, (weathered rock).	58	5.2	128.0	
5			Grades as above.	90	3.5	--	
10			Grades as above.	>50	2.7	--	
15			Grades as above.	38	5.3	--	
			End of boring at 16.5ft. BSG				

Notes:

Figure Number A-1

SALEM
engineering group, inc.

Test Boring: B-2 **Page** 1 **Of:** 1

Project Number: 1-219-1134

Date: 12/26/2019

Client: SCCCD

Project: Proposed Classroom Building & Parking Oakhurst Community College

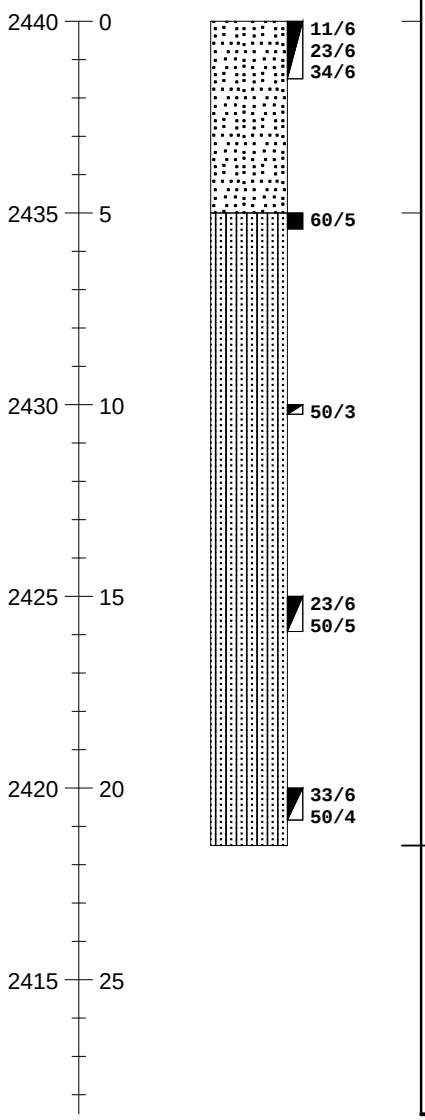
Location: WestLake Drive, Oakhurst, CA.

Drilled By: Salem Engineering Group, Inc. **Logged By:** AG

Drill Type: CME 55 **Elevation:** 2,440 ft. AMSL

Auger Type: 6in. Solid Flight Auger **Initial Depth to Groundwater:** N/A

Hammer Type: Automatic Trip - 140lbs/30in. **Final Depth to Groundwater:** N/A



ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	N-Values blows/ft.	Moisture Content %	Dry Density, PCF	Remarks
0	11/6 23/6 34/6	SP	Poorly-graded sand; very dense, tan, damp, medium grained, (weathered rock).	57	5.7	--	
5	60/5	SM	Silty sand; dense, light brown, moist, medium-grained.	>60	4.6	97.7	
10	50/3		Grades as above.	>50	3.4	--	
15	23/6 50/5		Grades as above.	>50	4.9	--	
20	33/6 50/4		Grades as above.	>50	4.3	--	
			End of boring at 21.5ft. BSG				

Notes:

Figure Number A-2

SALEM engineering group, inc.

Test Boring: B-3 **Page** 1 **Of:** 2

Project Number: 1-219-1134

Date: 12/26/2019

Client: SCCCD

Project: Proposed Classroom Building & Parking Oakhurst Community College

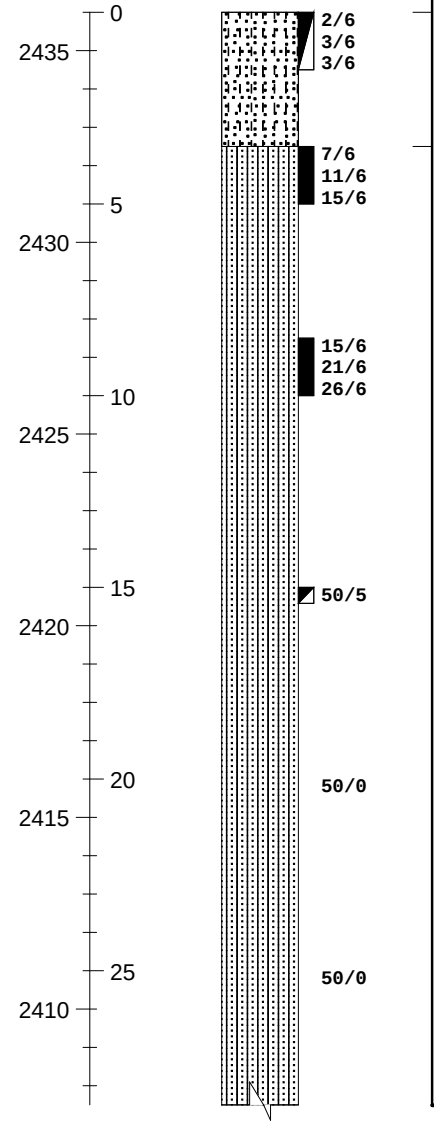
Location: WestLake Drive, Oakhurst, CA.

Drilled By: Salem Engineering Group, Inc. **Logged By:** AG

Drill Type: CME 55 **Elevation:** 2,436 ft. AMSL

Auger Type: 6in. Solid Flight Auger **Initial Depth to Groundwater:** N/A

Hammer Type: Automatic Trip - 140lbs/30in. **Final Depth to Groundwater:** N/A



ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	N-Values blows/ft.	Moisture Content %	Dry Density, PCF	Remarks
0	2/6 3/6 3/6	SP-SM	Poorly-graded sand with silt; loose, brown, moist, medium grained.	6	16.9	--	
5	7/6 11/6 15/6	SM	Silty sand; medium dense, tan, moist, medium to fine grained, (weathered rock) .	26	10.2	121.9	
10	15/6 21/6 26/6		Grades as above; dense.	47	9.2	114.4	
15	50/5		Grades as above.	>50	4.9	--	
20	50/0		Grades as above.	>50	--	--	[No Recovery].
25	50/0		Grades as above.	>50	--	--	[No Recovery].

Notes:

Figure Number A-3

SALEM engineering group, inc.

Project Number: 1-219-1134
Date: 12/26/2019
Test Boring: B-3

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	N-Values blows/ft.	Moisture Content %	Dry Density, PCF	Remarks
30 / 2405	27/6 33/6 33/6		Grades as above; very dense, tan.	66	6.3	--	
35 / 2400	4/6 7/6 50/5		Grades as above; dense.	57	14.2	--	
			End of boring at 36.5ft. BSG due to refusal from bedrock.				
40 / 2395							
45 / 2390							
50 / 2385							
55 / 2380							
60 / 2375							

Notes:

Figure Number A-3

SALEM engineering group, inc.

Test Boring: B-4 **Page** 1 **Of:** 1

Project Number: 1-219-1134

Date: 12/26/2019

Client: SCCCD

Project: Proposed Classroom Building & Parking Oakhurst Community College

Location: WestLake Drive, Oakhurst, CA.

Drilled By: Salem Engineering Group, Inc. **Logged By:** AG

Drill Type: CME 55 **Elevation:** 2,438 ft. AMSL

Auger Type: 6in. Solid Flight Auger **Initial Depth to Groundwater:** N/A

Hammer Type: Automatic Trip - 140lbs/30in. **Final Depth to Groundwater:** N/A

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	N-Values blows/ft.	Moisture Content %	Dry Density, PCF	Remarks
0 / 2435	3/6 13/6 26/6	SM	Silty sand; dense, dark brown, moist, medium to fine grained, (weatherd rock).	39	8.4	--	
5 / 2430	9/6 11/6 10/6		Grades as above; tan, medium dense.	21	5.6	--	
			End of boring at 5ft. BSG				
10 / 2425							
15 / 2420							
20 / 2415							
25 / 2410							

Notes:

Figure Number A-4

SALEM engineering group, inc.

Test Boring: B-5 **Page** 1 **Of:** 1

Project Number: 1-219-1134

Date: 12/26/2019

Client: SCCCD

Project: Proposed Classroom Building & Parking Oakhurst Community College

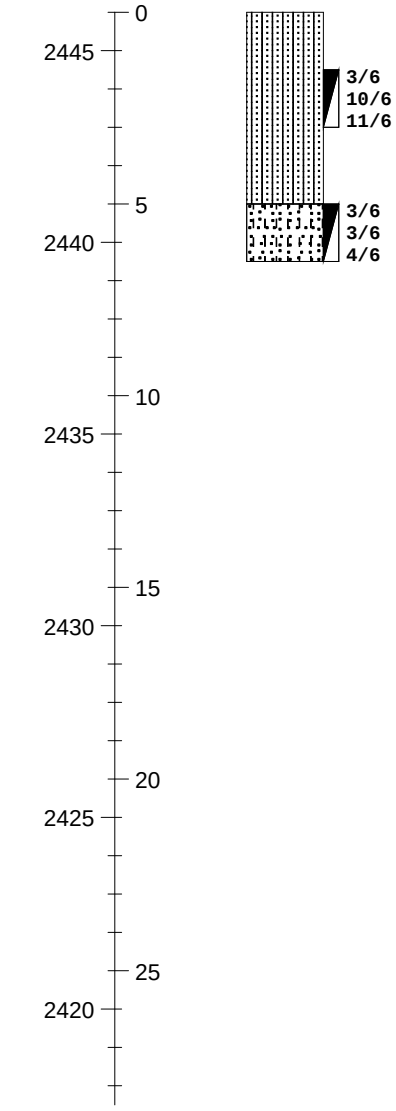
Location: WestLake Drive, Oakhurst, CA.

Drilled By: Salem Engineering Group, Inc. **Logged By:** AG

Drill Type: CME 55 **Elevation:** 2,446 ft. AMSL

Auger Type: 6in. Solid Flight Auger **Initial Depth to Groundwater:** N/A

Hammer Type: Automatic Trip - 140lbs/30in. **Final Depth to Groundwater:** N/A



ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	N-Values blows/ft.	Moisture Content %	Dry Density, PCF	Remarks
		SM	Silty sand; medium dense, brown, moist, medium to fine grained.	21	5.9	--	
		SP-SM	Poorly-graded sand with silt; loose, tan, damp, medium grained.	7	--	--	
			End of boring at 6.5ft. BSG				

Notes:

Figure Number A-5

KEY TO SYMBOLS

Symbol Description

Strata symbols

Well graded sand with silt

Poorly graded sand

Silty sand

Poorly graded sand with silt

Misc. Symbols

Boring continues

Soil Samplers

California sampler

Standard penetration test

Notes:

Consistency Classification

Blows Per Foot (Uncorrected)

Granular Soils

	MCS	SPT
Very loose	<5	<4
Loose	5 -15	4 - 10
Medium dense	16 - 40	11 - 30
Dense	41 - 65	31 - 50
Very dense	>65	>50

Cohesive Soils

	MCS	SPT
Very soft	<3	<2
Soft	3 - 5	2 - 4
Firm	6 - 10	5 - 8
Stiff	11 - 20	9 - 15
Very Stiff	21 - 40	16 - 30
Hard	>40	>30

MCS = Modified California Sampler
SPT = Standard Penetration Test Sampler

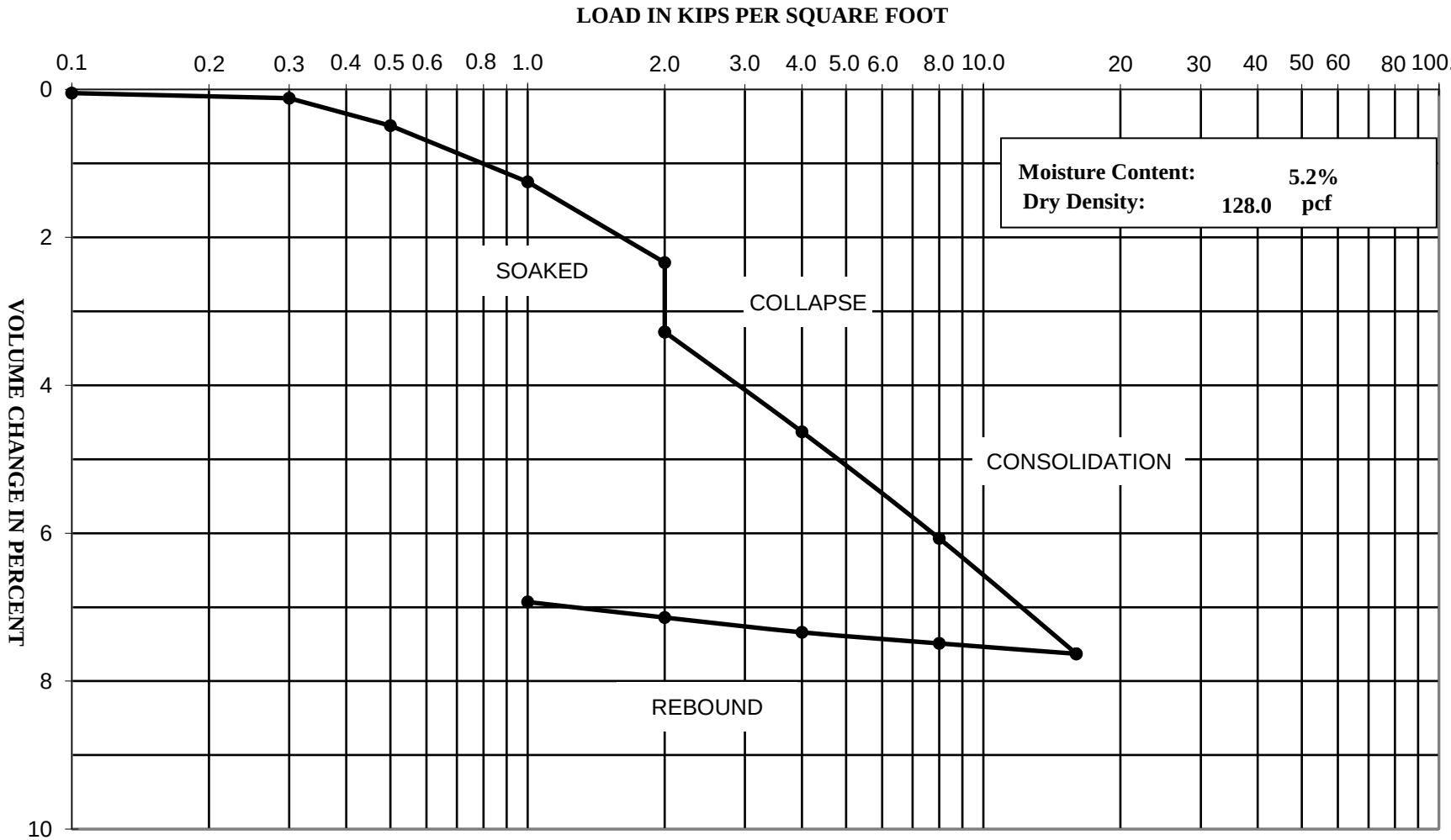
APPENDIX

B

APPENDIX B
LABORATORY TESTING

Laboratory tests were performed in accordance with generally accepted test methods of the American Society for Testing and Materials (ASTM), Caltrans, or other suggested procedures. Selected samples were tested for in-situ dry density and moisture content, corrosivity, consolidation, shear strength, soil resistivity, expansion index, Atterberg limit, resistance value, and grain size distribution. The results of the laboratory tests are summarized in the following figures.

CONSOLIDATION - PRESSURE TEST DATA
ASTM D2435



Project Name: Classroom Building And Parking Oakhurst Community College Campus - Oakhurst, CA

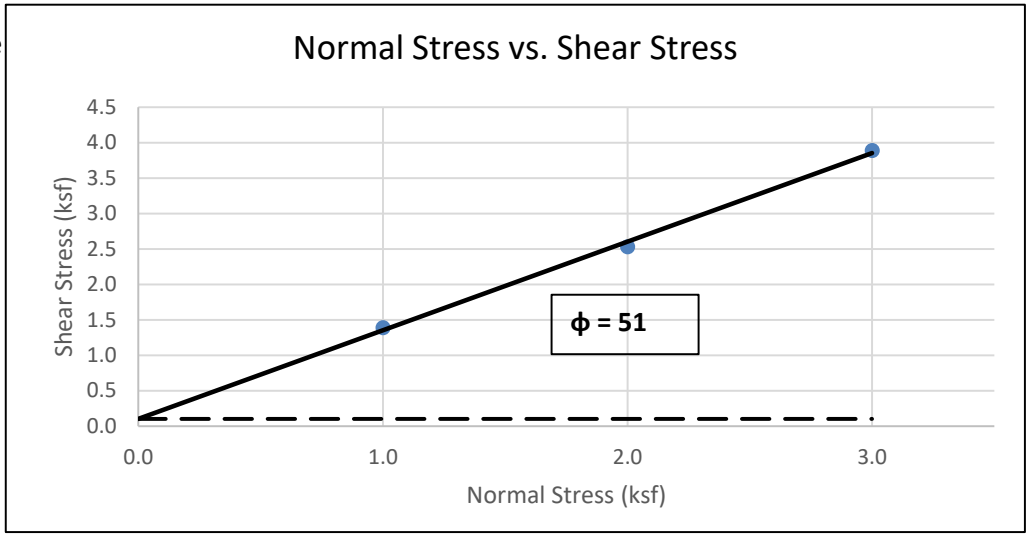
Project Number: 1-219-1134

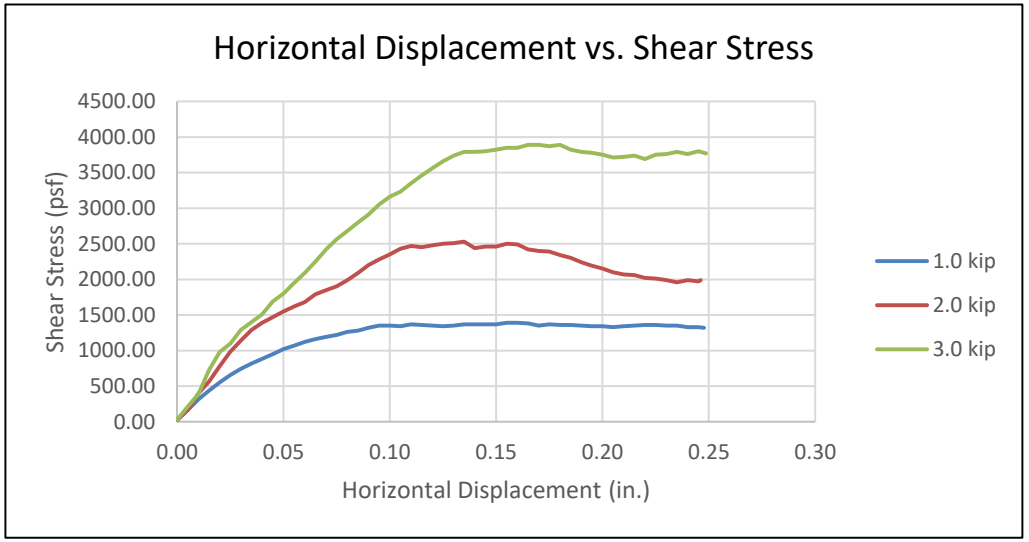
Boring: B-1 @ 1.5'

SALEM engineering group, inc.

Direct Shear Test (ASTM D3080)

Project Name: Classroom Building And Parking Oakhurst Community College
Project Number: 1-219-1134
Client: SCCCD
Boring: B-2 @ 5'
Soil Type: Silty sand (SM)
Sample Type: Undisturbed Ring
Tested By: MZ
Reviewed By: JRM
Date of Test: 1/16/20
Test Equipment: GeoComp ShearTrac II





	Loading		
	1.0 kip	**2.0 kip**	**3.0 kip**
Normal Stress (ksf)	1.00	2.00	3.00
Shear Rate (in/min)	0.0040	0.0040	0.0040
Peak Shear Stress (ksf)	1.39	2.53	3.89
Residual Shear Stress (ksf)	0.00	0.00	0.00

Initial Height of Sample (in)	1.000	1.000	1.000
Post-Consol. Sample Height (in.)	0.982	0.961	0.952
Post-Shear Sample Height (in.)	0.991	0.968	0.950
Diameter of Sample (in)	2.4	2.4	2.4
Initial (pre-shear) Values			
Moisture Content (%)		4.6	
Dry Density (pcf)	109.5	113.1	110.7
Saturation %	23.7	26.2	24.5
Void Ratio	0.51	0.46	0.49
Consolidated Void Ratio	0.48	0.40	0.42
Final (post-shear) Values			
Final Moisture Content (%)	17.1	17.3	18.1
Dry Density (pcf)	105.1	110.1	110.2
Saturation %	66.9	78.2	79.4
Void Ratio	0.68	0.59	0.60

Peak Shear Strength Values		**Residual Shear Strength Values**	
Slope	1.25	**Slope**	0.00
Friction Angle	51	**Friction Angle**	0
Cohesion (psf)	103	**Cohesion (psf)**	0

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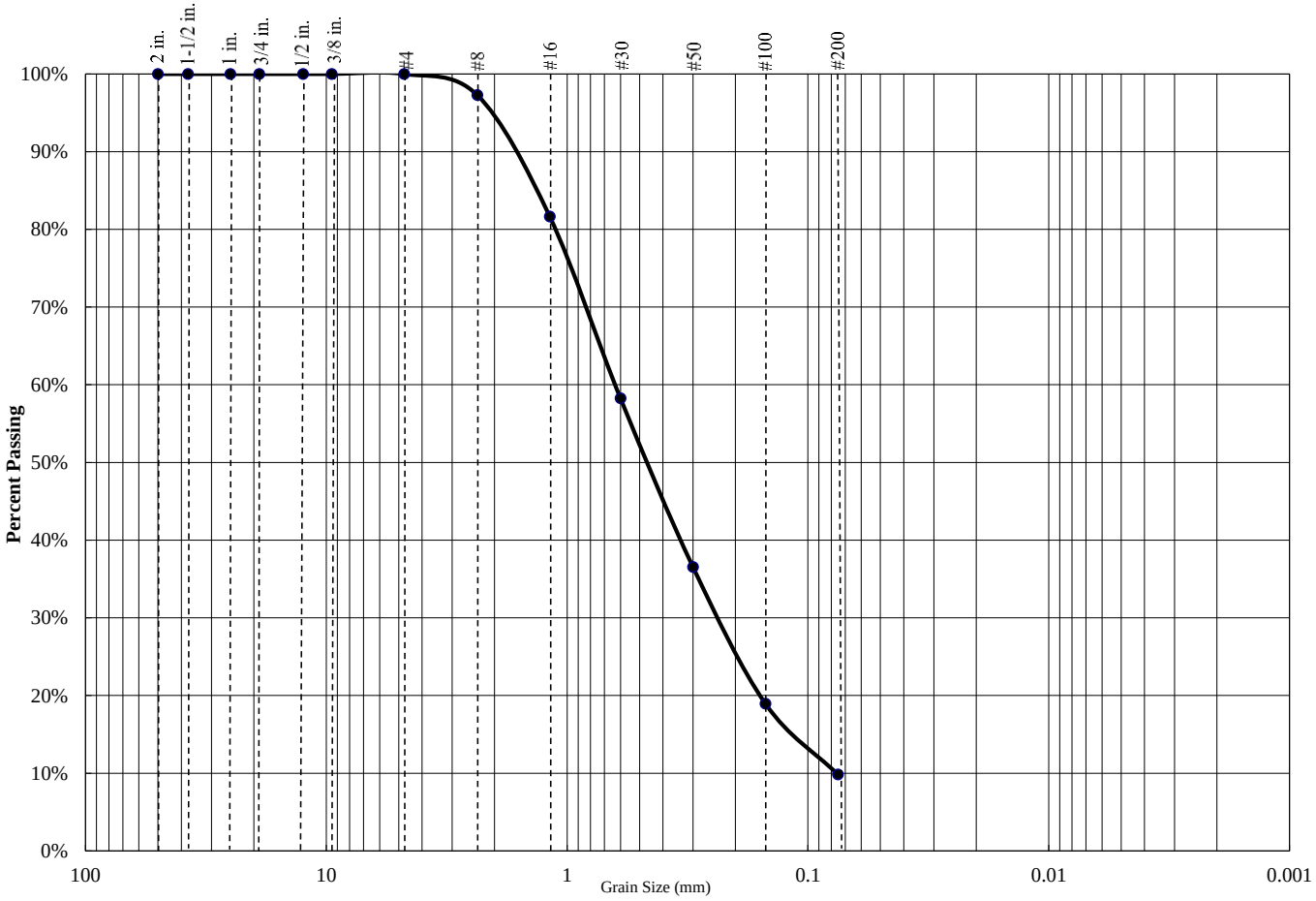
4729 W. Jacquelyn Ave.
Fresno, CA 93722

PARTICLE SIZE DISTRIBUTION DIAGRAM

GRADATION TEST - ASTM C136



Percent Gravel	Percent Sand	Percent Silt/Clay
0%	90%	10%

Sieve Size	Percent Passing
3/4 inch	100.0%
1/2 inch	100.0%
3/8 inch	100.0%
#4	100.0%
#8	97.3%
#16	81.6%
#30	58.2%
#50	36.5%
#100	18.9%
#200	9.8%

Atterberg Limits					
PL=	N/A	**LL=**	N/A	**PI=**	N/A

Coefficients					
D_{85}=	1.5	**D_{60}=**	0.74	**D_{50}=**	0.47
D_{30}=	0.25	**D_{15}=**	0.12	**D_{10}=**	0.075
C_u=	9.87	**C_c=**	1.13		

USCS CLASSIFICATION
Well-graded sand with silt (SW-SM)

Project Name: Classroom Building And Parking Oakhurst Community College Campus - Oakhurst, CA

Project Number: 1-219-1134

Boring: B-1 @ 1.5'

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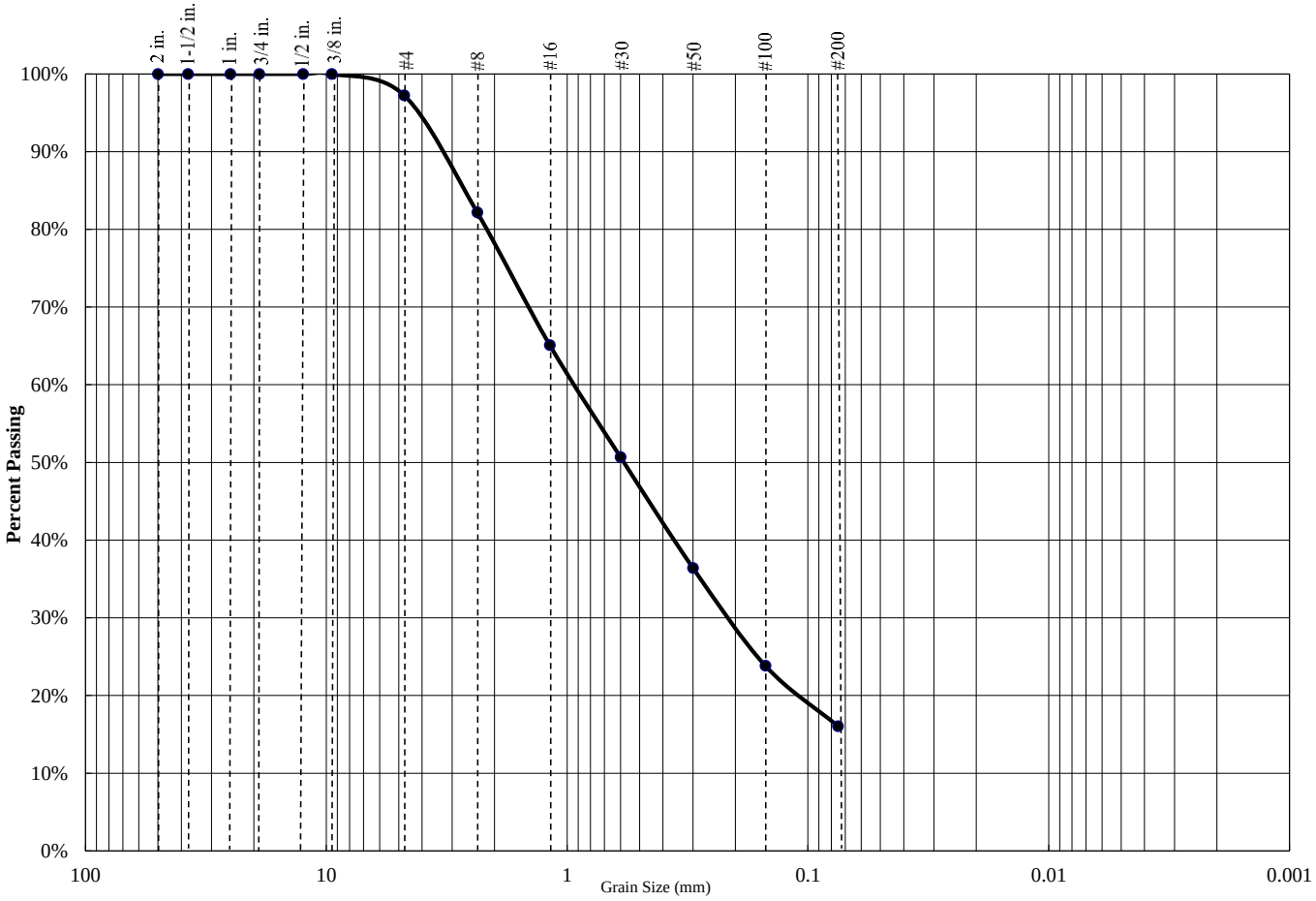
PARTICLE SIZE DISTRIBUTION DIAGRAM

GRADATION TEST - ASTM C136



Percent Gravel	Percent Sand	Percent Silt/Clay
3%	81%	16%

Sieve Size	Percent Passing
3/4 inch	100.0%
1/2 inch	100.0%
3/8 inch	100.0%
#4	97.3%
#8	82.2%
#16	65.1%
#30	50.7%
#50	36.4%
#100	23.8%
#200	16.1%

Atterberg Limits					
PL=	N/A	**LL=**	N/A	**PI=**	N/A

Coefficients					
D_{85}=	2.7	**D_{60}=**	0.94	**D_{50}=**	0.59
D_{30}=	0.22	**D_{15}=**	n/a	**D_{10}=**	n/a
C_u=	N/A	**C_c=**	N/A		

USCS CLASSIFICATION
Silty sand (SM)

Project Name: Classroom Building And Parking Oakhurst Community College Campus - Oakhurst, CA

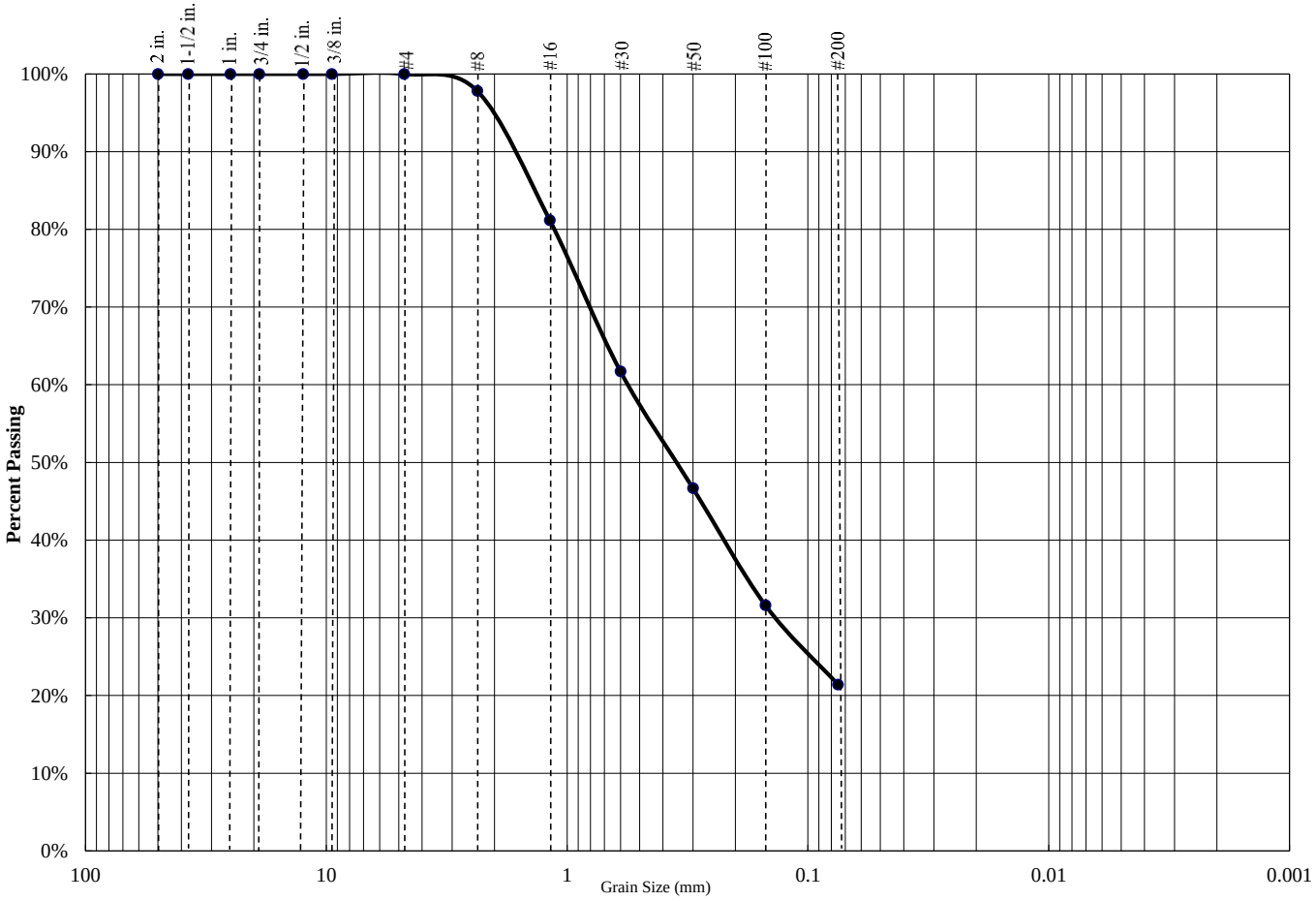
Project Number: 1-219-1134

Boring: B-2 @ 5'

SALEM engineering group, inc.

PARTICLE SIZE DISTRIBUTION DIAGRAM

GRADATION TEST - ASTM C136



Percent Gravel	Percent Sand	Percent Silt/Clay
0%	79%	21%

Sieve Size	Percent Passing
3/4 inch	100.0%
1/2 inch	100.0%
3/8 inch	100.0%
#4	100.0%
#8	97.8%
#16	81.2%
#30	61.7%
#50	46.7%
#100	31.6%
#200	21.4%

Atterberg Limits					
PL=	N/A	**LL=**	N/A	**PI=**	N/A

Coefficients					
D_{85}=	1.4	**D_{60}=**	0.57	**D_{50}=**	0.36
D_{30}=	0.15	**D_{15}=**	N/A	**D_{10}=**	N/A
C_u=	N/A	**C_c=**	N/A		

USCS CLASSIFICATION
Silty sand (SM)

Project Name: Classroom Building And Parking Oakhurst Community College Campus - Oakhurst, CA

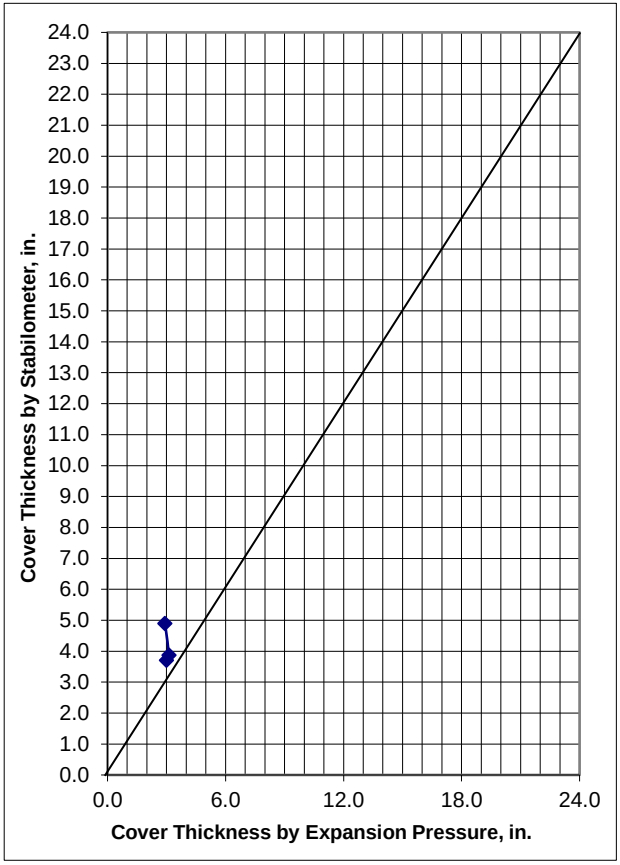
Project Number: 1-219-1134

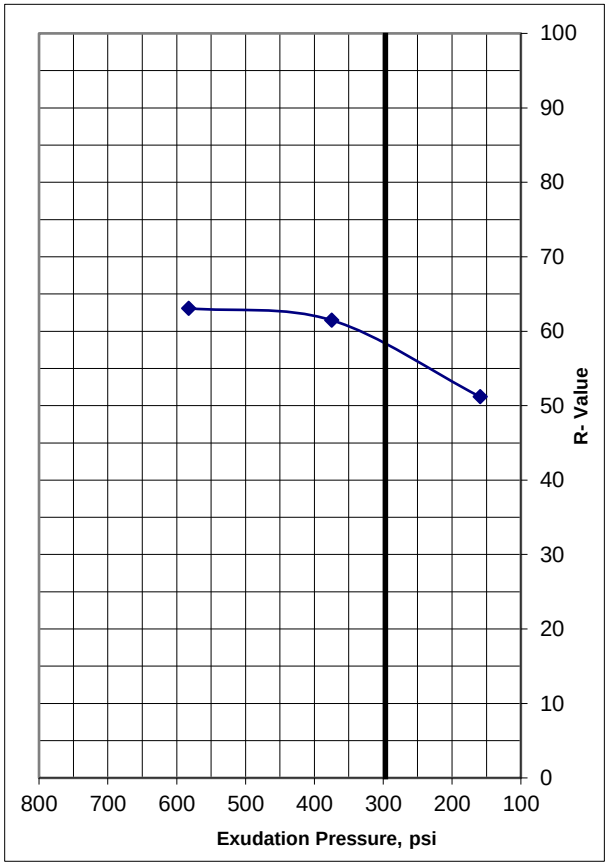
Boring: B-3 @ 3.5'

SALEM engineering group, inc.

Resistance R-Value
and Expansion Pressure of Compacted Soils
ASTM D2844

Project Name: Classroom Building And Parking Oakhurst Community College Campus - Oakhu
Project Number: 1-219-1134
Date Sampled: 12/26/19 Date Tested: 1/10/20
Sampled By: SEG Tested By: NW \ RM
Sample Location: B-5 @ 0 - 3'
Soil Description: Silty sand (SM)





Specimen	1	2	3
Exudation Pressure, psi	582.6	375	159.3
Moisture at Test, %	19.7	19.9	20.2
Dry Density, pcf	113.1	112.1	112.3
Expansion Pressure, psf	325	338	316
Thickness by Stabilometer, in.	3.7	3.9	4.9
Thickness by Expansion Pressure, in.	3.0	3.1	2.9
R-Value by Stabilometer	63	61	51
R-Value by Expansion Pressure	N/A		
R-Value at 300 psi Exudation Pressure	58		

Controlling R-Value	**58**

SALEM engineering group, inc.

CHEMICAL ANALYSIS

SO_4 - Modified CTM 417 & Cl - Modified CTM 417/422

Project Name: Classroom Building And Parking Oakhurst Community College Campus - Oakhurst, (
Project Number: 1-219-1134
Date Sampled: 12/26/19 Date Tested: 1/3/20
Sampled By: SEG Tested By: JH
Soil Description: Silty sand (SM)

Sample Number	Sample Location	Soluble Sulfate SO_4-S	Soluble Chloride Cl	pH
1a.	B-3 @ 0 - 3'	110 mg/kg	23 mg/kg	6.9
1b.	B-3 @ 0 - 3'	110 mg/kg	22 mg/kg	6.9
1c.	B-3 @ 0 - 3'	110 mg/kg	22 mg/kg	6.9
Average:		**110 mg/kg**	**22 mg/kg**	**6.9**

SALEM engineering group, inc.

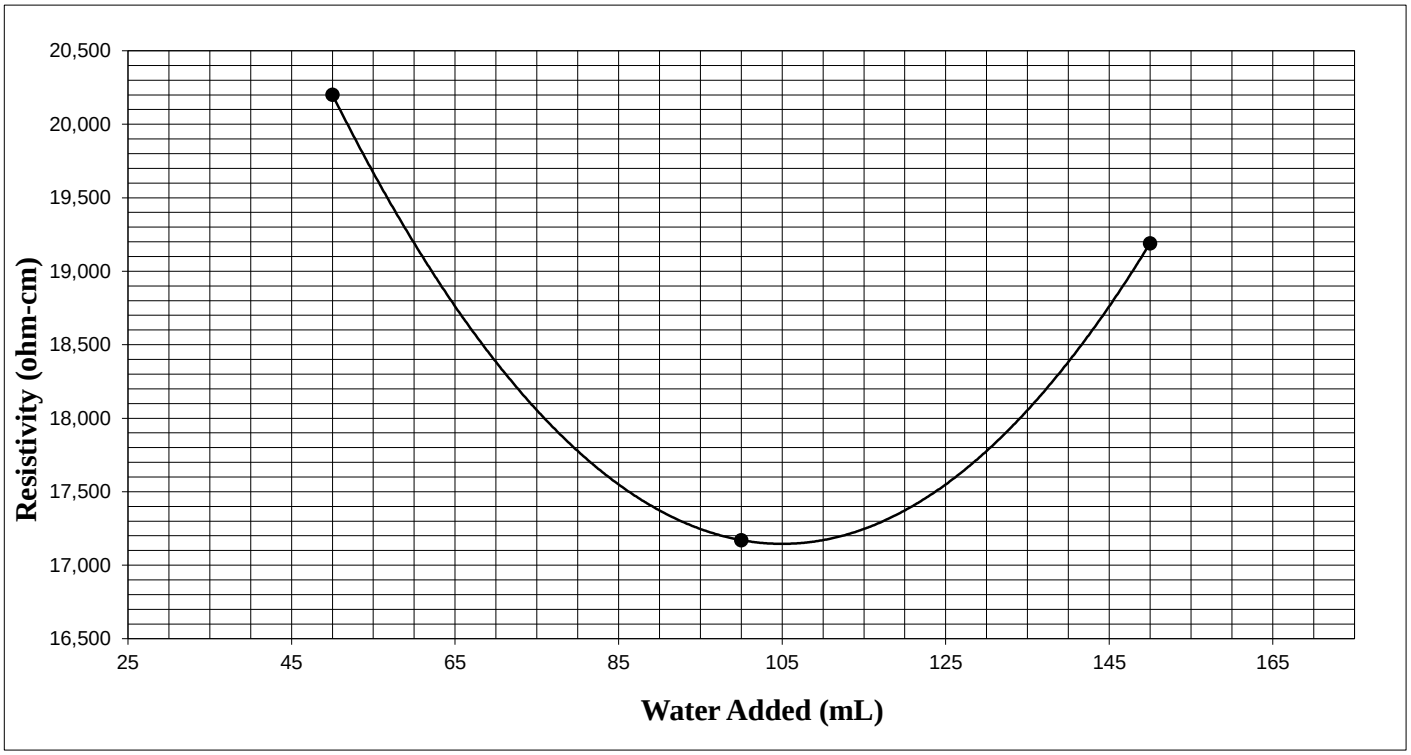
SOIL RESISTIVITY
CTM 643

Project Name: Classroom Building And Parking Oal Date Sampled: 12/26/19
Project Number: 1-219-1134 Sampled By: SEG
Sample Location: B-3 @ 0 - 3' Date Tested: 1/6/20
Soil Description: Silty sand (SM) Tested By: EB

Chloride Content:	22	mg/Kg	Initial Sample Weight:	700	gms
Sulfate Content:	110	mg/Kg	Test Box Constant:	1.010	cm
Soil pH:	6.9				

Test Data:

Trial #	Water Added (mL)	Meter Dial Reading	Multiplier Setting	Resistance (ohms)	Resistivity (ohm-cm)
1	50	2.0	10,000	20,000	20,201
2	100	1.7	10,000	17,000	17,171
3	150	1.9	10,000	19,000	19,191



Minimum Resistivity:	**17,145** ohm-cm

SALEM engineering group, inc.

EXPANSION INDEX TEST
ASTM D4829

Project Name: Classroom Building And Parking Oakhurst Community College Campus - Oakhurst,
Project Number: 1-219-1134
Date Sampled: 12/26/19 Date Tested: 1/7/20
Sampled By: SEG Tested By: JH
Sample Location: B-3 @ 0 - 3'
Soil Description: Silty sand (SM)

Trial #	1	2	3
Weight of Soil & Mold, g.	585.9		
Weight of Mold, g.	188.2		
Weight of Soil, g.	397.7		
Wet Density, pcf	119.9		
Weight of Moisture Sample (Wet), g.	855.0		
Weight of Moisture Sample (Dry), g.	776.1		
Moisture Content, %	10.2		
Dry Density, pcf	108.9		
Specific Gravity of Soil	2.7		
Degree of Saturation, %	50.1		

Time	Inital	30 min	1 hr	6 hrs	12 hrs	24 hrs
Dial Reading	0	0.0065	0.0082	0.0094	--	0.0095

Expansion Index $_{measured}$ = 9.5
Expansion Index $_{50}$ = 9.6

Expansion Index = **10**

Expansion Potential Table	
Exp. Index	Potential Exp.
0 - 20	Very Low
21 - 50	Low
51 - 90	Medium
91 - 130	High
>130	Very High

SALEM engineering group, inc.

Atterberg Limits Determination
ASTM D4318

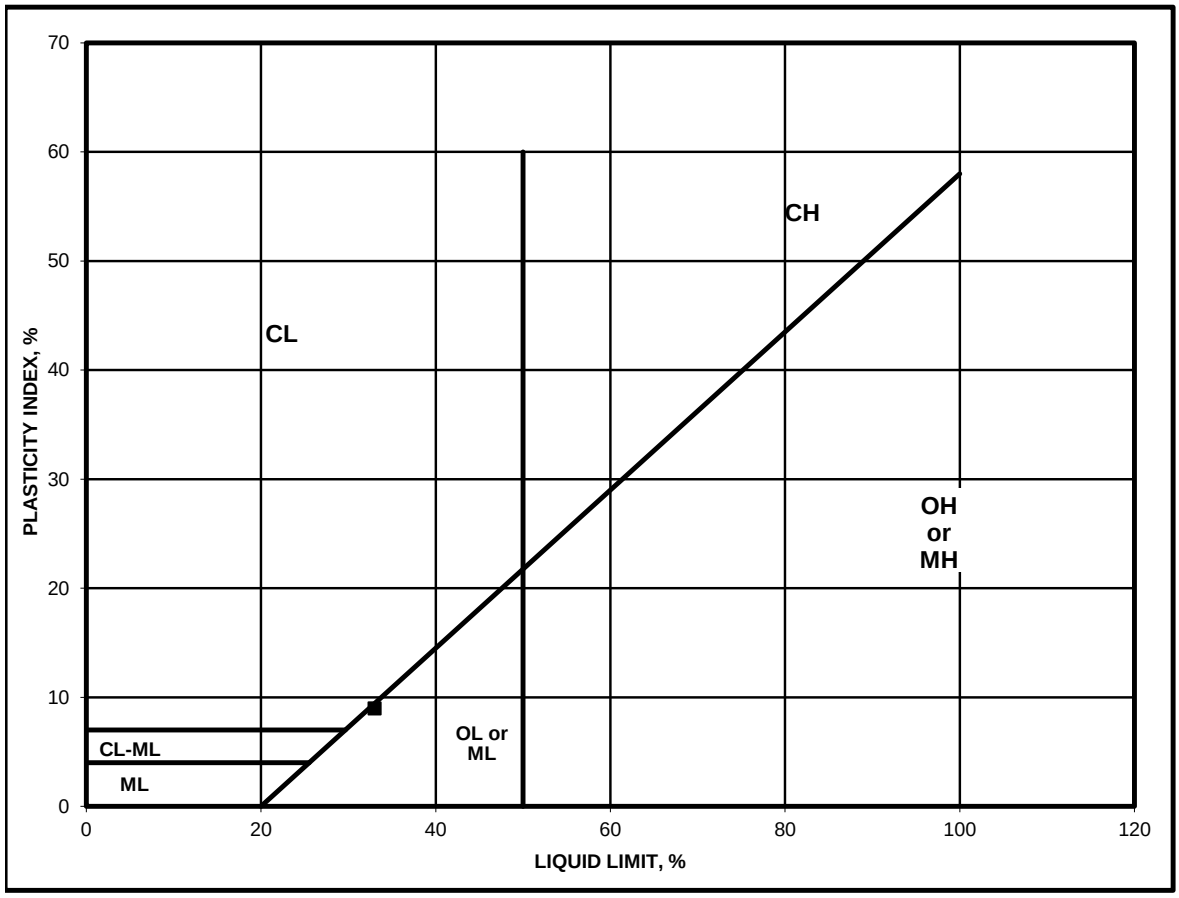
Project Name: Classroom Building And Parking Oakhurst Community College Campus - Oakhurst
Project Number: 1-219-1134
Date Sampled: 12/26/19 Date Tested: 1/3/20
Sampled By: SEG Tested By: JH
Sample Location: B-3 @ 0 - 3'

	Plastic Limit			Liquid Limit		
Run Number	1	2	3	1	2	3
Weight of Wet Soil & Tare	29.01	28.60	29.46	28.11	30.96	29.88
Weight of Dry Soil & Tare	27.41	27.14	27.85	26.38	28.49	27.66
Weight of Water	1.60	1.46	1.61	1.73	2.47	2.22
Weight of Tare	20.91	21.10	21.22	20.83	21.00	21.13
Weight of Dry Soil	6.50	6.04	6.63	5.55	7.49	6.53
Water Content	24.6	24.2	24.3	31.2	33.0	34.0
Number of Blows				30	24	21

Plastic Limit : 24 **Liquid Limit : 33**

Plasticity Index : 9

Unified Soil Classification : ML



SALEM engineering group, inc.

APPENDIX

C

APPENDIX C
GENERAL EARTHWORK AND PAVEMENT SPECIFICATIONS

When the text of the report conflicts with the general specifications in this appendix, the recommendations in the report have precedence.

1.0 SCOPE OF WORK: These specifications and applicable plans pertain to and include all earthwork associated with the site rough grading, including, but not limited to, the furnishing of all labor, tools and equipment necessary for site clearing and grubbing, stripping, preparation of foundation materials for receiving fill, excavation, processing, placement and compaction of fill and backfill materials to the lines and grades shown on the project grading plans and disposal of excess materials.

2.0 PERFORMANCE: The Contractor shall be responsible for the satisfactory completion of all earthwork in accordance with the project plans and specifications. This work shall be inspected and tested by a representative of SALEM Engineering Group, Incorporated, hereinafter referred to as the Soils Engineer and/or Testing Agency. Attainment of design grades, when achieved, shall be certified by the project Civil Engineer. Both the Soils Engineer and the Civil Engineer are the Owner's representatives. If the Contractor should fail to meet the technical or design requirements embodied in this document and on the applicable plans, he shall make the necessary adjustments until all work is deemed satisfactory as determined by both the Soils Engineer and the Civil Engineer. No deviation from these specifications shall be made except upon written approval of the Soils Engineer, Civil Engineer, or project Architect.

No earthwork shall be performed without the physical presence or approval of the Soils Engineer. The Contractor shall notify the Soils Engineer at least 2 working days prior to the commencement of any aspect of the site earthwork.

The Contractor shall assume sole and complete responsibility for job site conditions during the course of construction of this project, including safety of all persons and property; that this requirement shall apply continuously and not be limited to normal working hours; and that the Contractor shall defend, indemnify and hold the Owner and the Engineers harmless from any and all liability, real or alleged, in connection with the performance of work on this project, except for liability arising from the sole negligence of the Owner or the Engineers.

3.0 TECHNICAL REQUIREMENTS: All compacted materials shall be densified to no less that 95 percent of relative compaction (90 percent for cohesive soils) based on ASTM D1557 Test Method (latest edition), UBC or CAL-216, or as specified in the technical portion of the Soil Engineer's report. The location and frequency of field density tests shall be determined by the Soils Engineer. The results of these tests and compliance with these specifications shall be the basis upon which satisfactory completion of work will be judged by the Soils Engineer.

4.0 SOILS AND FOUNDATION CONDITIONS: The Contractor is presumed to have visited the site and to have familiarized himself with existing site conditions and the contents of the data presented in the Geotechnical Engineering Report. The Contractor shall make his own interpretation of the data contained in the Geotechnical Engineering Report and the Contractor shall not be relieved of liability for any loss sustained as a result of any variance between conditions indicated by or deduced from said report and the actual conditions encountered during the progress of the work.

5.0 DUST CONTROL: The work includes dust control as required for the alleviation or prevention of any dust nuisance on or about the site or the borrow area, or off-site if caused by the Contractor's operation either during the performance of the earthwork or resulting from the conditions in which the Contractor leaves the site. The Contractor shall assume all liability, including court costs of codefendants, for all claims related to dust or wind-blown materials attributable to his work. Site preparation shall consist of site clearing and grubbing and preparation of foundation materials for receiving fill.

6.0 CLEARING AND GRUBBING: The Contractor shall accept the site in this present condition and shall demolish and/or remove from the area of designated project earthwork all structures, both surface and subsurface, trees, brush, roots, debris, organic matter and all other matter determined by the Soils Engineer to be deleterious. Such materials shall become the property of the Contractor and shall be removed from the site.

Tree root systems in proposed improvement areas should be removed to a minimum depth of 3 feet and to such an extent which would permit removal of all roots greater than 1 inch in diameter. Tree roots removed in parking areas may be limited to the upper 1½ feet of the ground surface. Backfill of tree root excavations is not permitted until all exposed surfaces have been inspected and the Soils Engineer is present for the proper control of backfill placement and compaction. Burning in areas which are to receive fill materials shall not be permitted.

7.0 SUBGRADE PREPARATION: Surfaces to receive Engineered Fill and/or building or slab loads shall be prepared as outlined above, scarified to a minimum of 12 inches, moisture-conditioned as necessary, and recompacted to 95 percent relative compaction (90 percent for cohesive soils).

Loose soil areas and/or areas of disturbed soil shall be moisture-conditioned as necessary and recompacted to 95 percent relative compaction (90 percent for cohesive soils). All ruts, hummocks, or other uneven surface features shall be removed by surface grading prior to placement of any fill materials. All areas which are to receive fill materials shall be approved by the Soils Engineer prior to the placement of any fill material.

8.0 EXCAVATION: All excavation shall be accomplished to the tolerance normally defined by the Civil Engineer as shown on the project grading plans. All over-excavation below the grades specified shall be backfilled at the Contractor's expense and shall be compacted in accordance with the applicable technical requirements.

9.0 FILL AND BACKFILL MATERIAL: No material shall be moved or compacted without the presence or approval of the Soils Engineer. Material from the required site excavation may be utilized for construction site fills, provided prior approval is given by the Soils Engineer. All materials utilized for constructing site fills shall be free from vegetation or other deleterious matter as determined by the Soils Engineer.

10.0 PLACEMENT, SPREADING AND COMPACTION: The placement and spreading of approved fill materials and the processing and compaction of approved fill and native materials shall be the responsibility of the Contractor. Compaction of fill materials by flooding, ponding, or jetting shall not be permitted unless specifically approved by local code, as well as the Soils Engineer. Both cut and fill shall be surface-compacted to the satisfaction of the Soils Engineer prior to final acceptance.

11.0 SEASONAL LIMITS: No fill material shall be placed, spread, or rolled while it is frozen or thawing, or during unfavorable wet weather conditions. When the work is interrupted by heavy rains, fill operations shall not be resumed until the Soils Engineer indicates that the moisture content and density of previously placed fill is as specified.

12.0 DEFINITIONS - The term "pavement" shall include asphaltic concrete surfacing, untreated aggregate base, and aggregate subbase. The term "subgrade" is that portion of the area on which surfacing, base, or subbase is to be placed.

The term “Standard Specifications”: hereinafter referred to, is the most recent edition of the Standard Specifications of the State of California, Department of Transportation. The term "relative compaction" refers to the field density expressed as a percentage of the maximum laboratory density as determined by ASTM D1557 Test Method (latest edition) or California Test Method 216 (CAL-216), as applicable.

13.0 PREPARATION OF THE SUBGRADE - The Contractor shall prepare the surface of the various subgrades receiving subsequent pavement courses to the lines, grades, and dimensions given on the plans. The upper 12 inches of the soil subgrade beneath the pavement section shall be compacted to a minimum relative compaction of 95 percent based upon ASTM D1557. The finished subgrades shall be tested and approved by the Soils Engineer prior to the placement of additional pavement courses.

14.0 AGGREGATE BASE - The aggregate base material shall be spread and compacted on the prepared subgrade in conformity with the lines, grades, and dimensions shown on the plans. The aggregate base material shall conform to the requirements of Section 26 of the Standard Specifications for Class II material, ¾-inch or 1½-inches maximum size. The aggregate base material shall be compacted to a minimum relative compaction of 95 percent based upon CAL-216. The aggregate base material shall be spread in layers not exceeding 6 inches and each layer of aggregate material course shall be tested and approved by the Soils Engineer prior to the placement of successive layers.

15.0 AGGREGATE SUBBASE - The aggregate subbase shall be spread and compacted on the prepared subgrade in conformity with the lines, grades, and dimensions shown on the plans. The aggregate subbase material shall conform to the requirements of Section 25 of the Standard Specifications for Class II Subbase material. The aggregate subbase material shall be compacted to a minimum relative compaction of 95 percent based upon CAL-216, and it shall be spread and compacted in accordance with the Standard Specifications. Each layer of aggregate subbase shall be tested and approved by the Soils Engineer prior to the placement of successive layers.

16.0 ASPHALTIC CONCRETE SURFACING - Asphaltic concrete surfacing shall consist of a mixture of mineral aggregate and paving grade asphalt, mixed at a central mixing plant and spread and compacted on a prepared base in conformity with the lines, grades, and dimensions shown on the plans. The viscosity grade of the asphalt shall be PG 64-10, unless otherwise stipulated or local conditions warrant more stringent grade. The mineral aggregate shall be Type A or B, ½ inch maximum size, medium grading, and shall conform to the requirements set forth in Section 39 of the Standard Specifications. The drying, proportioning, and mixing of the materials shall conform to Section 39. The prime coat, spreading and compacting equipment, and spreading and compacting the mixture shall conform to the applicable chapters of Section 39, with the exception that no surface course shall be placed when the atmospheric temperature is below 50 degrees F. The surfacing shall be rolled with a combination steel-wheel and pneumatic rollers, as described in the Standard Specifications. The surface course shall be placed with an approved self-propelled mechanical spreading and finishing machine

APPENDIX

D

Appendix E

Noise & Groundborne Vibration Impact Assessment

NOISE & GROUNDBORNE VIBRATION IMPACT ANALYSIS

FOR

OAKHURST COMMUNITY COLLEGE CENTER PROJECT

STATE CENTER COMMUNITY COLLEGE DISTRICT
OAKHURST, CA

MARCH 2020

PREPARED FOR:

ODELL PLANNING & RESEARCH, INC.
49346 ROAD 426, SUITE 2
OAKHURST, CA 93644

PREPARED BY:

AMBIENT
AIR QUALITY & NOISE CONSULTING

612 12TH STREET, SUITE 201
PASO ROBLES, CA 93446

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LIST OF COMMON TERMS AND ACRONYMS

ANSI	Acoustical National Standards Institute, Inc.
Caltrans	California Department of Transportation
CEQA	California Environmental Quality Act
CNEL	Community Noise Equivalent Level
dB	Decibels
dBA	A-Weighted Decibels
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
Hz	Hertz
HVAC	Heating Ventilation & Air Conditioning
in/sec	Inches per Second
L_{dn}	Day-Night Level
L_{eq}	Equivalent Sound Level
L_{max}	Maximum Sound Level
ppv	Peak Particle Velocity
U.S. EPA	United States Environmental Protection Agency

INTRODUCTION

This report discusses the existing setting, identifies potential noise impacts associated with implementation of the proposed project. Noise mitigation measures are recommended where the predicted noise levels would exceed applicable noise standards.

PROPOSED PROJECT SUMMARY

The proposed State Center Community College District's Oakhurst Community College Center (project) will occupy a site in Liberty Village. Liberty Village development anticipates a range of land uses that are already permitted under the current Madera County CUM, IL, and RUM zoning designations. The proposed project site is on 30 acres located off of Westlake Drive roughly one-quarter mile north of State Route 49 (SR 49). The proposed project regional location site boundaries are depicted in Figure 1 and Figure 2, respectively.

The proposed project includes approximately 28,500 sf feet of building area at completion. The current enrollment of the existing facility located off of Civic Center Drive is 1,030 students, and these students would theoretically be relocated to the new site. The project envisions a maximum enrollment of 1,530 students. Proposed facilities are depicted in Figure 3. Construction of the project is anticipated to begin in 2020 and be completed by spring 2022.

EXISTING SETTING

CONCEPTS AND TERMINOLOGY

ACOUSTIC FUNDAMENTALS

Noise is generally defined as sound that is loud, disagreeable, or unexpected. Sound is mechanical energy transmitted in the form of a wave because of a disturbance or vibration. Sound levels are described in terms of both amplitude and frequency.

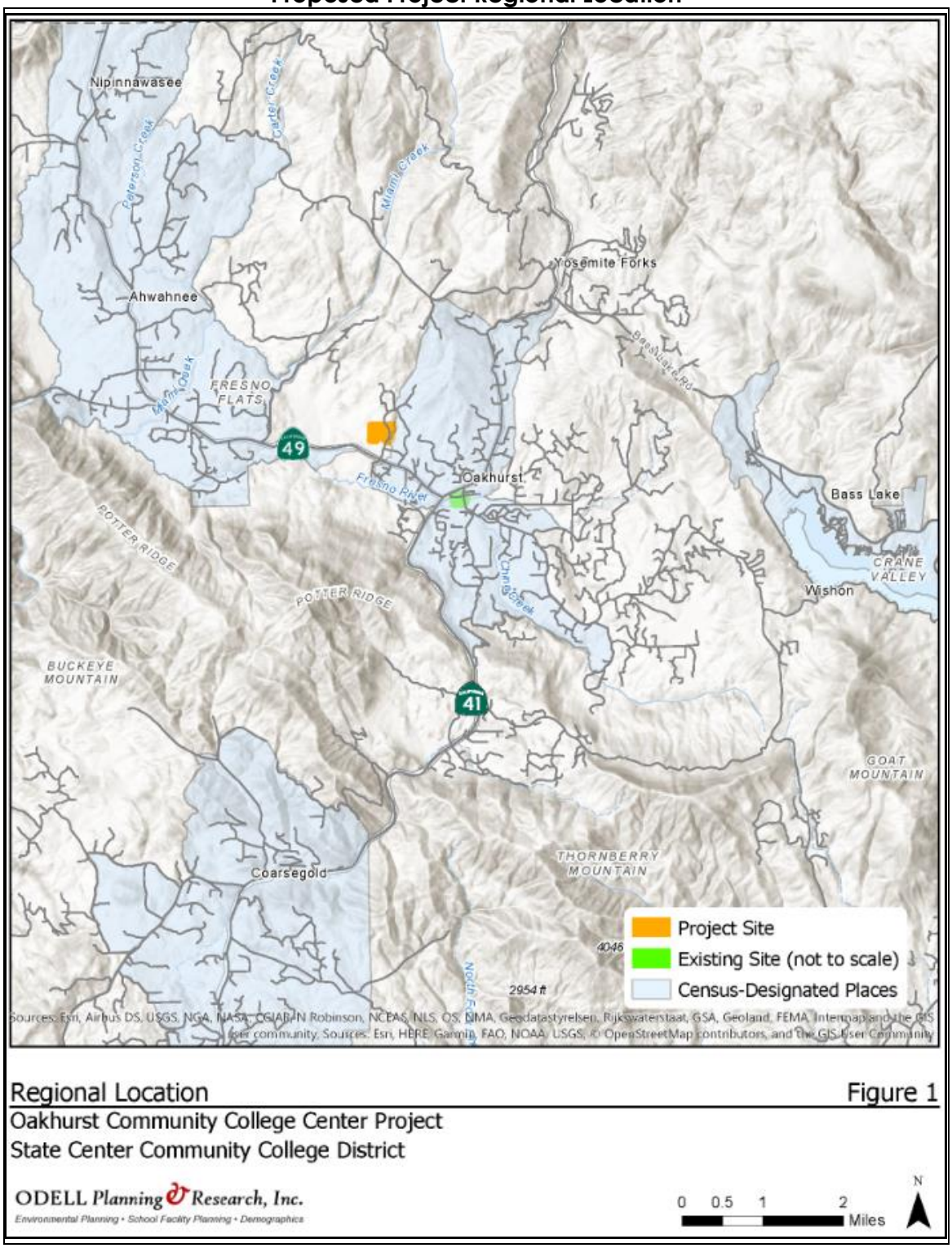
Amplitude

Amplitude is defined as the difference between ambient air pressure and the peak pressure of the sound wave. Amplitude is measured in decibels (dB) on a logarithmic scale. For example, a 65-dB source of sound, such as a truck, when joined by another 65 dB source results in a sound amplitude of 68 dB, not 130 dB (i.e., doubling the source strength increases the sound pressure by 3 dB). Amplitude is interpreted by the ear as corresponding to different degrees of loudness. Laboratory measurements correlate a 10 dB increase in amplitude with a perceived doubling of loudness and establish a 3-dB change in amplitude as the minimum audible difference perceptible to the average person.

Frequency

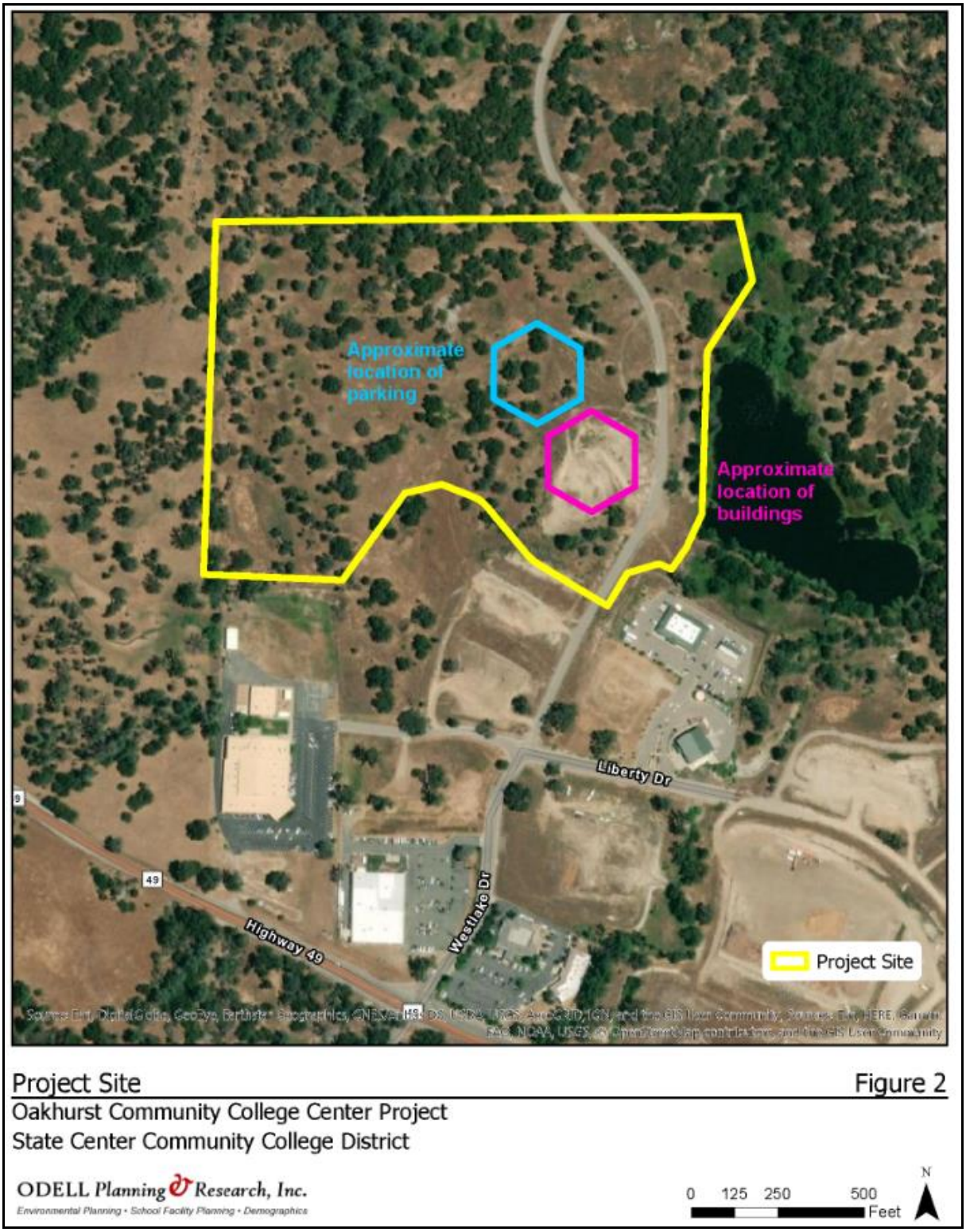
The frequency of a sound is defined as the number of fluctuations of the pressure wave per second. The unit of frequency is the Hertz (Hz). One Hz equals one cycle per second. The human ear is not equally sensitive to sound of different frequencies. For instance, the human ear is more sensitive to sound in the higher portion of this range than in the lower and sound waves below 16 Hz or above 20,000 Hz cannot be heard at all. To approximate the sensitivity of the human ear to changes in frequency, environmental sound is usually measured in what is referred to as "A-weighted decibels" (dBA). On this scale, the normal range of human hearing extends from about 10 dBA to about 140 dBA (U.S. EPA 1971). Common community noise sources and associated noise levels, in dBA, are depicted in Figure 4.

Figure 1
Proposed Project Regional Location



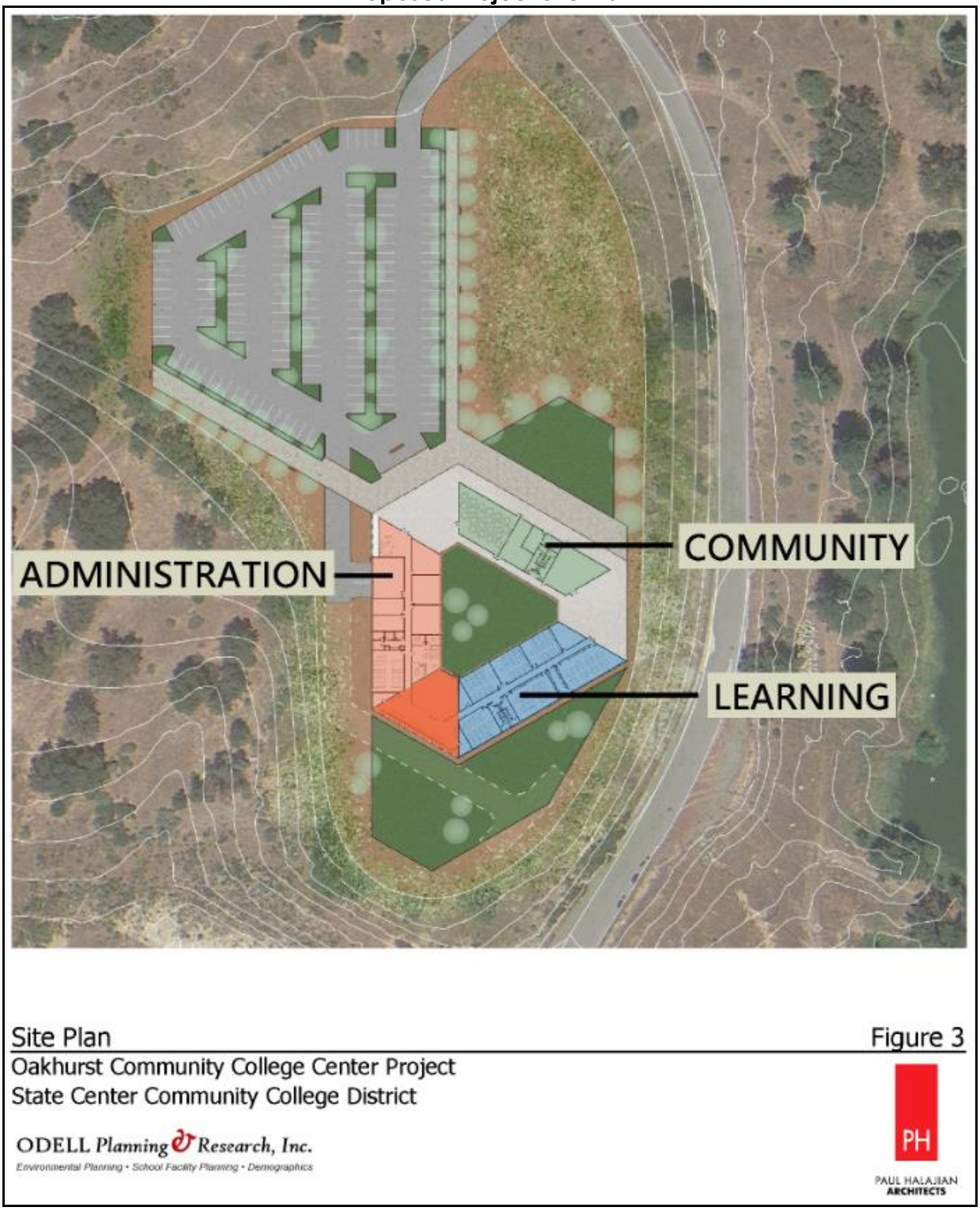
Source: OPR 2020

Figure 2
Proposed Project Site Boundaries



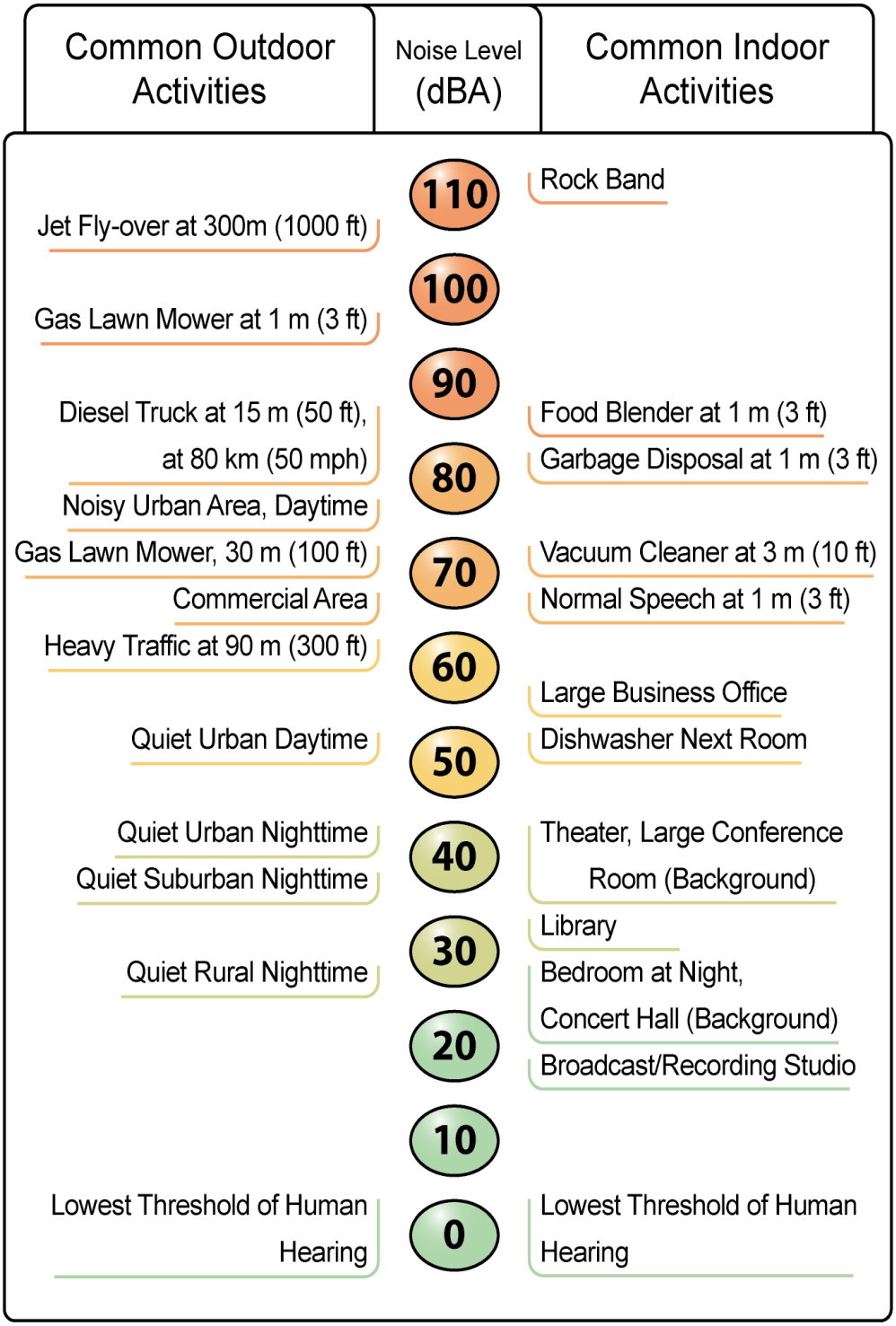
Source: OPR 2020

Figure 3
Proposed Project Site Plan



Source: OPR 2020

Figure 4
Common Community Noise Sources & Noise Levels



Source: Caltrans 2018

Addition of Decibels

Because decibels are logarithmic units, sound levels cannot be added or subtracted through ordinary arithmetic. Under the decibel scale, a doubling of sound energy corresponds to a 3-dB increase. In other words, when two identical sources are each producing sound of the same loudness, the resulting sound level at a given distance would be 3 dB higher than one source under the same conditions. For example, if one automobile produces a sound level of 70 dB when it passes an observer, two cars passing simultaneously would not produce 140 dB; rather, they would combine to produce 73 dB. Under the decibel scale, three sources of equal loudness together would produce an increase of 5 dB.

Sound Propagation & Attenuation

Geometric Spreading

Sound from a localized source (i.e., a point source) propagates uniformly outward in a spherical pattern. The sound level decreases (attenuates) at a rate of approximately 6 decibels for each doubling of distance from a point source. Highways consist of several localized noise sources on a defined path, and hence can be treated as a line source, which approximates the effect of several point sources. Noise from a line source propagates outward in a cylindrical pattern, often referred to as cylindrical spreading. Sound levels attenuate at a rate of approximately 3 decibels for each doubling of distance from a line source, depending on ground surface characteristics. For acoustically hard sites (i.e., sites with a reflective surface between the source and the receiver, such as a parking lot or body of water,), no excess ground attenuation is assumed. For acoustically absorptive or soft sites (i.e., those sites with an absorptive ground surface between the source and the receiver, such as soft dirt, grass, or scattered bushes and trees), an excess ground-attenuation value of 1.5 decibels per doubling of distance is normally assumed. When added to the cylindrical spreading, the excess ground attenuation for soft surfaces results in an overall attenuation rate of 4.5 decibels per doubling of distance from the source.

Atmospheric Effects

Receptors located downwind from a source can be exposed to increased noise levels relative to calm conditions, whereas locations upwind can have lowered noise levels. Sound levels can be increased at large distances (e.g., more than 500 feet) from the highway due to atmospheric temperature inversion (i.e., increasing temperature with elevation). Other factors such as air temperature, humidity, and turbulence can also have significant effects.

Shielding by Natural or Human-Made Features

A large object or barrier in the path between a noise source and a receiver can substantially attenuate noise levels at the receiver. The amount of attenuation provided by shielding depends on the size of the object and the frequency content of the noise source. Natural terrain features (e.g., hills and dense woods) and human-made features (e.g., buildings and walls) can substantially reduce noise levels. Walls are often constructed between a source and a receiver specifically to reduce noise. A barrier that breaks the line of sight between a source and a receiver will typically result in minimum 5 dB of noise reduction. Taller barriers provide increased noise reduction.

Noise reductions afforded by building construction can vary depending on construction materials and techniques. Standard construction practices typically provide approximately 15 dBA exterior-to-interior noise reductions for building facades, with windows open, and approximately 20-30 dBA, with windows closed. With compliance with current Title 24 energy efficiency standards, which require increased building insulation and inclusion of an interior air ventilation system to allow windows on noise-impacted façades to remain closed, exterior-to-interior noise reductions typically average approximately 25 dBA. The absorptive characteristics of interior rooms, such as carpeted floors, draperies and furniture, can result in further reductions in interior noise.

NOISE DESCRIPTORS

The decibel scale alone does not adequately characterize how humans perceive noise. The dominant frequencies of a sound have a substantial effect on the human response to that sound. Although the intensity (energy per unit area) of the sound is a purely physical quantity, the loudness or human response is determined by the characteristics of the human ear.

Human hearing is limited in the range of audible frequencies as well as in the way it perceives the sound-pressure level in that range. In general, people are most sensitive to the frequency range of 1,000–8,000 Hz, and perceive sounds within that range better than sounds of the same amplitude in higher or lower frequencies. To approximate the response of the human ear, sound levels of individual frequency bands are weighted, depending on the human sensitivity to those frequencies, which is referred to as the "A-weighted" sound level (expressed in units of dBA). The A-weighting network approximates the frequency response of the average young ear when listening to most ordinary sounds. When people make judgments of the relative loudness or annoyance of a sound, their judgments correlate well with the A-scale sound levels of those sounds. Other weighting networks have been devised to address high noise levels or other special problems (e.g., B-, C-, and D-scales), but these scales are rarely used in conjunction with environmental noise.

The intensity of environmental noise fluctuates over time, and several descriptors of time-averaged noise levels are typically used. For the evaluation of environmental noise, the most commonly used descriptors are L_{eq}, L_{dn}, CNEL and SEL. The energy-equivalent noise level, L_{eq}, is a measure of the average energy content (intensity) of noise over any given period. Many communities use 24-hour descriptors of noise levels to regulate noise. The day-night average noise level, L_{dn}, is the 24-hour average of the noise intensity, with a 10-dBA "penalty" added for nighttime noise (10 p.m. to 7 a.m.) to account for the greater sensitivity to noise during this period. CNEL, the community equivalent noise level, is similar to L_{dn} but adds an additional 5-dBA penalty for evening noise (7 p.m. to 10 p.m.) Another descriptor that is commonly discussed is the single-event noise exposure level, also referred to as the sound-exposure level, expressed as SEL. The SEL describes a receiver's cumulative noise exposure from a single noise event, which is defined as an acoustical event of short duration (0.5 second), such as a backup beeper, the sound of an airplane traveling overhead, or a train whistle. Common noise level descriptors are summarized in Table 1.

Table 1
Common Acoustical Descriptors

Descriptor	Definition
Energy Equivalent Noise Level (L_{eq})	The energy mean (average) noise level. The instantaneous noise levels during a specific period of time in dBA are converted to relative energy values. From the sum of the relative energy values, an average energy value (in dBA) is calculated.
Minimum Noise Level (L_{min})	The minimum instantaneous noise level during a specific period of time.
Maximum Noise Level (L_{max})	The maximum instantaneous noise level during a specific period of time.
Day-Night Average Noise Level (DNL or L_{dn})	The DNL was first recommended by the U.S. EPA in 1974 as a "simple, uniform and appropriate way" of measuring long term environmental noise. DNL takes into account both the frequency of occurrence and duration of all noise events during a 24-hour period with a 10 dBA "penalty" for noise events that occur between the more noise-sensitive hours of 10:00 p.m. and 7:00 a.m. In other words, 10 dBA is "added" to noise events that occur in the nighttime hours to account for increases sensitivity to noise during these hours.
Community Noise Equivalent Level (CNEL)	The CNEL is similar to the L_{dn} described above, but with an additional 5 dBA "penalty" added to noise events that occur between the hours of 7:00 p.m. to 10:00 p.m. The calculated CNEL is typically approximately 0.5 dBA higher than the calculated L_{dn}.
Sound Exposure Level (SEL)	The level of sound accumulated over a given time interval or event. Technically, the sound exposure level is the level of the time-integrated mean square A-weighted sound for a stated time interval or event, with a reference time of one second.

HUMAN RESPONSE TO NOISE

The human response to environmental noise is subjective and varies considerably from individual to individual. Noise in the community has often been cited as a health problem, not in terms of actual physiological damage, such as hearing impairment, but in terms of inhibiting general well-being and contributing to undue stress and annoyance. The health effects of noise in the community arise from interference with human activities, including sleep, speech, recreation, and tasks that demand concentration or coordination. Hearing loss can occur at the highest noise intensity levels. When community noise interferes with human activities or contributes to stress, public annoyance with the noise source increases. The acceptability of noise and the threat to public well-being are the basis for land use planning policies preventing exposure to excessive community noise levels.

Unfortunately, there is no completely satisfactory way to measure the subjective effects of noise or of the corresponding reactions of annoyance and dissatisfaction. This is primarily because of the wide variation in individual thresholds of annoyance and habituation to noise over differing individual experiences with noise. Thus, an important way of determining a person's subjective reaction to a new noise is the comparison of it to the existing environment to which one has adapted: the so-called "ambient" environment. In general, the more a new noise exceeds the previously existing ambient noise level, the less acceptable the new noise will be judged. Regarding increases in A-weighted noise levels, knowledge of the following relationships will be helpful in understanding this analysis:

- Except in carefully controlled laboratory experiments, a change of 1 dB cannot be perceived by humans;
- Outside of the laboratory, a 3-dB change is considered a just-perceivable difference;
- A change in level of at least 5 dB is required before any noticeable change in community response would be expected. An increase of 5 dB is typically considered substantial;
- A 10-dB change is subjectively heard as an approximate doubling in loudness and would almost certainly cause an adverse change in community response.

Effects of Noise on Human Activities

The extent to which environmental noise is deemed to result in increased levels of annoyance, activity interference, and sleep disruption varies greatly from individual to individual depending on various factors, including the loudness or suddenness of the noise, the information value of the noise (e.g., aircraft overflights, child crying, fire alarm), and an individual's sleep state and sleep habits. Over time, adaptation to noise events and increased levels of noise may also occur. In terms of land use compatibility, environmental noise is often evaluated in terms of the potential for noise events to result in increased levels of annoyance, sleep disruption, or interference with speech communication, activities, and learning. Noise-related effects on human activities are discussed in more detail, as follows:

Speech Communication

For most noise-sensitive land uses, an interior noise level of 45 dB L_{eq} is typically identified for the protection of speech communication in order to provide for 100-percent intelligibility of speech sounds. Assuming a minimum 20-dB reduction in sound level between outdoors and indoors, with windows closed, this interior noise level of 45 dB L_{eq} would equate to an exterior noise level of 65 dBA L_{eq}. For outdoor voice communication, an exterior noise level of 60 dBA L_{eq} allows normal conversation at distances up to 2 meters with 95 percent sentence intelligibility (U.S. EPA 1974.) Based on this information, speech interference begins to become a problem when steady noise levels reach approximately 60 to 65 dBA. Within interior noise environments, an average-hourly background noise level of 45 dBA L_{eq} is typically recommended for noise-sensitive land uses, such as educational facilities (Caltrans 2002).

Learning

Closely related to speech interference are the effects of noise on learning and, more broadly, on cognitive tasks. Recent studies have shown a strong relationship between noise and children's reading ability. Children's attention spans also appear to be adversely affected by noise. Adults are affected as well. Some studies indicate that, in a noisy environment, adults have increased difficulty accomplishing complex tasks. One of the issues associated with assessment of these effects is which noise metric correlates most closely with the impacts. For example, the average-daily noise level (i.e., CNEL/L_{dn}), which incorporates a nighttime weighting, may not be the best measure of noise impacts on schools given that operational activities are often limited to the daytime hours (Caltrans 2002).

Various standards and recommended criteria have been developed to specifically address classroom noise. For instance, with regard to transportation sources, the California Department of Transportation has adopted abatement criteria that limit the maximum interior average-hourly noise level within classrooms and other noise-sensitive interior uses, to 52 dBA L_{eq}. In June 2002, the American National Standards Institute, Inc. (ANSI) released a new classroom acoustics standard entitled Acoustical Performance Criteria, Design Requirements, and Guidelines for Schools" (ANSI S12.60-2002). For schools exposed to intermittent background noise sources, such as airport and other transportation noise, the ANSI standards recommend that interior noise levels not exceed 40 dBA L_{eq} during the noisiest hour of the day. At present complying with the ANSI-recommended standard is voluntary in most locations.

Annoyance & Sleep Disruption

With regard to potential increases in annoyance, activity interference, and sleep disruption, land use compatibility determinations are typically based on the use of the cumulative noise exposure metrics (i.e., CNEL or L_{dn}). Perhaps the most comprehensive and widely accepted evaluation of the relationship between noise exposure and the extent of annoyance was one originally developed by Theodore J. Schultz in 1978. In 1978 the research findings of Theodore J. Schultz provided support for L_{dn} as the descriptor for environmental noise. Research conducted by Schultz identified a correlation between the cumulative noise exposure metric and individuals who were highly annoyed by transportation noise. The Schultz curve, expressing this correlation, became a basis for noise standards. When expressed graphically, this relationship is typically referred to as the Schultz curve. The Schultz curve indicates that approximately 13 percent of the population is highly annoyed at a noise level of 65 dBA L_{dn}. It also indicates that the percent of people describing themselves as being highly annoyed accelerates smoothly between 55 and 70 dBA L_{dn}. A noise level of 65 dBA L_{dn} is a commonly referenced dividing point between lower and higher rates of people describing themselves as being highly annoyed (Caltrans 2002).

The Schultz curve and associated research became the basis for many of the noise criteria subsequently established for federal, state, and local entities. Most federal and state of California regulations and policies related to transportation noise sources establish a noise level of 65 dBA CNEL/L_{dn} as the basic limit of acceptable noise exposure for residential and other noise-sensitive land uses. For instance, with respect to aircraft noise, both the Federal Aviation Administration (FAA) and the State of California have identified a noise level of 65 dBA L_{dn} as the dividing point between normally compatible and normally incompatible residential land use generally applied for determination of land use compatibility. For noise-sensitive land uses exposed to aircraft noise, noise levels in excess of 65 dBA CNEL/L_{dn} are typically considered to result in a potentially significant increase in levels of annoyance (Caltrans 2002).

Allowing for an average exterior-to-interior noise reduction of 20 dB, an exterior noise level of 65 dBA CNEL/L_{dn} would equate to an interior noise level of 45 dBA CNEL/L_{dn}. An interior noise level of 45 dB CNEL/L_{dn} is generally considered sufficient to protect against activity interference at most noise-sensitive land uses, including residential dwellings, and would also be sufficient to protect against sleep interference (U.S. EPA 1974.) Within California, the California Building Code establishes a noise level of 45 dBA CNEL as the maximum acceptable interior noise level for residential uses (other than detached single-family dwellings). Use of the 45 dBA CNEL threshold is further supported by recommendations provided in the State of California Office of Planning and Research's *General Plan Guidelines*, which recommend an

interior noise level of 45 dB CNEL/L_{dn} as the maximum allowable interior noise level sufficient to permit "normal residential activity."

The cumulative noise exposure metric is currently the only noise metric for which there is a substantial body of research data and regulatory guidance defining the relationship between noise exposure, people's reactions, and land use compatibility. However, when evaluating environmental noise impacts involving intermittent noise events, such as aircraft overflights and train passbys, the use of cumulative noise metrics may not provide a thorough understanding of the resultant impact. The general public often finds it difficult to understand the relationship between intermittent noise events and cumulative noise exposure metrics. In such instances, supplemental use of other noise metrics, such as the L_{eq} or L_{max} descriptor, may be helpful as a means of increasing public understanding regarding the relationship between these metrics and the extent of the resultant noise impact (Caltrans 2002).

AFFECTED ENVIRONMENT

NOISE-SENSITIVE LAND USES

Noise-sensitive land uses are generally considered to include those uses where noise exposure could result in health-related risks to individuals, as well as places where quiet is an essential element of their intended purpose. Residential dwellings are of primary concern because of the potential for increased and prolonged exposure of individuals to both interior and exterior noise levels. Additional land uses such as parks, historic sites, cemeteries, and recreation areas are also considered sensitive to increases in exterior noise levels. Schools, churches, hotels, libraries, and other places where low interior noise levels are essential are also considered noise-sensitive land uses.

Nearby existing land uses consist predominantly of a mix of commercial and office land uses. The nearest noise-sensitive land uses located in the vicinity of the proposed project site include a church/childcare center, which is located approximately 300 feet south of the project site at the terminus of Liberty Drive, west of Westlake Drive. Residential land uses are also approved for future construction approximately 800 feet south of the project site, adjacent to and south of Liberty Drive.

AMBIENT NOISE ENVIRONMENT

To document existing ambient noise levels in the project area, short-term ambient noise measurements were conducted on September 18 and 19, 2020, using a Larson Davis Laboratories, Type I, Model 820 integrating sound-level meter. The meter was calibrated before use and is certified to be in compliance with ANSI specifications. Measured ambient noise levels are summarized in Table 2.

As indicated in Table 2, measured ambient noise levels in the project area ranged from approximately 47 to 55 dBA L_{eq}. Ambient noise levels within the project area are predominantly influenced by vehicle traffic on area roadways. Ambient noise levels during the evening and nighttime hours are generally 5 to 10 dB lower than daytime noise levels.

Table 2
Summary of Measured Ambient Noise Levels

Location	Monitoring Period	Noise Levels (dBA)	
		L_{eq}	L_{max}
Monitoring Date 9/18/19			
ST-1: approximately 230 feet north of SR-49, on the west side of Westlake Dr.	15:00 - 15:10	55.2	67.3
ST-2: approximately 70 east of the corner of Westlake Dr. and Liberty Dr.	14:20 - 14:30	50.4	65.6
ST-3: approximately 800 feet north of Liberty Dr., on the east side of Westlake Dr.	14:40 – 14:50	47.1	55.2
Monitoring Date 9/19/19			
ST-1: approximately 230 feet north of SR-49, on the west side of Westlake Dr.	08:55 – 09:05	52.7	65.9
ST-2: approximately 70 east of the corner of Westlake Dr. and Liberty Dr.	09:18 – 09:28	50.4	60.0
ST-3: approximately 800 feet north of Liberty Dr., on the east side of Westlake Dr.	09:30 – 09:40	48.3	55.8
Ambient noise measurements were conducted using a Larson Davis Laboratories, Type I, Model 820 integrating sound-level meter.			

REGULATORY FRAMEWORK

NOISE

State of California

The State of California regulates vehicular and freeway noise affecting classrooms, sets standards for sound transmission and occupational noise control, and identifies noise insulation standards and airport noise/land-use compatibility criteria.

California General Plan Guidelines

The *State of California General Plan Guidelines*, published by the Governor's Office of Planning and Research (OPR 2003), also provides guidance for the acceptability of projects within specific CNEL/L_{dn} contours. The guidelines also present adjustment factors that may be used in order to arrive at noise acceptability standards that reflect the noise control goals of the community, the particular community's sensitivity to noise, and the community's assessment of the relative importance of noise pollution. For school land uses, the *State of California General Plan Guidelines* identify a "normally acceptable" exterior noise level of up to 70 dBA CNEL/L_{dn}. Schools are considered "conditionally acceptable" within noise environments of 60 to 70 dBA CNEL/L_{dn} and "normally unacceptable" within exterior noise environments of 70 to 80 CNEL/L_{dn} and "clearly unacceptable" within exterior noise environments in excess of 80 dBA CNEL/L_{dn}. Assuming a minimum exterior-to-interior noise reduction of 20 dB, an exterior noise environment of 65 dBA CNEL/L_{dn} would allow for a normally acceptable interior noise level of 45 dBA CNEL/L_{dn}.

County of Madera

The *Madera County General Plan Noise Element* includes noise standards for both transportation and stationary noise sources for determination of land use compatibility. In accordance with General Plan policies, noise-sensitive land uses exposed to transportation noise sources are limited to 60 dB L_{dn} in outdoor activity areas and 45 dB L_{dn} in interior spaces. Non-transportation noise sources are limited to an exterior average-hourly noise level of 50 dBA L_{eq} during the daytime hours of 7 a.m. to 10 p.m., and to 45 dBA L_{eq} during the nighttime hours of 10 p.m. to 7 a.m. Maximum instantaneous noise levels are limited to 70 and 65

dBA L_{max} for these same daytime and nighttime periods, respectively. The County's noise standards for non-transportation noise sources are summarized in Table 3.

Table 3
County of Madera General Plan Noise Standards - Stationary Noise Sources[1]

Noise Descriptor	Noise Level Standards (dBA)	
	Daytime (7 am - 10 pm)	Nighttime (10 pm – 7 am)
Hourly Equivalent Sound Level (L_{eq})	50	45
Maximum Sound Level (L_{max})	70	65

[1]As determined at the property line of the receiving land use. When determining the effectiveness of noise mitigation measures, the standards may be applied on the receptor side of noise barriers at the property line.

Source: County of Madera 1995

The County of Madera Municipal Code (Title 9, Chapter 9.58, Noise Regulation) contains additional limitations intended to prevent noise which may create dangerous, injurious, noxious, or otherwise objectionable conditions. As opposed to the City's General Plan noise standards, the City's noise ordinance is primarily used for the regulation of existing uses and activities, including construction activities, and are not typically used as a basis for land use planning. Construction activities are limited to the hours of 7:00 a.m. to 7:00 p.m., Monday through Friday, 9:00 a.m. to 5:00 p.m. on Saturday and prohibited on Sunday (County of Madera 2019).

GROUNDBORNE VIBRATION

Vibration is like noise in that it involves a source, a transmission path, and a receiver. While vibration is related to noise, it differs in that noise is generally considered to be pressure waves transmitted through air, whereas vibration usually consists of the excitation of a structure or surface. As with noise, vibration consists of amplitude and frequency. A person's perception of the vibration will depend on their individual sensitivity to vibration, as well as the amplitude and frequency of the source and the response of the system which is vibrating. Vibration can be measured in terms of acceleration, velocity, or displacement. Measurements in terms of velocity are expressed as peak particle velocity (PPV) with units of inches per second (in/sec).

There are no federal, state, or local regulatory standards for groundborne vibration. However, Caltrans has developed vibration criteria based on potential structural damage risks and human annoyance. Caltrans-recommended criteria for the evaluation of groundborne vibration levels, with regard to structural damage and human annoyance, are summarized in Table 4. The criteria apply to continuous vibration sources, which include vehicle traffic and most construction activities. All damage criteria for buildings are in terms of ground motion at the buildings' foundations. No allowance is included for the amplifying effects of structural components (Caltrans 2013).

As indicated in Table 4, the threshold at which there is a risk to normal structures from continuous events is 0.3 in/sec PPV for older residential structures and 0.5 in/sec PPV for newer building construction. With regard to human perception, vibration levels would begin to become distinctly perceptible at levels of 0.04 in/sec PPV for continuous events. Continuous vibration levels are considered potentially annoying for people in buildings at levels of 0.2 in/sec PPV.

Table 4
Summary of Groundborne Vibration Levels and Potential Effects

Vibration Level (in/sec ppv)	Human Reaction	Effect on Buildings
0.006 - 0.019	Threshold of perception; possibility of intrusion.	Vibrations unlikely to cause damage of any type.
0.08	Vibrations readily perceptible.	Recommended upper level of the vibration to which ruins and ancient monuments should be subjected.
0.10	Level at which continuous vibrations begin to annoy people.	Virtually no risk of "architectural" damage to normal buildings.
0.20	Vibrations annoying to people in buildings (this agrees with the levels established for people standing on bridges and subjected to relatively short periods of vibrations).	Threshold at which there is a risk of "architectural" damage to fragile buildings.
0.3 - 0.6	Vibrations become distinctly perceptible at 0.04 in/sec ppv and considered unpleasant by people subjected to continuous vibrations and unacceptable to some people walking on bridges.	Potential risk of "architectural" damage may occur at levels above 0.3 in/sec ppv for older residential structures and above 0.5 in/sec ppv for newer structures.

The vibration levels are based on peak particle velocity in the vertical direction for continuous vibration sources, which includes most construction activities.
Source: Caltrans 2013

IMPACTS AND MITIGATION MEASURES

METHODOLOGY

Short-Term Construction Noise

Short-term noise impacts associated with construction activities were analyzed based on typical construction equipment noise levels and distances to the nearest noise-sensitive land uses. Noise levels were predicted based on an average noise-attenuation rate of 6 dB per doubling of distance from the source.

Long-term Operational Noise

Roadway Traffic Noise

Traffic noise levels were calculated using the Federal Highway Administration (FHWA) roadway noise prediction model (FHWA-RD-77-108) based on California vehicle reference noise levels and traffic data obtained from the traffic analysis prepared for this project. Additional input data included day/night percentages of autos, medium and heavy trucks, vehicle speeds, ground attenuation factors, and roadway widths. The project's contribution to traffic noise levels along area roadways was determined by comparing the predicted noise levels with and without project-generated traffic. The compatibility of the proposed land uses were evaluated based on predicted future on-site noise conditions and in comparison to the County of Madera's interior noise standard of 45 dBA CNEL/L_{dn} for school uses.

The *CEQA Guidelines* do not define the levels at which temporary and permanent increases in ambient noise are considered "substantial." As discussed previously in this section, a noise level increase of 3 dBA is barely perceptible to most people, a 5 dBA increase is readily noticeable, and a difference of 10 dBA would be perceived as a doubling of loudness. For purposes of this analysis, a significant increase in ambient noise levels would be defined as an increase of 3 dBA, or greater. Significant increases in ambient

noise levels that would exceed applicable noise standards would be considered to have a potentially significant impact.

Non-Transportation Noise

Noise levels associated with vehicle parking areas were calculated in accordance with FHWA's *Transit Noise and Vibration Impact Assessment Guidelines* (2006) assuming a reference noise level of 92 dBA SEL. Average-hourly noise levels associated with vehicle parking-related activities were calculated based on the conservative assumption that all parking spaces would be accessed over a one-hour period. Noise levels generated by other on-site noise sources, including on-site building mechanical equipment were assessed based on representative manufacturer and measured data obtained from similar sources.

Groundborne Vibration

The *CEQA Guidelines* also do not define the levels at which groundborne vibration levels would be considered excessive. For this reason, Caltrans' recommended groundborne vibration thresholds were used for the evaluation of impacts based on increased potential for structural damage and human annoyance, as identified in Table 4. Based on these levels, groundborne vibration levels would be considered to have a potentially significant impact with regard to potential structural damage if levels would exceed a 0.5 in/sec ppv.

PROJECT IMPACTS

Impact Noise-A:	***Would the project result in the generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?***

Noise generated by the proposed project would occur during short-term construction and long-term operation. Noise-related impacts associated with short-term construction and long-term operations of the proposed project are discussed separately, as follows:

Short-term Construction Noise Levels

Construction noise typically occurs intermittently and varies depending upon the nature or phase (e.g., demolition/land clearing, grading and excavation, erection) of construction. Noise generated by construction equipment, including earth movers, material handlers, and portable generators, can reach high levels. Although noise ranges were found to be similar for all construction phases, the initial site preparation phases, including demolition and grading/excavation activities, tend to involve the most equipment and result in the highest average-hourly noise levels.

Noise levels commonly associated with construction equipment are summarized in Table 5. As noted in Table 5, instantaneous noise levels (in dBA L_{max}) generated by individual pieces of construction equipment typically range from approximately 80 dBA to 85 dBA L_{max} at 50 feet (FTA 2006). Typical operating cycles may involve 2 minutes of full power, followed by 3 or 4 minutes at lower settings. Average-hourly noise levels for individual equipment generally range from approximately 73 to 82 dBA L_{eq}. Based on typical off-road equipment usage rates and assuming multiple pieces of equipment operating simultaneously within a localized area, such as soil excavation activities, average-hourly noise levels could reach levels of approximately 80 dBA L_{eq} at roughly 100 feet.

Table 5
Typical Construction Equipment Noise Levels

Equipment	Typical Noise Level (dBA) at 50 feet from Source	
	L_{max}	L_{eq}
Compactor, Concrete Vibratory Mixer	80	73
Backhoe/Front-End Loader, Air Compressor	80	76
Generator	82	79
Crane, Mobile	85	77
Jack Hammer, Roller	85	78
Dozer, Excavator, Grader, Concrete Mixer Truck	85	81
Paver, Pneumatic Tools	85	82
Sources: FTA 2006		

The County has not adopted noise standards that apply to short-term construction activities. However, based on screening noise criteria commonly recommended by federal agencies, construction activities would generally be considered to have a potentially significant impact if average-hourly daytime noise levels would exceed 80 dBA L_{eq} at noise-sensitive land uses, such as residential land uses (FTA 2006). Depending on the location and types of activities conducted (e.g., building demolition, soil excavation, grading), predicted noise levels at nearby existing or future planned residential land uses could potentially exceed 80 dBA L_{eq}. Furthermore, with regard to residential land uses, activities occurring during the more noise-sensitive evening and nighttime hours could result in increased levels of annoyance and potential sleep disruption. For these reasons, noise-generating construction activities would be considered to have a ***potentially significant*** short-term noise impact.

Mitigation Measure Noise-1: The following measures shall be implemented to reduce construction-generated noise levels:

a. Construction activities (excluding activities that would result in a safety concern to the public or construction workers) shall be limited to between the hours of 7:00 a.m. to 7:00 p.m., Monday through Friday, 9:00 a.m. to 5:00 p.m. on Saturdays, and prohibited on Sundays and legal holidays.

b. Construction truck trips shall be scheduled, to the extent feasible, to occur during non-peak hours and truck haul routes shall be selected to minimize impacts to the nearby childcare center.

c. Construction equipment shall be properly maintained and equipped with noise-reduction intake and exhaust mufflers and engine shrouds, in accordance with manufacturers' recommendations. Equipment engine shrouds shall be closed during equipment operation.

d. Stationary construction equipment (e.g., portable power generators) should be located at the furthest distance possible from the nearby childcare center.

e. When not in use, all equipment shall be turned off and shall not be allowed to idle. Provide clear signage that posts this requirement for workers at the entrances to the site.

Significance After Mitigation: Use of mufflers would reduce individual equipment noise levels by approximately 10 dBA. In addition, implementation of the above mitigation measures would limit construction activities to the less noise-sensitive periods of the day. With implementation of the above mitigation measures, this impact would be considered ***less than significant***.

Long-term Operational Noise Levels

Potential long-term increases in noise associated with the proposed project would be primarily associated with the operation of building mechanical equipment, such as heating, ventilation, and air conditioning (HVAC) units, and vehicle use within onsite parking areas and along area roadways.

Building Maintenance & Mechanical Equipment

Proposed structures would be anticipated to include the use of building mechanical equipment, such as air conditioning units and exhaust fans. The specific building mechanical equipment to be installed and the locations of such equipment have not yet been identified. Building mechanical equipment (e.g., air conditioning units, exhaust fans) would typically be located within the structures, enclosed, or placed on rooftop areas away from direct public exposure. Exterior air conditioning units and exhaust fans can generate noise levels up to approximately 65 dBA L_{eq} at 10 feet. Depending on type and location of onsite equipment, predicted operational noise levels at the nearby childcare center would be approximately 27 dBA L_{eq}, or less. Predicted noise levels at the planned residential development would be approximately 28 dBA L_{eq}, or less. Predicted operational noise levels associated with building mechanical equipment would not exceed the County's exterior daytime and nighttime noise standards of 50 and 45 dBA L_{eq}, respectively. As a result, this impact would be considered ***less than significant***.

Vehicle Parking Lot

The proposed project includes the construction of an approximate 187-space parking lot. Based on a conservative assumption that all parking spaces would to be accessed over a one-hour period, predicted noise levels at the southern property line of the project site would be approximately 41 dBA L_{eq}. Predicted noise levels at the nearby childcare center and planned residential development would be less than 10 dBA. Predicted operational noise levels would be largely masked by ambient noise levels, which generally range from the upper 40's to mid 50's (in dBA L_{eq}) and are predominantly influenced by vehicle traffic noise on area roadways. Predicted noise levels associated with on-site parking lot activities would not exceed the County's exterior daytime and nighttime noise standards of 50 and 45 dBA L_{eq}, respectively As a result, this impact would be considered ***less than significant.***

Roadway Traffic

Predicted existing traffic noise levels, with and without implementation of proposed project, are summarized in Table 6. In comparison to existing traffic noise levels, the proposed project would result in a predicted increase in traffic noise levels of 0.7 dBA CNEL along Westlake Dr., north of SR-49.

Predicted future cumulative traffic noise levels, with and without implementation of proposed project, are summarized in Table 7. Under future cumulative conditions, the proposed project would result in predicted increases in traffic noise levels of 0.8 dBA CNEL, or less, along primarily affected roadways.

As noted earlier in this report, changes in ambient noise levels of approximately 3 dBA, or less, are typically not discernible to the human ear and would not be considered to result in a significant impact. Implementation of the proposed project would not result in a significant increase (i.e., 3 dBA, or greater) in existing and projected future traffic noise levels along primarily affected roadways. As a result, this impact would be considered ***less than significant***.

Table 6
Predicted Increases in Existing Traffic Noise Levels

Roadway Segment	Predicted Noise Level at 50 feet from Centerline of Near Travel Lane (dBA CNEL/L_{dn})[1]			
	Existing Without Project	Existing With Project	Difference[2]	Significant Impact?[3]
Westlake Drive, North of SR-49	55.9	56.6	0.7	No
SR-49, East of Westlake Drive	66.6	67.0	0.4	No
SR-49, West of Westlake Drive	59.8	59.8	0.0	No

1. Traffic noise levels were calculated using the FHWA roadway noise prediction model (FHWA-RD-77-108), based on data obtained from the traffic analysis prepared for this project.
2. Difference in noise levels reflects the incremental increase attributable to the proposed project.
3. Defined as a substantial increase (i.e., 3 dBA, or greater) in ambient noise levels.

Table 7
Predicted Increases in Future Cumulative Traffic Noise Levels

Roadway Segment	Predicted Noise Level at 50 feet from Centerline of Near Travel Lane (dBA CNEL/L_{dn})[1]			
	Future Without Project	Future With Project	Difference[2]	Significant Impact?[3]
Westlake Drive, North of SR-49	57.4	58.2	0.8	No
SR-49, East of Westlake Drive	67.5	67.8	0.3	No
SR-49, West of Westlake Drive	60.7	60.7	0.0	No

1. Traffic noise levels were calculated using the FHWA roadway noise prediction model (FHWA-RD-77-108), based on data obtained from the traffic analysis prepared for this project.
2. Difference in noise levels reflects the incremental increase attributable to the proposed project.
3. Defined as a substantial increase (i.e., 3 dBA, or greater) in ambient noise levels.

Land Use Compatibility

In accordance with Madera County General Plan policies, noise-sensitive land uses exposed to transportation noise sources are limited to 60 dB L_{dn} in outdoor activity areas and 45 dB L_{dn} in interior spaces. The proposed project does not include outdoor activity areas (e.g., recreational uses). Based on the noise modeling noted above, predicted future cumulative exterior traffic noise levels at the boundary of the project site would be approximately 59 dBA CNEL, or less. Based on this predicted noise level and assuming an average exterior-to-interior noise reduction of 25 dBA, which is typical for newer building construction, predicted onsite interior noise levels would be approximately 34 dBA CNEL, or less. Predicted interior noise levels would not exceed the County's noise standard of 45 dBA CNEL. As a result, this impact would be considered ***less than significant***.

Impact Noise-B. ***Would the project result in the generation of excessive groundborne vibration or groundborne noise levels?***

Long-term operational activities associated with the proposed project would not involve the use of any equipment or processes that would result in potentially significant levels of ground vibration. Increases in groundborne vibration levels attributable to the proposed project would be primarily associated with short-term construction-related activities. Construction activities associated with the proposed improvements would likely require the use of various off-road equipment, such as tractors, concrete mixers, and haul

trucks. The use of major groundborne vibration-generating construction equipment, such as pile drivers, would not be required for this project.

Groundborne vibration levels associated with representative construction equipment are summarized in Table 8. As depicted, ground vibration generated by construction equipment would be approximately 0.089 in/sec ppv, or less, at 25 feet. Predicted vibration levels at the nearest existing structures would not be anticipated to exceed commonly applied criteria for structural damage or human annoyance (i.e., 0.5 and 0.2 in/sec ppv, respectively). In addition, no fragile or historic structures have been identified in the project area. As a result, this impact would be considered ***less than significant***.

Table 8
Representative Vibration Source Levels for Construction Equipment

Equipment	Peak Particle Velocity at 25 Feet (In/Sec)
Large Bulldozer	0.089
Loaded Truck	0.076
Jackhammer	0.035
Small Bulldozer	0.003
Source: FTA 2006, Caltrans 2004	

Impact Noise-C. ***For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?***

The nearest airport in the project vicinity is the Mariposa-Yosemite Airport, approximately 24 miles northwest of the project site. The proposed project is not located within the projected 60 dBA CNEL/L_{dn} noise contours of this airport (Mariposa County 1995). No private airstrips were identified within two miles of the project site. Implementation of the proposed project would not result in the exposure of sensitive receptors to aircraft noise levels nor would the proposed project affect airport operations. This impact is considered ***less than significant***.

REFERENCES

California, Department of Transportation (Caltrans). 1998. *California Department of Transportation (Caltrans). Technical Noise Supplement.*

California Department of Transportation (Caltrans). 2002. *Caltrans Airport Land Use Planning Handbook.*

California Department of Transportation (Caltrans). 2013. *Transportation and Construction Vibration Guidance Manual.*

California Department of Transportation (Caltrans). August 2006. *Traffic Noise Analysis Protocol*.

California Department of Transportation (Caltrans). 2018. *EIR/EA Annotated Outline*.

California, Governor's Office of Planning and Research (OPR). October 2003. *State of* California *General Plan Guidelines*.

County of Madera. 1995. *Madera County General Plan, Noise Element*.

County of Madera. May 31, 2019. *Madera County Municipal Code*. *Title 9 – Peace, Safety and Morals, Chapter 9.58 - Noise Regulation*. Website URL: *https://library.municode.com/ca/madera_county/codes/code_of_ordinances?nodeId=TIT9PESAMO.*

County of Mariposa. April 1995. *Mariposa-Yosemite Airport Comprehensive Land Use Plan*.

Federal Register Vol 65, No 136, July 14, 2000. *FAA Aviation Noise Abatement Policy*. Available at Website url: www.transource.org/shared_files/noisepol.pdf.

KD Anderson & Associates, Inc. February 14, 2020. *Traffic Impact Analysis: State Center Community College District Oakhurst Center Relocation & Master Plan.*

Odell Planning & Research (OPR). September 13, 2019. *State Center Community College District Request for Preliminary Comment, Oakhurst Community College Center Project.*

United States Department of Transportation, Federal Transit Administration (FTA). April 2006. *Transit Noise and Vibration Impact Assessment.*

U.S. Environmental Protection Agency (U.S. EPA). December 31, 1971. *Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances*.

U.S. Environmental Protection Agency (U.S. EPA). 1974. *Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety*.

APPENDIX A

Noise Prediction Modeling & Supportive Documentation

Predicted Traffic Noise Levels - Existing Without Project								
Direction from Intersection	ADT	AHW	Speed	CNEL at 50 ft	Distance (ft) From Centerline to			
					70 CNEL	65 CNEL	60 CNEL	55 CNEL
Westlake, N of Hwy 49	3140	9	25	55.9	0	0	0	62.6
Westlake, S of Hwy 49	150	6	25	42.49	0	0	0	0
Hwy 49, E of Westlake	10910	12.5	45	66.64	0	79.7	170	365.4
Hwy 49, W of Westlake	9300	12	25	59.83	0	0	60.4	128.2

Predicted Traffic Noise Levels - Existing With Project								
Direction from Intersection	ADT	AHW	Speed	CNEL at 50 ft	Distance (ft) From Centerline to			
					70 CNEL	65 CNEL	60 CNEL	55 CNEL
Westlake, N of Hwy 49	4140	9	25	56.59	0	0	0	75
Westlake, S of Hwy 49	150	6	25	42.49	0	0	0	0
Hwy 49, E of Westlake	11720	12.5	45	66.95	0	83.5	178.3	383.3
Hwy 49, W of Westlake	9330	12	25	59.84	0	0	60.6	128.4

Predicted Traffic Noise Levels - Cumulative Without Project								
Direction from Intersection	ADT	AHW	Speed	CNEL at 50 ft	Distance (ft) From Centerline to			
					70 CNEL	65 CNEL	60 CNEL	55 CNEL
Westlake, N of Hwy 49	5010	9	25	57.42	0	0	0	85
Westlake, S of Hwy 49	140	6	25	41.88	0	0	0	0
Hwy 49, E of Westlake	13310	12.5	45	67.5	0	90.7	194	417.2
Hwy 49, W of Westlake	11240	12	25	60.65	0	0	68.3	145.3

Predicted Traffic Noise Levels - Cumulative With Project							
Direction from Intersection	ADT	Speed	CNEL at 50 ft	Distance (ft) From Centerline to			
				70 CNEL	65 CNEL	60 CNEL	55 CNEL
Westlake, N of Hwy 49	6000	25	58.2	0	0	0	95.7
Westlake, S of Hwy 49	140	25	42.19	0	0	0	0
Hwy 49, E of Westlake	14110	45	67.75	0	94.3	201.7	433.7
Hwy 49, W of Westlake	11270	25	60.66	0	0	0	145.5

AMBIENT
AIR QUALITY & NOISE CONSULTING

NOISE MEASUREMENT SURVEY FORM

DATE:	9/18/2019 - 9/19/19				
PROJECT:	OAKHURST COMMUNITY COLLEGE CENTER PROJECT				
LOCATION:	OAKHURST, CA				
MONITORING STAFF:	DANNY L				
MET CONDITIONS:	TEMP: 60-79F. HUMIDITY: 26-74% WIND SPEED: 5-9MPH SKY: CLEAR GROUND: DRY				
NOISE MONITORING EQUIPMENT:	LARSON DAVIS SLM MODEL:	820	S/N:	S	
	MICROPHONE:	PRM 828	S/N:	S	
	CALIBRATOR:	LD CAL 200	S/N:	S	
CALIBRATED PRIOR TO AND UPON COMPLETION OF MEASUREMENTS:	YES	METER SETTINGS:	A-WHT	SLOW	

NOISE MONITORING DATE/TIME	PRIMARY NOISE SOURCES NOTED	MEASURED NOISE LEVELS			
		LEQ	LMIN	LMAX	LOCATION
9/18/19 1420-1430	TRAFFIC	50.4	39.8	65.6	2
9/18/19 1440-1450	BACKGROUND	47.1	41.5	55.2	3
9/18/19 1500-1510	TRAFFIC	55.2	44.6	67.3	1
9/19/19 0855-0905	TRAFFIC	52.7	40.4	65.9	1
9/19/19 0918-0928	TRAFFIC	50.4	43.6	60.0	2
9/19/19 0930-0940	BACKGROUND	48.3	39.3	55.8	3

TRAFFIC COUNTS DATE/TIME	TRAFFIC DIRECTION/LANE ASSIGNMENT	VEHICLE CLASSIFICATION					AVG. VEHICLE SPEEDS		
		LDV	MDV	HDV	MC	BUS	HOV	MAIN	TRUCK
9/18/19 1420-1430	EB VILLAGE DR	4	0	0	0	0	-	25	-
	WB VILLAGE DR	2	0	0	0	0	-	25	-
9/18/19 1500-1510	SB WESTLAKE DR	10	0	0	0	0	-	30	-
	NB WESTLAKE DR	5	0	0	0	0	-	30	-
9/19/19 0855-0905	SB WESTLAKE DR	4	0	0	0	0	-	30	-
	NB WESTLAKE DR	6	0	0	0	0	-	30	-
9/19/19 0918-0928	EB VILLAGE DR	0	0	0	0	0	-	25	-
	WB VILLAGE DR	1	0	0	0	0	-	25	-

Project Site

Figure 2

Oakhurst Community College Center Project

State Center Community College District

ODELL *Planning & Research, Inc.*

Environmental Planning • School Facility Planning • Demographics

0 125 250 500 Feet

N

Appendix F

Traffic Impact Analysis

TRAFFIC IMPACT ANALYSIS

FOR

STATE CENTER COMMUNITY COLLEGE DISTRICT
OAKHURST COMMUNITY COLLEGE CENTER

Oakhurst, California

Prepared For:

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March 17, 2020

Job No. 5015-A-01

SCCCD Oakhurst.rpt

TRAFFIC IMPACT ANALYSIS
STATE CENTER COMMUNITY COLLEGE DISTRICT
OAKHURST COMMUNITY COLLEGE CENTER
Oakhurst, California

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KDA

TRAFFIC IMPACT ANALYSIS FOR
STATE CENTER COMMUNITY COLLEGE DISTRICT
OAKHURST COMMUNITY COLLEGE CENTER
Oakhurst, California

INTRODUCTION

This report documents **KD Anderson & Associates'** analysis of the circulation system requirements associated with developing the **State Center Community College District's (SCCCD) Oakhurst Community College Center** in the Madera County community of Oakhurst. The proposed project is located in the area north of State Route 49 near the western limits of Oakhurst off of Westlake Drive. The proposed project would replace the existing Oakhurst Center located on Civic Center Drive.

The proposed project will occupy a site within the Liberty Village area. Liberty Village is a development proposal originating in the early 2000's but which has not yet been fully occupied. At the direction of Madera County Planning Department staff this analysis assumes Liberty Village occupancy and development of adjoining properties under its evaluation of cumulative impact.

Project Description

Location / Access. The proposed SCCCD Oakhurst Center site is on 30 acres located off of Westlake Drive roughly ¼ mile north of State Route 49 (SR 49), as noted in Figure 1. Several parcels within the original Liberty Village project area have been developed, including the True Value Hardware store, Madera County Government Center and Kaiser / VA offices. The Wright Ranch lies to the north beyond Liberty Village, and the approved Oakhurst Townhomes project lies to the east. Primary access to the Oakhurst Center will be provided by an existing intersection on SR 49 at Westlake Drive. In the future additional access could be developed via Liberty Village's internal roads and the SR 49 / Village Drive intersection. Secondary access could become available to SR 49 via Meadow Vista Drive.

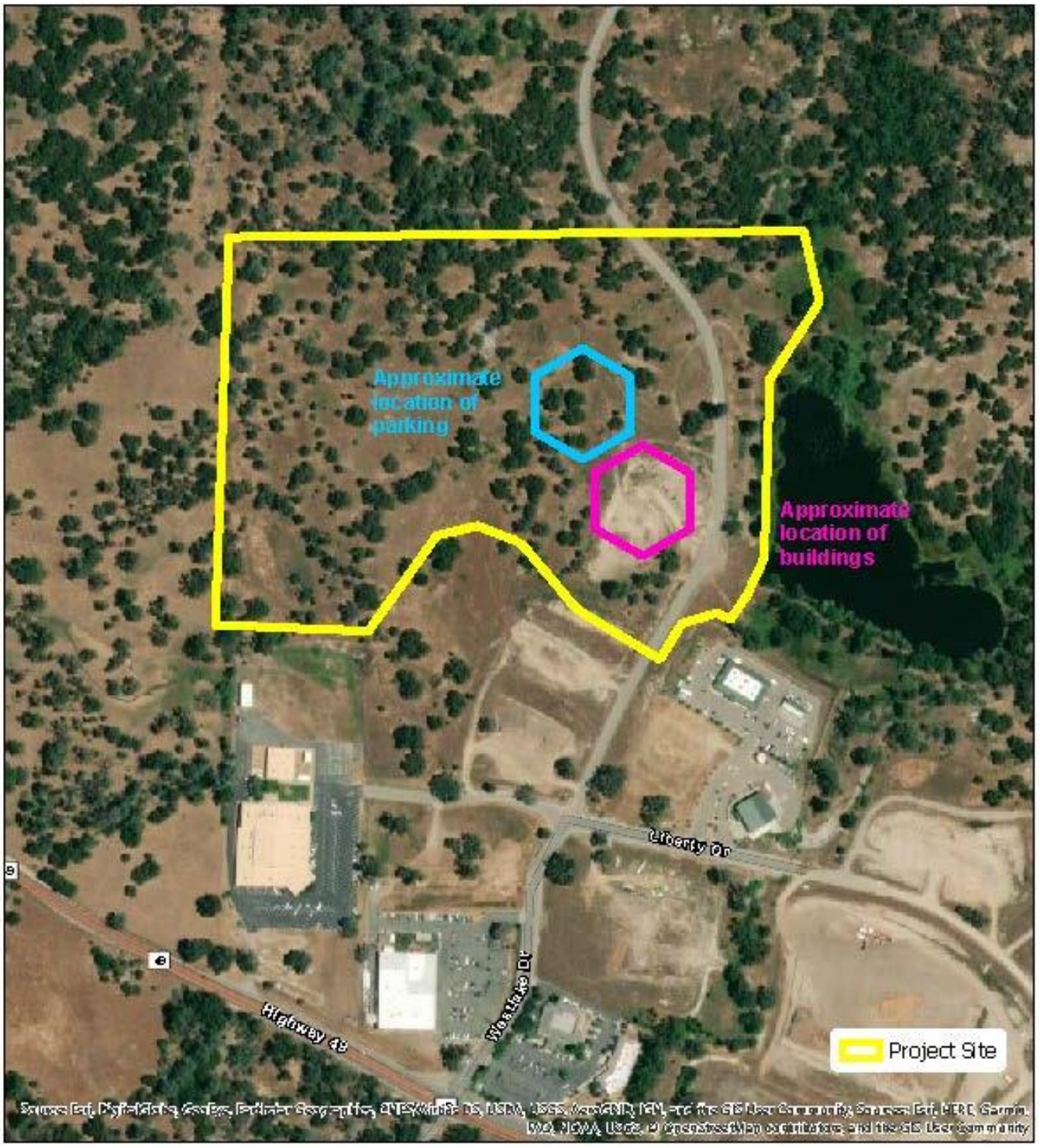
Land Use. The SCCCD Oakhurst Center will occupy a site in Liberty Village. Liberty Village development anticipates a range of land uses that are already permitted under the current Madera County CUM, IL, and RUM zoning designations. As noted in Figure 2, the project proposes roughly 21,148 square feet of building area at completion. The current enrollment of the facility off of Civic Center Drive is 1,030 students, and these students would theoretically be relocated to the new site. The project envisions a maximum enrollment of 1,530 students.

VICINITY MAP

KD Anderson & Associates, Inc.
Transportation Engineers

5015-A-01 2/18/2020

figure 1



Project Site

Figure 2

Oakhurst Community College Center Project

State Center Community College District

ODELL Planning & Research, Inc.

0 125 250 500 Feet

N

SITE MAP

EXISTING SETTING

This report section describes the facilities that are available today serving vehicular, pedestrian, and bicycle traffic and transit users in the western Oakhurst area.

Study Area Circulation System - Roads

Regionally, development in Liberty Village will be served by state highways and Madera County roads. State Route 49 connects residences and businesses in western Oakhurst with State Route 41 and continues to the north to the community of Mariposa. SR 41 provides access to central and northern Oakhurst and links the community with the Fresno Metropolitan area to the south. Numerous Madera County roads provide local access to SR 49 in the area west of the SR 41 intersection.

The text which follows provides additional detail regarding the state highways and Madera County streets included in the study area.

State Route 49 (SR 49). SR 49 links Madera County with the Motherlode communities to the north while providing local access to residential and commercial areas of western Oakhurst. Today SR 49 is a two-lane conventional rural highway in the project area with a striped center left turn area. The speed limit is currently posted at 45 mph in this area. The highway widens to four travel lanes at the Meadow Vista Drive intersection, and that section continues to the intersection with SR 41. The posted speed limit is 35 mph on the four lane section of SR 49.

The California Department of Transportation (Caltrans) monitors traffic volumes on state highways and provides annual reports. The most recent Caltrans report indicated that in 2017 an *Average Annual Daily Traffic (AADT)* volume of 13,500 vehicles per day was reported north of the SR 41 intersection, with the volume dropping to 7,700 ADT at the intersection with County Road 600. Trucks comprise 8% of the daily traffic on SR 49.

State Route 41 (SR 41). SR 41 links Oakhurst with the south entrance of Yosemite National Park to the north and with the Rio Mesa Area of Madera County and the Fresno Metropolitan Area to the south. SR 41 also provides local access to businesses in southern and northern Oakhurst. SR 41 is a four lane conventional highway in the area north of the Fresno River bridge through its intersection with SR 49 in downtown Oakhurst. The road narrows to two lanes with a center two-way left turn lane in eastern Oakhurst.

The most recent Caltrans information indicated that in 2017 SR 41 carried 16,500 AADT south of SR 49 and 21,500 AADT north of the intersection.

Westlake Drive / Bollinger Place. Westlake Drive and Bollinger Place intersect SR 49 at a stop-controlled intersection at the western end of Liberty Village. Each is a local two lane rural County road. Daily traffic counts completed in April 2013 indicated that Westlake Drive carried 2,625 vehicles per day in the area between the Kaiser/VA driveway and the access to True Value

Hardware. Based on its peak hour traffic volume, Bollinger Place is estimated to carry roughly 150 vehicles per day.

Liberty Drive. Liberty Drive is a partially constructed two lane road that connects Westlake Drive with an entrance to the Madera County Government Center. Eventually the roadway will be improved to the eastern limits of Liberty Village and will likely connect to Meadow Vista Drive.

Redbud Drive. Redbud Drive is a two-lane local Madera County road that intersects SR 49 roughly 800 feet east of Westlake Drive. Redbud Drive provides access to existing commercial residential development and to the CHP station. Based on the peak hour counts conducted for this study the daily volume on Redbud Drive is estimated to be roughly 500 vehicles per day.

Village Drive. Village Drive is an undeveloped local road that intersects SR 49 in the center of Liberty Village roughly 500 feet from Redbud Drive and 1,320 feet from Westlake Drive. There is no appreciable traffic on this road today.

Oak Park Way. Oak Park Way is a minor two-lane local street that intersects SR 49 roughly 525 feet east of Village Drive and provides access to an existing business park on the south side of the highway. Based on the observed peak hour, Oak Park Way is estimated to carry roughly 650 vehicles per day.

Meadow Vista Drive. Meadow Vista Drive is a two-lane Madera County road that intersects SR 49 from commercial areas both on the north and south of the highway. The Meadow Vista Drive intersection is roughly 640 feet east of Oak Park Way. The north leg of Meadow Vista Drive extends to the southern limit of the approved Oakhurst Townhomes project and will eventually be connected to the eastern end of Liberty Village via Liberty Drive. The south leg provides private access to an existing commercial/industrial center (Enterprise Center). Based on observed peak hour volumes, the north leg of Meadow Vista Drive carries roughly 450 vehicles per day, and the south leg carries roughly 600 vehicles per day.

Junction Drive. Junction Drive is an important signalized access to SR 49 located at the western end of the retail commercial district located adjoining the SR 49/SR 41 intersection. Junction Drive is roughly 1,100 feet from Meadow Vista Drive and 3,500 feet from Westlake Drive. The north leg of Junction Drive is a two-lane roadway. The south leg provides access to the Old Mill Village Shopping Center. Based on the peak hour volume observed for this study, the north leg of Junction Drive may carry 2,800 vehicles per day, while the south leg may carry 6,000 vehicles per day.

Study Area Circulation System - Intersections

The quality of traffic flow in developed areas is often governed by the operation of key intersections. The following seven intersections have been identified for evaluation in this study.

The **SR 49 / Westlake Drive / Bollinger Place intersection** is controlled by stop signs on the Westlake Drive and Bollinger Place approaches. Left turn lanes exist in both directions on SR 49, and the westbound SR 49 approach has been widened to provide some room for right turns outside of the through travel way.

The **SR 49 / Redbud Drive intersection** is currently a "tee" intersection controlled by a stop sign on the Redbud Drive approach. A westbound left turn lane exists on SR 49, and a raised median exists on the Redbud Drive approach to separate inbound and outbound traffic.

The **SR 49 / Village Drive intersection** is a "tee" intersection controlled by a stop sign on Village Drive. An eastbound left turn lane exists on SR 49.

The **SR 49 / Oak Park Way intersection** is a "tee" intersection controlled by a stop sign on the northbound Oak Park Way approach. A westbound left turn lane exists on SR 49.

The **SR 49 / Meadow Vista Drive intersection** is controlled by stop signs on both Meadow Vista Drive approaches. There are two through lanes on SR 49 through the intersection, although the westbound lane ends just beyond the intersection. Left turn lanes exists on SR 49 in each direction.

The **SR 49 / Junction Drive intersection** is controlled by an actuated traffic signal that operates with "split" phases when serving Junction Drive and protected left turns on SR 49. There are two through lanes on SR 49 through the intersection. Separate left turn lanes are provided on each SR 49 approach. A separate right turn lane is available on the northbound Junction Drive approach. There are crosswalks across each leg of the intersection and a street light on each corner.

The **SR 41 / SR 49 intersection** is a "tee" intersection controlled by a traffic signal. Two through lanes exist in each direction on SR 41. Dual left turn lanes exist on the northbound SR 41 and eastbound SR 49 approaches, and there are separate right turn lanes on southbound SR 41 and eastbound SR 49. Both right turns operate with "overlap" phasing with the corresponding left turn. Crosswalks are striped across the SR 49 and northbound SR 41 approaches, and there are street lights at each corner of the intersection.

Standards of Significance: Levels of Service - Methodology

Levels of Service were calculated at study area intersections in order to assess the quality of existing traffic conditions and to provide a basis for assessing future needs. "Level of Service" is a qualitative measure of traffic operating conditions whereby a letter grade "A" through "F", corresponding to progressively worsening operating conditions, is assigned to an intersection or roadway segment.

Analysis Methodology for Intersections. For this analysis both signalized and unsignalized intersections are analyzed using the methodologies described in *Highway Capacity Manual, 6th Edition* (HCM). HCM techniques base Level of Service on the length of delays experienced by motorists waiting at traffic signals or at stop signs. Delay values can be reported as an average value for the overall operation of the intersection or for each movement where motorists are required to yield the right of way to other traffic, in the case of side street stops. This analysis bases Level of Service on the overall delay at signalized intersections and the "worst case" side street delay at unsignalized intersections.

Table 1 presents general characteristics associated with each Level of Service grade.

TABLE 1
LEVEL OF SERVICE DEFINITIONS

Level of Service	Signalized Intersection	Unsignalized Intersection	Roadway (Daily)
"A"	Uncongested operations, all queues clear in a single-signal cycle. Ave Delay ≤ 10 sec/veh	Little or no delay. Ave Delay ≤ 10 sec/veh	Completely free flow.
"B"	Uncongested operations, all queues clear in a single cycle. Ave Delay > 10 sec/veh and ≤ 20 sec/veh	Short traffic delays. Delay > 10 sec/veh and ≤ 15 sec/veh	Free flow, presence of other vehicles noticeable.
"C"	Light congestion, occasional backups on critical approaches. Ave Delay > 20 sec/veh and ≤ 35 sec/veh	Average traffic delays. Delay > 15 sec/veh and ≤ 25 sec/veh	Ability to maneuver and select operating speed affected.
"D"	Significant congestions of critical approaches but intersection functional. Cars required to wait through more than one cycle during short peaks. No long queues formed. Ave Delay > 35 sec/veh and ≤ 55 sec/veh	Long traffic delays. Delay > 25 sec/veh and ≤ 35 sec/veh	Unstable flow, speeds and ability to maneuver restricted.
"E"	Severe congestion with some long-standing queues on critical approaches. Blockage of intersection may occur if traffic signal does not provide for protected turning movements. Traffic queue may block nearby intersection(s) upstream of critical approach(es). Ave Delay > 55 sec/veh and ≤ 80 sec/veh	Very long traffic delays, failure, extreme congestion. Delay > 35 sec/veh and ≤ 50 sec/veh	At or near capacity, flow quite unstable.
"F"	Total breakdown, stop-and-go operation. Ave Delay > 80 sec/veh	Intersection often blocked by external causes. Delay > 50 sec/veh	Forced flow, breakdown.

Sources: Highway Capacity Manual, 6th Edition , and Transportation Research Board (TRB) Special Report 209.

At intersections, Level of Service calculations can reflect average conditions occurring over the breadth of the hour or can be indicative of conditions occurring during the highest volume 15 minute period within that hour. The choice of perspective is made by local agencies as part of their development of standards of significance. Based on Caltrans traffic study guidelines, this analysis addresses conditions occurring during the peak 15 minutes within the peak hour.

Traffic Signal Warrants. The extent to which a traffic signal may be justified is determined based on many factors. From the standpoint of traffic impact analysis, signal warrant criteria contained in the *California Manual of Uniform Traffic Control Devices (CMUTCD)* are employed in order to assess the relative impact of the additional traffic accompanying a development proposal. For this analysis, Warrant 3 (Peak Hour Traffic) has been employed. Variation in warrant requirements occurs based on the design speed of the road (i.e., > 40 mph) and on the location of the intersection (i.e., rural versus urban locations). In this case, rural criteria have been employed on the two-lane section of SR 49. It is important to note that other warrants addressing factors such as volumes throughout the day, pedestrian activity and collision history should be considered before a decision is made to install a traffic signal.

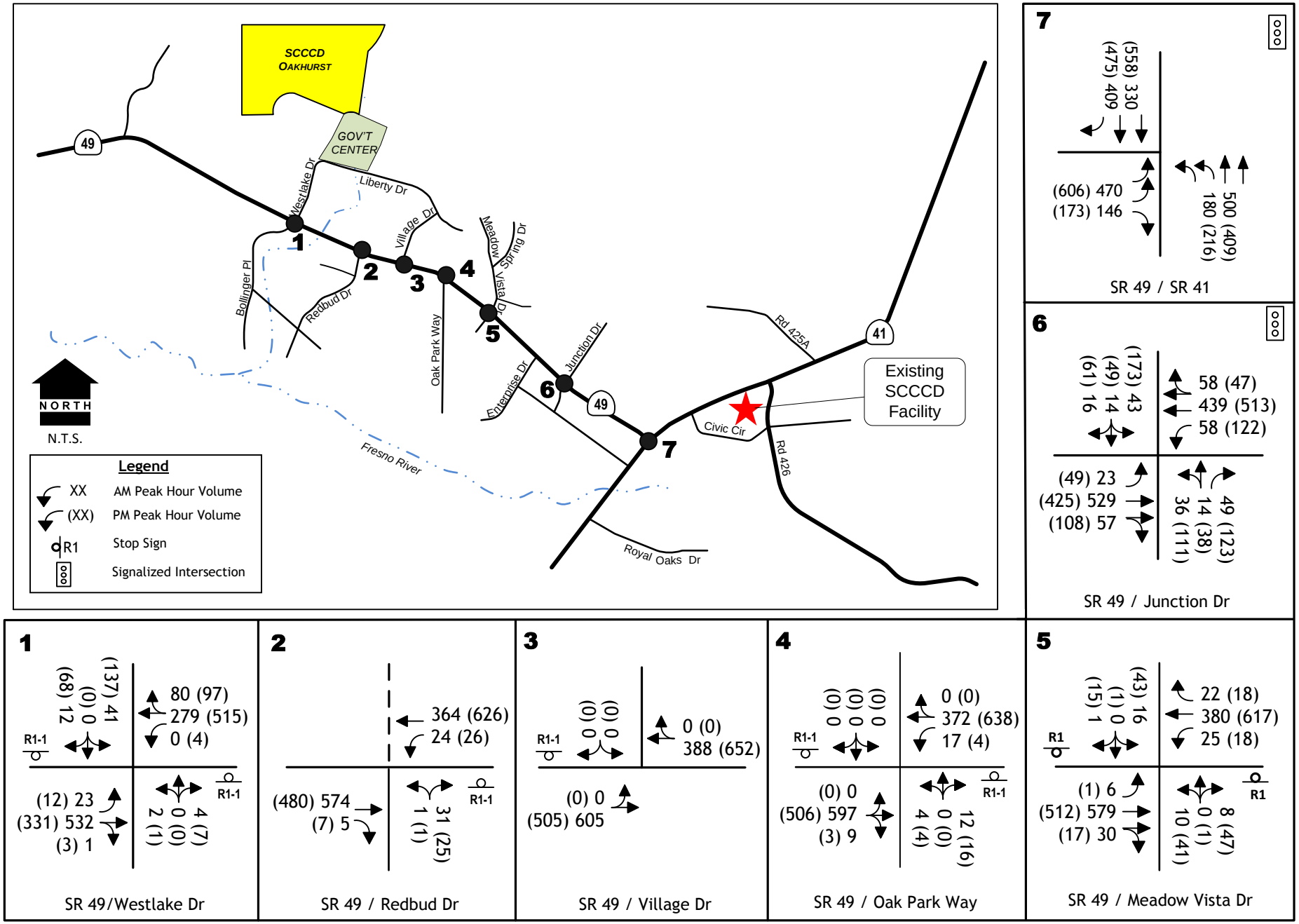
Standards of Significance. Caltrans and local jurisdictions adopt minimum standards for operating Levels of Service. The Caltrans traffic study guidelines note that LOS C is the minimum standard unless superseded by adopted policies. The SR 49 TCR indicates that the Concept LOS for SR 49 is LOS D, which matches the Madera County General Plan standard. This analysis assumes LOS D is the minimum acceptable Level of Service at signalized intersections and on side street approaches controlled by stop signs.

Existing Traffic Volumes / Levels of Service / Signal Warrants

Traffic Volume Counts. The peak hour intersection traffic counts used for this study were made on May 3, 2018. These counts were conducted on days when Oakhurst schools were in session. Intersection turning movement counts were made at study intersections during the period 7:00 a.m. to 9:00 a.m. and 4:00 p.m. to 6:00 p.m. The highest hourly traffic volume period within each two-hour window was identified as the peak hour.

It is recognized that the quality of traffic flow can vary throughout the day and that some trip generators can result in localized traffic peaks that fall outside of the traditional peak periods. This may be the case on streets providing access to commercial districts.

Figure 3 illustrates the intersection turning movement count data recorded for each count period. This figure also notes the existing geometric layout of each intersection and the location of traffic controls. This data has been used to determine the operating Level of Service at each intersection.



EXISTING TRAFFIC VOLUMES AND INTERSECTION GEOMETRY

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figure 3

Intersection Level of Service. Table 2 identifies current intersection Levels of Service at the six existing study locations. As shown, with one exception the Level of Service at each location is LOS D or better and these locations satisfy the minimum LOS D goal. The exception is the SR 49 / Westlake Drive intersection where the southbound approach operates at LOS F in the p.m. peak hour. LOS F exceeds the minimum LOS D standard.

TABLE 2
EXISTING INTERSECTION LEVEL OF SERVICE

Intersection	Control	Time Period			
		AM Peak Hour (7:00 to 9:00 a.m.)		PM Peak Hour (4:00 to 6:00 p.m.)	
		LOS	Average Delay (sec/veh)	LOS	Average Delay (sec/veh)
SR 49 / Westlake Drive / Bollinger Place	Northbound / Southbound Stop				
Eastbound left turn		A	8.3	A	9.0
Westbound left turn		A	-	A	8.0
Northbound Bollinger Place		B	16.6	B	12.3
Southbound Westlake Drive		C	26.5	**F**	**65.8**
SR 49 / Redbud Drive	Northbound Stop				
Westbound left turn		A	9.1	A	8.5
Northbound Redbud Drive		B	14.3	B	12.5
SR 49 / Oak Park Way	Northbound Stop				
Westbound left turn		A	9.2	A	8.5
Northbound Oak Park Way		C	16.3	B	14.6
SR 49/ Meadow Vista Drive	Northbound / Southbound Stop				
Eastbound left turn		A	8.4	A	9.1
Westbound left turn		A	9.4	A	8.7
Northbound Meadow Vista Drive		C	20.5	C	21.3
Southbound Meadow Vista Drive		C	23.1	D	29.6
SR 49 / Junction Drive	Signal	B	16.7	C	24.0
SR 49 / SR 41	Signal	B	12.1	B	13.7

Bold indicates conditions in excess of adopted minimum LOS standard

Traffic Signal Warrants. The volume of traffic carried at most un-signalized study intersections during the a.m. and p.m. peak hours falls below the level that would satisfy Warrant 3 (Peak Hour warrants). As noted in Table 3 the p.m. peak hour volume at the SR 49 / Westlake Drive intersection satisfies the peak hour volume warrant for "rural" locations (i.e., speed > 40 mph).

TABLE 3 EXISTING STATUS OF TRAFFIC SIGNAL WARRANTS					
		Approach Volume			
		AM Peak Hour (7:00 to 9:00 a.m.)		PM Peak Hour (4:00 to 6:00 p.m.)	
Intersection	Warrant Satisfied?	Major	Minor	Major	Minor
SR 49 / Westlake Drive / Bollinger Place	Yes	915	53	963	170
Highlight indicates volumes satisfying peak hour warrant volume requirements					

Alternative Transportation Modes

The status of existing and planned facilities serving pedestrians, bicyclists and transit riders has been determined. The Madera County Active Transportation Plan[1] describes regional facilities.

Pedestrians. Dedicated facilities for pedestrians exist in the developed area of Oakhurst but are limited in the area of the project. Sidewalks exist adjoining SR 41 but not along SR 49 or along the local streets within the Liberty Village area.

Bicycles. There are no dedicated facilities for bicycles in the immediate area of the project. While paved shoulders of varying width are available along state highways, no roadways are marked as Class II bike lanes.

Transit. The **Madera County Connection (MCC)** provides service along its Eastern Madera County Route Monday through Friday from Downtown Madera to South Fork via Oakhurst. The route follows SR 41, and stops at the existing SCCCD Oakhurst Center three times each day in the southbound direction and twice daily in the inbound direction. There is no service along SR 49.

Similarly, **Yosemite Area Regional Transportation System (YARTS)** offers seasonal service between Yosemite and Fresno along SR 41 with a stop at the Oakhurst Best Western Hotel. YARTS operates on SR 41 from May 11, 2020 to September 11, 2020.

[1] Madera County Active Transportation Plan, MCTC,

REGULATORY SETTING

State of California

Caltrans has jurisdiction over state highways. Caltrans Traffic Study Guidelines provide direction for traffic impact analysis.

SR 49 Transportation Concept Report (SR 49 TCR). SR 49 is under the jurisdiction of Caltrans. Caltrans developed a Transportation Concept Report (TCR) for SR 49 in 2011. The TCR identifies existing and cumulative operational deficiencies on state routes and identifies potential improvements. According to the SR 49 TCR, SR 49 from the SR 41 junction northerly to Westlake Drive is subject to a concept LOS D criteria and is ultimately a four-lane facility.

Traffic Operations Policy Directive 13-02. Caltrans policy regarding applicable traffic controls has recently been expanded based on Traffic Operations Policy Directive 13-02. This directive requires that Caltrans consider the relative merits of alternative traffic controls when it becomes necessary to stop traffic on state highways. Roundabouts are the default intersection control, but all-way stops and traffic signals are to be considered. The policy directive requires preparation of an *Intersection Control Evaluation (ICE)* to determine the preferred traffic control.

Caltrans Encroachment Permit. Improvements made to the state highway by private parties or local agencies are processed under a permit from Caltrans.

Regional

Madera County General Plan (1995) / Oakhurst Area Plan (2005). The General Plan consists of three components - the Countywide General Plan, Area Plans which relate to specific areas of the unincorporated area of the County, and a Technical Background Report with data and information to support the General Plan and Community Plans.

The Countywide General Plan provides an overall framework for development of the County and protection of its natural and cultural resources, rural character, and the rights of its residents and property owners. The goals and policies contained in the General Plan apply throughout the County, except within the boundaries of the incorporated cities and are supplemented by the policies contained in the Area Plans. Section 2 Transportation and Circulation presents policies that are relevant to this analysis. The Area Plans provide a more detailed focus on specific geographical areas within the unincorporated County. The goals and policies contained in the Area plans supplement and elaborate upon the goals and policies of the Countywide General Plan. The Oakhurst Area Plan was adopted in 2005.

Madera County Transportation Commission Regional Transportation Plan and Sustainable Communities (2018 RTP/SCS). The Madera County Transportation Commission (MCTC), as the State-designated regional transportation planning agency (RTPA) and Metropolitan Planning Organization (MPO) for Madera County, is required by both federal and

State law to prepare a long-range (at least 20-year) transportation planning document known as a Regional Transportation Plan (RTP). The RTP is an action-oriented document used to achieve a coordinated and balanced regional transportation system. Under both federal and State law, MCTC must update its RTP every five years.

The 2018 RTP / STS demonstrates how MCTC plans to meet the transportation needs of the region for the period from 2018 to 2042, considering existing and projected future land use patterns as well as forecasted population and job growth. The 2018 RTP / STS identifies and prioritizes expenditures of anticipated funding for transportation projects that involve all transportation modes. The projects that constitute the 2018 RTP focus on highway, local roadway, aviation, rail, non-motorized transportation, and public transportation

PROJECT CHARACTERISTICS

The characteristics of the project are described in terms of *Trip Generation* and *Trip Distribution.*

The project consists of a single structure containing 21,148 square feet of enclosed building area and 9,654 square feet of open covered area for an overall area of 31,102 square feet on a 30 acre site. The Administration (6,250 sq. ft.) and Classroom (7,684 sq. ft.) Wings are connected by an enclosed "Learning Commons" (2,509 sq. ft.) The Science Wing (5,005 sq. ft.) is connected to the Administration and Classroom Wings by covered patios. The buildings and covered areas surround an open courtyard. The project also includes a 159-stall parking lot, a utility yard, pathways, and landscaping. The campus, as initially constructed, will serve the existing approximately 1,030 students and 24 faculty and staff. The campus will expand as needed to accommodate future growth, serving an estimated 1,582 students and 30 faculty and staff by 2040.

Trip Generation Rates. The amount of new traffic associated with development projects is typically forecast using information developed from recognized national sources. The Institute of Transportation Engineers (ITE) publication *Trip Generation, 10th Edition* is a source recognized by Madera County and Caltrans, and applicable average trip generation rates for a Junior College are noted in Table 4.

ITE rates are developed from data gathered at various locations throughout the US and in the case of Junior / Community Colleges reflect data collected from a broad range of campuses. The total build square feet for the observed colleges ranged from 35,000 to 900,000 sf. The total number of students ranged from 890 to 27,000, and the supporting information was unclear as to the "students" represent overall total enrollment, Full-time Equivalent Enrollment (FTE) or the number of students vising the campus each day.

Because the available data is unclear, as site specific trip generation analysis was conducted at the existing Oakhurst Center on Civic Center Drive. Video cameras were installed at each parking lot driveway, and traffic inbound and outbound vehicles were monitored during the a.m. and p.m. peak hour. As noted, the existing facility generated 24 trips in the a.m. peak hour and 65 trips in the p.m. peak hour. Applicable trip generation rates on a "per student" basis were then created from this data and applied.

Trip Generation Forecasts. Table 4 also identifies the trip generation forecast for the project that has been used for this analysis. Based observation of the existing facility, the proposed project is expected to generate 37 trips in the a.m. peak hour and 100 trips in the p.m. peak hour. These forecasts are similar to those projected from ITE data. Because a daily trip generation rate was not developed from local observations, the rate based on ITE data is assumed, with 427 daily trips anticipated.

TABLE 4
TRIP GENERATION RATES / FORECASTS

ITE Code	Description	Unit	Average Trips per Unit						
			Daily	AM Peak Hour			PM Peak Hour		
				In	Out	Total	In	Out	Total
540	Junior / Community College	ksf	20.25	77%	23%	2.07	50%	50%	1.86
		student	1,15	81%	19%	0.11	56%	44%	0.11
Existing Oakhurst Center (October 22, 2019)		1,030 students	-	20	4	24	42	23	65
		students		83%	17%	0.023	65%	35%	0.063
Proposed Project from ITE rates		21.1 ksf	**427**	33	11	44	20	19	39
Proposed Project from Civic Center site		1,582 students	-	**31**	**6**	**37**	**65**	**35**	**100**

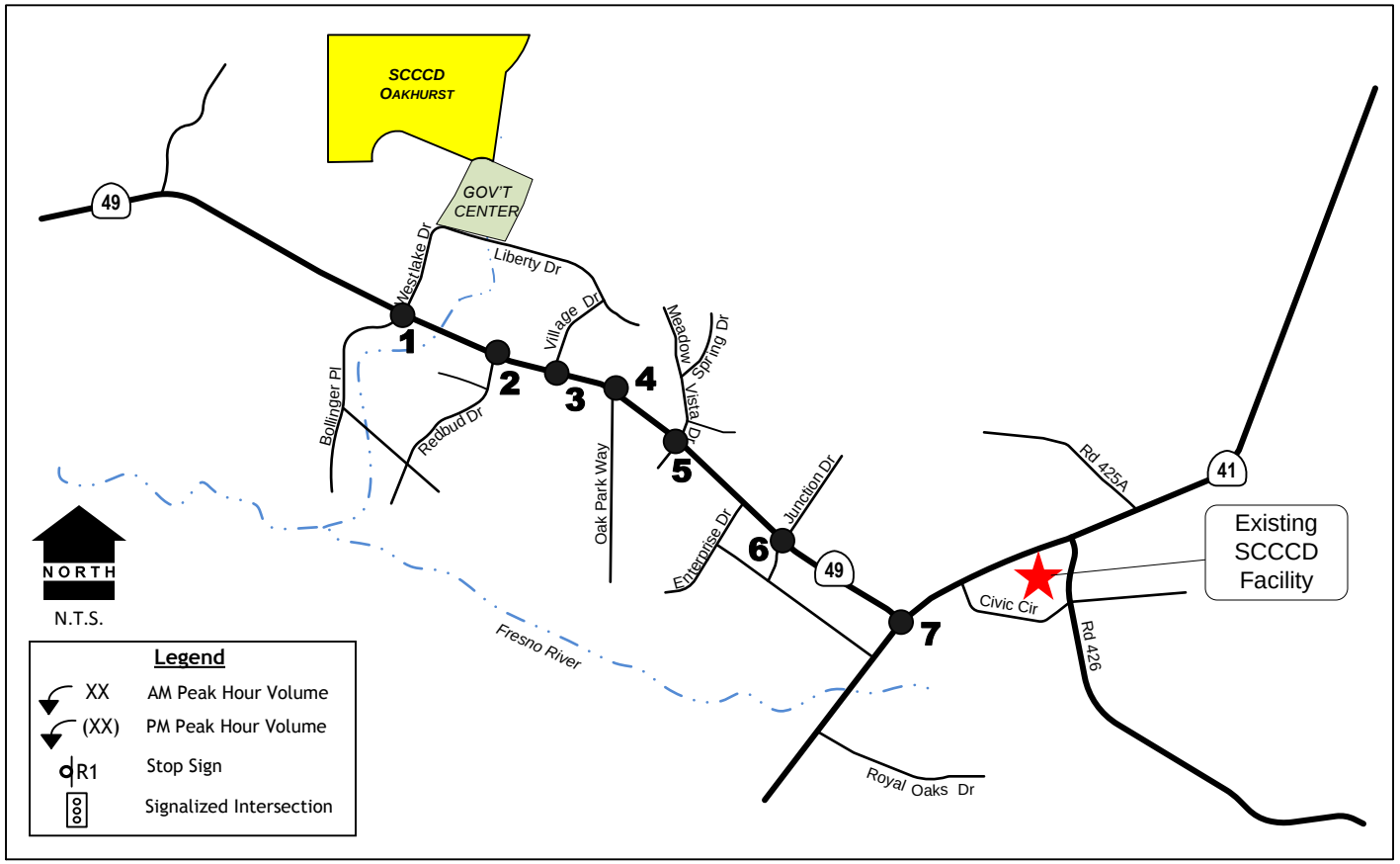
Source: *Trip Generation Manual, 10th Edition,* Institute of Transportation Engineers (ITE) **HIGHLIGHT** are values used for analysis.

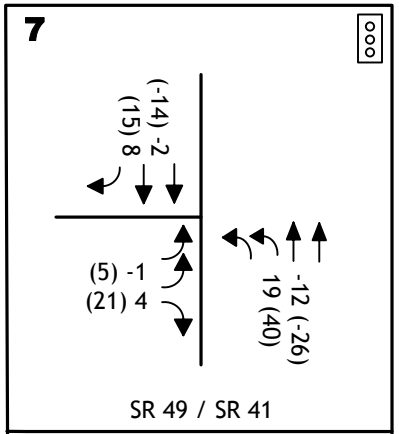
Directional Distribution. The directional distribution for the trips generated by the community college center has been assumed to be similar to the distribution of residences within the campus' service area. Based on the estimated population (per ACS data) of the various census tracts that would feed into the college, the distribution would be as noted in Table 5.

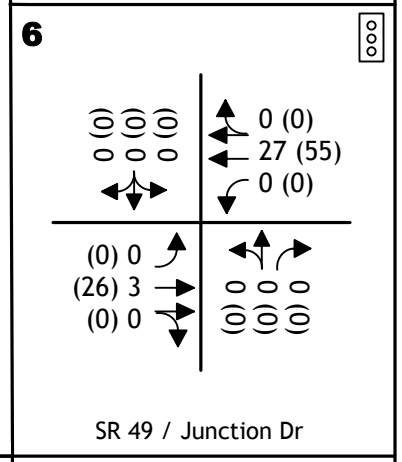
TABLE 5
REGIONAL TRIP DISTRIBUTION ASSUMPTIONS

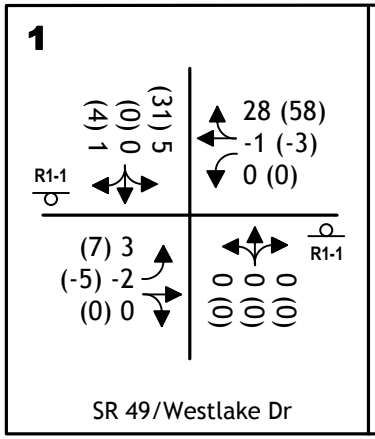
Direction	Route	Percent of Trips
West	SR 49 (North)	11.2%
North	SR 41 north of SR 49	27.4%
South	SR 41 south of SR 49	61.4%
Total		100.0%

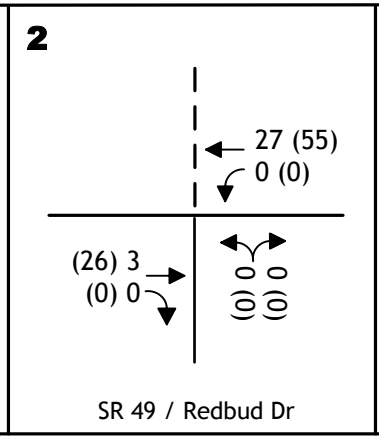
Project trips were assigned to the study area street system under these assumptions, and the resulting "project only" traffic is presented in Figure 4.

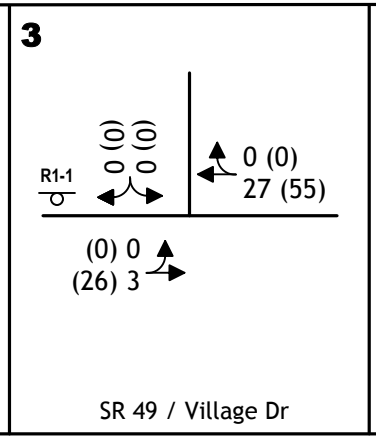


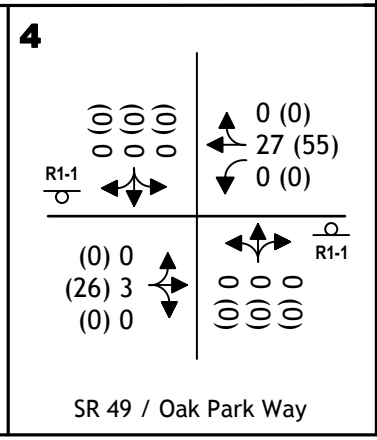


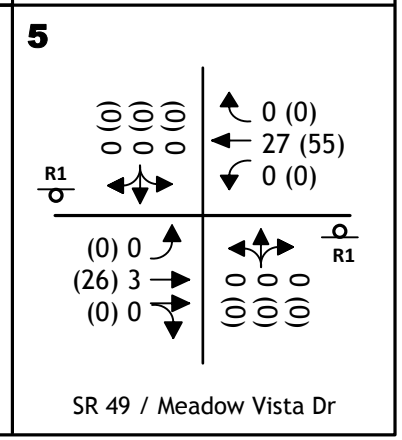












NET PROJECT ONLY
VOLUMES AND INTERSECTION GEOMETRY

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figure 4

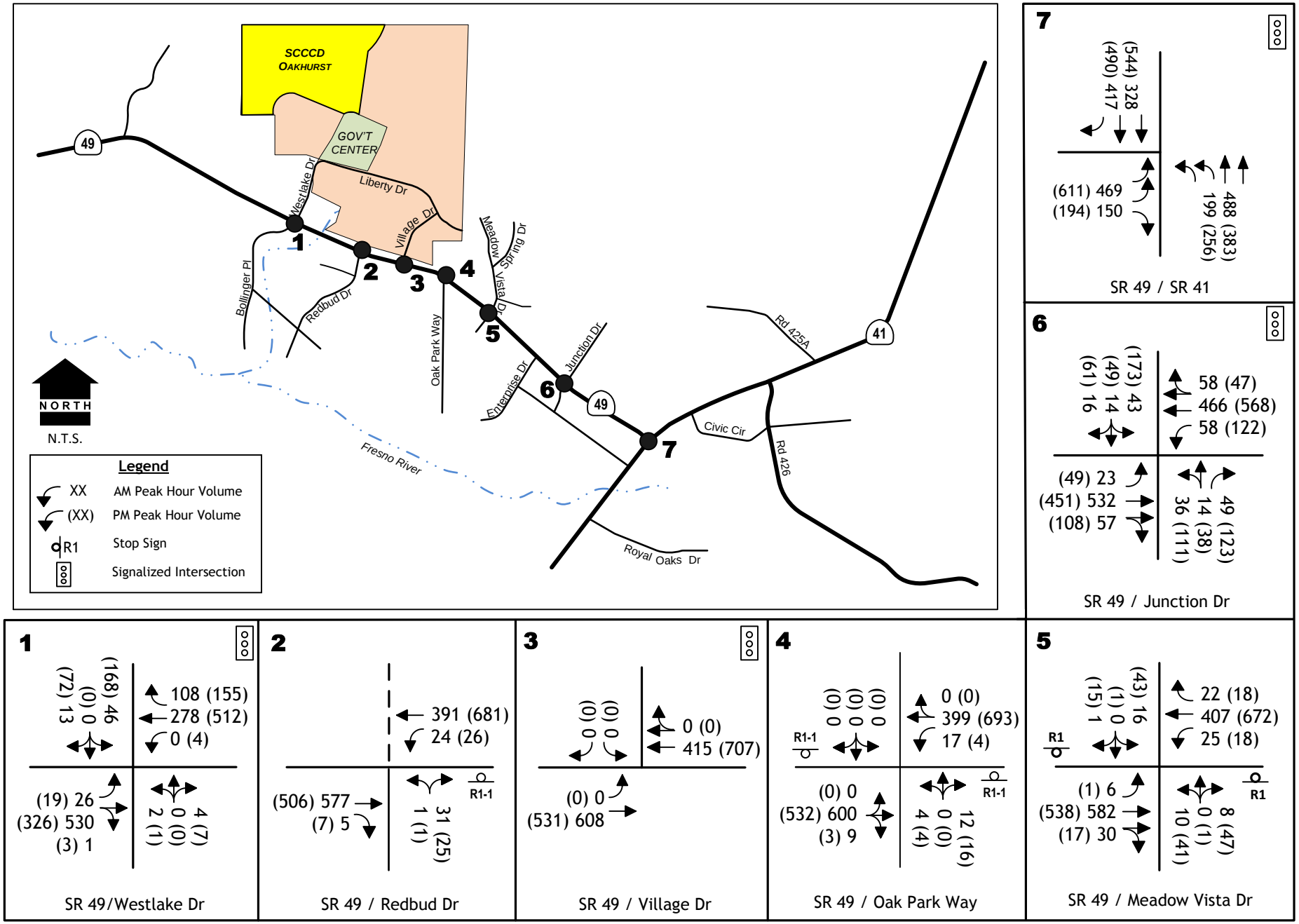
PROJECT IMPACTS

Traffic Volume Forecasts / Levels of Service

Traffic Volumes. Figure 5 presents the sum of current traffic and peak hour trips associated with operation of the SCCCD Oakhurst Center on the proposed site at full enrollment. Because the existing center on Civic Drive will no longer be in operation, its trips, which are included in the background traffic counts, have been subtracted.

Intersection Levels of Service. Table 6 identifies Levels of Service expected with operation of the SCCCD Oakhurst Center on its new site. As shown, most of the study intersections will continue to provide adequate Levels of Service that satisfy Madera County's minimums standards. However, the addition of project trips will exacerbate the LOS F conditions on the southbound approach to **the SR 49 / Westlake Drive intersection** in the p.m. peak hour. LOS F exceeds the minimum LOS D standard. This is a significant impact that would require mitigation.

Measures to address this impact and deliver adequate Level of Service have been considered in the past during discussions regarding other development in the area, and other development projects have allocated funds towards intersection improvements as the overall Liberty Village area has proceeded.



EXISTING PLUS PROJECT
TRAFFIC VOLUMES AND INTERSECTION GEOMETRY

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figure 5

TABLE 6
EXISTING PLUS PROJECT PEAK HOUR INTERSECTION LEVELS OF SERVICE

Intersection	Control	AM Peak Hour				PM Peak Hour			
		Existing		Existing Plus Project		Existing		Existing Plus Project	
		LOS	Average Delay (sec/veh)	LOS	Average Delay (sec/veh)	LOS	Average Delay (sec/veh)	LOS	Average Delay (sec/veh)
SR 49 / Westlake Drive / Bollinger Place	Northbound / Southbound Stop								
Eastbound left turn		A	8.3	A	8.4	A	9.0	A	9.2
Westbound left turn		-	-	-	-	A	8.0	A	8.0
Northbound Bollinger Plan		C	16.6	C	16.8	B	12.3	B	12.5
Southbound Westlake Drive		D	26.5	D	28.7	**F**	**65.8**	**F**	**127.4**
Signal, westbound right turn lane								B	13.0
Roundabout								A	7.7
SR 49 / Redbud Drive	Northbound Stop								
Westbound left turn		A	9.1	A	9.1	A	8.5	A	8.6
Northbound Redbud Drive		C	14.3	C	14.4	B	12.5	B	13.0
SR 49 / Oak Park Way	Northbound Stop								
Westbound left turn		A	9.2	A	9.2	A	8.5	A	8.6
Northbound Oak Park Way		C	16.3	C	16.6	B	14.6	C	15.4
SR 49/ Meadow Vista Drive	Northbound / Southbound Stop								
Eastbound left turn		A	8.4	A	8.5	A	9.1	A	9.3
Westbound left turn		A	9.4	A	9.4	A	8.7	A	8.8
Northbound Meadow Vista Drive		C	20.5	C	21.1	C	21.3	C	23.3
Southbound Meadow Vista Drive		C	23.1	C	24.3	D	29.6	D	34.5
SR 49 / Junction Drive	Signal	B	16.7	C	16.7	C	24.0	C	24.3
SR 49 / SR 41	Signal	B	12.1	B	12.4	B	13.7	B	16.6

Bold indicates conditions in excess of adopted minimum LOS D standard. **HIGHLIGHTED** values are a significant impact

Potential Mitigations. Intersection improvements would be needed to improve the Level of Service at this location and to deliver LOS D or better conditions in the weekday p.m. peak hour. Identified options are listed below and their resulting Levels of Service are also shown in Table 6. Each has ramifications that affect their feasibility, as noted below:

***Traffic Signal with westbound right turn lane*.** Signalizing the intersection with an auxiliary lane would result in LOS B conditions that satisfy minimum standards. However, without widening the southbound Westlake Drive approach the queue of waiting traffic will likely extend northerly and block the access to adjoining businesses. While not required to address a CEQA impact, the approach should be widened to provide a separate right turn lane as well. Caltrans may require a complete Traffic Signal Warrants Analysis to determine when to install a traffic signal.

Roundabout. A roundabout intersection would deliver LOS A conditions. The extent of right of way to be acquired to accommodate a roundabout and earthwork needed to accommodate the roundabout is unknown, and right of way availability is unknown.

Under Caltrans policy an ICE report will be required in order to determine the applicable course of action at this intersection. A preliminary ICE report is also required for Caltrans to identify an applicable design alternative if stopping main-line SR 49 traffic is involved.

CUMULATIVE IMPACTS

Land Use Assumptions

Background traffic cumulative traffic conditions have been created based on assumptions for development of future land uses in the Oakhurst area created in consultation with Madera County Planning Department staff, as well as consideration of Year 2042 traffic volume forecasts created from the Madera County Transportation Commission's regional travel demand forecasting model. The text which follows outlines the assumptions made for this analysis.

Liberty Village. The Liberty Village development is located on the north side of State Route 49, as noted in Figure 6. Over the years several parcels within the original project area have been developed, including the True Value Hardware store, Madera County Government Center, Kaiser / VA offices, and most recently Tractor Supply.

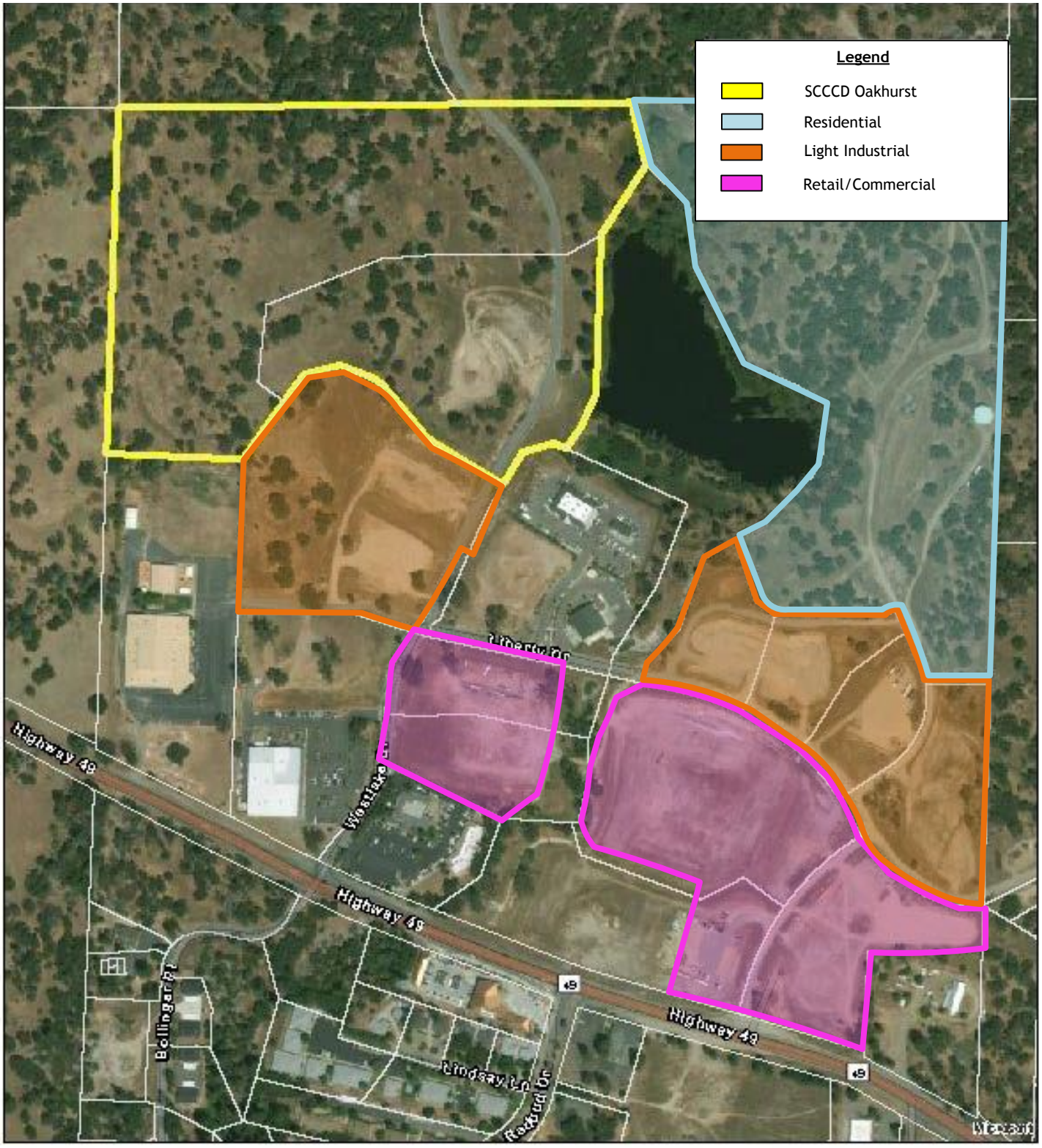
Other Development. Madera County staff identified several other projects to include in the cumulative analysis.

The Wright Ranch lies immediately to the north of Liberty Village. It could be developed with both multiple family and single family uses and would have access to SR 49 via Liberty Village and to SR 41 directly. The approved Oakhurst Townhomes lies to the east of Liberty Village, and its access is via Meadow Vista Drive.

Travel Characteristics of Cumulative Development

Land Use / Trip Generation. The Liberty Village development anticipates a range of land uses that are already permitted under the current Madera County CUM, IL, and RUM zoning designations. Anticipated development would be consistent with the Oakhurst Area Plan (2005). As was noted in Figure 6, a mix of retail, office and light industrial uses are expected in the southern half of the project, while residential development is anticipated in the northern half.

Trip Generation Forecasts. Table 7 identifies the trip generation forecast for the cumulative development identified as part of this study. These forecasts are based on Trip Generation rates contained in the ITE publication, *Trip Generation Manual, 10th Edition*. The total forecast for these uses is to be 12,945 daily, 525 a.m. and 1,278 p.m. peak hour trips.



New Oakhurst Center Site

State Center Community College District

ODELL Planning & Research, Inc.

0 125 250 500 750 1,000 Feet

N

LAND USE MAP

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5015-A-01 2/18/2020

figure 6

TABLE 7
OAKHURST SR 49 CORRIDOR AREA LAND USE

Description	Quantity	Trip Generation						
		Daily	AM Peak Hour			PM Peak Hour		
			in	out	total	in	out	total
Liberty Village Area								
Light Industrial	52 ksf	258	32	4	36	4	29	33
General Retail[1]	210 ksf	9,957	159	98	257	452	489	941
Tractor Supply	18.6 ksf	266	11	7	18	12	14	26
Multiple Family Residential	60 du's	439	6	22	28	21	13	34
Subtotal		10,894	208	131	339	489	545	1,034
Adjoining Properties								
Oakhurst Townhomes	192 du's	1,405	20	68	88	68	40	108
Wright Ranch – Multiple Family	88 du's	644	9	31	40	31	18	49
Wright Ranch – Single Family	108 du's	1,020	20	60	80	67	40	107
Gross Total		**13,043**	**257**	**290**	**547**	**655**	**643**	**1,298**
Retail Pass-by Trips		**3,066**	**0**	**0**	**0**	**145**	**145**	**290**
Net Primary Trips		**9,977**	**257**	**290**	**547**	**510**	**498**	**1,008**

[1] trip estimate based on equations for ITE Code 820 (Shopping Center) for 210 ksf center.

Vehicle Trip Distribution. Having determined the number of vehicle trips that is expected to be generated by development in the project area, it is next necessary to identify the distribution of these trips. For mixed use development, there are three components to trip distribution:

Trips made between complimentary uses within the immediate project area (i.e., Internal Trips). In this case, because the ITE code for shopping center has been used, internal trips between retail uses has already been addressed. Because the retail component is such a large share of the total cumulative traffic, no additional discount has been made for internal trips between retail uses and other uses.

"Pass-by Trips" trips drawn from the stream of traffic passing retail development as part of another trip. In this case, because the nature of individual retail uses is unknown, a p.m. peak hour and daily pass-by percentage that is consistent with the average for retail shopping centers has been assumed (i.e., 30%). With this reduction the cumulative development generates 9,878 primary trips on a daily basis.

Destination for New trips leaving the Projects. The directional distribution for "new" trips (i.e., those trips that are not "internal" nor "pass-by") has been determined based on review of current travel patterns in the study area and understanding of the location of complimentary and competing land use. Review of the current peak hour traffic volumes at the SR 49 / Westlake Drive intersection reveals that the vast majority of those trips already generated by True Value Hardware, Kaiser / VA, MCC and the Madera County Government Center are oriented to the south (i.e., 85% southbound and 15% northbound). Much of the traffic headed south on SR 49 continues to the SR 41 intersection where the majority of the volume turns onto SR 41 north into central Oakhurst. This pattern is likely to be replicated by the new retail, industrial uses in this area. New residential uses will follow the same general pattern, but because existing regional commercial uses are accessed via local streets like Junction Drive, a greater share of these trips will be oriented to the local street system north of the SR 41 intersection.

Table 8 summarizes the directional distribution assumptions made for the "new trips" generated by cumulative projects in the study area.

TABLE 8
REGIONAL TRIP DISTRIBUTION ASSUMPTIONS

Direction	Route	Percent of New Trips by Land Use		
		Retail	Industrial	Residential
West	SR 49 (North)	20%	20%	17%
North	SR 41 north of SR 49	50%	50%	54%
South	SR 41 south of SR 49	25%	25%	22%
Local	Streets along SR 49 between Westlake Drive and SR 41	5%	5%	7%
Total		100%	100%	100%

Regional Traffic Growth

The extent to which the volume of traffic on the SR 49 corridor may increase in the future as a result of growth outside of the study area was considered. From prior conversations with Caltrans District 6 staff we understand that historic growth rates have been very low in this area. In addition, based on review of MCTC regional travel demand model forecasts, it appears that relatively little through traffic volume increases should be anticipated. Conversely, the traffic contribution of cumulative development projects adds trips (7,800 SDT) that are equal to roughly 57% of the current volume on SR 49 west of SR 41 (13,500). For these reasons, it has been assumed that the trips caused by cumulative projects as contained in this report will approximate a reasonable long-term planning horizon, and no additional through traffic increase is warranted for the projections.

Circulation System Improvements

As noted earlier, SR 49 is ultimately planned to be a 4 lane facility under Caltrans's *SR 49 Transportation Concept Report* (2011). However, because the schedule and funding for that project is uncertain, this analysis assumes that only the following improvements will have been made under cumulative background conditions:

1. Completion of Liberty Drive to Meadow Vista Drive
2. Completion of planned roads north of Liberty Drive to Wright Ranch

In addition, assumptions have been made as to the level of access that will be allowed by Caltrans to new projects in this area. While not necessarily based on any agreement from the affected property owners or District 6, this analysis assumes the following:

- SR 49 / Westlake Drive: full access
- SR 49 / Redbud Drive: no outbound left turns
- SR 49 / Village Drive: full access

Traffic Volume Forecasts / Levels of Service – No Project

Traffic Volumes. Figure 7 presents Cumulative a.m. and p.m. peak hour traffic volumes assuming the land use and traffic control assumptions noted above but without the SCCCD Oakhurst campus.

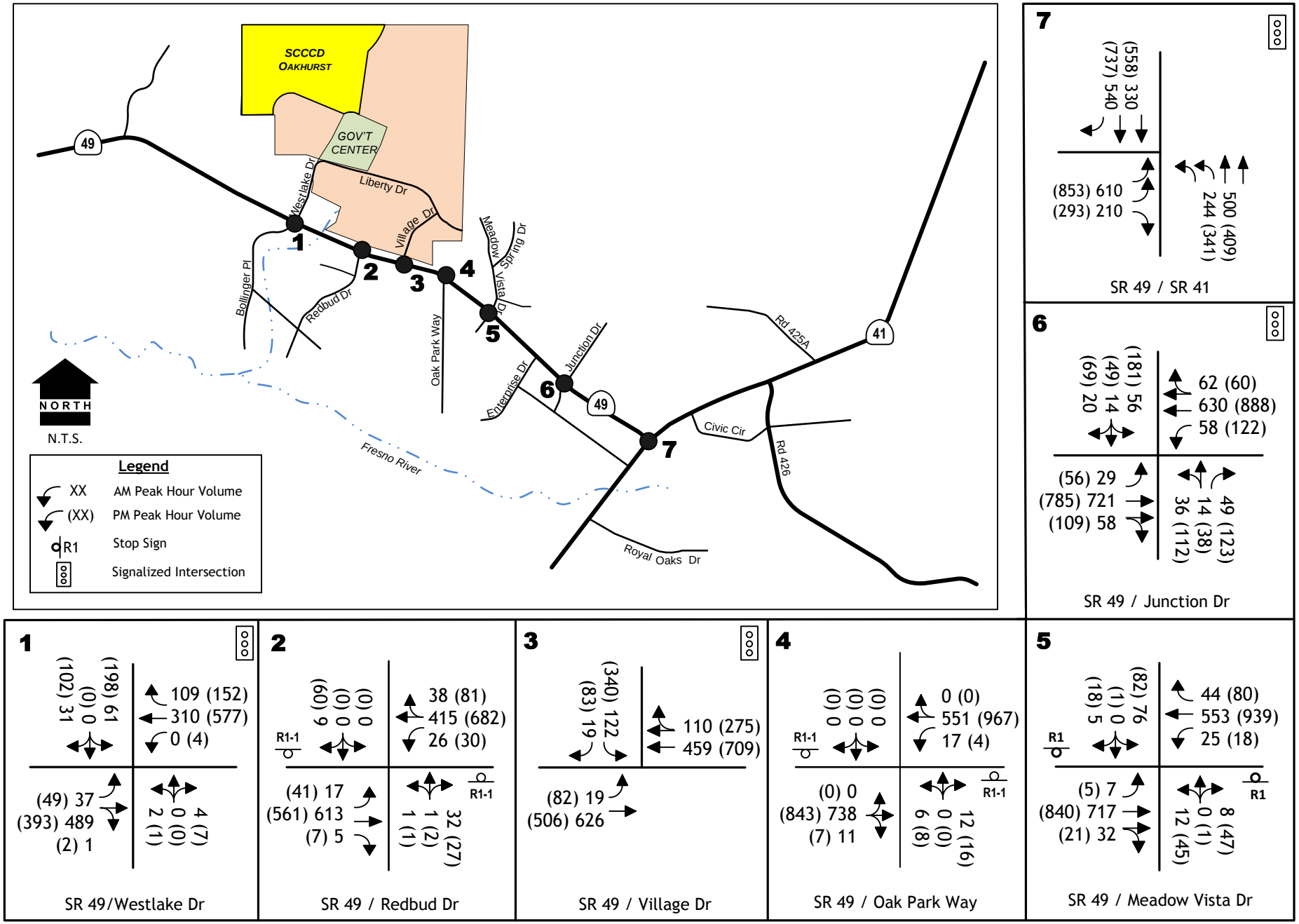
Peak Hour Intersection Levels of Service. Table 9 identifies peak hour Level of Service assuming no improvements are made to the study area circulation system. As indicated, three intersections will operate with Levels of Service that exceed the minimum LOS D standard.

The southbound approach at the **SR 49 / Westlake Drive intersection** will operate at LOS F in the p.m. peak hour.

The southbound approach at the **SR 49 / Village Drive intersection** will operate at LOS F in the a.m. and p.m. peak hour.

The southbound approach at the **SR 49 / Meadow Vista Drive intersection** will operate at LOS F in the a.m. peak hour, and both the northbound and southbound approaches will operate at LOS F in the p.m. peak hour.

Peak Hour Traffic Signal Warrants. Table 10 reviews the status of peak hour traffic signal warrants at study intersections under cumulative conditions. As shown, the Westlake Drive, Village Drive and Meadow Vista Drive intersections on SR 49 will carry volumes that satisfy peak hour volume warrants.



CUMULATIVE WITHOUT PROJECT
TRAFFIC VOLUMES AND INTERSECTION GEOMETRY

KD Anderson & Associates, Inc.
Transportation Engineers

5015-A-01 2/18/2020

figure 7

TABLE 9
CUMULATIVE PLUS PROJECT PEAK HOUR INTERSECTION LEVELS OF SERVICE

Intersection	Control	AM Peak Hour				PM Peak Hour			
		Cumulative		Cumulative Plus Project		Cumulative		Cumulative Plus Project	
		LOS	Average Delay (sec/veh)	LOS	Average Delay (sec/veh)	LOS	Average Delay (sec/veh)	LOS	Average Delay (sec/veh)
SR 49 / Westlake Drive / Bollinger Place	Northbound / Southbound Stop								
Eastbound left turn		A	8.5	A	8.6	A	9.6	B	10.0
Westbound left turn		-	-	-	-	A	8.2	A	8.2
Northbound Bollinger Place		C	17.2	C	17.5	B	14.9	C	15.4
Southbound Westlake Drive		D	32.6	**E**	**36.8**	**F**	**425.8**	**F**	**607.2**
SR 49 / Redbud Drive	Northbound / Southbound Stop								
Eastbound left turn		A	8.6	A	8.7	B	9.7	B	10.0
Westbound left turn		A	9.3	A	9.3	A	8.8	A	8.9
Northbound Redbud Drive		C	15.9	C	16.0	C	16.7	C	17.7
Southbound right turn		B	11.6	B	11.9	B	15.8	C	16.9
SR 49/ Village Drive	Southbound Stop								
Eastbound left turn		A	9.0	A	9.8	C	11.3	B	11.7
Southbound Village Drive		**F**	**121.2**	**F**	**140.9**	**F**	**>999**	**F**	**>999**
SR 49 / Oak Park Way	Northbound Stop								
Westbound left turn		A	9.8	A	9.8	A	9.6	B	10.0
Northbound Oak Park Way		C	24.0	C	24.7	D	34.9	**E**	**38.5**
SR 49/ Meadow Vista Drive	Northbound / Southbound Stop								
Eastbound left turn		A	9.2	A	9.4	B	10.9	B	11.3
Westbound left turn		B	10.2	B	10.2	A	10.2	B	10.3
Northbound Meadow Vista Drive		D	32.6	D	33.5	**F**	**94.6**	**F**	**123.2**
Southbound Meadow Vista Drive		**F**	**96.7**	**F**	**110.1**	**F**	**416.8**	**F**	**529.1**
SR 49 / Junction Drive	Signal	B	17.6	B	17.6	C	30.7	C	31.9
SR 49 / SR 41	Signal	B	16.0	B	16.7	C	24.4	C	28.6

Bold indicates conditions in excess of adopted minimum LOS D standard. **HIGHLIGHTED** values are a significant impact

TABLE 10
STATUS OF TRAFFIC SIGNAL WARRANTS UNDER CUMULATIVE CONDITIONS

Intersection	Warrant Satisfied?	Approach Volume							
		AM Peak Hour (7:00 to 9:00 a.m.)				PM Peak Hour (4:00 to 6:00 p.m.)			
		Cumulative		Cumulative Plus SCCCD Oakhurst		Cumulative		Cumulative Plus SCCCD Oakhurst	
		Major	Minor	Major	Minor	Major	Minor	Major	Minor
SR 49 / Westlake Drive / Bollinger Place	Yes	946	92	974	98	1,177	300	1,233	335
SR 49 / Red Bud Drive	No	1,114	34	1,120	34	1,402	60	1,483	60
SR 49 / Village Drive	Yes	1,214	141	1,244	141	1,572	423	1,654	423
SR 49 / Oak Park Way	No	1,317	18	1,347	18	1,821	24	1,902	24
SR 49 / Meadow Vista Drive	Yes	1,378	81	1,408	81	1,903	101	1,984	101

Highlight indicates volumes satisfying peak hour warrant volume requirements

Traffic Volume Forecasts and Levels of Service – Plus Project

Traffic Volumes. Figure 8 presents the sum of net project trips and background cumulative traffic at each study location.

Peak Hour Intersection Levels of Service. Table 9 identified peak hour Level of Service with the project again assuming no improvements are made to the study area circulation system. As indicated, three intersections will continue to operate with Levels of Service that exceed the minimum LOS D standard.

The southbound approach at the **SR 49 / Westlake Drive intersection** will operate at LOS F in the a.m. and p.m. peak hour.

The southbound approach at the **SR 49 / Village Drive intersection** will operate at LOS F in the a.m. and p.m. peak hour.

The southbound approach at the **SR 49 / Meadow Vista Drive intersection** will operate at LOS F in the a.m. peak hour, and both the northbound and southbound approaches will operate at LOS F in the p.m. peak hour.

Peak Hour Traffic Signal Warrants. Table 10 reviews the status of peak hour traffic signal warrants at study intersections under cumulative conditions. As shown, the same three intersections on SR 49 (i.e., Westlake Drive, Village Drive and Meadow Vista Drive) will carry volumes that satisfy peak hour volume warrants.

Potential Mitigations

Intersection improvements would be needed to improve the Level of Service at three locations and to deliver LOS D or better conditions. Identified options are listed below and their resulting Levels of Service are also reflected shown in Table 11, including:

SR 49 / Westlake Drive. The two options described under Existing Plus Project conditions remain applicable:

- Install a traffic signal with auxiliary turn lanes: LOS B
- Install a roundabout: LOS B

SR 49 / Village Drive. Two options are available:

- ***Traffic Signal with westbound right turn lane and southbound right turn lane.*** Signalizing the intersection with two auxiliary lanes would result in LOS D conditions that satisfy minimum standards. Caltrans may eventually require a complete Traffic Signal Warrants Analysis to determine when to install a traffic signal.

- ***Roundabout.*** A roundabout intersection would deliver LOS C conditions. The extent of right of way to be acquired to accommodate a roundabout is unknown, and right of way availability is unknown.

Under Caltrans policy an ICE report will be required in order to determine the applicable course of action at this intersection. A preliminary ICE report is also required for Caltrans to identify an applicable design alternative if stopping main-line SR 49 traffic is involved.

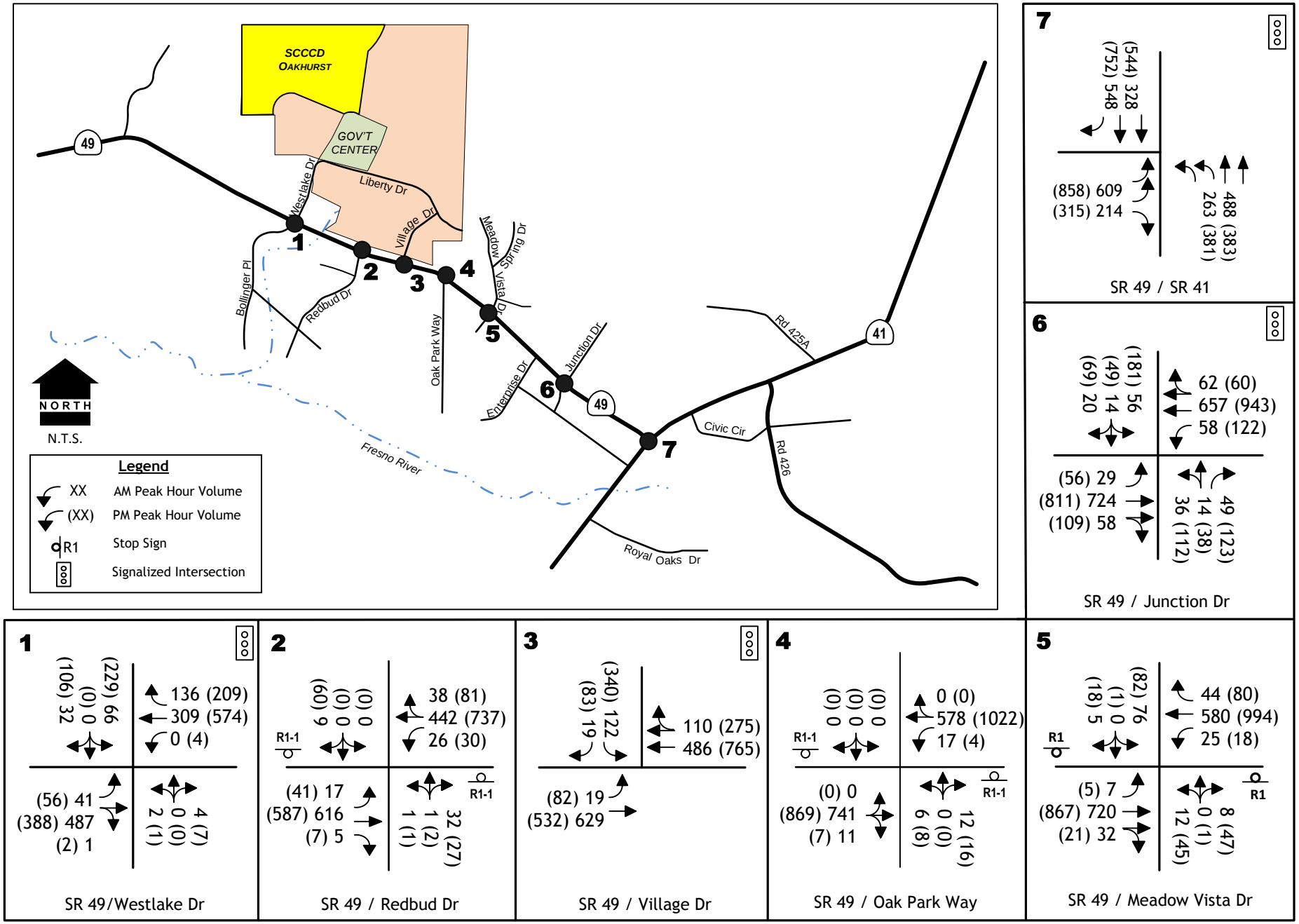
SR 49 / Meadow Vista Drive. Three options are available.

- ***Traffic Signal with 4 lane SR 49*.** Signalizing the intersection with SR 49 widened to 4-lanes two auxiliary lanes would result in LOS B conditions that satisfy minimum standards. Caltrans may eventually require a complete Traffic Signal Warrants Analysis to determine when to install a traffic signal.

- ***Roundabout.*** A roundabout intersection would deliver LOS C conditions. The extent of right of way to be acquired to accommodate a roundabout is unknown, and right of way availability is unknown.

Under Caltrans policy an ICE report will be required in order to determine the applicable course of action at this intersection. A preliminary ICE report is also required for Caltrans to identify an applicable design alternative if stopping main-line SR 49 traffic is involved.

- **Prohibit outbound left turns onto SR 49**. Because the minor street approach volume is just over the minimum requirements under peak hour traffic signal warrants, prohibiting left turns onto the state highway could be considered and would improve the side street Level of Service.



CUMULATIVE PLUS PROJECT
TRAFFIC VOLUMES AND INTERSECTION GEOMETRY

KD Anderson & Associates, Inc.
Transportation Engineers

5015-A-01 2/18/2020

figure 8

TABLE 11
MITIGATED CUMULATIVE PLUS PROJECT PEAK HOUR INTERSECTION LEVELS OF SERVICE

Intersection	Control	AM Peak Hour				PM Peak Hour			
		Cumulative		Cumulative Plus Project		Cumulative		Cumulative Plus Project	
		LOS	Average Delay (sec/veh)	LOS	Average Delay (sec/veh)	LOS	Average Delay (sec/veh)	LOS	Average Delay (sec/veh)
SR 49 / Westlake Drive / Bollinger Place	Northbound / Southbound Stop								
Eastbound left turn		A	8.5	A	8.6	A	9.6	B	10.0
Westbound left turn		-	-	-	-	A	8.2	A	8.2
Northbound Bollinger Place		C	17.2	C	17.5	B	14.9	C	15.4
Southbound Westlake Drive		D	32.6	**E**	**36.8**	**F**	**425.8**	**F**	**607.2**
Signal, westbound right turn lane				A	9.4			B	18.2
Roundabout		A	6.4	A	6.5	A	9.7	B	10.7
SR 49/ Village Drive	Southbound Stop								
Eastbound left turn		A	9.0	A	9.8	C	11.3	B	11.7
Southbound Village Drive		**F**	**121.2**	**F**	**140.9**	**F**	**>999**	**F**	**>999**
Signal, southbound right turn lane, westbound right turn lane				B	10.2			D	44.7
Roundabout		A	8.2	A	8.4	C	19.7	C	23.2
SR 49/ Meadow Vista Drive	Northbound / Southbound Stop								
Eastbound left turn		A	9.2	A	9.4	B	10.9	B	11.3
Westbound left turn		B	10.2	B	10.2	A	10.2	B	10.3
Northbound Meadow Vista Drive		D	32.6	D	33.5	**F**	**94.6**	**F**	**123.2**
Southbound Meadow Vista Drive		**F**	**96.7**	**F**	**110.1**	**F**	**416.8**	**F**	**529.1**
Signal, 4 lane SR 49				A	9.9			B	10.4
Roundabout		A	9.4	A	9.6	C	16.2	C	18.5

Bold indicates conditions in excess of adopted minimum LOS D standard. **HIGHLIGHTED** values are a significant impact

IMPACT / MITIGATION SUMMARY

The section which follows identifies those conditions which might be considered significant traffic impacts and prescribes improvements to provide traffic operations meeting adopted minimum standards.

Existing Plus Project Impacts

Impact T-1. The project will exacerbate p.m. peak hour traffic conditions at the **SR 49 / Westlake Drive intersection** which already exceed the LOS D threshold and where peak hour traffic signal warrants are already satisfied. This is a significant impact.

Mitigation T-1A. The project shall fund an Intersection Control Evaluation (ICE) report to be completed to the satisfaction of Caltrans District 6 to determine whether a traffic signal roundabout is the preferred improvement at this location.

Mitigation T-1B. The project shall install the traffic signal or roundabout recommended by the ICE report. Because this improvement is already needed and will benefit the balance of Liberty Village, the SCCD project shall be responsible for its fair share of the cost of the improvement. An applicable fair share calculation under Caltrans guidelines is noted in Table 12.

Cumulative Impacts

Impact T-2. The project will exacerbate cumulative p.m. peak hour traffic conditions at the **SR 49 / Westlake Drive intersection** which are expected to exceed the LOS D threshold and where peak hour traffic signal warrants are already satisfied. This is a significant impact.

Mitigation Measures T1A and T1B address this issue and no further mitigation is needed.

Impact T-3. The project will exacerbate cumulative a.m. and p.m. peak hour traffic conditions at the **SR 49 / Village Drive intersection** which are expected to exceed the LOS D threshold and where peak hour traffic signal warrants are expected to be satisfied. This is a significant impact.

Mitigation T-3A. The project shall contribute its fair share to the cost of an Intersection Control Evaluation (ICE) report to be completed to the satisfaction of Caltrans District 6 to determine whether a traffic signal roundabout is the preferred improvement at this location.

Mitigation T-3B. The SCCCD Oakhurst project shall contribute its fair share of the cost of the identified improvement. An applicable fair share calculation under Caltrans guidelines is noted in Table 12.

Impact T-4. The project will exacerbate cumulative a.m. and p.m. peak hour traffic conditions at the **SR 49 / Meadow Vista Drive** which are expected to exceed the LOS D threshold and where peak hour traffic signal warrants are expected to be satisfied. This is a significant impact.

Mitigation T-4A. The project shall contribute its fair share to the cost of an Intersection Control Evaluation (ICE) report to be completed to the satisfaction of Caltrans District 6 to determine whether left turn prohibition, a traffic signal or roundabout is the preferred improvement at this location.

Mitigation T-4B. The SCCCD Oakhurst project shall contribute its fair share of the cost of the identified improvement. An applicable fair share calculation under Caltrans guidelines is noted in Table 12.

TABLE 12
PROJECT FAIR SHARE PERCENTAGES

Location	PM Peak Hour Traffic			Project Share
	Existing	SCCCD Oakhurst Alone	Total Cumulative Plus Project	
	A	B	C	B/(C-A)
SR 49 / Westlake Drive	1,174	92	1,576	23%
SR 49 / Village Drive	1,157	81	2,077	9%
SR 49 / Meadows Vista Drive	1,331	81	2,179	10%

(Note: Table 12 fair share percentages are based on buildout of future land uses in the cumulative scenario and the project. However, there are a number of developed properties in the area that have previously agreed to contribute to traffic improvements either through CC&Rs or separate agreements. Any mechanism to fund future improvements should include the participation of these developed properties.)

APPENDIX

Year 2013 Traffic Counts

Level of Service Worksheets

All Traffic Data

(916) 771-8700
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City of Oakhurst

File Name : 13-7204-001 Westlake-SR 49
Site Code : 00000000
Start Date : 4/16/2013
Page No : 1

Groups Printed- Unshifted

	State Route 49 Southbound				Westlake Drive Westbound				State Route 49 Northbound				Bollinger Place Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00	1	69	0	70	2	0	0	2	1	26	9	36	0	0	0	0	108
07:15	3	111	0	114	8	0	0	8	0	38	9	47	0	0	2	2	171
07:30	2	142	0	144	5	0	1	6	0	47	12	59	0	0	1	1	210
07:45	6	140	1	147	19	0	0	19	2	70	29	101	0	0	0	0	267
Total	12	462	1	475	34	0	1	35	3	181	59	243	0	0	3	3	756
08:00	5	148	0	153	14	0	4	18	0	49	28	77	0	0	3	3	251
08:15	7	99	0	106	14	0	1	15	0	47	18	65	0	0	2	2	188
08:30	5	88	0	93	9	0	3	12	0	48	22	70	0	0	0	0	175
08:45	8	123	1	132	13	0	2	15	0	62	23	85	0	0	2	2	234
Total	25	458	1	484	50	0	10	60	0	206	91	297	0	0	7	7	848
09:00	10	85	1	96	17	0	2	19	0	50	15	65	1	0	1	2	182
09:15	8	79	1	88	18	0	4	22	2	56	19	77	1	2	3	6	193
09:30	4	65	1	70	19	0	2	21	1	61	22	84	2	0	0	2	177
09:45	7	93	0	100	21	1	4	26	3	59	27	89	0	0	1	1	216
Total	29	322	3	354	75	1	12	88	6	226	83	315	4	2	5	11	768
10:00	4	69	0	73	25	1	8	34	1	40	28	69	0	1	0	1	177
10:15	12	71	1	84	31	1	5	37	1	61	32	94	0	2	2	4	219
10:30	11	85	0	96	36	2	4	42	3	62	44	109	1	1	2	4	251
10:45	10	73	0	83	40	1	6	47	1	53	29	83	0	1	0	1	214
Total	37	298	1	336	132	5	23	160	6	216	133	355	1	5	4	10	861
11:00	4	76	2	82	24	0	9	33	1	72	32	105	0	1	0	1	221
11:15	8	71	0	79	41	0	3	44	3	51	34	88	2	0	1	3	214
11:30	6	78	1	85	31	0	4	35	3	63	24	90	1	0	3	4	214
11:45	3	63	1	67	35	0	5	40	2	90	30	122	0	0	4	4	233
Total	21	288	4	313	131	0	21	152	9	276	120	405	3	1	8	12	882
12:00	4	87	0	91	40	1	4	45	4	78	30	112	0	0	0	0	248
12:15	7	92	0	99	43	1	6	50	1	75	37	113	0	1	5	6	268
12:30	3	68	0	71	28	0	8	36	1	86	27	114	0	0	4	4	225

All Traffic Data

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City of Oakhurst

File Name : 13-7204-001 Westlake-SR 49
Site Code : 00000000
Start Date : 4/16/2013

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	State Route 49 Southbound				Westlake Drive Westbound				State Route 49 Northbound				Bollinger Place Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
12:45	2	71	0	73	40	1	13	54	1	64	23	88	0	1	2	3	218
Total	16	318	0	334	151	3	31	185	7	303	117	427	0	2	11	13	959
13:00	1	77	0	78	19	0	4	23	1	65	29	95	0	0	0	0	196
13:15	6	69	0	75	17	1	4	22	3	82	29	114	0	0	2	2	213
13:30	1	79	0	80	27	0	3	30	2	91	35	128	0	0	2	2	240
13:45	2	88	0	90	30	0	3	33	2	94	24	120	0	0	2	2	245
Total	10	313	0	323	93	1	14	108	8	332	117	457	0	0	6	6	894
14:00	4	78	1	83	22	0	4	26	5	104	26	135	0	0	1	1	245
14:15	4	75	1	80	19	0	5	24	1	102	21	124	2	0	3	5	233
14:30	3	83	1	87	26	1	7	34	6	94	30	130	0	0	1	1	252
14:45	3	94	0	97	24	0	5	29	2	87	20	109	0	1	0	1	236
Total	14	330	3	347	91	1	21	113	14	387	97	498	2	1	5	8	966
15:00	4	77	0	81	19	0	5	24	0	107	24	131	0	0	3	3	239
15:15	3	55	1	59	20	1	5	26	0	78	26	104	0	0	2	2	191
15:30	2	57	1	60	30	0	4	34	3	88	14	105	0	0	0	0	199
15:45	5	70	0	75	17	0	3	20	3	84	24	111	0	0	1	1	207
Total	14	259	2	275	86	1	17	104	6	357	88	451	0	0	6	6	836
16:00	4	61	0	65	22	0	7	29	2	99	14	115	0	0	0	0	209
16:15	4	69	0	73	24	0	6	30	1	103	27	131	0	0	0	0	234
16:30	1	61	0	62	24	1	10	35	1	117	9	127	0	0	1	1	225
16:45	1	60	0	61	20	0	2	22	3	92	18	113	0	0	0	0	196
Total	10	251	0	261	90	1	25	116	7	411	68	486	0	0	1	1	864
17:00	1	54	1	56	26	0	6	32	3	142	16	161	0	0	3	3	252
17:15	3	54	1	58	16	0	7	23	4	83	14	101	0	0	1	1	183
17:30	2	59	0	61	17	0	3	20	2	107	12	121	0	0	0	0	202
17:45	6	55	0	61	10	0	0	10	0	96	7	103	0	0	1	1	175
Total	12	222	2	236	69	0	16	85	9	428	49	486	0	0	5	5	812
18:00	1	61	1	63	8	0	5	13	1	87	13	101	0	0	0	0	177

All Traffic Data

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City of Oakhurst

File Name : 13-7204-001 Westlake-SR 49
Site Code : 00000000
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	State Route 49 Southbound				Westlake Drive Westbound				State Route 49 Northbound				Bollinger Place Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
18:15	0	53	0	53	13	0	4	17	3	58	8	69	1	0	1	2	141
18:30	1	49	0	50	11	1	3	15	0	75	8	83	0	0	2	2	150
18:45	2	38	1	41	5	0	3	8	2	62	3	67	0	0	2	2	118
Total	4	201	2	207	37	1	15	53	6	282	32	320	1	0	5	6	586
Grand Total	204	3722	19	3945	1039	14	206	1259	81	3605	1054	4740	11	11	66	88	10032
Apprch %	5.2	94.3	0.5		82.5	1.1	16.4		1.7	76.1	22.2		12.5	12.5	75		
Total %	2	37.1	0.2	39.3	10.4	0.1	2.1	12.5	0.8	35.9	10.5	47.2	0.1	0.1	0.7	0.9	

	State Route 49 Southbound				Westlake Drive Westbound				State Route 49 Northbound				Bollinger Place Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 13:00 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 11:45																	
11:45	3	63	**1**	67	35	0	5	40	2	**90**	30	**122**	0	0	4	4	233
12:00	4	87	0	91	40	**1**	4	45	**4**	78	30	112	0	0	0	0	248
12:15	**7**	**92**	0	**99**	**43**	1	6	**50**	1	75	**37**	113	0	**1**	**5**	**6**	**268**
12:30	3	68	0	71	28	0	**8**	36	1	86	27	114	0	0	4	4	225
Total Volume	17	310	1	328	146	2	23	171	8	329	124	461	0	1	13	14	974
% App. Total	5.2	94.5	0.3		85.4	1.2	13.5		1.7	71.4	26.9		0	7.1	92.9		
PHF	.607	.842	.250	.828	.849	.500	.719	.855	.500	.914	.838	.945	.000	.250	.650	.583	.909

All Traffic Data

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City of Oakhurst

File Name : 13-7204-001 Westlake-SR 49
Site Code : 00000000
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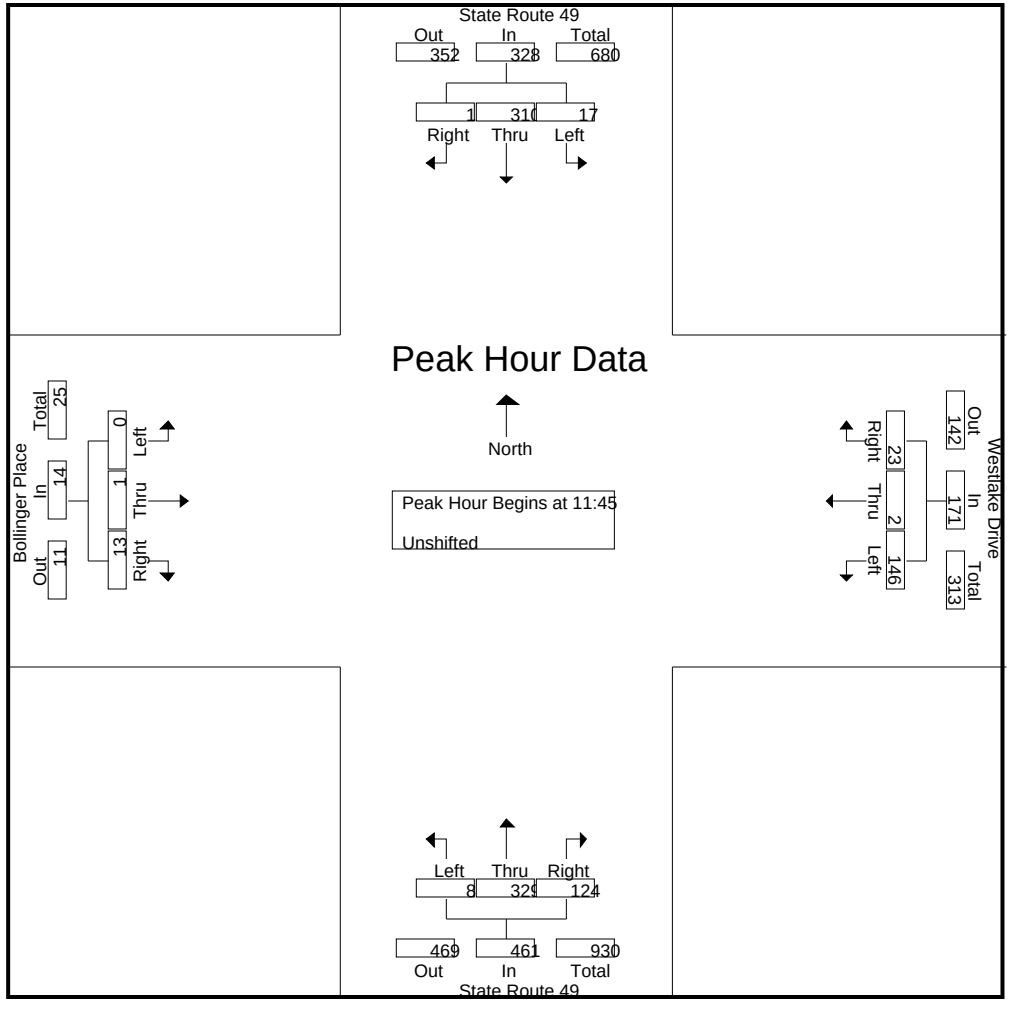
Page No : 4



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City of Oakhurst

File Name : 13-7204-001 Westlake-SR 49
Site Code : 00000000
Start Date : 4/16/2013

	State Route 49 Southbound				Westlake Drive Westbound				State Route 49 Northbound				Bollinger Place Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 13:15 to 18:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 13:45																	
13:45	2	**88**	0	**90**	**30**	0	3	33	2	94	24	120	0	0	2	2	245
14:00	**4**	78	**1**	83	22	0	4	26	5	**104**	26	**135**	0	0	1	1	245
14:15	4	75	1	80	19	0	5	24	1	102	21	124	**2**	0	**3**	**5**	233
14:30	3	83	1	87	26	**1**	**7**	**34**	**6**	94	**30**	130	0	0	1	1	**252**
Total Volume	13	324	3	340	97	1	19	117	14	394	101	509	2	0	7	9	975
% App. Total	3.8	95.3	0.9		82.9	0.9	16.2		2.8	77.4	19.8		22.2	0	77.8		
PHF	.813	.920	.750	.944	.808	.250	.679	.860	.583	.947	.842	.943	.250	.000	.583	.450	.967

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City of Oakhurst

File Name : 13-7204-001 Westlake-SR 49
Site Code : 00000000
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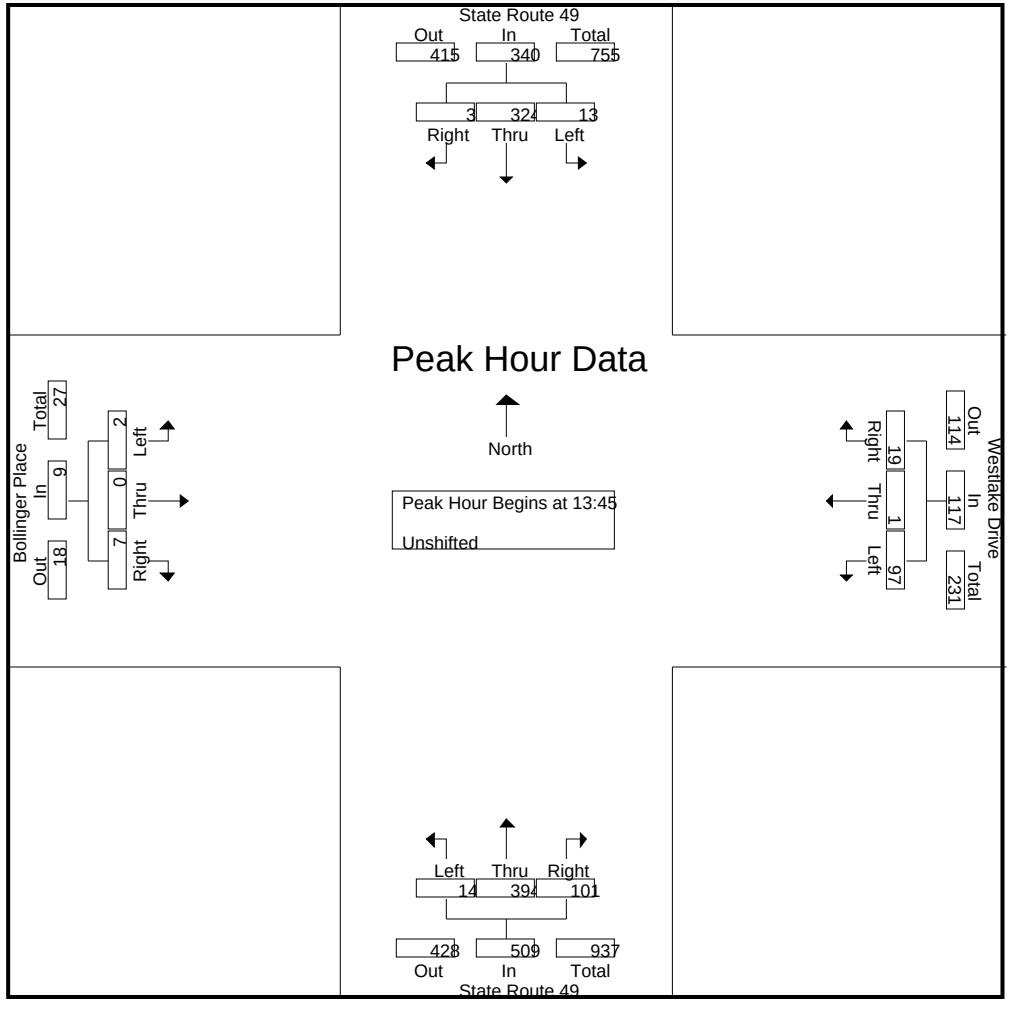

All Traffic Data

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orders@atdtraffic.com

City of Oakhurst

File Name : 13-7204-002 Redbud-SR 49
Site Code : 00000000
Start Date : 4/16/2013
Page No : 1

Groups Printed- Unshifted

	State Route 49 Southbound				Westbound				State Route 49 Northbound				Redbud Drive Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00	0	72	0	72	0	0	0	0	1	34	0	35	0	0	2	2	109
07:15	0	118	2	120	0	0	0	0	1	48	0	49	1	0	5	6	175
07:30	0	144	0	144	0	0	0	0	1	64	0	65	0	0	6	6	215
07:45	0	161	0	161	0	0	0	0	5	93	0	98	1	0	6	7	266
Total	0	495	2	497	0	0	0	0	8	239	0	247	2	0	19	21	765
08:00	0	163	1	164	0	0	0	0	3	78	0	81	0	0	4	4	249
08:15	0	113	1	114	0	0	0	0	2	62	0	64	1	0	3	4	182
08:30	0	96	2	98	0	0	0	0	0	76	0	76	1	0	7	8	182
08:45	0	137	1	138	0	0	0	0	2	78	0	80	1	0	3	4	222
Total	0	509	5	514	0	0	0	0	7	294	0	301	3	0	17	20	835
16:00	0	82	1	83	0	0	0	0	2	116	0	118	1	0	3	4	205
16:15	0	89	1	90	0	0	0	0	3	125	0	128	1	0	6	7	225
16:30	0	85	0	85	0	0	0	0	6	124	0	130	0	0	2	2	217
16:45	0	78	1	79	0	0	0	0	2	109	0	111	1	0	4	5	195
Total	0	334	3	337	0	0	0	0	13	474	0	487	3	0	15	18	842
17:00	0	80	1	81	0	0	0	0	8	165	0	173	0	0	5	5	259
17:15	0	73	1	74	0	0	0	0	5	94	0	99	3	0	4	7	180
17:30	0	72	2	74	0	0	0	0	7	121	0	128	1	0	5	6	208
17:45	0	65	0	65	0	0	0	0	6	100	0	106	1	0	5	6	177
Total	0	290	4	294	0	0	0	0	26	480	0	506	5	0	19	24	824
Grand Total	0	1628	14	1642	0	0	0	0	54	1487	0	1541	13	0	70	83	3266
Apprch %	0	99.1	0.9		0	0	0		3.5	96.5	0		15.7	0	84.3		
Total %	0	49.8	0.4	50.3	0	0	0	0	1.7	45.5	0	47.2	0.4	0	2.1	2.5	

All Traffic Data

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City of Oakhurst

File Name : 13-7204-002 Redbud-SR 49
Site Code : 00000000
Start Date : 4/16/2013
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	State Route 49 Southbound				Westbound				State Route 49 Northbound				Redbud Drive Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30																	
07:30	0	144	0	144	0	0	0	0	1	64	0	65	0	0	**6**	6	215
07:45	0	161	0	161	0	0	0	0	**5**	**93**	0	**98**	**1**	0	6	**7**	**266**
08:00	0	**163**	**1**	**164**	0	0	0	0	3	78	0	81	0	0	4	4	249
08:15	0	113	1	114	0	0	0	0	2	62	0	64	1	0	3	4	182
Total Volume	0	581	2	583	0	0	0	0	11	297	0	308	2	0	19	21	912
% App. Total	0	99.7	0.3		0	0	0		3.6	96.4	0		9.5	0	90.5		
PHF	.000	.891	.500	.889	.000	.000	.000	.000	.550	.798	.000	.786	.500	.000	.792	.750	.857

All Traffic Data

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City of Oakhurst

File Name : 13-7204-002 Redbud-SR 49
Site Code : 00000000
Start Date : 4/16/2013
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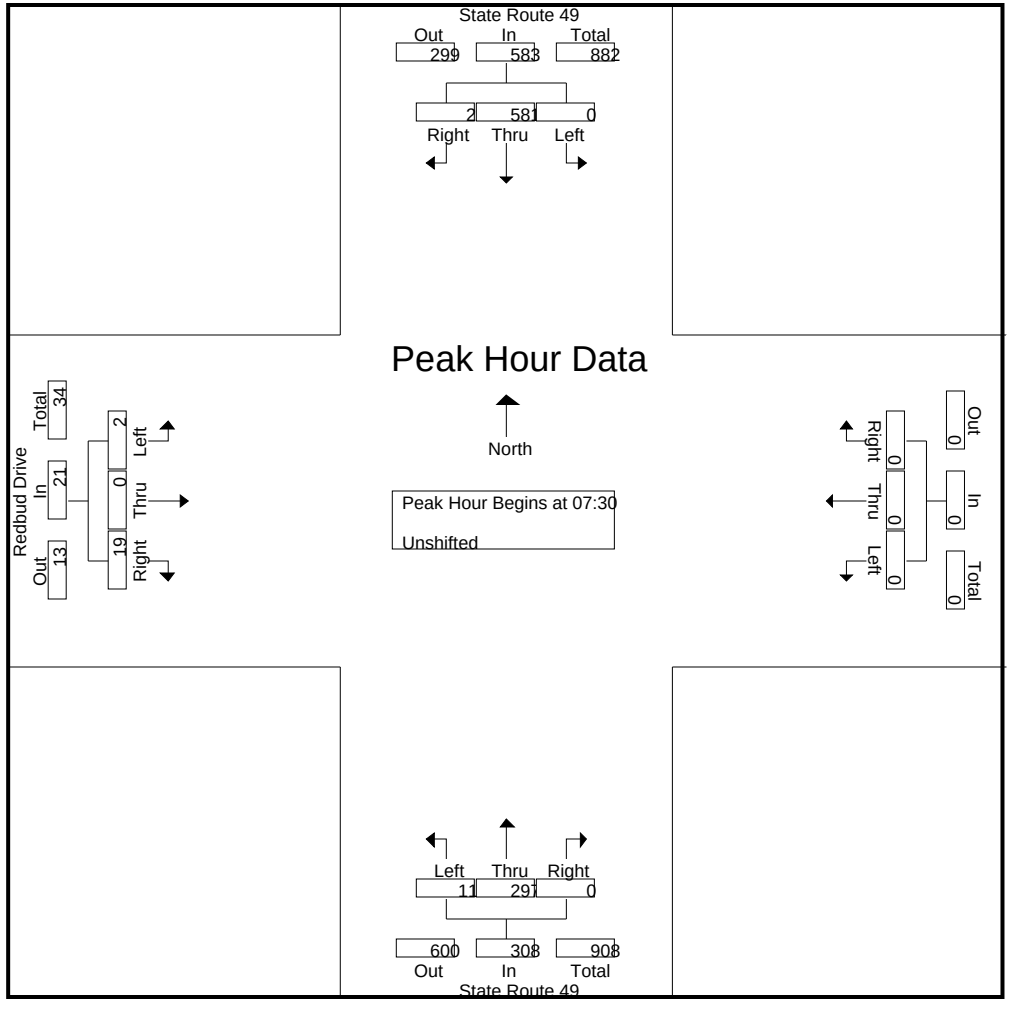

All Traffic Data

(916) 771-8700
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City of Oakhurst

File Name : 13-7204-002 Redbud-SR 49
Site Code : 00000000
Start Date : 4/16/2013

	State Route 49 Southbound				Westbound				State Route 49 Northbound				Redbud Drive Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 16:15																	
16:15	0	**89**	**1**	**90**	0	0	0	0	3	125	0	128	**1**	0	**6**	**7**	225
16:30	0	85	0	85	0	0	0	0	6	124	0	130	0	0	2	2	217
16:45	0	78	1	79	0	0	0	0	2	109	0	111	1	0	4	5	195
17:00	0	80	1	81	0	0	0	0	**8**	**165**	0	**173**	0	0	5	5	**259**
Total Volume	0	332	3	335	0	0	0	0	19	523	0	542	2	0	17	19	896
% App. Total	0	99.1	0.9		0	0	0		3.5	96.5	0		10.5	0	89.5		
PHF	.000	.933	.750	.931	.000	.000	.000	.000	.594	.792	.000	.783	.500	.000	.708	.679	.865

All Traffic Data

(916) 771-8700
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City of Oakhurst

File Name : 13-7204-002 Redbud-SR 49
Site Code : 00000000
Start Date : 4/16/2013
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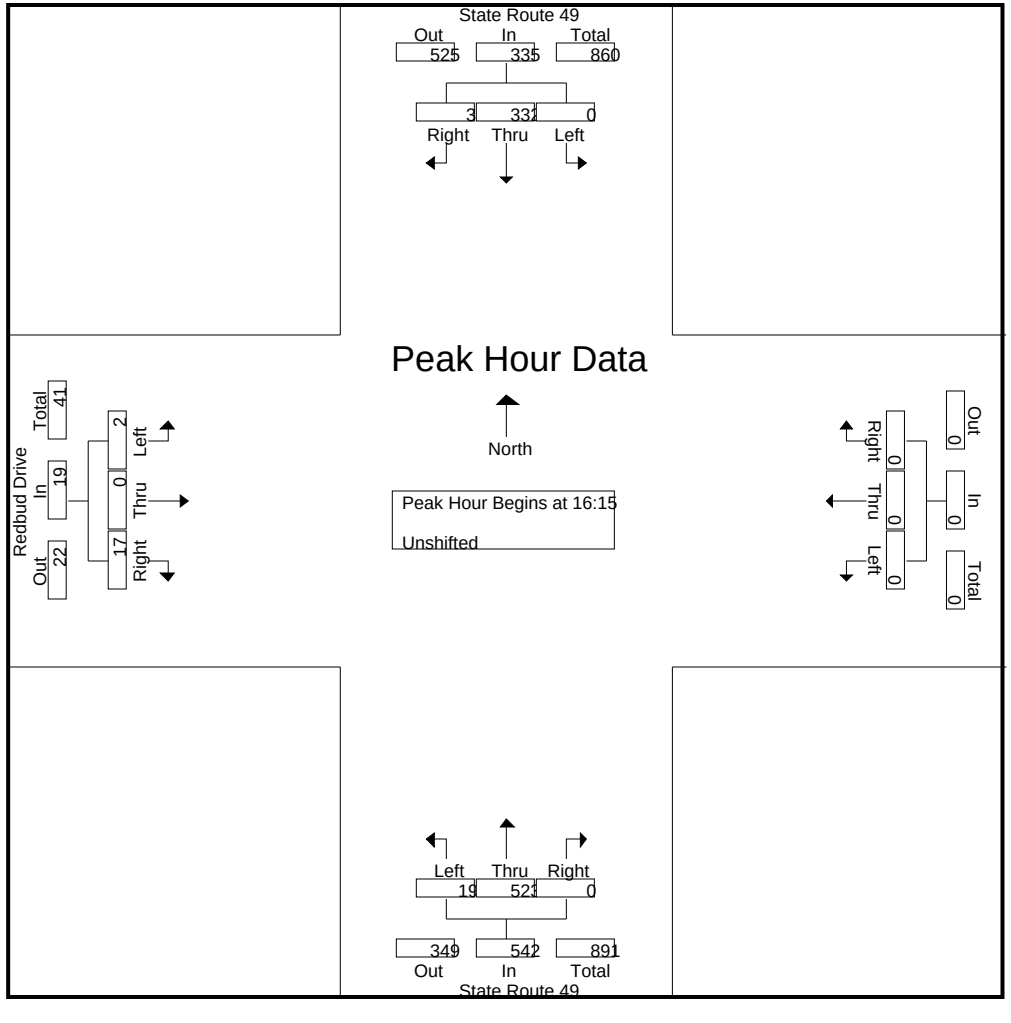

All Traffic Data

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City of Oakhurst

File Name : 13-7204-003 Oak Park-SR 49
Site Code : 00000000
Start Date : 4/16/2013
Page No : 1

Groups Printed- Unshifted

	State Route 49 Southbound				Driveway Westbound				State Route 49 Northbound				Oak Park Way Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00	0	73	1	74	0	0	0	0	6	35	0	41	0	0	7	7	122
07:15	0	116	0	116	0	0	0	0	2	52	0	54	1	0	8	9	179
07:30	0	153	1	154	1	0	0	1	5	64	0	69	0	0	3	3	227
07:45	0	167	6	173	0	0	0	0	3	97	0	100	0	0	1	1	274
Total	0	509	8	517	1	0	0	1	16	248	0	264	1	0	19	20	802
08:00	0	167	1	168	0	0	0	0	5	83	0	88	1	0	4	5	261
08:15	0	123	0	123	0	1	0	1	1	68	1	70	0	0	2	2	196
08:30	0	105	0	105	0	0	0	0	7	81	1	89	0	0	1	1	195
08:45	0	137	0	137	1	0	0	1	6	80	0	86	0	0	6	6	230
Total	0	532	1	533	1	1	0	2	19	312	2	333	1	0	13	14	882
16:00	0	86	1	87	0	0	0	0	6	118	0	124	3	0	3	6	217
16:15	0	91	3	94	0	0	0	0	3	125	0	128	1	0	10	11	233
16:30	0	91	0	91	0	0	0	0	5	128	0	133	5	0	5	10	234
16:45	0	82	1	83	0	0	0	0	6	108	0	114	0	0	5	5	202
Total	0	350	5	355	0	0	0	0	20	479	0	499	9	0	23	32	886
17:00	0	84	1	85	0	0	0	0	8	165	0	173	4	0	5	9	267
17:15	0	82	1	83	0	0	0	0	0	100	0	100	1	0	4	5	188
17:30	0	81	0	81	0	0	0	0	1	138	0	139	3	0	2	5	225
17:45	0	74	0	74	0	0	0	0	4	106	0	110	1	0	1	2	186
Total	0	321	2	323	0	0	0	0	13	509	0	522	9	0	12	21	866
Grand Total	0	1712	16	1728	2	1	0	3	68	1548	2	1618	20	0	67	87	3436
Apprch %	0	99.1	0.9		66.7	33.3	0		4.2	95.7	0.1		23	0	77		
Total %	0	49.8	0.5	50.3	0.1	0	0	0.1	2	45.1	0.1	47.1	0.6	0	1.9	2.5	

All Traffic Data

(916) 771-8700
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City of Oakhurst

File Name : 13-7204-003 Oak Park-SR 49
Site Code : 00000000
Start Date : 4/16/2013

	State Route 49 Southbound				Driveway Westbound				State Route 49 Northbound				Oak Park Way Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30																	
07:30	0	153	1	154	**1**	0	0	**1**	**5**	64	0	69	0	0	3	3	227
07:45	0	**167**	**6**	**173**	0	0	0	0	3	**97**	0	**100**	0	0	1	1	**274**
08:00	0	167	1	168	0	0	0	0	5	83	0	88	**1**	0	**4**	**5**	261
08:15	0	123	0	123	0	**1**	0	1	1	68	**1**	70	0	0	2	2	196
Total Volume	0	610	8	618	1	1	0	2	14	312	1	327	1	0	10	11	958
% App. Total	0	98.7	1.3		50	50	0		4.3	95.4	0.3		9.1	0	90.9		
PHF	.000	.913	.333	.893	.250	.250	.000	.500	.700	.804	.250	.818	.250	.000	.625	.550	.874

All Traffic Data

(916) 771-8700
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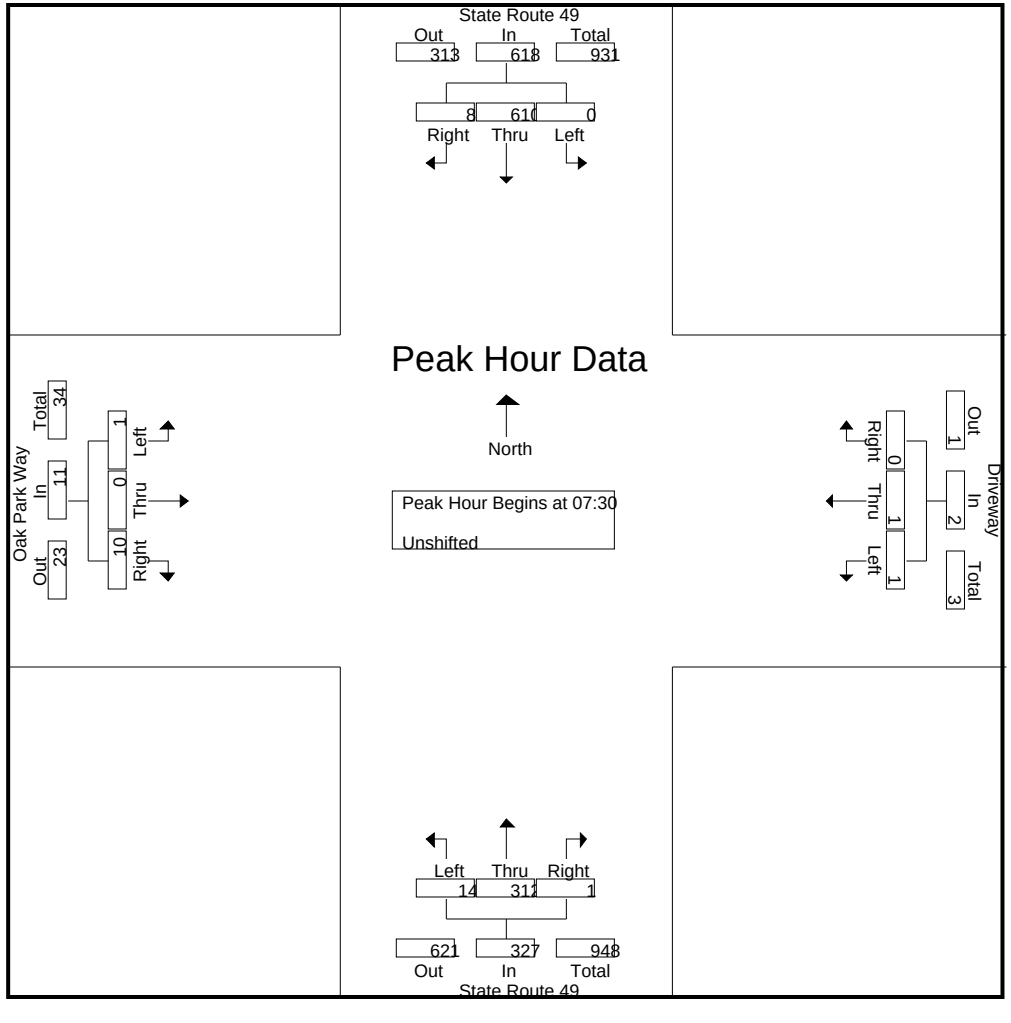
City of Oakhurst

File Name : 13-7204-003 Oak Park-SR 49
Site Code : 00000000
Start Date : 4/16/2013
Page No : 3



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City of Oakhurst

File Name : 13-7204-003 Oak Park-SR 49
Site Code : 00000000
Start Date : 4/16/2013
Page No : 4

	State Route 49 Southbound				Driveway Westbound				State Route 49 Northbound				Oak Park Way Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 16:15																	
16:15	0	**91**	**3**	**94**	0	0	0	0	3	125	0	128	1	0	**10**	**11**	233
16:30	0	91	0	91	0	0	0	0	5	128	0	133	**5**	0	5	10	234
16:45	0	82	1	83	0	0	0	0	6	108	0	114	0	0	5	5	202
17:00	0	84	1	85	0	0	0	0	**8**	**165**	0	**173**	4	0	5	9	**267**
Total Volume	0	348	5	353	0	0	0	0	22	526	0	548	10	0	25	35	936
% App. Total	0	98.6	1.4		0	0	0		4	96	0		28.6	0	71.4		
PHF	.000	.956	.417	.939	.000	.000	.000	.000	.688	.797	.000	.792	.500	.000	.625	.795	.876

All Traffic Data

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City of Oakhurst

File Name : 13-7204-003 Oak Park-SR 49
Site Code : 00000000
Start Date : 4/16/2013
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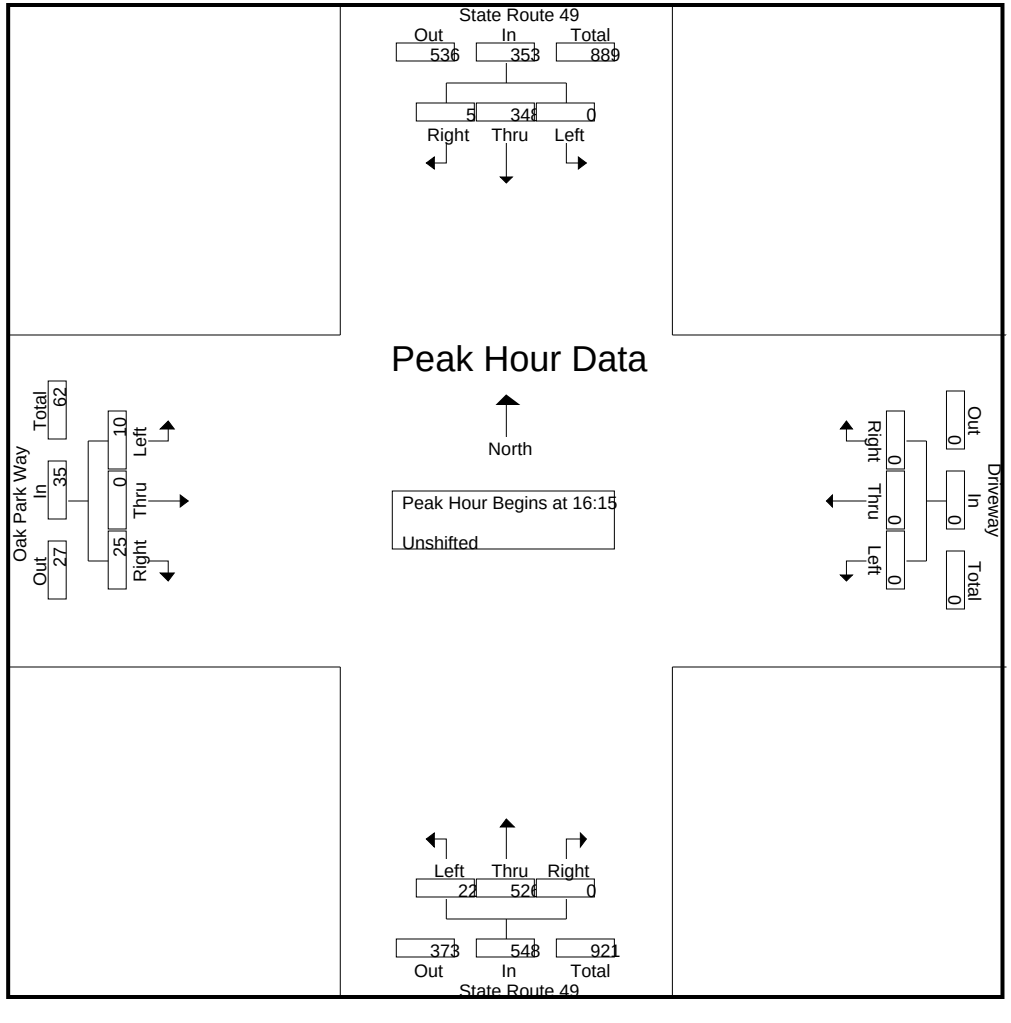

All Traffic Data

(916) 771-8700
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City of Oakhurst

File Name : 13-7204-004 Meadow View-SR 49
Site Code : 00000000
Start Date : 4/16/2013
Page No : 1

Groups Printed- Unshifted

	State Route 49 Southbound				Meadow Vista Drive Westbound				State Route 49 Northbound				Meadow Vista Drive Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00	0	73	4	77	0	0	1	1	3	40	6	49	0	0	3	3	130
07:15	1	124	5	130	2	0	0	2	1	48	6	55	2	0	1	3	190
07:30	2	150	3	155	5	0	1	6	1	73	3	77	1	1	1	3	241
07:45	5	154	11	170	2	1	4	7	7	93	7	107	2	0	2	4	288
Total	8	501	23	532	9	1	6	16	12	254	22	288	5	1	7	13	849
08:00	5	164	3	172	3	1	1	5	4	85	4	93	2	0	1	3	273
08:15	0	115	3	118	7	1	1	9	7	59	3	69	2	0	4	6	202
08:30	3	100	2	105	2	0	2	4	3	80	2	85	3	0	5	8	202
08:45	0	149	7	156	5	1	2	8	13	90	3	106	2	3	3	8	278
Total	8	528	15	551	17	3	6	26	27	314	12	353	9	3	13	25	955
16:00	1	82	6	89	3	0	2	5	4	116	1	121	3	0	5	8	223
16:15	0	102	2	104	1	0	2	3	3	130	5	138	5	0	3	8	253
16:30	0	97	1	98	5	0	3	8	6	127	4	137	4	0	5	9	252
16:45	1	84	2	87	7	0	0	7	2	105	3	110	4	0	4	8	212
Total	2	365	11	378	16	0	7	23	15	478	13	506	16	0	17	33	940
17:00	0	92	4	96	4	1	2	7	2	165	4	171	7	0	4	11	285
17:15	0	92	1	93	3	0	0	3	3	94	2	99	0	0	4	4	199
17:30	0	81	0	81	1	0	0	1	3	121	2	126	6	0	5	11	219
17:45	0	71	0	71	0	0	1	1	2	108	1	111	3	0	5	8	191
Total	0	336	5	341	8	1	3	12	10	488	9	507	16	0	18	34	894
Grand Total	18	1730	54	1802	50	5	22	77	64	1534	56	1654	46	4	55	105	3638
Apprch %	1	96	3		64.9	6.5	28.6		3.9	92.7	3.4		43.8	3.8	52.4		
Total %	0.5	47.6	1.5	49.5	1.4	0.1	0.6	2.1	1.8	42.2	1.5	45.5	1.3	0.1	1.5	2.9	

All Traffic Data

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City of Oakhurst

File Name : 13-7204-004 Meadow View-SR 49
Site Code : 00000000
Start Date : 4/16/2013
Page No : 2

	State Route 49 Southbound				Meadow Vista Drive Westbound				State Route 49 Northbound				Meadow Vista Drive Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30																	
07:30	2	150	3	155	5	0	1	6	1	73	3	77	1	**1**	1	3	241
07:45	**5**	154	**11**	170	2	**1**	**4**	7	**7**	**93**	**7**	**107**	**2**	0	2	4	**288**
08:00	5	**164**	3	**172**	3	1	1	5	4	85	4	93	2	0	1	3	273
08:15	0	115	3	118	**7**	1	1	**9**	7	59	3	69	2	0	**4**	**6**	202
Total Volume	12	583	20	615	17	3	7	27	19	310	17	346	7	1	8	16	1004
% App. Total	2	94.8	3.3		63	11.1	25.9		5.5	89.6	4.9		43.8	6.2	50		
PHF	.600	.889	.455	.894	.607	.750	.438	.750	.679	.833	.607	.808	.875	.250	.500	.667	.872

All Traffic Data

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City of Oakhurst

File Name : 13-7204-004 Meadow View-SR 49
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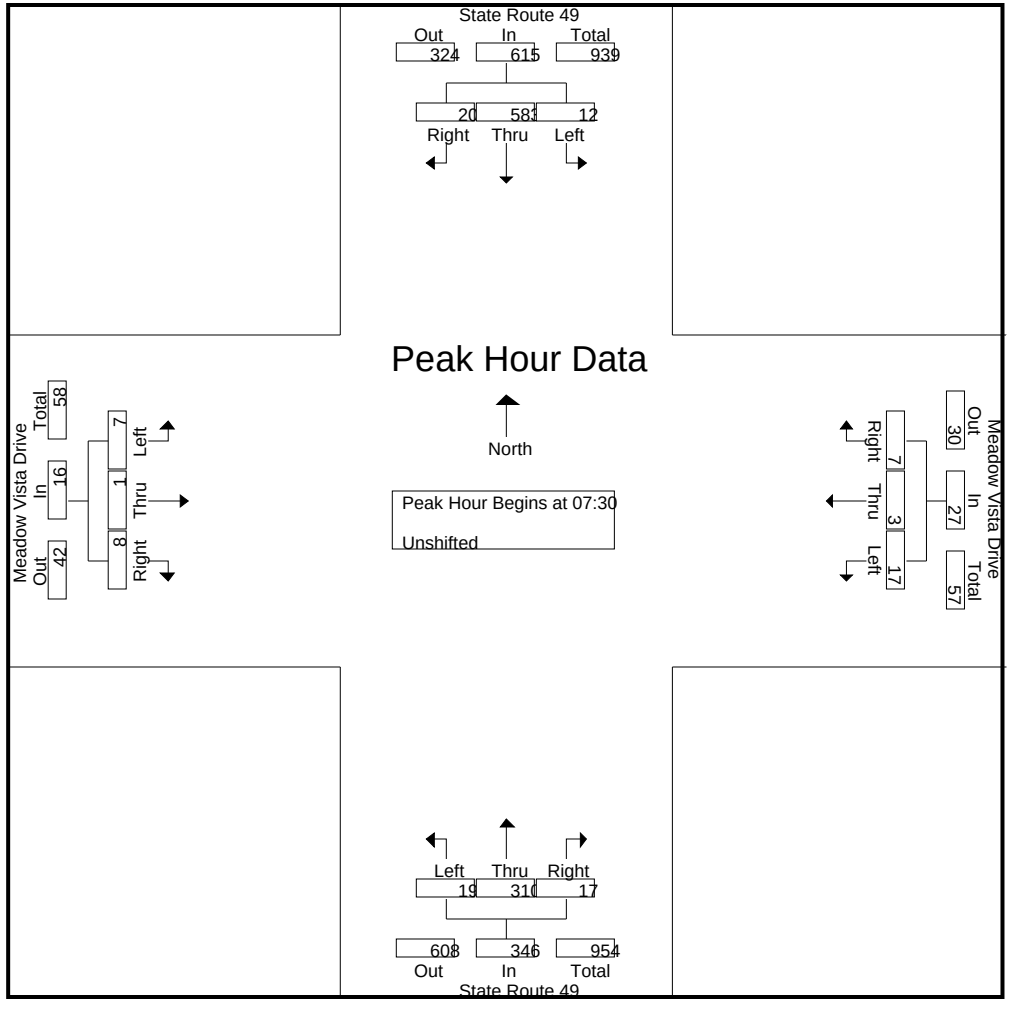

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City of Oakhurst

File Name : 13-7204-004 Meadow View-SR 49
Site Code : 00000000
Start Date : 4/16/2013

	State Route 49 Southbound				Meadow Vista Drive Westbound				State Route 49 Northbound				Meadow Vista Drive Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 16:15																	
16:15	0	**102**	2	**104**	1	0	2	3	3	130	**5**	138	5	0	3	8	253
16:30	0	97	1	98	5	0	**3**	**8**	**6**	127	4	137	4	0	**5**	9	252
16:45	**1**	84	2	87	**7**	0	0	7	2	105	3	110	4	0	4	8	212
17:00	0	92	**4**	96	4	**1**	2	7	2	**165**	4	**171**	**7**	0	4	**11**	**285**
Total Volume	1	375	9	385	17	1	7	25	13	527	16	556	20	0	16	36	1002
% App. Total	0.3	97.4	2.3		68	4	28		2.3	94.8	2.9		55.6	0	44.4		
PHF	.250	.919	.563	.925	.607	.250	.583	.781	.542	.798	.800	.813	.714	.000	.800	.818	.879

All Traffic Data

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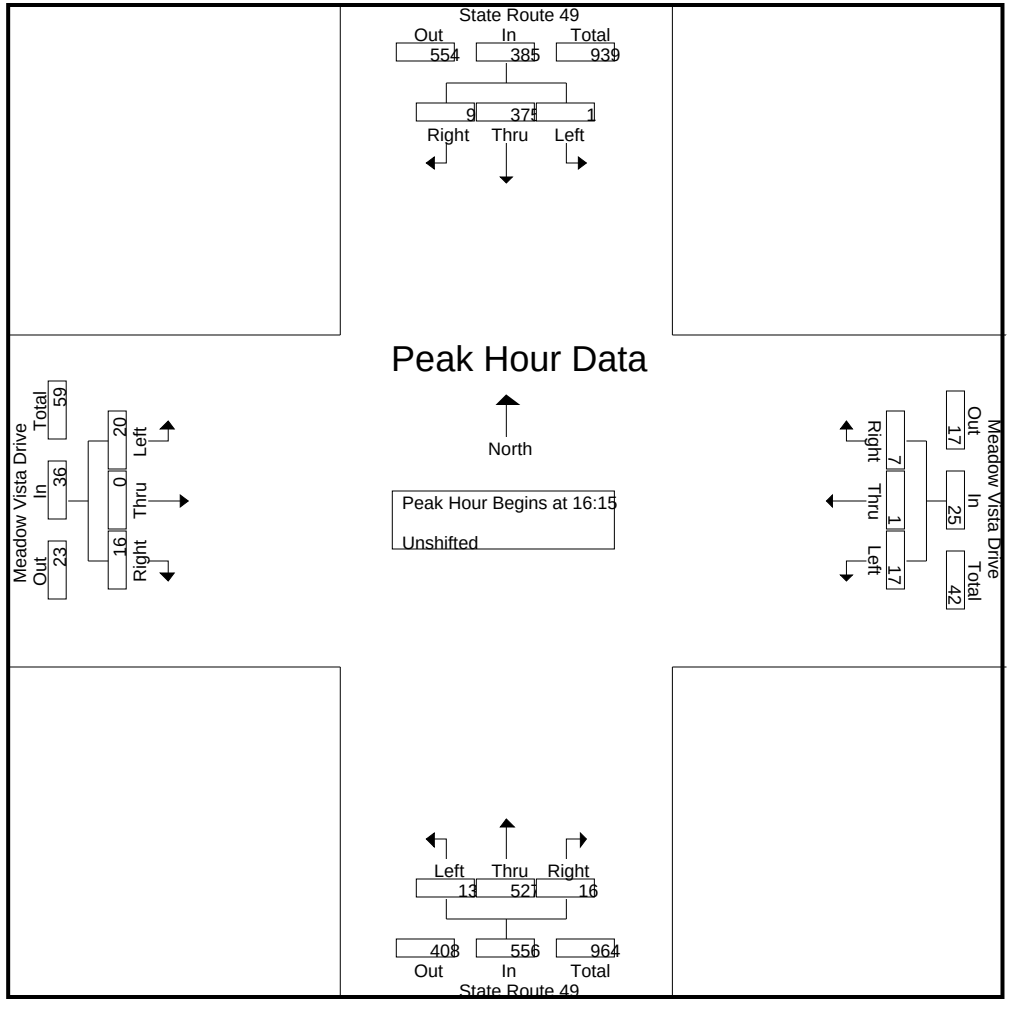
City of Oakhurst

File Name : 13-7204-004 Meadow View-SR 49
Site Code : 00000000
Start Date : 4/16/2013
Page No : 5



All Traffic Data

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City of Oakhurst

File Name : 13-7204-005 Junction-SR 49
Site Code : 00000000
Start Date : 4/16/2013
Page No : 1

Groups Printed- Unshifted

	State Route 49 Southbound				Junction Drive Westbound				State Route 49 Northbound				Junction Drive Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00	1	70	12	83	3	0	0	3	10	43	2	55	2	1	5	8	149
07:15	6	119	10	135	3	1	2	6	13	53	5	71	10	2	9	21	233
07:30	3	137	18	158	4	1	1	6	13	89	3	105	4	0	11	15	284
07:45	3	141	15	159	5	2	1	8	8	118	14	140	7	2	5	14	321
Total	13	467	55	535	15	4	4	23	44	303	24	371	23	5	30	58	987
08:00	8	123	26	157	7	1	8	16	12	93	12	117	12	1	9	22	312
08:15	7	104	19	130	3	5	4	12	11	68	11	90	8	4	12	24	256
08:30	2	92	16	110	6	3	0	9	18	87	12	117	15	0	16	31	267
08:45	16	108	26	150	8	2	5	15	17	97	16	130	4	7	15	26	321
Total	33	427	87	547	24	11	17	52	58	345	51	454	39	12	52	103	1156
16:00	9	83	18	110	25	20	9	54	22	102	8	132	15	9	46	70	366
16:15	4	100	22	126	31	14	14	59	23	101	10	134	30	2	29	61	380
16:30	7	68	28	103	17	14	16	47	34	78	4	116	35	12	28	75	341
16:45	5	97	15	117	14	6	9	29	21	83	4	108	25	5	30	60	314
Total	25	348	83	456	87	54	48	189	100	364	26	490	105	28	133	266	1401
17:00	5	79	26	110	37	14	14	65	31	121	3	155	32	5	32	69	399
17:15	4	78	17	99	22	10	8	40	35	70	8	113	26	6	37	69	321
17:30	7	79	21	107	20	11	11	42	26	95	3	124	26	1	38	65	338
17:45	1	71	14	86	15	2	7	24	21	75	5	101	29	2	28	59	270
Total	17	307	78	402	94	37	40	171	113	361	19	493	113	14	135	262	1328
Grand Total	88	1549	303	1940	220	106	109	435	315	1373	120	1808	280	59	350	689	4872
Apprch %	4.5	79.8	15.6		50.6	24.4	25.1		17.4	75.9	6.6		40.6	8.6	50.8		
Total %	1.8	31.8	6.2	39.8	4.5	2.2	2.2	8.9	6.5	28.2	2.5	37.1	5.7	1.2	7.2	14.1	

All Traffic Data

(916) 771-8700
orders@atdtraffic.com

City of Oakhurst

File Name : 13-7204-005 Junction-SR 49
Site Code : 00000000
Start Date : 4/16/2013

	State Route 49 Southbound				Junction Drive Westbound				State Route 49 Northbound				Junction Drive Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30																	
07:30	3	137	18	158	4	1	1	6	**13**	89	3	105	4	0	11	15	284
07:45	3	**141**	15	**159**	5	2	1	8	8	**118**	**14**	**140**	7	2	5	14	**321**
08:00	**8**	123	**26**	157	**7**	1	**8**	**16**	12	93	12	117	**12**	1	9	22	312
08:15	7	104	19	130	3	**5**	4	12	11	68	11	90	8	**4**	**12**	**24**	256
Total Volume	21	505	78	604	19	9	14	42	44	368	40	452	31	7	37	75	1173
% App. Total	3.5	83.6	12.9		45.2	21.4	33.3		9.7	81.4	8.8		41.3	9.3	49.3		
PHF	.656	.895	.750	.950	.679	.450	.438	.656	.846	.780	.714	.807	.646	.438	.771	.781	.914

All Traffic Data

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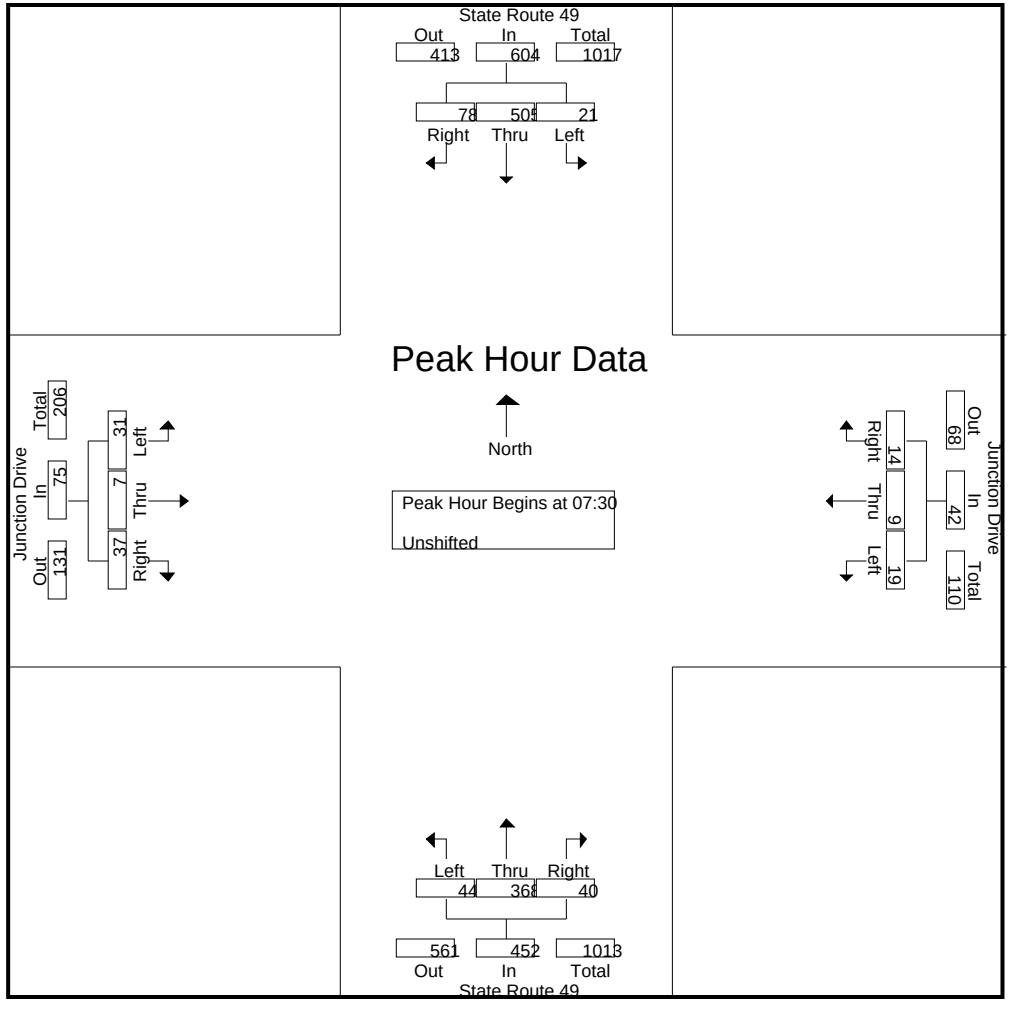
orders@atdtraffic.com

City of Oakhurst

File Name : 13-7204-005 Junction-SR 49
Site Code : 00000000
Start Date : 4/16/2013
Page No : 3



All Traffic Data

(916) 771-8700
orders@atdtraffic.com

City of Oakhurst

File Name : 13-7204-005 Junction-SR 49
Site Code : 00000000
Start Date : 4/16/2013
Page No : 4

	State Route 49 Southbound				Junction Drive Westbound				State Route 49 Northbound				Junction Drive Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 16:15																	
16:15	4	**100**	22	**126**	31	**14**	14	59	23	101	**10**	134	30	2	29	61	380
16:30	**7**	68	**28**	103	17	14	**16**	47	**34**	78	4	116	**35**	**12**	28	**75**	341
16:45	5	97	15	117	14	6	9	29	21	83	4	108	25	5	30	60	314
17:00	5	79	26	110	**37**	14	14	**65**	31	**121**	3	**155**	32	5	**32**	69	**399**
Total Volume	21	344	91	456	99	48	53	200	109	383	21	513	122	24	119	265	1434
% App. Total	4.6	75.4	20		49.5	24	26.5		21.2	74.7	4.1		46	9.1	44.9		
PHF	.750	.860	.813	.905	.669	.857	.828	.769	.801	.791	.525	.827	.871	.500	.930	.883	.898

All Traffic Data

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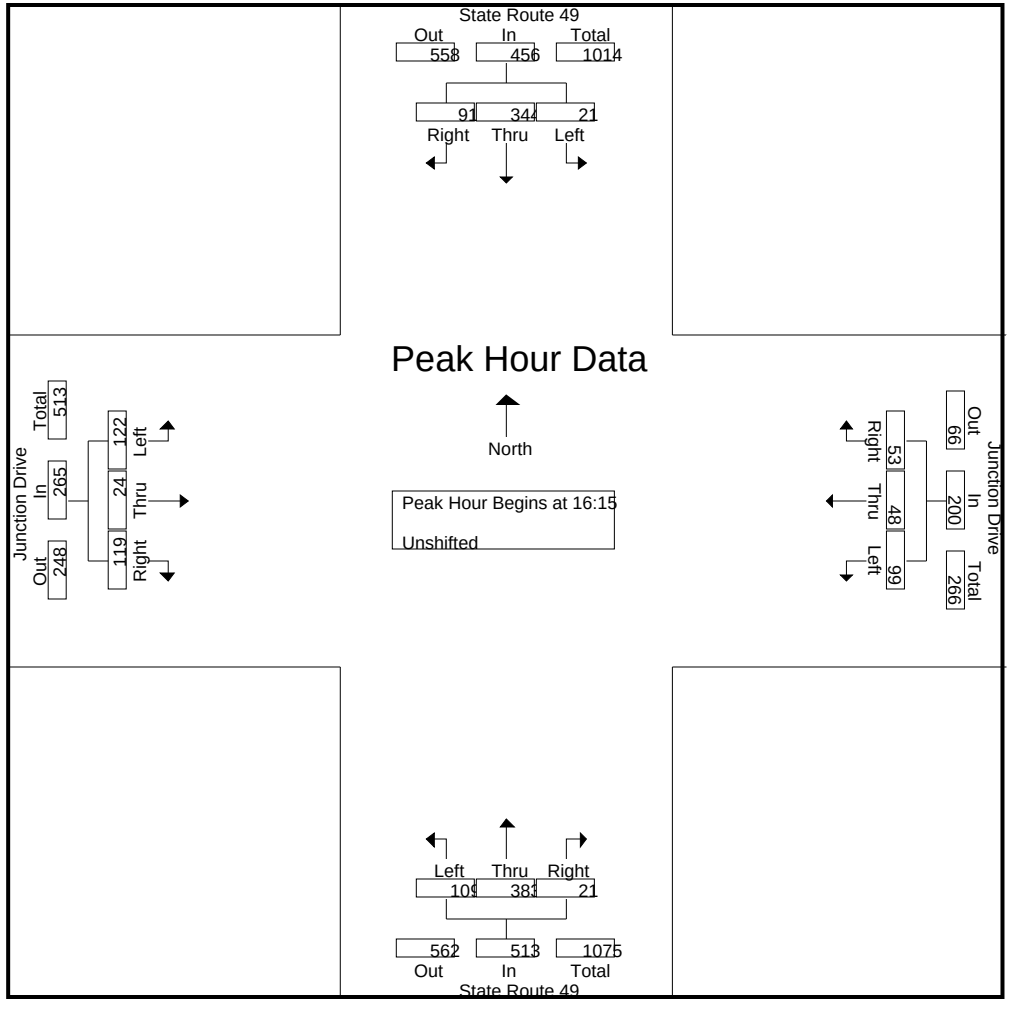
orders@atdtraffic.com

City of Oakhurst

File Name : 13-7204-005 Junction-SR 49
Site Code : 00000000
Start Date : 4/16/2013
Page No : 5



All Traffic Data

(916) 771-8700
orders@atdtraffic.com

City of Oakhurst

File Name : 13-7204-006 SR 41-SR 49
Site Code : 00000000
Start Date : 4/16/2013
Page No : 1

Groups Printed- Unshifted

	State Route 49 Southbound				State Route 41 Westbound				Northbound				State Route 41 Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00	44	0	35	79	0	62	42	104	0	0	0	0	19	53	0	72	255
07:15	83	0	18	101	0	72	59	131	0	0	0	0	13	81	0	94	326
07:30	113	0	29	142	0	58	81	139	0	0	0	0	25	148	0	173	454
07:45	113	0	34	147	0	84	123	207	0	0	0	0	40	128	0	168	522
Total	353	0	116	469	0	276	305	581	0	0	0	0	97	410	0	507	1557
08:00	93	0	32	125	0	84	93	177	0	0	0	0	30	94	0	124	426
08:15	93	0	22	115	0	69	64	133	0	0	0	0	31	89	0	120	368
08:30	80	0	26	106	0	85	92	177	0	0	0	0	28	93	0	121	404
08:45	78	0	41	119	0	76	97	173	0	0	0	0	40	101	0	141	433
Total	344	0	121	465	0	314	346	660	0	0	0	0	129	377	0	506	1631
16:00	101	0	36	137	0	120	99	219	0	0	0	0	38	96	0	134	490
16:15	122	0	33	155	0	110	85	195	0	0	0	0	42	87	0	129	479
16:30	100	0	29	129	0	112	86	198	0	0	0	0	39	84	0	123	450
16:45	115	0	29	144	0	73	75	148	0	0	0	0	40	71	0	111	403
Total	438	0	127	565	0	415	345	760	0	0	0	0	159	338	0	497	1822
17:00	122	0	40	162	0	149	127	276	0	0	0	0	36	89	0	125	563
17:15	129	0	40	169	0	113	81	194	0	0	0	0	39	82	0	121	484
17:30	107	0	35	142	0	79	70	149	0	0	0	0	37	80	0	117	408
17:45	94	0	17	111	0	79	65	144	0	0	0	0	35	79	0	114	369
Total	452	0	132	584	0	420	343	763	0	0	0	0	147	330	0	477	1824
Grand Total	1587	0	496	2083	0	1425	1339	2764	0	0	0	0	532	1455	0	1987	6834
Apprch %	76.2	0	23.8		0	51.6	48.4		0	0	0		26.8	73.2	0		
Total %	23.2	0	7.3	30.5	0	20.9	19.6	40.4	0	0	0	0	7.8	21.3	0	29.1	

All Traffic Data

(916) 771-8700
orders@atdtraffic.com

City of Oakhurst

File Name : 13-7204-006 SR 41-SR 49
Site Code : 00000000
Start Date : 4/16/2013

	State Route 49 Southbound				State Route 41 Westbound				Northbound				State Route 41 Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30																	
07:30	**113**	0	29	142	0	58	81	139	0	0	0	0	25	**148**	0	**173**	454
07:45	113	0	**34**	**147**	0	**84**	**123**	**207**	0	0	0	0	**40**	128	0	168	**522**
08:00	93	0	32	125	0	84	93	177	0	0	0	0	30	94	0	124	426
08:15	93	0	22	115	0	69	64	133	0	0	0	0	31	89	0	120	368
Total Volume	412	0	117	529	0	295	361	656	0	0	0	0	126	459	0	585	1770
% App. Total	77.9	0	22.1		0	45	55		0	0	0		21.5	78.5	0		
PHF	.912	.000	.860	.900	.000	.878	.734	.792	.000	.000	.000	.000	.788	.775	.000	.845	.848

All Traffic Data

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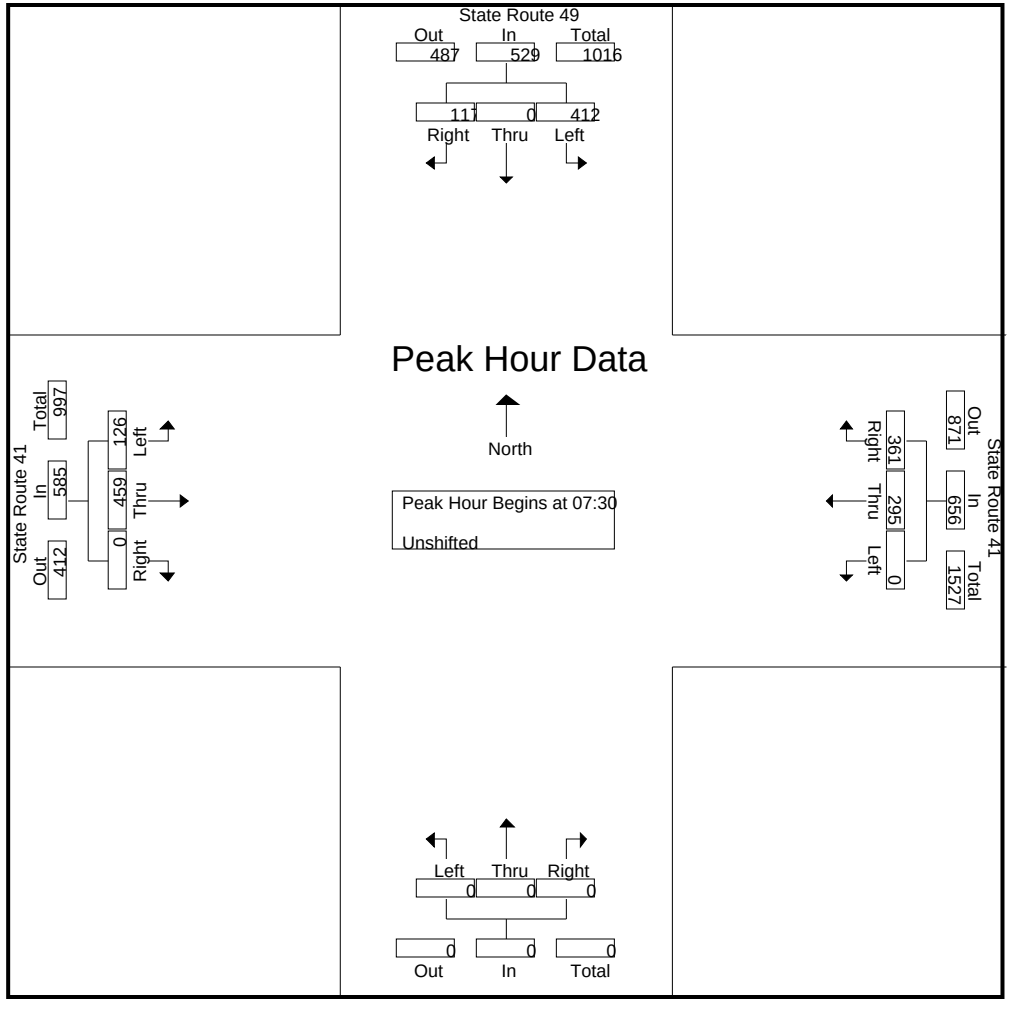
orders@atdtraffic.com

City of Oakhurst

File Name : 13-7204-006 SR 41-SR 49
Site Code : 00000000
Start Date : 4/16/2013
Page No : 3



All Traffic Data

(916) 771-8700
orders@atdtraffic.com

City of Oakhurst

File Name : 13-7204-006 SR 41-SR 49
Site Code : 00000000
Start Date : 4/16/2013
Page No : 4

	State Route 49 Southbound				State Route 41 Westbound				Northbound				State Route 41 Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 16:30																	
16:30	100	0	29	129	0	112	86	198	0	0	0	0	39	84	0	123	450
16:45	115	0	29	144	0	73	75	148	0	0	0	0	**40**	71	0	111	403
17:00	122	0	**40**	162	0	**149**	**127**	**276**	0	0	0	0	36	**89**	0	**125**	**563**
17:15	**129**	0	40	**169**	0	113	81	194	0	0	0	0	39	82	0	121	484
Total Volume	466	0	138	604	0	447	369	816	0	0	0	0	154	326	0	480	1900
% App. Total	77.2	0	22.8		0	54.8	45.2		0	0	0		32.1	67.9	0		
PHF	.903	.000	.863	.893	.000	.750	.726	.739	.000	.000	.000	.000	.963	.916	.000	.960	.844

All Traffic Data

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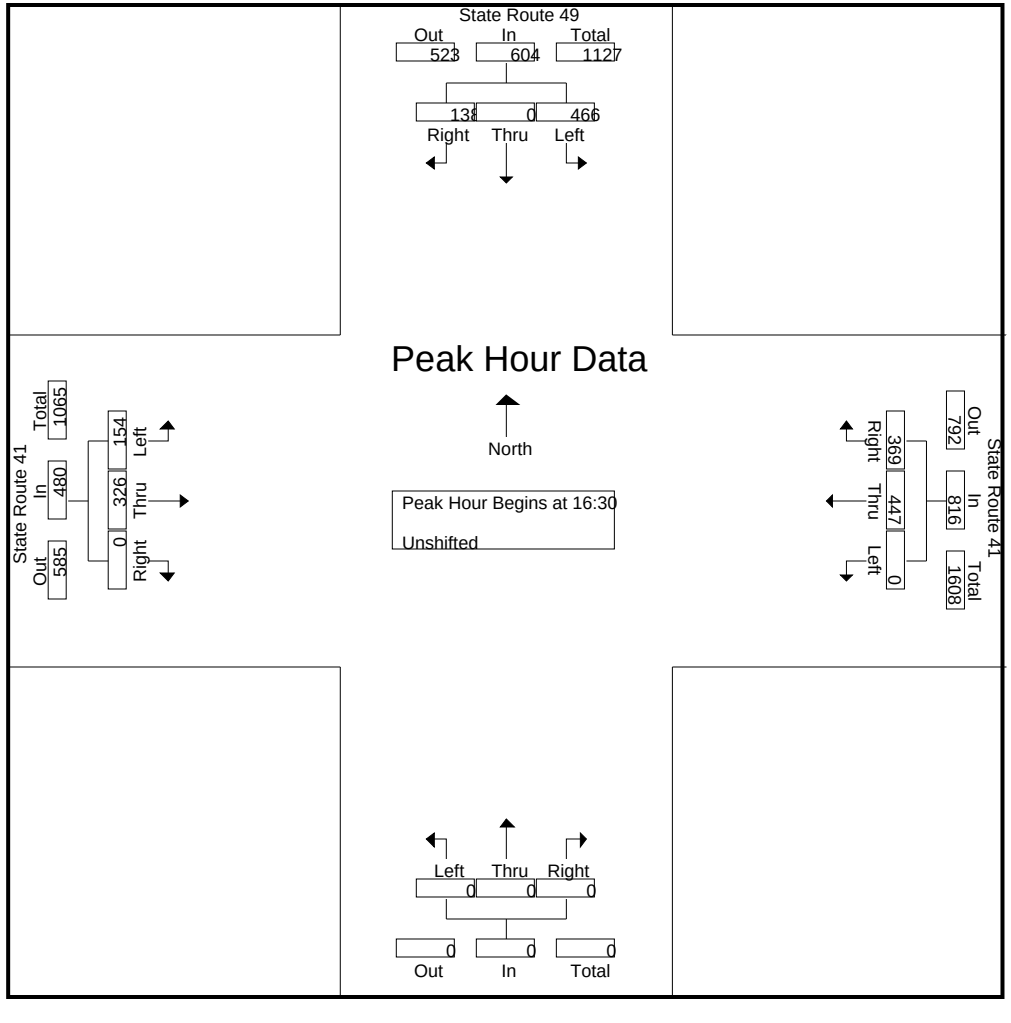
City of Oakhurst

File Name : 13-7204-006 SR 41-SR 49
Site Code : 00000000
Start Date : 4/16/2013
Page No : 5



Volumes for: Tuesday, April 16, 2013 City: Oakhurst Project #: 6573-03
Location: SR 49 north of Westlake Drive

Start	Northbound		Hour Totals		Southbound		Hour Totals		Combined Totals	
Time	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00	9	76			0	98				
12:15	4	82			0	92				
12:30	4	96			0	78				
12:45	3	76	20	330	1	67	1	335	21	665
1:00	3	73			1	82				
1:15	4	85			3	80				
1:30	0	92			1	82				
1:45	3	99	10	349	1	75	6	319	16	668
2:00	1	106			1	85				
2:15	2	116			0	85				
2:30	1	98			1	87				
2:45	0	92	4	412	2	104	4	361	8	773
3:00	1	106			4	75				
3:15	1	86			1	57				
3:30	3	95			2	66				
3:45	2	91	7	378	3	76	10	274	17	652
4:00	1	103			4	66				
4:15	3	113			4	64				
4:30	0	126			8	67				
4:45	1	90	5	432	10	59	26	256	31	688
5:00	5	145			10	52				
5:15	7	89			12	58				
5:30	4	109			17	64				
5:45	8	96	24	439	26	58	65	232	89	671
6:00	6	88			34	63				
6:15	14	68			43	52				
6:30	21	77			67	52				
6:45	30	70	71	303	79	45	223	212	294	515
7:00	25	47			76	33				
7:15	41	49			119	26				
7:30	56	36			157	25				
7:45	62	55	184	187	139	21	491	105	675	292
8:00	57	53			145	20				
8:15	39	50			113	31				
8:30	59	56			97	13				
8:45	57	27	212	186	123	13	478	77	690	263
9:00	52	33			99	21				
9:15	60	24			81	12				
9:30	70	21			77	6	0			
9:45	55	17	237	95	101	10	358	49	595	144
10:00	55	22			72	10				
10:15	66	13			77	6				
10:30	66	16			99	13				
10:45	64	13	251	64	86	6	334	35	585	99
11:00	81	14			76	3				
11:15	55	10			79	5				
11:30	76	9			87	2				
11:45	96	5	308	38	65	3	307	13	615	51
Total	1333	3213	1333	3213	2303	2268	2303	2268	3636	5481
Combined Total	4546		4546		4571		4571		9117	
AM Peak	11:45 AM				7:15 AM					
Vol.	350				560					
P.H.F.	0.911				0.892					
PM Peak		4:15 PM				2:00 PM				
Vol.		474				361				
P.H.F.		0.831				0.868				
Percentage	29.3%	70.7%			50.4%	49.6%				

Volumes for: Tuesday, April 16, 2013 City: Oakhurst Project #: 6573-03
Location: SR 49 south of Westlake Drive

Start	Northbound		Hour Totals		Southbound		Hour Totals		Combined Totals	
Time	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00	9	112			0	126				
12:15	4	111			1	145				
12:30	2	111			0	97				
12:45	4	96	19	430	1	119	2	487	21	917
1:00	4	94			1	91				
1:15	4	114			4	94				
1:30	0	120			0	104				
1:45	4	121	12	449	0	122	5	411	17	860
2:00	2	135			2	96				
2:15	1	123			1	98				
2:30	4	132			2	113				
2:45	0	110	7	500	2	117	7	424	14	924
3:00	0	125			4	103				
3:15	1	112			1	73				
3:30	3	100			1	91				
3:45	1	107	5	444	5	89	11	356	16	800
4:00	2	121			6	86				
4:15	3	133			3	89				
4:30	1	133			8	89				
4:45	3	114	9	501	9	77	26	341	35	842
5:00	5	153			12	82				
5:15	6	102			13	75				
5:30	7	125			17	72				
5:45	9	99	27	479	28	67	70	296	97	775
6:00	6	101			27	70				
6:15	18	78			47	60				
6:30	23	78			63	72				
6:45	38	66	85	323	86	41	223	243	308	566
7:00	34	51			75	41				
7:15	50	51			118	29				
7:30	64	38			143	27				
7:45	95	56	243	196	166	25	502	122	745	318
8:00	81	55			162	25				
8:15	57	48			118	30				
8:30	79	56			99	20				
8:45	80	30	297	189	137	16	516	91	813	280
9:00	66	36			108	20				
9:15	80	24			99	15				
9:30	81	20			85	12	0			
9:45	84	15	311	95	115	9	407	56	718	151
10:00	77	24			93	11				
10:15	88	12			102	6				
10:30	109	16			118	10				
10:45	85	18	359	70	114	10	427	37	786	107
11:00	106	14			98	2				
11:15	91	11			116	6				
11:30	92	9			108	3				
11:45	122	5	411	39	105	4	427	15	838	54
Total	1785	3715	1785	3715	2623	2879	2623	2879	4408	6594
Combined Total	5500		5500		5502		5502		11002	
AM Peak	11:45 AM				7:15 AM					
Vol.	456				589					
P.H.F.	0.934				0.887					
PM Peak		4:15 PM				12:00 PM				
Vol.		533				487				
P.H.F.		0.929				0.840				
Percentage	32.5%	67.5%			47.7%	52.3%				

Volumes for: Tuesday, April 16, 2013 City: Oakhurst Project #: 6573-03
Location: Westlake Drive east of SR 49

Start	Eastbound		Hour Totals		Westbound		Hour Totals		Combined Totals	
Time	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00	0	31			0	50				
12:15	0	43			1	51				
12:30	0	31			0	39				
12:45	0	24	0	129	0	46	1	186	1	315
1:00	1	30			0	27				
1:15	0	31			0	23				
1:30	1	37			0	32				
1:45	1	27	3	125	0	34	0	116	3	241
2:00	1	31			0	22				
2:15	0	25			1	27				
2:30	1	38			1	30				
2:45	0	22	2	116	0	26	2	105	4	221
3:00	0	30			0	23				
3:15	0	26			0	28				
3:30	1	16			0	35				
3:45	0	29	1	101	1	14	1	100	2	201
4:00	2	18			2	34				
4:15	0	35			0	32				
4:30	1	13			0	32				
4:45	1	20	4	86	0	20	2	118	6	204
5:00	0	18			0	31				
5:15	0	15			0	24				
5:30	2	14			1	20				
5:45	2	11	4	58	2	11	3	86	7	144
6:00	0	12			1	11				
6:15	4	8			0	19				
6:30	3	7			1	16				
6:45	6	10	13	37	1	14	3	60	16	97
7:00	10	3			1	9				
7:15	12	1			5	8				
7:30	14	2			5	0				
7:45	35	3	71	9	19	2	30	19	101	28
8:00	29	2			20	1				
8:15	24	1			15	0				
8:30	26	0			15	6				
8:45	30	3	109	6	14	4	64	11	173	17
9:00	28	0			18	0				
9:15	28	1			27	0				
9:30	27	0			26	3				
9:45	33	0	116	1	22	0	93	3	209	4
10:00	33	0			36	0				
10:15	50	0			34	0				
10:30	50	0			39	0				
10:45	41	2	174	2	49	0	158	0	332	2
11:00	37	1			28	0				
11:15	43	0			38	0				
11:30	31	0			43	1				
11:45	36	0	147	1	38	1	147	2	294	3
Total	644	671	644	671	504	806	504	806	1148	1477
Combined Total	1315		1315		1310		1310		2625	
AM Peak	10:15 AM				11:30 AM					
Vol.	178				182					
P.H.F.	0.890				0.892					
PM Peak		12:00 PM				12:00 PM				
Vol.		129				186				
P.H.F.		0.750				0.912				
Percentage	49.0%	51.0%			38.5%	61.5%				

Intersection	
Int Delay, s/veh	1.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	23	532	1	0	279	80	2	0	4	41	0	12
Future Vol, veh/h	23	532	1	0	279	80	2	0	4	41	0	12
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	325	-	-	280	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	84	84	84	84	84	84	84	84	84	84	84	84
Heavy Vehicles, %	2	4	2	2	4	2	2	2	2	2	2	2
Mvmt Flow	27	633	1	0	332	95	2	0	5	49	0	14

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	427	0	0	634	0	0	1075	1115	634	1070	1068	380
Stage 1	-	-	-	-	-	-	688	688	-	380	380	-
Stage 2	-	-	-	-	-	-	387	427	-	690	688	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1132	-	-	949	-	-	197	208	479	199	222	667
Stage 1	-	-	-	-	-	-	436	447	-	642	614	-
Stage 2	-	-	-	-	-	-	637	585	-	435	447	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1132	-	-	949	-	-	189	203	479	193	217	667
Mov Cap-2 Maneuver	-	-	-	-	-	-	189	203	-	193	217	-
Stage 1	-	-	-	-	-	-	426	436	-	627	614	-
Stage 2	-	-	-	-	-	-	623	585	-	420	436	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0	16.6	26.5
HCM LOS			C	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	317	1132	-	-	949	-	-	230
HCM Lane V/C Ratio	0.023	0.024	-	-	-	-	-	0.274
HCM Control Delay (s)	16.6	8.3	-	-	0	-	-	26.5
HCM Lane LOS	C	A	-	-	A	-	-	D
HCM 95th %tile Q(veh)	0.1	0.1	-	-	0	-	-	1.1

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	574	5	24	364	0	1	0	31	0	0	0
Future Vol, veh/h	0	574	5	24	364	0	1	0	31	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	150	-	0	200	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	84	84	84	84	84	84	84	84	84	84	84	84
Heavy Vehicles, %	2	4	2	2	4	2	2	2	2	2	2	2
Mvmt Flow	0	683	6	29	433	0	1	0	37	0	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	433	0	0	689	0	0	1174	1174	683	1196	1180	433
Stage 1	-	-	-	-	-	-	683	683	-	491	491	-
Stage 2	-	-	-	-	-	-	491	491	-	705	689	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1127	-	-	905	-	-	169	192	449	163	190	623
Stage 1	-	-	-	-	-	-	439	449	-	559	548	-
Stage 2	-	-	-	-	-	-	559	548	-	427	446	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1127	-	-	905	-	-	165	186	449	146	184	623
Mov Cap-2 Maneuver	-	-	-	-	-	-	165	186	-	146	184	-
Stage 1	-	-	-	-	-	-	439	449	-	559	530	-
Stage 2	-	-	-	-	-	-	541	530	-	392	446	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.6	14.3	0
HCM LOS			B	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	426	1127	-	-	905	-	-	-
HCM Lane V/C Ratio	0.089	-	-	-	0.032	-	-	-
HCM Control Delay (s)	14.3	0	-	-	9.1	-	-	0
HCM Lane LOS	B	A	-	-	A	-	-	A
HCM 95th %tile Q(veh)	0.3	0	-	-	0.1	-	-	-

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	605	388	0	0	0
Future Vol, veh/h	0	605	388	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	2	4	4	2	2	2
Mvmt Flow	0	712	456	0	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	456	0	-	0	1168	456
Stage 1	-	-	-	-	456	-
Stage 2	-	-	-	-	712	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1105	-	-	-	214	604
Stage 1	-	-	-	-	638	-
Stage 2	-	-	-	-	486	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1105	-	-	-	214	604
Mov Cap-2 Maneuver	-	-	-	-	214	-
Stage 1	-	-	-	-	638	-
Stage 2	-	-	-	-	486	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1105	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	-	0
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection	
Int Delay, s/veh	0.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	597	9	17	372	4	12
Future Vol, veh/h	597	9	17	372	4	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	4	2	2	4	2	2
Mvmt Flow	702	11	20	438	5	14

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	713	0	1186	708
Stage 1	-	-	-	-	708	-
Stage 2	-	-	-	-	478	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	887	-	208	435
Stage 1	-	-	-	-	488	-
Stage 2	-	-	-	-	624	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	887	-	202	435
Mov Cap-2 Maneuver	-	-	-	-	202	-
Stage 1	-	-	-	-	488	-
Stage 2	-	-	-	-	605	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.4	16.3
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	338	-	-	887	-
HCM Lane V/C Ratio	0.056	-	-	0.023	-
HCM Control Delay (s)	16.3	-	-	9.2	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0.1	-

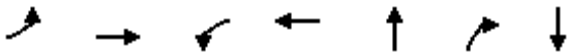
Intersection	
Int Delay, s/veh	1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	6	579	30	25	380	22	10	0	8	16	0	1
Future Vol, veh/h	6	579	30	25	380	22	10	0	8	16	0	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	180	-	-	800	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	80	80	80	80	80	80	80	80	80	80	80
Heavy Vehicles, %	2	4	2	2	4	2	2	2	2	2	2	2
Mvmt Flow	8	724	38	31	475	28	13	0	10	20	0	1

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	503	0	0	762	0	0	1059	1324	381	929	1329	252
Stage 1	-	-	-	-	-	-	759	759	-	551	551	-
Stage 2	-	-	-	-	-	-	300	565	-	378	778	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	1058	-	-	846	-	-	179	155	617	222	154	748
Stage 1	-	-	-	-	-	-	365	413	-	486	514	-
Stage 2	-	-	-	-	-	-	684	506	-	616	405	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1058	-	-	846	-	-	173	148	617	211	147	748
Mov Cap-2 Maneuver	-	-	-	-	-	-	173	148	-	211	147	-
Stage 1	-	-	-	-	-	-	362	410	-	482	495	-
Stage 2	-	-	-	-	-	-	658	487	-	601	402	-

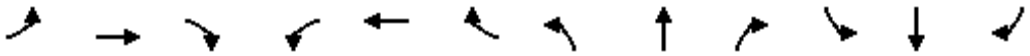
Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.6	20.5	23.1
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	254	1058	-	-	846	-	-	220
HCM Lane V/C Ratio	0.089	0.007	-	-	0.037	-	-	0.097
HCM Control Delay (s)	20.5	8.4	-	-	9.4	-	-	23.1
HCM Lane LOS	C	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	0.3	0	-	-	0.1	-	-	0.3



Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	28	706	70	599	60	59	88
v/c Ratio	0.08	0.44	0.21	0.36	0.17	0.12	0.23
Control Delay	27.3	16.9	29.6	15.3	27.4	0.5	23.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.3	16.9	29.6	15.3	27.4	0.5	23.8
Queue Length 50th (ft)	9	114	24	61	20	0	25
Queue Length 95th (ft)	31	171	64	151	54	0	64
Internal Link Dist (ft)		1048		1021	832		814
Turn Bay Length (ft)	150		100				
Base Capacity (vph)	399	2107	375	2103	756	783	746
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.07	0.34	0.19	0.28	0.08	0.08	0.12

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	23	529	57	58	439	58	36	14	49	43	14	16
Future Volume (veh/h)	23	529	57	58	439	58	36	14	49	43	14	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1841	1841	1870	1841	1841	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	28	637	69	70	529	70	43	17	59	52	17	19
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Percent Heavy Veh, %	2	4	4	2	4	4	2	2	2	2	2	2
Cap, veh/h	186	920	99	140	788	104	136	54	167	93	31	34
Arrive On Green	0.10	0.29	0.29	0.08	0.25	0.25	0.11	0.11	0.11	0.09	0.09	0.09
Sat Flow, veh/h	1781	3183	344	1781	3106	410	1294	512	1585	1034	338	378
Grp Volume(v), veh/h	28	350	356	70	297	302	60	0	59	88	0	0
Grp Sat Flow(s),veh/h/ln	1781	1749	1779	1781	1749	1767	1806	0	1585	1751	0	0
Q Serve(g_s), s	0.6	7.7	7.8	1.6	6.6	6.7	1.3	0.0	1.5	2.1	0.0	0.0
Cycle Q Clear(g_c), s	0.6	7.7	7.8	1.6	6.6	6.7	1.3	0.0	1.5	2.1	0.0	0.0
Prop In Lane	1.00		0.19	1.00		0.23	0.72		1.00	0.59		0.22
Lane Grp Cap(c), veh/h	186	505	514	140	444	448	190	0	167	158	0	0
V/C Ratio(X)	0.15	0.69	0.69	0.50	0.67	0.67	0.32	0.00	0.35	0.56	0.00	0.00
Avail Cap(c_a), veh/h	299	1206	1227	299	1206	1219	664	0	583	644	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	17.7	13.7	13.8	19.2	14.6	14.6	18.0	0.0	18.1	18.9	0.0	0.0
Incr Delay (d2), s/veh	0.4	1.7	1.7	2.7	1.8	1.8	0.9	0.0	1.3	3.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	2.6	2.7	0.7	2.3	2.4	0.6	0.0	0.6	0.9	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	18.1	15.5	15.4	21.9	16.3	16.4	19.0	0.0	19.4	22.0	0.0	0.0
LnGrp LOS	B	B	B	C	B	B	B	A	B	C	A	A
Approach Vol, veh/h		734			669			119			88	
Approach Delay, s/veh		15.5			16.9			19.2			22.0	
Approach LOS		B			B			B			C	

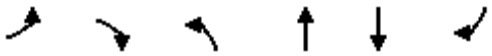
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	8.1	17.7		8.5	9.7	16.1		9.2				
Change Period (Y+Rc), s	* 4.7	5.1		4.6	5.1	* 5.1		4.6				
Max Green Setting (Gmax), s	* 7.3	30.0		16.0	7.3	* 30		16.0				
Max Q Clear Time (g_c+I1), s	3.6	9.8		4.1	2.6	8.7		3.5				
Green Ext Time (p_c), s	0.0	2.8		0.2	0.0	2.3		0.3				

Intersection Summary		
HCM 6th Ctrl Delay		16.7
HCM 6th LOS		B

Notes

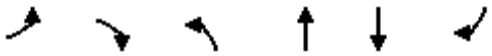
User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	580	180	222	617	407	505
v/c Ratio	0.55	0.18	0.39	0.36	0.52	0.50
Control Delay	17.9	1.6	24.2	9.8	21.9	6.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.9	1.6	24.2	9.8	21.9	6.2
Queue Length 50th (ft)	77	0	32	58	60	56
Queue Length 95th (ft)	118	15	64	97	100	93
Internal Link Dist (ft)	1021			192	1426	
Turn Bay Length (ft)		250	135			150
Base Capacity (vph)	2156	1027	691	3309	2615	1454
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.27	0.18	0.32	0.19	0.16	0.35

Intersection Summary



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	470	146	180	500	330	409
Future Volume (veh/h)	470	146	180	500	330	409
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1841	1841	1841	1841	1841	1841
Adj Flow Rate, veh/h	580	180	222	617	407	505
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81
Percent Heavy Veh, %	4	4	4	4	4	4
Cap, veh/h	894	585	381	1883	1143	920
Arrive On Green	0.26	0.26	0.11	0.54	0.33	0.33
Sat Flow, veh/h	3401	1560	3401	3589	3589	1560
Grp Volume(v), veh/h	580	180	222	617	407	505
Grp Sat Flow(s),veh/h/ln	1700	1560	1700	1749	1749	1560
Q Serve(g_s), s	7.8	4.2	3.2	5.1	4.5	10.1
Cycle Q Clear(g_c), s	7.8	4.2	3.2	5.1	4.5	10.1
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	894	585	381	1883	1143	920
V/C Ratio(X)	0.65	0.31	0.58	0.33	0.36	0.55
Avail Cap(c_a), veh/h	2254	1209	723	2584	2727	1626
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	16.8	11.3	21.6	6.6	13.2	6.4
Incr Delay (d2), s/veh	0.8	0.3	1.4	0.1	0.2	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.7	1.2	1.2	1.3	1.5	5.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	17.6	11.6	23.0	6.7	13.3	6.9
LnGrp LOS	B	B	C	A	B	A
Approach Vol, veh/h	760			839	912	
Approach Delay, s/veh	16.2			11.1	9.8	
Approach LOS	B			B	A	

Timer - Assigned Phs		2	3	4			8
Phs Duration (G+Y+Rc), s		18.6	10.8	21.9			32.7
Change Period (Y+Rc), s		5.1	5.1	5.1			5.1
Max Green Setting (Gmax), s		34.0	10.9	40.0			37.9
Max Q Clear Time (g_c+I1), s		9.8	5.2	12.1			7.1
Green Ext Time (p_c), s		3.7	0.4	4.7			3.0

Intersection Summary	
HCM 6th Ctrl Delay	12.1
HCM 6th LOS	B

Intersection	
Int Delay, s/veh	11.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	12	331	3	4	515	97	1	0	7	137	0	68
Future Vol, veh/h	12	331	3	4	515	97	1	0	7	137	0	68
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	325	-	-	280	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	4	2	2	4	2	2	2	2	2	2	2
Mvmt Flow	13	360	3	4	560	105	1	0	8	149	0	74

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	665	0	0	363	0	0	1046	1061	362	1013	1010	613
Stage 1	-	-	-	-	-	-	388	388	-	621	621	-
Stage 2	-	-	-	-	-	-	658	673	-	392	389	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	924	-	-	1196	-	-	206	224	683	217	240	492
Stage 1	-	-	-	-	-	-	636	609	-	475	479	-
Stage 2	-	-	-	-	-	-	453	454	-	633	608	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	924	-	-	1196	-	-	173	220	683	212	236	492
Mov Cap-2 Maneuver	-	-	-	-	-	-	173	220	-	212	236	-
Stage 1	-	-	-	-	-	-	627	600	-	468	478	-
Stage 2	-	-	-	-	-	-	384	453	-	617	599	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0.1	12.3	65.8
HCM LOS			B	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	499	924	-	-	1196	-	-	261
HCM Lane V/C Ratio	0.017	0.014	-	-	0.004	-	-	0.854
HCM Control Delay (s)	12.3	9	-	-	8	-	-	65.8
HCM Lane LOS	B	A	-	-	A	-	-	F
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	7.1

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	480	7	26	626	0	1	0	25	0	0	0
Future Vol, veh/h	0	480	7	26	626	0	1	0	25	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	150	-	0	200	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	2	4	2	2	4	2	2	2	2	2	2	2
Mvmt Flow	0	516	8	28	673	0	1	0	27	0	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	673	0	0	524	0	0	1245	1245	516	1263	1253	673
Stage 1	-	-	-	-	-	-	516	516	-	729	729	-
Stage 2	-	-	-	-	-	-	729	729	-	534	524	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	918	-	-	1043	-	-	151	174	559	147	172	455
Stage 1	-	-	-	-	-	-	542	534	-	414	428	-
Stage 2	-	-	-	-	-	-	414	428	-	530	530	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	918	-	-	1043	-	-	148	169	559	137	167	455
Mov Cap-2 Maneuver	-	-	-	-	-	-	148	169	-	137	167	-
Stage 1	-	-	-	-	-	-	542	534	-	414	416	-
Stage 2	-	-	-	-	-	-	403	416	-	505	530	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.3	12.5	0
HCM LOS			B	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	505	918	-	-	1043	-	-	-
HCM Lane V/C Ratio	0.055	-	-	-	0.027	-	-	-
HCM Control Delay (s)	12.5	0	-	-	8.5	-	-	0
HCM Lane LOS	B	A	-	-	A	-	-	A
HCM 95th %tile Q(veh)	0.2	0	-	-	0.1	-	-	-

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	505	652	0	0	0
Future Vol, veh/h	0	505	652	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	2	4	4	2	2	2
Mvmt Flow	0	543	701	0	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	701	0	-	0	1244	701
Stage 1	-	-	-	-	701	-
Stage 2	-	-	-	-	543	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	896	-	-	-	192	439
Stage 1	-	-	-	-	492	-
Stage 2	-	-	-	-	582	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	896	-	-	-	192	439
Mov Cap-2 Maneuver	-	-	-	-	192	-
Stage 1	-	-	-	-	492	-
Stage 2	-	-	-	-	582	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	896	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	-	0
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection	
Int Delay, s/veh	0.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	506	3	4	638	4	16
Future Vol, veh/h	506	3	4	638	4	16
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	4	2	2	4	2	2
Mvmt Flow	544	3	4	686	4	17

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	547	0	1240	546
Stage 1	-	-	-	-	546	-
Stage 2	-	-	-	-	694	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1022	-	193	538
Stage 1	-	-	-	-	580	-
Stage 2	-	-	-	-	496	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1022	-	192	538
Mov Cap-2 Maneuver	-	-	-	-	192	-
Stage 1	-	-	-	-	580	-
Stage 2	-	-	-	-	493	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	14.6
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	395	-	-	1022	-
HCM Lane V/C Ratio	0.054	-	-	0.004	-
HCM Control Delay (s)	14.6	-	-	8.5	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0	-

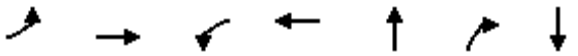
Intersection	
Int Delay, s/veh	2.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	1	512	17	18	617	18	41	1	47	43	1	15
Future Vol, veh/h	1	512	17	18	617	18	41	1	47	43	1	15
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	180	-	-	800	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	4	2	2	4	2	2	2	2	2	2	2
Mvmt Flow	1	569	19	20	686	20	46	1	52	48	1	17

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	706	0	0	588	0	0	965	1327	294	1023	1326	353
Stage 1	-	-	-	-	-	-	581	581	-	736	736	-
Stage 2	-	-	-	-	-	-	384	746	-	287	590	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	888	-	-	983	-	-	209	154	702	190	154	643
Stage 1	-	-	-	-	-	-	467	498	-	377	423	-
Stage 2	-	-	-	-	-	-	611	419	-	696	493	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	888	-	-	983	-	-	199	151	702	172	151	643
Mov Cap-2 Maneuver	-	-	-	-	-	-	199	151	-	172	151	-
Stage 1	-	-	-	-	-	-	467	498	-	377	415	-
Stage 2	-	-	-	-	-	-	581	411	-	642	493	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.2	21.3	29.6
HCM LOS			C	D

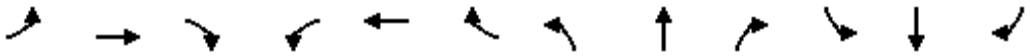
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	318	888	-	-	983	-	-	211
HCM Lane V/C Ratio	0.311	0.001	-	-	0.02	-	-	0.311
HCM Control Delay (s)	21.3	9.1	-	-	8.7	-	-	29.6
HCM Lane LOS	C	A	-	-	A	-	-	D
HCM 95th %tile Q(veh)	1.3	0	-	-	0.1	-	-	1.3



Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	53	573	131	603	160	132	305
v/c Ratio	0.33	0.69	0.58	0.51	0.58	0.37	0.76
Control Delay	41.4	29.8	45.4	23.3	40.2	9.2	41.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.4	29.8	45.4	23.3	40.2	9.2	41.9
Queue Length 50th (ft)	24	126	60	133	72	0	129
Queue Length 95th (ft)	64	185	#141	193	143	46	#282
Internal Link Dist (ft)		1048		1021	832		814
Turn Bay Length (ft)	150		100				
Base Capacity (vph)	176	1359	249	1506	359	425	454
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.30	0.42	0.53	0.40	0.45	0.31	0.67

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	49	425	108	122	513	47	111	38	123	173	49	61
Future Volume (veh/h)	49	425	108	122	513	47	111	38	123	173	49	61
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1841	1841	1870	1841	1841	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	53	457	116	131	552	51	119	41	132	186	53	66
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	4	4	2	4	4	2	2	2	2	2	2
Cap, veh/h	71	629	159	170	917	85	176	61	208	227	65	80
Arrive On Green	0.04	0.23	0.23	0.10	0.28	0.28	0.13	0.13	0.13	0.21	0.21	0.21
Sat Flow, veh/h	1781	2767	697	1781	3237	298	1341	462	1585	1067	304	378
Grp Volume(v), veh/h	53	288	285	131	298	305	160	0	132	305	0	0
Grp Sat Flow(s),veh/h/ln	1781	1749	1715	1781	1749	1787	1803	0	1585	1749	0	0
Q Serve(g_s), s	1.7	8.7	8.8	4.1	8.4	8.4	4.8	0.0	4.5	9.5	0.0	0.0
Cycle Q Clear(g_c), s	1.7	8.7	8.8	4.1	8.4	8.4	4.8	0.0	4.5	9.5	0.0	0.0
Prop In Lane	1.00		0.41	1.00		0.17	0.74		1.00	0.61		0.22
Lane Grp Cap(c), veh/h	71	398	390	170	495	506	237	0	208	372	0	0
V/C Ratio(X)	0.75	0.72	0.73	0.77	0.60	0.60	0.68	0.00	0.63	0.82	0.00	0.00
Avail Cap(c_a), veh/h	228	886	869	322	920	940	462	0	406	567	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	27.1	20.4	20.4	25.2	17.7	17.7	23.6	0.0	23.5	21.4	0.0	0.0
Incr Delay (d2), s/veh	14.4	2.5	2.7	7.1	1.2	1.2	3.3	0.0	3.2	5.7	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.9	3.4	3.4	1.9	3.1	3.2	2.2	0.0	1.8	4.2	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	41.5	22.9	23.1	32.3	18.8	18.8	27.0	0.0	26.7	27.1	0.0	0.0
LnGrp LOS	D	C	C	C	B	B	C	A	C	C	A	A
Approach Vol, veh/h		626			734			292			305	
Approach Delay, s/veh		24.5			21.2			26.8			27.1	
Approach LOS		C			C			C			C	

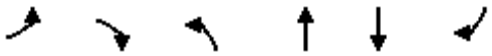
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	10.2	18.1		16.7	7.0	21.3		12.1				
Change Period (Y+Rc), s	* 4.7	5.1		4.6	* 4.7	5.1		4.6				
Max Green Setting (Gmax), s	* 10	28.9		18.5	* 7.3	30.0		14.6				
Max Q Clear Time (g_c+I1), s	6.1	10.8		11.5	3.7	10.4		6.8				
Green Ext Time (p_c), s	0.1	2.2		0.7	0.0	2.3		0.7				

Intersection Summary		
HCM 6th Ctrl Delay		24.0
HCM 6th LOS		C

Notes

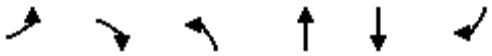
User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	659	188	235	445	607	516
v/c Ratio	0.61	0.20	0.46	0.25	0.63	0.48
Control Delay	21.3	3.0	30.1	9.7	24.2	5.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.3	3.0	30.1	9.7	24.2	5.6
Queue Length 50th (ft)	106	6	41	45	105	64
Queue Length 95th (ft)	183	36	93	91	186	114
Internal Link Dist (ft)	1021			192	1426	
Turn Bay Length (ft)		250	135			150
Base Capacity (vph)	1875	966	601	3043	2275	1405
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.35	0.19	0.39	0.15	0.27	0.37

Intersection Summary



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	606	173	216	409	558	475
Future Volume (veh/h)	606	173	216	409	558	475
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1841	1841	1841	1841	1841	1841
Adj Flow Rate, veh/h	659	188	235	445	607	516
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	4	4	4	4	4	4
Cap, veh/h	963	609	365	1863	1167	962
Arrive On Green	0.28	0.28	0.11	0.53	0.33	0.33
Sat Flow, veh/h	3401	1560	3401	3589	3589	1560
Grp Volume(v), veh/h	659	188	235	445	607	516
Grp Sat Flow(s),veh/h/ln	1700	1560	1700	1749	1749	1560
Q Serve(g_s), s	9.6	4.6	3.7	3.8	7.8	10.5
Cycle Q Clear(g_c), s	9.6	4.6	3.7	3.8	7.8	10.5
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	963	609	365	1863	1167	962
V/C Ratio(X)	0.68	0.31	0.64	0.24	0.52	0.54
Avail Cap(c_a), veh/h	2086	1124	669	2454	2523	1567
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	17.7	11.7	23.7	6.9	14.9	6.1
Incr Delay (d2), s/veh	0.9	0.3	1.9	0.1	0.4	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.4	1.4	1.4	1.1	2.7	5.6
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	18.5	12.0	25.6	7.0	15.3	6.5
LnGrp LOS	B	B	C	A	B	A
Approach Vol, veh/h	847			680	1123	
Approach Delay, s/veh	17.1			13.4	11.3	
Approach LOS	B			B	B	

Timer - Assigned Phs		2	3	4		8
Phs Duration (G+Y+Rc), s		20.8	11.0	23.6		34.6
Change Period (Y+Rc), s		5.1	5.1	5.1		5.1
Max Green Setting (Gmax), s		34.0	10.9	40.0		38.9
Max Q Clear Time (g_c+I1), s		11.6	5.7	12.5		5.8
Green Ext Time (p_c), s		4.2	0.4	6.0		2.1

Intersection Summary	
HCM 6th Ctrl Delay	13.7
HCM 6th LOS	B

Intersection	
Int Delay, s/veh	2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	26	530	1	0	278	108	2	0	4	46	0	13
Future Vol, veh/h	26	530	1	0	278	108	2	0	4	46	0	13
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	325	-	-	280	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	84	84	84	84	84	84	84	84	84	84	84	84
Heavy Vehicles, %	2	4	2	2	4	2	2	2	2	2	2	2
Mvmt Flow	31	631	1	0	331	129	2	0	5	55	0	15

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	460	0	0	632	0	0	1097	1154	632	1092	1090	396
Stage 1	-	-	-	-	-	-	694	694	-	396	396	-
Stage 2	-	-	-	-	-	-	403	460	-	696	694	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1101	-	-	951	-	-	191	197	480	192	215	653
Stage 1	-	-	-	-	-	-	433	444	-	629	604	-
Stage 2	-	-	-	-	-	-	624	566	-	432	444	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1101	-	-	951	-	-	182	191	480	186	209	653
Mov Cap-2 Maneuver	-	-	-	-	-	-	182	191	-	186	209	-
Stage 1	-	-	-	-	-	-	421	432	-	611	604	-
Stage 2	-	-	-	-	-	-	609	566	-	416	432	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.4	0	16.8	28.7
HCM LOS			C	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	311	1101	-	-	951	-	-	221
HCM Lane V/C Ratio	0.023	0.028	-	-	-	-	-	0.318
HCM Control Delay (s)	16.8	8.4	-	-	0	-	-	28.7
HCM Lane LOS	C	A	-	-	A	-	-	D
HCM 95th %tile Q(veh)	0.1	0.1	-	-	0	-	-	1.3

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	577	5	24	391	0	1	0	31	0	0	0
Future Vol, veh/h	0	577	5	24	391	0	1	0	31	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	150	-	0	200	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	84	84	84	84	84	84	84	84	84	84	84	84
Heavy Vehicles, %	2	4	2	2	4	2	2	2	2	2	2	2
Mvmt Flow	0	687	6	29	465	0	1	0	37	0	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	465	0	0	693	0	0	1210	1210	687	1232	1216	465
Stage 1	-	-	-	-	-	-	687	687	-	523	523	-
Stage 2	-	-	-	-	-	-	523	523	-	709	693	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1096	-	-	902	-	-	159	183	447	154	181	597
Stage 1	-	-	-	-	-	-	437	447	-	537	530	-
Stage 2	-	-	-	-	-	-	537	530	-	425	445	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1096	-	-	902	-	-	155	177	447	138	175	597
Mov Cap-2 Maneuver	-	-	-	-	-	-	155	177	-	138	175	-
Stage 1	-	-	-	-	-	-	437	447	-	537	513	-
Stage 2	-	-	-	-	-	-	520	513	-	390	445	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.5	14.4	0
HCM LOS			B	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	422	1096	-	-	902	-	-	-
HCM Lane V/C Ratio	0.09	-	-	-	0.032	-	-	-
HCM Control Delay (s)	14.4	0	-	-	9.1	-	-	0
HCM Lane LOS	B	A	-	-	A	-	-	A
HCM 95th %tile Q(veh)	0.3	0	-	-	0.1	-	-	-

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	608	415	0	0	0
Future Vol, veh/h	0	608	415	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	2	4	4	2	2	2
Mvmt Flow	0	715	488	0	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	488	0	-	0	1203	488
Stage 1	-	-	-	-	488	-
Stage 2	-	-	-	-	715	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1075	-	-	-	204	580
Stage 1	-	-	-	-	617	-
Stage 2	-	-	-	-	485	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1075	-	-	-	204	580
Mov Cap-2 Maneuver	-	-	-	-	204	-
Stage 1	-	-	-	-	617	-
Stage 2	-	-	-	-	485	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1075	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	-	0
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection	
Int Delay, s/veh	0.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	600	9	17	399	4	12
Future Vol, veh/h	600	9	17	399	4	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	4	2	2	4	2	2
Mvmt Flow	706	11	20	469	5	14

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	717	0	1221	712
Stage 1	-	-	-	-	712	-
Stage 2	-	-	-	-	509	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	884	-	199	432
Stage 1	-	-	-	-	486	-
Stage 2	-	-	-	-	604	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	884	-	193	432
Mov Cap-2 Maneuver	-	-	-	-	193	-
Stage 1	-	-	-	-	486	-
Stage 2	-	-	-	-	585	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.4	16.6
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	330	-	-	884	-
HCM Lane V/C Ratio	0.057	-	-	0.023	-
HCM Control Delay (s)	16.6	-	-	9.2	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0.1	-

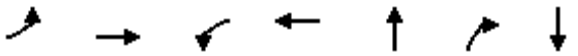
Intersection	
Int Delay, s/veh	1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	6	582	30	25	407	22	10	0	8	16	0	1
Future Vol, veh/h	6	582	30	25	407	22	10	0	8	16	0	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	180	-	-	800	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	80	80	80	80	80	80	80	80	80	80	80
Heavy Vehicles, %	2	4	2	2	4	2	2	2	2	2	2	2
Mvmt Flow	8	728	38	31	509	28	13	0	10	20	0	1

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	537	0	0	766	0	0	1080	1362	383	965	1367	269
Stage 1	-	-	-	-	-	-	763	763	-	585	585	-
Stage 2	-	-	-	-	-	-	317	599	-	380	782	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	1027	-	-	843	-	-	172	147	615	209	146	729
Stage 1	-	-	-	-	-	-	363	411	-	464	496	-
Stage 2	-	-	-	-	-	-	669	489	-	614	403	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1027	-	-	843	-	-	166	140	615	199	139	729
Mov Cap-2 Maneuver	-	-	-	-	-	-	166	140	-	199	139	-
Stage 1	-	-	-	-	-	-	360	408	-	460	478	-
Stage 2	-	-	-	-	-	-	643	471	-	599	400	-

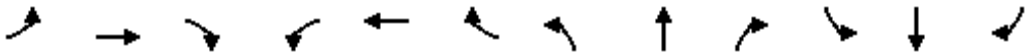
Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.5	21.1	24.3
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	246	1027	-	-	843	-	-	208
HCM Lane V/C Ratio	0.091	0.007	-	-	0.037	-	-	0.102
HCM Control Delay (s)	21.1	8.5	-	-	9.4	-	-	24.3
HCM Lane LOS	C	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	0.3	0	-	-	0.1	-	-	0.3



Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	28	710	70	631	60	59	88
v/c Ratio	0.09	0.44	0.21	0.37	0.17	0.12	0.23
Control Delay	27.9	16.9	29.8	15.2	27.5	0.5	24.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.9	16.9	29.8	15.2	27.5	0.5	24.0
Queue Length 50th (ft)	10	115	24	65	20	0	25
Queue Length 95th (ft)	32	172	64	158	54	0	64
Internal Link Dist (ft)		1048		1021	832		814
Turn Bay Length (ft)	150		100				
Base Capacity (vph)	390	2088	373	2088	748	778	741
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.07	0.34	0.19	0.30	0.08	0.08	0.12

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	23	532	57	58	466	58	36	14	49	43	14	16
Future Volume (veh/h)	23	532	57	58	466	58	36	14	49	43	14	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1841	1841	1870	1841	1841	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	28	641	69	70	561	70	43	17	59	52	17	19
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Percent Heavy Veh, %	2	4	4	2	4	4	2	2	2	2	2	2
Cap, veh/h	170	923	99	140	826	103	134	53	164	93	31	34
Arrive On Green	0.10	0.29	0.29	0.08	0.26	0.26	0.10	0.10	0.10	0.09	0.09	0.09
Sat Flow, veh/h	1781	3185	342	1781	3130	390	1294	512	1585	1034	338	378
Grp Volume(v), veh/h	28	352	358	70	313	318	60	0	59	88	0	0
Grp Sat Flow(s),veh/h/ln	1781	1749	1779	1781	1749	1771	1806	0	1585	1751	0	0
Q Serve(g_s), s	0.6	7.8	7.8	1.6	7.0	7.0	1.3	0.0	1.5	2.1	0.0	0.0
Cycle Q Clear(g_c), s	0.6	7.8	7.8	1.6	7.0	7.0	1.3	0.0	1.5	2.1	0.0	0.0
Prop In Lane	1.00		0.19	1.00		0.22	0.72		1.00	0.59		0.22
Lane Grp Cap(c), veh/h	170	507	516	140	462	468	186	0	164	158	0	0
V/C Ratio(X)	0.16	0.69	0.70	0.50	0.68	0.68	0.32	0.00	0.36	0.56	0.00	0.00
Avail Cap(c_a), veh/h	298	1203	1224	298	1203	1218	658	0	578	642	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	18.1	13.8	13.8	19.3	14.4	14.4	18.1	0.0	18.2	19.0	0.0	0.0
Incr Delay (d2), s/veh	0.5	1.7	1.7	2.7	1.7	1.8	1.0	0.0	1.3	3.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	2.7	2.7	0.7	2.4	2.5	0.6	0.0	0.6	0.9	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	18.6	15.5	15.5	22.0	16.1	16.1	19.1	0.0	19.5	22.1	0.0	0.0
LnGrp LOS	B	B	B	C	B	B	B	A	B	C	A	A
Approach Vol, veh/h		738			701			119			88	
Approach Delay, s/veh		15.6			16.7			19.3			22.1	
Approach LOS		B			B			B			C	

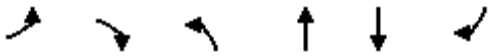
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	8.1	17.7		8.5	9.3	16.6		9.2				
Change Period (Y+Rc), s	* 4.7	5.1		4.6	5.1	* 5.1		4.7				
Max Green Setting (Gmax), s	* 7.3	30.0		16.0	7.3	* 30		15.9				
Max Q Clear Time (g_c+I1), s	3.6	9.8		4.1	2.6	9.0		3.5				
Green Ext Time (p_c), s	0.0	2.8		0.2	0.0	2.5		0.3				

Intersection Summary		
HCM 6th Ctrl Delay		16.7
HCM 6th LOS		B

Notes

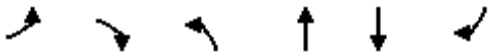
User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	579	185	246	602	405	515
v/c Ratio	0.55	0.19	0.42	0.35	0.52	0.51
Control Delay	18.0	1.6	24.4	9.7	22.0	6.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.0	1.6	24.4	9.7	22.0	6.7
Queue Length 50th (ft)	78	0	37	57	60	64
Queue Length 95th (ft)	118	15	70	94	100	101
Internal Link Dist (ft)	1021			192	1426	
Turn Bay Length (ft)		250	135			150
Base Capacity (vph)	2145	1025	687	3306	2601	1449
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.27	0.18	0.36	0.18	0.16	0.36

Intersection Summary



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	469	150	199	488	328	417
Future Volume (veh/h)	469	150	199	488	328	417
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1841	1841	1841	1841	1841	1841
Adj Flow Rate, veh/h	579	185	246	602	405	515
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81
Percent Heavy Veh, %	4	4	4	4	4	4
Cap, veh/h	890	585	385	1896	1157	924
Arrive On Green	0.26	0.26	0.11	0.54	0.33	0.33
Sat Flow, veh/h	3401	1560	3401	3589	3589	1560
Grp Volume(v), veh/h	579	185	246	602	405	515
Grp Sat Flow(s),veh/h/ln	1700	1560	1700	1749	1749	1560
Q Serve(g_s), s	7.9	4.4	3.6	4.9	4.6	10.4
Cycle Q Clear(g_c), s	7.9	4.4	3.6	4.9	4.6	10.4
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	890	585	385	1896	1157	924
V/C Ratio(X)	0.65	0.32	0.64	0.32	0.35	0.56
Avail Cap(c_a), veh/h	2225	1197	713	2551	2692	1609
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	17.1	11.5	22.0	6.6	13.2	6.4
Incr Delay (d2), s/veh	0.8	0.3	1.8	0.1	0.2	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.7	1.3	1.4	1.3	1.5	5.2
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	17.9	11.8	23.8	6.7	13.3	7.0
LnGrp LOS	B	B	C	A	B	A
Approach Vol, veh/h	764			848	920	
Approach Delay, s/veh	16.4			11.6	9.8	
Approach LOS	B			B	A	

Timer - Assigned Phs		2	3	4			8
Phs Duration (G+Y+Rc), s		18.7	11.0	22.3			33.3
Change Period (Y+Rc), s		5.1	5.1	5.1			5.1
Max Green Setting (Gmax), s		34.0	10.9	40.0			37.9
Max Q Clear Time (g_c+I1), s		9.9	5.6	12.4			6.9
Green Ext Time (p_c), s		3.7	0.5	4.7			2.9

Intersection Summary	
HCM 6th Ctrl Delay	12.4
HCM 6th LOS	B

Intersection	
Int Delay, s/veh	24.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	19	326	3	4	512	155	1	0	7	168	0	72
Future Vol, veh/h	19	326	3	4	512	155	1	0	7	168	0	72
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	325	-	-	280	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	4	2	2	4	2	2	2	2	2	2	2
Mvmt Flow	21	354	3	4	557	168	1	0	8	183	0	78

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	725	0	0	357	0	0	1086	1131	356	1051	1048	641
Stage 1	-	-	-	-	-	-	398	398	-	649	649	-
Stage 2	-	-	-	-	-	-	688	733	-	402	399	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	878	-	-	1202	-	-	194	203	688	205	228	475
Stage 1	-	-	-	-	-	-	628	603	-	458	466	-
Stage 2	-	-	-	-	-	-	436	426	-	625	602	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	878	-	-	1202	-	-	159	198	688	198	222	475
Mov Cap-2 Maneuver	-	-	-	-	-	-	159	198	-	198	222	-
Stage 1	-	-	-	-	-	-	613	589	-	447	465	-
Stage 2	-	-	-	-	-	-	363	425	-	603	588	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.5	0	12.5	127.4
HCM LOS			B	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	486	878	-	-	1202	-	-	240
HCM Lane V/C Ratio	0.018	0.024	-	-	0.004	-	-	1.087
HCM Control Delay (s)	12.5	9.2	-	-	8	-	-	127.4
HCM Lane LOS	B	A	-	-	A	-	-	F
HCM 95th %tile Q(veh)	0.1	0.1	-	-	0	-	-	11.3

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	506	7	26	681	0	1	0	25	0	0	0
Future Vol, veh/h	0	506	7	26	681	0	1	0	25	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	150	-	0	200	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	2	4	2	2	4	2	2	2	2	2	2	2
Mvmt Flow	0	544	8	28	732	0	1	0	27	0	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	732	0	0	552	0	0	1332	1332	544	1350	1340	732
Stage 1	-	-	-	-	-	-	544	544	-	788	788	-
Stage 2	-	-	-	-	-	-	788	788	-	562	552	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	873	-	-	1018	-	-	131	154	539	128	153	421
Stage 1	-	-	-	-	-	-	523	519	-	384	402	-
Stage 2	-	-	-	-	-	-	384	402	-	512	515	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	873	-	-	1018	-	-	128	150	539	119	149	421
Mov Cap-2 Maneuver	-	-	-	-	-	-	128	150	-	119	149	-
Stage 1	-	-	-	-	-	-	523	519	-	384	391	-
Stage 2	-	-	-	-	-	-	373	391	-	486	515	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.3	13	0
HCM LOS			B	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	480	873	-	-	1018	-	-	-
HCM Lane V/C Ratio	0.058	-	-	-	0.027	-	-	-
HCM Control Delay (s)	13	0	-	-	8.6	-	-	0
HCM Lane LOS	B	A	-	-	A	-	-	A
HCM 95th %tile Q(veh)	0.2	0	-	-	0.1	-	-	-

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	531	707	0	0	0
Future Vol, veh/h	0	531	707	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	2	4	4	2	2	2
Mvmt Flow	0	571	760	0	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	760	0	-	0	1331	760
Stage 1	-	-	-	-	760	-
Stage 2	-	-	-	-	571	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	852	-	-	-	170	406
Stage 1	-	-	-	-	462	-
Stage 2	-	-	-	-	565	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	852	-	-	-	170	406
Mov Cap-2 Maneuver	-	-	-	-	170	-
Stage 1	-	-	-	-	462	-
Stage 2	-	-	-	-	565	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	852	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	-	0
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection	
Int Delay, s/veh	0.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	532	3	4	693	4	16
Future Vol, veh/h	532	3	4	693	4	16
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	4	2	2	4	2	2
Mvmt Flow	572	3	4	745	4	17

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	575	0	1327	574
Stage 1	-	-	-	-	574	-
Stage 2	-	-	-	-	753	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	998	-	171	518
Stage 1	-	-	-	-	563	-
Stage 2	-	-	-	-	465	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	998	-	170	518
Mov Cap-2 Maneuver	-	-	-	-	170	-
Stage 1	-	-	-	-	563	-
Stage 2	-	-	-	-	462	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	15.4
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	368	-	-	998	-
HCM Lane V/C Ratio	0.058	-	-	0.004	-
HCM Control Delay (s)	15.4	-	-	8.6	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0	-

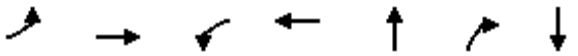
Intersection	
Int Delay, s/veh	3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	1	538	17	18	672	18	41	1	47	43	1	15
Future Vol, veh/h	1	538	17	18	672	18	41	1	47	43	1	15
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	180	-	-	800	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	4	2	2	4	2	2	2	2	2	2	2
Mvmt Flow	1	598	19	20	747	20	46	1	52	48	1	17

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	767	0	0	617	0	0	1024	1417	309	1099	1416	384
Stage 1	-	-	-	-	-	-	610	610	-	797	797	-
Stage 2	-	-	-	-	-	-	414	807	-	302	619	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	842	-	-	959	-	-	190	136	687	167	136	614
Stage 1	-	-	-	-	-	-	448	483	-	346	397	-
Stage 2	-	-	-	-	-	-	586	392	-	682	478	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	842	-	-	959	-	-	181	133	687	151	133	614
Mov Cap-2 Maneuver	-	-	-	-	-	-	181	133	-	151	133	-
Stage 1	-	-	-	-	-	-	448	483	-	346	389	-
Stage 2	-	-	-	-	-	-	557	384	-	628	478	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.2	23.3	34.5
HCM LOS			C	D

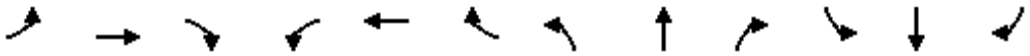
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	294	842	-	-	959	-	-	186
HCM Lane V/C Ratio	0.336	0.001	-	-	0.021	-	-	0.352
HCM Control Delay (s)	23.3	9.3	-	-	8.8	-	-	34.5
HCM Lane LOS	C	A	-	-	A	-	-	D
HCM 95th %tile Q(veh)	1.4	0	-	-	0.1	-	-	1.5



Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	53	601	131	662	160	132	305
v/c Ratio	0.33	0.71	0.59	0.55	0.58	0.37	0.77
Control Delay	42.0	30.2	46.3	23.8	40.9	9.2	42.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	42.0	30.2	46.3	23.8	40.9	9.2	42.9
Queue Length 50th (ft)	25	135	61	150	73	0	131
Queue Length 95th (ft)	65	196	#143	214	145	46	#288
Internal Link Dist (ft)		1048		1021	832		814
Turn Bay Length (ft)	150		100				
Base Capacity (vph)	174	1343	246	1488	354	421	449
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.30	0.45	0.53	0.44	0.45	0.31	0.68

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	49	451	108	122	568	47	111	38	123	173	49	61
Future Volume (veh/h)	49	451	108	122	568	47	111	38	123	173	49	61
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1841	1841	1870	1841	1841	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	53	485	116	131	611	51	119	41	132	186	53	66
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	4	4	2	4	4	2	2	2	2	2	2
Cap, veh/h	71	658	157	170	950	79	175	60	207	226	64	80
Arrive On Green	0.04	0.23	0.23	0.10	0.29	0.29	0.13	0.13	0.13	0.21	0.21	0.21
Sat Flow, veh/h	1781	2803	666	1781	3268	272	1341	462	1585	1067	304	378
Grp Volume(v), veh/h	53	301	300	131	327	335	160	0	132	305	0	0
Grp Sat Flow(s),veh/h/ln	1781	1749	1721	1781	1749	1792	1803	0	1585	1749	0	0
Q Serve(g_s), s	1.7	9.3	9.4	4.2	9.5	9.5	4.9	0.0	4.6	9.7	0.0	0.0
Cycle Q Clear(g_c), s	1.7	9.3	9.4	4.2	9.5	9.5	4.9	0.0	4.6	9.7	0.0	0.0
Prop In Lane	1.00		0.39	1.00		0.15	0.74		1.00	0.61		0.22
Lane Grp Cap(c), veh/h	71	411	404	170	509	521	235	0	207	371	0	0
V/C Ratio(X)	0.75	0.73	0.74	0.77	0.64	0.64	0.68	0.00	0.64	0.82	0.00	0.00
Avail Cap(c_a), veh/h	224	870	856	316	903	926	453	0	399	557	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	27.6	20.5	20.6	25.6	18.0	18.0	24.1	0.0	23.9	21.8	0.0	0.0
Incr Delay (d2), s/veh	14.7	2.6	2.7	7.2	1.4	1.3	3.4	0.0	3.2	6.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	3.7	3.7	2.0	3.5	3.6	2.2	0.0	1.8	4.3	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	42.3	23.1	23.3	32.8	19.3	19.3	27.5	0.0	27.2	27.9	0.0	0.0
LnGrp LOS	D	C	C	C	B	B	C	A	C	C	A	A
Approach Vol, veh/h		654			793			292			305	
Approach Delay, s/veh		24.7			21.5			27.4			27.9	
Approach LOS		C			C			C			C	

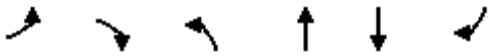
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	10.2	18.7		16.9	7.0	22.0		12.2				
Change Period (Y+Rc), s	* 4.7	5.1		4.6	* 4.7	5.1		4.6				
Max Green Setting (Gmax), s	* 10	28.9		18.5	* 7.3	30.0		14.6				
Max Q Clear Time (g_c+I1), s	6.2	11.4		11.7	3.7	11.5		6.9				
Green Ext Time (p_c), s	0.1	2.3		0.7	0.0	2.5		0.7				

Intersection Summary		
HCM 6th Ctrl Delay		24.3
HCM 6th LOS		C

Notes

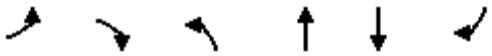
User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	664	211	278	416	591	533
v/c Ratio	0.54	0.23	0.58	0.23	0.51	0.45
Control Delay	20.8	5.1	35.5	10.1	22.7	4.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.8	5.1	35.5	10.1	22.7	4.2
Queue Length 50th (ft)	124	24	63	52	118	55
Queue Length 95th (ft)	173	53	100	76	168	102
Internal Link Dist (ft)	1021			192	1426	
Turn Bay Length (ft)		250	135			150
Base Capacity (vph)	1240	937	531	1826	1151	1195
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.54	0.23	0.52	0.23	0.51	0.45

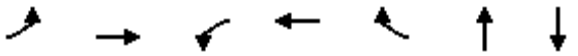
Intersection Summary



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	611	194	256	383	544	490
Future Volume (veh/h)	611	194	256	383	544	490
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1841	1841	1841	1841	1841	1841
Adj Flow Rate, veh/h	664	211	278	416	591	533
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	4	4	4	4	4	4
Cap, veh/h	1253	748	377	1841	1269	1141
Arrive On Green	0.37	0.37	0.11	0.53	0.36	0.36
Sat Flow, veh/h	3401	1560	3401	3589	3589	1560
Grp Volume(v), veh/h	664	211	278	416	591	533
Grp Sat Flow(s),veh/h/ln	1700	1560	1700	1749	1749	1560
Q Serve(g_s), s	11.6	6.2	6.0	4.9	9.8	10.6
Cycle Q Clear(g_c), s	11.6	6.2	6.0	4.9	9.8	10.6
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	1253	748	377	1841	1269	1141
V/C Ratio(X)	0.53	0.28	0.74	0.23	0.47	0.47
Avail Cap(c_a), veh/h	1253	748	537	1841	1269	1141
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.72	0.72	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	18.8	11.9	32.7	9.7	18.6	4.2
Incr Delay (d2), s/veh	1.2	0.7	3.2	0.3	1.2	1.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.4	2.1	2.5	1.7	3.9	8.8
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	20.0	12.6	35.9	10.0	19.8	5.5
LnGrp LOS	B	B	D	A	B	A
Approach Vol, veh/h	875			694	1124	
Approach Delay, s/veh	18.2			20.3	13.0	
Approach LOS	B			C	B	

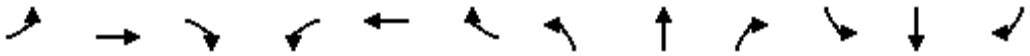
Timer - Assigned Phs		2	3	4		8
Phs Duration (G+Y+Rc), s		32.0	12.4	31.6		44.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0
Max Green Setting (Gmax), s		28.0	12.0	24.0		40.0
Max Q Clear Time (g_c+I1), s		13.6	8.0	12.6		6.9
Green Ext Time (p_c), s		3.7	0.4	4.3		1.9

Intersection Summary	
HCM 6th Ctrl Delay	16.6
HCM 6th LOS	B



Lane Group	EBL	EBT	WBL	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	21	357	4	557	168	9	261
v/c Ratio	0.08	0.42	0.02	0.67	0.21	0.02	0.59
Control Delay	29.4	11.1	32.2	15.9	2.8	0.1	18.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.4	11.1	32.2	15.9	2.8	0.1	18.3
Queue Length 50th (ft)	4	48	1	87	0	0	30
Queue Length 95th (ft)	33	176	12	327	31	0	154
Internal Link Dist (ft)		964		774		748	712
Turn Bay Length (ft)	325		280		280		
Base Capacity (vph)	269	1604	170	1581	1393	922	823
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.08	0.22	0.02	0.35	0.12	0.01	0.32

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	19	326	3	4	512	155	1	0	7	168	0	72
Future Volume (veh/h)	19	326	3	4	512	155	1	0	7	168	0	72
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1841	1841	1870	1841	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	21	354	3	4	557	168	1	0	8	183	0	78
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	4	4	2	4	2	2	2	2	2	2	2
Cap, veh/h	55	750	6	8	709	610	104	29	320	362	10	98
Arrive On Green	0.03	0.41	0.41	0.00	0.39	0.39	0.22	0.00	0.22	0.22	0.00	0.22
Sat Flow, veh/h	1781	1822	15	1781	1841	1585	49	129	1425	983	47	439
Grp Volume(v), veh/h	21	0	357	4	557	168	9	0	0	261	0	0
Grp Sat Flow(s),veh/h/ln	1781	0	1838	1781	1841	1585	1603	0	0	1468	0	0
Q Serve(g_s), s	0.5	0.0	6.1	0.1	11.5	3.1	0.0	0.0	0.0	6.8	0.0	0.0
Cycle Q Clear(g_c), s	0.5	0.0	6.1	0.1	11.5	3.1	0.2	0.0	0.0	7.2	0.0	0.0
Prop In Lane	1.00		0.01	1.00		1.00	0.11		0.89	0.70		0.30
Lane Grp Cap(c), veh/h	55	0	757	8	709	610	452	0	0	471	0	0
V/C Ratio(X)	0.38	0.00	0.47	0.52	0.79	0.28	0.02	0.00	0.00	0.55	0.00	0.00
Avail Cap(c_a), veh/h	260	0	2022	165	1931	1663	932	0	0	922	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	20.5	0.0	9.3	21.4	11.7	9.1	13.0	0.0	0.0	15.7	0.0	0.0
Incr Delay (d2), s/veh	4.3	0.0	0.5	44.7	2.0	0.2	0.0	0.0	0.0	1.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	0.0	1.6	0.1	3.4	0.8	0.1	0.0	0.0	2.2	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	24.7	0.0	9.7	66.1	13.7	9.4	13.1	0.0	0.0	16.7	0.0	0.0
LnGrp LOS	C	A	A	E	B	A	B	A	A	B	A	A
Approach Vol, veh/h		378			729			9			261	
Approach Delay, s/veh		10.5			12.9			13.1			16.7	
Approach LOS		B			B			B			B	

Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		14.3	5.3	23.5		14.3	6.4	22.4				
Change Period (Y+Rc), s		4.6	5.1	5.8		4.6	5.1	5.8				
Max Green Setting (Gmax), s		23.0	4.0	47.4		23.0	6.3	45.2				
Max Q Clear Time (g_c+I1), s		2.2	2.1	8.1		9.2	2.5	13.5				
Green Ext Time (p_c), s		0.0	0.0	1.4		0.9	0.0	3.1				

Intersection Summary												
HCM 6th Ctrl Delay			13.0									
HCM 6th LOS			B									

Notes

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

Intersection	
Int Delay, s/veh	3.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	37	489	1	0	310	109	2	0	4	61	0	31
Future Vol, veh/h	37	489	1	0	310	109	2	0	4	61	0	31
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	325	-	-	280	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	84	84	84	84	84	84	84	84	84	84	84	84
Heavy Vehicles, %	2	4	2	2	4	2	2	2	2	2	2	2
Mvmt Flow	44	582	1	0	369	130	2	0	5	73	0	37

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	499	0	0	583	0	0	1124	1170	583	1107	1105	434
Stage 1	-	-	-	-	-	-	671	671	-	434	434	-
Stage 2	-	-	-	-	-	-	453	499	-	673	671	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1065	-	-	991	-	-	183	193	512	188	211	622
Stage 1	-	-	-	-	-	-	446	455	-	600	581	-
Stage 2	-	-	-	-	-	-	586	544	-	445	455	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1065	-	-	991	-	-	167	185	512	180	202	622
Mov Cap-2 Maneuver	-	-	-	-	-	-	167	185	-	180	202	-
Stage 1	-	-	-	-	-	-	428	436	-	575	581	-
Stage 2	-	-	-	-	-	-	551	544	-	423	436	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.6	0	17.2	32.6
HCM LOS			C	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	303	1065	-	-	991	-	-	237
HCM Lane V/C Ratio	0.024	0.041	-	-	-	-	-	0.462
HCM Control Delay (s)	17.2	8.5	-	-	0	-	-	32.6
HCM Lane LOS	C	A	-	-	A	-	-	D
HCM 95th %tile Q(veh)	0.1	0.1	-	-	0	-	-	2.3

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	17	613	5	26	415	38	1	1	32	0	0	9
Future Vol, veh/h	17	613	5	26	415	38	1	1	32	0	0	9
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	150	-	0	200	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	84	84	84	84	84	84	84	84	84	84	84	84
Heavy Vehicles, %	2	4	2	2	4	2	2	2	2	2	2	2
Mvmt Flow	20	730	6	31	494	45	1	1	38	0	0	11

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	539	0	0	736	0	0	1354	1371	730	1372	1355	517
Stage 1	-	-	-	-	-	-	770	770	-	579	579	-
Stage 2	-	-	-	-	-	-	584	601	-	793	776	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1029	-	-	870	-	-	127	146	422	123	149	558
Stage 1	-	-	-	-	-	-	393	410	-	501	501	-
Stage 2	-	-	-	-	-	-	498	489	-	382	407	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1029	-	-	870	-	-	119	138	422	107	141	558
Mov Cap-2 Maneuver	-	-	-	-	-	-	119	138	-	107	141	-
Stage 1	-	-	-	-	-	-	386	402	-	491	483	-
Stage 2	-	-	-	-	-	-	471	471	-	340	399	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0.5	15.9	11.6
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	372	1029	-	-	870	-	-	558
HCM Lane V/C Ratio	0.109	0.02	-	-	0.036	-	-	0.019
HCM Control Delay (s)	15.9	8.6	-	-	9.3	-	-	11.6
HCM Lane LOS	C	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.4	0.1	-	-	0.1	-	-	0.1

Intersection	
Int Delay, s/veh	12.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	19	626	459	110	122	19
Future Vol, veh/h	19	626	459	110	122	19
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	2	4	4	2	2	2
Mvmt Flow	22	736	540	129	144	22

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	669	0	-	0	1385	605
Stage 1	-	-	-	-	605	-
Stage 2	-	-	-	-	780	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	921	-	-	-	158	498
Stage 1	-	-	-	-	545	-
Stage 2	-	-	-	-	452	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	921	-	-	-	152	498
Mov Cap-2 Maneuver	-	-	-	-	152	-
Stage 1	-	-	-	-	523	-
Stage 2	-	-	-	-	452	-

Approach	EB	WB	SB
HCM Control Delay, s	0.3	0	121.2
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	921	-	-	-	168
HCM Lane V/C Ratio	0.024	-	-	-	0.987
HCM Control Delay (s)	9	0	-	-	121.2
HCM Lane LOS	A	A	-	-	F
HCM 95th %tile Q(veh)	0.1	-	-	-	7.8

Intersection	
Int Delay, s/veh	0.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	738	11	17	551	6	12
Future Vol, veh/h	738	11	17	551	6	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	4	2	2	4	2	2
Mvmt Flow	868	13	20	648	7	14

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	881	0	1563	875
Stage 1	-	-	-	-	875	-
Stage 2	-	-	-	-	688	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	767	-	123	349
Stage 1	-	-	-	-	408	-
Stage 2	-	-	-	-	499	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	767	-	118	349
Mov Cap-2 Maneuver	-	-	-	-	118	-
Stage 1	-	-	-	-	408	-
Stage 2	-	-	-	-	479	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.3	24
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	211	-	-	767	-
HCM Lane V/C Ratio	0.1	-	-	0.026	-
HCM Control Delay (s)	24	-	-	9.8	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	0.3	-	-	0.1	-

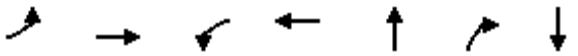
Intersection	
Int Delay, s/veh	6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	7	717	32	25	553	44	12	0	8	76	0	5
Future Vol, veh/h	7	717	32	25	553	44	12	0	8	76	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	180	-	-	800	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	80	80	80	80	80	80	80	80	80	80	80
Heavy Vehicles, %	2	4	2	2	4	2	2	2	2	2	2	2
Mvmt Flow	9	896	40	31	691	55	15	0	10	95	0	6

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	746	0	0	936	0	0	1342	1742	468	1247	1735	373
Stage 1	-	-	-	-	-	-	934	934	-	781	781	-
Stage 2	-	-	-	-	-	-	408	808	-	466	954	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	858	-	-	727	-	-	110	86	542	130	87	624
Stage 1	-	-	-	-	-	-	286	343	-	354	403	-
Stage 2	-	-	-	-	-	-	591	392	-	546	335	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	858	-	-	727	-	-	105	81	542	122	82	624
Mov Cap-2 Maneuver	-	-	-	-	-	-	105	81	-	122	82	-
Stage 1	-	-	-	-	-	-	283	340	-	350	386	-
Stage 2	-	-	-	-	-	-	560	375	-	530	332	-

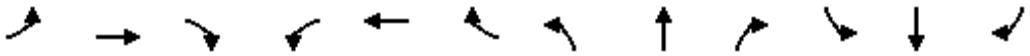
Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.4	32.6	96.7
HCM LOS			D	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	155	858	-	-	727	-	-	128
HCM Lane V/C Ratio	0.161	0.01	-	-	0.043	-	-	0.791
HCM Control Delay (s)	32.6	9.2	-	-	10.2	-	-	96.7
HCM Lane LOS	D	A	-	-	B	-	-	F
HCM 95th %tile Q(veh)	0.6	0	-	-	0.1	-	-	4.7



Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	35	939	70	834	60	59	108
v/c Ratio	0.11	0.55	0.23	0.44	0.18	0.13	0.30
Control Delay	32.0	19.2	34.1	15.3	31.4	0.6	28.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.0	19.2	34.1	15.3	31.4	0.6	28.0
Queue Length 50th (ft)	14	174	28	100	24	0	37
Queue Length 95th (ft)	41	246	68	212	57	0	80
Internal Link Dist (ft)		1048		1021	832		814
Turn Bay Length (ft)	150		100				
Base Capacity (vph)	349	1864	334	1956	686	730	678
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.50	0.21	0.43	0.09	0.08	0.16

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	29	721	58	58	630	62	36	14	49	56	14	20
Future Volume (veh/h)	29	721	58	58	630	62	36	14	49	56	14	20
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1841	1841	1870	1841	1841	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	35	869	70	70	759	75	43	17	59	67	17	24
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Percent Heavy Veh, %	2	4	4	2	4	4	2	2	2	2	2	2
Cap, veh/h	176	1148	93	133	1023	101	126	50	155	102	26	36
Arrive On Green	0.10	0.35	0.35	0.07	0.32	0.32	0.10	0.10	0.10	0.09	0.09	0.09
Sat Flow, veh/h	1781	3278	264	1781	3215	318	1294	512	1585	1083	275	388
Grp Volume(v), veh/h	35	464	475	70	413	421	60	0	59	108	0	0
Grp Sat Flow(s),veh/h/ln	1781	1749	1793	1781	1749	1784	1806	0	1585	1746	0	0
Q Serve(g_s), s	0.9	11.6	11.6	1.9	10.4	10.4	1.5	0.0	1.7	3.0	0.0	0.0
Cycle Q Clear(g_c), s	0.9	11.6	11.6	1.9	10.4	10.4	1.5	0.0	1.7	3.0	0.0	0.0
Prop In Lane	1.00		0.15	1.00		0.18	0.72		1.00	0.62		0.22
Lane Grp Cap(c), veh/h	176	613	628	133	556	567	176	0	155	164	0	0
V/C Ratio(X)	0.20	0.76	0.76	0.52	0.74	0.74	0.34	0.00	0.38	0.66	0.00	0.00
Avail Cap(c_a), veh/h	262	1059	1086	262	1059	1080	583	0	512	564	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	20.5	14.2	14.2	22.1	15.1	15.1	20.9	0.0	21.0	21.7	0.0	0.0
Incr Delay (d2), s/veh	0.5	1.9	1.9	3.2	2.0	1.9	1.1	0.0	1.5	4.5	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	4.0	4.1	0.8	3.7	3.8	0.7	0.0	0.7	1.3	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	21.1	16.2	16.1	25.2	17.1	17.0	22.0	0.0	22.5	26.2	0.0	0.0
LnGrp LOS	C	B	B	C	B	B	C	A	C	C	A	A
Approach Vol, veh/h		974			904			119			108	
Approach Delay, s/veh		16.3			17.7			22.2			26.2	
Approach LOS		B			B			C			C	

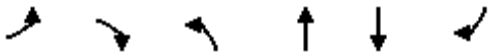
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	8.4	22.5		9.2	10.0	20.9		9.4				
Change Period (Y+Rc), s	* 4.7	5.1		4.6	5.1	* 5.1		4.6				
Max Green Setting (Gmax), s	* 7.3	30.0		16.0	7.3	* 30		16.0				
Max Q Clear Time (g_c+I1), s	3.9	13.6		5.0	2.9	12.4		3.7				
Green Ext Time (p_c), s	0.0	3.7		0.2	0.0	3.3		0.3				

Intersection Summary		
HCM 6th Ctrl Delay		17.7
HCM 6th LOS		B

Notes

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

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	753	259	301	617	407	667
v/c Ratio	0.61	0.24	0.53	0.38	0.55	0.64
Control Delay	18.5	1.4	29.6	12.5	26.0	8.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.5	1.4	29.6	12.5	26.0	8.9
Queue Length 50th (ft)	116	0	53	73	72	116
Queue Length 95th (ft)	156	16	97	125	117	155
Internal Link Dist (ft)	1021			192	1426	
Turn Bay Length (ft)		250	135			150
Base Capacity (vph)	1882	1074	603	3083	2282	1331
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.40	0.24	0.50	0.20	0.18	0.50

Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	610	210	244	500	330	540
Future Volume (veh/h)	610	210	244	500	330	540
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1841	1841	1841	1841	1841	1841
Adj Flow Rate, veh/h	753	259	301	617	407	667
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81
Percent Heavy Veh, %	4	4	4	4	4	4
Cap, veh/h	1013	651	406	1942	1267	1030
Arrive On Green	0.30	0.30	0.12	0.56	0.36	0.36
Sat Flow, veh/h	3401	1560	3401	3589	3589	1560
Grp Volume(v), veh/h	753	259	301	617	407	667
Grp Sat Flow(s),veh/h/ln	1700	1560	1700	1749	1749	1560
Q Serve(g_s), s	13.9	8.1	5.9	6.6	5.8	17.6
Cycle Q Clear(g_c), s	13.9	8.1	5.9	6.6	5.8	17.6
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	1013	651	406	1942	1267	1030
V/C Ratio(X)	0.74	0.40	0.74	0.32	0.32	0.65
Avail Cap(c_a), veh/h	1666	951	534	1942	2016	1364
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	22.0	14.1	29.5	8.3	16.0	7.0
Incr Delay (d2), s/veh	1.1	0.4	3.9	0.1	0.1	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.2	2.6	2.5	2.1	2.1	10.9
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	23.1	14.5	33.4	8.4	16.1	7.7
LnGrp LOS	C	B	C	A	B	A
Approach Vol, veh/h	1012			918	1074	
Approach Delay, s/veh	20.9			16.6	10.9	
Approach LOS	C			B	B	

Timer - Assigned Phs		2	3	4		8
Phs Duration (G+Y+Rc), s		25.8	13.4	30.2		43.6
Change Period (Y+Rc), s		5.1	5.1	5.1		5.1
Max Green Setting (Gmax), s		34.0	10.9	40.0		37.9
Max Q Clear Time (g_c+I1), s		15.9	7.9	19.6		8.6
Green Ext Time (p_c), s		4.8	0.4	5.5		3.0

Intersection Summary	
HCM 6th Ctrl Delay	16.0
HCM 6th LOS	B

Intersection	
Int Delay, s/veh	86.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	49	393	2	4	577	152	1	0	7	198	0	102
Future Vol, veh/h	49	393	2	4	577	152	1	0	7	198	0	102
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	325	-	-	280	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	4	2	2	4	2	2	2	2	2	2	2
Mvmt Flow	53	427	2	4	627	165	1	0	8	215	0	111

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	792	0	0	429	0	0	1307	1334	428	1256	1253	710
Stage 1	-	-	-	-	-	-	534	534	-	718	718	-
Stage 2	-	-	-	-	-	-	773	800	-	538	535	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	829	-	-	1130	-	-	137	154	627	~ 148	172	434
Stage 1	-	-	-	-	-	-	530	524	-	420	433	-
Stage 2	-	-	-	-	-	-	392	397	-	527	524	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	829	-	-	1130	-	-	97	144	627	~ 139	160	434
Mov Cap-2 Maneuver	-	-	-	-	-	-	97	144	-	~ 139	160	-
Stage 1	-	-	-	-	-	-	496	490	-	393	431	-
Stage 2	-	-	-	-	-	-	291	395	-	487	490	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.1	0	14.9	$ 425.8
HCM LOS			B	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	373	829	-	-	1130	-	-	181
HCM Lane V/C Ratio	0.023	0.064	-	-	0.004	-	-	1.802
HCM Control Delay (s)	14.9	9.6	-	-	8.2	-	-	$ 425.8
HCM Lane LOS	B	A	-	-	A	-	-	F
HCM 95th %tile Q(veh)	0.1	0.2	-	-	0	-	-	23.4

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	1.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	41	561	7	30	682	81	1	2	27	0	0	60
Future Vol, veh/h	41	561	7	30	682	81	1	2	27	0	0	60
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	150	-	0	200	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	2	4	2	2	4	2	2	2	2	2	2	2
Mvmt Flow	44	603	8	32	733	87	1	2	29	0	0	65

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	820	0	0	611	0	0	1564	1575	603	1552	1540	777
Stage 1	-	-	-	-	-	-	691	691	-	841	841	-
Stage 2	-	-	-	-	-	-	873	884	-	711	699	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	809	-	-	968	-	-	91	110	499	92	115	397
Stage 1	-	-	-	-	-	-	435	446	-	359	380	-
Stage 2	-	-	-	-	-	-	345	363	-	424	442	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	809	-	-	968	-	-	71	101	499	80	105	397
Mov Cap-2 Maneuver	-	-	-	-	-	-	71	101	-	80	105	-
Stage 1	-	-	-	-	-	-	412	422	-	340	367	-
Stage 2	-	-	-	-	-	-	279	351	-	376	418	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.7	0.3	16.7	15.8
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	341	809	-	-	968	-	-	397
HCM Lane V/C Ratio	0.095	0.054	-	-	0.033	-	-	0.163
HCM Control Delay (s)	16.7	9.7	-	-	8.8	-	-	15.8
HCM Lane LOS	C	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	0.3	0.2	-	-	0.1	-	-	0.6

Intersection	
Int Delay, s/veh	335.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	82	506	709	275	340	83
Future Vol, veh/h	82	506	709	275	340	83
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	2	4	4	2	2	2
Mvmt Flow	88	544	762	296	366	89

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1058	0	-	0	1630	910
Stage 1	-	-	-	-	910	-
Stage 2	-	-	-	-	720	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	658	-	-	-	~ 112	333
Stage 1	-	-	-	-	393	-
Stage 2	-	-	-	-	482	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	658	-	-	-	~ 90	333
Mov Cap-2 Maneuver	-	-	-	-	~ 90	-
Stage 1	-	-	-	-	~ 318	-
Stage 2	-	-	-	-	482	-

Approach	EB	WB	SB
HCM Control Delay, s	1.6	0	$ 1581.9
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	658	-	-	-	105
HCM Lane V/C Ratio	0.134	-	-	-	4.332
HCM Control Delay (s)	11.3	0	-	-	$ 1581.9
HCM Lane LOS	B	A	-	-	F
HCM 95th %tile Q(veh)	0.5	-	-	-	47.3

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	0.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	843	7	4	967	8	16
Future Vol, veh/h	843	7	4	967	8	16
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	4	2	2	4	2	2
Mvmt Flow	906	8	4	1040	9	17

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	914	0	1958	910
Stage 1	-	-	-	-	910	-
Stage 2	-	-	-	-	1048	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	746	-	70	333
Stage 1	-	-	-	-	393	-
Stage 2	-	-	-	-	338	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	746	-	69	333
Mov Cap-2 Maneuver	-	-	-	-	69	-
Stage 1	-	-	-	-	393	-
Stage 2	-	-	-	-	334	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	34.9
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	146	-	-	746	-
HCM Lane V/C Ratio	0.177	-	-	0.006	-
HCM Control Delay (s)	34.9	-	-	9.9	0
HCM Lane LOS	D	-	-	A	A
HCM 95th %tile Q(veh)	0.6	-	-	0	-

Intersection	
Int Delay, s/veh	24.4

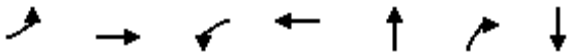
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	840	21	18	939	80	45	1	47	82	1	18
Future Vol, veh/h	5	840	21	18	939	80	45	1	47	82	1	18
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	180	-	-	800	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	4	2	2	4	2	2	2	2	2	2	2
Mvmt Flow	6	933	23	20	1043	89	50	1	52	91	1	20

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1132	0	0	956	0	0	1519	2129	478	1607	2096	566
Stage 1	-	-	-	-	-	-	957	957	-	1128	1128	-
Stage 2	-	-	-	-	-	-	562	1172	-	479	968	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	613	-	-	715	-	-	82	49	534	~ 70	51	467
Stage 1	-	-	-	-	-	-	277	334	-	218	278	-
Stage 2	-	-	-	-	-	-	479	264	-	537	330	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	613	-	-	715	-	-	75	47	534	~ 60	49	467
Mov Cap-2 Maneuver	-	-	-	-	-	-	75	47	-	~ 60	49	-
Stage 1	-	-	-	-	-	-	274	331	-	216	270	-
Stage 2	-	-	-	-	-	-	444	257	-	478	327	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.2	94.6	$ 416.8
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	131	613	-	-	715	-	-	71
HCM Lane V/C Ratio	0.789	0.009	-	-	0.028	-	-	1.581
HCM Control Delay (s)	94.6	10.9	-	-	10.2	-	-	$ 416.8
HCM Lane LOS	F	B	-	-	B	-	-	F
HCM 95th %tile Q(veh)	4.7	0	-	-	0.1	-	-	9.6

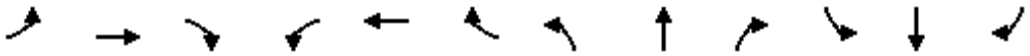
Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon



Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	60	961	131	1020	161	132	322
v/c Ratio	0.45	0.84	0.66	0.74	0.70	0.42	0.83
Control Delay	54.9	36.5	57.8	29.0	57.7	11.7	52.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	54.9	36.5	57.8	29.0	57.7	11.7	52.5
Queue Length 50th (ft)	37	287	81	293	99	0	186
Queue Length 95th (ft)	79	367	#160	374	#188	53	#321
Internal Link Dist (ft)		1048		1021	832		814
Turn Bay Length (ft)	150		100				
Base Capacity (vph)	144	1313	223	1471	258	340	452
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.42	0.73	0.59	0.69	0.62	0.39	0.71

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	56	785	109	122	888	60	112	38	123	181	49	69
Future Volume (veh/h)	56	785	109	122	888	60	112	38	123	181	49	69
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1841	1841	1870	1841	1841	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	60	844	117	131	955	65	120	41	132	195	53	74
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	4	4	2	4	4	2	2	2	2	2	2
Cap, veh/h	77	1005	139	167	1251	85	159	54	188	226	61	86
Arrive On Green	0.04	0.33	0.33	0.09	0.38	0.38	0.12	0.12	0.12	0.21	0.21	0.21
Sat Flow, veh/h	1781	3085	428	1781	3323	226	1344	459	1585	1057	287	401
Grp Volume(v), veh/h	60	478	483	131	503	517	161	0	132	322	0	0
Grp Sat Flow(s),veh/h/ln	1781	1749	1764	1781	1749	1800	1803	0	1585	1745	0	0
Q Serve(g_s), s	2.6	19.5	19.5	5.5	19.3	19.3	6.6	0.0	6.1	13.6	0.0	0.0
Cycle Q Clear(g_c), s	2.6	19.5	19.5	5.5	19.3	19.3	6.6	0.0	6.1	13.6	0.0	0.0
Prop In Lane	1.00		0.24	1.00		0.13	0.75		1.00	0.61		0.23
Lane Grp Cap(c), veh/h	77	570	575	167	658	677	214	0	188	374	0	0
V/C Ratio(X)	0.78	0.84	0.84	0.79	0.76	0.76	0.75	0.00	0.70	0.86	0.00	0.00
Avail Cap(c_a), veh/h	170	780	787	263	872	897	304	0	267	515	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	36.3	24.0	24.0	34.0	20.9	20.9	32.7	0.0	32.5	29.0	0.0	0.0
Incr Delay (d2), s/veh	15.6	6.0	6.0	7.9	2.9	2.8	6.4	0.0	4.7	10.6	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.4	8.4	8.4	2.7	7.7	7.9	3.2	0.0	2.6	6.7	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	51.9	30.0	29.9	41.9	23.8	23.7	39.1	0.0	37.2	39.6	0.0	0.0
LnGrp LOS	D	C	C	D	C	C	D	A	D	D	A	A
Approach Vol, veh/h		1021			1151			293			322	
Approach Delay, s/veh		31.2			25.8			38.2			39.6	
Approach LOS		C			C			D			D	

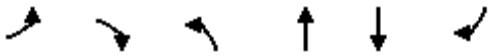
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	11.9	30.1		21.0	8.0	33.9		13.7				
Change Period (Y+Rc), s	* 4.7	5.1		4.6	* 4.7	5.1		4.6				
Max Green Setting (Gmax), s	* 11	34.2		22.6	* 7.3	38.2		12.9				
Max Q Clear Time (g_c+I1), s	7.5	21.5		15.6	4.6	21.3		8.6				
Green Ext Time (p_c), s	0.1	3.5		0.8	0.0	4.2		0.5				

Intersection Summary		
HCM 6th Ctrl Delay		30.7
HCM 6th LOS		C

Notes

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

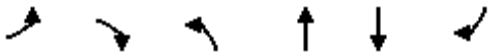
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	927	318	371	445	607	801
v/c Ratio	0.70	0.32	0.74	0.27	0.69	0.72
Control Delay	22.8	5.0	43.3	13.1	30.3	10.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.8	5.0	43.3	13.1	30.3	10.4
Queue Length 50th (ft)	177	31	89	66	139	171
Queue Length 95th (ft)	274	81	#176	102	200	285
Internal Link Dist (ft)	1021			192	1426	
Turn Bay Length (ft)		250	135			150
Base Capacity (vph)	1557	1002	499	2644	1889	1221
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.60	0.32	0.74	0.17	0.32	0.66

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	853	293	341	409	558	737
Future Volume (veh/h)	853	293	341	409	558	737
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1841	1841	1841	1841	1841	1841
Adj Flow Rate, veh/h	927	318	371	445	607	801
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	4	4	4	4	4	4
Cap, veh/h	1098	692	410	1974	1355	1108
Arrive On Green	0.32	0.32	0.12	0.56	0.39	0.39
Sat Flow, veh/h	3401	1560	3401	3589	3589	1560
Grp Volume(v), veh/h	927	318	371	445	607	801
Grp Sat Flow(s),veh/h/ln	1700	1560	1700	1749	1749	1560
Q Serve(g_s), s	22.9	12.9	9.7	5.7	11.6	27.7
Cycle Q Clear(g_c), s	22.9	12.9	9.7	5.7	11.6	27.7
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	1098	692	410	1974	1355	1108
V/C Ratio(X)	0.84	0.46	0.90	0.23	0.45	0.72
Avail Cap(c_a), veh/h	1279	775	410	1974	1548	1194
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	28.5	17.6	39.2	9.8	20.5	7.8
Incr Delay (d2), s/veh	4.7	0.5	23.0	0.1	0.2	2.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	9.6	4.4	5.3	2.0	4.5	18.2
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	33.2	18.1	62.2	9.9	20.8	9.8
LnGrp LOS	C	B	E	A	C	A
Approach Vol, veh/h	1245			816	1408	
Approach Delay, s/veh	29.4			33.7	14.5	
Approach LOS	C			C	B	

Timer - Assigned Phs		2	3	4		8
Phs Duration (G+Y+Rc), s		34.3	16.0	40.1		56.1
Change Period (Y+Rc), s		5.1	5.1	5.1		5.1
Max Green Setting (Gmax), s		34.0	10.9	40.0		38.9
Max Q Clear Time (g_c+I1), s		24.9	11.7	29.7		7.7
Green Ext Time (p_c), s		4.2	0.0	5.4		2.1

Intersection Summary	
HCM 6th Ctrl Delay	24.4
HCM 6th LOS	C

Intersection	
Int Delay, s/veh	3.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	41	487	1	0	309	136	2	0	4	66	0	32
Future Vol, veh/h	41	487	1	0	309	136	2	0	4	66	0	32
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	325	-	-	280	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	84	84	84	84	84	84	84	84	84	84	84	84
Heavy Vehicles, %	2	4	2	2	4	2	2	2	2	2	2	2
Mvmt Flow	49	580	1	0	368	162	2	0	5	79	0	38

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	530	0	0	581	0	0	1147	1209	581	1130	1128	449
Stage 1	-	-	-	-	-	-	679	679	-	449	449	-
Stage 2	-	-	-	-	-	-	468	530	-	681	679	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1037	-	-	993	-	-	176	183	514	181	204	610
Stage 1	-	-	-	-	-	-	441	451	-	589	572	-
Stage 2	-	-	-	-	-	-	575	527	-	440	451	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1037	-	-	993	-	-	159	174	514	173	194	610
Mov Cap-2 Maneuver	-	-	-	-	-	-	159	174	-	173	194	-
Stage 1	-	-	-	-	-	-	420	430	-	561	572	-
Stage 2	-	-	-	-	-	-	539	527	-	415	430	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.7	0	17.5	36.8
HCM LOS			C	E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	295	1037	-	-	993	-	-	226
HCM Lane V/C Ratio	0.024	0.047	-	-	-	-	-	0.516
HCM Control Delay (s)	17.5	8.6	-	-	0	-	-	36.8
HCM Lane LOS	C	A	-	-	A	-	-	E
HCM 95th %tile Q(veh)	0.1	0.1	-	-	0	-	-	2.7

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	17	616	5	26	442	38	1	1	32	0	0	9
Future Vol, veh/h	17	616	5	26	442	38	1	1	32	0	0	9
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	150	-	0	200	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	84	84	84	84	84	84	84	84	84	84	84	84
Heavy Vehicles, %	2	4	2	2	4	2	2	2	2	2	2	2
Mvmt Flow	20	733	6	31	526	45	1	1	38	0	0	11

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	571	0	0	739	0	0	1389	1406	733	1407	1390	549
Stage 1	-	-	-	-	-	-	773	773	-	611	611	-
Stage 2	-	-	-	-	-	-	616	633	-	796	779	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1002	-	-	867	-	-	120	139	421	117	142	535
Stage 1	-	-	-	-	-	-	392	409	-	481	484	-
Stage 2	-	-	-	-	-	-	478	473	-	380	406	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1002	-	-	867	-	-	113	131	421	101	134	535
Mov Cap-2 Maneuver	-	-	-	-	-	-	113	131	-	101	134	-
Stage 1	-	-	-	-	-	-	384	401	-	471	467	-
Stage 2	-	-	-	-	-	-	452	456	-	338	398	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0.5	16	11.9
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	368	1002	-	-	867	-	-	535
HCM Lane V/C Ratio	0.11	0.02	-	-	0.036	-	-	0.02
HCM Control Delay (s)	16	8.7	-	-	9.3	-	-	11.9
HCM Lane LOS	C	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.4	0.1	-	-	0.1	-	-	0.1

Intersection	
Int Delay, s/veh	14.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	19	629	486	110	122	19
Future Vol, veh/h	19	629	486	110	122	19
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	2	4	4	2	2	2
Mvmt Flow	22	740	572	129	144	22

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	701	0	-	0	1421	637
Stage 1	-	-	-	-	637	-
Stage 2	-	-	-	-	784	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	896	-	-	-	150	477
Stage 1	-	-	-	-	527	-
Stage 2	-	-	-	-	450	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	896	-	-	-	144	477
Mov Cap-2 Maneuver	-	-	-	-	144	-
Stage 1	-	-	-	-	505	-
Stage 2	-	-	-	-	450	-

Approach	EB	WB	SB
HCM Control Delay, s	0.3	0	140.9
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	896	-	-	-	159
HCM Lane V/C Ratio	0.025	-	-	-	1.043
HCM Control Delay (s)	9.1	0	-	-	140.9
HCM Lane LOS	A	A	-	-	F
HCM 95th %tile Q(veh)	0.1	-	-	-	8.3

Intersection	
Int Delay, s/veh	0.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	741	11	17	578	6	12
Future Vol, veh/h	741	11	17	578	6	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	4	2	2	4	2	2
Mvmt Flow	872	13	20	680	7	14

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	885	0	1599	879
Stage 1	-	-	-	-	879	-
Stage 2	-	-	-	-	720	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	765	-	117	347
Stage 1	-	-	-	-	406	-
Stage 2	-	-	-	-	482	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	765	-	112	347
Mov Cap-2 Maneuver	-	-	-	-	112	-
Stage 1	-	-	-	-	406	-
Stage 2	-	-	-	-	462	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.3	24.7
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	204	-	-	765	-
HCM Lane V/C Ratio	0.104	-	-	0.026	-
HCM Control Delay (s)	24.7	-	-	9.8	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	0.3	-	-	0.1	-

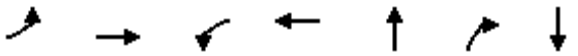
Intersection	
Int Delay, s/veh	6.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	7	720	32	25	580	44	12	0	8	76	0	5
Future Vol, veh/h	7	720	32	25	580	44	12	0	8	76	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	180	-	-	800	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	80	80	80	80	80	80	80	80	80	80	80
Heavy Vehicles, %	2	4	2	2	4	2	2	2	2	2	2	2
Mvmt Flow	9	900	40	31	725	55	15	0	10	95	0	6

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	780	0	0	940	0	0	1363	1780	470	1283	1773	390
Stage 1	-	-	-	-	-	-	938	938	-	815	815	-
Stage 2	-	-	-	-	-	-	425	842	-	468	958	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	833	-	-	725	-	-	107	81	540	122	82	609
Stage 1	-	-	-	-	-	-	284	341	-	338	389	-
Stage 2	-	-	-	-	-	-	578	378	-	545	334	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	833	-	-	725	-	-	102	77	540	115	78	609
Mov Cap-2 Maneuver	-	-	-	-	-	-	102	77	-	115	78	-
Stage 1	-	-	-	-	-	-	281	337	-	334	372	-
Stage 2	-	-	-	-	-	-	548	362	-	529	330	-

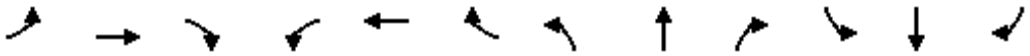
Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.4	33.5	110.1
HCM LOS			D	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	151	833	-	-	725	-	-	121
HCM Lane V/C Ratio	0.166	0.011	-	-	0.043	-	-	0.837
HCM Control Delay (s)	33.5	9.4	-	-	10.2	-	-	110.1
HCM Lane LOS	D	A	-	-	B	-	-	F
HCM 95th %tile Q(veh)	0.6	0	-	-	0.1	-	-	5



Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	35	942	70	867	60	59	108
v/c Ratio	0.12	0.56	0.23	0.45	0.18	0.13	0.30
Control Delay	32.3	19.2	34.2	15.3	31.4	0.6	28.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.3	19.2	34.2	15.3	31.4	0.6	28.0
Queue Length 50th (ft)	14	175	28	105	24	0	37
Queue Length 95th (ft)	41	247	68	222	57	0	80
Internal Link Dist (ft)		1048		1021	832		814
Turn Bay Length (ft)	150		100				
Base Capacity (vph)	345	1863	333	1956	686	730	677
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.51	0.21	0.44	0.09	0.08	0.16

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	29	724	58	58	657	62	36	14	49	56	14	20
Future Volume (veh/h)	29	724	58	58	657	62	36	14	49	56	14	20
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1841	1841	1870	1841	1841	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	35	872	70	70	792	75	43	17	59	67	17	24
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Percent Heavy Veh, %	2	4	4	2	4	4	2	2	2	2	2	2
Cap, veh/h	160	1151	92	133	1060	100	126	50	154	101	26	36
Arrive On Green	0.09	0.35	0.35	0.07	0.33	0.33	0.10	0.10	0.10	0.09	0.09	0.09
Sat Flow, veh/h	1781	3279	263	1781	3229	306	1294	512	1585	1083	275	388
Grp Volume(v), veh/h	35	465	477	70	429	438	60	0	59	108	0	0
Grp Sat Flow(s),veh/h/ln	1781	1749	1793	1781	1749	1786	1806	0	1585	1746	0	0
Q Serve(g_s), s	0.9	11.7	11.7	1.9	10.8	10.8	1.5	0.0	1.7	3.0	0.0	0.0
Cycle Q Clear(g_c), s	0.9	11.7	11.7	1.9	10.8	10.8	1.5	0.0	1.7	3.0	0.0	0.0
Prop In Lane	1.00		0.15	1.00		0.17	0.72		1.00	0.62		0.22
Lane Grp Cap(c), veh/h	160	614	630	133	574	586	176	0	154	164	0	0
V/C Ratio(X)	0.22	0.76	0.76	0.53	0.75	0.75	0.34	0.00	0.38	0.66	0.00	0.00
Avail Cap(c_a), veh/h	262	1057	1084	262	1057	1080	582	0	511	563	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	21.0	14.2	14.2	22.1	14.8	14.8	20.9	0.0	21.0	21.7	0.0	0.0
Incr Delay (d2), s/veh	0.7	1.9	1.9	3.2	2.0	1.9	1.1	0.0	1.5	4.5	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	4.0	4.1	0.8	3.8	3.9	0.7	0.0	0.7	1.3	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	21.7	16.2	16.1	25.3	16.8	16.8	22.0	0.0	22.5	26.2	0.0	0.0
LnGrp LOS	C	B	B	C	B	B	C	A	C	C	A	A
Approach Vol, veh/h		977			937			119			108	
Approach Delay, s/veh		16.3			17.4			22.3			26.2	
Approach LOS		B			B			C			C	

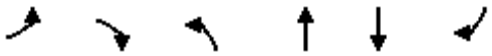
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	8.4	22.5		9.2	9.5	21.4		9.4				
Change Period (Y+Rc), s	* 4.7	5.1		4.6	5.1	* 5.1		4.6				
Max Green Setting (Gmax), s	* 7.3	30.0		16.0	7.3	* 30		16.0				
Max Q Clear Time (g_c+I1), s	3.9	13.7		5.0	2.9	12.8		3.7				
Green Ext Time (p_c), s	0.0	3.8		0.2	0.0	3.5		0.3				

Intersection Summary		
HCM 6th Ctrl Delay		17.6
HCM 6th LOS		B

Notes

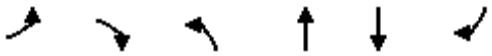
User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	752	264	325	602	405	677
v/c Ratio	0.61	0.25	0.56	0.37	0.55	0.66
Control Delay	18.4	1.4	30.3	12.6	26.3	9.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.4	1.4	30.3	12.6	26.3	9.4
Queue Length 50th (ft)	115	0	58	71	71	121
Queue Length 95th (ft)	155	16	105	123	117	162
Internal Link Dist (ft)	1021			192	1426	
Turn Bay Length (ft)		250	135			150
Base Capacity (vph)	1867	1074	598	3072	2265	1320
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.40	0.25	0.54	0.20	0.18	0.51

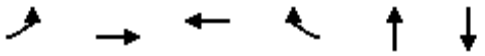
Intersection Summary



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	609	214	263	488	328	548
Future Volume (veh/h)	609	214	263	488	328	548
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1841	1841	1841	1841	1841	1841
Adj Flow Rate, veh/h	752	264	325	602	405	677
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81
Percent Heavy Veh, %	4	4	4	4	4	4
Cap, veh/h	1004	655	425	1965	1278	1030
Arrive On Green	0.30	0.30	0.13	0.56	0.37	0.37
Sat Flow, veh/h	3401	1560	3401	3589	3589	1560
Grp Volume(v), veh/h	752	264	325	602	405	677
Grp Sat Flow(s),veh/h/ln	1700	1560	1700	1749	1749	1560
Q Serve(g_s), s	14.3	8.4	6.6	6.5	5.9	18.6
Cycle Q Clear(g_c), s	14.3	8.4	6.6	6.5	5.9	18.6
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	1004	655	425	1965	1278	1030
V/C Ratio(X)	0.75	0.40	0.76	0.31	0.32	0.66
Avail Cap(c_a), veh/h	1621	938	520	1965	1961	1335
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	22.8	14.4	30.2	8.3	16.3	7.3
Incr Delay (d2), s/veh	1.1	0.4	5.4	0.1	0.1	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.4	2.7	2.9	2.0	2.2	11.5
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	23.9	14.8	35.6	8.4	16.4	8.0
LnGrp LOS	C	B	D	A	B	A
Approach Vol, veh/h	1016			927	1082	
Approach Delay, s/veh	21.5			17.9	11.2	
Approach LOS	C			B	B	

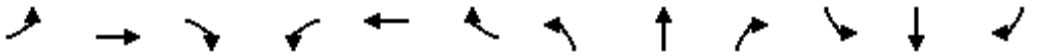
Timer - Assigned Phs		2	3	4		8
Phs Duration (G+Y+Rc), s		26.2	14.0	31.2		45.2
Change Period (Y+Rc), s		5.1	5.1	5.1		5.1
Max Green Setting (Gmax), s		34.0	10.9	40.0		37.9
Max Q Clear Time (g_c+I1), s		16.3	8.6	20.6		8.5
Green Ext Time (p_c), s		4.8	0.3	5.5		2.9

Intersection Summary	
HCM 6th Ctrl Delay	16.7
HCM 6th LOS	B



Lane Group	EBL	EBT	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	49	581	368	162	7	117
v/c Ratio	0.15	0.63	0.49	0.22	0.02	0.31
Control Delay	18.2	9.3	12.1	3.2	0.2	6.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.2	9.3	12.1	3.2	0.2	6.6
Queue Length 50th (ft)	6	62	33	0	0	0
Queue Length 95th (ft)	36	121	131	23	0	25
Internal Link Dist (ft)		964	774		748	712
Turn Bay Length (ft)	325			280		
Base Capacity (vph)	358	1624	1580	1391	553	522
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.14	0.36	0.23	0.12	0.01	0.22

Intersection Summary



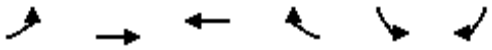
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	41	487	1	0	309	136	2	0	4	66	0	32
Future Volume (veh/h)	41	487	1	0	309	136	2	0	4	66	0	32
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1841	1841	1870	1841	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	49	580	1	0	368	162	2	0	5	79	0	38
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Percent Heavy Veh, %	2	4	4	2	4	2	2	2	2	2	2	2
Cap, veh/h	117	942	2	5	545	469	174	45	203	328	33	87
Arrive On Green	0.07	0.51	0.51	0.00	0.30	0.30	0.18	0.00	0.18	0.18	0.00	0.18
Sat Flow, veh/h	1781	1837	3	1781	1841	1585	204	251	1137	835	185	491
Grp Volume(v), veh/h	49	0	581	0	368	162	7	0	0	117	0	0
Grp Sat Flow(s),veh/h/ln	1781	0	1840	1781	1841	1585	1591	0	0	1510	0	0
Q Serve(g_s), s	0.9	0.0	7.6	0.0	5.9	2.7	0.0	0.0	0.0	1.3	0.0	0.0
Cycle Q Clear(g_c), s	0.9	0.0	7.6	0.0	5.9	2.7	0.1	0.0	0.0	2.2	0.0	0.0
Prop In Lane	1.00		0.00	1.00		1.00	0.29		0.71	0.68		0.32
Lane Grp Cap(c), veh/h	117	0	944	5	545	469	421	0	0	448	0	0
V/C Ratio(X)	0.42	0.00	0.62	0.00	0.68	0.35	0.02	0.00	0.00	0.26	0.00	0.00
Avail Cap(c_a), veh/h	365	0	1918	212	1760	1516	619	0	0	639	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	0.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	15.1	0.0	5.8	0.0	10.4	9.3	11.4	0.0	0.0	12.2	0.0	0.0
Incr Delay (d2), s/veh	2.4	0.0	0.7	0.0	1.5	0.4	0.0	0.0	0.0	0.3	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	0.0	1.0	0.0	1.6	0.6	0.0	0.0	0.0	0.6	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	17.5	0.0	6.5	0.0	11.9	9.7	11.4	0.0	0.0	12.5	0.0	0.0
LnGrp LOS	B	A	A	A	B	A	B	A	A	B	A	A
Approach Vol, veh/h		630			530			7			117	
Approach Delay, s/veh		7.4			11.2			11.4			12.5	
Approach LOS		A			B			B			B	

Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		10.6	0.0	23.1		10.6	7.3	15.8				
Change Period (Y+Rc), s		4.6	5.1	5.8		4.6	5.1	5.8				
Max Green Setting (Gmax), s		10.4	4.0	35.1		10.4	6.9	32.2				
Max Q Clear Time (g_c+I1), s		2.1	0.0	9.6		4.2	2.9	7.9				
Green Ext Time (p_c), s		0.0	0.0	2.4		0.2	0.0	2.0				

Intersection Summary		
HCM 6th Ctrl Delay		9.4
HCM 6th LOS		A

Notes

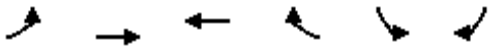
User approved pedestrian interval to be less than phase max green.



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	22	740	572	129	144	22
v/c Ratio	0.06	0.64	0.53	0.13	0.28	0.05
Control Delay	21.5	10.6	12.5	2.8	18.4	8.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.5	10.6	12.5	2.8	18.4	8.9
Queue Length 50th (ft)	5	117	78	0	29	0
Queue Length 95th (ft)	24	236	#272	23	83	14
Internal Link Dist (ft)		100	210		718	
Turn Bay Length (ft)	90			200		200
Base Capacity (vph)	382	1539	1182	1069	938	849
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.48	0.48	0.12	0.15	0.03

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	19	629	486	110	122	19
Future Volume (veh/h)	19	629	486	110	122	19
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1870	1841	1841	1870	1870	1870
Adj Flow Rate, veh/h	22	740	572	129	144	22
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	2	4	4	2	2	2
Cap, veh/h	58	1021	716	616	309	275
Arrive On Green	0.03	0.55	0.39	0.39	0.17	0.17
Sat Flow, veh/h	1781	1841	1841	1585	1781	1585
Grp Volume(v), veh/h	22	740	572	129	144	22
Grp Sat Flow(s),veh/h/ln	1781	1841	1841	1585	1781	1585
Q Serve(g_s), s	0.5	11.4	10.5	2.1	2.8	0.4
Cycle Q Clear(g_c), s	0.5	11.4	10.5	2.1	2.8	0.4
Prop In Lane	1.00			1.00	1.00	1.00
Lane Grp Cap(c), veh/h	58	1021	716	616	309	275
V/C Ratio(X)	0.38	0.72	0.80	0.21	0.47	0.08
Avail Cap(c_a), veh/h	321	1742	1165	1003	857	762
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	18.1	6.3	10.4	7.8	14.2	13.3
Incr Delay (d2), s/veh	4.0	1.0	2.1	0.2	1.1	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	1.7	2.8	0.4	1.0	0.4
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	22.1	7.3	12.5	7.9	15.3	13.4
LnGrp LOS	C	A	B	A	B	B
Approach Vol, veh/h		762	701		166	
Approach Delay, s/veh		7.8	11.6		15.1	
Approach LOS		A	B		B	

Timer - Assigned Phs			4		6	7	8
Phs Duration (G+Y+Rc), s			27.0		11.2	6.4	20.7
Change Period (Y+Rc), s			5.8		4.6	5.1	5.8
Max Green Setting (Gmax), s			36.2		18.4	6.9	24.2
Max Q Clear Time (g_c+I1), s			13.4		4.8	2.5	12.5
Green Ext Time (p_c), s			3.3		0.5	0.0	2.3

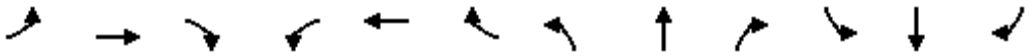
Intersection Summary		
HCM 6th Ctrl Delay		10.2
HCM 6th LOS		B

Notes

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

Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	9	940	31	780	25	101
v/c Ratio	0.03	0.39	0.11	0.32	0.05	0.18
Control Delay	18.9	6.1	19.1	5.6	0.1	4.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.9	6.1	19.1	5.6	0.1	4.6
Queue Length 50th (ft)	1	48	5	37	0	0
Queue Length 95th (ft)	12	125	26	99	0	18
Internal Link Dist (ft)		127		1048	772	658
Turn Bay Length (ft)	180		800			
Base Capacity (vph)	281	2634	281	2624	1477	1549
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.03	0.36	0.11	0.30	0.02	0.07

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	7	720	32	25	580	44	12	0	8	76	0	5
Future Volume (veh/h)	7	720	32	25	580	44	12	0	8	76	0	5
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1841	1841	1870	1841	1841	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	9	900	40	31	725	55	15	0	10	95	0	6
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Percent Heavy Veh, %	2	4	4	2	4	4	2	2	2	2	2	2
Cap, veh/h	17	1312	58	53	1334	101	257	35	81	377	0	11
Arrive On Green	0.01	0.38	0.38	0.03	0.40	0.40	0.12	0.00	0.12	0.12	0.00	0.12
Sat Flow, veh/h	1781	3411	152	1781	3295	250	693	286	653	1366	0	86
Grp Volume(v), veh/h	9	461	479	31	385	395	25	0	0	101	0	0
Grp Sat Flow(s),veh/h/ln	1781	1749	1813	1781	1749	1796	1632	0	0	1453	0	0
Q Serve(g_s), s	0.2	7.4	7.4	0.6	5.6	5.6	0.0	0.0	0.0	1.7	0.0	0.0
Cycle Q Clear(g_c), s	0.2	7.4	7.4	0.6	5.6	5.6	0.4	0.0	0.0	2.1	0.0	0.0
Prop In Lane	1.00		0.08	1.00		0.14	0.60		0.40	0.94		0.06
Lane Grp Cap(c), veh/h	17	673	697	53	708	727	373	0	0	388	0	0
V/C Ratio(X)	0.53	0.69	0.69	0.58	0.54	0.54	0.07	0.00	0.00	0.26	0.00	0.00
Avail Cap(c_a), veh/h	212	1209	1254	212	1209	1242	1391	0	0	1364	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	16.5	8.6	8.6	16.1	7.6	7.6	13.1	0.0	0.0	13.8	0.0	0.0
Incr Delay (d2), s/veh	22.9	1.3	1.2	9.7	0.7	0.6	0.1	0.0	0.0	0.4	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	1.9	1.9	0.3	1.3	1.4	0.1	0.0	0.0	0.6	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	39.4	9.9	9.8	25.7	8.3	8.3	13.2	0.0	0.0	14.1	0.0	0.0
LnGrp LOS	D	A	A	C	A	A	B	A	A	B	A	A
Approach Vol, veh/h		949			811			25			101	
Approach Delay, s/veh		10.1			8.9			13.2			14.1	
Approach LOS		B			A			B			B	

Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		8.7	6.1	18.7		8.7	5.4	19.4				
Change Period (Y+Rc), s		4.6	5.1	5.8		4.6	5.1	5.8				
Max Green Setting (Gmax), s		27.3	4.0	23.2		27.3	4.0	23.2				
Max Q Clear Time (g_c+I1), s		2.4	2.6	9.4		4.1	2.2	7.6				
Green Ext Time (p_c), s		0.0	0.0	3.5		0.3	0.0	2.9				

Intersection Summary												
HCM 6th Ctrl Delay			9.9									
HCM 6th LOS			A									

Intersection	
Int Delay, s/veh	129.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	56	388	2	4	574	209	1	0	7	229	0	106
Future Vol, veh/h	56	388	2	4	574	209	1	0	7	229	0	106
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	325	-	-	280	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	4	2	2	4	2	2	2	2	2	2	2
Mvmt Flow	61	422	2	4	624	227	1	0	8	249	0	115

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	851	0	0	424	0	0	1348	1404	423	1295	1292	738
Stage 1	-	-	-	-	-	-	545	545	-	746	746	-
Stage 2	-	-	-	-	-	-	803	859	-	549	546	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	788	-	-	1135	-	-	128	140	631	~ 139	163	418
Stage 1	-	-	-	-	-	-	523	519	-	405	421	-
Stage 2	-	-	-	-	-	-	377	373	-	520	518	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	788	-	-	1135	-	-	87	129	631	~ 129	150	418
Mov Cap-2 Maneuver	-	-	-	-	-	-	87	129	-	~ 129	150	-
Stage 1	-	-	-	-	-	-	483	479	-	374	419	-
Stage 2	-	-	-	-	-	-	272	372	-	474	478	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.2	0	15.4	$ 607.2
HCM LOS			C	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	354	788	-	-	1135	-	-	165
HCM Lane V/C Ratio	0.025	0.077	-	-	0.004	-	-	2.207
HCM Control Delay (s)	15.4	10	-	-	8.2	-	-	$ 607.2
HCM Lane LOS	C	A	-	-	A	-	-	F
HCM 95th %tile Q(veh)	0.1	0.2	-	-	0	-	-	29.5

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	1.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	41	587	7	30	737	81	1	2	27	0	0	60
Future Vol, veh/h	41	587	7	30	737	81	1	2	27	0	0	60
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	150	-	0	200	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	2	4	2	2	4	2	2	2	2	2	2	2
Mvmt Flow	44	631	8	32	792	87	1	2	29	0	0	65

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	879	0	0	639	0	0	1651	1662	631	1639	1627	836
Stage 1	-	-	-	-	-	-	719	719	-	900	900	-
Stage 2	-	-	-	-	-	-	932	943	-	739	727	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	769	-	-	945	-	-	79	97	481	80	102	367
Stage 1	-	-	-	-	-	-	420	433	-	333	357	-
Stage 2	-	-	-	-	-	-	320	341	-	409	429	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	769	-	-	945	-	-	61	88	481	69	93	367
Mov Cap-2 Maneuver	-	-	-	-	-	-	61	88	-	69	93	-
Stage 1	-	-	-	-	-	-	396	408	-	314	345	-
Stage 2	-	-	-	-	-	-	255	329	-	360	405	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.6	0.3	17.7	16.9
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	315	769	-	-	945	-	-	367
HCM Lane V/C Ratio	0.102	0.057	-	-	0.034	-	-	0.176
HCM Control Delay (s)	17.7	10	-	-	8.9	-	-	16.9
HCM Lane LOS	C	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	0.3	0.2	-	-	0.1	-	-	0.6

Intersection	
Int Delay, s/veh	380.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	82	532	765	275	340	83
Future Vol, veh/h	82	532	765	275	340	83
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	2	4	4	2	2	2
Mvmt Flow	88	572	823	296	366	89

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1119	0	-	0	1719	971
Stage 1	-	-	-	-	971	-
Stage 2	-	-	-	-	748	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	624	-	-	-	~ 99	307
Stage 1	-	-	-	-	367	-
Stage 2	-	-	-	-	468	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	624	-	-	-	~ 79	307
Mov Cap-2 Maneuver	-	-	-	-	~ 79	-
Stage 1	-	-	-	-	~ 291	-
Stage 2	-	-	-	-	468	-

Approach	EB	WB	SB
HCM Control Delay, s	1.6	0	$ 1866.7
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	624	-	-	-	92
HCM Lane V/C Ratio	0.141	-	-	-	4.944
HCM Control Delay (s)	11.7	0	-		$ 1866.7
HCM Lane LOS	B	A	-	-	F
HCM 95th %tile Q(veh)	0.5	-	-	-	48.8

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	0.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	869	7	4	1022	8	16
Future Vol, veh/h	869	7	4	1022	8	16
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	4	2	2	4	2	2
Mvmt Flow	934	8	4	1099	9	17

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	942	0	2045	938
Stage 1	-	-	-	-	938	-
Stage 2	-	-	-	-	1107	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	728	-	62	321
Stage 1	-	-	-	-	381	-
Stage 2	-	-	-	-	316	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	728	-	61	321
Mov Cap-2 Maneuver	-	-	-	-	61	-
Stage 1	-	-	-	-	381	-
Stage 2	-	-	-	-	312	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	38.5
HCM LOS			E

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	133	-	-	728	-
HCM Lane V/C Ratio	0.194	-	-	0.006	-
HCM Control Delay (s)	38.5	-	-	10	0
HCM Lane LOS	E	-	-	A	A
HCM 95th %tile Q(veh)	0.7	-	-	0	-

Intersection	
Int Delay, s/veh	29.9

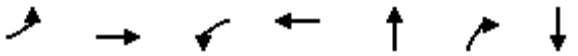
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	867	21	18	994	80	45	1	47	82	1	18
Future Vol, veh/h	5	867	21	18	994	80	45	1	47	82	1	18
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	180	-	-	800	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	4	2	2	4	2	2	2	2	2	2	2
Mvmt Flow	6	963	23	20	1104	89	50	1	52	91	1	20

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1193	0	0	986	0	0	1580	2220	493	1683	2187	597
Stage 1	-	-	-	-	-	-	987	987	-	1189	1189	-
Stage 2	-	-	-	-	-	-	593	1233	-	494	998	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	581	-	-	696	-	-	73	43	522	~ 61	45	446
Stage 1	-	-	-	-	-	-	265	324	-	199	260	-
Stage 2	-	-	-	-	-	-	459	247	-	526	320	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	581	-	-	696	-	-	66	41	522	~ 52	43	446
Mov Cap-2 Maneuver	-	-	-	-	-	-	66	41	-	~ 52	43	-
Stage 1	-	-	-	-	-	-	262	321	-	197	252	-
Stage 2	-	-	-	-	-	-	424	240	-	467	317	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.2	123.2	$ 529.1
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	117	581	-	-	696	-	-	62
HCM Lane V/C Ratio	0.883	0.01	-	-	0.029	-	-	1.81
HCM Control Delay (s)	123.2	11.3	-	-	10.3	-	-	$ 529.1
HCM Lane LOS	F	B	-	-	B	-	-	F
HCM 95th %tile Q(veh)	5.4	0	-	-	0.1	-	-	10.3

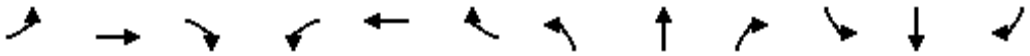
Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon



Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	60	989	131	1079	161	132	322
v/c Ratio	0.45	0.86	0.66	0.78	0.70	0.42	0.83
Control Delay	55.3	37.6	58.2	30.3	58.3	11.7	52.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	55.3	37.6	58.2	30.3	58.3	11.7	52.9
Queue Length 50th (ft)	37	298	81	317	100	0	186
Queue Length 95th (ft)	79	382	#160	404	#188	53	#321
Internal Link Dist (ft)		1048		1021	832		814
Turn Bay Length (ft)	150		100				
Base Capacity (vph)	143	1302	221	1460	256	339	449
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.42	0.76	0.59	0.74	0.63	0.39	0.72

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	56	811	109	122	943	60	112	38	123	181	49	69
Future Volume (veh/h)	56	811	109	122	943	60	112	38	123	181	49	69
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1841	1841	1870	1841	1841	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	60	872	117	131	1014	65	120	41	132	195	53	74
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	4	4	2	4	4	2	2	2	2	2	2
Cap, veh/h	77	1029	138	166	1276	82	158	54	187	225	61	86
Arrive On Green	0.04	0.33	0.33	0.09	0.38	0.38	0.12	0.12	0.12	0.21	0.21	0.21
Sat Flow, veh/h	1781	3099	416	1781	3337	214	1344	459	1585	1057	287	401
Grp Volume(v), veh/h	60	492	497	131	531	548	161	0	132	322	0	0
Grp Sat Flow(s),veh/h/ln	1781	1749	1766	1781	1749	1802	1803	0	1585	1745	0	0
Q Serve(g_s), s	2.6	20.4	20.4	5.6	21.0	21.1	6.8	0.0	6.3	13.9	0.0	0.0
Cycle Q Clear(g_c), s	2.6	20.4	20.4	5.6	21.0	21.1	6.8	0.0	6.3	13.9	0.0	0.0
Prop In Lane	1.00		0.24	1.00		0.12	0.75		1.00	0.61		0.23
Lane Grp Cap(c), veh/h	77	581	587	166	669	689	213	0	187	372	0	0
V/C Ratio(X)	0.78	0.85	0.85	0.79	0.79	0.79	0.76	0.00	0.71	0.87	0.00	0.00
Avail Cap(c_a), veh/h	167	766	773	258	855	882	298	0	262	505	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	37.0	24.2	24.2	34.6	21.4	21.4	33.4	0.0	33.1	29.6	0.0	0.0
Incr Delay (d2), s/veh	15.5	6.9	6.8	8.4	4.1	3.9	6.9	0.0	5.0	11.3	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.4	8.9	9.0	2.7	8.6	8.8	3.3	0.0	2.6	6.9	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	52.5	31.1	31.0	43.1	25.4	25.3	40.3	0.0	38.1	40.9	0.0	0.0
LnGrp LOS	D	C	C	D	C	C	D	A	D	D	A	A
Approach Vol, veh/h		1049			1210			293			322	
Approach Delay, s/veh		32.3			27.3			39.3			40.9	
Approach LOS		C			C			D			D	

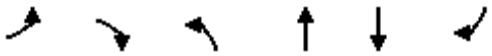
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	12.0	31.0		21.3	8.1	35.0		13.8				
Change Period (Y+Rc), s	* 4.7	5.1		4.6	* 4.7	5.1		4.6				
Max Green Setting (Gmax), s	* 11	34.2		22.6	* 7.3	38.2		12.9				
Max Q Clear Time (g_c+I1), s	7.6	22.4		15.9	4.6	23.1		8.8				
Green Ext Time (p_c), s	0.1	3.5		0.8	0.0	4.3		0.5				

Intersection Summary			
HCM 6th Ctrl Delay		31.9	
HCM 6th LOS		C	

Notes

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

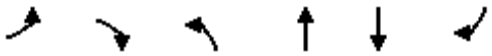
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	933	342	414	416	591	817
v/c Ratio	0.71	0.34	0.83	0.26	0.68	0.74
Control Delay	22.6	5.0	48.9	13.0	30.2	11.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.6	5.0	48.9	13.0	30.2	11.0
Queue Length 50th (ft)	177	33	100	62	135	179
Queue Length 95th (ft)	274	87	#204	95	194	302
Internal Link Dist (ft)	1021			192	1426	
Turn Bay Length (ft)		250	135			150
Base Capacity (vph)	1564	1010	501	2656	1897	1217
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.60	0.34	0.83	0.16	0.31	0.67

Intersection Summary

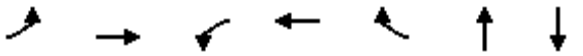
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	858	315	381	383	544	752
Future Volume (veh/h)	858	315	381	383	544	752
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1841	1841	1841	1841	1841	1841
Adj Flow Rate, veh/h	933	342	414	416	591	817
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	4	4	4	4	4	4
Cap, veh/h	1099	690	405	1977	1366	1114
Arrive On Green	0.32	0.32	0.12	0.57	0.39	0.39
Sat Flow, veh/h	3401	1560	3401	3589	3589	1560
Grp Volume(v), veh/h	933	342	414	416	591	817
Grp Sat Flow(s),veh/h/ln	1700	1560	1700	1749	1749	1560
Q Serve(g_s), s	23.4	14.3	10.9	5.4	11.3	28.8
Cycle Q Clear(g_c), s	23.4	14.3	10.9	5.4	11.3	28.8
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	1099	690	405	1977	1366	1114
V/C Ratio(X)	0.85	0.50	1.02	0.21	0.43	0.73
Avail Cap(c_a), veh/h	1263	765	405	1977	1528	1186
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	28.9	18.2	40.3	9.8	20.5	7.9
Incr Delay (d2), s/veh	5.0	0.6	50.7	0.1	0.2	2.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	9.8	5.0	7.3	1.9	4.4	18.9
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	33.9	18.8	91.0	9.9	20.7	10.1
LnGrp LOS	C	B	F	A	C	B
Approach Vol, veh/h	1275			830	1408	
Approach Delay, s/veh	29.9			50.3	14.5	
Approach LOS	C			D	B	

Timer - Assigned Phs		2	3	4		8
Phs Duration (G+Y+Rc), s		34.7	16.0	40.9		56.9
Change Period (Y+Rc), s		5.1	5.1	5.1		5.1
Max Green Setting (Gmax), s		34.0	10.9	40.0		38.9
Max Q Clear Time (g_c+I1), s		25.4	12.9	30.8		7.4
Green Ext Time (p_c), s		4.2	0.0	5.0		1.9

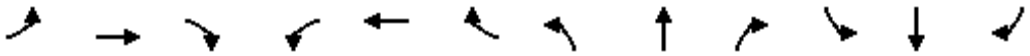
Intersection Summary	
HCM 6th Ctrl Delay	28.6
HCM 6th LOS	C



Lane Group	EBL	EBT	WBL	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	61	424	4	624	227	9	364
v/c Ratio	0.33	0.45	0.03	0.76	0.27	0.02	0.76
Control Delay	41.3	12.2	39.8	23.6	2.8	0.0	31.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.3	12.2	39.8	23.6	2.8	0.0	31.2
Queue Length 50th (ft)	28	102	2	249	0	0	112
Queue Length 95th (ft)	#79	213	13	380	35	0	#304
Internal Link Dist (ft)		964		774		748	712
Turn Bay Length (ft)	325		280		280		
Base Capacity (vph)	188	1332	122	1283	1179	676	606
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.32	0.32	0.03	0.49	0.19	0.01	0.60

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



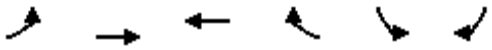
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	56	388	2	4	574	209	1	0	7	229	0	106
Future Volume (veh/h)	56	388	2	4	574	209	1	0	7	229	0	106
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1841	1841	1870	1841	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	61	422	2	4	624	227	1	0	8	249	0	115
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	4	4	2	4	2	2	2	2	2	2	2
Cap, veh/h	113	841	4	8	737	635	88	30	418	382	1	131
Arrive On Green	0.06	0.46	0.46	0.00	0.40	0.40	0.28	0.00	0.28	0.28	0.00	0.28
Sat Flow, veh/h	1781	1830	9	1781	1841	1585	79	106	1476	997	4	462
Grp Volume(v), veh/h	61	0	424	4	624	227	9	0	0	364	0	0
Grp Sat Flow(s),veh/h/ln	1781	0	1839	1781	1841	1585	1660	0	0	1464	0	0
Q Serve(g_s), s	2.0	0.0	9.9	0.1	18.8	6.1	0.0	0.0	0.0	14.3	0.0	0.0
Cycle Q Clear(g_c), s	2.0	0.0	9.9	0.1	18.8	6.1	0.2	0.0	0.0	14.5	0.0	0.0
Prop In Lane	1.00		0.00	1.00		1.00	0.11		0.89	0.68		0.32
Lane Grp Cap(c), veh/h	113	0	845	8	737	635	536	0	0	514	0	0
V/C Ratio(X)	0.54	0.00	0.50	0.52	0.85	0.36	0.02	0.00	0.00	0.71	0.00	0.00
Avail Cap(c_a), veh/h	183	0	1423	119	1358	1169	678	0	0	648	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	27.8	0.0	11.6	30.4	16.7	12.9	15.8	0.0	0.0	20.9	0.0	0.0
Incr Delay (d2), s/veh	4.0	0.0	0.5	45.8	2.8	0.3	0.0	0.0	0.0	2.6	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.9	0.0	3.2	0.2	6.9	1.8	0.1	0.0	0.0	5.0	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	31.8	0.0	12.1	76.3	19.5	13.2	15.8	0.0	0.0	23.5	0.0	0.0
LnGrp LOS	C	A	B	E	B	B	B	A	A	C	A	A
Approach Vol, veh/h		485			855			9			364	
Approach Delay, s/veh		14.6			18.1			15.8			23.5	
Approach LOS		B			B			B			C	

Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		22.0	5.4	33.9		22.0	9.0	30.3				
Change Period (Y+Rc), s		4.6	5.1	5.8		4.6	5.1	5.8				
Max Green Setting (Gmax), s		23.0	4.1	47.4		23.0	6.3	45.2				
Max Q Clear Time (g_c+I1), s		2.2	2.1	11.9		16.5	4.0	20.8				
Green Ext Time (p_c), s		0.0	0.0	1.7		0.9	0.0	3.7				

Intersection Summary												
HCM 6th Ctrl Delay			18.2									
HCM 6th LOS			B									

Notes

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

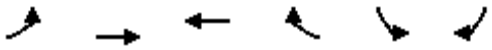


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	88	572	823	296	366	89
v/c Ratio	0.46	0.58	1.16	0.38	0.74	0.17
Control Delay	35.9	12.9	109.8	4.7	29.2	5.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.9	12.9	109.8	4.7	29.2	5.2
Queue Length 50th (ft)	32	127	~395	6	122	0
Queue Length 95th (ft)	#82	240	#632	53	205	27
Internal Link Dist (ft)		100	210		718	
Turn Bay Length (ft)	200			200		200
Base Capacity (vph)	195	1078	712	783	652	640
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.45	0.53	1.16	0.38	0.56	0.14

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	82	532	765	275	340	83
Future Volume (veh/h)	82	532	765	275	340	83
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1870	1841	1841	1870	1870	1870
Adj Flow Rate, veh/h	88	572	823	296	366	89
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	4	4	2	2	2
Cap, veh/h	142	1037	725	624	449	399
Arrive On Green	0.08	0.56	0.39	0.39	0.25	0.25
Sat Flow, veh/h	1781	1841	1841	1585	1781	1585
Grp Volume(v), veh/h	88	572	823	296	366	89
Grp Sat Flow(s),veh/h/ln	1781	1841	1841	1585	1781	1585
Q Serve(g_s), s	2.7	11.1	22.2	7.9	10.9	2.5
Cycle Q Clear(g_c), s	2.7	11.1	22.2	7.9	10.9	2.5
Prop In Lane	1.00			1.00	1.00	1.00
Lane Grp Cap(c), veh/h	142	1037	725	624	449	399
V/C Ratio(X)	0.62	0.55	1.14	0.47	0.82	0.22
Avail Cap(c_a), veh/h	199	1097	725	624	663	590
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	25.1	7.8	17.1	12.8	19.9	16.7
Incr Delay (d2), s/veh	4.4	0.5	77.5	0.6	5.0	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	2.9	22.7	2.3	4.8	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	29.5	8.3	94.6	13.3	24.8	17.0
LnGrp LOS	C	A	F	B	C	B
Approach Vol, veh/h		660	1119		455	
Approach Delay, s/veh		11.1	73.1		23.3	
Approach LOS		B	E		C	

Timer - Assigned Phs	4	6	7	8
Phs Duration (G+Y+Rc), s	37.6	18.8	9.6	28.0
Change Period (Y+Rc), s	5.8	4.6	5.1	5.8
Max Green Setting (Gmax), s	33.6	21.0	6.3	22.2
Max Q Clear Time (g_c+I1), s	13.1	12.9	4.7	24.2
Green Ext Time (p_c), s	2.2	1.3	0.0	0.0

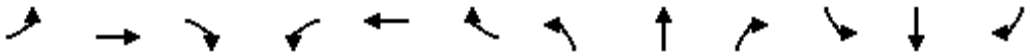
Intersection Summary	
HCM 6th Ctrl Delay	44.7
HCM 6th LOS	D

Notes

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

Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	6	986	20	1193	103	112
v/c Ratio	0.03	0.47	0.09	0.57	0.26	0.30
Control Delay	24.4	8.4	24.4	9.4	12.1	17.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.4	8.4	24.4	9.4	12.1	17.7
Queue Length 50th (ft)	1	65	4	85	9	18
Queue Length 95th (ft)	12	195	27	252	53	74
Internal Link Dist (ft)		127		1048	772	658
Turn Bay Length (ft)	180		800			
Base Capacity (vph)	221	2656	232	2653	660	638
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.03	0.37	0.09	0.45	0.16	0.18

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	867	21	18	994	80	45	1	47	82	1	18
Future Volume (veh/h)	5	867	21	18	994	80	45	1	47	82	1	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1841	1841	1870	1841	1841	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	6	963	23	20	1104	89	50	1	52	91	1	20
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	2	4	4	2	4	4	2	2	2	2	2	2
Cap, veh/h	11	1560	37	36	1509	122	223	24	112	329	13	38
Arrive On Green	0.01	0.45	0.45	0.02	0.46	0.46	0.14	0.14	0.14	0.14	0.14	0.14
Sat Flow, veh/h	1781	3491	83	1781	3278	264	625	171	812	1175	97	277
Grp Volume(v), veh/h	6	482	504	20	589	604	103	0	0	112	0	0
Grp Sat Flow(s),veh/h/ln	1781	1749	1826	1781	1749	1793	1609	0	0	1548	0	0
Q Serve(g_s), s	0.1	8.3	8.3	0.4	10.7	10.8	0.0	0.0	0.0	0.2	0.0	0.0
Cycle Q Clear(g_c), s	0.1	8.3	8.3	0.4	10.7	10.8	2.1	0.0	0.0	2.3	0.0	0.0
Prop In Lane	1.00		0.05	1.00		0.15	0.49		0.50	0.81		0.18
Lane Grp Cap(c), veh/h	11	782	816	36	805	826	359	0	0	380	0	0
V/C Ratio(X)	0.52	0.62	0.62	0.56	0.73	0.73	0.29	0.00	0.00	0.29	0.00	0.00
Avail Cap(c_a), veh/h	186	1381	1442	195	1390	1425	691	0	0	691	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	19.4	8.3	8.3	19.1	8.6	8.6	15.5	0.0	0.0	15.5	0.0	0.0
Incr Delay (d2), s/veh	32.1	0.8	0.8	13.2	1.3	1.3	0.4	0.0	0.0	0.4	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	2.1	2.2	0.3	2.7	2.8	0.8	0.0	0.0	0.9	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	51.6	9.1	9.1	32.2	9.9	9.9	15.9	0.0	0.0	16.0	0.0	0.0
LnGrp LOS	D	A	A	C	A	A	B	A	A	B	A	A
Approach Vol, veh/h		992			1213			103			112	
Approach Delay, s/veh		9.3			10.3			15.9			16.0	
Approach LOS		A			B			B			B	

Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		10.0	5.9	23.3		10.0	5.4	23.9				
Change Period (Y+Rc), s		4.6	5.1	5.8		4.6	5.1	5.8				
Max Green Setting (Gmax), s		14.2	4.3	31.0		14.2	4.1	31.2				
Max Q Clear Time (g_c+I1), s		4.1	2.4	10.3		4.3	2.1	12.8				
Green Ext Time (p_c), s		0.2	0.0	4.2		0.2	0.0	5.3				

Intersection Summary		
HCM 6th Ctrl Delay		10.4
HCM 6th LOS		B

Notes

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

MOVEMENT SUMMARY

Site: 1 [SR 49 / Westlake Dr]

Existing plus Project PM
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed mph
South: Westlake Dr												
3	L2	1	3.0	0.013	5.0	LOS A	0.0	1.3	0.53	0.39	0.53	34.9
8	T1	1	3.0	0.013	5.0	LOS A	0.0	1.3	0.53	0.39	0.53	34.8
18	R2	8	3.0	0.013	5.0	LOS A	0.0	1.3	0.53	0.39	0.53	33.8
Approach		10	3.0	0.013	5.0	LOS A	0.0	1.3	0.53	0.39	0.53	34.0
East: SR 49												
1	L2	4	3.0	0.516	7.8	LOS A	4.0	104.2	0.18	0.05	0.18	33.8
6	T1	557	4.0	0.516	7.8	LOS A	4.0	104.2	0.18	0.05	0.18	33.7
16	R2	168	3.0	0.516	7.8	LOS A	4.0	104.2	0.18	0.05	0.18	32.8
Approach		729	3.8	0.516	7.8	LOS A	4.0	104.2	0.18	0.05	0.18	33.5
North: Westlake Dr												
7	L2	183	3.0	0.355	9.3	LOS A	1.7	43.2	0.66	0.67	0.69	31.3
4	T1	1	3.0	0.355	9.3	LOS A	1.7	43.2	0.66	0.67	0.69	31.3
14	R2	78	3.0	0.355	9.3	LOS A	1.7	43.2	0.66	0.67	0.69	30.4
Approach		262	3.0	0.355	9.3	LOS A	1.7	43.2	0.66	0.67	0.69	31.0
West: SR 49												
5	L2	21	3.0	0.341	6.6	LOS A	1.8	47.3	0.43	0.29	0.43	34.3
2	T1	354	4.0	0.341	6.6	LOS A	1.8	47.3	0.43	0.29	0.43	34.2
12	R2	3	3.0	0.341	6.6	LOS A	1.8	47.3	0.43	0.29	0.43	33.2
Approach		378	3.9	0.341	6.6	LOS A	1.8	47.3	0.43	0.29	0.43	34.2
All Vehicles		1379	3.7	0.516	7.7	LOS A	4.0	104.2	0.34	0.24	0.35	33.2

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

Site: 3 [SR 49 / Village Dr]

Cumulative AM
Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed mph
East: SR 49												
6	T1	499	4.0	0.437	6.7	LOS A	3.0	77.3	0.14	0.04	0.14	34.3
16	R2	120	3.0	0.437	6.7	LOS A	3.0	77.3	0.14	0.04	0.14	33.3
Approach		618	3.8	0.437	6.7	LOS A	3.0	77.3	0.14	0.04	0.14	34.1
North: Village Dr												
7	L2	133	3.0	0.194	6.6	LOS A	0.8	21.0	0.57	0.53	0.57	32.1
14	R2	21	3.0	0.194	6.6	LOS A	0.8	21.0	0.57	0.53	0.57	31.2
Approach		153	3.0	0.194	6.6	LOS A	0.8	21.0	0.57	0.53	0.57	32.0
West: SR 49												
5	L2	21	3.0	0.580	9.9	LOS A	4.5	115.7	0.50	0.31	0.50	32.7
2	T1	680	4.0	0.580	9.9	LOS A	4.5	115.7	0.50	0.31	0.50	32.7
Approach		701	4.0	0.580	9.9	LOS A	4.5	115.7	0.50	0.31	0.50	32.7
All Vehicles		1473	3.8	0.580	8.2	LOS A	4.5	115.7	0.36	0.22	0.36	33.2

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

Site: 5 [SR 49 / Meadow Vista Dr]

Cumulative AM
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed mph
South: Westlake Dr												
3	L2	13	3.0	0.043	7.3	LOS A	0.2	3.9	0.63	0.60	0.63	32.5
8	T1	1	3.0	0.043	7.3	LOS A	0.2	3.9	0.63	0.60	0.63	32.4
18	R2	9	3.0	0.043	7.3	LOS A	0.2	3.9	0.63	0.60	0.63	31.6
Approach		23	3.0	0.043	7.3	LOS A	0.2	3.9	0.63	0.60	0.63	32.1
East: SR 49												
1	L2	27	3.0	0.478	7.2	LOS A	3.5	90.4	0.16	0.05	0.16	34.0
6	T1	601	4.0	0.478	7.3	LOS A	3.5	90.4	0.16	0.05	0.16	33.9
16	R2	48	3.0	0.478	7.2	LOS A	3.5	90.4	0.16	0.05	0.16	33.0
Approach		676	3.9	0.478	7.2	LOS A	3.5	90.4	0.16	0.05	0.16	33.9
North: Westlake Dr												
7	L2	83	3.0	0.131	6.8	LOS A	0.5	13.2	0.60	0.58	0.60	31.9
4	T1	1	3.0	0.131	6.8	LOS A	0.5	13.2	0.60	0.58	0.60	31.8
14	R2	5	3.0	0.131	6.8	LOS A	0.5	13.2	0.60	0.58	0.60	31.0
Approach		89	3.0	0.131	6.8	LOS A	0.5	13.2	0.60	0.58	0.60	31.8
West: SR 49												
5	L2	8	3.0	0.659	11.5	LOS B	6.0	155.9	0.53	0.31	0.53	32.0
2	T1	779	4.0	0.659	11.6	LOS B	6.0	155.9	0.53	0.31	0.53	32.0
12	R2	35	3.0	0.659	11.5	LOS B	6.0	155.9	0.53	0.31	0.53	31.1
Approach		822	3.9	0.659	11.6	LOS B	6.0	155.9	0.53	0.31	0.53	31.9
All Vehicles		1610	3.9	0.659	9.4	LOS A	6.0	155.9	0.38	0.22	0.38	32.7

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

Site: 1 [SR 49 / Westlake Dr]

Cumulative PM
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed mph
South: Westlake Dr												
3	L2	1	3.0	0.015	5.8	LOS A	0.1	1.4	0.58	0.46	0.58	34.5
8	T1	1	3.0	0.015	5.8	LOS A	0.1	1.4	0.58	0.46	0.58	34.4
18	R2	8	3.0	0.015	5.8	LOS A	0.1	1.4	0.58	0.46	0.58	33.4
Approach		10	3.0	0.015	5.8	LOS A	0.1	1.4	0.58	0.46	0.58	33.6
East: SR 49												
1	L2	4	3.0	0.593	9.4	LOS A	5.2	133.3	0.33	0.15	0.33	33.0
6	T1	627	4.0	0.593	9.5	LOS A	5.2	133.3	0.33	0.15	0.33	32.9
16	R2	165	3.0	0.593	9.4	LOS A	5.2	133.3	0.33	0.15	0.33	32.0
Approach		797	3.8	0.593	9.5	LOS A	5.2	133.3	0.33	0.15	0.33	32.7
North: Westlake Dr												
7	L2	215	3.0	0.478	12.4	LOS B	2.9	75.4	0.73	0.83	1.03	30.1
4	T1	1	3.0	0.478	12.4	LOS B	2.9	75.4	0.73	0.83	1.03	30.1
14	R2	111	3.0	0.478	12.4	LOS B	2.9	75.4	0.73	0.83	1.03	29.3
Approach		327	3.0	0.478	12.4	LOS B	2.9	75.4	0.73	0.83	1.03	29.9
West: SR 49												
5	L2	53	3.0	0.448	8.3	LOS A	2.7	68.8	0.52	0.38	0.52	33.3
2	T1	427	4.0	0.448	8.3	LOS A	2.7	68.8	0.52	0.38	0.52	33.2
12	R2	2	3.0	0.448	8.3	LOS A	2.7	68.8	0.52	0.38	0.52	32.3
Approach		483	3.9	0.448	8.3	LOS A	2.7	68.8	0.52	0.38	0.52	33.2
All Vehicles		1616	3.7	0.593	9.7	LOS A	5.2	133.3	0.47	0.36	0.53	32.2

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

Site: 3 [SR 49 / Village Dr]

Cumulative PM
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed mph
East: SR 49												
6	T1	771	4.0	0.826	18.4	LOS C	12.2	313.5	0.74	0.41	0.74	29.1
16	R2	299	3.0	0.826	18.4	LOS C	12.2	313.5	0.74	0.41	0.74	28.4
Approach		1070	3.7	0.826	18.4	LOS C	12.2	313.5	0.74	0.41	0.74	28.9
North: Village Dr												
7	L2	370	3.0	0.777	28.0	LOS D	8.1	207.2	0.90	1.27	2.07	24.8
14	R2	90	3.0	0.777	28.0	LOS D	8.1	207.2	0.90	1.27	2.07	24.3
Approach		460	3.0	0.777	28.0	LOS D	8.1	207.2	0.90	1.27	2.07	24.7
West: SR 49												
5	L2	89	3.0	0.699	16.0	LOS C	9.6	246.3	0.81	1.03	1.45	29.9
2	T1	550	4.0	0.699	16.0	LOS C	9.6	246.3	0.81	1.03	1.45	29.8
Approach		639	3.9	0.699	16.0	LOS C	9.6	246.3	0.81	1.03	1.45	29.8
All Vehicles		2168	3.6	0.826	19.7	LOS C	12.2	313.5	0.80	0.77	1.23	28.1

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

Site: 5 [SR 49 / Meadow Vista Dr]

Cumulative PM
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed mph
South: Westlake Dr												
3	L2	49	3.0	0.220	11.1	LOS B	0.8	20.9	0.71	0.71	0.71	31.0
8	T1	1	3.0	0.220	11.1	LOS B	0.8	20.9	0.71	0.71	0.71	31.0
18	R2	51	3.0	0.220	11.1	LOS B	0.8	20.9	0.71	0.71	0.71	30.1
Approach		101	3.0	0.220	11.1	LOS B	0.8	20.9	0.71	0.71	0.71	30.6
East: SR 49												
1	L2	20	3.0	0.832	18.2	LOS C	13.8	356.0	0.63	0.29	0.63	29.2
6	T1	1021	4.0	0.832	18.2	LOS C	13.8	356.0	0.63	0.29	0.63	29.2
16	R2	87	3.0	0.832	18.2	LOS C	13.8	356.0	0.63	0.29	0.63	28.5
Approach		1127	3.9	0.832	18.2	LOS C	13.8	356.0	0.63	0.29	0.63	29.1
North: Westlake Dr												
7	L2	89	3.0	0.260	12.8	LOS B	1.0	24.9	0.74	0.75	0.77	29.7
4	T1	1	3.0	0.260	12.8	LOS B	1.0	24.9	0.74	0.75	0.77	29.6
14	R2	20	3.0	0.260	12.8	LOS B	1.0	24.9	0.74	0.75	0.77	28.9
Approach		110	3.0	0.260	12.8	LOS B	1.0	24.9	0.74	0.75	0.77	29.5
West: SR 49												
5	L2	5	3.0	0.751	14.7	LOS B	8.5	218.0	0.65	0.38	0.65	30.7
2	T1	913	4.0	0.751	14.7	LOS B	8.5	218.0	0.65	0.38	0.65	30.6
12	R2	23	3.0	0.751	14.7	LOS B	8.5	218.0	0.65	0.38	0.65	29.8
Approach		941	4.0	0.751	14.7	LOS B	8.5	218.0	0.65	0.38	0.65	30.6
All Vehicles		2279	3.8	0.832	16.2	LOS C	13.8	356.0	0.65	0.37	0.65	29.8

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

Site: 1 [SR 49 / Westlake Dr]

Cumulative plus Project AM
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed mph
South: Westlake Dr												
3	L2	2	3.0	0.011	5.4	LOS A	0.0	1.1	0.57	0.43	0.57	34.1
8	T1	1	3.0	0.011	5.4	LOS A	0.0	1.1	0.57	0.43	0.57	34.1
18	R2	4	3.0	0.011	5.4	LOS A	0.0	1.1	0.57	0.43	0.57	33.1
Approach		8	3.0	0.011	5.4	LOS A	0.0	1.1	0.57	0.43	0.57	33.5
East: SR 49												
1	L2	1	3.0	0.361	6.0	LOS A	2.2	55.9	0.21	0.08	0.21	34.7
6	T1	336	4.0	0.361	6.0	LOS A	2.2	55.9	0.21	0.08	0.21	34.7
16	R2	148	3.0	0.361	6.0	LOS A	2.2	55.9	0.21	0.08	0.21	33.7
Approach		485	3.7	0.361	6.0	LOS A	2.2	55.9	0.21	0.08	0.21	34.3
North: Westlake Dr												
7	L2	72	3.0	0.115	4.9	LOS A	0.5	12.3	0.46	0.35	0.46	33.4
4	T1	1	3.0	0.115	4.9	LOS A	0.5	12.3	0.46	0.35	0.46	33.3
14	R2	35	3.0	0.115	4.9	LOS A	0.5	12.3	0.46	0.35	0.46	32.4
Approach		108	3.0	0.115	4.9	LOS A	0.5	12.3	0.46	0.35	0.46	33.0
West: SR 49												
5	L2	45	3.0	0.443	7.2	LOS A	2.9	75.7	0.30	0.15	0.30	33.9
2	T1	529	4.0	0.443	7.2	LOS A	2.9	75.7	0.30	0.15	0.30	33.9
12	R2	1	3.0	0.443	7.2	LOS A	2.9	75.7	0.30	0.15	0.30	32.9
Approach		575	3.9	0.443	7.2	LOS A	2.9	75.7	0.30	0.15	0.30	33.9
All Vehicles		1175	3.7	0.443	6.5	LOS A	2.9	75.7	0.28	0.14	0.28	34.0

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

Site: 3 [SR 49 / Village Dr]

Cumulative plus Project AM
Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed mph
East: SR 49												
6	T1	528	4.0	0.457	7.0	LOS A	3.2	83.6	0.15	0.04	0.15	34.2
16	R2	120	3.0	0.457	6.9	LOS A	3.2	83.6	0.15	0.04	0.15	33.2
Approach		648	3.8	0.457	7.0	LOS A	3.2	83.6	0.15	0.04	0.15	34.0
North: Village Dr												
7	L2	133	3.0	0.200	6.9	LOS A	0.8	21.6	0.59	0.55	0.59	32.0
14	R2	21	3.0	0.200	6.9	LOS A	0.8	21.6	0.59	0.55	0.59	31.1
Approach		153	3.0	0.200	6.9	LOS A	0.8	21.6	0.59	0.55	0.59	31.9
West: SR 49												
5	L2	21	3.0	0.583	9.9	LOS A	4.5	116.8	0.50	0.31	0.50	32.7
2	T1	684	4.0	0.583	10.0	LOS A	4.5	116.8	0.50	0.31	0.50	32.6
Approach		704	4.0	0.583	10.0	LOS A	4.5	116.8	0.50	0.31	0.50	32.6
All Vehicles		1505	3.8	0.583	8.4	LOS A	4.5	116.8	0.36	0.22	0.36	33.1

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

Site: 5 [SR 49 / Meadow Vista Dr]

Cumulative plus Project AM
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed mph
South: Westlake Dr												
3	L2	13	3.0	0.043	7.3	LOS A	0.2	4.0	0.63	0.60	0.63	32.5
8	T1	1	3.0	0.043	7.3	LOS A	0.2	4.0	0.63	0.60	0.63	32.4
18	R2	9	3.0	0.043	7.3	LOS A	0.2	4.0	0.63	0.60	0.63	31.6
Approach		23	3.0	0.043	7.3	LOS A	0.2	4.0	0.63	0.60	0.63	32.1
East: SR 49												
1	L2	27	3.0	0.499	7.5	LOS A	3.8	97.7	0.16	0.05	0.16	33.9
6	T1	630	4.0	0.499	7.5	LOS A	3.8	97.7	0.16	0.05	0.16	33.8
16	R2	48	3.0	0.499	7.5	LOS A	3.8	97.7	0.16	0.05	0.16	32.8
Approach		705	3.9	0.499	7.5	LOS A	3.8	97.7	0.16	0.05	0.16	33.7
North: Westlake Dr												
7	L2	83	3.0	0.135	7.0	LOS A	0.5	13.5	0.61	0.60	0.61	31.8
4	T1	1	3.0	0.135	7.0	LOS A	0.5	13.5	0.61	0.60	0.61	31.7
14	R2	5	3.0	0.135	7.0	LOS A	0.5	13.5	0.61	0.60	0.61	30.9
Approach		89	3.0	0.135	7.0	LOS A	0.5	13.5	0.61	0.60	0.61	31.7
West: SR 49												
5	L2	8	3.0	0.661	11.6	LOS B	6.1	157.3	0.53	0.31	0.53	32.0
2	T1	783	4.0	0.661	11.6	LOS B	6.1	157.3	0.53	0.31	0.53	31.9
12	R2	35	3.0	0.661	11.6	LOS B	6.1	157.3	0.53	0.31	0.53	31.1
Approach		825	3.9	0.661	11.6	LOS B	6.1	157.3	0.53	0.31	0.53	31.9
All Vehicles		1642	3.9	0.661	9.6	LOS A	6.1	157.3	0.38	0.22	0.38	32.6

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 1 [SR 49 / Westlake Dr]

Cumulative plus Project PM
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed mph
South: Westlake Dr												
3	L2	1	3.0	0.016	6.0	LOS A	0.1	1.5	0.59	0.48	0.59	34.3
8	T1	1	3.0	0.016	6.0	LOS A	0.1	1.5	0.59	0.48	0.59	34.3
18	R2	8	3.0	0.016	6.0	LOS A	0.1	1.5	0.59	0.48	0.59	33.3
Approach		10	3.0	0.016	6.0	LOS A	0.1	1.5	0.59	0.48	0.59	33.5
East: SR 49												
1	L2	4	3.0	0.642	10.6	LOS B	6.1	158.2	0.39	0.18	0.39	32.4
6	T1	624	4.0	0.642	10.6	LOS B	6.1	158.2	0.39	0.18	0.39	32.4
16	R2	227	3.0	0.642	10.6	LOS B	6.1	158.2	0.39	0.18	0.39	31.5
Approach		855	3.7	0.642	10.6	LOS B	6.1	158.2	0.39	0.18	0.39	32.1
North: Westlake Dr												
7	L2	249	3.0	0.531	13.7	LOS B	3.7	93.6	0.76	0.89	1.16	29.6
4	T1	1	3.0	0.531	13.7	LOS B	3.7	93.6	0.76	0.89	1.16	29.5
14	R2	115	3.0	0.531	13.7	LOS B	3.7	93.6	0.76	0.89	1.16	28.8
Approach		365	3.0	0.531	13.7	LOS B	3.7	93.6	0.76	0.89	1.16	29.3
West: SR 49												
5	L2	61	3.0	0.469	8.8	LOS A	2.8	71.8	0.56	0.44	0.56	33.0
2	T1	422	4.0	0.469	8.9	LOS A	2.8	71.8	0.56	0.44	0.56	32.9
12	R2	2	3.0	0.469	8.8	LOS A	2.8	71.8	0.56	0.44	0.56	32.0
Approach		485	3.9	0.469	8.9	LOS A	2.8	71.8	0.56	0.44	0.56	32.9
All Vehicles		1715	3.6	0.642	10.7	LOS B	6.1	158.2	0.52	0.41	0.60	31.7

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

Site: 3 [SR 49 / Village Dr]

Cumulative plus Project PM
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed mph
East: SR 49												
6	T1	832	4.0	0.872	22.1	LOS C	15.1	388.8	0.87	0.48	0.87	27.8
16	R2	299	3.0	0.872	22.1	LOS C	15.1	388.8	0.87	0.48	0.87	27.2
Approach		1130	3.7	0.872	22.1	LOS C	15.1	388.8	0.87	0.48	0.87	27.6
North: Village Dr												
7	L2	370	3.0	0.829	34.6	LOS D	9.4	240.1	0.92	1.38	2.39	23.2
14	R2	90	3.0	0.829	34.6	LOS D	9.4	240.1	0.92	1.38	2.39	22.7
Approach		460	3.0	0.829	34.6	LOS D	9.4	240.1	0.92	1.38	2.39	23.1
West: SR 49												
5	L2	89	3.0	0.728	17.3	LOS C	11.0	284.0	0.84	1.10	1.58	29.4
2	T1	578	4.0	0.728	17.3	LOS C	11.0	284.0	0.84	1.10	1.58	29.3
Approach		667	3.9	0.728	17.3	LOS C	11.0	284.0	0.84	1.10	1.58	29.3
All Vehicles		2258	3.6	0.872	23.2	LOS C	15.1	388.8	0.87	0.85	1.39	27.0

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

Site: 5 [SR 49 / Meadow Vista Dr]

Cumulative plus Project PM
Site Category: (None)
Roundabout

Movement Performance - Vehicles													
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed mph
South: Westlake Dr												
3	L2	49	3.0	0.226	11.5	LOS B	0.8	21.5	0.72	0.72	0.72	30.8
8	T1	1	3.0	0.226	11.5	LOS B	0.8	21.5	0.72	0.72	0.72	30.8
18	R2	51	3.0	0.226	11.5	LOS B	0.8	21.5	0.72	0.72	0.72	30.0
Approach		101	3.0	0.226	11.5	LOS B	0.8	21.5	0.72	0.72	0.72	30.4
East: SR 49												
1	L2	20	3.0	0.875	21.7	LOS C	17.3	447.1	0.75	0.34	0.75	28.0
6	T1	1080	4.0	0.875	21.8	LOS C	17.3	447.1	0.75	0.34	0.75	27.9
16	R2	87	3.0	0.875	21.7	LOS C	17.3	447.1	0.75	0.34	0.75	27.3
Approach		1187	3.9	0.875	21.7	LOS C	17.3	447.1	0.75	0.34	0.75	27.9
North: Westlake Dr												
7	L2	89	3.0	0.277	13.9	LOS B	1.0	26.9	0.77	0.79	0.84	29.3
4	T1	1	3.0	0.277	13.9	LOS B	1.0	26.9	0.77	0.79	0.84	29.2
14	R2	20	3.0	0.277	13.9	LOS B	1.0	26.9	0.77	0.79	0.84	28.5
Approach		110	3.0	0.277	13.9	LOS B	1.0	26.9	0.77	0.79	0.84	29.1
West: SR 49												
5	L2	5	3.0	0.773	15.7	LOS C	9.2	237.9	0.68	0.41	0.68	30.3
2	T1	942	4.0	0.773	15.7	LOS C	9.2	237.9	0.68	0.41	0.68	30.2
12	R2	23	3.0	0.773	15.7	LOS C	9.2	237.9	0.68	0.41	0.68	29.4
Approach		971	4.0	0.773	15.7	LOS C	9.2	237.9	0.68	0.41	0.68	30.2
All Vehicles		2368	3.9	0.875	18.5	LOS C	17.3	447.1	0.72	0.41	0.73	28.9

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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